TRANSACTIONS

OF THE

SIXTEENTH ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL
AND OTOLOGICAL SOCIETY

HELD IN

WASHINGTON, D. C.

April 28th, 29th and 30th, 1910.

Published by the Society.
1910.
OFFICERS.
1909-10.

President.
JAMES F. McKERNON, M. D., New York, N. Y.

Vice Presidents.
JAMES F. McCaW, M. D., Watertown, N. Y., Chairman Eastern Section.
HENRY J. HARTZ, M. D., Detroit, Mich., Chairman Middle Section.
O. A. M. McKIMMIE, M. D., Washington, D. C., Chairman Southern Section.
AMOS R. SOLENBERGER, M. D., Colorado Springs, Col., Chairman Western Section.

Secretary.
THOMAS J. HARRIS, M. D., 117 East 40th St., New York, N. Y.

Treasurer.
EWING W. DAY, M. D., Westinghouse Building, Pittsburgh, Pa.

Council.
WENDELL C. PHILLIPS, M. D., New York, N. Y.
GEORGE L. RICHARDS, M. D., Fall River, Mass.
JOHN F. BARNHILL, M. D., Indianapolis, Ind.
NORVAL H. PIERCE, M. D., Chicago, Ill.
CHRISTIAN R. HOLMES, M. D., Cincinnati, O.
ARTHUR B. DUEL, M. D., New York, N. Y.
ROBERT LEVY, M. D., Denver, Colo.

Library Committee.
H. HOLBROOK CURTIS, M. D., Chairman, New York, N. Y.
LEWIS A. COFFIN, M. D., New York, N. Y.
CLEMENT F. THEISEN, M. D., Albany, N. Y.
NORTON L. WILSON, M. D., Elizabeth, N. J.

Publication Committee.
PHILIP D. KERRISON, M. D., Chairman, New York, N. Y.
OTTO J. STEIN, M. D., Chicago, Ill.
THOMAS H. HALSTED, M. D., Syracuse, N. Y.
LIST OF PRESIDENTS

1896. EDWARD B. DENCH, M. D.
1897. FRANK HYATT, M. D.
1898. WILLIAM H. DALY, M. D.
1899. S. E. Solly, M. D.
1900. D. BRADEN KYLE, M. D.
1901. ROBERT C. MYLES, M. D.
1902. CHARLES W. RICHARDSON, M. D.
1903. J. A. STUCKY, M. D.
1904. NORVAL H. PIERCE, M. D.
1905. FREDERICK C. COBB, M. D.
1906. JAMES E. LOGAN, M. D.
1907. WENDELL C. PHILLIPS, M. D.
1908. EWING W. DAY, M. D.
1909. CHRISTIAN R. HOLMES, M. D.
1910. JAMES F. MCKERNON, M. D.
1911. CHEVALIER JACKSON, M. D.
TABLE OF CONTENTS.

ANNUAL MEETING.

Address of President. James F. McKernon, M. D. ................. 1

Symposium—"The Deaf Child from the Viewpoint of the Physician
and Teacher"

Papers.

The Physiology and Psychology of Hearing with Special Reference to
the Development of Speech. G. Hudson Makuen, M. D. .......... 8

The Clinical Aspects of Deaf-mutism. Francis R. Packard, M. D. 14

The Physician and the Deaf Child. Max A. Goldstein, M. D. ...... 29

Development of the Hearing. Mrs. J. Scott Anderson ............. 29

The Mental Development of the Deaf Child. Edward M. Gallaudet ........................................... 33

The Development of Speech in the Deaf Child A. L. E. Crouter, L. L. D. ........................................... 39

The Development of Language in the Deaf Child. J. W. Jones ...... 50

The Development of Speech Reading in the Deaf Child. Miss McCowen ........................................... 58

The Deaf Child from the Viewpoint of the Physician and of the Teacher. James Kerr Love, M. D. ................. 64

Abscess of the Larynx, with Report of a Case. J. S. Waterman, M. D. ........................................... 84

Hemilaryngectomy for Epithelioma. Exhibition of the Patient. T. Passmore Berens, M. D. .......................... 91

Laryngitis Dolorosa Wolff Freudenthal, M. D. ......................... 96

Vincent's Angina, Involving the Larynx Exclusively. H. Arrow-
smith. M. D. ........................................... 108

Some Laboratory Aids to Otologic Diagnosis. Frederic E. Sond-
ern, M. D. ........................................... 114

Affections of the External Auditory Meatus. J. E. Sheppard, M. D. ........................................... 124

Results of Vaccine Therapy in Chronic Suppurative Ears. Evelyn
Wyman Nagle, M. D. ........................................... 132

Foreign Body in the Right Bronchus, Removed by Lower Bron-
choscopy. Charles W. Richardson, M. D. .......................... 141

Acute Nephritis Following Acute Tonsillitis. Hanau W. Loeb, A. M., M. D. ........................................... 146

The Effect of Tobacco on the Ear and Upper Respiratory Tract.
Henry O. Reik, M. D. ........................................... 160
TABLE OF CONTENTS.

Carcinoma of the Uvula. Edgar M. Holmes, M. D................. 172
Consideration of the End Results of the Operation for Submucous
Resection of the Nasal Septum. Frederick C. Cobb, M. D... 180
A Contribution to the Study of the So-Called Bone Cysts of the
Middle Turbinate. Ross Hall Skillern, M. D................... 185
Preliminary Pathological and Clinical Report of a Case of Expoli-
ation of the Bony Tympanic Wall; Including the Major
Portion of the Semicircular Canals. J. A. Stucky, M. D... 195
Presentation of Specimens........................................... 198

MEETING OF EASTERN SECTION.

Papers.

Removal of a Rhinestone from the Middle Ear of a Child. Exhi-
bition of Specimen. Clement F. Theisen, M. D.............. 200
Sarcoma of the Nose and Naso-Pharynx. T. H. Farrell, M. D... 203
The Tonsil as a Port of Entry for the Tubercle Bacillus. T. H.
Halsted, M. D...................................................... 210
The Etiology, Pathology, Symptoms and Diagnosis of Phlebitis
and Thrombosis of the Blood Vessels when Complicating
Purulent Otitis Media. Wendell C. Phillips, M. D.......... 216
Mastoiditis in Scarlet Fever and Measles. Henry A. Alderton
M. D............................................................... 227
The Value of Vaccine Therapy in Mastoiditis, Complicating Acute
Infectious Diseases. James F. McKernon, M. D............. 238
A Note on the Aural Manifestations of Myxedema. S. MacCuen
Smith, M. D.................................................... 249
Direct Inspection of the Naso-Pharynx. Percy Fridenberg, M. D. 253

MEETING OF MIDDLE SECTION.

Papers.

A Plea for Conservative Surgery in the Treatment of Nasal
Sarcoma. J. Price Brown, M. D................................. 255
Widening the Dental Arches in Nasal Stenosis. Its Results and
Possibilities. Nelson M. Black, M. D....................... 261
The Effect of Maxillary Readjustment Upon the Development of
Nasal Chambers and Face. Geo. V. I. Brown, M. D......... 274
A Case of Traumatic Hemiplegia Following Fracture of the Skull
with Periodic Loss of Cerebro-Spinal Fluid from the Left
Frontal Sinus. Operation; Recovery. R. Bishop Canfield,
M. D............................................................ 293
Some Practical Points in the Extirpation of the Tonsils from an
Experience of Five Hundred Cases. Wm. B. Chamberlain,
M. D............................................................. 295
Abscess of the Nasal Septum. George F. Keiper, M. A., M. D... 303
"A Method of Procedure in Septal Work." Perry G. Goldsmith,
M. D.......................................................... 308
TABLE OF CONTENTS.

A Safe Intra-Nasal Method of Opening the Frontal Sinus. John A. Thompson, M. D. ........................................ 311
Laboratory Methods as Aids in Diagnosis of Nose, Throat and Ear Affections. Joseph C. Beck, M. D ........................................ 315

MEETING OF SOUTHERN SECTION.

Papers.
The Truth about Tonsils and Adenoids. J. W. Jervey, M. D. .... 321
Calcium Sulphide in the Treatment of Aural Suppuration. George E. Steel .......................................................... 333
Further Observations on Some of the Newer Therapeutic Measures in Ear, Nose and Throat Affections. Joseph C. Beck, M. D .......................................................... 337
Some Observations Upon the Removal of the Middle Turbinate Body. John J. Kyle, M. D ................................................... 352
An Unusual Complication Following the Radical Operation for Middle-Ear Suppuration. Edward Bradford Dench, M. D .............................. 361
Sigmoid Sinus Thrombosis. W. B. Mason, M. D ........................................ 383
An Unusual Case of Cerebral Tuberculosis Following Tuberculosis Otitis Media. Autopsy Findings. H. O. Reik, M. D ................. 394
The Respiratory and Vocal Symptoms in Papillomata of the Larynx. G. Hudson Makuen, M. D ........................................ 401
A Forceps for the Control of Tonsillar Hemorrhage. Slyvan Rosenheim, M. D ..................................................... 405

MEETING OF THE WESTERN SECTION.

Papers.
Personal Hygiene in Infancy and Childhood. Wm. C. Bane, M. D 407
Surgery of the Frontal Sinus. Thomas J. Gallaher, A. M., M. D 411
The Etiological Relation of Diseases of the Ear, Nose and Throat to Diseases of the Heart, Lungs and Blood Vessels. Robert Levy, M. D .......................................................... 419

MINUTES.

Members registered during sessions of the sixteenth Annual Meeting ........................................ 423
Reports of Section Meetings .................................................. 425
Obituary of the Late Dr. Frank B. Sprague ........................................ 427
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obituary of the Late Dr. Charles F. McGahan</td>
<td>428</td>
</tr>
<tr>
<td>Second Session</td>
<td>429</td>
</tr>
<tr>
<td>Third Session</td>
<td>430</td>
</tr>
<tr>
<td>Secretary's Report</td>
<td>430</td>
</tr>
<tr>
<td>Treasurer's Report</td>
<td>431</td>
</tr>
<tr>
<td>Business Meeting</td>
<td>432</td>
</tr>
<tr>
<td>Fourth Session</td>
<td>433</td>
</tr>
<tr>
<td>List of Fellows</td>
<td>435</td>
</tr>
<tr>
<td>List of Vice-Presidents</td>
<td>442</td>
</tr>
<tr>
<td>Secretaries, Treasurers, and Councillors</td>
<td>443</td>
</tr>
</tbody>
</table>
TRANSACTIONS
OF THE
SIXTEENTH ANNUAL MEETING
OF THE
AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND
OTOLOGICAL SOCIETY.


ADDRESS OF THE PRESIDENT.
JAMES F. MCKERNON, M. D., New York, N. Y.

Fellows of the American Laryngological, Rhinological, and Oto-
logical Society:

It is my pleasure and privilege to welcome you to Washington, that we may hold the sixteenth annual meeting of our Society. In extending to you a welcome, I wish also to thank you most sincerely for the high honor which you have conferred upon me in electing me your presiding officer. It is an office by no means easy to fill, when one glances for a moment at the names of my distinguished predecessors who have so ably and faithfully discharged the duties incumbent upon them while in this position, but it has been made pleasant and easy for me by the loyal, enthusiastic, and consistent support of you, its members. For this support I thank you most heartily.

We have with us at this meeting as our honored guest, Dr. James Kerr Love of Glasgow, Scotland, the foremost educator on the continent of that poor unfortunate, the deaf mute. We are singularly fortunate in having Dr. Love with us, and owe him our sincere thanks for having journeyed across the water to give us the benefit of his years of teaching and experience in this most important subject,—a subject which has been greatly neglected from the otological standpoint, except for the work done here and there by a pioneer like Dr. Love. It is the hope of your President and, I am sure, of all of you, that he will so imbue us
with the spirit of the valuable work he is doing, and that we may gain such knowledge from the interesting symposium arranged for this meeting, that all of us may be stimulated to do better and more conscientious work along these lines than we have ever done before. To you, Dr. Love, we extend our heartiest greetings, and bid you welcome to America and to our Society.

The scientific work done in the past by the members of our Society is second to none, and the original work of investigation as pursued by some of our members, notably that done by Jackson, needs no commendation from me. By his thorough, careful, and painstaking methods of investigation, he has placed the subject to which his name will be forever linked on a plane which is highest in this country and equals that of any investigator abroad.

Another member who has singularly distinguished himself along the lines of original research work during the past two years has been Loeb.

While it is pleasant to look back upon the work done by our members in the past, we must not forget for a moment the many fields of investigation that are constantly presenting themselves for original research work and study. Amongst the many may be mentioned the comparatively new field now being so diligently worked in by the investigators of the various vaccines. Let us be so stimulated by the work which has been done along these lines that we, as workers in the different specialties which we represent may seek a deeper knowledge of these sera, so that in the near future we may come to understand more clearly their action and, thus understanding, apply them in our daily work for the cure and prevention of disease.

The most important recent advance in otology has undoubtedly been in connection with the labyrinth. This advance has been due in greatest measure to the researches of Bárány, Alexander, and Neumann. The acoustic labyrinth and the static labyrinth have been definitely differentiated; the pathology and symptomatology of labyrinthine disease have been carefully worked out, and a practical method has been devised whereby, with the aid of rotation, caloric, galvanic, and other tests, a diagnosis of the different labyrinthine diseases can reasonably be reached. It is difficult to over-estimate the value of this work. While the otologist is most directly benefited, every branch of medicine is a gainer by this addition to our knowledge. The questions of vertigo and nystagmus have had new light thrown upon them,
and their significance has been taken from the dim realm of doubt and placed upon a reasonably secure scientific basis. Apart from a mere increase of our theoretical information, there is an intensely practical side in connection with this work. The methods of attacking the diseased labyrinth by operation have been and are being studied; the operative indications have been established, and many lives will be saved which without such knowledge would be lost.

While the physiological and pathological aspects of this subject have been investigated abroad, the American surgeon, alert to understand and improve, has already taken part in this work, particularly with reference to the operative technique. It is not too much to hope that further study and investigation on the part of members of this Society will advance this most important and difficult work to an even higher and more practical plane.

Advances have been made in rhinology commensurate with those in our other specialties,—the most important of which are the diagnosis and treatment of diseases of the accessory sinuses. Increased knowledge has enabled the rhinologist to differentiate diseases of the sinuses and to institute appropriate surgical measures for their relief. A most important adjunct in diagnosis has been the application of the x-ray, and with this particular work the name of one member of the Society is prominently identified, that of Dr. Coakley.

The advance in laryngology during the past year has dealt almost exclusively with methods in technique in removing new growths and foreign bodies from the larynx, trachea, bronchi, and oesophagus. By the invention of many new instruments for work in these special regions, most brilliant results have been obtained, and many cases have been relieved and cured that otherwise would have resulted fatally. Many of our members are now most actively engaged in this work, and it is hoped that still greater advances may be made in it in the future.

During the past year our Society has lost by death three of its members. Dr. Sprague, of Providence, R. I., contracted blood poisoning in the discharge of his duty while operating upon a patient, and lived but a few days. He was one of the most active members of this Society and gave to us valuable and frequent contributions from a large and ripe clinical experience. We shall miss seeing him in the meetings to come, and all of us who knew him feel that in his death the Society has lost one of its most valued members, and we, a warm and loyal friend.
Dr. McGahan, of Aiken, S. C., a member well known to all of you, died early this year. He was a former Chairman of the Southern Section, and one of the best known of our members in the South. His work in pulmonary and laryngeal tuberculosis was of the utmost value, and his many contributions on this subject are standard references today. His attractive personality endeared him to all with whom he came in contact, and his death leaves a gap in our ranks by no means easy to fill.

Dr. Peter Burnett, of Brooklyn, N. Y., another one of the members of our Society, died last June, after a short illness. He was well known to many of our older members, and his loss is keenly regretted.

I now approach a subject which I consider of great importance from the standpoint of the specialist, and one in which I feel sure many, if not all, of the members of this Society feel as deep an interest as I do. The undergraduate schools of the country have kept well abreast of the times in providing instruction for the medical student in keeping with advanced requirements here and elsewhere. The first post-graduate school in the world was and is an American institution, but it is open to question if any one school has yet succeeded in laying out a plan for the education to the best advantage of physicians seeking instruction in our specialties. A well equipped specialist, whatever his particular line may be, should, in the first place, be a well equipped general man. His undergraduate course should be supplemented by a hospital training in medicine and surgery, and, following this, he should engage in the general practice of his profession for a period of years. This last proposition seems entirely reasonable when we consider that the diseases which we, in our special branches are most frequently called upon to treat are, in the main, but complications of other and general conditions. However much the diagnosis and treatment of these diseases may call for exact and minute knowledge, only to be acquired by special study and training, still the fact remains that the broad-minded well-informed man will surely be better able to care for his patients than the man whose field of vision is limited by what he can observe through a nasal or aural speculum. Moreover, in complicated cases it may be of the utmost importance to distribute values, that is, rightly to place cause and effect; and here there can be no question of the benefit, particularly to the patient, of a good general training. Service as an intern in one of the special hospitals is an excellent method of rapidly acquir-
ing a large experience. Only a limited number of men, however, have the time and the means to take advantage of this method, and it is a matter of experience that these men are most likely to engage immediately in the practice of their specialty without seeking the benefit that would be obtained by general practice, and this seems to be the weakest point in this particular method.

In the larger cities, the common custom of today seems to be that a young man, while still engaged in general practice, attaches himself to the staff of a clinic. Beginning at the lowest round of the ladder, he has no difficulty in gradually acquiring knowledge and experience. Under the supervision of his seniors he sees, and later shares, in the operative work. His reading is directed and he is able to pursue his cadaver work and take advantage of all the opportunities which large communities offer. By degrees the special work of such a man accumulates, and in due course of time is produced the excellent type of specialist with whom we are today most familiar.

In scattered communities conditions are entirely different. When occasion arises, the need for the services of the specialist is just as urgent as in the cities, but the facilities for his training are entirely lacking. The man intending to study a particular line under these circumstances must give up active work for a time and look for instruction in one of the large centres of population.

This brings up the whole question of so-called post-graduate teaching. There are several institutions in the country giving this class of instruction, and much of the work they have done in the past has been admirable; but many objections can be made to their methods, and suggestions offered for their betterment. The busy physician who feels the need of revising his work or of informing himself of more modern methods, and who becomes a student at such an institution, is a real post-graduate student. The work in which he engages he is already more or less familiar with and is the work which he will pursue when he returns to practice. The teaching of this student is rightly almost exclusively clinical. On the other hand, the physician who seeks instruction, let us say, on the ear, is in an entirely different situation. As a rule, he has done little or no work in this subject, and is practically ignorant concerning it. This student is by no means a post-graduate student, so far as this particular branch is concerned, but is rather in the position of an under-graduate. The schools have failed to make this distinction, and have also
failed rightly to provide for the instruction of this last class of students. Many of you are teachers in post-graduate schools and are familiar with the type of student who after a six or eight weeks course, mostly spent in desultory work in the clinics and watching others operate, returns to his home, frequently with an imposing diploma, to practice on an unsuspecting community. That this procedure is wrong and should not be continued, cannot be disputed. Its correction is largely in your hands, and your President urges, as one of the real needs of the day and making for the betterment of our profession, that adequate arrangements be made for the instruction of our students, that the courses be lengthened within reason, that didactic instruction be faithfully carried out, that work upon the cadaver be insisted upon, that clinical work be encouraged, and, lastly, that no school give the mark of its approval in the shape of a diploma to any student who has not satisfactorily met all these requirements.

In the rapid and energetic growth of a Society such as ours, we are at times prone to overlook some of the principal objects for which such a Society was originally formed, thereby unconsciously doing harm.—first, to individuals who wish to join our Society; and, second, to the Society itself, by causing to be raised barriers which tend to keep out the young man who should be welcomed into membership. Today, our standard for membership is the highest of any special society in this country, if not in the world, and by no means do I wish to be understood as depreciating this; but what I do wish is to make this plea: When a candidate comes before the Council of this Society and is vouched for by men in the Society as to his qualities as a man and as to his scientific attainments in the profession he practices, then, I believe that, all things being equal, such a candidate should receive consideration on the basis of what he is and what kind of work he is doing rather than on what kind of a thesis he can write. Such a candidate may not be in a position where he is the fortunate possessor of large and varied clinical material; he may be far away from large clinical and special centres and yet, with the diminished advantages he has, is doing good, honest, faithful work, and wishes to advance in his specialty by becoming a member of a society, so that he may attend the meetings and learn of advances in his special field of work, and come in contact with the best men doing this work, by this contact carrying back with him to his work an enthusiasm and a knowledge to which heretofore he has been a stranger. I believe were
we to be placed in the same position, under similar limited advantages, we could do no better. Let us then, in the future, when considering such an application for membership, be guided more by our knowledge of the candidate's good qualities than by the fact of his ability or inability to write a classical thesis. An individual's knowledge of an individual is greatly increased by what he can learn from others, and free discussion in a Society like ours has been of untold advantage to every member; and it is just this that we have occasionally been denying to the young candidate.

In closing, I wish to speak of the excellent work done by our various Sections during the past year. Your President was unfortunately able to attend but one of these meetings during the year, and he regrets very deeply that he could not attend more of them. The extensive and attractive programmes arranged by the Chairmen of the several Sections reflect much credit upon them, and the Society owes them warmest thanks for the enthusiasm exhibited in arranging such a scientific treat as they gave us during the past year.

Your President wishes to acknowledge with sincerest thanks the help which has been given to him by our most able and conscientious Secretary during the past year. To his unaided efforts is due the splendid programme upon which we will shortly begin.

Again thanking you for the honor conferred upon me, I now declare the Sixteenth Annual Meeting of the American Laryngological, Rhinological, and Otological Society open for business in accordance with the programme before you.
THE PHYSIOLOGY AND PSYCHOLOGY OF HEARING
WITH SPECIAL REFERENCE TO THE DEVELOPMENT
OF SPEECH.

By G. HUDSON MAKUEN, M. D., of Philadelphia.

In the time allotted to the opening paper of this symposium, only the briefest resume of the more generally accepted views on the subjects suggested by the title will be at all possible, and no attempt will be made to discuss their plausibility or to add to their number.

While the anatomists are still at variance with reference to certain complicated structural peculiarities of the inner ear, physiologists may be excused for their lack of agreement with reference to the precise functions of these structures.

The anatomy of the external and middle portions of the ear is well established, and likewise there is no difference of opinion as to the physiology of hearing so far as these particular structures are concerned. We have the so-called sound waves, generated and set in motion by the sounding body, collected and condensed by the auricle, conducted through the external auditory canal to the tympanic membrane, and thence by means of the ossicular chain and other contents of the middle ear to the oval window through which they pass to the fluids of the labyrinth.

It is from this point in the inner ear that we must begin to theorize. How are the sound waves transmitted from the labyrinthine fluid to the auditory nerve, and what particular changes take place in them during this transmission?

Helmholtz was the first to offer any definite solution to these problems and for many years his resonance or piano string theory was accepted as being the most satisfactory. At first he thought that the rods of Corti respond to different notes as do the strings of a piano, but when it was shown that some animals have no rods he transferred this function to the fibres of the basilar membrane. It was supposed that this membrane, because of its
position and peculiar structure, served the purpose of receiving the sound waves, selecting them according to their adaptation to its transverse fibres which increase in length from the base of the cochlea to its apex, that the high tones were perceived by the shorter fibres at the base and the lower ones by the corresponding longer ones toward the apex, and that the responsive vibrations were taken up by the hair cells resting upon the membrane where they are changed into impulses suitable for conduction by the auditory nerve to the hearing centre of the brain.

This was an ingenious theory but it has not stood the test of time, for neither in its structure nor in its size has the basilar membrane been found to meet the requirements which Helmholtz imposed upon it. The transverse fibres are not sufficiently numerous to produce the range of pitch that the human ear is capable of perceiving and their disposition in relation to the longitudinal fibres and various blood vessels make it physically impossible for them to vibrate after the manner of piano strings. Moreover, it has been found that the membrane does not extend to the lowermost part of the cochlea and that the hair cells in this region do not come in contact with it and therefore cannot transmit its vibrations to the neuro-epithelial cells, where they are supposed to be transformed into nerve impulses.

This latter objection to the piano string theory seems also to be opposed to the so-called telephone theory which regards the basilar membrane as a kind of second drum membrane between which and the tectorial membrane so-called "pressure patterns" are made which impart their vibratory motions to the hair cells. This theory supposes that the analysis of tone or the perception of pitch takes place in the cerebral cortex, while the piano string theory locates this function in the cochlea.

In addition to the anatomical objections to the two basilar membrane theories which I have mentioned there seem to be good phylogenetetic, ontogenetic and histological reasons for the entire abandonment of this membrane as a conspicuous factor in the transmission and perception of tone, and for the substitution of the tectorial membrane in its stead. On account of the extreme delicacy of the tectorial membrane, however, the difficulties of demonstrating absolutely its exact service are almost insurmountable, and we can only say that it appears in all respects to be better adapted to the functions which have been described.

Again it is said that the tectorial membrane is merely a con-
glomeration of sensitive hair cells and that they respond to the sound waves of the endolymph somewhat as a field of grain responds to the blowing winds.

It will be observed that there is still a difference of opinion as to the exact location of the perception of tone but the evidence seems to be strongly in favor of its peripheral location with a central representation of its final analysis.

It is not enough for the so-called sound waves to be transmitted in regular order through the peripheral organs of hearing and to be converted into nerve impulses, but for speech purposes, these impulses must be taken up by the central mechanisms and converted into characters or symbols which may enter into consciousness and be intelligible to the individual. We have, therefore, in the cerebral cortex regions or centres, as they are called, in which sensations transmitted through the auditory nerve are deposited and registered, and different kinds of sounds, after frequent repetitions, come to be recognized by the character and individuality of their sensations. For this final analysis, therefore, we have in the brain bilateral centres in which all the auditory impressions are received, and an adjacent associated unilateral centre in which only word images are received and registered. The first are called the primary or general auditory centres, and the other, the more specialized word centre.

The location of the centres for the hearing of sounds is in the region of the first temporal lobe on either side, but the centre for the registration of word images is developed only on one side of the brain, the left side in right-handed, and the right side in left-handed persons.

The auditory word centre is developed in a manner somewhat similar to that of the making of phonographic records, but of course these living centres are far more delicate and sensitive than mere metal plates, and it requires almost an infinitude of repetitions of sounds to make them reach their highest efficiency.

The auditory word centre, therefore, is of slow development and from small beginnings. It follows, of course, the development of the primary auditory centre, and to some extent also the development of the motor or glosso-kinesthetic centre. A child must hear sounds before he can understand them, and he must be able to produce words before he can hear them accurately. Speech at first therefore, is largely automatic or reflex but as the child grows intellectually and slowly begins to associate certain of the words which he hears and which he himself uses
automatically, with certain appropriate individuals or things, the higher intellectual centres of the brain assume control of the lower and hitherto reflex centres, and the increase in the child's vocabulary depends upon the number of new word images which are developed daily in his auditory word centre.

Hearing, therefore, is a matter of education. The child is not endowed at birth with this faculty. If he were born into a world of silence, there would be no development of hearing, and if he were afterward quickly ushered into a world of action and of speech, he would have to learn to hear just as he would have to learn to speak. The development of hearing is contingent upon certain subjective and objective physical conditions. There must be sounds to hear, and there must be a certain amount of development in the various mechanisms employed before there can be any hearing. The sensory nerves have no power to functionate until they have developed myelin sheaths or until they have become medullated, and of all the various afferent nerves, the auditory nerves are the last to become thus endowed, and to take upon themselves their full quota of function. Congenitally, therefore, the child may have all the primary essentials to the faculty of hearing and yet be developmentally deaf. In other words, arrested development may be a casual factor in deaf-mutism.

While the ear is the most important avenue to the brain for speech purposes and while its integrity is absolutely essential to spontaneous speech development, two other supplementary avenues, namely, the visual and tactile, are used far more than is generally supposed. The importance of vision as a factor in the development of speech is shown by the fact that blind children are slow in the acquirement of speech, and also by the fact that when the eyes are closed many words are lost either in a general conversation or when listening to an address.

The tactile avenues to the brain are important also, for without the sense of touch we can have no kinesthetic centres whatever and the acquirement of speech would be quite impossible.

The cortical centres, therefore, may be summed up as follows: The auditory and the glosso-kinesthetic, comprising the so-called primary compleat, in the one of which are stored auditory word images and in the other, memories for the articulatory movements in the production of speech, and the visual and chiro-kinesthetic centres in which are stored the visual images of
written and printed words and memories for the movements of the hand in writing.

To normal speech development the auditory centre is indispensable, but its function is supplemented by the visual and tactile centres. In the blind child the visual centre is undeveloped and we have substituted the tactile centres in which are stored the word images or memories revived in reading. In the deaf child the auditory centre is undeveloped, and when he is taught to speak we substitute for the auditory centre the visual centre in which are stored memories of articulatory and other expressional movements of the face and body. In the child who is both deaf and blind, the acquisition of speech must be through the tactile avenue, supplemented to some extent perhaps by the gustatory, olfactory and possibly other avenues to the brain, and his success, of course, will depend upon his psycho-physical ability to overcome serious handicaps.

The cortical centres in the so-called zone of language are somewhat analogous to the tools in a carpenter's shop. The carpenter can do his best work with a full kit of tools, but fairly good work is not impossible with a limited number, and so an individual may acquire speech and a fair command of language without hearing and sometimes also without seeing.

SUMMARY.

The physiology of hearing has been a subject for investigation and study since before the Christian Era began, but Helmholtz was the first to place it upon a scientific basis.

Helmholtz's "resonance theory" with slight modifications is the one now most generally accepted.

The only important modification of the Helmholtz theory has been the substitution of the tectorial for the basilar membrane as the resonance body.

Helmholtz located the perception of tone in the cochlea and its final analysis in the cerebral cortex, and with few exceptions physiologists have subscribed to this disposition of these functions.

The importance of hearing as a factor in the development of speech is of later recognition and even now it is not generally understood.

Spontaneous speech development takes place only as the individual is capable of hearing speech sounds both subjectively and
objectively, and speech acquired in any other way is a forced and artificial product.

A little hearing in the development of speech is far better than no hearing at all, and hearing like speech may be improved by training.

The eye is the best substitute for the ear in the development of speech but the tactile and other avenues to the brain may be trained to take the place of either or both under favorable conditions and in case of absolute necessity. (It is said that a rabbit can climb a tree when it has to.)

The conditions favoring the development of speech in the absence of important receptive avenues to the brain are chiefly cortical and they are included in the terms intellectualism, attention and volition.
THE CLINICAL ASPECTS OF DEAF-MUTISM.


In the following remarks, I shall confine myself strictly to the consideration of the problems of deaf-mutism as they present themselves to the aurist, and endeavor to briefly indicate some of the points in which co-operation between the aurist and teacher may prove mutually helpful and of benefit to the patient.

THE CAUSES OF DEAF-MUTISM.

Deaf-mutism may be congenital or acquired. Hammerschlag pointed out the fact that, it is better to employ the term congenital than hereditary deafness, as true inheritance of deafness from progenitors is rare, compared with congenital deafness resulting from intermarriages between persons in whose families there is a taint of deafness, or from consanguineous marriages.

There are, undoubtedly, instances of true hereditary deafness; that is, of deafness transmitted by deaf-mute parents to their children, but this is by no means so frequent as is generally supposed. The most complete study of the statistics of this subject in America was that made by Fay. He states that, "Taking the deaf as a whole, without regard to the character of the deafness, marriages in which both the partners are deaf are not more liable to deaf offspring than marriages in which one of the partners is deaf and the other is a hearing person."

This is true because cases of true congenital deafness are so much rarer than the acquired, and, of course, the latter is not transmitted any more than any other acquired trait or lesion would be.

Sheppegruell, in his remarkably complete critical summary of the literature on the influence of heredity in deafness, states from a careful study of the statistics from all countries, that in only one-third of the cases of deaf-mutism is the deafness con-

genital, in the other two-thirds it is acquired. This estimate agrees almost exactly with that of Holger Mygind².

Love¹ points out in his work the very important fact that the earlier statistics from institutions on deaf-mutism, and the statistics compiled in the various census reports of most countries, put the number of the congenitally deaf persons at disproportionately large figures, compared with more recent or more carefully compiled statistical tables. In compiling the earlier data, statements of patients were accepted without question. In more recent years, however, careful examinations have been, as a rule, made in institutions, and they have resulted in showing the presence of undoubtedly acquired aural disease in the vast majority of those heretofore classed as congenital cases.

As to the causes of acquired deafness resulting in deaf-mutism, we find that all the statistical tables that have been collected from reliable sources are in practical agreement in certain essential points. Thus, meningitis or inflammatory cerebral affections and scarlet fever lead the list of causes, in all instances, in every country or region.

Hartmann's⁵ statistics from German sources, those of Bliss⁶ from the Pennsylvania Institution for the Deaf and Dumb at Mt. Airy, and those given by Kerr Love, from Glasgow, all coincide in their presentation of this matter. Under meningitis, we must include such cases as are stated as convulsions, hydrocephelus, and congestion of the brain. It will be noticed that these affections are prevalent amongst children, as are the other diseases to which the origin of acquired deafness resulting in deaf-mutism are generally ascribed, such as scarlet fever, measles and diphtheria. In the majority of cases of acquired deaf-mutism, according to Bezold, the hearing is lost in the second year, although the child’s deafness is frequently not noticed until it is several years older. Although most authorities agree in stating that when deafness is acquired before four years of age, loss of speech invariably follows, John Dutton Wright⁷ believes that a child possessing normal speech, even up to eight years of age, will become a deaf-mute if hearing is lost at that age, unless prompt attention is given to his instruction in speaking.

3. Deaf-mutism. 1894.
5. Deaf-mutism. 1889.
HEARING POWER OF DEAF-MUTES.

Increased attention was drawn to the well known fact that many deaf-mutes had oftentimes a considerable remnant of hearing left, by the studies of Urbantschitsch, who, in 1893, evolved a system of educatory exercises which aimed at evoking this sound perception and cultivating it as an aid to the education of the patient.

Urbantschitsch believes that deafness in cases of deaf-mutism is frequently due to lack of exercise of its functioning power by the auditory nerve, and, that it should be aroused and stimulated by causing it to functionate. Although the practical results of Urbantschitsch’s system are not such as to justify the great expectations formed of it, nevertheless, in some instances with some modifications, they have proved of great service.

Politzer called attention to the fact that exercises in hearing for deaf adults had been recommended by Philippe as early as 1846, but that they were not then regarded as having much value. Politzer also refers to the fact that Maloney, of Washington, D. C., in 1893, recommended the otacoustic method of treatment for the purpose of improving the hearing power, if any existed, of those who were deaf for conversation.

Although I believe that it is now generally conceded that Urbantschitsch’s first published investigations led to an extravagant laudation of his method for the cultivation of sound perception in the deaf, nevertheless, further work on the subject, especially by Bezold, has shown that it possesses distinct value in many cases. Up to the year 1898, Bezold had tested the ears of 276 deaf-mutes, and out of that number, but 79 were totally deaf. Director Koller of the Deaf and Dumb Institution of Munich has, since 1898, made practical application of the results of the use of the limited hearing of some of the deaf-mutes in the institution. His results are summed up as follows:9 "These children command a vocabulary that the totally deaf can never obtain. Their manner of expressing their thoughts is equal to that of hearing people. Their readiness to speak is surprising. Similar results can never be obtained in totally deaf children. They are unattainable to partially hearing children who are constantly instructed together with their totally deaf comrades. Separation of the partially hearing pupils from the totally deaf ones, and

---

8. Text Book of Diseases of the Ear.
DEVELOPMENT OF THE DEAF CHILD.

instruction in separate rooms, or if possible, in separate institutions, must be our aim."

I am aware that Director Koller's statement will probably not meet with the approval of some teachers, and I am, of course, not qualified myself to pronounce whether it is correct or not. I feel, however, that in such a matter only the most careful study and investigation, undertaken conjointly by the teacher and the aurist would justify its absolute acceptance or rejection. Director Koller does not believe that hearing is improved by the otacoustic method of instruction, but he thinks the pupils learn to associate words which they have understood by reading the motion of the lips, with those which they have been able to perceive by means of hearing.

For the purpose of testing the perception of sound in deaf-mutes, many ways have been employed. Deaf-mutes do not, as a rule, perceive the tones of the voice or the ticks of a watch which, of course, are the simplest methods of testing the perception of sound, and resort has been had to various other appliances. Kerr Love used a large dinner bell with a spring tongue attached to the junction of the handle and the bell, and so arranged that a violent shake produced a sound of great intensity. He states that a little practice enables the operator to produce sounds of very uniform loudness.

Urbantschitsch used a harmonica with a range of six octaves. Scheppegrell used for his testing, a snapper similar to that used in teaching pupils of telegraphy, but of a larger size, and a whistle of high pitch which contained a ball to change the vibrations, and a series of automatic bells varying in pitch, and made somewhat like those used on bicycles. He stated that with these tests he had been able to demonstrate hearing in cases that other aurists had pronounced totally deaf. Edelmann's weighted tuning forks are probably the most accurate instruments used to ascertain the exact limits of sound perception. The Galton whistle is also useful, especially for the purpose of eliciting the perception of the higher tones. Kerr Love agreed with De Rossi in the following conclusions, which he thus states:

1. Total deafness is not common amongst deaf-mutes. To aerial sounds not more than 15 or 20 per cent. are quite deaf, sometimes only 7 or 8 per cent.; to bone conduction sounds even a smaller number.

2. Hearing for speech is pretty common. It exists to a useful extent in 25 or 27 per cent. of deaf-mutes, and from 10 to 15
per cent. are only semi-deaf. Under the finger method of teaching these become rapidly deafer, and soon totally dumb. The oral system may do something to prevent this, but it can only be properly dealt with by the acoustic method.

3. Cranial conduction exists in almost all cases, and a large vibrating tuning-fork is almost always heard in this way. It is also heard in the majority of cases by aerial conduction.

PATHOLOGY AND DEAF-MUTISM.

Holger Mygind and others have compiled records of autopsies held upon deaf-mutes, so that our knowledge of the pathological conditions present in the ears of those who have suffered during life, from either acquired or congenital deaf-mutism, is now very complete. The lesions found have, as might have been expected, been of infinite number and variety. In the congenital cases, malformations or lack of development of the bony or membranous labyrinth, or of the auditory nerve, are probably the most frequently found conditions. In the acquired cases, the results of suppuration in the middle ear or in the labyrinth, or the pathological changes produced by inflammation of the meninges are more common. In cases of acquired deafness, there is often found an atrophy of the nerves and centres concerned with audition, due to lack of use of their functionating power. Thus, in the case of Laura Bridgman who was blind, and a deaf-mute, and had also lost the sense of smell, as the result of scarlet fever in infancy, Henry H. Donaldson\(^{10}\) reported as follows:

"The anatomical condition was that of a normal brain in which the olfactory bulbs and nerves, the optic nerves, and possibly the glosso pharyngeal, had all been more or less destroyed at their peripheral ends. This destruction caused a degeneration—most marked in the optic nerves—which extended towards the centres and involved them indirectly. This condition has left its mark more or less plainly on the whole brain, as indicated by the extent and thickness of the cerebral cortex, and especially by the cortex connected with these deficient sensory nerves. The physiological effect of the peripheral lesions, as I conceive it, was to retard growth in the centres, cortical and subcortical, which were thus involved, and also to interfere with, if not entirely prevent the formation of the association tracts."

Of course, there is a distinct class of cases in which the power

---

of speech is lost because of a lack of cerebral development, or because of meningeal or cerebral disease in infancy. These unfortunate patients are not, as a rule, deaf, although they are frequently unable to appreciate ordinary sounds. Their deafness is psychical and increases because of the lack of training and use of any perception of sound they may have.

TREATMENT.

I believe that enough emphasis is not placed upon the thorough examination of every child, by a competent aurist, before he is placed in any institution and considered solely as a subject for instruction. Many cases, undoubtedly, occur in which ears are allowed to go on suppurating, or chronic catarrhal conditions are permitted to continue, because of lack of proper examination. Adenoid growths in the nasopharynx, or diseased conditions of the faucial tonsils, constituting sources of obstruction to the Eustachian tubes, or of infection and re-infection of the middle ear, should be removed by operation. When suppuration in the ears will not yield to conservative treatment, the radical mastoid operation should be performed. Much could be done, if not to aid the hearing, at least to add to the physical comfort of the patient, and it should be kept in mind that, at the present time, a chronic discharge from the ear is regarded as a source of danger to the patient's life, because of the risk of mastoid, meningeal or sinus involvement.

The labyrinthine condition in deaf-mutes should also be examined. Alexander and MacKenzie have recently made a most valuable and interesting contribution to this aspect of the subject, reporting the results of their examinations of the pupils of the K. K. Taubstummen Institution in Vienna. Many deaf-mutes suffer greatly from vertigo and nystagmus, with disturbance of equilibrium, due to labyrinthine disease. With our recently acquired knowledge of the function of the static and acoustic labyrinth, such investigations would not only be helpful to the patient, but would also yield results of the greatest scientific value.

THE PHYSICIAN AND THE DEAF CHILD.

By MAX A. GOLDSTEIN, M. D., St. Louis, Mo.

The problem of "Child Study" has received so general, and constant an impetus from medical, pedagogical, sociological and psychological sources in the past decade that the literature, data and subject-matter resulting from the many energies brought to bear on this question have become so voluminous and replete with theories, suggestions and plans, that it may now be an exceedingly difficult task to evolve a practical solution out of this scientific chaos.

It is a fact of great significance that the medical fraternity, educators, women's clubs, mother's circles and almost every organization, large and small, which has the interest of the education and development of the growing child at heart, has been seriously occupied with this all-important subject.

A recent writer (1) has aptly said, "Child culture has absorbed society to such a degree that I fear it has lost its dignified, scientific prestige." Another popular writer in this field states (2): "What the average child needs nowadays is 'a little wholesome neglect.' He is studied and absorbed and cultivated until he cannot take a long breath and take it naturally." Again, "The one thing on earth that needs to be stamped out, and stamped out quickly, is the American fad of child culture and child study."

In our efforts and our over-zealous energy to solve this question our American child has unfortunately received an over-dose, and, like over-doses in medicine generally the result will not prove fatal, and we believe that the intelligent co-operation of physician, teacher and parent will soon lay a healthy foundation on which this vital structure may be carefully and rationally built.

The task has been assigned to me to analyze the relations of the physician to the deaf child. I have subdivided this theme into three sections: I. The Civic Status. II. Professional Activities. III. Personal Equation.

I. THE CIVIC STATUS. The physician is an important factor in the responsibilities assumed by the community toward
the education and training of the deaf child. The teaching of
the deaf child along lines of recent research and scientific ac-
curacy is a comparatively new field of work. Parents of children
with congenital or acquired deafness have generally but little
knowledge concerning schools and teachers for these little unfor-
tunates and appeal to their family physician for advice. He is
perhaps the first to be consulted by the family as to the proper
disposal of these defective children. It is surprising then to
realize how poorly informed the general practitioner has been
in the past in such matters. Let it be said to the eredit of our
American otologists that they have contributed much toward the
edification of the general practitioner in this work. Those who
specialize in otology and whose relations to children with defects
of speech and hearing are more intimate, are constantly seeking
data and information by which the general medical body and
the community at large must profit, and we must look especially
to their influence for the readjustment of the problems concerned
with the training of these children.

Among the responsibilities which must be assumed by us is the
introduction of proper measures and bills before local and State
Boards of Health, School Boards and Legislative Bodies; the en-
actment of reforms which shall have for their purpose the segre-
gation of defective children in the public schools; the systematic
examination of all public school children for all defects of sight,
speech and hearing; the selection of qualified teachers for such
children and the elimination of all political influence from such
educational reforms.

The otologist here becomes the advisor of the family physician
and the counsellor of the teacher; the family physician, together
with the teacher, instruct the parent; the parent, profiting by
these revisions and reforms in the education of defective chil-
dren, is then placed in a position to act as a more intelligent
guide to the child.

Many of the wheels of this intricate and scientific educational
machinery have already been set in motion at home and abroad;
legislation has been enacted in many communities whereby the
larger educational institutions, especially the public schools, are
brought under more careful scientific observation and control.
Reports are coming in from every quarter where systematic ex-
aminations of the organs of sight, speech and hearing of each
child are made, where the results of all defects are recorded and
where active measures are taken to remedy such defects.
It requires no great depth of thought to observe that when all large communities in this broad land have been enlisted in such a cause and when each contributes his quota to the general good and welfare, the final outcome will be a surprising decrease in some of the most marked infirmities of child development. There are in the United States over fifteen million school children. Even in the records thus far gathered (2) it was found that three per cent, of the children examined had some form of impediment in speech; over twenty per cent. had impaired hearing, and from forty to fifty per cent. impaired sight. It must be observed that these tests were all made in the simplest manner possible and where defects were found they were mainly of the most apparent form. It may be of interest to note that the more highly intellectual the race and the closer the application to study, the greater the tendency to such defects. These and many other observations constitute the chapter on the civic status in which the physician must concentrate his energies and offer his active support.

II. PROFESSIONAL ACTIVITIES. Medical science in its relations to defective children has undergone a tremendous evolution in the last two decades. When the venerable discoverer of adenoid vegetations, Wilhelm Meyer, of Copenhagen, presented his exhaustive thesis before the British Medical Association in 1870, describing the nature and results of adenoid growths, their influence on the physical character of the growing child, their tendency to stunted bodily development, to deafness and to mental progress, he conferred not only one of the greatest boons to the progress of medical science, but also one of the most valuable contributions to the advancement of the human race. The medical fraternity first received this startling discovery with surprise and incredulity, and it has required more than a quarter of a century to convince not only our profession, but educators, parents and the community at large as to the importance and significance of these observations. Today we know that our institutions for the deaf were at one time filled with a large percentage of children whose original sources of deafness depended on the presence of this lymphoid pathology in the pharyngeal vault.

How large a percentage of defects of speech and hearing are still due to the influence of such a pathology we shall be better enabled to determine when the systematic examination of all
school children in the length and breadth of the land has been completed. Much has already been accomplished by the profession to stamp out this prevalent cause of deafness, yet our labor in this direction have but begun.

Let us select at random one of these defective children as he is brought to our notice, following the results of the examination in our public schools. Frequently he will be a poor child of foreign birth, pale and emaciated in body, badly nourished, under-sized, flat-chested and dull of comprehension, all indicative of insufficient care and nourishment, of poor hygienic surroundings, of local pathologic entities and constitutional dyscrasias. He may present evidences of physical malnutrition, expressed by an unusually stupid countenance and bulging eyes, the result of enlarged tonsils or adenoid growths, which prevent the proper nasal respiration and produce improper oxygenation and lung expansion. This is a picture of the catarrhal type which eventually produces deafness because of nasal or throat obstruction and is also often the precursor of many forms of speech defects.

This child acquires an education under tremendous difficulties. He cannot hear the directions given in the schoolroom, the oral recitations of his classmates, or the questions put to him. The frequent reprimands of the teacher are discouraging and oftentimes produce a sensitiveness and fear which may wreck the entire nervous constitution of the little unfortunate; he becomes indifferent to his work; he sees his classmates promoted and loses ambition; his school life, which the healthy child always looks back upon as one of the most pleasant reminiscences of his life, becomes to him irksome and a source of constant regret, and he often discontinues his scholastic work long before he has acquired an education sufficient to fit him for his strenuous labors as a useful citizen. This is not a pen-picture, but a brief, unvarnished description of a child with defective speech or hearing, selected at random from the twenty to thirty per cent. of our entire enrollment of school children in the United States. We must recognize, then, the importance of systematic examination of all school children, in order that more definite attention may be given to such defects as they are singled out.

The practical application of medical and pedagogical science in its relation to the deaf child is of varying possibilities. The deaf child must be classified according to the degree of deafness which exists. The results of special training and the development of these several classes of defectives depend for their
efficiency on the character of such teaching and the success with which it can be applied.

Classification of the Degrees of Deafness:— (1) Total deafness, before speech has been acquired. (2) Total deafness, after speech has been acquired. (3) Pronounced deafness. (4) Slight deafness.

Total deafness before speech has been acquired comprises that class of unfortunates who are congenitally deaf, or who have acquired deafness in early infancy and before they have been taught to speak. These weaklings are not only deaf, but also dumb, and form that large group of children whose education is acquired under tremendous difficulties and hardships, for we deal here with pupils whose voice and speech producing organs are practically undeveloped. With all the progress which has been made in practical and pedagogical science, the De l’Epée system of sign-language and the manual or finger-alphabet is still frequently employed in the training of this class of children, especially in France and England.

In the sub-class of total deafness after speech has been acquired, some of the teaching difficulties are eliminated. In this class the child has acquired speech to a greater or less extent, depending on the age of the child before deafness has developed. One of the serious difficulties therefore, namely, the teaching of the production of speech, is here eliminated. It is in the disposal of this class of children that grievous errors are frequently committed. Viewing this question not as a teacher of the deaf, but from an experience and association of twenty years with such defectives, from the standpoint of the otologist, it is my humble opinion that this group of pupils should under no circumstances be taught by the sign-language or the manual alphabet. They have acquired speech, a wonderful asset in their future social intercourse, and this should be cultivated and not stunted. All sign-language should be eliminated from their teaching and lip-reading developed as the rational system of instruction possible and practical in this class. I refer to this deliberately and emphatically, for many of the schools for the deaf, both public and private, state and municipal, still employ the sign-language indiscriminately in the teaching of children classified as totally deaf without the acquisition of speech, and those totally deaf after acquiring speech.

There has been an interesting evolution in the teaching of this class of the deaf in America. I quote from the interesting sta-
tistics gathered by Wright (3) as to the progress of the oral method and the decline of the manual method. "The first school in the United States where pupils were taught exclusively by means of speech and writing without signs or the manual alphabet, was established in America in 1867. Twenty-six years later, in 1893, twenty per cent. of the 8,000 pupils in the schools for the deaf in the United States were taught by the pure oral method. In 1908, fifteen years later, there were 12,000 pupils in school and 56.5 per cent. were taught without the use of signs or the manual alphabet. At the same rate of progress another generation should see the practical disappearance of manual methods from the school-room."

This method of instruction has been a bone of contention among teachers of the deaf for a long period, and it is time that a unification of opinions on this question, of such vital interest to the future of the individual pupil, should be adopted.

3. Pronounced deafness is applied to those who possess sufficient function of hearing to distinguish the sounds of the human voice whereby they may be trained by the auricular method to differentiate vowels, consonants, or even some words. —classified by the British Royal Commission on the Deaf,—(4) as the semi-deaf. A more accurate means of determining the limitations of hearing has been definitely developed in the achievements of Bezold by means of the continuous tone series of tuning-forks. Children who cannot appreciate the sounds of the tuning-fork within the tone limit of the musical scale from b' to g" have been found incapable of sufficient perception of speech to warrant their successful training by means of the auricular method. This is known as the "word-limit" of the musical scale, as tested by the tuning-fork series. When this relatively small portion of the sound scale is present and the other functions of the child are found to be normally developed, it is reasonable to assume that this child can be taught to speak in the natural way by the auricular hearing method. It is not within the scope of this paper to consider the details of advanced methods in the teaching of the deaf, but I cannot refrain from an honorable mention of our colleagues in otology who have been largely instrumental for this new impetus in the training of the deaf. To V. Urbantschitsch, of Vienna, we must credit the first successful results in the instruction of the deaf by a systematic course of training by the aid of the voice. It was my privilege to be present and to participate in the demon-
stration of the first results of this system of aural practice in 1893. The first successful results obtained by this system among our American institutions were embodied in my paper (5) presented before the American Academy of Ophthalmology and Otology, with demonstration of a class of sixteen Deaf Children showing the marked improvements obtained by this method. Hartmann (6) has devoted much time and attention to the oral and aural methods of instruction of the deaf. He decries the use of the finger alphabet in all cases and presented at the International Otological Congress in Budapest, a very impressive statement of successful results obtained by the oral method throughout Germany. Wanner (7) of the Bezold school recently gave a convincing demonstration of the value of segregating cases by tuning-fork tests and then successfully teaching them by the auricular method. To our esteemed colleague, James Kerr Love, of Glasgow, belongs the credit of bringing the medical profession in closer relation with the teacher and with the institutions for the deaf; of presenting valuable comparative study of the teaching methods employed and a classification of the deaf in institutions at home and abroad. Here in America many of our progressive teachers of the deaf have taken up this advanced method of training, and the results and influence of the good work already obtained is attracting attention and recognition in every section of the land.

4. I have included in the fourth class of slight deafness a large number of children referred to so frequently in the reports of the systematic examination of school children as having nasal obstruction, adenoid growths, hypertrophied tonsils, suppurating ears, or other mechanical or pathological conditions producing a moderate degree of impairment of hearing. These children are not sufficiently handicapped to require training in special schools or by special methods, but they should be assigned to smaller classes where better individual instruction may be given and where these defects may be constantly before the mind of the teacher, so that all allowances for insufficient scholastic work may be made and more careful supervision directed.

In all of these forms of deafness the physician should share with the teacher and the parent the responsibilities for the proper training and attention to this class of defective children. The education of the deaf is not a charity, but just as sacred a civic obligation as the education of the normal child, and the physi-
DEVELOPMENT OF THE DEAF CHILD.

27

cian, especially the otologist, is an influential factor in its proper up-building.

Another force which must be developed in this splendid cause is the education of the under-graduate in medicine. Those of us who are teachers in the medical department of our universities present to our classes in otology every phase of otological science from detailed anatomy to the most intimate ramifications of the labyrinth and touch upon many unusual diseases and complicated operations, but how many medical teachers devote any part of the session's work to a discussion of the deaf child as he may be found in the country communities as well as in the cities, the determination of the degree of deafness in each case, the proper advice to the parents for the educational institution best adapted to the child of such infirmities? I would go one step further without fear of contradiction and say that there are many otologists today, authorities in their field of work and prominent as medical teachers, who are themselves uninformed concerning the public and private institutions for the deaf in their own State or their own community. Here is where the reform and crusade must begin. If we are to benefit the general practitioner, the teacher and the parent, it is incumbent on us as specialists in medicine who are brought into touch with these important problems to acquaint ourselves with all of their details, recent research and future possibilities for good.

III. PERSONAL EQUATION. The influence of the physician in the family must be regarded as of vital interest to the welfare of the child, and his advice is often given along broader lines than simply for its physical care and mental development. It is the physician who first comes into contact with and intelligently recognizes the child's defects, and its future depends largely on the character of advice which the physician offers the family as to its proper disposition. There are some popular fallacies still quite prevalent, especially in the rural districts, and it is even surprising to hear well-informed men and women of our metropolitan communities refer to the deaf-and-dumb and the deaf-mute in so definite a way as to indicate that the impression is firmly fixed in their minds that deafness of this form must absolutely be associated with absence of voice or speech. Again, the fear of an "operation" is often so intense in the mind of a nervous mother that she will delay for years having her child's adenoids removed or tonsils excised because the doctor, under
pressure, has offered the questionable alternative that "the child may out-grow this condition and the adenoids or tonsils may be absorbed when it has reached the age of puberty." Viewed in the light of the pathology and surgery of oto-laryngology of today, such fallacies and such delays are almost criminal. It is here that the physician must act, not only as the advisor but as the educator of the family, so that every measure for prophylaxis and for the child's physical growth and mental development may be properly cared for.

It is our duty to co-operate just as faithfully with the teacher and the parent in the education of the deaf child, as it is with the normal child. I might even insist that our obligation toward the defectives are greater, for our means for their proper care and education are less perfectly and systematically developed, and it is only by intelligent co-operation, diligent examination into every cause and condition associated with these defects, and with scientific and pedagogic evolution and progress, that we hope eventually to bring about a higher standard of efficiency in this important educational field.

It may not be as fascinating to the otologist to contribute his energies, his logic and his talents to the development of this question which so vitally affects the welfare of the community and of all human kind, as to concentrate his time on original research or on the intricate pathology or operations on the labyrinth, but we are confronted with the appalling information that four million defective school children exist in the United States alone, and this obligation must be met by the profession, and a large share of it must be assumed by our American otologists.

REFERENCES.

2. Allport. The Necessity for the Systematic Examination of School Children's Eyes, Ears, Noses. and Throats.—Medical & Surgical Monitor, February, 1904.
5. Goldstein. Advanced Method in Teaching the Deaf.—The Laryngoscope, June, 1897.
DEVELOPMENT OF THE HEARING.

By MRS. J SCOTT ANDERSON.*

(This Paper by Invitation.)

1. HOW THE NORMAL CHILD’S HEARING DEVELOPS FROM EARLY INFANCY. The normal baby learns to understand the language spoken around him only after he has long been familiar with such sounds as the rustling of his crib sheets, the opening and closing of the door, the splash of water, the mother’s lullaby, and the soft foot-falls of those who are his caretakers. These noises of the home added to those of the outer world increase his knowledge of his environment and develop his hearing, while the constant repetition of spoken language, associated with certain acts and situations, soon enables him to comprehend the meaning of the sentences he has heard and, later, to use them.

2. RELATION OF HEARING TO VOCABULARY, SPEECH, AND GENERAL UNDERSTANDING OF SPOKEN LANGUAGE. While the senses of sight and touch are great aids to the child learning to talk, that of hearing plays a double roll. It enables him, first to understand and then to reproduce. He hears the speech of others and attempts to talk. He hears his own voice and modulates it accordingly. His language is a reproduction of what he hears, and will be modified as time goes on by what he reads. If he does not hear English he will not speak English, just as you, not hearing Chinese spoken, are unable to converse in that tongue. Thus we see what an important factor hearing is in the development of language.

3. CONTRAST BETWEEN NATURAL DEVELOPMENT OF HEARING AND USUAL METHODS EMPLOYED WITH THE SO-CALLED DEAF. Thus the hearing child becomes accustomed to sound and speech long before he attempts to talk. We leave him alone to work out his own salvation, but what do we do with the deaf pupil? We speak into his ear for fifteen minutes daily allowing him to remain in silence for the remainder

* Principal Swarthmore School and Kindergarten for the Deaf, Swarthmore, Pa., U. S. A.
of his waking day. We say, and truly, that he can stand only a short period of ear work, because it is too nerve-racking. Nevertheless we expect him to learn to hear some words and sentences in just those few minutes. Wonderful to relate, he does, once in a great while, come up to our expectations, but at enormous cost of effort on both his side and that of the teacher. Why do we persist in a method so different from that of nature?

4. PROPER USE OF ARTIFICIAL AIDS. Artificial aids, which magnify sound, should be constantly used if they enable the child to hear better, for they not only make the pupil conscious of sound while they are being used, but increase the general ability to hear at all times. Let the child wear one on left ear if possible, in school and out—even at table. Let him become used to the sound of the voices of his school mates, the pleasant or sometime angry voice of his teacher, the tapping of little feet upon the floor, the slamming of the door, laughter, music, and street noises. Let him, like the normal child, simply hear, and hear and hear, no matter what he hears. Then, when the time for daily drill arrives, there is no difficulty in securing attention—and there is less nervous strain because the child is accustomed to sound. This is the logical method of developing the hearing, as it requires almost no effort on the teacher’s part, and is a source of real pleasure to the pupil.

5. AURICULAR DRILLS. In dealing with our pupils we have two classes to consider,—those whose hearing is only defective, and those who are practically deaf. In either case use an instrument in school and out—at all times when it does not interfere with the child’s play. Never allow a drill to exceed fifteen minutes with older pupils, and spend even less time with the very little ones, else they will become nervous and tired.

First class. With the partially deaf the aim is to increase distance at which sounds already heard may be distinguished and to add new words to this list. Test the hearing by conversing with back toward teacher and determine how far away familiar questions, quotations, sentences and words may be heard, making that limit your starting point. Begin the drill by asking for every-day information or by discussing topics of general or special interest. Next use names of the days of the week, letters of the alphabet, and numerals, always guarding against telling pupil
when he does not hear correctly. Keep a careful record of sounds heard, as well as of those not heard.

There is, of course, a limit beyond which sounds cannot be heard, but the first halting place is seldom the last.

The practical results of this drill are:

I. Pupil hears at increased distance from speaker;

II. He hears a greater number of words, sentences, &c., and

III. He hears new sounds on which he has never been drilled. However, a peculiar thing is here noticeable. Conversation carried on in tones different from those used in the drill can seldom be heard, but if a second drill be resorted to, all tones between the two drills may be heard.

Second class. As the so-called deaf child never learns to hear many words or sentences, we should not make the understanding of these our aim—it is too high. Neither should we cease our efforts to teach him to hear, as most teachers are likely to do. What should our aim be? To train the child so that, through hearing and touch he is able to reproduce the tones of his teacher's voice, and to accent words and sentences correctly. We can do no more. This should be accomplished by first calling his attention to the existence of sound itself and to number of beats. Then he should be taught to distinguish between the sound of different bells, musical instruments, and finally the various tones of the human voice.

6. WHY THE DEAF CHILD SHOULD BE TAUGHT TO HEAR AS WELL AS TO SPEAK. In closing I would say that I have left an exceedingly strong reason for auricular training until the last. While little, if anything, is known concerning the physiology of the brains of the deaf, contrasted with those of the hearing, psychologists assure us that where one centre is inactive the whole structure suffers. What, then, must be the result of the inactivity of two centres?—that of speech and that of hearing? Reasoning from the accepted theory we find that such a condition should tend to abnormal—or should I say, sub-normal?—brain development. Does it? Have we proofs either way?

Are orally taught deaf children really more nearly normal than those taught otherwise? Is this the reason they appear so much brighter? I believe so and I believe that we find here a
most convincing argument for the oral method of instruction, even though the speech of many may be very defective.

Considering that there is a probability of better general brain development when all the centres are called into activity, the duty of the instructor of the deaf is surely very plain—to develop both speech and hearing in every child in the class-room.
THE MENTAL DEVELOPMENT OF THE DEAF CHILD.

By EDWARD M. GALLAUDET, Washington, D. C.

(By Invitation).

The condition of the mind of an uneducated deaf child which differs from that of the normal child may be described by the single word deaf-mutism.

The phenomena of deaf-mutism arrange themselves in two distinct divisions, namely, the physical and the psychical.

Physical deaf-mutism will be readily understood as consisting in mere organic deafness, and consequent dumbness, while psychical deaf-mutism includes the mental and moral conditions induced by and growing out of the physical disability.

It may be said of deaf-mutes as a class that their physical deaf-mutism cannot be entirely removed. Their deafness has hitherto baffled the relieving hands of the surgeon and the physician. Their dumbness has only partially yielded before the persistent efforts of teachers of speech, to whose patience and skill all praise is due.

It is, therefore, upon psychical deaf-mutism that the attention of the teacher should be chiefly fixed, to the complete removal of which, in a vast majority of cases, no inherent or insurmountable obstacles present themselves.

Psychical deaf-mutism may be considered under three subdivisions, viz., (1) Mental, (2) Moral, and (3) Social.

In the mental development of the deaf-mute, the great and peculiar obstacle is his lack of language. That marvelous process by means of which the hearing child, between his first and fourth year, possesses himself, without conscious effort, of his mother tongue, and sometimes even gains two or three languages, has no counterpart in the experience of the uneducated deaf child; and as a consequence he lacks not only the language, but all that mental discipline and growth which are incident even to the vernacular aquirement of language.

That the untaught deaf-mute has methods of thought is undoubtedly true. But the necessary crudeness of them will appear from the reflection that as he works them out, he can only imperfectly call to his aid the imitative faculty. He must originate
almost everything, and arrive at just conclusions only after blunders infinitely more numerous than those of the hearing child.

Even in the imperfect development possible to the uneducated deaf-mute, the necessity of some language becomes apparent. Failing to learn that of his fellows, he will invent one of his own, and impose its use on all who will accept it. And when the indifference, or hardheartedness of his family or associates denies him the use of this, he lapses into a condition but slightly elevated above idiocy.

In proof of this an instance may be cited which fell under the speaker’s notice some years ago, of a girl who had been held as a household drudge or slave by her family, till in her sixteenth year she was brought through the interference of her humane neighbors, to a school where she might be taught. On entering she presented evidences of idiocy that were thought to be unmistakable.

Premature discrepitude of form, with crooked claw shaped fingers, and a face utterly expressionless, were taken as plain tokens of mental feebleness.

A few months, however, of the ordinary treatment of a school for the deaf, wrought what seemed almost a miracle. Rest from exhausting labor allowed the fingers to relax and the form to straighten; kindness lighted smiles in a face that had lost, if it had ever possessed, the power of changing its expression; patient instruction reached, at length, the awakened intellect, and at the end of a year eager, happy intelligence was in process of healthy development where there seemed before to have been no germ of mental life.

The language of pantomime suffices for the ordinary development of the intellectual faculties. A deaf-mute who never learns a language of words, may still be taught much as to the operations of the natural world; something of history and geography, not a little of science and mathematics, the laws and usages of society, and the principles and precepts of religion.

But this will not relieve him from his mental deaf-mutism. Having no language in common with his fellow men; shut out from the stores of information and food for thought conserved in books; unable to acquaint himself with even the news of the day as chronicled in the journals; often excited and perhaps tormented with thoughts and queries for which he has no means of exact expression, his mind may be likened to an eagle caged or a lion chained. He will either lapse into the contentedness of ignoble bondage, or drag out an unhappy existence, beating at
Development of the Deaf Child.

bars, or chafing in fetters from the thraldom of which he is powerless to free himself.

The question naturally rises in the mind of a philanthropic person: "Is there no way of escape from so sad a condition?"

Happily an affirmative answer may be found in the history of every well ordered school for the deaf. Among those taught many will appear who remaining physically deaf are no longer dumb, or in the condition of mental deaf-mutism.

Their processes of thought, their methods of reasoning, their modes of expression, are the same as those of hearing persons, with the exception that verbal language is to them only visible, whether coming to them from the lips or hands of others, or from the printed page, and not visible or audible according to circumstances.

Another exception should also be made, that a person born and continuing totally deaf can have no appreciation of the phenomena of sound.

But this is not true of that rather large proportion of the deaf who have had hearing for several years. To them the mental condition of deaf-mutism does not in any degree appertain, and the extent to which they can appreciate the phenomena of sound has been aptly described by one of their own number in a sonnet.

"They are like one who shuts his eyes to dream
Of some bright vista in his fading past;
And suddenly the faces that were lost
In long forgetfulness before him seem—
Th' uplifted brow, the love lit eyes whose beam
Could ever o'er his soul a radiance cast,
Numberless charms that long ago have askst
The homage of his fresh young life's esteem;
For sometimes, from the silences they bear,
Well up the tones that erst formed half their joys—
A strain of music floats to the dull ear,
Or low melodious murmur of a voice,
Till all the chords of harmony vibrant are
With consciousness of deeply slumb'ring powers."

We pass to the consideration of the second feature of psychical deaf-mutism, namely, that which pertains to the development of the moral nature.

The untaught deaf-mute is either wholly devoid of language, or possesses it in a very imperfect degree.
In the first case, if he continue without language, his moral development is an impossibility. In the latter case the readiness with which his moral perceptions may be awakened, and his moral powers trained increases with the growth of his faculty of language.

That an uneducated deaf-mute should be morbid, suspicious, jealous, selfish, unreliable and dependent, will seem most natural when one considers at how terrible a disadvantage he remains as compared with his hearing fellows; and to how small an extent his mind has been affected by those influences, which naturally eliminate these undesirable moral qualities from the human character.

It must be observed that we have not claimed the possession of verbal language as necessary to the moral development of the deaf-mute. His natural language of signs will suffice for this: that is to say for imparting the essentials of a moral character.

The speaker is, however, of the opinion that, other things being equal, the deaf person who has a perfect command of verbal language, has a decided advantage even in points of moral development, over one whose habit is to think in signs.

That moral deaf-mutism can be entirely removed by the methods now employed in our best schools, admits of no question. That is to say that the standard of moral character among the graduates of our schools for the deaf will be found to be quite as high as that of persons with all their faculties, who have had an equal amount of education.

In providing means for the moral and religious training of deaf children in schools, practice differs as to the employment of the sign language.

In the opinion of the speaker the use of this language in addressing considerable numbers of deaf persons, whether children or adults, is of great value.

In this view he is sustained by two of the leading schools in Germany, both of which are oral schools, and one of which is the cradle of the oral method.

When we consider social deaf-mutism it goes without saying that the deaf-mute, denied all language must remain a social cipher. Given only the sign language, his enjoyment of social privileges is of course limited to the narrow circle of those who can use that language. If we add verbal language, even without speech or the power of lip-reading, we widen the social range very greatly. And those deaf-mutes who are so fortunate as to
possess the power, and are granted the opportunity of acquiring these last named accomplishments to a degree reasonably approaching perfection, may, without doubt, aspire to complete enfranchisement from social deaf-mutism.

Whether conditions between the hearing and the deaf are such as to enable the latter, in large numbers to realize this aspiration is a question.

It is an oft repeated assertion that when a deaf person has acquired the power of speech, and is able to read the lips of others he is "restored to society."

In a recent letter a deaf lady of high social standing and unusual mental ability, who was educated in an oral school, writes as follows:

"It seems to me the pure oral teachers expect too much of both the deaf and the hearing. They think that the former should be capable of an equality with the latter, which, is physically impossible. They think the hearing should receive the deaf with open arms, or at least treat them half way. They ought to, of course, but the practical question is, do they? In most cases, No. Where there are deaf friends or relatives, something of interest and kindness will be shown by the hearing, but with ordinary people the deaf are simply strange creatures, like the idiotic or insane, though of course in a less degree."

"The great majority of oralists are absolutely ignorant of the way they are laughed at behind their backs. I myself knew nothing of this while I had home and family to ensure me respect, but I have had some bitter experiences since then."

"For this reason, if for no other, those with bad voices should not be forced to talk. They simply make themselves a laughing stock among the hearing. I have been told that my voice was not specially disagreeable, yet I have known hearing friends to pass me on the street without recognition, and when I demanded an explanation confess that they did not wish the friends they happened to be with, to hear me speak."

"Is not that enough to seal the lips of any sensitive oralist?"

"In all this I am putting myself in strong antagonism to my school, but it is not to be helped. Truth and common sense should be considered as well as theory, and with the theories of the pure oralists I cannot agree."

In many of our large cities and towns associations of the deaf exist.

The meetings of these societies are for social enjoyment, with
lectures in the sign language on subjects of interest, and for religious worship.

These associations are condemned by some as tending to isolate the deaf from the hearing, thus making their social deaf-mutism permanent.

We cannot join in this condemnation, though our advice to the deaf has always been to mingle with the hearing as much as possible, and not to depend for all their social enjoyment on intercourse with each other.

It is natural for the deaf to come together socially and they should not be denied that pleasure.

But especially should they be sustained when they seek to have religious instruction and worship in that language in which, alone, such instruction can be given, and such worship can be conducted, in a manner to be understood by a considerable number of persons.

The lady from whose letter a quotation was read a few minutes ago writes as follows on this matter:

"I insist on signs, and signs only, in public speaking to the deaf. On March 20th, 1910, I was present at the confirmation service at Trinity Church, Boston, where Mr. Searing interpreted to us the sermon of Bishop Lawrence. When I came to read the printed report of that sermon I found nothing new. I had understood the greater part from the gestures of Mr. Searing. Had I been seated with the general audience I should not have known a word from beginning to end."

Society may offer to the individual deaf-mute social recognition, and many testimonials of thoughtful consideration which he has no right to demand.

In any neighborhood where an educated deaf-mute may have taken up his residence, the work of relieving him of his social deaf-mutism should go on. A little patience and painstaking to establish easy communication; a little exercise of self-denial; the acceptance of the deaf-mute neighbor as a fellow man, and not always as a deaf-mute, will in process of time perfect the work begun by his teachers in school, emancipating him so fully from the trammels of mental and moral deaf-mutism, as to make him often forget the burden of the heavy trial which must still rest upon him, when all shall have been done that the good will of his fellow men can devise and suggest.
THE DEVELOPMENT OF SPEECH IN THE DEAF CHILD.


An eminent neurologist, Dr. H. H. Donaldson, has tersely defined education as the modification of the central nervous system. "The education of an individual," he adds, "is a very local problem in its details." The well-trained teacher of the deaf is quite free from any doubt as to the precise localities in the brain of his pupil which need attention. His problem is not how to facilitate the development of a normal organ, but how to repair the injuries of a crippled structure. I need hardly point out the fact that the tragedy of deafness lies not in the mere fact that the deaf child does not hear sounds, nor that he does not speak, but in the almost irremediable effect which it produces upon the development of his mind.

Before discussing "The Development of Speech in the Deaf Child" and attempting to answer the questions where and when and how he should be taught to speak, let us consider carefully his mental condition and the question why he should be taught speech at all. The normal child has three principal store houses of language. In the first temporal convolution in the auditory area of the brain are stored words received through the ear; in the angular gyrus of the visual area are stored words received through the eye in reading; while in the motor area in Broca's convolution is stored every word which can be spoken. These three centres connected by the nerves of association which alone render them operative, constitute the mechanism of speech within the brain.

The born deaf child comes to us without a single impression in any one of these centres. A war of centuries has been waged among his teachers over the question of the advisability of attempting to establish the missing function of speech. It would certainly be easier for all concerned to leave him a few thousand years behind the race in the use of that language of signs from which human speech has been evolved, a stage of development beyond which he is unable, in the very nature of the case, to advance without assistance than to attempt by long years of patient toil to develop these centres of functional activity,
did not humanity and the child's best welfare demand the effort.

Under the old psychology which assumed that the brain functioned as a whole and, therefore, that it could be developed as a whole—as the body may be developed by gymnastics—signs were logically believed to have great disciplinary value. Language was taught by translation through signs and remained a secondary form of expression. If, however, the natural method is superior to translation in teaching a foreign language to a hearing child, it is surely unwise to teach English to a deaf child by translation through a language which not only has a different order and idiom, but is not a language of words at all,—but a language of pictures presented in pantomime. Dr. W. H. Thomson in discussing the faculty of speech says that "Thoughts need words to become true thoughts, but feelings do not need words to become true feelings." The deaf-mute, habituated to the use of signs, is condemned to a life of feeling upon a mental plane far below that of a mind disciplined by the use of words.

But more recent investigations into the workings of the brain and the establishment of the facts concerning the localization of its functions have necessitated a revolution in methods of education. We know now that the development of intelligence results from definite modifications upon the frame-work of fundamental functions in the central nervous system produced by perfecting the sense organs and by establishing paths of association between them. We know that brain power depends chiefly upon the complexity of these associations. We know also that lack of development in one part of the brain weakens the whole structure. Our effort then should be to establish in the brain of the deaf child the greatest possible number of functions and of associative reactions between them. Even if the articulation and lip-reading of deaf children prove of no practical value as a means of communication, their acquisition has been of incalculable value in mind building. Baldwin says of the development of language that "the way of getting to speak by imitation is itself perhaps the profoundest pedagogical influence in the child’s mental history. . . . It is because the parent or teacher has more lessons for him to learn . . . that it is important for him to learn the present words. They cannot impart their learning except in the moulds in which they have learned.''

How now, does the process of developing speech in the mind of the deaf child differ from the procedure in the case of the normal child? The auditory area cannot be reached and there-
fore no language centre can be established there, but the visual area may be made to do double duty by establishing in it not only a registry of written and printed words, but also—a faculty which the normal mind does not ordinarily possess—a registry for spoken words. Just as the blind establish a third word registry by which they read through touch, so the deaf may acquire a record of lip-read language from which the motor speech centre undoubtedly receives its strongest stimuli. To a lesser extent they store away impressions of speech received through touch, since it is upon that sense that they must rely for the modulation of vibration and force in articulation. These phenomena afford us striking examples of the wonderful power of the brain to create new functions under the constant repetition of a stimulus.

We have been considering the case of the child born with no hearing at all. The teacher of the deaf, however, is not confronted with this type of child alone. Fully 25 per cent. of the pupils in our schools possess some degree of hearing—for it devolves upon the school for the deaf to afford instruction to all children who have not hearing enough to acquire language naturally.

Children who have enough hearing to develop the motor centre through auditory stimuli should not be placed in schools for the deaf. Their development will be more rapid and more nearly normal if they are compelled to rely upon auditory impressions. Such children are, however, often neglected until too late for their best development through the ear, and sight and touch must then be called into service to gain speech impressions with which to reinforce those received through hearing. A slight degree of deafness which would not greatly inconvenience an adult, seriously hampers the development of the growing brain of the child, interfering as it does with the frequency of the stimulations upon which the development of the nerves of association absolutely depend and without which the mechanism of speech, however perfect, must remain inoperative.

It is to this lack of sufficient stimulation that we must attribute the disappointing results of the use of the various mechanical aids to hearing with this class of pupils so often presented to our consideration. Experiment quickly demonstrates that many of these appliances do, in some degree, aid hearing, and the hasty conclusion is drawn that by their use the deaf child may become a hearing child. At best the trumpet or other
device, can only be used by the child during a fraction of his waking hours, but his eyes are always on duty ready to store the visual language centre with impressions which are to bear fruit in speech. Lip-reading, rather than ear training, remains then, even for the partially deaf, the surest reliance for the speech teacher. The partially deaf child may be able to store his auditory centre with speech impressions by the use of some mechanical appliance, but very considerable hearing power is needed, in such cases, to give sufficient stimulation to force the development of the necessary lines of communication between the auditory and motor centres, which alone can make his auditory impressions of service in the production of speech. Let me repeat most emphatically the opinion that children who possess decided hearing powers should never be associated with deaf-mutes.

In this connection it may be of interest to note the cases of certain hearing mutes who, entering school with normal hearing, but without speech, have developed the power through lip-reading. These pupils undoubtedly lack proper communication between their auditory and motor centres, from whatever cause, but upon the establishment of a visual speech centre the dormant motor area awakens and becomes operative. In other cases having the same external characteristics where the motor area fails to respond to visual stimuli, we must conclude that the defect is in the Broca convolution itself and therefore that speech is impossible under any stimulation.

It must not be supposed from what I have said concerning the value of partial hearing in producing motor reactions that the hearing powers in such cases are of no value. A degree of hearing quite insufficient for the development of an auditory speech centre is still invaluable to the teacher of articulation in the cultivation of voice. The teacher must laboriously train the totally deaf child to distinguish differences of vibration by touch which even a slight trace of hearing enables him to differentiate without difficulty. So keen, indeed, is the expert articulation teacher in the detection of these traces of hearing that she often develops valuable hearing powers in children who have not responded at all to the tests of the aurist. This happens most frequently in cases where the child can hear only a tone of a certain pitch or quality which is discovered only after long experiment. These slight hearing powers are also of prime importance in teaching accent, emphasis and inflection. What Sidney Lanier so aptly calls "speech tunes," the totally deaf
child can never acquire, and the teacher finds to her sorrow that intelligibility depends more upon these speech tunes than upon exact consonant positions or the production of pleasing tones of voice.

The teaching of lip-reading to the deaf child should begin in infancy. It is of fundamental importance that his visual store house of words should begin to receive images at the earliest possible moment since it is upon this store of word memories that we must depend later for motor stimuli. It is at this point that superficial students of the subject are likely, and indeed often have, fallen into grievous error. It does not at all follow that because a totally deaf infant may wisely be taught to read the lips he should be allowed to attempt to articulate at the same early age. A hearing child often talks baby-talk which only his nurse can understand, but he has no difficulty, as his ability to differentiate sounds increases, in correcting his errors in pronunciation. Little by little he becomes conscious of his defects and one by one he corrects them. In the case of the totally deaf child the very opposite is true from equally natural causes. The hearing child rouses his motor speech centre through his auditory and motor memories. The deaf child gets comparatively little aid in articulation from visual images obtained from lip-reading, for, much as this power aids him in acquiring language, it is entirely inadequate to the production of correct articulation, since only a few of the positions taken by the vocal organs in pronouncing even the simplest words are visible. He must depend almost entirely upon his kinaesthetic word centre—recalling words always in terms of sensations of movement. A sound mispronounced at first may be doomed by the law of habit to be forever mispronounced. I do not need to dwell upon this point before this audience. Anyone familiar, as you are, with the difficulties of overcoming wrong habits in cases of stammering, stuttering, asthma and the like, will recognize the analogy, and understand the great danger there is in attempting to teach a deaf child to articulate before he is old enough to take exact positions easily and perform, as he must perform, highly complicated exercises in vocal gymnastics. No one would attempt, I think, to teach a child of two or three years to play the piano, but the production of spoken words is a far more difficult and complex achievement. Burk tells us that the kinaesthetic sensations, necessary to the production of the definite voluntary movements of articulation are, in general, in a very immature state until the age of
eight or ten years. This is the case of the hearing child. The wise
teacher, therefore, delays work upon articulation until her pupil is
sufficiently mature to stand the serious mental strain. Individuals
differ greatly of course, some children taught as early as five giving good results, though the age of six is considered safer with the
average deaf child, and many experienced articulation teachers
maintain that they have secured their best results with children
of eight. These are points which only careful experiment covering a long period of time have been able wisely to determine.

Careful observation of the school history of the deaf child
confirms me in these views. The articulation of the hearing
child tends to improve without special effort on his part or that
of his teacher—simply through the aid of his hearing. The
articulation of the deaf child, on the contrary, tends to deteriorate,
and throughout his whole school course he requires daily drill
and correction in order to maintain and improve his speech powers.
It is a well known fact that a deaf child’s articulation is at its best
during his first years in school. As his vocabulary increases and
his speech grows more complex, he tends to become inaccurate
and careless in articulating, but when he leaves school and finds
himself among people who do not readily understand his imper-
fect speech, we note a marked improvement owing to his greater
effort to make himself understood.

At this point let me pause to define certain terms I am using
which are often employed loosely in discussing these subjects
and do not make for a clear understanding of them. Let us
remember that speech = articulation + language. A deaf child
of six or eight will, in the first three or four months of his
school life, acquire accurate articulation, but he still has no
speech. This articulation is simply an instrument to be used
with lip-reading in the long years of work required to give him
an understanding of language. Beside that task, the work
of the articulation teacher becomes insignificant and simple.

From the subject assigned to the gentleman who is to follow
me, I conclude that I am expected to speak more particularly
on the development of articulation as a factor in the speech
of the deaf-mute, but, before entering upon that phase of my
subject, I want to mention two points upon which there is much
popular misunderstanding regarding the oral method. The first
is the question of aim or object. The oral teacher does not use
the oral method for the development of speech per se—but
because he is convinced that by its use he secures a better com-
mand of language spoken and written and greater mental development.

The second point is an historical one. There seems to be a popular delusion that the oral method is a new thing. I have even heard the faulty articulation of the deaf explained on the ground that the method was a new one which would doubtless produce better results when experience had perfected it. The truth is—I might almost say—the sad truth is—that the oral method is the oldest of all known methods of teaching the deaf, and has been far more widely used than any other. Quite by chance the first teacher of the deaf imported into this country, nearly a century ago, was a French gentleman who brought with him the French sign method. Half a century later, through the efforts of Gardner Green Hubbard, Horace Mann and Samuel Gridley Howe, the German method was introduced in Massachusetts. This method had been slowly perfected by long years of that painstaking work for which German teachers are so justly famous. Nor was its application to the problem of teaching English undertaken in a haphazard way.

Alexander Melville Bell, who by his organic method of classifying sounds and his visible speech symbols, had placed the study of phonics upon a scientific basis in England, had already devoted some attention to the work of teaching articulation to the deaf. He was at that time lecturing at the Lowell Institute and was appealed to for assistance by those interested in the introduction of the German method. His son, Alexander Graham Bell, whose fame as the inventor of the telephone has somewhat overshadowed his achievements as a Phonetician, came to the assistance of these workers and for several years devoted his expert knowledge of the subject and his remarkable powers as a teacher, to the task of giving articulation to the deaf. He gave lessons to teachers and pupils in several schools and established in Boston a training class for students. His two most distinguished pupils are still at the head of the two pioneer oral schools, established at that time, in Massachusetts—Miss Sarah Fuller, principal of the Horace Mann Day School for the Deaf in Boston, and Miss Caroline A. Yale at the head of the Clarke School—a boarding school at Northampton.

The American Association to Promote the Teaching of Speech to the Deaf—founded by Dr. Bell and endowed by him as a memorial to his distinguished father,—maintains in the Clarke School a Normal Class which is sending out every year highly
trained articulation teachers who are carrying on in schools for the deaf all over America, the careful scientific work begun forty years ago by this great philanthropist and inventor. Let us now consider the methods of speech teaching which have been evolved by these expert teachers and their reasons for adopting them.

Hartwell, in speaking of the training of the speech function says, "It seems to me that we may safely aver that the law of the evolution of the nervous system is of great pedagogical importance, since it suggests the natural order which should be followed in training the organs concerned in any complex co-ordinated movements. For instance, it is transgressing the laws of nature to emphasize the training of the fingers before the neuro-muscular mechanisms of the hand, arm and shoulder have become thoroughly organized, and their respective movements brought under control; or to attempt to teach a child to read aloud before he has learned to speak plainly and readily." It is of prime importance then that before the deaf child attempts to use spoken language he should develop his speech function by following as nearly as possible the natural order of development of the function in hearing children.

An infant only a few months old amuses himself by repeating over and over some consonant sound—it may be vocal or non-vocal, and is quite as likely to give the consonant alone as in combination with a vowel. A careful observation of a number of infants forces me to the conclusion that the order in which such sounds are made is entirely accidental. One infant's first attempt at speech—if we leave out of account the vowels uttered in crying—is ma-ma-ma, while another begins with t-t-t-t and another with g-g-g-g and so on. For several months the infant continues this articulation drill in the use of syllables and elementary sounds, the combinations growing gradually more rapid and more complex until at about the period when words begin to take on meaning, we often hear the child "jabbering" for some minutes almost continuously using a variety of complex combinations. With the deaf child, the teacher follows practically the same order of development, modifying it only as she is compelled to do so by the fact of his deafness.

Miss Yale, of the Clarke School, in her valuable treatise on the Formation and Development of the Elementary English Sounds says, "It would, no doubt, be possible to teach the elementary sounds in the order of their natural arrangement in groups and scales, but it is vastly easier for a little deaf child, if
he is aided in accomplishing the work of acquiring these sounds by a judicious order in teaching so that he may not be confused by attempting to learn, at the same time, elements too closely resembling each other in formation. The breath consonants may well be taught first, then voice consonants and vowels. We would suggest the following order as one which presents, possibly, as few difficulties as any. First the breath consonants—h, wh, p, t, k, f, th, s, sh, ch. Then the vowels and vocal consonants alternately—a(r), v, aw, th, ōō, z, -u-, m, -o-, qu, ōō, u, ou, r, o-e, ng, u(r), b, d, g, j, ee, -a-, -i-, i-e, l, a-e, x, -e-, oi, u-e."

While the breath consonants are being mastered, the teacher should devote much time to the cultivation of the voice. Vowel sounds are not attempted until the pupil can distinguish comparatively slight differences of pitch by the sense of touch. One of the smaller stringed instruments is usually employed for this work and the pupils find it fascinating work to distinguish differences of tone as they stand blindfolded with eager finger tips feeling the vibrating wood of the instrument. Differences of a very few tones are often noted by pupils after a little training. The child is now allowed to attempt his first vowel, but much labor is often required before it resembles any sound of human speech. Tense vocal cords may produce too high a pitch, but often the fault does not lie in the larynx but in the resonance chamber above. Constricted pillars of the fauces, or a flabby, useless soft palate, may prevent the production of a pleasant tone. These conditions necessitate gymnastic exercises of the fauces with a mirror, and there must be constant drill until the muscles are so controlled that we have proper resonance and a soft palate capable of controlling the direction of the passing stream of breath or voice.

The question at once arises: how is it possible for a deaf child to reproduce sounds whose positions, as in the case of the guttural and nasal consonants and nearly all the vowels, he cannot even see? It is in the solution of this difficulty that the visible speech diagrams of Dr. A. Melville Bell have been of the greatest possible value. The teacher outlines upon the blackboard the profile of one of the class. Within this outline are drawn, in their natural positions, the teeth, the tongue, the palate, etc., making, when completed, a cross section of the vocal organs. The pupils

*The non-vocals qu and x are placed in the second group because of their difficulty for beginners.
quickly grasp the idea of assuming the positions suggested by the drawing. Another most important use of the diagram is in portraying faulty positions so frequently assumed by pupils. For instance, the trained ear of the teacher may tell her that a pupil is making $g$ by bringing the back of his tongue into contact with the back of the pharynx instead of the soft palate. By drawing a diagram of this faulty position and contrasting it with the correct one, the pupil is enabled to correct his mistake at once. With older pupils the cumbersome diagrams may be discarded and visible speech symbols used instead. These symbols are really abbreviated diagrams and, if rightly understood by the pupil, enable him to take the proper positions for the elementary sounds at sight.

But the ability to pronounce the elementary sounds is only the beginning of articulation drill. In speech the sounds do not follow but over-lap each other, and each sound must be practiced in combination with every other—as the manner in which they overlap varies with almost every combination. Smoothness of combination must be secured and the pupil trained to put stress upon the vowel as soon as he begins to pronounce syllables. When two syllables are joined, drill on accent must begin and that be followed in turn by work on emphasis and phrasing when words are grouped in sentences.

The work in articulation here given in the barest outline may, as I have already said, be accomplished by the deaf child in the first few months of his school life. But years of intelligent painstaking instruction are required if he is ever to master speech and gain the knowledge it alone can give.

The first necessity for every deaf child is an intelligent, trained articulation and language teacher, preferably of course in his own home, but, if circumstances make it impossible for him to receive expert instruction there, he should be placed in a school as near his home as possible, for it must always be remembered that he, more than his hearing brothers and sisters, needs the protection of home and family affection. His world is a world of fact—he is without the humanizing influence of the nursery rhyme, the fairy-tale or the Bible story—and with him out of sight is often, literally, out of mind.

In schools located in large centres of population, pupils may easily be kept in close touch with family life and so, free from the unfortunate tendencies of unbroken institutional routine.
Under expert instruction the better grade of pupils often become so proficient that they may be placed in schools with the hearing for the work of the High School grades, or indeed in schools for still higher collegiate training. Attempts to carry on their instruction with hearing children in the earlier stages have proved very unsatisfactory and can only be made successful by giving the pupil the assistance of an expert tutor. Such ideal conditions are obviously impossible for the mass of the deaf.

Theoretically the day school for the deaf of large cities has many arguments in its favor, but where such schools are a part of the public school system the fact has not been sufficiently recognized that, to overcome the serious handicap of deafness, the pupils require much more than the ordinary public school facilities for education. Gymnastic and industrial training are now-a-days regarded as absolute necessities in the training of growing boys and girls, and so far have been adequately provided only by the boarding schools.

In this brief presentation of the subject assigned me—the Development of Speech in the Deaf Child—I have pointed out the differences in physiological structure and psychological function between the brain of the normal and the deaf child, and endeavored to show in what manner and to what extent these differences may be overcome by proper instruction in speech. The occasion and the limits of this paper obviously forbid my attempting more than a passing mention of some of the more important points in a work which requires, for its prosecution, expert training and long experience. In concluding permit me to add the thought that your society may do much professionally to aid us in this work. It is a matter of prime importance that the vocal apparatus of deaf children be maintained in a healthful condition and that whatever traces of hearing they may possess be conserved and strengthened. It is perhaps of even greater importance that medical men should be conversant with the best methods of oral instruction and their possibilities. The parents of children afflicted with deafness very wisely turn first to the members of your profession for advice and assistance. Upon your advice, in the great majority of cases, depends the deaf child’s whole future. It therefore would be of incalculable advantage to the child, and an aid and an inspiration to his teachers, if the recognized professional ability, which has done so much for his physical relief, might be enlisted in the cause of his mental and moral development.
THE DEVELOPMENT OF LANGUAGE IN THE DEAF CHILD

By J. W. JONES, Columbus, O.*

(By Invitation).

To those who are familiar with the uneducated deaf child, it is well known that he is in no wise apparently different from his hearing brother. If nature's touch has not deformed or dwarfed his mental powers, he is alert, active, quick to comprehend, and responsive to all calls upon his attention. His body is vibrant with energy, and yields readily to the activities of play and games. He responds to the call of his parents to do chores about the house with the same interest and enthusiasm as the other children. He may go to the grocery or the butcher's and return with the articles for which he was sent, in less time perhaps than other children because he has not stopped on the way to talk. He is familiar with the fields, orchards, trees or public buildings which are near and around his home. He is acquainted with the call of the physician and the visit to the dentist and the oculist and knows the official function of one from the other. He is as much at home in the nearby swimming stream as any of the other children. Every piece of household furniture he knows and its use. He knows the domestic from the wild animal: the one to pet and the other to flee from. He knows when the fire should be kindled in the stove and for what purpose and when a special meal is being prepared and why. He feels the pleasure and thrill of new clothes, a clean body and a combed head. In fact, as far as ideas are concerned, he has, perhaps, as clear a conception of the uses of things as the other members of the household. Yet he knows not the name of one. He is without any means of expressing his thought except in a very limited and in the very crudest way. He lacks language. Being shut out from the world by the loss of hearing, the natural avenue of learning language, he must needs go through the hardest and longest processes for acquiring it.

In fact the accepted philosophy up to the close of the sixteenth

* Superintendent of the School for the Deaf.
century and the beginning of the seventeenth, announced by Aristotle, declared that the deaf child could not be instructed because he lacked language. "That thought and information could only follow instruction in language and could in no way precede it." Such a theory was ably upheld by some of the brightest men that our most enlightened countries of the middle ages and thereafter furnished. It prevented any general attempt to educate the deaf. At this time, however, its correctness was vigorously denied. It was discovered that a great many bright deaf people had learned to express themselves in various ways showing their minds as abounding in good ideas and an understanding of the nature and work of almost everything with which they came in contact, although they were unable to speak, read or write a single word.

Perhaps the greatest champion of this philosophy, since proven to be false, was the brilliant and distinguished John Conrad Amman, a Swiss physician. "In the human voice," he says, "may be said to dwell the very essence of life. The voice is a distinct emanation of that immortal spirit which God breathed into the nostrils of man when he created him a living soul." His chief follower, the well known founder of the education of the deaf in Germany, Heinicke, declared, "it was the voice which showed forth the glory of God's gift to man. It was speech only which fully comprehended, contained and expressed the movements of the soul. Every other means of communication was dead."

Charles Michael De l'Epée, a Frenchman and a resident of Paris, was the first to dispute this theory. He believed that the deaf could be educated to express themselves vigorously, beautifully and reverently, even though they might not be taught to use the voice for that purpose. In 1760 he established a school for the deaf in that great city and his instruction was based on a denial of the philosophy of Dr. Amman and his followers. He declared, "there is no more natural and necessary connection between abstract ideas and articulate sounds which strike the ear than there is between the same ideas and the written characters which address the eye." The means of communication in his school were speech, the sign language, finger spelling and writing. Thus the very inception of a concerted effort to educate the deaf in the world was marked by a dispute, and at no time since the founding of these two schools, in different countries, has there been unanimity in the methods of educating the deaf.
or in opinion as to what will bring to them the greatest blessings of life. But as to the correctness of the philosophy promulgated by Dr. Amman and his followers, the school of De l’Épée has demonstrated its absurdity. This school attracted world wide attention. It had visitors from foreign countries, among whom were crowned heads and prominent and intelligent people of all classes. The fact that the school he founded has since become a national institution, using speech exclusively, has in no way reflected upon his educational philosophy. Other considerations have brought about this result. But no one who is at all familiar with the accomplishments of the deaf, will deny that they may become well skilled in the use of language, being taught wholly and independently of speech. The thousands of deaf people in other countries, particularly in America, who have learned to express themselves first in the finger and sign languages and secondly on the written page, have substantially proven that the Abbé De l’Épée’s idea was correct.

But whether we accept the philosophy of Dr. Amman and Mr. Heinicke, or of the Abbé De l’Épée, the development of language in the deaf child is a most difficult task. It has occupied the best thought in all these years of those engaged in their instruction. It is the chief goal in their education. Instruction in every other subject depends upon their ability to use language intelligently and correctly. It requires time, patience, intelligence and a correct understanding of the use of the best devices which have been invented to teach the deaf child how to write language correctly in any reasonable length of time.

Any language is distinctly foreign to him. He must learn it as hearing people learn a foreign language except he has the additional handicap of being without any language in which to receive instruction, or with which to compare the new language he is learning. No lexicon is of any help to him at the beginning. Nor can we compare him with the hearing person in a strange land learning a foreign language. For there the hearing person is in touch with the new language at every turn, while the deaf child’s instruction must be confined to his few hours a day in the class room. The rest of the time he is left alone in his silence. He is cut off from the daily and hourly communication with those who know the language he is learning. It is, therefore, not a surprise that it takes a number of years for an intelligent deaf person to learn to use language well and that it takes in addition to ten or twelve years in his home school,
a college course to give him a fair mastery of written language. The written language of the partially educated deaf is much like the language of a foreigner who has been in our country a few years trying to learn English.

But to return to the beginning of the education of the deaf in France, we wish to note the plan adopted at that time and the changes which have taken place since. We return to France rather than to Germany or England, because it was from the French, America received her instruction in this particular line of education, and the French methods were adopted in the first school established in the United States at Hartford, Conn., in 1817. From that school sprang all the earlier schools established in the various states, which schools copied the methods used in Hartford.

The sign language as founded by De l’Epee was quite different from that in use at the present time. It was a language of word signs. The present sign language is one of signs for ideas, and is more natural and pleasing to the deaf than its predecessor. (It would naturally be expected that there would be improvement; but whatever improvement has been made, the glory and honor which the educated deaf the world over originally bestowed upon De l’Epee for the great blessings he brought to them, have not diminished in the least, but rather grown as the years succeed each other.)

He was succeeded by the Abbé Sicard, who enlarged the scope and perfected the system of his predecessor. Under it the bright deaf child could translate a story rendered in the sign language into French almost word for word, although he might not know the meaning of much of the language he had translated. This correct translation, wonderful as it appeared, was really not satisfying to the teachers of the deaf, because they found their pupils when thrown upon their own resources and required to express their ideas in written language, fell far short of the correct expression.

Sicard was succeeded in 1822 by Bebian, who conceived that the converse of the methodical sign language established by De l’Epee would be the better method of securing the correct and original expression in written language. He therefore discontinued the methodical sign language which, as has been said, consisted of a sign for each word, and adopted the pantomime, which means, a natural language for ideas. He felt if the pupils had correct ideas and were forced to express them in their own
language, a more perfect written language could be attained. This was a new idea and theoretically had much to commend it.

It is an old and well known proposition in teaching that pupils learn best by doing. Why should it not apply to deaf children? They received and imparted their ideas in natural pantomime. Why should they not become masters of written language by being compelled from day to day to express these ideas in writing under the direction of their teachers? It looked plausible and reasonable, and so this new idea soon spread. Besides it was the easiest and most beautiful language and this helped to its ready acceptance. A few years of experience in testing it, demonstrated that as far as it enabled children to express themselves in correct written language, it was ineffective except in the hands of the most skilled teachers. The same errors constantly appeared in the written language of the deaf as existed before.

Another philosophy appeared in 1836. It was announced by the Principal of the National Institution at Bordeaux. He had been a pupil of the famous Pestalozzi and was therefore afire with enthusiasm and earnestness. He conceived the idea that the sign language of whatever kind was the confusing element in the teaching of language; that the well accepted educational proposition stated above, "learning by doing," would find its best application in teaching the pupils from first to last, to use written language without the intervention or help in any way of signs. He therefore depended entirely upon the spelled and written language.

This Principal was J. J. Valade-Gabel. He was an indefatigable reformer. His ideas, therefore, were seized upon by many people who had been discouraged in teaching the deaf written language. The sign language of ideas, however, was so easily understood that its supporters refused to dispense with it for this new intuitional language and but little progress was made in supplanting it, except in the one particular school at Bordeaux. I know of but one school in this country whose management has accepted the Valade-Gabel idea. This is the School for the Deaf at Rochester, N. Y., under the able management of Mr. Z. T. Westervelt. His system of instruction is based upon the practice of the manual spelling in all communications between the pupils and teachers. It is practiced on the playground, in the dining room and everywhere there is occasion for conversation. In this school the sign language is entirely abolished and the English language in spelling and written form is everywhere used.
It is claimed by the friends of this school that its pupils have a better command of the English language than most other schools for the deaf. This, however, is disputed by the friends of other schools.

It is now necessary to consider the effectiveness of the educational philosophy of Heinicke of Germany. His philosophy will be remembered as having speech and lip reading as its basic principle, a prerequisite, as he claimed, to the development of ideas and the teaching of language. His method of instruction spreading to England and other Anglo Saxon nations has taken greater and greater hold upon all schools for the deaf throughout the civilized world including the school founded by Abbé De l’Epée in Paris. The growth of the idea and the wide spread use of speech and lip reading throughout the world is not so much due to its effectiveness in the teaching of language as it has been brought about by the desire of the parents of deaf children that they should talk and be able to understand what others say by reading the lips and by their abhorrence of the ‘‘hand language’’ as they term it.

Being a system of education, however, which must necessarily make constant use of language in its natural order, its friends claim, as did Valade-Gabel, that it is the very best method of teaching language and that the pupils so taught express their ideas better and with much more certainty and ease than pupils who are taught the manual and sign method. This part of the theory is now generally accepted by all educators of the deaf, even in schools where the sign language and finger spelling are the accepted method of communication. In such schools the signs are restricted in the school room and the pupils are thrown upon the use of English expressed by speech, finger spelling and writing.

This unanimity of opinion, as far as teaching language is concerned, did not express, however, the satisfaction with results accomplished. The correct use of language by the deaf has always been, and is today, whatever methods have been used in teaching, proportional to the intelligence, the length of time the pupils have been in school and the ability and enthusiasm of the teachers who have given the instruction.

This leaves us to consider the various devices and plans which have been invented and developed for the purpose of teaching language better, all of which have grown out of the unsatisfactory results attained.

The best way of describing the language of the partially ed-
ucated deaf is to say, it is mixed. The order of words has always been a bugbear to them. The various verb forms have given them much labor and worry. They are liable to use one part of speech for another, using nouns, adjectives, adverbs, etc. as verbs. The idea may be right in the child's mind and it will be understood when put on paper, but his manner of expression often causes merriment to those who read.

A most striking illustration of that came to my notice a short time ago. One little boy was seen to strike another in class. His teacher reproved him. His defense was, "I whyed him and he wouldn't because me.' No one would misunderstand what had taken place between the two boys, but he took the shortest and to him, the most effective method of stating it.

A teacher had taken her class to see the Seventeenth Regiment leave for the Phillipine Islands. She desired to use the occasion for journal writing and as a language drill. On the return the pupils were to write what they had seen. One boy wrote, "Many men were banding, but I did not see them horn." Evidently he was impressed with the great number of men in the band but that they were not playing when they passed him.

A girl in describing sheep shearing said, "The farmer washed and nicely the sheep.'

A little fellow handed to me, one day, a letter which he had written to his father and his first sentence was, "I am dead. The boys kill me.'

To overcome all these difficulties, the earnest teachers of the deaf have devised many plans. One of the earliest was the separation of sentences into their component parts having symbols for the various parts of speech and drilling the pupils to a perfect understanding of them. With the symbols before them, they were enabled to follow in the natural order, but without the symbols they fell into the same manner of errors as before. This was known as the technical grammar method. Pupils were required to diagram sentences and parse words to the minutest detail of etymology and construction. This method was pronounced by Dr. E. A. Fay, Professor of Gallaudet College, to be the worst of all and it has been generally abandoned.

The technical grammar method being stripped of much of its detail, and the technical names being used as nails on which to hang the descriptive terms, in explanation, is a valuable aid in teaching language. It is used in simpler forms in many of the best schools throughout our country.
Opposed to this method in the earlier day was the sentence method. This gave expression to the idea as a whole. It is also in use in many of our schools at the present time.

There are a great many other devices in more or less general use. Some have been confined to a single school room, others to a single school; each serving its best purpose in the hands of the teacher who invented it and who has the best knowledge of it.

The teaching of the deaf is necessarily objective until a knowledge of the language is formed. Hence the school rooms for the deaf are well equipped with objects and pictures and the skilled teacher of the deaf is ready with the crayon in drawing. From these objects and pictures a large vocabulary of nouns and adjectives is secured. By means of actions, a knowledge of verbs is attained and their names are learned. Putting these together, we have simple sentences which the children soon understand. After acquiring a certain amount of language, the processes of education are about the same as are adapted to hearing children in public schools.

But no device has yet appeared which makes the work of teaching language easy or which will take the place of the intelligent, enthusiastic and industrious teacher. In her hands, whatever plan is used, the best results will be attained. She will equip her school with objects, pictures, and appliances and use them all as the condition and the necessity demands. As physicians are born, so are teachers. As there are lifeless, clumsy, disinterested, ineffective physicians, so there are weak, ineffective teachers. As instruments are helps in your hands, so are devices, books, and pictures but helps to the intelligent teacher. As in your heart and personality must be the elements of success, so must the fountain from which will flow the greatest accomplishment in teaching language to the deaf be found in the teacher herself. Under any and all circumstances, the road is difficult and beset with many discouragements. To her who is most liberally endowed by nature, is in the best state of mind and health, with the deepest insight into human nature and filled with the most enthusiasm, the journey is the easiest and safest.
THE DEVELOPMENT OF SPEECH READING IN THE DEAF CHILD.

By MISS McCOWEN.

However well a deaf child may be developed mentally, educated in the knowledge and use of language and speech, and trained to understand all that his partial hearing appropriates from the world of sound, without speech-reading, he is still on the off side of a chasm with no bridge near to span the distance between him and the world of hearing people.

True, he may flash a message across by the use of conventional signs, but like the wireless, this can only evoke reply from the one among a thousand or more who is familiar with the language of signs.

Or, a message may be sent by finger spelling, but this too will only be recognized and answered by the few who have been trained to know language through finger spelling and it, in common with writing, has also the additional disability of being "the longest way around"—naming every individual letter in every word used—and both writing and finger spelling are therefore accounted slow and tedious by the general public.

Speech, because the universal medium of communication, even poor speech, if barely intelligible, appeals to and is understood by the whole world of hearing people and through speech-reading may bring direct and swift reply.

What, then, is speech-reading, this medium that puts the deaf child who never heard, and keeps the partially deaf child or adult who is gradually losing hearing, in close touch with friends and associates of the hearing world—the ability to understand spoken language by watching speech movements on the face of the speaker.

Truly this sounds very simple, but it too must have its limitations.

Reading we know is interpreting the thought of others expressed in language symbols (written or printed).

Speech-reading is, therefore, interpreting the thought of others expressed in speech. Speech is the universal oral symbol of language and speech-reading must therefore impose a knowledge of both speech and language upon the part of the speech-reader.
Thus is established one definite limitation upon the realm of speech-reading which is large or small, broad or narrow, according to the knowledge and understanding by the speech-reader of speech and language.

Language the inclusive term, is here construed to mean the accepted medium for expression of thought and interchange of ideas among human kind, and assumes various forms, some of which appeal to the eye and others to the ear, some being expressed by the hand and others by the mouth and allied organs of voice expression.

Signs, gesture, finger spelling, writing and print are expressed by the hand and appeal to the eye.

Emotional language and speech are expressed by the voice and appeal to the ear, emotional language including the cry, laugh, sigh, shout and song, speech being the one oral symbol of language expressed in definite words.

To illustrate the interdependence of speech, language and speech-reading, we note the following conditions:

A deaf child can be taught to articulate the elements of speech clearly and to pronounce words, but unless such articulation stands for the expression of thought it would remain simply articulation, could not rightly be called speech, is not in any sense language and could therefore be no basis for giving such a child the art of speech-reading.

Again, it would be entirely possible to teach speech-reading to an educated deaf person who had no knowledge of speech, but in such a case the speech symbols would be interpreted not through the spoken or heard language symbols, because unknown to such a one, but through the familiar written language symbols, and speech-reading having so little opportunity for use would be of correspondingly limited practical value.

To a deaf child who knows nothing of either speech or language, the movements on the face of a speaker would be necessarily meaningless.

One who has made a bare beginning in language getting and knows say ten words, if taught orally, will understand by speech-reading those ten words.

One with what might be called a Second Reader vocabulary will be able to understand to the limit of that vocabulary, while a man of culture, speaking fluently several different languages, if deaf or becoming deaf, can be taught to understand through speech-reading any one or all of those languages.
In analyzing the possibilities of acquiring speech-reading we find a still greater difference between the deaf child just begin-
ing to get an education through speech-reading and the educated adult who is becoming deaf and wants to learn speech-reading. The latter has command of a conventional language—his mother tongue—and through the printed page he can still keep in touch with all that is being done in the world. Speech-reading is to him merely another form of language to master, a translation as it were of the known language forms, spoken, heard, written, into the language of mouth movements or more properly facial move-
ments, and can be acquired by any intelligent adult who wishes to give the matter sufficient time and effort.

The illogical spelling and idiomatic structure of English add to the difficulty, but these while somewhat different, are no harder than the difficulty met and mastered by every little hearing child in learning to read.

For the little deaf child there can be no process of translation, for he has no language to translate—has yet to learn his mother tongue. When taught orally, speech-reading becomes to him the unconscious medium through which he learns his first vocabulary and which he should continue to use as unconsciously as the hearing child uses hearing in getting his education.

As to the process, Mother Nature’s way of learning a language through use is a good rule to follow in learning speech-reading.

Life, even the simplest, is but a succession of situations that demand the use of speech expression and these, if rightly utilized, furnish ample opportunity for the little deaf child to acquire the understanding and recognition of language, which is speech-read-
ing, unconsciously before he is of school age.

Too often, however, this golden opportunity is wasted because the child’s companion, be it mother, sister, servant or friend, either does not know how, or is too much occupied with other cares to give the little deaf child the necessary attention and the time, both of which are, in this case, absolutely indispensable elements.

It is always easier when a deaf child is wanted, to beckon with the finger than to take time to teach him to understand and recognize the spoken word “come” or “come here” or “come to me,” but when once learned, the one is no longer more difficult than the other and the more frequently the word is used and understood the stronger does the habit become of watching the face instead of the hand for speech.

It is much easier in the beginning to think for a deaf child, to
supply his every need without giving him a chance to try to ask for what he wants, but this habit of mistaken kindness which anticipates every want, robs him of his inherent right to learn language in the easy natural way—through use—and sends him later to school, not only without language, but without that mental quickening and discipline that comes from early natural language getting and leaves him permanently at a disadvantage.

The hearing child is unconsciously absorbing language through all his waking hours and it matters not what language, nor how impossible it may seem to an adult.

Indeed, no language is too difficult, even the most intricate, for the hearing babe to learn to understand, and later to use, if only he be surrounded by it, if it happen to be the vernacular of his environment at the natural age for language getting.

Parents who wish their hearing children to acquire fluency in a foreign tongue provide them while young with a companion using only the desired language.

Could we but give every congenital deaf child a chance to learn language through use—and by means of speech-reading at the natural time—before the Kindergarten age, we should have fewer so-called stupid deaf children in our schools. One additional advantage of this early training will be at least a partial elimination of the uncomfortable "deaf-mute" voice spoken of today.

The initial expense would no doubt be greater, but the results as compared with present conditions would more than compensate.

Another large class of children to whom speech-reading may be of untold value is the adventitious deaf, whether total or partial, and the congenitally hard of hearing. Some of these children are permanently in schools for the deaf; many hundreds more are scattered throughout our public schools and, misunderstood and harshly misjudged as they often are, should command our interest quite as much as the congenitally totally deaf child. All who are "too deaf to hear the question and response of the ordinary recitation in the regular school room unless given speech-reading, will ultimately fall behind their classes, the schoolwork becoming more and more difficult and impossible as they advance in the grades, and as more is expected and demanded of them, 'till they finally reach a point of utter discouragement, where the effort to participate in the activities of the school room continually leads to uncomfortable mistakes and misunderstandings, their unhappy isolation being far greater than that
of the deaf born, for they know what they are losing and rebel bitterly against the deprivation."

All this class of children to begin with, have approximately perfect speech, but without speech-reading, as they naturally use speech less and less, it will steadily deteriorate.

At this stage the pleasure derived from speech by one unacquainted with speech-reading might be likened to the pleasure derived from using a disconnected telephone into which one might still speak, but through which no reply could reach the speaker.

If all such children should be recommended to a teacher of the deaf to get speech-reading as soon as their growing deafness were discovered, a majority of them could return, after a time, to their classes and using speech-reading complete their education with hearing companions.

Of the three classes named for whom speech-reading is possible and a distinct advantage, the little deaf-child is the only one for whom it may be said to be easy, and that only when acquired unconsciously in the process of language getting.

The degree of so-called difficulty for the child with perfect speech and some education who becomes deaf and the adult who is deaf or becoming deaf, depends largely upon the individual attitude towards study or any sustained mental effort and their earnestness of purpose.

A foreigner who comes to this country without funds and who is obliged to make himself understood and to understand when spoken to, or starve, will acquire English in a surprisingly short time.

The records of success in the world in every path are the records of those who earnestly wanted something and who were willing to work for it till secured.

The man who, losing his right arm, would still find a way to do a man's work in the world, if deaf, would get speech-reading.

In this brief presentation we have discussed none of the technical difficulties of speech-reading, have barely mentioned the economic question and expense is usually an important factor. I have urged it, not as an end in itself, but as a means—the most practical—toward bridging the gap between the deaf child and the hearing world: a step that if persevered in will bring one of the so-called defective classes (and that the most hopeful) a little nearer the normal type of man.

The one armed man though in spirit he surmounts his affliction
and does a man’s work, must remain physically a one armed man, the deaf child—deaf, but with the alert mind, the eye trained to catch thought from the subtle movements of the speaker’s face, the deaf child will be able to give and get more in the home, at school, among friends, in business, and in social life; to live a more helpful and happy, a richer and a fuller life.
THE DEAF CHILD FROM THE VIEWPOINT OF THE
PHYSICIAN AND OF THE TEACHER.

By JAMES KERR LOVE, M. D., of Glasgow, Scotland.

(By Invitation)

Speaking, as I do, in the city of the younger Gallaudet, the
greatly respected Principal of the College for the Deaf, I am
reminded that nearly 100 years ago his father came to Scotland
for information about the education of the deaf and that we,
metaphorically shut the door on him. Gallaudet met with the
same treatment in England and must have met with it in any
country where speech was taught to the deaf, for at that time
the art was a proprietary one.

Gallaudet turned, therefore, to France, where the Abbé De
l'Epée's sign system could be openly examined.

I am here, therefore, if you will let me say so, to repay a little
bit of national debt, and I take this opportunity of thanking this
American Society for giving me the chance of doing so, and also
for the great honor they have conferred on me by inviting me
to come.

To understand just what speech means to man we may reflect
on the cases of those children, few in number, who have grown
up outside of human society with only the lower animals for
companions, and using this as a link we may travel back in
imagination to that period in human history when speech was
not.

Leaving this stage with its sign language, its inarticulate vocal
calls, its poorly developed thought and returning towards our
own time, we find primitive speech such as may still be found
amongst barbarous tribes. Writing of some kind must have
been the next great advance in civilization, and although we do
not know the names of the inventors and are hardly sure of
their nationality, two inventions followed, beside which our rail-
ways and telegraphs are relatively unimportant. I refer to
the invention of the written alphabet and of the system of
numerals. With speech, a written alphabet and a system of
numerals, the progress of man was assured—the printing press
and the electric telegraph valuable but relatively unimportant later details.

Speech is the silver bridge over which the thought of man has come to travel. When an adult becomes deaf this bridge is broken at its further end and is best repaired by using the eye for the lost ear. In congenital deafness the whole bridge has to be laboriously built without the aid of the architect—the sense of hearing.

If less worthy material than speech be put into the structure, the passage of thought is impeded. The deaf man feels lonely and the deaf child, who would reach out to all knowledge and truth is disappointed because he is misunderstood and his questioning glance is not answered.

That signs are the natural language of the deaf is a statement constantly reiterated in books and on platforms. This is a dangerous half truth. Signs are really a natural language both of the deaf and of the hearing. Speech has become the natural language of man and a far more important one than signs.

In the absence of hearing which so greatly facilitates the acquisition of speech, deaf children take to signs naturally by reverting to the habits of a more primitive type—by atavism in fact.

Similar reversions are the ability to move the ears by means of the extrinsic aural muscles, the tendency to scratch by a scolding woman, who finds her speech insufficient to express her anger. Now I do not say that the ability to scratch and to sign are of no value. Under certain circumstances, I am prepared to justify both. But to describe either as natural, except in the sense that they are "reversions", is incorrect. In education we must bring the deaf into the company of the hearing for we will never get the hearing back to the pre-speech stage of language—the stage of natural signs.

In looking over the work done for the deaf during the past 300 years one is struck by the scarcity of medical names on the list of workers. These years may conveniently be divided into two almost equal periods of 150 years—the first or sporadic period beginning with Bonet towards the end of the 16th century, the second or systematic period, beginning with De l'Epée about the year 1760 and extending to our own time.

I think we are at the beginning of a third period which I may call the clinical period during which, medical men and teachers will co-operate with results beneficial to the deaf child in a de-
gree hitherto undreamt of. Hence the importance of this meeting.

The cause of the neglect of the deaf child by the medical man is that the former has never been regarded by the doctor as a patient. A patient is a diseased person who is being studied and treated by a doctor. Now our chief business is to get the deaf child raised to the rank of a patient.

During these 300 years several medical names appear.

In the sporadic period Dr. John Bulwer published between 1644 and 1648 several works on the education of the deaf. There is nothing clinical in Bulwer's treatment of the subject of deaf-mutism and his writings might be the product of one of the philosophical divines like Holder or Wallis who wrote during the same period.

The work of the sporadic period was chiefly oral. The preference for the oral element was based on what we may now regard as a fortunate fallacy—that without speech there could be no thought. But for this fallacy, one can hardly see how any of the deaf would have been taught at all. As it was, the sporadic period was that of the education of the deaf rich.

Another medical writer of the sporadic period was Dr. Amman, born at Schaffhausen in Switzerland, in 1669, and in after life a practitioner at Haarlem, Holland. Amman was an oralist—even the titles of his books proclaim him so. "Surdus Loquens" and the "Disertatio Loquela" are eloquent of their purpose. But with Amman there is no traceable physiological basis for oralism. Speech and language are represented as gifts bestowed on man at his creation, all but lost at his fall and now existing even in the hearing, as a conventional artifice, without which we should be mute. Amman's oralism was based on his views on the divine origin of speech and on his mistaken idea that only speech could be regarded as language.

Coming now to the second or systematic period which began with the Abbé De l'Epée and Heinicke, we find in the educational records hardly any medical names at all. With the single exception of Dr. Graser of Bavaria, who introduced the practice of making the education of the deaf a part of the public school system, no medical man until recent years seems to have taken any interest in the education of the deaf. Deaf scholars on Graser's plan, spent 1½ or 2 years under special training before entering the ordinary schools for the hearing.
This plan failed, as even with our better organized school system, it would, I think, still fail.

In 1880, Hartmann of Berlin wrote his book on deaf-mutism, by far the ablest medical work on the subject which has ever appeared. Hartmann’s book is full of insight not only regarding the morbid anatomy of deaf-mutism but regarding the living deaf-mute child and educational problems, and has not received the attention it deserves either from medical men or from teachers of the deaf.

What then was the attitude of the medical profession during this second or systematic period, at the close of which I am speaking? Generally the doctor refused to regard the deaf-mute child as a patient but thought he would make an interesting pathological specimen. “He is deaf and dumb and I cannot do anything for him, but send me his temporal bone after he is dead and I’ll examine it; the result will be very interesting.” Thus spoke the doctor.

From the end of the 18th century until now we have about 200 examinations of the temporal bones of deaf-mute children. Now, if this attitude of my profession were merely an historical one I should not discuss it, but inasmuch as it is still quite a common one it merits examination.

That interest in the deaf child is chiefly a post-mortem one amongst present day doctors is easy to prove.

Three or four years ago I visited Mygind, of Copenhagen, whose work on deaf-mutism from the side of morbid anatomy is of great value, but who has no connection with any institution for the education of the deaf, and if you will refer to Mygind’s book, you will find that he treats the subject of education of the deaf in a single page and whilst indicating a preference for the oral method, he dismisses the question of whether all should be taught orally or some manually, by saying that “the solution of this problem must be left to pedagogues.”

Further evidence of this kind of preference for the deaf child is that in the otological journals, nearly all the references are to the post-mortem findings, seldom to the clinical features of the deaf child. As a subject of scientific research the examination of temporal bones of deaf children is interesting and valuable, but it is of little educational value. There are two reasons for this. The diseased process is a finished one and even a complete knowledge of the pathology of deaf-mutism would not enable us to do anything to cure the deafness which causes the
mutism. The disease has long ago destroyed the elements of
the cochlea and we will never be able to replace them.

The second reason is, that although the deafness is due to
changes in the internal ear, these are merely an outworks or
by-product of a more general disease and it is the prevention of
this latter and not the study of the by-product which will help
the children of the future. This is true of measles, of scarlet
fever, of meningitis, by far the commonest causes of acquired
deafness, and it is true of syphilis, perhaps the commonest cause
of congenital deafness.

Even as a department of scientific investigation, this study of
the temporal bone is robbed of much of its value, by the fact
that it is very difficult to place alongside the pathological find-
ings, the clinical history of the illness causing the deafness, or
even to state whether the deafness is congenital or acquired.

Recently Bezold of Munich has added an interesting section
to the study of the deaf mute child. He has mapped out the
islands of remaining hearing—as I have done in the chart I show
you here. Bezold was the most careful clinical investigator of
the deaf child whom I have ever seen at work, and if I could get
the temporal bones of these 30 deaf children and examine them,
and then place the pathological findings alongside the clinical
chart, I might be able to throw some light on the physiology of
hearing and the pathology of deafness, though I could hardly
help the deaf child. But as these deaf-mutes are all young
healthy children and likely to outlive me, what chance have I of
completing my picture.

While this kind of research certainly should go on, I appeal to
the practical men in the both professions to look at the living
deaf child, to see what is left of his hearing and speech, to see
that the most is made of his eyesight and whilst aiming at the
acquisition of speech in as many cases as possible, to cease teach-
ing defective deaf children by a method which is unsuitable.

If during the systematic period the doctors have done so little,
what have the teachers done? Briefly stated they have elabor-
ated two opposing methods and made them about as perfect as
human effort is likely to make them. I refer to the manual
alphabet method and to the oral method.

De l'Epée and his successor, Sicard, did all that enthusiasm
and genius could do to perfect a system of signs and they failed.
They based their system on the fallacy that signs are the natural
language of the deaf. De l'Epée assumed that the natural or
mimic language of signs was the only one in which the deaf could think or reason.

Now, signs are no more the natural language of the deaf than of the hearing, but in the absence of speech they are the best the untaught deaf can do in the way of finding a substitute for speech. Speech is natural to both hearing and deaf children but the conventional forms in which it exists are not natural to either. Both have to learn these forms and in the absence of hearing this task is very difficult. Hence deaf children fall back on the easier and more primitive language of signs.

If what I am stating about the natural languages of the deaf seems to belong to academic discussion and not to practical education, I have to remind you that fallacies on this point have given definite and opposing directions to the efforts of educators for 300 years and have produced a war of methods extending over 150 years, a war which is not yet over. Here I wish to state that speech is a natural language of deaf children, and that our business is, wherever possible, to assist in its development.

To talk of signs as the natural language or the mother tongue of the deaf is physiologically incorrect.

If you hearing people enter a foreign country, the language of which you do not know, you will have to sign. You will take to it as naturally as the deaf and dumb, and if you are looking for a lost travelling case you will spend an hour in trying to make yourselves understood and may fail in the end although the case be lying in the back room of the agency all the time.

You may have as much language as you choose, you may have as many languages as you choose, but unless you have that language which is known to the group of people around you and unless you can express that language in speech, you do not belong to their world.

Signs are not the language of nature, they are a language of necessity forced on impaired or uneducated human nature.

If a child have neither sight nor hearing, he uses a more primitive language still, the language of the sense of touch—the language of a sense which existed before either eyes or ears had appeared amongst living creatures.

In talking of natural languages and mother tongues, let us be quite clear that speech is the natural language of man.

During the latter half of the 18th century when De l'Epée in France and Heinicke in Germany turned their attention to the public education of the deaf or to the education of the deaf
poor, no educational arrangements existed even for the hearing which were at all comparable with those of our own day.

Neither De l'Epée nor Heinicke started life as teachers of the deaf. De l'Epée was first a clergymen, then a lawyer, then again a clergymen. He was nearly 50 years old when he accidentally met the two deaf children who gave him the chance of doing the great work of his life.

Heinicke was first a farmer, then a soldier, then a tutor and secretary, and lastly a precentor at Eppendorf, where he stayed till 1778. He too, like De l'Epée, was by this time nearly 50 years of age. There was still no public school for the deaf.

Heinicke educated one deaf boy with some success at Dresden during his soldiering period, and a few more at Eppendorf during his precentorship and because of his success with these, he was asked by the Elector of Hanover to come to Leipsic and found the first school for the deaf in Germany. This was in 1778.

Such were the first public school teachers of the deaf. They had no training as such, and any help they could get was from the books written during the sporadic period by the men who had taught single or at the most, two or three children of wealthy parentage. Neither these teachers nor their successors had any idea of the capacity of deaf children. They discovered that the average deaf child could be taught, but they had no idea of his ever taking his place in the hearing world. Deaf children had to gather round these pioneer teachers and as the children were poor and the work had to be done by charity, the institution was inevitable. Even if the education of hearing children had been general then as it is now, even if it had been compulsory and free as it now is in many countries, the institution for the deaf had still been inevitable, for the deaf child himself was not understood and when the first institutions in England and America were established they called themselves Asylums.

Now in describing the institutions as inevitable and recalling their original titles as asylums I am not condemning them. They were just what they called themselves—homes where the deaf children of the poor were clothed and educated. These asylums or institutions have done a magnificent work. Without them the deaf children of the poor could not have been educated. For one hundred years they did for deaf children what must otherwise have gone undone. But they have done more. Gradually within their walls, the capacity of the deaf child has come to be recognized until now his teacher is not afraid to state that unless
the deaf child be also mentally defective, he will with time and patience make him a capable and reliable citizen—a help and not a burden to the state. This is the great work of the institutions.

What would the deaf child of today do without the experience which the teaching of his predecessors in institutions has accumulated? A glance at the arrangements for the education of the hearing children of the latter half of the 18th century may now be taken.

In France, where the first public school for the deaf was started in 1760, education was in the hands of the Jesuits. When the children of 1760 had grown to be adults—say in 1790—53% of the men and 73% of the women could not sign their names to their marriage contracts. The teaching of hearing children was entirely in the hands of the church, and the church taught hearing children for the furtherance of its ends, not theirs. It taught them nothing that had for its object the making of useful citizens. Protest was constantly made that even the French language was not taught, that history and geography were not taught even to advanced scholars, and that education was nothing more than the study of books filled with "vain distinctions and frivolous questions." La Chalotais and Rolland, the great pre-revolutionists, had not begun to write. The essay of the former did not appear till 1763 and Rolland's report was not made till 1768.

Even at the revolution, when Mirabeau and Tallyrand laid down the principles on which the education of the child must proceed in the interests both of the individual and of the nation, practically no work had been done for the hearing children of the poor. An interesting exception to this statement may be made in the case of the schools founded by La Salle, because these were residential schools for hearing children, in which speech was repressed as much as possible and much of the teaching done by a system of signs.

In the German countries the education of hearing children was hardly better than in France. True, public instruction was considered to be an affair of the State and education was less under the control of the church than in France, but the results were very poor and most of the children of these countries got no instruction at all. When Pestalozzi, the De l'Epée of hearing children, took to teaching 15 years after the French Abbe, it was to found an asylum for poor children at Neuhof.

In England, where the first public school for deaf children was
started in 1792, the institution for the deaf must have come, even if it had existed in no other country. The grammar school had existed for the children of gentlemen for 200 years, but it was only during the 18th century that the charity schools began to spring up.

"These latter were founded on a conception of education partly religious and partly feudal, but almost wholly ignoble and humiliating. The children were to be taught the church catechism, reading and writing, and in a few cases arithmetic, but were to be sedulously discouraged from attempting to learn more. They were to be clothed in a distinctive dress so as to show that they were objects of public benevolence and to remind them of their rank. There was no provision for girls in the grammar schools, but as a girl might, if poor, be needed to contribute to the comfort of her betters as an apprentice or a servant, the charity schools were open to her." Surely in England more than in any other country the institution for the deaf was inevitable.

Now I am not going at this stage to refer to the advantages or the faults of the institution system, but I wish to point out here two of its results. The deaf child had to leave his home and he had to associate outside the classroom with other deaf-mute children. The definition of a deaf-mute child was and is not what he could do, but what he could not do. He could not be educated along with the hearing children of ordinary schools. He might be wholly or partially deaf, he might be wholly or partially mute. He might be only very hard of hearing and have perfect speech. He might be aphasic with perfect hearing, dumb but not deaf. He might be mentally defective to the verge of idiocy, or he might be bright and intelligent. It did not and does not matter. Out of the home and into the institution he must go. There was nowhere else for him and there is, generally speaking, nowhere else now. So that the institution for the deaf became a kind of dumping ground for what the ordinary schools could not deal with, and in most countries it is so still.

Now such a statement needs proof; for if it is true, the condition which it describes should be altered.

If you will scan the membership of a deaf-mute class in the ordinary institution or in the ordinary day school for the deaf, you will find it composed as follows. There are 10 or 12 children. One or two are semi-deaf or very hard of hearing. that is they speak because of the remaining hearing they have; one or two
are semi-mute children who speak because of the speech they have not forgotten and which they acquired during the early hearing years of their lives; one or two are mentally defective deaf children, and there are half a dozen ordinary deaf-mute children.

Now you may have two methods carried on in the same institution, but you cannot have two methods carried on in the same class, and unless it can be shown that there is one method which suits children so unlike in educational needs, a minority must suffer, and this minority is often a large one. The truth is that the semi-deaf and semi-mute children should not associate with the deaf-mutes at all, even in the classroom. Their habits of thought are those of the hearing child. On the other hand, the mentally defective deaf child cannot be profitably taught orally, and in any case he wastes the time of the ordinary deaf-mute child and he will never use his speech; so that some kind of classification is necessary. And in very large institutions some kind of classification is possible and occasionally is attempted. In the New York Institution, for instance, I saw a class of semi-mute children, all the product of cerebro-spinal fever. At Dresden, I found the children in the institution classified into A, B and C classes. A—having most of the semi-deaf and semi-mute; B—the ordinary deaf-mute children, and C—all the weak-minded children. In London all the mentally defective children are in a separate institution. In Denmark, the semi-deaf and semi-mute are in one institution whilst the mentally defective deaf are in another.

But such arrangements are quite exceptional. The general practice is to have all kinds of deaf children in one institution or school and to have them distributed throughout all the classes. And this state of matters is getting worse. Compulsory education is sending may hitherto neglected children, and medical inspection many hitherto mis-placed children into the institutions for the deaf, and as many of the former are physically and mentally poor, and many of the latter speak and are only very hard of hearing, the need for classification and separation is growing.

What would you think of the physician who treated all feverish complaints with an antipyretic and made no differentiation in his treatment? If influenza, small pox, enteric fever and diphtheria were all treated by phenacetin or antipyrin merely because the temperature is high in each, and if no directions were given
about diet, or no antitoxin used, what would become of our patients? Or if all abdominal pains were treated by purgatives without differentiation of causes what would the death rate become? So, if all children are to receive the same educational treatment because they are more or less deaf and therefore cannot benefit from the classes in an elementary school, how can the best be done for them? As an example of how clinical examination makes for correct classification and for more efficient education, I might instance the recently formed classes for the semi-deaf and semi-mute in Glasgow.

As I have dealt with this school in a recent paper I mention it now only to state that it has just been extended, that there are 40 children on the roll and that it continues to receive children who have been in ordinary schools and in schools for the mentally defective but who have failed to make progress on account of deafness.

A more recent example I take from Bristol, England. In describing a class there which started on the 11th of this month the secretary of the Bristol education committee, writing on the 4th inst., states: "There will probably be about 10 or 12 children in attendance, some of them will be children now at the deaf institution who are semi-deaf but have a certain amount of spoken language, and a few others will be children who are now attending our special school for defective children but whose backwardness is thought to be due to deafness rather than to mental deficiency." But the most interesting illustration I can give you is from London, where another class for hard of hearing children is being started this month, and I am indebted to Dr. McLeod Yearsley, aurist to the London County Council Schools, for the following figures, contained in a letter dated April 4th:

"Since January 18th, 1910, I have once a week attended at the head office examining children sent up to me as deaf. The results are as follows:

<table>
<thead>
<tr>
<th>No. examined</th>
<th>Fit for ordinary school</th>
<th>Deaf school</th>
</tr>
</thead>
<tbody>
<tr>
<td>208</td>
<td>43</td>
<td>36</td>
</tr>
</tbody>
</table>

Fit for ordinary school—front row.

Hard of hearing.

Mentally defective.
These figures might be made to point to various conclusions. The one of interest to us here is that clinical examination is essential to any correct placing of deaf children. All of these children were sent up to the specialist by teachers or doctors as deaf and only a bare majority had any considerable deafness at all.

I must now revert to an aspect of the subject which I have postponed until the question of classification had been considered. Is there anything about an ordinary deaf-mute child which makes it necessary or even advisable to remove him from his home and educate him in an institution? I have already answered this question so far as it applies to the semi-deaf and semi-mute by saying that he should not associate with the deaf and dumb at all. I shall now answer it for the mentally defective deaf child by saying that there is good reason for removing him from his home and educating him apart, and I would extend his period of residence in some kind of institution to the end of his life, for two reasons: 1—He will never be self-supporting, and 2—if you let him out he will beget other mentally defective children.

The question is thus simplified or narrowed down to this: Should the ordinary deaf-mute—the subject of what I have called surdism—the child who is so deaf that he is also dumb—be removed from his home and merely because of his deafness be made to associate with other deaf children during the whole of his waking hours? To this question I answer NO. Such a child should attend a day school for deaf children, and when his school work is over he should go home, or if his home be too far off he should be boarded out in a selected household near the school. This plan preserves the family life of the deaf child, or where this must be broken supplies the best substitute. Further it gives the orally taught deaf child the best chance of practising what he has been taught in class. Outside the classroom he is in a world where he is induced to use all the speech he has. On this subject I quote Hartmann:

"It must be said that the influence of parental love upon the mind, the morals, and the character of the child living at home is a boon for which no substitute can be found in an institution."

"In this respect all children, deaf-mutes as well as others, are situated alike, and I consider the influence of the family life upon the child of such importance, that for this reason alone I would prefer a good school to which deaf-mute children, living at home.
may be sent to a large institution in which the children reside and are trained by their teachers."

Instead therefore of deafness being a reason for sending a child to an institution, it is, physiologically considered, a reason for keeping him out of an institution. The massing of deaf children tends to make them a race apart, and during their most receptive period deprives them of that contact with the world which is really an essential part of education. Within recent years education committees have taken in hand the feeding, bathing, clothing and drilling of hearing children, and if these committees will do all this for deaf children it will no longer be necessary to mass them together in institutions.

I have told you that I believe we have entered the third period in the education of the deaf child—the clinical period.

The great feature of this period will be the classification of deaf children on a clinical basis. It will involve both an extension of and a limitation of oralism. Where oralism is taught at all it will be taught thoroughly and unmixed. The period will also see an extension of the day school system and the restoration of most deaf children to family life. And it will see a larger number of the deaf than heretofore removed from the smaller world of the deaf and dumb and placed in the greater world of the hearing as capable and helpful citizens. Two great legislative movements—the free and compulsory education of deaf children and the medical inspection of school children—have made for the inauguration of this clinical period.

The changes I have outlined can only happen gradually, and if there be undue haste mistakes are sure to be made. Graser's mistake of the third decade of the 19th century is likely to be repeated. Deaf children will, after a short mechanical training in the elements of speech, be put into ordinary classes with hearing children and taught by teachers who are not fully qualified in this special branch of work.

Graser's system failed and must always fail. Not only does the deaf child need special training for the full school period of 10 or 12 years, but the teacher must be fully equipped for this special work. Then the classes must be so small that the teacher is able to devote time to each individual child. With these precautions the success of the day school for the deaf is assured and the cost will be little over half that of the institution system.

It having been ascertained that a child is or has become deaf, when should his education begin? My answer is, as soon as the
discovery is made. And in a young deaf child the first teacher should be the child’s mother. That is the case with hearing children.

The teacher of the hearing child finds much of the spade work done. The mother has taught the child to speak, and the acquired and understood vocabulary gives the teacher something which he can use at once in getting educational advancement. But the mother of the deaf child has been able to do nothing for the child. In the case of the hearing child the mother’s work is so nearly perfect in speech teaching, that all the teacher has to do is to correct some baby language in which perhaps the mother took a silent pride, but in the deaf child there is not even the skeleton of words, and although the instinct to speak be present there is no speech habit.

I see that the National Association of Teachers of the Deaf in Britain has issued a circular to parents and guardians of deaf children which attempts to guide the mother in creating or perpetuating the speech habit.

Were the mother of the deaf child invited to visit periodically the school for the deaf and to see the teacher at work, I think the deaf child might arrive at school—say at 5 years—much better prepared for the work of the class than he is at present. The instinct to speak might be made to become a speech habit, and although the articulation might be faulty or the results unrecognizable, the mistake could be corrected like the baby speech of the hearing child.

If you will study the circular to parents, you will see what a difficult task is set to the mother of a little deaf child and how much she needs the help which can only be given by watching the skilled teacher do the difficult work. (See page 2 of Circular.)

You who teach the deaf to speak know how difficult this work is. I entirely approve of this circular to parents as a guide to mothers who would have their children speak, but without some practical help the mother will make no use of it.

How is this practical help to be given? By following the mother’s plan with the hearing child. From the earliest months, the mother trains the child to look to her face and especially to her mouth for meaning. If the deaf child’s mother only knew a little of how it was done in the oral schools, she might train her child to look to her face and especially to her lips for that which even without sound is speech.
The circular I refer to indicates the way. To make the teaching of the circular effective, two things are necessary:

(1) The notification of the occurrence of great deafness or of the discovery of great deafness in a young child. The health visitors of the sanitary authorities might here co-operate with the school board or education committee.

(2) The opening of the day schools for the deaf to the mothers of little deaf children on one day in the month so that they may have some instruction in the cultivation of the speech habit in the little children who in two or three years must become the pupils in these schools.

Should this plan not succeed, nursery schools for little deaf children should be formed and mothers encouraged to witness the teaching, or visiting teachers might go to the children’s homes.

If oral methods are to succeed fully they must begin early.

Could you keep a hearing child from starting speech till the age of five years, I do not think the development of speech or even of language would be rapid or satisfactory, and I cannot but believe that neglecting the speech habit in deaf children till they are 8, 7, 6, or even 5 years of age is a grave mistake.

On the other hand, the removal of little deaf children from the home at 2 and 3 years of age is a practice I cannot recommend.

I now quote from a letter sent me by an eminent English teacher of the deaf. Mr. Story: “In my opinion the failure of oral teaching, is in the majority of cases, because it was begun too late. Five years even is not early enough in life for full oral success.

“The work should begin at five months rather, by the mother talking to the child and setting up the idea of looking to the mouth for meaning. The mothers must be the first teachers if oral work is to succeed.”

If Mr. Story is correct we must give the mothers some practical help in the doing of this difficult work.

In order to focus attention on, and to facilitate discussion of the chief points raised in this paper they may be expressed in these propositions:

(1) The education of deaf children without previous clinical examination and classification is wasteful and inefficient.

(2) The massing of deaf children in Institutions should be avoided except in the case of the mentally defective deaf.

Necessitous deaf children should be fed, clad, and where neces-
sary boarded out at the expense of the education authority. In these respects they need the same treatment as necessitous hearing children.

(3) The education but not the instruction of deaf children should begin as soon as the fact of deafness is known and the mothers should be the first teachers. Unless the speech habit be acquired before the age of five years, the best oral results can seldom be got.

If the physician and the teacher are to co-operate in the work of educating the deaf child there must be not only medical inspection of all school children, but there must be a specialist attached to every school or institution for the education of the deaf. The best man for this work is the aural surgeon. And even the aural surgeon must study the deaf child long and carefully before he can understand this strange creature, without hearing, without speech, this half animal, half god, who by education may be made a man, with no evidence of that which stamps man more than anything as higher than the lower animals, the power to receive and communicate thought. But as year after year he sees further into the patient waiting spirit, and as year after year he sees this spirit set free, he will be rewarded by the highest that is given to our professions, love, not mere pity—but an intelligent and helpful love, for these little ones who cannot help themselves.

Thus will the physician share a privilege which has been too long the exclusive possession of the teacher of the deaf.

REFERENCES.


Circular to Parents, issued by the National Association of Teachers of the Deaf. Hon. Sec. A. E. Smith.
DISCUSSION.

Dr. Alexander Graham Bell, of Washington, D. C., expressed his pleasure at being present at this unique gathering of otologists and others particularly interested in preventing or curing deafness by medical or surgical means, and of teachers of little deaf children who are interested in the amelioration of their condition by education. He had been an otologist and teacher of the deaf for many years, and a member of the American Otological Society for thirty years, and this was the first time he had known the two professions to come together in such a meeting. To the teachers of the deaf he had nothing new to say, but to otologists he made a strong plea for co-operation and assistance. Many cases suffering from progressive catarrhal deafness, who cannot be benefited by medical or surgical measures, can be advised by the otologist, to whom they apply for help, to learn to read speech from the lips. Many such persons, the victims of acquired deafness, are useful members of society, suffering very little restriction on account of their deafness. By recommending, to many of these individuals, the study of speech reading, the otologist can bring happiness and hope to many homes where now there is only despair. In the case of children born deaf, or those becoming deaf in early life from scarlet fever or other causes, though the otologist can do nothing to relieve the condition, or to prevent the little ones from becoming dumb from lack of conversation with others, he can and should advise the parents of such children concerning their education. The speaker here briefly alluded to the progress which had been made in America in the education of deaf children since the founding of the first school in this country at Hartford, Conn., in 1817, by Dr. Thomas Hopkins Gallaudet. The sign language of the Abbé De l’Epée became the conventional language of the deaf, while its use spread all over the country, becoming at one time universal. In process of time it came to be agreed that it is not advisable for deaf children to use a language that is not understood by the people around them, and so the sign language is little employed today, the verdict being that it must give way to a language which all understand. And so, as English is the language of other schools, it has come to be the language of the deaf in English speaking countries, whether it is spelled upon the fingers, written, or spoken. As the development of the education of the deaf progressed, teachers were unwilling to confine their pupils to communication with their fellows by means of the sign language, nor yet by means of pencil and pad, and so it has come about that the deaf child, who is also dumb because he cannot hear, can be taught to speak. It is not claimed that elocutionists can be made of them, but they can be taught to speak so that their family and friends understand them. Some few speak well, but the majority speak so they can be understood. A great movement has sprung up in this country, fostered by the American Association for the Promotion of the Teaching of the Deaf, which has its home in Washington City, where the Volta Bureau furnishes all literature and other information concerning the deaf. Over seventy per cent. of deaf children in America are now taught by the speech method, while there is a steady decrease in the number being taught by the use of the sign language. The speaker here presented and briefly explained a system of symbols devised by his father, Dr. Melville Bell, which are used in teaching the deaf. The different figures represent the various positions of the vocal organs in speech. This method of symbolizing the action of speech has proved of great assistance, both in teaching deaf children to speak and in familiarizing the teachers of the deaf with the mechanism of speech.

Miss Mary S. Garrett, of Philadelphia, thought the duty regarding the subjects of the papers which had been read is to observe the natural
powers of the little deaf child from the time deafness is discovered, and to aid in their development according to their possibilities rather than their supposed limitations. The fact that a child can cry or babble signifies that it has a voice which, like other parts of the body, can be developed. With the deaf child as with the hearing child, learning to talk is a matter of repetition, and it should be the duty of parents and teachers to give to the deaf child such repetition, through the eye, as the hearing child receives through the ear. No age-limit can be fixed for sending the deaf child to school,—the school age begins when the child has acquired the knowledge of articulate speech, language and speech-reading. The chief aim should be to eliminate deafness by eliminating the three main causes, viz., intermarriage of near relatives, diseases which produce deafness, and the massing together of deaf persons during adolescence and early adult life for purposes of education, thus fostering intermarriage among them.

Mr. John Dutton Wright, Principal of the Wright Oral School for the Deaf, of New York city, expressed the hope that this joint meeting would result in some permanent benefit to the deaf child, and that the Society would adopt a motion with this purpose in view. He suggested that medical schools should send out graduates who are prepared to meet the problem of the deaf child. At the present time medical colleges give practically no instruction concerning what can be done for a deaf child educationally, where it can be done and when the work should be begun. He suggested that a practical means of aiding the work of educating the deaf would be for the Society to appoint a committee whose duty it should be to endeavor to have the graduating class in each medical school in the United States and Canada instructed by the Professor of Otology, or by some competent educator of the deaf, on the means available for ameliorating the condition of the deaf by education. Then an increasing body of young men would go out into the world prepared to guide the parents of deaf children in arranging for their education.

Referring to the age at which a child becoming deaf may become dumb also, though having spoken like any other child up to the time hearing was lost, the speaker cited the case of a little girl who became deaf at the age of six and a half years, and who, one and a half years later, spoke so imperfectly that even her mother could only partially understand her and strangers not at all, despite the fact that she had acquired a good vocabulary for her years before she lost her hearing, and is exceptionally intelligent. She has recovered ninety-five per cent. of her speech since entering a school for the deaf, but it has taken nearly a year of hard work to accomplish this. The deterioration in speech might have been avoided and she would almost unconsciously have learned to read the lips had prompt measures been taken. He urged upon physicians the great desirability of seeing that the child is placed under the guidance of a trained teacher the moment hearing is seriously impaired, even while the physical condition still requires medical treatment, in order that there may be no deterioration in speech and that lip-reading may so immediately replace hearing that the transition is rendered much easier. Even a short time each day devoted to this purpose, and the direction of the home life to this end will save many months of difficult labor, and promptness in beginning the work is essential to the best results.

Some standard of measurement of hearing should be adopted for that class of children who are too deaf to go to the ordinary schools, in order that the results of auricular training with them may be satisfactorily interpreted, and that it may be determined how much of the improved use of the remaining hearing is due to actual change in the power of sound perception in the organ of hearing, and how much is due to the mental development increasing the ability to associate ideas with the imperfect sounds heard.

Dr. Goldstein had spoken of the large number of children in this
country who are struggling along in the public schools, classed as
dull or stupid, when they are not really so, but simply cannot get what
they need from the public school system, with its necessarily large
class units. In the city of New York there are 600,000 public school
children, of whom the Department of Child Hygiene, under Dr. S. J.
Baker, has now examined 477,500 and has found between four and
five thousand whose hearing is sufficiently defective to be noted in the
more or less superficial examination which is given them. At the
present time there is no adequate provision for giving these children
what they need in the public schools. They are in no sense candidates
for a school for the deaf. It is hoped that arrangements can soon be
made to give them their public school education in small enough
groups to ensure the necessary individual attention.

While the speech of the totally deaf child is not always intelligible
to strangers and not always very good, it can be made of sufficiently
good quality to remove the child from the category of the deaf-mute.
The sense of touch and the muscular sense, upon which dependence
must be principally placed, are not sufficiently delicate to recognize
the swiftly recurring and almost infinite variety of modulation which
enters into normal speech. Even the sense of touch of Helen Keller,
whom he had the pleasure of teaching, keen as it is, is not capable of
giving her the finer modulations. The multiplicity of inflections of
which each word is capable accounts for the fact that the speech of
the deaf differs so from that of the normal individual.

*Such a committee as was suggested by Mr. Wright was appointed
by the Chair at a later executive session.

Dr. George L. Richards, of Fall River, Mass., had been especially
interested in that phase of the subject which deals with the time when
the teaching of the deaf child should begin. In the manufacturing
district in which he lives there are many absolutely deaf children,
many of whose mothers bring the children to him to know if they are
really deaf. It is not always an easy matter to tell whether a child two
or three years of age is deaf, but suppose it is, what is to be done with
it? The child must be six or seven years of age before it may be sent
away from home. In the meantime it should be the duty of the
otologist, who is consulted in a given case, to teach the mother or others
who care for the deaf child to develop its power of speech as much as
possible.

Dr. J. L. Kent, of Lynchburg, Va., referring to what has been called
congenital deafness, cited two cases which had recently come under his
observation. One case was that of a young man, of perfect physical
make-up and attractive appearance, who asked if anything could be
done for his deafness. In eliciting the family history it was learned
that his father and mother were educated in a co-educational institution
for the deaf and dumb, to which they were sent as children, that they
were married shortly after leaving the school, and that their offspring
consists of eight deaf and dumb children, not one of whom can hear
anything or make more than an ordinary animal sound. The young
man, upon careful examination, presented no visible anatomical anomaly
about his hearing apparatus. But for a slight thickening of the drum
membranes it would not have been suspected from physical examination
that he was deaf. He had no adenoids, nor signs of previous
adenoids. All of the children are perfectly healthy. The other case
is that of a man who became deaf after he was sixteen or eighteen
years of age. He married a perfectly normal woman who had never
had any trouble with her ears. Of their four children, one became
deaf from atrophy of the auditory nerve, just as the father had; the
second was becoming deaf when he died; the third is perfectly deaf,
and the fourth is the only one with perfect hearing. The sexes should
be separated as much as possible and intermarriage of these afflicted
people prevented where it is possible. There should at least be separate schools for them.

Dr. G. Hudson Makuen, of Philadelphia, emphasized the importance of trying to improve the voices of the deaf as well as the articulation, and he is convinced that this can be done to a greater degree than is generally supposed through the development of those particular kinesthetic areas of the brain in which are stored memories for the movements of the respiratory and phonatory muscles. He would teach a definite musculature of respiration in these cases, making it just as accurate and precise as the musculature of articulation, and he thinks that if this were done it would be possible to give to the deaf much more agreeable and effective voices, thus removing one great objection to the oral method of teaching.

Mrs. J. Scott Anderson, of Swathmore, Pa., said she had employed the term "lip reading" merely because it is more generally used than the term "expression reading." She called especial attention to the Volta Bureau, where information concerning the deaf throughout the world may be obtained free of charge. She believed the time will come when the legislature will be asked to give sufficient sums to state educationalists that they may establish separate homes or divisions for the mentally defective deaf child. With reference to the work among the mothers of deaf children, the speaker alluded to a paper which she will read before the Brussels congress, (III Congres International d'Education familiale) tracing simply, step by step, the development of the early education of the deaf child, and which will later be printed by the Volta Bureau for distribution among the mothers of deaf children.

Miss Mary McCowen, of Chicago, said it was not until 1883 that the first school which advocated teaching young deaf children was established in the United States. The proper time for beginning the education of the deaf child was then considered to be the eighth or ninth year, and many schools still hold that view. The number of schools in this country today where little children are welcomed can be numbered on the fingers of one hand, and indeed few State schools are equipped to provide for children of a tender age. But on the other hand, in how few homes does the mother know how to train the little deaf child in good habits and give him language, or knowing what to do, does she have the necessary time and strength to do it? Therefore much of this work, which is necessary for the best development of the deaf child, must still go undone unless provided for outside the child's home.

Concerning the question of present attainments among the deaf, it may be stated that when the work of teaching the deaf to speak was first begun little was expected, because, hitherto, no high standards of excellence for the deaf along any line had been established. Steady progress has, however, been made and most schools are today doing many times better work in every way than was thought possible only a few years ago. While a great deal has been accomplished in the way of voice control, much remains to be done. But when it is borne in mind that many hearing persons strive in vain for some desired trick of speech, or for the correction of a lisp or slight defect of enunciation, and that voices once under perfect control, when suddenly deprived of hearing, the natural source of voice control, are prone to wander up and down like a vessel without a rudder, one should not too suddenly demand perfection of the deaf, but take courage from the fact that the voices of those who never heard do respond, even though slowly, to careful training.
ABSCESS OF THE LARYNX, WITH REPORT OF A CASE.

By J. S. WATERMAN, M. D., Brooklyn, N. Y.

The case, which I have the honor to report, is that of a man, G. J., aged 42, Irish, barber, married. He came to me August 24th, 1904, complaining of a slight sore throat, hoarseness, and a dry, hacking cough.

Family history: A brother and sister died of tuberculosis.

Denies specific disease.

Habits excellent. Not addicted to the use of alcohol or tobacco, in excess.

Previous history: One year ago, he developed incipient tuberculosis at the left apex, examination of the sputum showing a few tubercle bacilli. From this condition, he made a good recovery, under rational treatment, fresh air, rest and feeding.

Physical examination: Patient well nourished, somewhat anaemic. Pulse 80; temperature 99.2. Larynx slightly congested and red. Lungs normal, so far as physical examination could determine. Heart normal.

Treatment was outlined and patient told to return the next day, August 25th. Patient looked like a man who was seriously ill, and said that he felt sick. The larynx was very red, and somewhat swollen. The cough was troublesome, with only slight expectoration. The following day there was some difficulty in breathing; the inspiration becoming stridulous in character. There was moderate pain on swallowing. The cough was constant, and the expectoration slightly offensive. Temperature 102; pulse 110 to 120. Laryngeal examination showed considerable swelling of the arytenoids, ary-epiglottic folds, and ventricular bands. The whole larynx was intensely red.

Although a solution of adrenalin chloride was freely used, with applications of ice over the larynx, and soothing inhalations, the swelling and edema in the larynx continued to increase with alarming rapidity, so that by ten o'clock in the evening preparations were made to do a tracheotomy. Instead of doing a tracheotomy, however, at one o'clock, I freely scarified the swollen area, which resulted in giving the patient such pronounced relief, that by half past two I was able to leave him in comparative comfort.
Immediately after the scarification the patient had a severe rigor, the temperature rising to 104; but promptly fell to 102 within the hour. The next day the larynx was much less red, and less swollen. The cough was still troublesome, the expectoration very offensive, and dark in color. The inspirations were stridulous in character, and respirations labored.

On the fifth day the arytenoids showed as full, round masses, pale in color, and nearly filling the glottis. Dr. F. L. Tucker saw the case with me at this time. After deciding that we had to deal with a double abscess of the larynx, situated at the summit of each arytenoid, the larynx was cocainized, and the abscesses were evacuated, each discharging a foul smelling pus, similar in odor to the expectoration. The evacuation of the pus was followed by almost immediate relief from the dyspnoea.

The local condition continued to improve, and the larynx had nearly approached the normal by the seventh day following the evacuation of the pus, excepting that the color was redder than normal, and the vocal cords were intensely congested.

On the fifth day after the opening of the abscesses there was a slight dullness found over the right lower pulmonary lobe anteriorly. Over a small area there were numerous coarse moist rales. There was no pain in the chest, and no appreciable change from the normal in voice, breathing or vocal fremitus.

This condition had existed for several days, when the patient complained that, on coughing, a mass came into his throat, and nearly strangled him. A careful examination showed a larynx which was red but not swollen; and although a view was obtained below the cords, well into the trachea, there was nothing to be seen which could account for the strangling sensations. The following morning, after a violent fit of coughing, the patient coughed up and expectorated a fleshy mass, two inches long, by three quarters of an inch in thickness. This was examined by Dr. Jonathan Wright, who reported as follows: "Microscopically, the mass consists of detritus, granules, a few epithelial cells, and a large number of elastic fibres. Stained for bacteria, there is dimly seen a large number of bacilli, but few cocci, and these not in chains." Subsequently Dr. Wright suggested that the bacillus noted in the sections might have been the colon bacillus.

The patient gradually sank and died on the sixteenth day of his illness. After the second day of the illness the sputum assumed a brownish color, and a very offensive odor, increasing
in offensiveness and in quantity to the end. The temperature ran from 99 to 102 F., with the exception of one time when it touched 104 following the rigor.

We have here a man who had entirely recovered from an incipient tuberculosis, but was much below par, apparently dying from a septic pulmonary lesion, the nature of the offending organism being uncertain.

He was in no condition physically to resist such an infection. Without the gangrene of the lung, there is no doubt in my mind but that he would have recovered from the laryngeal condition, as that was practically finished when the pulmonary complication developed.

In looking over the literature of this subject, I have found the terms used to classify it as: Infectious Interstitial Inflammation of the Larynx, Submucous Laryngitis, Phlegmonous Laryngitis, Suppuration of the Larynx, and Abscess of the Larynx. The latter term seems much the simpler, as it presupposes a submucous or interstitial inflammation, and includes all of the other conditions leading up to the abscess.

Morrell McKenzie defines Abscess of the Larynx as "A circumscribed collection of pus, due to inflammation of the soft tissues of the larynx, interfering with the vocal functions of that organ, and sometimes with the proper action of the epiglottis."

Grunwald speaks of an "Infectious interstitial inflammation." An invasion by specific micro-organisms, the streptococcus pyogenes, the various forms of staphylococci, the pneumococcus, and possibly the bacterium coli. These cases do not always terminate in abscess.

McKenzie reports thirteen cases of abscess of the larynx. In six, the abscess was situated at the base of the epiglottis. In four, it was in one of the ventricular bands. In three, it was in one of the ary-epiglottic folds. Of these cases, nine were opened and four burst. All recovered.

Richards, in the American Journal of Medical Sciences, 1890, reports one case, and collects twenty-four. Of these, six were at the base of the epiglottis, two were in the arytenoid eminence, three were in the ary-epiglottic folds, one was in a ventricular band, three were in the vocal cords, six were subglottic, two were on the internal portion of the thyroid cartilage, and two were in the pyriform sinus.

Price Brown, in the Medical Record, 1893, reports two cases, one of which was subglottic, and one was at the base of the
epiglottis. He also found one case reported by Irsay of Budapest, in 1891. In this case the abscess was situated in the left arytenoid. He found one case reported by Milligan, of Manchester, in 1892, in which an abscess situated over the external surface of the thyroid ala, pointed internally to the laryngeal surface of the right side of the epiglottis.

LaFevre, in 1890, reported a case in which the abscess was situated at the base of the epiglottis on the right side. In this case operation was followed by recovery.

W. L. Culbert, in the transactions of the American Laryngological, Rhinological and Otological Society, reports a case of abscess, situated at the base of the epiglottis anteriorly. Operation was followed by recovery.

N. H. Pierce in the transactions of the American Laryngological Society, 1906, reports a case of “Primary Laryngeal Phlegmon,” in a woman, involving first the right side of the larynx, extending from the base of the epiglottis downward. The left side became involved later. No operation was done; death occurred on the fifth day from profound sepsis.

The condition seems to be more frequent in males than in females, and may occur at any age. Richards found one case at nine months and one at seventy-two years.

Grunwald says: “These cases are characterized by the sudden onset and rapid increase in symptoms. Dyspnoea and suffocation in many cases set in early. In grave septic cases death sometimes occurs from the extreme toxemia alone, before stenosis develops, as in Pierce's case.” Sir Felix Semon, in his address, on “Acute Laryngitis,” at the Polhemus Clinic, mentioned a number of cases which suggested the latter class.

Richards mentions a case of Berger's, in which after two days of slight sore throat, intense dyspnoea suddenly developed, death occurring that same evening. He also mentions a case of Dorning's, in a soldier, who, although complaining of a slight pain in the throat, went on parade at noon, and at five o'clock was dead; abscess of the larynx was found on autopsy.

In adults, the prognosis is good in those cases operated upon, bad in those upon whom no operation is done. While the cases of McKenzie's, which were not operated upon, recovered, nature doing the surgery, Richards found ten cases, reported as not operated upon, nine of which died; while of Price Brown's cases, the one upon which he operated recovered.
In children the prognosis is bad; five out of eight reported cases died.

From four to ten days seems to be the usual time for the abscess to form; and the course to recovery from ten days to two weeks. There is no class of cases which requires closer attention, none which causes greater anxiety, and, I imagine, none which, recovering, would give the surgeon greater satisfaction.

This case seems to be the only one on record, in which there were two separate abscesses in the larynx, occurring at the same time.

Cases of laryngeal abscess, due to perichondritis, are not considered in this paper.

**DISCUSSION.**

**Dr. H. Holbrook Curtis,** of New York City, liked better the term phlegmonous inflammation. It has long been maintained by Semon that the majority of cases of abscess of the larynx are caused by a specific germ, while others have contended that a variety of germs may give rise to the same anatomical and pathological picture. The speaker believed the abscess in the case reported to have had its genesis in the laryngeal tuberculosis said to have been present in the past. Williams had classified septic inflammation of the larynx under five different heads, each of which condition, however, may be due to the streptococcus, the staphylococcus pyogenes aurus and albus, the bacillus tuberculosis, the micrococcus erysipelatis, or the bacillus coli communis. Abscess of the larynx is well known to be less dangerous than the resulting infiltration in the cervical fascia and possibly the mediastinum. Early incision and scarification, as practiced, is evidently the proper treatment.

**Dr. B. R. Shurly,** of Detroit, Mich., added the seventh to the series of six cases which the reader of the paper had said to be the only instances of subglottic abscess reported in the literature. The patient, a male child two and a half years old, was admitted to the diphtheria ward of Harper Hospital December 12, 1909. The pulse was 150 and the axillary temperature 99.6°. Breathing was extremely difficult, the respirations were of a whistling character, the inspirations were prolonged and the expirations short and hollow. Cyanosis was not marked. Intubation was performed half an hour after admission, with immediate relief. Four hours later the patient coughed up the tube, which was reinserted. The tube was retained for four days without further difficulty, the child took nourishment well, the pulse dropped to 128, and the temperature became practically normal. On the fourth day extubation was performed, but as breathing became more difficult, the patient became cyanotic and the pulse very weak, so the tube was reinserted one hour after removal. It was again coughed up within a few minutes after insertion, was again reinserted, and again coughed up, with considerable membrane, five hours later. A few hours' relief followed, but the child's condition then became so alarming that cardiac stimulation was resorted to, and intubation again performed. At the end of twenty hours the tube was once more coughed up. The patient recovered, though the respiration never returned to normal, and when dismissed, twenty-one days after admission, there were evidences of laryngeal constriction. On January 20, 1910, 34 days later, the patient was again admitted to the Hospital. The respirations were of a wheezy character and increased from 26 to 32 in two days.
Breathing became gradually more difficult, until on the fifth day the patient was cyanotic, and the pulse was almost imperceptible. Intubation was performed with difficulty, but the tube was immediately expelled. Artificial respiration was resorted to and oxygen administered. Strychnine was given hypodermatically. The patient suddenly coughed up a pus-like discharge mixed with mucous, the tube having broken a subglottic abscess. Breathing at once became markedly improved and the pulse stronger. When the patient was discharged, seventeen days after admission, the respirations were only slightly wheezy. On March 10, the patient was again admitted, with temperature 100.6°, pulse 100, respirations 36 and still wheezy, and with a severe cough. He gradually improved, and when discharged there remained a very slight subglottic stricture.

Dr. W. C. Braislin, of Brooklyn, N. Y., said the paper illustrates very well two conditions which are likely to cause death in these cases; the edema, shutting off the air passage, and the tendency of later pus formation to burrow downward into the mediastinum, causing pericarditis, endocarditis, or pneumonia. A strict line of demarcation cannot be made between cases of this kind and those cases of abscess which occur outside the larynx, requiring incision of the neck. He had found abscesses very common in children after one infection or another, particularly after diphtheria. Early and repeated incisions had given the best results in his experience. Edematous inflammation soon degenerates into a purulent condition, and for this reason every point which is at all suggestive of fluid infiltration or edema should be incised.

Dr. Walter B. Johnson, of Paterson, N. J., considered the case detailed in the paper as one of phlegmonous inflammation. Abscess of the larynx of traumatic origin should not be placed in the same category with this severe form of inflammation, in which the abscess is only an incident. The inflammatory condition occurs first and lasts for a considerable time, when the breaking down and abscess formation occur. The discharge in such cases is not the ordinary purulent discharge met with in abscess of the larynx of traumatic origin.

Dr. Edgar M. Holmes, of Boston, Mass., reported the case of a man, twenty-five years of age, who had become hoarse the morning after being out to dinner. Toward night speech became painful, and the following day dyspnea was marked, the temperature rose to 101°, and the pulse was considerably accelerated. The laryngeal image was one of edema plus redness, much greater redness than is ordinarily seen with edema. The false vocal bands were so swollen that the cords could not be seen. The diagnosis was made of probable acute inflammation with edema. The use of the scarifying knife was followed by a marked discharge of pus, after which the symptoms subsided.

Dr. William Ledlie Culbert, of New York City, in speaking of the case of his that Dr. Waterman referred to, said, that there was no extensive oedema, the abscess being sharply defined. There was no previous history of infection of any kind that could be elicited. The patient was subject to frequent attacks of tonsilitis, had had attacks of muscular rheumatism, and was of a gouty diathesis. He incised the abscess with a sharp curved bistoury, liberating about two drams of pus. The wound promptly healed, and the patient has had no recurrence. He also recently had a case of Ludwig's angina with a very extensive abscess. The patient, a woman, 34 years old, was having great difficulty in breathing when he was first called in, which was at midnight. When he examined the larynx, he found there was hardly any opening at all, the glottis being almost entirely closed on account of the oedema. He scarified the edematous mucous membrane immediately above the larynx, but getting no pus, sent the patient to the hospital and ordered applications of ice packs. The patient was not intubated.
Early the next morning, under ether, the abscess was opened externally, allowing the escape of about two ounces of pus. In this case a large smooth artery clamp passed into the wound could be readily felt by the finger immediately underneath the mucous membrane just at the upper part of the larynx.

Dr. Waterman, in closing the discussion, said the larynx had not been involved in tuberculosis in the case reported. The tuberculous process was situated in the left apex. Lung involvement seems to be a rare complication in these cases of laryngeal abscess, as he found no other similar case reported. He would be interested to see the injection of leucocytes in this class of cases.
HEMILARYNGECTOMY FOR EPITHELIOMA. EXHIBITION OF THE PATIENT.

By T. PASSMORE BERENS, M. D., New York, N. Y.

Mr. X., age 49, presented himself for examination on April 26, 1909, with the following history:

For the past four or five years has had hoarseness that troubled him particularly when singing. The hoarseness increased and began to trouble him when talking. Two years ago he consulted an eminent laryngologist, who informed him that he had a small growth on one of his vocal cords and advised its removal. Mr. X. referred the matter to his family physician, who persuaded him not to have the operation or further treatment of his throat.

His singing teacher about this time told him that his voice (basso) was misplaced, and taught him to sing tenor. This replacing of the voice was successful, so far as his singing voice was concerned, for during the following year and a half he sang to his own satisfaction, although his speaking voice frequently was hoarse. For the few months previous to his first visit to me his hoarseness increased, until his speaking voice was permanently affected, although the singing voice at times was clear, especially for the higher tones.

His personal and family history were negative for syphilis, tuberculosis and cancer.

EXAMINATION: The patient is a tall, large, well-proportioned man of about 230 lbs., presenting a picture of robust health. There has been no loss of weight. No cachexia is present. The glands in the neck can not be palpated. Laryngeal examination reveals a growth resting on the left vocal cord, occupying its anterior two-thirds, and spreading over its free edge into the chink of the glottis. On phonation this overhanging portion of the growth moves upward. It does not perceptibly interfere with the movements of the cord and allows of the production of a clear tone. The color of the growth is grayish with a slightly pink hue. It is apparently sessile with a surface suggestive of papilloma. Its size is that of a white bean. There is no induration noticeable in any other part of the larynx.

On April 29th, under the influence of cocaine and adrenalin,
the cord was readily freed of the growth by intra-laryngeal operation with the Schroetter tube-forceps. The growth was removed in several large masses with very little discomfort to the patient. The bleeding was slight. In cutting the growth a peculiar sensation as that of cutting through a crisp apple was felt. After removal it was apparent that the growth had been attached to the upper surface of the cord throughout almost the anterior two-thirds. The tumor was sent to the laboratory of the Manhattan Eye, Ear and Throat Hospital for examination, and Dr. Jonathan Wright reported as follows:

"This specimen presents the characteristic structural features of flat-celled epithelioma. There are stickel cells, epithelial whorls and infiltration of the stroma with atypical cells which spring evidently from the superficial layers of the epithelium of the cord."

The diagnosis was explained to the patient, and he readily consented to an external operation, even after its gravity had been fully dwelt upon. A consultation was advised, and the following is an extract from a letter received from Dr. Delavan, upon whom the patient called:

"I have examined your patient, Mr. X., with all possible care. It seems very difficult to estimate just how far below the left vocal band the growth may extend. From the appearance of the band itself it does not seem necessary to pronounce the case as undoubtedly malignant. The microscopical findings, however, would seem to set this matter at rest and establish the diagnosis beyond a doubt. The apparent chronicity of the case would of course be in its favor.

In the light of the histological diagnosis it would seem to me that while such cases have in former years been treated by intra-laryngeal methods with occasional success, with our present knowledge such a course would not be justified. Considering the history of the growth, and also fully appreciating the unusually favorable conditions in general which are present in this case,—such as moderate age, a strong constitution, a fairly well regulated life, the absence of bronchitis and weakness of the heart, and other possibly complicating factors,—and in view of the slow progress which the disease has seemed to make, it would appear that surgical intervention would offer unusual possibilities of help. The apparent absence of glandular involvement is another favorable omen. It would seem therefore that the least that could be done would be to divide the larynx and then determine
to what extent removal of the diseased area should be effected.

Mr. Butlin has lately made some changes in his views, assuming the position taken by Dr. John Mackenzie to the effect that the lymph nodes should be removed in all these cases. This is such a radical change on his part that it seems worth mentioning. I do not go so far as to advise it in this particular case, but simply call your attention to this somewhat remarkable fact.

I have told Mr. X. that the best hope of success lay in operation, supposing meanwhile that the microscopical findings have been correct."

On May 10th. in the Manhattan Eye, Ear and Throat Hospital, the following operation was performed under ether anaesthesia, which had been preceded by a hypodermic injection of morphine and atropine:

An incision was made in the median line of the neck from the os hyoid downward almost to the sternal notch. The thyroid isthmus was pushed downward and the first and second rings of the trachea were incised. Care having been taken not to carry the incision through the mucous membrane of the trachea. Adrenalin, 1-1000 solution, was then applied to this exposed mucous membrane and it was incised without bleeding resulting. Two per cent. cocaine in 1-1000 adrenalin solution was then sprayed into the larynx through the tracheal opening, and the cricoid and thyroid were split in the median line. The adrenalin controlled the bleeding completely. Examination of the larynx showed the left cord to be much thicker than the right, and palpation revealed thickening of the false cord and of the greater part of the central portion of the mucous membrane covering the left half of the larynx. Owing to this extensive thickening of the mucosa the left half of the larynx and of the cricoid was removed. The epiglottis was well above the indurated area and was not disturbed. The cervical glands were not enlarged and were not removed. The wound was stitched in layers with heavy gut, a tracheotomy tube was inserted, and the patient returned to bed. The recovery from the anaesthesia was without nausea and the shock from the operation was slight.

Convalescence was unexpectedly rapid, the patient visiting me in my office two weeks after the operation. This rapidity of convalescence was undoubtedly due to the magnificent courage and keen good sense of the patient. He taught himself to swallow liquids on the third day by hanging his head over the edge of the bed, and swallowing upwards.
DISCUSSION.

The report by Dr. Jonathan Wright of the result of the examination of the tissues removed was that all of the epithelioma had been removed at the time of the intra-laryngeal examination. Your examination of the patient, who is present, will reveal in the region of the left arytenoid a small nipple, the result of a fold in the mucous membrane during the stitching of the wound. Other than this the left side of the larynx is occupied by a smooth cicatrix, against which the right cord vibrates, with the production of a useful speaking voice which is fairly strong, being distinctly audible over the telephone.

There are several points of interest in this case apart from the all-important fact of his apparently complete recovery:—The difficulty in arriving at a correct diagnosis in spite of the man's age; the long duration of the condition; the surface appearance and color of the growth; the mobility of the cord; the apparent lack of induration of the nearby tissues; the absence of palpable lymphatics in the neck, and the general good health of the patient; the unexpected finding, during the second operation, of thickened tissue in the false cord and ventricle that could not be seen, at least was not observed by the laryngoscope, and indeed at the time of operation was more palpable than visible,—this thickened tissue later proving to be but simple inflammation, the result probably of bruising during the intra-laryngeal operation; the rapid and uneventful convalescence; lack of bleeding into the trachea, from the free use of adrenalin; the fair volume of voice that has resulted.

DISCUSSION.

Dr. Charles W. Richardson, of Washington, D. C., cited a case in his practice similar to that reported by Dr. Berens, with the exception that there was more infiltration of the left cord, and that the patient was younger, being only forty years of age. The character of the growth was the same. He had for some time thought when next he had a case of true intrinsic growth of the larynx he would operate by a new method, as suggested by Dr. J. Solis Cohen, viz., thyrotomy, without tracheotomy, with submucous resection of the growth. This was done in the case cited. There was practically no bleeding with the use of cocaine and suprarenal extract. Good exposure was obtained by drawing the wings of the thyroid outward. The perichondrial elevation was very easily accomplished by the introduction of the Killian separator, as is done in the intra-nasal submucous operation. It was then a simple matter to introduce curved scissors and cut out the whole mass. The recovery was even more rapid than in the case reported by Dr. Berens, there being no removal of cartilage, and it was uneventful, without temperature. The healing of the lower portion of the wound took two or three weeks. The man is in perfect health eleven months after the operation, is in active business, his voice is better than that of Dr. Berens' patient, and there is no sign
HEMILARYNGECTOMY FOR EPITHELIOMA.

95

of recurrence. Where there is no infiltration the submucous method for the removal of intrinsic growths is the ideal method.

Dr. Norval H. Pierce, of Chicago, had found the history of total extirpation of the larynx in his experience disheartening. Of the eight cases with which he had been identified, all had died within ten days. His experience with partial laryngectomy was somewhat more assuring. The hope of carcinoma of the larynx rests in the early diagnosis, and he doubted whether it is wise for the rank and file of the profession to make a diagnosis by the laryngeal method before laryngo-fissure. He had known of cases which had gone on to hopelessness as a consequence of such work. In patients over forty with a suspicious tumor of the vocal cord, he preferred to operate by laryngo-fissure, rather than by direct or indirect laryngoscopy. The microscopic diagnosis can be made in the operating room, and if the growth prove to be carcinoma its removal can be best assured by the method of Solis Cohen, quoted by Dr. Richardson, viz., the sub-perichondrial method. He had performed this operation in several early cases, all of which had gotten along very well. Chloroform anaesthesia without previous tracheotomy was employed. The speaker asked Dr. Berens what method he used in closing the anterior incision.

Dr. Wolff Freudenthal, of New York City, said that as a rule the total removal of the larynx is quite unfavorable, though Dr. Gluck, of Berlin, presented some very good results at Budapest. In those cases both sides were affected. Too much intralaryngeal work had been done, and in his opinion as soon as the diagnosis of carcinoma has been made the larynx should be opened. He recommended tracheotomy in such cases, even in well regulated hospitals, as the danger of edema is very great.

Dr. Wendell C. Phillips, of New York City, referring to the ultimate results of the operation described by Dr. Berens, gave the subsequent history of a case which he had reported twelve years ago. The patient, a man, had what appeared to be a fibroma of the vocal cord. He removed the growth intralaryngeally, and upon examination it proved to be epithelioma. A partial laryngectomy was then performed. The man had pneumonia following the operation, but recovered, and returned to his work. After about one year it was found that a loose flap of mucous membrane which waved up and down in the larynx caused considerable difficulty in breathing. This was rounded out under local anaesthesia, and the night following the operation the patient was seized with sudden edema, having barely strength enough to ring for assistance. The nurse promptly responded, the house surgeon was called, and a tracheotomy was quickly performed. He recovered promptly, and had no further trouble until a year and a half ago, when he had a recurrence of the loose membrane in his laryngeal space, which so interfered with his breathing that it was necessary to put in a tracheotomy tube. At present there is apparently a hard tumor in the deep tissues of the neck which presses upon the trachea. About three months ago he began to have difficulty in swallowing, and at the present time cannot swallow at all. An attempt was made to introduce bougles, but without success. Two months ago a gastrotomy was performed, so that he now breathes through one tube and feeds through another. The patient is seventy-two years of age.
LARYNGITIS DOLOROSA.

By WOLFF FREUDENTHAL, M. D., New York.

The title adopted for this paper is not intended to indicate that a new disease is to be discussed, but is rather to be taken as a symptomatic designation for many affections that may well be grouped under the same head.

Since Guyon applied the term of cystitis dolorosa to a variety of bladder troubles, such as ulcers, neoplasms, stones, etc., all of which have the one symptom in common, viz.: attacks of severe pain, it seemed to me proper to give the name laryngitis dolorosa to all those affections of the larynx in which pain is the most prominent feature. As that symptom is of so great importance, not only with reference to the comfort, but also the life of the patient, and as its treatment can be considered from one common viewpoint, the writer has taken the liberty of bringing this theme before this body of experienced men, hoping thus to contribute to some extent to the management of some of the most obstinate cases met with in practice. Diverse as is the general treatment of such diseases as lues, tuberculosis, etc., the symptomatic therapy of the larynx in all these cases will be very much the same.

Since pain is the only symptom which we are considering, and this occurs most often and severely in ulcerative processes of the larynx, we shall confine our remarks to

(a) Tuberculous ulcers,
(b) Syphilitic ulcers,
(c) Carcinomatous ulcers,
(d) Diabetic ulcers.

It may be said that since the writer in 1899 described the occurrence of diabetic ulcerations in the larynx,(1) little has been published on this subject. Certainly such cases are rare; but when they do occur and are recognized their treatment is very gratifying. But although ulcerations of the larynx, whatever their origin, may be treated on similar lines, locally, in order to

---

relieve the pain, yet there seems to be a difference in regard to certain applications of which we shall speak later.

The local treatment of these cases should be divided into two forms—the intralaryngeal and the extralaryngeal.

Whatever treatment be adopted in the disease which will occupy most of our time, viz.: tuberculosis, three requirements have to be fulfilled: (1) To stop the cough which originates in or near the larynx; (2) to remove the dysphagia; and (3) to seek to effect a cure by local applications.

If one sees a patient with infiltrations in the larynx, there is little to be done—in fact, it is best not to resort to any treatment whatsoever. About a year ago Sir Felix Semon published an article in the Berliner Klinische Wochenschrift recommending laryngeal rest as the main factor in the management of such cases. Long before that time the writer had advocated such a procedure, and had sent many patients to the West and South-west of the United States, where an enforced rest of the larynx was secured. These patients were not able to talk for days and weeks at a time, for the simple reason that they had no one with whom to converse. At the Bedford Station Sanatorium a similar mode of treatment is followed; that is, the patients are ordered to keep silent, to avoid irritants such as smoke, dust, tobacco, etc., and a number of them recover.

If, however, these infiltrations break down and ulcers appear, then the pain often sets in and the method of treatment is much more difficult. For years we have applied lactic acid in these cases. Working under Krause when he first tried it, the writer was the next to make use of it, and did so for at least fifteen years, simply for want of something better. It has now been discarded entirely by me, and the only time it may be effectively used is after a thorough curettage.

A new astringent has lately been introduced under the name of omorol (Heyden). This is an albuminate of silver which appears to have a distinct penetrating action. It is not soluble in water, and has to be employed as a powder. In some cases it seems to be very efficacious. The writer has used it in some ulcerations of the larynx with quite satisfactory results.

If you want to have a deeper caustic effect, it is best to use the galvano-cautery point as proposed by my friend, Ludwig Grünwald, of Munich. Siebenmann of Basel also advises treatment with the galvano-cautery, having tried it in 66 cases. The writer employs the galvano-cautery occasionally, and is inclined
to recommend it for certain cases, but at the same time would caution against severe cauterizing at one sitting. It has been claimed that edema of the larynx does not follow this treatment. This, however, occurred in one of my cases. The patient, a rather strong man, desired to get through as quickly as possible, and was cauterized quite extensively in the larynx. The following night he developed a very unpleasant edema, which, fortunately, subsided the next day, the patient feeling much improved. Perhaps the writer himself was responsible for that accident, which might have been avoided by more conservative treatment.

A more important point than the application of caustics is to remove the hyperalgesia of the larynx by drugs, thus enabling the patients to take solid as well as fluid foods. In former years there was nothing at our disposal with which to accomplish this except cocaine. I hope no one at the present time will resort to it, since we have better drugs for this purpose.

The first of the new preparations for producing prolonged analgesia was orthoform. What has been reported by me about orthoform on many occasions holds good today. It is an excellent analgesic drug, if you can reach the ulcerated parts with it. Perhaps some of you have used the emulsion which bears the writer’s name. But orthoform has its disadvantages. If applied to the skin, it often produces a very unpleasant dermatitis. The writer had a case in his own family in which a salve containing orthoform had, without his knowledge, been applied to the skin, the patient developing a dermatitis over the entire body.

The drug next to be recommended was anaesthesin. It proved indeed a very valuable addition to our pharmacopoeia, and the writer used it frequently. But a case of poisoning resulted after administration of a 3-grain powder of this drug. The experiment was twice repeated with one-half the dose, and each time the patient developed cyanosis of the lips, face, fingers, etc. Whether in this instance it was a mere idiosyncracy it is impossible to say, but it made me cautious.

Finally Dr. Stürmer and Dr. Lüders, of Hamburg, published in the Deut. Med. Woch., No. 53, 1908, their experiments with another drug, which they called propaesin. They had started out to discover a product that would have all the good qualities of anaesthesin and orthoform in a higher degree, without any of their deleterious effects. Apparently they found it in propaesin, which is non-toxic (two grammes have been taken per os without bad results), and produces a much more prolonged analgesic
effect than that of either of the others. Thus they found that
the powder applied to the conjunctiva of a guinea pig caused
an insensibility of the cornea, lasting with orthoform 9 minutes,
with anaesthesin 21 minutes, and with propaesin 84 minutes.
Chemically orthoform is methylester of metamido-paraoxy-
benzoic acid; anaesthesin is ethylester of paramido-benzoic acid;
propaesin is propylester of paramido-benzoic acid. Chemically
propaesin is $\text{C}_6\text{H}_4-N\cdot\text{H}_2$ (1)
$\text{COOC}_3\text{H}_7$ (1)
It is a white crystalline powder, almost tasteless and odorless,
soluble in alcohol, ether, etc., but not in water. I use the powder
or an emulsion that I have had made. The latter consists of

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propaesin</td>
<td>5,0</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>1,0</td>
</tr>
<tr>
<td>Menthol</td>
<td>0,5</td>
</tr>
<tr>
<td>Ol. amygdl. dule.</td>
<td>15,0</td>
</tr>
<tr>
<td>Gum. acaciae quis.</td>
<td></td>
</tr>
<tr>
<td>Aqu. dest. ad</td>
<td>50,0</td>
</tr>
</tbody>
</table>

I must repeat: What I formerly have said of orthoform and
anaesthesin holds good to-day. They were great improvements
in our armamentarium medicorum, but according to my present
knowledge propaesin is better.

I shall omit any histories, since you will try that drug your-
selves.

The same treatment was followed in two cases of syphilitic
ulcers of the larynx with good results.

Of late dionin has been applied directly to laryngeal ulcera-
tions, it is claimed with good results, but the writer has had no
experience with this drug.

**INJECTIONS OF ALCOHOL.**

There are many cases in which we cannot reach the diseased
part, as for example, in a flattened epiglottis, when the ulcer is
located on its lower surface, or often on the posterior wall of
the larynx or in the trachea. For such cases a new treatment
recommended by Rudolph Hoffmann, of Munich, namely, injection
of alcohol, may be used with benefit. Braun and Valentin had
injected cocaine into the superior laryngeal nerve in order to
produce anaesthesia for endolaryngeal operations; but Hoff-
mann(1) was the first to employ alcohol injections for analgesia

Bd. LIX, page 168, 1909.
of long duration ("Daueranalgesie"). The place where the superior-laryngeal nerve penetrates the membrana thyro-hyoidea can be felt with the finger, from the outside. If the patient be placed on his back and the larynx pushed toward the affected side, the most painful spot can be determined with the finger. Here the needle puncture is made in a direct vertical line to the body, a little more toward the outside. The needle is inserted to a depth of about 1½ cm., feeling meanwhile for the spot where the patient complains of the greatest pain, and here the alcohol is injected. Hoffmann recommends 85 per cent. alcohol, and of a temperature of 45° C., equal to about 112° F. The writer has used the same proportion.

After the subsidence of the initial pain, which is sometimes quite severe, another injection is immediately made. Hoffmann advises a strong and somewhat blunt needle, which is preferable, as it avoids the blood vessels and is less liable to break. In making injections with an ordinary hypodermic needle, there is risk of its breaking, and it is a difficult matter, even at present, to extract a needle from the trachea or bronchi of a tuberculous patient. For this reason it is always best to employ a strong needle, and to tell the patient neither to swallow nor to talk until the procedure has been completed.

You are aware that Schlösser was the first to recommend alcohol injections for neuralgia of the face, and many such cases have been cured by him as well as by others. While we do not expect such results, we are quite satisfied if we secure an analgesia lasting from five to ten days. That is all we can expect, and that is indeed a great achievement. Hoffmann, himself, has found that usually after such injections solid food was swallowed easily, while it was still unpleasant to drink liquids.

 Permit me to present a few of my case histories, the first of which is a most favorable one:

Mr. I. K. R., teacher, aged 43, first consulted me on December 5th, 1909, for severe dysphagia. He had had two operations, but at the time of his visit was feeling very badly and was unable to swallow. On examination I found ulcerations on the right ary-epiglottic fold, on the right arytenoid, and one ulcer a little further down in the trachea. Alcohol was injected, and when the patient returned a week later he told me that while before the operation he could not eat on account of pain, during the past week he had been able to eat well and had had a good
appetite. He had remained continuously in the open air, and only the day before had had a slight return of pain. A second injection was made, and the patient went to the country. A week later he returned, having again had slight pain on the same side. After a third injection he again went to the country, and, so far as I know, he has had no recurrence of pain in the past two months. This is the most satisfactory result I have had.

Case 2 is not so favorable. M. S., male, baker, aged 36; far advanced pulmonary tuberculosis. He complained of severe pain in swallowing, and a scratchy sensation in the throat, resulting in coughing spells. There was an ulcer on the lower surface of the epiglottis, and quite marked edema of the arytenoids, perichondritis, and ankylosis of the cricoarytenoid articulation. 2 c.c. of 85 per cent. alcohol were injected into the left side, November 15th. When I saw him two weeks later—that is, on November 29th—at the Bedford Station Sanatorium, the perichondritis of the left arytenoid was more marked, but the pain on the left side was gone. However, there was pain on the right side, but no cause for it was found in the larynx. A few days later I was informed that the patient had developed palsy on the right side of the face. When I saw him on December 13th, 1909, the paralysis of the facial nerve was marked, and examination showed that it was due to the condition of the right ear. A mastoid operation was not advisable, on account of the advanced stage of the tuberculosis. However, an injection of alcohol was made on the right side of the larynx, and, strange to say, the pain on that side almost immediately disappeared, thus proving that analgesia travels along the ramus auricularis nervi vagi from below upward, just as in other cases it transmits painful sensations upwards. The pain on the left side, however, returned very soon, and in spite of repeated injections, the patient died within the following month of pulmonary and laryngeal tuberculosis.

Case 3. Mrs. W. B., aged 39, had caught a cold a year before and had been suffering since that time from pulmonary tuberculosis. She was hoarse and had some pain on the left side of the larynx which extended to the left ear. On examination an ulcer was found on the left side of the epiglottis, with marked infiltration of the entire left side of the larynx. The first injection of alcohol was made on December 9, 1909. Immediately after she began coughing, followed by slight vomiting. The cough continued for the following three days, when she again called to see me, telling me that she not only coughed, but had had
a constant irritation in the larynx since I made the alcohol injection. On that day, December 12th, the left arytenoid cartilage was much more swollen, as well as the left aryepiglottic ligament. Behind this ligament pus appeared. December 15th, the patient reported that there was tickling in the throat, which lasted for a day and then disappeared. She expectorated a thick, yellow mucus having an offensive odor. Laryngeal examination showed that the pus had penetrated the left ary-epiglottic fold, being plainly visible now. On December 19th the patient felt much easier, and the abscess had disappeared. While the patient continued to call on me occasionally, she objected to another injection, and on February 15th the same clinical picture was seen as before, viz.: swelling on the left side, which meant pus formation. The question in my mind was whether the abscess had been present before the alcohol injection, or whether it had been artificially produced thereby. As the patient had begun to cough immediately after the injection, it seems probable that pus was present and brought to the surface by the alcohol. At any rate, the patient was relieved. The treatment to be followed in her case will be discussed in the next chapter.

I have treated about 10 or 12 other cases, with various results. In most cases where I succeeded in striking the external branch of the superior laryngeal nerve, there was immediate and marked amelioration of pain, the patient not only being able to swallow solid and semi-solid food, but also to drink water.

We generally can tell when we have reached the laryngeal nerve by the pain which the patient immediately experiences. The alcohol injection does not cause paralysis of the nerve as in anaesthesia, but it produces analgesia which usually lasts from three to eight days, and since there is only analgesia present, no "schluck"-pneumonia has ever been observed.

Interesting in this respect was the case reported above, in which there was on the left side a laryngeal otalgia, that is, a pain in the ear which originated in the larynx, while on the right side there was pain in the larynx of otitic origin, both being ameliorated by the alcohol injections.

THYROTOMY.

We now come to the third method of treating laryngeal conditions of tuberculous origin, by thyrotomy or laryngotomy, a procedure which I recommend as a very important factor in curing certain cases. Laryngotomy is practically a new method
of treatment, as I was able to find only a few reports on it in literature. Formerly, whenever there was obstruction in a tuberculous larynx, tracheotomy was performed and the patient left to his fate. In the majority of cases he died soon thereafter.

Generally we laryngologists tried to overcome the laryngeal disorders of tuberculous patients by intralaryngeal procedures, so that we meet in American literature reports by only two authors who have done thyrotomy for the above reasons. The one is a surgeon. Dr. A. G. Gerster of New York, who operated successfully for a tubercular tumor of the larynx; the other is our colleague. Dr. Otto J. Stein of Chicago, who has published two successful cases(1).

Of European writers, V. Uchermann of Christiania(2), in an extensive and interesting paper read before the Congress at Budapest, reported but one case of tuberculous stenosis of the larynx operated on by laryngotomy.

The following case induced me to perform tracheotomy and open the larynx:

M. K., aged 35, occupation window cleaner, has suffered from pulmonary tuberculosis for 6 months; sputum positive for tubercle bacilli. He has complained for about four months of pain in the throat, dysphagia and increasing hoarseness, as well as aphonia and dyspnea. When I examined him at the Montefiore Home in this city, I found ulceration of both vocal cords, the movements of which, especially on the left side, were very much limited; the ventricular bands were congested; and there was perichondritis of the arytenoids. There was visible a large subglottic mass, the nature of which could not be determined. This was so large that it caused extreme dyspnea, and the patient begged for operative relief; in fact, it was difficult to see how he could breathe at all with this obstruction. As the pulmonary condition was not far advanced, I decided to remove the entire mass by an external operation.

This operation was performed on October 13, 1909, under local anaesthesia with adrenalin and cocaine. High tracheotomy was done, the cricoid and thyroid cartilages divided in the middle line, the larynx laid open, and then a large mass removed. The interior of the larynx was curetted strongly, and then cauterized with pure lactic acid. The bleeding was very slight. A tracheotomy tube was inserted and the patient removed to bed in

---

(1) The Laryngoscope, October, 1904.
good condition. The temperature was 102° F. for two days, soon returning to normal. The general condition was markedly improved. October 30, 1909, the wound was healed, the breathing normal, no subglottic swelling present; the larynx was congested, but no ulceration was visible, and the cords moved freely. The patient was sent to the Bedford Station Sanatorium, and is now feeling very well.

Case II. L. O., male, aged 42, occupation shirt-maker. Father died of tuberculosis. Present illness began about four years ago. Pain in the neck and throat; almost complete aphonia and also marked dyspnea and dysphagia. The lungs showed advanced tuberculosis. The epiglottis was thickened, whitish and irregular. The left arytenoid presented a mass about the size of a large cherry, which concealed the vocal cord on that side. No ulcer could be seen. As this patient was in the same ward with Case I, and had watched the good results in that case, he begged for an operation. This was performed under local anaesthesia, with cocaine and adrenalin, with good results. High tracheotomy was done, after which the larynx was plugged with gauze. An incision was made through the cricoid and thyroid in the median line. After the larynx was laid open, the left arytenoid was removed and about one drachm of pus evacuated through the wound. Then the left ventricular band was removed, also the right arytenoid and the epiglottis, after which the whole interior of the larynx was curetted and cauterized with pure lactic acid. The wound was closed with chromic gut sutures.

The condition after operation gradually became worse. Food was regurgitated through the tracheotomy tube and probably aspirated. The stitches at the upper angle of the wound ripped out, and the discharge was also expelled through this opening. The patient developed pulmonary edema and died within a few days.

In going over this history we ask ourselves whether or not we were justified in performing such an operation in a case so far advanced. The fact is, however, that we were forced to do tracheotomy, as otherwise the patient would have inevitably succumbed from dyspnea. Tracheotomy done, it seemed only a small matter to go a step further and perform thyrotomy, thus affording the patient the only chance of a cure of the laryngeal lesions. Of course, we had no means of knowing how deep these were, from the usual laryngeal examination. Had we known, we would not have opened the larynx.
The next case we intended to operate on was that of Mrs. W. B. (see Case III). Here we had a typical, almost ideal, condition for this procedure. The woman was in comparatively good health, the lungs not much affected, the only active process apparently being in the larynx. The pus in her larynx was like an active volcano. It was the only cause of her cough, and apparently acted all the time as a source of infection of other parts. Unfortunately, an operation was refused, and nothing further was heard from the patient.

Case III. B. A., aged 25, clerk; has been hoarse for 5 months; has a cough, and has lost in weight 10 pounds during that time. No night sweats; no tubercle bacilli in the sputum. On examination a somewhat irregular mass was found occupying the largest part of the left ventricular band. The main swelling was in the anterior portion, corresponding to which was an excavation on the right side. That side, however, was apparently normal, with the exception of some injection. The largest portion of the left vocal cord was not visible on account of the swelling. The condition of his lungs was quite favorable, only the left apex being found affected. As the man's general condition was good, and in view of the possibility of the larynx being the primary and only active focus of infection, the removal of that focus by thyroto my was, after due deliberation, considered advisable in the best interest of the patient. This was done January 4, 1910, under cocaine-adrenalin anaesthesia. After laying open the larynx it was found necessary to remove the left vocal cord and ventricular band in toto. The latter on inspection was seen to be ulcerated. Curettament and application of pure lactic acid were made. The right side of the larynx was not touched, as the pathological changes were considered secondary to the irritation of the other side. Cessante causa morbus cessat proved to be correct.

The patient had quite high fever after the operation. On the fourth day it reached its maximum with 104.2° F. Then it slowly went down, but it did not subside entirely before January 22, 1910, i.e., 18 days after the operation. From now on his recovery was very quick, the patient being out of bed the greater part of the day.

In summing up our limited experience with this operation, we must say that occasionally such a procedure may be unsuccessfully attempted in a hopeless case as the last resort, but in other instances it will tend to prolong the life of the patient and will
open a path towards a final recovery. If we had simply done
a tracheotomy in Case I, the man would still carry his tumor with
him, this acting as a source of constant irritation as well as a
menace to his life. But even such patients without any tumor,
as Case III, should be operated upon by laryngotomy and all the
diseased tissue removed. If the lungs, as in this case, are but
slightly affected and the larynx is the chief factor in causing
trouble, then only radical surgical intervention will prove of ser-
vice, and this cannot be accomplished intralaryngeally.

Furthermore, if you make many autopsies on persons with
laryngeal tuberculosis, you will find abscesses and their sequelae
often more frequent than you think. Thus, for example in this specimen, pus
was found in the neck, of the presence of which we had no
knowledge while the patient was alive. That pus came from the
interior of the larynx, having made quite a perforation through
the thyroid cartilage. In vivo there was seen a marked infiltrat-
on that side, with ulcerations. Pus had been noted in the
larynx, but naturally it was supposed to have its origin lower
down in the lungs. That specimen and the case of Mrs. W. B.
convinced me that in tuberculous cases the larynx should be
opened up oftener than hitherto, so as to permit of direct
inspection. With the present Schleich anaesthesia the patients
can stand the operation better than under a general anaesthetic,
and those who have fair resistance power will certainly benefit
by it.

The question of thyrotomy in cases of carcinoma of the larynx
is an entirely different one, and the writer has nothing to add on
that point at present.

DISCUSSION.

Dr. B. R. Shurly, of Detroit, Mich., asked if these cases had any
pulmonary lesion. The procedure in the larynx is decidedly modified
by the presence of pulmonary lesions, some variety of which had
existed in practically every case which he had encountered.

Dr. John A. Thompson, of Cincinnati, Ohio, called attention to the
use of monochlorphenol, not mentioned by Dr. Freudenthal, which
gives more relief in advanced tuberculosis than anything he has ever
tried. It is used by direct intra-tracheal injection. The preparation
made by Merck is soothing, whereas some of the others are irritating.

Dr. Robert C. Myles, of New York City, expressed his personal
indebtedness to Dr. Freudenthal for some of the preparations which
he had proposed, especially the orthoform and egg combination. This
should be rubbed in thoroughly and freely by means of a long curved,
cotton-tipped applicator. In some cases he had seen the pain and
swelling entirely relieved by this method.
Dr. Hubert Arrowsmith, of Brooklyn, called attention to Dr. Yankauer's dropper to be used in the cases under consideration.

Dr. Freudenthal, in closing the discussion, said in answer to Dr. Shurly's question, that there is always some pulmonary lesion present, particularly in very far advanced cases. He would be glad to try the monochlorphenol mentioned by Dr. Thompson. He had used Dr. Yankauer's instrument, or rather had given it to patients to use when they could not come to the office for treatment, but for the physician himself any ordinary syringe is preferable. Dr. Myles had good results from rubbing the emulsion into the tissues because he reached some ulcerations which otherwise could not be reached.
VINCENT'S ANGINA, INVOLVING THE LARYNX EXCLUSIVELY.

By H. ARROWSMITH, M. D., Brooklyn, N. Y.

My purpose in presenting this report is to put on record a case which seems to be unique in the history of this disease. The bacteriology, pathology, symptomatology, diagnosis and treatment of Vincent's angina, having been hitherto so exhaustively covered by various writers, will be entirely omitted.

J. N., male, 26½ years of age, United States, married, a stableman, formerly a United States naval apprentice, came to my clinic at the Brooklyn Eye and Ear Hospital, on August 27th, 1909. During the previous week he had experienced a deep-seated sensation of discomfort in the throat, with gradually increasing hoarseness and dyspnea which latter was pronounced at the time of his admission. His family history was negative. In 1899 he had pneumonia and gave a vague history of an attack of Beri-beri lasting two months, while he was in the Navy in the Pacific. He has been a very moderate user of alcohol, a smoker and denies any venereal infection. He has had occasional slight sore throat. Physical examination of the thorax
was negative, pulse and temperature normal, respiration decidedly embarrassed. There was slight swelling of the neck externally. Laryngoscopy showed oedematous swelling of the epiglottis, arytenoids and ventricular bands, and as his condition seemed serious, he was sent to the wards for observation. (See cut).

His urine contained a trace of albumin and a small amount of sugar and microscopically a few granular and hyaline casts. He was passing about fifty ounces a day.

About twenty-four hours after admission to the hospital, his dyspnea became so urgent that the House Surgeon was obliged to do a hurried tracheotomy. This entirely relieved the laryngeal symptoms: the tube was removed after four days and the tracheal wound was completely healed by the third week. There was nothing of moment in the laryngoscopic picture, beyond a slight tumefaction of the epiglottis and the ventricular bands. His voice had recovered its usual tone and the discomfort and dyspnea were completely relieved. He was discharged, but returned on October 4th, with recurrence of hoarseness, dyspnea and swelling of the soft tissues of the neck.

The skin incision had reopened and was discharging very foul-smelling pus which had collected in the peri-tracheal soft parts, and could be pressed out in considerable quantity. Several small abscesses were incised and quite an amount of pus was liberated. No communication with the interior of the trachea could be discovered. The pus from these suppurating tracts was found to contain immense numbers of fusiform bacilli and spirilla of Vincent. Most unfortunately, owing to a misunderstanding, the sputum was not examined at this time, so that it is uncertain whether or not these bacteria were then present in the laryngeal and tracheal secretions.

On October 10th, his dyspnea demanded a second tracheotomy and smears from the interior of the trachea showed almost a pure culture of the specific germs, as did also sputum obtained by coughing. A blood count showed a moderate anaemia, (hemoglobin 68%), erythrocytes 3,867,000 and some leucocytosis, 17,400. Urinalysis:—A trace of albumin, no sugar, indican in excess, a few casts.

The tracheal secretions were extremely offensive and very viscid, necessitating frequent cleaning and removal of the cannula. The odor persisted for weeks. During the ensuing six weeks frequent examinations of the sputum, tracheal secretions and granu-
lation tissue from the tracheal wound, showed almost pure cultures of the spirillum and fusiform bacillus, at times mixed with pneumococci, staphylococci and streptococci.

As his symptoms showed no amelioration and practically no air passed through the larynx when the tracheotomy tube was closed, on November 5th, I did a thyrotomy and inserted a Jackson’s laryngostomy tube for the purpose of keeping the larynx open for topical applications and with the hope of averting future deforming cicatration. When the larynx was split I removed a mass of friable cheesy exudate which teemed with the specific germs. Beneath this exudate the mucous membrane was eroded and bled easily and in spots the bare cartilage could be felt. The laryngo-fissure made the local treatment of the interior of the larynx and trachea very easy and satisfactory.

The patient received a thorough anti-syphilitic course of medication without benefit and at my request Dr. Archibald Murray made a Wassermann test after the Noguchi method with absolutely negative results, thus presumptively eliminating syphilis as a factor.

At this point, on account of personal illness, I was unable to see the patient for several weeks, and for some reason which has never been made clear, the laryngostomy tube was removed and the ordinary tracheotomy tube reinserted on November 19th. When I saw him again the thyrotomy wound had closed, down to the tracheal opening. About December first the patient had almost complete suppression of urine: albumin was 30% by bulk, no sugar, urea greatly diminished, casts of all descriptions, renal and vesical epithelium and free blood. For several days he had decided symptoms of uremic poisoning and since that time has had several less severe recrudescences of his kidney symptoms. An examination on April 14th, showed Sp. gr. 1012, albumin 10% by bulk, urea 1%, indican excessive, hyaline, granular, fatty, epithelial and blood casts, free blood and leucocytes.

By the middle of December the fusiform bacilli and spirilla had practically disappeared from the sputum and secretions and cicatricial contraction had produced marked stenosis of the larynx. The patient has since been unable to breathe at all adequately through the larynx with the tracheal tube closed, but can phonate in very raucous and inharmonious tones. For more than a month daily attempts were made to dilate the larynx with Schroetter’s tubes, but it has never been possible to introduce the fourth tube in the ascending scale and as there was no apparent
improvement the attempt has been abandoned. The larynx will now admit a fair sized goose quill but its structures are thickened and rigid.

Owing to the condition of the kidneys I have not thought it justifiable to subject him to further operative attacks, as he is fairly comfortable generally and perfectly so as far as his ability to breathe is concerned.

The temperature throughout his illness has been practically normal, the highest point, 100°, being just prior to the evacuation of the pus in the neck. At no time was there any oral or pharyngeal evidence of the specific lesion in question, nor any involvement of the adjacent lymphatic glands, which has been a prominent and distressing symptom in the other cases of Vincent’s angina that I have seen.

It would have been most interesting to determine whether the primary seat of infection had been within the larynx or trachea, or in the peri-tracheal areolar tissue. I have not been able to find in the literature that the spirillum and the fusiform bacillus have ever been identified in pus from abscess cavities or sinuses.

As complementary to the foregoing, the history of a recent case is of interest.

C. S., aged 41, male, United States, a tutor, came to my clinic on April 20th, 1910. Since October, 1909, he has suffered from gradually increasing hoarseness and dysphagia which latter has become greatly aggravated during the past three weeks, so that now he is able to swallow fluids with the greatest difficulty. Coincidentally with the increase of his dysphagia, a painful swelling of the sub-maxillary glands of the right side made its appearance. Since the commencement of his illness he has progressively emaciated and has had more or less cough.

Laryngoscopic examination showed so much swelling and distortion of the supraglottic structures that the vocal bands could not be seen. The laryngeal surface of the epiglottis, the arytenoids and the ventricular bands were covered by a thick, dirty whitish exudate, and my first thought was of extensive malignant disease with sloughing. Part of this exudate was scraped off, revealing a bleeding surface beneath. Physical examination of the chest showed infiltration of the right lower lobe, broncho-vascular respiration and some moist rales.

Dr. B. F. Cline, our pathologist, reported immediately as follows: ‘‘The exudate from the throat of C. S. shows numerous
DISCUSSION.

fusiform bacilli and spirilla of Vincent, with occasional streptococci and staphylococci and occasional tubercle bacilli."

The implantation of an infection of this kind on a pre-existing laryngeal tuberculosis is also, I believe, hitherto unrecorded. No exudate was discoverable elsewhere than in the larynx. Presumptively the intense aggravation of the pain, dating from three weeks before he consulted us, as well as the glandular involvement, marked the onset of the infection by the specific germs.

He has not returned since the first visit.

DISCUSSION.

Dr. H. W. Loeb, of St. Louis, said that however great the similarity may be between Vincent's angina and syphilis it is not significant of identity. There is a specific entity in Vincent's angina, in which Vincent's spirillum and the fusiform bacillus are associated. Just as iodide of sodium or potassium is a specific for syphilis, so the chlorate is specific for the milder cases of Vincent's angina, involving the palate, gums and cheeks. Chlorate of potash for this purpose is given as a gargle and internally.

Dr. Norval H. Pierce, of Chicago, said Dr. Arrowsmith had undoubtedly had unique experience with Vincent's angina, not only as reported in the present paper, but in one or two papers in the past. The speaker had never seen a case such as Dr. Arrowsmith reported. The presence of Vincent's spirillum or the fusiform bacillus in an ulceration of the mucous membrane of the upper air tract does not mean that the pathological process is due to that organism. In this connection he cited a case reported by Koenig of Paris, which was diagnosed Vincent's angina. It went on until perforation occurred, and, despite a negative Wasserman, if I remember correctly, healed up immediately upon the administration of antisyphilitic medication. He also cited a case which had come under his observation in Chicago. A young man brought his wife in for an opinion, giving no previous history. Upon examination it was found that there was infiltration and ulceration of both posterior pillars and the upper part of the tonsils, rather symmetrical; stiffening, swelling and infiltration of the soft palate, so that the patient had a nasal voice. Examination of the nose revealed posteriorly a pronounced swelling and infiltration, which occluded the view of the inferior meatus. The diagnosis of syphilis was made. Such a possibility was vigorously denied, and the husband then told that the patient had been under treatment for a month for Vincent's angina because at every examination swarms of the fusiform bacilli and of Vincent's spirillum were found. It was finally agreed that antisyphilitic treatment be instituted. This was done, and after a short time everything healed up, with perforation of the palate and of the anterior pillar on one side. The Wasserman test had been made in this case and was negative. The spirochaete of syphilis had not been looked for. Emphasis was laid upon the great danger of mistaking syphilis for Vincent's angina, the organisms of which, in his opinion, do not cause perforation of the cheek and palate. Undoubted syphilitic lesions may contain these organisms in great numbers. No examination is complete in these cases until a search has been made for the spirochaete in the local ulceration and a Wasserman test made. If such cases have resisted local treatment for weeks it is always good practice to give antisyphilitic treatment, even though the Wasserman test and the search for spirochaete result negatively.
Dr. Talbot R. Chambers, of Jersey City, N. J., called attention to the fact that the Wasserman test may be negative when syphilis is present, the accuracy with which the test is made having much to do with the result. He had had two or three cases similar to those cited by Dr. Pierce.

Dr. Norton L. Wilson, of Elizabeth, N. J., sounded a warning note with reference to the association of some of the cases under consideration with tuberculosis. Tuberculous cases if given iodide of potash do very badly, and one should, therefore, be very positive in the diagnosis before instituting antisyphilitic treatment.

Dr. D. Braden Kyle, of Philadelphia, agreed with Dr. Pierce. He cited one case, among a number previously reported in which the spirillum had been demonstrated, which did not yield to the iodides, but which responded readily to mercurial inunctions. This was undoubtedly a case of syphilis, though the germ of syphilis was not found. Just what the presence of the spirillum signified he did not know. Ulceration in the membrane which forms on the palate and sometimes along the cheek is rarely found. There is nearly always some swelling in the thyroid region. In the only two cases of true Vincent's angina which he had seen the thyroid gland was swollen and there was cellulitis in the neck.

Dr. Arrowsmith, in closing the discussion, said antisyphilitic treatment, as well as the Wasserman test, had been employed in all the cases he had reported. He took issue with the remarks of Dr. Pierce concerning the non-association of the germs with the disease. There is nothing in syphilis that looks like Vincent's angina in the early stage. The exudate is characteristic, as is likewise the appearance of the adjacent parts. The ulceration in Vincent's angina begins a short time after the commencement of the exudate, and looks not at all like that of syphilis. In the former cases there is, at times, a tremendous loss of tissue and the formation of a great deal of cicatricial tissue.
SOME LABORATORY AIDS TO OTOLOGIC DIAGNOSIS.

By FREDERIC E. SONDERN, M. D., New York.

The usefulness of the differential leucocyte count as an aid in the diagnosis of inflammatory lesions, the added significance it gives to the leucocyte count itself and the value of the ratio existing between the two, as originally described in the Medical Record, March 25, 1895, have been accepted as important aids by the physician as well as the surgeon, to which the many articles in current medical literature bear testimony. Their application in acute middle ear disease and its complications was the subject of my communication read before the Otological Section of the New York Academy of Medicine three years ago (Archives of Otol. 36, 1), and continued contact with cases, in which this diagnostic and prognostic aid is sought, has strengthened my belief in its value. It is obviously difficult for the laboratory worker to present substantiating clinical reports, nor is this necessary at present owing to the large number which have been published by surgeons of both continents. When dissatisfaction with the method has been expressed, it can usually be traced to a disregard of the limitations and exceptions from which no laboratory procedure is immune. Accurate technic is absolutely necessary and, while simple, is not universally practiced by any means. Inflammatory lesions confined to cellular bone structures do not show as high leucocytosis or relative polynucleosis as noted when soft parts are involved, but the disproportion between the two is present, as shown by the resistance line in the majority of cases, and, after all, this constitutes the important feature. The claim that pus was found with slight polynucleosis and none with marked polynucleosis, or that the leucocyte count was low in severe cases and high in slight ones, demonstrates that the most valuable feature of the method has been overlooked, namely the relation between leucocytosis and polynucleosis or the resistance line. It has also been stated on several occasions that lesions confined to bone show no blood change. This is contrary to the experience of most observers. As previously stated purulent inflammations in cellular bone structures as a rule show lower figures than processes of similar severity in soft parts, though not necessarily so. Suppurative processes on the surface
of mucous membranes, pyogenic infections mixed with tuberculosis, typhoid fever or measles, or following these diseases, show relatively low figures. When purulent exudates are confined in dense pyogenic membrane and toxic absorption is prevented, or when they are the result of organisms which do not produce leucocytosis or relative polynucleosis, the absence of these changes is explained. The exact bacterial nature of the infection also has a bearing on the degree of leucocytosis and relative polynucleosis. With the exercise of every precaution, a relatively very small number of cases is met with in which the examination does not reflect the true condition. These are usually patients with much reduced vitality, and it seems reasonable to look to one of two causes for an explanation. Either the vitality is so low that absorption of toxin no longer takes place, or, on account of improper circulation, the drop of blood, taken from the finger or ear, does not represent the actual condition of the blood as a whole. It is probable that the same reason explains why the method does not work out as well in infants and young children, particularly in those in whom the prostration is extreme. After the leucocyte count and polynuclear percentage have been determined, the resistance line should be drawn as shown on the accompanying chart, which is an improvement suggested by Wilson of Rochester, Minn., (Northwestern Lancet, 1, July, 1901.) on the chart as originally proposed by Gibson, by showing successive examinations, as in a temperature chart instead of on top of one another. It goes without saying that repeated examinations are essential if the desired information is to be obtained. A horizontal or falling resistance line means good leucocytosis and relatively moderate polynucleosis, the higher in the scale the greater the severity, but in any event well borne by the patient with comparatively good prognosis. An ascending resistance line means insufficient leucocytosis and relatively pronounced polynucleosis, the longer the line and the higher in the scale, the greater the severity, the poorer the resistance and the poorer the prognosis. The dotted line shows the leucocyte curve while the dashed line shows the polynuclear percentage curve. A brief description of the case plotted, a mastoiditis followed by sinus thrombosis and general sepsis, will illustrate the usefulness of the chart. The first examination shows 13,000 leucoeytes and 74% polynuclear cells or a descending resistance line, low in the scale, indicating mild infection and good resistance. Second examination: 13,000 leucocytes and 80% polynuclear cells or an
116

F. E. SONDERN.
ascending resistance line higher in the scale. Neither the leucocyte count nor the polynuclear percentage is high, but the resistance line indicates more marked infection and loss of resistance, which in view of the clinical history justifies the suspicion of the presence of a purulent exudate. Third examination shows the same somewhat higher in the scale. Fourth examination shows some improvement. All subsequent examinations show increasing infection and decreasing resistance to the end. Drawing the resistance line on a chart as illustrated is to be recommended when blood examinations are made as a routine procedure, as it enhances the value of the determinations.

Iodophilia, as an indicator of the presence and severity of an inflammatory process, was warmly recommended by Locke (Boston Medical and Surgical Journal, 1902) some eight years ago, and while the method still has few advocates it has been abandoned by the majority in favor of the leucocyte and differential count ratio.

The Arneth nuclear count has, as its object, the determination of the phagocytic power of the blood, on the basis that the older polynuclear cells are the true phagocytes. In a recent article by Dluski and Rospedzihowski (Beitr. z. Klinik d. Tuberk. XIV. No. 3) this is modified by the statement that the older polynuclear cells are the anti-toxin bearers or producers. The degree to which these older cells are destroyed by the action of the infection is believed to be characteristic of the severity of the affection and of the resisting power of the patient. Several years ago I had a long series of observations tabulated (Smith and Lansing, Bull, Lying-In Hosp. March, 1908) which failed to bear out this claim. Milligan read a paper before the Otological Section of the New York Academy of Medicine some time ago which I have not been able to find in print, in which he advocates the use of the method, particularly in infants, to get an index of the resistance as well as of the severity of the infection. Though faithfully tried I regret that I was not able to demonstrate the value of the method for this purpose.

The introduction of comparatively simple apparatus for sufficiently accurate determination of the viscosity of the blood, by Hess and others, promises an additional clinical laboratory help in diagnosis. W. Müller (Centralbl. f. Chir. 9. Oct. 1909) recites the results of his investigations in surgical affections. The viscosity normally increases during the first day after operation. It then declines to normal in three days, is subnormal for two
days and then returns to the normal. It is abnormally high in acute inflammatory lesions, and sudden decline indicates exhaustion. Any focus of inflammation causes increased viscosity of the blood, and rapid and regular postoperative decline indicates freedom from complications. Rubino (Policlinico 29. Aug. 1909) claims that the change in viscosity of the blood is one of the first signs of cardiac insufficiency. A far greater amount of investigation will be necessary before the method can become of practical use to the clinician.

The examination of aural discharges should include a bacteriological and cytological investigation. While it is not within my province to urge the clinical necessity for this information, there is no doubt but what the laboratory factor is a valuable adjunct to diagnosis and prognosis, as the published records of Suepfle, Witmanck, Libman and numerous others quoted by the latter indicate. The bacterial examination can be made in two way; by means of stained smears of the discharge and by culture on suitable media. The examination of properly prepared stained smears is of considerable diagnostic value, but there is not only occasional difficulty in determining the identity of the organism found solely on its morphological features and staining quality, but these may at times be directly misleading. The differential staining methods as proposed by Buerger (Journ. Infect. Dis. June, 1907) are certainly a great help, but they unfortunately make it necessary for the microscopist to be present when the specimen is obtained if the method is to be applied directly to the aural discharge, a difficulty more easily overcome in hospital than in private practice. Rulison (Journ. A. M. A. 30, April, 1910) has just described a much more simple method of staining capsules which promises equally good results. The use of this method will demonstrate how crude the ordinary procedures usually employed are, and in consequence the results of the latter must be taken for what they are worth. Some workers go so far as to refuse to interpret information from any single smear, though this would seem ultra conservative. Cultures from aural discharge certainly allow a more accurate determination of the bacterial content, provided the medium be properly selected and the organism grows on it. As there are a number of organisms found in aural discharge which it is difficult or impossible to demonstrate quickly on culture, such as tubercle bacilli, gonococci, Vincent's spirillum and others, it is advisable to use both methods. Direct staining for immediate information and
culture for corroboration and to have material for vaccine if this therapy should be decided on. A very complete enumeration of the organisms met with, particularly in cases of chronic otitis media, can be found in an article by Wingrave in the Medical Press of London, 1908.

The cytological study of aural discharges has had comparatively little attention, if journal articles are a proper indication. As applied to transudates and exudates, other than those from the ear, it has proved to be of value in diagnosis, and therefore an investigation of the subject is justified, particularly in chronic discharges. Wingrave, in the article quoted, also calls attention to the benefit derived from cytological studies. Several years ago I made cyt counts in quite a number of specimens of aural discharge received for examination with the hope that an interest might be created. The number is not sufficient to justify conclusions, but in a general way it may be said that an acute otitis media shows a pronounced predominance of polynuclear cells. In the cases which promptly get well the count soon changes to about equal percentages of lymphocytes and polynuclear cells, while the cases which do not do so well, and particularly those in which mastoid involvement follows, continue to show a high polynuclear percentage for some time. The nature of the organism also has an influence on the figures. The smears used to determine the organism can also be used for obtaining the cyt count.

The blood culture is of particular diagnostic value in the complications of otitis media, owing to the frequency and significance of bacteriemia. The researches of Libman (Amer. Journ. Med. Sciences Sept. 1909) in the otological service of Gruening at the Mt. Sinai Hospital are particularly praiseworthy on account of the accurate technic employed not only in the culture, but also in the identification of the organisms obtained. A critical study of the opinions voiced by different observers, as well as personal experience, in reference to the invariable absence of a bacteriemia in cases of otitis media, with mastoid involvement and without sinus thrombosis, would indicate that this is still an open question and by no means settled, as Libman would have us believe. Cases are now and again met with in which a bacteriemia is demonstrated not only in one but in several cultures, and where there are no evidences of sinus thrombosis, though these are certainly exceptional instances. It is beyond the scope of this communication to enter into a consideration of the value of both negative
and positive findings, nor can those tabulated by Libman, in his last paper on the subject, be improved upon.

Vaccine therapy rests, according to Wright, on the basis that the opsonic value of the blood is reduced and can be brought to normal or above by the injection of the bacterial vaccine. This stimulates the formation of antibody only if the cells are in condition to react. In active systemic infections the opsonic value of the blood is high and does not need increasing, and the cells are exhausted and consequently cannot be stimulated to produce more antibody. It is on this ground that the use of vaccines is not advised in acute systemic infections; if, however, they are found useful in these cases, it will be necessary to modify the views concerning their mode of action. If the present theory is correct, an ascending resistance line found on blood examination, and particularly the demonstration of a bacteriemia, should contra-indicate the use of vaccines. Personal experience, as well as the opinions of Thomas (Journ. A. M. A. 12. Oct. 1907), Potter (Journ. A. M. A. 49. 1815), Saathoff (Münch Med. Woeh. 55, 779) and many others indicate that the opsonic index determination is inconstant and impracticable and not to be recommended as a diagnostic procedure. Horder’s description of the reasons for this, in the St. Bartholomew’s Hospital Journal, is interesting.

The information obtained from the urine concerning evidences indicating the presence of nephritis or diabetes, as well as intestinal toxemia, acidosis or other form of faulty metabolism, is of interest to the otologist, as it has a bearing sometimes on the diagnosis and more often on the prognosis of the ear lesion. Careful analysis of the urine prior to anaesthesia is frequently a safeguard against disagreeable surprises afterward.

In closing allow me to say that the most ardent advocates of laboratory aids, if they have clinical experience, have never intentionally conveyed the idea that these methods are intended to take the place of clinical observation. The most acute bedside observer is usually the one who also obtains most help from laboratory procedures, as he is well versed in the value of this information. When interpreting the significance of laboratory findings, no matter how characteristic these may seem, it is imperative to recall all the causes which may occasion this change, and disregard of a single one is the most potent factor in erroneous conclusions. Laboratory methods of diagnosis are aids only, and are not intended to replace diagnostic skill or prognostic ability based on clinical experience.
Dr. Arthur B. Duel, of New York City, said the clinician is coming more and more to depend upon the help offered by the laboratory man, but, as Dr. Sondern had emphasized, laboratory findings must always be considered in the nature of aids and by no means to take the place of clinical examination. In the majority of instances invaluable information is obtained from the smear, but it must be borne in mind that a mere smear may be misleading. If the smear is positive as to streptococcus infection one may be sure that it is a more virulent infection than if the staphylococcus is found. If the laboratory examination of a specimen does not bear out the clinical condition found, there is a possibility of error which the laboratory man always admits, and which Dr. Sondern insists must be kept in mind. Dr. Sondern had called attention to the fact that in a small percentage of cases the blood count does not reflect the true condition of the patient, this being the result, in the majority of cases, of the reduced vitality of the patient. It should be emphasized in this connection that it is important to begin early to make the blood examinations in order to have a basis for comparison as to the future condition of the patient. Vaccine therapy in cases undergoing suppuration offers a hopeful field for the future. Recent investigations tended to show that the use of chloroform as an anaesthetic in cases where the streptococcus is present is apt to set up a destructive process in the liver; therefore, if examination of the pus reveals the presence of streptococcus some other anaesthetic should be employed.

Dr. Edward B. Dench, of New York City, referred to a paper presented by Dr. McKernon and Dr. Sondern before the New York Academy of Medicine, in which the part played by the differential blood count, as applied to otology, was considered. He had attempted to confirm these findings by observing a series of cases extending over a period of more than a year, both in private and hospital practice. The result of these observations had been presented in a paper before the American Laryngological, Rhinological and Otological Society, at the meeting held in Pittsburg two years ago. The substance of his paper confirmed the remarks made in the summing up of Dr. Sondern's paper, read today, in which it is said that the laboratory findings are simply aids to clinical diagnosis. In a suspicious case of otitis media a high polymorphonuclear count is a sign of the presence of pus, and, with sufficient clinical symptoms, is an indication for operation upon the mastoid. The absence of a high polymorphonuclear count, however, is no contra-indication for operation, if the clinical symptoms are present. In his own experience, he had operated upon many mastoids in which the polymorphonuclear was low, and in spite of this negative report, so far as the blood was concerned, he had found pus in the mastoid. While the differential blood count is a very important aid, it must not be relied upon too much. In one or two cases if he had relied upon the blood count as an indication for operation, he would have committed an error. One case cited was that of a nervous child, suffering from a double otitis, in which the infection was streptococcus. There was a high polymorphonuclear count, with some mastoid tenderness, although this latter sign could not be definitely determined on account of the nervousness of the child. While still in doubt as to whether or not to operate, a central pneumonia was discovered, and this central pneumonia was the cause of the high polymorphonuclear count. In another case, one of double sinus thrombosis, with extension to both jugular veins, the polymorphonuclear count never rose above 70 per cent. Later in the history of the case, suppuration of the supraclavicular glands developed, and as soon as this infection of the glandular structures occurred, the polymorphonuclear percentage rose to over 80 per cent. In this latter instance, thrombosis of the lateral sinus gave rise to no increase in this polymorphonuclear percentage, although
as soon as the lymphatic structures became infected, the polymorphonuclear percentage immediately rose to over 80 per cent. In a case of cerebellar abscess, the polymorphonuclear count never rose above 70 per cent., although the abscess was discovered at the time of operation. Where the evidence from the differential blood count is positive, it may be valuable, although great attention must be given to a thorough investigation of all other organs, in order to exclude any involvement of the viscera, such as the lungs, liver, and so forth, before deciding to operate upon a case without definite clinical symptoms upon the blood count alone. The fact that the differential blood count is negative, that is, that the polymorphonuclear percentage does not rise above 80 per cent., is absolutely of no value in excluding the presence of a suppurative process within the mastoid.

Dr. Percy Fridenberg, of New York City, emphasized the diagnostic importance of blood cultures and the recognition of the presence of bacteriemia in otologic practice. He believed the time would come when this method would be as much a routine as is the differential count. It is not a routine now, either among surgeons or in hospitals, to study the blood with this in view. It is not so long ago that the textbooks gave a number of diagnostic symptoms of sinus thrombosis, whereas now they are getting down to one or two, and laying more and more stress upon the temperature curve. Post-mastoid tenderness along the emissary vein is often misleading, and the painful, cord-like swelling along the sterno-cleido-mastoid may be absent. Any method which gives a gain of half a day in making the diagnosis of sinus thrombosis is important, and such a method is the blood culture. In this, as in other laboratory examinations, a single negative finding means nothing, as a single negative smear would mean nothing—in the search for tubercle bacilli. If repeated examinations are negative, the result may be considered negative and a systemic infection excluded. A single negative finding may mean that few bacilli are entering the blood, or that the blood can dispose of large numbers of bacteria so rapidly that a number of cultures must be made before the bacteria can be discovered. If, for example, the diagnosis of sinus thrombosis has been made, the mastoid operation has been performed, and free flow has been established, and yet a positive blood culture is found twenty-four hours after operation, repeated tests giving the same finding, or increasing bacteremia, it is proof positive that the source of infection has not been removed. The blood culture is particularly important as an aid to diagnosis in children. It is a better guide to diagnosis and prognosis than clinical symptoms alone, especially as the temperature in infants and children is, as is known, a very unreliable guide. Capable otologists have been misled more than once by a central pneumonia to diagnose sinus thrombosis which the blood count would positively have excluded.

Dr. Sondern, in closing the discussion, replying to Dr. Dench's remarks with reference to the frequency of streptococcus infections following chloroform anaesthesia, said that any debilitating influence favors an infection of this kind. Chloroform anaesthesia is particularly liable to produce a disturbance of hepatic function with consequent acidosis and an actual necrosis of the liver may result. It seems natural that such more-or less profound intoxications would favor streptococcus infections. The speaker again emphasized the value of the resistance line in the diagnosis and prognosis of inflammatory processes. The leucocytosis or the relative polynucleosis may not show high figures, particularly in cases of mastoid disease, but when considered together, and particularly if the resistance line has been followed from day to day, a clue of diagnostic value is obtained. It should be borne in mind that evidences in the blood of an inflammatory process do not necessarily mean that a middle ear inflammation has extended to the mastoid. A pneumonia or an abscess in some other part of the body
may produce the same change. He cited an illustrative case of appendicitis with leucocytosis of 30,000 and a polynuclear percentage of 90. It soon developed that the blood changes were due to an abscess of the toe and not to the mild attack of catarrhal appendicitis. In reply to the query concerning the streptococcus mucosus the speaker said the positive diagnosis of this organism is attended with difficulty. Unless the method of Buerger or the more simple one recently described by Rullison of Roosevelt Hospital, is employed, errors in diagnosis are not uncommon. Blood cultures offer much valuable information, and while well beyond the experimental stage, there are still a number of points that require further observation and confirmation. Concerning examination of the cerebro-spinal, there is no doubt but what much help is obtained not only in reference to the degree of inflammation, but also by learning which organism is present. Confirmatory cultures should always be made as in the case of aural discharges. In answer to the question concerning the term leucocytosis, he said it should be applied to counts above 10,000. A normal leucocyte count should not be spoken of as a leucocytosis. The leucocytosis is an indication of the patient’s resistance toward the infection while the relative polynucleosis is a guide to the toxic absorption.
AFFECTIONS OF THE EXTERNAL AUDITORY MEATUS.

By J. E. SHEPPARD, M. D., Brooklyn, N. Y.

The material from which this paper has been prepared, was culled from the histories of 2000 private cases, it having appeared that thus a good line could be secured on the frequency and importance of such conditions.

From this I find that of all cases coming to us, 17.5% refer to the external ear. 9%, or a little more than half, are cases in which cerumen has become pathological, meaning, thereby, that the wax has become so impacted as to produce symptoms referable to the ear; of these wax cases 54.7% occurred in males, 45.3% in females; it occurred in both ears in 46 patients, or just about half; in the right ear alone 18 times; left ear alone 26 times.

Of the otitis externa circumscripta, or furuncle, patients there were 36, or 3.6% of all cases, of which 28.7% occurred in males, 71.3% in females. An evidence to my mind that the hair-pin is more dangerous than the tooth-pick. Both ears were involved in 6 cases, the right ear in 11, the left ear in 19.

Thirty-one patients, or 3.1%, were affected with eczema, of which 43.5% were in males, 56.5% in females. Both ears were involved in 24 cases, the right ear alone in 4, and the left ear alone in 3.

Myringitis chronica, properly a sub-group of eczema, furnished 5 cases, or 0.5% of all cases, and occurred twice in males, three times in females. Twice in both ears, twice in the right ear alone, once in the left ear alone. There was one case of aspergillus among 2000 patients, a ratio of 0.5%, and occurred in a young female.

There were 4 cases of foreign body in the ear, 0.4% of all cases. 3 in males. 1 in females, and twice in the right ear, twice in the left ear.

As to the age when these conditions occurred, there were in the wax cases,——

1 under 10 years of age,
5 between 11 and 20,
66 between 20 and 50,
9 between 51 and 60,
4 between 61 and 70, and
5 over 70.
In the Furuncle cases,—

2 occurred under 10,
26 between 20 and 40,
2 between 41 and 50,
5 between 51 and 60, and
1 over 70.

In the Eczema cases, there were,—

24 between 20 and 50,
3 between 51 and 60,
3 between 61 and 70, and
1 over 70.

I have grouped these cases because they, in my judgment, may be classed together as due to improper hygiene, and instead of 90% as suggested in the abstract, really constitute over 95% of all the conditions of the external ear.

Perhaps some one may say that foreign bodies do not belong in this category, to which I would reply that of the four cases, per thousand, plugs of cotton tight against the membrane, and masses of vaseline more or less blocking the canal, were the foreign bodies found in this series of cases.

In spite of the fact that the authorities speak of "insufficient" and "excessive secretion of cerumen," it has become more and more my belief that in virtually all cases cerumen becomes impacted sufficiently to produce symptoms because of the old and mistaken idea that wax is dirt, and the consequent undue effort to get rid of it. I must admit that I have two or three patients who come back to me from year to year with their ears more or less filled with wax, and this in spite of the most careful directions to them about how to cleanse their ears, which directions they claim to have followed. But I still believe that, could I see them in their daily ablutions, I could pick some flaw in their methods which would account for the recurrent accumulations.

My instructions to patients are in brief to use nothing more than a damp wash-cloth over the end of their largest finger. In the same way I believe the whole group of eczema cases, myringitis, etc., to be due in very nearly, if not quite, all cases to too much soap and water in the ear, which is insufficiently dried out. This may sound like a somewhat radical statement to many of you, especially to those who believe in the uric acid or rheumatic foundation for these conditions, but my purpose is to present to you the result of my own personal observations. My preventive treatment for these conditions is the same exactly as that for impaction of cerumen, viz., a damp wash-cloth, with little or no soap on it, over the end of the middle finger. It will,
of course, go without saying that, after the condition has been acquired and patients come to us for relief, curative measures must be instituted, in addition to the above suggested means of prevention.

It will be readily granted that a furuncular infection arises almost exclusively from efforts to get rid of wax, or to relieve the itching of eczema, hence, if these efforts can be controlled, boils will practically cease to occur in the ear.

This brings me then to the less usual conditions of the external auditory canal.

Among these I would mention exostosis and hyperostosis, of which I found 4 or 5 cases in each of the 1000 histories involved in this discussion. They are at times single, at times multiple, most often situated at the extremities of the so-called tympanic ring, but in none of these cases of mine were they producing symptoms sufficient to require operative interference for their relief. There was one case of what seemed a true osteoma, which I reported some years ago, I think, to the New York Otological Society. I remember but one other case in my experience, so that this one case among 2000 patients, or 0.05%, would seem to represent an unduly large proportion for a condition which is certainly rare.

Possibly the question would properly arise whether we should call it an osteoma of the external auditory canal, or of the mastoid, but the symptoms and appearances certainly refer to the former. The patient, Miss P., aged 30, had suffered for three months from pain and a "blowing sound" (pulsating tinnitus?) in the right ear, with discharge for the past month. The canal, a short way in, was entirely blocked by a hard bony growth past which it was impossible to get the smallest probe. Operation was immediately undertaken, an incision posterior to the auricle was made, and the periosteum elevated, under which was found an outgrowth of bone from the anterior surface of the mastoid. A slight tap with the chisel loosened a bony growth which appeared to be resting in a depression in, but without bony attachment to, the mastoid. Some of the surrounding bone was chiselled away to give extra room in the canal, from which much debris was syringed, and the posterior wound promptly healed.

Sebaceous cysts in the canal are of interest principally because they are often mistaken for furuncle, and when so mistaken usually sooner or later recur, because the treatment-indication
is to curette and destroy the secreting internal surface of the cyst.

Keratosis obturans, laminated epithelial plug, or otitis externa desquamativa, is likely to be found once or twice in every 1000 cases. It is almost always mistaken at first for impacted cerumen, usually requires much patience and dexterity with syringe, forceps, curette, etc., for its removal, and such cases should always be seen at three or four month intervals for at least two years to guard against recurrence, which is frequent.

Trauma of canal of varied kinds and extent will be met with from time to time, but permits of no generalization. I would simply speak of tubercular caries of the canal, of the very painful herpes of the canal, and of tinea circinata involving the canal, as among the rarer conditions met with.

Otitis externa hemorrhagica is occasionally seen, but is usually an accompaniment of a severe middle ear inflammation, most often the grippal form.

Occlusion of the canal, both congenital and acquired, are met with sufficiently often to, perhaps, require mention. My experience in operating for the congenital form has not been such as to lead me to recommend it, while the acquired form does not as a rule present insurmountable difficulties.

I wish now to direct our attention to the great importance, and the sometimes great difficulty, of a differentiation between the mastoid periostitis due to an underlying mastoiditis and that due to an overlying furunculosis. The protruded auricle in the two conditions oftentimes presents an identical appearance. The tenderness in the two conditions is sometimes so nearly alike as to be misleading, as is also the appearance of the sagged or bulged posterior-superior canal wall. The history, the appearance of the tympanic membrane, and the interference with hearing, or the lack of it, will sometimes have to be the guiding factors in determining the real character of the trouble.

Finally, I wish to speak of epithelioma of the canal as a condition worthy of our serious consideration. In the 2000 patients, I have seen three such ears, two of them in one person. The first case was that of a retired sea-captain, Mr. T., aged 70, who first visited me May 18, 1896, and gave the following history:

For two or three years has had frequently recurring, at the entrance to the canal, and on its floor, a feeling of soreness, with darting pain and itching lasting two or three days, then better a few days, and again recurring. There was seen a crack in the
space between the tragus and anti-tragus covered with a crust, and on the floor of the meatus at the entrance, an infiltrated, red, eczematous-looking patch nearly a half inch in diameter. A diagnosis was made of either epithelioma or eczema, with the chances strongly favoring the former. I tried, and watched, the effect of local measures for a short time, then stated positively that it was epithelioma, and asked for additional counsel before resorting to radical measures.

The patient disappeared, and was not seen again until July 15, 1909, when he reported having undergone some form of paste treatment at the hands of an out-of-town cancer-doctor, and that he had been entirely well after that until within the past two months, during which he has been suffering intense pain in the ear. I found the entrance to the canal was narrowed by cicatricial tissue to barely a pin-point opening. I advised immediate enlargement of this opening for drainage and investigation, which by the way he did not permit until twelve days later, when the whole surface of the canal walls, the tympanic membrane, and the tympanic cavity region seemed to be involved. I gave a bad prognosis, and have not seen him since.

Cases II. and III. Miss V. O., aged 38, was first seen March 18, 1903, when she gave the following history:

Some deafness in the left ear a year ago, with slight watery discharge last summer, and increased deafness during the past autumn, followed by a period of improvement, until during the past week, when there has been deafness, tinnitus, and slight dull pain; itching had persisted more or less throughout the year. I found the canal blocked with seeretion, after removing which with a syringe, the walls at the inner end of the canal were seen to be much inflamed, and "a suspicious-looking spot on the floor of the canal" about half-way in the ear. A diagnosis of "Eczema of the Canal" was put down followed by a question mark. By March 31st, I felt that the ulceration on the floor of the canal was so suggestive of epithelioma that I asked her to see Dr. Mathewson, whose patient she had been before he gave up his ear work. He felt unwilling to make a positive diagnosis, but made some suggestions as to treatment, which were carried out. Without, however, any improvement, and on April 24th, I referred her to Dr. Winfield for treatment with the x-ray. He concurred in the diagnosis, and immediately began treatment, which was carried on, with intermissions during the summer months of 1903 and '04, until December 28, 1904, when the surface of the canal seemed to be smoothly healed throughout.
As showing the depth to which the disease had extended, I
would call attention to the fact that during June and July, 1903,
and again during the following midwinter, small superficial scales
of bone were removed from the ulcerated area.

In March, 1906, the left canal is noted as being still smoothly
healed, but in the right ear was found an appearance very similar
to what had formerly existed in the left ear, and accompanied
by similar symptoms, and treatment with the x-ray was promptly
begun. One month later, in April, ulcerated areas existed in
both canals, and both were treated with the x-ray, under which
the left ear again promptly healed, the right one improving more
slowly. By the middle of July of the same year, both canals
seemed healed, although small thin crusts marked the areas of
former trouble. These were removed, and from that time to the
present, now nearly four years, the ears have caused no further
trouble. During all this time there was a small growth of the
same character on the forehead at the junction with the hair-
line, which only partially yielded to the x-ray treatment.

While, in the early stages of epithelioma, it may be extremely
difficult, or even impossible, to positively differentiate the con-
dition from eczema, yet I believe that there will usually be found
something in the history to arouse our suspicion, which a brief
course of treatment will suffice to confirm or dispel, and so soon
as the conclusion is arrived at that we are dealing with epitheli-
oma, my above-related experience would naturally impel me to
a recommendation of the x-ray treatment as more than likely to
result in cure. In case of failure with this form of treatment,
the experience of my dermatological friends would lead me to
speak highly of the use of the curette and acid nitrate of mercury,
before resorting to the knife.

DISCUSSION.

Dr. James F. McKernon, of New York City, had found eczema of
the external auditory meatus in a number of cases of rheumatic or
gouty diathesis, and where there is a slight discharge through a small
perforation close to the tympanic ring, appearing only when the patient
is lying down. The application of cleansing and stimulating solutions,
such as bichloride of mercury or a mild solution of formalin, will
generally clear up the condition. Many of these eczematous conditions
resulting from old perforations can be cleared up in the same way.
Exostosis, whether of the external or deeper portions, is generally
traceable to rheumatism, gout or syphilis. He had seen a number of
cases in which no history was obtainable other than of former syphilis.
As a rule exostoses of the external auditory canal develop very slowly.
In the treatment of occlusions of the canal, whether congenital, due
to marked perichondritis, to cicatrix following operations for the re-
moval of foreign growths, his results had formerly been very unsatis-
factory. He had much more favorable results since employing the very clever flap devised by Dr. Duel. The flap is taken from the roof of the canal, brought down and sutured in place, thus forming almost the entire circumference of the canal, a foreign body of some kind being placed in the opening to prevent contraction and to keep the flap in place until cicatization takes place. At first a solid plug was employed, but he had later used a celluloid tube, which is worn by the patient for months, and had found it much more satisfactory. The differential diagnosis between furunculosis of the external auditory canal and mastoiditis can generally be made by bearing in mind four tests which elicit pain in furunculosis, viz., pressure of the tragus; pressure under the lobe exerted upward; passing the finger into the post-aural fold and pressing against the posterior canal wall; and taking the auricle between the thumb and fingers and moving it up and down or in any direction. In furunculosis of the canal there is sometimes just as large swelling as is found in mastoiditis, but the latter condition can be detected if pressure is exerted not on the structures of the canal but on the mastoid. It should be remembered that there may be a concurrent involvement of the mastoid and furunculosis. In the treatment of epitheloma in and around the external auditory meatus he had during the past year employed carbonic acid snow in three cases. In one of these cases Dr. Sondern had made the diagnosis from sections. The primary growth almost entirely healed, but the patient died later of metastasis.

Dr. F. C. Ard, of Plainfield, N. J., said that since opening a perfectly normal mastoid many years ago he had been very careful in his differential diagnosis between mastoiditis and furunculosis of the external auditory canal. A case was recently referred to him that had been treated for ten days by a general practitioner for furunculosis. Three or four furuncles were found in the canal discharging quite freely, but the pain continued. The speaker watched the case very carefully and when there was a rather sudden increase in the discharge of pus he decided to open the mastoid. Upon doing so a very extensive destruction of the mastoid bone was found. This would indicate that cases of furunculosis should be watched with great care.

Dr. Robert Levy, of Denver, Colo., called attention to the frequent occurrence of otitis externa diffusa, in which there is a small amount of discharge, in cases associated with middle ear tuberculosis. In these cases mastoiditis may occur in connection with diffuse external inflammation. One finds here a diffuse swelling without circumscribed formation of pus. Ichthyol with glycerine, applied on a small tampon, reduces this swelling in the external canal rapidly. The tuberculous otitis may then be treated with solutions of formalin (1-500 or 1-1000) with much benefit. Recurrent attacks are not infrequently seen.

Dr. Norval H. Pierce, of Chicago, called attention to the fact that the most important point in the differential diagnosis between mastoiditis and furunculosis is that in furunculosis the swelling back of the ear is edema, whereas in mastoiditis it is infiltration. Edema is rarely if ever found in mastoiditis, perhaps occasionally in very young infants, and infiltration is never seen in furunculosis. If infiltration occurs back of the ear in furunculosis of the external auditory canal then there is either a periostitis due to the infection of the external auditory canal or a coincident involvement of the interior of the mastoid process.

Dr. Edward B. Densh, of New York City, asked the reader of the paper if he had ever seen a case of keratosis obturans without perforation of the membrana tympani. In his own experience perforation had always been present, and he had considered these cases of keratosis obturans as invariably indicating a cholesteatomatous deposit within the middle ear.
AFFECTIONS OF THE EXTERNAL AUDITORY MEATUS.

Regarding the differential diagnosis between a furuncle in the external auditory meatus and a mastoiditis, this differential diagnosis could be made in 99 cases out of a hundred without difficulty. In the one-hundredth case, most men would probably do as Dr. Ard did, and open a healthy mastoid.

In the treatment of epitheliomata of the external auditory canal, he had had excellent recoveries before the discovery of the X-ray treatment, by complete excision of the neoplasm and the removal of the cervical glands.

In discussing the methods for enlarging the external auditory meatus, where narrowing had occurred as the result of traumatism, or from other causes, he cited the case of a man who had been thrown from an automobile. In this patient, the entrance of the meatus had been so narrowed as only to admit the introduction of a very fine probe. As the result of the fall the inferior wall of the external auditory canal had been fractured so that the bony meatus was narrowed as well. The treatment consisted in making an incision behind the ear, turning the auricle forward, dissecting out the cartilaginous meatus and exposing fully the bony meatus. The bony meatus was then enlarged by means of a gouge, the bone being removed from the inferior and posterior aspects of the bony canal until this channel was restored to practically its normal calibre. A tongue-shaped flap was then cut from the fibro-cartilaginous meatus, a portion of the conchial tissue being included in this flap. The cartilage was removed from the flap and the cutaneous flap sutured upward and backward. A skin graft was applied to the raw cartilaginous edge and the posterior incision was closed without drainage, the auricle being replaced in its normal position. The result was most satisfactory, the patient recovering with a perfectly patent external auditory meatus and perfect hearing.

Dr. Harry L. Myers, of Norfolk, Va., mentioned two cases which had recently come under his care, in which the thickening of the auricle, so frequent in eczema of the external ear, was extreme, the auricle being nearly twice its original size. These cases cleared up and became normal remarkably rapidly under the daily swabbing of the involved area with peroxide of hydrogen, followed by absolute alcohol, and painting the surface with a two percent solution of nitrate of silver. In addition to this treatment, the patient was instructed to fill the ear twice daily with a five per cent. solution of resorcin in equal parts of alcohol and water. The dry scaly form had been greatly relieved by a two per cent. salicylic ointment.

Dr. Herbert E. Smyth, of Bridgeport, Conn., said the carbonic acid snow is rendered much colder if dipped into ether before using, as is the practice with the Doctors Mayo.

Dr. Sheppard, in closing the discussion, referring to the cases mentioned by Dr. McKernon, said he had seen cases treated for months for eczema which were in reality cases of chronic middle ear suppuration. He had usually found exostoses in gouty or syphilitic subjects, and had generally considered these diseases as etiologic factors. A clear distinction should be drawn between hereditary and acquired occlusion of the canal. The acquired can often be corrected, but the hereditary kind are hard to rectify. Referring to the discussion concerning the differential diagnosis between furunculosis and mastoiditis, the speaker called attention to the fact that his remarks dealt with the periostitis caused by mastoiditis and by boils. However, the mistake of opening the mastoid when furunculosis is the cause of the trouble is a mistake that may be easily made. He had seen a number of cases of keratosis obturans in which the tympanic membrane was perfectly normal. He had also seen cases in which the canal wall had undergone absorption owing to the pressure of these masses. He did not know the etiology, but had called the condition otitis externa exfoliata.
RESULTS OF VACCINE THERAPY IN CHRONIC SUPPURATIVE EARS.

EVELYN WYMAN NAGLE, M. D., of Boston.

(By Invitation.)

The series of cases I have to report were taken from Dr. E. R. Newton’s clinic at the Boston Dispensary, from cases referred to Dr. F. C. Cobb’s clinic at the same institution, from the Massachusetts General Hospital Out Patient Department and from private practice. The bacteriological work was done at the Harvard Medical School in the laboratory of the Throat Department of the Massachusetts General Hospital.

In making my vaccines I took the pus which was forced out into the aural canal from the Eustachian tube by catheterizing. The canal was previously cleansed. This discharge was smeared over the surface of the culture tubes and these tubes were then incubated at the temperature of 37° Centigrade until the growth had nearly reached its height. The time of incubation varies according to the rapidity of the growth of the bacteria. When the height of the growth is nearly reached it is washed down into the bottom of the tube, off the surface of the media, with normal saline solution under sterile conditions and collected in one tube. The tube is then sealed with the blow-pipe and subjected to the lowest temperature for the shortest period that was possible to kill the organism. The vaccine was then tested to see if it was sterile, and, if not, the tube was then sealed again and subjected to more heat. In staphylococcus vaccine six hundred million bacteria were put into every cubic centimeter of the vaccine, while vaccines made from other organisms contained only one hundred million bacteria to the cubic centimeter. I put the vaccine in sterile bottles holding fifty cubic centimeters and sealed it with an inverted rubber nipple. The well that was made by inverting the nipple was filled with absolute alcohol to sterilize it before pushing the asceptic hypodermic needle through it to
draw out the vaccine. It is quite essential to have an active vaccine. The activity depends on getting a virulent type of bacteria, on killing them at the correct time, before they begin to lose their characteristics and on subjecting them to the lowest degree of heat for the shortest possible time necessary to kill the bacteria. The injections were always given in the arm, alternating left and right. The skin of the arm where the hypodermic was to be injected was well scrubbed with absolute alcohol. The hypodermic was sterilized and the vaccine was drawn into it under aseptic conditions. The vaccine was put into the upper arm, just above the elbow close to the skin. I seemed to get the best results by giving my patients the injections at intervals of three days and by insisting that they should not miss a treatment. If they did miss an injection of vaccine before immunity was acquired, there was always a relapse and it was like starting over again. Usually my beginning dose was a small one, a quarter of a cubic centimeter, 150,000,000 bacteria in the case of staphylococcus vaccine, increasing to a half, two thirds, and then to a full cubic centimeter, continuing with this dose. Sometimes I have increased the dose to two cubic centimeters before there was improvement. I did not take the opsonic index in any of these cases, but depended entirely on the clinical symptoms. I have never had any complications or ill effects. After the first, and sometimes the second dose of vaccine, the patients complain of malaise, of a slight headache, and a few times of nausea. They also mention a feeling of depression. This is followed in about twelve hours by a sense of exhilaration which lasts about two and a half days and is followed by a slight depression. The injection is timed so as to come as the sense of exhilaration is wearing off and the depression is appearing. After the third dose the patient usually does not notice any soreness of the arm or the malaise. All my patients have remarked, themselves, about their improved physical condition while under the vaccine treatments. I usually continue giving the vaccine about six times after the ear is dry. The number of cases I wish to report are forty. Six of these cases were ones where the discharge had only been present several months, but they had resisted all the usual methods of treatment and the discharge was so profuse that I considered them suitable to include in the list of cases, especially so as my one failure came in this class. In the other thirty-four cases the ears had been discharging all the way from one year up to forty years. Out of the
forty cases there has only been one where the vaccine failed to
cure the discharge, and I do not know even now, the cause of
that one failure. Some of the cases were treated as far back as
a year and nine months ago. The bacteria found in the discharge
from the ears were staphylococci, a coccus in pairs, a bacillus of
the proteus type, an influenza-like bacillus, and a number of other
kinds of bacteria which I was unable to classify. Some of the
cases were of mixed infection. It was in treating one of these
cases of mixed infection, containing staphylococci and a pseudo-
diphtheria bacillus, that I found that the staphylococcus vaccine
alone raised the patient’s general resistance so that the pseudo-
diphtheria bacillus was killed the same time as the staphylococcus.
I then tried staphylococcus vaccine on a patient who had a dis-
charge which contained some unknown organism in pure culture.
The discharge from this ear also stopped after six injections of
the staphylococcus vaccine. Since then I have tried it in quite
a number of cases and the discharge has always ceased. Among
the most interesting of the cases are the following:

J. H., male, aged 24, was referred to me by Dr. F. C. Cobb.
The patient had a suppurative left ear for four years. During
this period the discharge was continuous most of the time. It
had stopped several times for a week, but never for a longer
period. The discharge was profuse and contained a coccus in
pairs in pure culture. I made an autogenous vaccine from the
pus. The discharge was profuse and not of a thick consistency.
There was a perforation about the size of a pin-head, in the pos-
tero inferior part of the drum. The patient had been under the
care of other specialists and the usual accepted methods of treat-
ment had been tried without any result. After the injections of
one quarter of a cubic centimeter of the vaccine there was only
a slight amount of moisture in the ear. In three days the patient
had two-thirds of a cubic centimeter of the vaccine. The next day
after the second injection the ear was dry and has remained so.
It is now ten months since the treatment was finished. Although
the ear was dry after the second injection, I still continued giv-
ing him the vaccine in one quarter of a cubic centimeter dose,
until ten injections had been given in all. The patient’s physical
condition improved markedly and the perforation of the drum
closed entirely.

F. C., male, aged 4, had a profuse discharge from both of his
ears for a year. A bacteriological examination showed a mixed
infection of staphylococcus and a pseudo-diphtheria bacillus. The
boy had been under constant medical care. After the first dose of a quarter of a cubic centimeter of staphylocoecus vaccine, there was a great decrease in the amount of the discharge. Three days afterward I gave the second dose—two-thirds of a cubic centimeter, and after this dose there was only a slight moisture in the ear. A third dose was given—a full cubic centimeter of the vaccine—and the ear was dry when the child came for the fourth treatment. I gave six more injections. There has been no recurrence in the past year.

The following case was of interest to me because artificial drums were put into both ears after they became dry. We all know that the ears are very liable to discharge again after drums are put into them and that they need to be watched.

C. G., female, aged 23, gave a history of both ears discharging since she was a baby. After this fourth injection of vaccine the ears were both dry. In two months after beginning the vaccine artificial drums were put in both ears and the hearing was doubled. The ears are still dry after having the drums in place three months.

Mr. K., male, aged 24, had a suppurative ear for the past ten years after scarlet fever. The drum was about all gone. The discharge was foul and thick. He had been unable to get a life insurance on account of the suppurative ear. There was a decrease in the amount of the discharge after the first injection of one-third of a cubic centimeter of staphylocoecus vaccine. Three days later he had a second dose of two-thirds of a cubic centimeter of the vaccine. The third dose was a full cubic centimeter. The next day after this last injection, the ear was dry. He had injections given to him six times after the ear ceased to discharge. The man then received his life insurance. This was six months ago and the ear is still dry.

E. R., female, aged 18, had discharge from her ear continuously for the past six years. It was thick and profuse with a bad odor. This case was one of those seen in Dr. Cobb's clinic. Bacteriological examination of the discharge showed a pure culture of some unknown organism. The drum of the ear was entirely gone and the ear was painful. After eight injections of the staphylocoecus vaccine the ear was perfectly dry. I at once decreased the dose to a quarter of a cubic centimeter. Two days after this injection the patient had a severe head cold and the ear began to discharge profusely again. I felt that I had decreased my dose too soon. The next two injections were full doses of
the vaccine and the ear was again dry and has remained so up to the present time, which is four months since there has been any suppuration.

N. B., female, aged 21, had a discharging ear since childhood. The ear sometimes remained dry for about a month. The drum had a large perforation in it. The ear was dry after the second dose of the vaccine. Eight more injections were given. It has been thirteen months since the ear ceased to discharge. This patient was also seen by Dr. Newton.

J. W., male, aged 2 years, had suppuration of both ears for several months. There was no change in the consistency or the amount of the discharge under ordinary treatment. It was so profuse and thick that the cotton in the ears had to be changed at short intervals. After the second injection there was a slight moisture in the right ear and the left ear was better. The right ear was entirely dry after the third dose, and in the left one, the discharge ceased after the fourth injection. A treatment was then missed. After the next injection the child had a severe bronchitis and cold in the head and the left ear, the last one to get well, began to discharge again after being dry only a week. Two more doses were given and then an injection was missed as the child was too sick with the bronchitis to come to the office. It was after the eighth injection that the left ear became dry again. He had twelve doses in all. The child’s mother said he was in better physical condition than he had even been before. The ear has been dry seven months now. The next case was of interest because I used large doses of the vaccine and because the patient required so many injections before the discharge ceased.

Mr. B., male, aged 30, had a profuse thick discharge from the ear for several months. He was under the ordinary treatment all this time, but did not improve. There was a decrease in the amount of the discharge after the first injection. The ear was not dry until the ninth injection; during this time one injection was missed. The amount of vaccine was increased up to two cubic centimeters. The ear remained dry only a week. After five more injections, making fourteen in all, the ear was again dry. I gave him the routine six doses after that. The ear has now been dry for five months, up to date.

T. M., male, aged 50, was referred by Dr. Augustus Thorndike to Dr. Cobb’s clinic. His ear had been discharging for forty years. There was an enlarged gland under the ear which was
about two inches in diameter. It was hard. The discharge from this ear had a bad odor. In the ear, there was a plyn. This was removed by a snare. The discharge stopped after the third injection of staphylococcus vaccine, and after the tenth injection, the gland disappeared.

The last case I am going to mention is the one where I failed to get any result.

C. W., male, aged 22 years, had a discharge from the right ear for six weeks. The discharge was thick but not profuse, and it contained staphylococci in pure culture. I had a very active staphylococcus vaccine and I decided to use it in this case. Five injections were given at intervals of three days with no improvement. There was bulging of the drum and it was incised. After this the discharge was greater in amount. The discharge decreased a little after the eighth injection. After the tenth dose, a nipple of granulation tissue was removed. I then made an autogenous vaccine and the patient had four injections of it. The discharge became thinner and less in amount. I again took cultures from the ear and the staphylococcus was still present in pure culture. There was no change in the next six treatments, making eighteen in all. The patient became discouraged over the slight improvement and did not return.

DISCUSSION.

Dr. Frederick C. Cobb, of Boston, was not sure whether the results reported will be permanent, nor is it claimed by Dr. Nagle that they will be. Recurrence in the ear may possibly take place later. He mentioned particularly one case, a patient of Dr. Thorndyke’s, who had discharge enough to drench the pillow at night. There was so large a swelling of the glands that Dr. Thorndyke thought he would have to operate. This all disappeared in a few weeks under treatment with the vaccine. Whether the cure is to be permanent or not, the method is of great importance and should certainly be tried. By way of contrast with the results obtained by the vaccine treatment in suppurative otitis media, the speaker mentioned a series of experiments, extending over eight months, first at the Massachusetts General Hospital and then at the Dispensary, with the vaccines in a series of cases of sinusitis and atrophic rhinitis. These vaccines were also prepared by Dr. Nagle. The treatment did not stop the pus, and while the patients were improved, it is not claimed that they are well. The ear cases for some reason do better than the nose cases, probably because it is much easier to obtain from the former a pure culture, while it is difficult to sterilize the latter, owing to the millions of bacteria on the hairs in the nose.

Dr. Frederic E. Sondern, of New York City, thought Dr. Nagle very wise in the rules laid down concerning the making of autogenous vaccines and agreed with her that these may be harmed by prolonged exposure to unnecessary high temperature. It has been interesting to note that a vaccine made by one person may not prove as efficacious as that made by another and the method of sterilizing may explain
DISCUSSION.

This. It is also well not to keep the cultures too long and fresh ones should be prepared every few weeks if the treatment is continued that long. The type of organism has a good deal to do with the outcome of vaccine therapy. It is to be regretted that the opsonic index determination has been found inconstant and not practical by expert workers, for it would help solve the problems of size and frequency of administration. The successful application of vaccine therapy depends in a great measure upon the acuteness of the user in determining not only the dose but particularly the time when the next injection should be given, as in any other therapeutic measure which must vary not only in different patients but also in different types of infection. Dr. Nagle's minute description of the clinical picture noted in the cases during treatment is an indication of the careful observation that is necessary and doubtless explains in a great measure the successful results obtained. It would seem reasonable to explain the coming away of sequestra during vaccine treatment by the fact that the surrounding inflammatory lesion subsides and thus allows the dead bone to drop out. Instances have been reported in which vaccine therapy has given good results in cases of acute systemic infection. The present theory on which this form of treatment is based would indicate its usefulness in chronic lesions only, and if it is found useful in acute systemic infections a change in the theory will be necessary.

Dr. B. R. Shurly, of Detroit, Mich., had found vaccine therapy of very little help in his work in the accessory sinuses, and in pyocyanus infection absolutely useless. Its chief field of usefulness is in staphylococcus infection. The poly-valent vaccine, where fifteen to seventeen selected strains are used, is one of the most effective of the stock vaccines. In many cases of staphylococcus infection the stock vaccine is useful. It can be employed in cases where operative interference is declined. Accuracy in dosage should be emphasized. He had witnessed a case in which six times the proper dose was given and in which, in a few minutes, there was tremendous shock, almost causing death.

Dr. Edgar M. Holmes, of Boston, had tried the vaccine method at the City Hospital, both the stock and the autogenous vaccine being used, but without very satisfactory results. The injections were made one a week as a rule, sometimes more frequently. One reason, perhaps, why the vaccines are effective in the ear and not in the nose and sinuses, is because the ear offers very little space for absorption, whereas in the other region there is so much absorption that it requires a tremendous dose to be effective at all. He asked if it would be justifiable, after the report presented, in cases of known necrosis, in polyps, and in mastoid complications, where there was a previous discharge, to wait, and if to wait, how long should the vaccine be used before resorting to other measures.

Dr. Ewing W. Day, of Pittsburg, Pa., had used the streptococcic vaccine in acute cases in six instances, with very gratifying results. The first patient was himself, the condition for which the vaccine was used being a streptococcic infection arising from a small pimple on the finger and extending up the arm to the glands in the axilla. His temperature, which was 101½° in the morning, rose to 103° by seven o'clock in the evening. A vaccine taken from a patient in the hospital who was suffering from streptococcic infection was employed, one hundred millions being injected that night, Wednesday. On Friday night a hundred million more were injected, and on Monday he was back in his office. A week later he had under observation a patient who presented all the symptoms of an acute mastoiditis. A lumbar puncture was made and streptococci were found in the cerebro-spinal fluid. The polymorphonuclear count was ninety-five per cent. The vaccine made from the speaker's finger was used, but the first dose gave no particular improvement. The patient's friends, having heard of the
vaccine, insisted that something more be done, and another lumbar puncture was made and the antistreptococcic serum injected into the spinal canal. The second dose of vaccine from the speaker's pus was used, and on the following day the antistreptococcic serum was employed. After that the vaccine was used every second day. The case showed a slow and steady decline from 960 at the height, to 700, 500, 200, and finally, when the last count was made, 60, the patient then being pretty well recovered. Recovery was slow, extending over three or four weeks. The next case was given mixed treatment of subdural drainage and vaccine, the vaccine being taken from the cerebro-spinal fluid. This patient recovered in about three weeks. The fourth case, also one of acute mastoiditis, is now under treatment in the hospital. At the time he was operated upon he had an acute suppuration on the finger and also sinus thrombosis. A blood culture was made and a pure streptococcus growth obtained. Injections have been made at intervals of from two to five days. The temperature has varied from normal to 99.5°, and the physical and mental condition is clearing up.

Dr. Halstead S. Hedges, of Charlottesville, Va., mentioned a case of serious meningitis, with exposure of the meninges, in which the staphylococcus vaccine had been used during the acute stage, with steady improvement in the patient's condition. Extensive exposure of the meninges was made ten days after the primary mastoid operation.

Dr. Kittredge, of Nashua, N. H., cited a case in which he had performed a submucous operation for deflected septum, at the same time amputating the anterior portion of the middle turbinate on the side opposite the deflection. The case showed some evidence of sepsis on the third day following operation. Upon the fourth day the patient insisted on returning to his home, which was at a distance, even though his temperature was 102°. The physician under whose care he was, reported that upon the sixth or seventh day his temperature varied from 103° to 105.5°, pulse from 130 to 150, and there was a bad smelling discharge from the side of the nose from which a portion of the turbinate had been removed. He had administered some of the stock vaccine for staphylococci with no apparent relief. Following this he sent some of the pus to Harvard Medical School, from which an autogenous serum was made, and upon the eighth or ninth day this was administered. There shortly followed a fall of temperature and an improvement in the general condition of the patient, who in the meantime had been a desperately sick man. A few injections were used. The physician in charge failed to report the number of injections, also the nature of the germ. The patient finally recovered.

Dr. John H. Allen, of Portland, Me., cited a case of sinus thrombosis, with the development in a few days of a metastatic abscess of the buttocks. The sinus was opened and a soft clot evacuated, from which a diplococcus was grown, while from the buttocks abscess was taken a streptococcus. From the two organisms an autogenous vaccine was made and employed, and the patient recovered quite promptly, whether as a result of the operation or of the use of the vaccine is a question. It would seem that in order to form an intelligent opinion of the value of the use of vaccines in chronic suppuration of the middle ears, one should know the exact conditions of the ears treated. It is, of course, of material difference whether there is simply swelling of the mucous membrane or a tubal catarrh, or whether there is an attic suppuration, with caries or cholesteatoma.

Dr. Nagle, in closing the discussion, said most of her patients had gained in weight, while others had neither gained nor lost. The stock vaccines in her hands had not given satisfactory results. She had failed in some way to obtain good results in nose cases, possibly in the making of the vaccine, possibly from the change in form of the bacteria. She had not made a vaccine in pyocyanic cases, having
considered these as secondary infections. Referring to the matter of surgical shock following too large doses and too great an interval between injections, a case was cited which she had observed under treatment in London. The injections were given ten days apart, and all of the injections were followed by marked shock and illness. Much of the success of the method depends upon how the vaccines are made, how the bacteria are killed, the length of time, etc., and upon having an active vaccine. The method had not been tried by her in acute cases. She had had only one case in which there was a discharge from the attic. The patient did well under the vaccine treatment for a time, then moved away, the subsequent history being unknown. During the vaccine treatment none of the cases had received any other treatment than cleansing measures.
FOREIGN BODY IN THE RIGHT BRONCHUS, REMOVED BY LOWER BRONCHOSCOPY.

By CHARLES W. RICHARDSON, M. D., Washington, D. C.

On January 3rd, 1910, shortly after 10 a. m., I was notified by Dr. Frischkorn that a patient of his, a young woman, had inspired a piece of a large rubber ink eraser, which he conjectured was then located in the right bronchus. The doctor further stated that he would have patient removed at once to the Garfield Hospital where a radiograph would be made by Dr. Merrill, and then to the Episcopal Eye, Ear and Throat Hospital for operative removal of the foreign body. The patient was brought to the hospital in the late afternoon. The picture displayed a large foreign body lodged in the right bronchus protruding slightly into the trachea. The patient was in a fair condition. There was no cyanosis, and cough was entirely absent. All the auxilliary muscles of respiration were in active co-operation. Her only complaint was of soreness and tired feeling about the neck and upper part of the chest. Respiratory sounds were exaggerated over the left side of the chest; respiratory sounds were absent over the whole of the lower portion of the right side of the lung. The patient’s temperature was normal. At 7 p. m., all prepara-
tion having been completed, an attempt was made to remove the foreign body by upper bronchoscopy. Chloroform narcosis was induced by Dr. Dye, and Dr. McKimmie supported the head in the Jackson position. The Killian tube readily passed through the larynx and down to the foreign body. The body was observed as a grayish white object, but as the illumination was so imperfect and as the efforts at removal under such condition seemed obviously so impracticable, I decided to do a tracheotomy and resort to lower bronchoscopy. Through the tracheal opening I introduced a Jackson tube, by means of which I readily recognized the foreign body. Numerous efforts were made to remove the body by all the forms of grasping forces at my command; all attempts being attended with a like degree of failure. None of the forceps possessed sufficient width of grasp to encompass the broad end of the presenting foreign body. Every effort was attended with the removal of small pieces of the rubber from which the eraser was made. Recognizing the futility of further efforts with the instruments at hand, and as the patient was evidently in distress, I decided to desist until I could procure the proper instrument to effect the object which I desired to accomplish.

It seemed to me, as the body was firmly fixed, as was evident through the efforts at removal, it would be possible to engage its presenting end in the mouth of the tube, and thus firmly held, screw into the eraser the instrument which I proposed having made, and extract the body.

I imparted my idea of the necessary methods of attack to Dr. McKimmie. I instructed my instrument maker to take a steel rod of about two or three millimeters in diameter, about twenty centimeters in length, the distal end of which should be made into a screw form for about one centimeter of its length. My man made a failure of his undertaking. Dr. McKimmie, grasping my idea, went to his instrument maker and stayed with him until the instrument was properly completed.

The patient was again brought into the operating room shortly after 1 P. M. the next day, and under cocaine anaesthesia the Jackson tube was again passed through the tracheal wound. The foreign body was engaged in the end of the bronchoscope and the screw provided rod was carefully made to penetrate the substance of the eraser. After the rod was apparently firmly fixed, the bronchoscope was removed and the body was cautiously brought to the tracheal opening, where it was lost in the effort to
In he remained by deal. fortunate privilege through tracheal turu. have peanut. Richardson I tried later just patient a laryngoscopy, his removal, fenestrated the practically grasp a fibroma little foreign tumor. was removed, and its size and shape disclosed. I was not surprised at the difficulty of its delivery. It seemed to me that it would be of interest to those present to report the case on account of the large size of the body and for the method by which it was extracted.

The patient made an uneventful and rapid recovery. The body remained in the bronchus for the period of thirty hours, and caused no reaction whatsoever. It gained access to the bronchus by being inspired during an epileptic paroxysm.

DISCUSSION.

Dr. Harris P. Mosher, of Boston, said he was pleased that it was his privilege to be the first speaker and so the first to congratulate Dr. Richardson on his unique and brilliant case. In some ways he was fortunate in the character of the foreign body with which he had to deal. It was not sharp and pointed so that it pierced the bronchus and became impacted, and it was not so brittle that it would crush like a peanut. If it had been a lead eraser instead of an ink eraser it would have been almost an ideal foreign body for removal.

The rubber was so large that Dr. Richardson had difficulty in making his forceps grasp it. In a recent article the speaker touched upon the importance of having the forceps exactly suited to the foreign body. When the case will permit it he prefers to delay the attempt to extract a foreign body until a duplicate of it is obtained upon which the grasp of the forceps can be tested.

As a slight contribution to this discussion he wished to cite two cases from which he learned a good deal. Both were cases of direct laryngoscopy, not cases of bronchoscopy. He was deviating, therefore, a little from the subject of the paper. In both of these cases there was a tumor springing from the anterior part of the vocal cord. The first patient was a young sailor of glorious physique. In his larynx there was a cystic growth which sprang from a pedicle which was placed just below the left vocal cord about two-thirds of the way forward. Under ether he had the greatest difficulty in seeing the growth. All the instruments known to him were tried, including the triangular fenestrated tube. The best that he was able to accomplish was to remove the larger part of the cyst. The pedicle could not be got. Later under cocaine various right angled instruments were tried through the mouth under the guidance of the mirror. Other men beside himself tried in this manner, but the result of all their efforts amounted to practically nothing.

Soon after this a case was referred to him in which there was a small fibroma of the left cord. As in the first case the growth was situated well forward. It was easy to see it with the mirror, but the physician, a laryngologist of experience, was not able, after repeated trials, to grasp it. He felt sure, and the speaker shared the feeling, that under ether it would be a simple matter to remove the tumor. Under ether, however, the same difficulties were encountered as presented in the case
of the young sailor. Instrument after instrument was tried and discarded, until finally, he went back to a small bronchoscope about ten inches long and a quarter of an inch in diameter. With this he was able to get in behind the last tooth and to shoot diagonally across the larynx and pin the growth inside the tube. He had the tumor pinned, as it were, against the wall and could deal with it as he pleased. Shortly after this the same tube and the same manipulation were successful in removing the pedicle of the cystic tumor from the larynx of the sailor. With the sailor the procedure was more difficult. In fact, in the attempts to corner the pedicle the tube was considerably twisted. It would seem from these two cases that where there is a growth on the anterior part of the vocal cords the use of the small bronchoscope is suggested. With the small tube the growth can be seen when other instruments fail to disclose it. With the small tube the growth can be pinned firmly against the side of the larynx, and when these two things have been accomplished the removal of the tumor with appropriate forceps is easy.

Dr. James F. McCaw, of Watertown, N. Y., cited a case in his practice in which he encountered the same difficulties mentioned by Dr. Mosher. The growth was a marginal fibroma of the right vocal cord situated near the anterior commissure. After three or four days training of the larynx by the introduction of instruments several ineffectual attempts were made to remove the growth by indirect laryngoscopy; at each attempt to grasp the growth it would disappear below the vocal cord. This method was therefore abandoned, and an attempt was made to remove the growth by direct laryngoscopy with Jackson’s split spatular. The same difficulties were encountered with this method, as with the indirect method, on account of the location and position of the tumor. With none of the instruments usually used in this procedure was he able to grasp the growth, and as a last resort he tried the long shank alligator forceps. He was able by crowding the anterior blade well forward to finally grasp the tumor and remove it. Tumors situated in this position of the larynx are undoubtedly among the most difficult to remove, and for that reason he was very glad to know of Dr. Mosher’s method of pinning the growth down with the ordinary bronchoscopic tube. It seemed that this would very much facilitate the removal of such tumors in this locality.

Dr. Walter B. Johnson, of Paterson, N. J., thought the interesting feature of Dr. Richardson’s case is the size of the rubber eraser, which, carefully measured, would compare favorably with an O’Dwyer adult intubation tube. He had recently had under his care a child one year old who had inspired half a peanut. When the patient was brought into the hospital it was having great difficulty in breathing, and was very cyanotic. A vain attempt was made to locate the peanut by means of the x-ray, and, after having spent the greater part of the morning with the child, it was decided to introduce a one-year-old O’Dwyer foreign-body tube, inasmuch as the respiratory movements were becoming constantly more difficult and the child more cyanotic. The intention was, after luncheon, to perform upper bronchoscopy. On removal of the foreign-body tube prior to using the bronroscope, the child was breathing easily, and had no further difficulty in either inspiratory or expiratory movements. The nurse reported that it had had a violent spell of coughing during the noon hour, and the presumption was that it had coughed up and swallowed the peanut. The presence of the peanut within the lung was demonstrated positively not only by the symptoms but by the auscultatory examination. The presumption that it was coughed up was borne out by the absence of further symptoms.

Dr. Harry L. Myers, of Norfolk, Va., cited two cases, one a grain of corn, the other a peanut, inspired into the trachea. Inspiration was free but at each expiration the foreign body in each case would be
thrown up against the under side of the vocal cords, producing a spasmatic closure of the glottis, and greatly interfering with full expiration. The impact of the bodies against the under side of the cords could be heard from without with great distinctness. Tracheotomy was done in both cases and as soon as the trachea was opened, expiration drove the foreign body out of the tracheal wound. I feel sure that had I then known of and used a laryngoscopy tube, the body, in each case, would have been thrown into the tube and tracheotomy avoided.

Dr. Wendell C. Phillips, of New York City, apropos of the toleration of the bronchi for foreign bodies, mentioned a case in which a patient, brought to him by a dentist, had swallowed a small metal instrument which dentists call a wrench, and which is used for adjusting the dam. Despite the warnings of the dentist the patient had inspired the instrument during a coughing spell. A very thorough examination with the laryngoscope and other methods, except the x-ray, failed to reveal the wrench, nor did the patient present any symptoms of having a foreign body in any part of his anatomy. It was decided that he must have swallowed it and that it was in his stomach. During the night he was awakened by a slight coughing spell, when he coughed up the wrench. In another instance an attempt was made to remove a papilloma from the vocal cord in a woman whose neck was so short and fat, and whose joints were so crippled with rheumatism, that it was impossible to get her in such position, despite the fact that she was profoundly anaesthetized, as to be able to introduce the tube into the larynx without sacrificing two incisor teeth.

Dr. A. A. M. McKimmie, of Washington, D. C., emphasized the difficulties which Dr. Richardson experienced in attempting to remove the eraser. All forceps failed to grasp it, and if the plan suggested by Dr. Mosher had been followed he would still have failed. The eraser is not pure rubber, but a combination of rubber and some other substance. It is friable, and would break each time it was grasped. The speaker had suggested using a hook, but with this, too, the eraser would break. It was not merely lodged, but was firmly impacted. The suggestion to remove it with a screw was excellent, and, as he thought at the time, was original with Dr. Richardson. He had learned, however, that Dr. Ingals had said, in a paper read before the Southern Section last year, that in some cases a screw might be used. This eraser was in the right bronchus, but it came up so far as to almost cover the left bronchial opening. A screw seemed to be the only instrument with which it could be removed.

Dr. B. R. Shurly, of Detroit, Mich., cited three cases which had recently come under his observation. The first, a fibroma of the anterior commissure, was removed by a specially devised laryngeal snare, with a Jackson spatula, under cocaine. The second was a papilloma, which was removed by specially devised forceps with the beak leading forward. The third case was a patient of Dr. Hickey, who presented herself with a diagnosis of pulmonary tuberculosis. She had coughed for three months. Upon inquiry it was found that she had had two teeth extracted under nitrous oxide two months previously, one of them evidently having been inspired, as the x-ray revealed a tooth well down in the bronchus. After considerable difficulty the tooth was removed by bronchoscopy.

Dr. Richardson, in closing the discussion, referring to Dr. Mosher's remarks, agreed that it is always well to be prepared for any emergency, but no grasping forceps which he had ever seen were sufficiently wide to encompass the broad upper extremity of this eraser and hold it firmly enough to allow it to be removed. Each time that an attempt was made to remove the body little pieces of the mass were pulled away. The idea of the screw was not original with him; he had probably read the article to which Dr. McKimmie referred, and from it the idea of using the screw in this case resulted.
ACUTE NEPHRITIS FOLLOWING ACUTE TONSILLITIS.

By HANAU W. LOEB, A. M., M. D., St. Louis, Mo.

An experience with acute nephritis, following tonsillitis, during the winter of 1908-9, has brought two important facts to mind:

1st: That acute nephritis is a frequent sequella of tonsillitis.

2nd: That this is overlooked in practice by the great majority of practitioners.

Pediatricians are perhaps more familiar with the associations of nephritis and tonsillitis than general practitioners and laryngologists, but what I have observed during the past year has convinced me that this association is too little appreciated by any class of practitioners.

On this account, it has seemed timely to bring the relation of these two conditions to the notice of laryngologists, not so much to add anything new as to present the known facts, and to draw inferences from them that are justifiable.

The following cases are the first in which I have ever recognized the association of nephritis with tonsillitis.

CASE I: I. L., daughter of a physician, age 13, had always been well and robust. She had had an attack of measles several years before, but otherwise she had had no exanthematous disease. On several occasions she had had an urticaria, and at one time an attack which resembled acute appendicitis, which, however completely disappeared without recurrence. Dr. Engman, who had seen her in the attacks of urticaria, thought that this was probably a similar condition in the cecum. Patient suffered about once a year with a very mild attack of tonsillitis but the tonsils themselves did not appear, up to this time, to be sufficiently large to require removal.

During the latter part of November, 1908, she was taken with a mild attack of lacunar tonsillitis, with temperature running up to 101°. The tonsillitis continued for several days without any increase in fever. On account of the slight elevation of temperature, great care was taken to eliminate diphtheria. cultures proving negative. There was no evidence whatever of scarlatina.
The attack was prolonged for something like two weeks, with intervals of amelioration and of increase. After this time she was permitted to return to school. Ten days later there was a recurrence of the tonsillitis, though evidently somewhat mild. However, it was deemed sufficient to justify her remaining home from school. Two weeks later, on December 17th, she complained of headache at night. During the following day she was more or less indisposed, and on the night of the 18th she again complained of headache, this time more severe. Aspirin was given to her but with very little effect. On the morning of the 19th, her urine was examined with the following result: Specific gravity 1,009, dirty red in color, with a ring of albumin, abundance of red corpuscles, hyalin, granular and pus casts. That afternoon, without warning except for a headache, patient had a uremic convolution which was succeeded thirty minutes later by another. Hot packs, enteroclysis, administrations of large doses of water, and pilocarpin, caused rapid improvement, and the quantity of urine for the first twenty-four hours after the convulsions amounted to fifty-four ounces.

On the afternoon of the 22nd, she was again attacked with convulsions, more severe than the previous ones, and, an hour later, another convolution appeared less severe, but followed by coma. Reaction was much less rapid from this attack, in fact her life was despaired of, but the use of the electric light pack combined with jalap powder and elaterium and magnesium sulphate was finally successful, although she was very much weakened. Patient, after this, received the electric light pack, pilocarpin and liquid diet, and was retained between blankets without clothing for a period of eleven weeks. The urinary conditions improved very gradually. Specific gravity about 1,010 for a period of two weeks, blood gradually disappearing from the urine, as did also the casts and albumin. On March 26th, 1909, albumin had entirely disappeared with the exception of an occasional hyalin cast; the condition of the urine was practically normal. She left then for California. Upon arrival, it was found that the albumin had increased somewhat, doubtless due to the long and trying trip. Patient spent six months in California and returned to the city with the conditions entirely normal. Patient has increased in weight, and physically, has been as good, or even better, than at any time in her life before. Tonsils were removed after she had been in bed for eleven weeks.
During the course of the disease, she was under the care of Doctors J. S. Myer, J. R. Clemens, W. P. Elmer, G. C. Crandall, W. E. Sauer, Dudley Fulton, and others.

CASE II: Mrs. M. G. S., age 28, wife of a physician, married for three years, one child two years of age. Previous history unimportant.

Early in January, 1909, patient had an acute lacunar tonsillitis of a rather severe type, differing in no particular from previous attacks. Cultures taken and found negative as to diphtheria; streptococci present. Small superficial ulceration appeared on the palate, but this speedily disappeared. Although the attack lasted two weeks, longer than usual, it gradually subsided. About this time, patient began to complain of slight headaches which gradually became more intense. Having noticed some puffiness about the eyes and a general indisposition and lack of energy, a specimen of urine was examined and the following conditions were found:

Specific gravity 1,005, acid in reaction, wide ring of albumin, a few pus casts, and red corpuscles.

Patient was at once sent to the Jewish Hospital with a diagnosis of acute hemorrhagic nephritis following the tonsillitis. Within the next few days the urinary conditions became gradually worse, the urine being decidedly bloody in character. Two per cent. of albumin (Esbach’s) was found, and casts of all sorts—chiefly granular. Under the usual treatment in the hospital, conditions gradually improved, with the usual varieties in the urinary findings, and after a period of sixteen weeks the urine had returned to a perfectly normal condition, all evidence of nephritic involvement entirely disappearing. One year has elapsed since the inception of the trouble, and entirely normal conditions have existed ever since.

Doctor J. S. Myer and Dr. W. P. Elmer were associated with me in the case.

CASE III: C. H. R., Intern in hospital, consulted me on January 11th on account of obstruction in his nasal passages. On January 20th, 1909, a submucous resection of the septum was performed, the nose being plugged immediately after the operation. That evening the plug was removed without any considerable hemorrhage. The next day, against advice, he pursued his usual work. That evening he was taken with a hemorrhage requiring packing, which was removed the following morning. On the
night of January 23rd, he was taken with severe pains in both ears, and on the morning of the 24th, paracentesis was performed on both sides. The bilateral middle ear suppuration pursued the usual course, the discharge ceasing entirely about February 3rd and 4th. The patient, who was a very active man, took very little care of himself and pursued his duties in the usual way. On February 8th he discovered edema of the ankles. An examination of the urine showed a very large amount of albumin, blood, and casts. After three months of rigid treatment in the usual way, by Dr. Wm. Engelbach, he entirely recovered from the acute hemorrhagic nephritis. It was only after the attack of nephritis came on that he told me that, at the time of the operation, he was suffering from an acute sore throat which had been going on for a week before, and which continued for a week after the operation. He stated that he had refrained from telling me, fearing that I might postpone the operation.

While, of course, it must be admitted that an acute hemorrhagic nephritis could follow an infection subsequent to a plug in the nose for secondary hemorrhage after a sub-mucous operation, in view of the fact that the other cases occurred about the same time, I have felt that I would be at least justified, with this explanation, to include this case among the others.

CASE IV: J. R., Interne at hospital, complained of sore throat for about three days, when first seen on March 26th, 1909. He had been having, year after year, a number of attacks of acute tonsillitis. Tonsils moderately enlarged. He was put to bed, temperature being 100.4, respiration 20, pulse 100. Examination of the throat revealed lacunar tonsillitis affecting both tonsils. Culture showed absence of Klebs-Loeffler bacilli and presence of staphylococci and streptococci. Under local application of argyrol and the administration of aspirin, caffëin, etc., the throat trouble entirely subsided in four days. Patient was permitted to leave the bed, minimum temperature being 97.8, maximum temperature 101.6 axillary.

Two days later, patient complained of dull ache across kidney region and general malaise. He was again put to bed. Urinary examination showed a moderate amount of albumin, few red blood cells, and a few hyalin and granular casts. Patient was put on liquid diet with plenty of water and no medication except daily laxative doses of magnesium sulphate. The temperature, pulse and respiration remained normal, and the twenty-four hours urine sixty to eighty ounces. Patient was permitted to
leave the bed in six days. Urine entirely cleared up in about three weeks time from the patient's admission to the hospital the second time. Patient was kept on a restricted diet for two months. Previous to throat trouble, the urine conditions were normal.

COMMENT.

Of these four cases, two were physicians, one the daughter of a physician, and one the wife of a physician; and, presumably, greater care was to be expected in observation than in patients not directly related to physicians. And yet there was no suspicion of the possibility of a nephritie condition until the disease was well advanced.

In each instance, diphtheria and scarlet fever were positively excluded.

In each instance, the nephritis was of the hemorrhagic non-scarlatinal type—that is, there was no pyrexia or great edema.

In each instance, the tonsillar inflammation was mild in character and the course unusually slow. The nephritis was not discovered in any of the cases until the tonsillar affection had disappeared. This differs materially from the nephritis of scarlatina and diphtheria, in which the physical signs as well as the symptoms of the nephritis are concomitant with the height of the disease.

Case I. shows how insidiously the nephritis may develop without noticeable symptoms, and how serious it may become without marked warning.

Case IV. is a good illustration of a case caught at its inception; perhaps it would have continued mild and, if the patient had not chanced to examine his urine, he might have recovered without ever knowing of the presence of an acute nephritis.

In all the cases, the nephritis would have been considered as spontaneous, or idiopathie, if the tonsil affection had not been so closely observed.

REVIEW OF LITERATURE.

The literature on the subject, although exceedingly meager considering the importance and gravity of the condition, bears out my own observation—particularly as to the course of the nephritis. Less attention has been paid to the character of the tonsillitis itself, which, after all, should be studied with the ut-
most care. This is mainly due to the fact that the subject has been far more widely studied by internists than by laryngologists.

The tonsil itself, as an atrium for the entrance of disease, has been investigated by a number of laryngologists; notably by Goodale, Wood and Wright.

Goodale (1) established that carmine granules may enter the parenchyma of the tonsil, and Wood (2) succeeded in finding tubercle bacilli in the cervical glands after rubbing a hog's tonsil with these micro-organisms.

Following the example of Goodale, Pirera (3) made applications of coloring agents to the tonsil lacunae and also micro-organisms in pure culture. In men, he made application of indifferent saprophytes (Prodigiosus), and in narcotized dogs, pathogenic micro-organisms (staphylococcus aureus). The result of the experiment was positive. He found that micro-organisms enter the tonsillar tissue more easily than coloring particles. The former are stopped under the lacunar epithelium, the latter are stopped within the follicle. The greatest possibility of invasion was found in connection with the pathogenic micro-organisms, which were scattered into the follicles as well as into the follicular connective tissue.

Jonathan Wright (4), on the other hand, claims that the experimental work of Pirera, frequently quoted in support of the idea that bacteria readily penetrate the epithelial walls of the tonsillar crypts, to be so crude, so glaringly open to criticism of technic, that his results and conclusions are utterly worthless. He thinks, however, that there is good presumptive clinical evidence that pathogenic bacteria, which in a state of equilibrium, are harmless habitants of the tonsillar crypts, are, under certain conditions, absorbed through the tonsillar epithelium.

He finds that there is fair experimental evidence that pathogenic bacteria of foreign origin in vast numbers and unmodified by the cellular environment of the tonsillar crypts, when blown into the throat of an animal unaccustomed to them, pass through the tonsillar epithelium and produce systemic effects.

In the first instance, we must suppose some antecedent change, some nerve shock, some systemic cause, which permits the pyogenic or other bacteria—habitual denizens of the crypt—to penetrate the epithelium.

In the next place, where there is presumably no systemic change, or shock, or other cause, we must suppose that the foreign pathogenic bacteria, in numbers that do not obtain under the
usual conditions, overpower the bacteriolytic and other protective influence, which is sufficient to repel, under usual conditions of health, the inhabitants of the tonsillar crypt. Wright concludes, after making a number of experiments, that the carmine granules pass through the layer of viscous bacteria and then through the epithelium without carrying any of the bacteria with them.

Whether or not bacteriologic investigation shows the possibility of the tonsil being the point of entrance for disease, there is abundant clinical evidence—at least so far as nephritis is concerned.

As early as 1881, Leyden (5) called attention to the possibility of nephritis occurring after a simple angina. However, he stated that it was analogous to the fact that diphtheritic paralysis could follow simple angina. He also described a form of acute spontaneous nephritis showing itself after exposure to cold and wet, and characterized by slight fever, hemorrhagic urine, albuminuria. Some of these cases run a slight course without edema, others have severe symptoms with edema, uremia, and exitus lethalis.

A. Thouvenet (6) reported, in 1894, a case of a woman, age 45, who was suddenly taken with acute lacunar tonsillitis. Ten days after beginning of this disease, she was taken with headache, dizziness and severe dyspnea, rapid heart action, edema of the eyelids and legs, urine loaded with albumin. The albumin disappeared after four weeks' treatment, and the patient remained well. Thouvenet believes that there are many cases of acute nephritis, said to be due to exposure to cold, which really result from an attack of inflammation of the tonsils, which, perhaps, is overlooked.

Jessen (7) reports four cases of acute tonsillitis in which the tonsils acted as point of entrance for severe general infections, and in two of which nephritis was present.

Du Mensil de Rochemont (8) states that in the clinic at Leipzig, out of twelve hundred and sixty-one cases of angina, thirty-one cases of nephritis were found in which the course was, in the main, not unfavorable. The majority went on to entire cure, while others required several months to recover, and one died.

On the other hand, Emil Mayer (9), in a very comprehensive study of the literature, in writing on the tonsils as portals of infection, only casually mentions albuminuria as one of the conditions known to follow angina.
Even Richards (10), in his extensive review of the present status of the tonsil operations, simply mentioned nephritis with numerous other conditions caused by tonsillitis—such as aneurism, appendicitis, erysipelas, meningitis, pneumonia, paraplegia, strabismus, osteomyelitis, phlegmon, oophoritis, orchitis, and general septic infection.

Julius Ullman (11) calls attention to the fact that nephritis often follows acute tonsillitis, and states that Bright’s disease later in life often results from angina in childhood.

John Lovett Morse (12) thinks that it is reasonable to consider tonsillitis as a cause of nephritis on account of the fact that it is due to bacterial infection, and that being complicated by cervical adenitis, peri-tonsillar abscess, or acute inflammation of the middle ear, it should lead to inflammation of the kidney as do other diseases due to micro-organisms. An additional reason is the fact that it is caused by streptococci, the usual cause of acute nephritis in scarlet fever. In eight months previous to his report, he had seen four cases of tonsillitis resulting in acute nephritis in all of which it was possible to exclude scarlet fever as the cause.

He further states that it is evident from these cases that tonsillitis, whether of a severe or mild type, may be the cause of acute inflammation of the kidneys. It is probable that tonsillitis is more often followed by nephritis than is commonly supposed, and it is very likely that in many cases which are considered primary the infection enters through the tonsils, the local manifestations not being severe and having been forgotten. This being true, tonsillitis should not be looked upon, as it usually is, as a simple disease of but little importance. The disease, which can cause acute endocarditis and acute nephritis, is certainly one worthy of consideration. The heart and urine, in tonsillitis, should therefore be examined as carefully as in rheumatism or scarlet fever, and the examination kept up for a time during the convalescence.

Herrick (13) states that tonsillitis, or an every day sore throat, is probably in many instances the atrium for the entrance of toxic infectious agents that induce nephritis, and in all cases of obscure origin careful inquiry should be made as to recent nose or throat trouble. A comparatively insignificant angina, a mild rheumatism, a cold or supposedly trifling la grippe, may be the precursor of a nephritis.

By far the best characterization of the relation of tonsillitis to nephritis is made by Fr. Müller (14). He considers that angina
(including angina phlegmonosa) is much more often the cause of nephritis than has been formerly believed, and that we are not justified in looking upon every angina followed by nephritis as scarlatina sine exanthemate.

Post-anginal nephritis is frequently overlooked, as it so commonly begins insidiously with very mild albuminuria and hematuria, which only a microscopic examination will reveal, and with no symptom except a slight lassitude. Such a nephritis can only be discovered early by physicians who make it a point to examine the urine carefully after every attack of sore throat.

It must be remembered that not only the severe anginas may cause nephritis but that, as in scarlatina, very mild—even ambulatory—cases of tonsillary infections may result in the affection of the kidney. He calls attention to the insidious character of the condition in contradistinction to the scarlatinal nephritis, which is usually characterized by pyrexia, oliguria, and a murky brown red urine. However, later in the anginal nephritis, slight edema—especially of the eyelids—appears, moderate albuminuria, cylindruria and red cells may be found for weeks and months, and even after many years there may be a recurrence of hematuria and albuminuria. Müller believes that the tendency to complete restitution is small; in some cases, there may be, in time, a rise in the blood pressure, hypertrophy of the heart, and other signs of a contracted kidney. Many of the relapsing chronic hemorrhagic nephritis in all probability are due to an original post-anginal nephritis.

Adler (15) describes a form of nephritis which occurs in at least seventy-five per cent of all cases of pure tonsillitis, not including, of course, scarlatina or other infectious diseases. Unless the physician makes it a point to look for this nephritis, no clinical manifestations will direct his attention toward it, as there are no symptoms. The urine, as a rule, is secreted in sufficient quantities and is not more scant or highly concentrated than we are accustomed to see in any febrile disease. Albumin appears usually within the first forty-eight hours from the onset of the tonsillitis, and is never very voluminous—in most cases but a trace. The microscope shows, possibly, a few red blood cells, some casts, hyalin, finely granular and epithelial, but always more or less abundant renal epithelium. We have, therefore, what is usually designated as desquamating nephritis. There is no edema, no vomiting, no headache, in fact no subjective or objective symptoms except those contained in the urine. In the overwhelming
majority of cases, the nephritis disappears simultaneously with the tonsillitis or soon thereafter; disappears as unnoted as it came. But sometimes it does not disappear and persists long after the tonsillitis is cured. Now and then, however, it does not permanently disappear, but persists indefinitely. It is true that these cases of persistence of nephritis after tonsillitis are, on the whole, of not very frequent occurrence, but they are not nearly as rare as would appear from the very scanty literature on the subject.

Phillip K. Brown (16) reports a case of nephritis after tonsillitis in which albumin appeared in the urine on the day on which his throat was attacked. The sediment contained hyalin, granular, epithelial and blood casts, and many mucous cylindroids, and also many red blood cells. Sugar was also found, but never before nor after. Patient progressed toward a definite acute nephritis, which was further complicated by a course of acute mania toward the end of the nephritis.

F. Kleininger (17) reports that, in three years, he had seen eighty-four cases of cryptogenic diseases, of which there were forty-nine cases of rheumatism, sixteen of nephritis, and eight of endocarditis. Of these cases, in eighty-three per cent the tonsils were the cause. He considers that the tonsils are a filtration apparatus which prevent bacteria from overwhelming the system.

H. Curschman (18) asserts that every simple acute tonsillitis, with or without abscess formation, may be the cause of an acute or subacute (generally hemorrhagic) nephritis, which often, unfortunately becomes chronic and cannot be cured. The nephritis occurs sometimes immediately after the beginning of the tonsillitis, but, as a rule, it is a sequella. He reports three cases of tonsillar hemorrhagic nephritis completely cured after tonsillectomy.

CONCLUSIONS.

1. Acute nephritis results from acute tonsillitis far more often than is generally believed.

2. The symptoms ordinarily are not manifested until some time after the inception of the disease.

3. The nephritis is of the hemorrhagic type and differs from that of scarlet fever in that pyrexia, edema, and oliguria are not marked symptoms of the disease. In addition, it follows the angina and is not concomitant as in scarlatina and diphtheria.
4. Judging from the course of the cases reported, there must be many in which a mild nephritis occurs incident to a tonsillitis, which goes on to resolution without patient or physician being conscious of its presence.

5. As each case of lacunar tonsillitis may be a potential source of acute nephritis, it is incumbent upon practitioners to observe the urine—not only during the height of the disease, but for some time after as well.

6. Spontaneous or idiopathic nephritis is probably often due to a tonsillitis that has not been considered as an etiologic possibility.

7. Chronic affections of the kidney may very well owe their origin to unrecognized acute attacks of nephritis of tonsillar origin.

8. Much light may be shed upon this subject by a study of the urine in a large number of cases of acute tonsillitis.

REFERENCES.

2. Wood.
3. Pirera—Le glandule del 'anello di Waldeyer, specialmente le tonsille palatine, considerate come via d'entrata delle effezioni (microbiche), Arch. Ital. di Laringol., April, 1900.
13. Herrick—Osler's Modern Medicine, Vol. VI.
NEPHRITIS FOLLOWING ACUTE TONSILLITIS.

DISCUSSION.

Dr. Wendell C. Phillips, of New York City, had not found in his own experience that acute nephritis follows acute tonsillitis in any considerable proportion of cases, though it is entirely probable that it should do so. He was inclined, however, to think Dr. Loeb had taken an extreme view of the importance of this complication. It is well known that ordinarily in the course of follicular tonsillitis one tonsil becomes the seat of the disease, the second morning the other is affected, the third morning the first is well, and by the fourth day all symptoms of the disease have subsided. The persistence of the symptoms in the first case cited by Dr. Loeb would suggest some other deep-seated trouble. In none of the cases cited does the history show that urinalysis was made before the attack of acute tonsillitis. In many instances there is no doubt a nephritis before the attack of tonsillitis. Urinalysis should be made in every case.

Dr. J. A. Stucky, of Lexington, Ky., had long since come to the conclusion that tonsillitis is simply a local manifestation of some systemic condition. For years he had had charge of an orphan asylum and two or three boarding schools, and he had made about three thousand examinations of the urine in all sorts of nose and throat troubles. He had never seen a case of follicular tonsillitis in which Heller's test with cold nitric acid did not show the red line indicating faulty metabolism. In the past eight or ten years he had seen five cases of nephritis. He did not believe that nephritis is the result of the tonsillitis, nor did he believe that the local treatment is of as much importance as the systemic treatment. So convinced was he that tonsillitis is due to systemic infection that in all cases he gives a routine treatment—clean out the intestinal tract. For this purpose he gives one dose of calomel, five grains for children, ten to fifteen grains for adults, followed in six hours by an ounce of castor oil, and two hours later a saline, such as a bottle of citrate of magnesia. For the pain and ache benzoate of soda is almost a specific, given in ten grain doses every three hours. Locally nothing is equal to cleaning out the tonsillar crypts and rubbing in argyrol. He believed Dr. Loeb's case to be one of mixed infection, and that the nephritis was the result of the intestinal condition and not of infection through the tonsil.

Dr. James F. McCaw, of Watertown, N. Y., said Dr. Loeb's paper suggested several similar cases in his own practice, the most severe one being that of a physician. This patient had a sub-acute follicular tonsillitis, not severe enough to confine him to bed, and he continued to attend to his practice for about one week, when suddenly he seemed to be overwhelmed with sepsis, almost complete anuria, the small amount of urine which was passed containing about fifty per cent. of albumin. Another case was that of a young boy about fourteen years of age, upon whom I had done a mastoid operation. On his return home after ten days following the operation, he developed an attack of acute follicular tonsillitis followed by acute nephritis. The urine contained large quantities of albumin and casts for several weeks. It was not likely that this was ether nephritis following the operation, as an analysis immediately afterward showed no trace of albumin.

Dr. Norton L. Wilson, of Elizabeth, N. J., said that in an experience of twenty years he had encountered one case such as Dr. Loeb had described. The lesson to be learned from these cases is that the urine is not examined often enough, either by the family physician or the specialist. He did not agree with Dr. Stucky, but on the contrary considered tonsillitis as a local infection. He had been subject to tonsillitis, and had found that if he took the trouble to paint his throat with equal parts of tincture of iodine, carbolic acid and glycerine he would not have it.
DISCUSSION.

Dr. Stephen H. Lutz, of Brooklyn, had found in his own personal experience that sore throat was cleared up promptly by the use of salol for a day or two, followed by rhubarb and soda.

Dr. Ewing W. Day, of Pittsburg, Pa., called attention to the use, by means of a spray, of pyocyanase, which is imported from Germany. This, sprayed over the tonsil, will cut off an attack of follicular tonsillitis in from twenty to twenty-four hours.

Dr. George L. Richards, of Fall River, Mass., disagreed with Dr. Wilson. The urine must be centrifuged if the examination is to be at all thorough.

Dr. Alva E. Abrams, of Hartford, Conn., did not consider that Dr. Loeb had laid too much emphasis upon the subject under discussion, and upon the importance of examining the urine. He had been surprised, in making such examinations, to find how many patients have a moderate degree of nephritis. He cited the case of a man, thirty years of age, who had twice been rejected by life insurance companies. He had consulted the speaker for tonsillitis, and examination of the urine showed it to be loaded with albumin. It was more than two weeks before he was out of danger, and more than two months before he had merely transitory albuminuria. He called attention to the danger of the careless use of chlorate of potash. Two deaths within a few years had occurred in Hartford from its use in acute tonsillitis. Even moderate doses of this drug are dangerous in this disease. Whether the condition has its origin in local or systemic infection, the tonsil should be removed as soon as the patient is in condition to permit the operation. Salicylate is as nearly a specific as any remedy he had tried.

Dr. Robert Levy, of Denver, Colo., thought the weak point in the discussion hinged upon the diagnosis of tonsillitis. Many mild cases sore throat had proved to be diphtheria. A bacteriological examination should be made in every case of tonsillitis. It is very often impossible to make a differential diagnosis between tonsillitis and mild diphtheria.

Dr. B. R. Shurly, of Detroit, Mich., asked if bacteriological examination had been made, and if there were any naso-pharyngeal complications in the cases reported by Dr. Loeb. The naso-pharynx, in all these infections, is the key to the problem of nephritis, endocarditis, etc. Many cases of albuminuria are not nephritis. There is a great deal in the bacteriology of tonsillitis which explains these complicating conditions.

Dr. John A. Thompson, of Cincinnati, called attention to a paper published twelve years ago by Wagner, giving his experience with rheumatism following tonsillitis, and stating that he had found the same organism in the tonsils and in the fluid from the joints. Goldthwaite, of Boston, found that it was much easier to find the streptococcus in the joint tissues than in the fluid. The speaker cited a case of acute tonsillitis in a girl who, five days later, developed acute nephritis and died.

Dr. Loeb, in closing, said the discussion proved that it was advisable to bring this subject to the special notice of the Society. Cases such as he had reported are very common. Pediatricians have long known this. After nineteen years of practice he had found that while he knew but little about it, this relationship was well known among practitioners of general medicine and diseases of children. The four cases reported were found within two months, and since that time a large number of cases had been found by general practitioners of his acquaintance who had watched cases of acute tonsillitis and who had discovered albumin and casts in the urine. Many cases of spontaneous
nephritis can be explained in this way. The severer cases are not so common. Many cases run a mild course, going on to recovery or to chronic nephritis. The question as to whether tonsillitis is the result of a systemic condition or the systemic condition the result of the tonsillitis is yet to be answered. It is well known, however, that in tonsillitis many of the symptoms of nephritis are present. In three of the cases reported the utmost care was taken to exclude diphtheria and scarlet fever. In the case of the child the pediatrician spent hours each day with the patient, as he suspected diphtheria. There was no sign of scarlet fever in any of these cases.
THE EFFECT OF TOBACCO ON THE EAR AND UPPER RESPIRATORY TRACT.

By HENRY O. REIK, M. D., Baltimore, Md.

When I accepted the secretary's invitation to prepare a paper on this subject I was strongly impressed with the notion that my principal task would consist in wading through a mass of literature, but, much to my surprise that task really resolved itself into a diligent search for any literature bearing upon the question. Not that there has been any dearth of writing or talking about the evil effects of tobacco and alcohol; you are all familiar with the diatribes of a certain irresponsible type of temperance lecturer and with the grossly inaccurate statements of a number of lay periodicals, especially those intended for boys' reading. That the medical profession is in some degree responsible for the reckless and unreliable publications of the laity has to be confessed for at least some of this misinformation has been taken from the writings of medical men. In some instances remarks thoughtlessly made by physicians have been used to support the teaching of fanatics or medical writings have actually been garbled for this same purpose. Somewhat in this way many of our public school books became inoculated a few years ago with matter that was not only misleading but so false as to produce a contrary effect to that designed by their writers. Works on physiology for use in instruction of grammar school boys and girls contained such exaggerated statements regarding the evil effects of alcohol and tobacco that the children themselves recognized their falsity. What good could be expected to come from telling a group of boys that the use of tobacco would stunt their physical progress and probably lead to imbecility and that alcoholic liquors of any kind or strength were deadly poisons, when they had only to look at their own fathers and other male relatives for ocular refutation of such arguments. In fact, the average boy submitted to such instruction, if he has not already run the gamut of smoking from home-made cigarettes of grape vine or corn silk to the common clap pipe, has his curiosity aroused and, after comparing the gloomy prophecy of the school physiology with his
personal observation of men, is rather tempted to experiment on himself and ascertain at once whether he is fit to survive the ordeal of the first smoke and to learn the effect of wine or whiskey.

There is cause for congratulation in the fact that the output of this particular kind of literature has diminished very markedly in recent years. The prohibitionists and the temperance advocates have become more temperate in their language of denunciation and have apparently decided to make their fight on the basis of truth. That is certainly the more sensible plan, for it would seem that the truth about either alcohol or tobacco would be sufficient to condemn them as being something less than blessings to humanity.

The scarcity of trustworthy literature upon this subject is very striking. Much that has been written is valueless because not based upon accurate observation and the attitude of the authoritative text books on diseases of the ear, nose and throat is somewhat surprising. The majority of them have either ignored or practically sidestepped the question, apparently content with classing tobacco and alcohol among the possible causes of local disease and devoting not more than a paragraph to the entire consideration of the subject. The explanation may be that experimental investigations for the proof of theories are so difficult of performance in this particular field, that these authors have wisely preferred silence to vague theorizing.

Having purposely thrown aside all palpably unreliable or misleading material bearing upon the subject and made the effort to cull out from the apparently reasonable and trustworthy writings, such as bear the stamp of scientific accuracy rather than mere assertion, one is confronted by a rather meagre list of articles. From these I have attempted to sift the most valuable portions as a judge might sift the conflicting evidence in a case in the hope that we might arrive at some fairly definite conclusions that would be acceptable as presenting what is actually known about the question at the present time.

If we should formulate an indictment against tobacco it would show that it is called a noxious weed and charged with committing the following overt acts: causing cancer of the tongue or lips and possibly of the larynx; setting up a chronic catarrhal
inflammation of the nose, throat and larynx; causing loss of the sense of smell and producing deafness; so altering the functions of the gastro-intestinal tract as to establish imperfect digestion; interfering with the circulation of the blood and giving rise to a distinctive disease of the heart; arresting physical development if used by young persons, and impairing mentality at any period of life; reducing the vital forces, especially the local resistance of the respiratory tract and rendering the victim more susceptible than the non-smoker to affections of the nose and throat. In addition, the charge is generally made that the alleged ill effects of tobacco smoking are due to a known poisonous alkaloid—nicotine—contained in the tobacco.

Let us then bring the prisoner before the bar of justice and consider who and what he is, the relative amount of good and bad in his character, his general conduct and whether it is possible that he could have committed the offenses named.

In preparation for use, tobacco leaves are piled in heaps and allowed to undergo fermentation, under the influence of bacteria and mold fungi, these minute chemists causing a partial destruction of the vegetable substance and the development of secondary products that impart flavor to the tobacco. Professor Stranch, of Vienna, has scientifically investigated the manufacture and composition of a variety of tobaccos and concludes that there is no apparent connection between the "strength" of tobacco and the amount of nicotine it contains. He says that at the present time we shall have to consider the strength of a cigar as due to an unrecognized chemical substance resulting from the union of some of the delicate products of fermentation with the air inhaled during combustion. He furthermore believes that tobacco is not smoked because of the nicotine it contains, for he finds that the best tobaccos contain the least nicotine; from one half to two per cent, while the poorer grades contain from two to eight per cent.

Chemical analysis of the smoke from tobacco shows it to consist according to Severson, of: water, in the form of vapor; free carbon, in minute particles; ammonia compounds, in a state of vapor; carbon monoxide and dioxide; and nicotine. Several investigators have attempted to determine the amount of nicotine that actually reaches the mouth of the smoker, and while their estimates vary somewhat, all agree that it is less than one per cent, of what is present in the tobacco, some contending that it is the merest trace. It must be remembered, too, that this small amount
of so-called nicotine is in reality not pure nicotine but a complex substance which contains a fluid alkaloid, nicotine proper, a volatile substance containing ammonia, and a bitter resinous extract. The weight of evidence would seem to show that a much more dangerous feature of tobacco smoke is the volume of carbon-monoxide that it may contain. The percentage of carbon-monoxide in tobacco smoke probably depends in part upon the quality of the tobacco, but more upon the conditions under which it is smoked: it is least when there is a sufficient amount of oxygen to afford complete combustion and to convert most of the carbon into carbon-dioxide. There will probably be more carbon-monoxide thrown off when the smoking is performed in a closed room than in the open air, and, of course, more still where a concourse of people have been smoking for some hours in a poorly ventilated hall—as at the smokers so popular with those inconsistency disciples of fresh air, the doctors. The ammoniated vapors in the cigar smoke are, likewise, not without possible deleterious influence upon the tissues and have to be considered in any estimation of the injurious effects of smoking.

The harmful elements existing in or produced during the use of tobacco, then, are principally nicotine, carbon-monoxide and ammonia compounds. In what manner may they occasion trouble? If employed in the form of snuff or by chewing, the physiological effect of tobacco is in small doses sedative and mildly narcotic; in larger quantities it acts as an emetic, a diuretic and cardiac depressant, and in excessive amounts produces decidedly toxic effects. The physiologic effect of long continued use of tobacco is said to be exerted mainly upon the nervous system, probably as the result of absorption into the circulation of carbon-monoxide or nicotine, the effect being a trophomenrosis.

When used for smoking, whether in the form of cigar, cigarette or through the medium of a pipe, the first effect is stimulation of the salivary glands and a soothing influence upon the nervous system. Some reliable observers attribute an apperient effect to moderate smoking, especially if indulged in just after meals, because of the induced contractions of involuntary muscle structures, but also show that excessive smoking tends to favor constipation because of the later paralysis of these same muscles. Prolonged or excessive smoking may also cause a dryness of the mouth and throat, a condition ascribed by some to interference with the normal secretions, by others to irritation of the mucous membrane by ammonia gases.
Since the custom of using snuff has almost entirely disappeared no further attention need be paid to that. The chewing of tobacco might be expected to give rise to trouble directly, through the constant irritation of the buccal and pharyngeal mucous membrane, and indirectly as the result of nicotine absorption. As regards the first, there is no positive evidence of its harmful action in this way; it has been accused of exciting granular pharyngitis but there is insufficient evidence to prove the connection. Regarding the indirect effect of systemic absorption, it does appear probable that gastric disturbances, especially disordered digestion, and occasionally systemic intoxication might occur. As these do not concern the special organs treated of in this paper we shall not discuss them in detail further than to say that they are sometimes serious and that occasionally a death has resulted from acute nicotine poisoning from chewing large quantities of tobacco.

The smoking of tobacco is such a universal habit and so directly concerns the upper respiratory tract that it will naturally be the most interesting feature of our study. Here again we have to consider the direct and indirect effects, this time of the smoke and its toxic elements. The direct bad effects are alleged to be the production of acute or chronic inflammatory changes in the mucous membrane of the pharynx or larynx, reducing the local resistant powers of the nasal and pharyngeal mucous membranes so that they become the easier prey of micro-organisms, and starting malignant growths of the mouth and larynx.

In the first place, no one has yet described any characteristic lesion of the throat or nose attributable to tobacco. The nearest approach to this is found in the fact that a considerable percentage of smokers show a chronic granular pharyngitis and a small percentage suffer from a mild but chronic form of laryngitis. It has not been shown that granular pharyngitis is any more frequent in smokers than in non-smokers; some rhinologists inform me that they see quite as many women as men with granular conditions of the pharynx although they rarely meet with a woman who smokes. In a very interesting paper on this subject, Lack has called attention to this point and makes the statement that in the great majority of these cases a careful investigation will show that more potent causes than tobacco are at work to produce this pharyngitis, that the pharyngeal condition is dependent upon abnormalities in the nose or a purulent disease of the accessory nasal cavities that has been neglected. That irritation from the
ammonia contents in the smoke may possibly cause dryness of the pharyngeal mucous membrane and even institute a chronic inflammation, with vesicular or granular development, must be admitted but that it does actually accomplish this is not proven, and if, from all the cases in which it is clinically suspected we should eliminate those showing evidence of nasal disease which might have a causative relationship to the pharyngitis, the number left for observation and study would probably be very small. The same argument applies to chronic laryngeal disturbances; all other possible causes, including nasal abnormalities, must be eliminated before we can attribute any case of laryngitis to the effect of tobacco.

In this connection, however, it should be said that practically all observers are agreed that when inflammatory affections of the pharynx or larynx exist, no matter from what cause, excessive tobacco smoking is prone to aggravate the trouble. This seems reasonable in view of the fact that clinical experience has shown that any slight atmospheric impurities—dust or smoke of any kind—may prove irritating to the inflamed nose, throat or larynx. Lack remarks, "It would be safe to state that moderate smoking originates no affection of the throat worthy of the name; at the most it causes slight hyperaemia of the parts with which the smoke comes in contact, or an insignificant catarrh", yet he adds "When there is disease in the upper air passages the effect of excessive smoking is often manifested by a marked increase of the trouble".

As regards any local depleting effect, suggestions along that line seem to have been purely theoretical and in contradistinction thereto must be taken into consideration Arnold's bacteriological experiments, proving that tobacco smoke is bactericidal to such germs as the diphtheria and typhoid bacilli, the staphylococcus and streptococcus. While Arnold did not offer this as an argument in favor of using tobacco, it must be acknowledged that the possible good effects, through the destruction of microorganisms in the mouth and nose, offset the possible bad effects by irritation of the mucous membrane; unless smoking be carried to a degree far beyond any value it might have as a disinfectant and towards the dangerous increase of the irritative action.

There is not one scintilla of evidence that malignant disease of the throat is due in any way to the use of tobacco and, if it be admitted that carcinoma of the lip or tongue has been produced by smoking, it is clearly not tobacco but traumatism from
the stem of the pipe, or other tobacco container, that is responsible.

Lastly, we come to consider the effect upon the special sense nerves. It has been suggested that there might be some effect upon the olfactory and auditory nerves analogous to the toxic injury of the optic nerve produced by tobacco or tobacco and alcohol acting in combination. At first sight it would seem reasonable to expect something of this kind but as yet there is no satisfactory proof that such a condition ever occurs. You will recall that deSchweinitz has shown that tobacco, alcohol and other drugs may produce a lesion of the optic nerve and that the poison is selective in action, injuring or destroying a certain limited part of the nerve bundle, that is, the papillo-macular fibres. So far as I can learn, nobody has conducted any similar studies of the olfactory or auditory nerves. I have found but one definite case of anosmia reported as due to tobacco and that is given with so little detail that it is impossible to judge whether the diagnosis was correct; the report states only that the man used tobacco to excess, that he had lost the sense of smell and had impaired vision, but it is not even shown that the eye symptoms were those characteristic of tobacco intoxication. Wyatt Wingrave has reported a series of 17 cases of deafness which he classes as due to the excessive use of tobacco and in which he believes the lesion was of a character comparable to that of the optic nerve in tobacco amblyopia. Corresponding to the central scotoma of the visual field he found loss of hearing for low tones. This defect appeared, however, in only half of his cases. The very brief notes on these cases in his paper are certainly insufficient to warrant an unqualified acceptance of his views. It would certainly be a unique experience for one otologist to have seen so many cases of so rare a disease and the report of such an experience should be accompanied by unquestionable evidence of their nature. Dr. Wingrave's testimony is unfortunately incomplete and consequently inconclusive.

The relationship between tobacco and deafness is probably quite as accurately established in a story told by Dr. Muir, relating a conversation with one of his Irish patients: "O'Sullivan, you are quite deaf; how long have you been so?" "Yes, sir, I am very deaf and it's bacca as makes me so." "How do you know that?" "Well, sir, d'ye see I've done time twice and each time they stopped my bacca while I was in quod and my hearin' returned." The deduction is quite as scientific as some of the medical men's conclusions.
Dr. Bramwell, from whose paper this story was obtained speaks interestingly of his personal experience with tobacco and its effect upon his hearing. "I have myself repeatedly suffered from temporary deafness and can always make myself more or less deaf if I smoke too many Havana cigars or too much Cavendish tobacco but Manilla cigars have no prejudicial effect, however many I may smoke." Several writers refer to tinnitus as occasionally due to the effect of tobacco and I have two friends who use that phenomenon as a guide to their smoking; both are fond of cigars and one of them smokes almost incessantly when he has a difficult problem to work over, only letting up on his smoking when his ears begin to ring or buzz.

Delie reports six cases of nerve deafness resulting from the excessive use of tobacco, four of them in persons under eighteen years of age. He believes that the tobacco produces a tropho-neurosis of the auditory nerve by acting upon the circulation, through the sympathetic system, and, like other toxic neurites, the affection is progressive and should involve both ears simultaneously and without objective symptoms.

Another important question to consider is the relative danger of the different methods of smoking tobacco. On this point I may quote Dudley, as follows: "There is a difference in the methods of smoking a cigarette and a cigar or pipe. In the two last mentioned the smoke is simply drawn into the mouth and expelled directly therefrom or through the nose, while the experienced cigarette smoker will inhale the smoke—that is, draw it to a greater or less extent into the air passages and in some cases to great depths in the lungs, and thus the absorption of the carbonic oxide and other gases will take place very rapidly, causing more or less deoxidation of the blood and thereby impairing its power to build up wasting tissues of the body." That such a result would follow deep and prolonged, or frequently repeated, inhalations of tobacco smoke is possible, but, that it is possible to inhale cigarette smoke deeply into the lungs, or even into the trachea, is open to question. However, this is the one really substantial objection to the use of cigarettes; all the talk about the injurious nature of the paper wrappers and the character of tobacco used in cigarettes is perfect nonsense. The tobacco employed in cigarettes is the same quality as that used in making cigars and there is nothing of an injurious nature in the paper holders. There is a varying quality for cigarettes just as there are differences in cigars. Cigarette smokers often use
a considerable number daily but we must not overlook the fact that one cigar contains as much tobacco as a dozen cigarettes. Inhalation of the smoke, whether of cigarette or cigar, is undoubtedly a reprehensible practice and is more common among cigarette than among cigar smokers, though only a small percentage of even the inveterate cigarette smokers actually inhale much of the smoke.

From such facts as I have been able to collect then, and I append a list of articles that seemed to me worthy of consideration, it seems fair to offer the following conclusions:

1. It does not appear, at least it has not been proven, that tobacco causes any definite, characteristic lesions of the nose, throat or ear.

2. While it is possible that the excessive use of tobacco may, by indirect action, produce a toxic effect upon the olfactory and auditory nerves, with resulting impairment of the sense of smell or of hearing, there is not at the present time any definite laboratory proof for such an opinion nor is there sufficient clinical evidence to substantiate the belief.

3. The ill effects of tobacco smoke upon existing diseases of the throat, arising from other causes, is established and is the same as would be observed from any other form of irritation.

4. That gastric and systemic nervous disturbances may arise from excessive use of tobacco, in any of its forms, is unquestioned; the nicotine content of tobacco is a recognized poisonous substance and, in the process of smoking, there are evolved other injurious chemical products.

5. That carbon monoxide is probably a more dangerous and injurious constituent of tobacco smoke than is nicotine, only a very fractional amount of which ever enters the tissues.

6. That if there is any more danger to be anticipated from cigarette than from cigar smoking it is to be looked for solely in the inhalation of the smoke; cigarette smoking without inhaling is no more injurious than is pipe or cigar smoking, probably not so much so unless enormous numbers be smoked.

In conclusion, I beg to say that the author of this paper has tried to review the literature fairly, that he holds no brief for either alcohol or tobacco, that he has never yet encountered an agreeable alcoholic drink, has never tried chewing tobacco and has not learned to enjoy smoking, though he has occasionally smoked both cigars and cigarettes.
EFFECT OF TOBACCO.

BIBLIOGRAPHY.

American Text Book of Diseases of the Nose, Throat and Ear. (Holmes') article, page 654; and Leland's article, page 881.

Barr's Manuel of Diseases of the Ear, pages 75 and 99.

Politzer's Diseases of the Ear, page 712.

Bramwell. Injurious Effects of Tobacco. Clinical Studies, Edin

burgh, 1905-6, IV. 68.

Brattan, J. M. Peculiar Toxic Effect of Tobacco Smoke. Jour. A.

M. A., 1887, IX. 415.

Chierici, Tabacco e funzione uditiva. Gazz. Med. de Roma, 1906,

XXXII. 309.


1904, VII. 292.


News, 1888, LIII. 286.

Hutchinson, J. Extract from Clinical Lecture on Tobacco Poisoning.

Med. Times and Gaz. 1884, I. 40.

Black, H. Lambert. The Effect of Tobacco Upon the Upper Air

Passages. Practitioner, Lond. 1905, LXXV. 64.

Langmaid. The Effect of Tobacco Upon the Throat. Trs. Amer.


Mancioli. Il tabacco; lesioni dell' orecchio, del naso e della gola


Parker, C. F. Anosmia from Tobacco Poisoning. Med. News, 1890,

LVII. 289.


Mirror, Lond. 1864, I. 781.

Severson. The Effects of Cigarette Smoke Upon Children and Youth.


and Laryngology, 1903, XII. 460.

Arnold. On the Effect of Exposure to Tobacco Smoke on the Growth


DISCUSSION.

Dr. Philip D. Kerrison, of New York City, said that he personally

had never seen a case of deafness which could be definitely traced to

alcohol or tobacco. He had, however, treated a few cases of tinnitus

in which distinct benefit had resulted from moderating or stopping the

use of tobacco. In no case was the tinnitus completely checked by

stopping the use of tobacco. There was no question that either alcohol

or tobacco might injuriously affect the ears in one of two ways, i. e.,

by exciting congestion and consequent tissue changes in the naso-

pharynx and eustachian tubes; or by directly influencing the auditory

nerves. In the literature of the subject he had failed to find much

that was definite, with the exception of a few cases reported by Bezold.

Bezold's cases occurred among medical students who for several weeks

had been drinking excessive amounts of beer. The symptoms com-

plained of were tinnitus and marked deafness, which more or less

promptly disappeared after the drinking was stopped. According to

Bezold's theory, prolonged excess in alcohol produces irritation of the

auditory nerves, resulting in a functional disorder, which disappears

after the drinking of alcohol in any form has been discontinued.

In clinics it was not uncommon to meet with patients suffering from

definite ear symptoms, who also gave a history of excessive drinking

or excessive smoking; and it was to be regretted that in the present

state of knowledge there cannot be traced, with any degree of certainty,

a casual relation between the aural symptoms and the excessive use

of the drugs under consideration.
Dr. Norval H. Pierce, of Chicago, said he would not positively assert that there is such a thing as "nicotine ear," but he was inclined to believe that there was, and attempted to paint the clinical picture. With otoscopy negative, and auscultation of the eustachian tube negative, there is in these cases no absolute loss of tone perception, no islands or defects, but as the scale ascends there is a diminution in duration for tuning-forks. This loss is not confined to any particular area, but extends over the entire length of the scale. High notes with the Edlemann whistle are not heard, but around C there is a decided lessening in duration. Bone conduction is slightly decreased in duration. Tinnitus may be slight or absent. Weber later changed to the least affected ear. The peculiar feature is the deafness or extreme hardness of hearing for words of all these pitches. He cited the case of a lawyer who was an excessive smoker, using eighteen cigars a day, and who complained of a steady increase in hardness of hearing. He was told to stop smoking and to take five grains of iodide of potassium a day, which is supposed to eliminate nicotine. In a month he returned, and whereas he could previously hear such words as "zig-zag" five or six inches from the ear, he could then hear them ten or fifteen feet away. No other treatment had been instituted but the abstinence from tobacco and the administration of five grains of potassium iodide thrice daily.

Dr. George F. Keiper, of La Fayette, Ind., said that reasoning from analogy as to the tobacco amblyopia, which is misnamed and should be called whiskey amblyopia, for tobacco without whiskey can hardly be said to produce the trouble as above, one is right in assuming that tobacco of itself is not likely to produce defects of hearing, at least there is no proof to that effect. But alcohol does produce hearing troubles, as may be seen every day by contact with the bibulous. The staggering gait of the drunkard is probably due to its effect on the semi-circular canals. That it diminishes the hearing of such an individual is easy to ascertain. In a case of so-called tobacco amblyopia examined by the speaker, an engineer of a transportation company, in which a test for hearing is also required, he thought he detected a shortening up of the range of hearing, together with a diminished bone conduction, and islands, as it were, wherein the tone perception by air conduction was much reduced. So, as it stands today, the verdict as to tobacco of itself producing ear troubles must be "not guilty."

Dr. J. E. Sheppard, of Brooklyn, mentioned the fact that after riding in a smoking car in winter or attending some doctors' banquets he had suffered from tinnitus the following day. In each instance he attributed it to the tobacco, and to the carbon monoxide and not to the nicotine. With reference to the effect of tobacco on the auditory nerve, he said of course the tuning-fork tests merely show that the nerve is involved, whether the cause be syphilis, alcohol or tobacco, making no difference in the tests. He had had, perhaps, as many as ten cases of extreme nerve-deafness in which he had noted, with a question mark after it, tobacco as the probable etiological factor. In two or three of these cases, stopping the tobacco and giving iodide of potassium had resulted in distinct benefit. More careful examination with the tuning-forks would doubtless reveal a larger proportion of nerve involvement, and some of this increase may possibly be due to tobacco.

Dr. Robert H. Craig, of Montreal, Canada, spoke from personal experience of the effect of tobacco upon the hearing, being himself particularly susceptible to its influence. Excessive smoking considerably diminished his hearing. He attributed it to congestion of the nasopharyngeal tract and eustachian tubes caused by irritation of the smoke. He also observed that many patients suffering from chronic catarrh of the middle ear found their hearing markedly affected by the
use of tobacco. In discussing a subject of this kind, however, one must not forget the idiosyncrasy of the individual, for just as certain food stuffs disagree with certain patients, so does the use of tobacco have a deleterious effect upon the ear, nose and throat of certain individuals when the point of least resistance is situated in this part of their anatomy.

Dr. Edward B. Dench, of New York City, had had the same results, with slight modifications, as those mentioned by Dr. Pierce, in testing the hearing of patients who smoked excessively. He had found diminution in bone conduction for a fork of 256 double vibrations per second, and a diminution to aerial conduction in the middle portion of the musical scale; that is, from 512 double vibrations per second to 2,048 double vibrations per second. Whether or not this impairment was due to the excessive use of tobacco, he could not say, but he had often found this condition in some patients who smoked excessively, and the hearing improved upon cutting down the tobacco consumption. He had found the internal administration of strychnine of much value in these cases.

Dr. Reik, in closing the discussion, said he was inclined to think, and would ask permission to do so, that the title of his paper be altered by striking out the reference to alcohol. It must have been evident to all that but little attention was really given to that subject. In preparing the matter he had found that it would be practically impossible to cover both topics without writing at great length, and that there are so many side issues in the alcohol questions that it would be difficult to untangle them satisfactorily. It would be better, then, to allow a change in the title so that it shall relate only to tobacco.

Dr. Craig had touched upon a very important element in the tobacco problem; that is, idiosyncrasy. The term "excessive use" means a different thing to different individuals. One person may smoke a large quantity of tobacco daily for many years and without evil effect, while another finds even one cigar poisonous; that has been shown very clearly in regard to toxic amblyopia.

The defect in hearing upper notes, referred to by Drs. Pierce and Dench, holds true in old persons whether they are users of tobacco or not. He called attention to the fact that the wide differences of opinion existing on this question are well illustrated in this discussion. Drs. Pierce and Dench have looked upon a loss of high notes as possibly characteristic of tobacco deafness, while Wingate believed the only definite lesion to be a loss for low notes.
Primary malignant disease of the uvula is a comparatively rare disease.

(a) Newman, in 1896, reported a case of adeno-carcinoma of the uvula extending into the soft palate and tonsils. No recurrence for six years.

(b) Lennox Brown reported two cases in 1899, one of these died in 19 months.


(d) Zurakowski reported a case in 1899.

(e) Oppenheim saw one in a man 81 years of age in 1901. No operation was performed.

(f) Raynor operated upon a case of malignant growth of the uvula in a man 66 years of age. This recurred in five months.

(g) Freedman, in 1905, reported four cases.

(h) Harmon Smith reported a case of operation for carcinoma of the uvula in a man 51 years of age. Operated second time at end of three months. There was no recurrence at end of five months.

(i) Downie reported three cases in 1909. One of these cases he had operated upon and reported in 1899. (j) This man died of carcinoma in the posterior triangle of the neck but there was no recurrence at the original site of the disease.

Case II. was in a woman of 41 years. She was well for nearly four years after the operation when the left tonsil became carcinomatous. The deep cervical glands were also carcinomatous.

Case III was a man 64 years of age who was operated upon in 1909.

(k) McCaw operated upon a carcinomatous uvula in a woman 31 years of age and followed the operation by x-ray treatment. At the time of the report there had been no return of the disease.

(l) Theisen reported in 1901 to this society a case of carcinoma of the uvula occurring in a man 52 years of age. There was no recurrence at the end of fourteen months.
CARCINOMA OF THE UVULA.

(m) In 1908, Milligan exhibited a specimen before the Laryngological division of the Royal Medical Society of London. The patient from whom the specimen was removed was a man 62 years of age.

In reporting this case of epithelioma of the uvula I wish to emphasize several points of interest and importance.

In the first place a new growth in this locality can be easily removed if only the operation can be performed in the early stages of development before it has spread into the palate and into the tonsillar area.

Early in the disease, there is much less chance of the cervical lymphatics being infected and there is, of course, much less of the surrounding tissue to be removed and therefore there is much less resulting deformity.

The chances of recurrence are very much less when there can be an early diagnosis and an immediate excision of the growth and adjacent structures.

It is evident that it is of the utmost importance that an early diagnosis be made of any indurated swelling or growth occurring in this locality, whether it presents an area of necrosis or not. In any case, the patient should be informed of the importance of having a microscopic examination of a portion of the growth and plans should be made for an immediate operation if the examination proves the growth to be malignant.

There is particular reason for haste in removing malignant growths from this locality as the lymphatics drain into the submaxillary and deep cervical glands. The deep cervical glands lying as they do in a net work of vessels and nerves including the sympathetic plexus make it no easy matter to thoroughly remove them even when there is no disease present. When malignant disease originating in the uvula, has extended into the soft palate and into the faecial pillars and tonsil as it did in this case, it is no easy matter to dissect about it with any feeling of assurance that the whole diseased area has been removed.

The diseases which may simulate in appearance carcinoma of the uvula are, syphilis, tuberculosis, traumatism, Vincent's angina, and pemphigus. Of these, syphilis is by far the most common. A necrosing syphilitic gumma may produce absolutely similar appearances macroscopically to those produced by malignant new growth.

When syphilis is present, we may find other lesions of this disease. We also frequently have a clear history of the disease
having existed. Even when we have other signs of syphilis and are fairly sure the disease has existed in the past we cannot feel at all positive that we are not dealing also with a malignant disease. Especially is this true if the condition is in a person past middle age. If there is doubt the aid of a skilled pathologist should be sought. Had this been done early in the case we are reviewing the chances are that a simple operation could have eradicated the disease.

Occasionally a tubercular ulceration may produce a similar appearance to carcinoma, but it is very rare to have a tubercular ulceration of the uvula, and when this does occur there is almost always a tuberculosis of the lungs.

I have seen one case of thickened, swollen, indurated uvula with a foul sloughing area extending into the palate where the spirillum and fusiform bacillus of Vincent were found. This was in a young man, 22 years of age, who gave a history of a similar appearance in the tonsil a few months previously.

Trauma of the uvula is rare and the history would likely easily decide the diagnosis.

About five years ago I saw at the Newton Hospital a uvula which presented a sloughing area surrounded by a nodular granular surface. This patient, a woman, had had pemphigus in both eyes and had a fresh blister inside the right cheek. The lesion upon the uvula was said to have begun as a blister and was probably due to pemphigus.

Tuberculosis, Vincent's angina, trauma, and pemphigus so rarely produce a condition in the uvula simulating malignant growth that we need hardly to consider them.

If operated upon early in the disease, the prognosis in malignant disease of the uvula so far as recurrence, should be as favorable as when the same disease attacks the lips or cheek. When much of the soft palate has to be sacrificed, there follow the disagreeable conditions found in congenital cleft palate. The speech is changed and there is often difficulty when swallowing liquids to prevent their passage into the nose.

When the disease has progressed, not only must there necessarily be much of the surrounding tissue sacrificed but there is much more liability of there being an infection of the lymphatic glands.

When a new growth located in the uvula has not advanced, the operation is a comparatively simple one, but often as in this case the process has extended into the pillars and into the tonsillar
tissue and the operation is not an easy one. The question must always arise, shall we remove the glands into which this area drains. Were it a simple matter to remove those glands and were there not an accompanying shock, it would be good surgery to remove them, whether they were apparently diseased or not. But one side is as liable to be affected as the other and both sides may be affected at the same time. Also the glands may be infected on the side showing less marked advance in the original growth. For these reasons it would not seem advisable to remove all the glands at the time of the first operation unless there were some signs of disease in one or more of them.

On September 21, 1908, Mr. D. C. consulted me for an ulceration upon the soft palate, and gave the following history.

His father and mother both lived to advanced age and died after short illness. One brother died of cancer about two years before.

Until the beginning of the present illness he had always been perfectly well. About eight months before there began to be a stiff feeling in the palate, (uvula). It was sore but not painful except when trying to swallow. Even when eating the pain was not serious at first. After about three weeks the patient noticed that the uvula was swollen and looked inflamed. He consulted his family physician who gave him a careful physical examination and examined the urine. This physician said there was no organic trouble found and the swollen uvula was likely due to some injury. He prescribed a gargle to be used every three hours. After using this wash about two weeks there appeared a little raw place at the end of the uvula which was very sore and painful. At about this time a throat specialist was consulted. This man asked many questions and finally told him there must have been at some time some venereal disease which he had not noticed or had forgotten. This physician painted the ulcer with some hot wash and gave a salty tasting medicine, twenty drops in water after meals. For about four weeks the throat was treated locally three times each week. The salty medicine was increased to 60 drops after each meal.

The symptoms grew gradually worse and the treatment was discontinued for 10 days or two weeks. He was now examined at the throat department of the Carney Hospital. He was here given more of the salt medicine. Not being satisfied, the Massachusetts General Hospital was next visited. Here he was told an operation might give him relief. Unfortunately some friend
advised him to consult some outside physician who laughed at the idea of an operation and said he would surely cure him in three months time. Now followed more internal treatment and local applications to throat several times each week for three months. There was no improvement. At this time the patient consulted a throat specialist who told him that he might have syphilis but he believed he had malignant growth and advised an operation. This last examination was about ten days before he came to my office.

I found Mr. C. to be a well nourished and healthy appearing man. The blood vessels of face were somewhat dilated giving a florid complexion. His speech was similar to one having cleft palate. The heart was normal, the arteries somewhat hardened. The blood pressure was 155 mm. of mercury. The urine was 1023 sp. gr. No albumin, no sugar, only an occasional hyaline cast was present. There were no enlarged glands found anywhere neither were there areas of pigmentation or periosteal thickening. The nose was normal. Both ears showed thickened drum membranes and there was considerable loss of hearing.

The uvula was gone and at its site was an ulcerated granular area surrounded by a nodular growth which extended about one-half inch upon the right side and over the whole lower edge of the left side into the left faucial pillars. Above this area the nasopharynx was apparently normal. There was no swelling of the deep cervical glands.

I advised immediate operation, hoping to be able to remove all of the affected tissue. The patient did not decide to be operated upon until September 29th, when he was admitted to St. Elizabeth’s Hospital and was operated upon the following day.

He took ether very poorly and when finally he was thoroughly anaesthetized it was found impossible to use the Whitehead mouth gag. We could not control the tongue to prevent choking. We were obliged to use a Denhardt gag and controlled the tongue by forceps and depressor.

The growth was removed by beginning on left side below pillars and tonsil and dissecting upward. The hemorrhage was hard to control and so much time was necessary to keep field sponged that progress was slow. Finally we were successful in removing the pillars and tonsil after which it was the work of but a moment to remove the soft palate. So far as possible the mucous membrane was approximated and sutured. Dr. Leary examined the mass removed and reported the structure to be that of a car-
Carcinoma of the uvula. The convalescence was normal and a perfect cicatrix formed except at the upper left border where a granular node formed and on November 19th I removed this with the surrounding tissue. Dr. Mallory examined the specimen and pronounced it to be a carcinoma. There has been no return of the disease locally but on November 28th, 1909, the patient came to me for swelling in the right side of the neck accompanied by pain. There was swelling of the deep and superficial cervical glands of the right side and also one gland under the right side of the tongue.

The patient was informed of the serious nature of his condition and the difficulty of removing the same. He finally consented to an operation for the removal of the affected glands and on December 2nd he was admitted to St. Elizabeth's Hospital.

The following day I tried to remove all of the glands in this side of the neck. It was found impossible to make a clean dissection as several of the glands were softened and necrotic. We used great care but one of the glands ruptured and discharged into the wound. We, so far as possible, removed all of the diseased structures but the condition was so extensive that the result seemed very doubtful.

The patient made a rapid recovery from this operation. The wound granulated and filled in rapidly and excepting a slight granulation at lower portion was healed at the end of two weeks.

The patient complained of considerable stiffness and pain in the right side of the neck. There was an indurated feeling below the cicatrix in wound, no more than would usually be present after the normal healing of a similar wound.

January 29th patient came to me complaining of much more pain which was located behind the ear. There was a swelling about $\frac{3}{4}$ of an inch in diameter situated behind the sternomastoid muscle. One week later this was fluctuating and an incision opened into a cavity filled with pus and necrotic material. For 3 days patient was much relieved but on the fourth day there was a chill and there developed an erysipelas of the right side of neck and face. He recovered from this within a week but rapidly lost strength, the whole right side of the neck gradually became involved, there was much pain and very little nourishment was taken and he is now nearing the end.
(c) Kyle. Dis. nose and throat, pge. 231, 1899.
(e) Oppenheim, Prim. epith. uvula, Am. L., R. & O., 1901.
(g) Freedman. Ein Fall von carcinoma der uvula, Berlin Klin Wohnsch, 1905.

DISCUSSION.

Dr. George B. Wood, of Philadelphia, emphasized the importance of removing the lymphatic glands of the neck at the same time that the mass in the throat is removed. The specialist does not see these cases, as a rule, until there is some lymphatic involvement, perhaps only microscopic, so that the lymph nodes are not palpable. If the disease is confined to one side of the throat the hemorrhage is easily controlled by first ligating the external carotid artery. The functional results of large operations upon the soft palate are not so bad as they have been represented to be. In all the cases he has operated upon he has never seen one in which there was nasal regurgitation, and in two cases, which are alive up to the present time, there has been no change in the voice despite the fact that the greater part of the palate had been removed. If the hemorrhage is controlled it is possible to do an extensive removal of the tissues of the throat through the mouth without any serious consequences, but the fatalities from the operation are enormously increased when external pharyngotomy is performed.

Dr. John A. Thompson, of Cincinnati, cited a case of carcinoma of the tonsil with involvement of the cervical glands, upon which he had operated last January. The neck was opened, all diseased glands removed, the external carotid tied, and the wound closed. The growth in the mouth was then removed. The patient lost only about a dram of blood. The starvation method of tying off the arterial supply had been recommended in some of these cases. A few days ago this patient, a man of seventy-two years, with hard arteries, complained of difficulty in swallowing. Careful examination showed the side of the throat and neck operated upon to be perfectly clear, but a large sarcomatous mass had developed on the other side of the tongue. When malignant disease is found in the nose or mouth as a rule there is a focus somewhere else in the body. The surgeon in the case cited advised the use of Coley’s Fluid, with which he had had excellent results. While not always curative it seems to lessen the danger of recurrence.

Dr. George L. Richards, of Fall River, Mass., cited a case in which the pathologist made a diagnosis of sarcoma. There was involvement of one side of the uvula, of the corresponding portion of the arch, of the upper one-third of the anterior and posterior pillars, and of the upper part of the tonsil. It was covered by a thin membrane which was removed with difficulty. The diagnosis was for a long time
in doubt, the pathologist first reporting from an examination of the membrane that it was a fungous growth. The growth was nodular, and a piece of this taken off for examination proved to be sarcoma. There was for a long time no macroscopic involvement of the glands. The first involvement of the glands occurred on the opposite side. Once the glands became involved they enlarged very rapidly, those on the side on which the uvula was affected becoming larger than the others. The axillary glands also became involved, and the condition terminated fatally.

Dr. Holmes, in closing the discussion, maintained that unless the glands are known to be diseased it is radical surgery to remove them. In the case cited it would have been necessary to remove the glands of both sides of the neck, which would have entailed considerable hemorrhage and shock. Inasmuch as the disease was carcinoma, Coley's Fluid was not employed.
CONSIDERATION OF THE END RESULTS OF THE OPERATION FOR SUBMUCOUS RESECTION OF THE NASAL SEPTUM.

By FREDERICK C. COBB, M. D., Boston, Mass.

The paper which I present to you has for its object the desire to show, impartially, the results of the submucous operation after the lapse of several years. The cases were operated upon by men sometimes experienced in the procedure, sometimes almost new to it; as a result the number of faults in technique were at first large, and perforations quite common. The cases were taken from the records of two of our large hospitals, and two hundred and fifty cases were asked to come in for re-examination. Of these 20 responded by letter, 50 only came to the hospital in person. As the condition of the mucous membrane was desired, only the 50 actually appearing are included in this paper.

The cases were selected on which the operation had been done for the longest time possible. Most of them had been operated on 4 to 6 years ago. The information desired was:

1. As to whether the operation had relieved the obstruction for which it was done.
2. Whether naso-pharyngeal catarrh, deafness, or other symptoms had been relieved.
3. As to the bad effects of the operation: whether perforation caused annoyance and in what way; whether dryness or scabbing occurred in mucous membranes deprived of their cartilaginous framework; whether cartilage renewed itself; what faults were most common in the technique as shown by after-results.
4. In children under 15 years of age did the removal of a large piece of cartilage interfere with the normal growth of the nose in such a way as to cause dropping of the tip or other deformity.

On the 50 cases examined obstruction was subjectively relieved in all but five or six, in which the improvement was slight or absent. Objectively a very much larger proportion were not relieved. In two or three turbinectomy was resorted to.

Naso-pharyngeal catarrh was seldom entered on the histories as a result of the nasal obstruction, and if present was relieved in about half of the cases. Perforations, which resulted fre-
sequently in the earlier operations and diminished as the technique improved, seemed to cause but little trouble unless the patient became aware of their existence, and then the complaints seemed more nervous than real. Scabbing and erusting were seldom troublesome, even when evident objectively.

The records were not complete enough to enable me to be sure that scabbing or erusting was or was not due to destruction of part of the mucous membrane of one side. In a few of the cases antra were subsequently opened and found to contain pus, and a mild ethmoiditis might have given the same result.

In no case examined was there any reproduction of the cartilage.

The fault most commonly met with was insufficient removal of the base and next in frequency the leaving of cartilaginous projections above.

Of great interest to the writer was the effect of the operation in young children. It has always seemed possible that the removal of cartilage, containing, perhaps, centres of growths, might affect the development of the nose so as to cause some difference in its shape. Sixteen children under fifteen and over six were examined. Of these, four showed some alteration in the shape of the nose from the normal standard. Two of these the parents report to have always been broad and drooping slightly at the tip. One a depression at the end of the nasal bones was there before operation, perhaps on account of an old abscess of the septum, and the fourth, a very marked case, was the result of a fall which had probably caused the deviation. Further investigation showed that but little of the cartilage had been removed but that a Gleason operation had been done subsequently.

Although in this series no bad results are observed, yet the writer feels that until more cases in young children have been examined no absolute scientific conclusions can be drawn.

DISCUSSION.

Dr. George L. Richards, of Fall River, Mass., had looked up the records of 150 cases of submucous operation on the septum done either for deviation or for spurs or for both. In the series of 150 cases six had perforations. In two, syphilis was a factor, but unknown at the time the operation was done. These should, therefore, in fairness to the operation, be deducted from the number of perforations, leaving four, or one in 37.5 cases. It would seem that whereas a perforation can usually be avoided, there is an occasional case where, instead of a true bend, there is a sharp knuckle on one side and a corresponding sharp depression on the other. The mucous membrane covering the sharp bend of the knuckle is very thin; it is also very thin on the
DISCUSSION.

concave side. To lift up the mucous membrane on the concave side and to remove the cartilage without nicking or breaking through on the convex side, is in the occasional case well-nigh impossible, no matter how experienced the operator may be. He had not found the perforations to be of any particular moment; they have not been very large nor have any whistles been produced. They are fewer in number than in the earlier operations, when the nasal saw, Asch operation or the Watson-Gleason operation were employed. In all of these there were rather frequent perforations.

Formerly, he had hesitated about doing a submucous operation on the stubby nose of a small child, the one occasionally seen where the bend blocks one nostril and the projection of the tip of the cartilage blocks the other. After one or two submucous operations on these, in which, some months afterwards, there appeared to be a slight depression, he had changed entirely his plan of operation on the young child, and now operates under ether on any child with an anterior deviation. The method is as follows: An incision is made on the convex side a little back of the tip, or preferably, in the left nostril, whichever way the deviation may be. The muco-periosteum is then dissected up as far back as the deviation extends, which in these children is not apt to be for a very great distance. An incision is then made through the cartilage, a little back of the tip, and the muco-periosteum dissected up for a way on this side as far as may be necessary. With a nasal chisel the attachment of the septum to the floor of the nose is severed, leaving the cartilage for the moment attached above and posteriorly, but not inferiorly. The septal cartilage is now entirely movable, but freed from its inferior attachment, which, if left, tends during the healing process to reform the deformity. The cartilage is now straightened with the finger, brought into the vertical position, and held there with cotton splints for two or three days. There is no sinking in, as no cartilage has been removed; it has only been reshaped. The muco-periosteum re-attaches itself. The results so far in the few cases in which he has used this operation have been entirely satisfactory. It certainly has the advantage that no tissue is removed, and this in the growing child is a decided advantage. Later on, if for any reason the deformity should reform when the individual is at a suitable age, another operation can be done. In the cases operated on in this way there has been a sufficient amount of air space left. It is very essential that the nasal process of the superior maxilla be fractured, especially so if there be any protuberance of it to one side or the other of the middle line. It may even be necessary to remove a small portion of this spine if it should be redundant. In removing this there is no danger of sinking in of the septal cartilage. It is necessary to dissect up the muco-periosteum, so that when the septal cartilage is put into proper position, it will attach itself properly to the muco-periosteum in its new location.

So far as the general results of the submucous operation are concerned, they have been satisfactory, although it cannot be said that in all instances the operation has accomplished everything that the patient desires. Patients will still complain of catarrh, but they can breathe, and for the purpose of proper breathing alone the operation is worth doing. Improvement continues for some months before the full result is obtained. Where the inferior turbinate is also hypertrophied, it seems unwise to operate on it at the same time as the septum, as there is a possible danger of an adhesion, and the patient suffers more when both are done at once. He now operates on the turbinate some time after the septum wound has completely healed.

Dr. Harris P. Mosher, of Boston, was pleased to have Dr. Cobb report this series of cases at the Massachusetts General Hospital, because these same cases had recently been reported by a recent graduate from the hospital, who had not handled the subject as satisfactorily as Dr. Cobb had done. The difficulties which the speaker encountered were
in the children upon whom he operated. He had operated upon a number under eight years of age, which are included in this series. It had been stated that there was a drop to the tip of the nose, whereas Dr. Cobb found very little, if any drop, in the series of cases. In one case there was a drop, but the patient was operated upon by the old Gleason method. Perforations occur either very early, during the first three weeks, or after two years, and in considering the end results of submucous resection, this fact must be taken into consideration. He had a number of private patients who had complained of scabbing as late as a year or two after the operation. Most of his submucous resections are done under ether anaesthesia, and in many cases he trims the inferior turbinate, particularly where the nose is narrow.

Dr. Thomas J. Harris, of New York City, agreed with Dr. Cobb that the end results subjectively are satisfactory in the main, but objectively not entirely so. He wished to add to the end results an interesting case which had come under his observation at the Manhattan Eye, Ear and Throat Hospital. The patient, one of the assistants at the hospital, had a point of contact between the nasal septum and the nasal wall on the side of the convexity. A submucous resection was performed by one of the distinguished Vienna surgeons. The result is a complete cicatricial stenosis on the side of the operation. The speaker had never seen such a result, nor had he ever heard of such. Packing with long strips of gauze were used, which were left in for some time, then withdrawn, causing considerable traumatism.

Dr. Robert Levy, of Denver, called attention to the carelessness which often pertains in the taking of histories before operation, especially as to syphilis. This had been impressed upon him by the experience of Jansen, who was at one time threatened with a malpractice suit because he had operated upon a patient who had syphilis and in whom a nasal deformity resulted. One should always make a thorough investigation as to syphilitic infection. The same need not be said with reference to tuberculosis. He had operated for deflected septum upon many tuberculous patients without fear of necrosis and with much general benefit. The dropping of the tip is the result of the development of contracting cicatrices. Even when the cartilage is not removed, but merely replaced, there is danger of cicatricial contraction and deformity. In view of the unsettled opinion as to deformity, he advocated operating upon adults only to the extent of relieving completely the obstruction. Children under twelve should not be operated upon for the correction of slight or moderate deflection. The object in all cases, should be to relieve the deformity and not to see how much of the septum can be removed merely because it is a part of the operation.

Dr. Stephen H. Lutz, of Brooklyn, called attention to the wisdom of removing as little cartilage as possible in adults, for the reason that very little new cartilage is formed as one advances in years. Perforations which occur two and three years after the operation, as cited by Dr. Mosher, are probably due to the habit of picking the nose. He mentioned two cases in which this was established positively. One patient, four days after operation, had a good septum; on the fifth day there was a large perforation. The patient confessed that she had scratched the nose with the finger, which went through. Such an accident is apt to happen when the perforation is far forward, in persons who have the habit of picking or rubbing the nose.

Dr. Edgar M. Holmes, of Boston, asked Dr. Cobb why he pared the turbinates, whether he did so in cases of hyperplasia or general bony hypertrophy, whether he pared both sides, and how much of the turbinate tissue he removed.
Dr. Sidney Yankauer, of New York City, was convinced that the scabbing, after the submucous operation, depends entirely upon the amount of scar tissue that is left in the septum; in other words, upon the area of the septum which is denuded of its ciliated epithelium. In cases in which a horizontal scar is left, particularly in flap operations where there is considerable retraction of the flap, so that there is left a broad band of squamous epithelium running horizontally over the septum, there is the greatest scabbing. The reason for this is that drainage of the nose and accessory sinuses takes place over the septum, the flow depending considerably upon the presence of ciliated epithelium. The broad band of squamous epithelium interferes with the flow, and scabbing results. A vertical incision is, therefore, preferable to the horizontal. He always avoided, if possible, operating upon young children. In over three hundred submucous operations he has not operated upon more than half a dozen children. In the first place, he objects to doing a submucous resection under a general anaesthetic, or in the horizontal position, as it is almost impossible to obtain a bloodless field of operation and so to do an exact operation under these circumstances, particularly in an extreme deviation. In the second place, the majority of children who have deviations do not suffer from that alone. They have or have had adenoids, removal of which will cause a decided alteration in the face as the years pass. Many of these children have high arches and projecting teeth. If a child has a small face, when there are adenoids the nasal chambers are small and undeveloped. When the adenoids are removed and the face develops, there is considerable chance for the deviation to become obliterated of itself. For these reasons he has operated upon children only when there was extreme deviation, and only when the child was sufficiently tractable for the operation to be done under local anaesthesia. In such cases he removes only enough tissue to insure breathing.

Dr. Robert H. Craig, of Montreal, Canada, performs the submucous resection in two stages when a general anaesthetic is indicated. He makes the preliminary incision and liberates the muco-perichondrium and periostrium under cocaine (adrenalin) anaesthesia. The patient is then placed in a recumbent posture, ether is administered and a post-nasal tampon is inserted. A mouth gag is applied and a suture put in the tongue for traction purposes. The nasal packing, which has been saturated with 1-4000 adrenalin solution, is removed from both nostrils. The deflected cartilage and bone can then be removed carefully and deliberately. Since adopting this method of operating in two stages (when it is desirable to administer a general anaesthetic) Craig has had no difficulty in controlling hemorrhage, which caused considerable trouble and loss of time in many of these cases.

Dr. Wendell C. Phillips, of New York, thought the end results depended in large measure upon the technic and the skill of the operator. His best results had been obtained with the patient in the recumbent position on the operating table, with the head-rest high. The discomfort to the patient is thus obviated, the liability to fainting is lessened, and the manipulation on the part of the operator is much more easily accomplished. He had never had reason to do the operation under a general anaesthetic. In atrophic rhinitis, according to Wright, the operation should never be performed.

Dr. Cobb, in closing the discussion, said that he had not seen perforation occur subsequent to the operation. He believed that a small perforation may have occurred in the mucous membrane, with laceration of the periosteum, and that the increased size was due to the shrinking of the mucous membrane edges until they reached the firm support of the periosteum below.
Despite the observations of various investigators, there still appears to be more or less obscurity, or at least diversity of opinion, in the genetic pathology of these structures. By the earlier writers they were considered true bone cysts analogous to those of dentigerous origin found in the superior maxilla, though of course similar only as far as the general characteristics were concerned.

In 1882 Zuckerkandl in his book "Der Anatomic der Nasenholle" refers to them as "Bildungsanamolien" of the anterior end of the middle turbinate and dismisses them with few words. Glasmacher in 1884, Bayer in 1885, MaeBride in 1888, Frankel, Heymann and Schmiegelow in 1890. Knight in 1892, Myerson & Beausoleil in 1893 and Chiari in 1894 reported cases or published short articles upon this subject, but it was not until Stieda in 1895 brought out his observations, that close attention began to be paid to the histo-pathology of these growths. The investigators, up to this time, were divided in their sentiments as to the origin or genesis; the general trend of opinion seemed to endorse the theory of Zucherkandl, that of congenitality with subsequent dilatation and enlargement due to inflammatory changes (empyema, mucocele, etc.) while others inclined to attribute their origin to pathological processes.

Glasmacher was of the opinion that air cells often occurred normally in the middle turbinate, but if for any reason they became enlarged, this hypertrophy should be considered pathologic. Chiari practically arrived at the same conclusion. B. Frankel believed in the previous existence of a cell which had become enlarged through the internal pressure of an empyema. Myerson adhered to the abnormal development theory and thought the enlargement was due not only to the mechanical pressure of the contained secretion, but also to the inflammatory effect of the irritation. Schmiegelow considered the entire process pathological.
from the initial formation of the air space to its final growth and believed it was induced by some inflammatory condition. Knight advanced a most original theory in that the inferior margin of the middle turbinate curved on itself thereby meeting and adhering with the lateral nasal wall and through the continued secretion of the mucous membrane, a larger or smaller cavity resulted as the ease might be. (Fig. 1, 2). This condition was the result of an osteophytic periostitis due to hypertrophic rhinitis.

Hajek in the first edition of his work, speaking of the bullous enlargement of the middle turbinate says: "These peculiarities in development result from the lateral and upward rolling of the free border of the middle turbinate forming a cavity which communicates with the middle nasal passage." In the last edition of the same work he claims to have been misunderstood and differentiates a cell in the middle turbinate from a bullous enlargement of that body, the cell being an anomaly in the embryonal development. The bullous enlargement is due to the above mentioned curving of the middle turbinate upon itself, thereby forming a pocket, the edges of which later coalesce. (Fig. 1, 2). Apparently neither of these conditions are considered pathological.

Beausoleil attributes the formation of these "cysts" in the middle turbinate to a myxomatous degeneration of the part, the subsequent shrinking of the tissue being responsible for the formation of the cavity.

In contradistinction to most of the preceding authors, Sundholm holds that the bullous swelling is originally of the same size as in the later stages and that the attention of the rhinologist is called to the larger ones by the obstruction symptoms which are induced by repeated attacks of rhinitis.

Harmer differentiates four conditions in connection with this affection:

1. Ethmoid Cell in the middle turbinate (anomalous but normal).
4. Mucocele of the middle turbinate. (pathological).

Kikuchi believes them to be anomalously situated ethmoid cells and was able to demonstrate their presence in a four months old foetus. Logan Turner takes a conservative stand in this question, accepting both the anatomical and pathological theories as the ease might be.
Do these "cysts" grow larger during adult life or do they retain their original size? Zuckerkandl says that a middle turbinate can become so enlarged through a cyst that it may entirely occlude the middle nasal passage.

Glasmacher speaks of a slow continued pathologic growth of the "cyst." B. Frankel believes they grow larger in ratio with the general body growth. Heymann inclines toward the same opinion but not in every case. Stieda thinks an irritation is responsible for its subsequent growth. Sundholm holds the opinion that the inflammation plays but a secondary role in their formation, first causing an empyema which in turn gives rise to the "cyst".

Harmer says that these cysts usually become larger but that irritation and inflammation have absolutely no influence upon their origin or growth. Kikuchi concludes that they do enlarge and that the enlargement is due to a process of reabsorption which appears as the inflammation is waning. Lothrop writes "even without any pathological changes the cell may become large enough to cause obstruction to respiration and to interfere with the sense of smell and to give rise to reflex symptoms in consequence of pressure."

Can the growth of the bone "cyst" be influenced by some internal condition?

Woakes in his works on "necrosing ethmoiditis" was the first observer to call attention to a connection between the diseased ethmoid bone and the blood. While most of his deductions were wrong, nevertheless he was the pioneer in this work and his histopathologic findings, although somewhat unrecognized and confused, have been substantiated by every subsequent observer. He believed that the growth of the bone "cyst" was distinctly influenced by some (unknown) internal condition.

Sundholm, Schaffer, Schmiegelow, Stieda, Kikuchi and Knight apparently hold a negative view. Harmer admits their subsequent growth, but states that often neither clinical nor pathologic reasons can be found.

Beausoleil, Hajek, Zuckerkandl and Glasmacher do not touch upon this question. B. Frankel, holding the view that the cystic enlargement grows with the body, must therefore accept the affirmative side. Heymann apparently inclines toward the same opinion.
Is some external condition responsible for the subsequent growth of the bone "cyst"?

Most of the above mentioned authorities are of this opinion, differing only in generalities, thus, Schaffer, Schmiegelow, Glasmacher, Stieda and Kikuchi believe that the enlargement is primarily due to irritation and subsequent inflammation and resort to the microscope to substantiate their claims. Stieda for example writes: "The growth of the congenital bone cyst (Knochenblasen) occurs through a rarefying periostitis, characterized by the formation of Howship lacunae and osteoclasts. The bone thus weakened must necessarily yield to the pressure of the inflammatory exudate."

Kikuchi says: "The inflammatory appearances are of different degrees; round cell inflammation is sometimes inconsiderable, sometimes well marked. The bone presents dissimilar appearances according to the grade of the inflammation."

Lothrop writes: "as a result of inflammation, secondary changes may take place in the mucous lining and also in the bony wall of the cell, whereby its general character and size may be altered, particularly when the ostium becomes closed."

Hoping to throw some light upon these questions I will briefly refer to the following cases:

Case 1. H. H. Had been under my care several years previously for chronic rhino-pharyngitis. Presented himself after an absence of three years complaining of almost complete obstruction of one nostril which had been gradually coming on for the past year. Never any discharge, little post nasal discharge. On examination was surprised to find a large cystic middle turbinate. Removed with snare. The specimen 22mm long and 9mm broad and consisted of three cells.

Histological examination. Fig. 3.

Mucous membrane for the most part columnar with loss of cilia over certain areas. On the surface of the "cyst" next to the nasal septum metamorphosis into pavement epithelium has occurred particularly well marked at base (Fig. 3); the glands were also hypertrophied in this region with considerable round cell infiltration (Fig. 4).

Bone normal; at extreme base evidences of rarefaction (Fig. 5). Inner mucous membrane normal; at base polypoid hypertrophy with beginning true polyp formation (Figs. 3 and 5). Lining membrane normal ciliated epithelium (Fig. 3).
Case 2. Emanuel W. Age 20. Consulted me after an absence of 15 months for alternate obstruction of nares, always more marked on left side. Previously had measles. No history of discharge, headaches or general symptoms, in fact, he was an athlete and desired treatment for this nasal obstruction which interfered with his running and had only appeared in the last year.

Examination showed a large cystic middle turbinate on the left side which occluded the greater part of the middle nasal passage. Inferior turbinate in a state of vaso-motor relaxation, but no true hypertrophy. Removed with snare. The specimen was 13mm long and 8mm broad, consisting of one cell.

Histological Examination.

Similar to case 1 except at the extreme tip of the ciliated epithelium had become changed into squamous. The inner lining of mucus membrane was perfectly normal even at the most dependent part.

Examination of four bullous enlarged middle turbinates from cadavers: These were similar to the preceding cases. All showed more or less inflammatory changes at the external base but these were undoubtedly the result of irritation from external conditions (particles of dust, etc.) The inner surfaces of all were practically normal, the bone being smooth and equally distributed throughout the entire structure. Whatever changes occurred in the bone (osteo-porosis and apposition) were always found at the base. The round cell infiltration when present was also confined to that portion of the structure which was directly met by the column of inspired air.

Deductions from these clinical experiences and examinations may be summed up as follows:

Regarding the origin of these bony enlargements.

The examinations disapprove the theories of Schaffer, Schmiegelow and others, in that they take their origin from some inflammatory process, because as Kikuchi has pointed out, the whole structure from a microscopical point of view shows no pathological changes, the mucous membrane being perfectly normal and corresponds to that which forms the outside lining of the ethmoid cells.

As far as the opinions of Hajek and Knight are concerned, that the middle turbinate turned on itself and grew fast to the ethmoidal wall, thus forming a hollow space which communicated with the middle nasal passage, they were undoubtedly based on
Theoretical grounds, for as Sundholm well puts it, "No author has observed that the 'cyst' is composed of two bony walls." This theory is also disproved in my two cases, as I was able to observe the growth of the process, and it is unlikely that three separate and distinct cells could be formed and in no case could a double lamella of bone be found.

Lothrop, in an examination of 1,000 skulls and 89 enlarged cells in the middle turbinate, would surely have found an intermediate stage if this theory were correct.

Jonathan Wright, speaking contrary to this opinion, says: "There is no way of accounting for the disappearance of the mucous glands which are tolerantly abundant on the under surface of the middle turbinated bone."

The illustrations which Hajek brings forward as proof of his theory (Fig. 1, 2), do not seem to me to suffice. In the first place they are half schematic, secondly there is no reason to believe that the lower middle turbinate margins will coalesce with the lateral nasal wall. That this pocket formation may occur in rare cases is possible but it is certainly the exception rather than the rule.

The inflammatory origin is also disproved in my cases in that active or passive pathological bone changes (except occasionally at the base) were not found in any of my specimens.

As my findings under the microscope, as far as this question is concerned, were identical with those of Stieda, Kikuchi and Harmer, it would be superfluous to enter into detail concerning them at this place. The fact, that, morphologically as well as histologically, these "cysts" are identical with the normal cells of the ethmoid labyrinth, certainly proves beyond question that those writers who considered them anomalously situated ethmoid cells were right. There is absolutely no ground on which to base the theory of their inflammatory origin.

Regarding their subsequent growth.

Zuckerkandl while admitting a subsequent enlargement of these bodies, does not advance any opinion as to the cause.

Harmer, B. Frankel, Heymann and Lothrop incline toward the natural theory. Schaffer, Schmiegelow, Glasmacher, Stieda and Kikuchi believe that they do grow larger from irritation.

Bayer, MacBride, Knight, Chiari, etc., do not specify what particular form of irritation plays the most important role.

My observations would tend to show that these "cysts" do enlarge, the growth taking place in an apparently natural manner from causes undiscovered.
In both cases reported I was able to observe the growth of these structures in 16 months and two years respectively. There was no evidence to show that either of the patients had ever suffered with any sinus affection or that the sudden enlargement was or had been due to internal pressure from contained secretions. The growth had apparently been slow and progressive until attention was directed to it by the partial obstruction of the nostril on that side. Neither of these patients were suffering with acute coryza when they presented themselves for examination.

Accepting, then, that these "cysts" are originally misplaced ethmoidal cells, what condition is responsible for their subsequent enlargement?

Stieda says that it is due to pathological changes in the bone. According to my observations his pathology appears to be at fault for the bone in the large "cysts" is as thick as that in the small and shows no great irregularity, which it certainly must if processes of osteoporosis and new formation had been the chief cause of their further growth.

Kikuchi in ascribing the growth to various degrees of inflammatory changes does not specify whether the size of the bullous enlargement depends upon the degree of inflammation, a most important point when the inflammatory theory of the growth is considered. This objection can also be raised regarding the round cell infiltration as well as the appearance of the bone. However, I take it that he does not have the size of the "cyst" in mind when speaking of these changes.

In none of my specimens was there any change to indicate that the growths owed either their origin or size to inflammatory or pathological changes. I examined particularly the ethmoidal portions (the point of attachment to the ethmoidal capsule) for these signs, but in all cases they corresponded absolutely to the mucous membrane and bone of a normal ethmoid cell. The condition of the ciliated epithelium was such as to preclude any superficial pathological process and the bone was smooth and evenly distributed over the entire swelling, with no apparent predominance of either osteoblasts or osteoclasts except occasionally at the free base.

The mucous membrane at the base, where it came in contact with the inspired air, always presented certain changes depending upon the degree of irritation. In the majority of sections the ciliated epithelium had become metamorphosed
into squamous (Figs. 4 and 6) with more or less round cell infiltration reaching to the periosteum (Fig. 6). In other sections true polypoid hypertrophy was observed (Fig. 5) and in still others a combination of these conditions with osteo-porosis and new bone formation (Figs. 4 and 5). All these changes, however, were confined to the base or inferior portion of the "cyst," the ethmoid or superior portion being normal, showing clearly that these changes were secondary and due to some extrinsic causes. They are in every way analogous to those changes which Uffenorde describes as occurring on the ethmoid capsule in chronic hyperplastic ethmoiditis. These findings also preclude the possibility of their having resulted from irritation or inflammation from within, as the lining mucous membrane of the "cysts" showed little or no change from the normal lining ciliated epithelium; moreover they were all empty and under the microscope showed no signs of ever having contained secretion. The lining mucous membrane was identical with that of a healthy ethmoid cell. The condition which Cordes describes and illustrates (Fig. 7) as one arising from internal causes I think can readily be explained when one recalls that all of these "cysts" have ostii and how easily infection can result through these openings. I cannot accept this in the sense which Cordes would apply, namely, that this is a proof the inflammation may take its origin from within, for these "cysts" always, at least primarily, have external communications by means of an ostium through which they probably have become infected. It also proves that a healthy sinus can become infected by prolonged contact with purulent material at the same time not rejecting the theory that a healthy sinus can act as a reservoir for a diseased one situated above without becoming infected. These conditions depend upon whether the purulent discharge is infected or not. As in the former case, it is easy to conceive how by prolonged contact, with subsequent maceration of the mucous membrane, the infecting germ can find an easy portal of entry.

Regarding the fact that the "cyst" often enlarges without any particular cause and apparently in a normal manner, has up to the present time not been satisfactorily explained. In the cases under my observation, I endeavored in every possible manner to find some condition or conditions to which I could positively ascribe these comparatively sudden enlargements. None of the conclusions reached, however, seemed reliable and most of them were quickly disproved until the theory of congestion was con-
sidered. Both cases were in young male adults; the first, a ‘‘high liver,’’ the second, an athlete, and both subject to intermittent congestion of the head.

Both Stucky and Uffenorde refer to injudicious eating and drinking causing congestion of the head and it is a well known fact that these ‘‘cysts’’ are often found in drinkers and excessive smokers. It would therefore seem to me that intermittent or continued congestion with the resulting positive and negative disturbances of nutrition might play a most important part in the subsequent enlargement of these structures.

It will be noted that I have always placed the word cyst in apostrophe for the reason that this name is distinctly a misnomer. These air cells have nothing in common with true cysts except, perhaps, the morphological appearance. Cysts are, moreover, the product of an inflammatory condition while all evidence is to the contrary that these cells have per se any connection with inflammation. When one microscopically compares for example, a true bone cyst of the superior maxilla (antrum) with a so-called bone cyst of the middle turbinate, the dissimilarity will be so striking as to make further investigations superfluous.

CONCLUSIONS.

1. These so-called cysts of the middle turbinate are genetically, anomalously situated normal ethmoid cells.

2. Under certain conditions they can enlarge without the pressure of any pathological product.

3. Pathological conditions such as empyema, pyocele and mucocele can contribute toward their enlargement.

4. Histological changes in the mucous membrane and bone at the base of the ‘‘cyst’’ are due to mechanical irritation.

REFERENCES.

5. Frankel B. Berliner klin. Wochenschr. No. 22, 1890.
6. Heymann. Ibid.
17. Lothrop. The anatomy of the superior ethmoidal turbinate bone with particular reference to cell formation, etc. Annals of Surgery, 1903.
Fig. 1. (After Zuckerkandl).

Fig. 2. (After Zuckerkandl).
A. Metamorphosis of Ciliated Epithelium into Squamous.
B. Normal Ciliated Epithelium.
C. Beginning Polyp Formation.
D. Hypertrophied Glands.
E. Bone.

A. Metamorphosis of Ciliated Epithelium.
B. Round Cell Infiltration to Periosteum.
C. Periosteum.
D. Bone.
E. Endosteum.
F. Lining Membrane of Cyst.
G. Blood Vessels.
A. Rarefaction of Bone.
B. Beginning Polyp Formation
C. New Bone Formation.

A. Hypertrophied Glands.
B. Round Cell Infiltration.
C. Osteoporosis or Rarefaction.
PRELIMINARY PATHOLOGICAL AND CLINICAL REPORT OF A CASE OF EXPOLIATION OF THE BONY TYMPANIC WALL; INCLUDING THE MAJOR PORTION OF THE SEMICIRCULAR CANALS.

By J. A. STUCKY, M. D., Lexington, Ky.

Eugenia W., a negress aged 7 years, was admitted to the Good Samaritan Hospital on Jan. 18th, 1909. Parents said she had had a running left ear since babyhood. For the previous three or four months, there was a swelling behind the ear which from time to time had opened spontaneously and discharged freely. The child was emaciated and anemic and gave evidence of syphilis and tuberculosis. Examination showed large tonsils and adenoid and facial paralysis of the left side, profuse discharge from auditory canal, swelling behind the ear and a fistulous tract which led into the antrum. The following day the mastoid was opened and the entire process was found soft and necrotic, the outer wall of the antrum, the entire middle ear and attic were filled with pus and granulations. The radical tympano-mastoid operation was done. The sinus exposed but not opened, no ossicles were found. The entire bony lining of the middle ear was necrotic, the tegmen tympani very soft, the dura was not exposed except through fissure in the additus. The Eustachian tube was large size and the osteum necrotic. The necrosis extended well into the cells of the zygomatic process, involving the anterior wall of the tympanic cavity. The posterior wall of the canal was very soft. The cochlea was exposed but not opened, the facial ridge was eroded but the nerve not exposed. No labyrinthine tests were made before the operation. The patient was given the open air treatment with liberal, nutritious food, with iodide of potash and mercury. Her general condition improved very much. She was allowed to leave the hospital six weeks with the ear still discharging.

She returned on April 12th, 1910, with complete facial paralysis, with very offensive discharge of thin, greenish-yellow pus through the auditory canal. An examination with probe revealed a sequestrum of bone in the middle ear. All the labyrinthine tests made were negative, giving no evidence whatever of vestibule
or semicircular canals functionating. The hearing as tested with Larms apparatus showed that the hearing was destroyed. There was no disturbance of the equilibrum nor nystagmus.

On April 12th, 1910, the patient was again etherized and the entire inferior, posterior, and superior wall of the auditory canal, also of the middle ear, were removed with little difficulty with forceps and curette. The entire posterior wall of the middle ear, including the round window and part of the oval window, were removed in mass. The facial ridge for its entire length was carious, exposing parts of the dead nerve. The entire tip and floor of the mastoid was also carious, exposing the jugular bulb. Covering of both the horizontal and vertical, semicircular canals were also opened and found filled with pus. The lateral sinuses which had been exposed in the previous operation, was covered with firm fibrous tissue. The orifice of the Eustachian tube was very necrotic and when curetted found to be of an unusual size, admitting freely the largest probe. The softened anterior wall of the middle ear was removed and the pulsating carotid artery could be plainly felt. The bone covering the posterior semicircular canal appeared healthy.

Fig. 1 is piece of bone of the posterior wall of the middle ear containing the round window. The part of the oval window remaining does not show. The other two pieces of bone, Figure 2, show pieces of bone removed from the anterior, inferior wall of the middle ear showing a part of the edge of the Eustachian tube. Figure 3 is part of the covering of the lower portion of the facial canal just as it enters into the stylo-mastoid foramen.

The case shows that part of the labyrinth may exfoliate without
producing any labyrinthine symptoms whatever. Recovery is complete with facial palsy.

Conclusion. At this time (July 21, 1910) the posterior wound is entirely closed and the child seems to be in good health, the facial palsy remaining unchanged. The labyrinthine tests are negative.

The patient will be kept under observation and tests made from time to time and a report made at the next meeting.
PRESENTATION OF SPECIMENS.

Dr. Charles W. Richardson, of Washington, D. C., presented a large number of specimens of tonsils which he had removed by means of finger dissection, according to the method proposed by Dr. George L. Richards. The specimens served to show how thoroughly and satisfactorily the removal may be accomplished by this procedure, which he considered the most satisfactory method he had yet employed. The operation can be done rapidly, from one and a half to two minutes being ample for the removal of both tonsils, and it is absolutely bloodless so far as secondary hemorrhage is concerned. Especial attention was directed to one specimen, in which the lower portion of the tonsil could be seen hanging down. In this connection particular emphasis was laid upon the importance of careful examination after apparent complete removal of tonsils in order to guard against leaving a small portion of the tonsil below, an accident which might easily happen. The specimens were prepared by Dr. W. W. Wilkinson, of Washington.

DISCUSSION.

Dr. George L. Richards, of Fall River, Mass., expressed his pleasure at noting the gradual disappearance of the skepticism concerning the operation. With reference to the technic of the operation, he emphasized the importance of getting the preliminary point of separation of the tonsil from the pillar as high as possible, so that the finger will go up into the supratonsillar space. The tonsil will then slip down easily, no, or only slight traction being necessary, until it is left hanging by the base. The tonsillotome is then used to detach the base. Every tonsil can be removed by this procedure. If the operator has difficulty in making the preliminary separation of the tonsil from the pillar, a moderately sharp or dull instrument can be used for this purpose. Sometimes this is necessary, but, as a rule, is not.

Dr. Robert Levy, of Denver, Col., called attention to a palate retractor devised by Dr. Amos R. Solenberger, of Denver, which is excellent for the complete examination after tonsillectomy. By means of this instrument the anterior pillar may be retracted so that a very small portion of tonsil tissue remaining, or a bleeding point may be detected. Small bits of tissue are apt to escape notice because of the lobulated condition of the tonsil.

Dr. Edgar M. Holmes, of Boston, Mass., reported a case in which there was very little hemorrhage at the operation and in which secondary hemorrhage, almost to the point of death, occurred the next morning. The case served to emphasize the fact that secondary hemorrhage may occur after the finger dissection.

Dr. G. Hudson Makuen, of Philadelphia, emphasized the great advantage of being able to know absolutely, by the sense of touch, when one is behind the capsule, and when the entire tonsil is removed. No harm can result from the procedure if one is careful not to use too much force.

Dr. Richardson, in closing the discussion, said that during the past year he had failed in no case to do a complete removal by finger dis-
PRESENTATION OF SPECIMENS.

section, in young children as well as in adults. The important point in the operation is to make the break through the mucous membrane between the anterior pillar and the tonsil, without injury to or tearing of the capsule.

Dr. Wendell C. Phillips, of New York city, presented an electric noise producer, in which the entire apparatus is in the box with the coil. The noise can be transmitted through tubing rather than being carried over with cords. A Y-shaped tube may be used when it is desired to close both ears. Glass tips are used for the ears. The principle involved in the noise producer was devised by the late Dr. Houghton, of New York, for another purpose. Barany’s apparatus works by winding up, and Neumann’s is an ordinary telephone transmitter.

Dr. Phillips also called attention to a rotator which he is having made for demonstrating nystagmus. It is a chair arranged on ballbearings and rotates with but little force.

Dr. Stephen H. Lutz, of Brooklyn, presented the septal ridge forceps illustrated above. This forceps is for use in the sub-mucous resection of the septum, to remove the ridge formed by the union of the two palatal processes of the superior maxillary bones. After the cartilage is removed and the perichondrium elevated freely downward to the floor of the nose, the septal ridge forceps is crowded down from above, opening and spreading the flaps until a good sized bite can be felt in the jaws of the forceps. The forcep is now closed and rocked from side to side, opened again and pushed further back and another bite taken until the ridge is all free, without removing the instrument. When the ridge, or as much of it as is to be removed, is loose it can be lifted out in one or two pieces. This is easier and safer than a chisel and much more comfortable to the patient.
REMOVAL OF A RHINESTONE FROM THE MIDDLE EAR OF A CHILD. EXHIBITION OF SPECIMEN.

By CLEMENT F. THEISEN, M. D., Albany, N. Y.

Early in May, 1908, a boy five years old was brought to my office with the following history: About six weeks previously, while playing with some children, he inserted a rhinestone, which had been taken out of a cheap ring, into the left ear, and in attempting to remove it pushed it further into the canal.

The boy lives in another city and was taken to the family physician, who could see the stone but could not get hold of it. Another physician (not a specialist), was called, the boy was given an anesthetic and according to the father's story, for two hours attempts were made to remove the stone from the ear, but without success. This operation was followed by a profuse bloody discharge which later became purulent, and then in about ten days stopped spontaneously. I did not see the boy for over a month after the attempts at removal, and then there had been no discharge for about two weeks, but the boy could hear very little on that side.

On examination I found that the left tympanic membrane had been practically destroyed, the stone had been pushed through it into the tympanic cavity, and all I could see was a mass of granulation tissue.

On examining with a probe I could feel a distinct resistance through this, and on tapping very gently could hear a click, showing that the foreign body was there.

The boy was sent to St. Peter's Hospital, put under ether, and the granulations carefully curetted away. This was followed by a fairly profuse hemorrhage which could be readily controlled with adrenalin and the rhinestone could then be plainly seen in the middle ear.
I tried to remove it through the meatus, but could not get back of it and the instruments constantly slipped off.

A posterior incision was then made, part of the posterior bony canal wall removed, and then after several attempts a ring curette could be inserted back of the stone and it was removed.

There was a discharge from the ear for several weeks, and later, as a result of the first attempts to remove the stone, a stricture of the external meatus developed, which had to be corrected by a secondary operation.

The boy is now in good condition. Hearing not quite as good as with the other ear, but the calibre of the external canal is nearly as large as that of the right ear.

DISCUSSION.

Dr. Thomas H. Halsted, of Syracuse, said that eight years ago he had a case which resulted more disastrously to the patient than in the case reported by Dr. Theisen. A child had a bean introduced into the external auditory canal which reached the drum membrane. The family physician had attempted to remove it under chloroform, but failed. During the course of the day the child was chloroformed three times and attempts at its removal made by two or three different men, with out succes. On the following day Dr. Halsted saw the child, who then was suffering a great deal of pain. On examination he found the bean, which was extremely hard and stony. The previous attempts at removal had pushed the bean through the drum membrane. Dr. Halsted was not able to remove this foreign body until he had made an incision back of the ear, going through the cartilaginous wall; in this way it was easily removed by means of the syringe. Before this operation all attempts at removing the bean with instruments failed; they all slipped when applied. Thirty-six hours after the operation the patient died of meningitis, the cause of which he did not know. The presumption was that the ineffectual efforts of the other men at the removal of the foreign body was the cause. This case showed the danger of attempting to remove foreign bodies from the middle ear when one was not properly prepared to do the work.

Dr. Wendell C. Phillips, of New York, said he had quite an extensive experience with the kind of cases just reported by Dr. Theisen, and in almost every instance previous attempts had been made to remove the foreign body without general anaesthesia and by incompetent and inexperienced men. In many cases the foreign body had been pushed through the drum membrane. The usual reason for failure to remove such bodies was lack of skill; somebody would hold the struggling child and an ineffectual attempt at removal was made without the use of a general anaesthesia. In the removal of foreign bodies from the external auditory canal, unless the object was one which could be easily grasped by some simple instrument and withdrawn, a general anaesthetic should be given. Objects like a shoe button, with the eye toward the external opening, could be removed by inserting a hook into the eye of the button. In his experience general anaesthesia was the rule. Whenever from the nature of the foreign body or its location in the canal, there was danger of forcing it through the drum membrane, Dr. Phillips thought it would be better to at once enter the external auditory canal by the post-auricular route.
In the case reported there was one point he did not quite understand, i.e., the necessity for removing a portion of the bony canal. Dr. Phillips recalled a case he had seen last fall in which an attempt to remove a foreign body was made by a family physician and it had been forced into the tympanic cavity. By means of a post-auricular incision he was able to remove it without difficulty and without disturbing the bone. In such cases, of course, there would be a long period of acute suppuration of the middle ear.

Dr. Thomas Henry Farrell, of Utica, believed that the reason so many general practitioners failed in their efforts at removing foreign bodies from the external auditory canal was because they failed to properly illuminate the canal; as a rule, they were unable to see what they were doing. He had seen a great many illustrations of this, one only last summer. This individual had a fly in the ear and a doctor went to work to remove it; after considerable effort he made the statement that he had got it out. One week later there was a suppuration of that ear. When Dr. Farrell saw this patient, the fly was still there, and there was a large perforation of the drum membrane. What the outcome of the case was, he did not know. What he wished to emphasize was, that medical graduates were not required to familiarize themselves with the use of the head mirror as they should be.

Dr. Arthur G. Root, of Albany, thought that all present had seen many cases similar to the one reported by Dr. Theisen, and the relating of the case by Dr. Halsted brought to his mind a similar one, and the same sort of foreign body. All had had experience with these cases. Dr. Root thought that the main point of value in the discussion was that those who were interested in otology were not doing enough in the line of instructing general practitioners in simple matters concerning the ear.

The sooner they impressed upon the general practitioner and upon students the necessity of taking good care of the child's ears, the better. They now had a great many cases coming to them requiring operative procedures which would not be required at all had the ears been taken proper care of in the beginning. When these cases were seen, the canal was inflamed and swollen and this made the proper illumination of the canal very difficult. The sooner the students and general practitioners understood and realized the necessity of sending such cases, case of foreign body in the external auditory canal, to some one who had the proper appliances and skill, the better. The great trouble was that the general practitioner wanted to hold on to his patients, and he made ineffectual attempts at removing these foreign bodies. If more of these cases were reported the general practitioner would realize the necessity of referring such cases to one properly equipped and qualified.

Dr. Theisen, in closing the discussion, said he wished to emphasize the value of the posterior incision in the removal of foreign bodies from the middle ear. It was very foolish for one to waste time when the foreign body could not be readily removed. The only way, in his opinion, was through a posterior incision; one then could see exactly what he was doing.
SARCOMA OF THE NOSE AND NASO-PHARYNX.

T. H. FARRELL, M. D., Utica, N. Y.

A. H., aged 46. This man consulted me first Aug. 6, 1906, complaining that "three weeks ago he began to have like a cold in the head"—obstruction to breathing, followed in one week by a foul-smelling and tasting discharge.

The right side of the nose was free, the left anterior naris was greatly narrowed by a spur, and was occluded by a mass looking like wet cotton. On manipulation there was persistent bleeding and the probe easily penetrated a movable mass until it felt rough bone on the outer nasal wall. No pedicle could be made out. There was a foul mucus-purulent discharge. Several pieces were removed and submitted to a pathologist who reported sarcoma. The patient declined further treatment as his breathing was relieved and he did not like the diagnosis.

However, he consulted a cancer specialist who told him he had a simple catarrh and gave him a solution to be used in a syringe. The third time it was used it brought on a severe epistaxis, which lasted for twenty-four hours and made him willing to submit to operation. On consultation with a general surgeon it was decided to remove the left superior maxilla as the growth did not appear to be pedunculated and the authorities I had at hand stated that sarcoma of the nose usually spread from adjacent structure. Sept. 10th (five weeks after first visit) Dr. J. H. Glass excised the left superior maxilla with the growth attached. It was a large friable bluish red mass with a comparatively small attachment in the region of the ethmoid. The antrum was free from disease. The pathologist reported the neoplasm to be a glandular sarcoma.

Healing took place with a fenestrum in the hard palate. This made a convenient window for examination of the left side of the nose—the anterior naris being exceedingly narrow.

Nine months later he began to have recurrences which manifested themselves by epistaxis. These growths were usually
pedunculated and the hemorrhage was immediately controlled by severing the attachment.

The recurrences took place from the surface of the posterior ethmoid cells and anterior wall of the sphenoid on left side, then appeared in the same localities on the right side and in Rosenmüller's fossa. On Oct. 29, 1907, (15 months after first appearance) the nasal membranes appeared normal.

Five weeks after this a polypoid mass was removed from the left side, the attachment being on the outer wall near the floor. A month later, Jan. 8, 1908, the neoplasm re-appeared in Rosenmüller's fossae, with a dark red appearance of the left half of the palate and ethmoid region. All tumefactions were thoroughly curetted.

In six months the curette had to be repeated and in August of this year (1908) the left external carotid artery was tied off, but without effect as another curettage had to be done in September, following which the naso-pharynx took on a healthy appearance. The patient was now put on Fowler's Solutions but two months later a pink nut-like movable tumor appeared in the right side of the naso-pharynx, attached postero-superiorly to the eustachian tube, while a dark red mass was seen back of left eustachian eminence covered with a foul-smelling greyish discharge requiring the use of creolin in a douche. The pink nut-like mass was snared and sent to Dr. Jonathan Wright, January 22, 1909. He reported as follows:—"This specimen is undoubtedly a Sarcoma. I should classify it as an Alveolar Sarcoma. I believe that this class of malignant connective tissues springs from the endothelium so that perhaps a more appropriate name would be Alveolar Endothelial Sarcoma."

About this time an enlarged gland was noticed in the right side of the neck.

In Feb., 1909, the soft palate was divided medianally and the naso-pharynx thoroughly evacuated of a large mass of new growth mostly from left side. Healing took place speedily with an improvement in the appearance of the membrane covering the sphenoid, but this was only of a short duration.

He now complained of his stomach and began to look cachectic. His general health up to this time had been good but he now rapidly failed and died about two and a half years after first appearance of growth. It is worthy of remark that the nasal growths were superficial while those in the naso-pharynx penetrated deeply.
J. A. Watson has a most interesting article in American Medicine for April 2, 1904,—based on a study of 150 cases including the reports of 49 cases collected by Bosworth, and 62 by Gibbs. I have been able to collect 18 cases not contained in the above, besides the one just reported. It would, therefore, appear that the disease is not so rare as the text-books suggest.

These nineteen cases comprise nearly all varieties: Unspecified, 4; round cell, 4; spindle cell, 2; round and spindle cell, 1; lympho-sarcoma. 2; chondro sarcoma. 1; angio sarcoma. 1; melano sarcoma. 1; endothelial. 1; fibro sarcoma. 1; alveolar. 1.

As regards the point of origin the middle turbinate and ethmoid are mentioned five times; the base of the cranium once; the septum and floor three times: the inferior turbinate once.

In three cases the maxillary sinuses were involved by extension and in one the frontal sinuses. In contrast to this I have seen sarcoma of the maxillary sinus three times without any involvement of the nasal mucous membranes in any one of them—though the nasal passages were narrowed by pressure.

In respect to sex this series differs from Watson’s—in that the more numerous are females, there having been eleven females and ten males.

The general view that sarcoma is a disease of youth is confirmed by this series. There were five cases in the second decade, four in the third, two in the fourth, one in the fifth, two in the sixth and four in the seventh. Thus it appears there were eleven occurring before forty, and seven after.

The question of diagnosis is generally an easy one. The neoplasm is, as a rule, yielding, friable and vascular, though the fibro-sarcomas may be dense and hard. The color varies considerably. In this series nasal stenosis occurred in practically every case and usually early. Pain is mentioned in seven cases and epistaxis in six cases, though it is probable that hemorrhage occurred more frequently and is the second most common symptom. Exophthalmos occurred in four of these nineteen cases and swelling of the cheek and nasal bones in five cases though these are late manifestations. Offensive purulent discharge is a distressing concomitant.

The microscope is a valuable aid in confirming the diagnosis and, when positive, should make us doubt clinical evidence of benignancy. On the other hand, Raoult’s case illustrates how the histological examination may declare for non-malignancy and yet the disease run a characteristically fatal course.
The occurrence of metastasis is rare. In my own case there was one small cervical gland enlarged, which may not have been sarcomatous. In Braislin's case there was a general infection of the subcutaneous lymphatics. In no other case was it mentioned.

In the large majority of these cases surgical treatment was the only one relied upon, though benefit is claimed from x-rays in one, injections of adrenalin solutions in another, and yellow oxide of mercury ointment with an alkaline spray in still another. In none of them does the treatment by toxins seem to have been instituted.

The percentage of cures by external operation have been unusually large, viz., three out of five. In nine cases submitted to internal operations recovery occurred four times, recurrence or death four times, and the result is unknown in one.

The extended experience I had with the one case would prejudice me in favor of intra-nasal operation. A radical antrum operation would have accomplished quite as much as the excision of the maxilla. It was remarkable how often the nasal growths had a small pedicle and how infrequent recurrences were at these points.

BIBLIOGRAPHY.

Watson. American Medicine, April 2, 1904.
Delic. Archives International de Laryngologie, Paris, 1907, XXIV.
Chiari & Marschik. Annales de Maladies de l'Oreille, etc., Paris, 1907, XXXIII.
Citelli. Arch. Internat. de Laryngo, Paris, 1907, XXIII.
Hasslauer. Deutsche Mil. arztli Ztadve, Berlin, 1905, XXIV.
Von Leyden. Monatschr fur Ohrenheilk, Berlin, 1897, XXXI.
J. Nardi. Arch. ital. di laringol., Napoli, 1902, XXII.
P. Bouchet. Soc. anat. de Paris, 1906, LXXXI.
G. Martuscelli. Arch. ital. di otol., Torino, Palermo, 1898, VII.
R. Kienbock. Wiener klin. Wochenschr, 1904, XVII.
Raoult. Arch. internat de laryngol., Paris, 1908, XXV.
Braislin. Laryngoscope, St. Louis, 1907, XVII.
Miller. Laryngoscope, St. Louis, 1906, XVI.
Walker Downie. Glasgow Med. Jour., 1907, LXVIII.
Watson. Laryngoscope, St. Louis, 1906, XVI.
DISCUSSION.

Dr. Clement F. Theisen, of Albany, asked to be allowed to speak of a case of lympho-sarcoma involving the naso-pharynx, and of the disease especially as it appeared in young people. He had one case under observation at the present time, a boy of fourteen years. He had also seen the disease appear in a child of seven years. This case has been reported. He thought it was well to call attention to an important point, that lympho-sarcoma involving the naso-pharynx and tonsils, sometimes disappeared spontaneously and without any operative interference whatever. Sometimes the operative interference stirs up the condition, making the patient worse. In the boy he now had under his observation, an attempt at operation was made, and a portion of the mass was removed. There was, however, a prompt recurrence of the disease, and metastases in the neck. He was inclined to believe that if the boy had been left alone and more conservative treatment employed, he might have done better. The patient was now getting full doses of arsenic and was being treated also with the X-ray, and the mass in the neck was getting smaller. He did not know whether the improvement was due to the employment of the arsenic or to the X-ray treatment.

Dr. Theisen called attention to the recent investigations of Mallory, who was of the opinion that lympho-sarcoma was at times not very malignant. He believed that if a growth was left alone, unless it became so great as to interfere with respiration, it would be better. The expectant treatment should be tried for a while.

Dr. Theisen said that he had four cases of lympho-sarcoma of the tonsil under his observation at the present time. In one the mass was removed; it was confined exclusively to the tonsil and was dissected out the same as one dissected out any diseased tonsil. This patient was still under observation.

Dr. Mallory’s point regarding the malignancy of lympho-sarcoma of the naso-pharynx was very important and Dr. Theisen believed that operative interference should be employed only in the most favorable cases.

Dr. Francis P. Emerson, of Boston, said that the writer of the paper should be congratulated upon his courage and persistence in the treatment of his case. He had occasion to look up this subject three or four years ago, and he found several such cases recorded; but along the line of treatment, he believed, we were as much at sea today as we had ever been. From the literature it was learned that lympho-sarcoma of the naso-pharynx often recovered spontaneously, after medicinal treatment and following the most radical surgical procedures. In lympho-sarcomata without any involvement of the glands, the patients were frequently benefited by the administration of arsenic. The giving of Coley’s toxins was often followed by remarkable results. He reported the case of a woman with sarcoma of the tonsil; she had lost thirty or forty pounds in weight; she was placed upon Coley’s toxins with the result that there was a complete disappearance of the growth, and she returned to her normal weight and vigor. But later there was a recurrence and death.

Dr. Emerson reported another case which he had followed for five years. In this patient there was a general involvement of the lateral and posterior walls of the pharynx and uvula and a collateral edema of the nares, with a cachexia simulating pernicious anemia. This patient, a man, had been an invalid for more than ten years. He had bleeding from the bowels, many fainting spells, often choked, and had the appearance as though he was not likely to live but a short time. He was placed upon arsenic; during the first six weeks there was no apparent benefit, but finally his condition entirely cleared up. He regained his weight. He was just on the point of resuming his
business, when he received a slight injury to his nose; this was followed by a general toxemia and death. The anatomical examination showed that the patient had entirely recovered from the sarcomatous condition; such was the report of the pathologist of the Harvard School.

Dr. Emerson reported another case in which a sarcoma appeared after a mastoid operation; this patient lost much weight and seemed as if he was about to die. However, the growth disappeared without any treatment whatever being given.

Here were reports of cases which cleared up under either the most extreme surgical measures or under medicinal treatments.

Dr. Arthur G. Root, of Albany, said that it seemed to him in this class of cases, whether surgical or non-surgical procedures were adopted, should depend largely upon the nature of the given case. In other words, if the growth occurred where one could get at it and remove it entirely, surgical measures should be employed. As an example of this, there was lympho-sarcoma of the tonsil. In such a case, if there was no glandular involvement, surgery should be employed. If for any reason all of the diseased tissues could not be removed, a surgical procedure was not indicated. Some internal treatment, such as the administration of arsenic, had better be resorted to. But if the growth was rapidly developing in a tonsil, for instance, and without any glandular involvement, it had better be thoroughly removed.

If a lympho-sarcoma of a tonsil was to be removed, Dr. Root did not believe that it should be done through the mouth; when done in this way it was not done thoroughly. The growth should be removed through an incision in the neck. Only yesterday, before leaving Albany to attend this meeting, he saw a patient who had just undergone this operation. An incision had been made in the neck, the external carotid vessel had been tied, the incision extended to the angle of the mouth, resection of the jaw was made with the result that ample room was given for the work to be done. This enabled him to remove the entire mass. It should be remembered that the ligation of the large vessels not only facilitated the operation, but had a good effect upon the malignant disease by cutting off the blood supply in this locality. In this case the surgical procedure was followed by good results. If, however, the situation of the growth was such that operative procedures did not seem to be warranted because of the impossibility of getting rid of the malignant tissue, perhaps the internal administration of arsenic, or some other form of medication would give better results.

Dr. Walter S. Daly, of Ogdensburg, agreed with Dr. Root's statement that these growths, when of such a size and position that they could not be thoroughly removed by the intranasal route, should be removed by the external operation. Such growths, whether of the hemorrhagic or fibrous form, could be more thoroughly enucleated by the external route.

Dr. Thomas Henry Farrell, of Utica, in closing the discussion, said that Dr. Watson had seen an unusual number of these cases of lympho-sarcoma of the naso-pharynx, and he maintained that they were not as malignant as when this disease appeared in other parts of the body. Moreover, the growth in this situation was usually pedunculated; for these reasons he maintained that the question was not one between intranasal or some form of external operation, but rather it was one of whether any operation at all should be
undertaken. In the reports of the cases that Dr. Farrell looked up in the literature, he found some surprising features. For instance, in one case a sarcoma sprang from the base of the cranium, filling most of the cavity, and had to be removed piecemeal, yet this patient recovered. Another case was cured by the use of the yellow oxide ointment together with sprays. This case seemed equally incredible.
THE TONSIL AS A PORT OF ENTRY FOR THE TUBERCLE BACILLUS.

T. H. HALSTED, M. D., Syracuse, N. Y.

By the term, "the tonsil," is included not alone the fauval tonsil, but all the tonsillar tissue in "Waldeyer's ring", a circular ring of tonsil or tonsillar tissue surrounding the fauval opening and the naso-pharynx. Included in this ring are the fauval tonsils, the lingual tonsil and the pharyngeal tonsil, together with more or less disseminated lymphoid tissue in the walls of the pharynx. The histological structure, the probable functions, the pathological changes of these various tonsils are identical. Their different locations produce different symptoms and local results when disease affects them, but they are all subject to the same forms of disease, and from them all may be carried, through the lymphatics, the same infections. Under puberty is the period when they are most susceptible to disease, though at no period of life are they exempt.

The fauval tonsil, situated between the pillars of the fauces in the so-called "Sinus tonsillaris", is made up of a number of segments of lymphoid tissue built up around the crypts or lacunae, of which latter there are from eight to twenty.

The exposed surface is covered with mucous membrane, this membrane dipping into and lining the crypts which reach to the base of the tonsil. The epithelial layer is stratified.

The inner or deep surface of the tonsil is covered by a fibrous capsule resting upon the superior constrictor muscle. The interior of the tonsil is made up of lymphoid tissue with more or less connective tissue intervening. As the child increases in age, normally there occurs an increase in the amount of connective tissue, with a diminution of the lymphoid tissue, resulting in a smaller mass of tonsil.

Lymphatic vessels, originating in the tonsil, including all of "Waldeyer's ring", drain into the superficial cervical glands, first those at the angle of the jaw, then into the deeper chain under the sterno-mastoid muscle. So free, however, is the anastomosis of the lymphatic vessels and glands in the neck, that any and almost all of them, superficial and deep, anterior and
posterior, may become invaded and involved in the infection that has reached out from the tonsil.

There still remains uncertainty as to the special functions of the tonsil. Wood says they are the principal leucocyte formers. They give rise to the lymphocytes, which in turn are transformed into other forms of leucocytes. It has also been thought, though not demonstrated conclusively, that the tonsils have an internal secretion. Just what is a normal and what a pathological tonsil is a debated question. Twenty years ago Bosworth made the statement that a normal tonsil does not project beyond the faucial pillars. This has been accepted in a general way as stating the truth, but it is not by any means the whole truth. The very worst tonsils are those submerged tonsils, buried or hidden behind the pillars, often of very large size, frequently the subject of most disease, but not projecting beyond the pillars or showing any encroachment upon the faucial opening.

Absorption takes place into the tonsillar substance through the intercellular spaces of the epithelial lining of the exposed surfaces and of the crypts. Bacteria, pathogenic and non-pathogenic do not readily pass through healthy mucous membrane, whether it be of the tonsil, of the mouth, of the nose, or of any other part of the body, and it is only when through some local or constitutional disease, lessening the normal resistance of the tissue, that absorption is likely to follow the implantation on its surface of the various bacilli and cocci, that produce disease.

Having passed through the intercellular spaces, the invading bacillus enters the lymphoid tissue of the tonsil, where it is likely to be destroyed by the leucocytes, unless this tissue through local disease or constitutional debility be unable to overcome the invader. In the vast majority of cases it is likely to be destroyed at this point. The healthy tonsil is then probably a protection against the deeper invasion of the pathogenic micro-organisms which infest the mouth. When, however, the tonsil becomes diseased, as evidenced by hypertrophy and enlargement, or the crypts become filled with cheesy concretions, showing a diseased condition of the mucous membrane lining the crypts, the tonsil invites invasion of pathogenic germs, and instead of being a barrier, becomes an aid to their absorption into the deeper glandular structures.

It is well known clinically that the infection producing acute rheumatism, endocarditis, septic phlebitis, pulmonary gangrene, frequently enters the system from the tonsils through the
lymphatics. It is the experience of every clinician that acute inflammatory rheumatism is often immediately preceded by an acute tonsillitis, and it is well known to laryngologists that patients subject to recurrent attacks of acute rheumatism, cease to have these attacks following the complete removal of the tonsils.

There is certainly very good reason to believe that the infection, whatever it is, that produces chorea, may have gained access through the tonsillar tissue.

Before going into the matter of glandular and lung tuberculosis resulting from tonsillar infection, it may be well to inquire as to the fact and the frequency of tuberculosis of the tonsil. Lartigan and Nicoll examined seventy-five pharyngeal tonsils not known to be tubercular. They found through inoculations and histological examinations that 16% were tuberculous, 10% showing histological tubercular lesions. The lesions were usually close to the surface and focal in character. Uffenorfe, in an examination of sixty-five adenoids, found four to five per cent tuberculous. Dieulefoy inoculated ninety-six healthy guinea pigs with pieces of tonsils not known to be tubercular with the result that fifteen developed tuberculosis. There has been a very wide divergence of findings by different investigators as to the prevalence of tuberculosis of the tonsils, but there is a general agreement that the tubercle bacillus very frequently invades the tonsil, where it may become latent, or it may produce a local tuberculosis, or again it may penetrate the tonsil, pass through it to the lymphatic vessels and on to the cervical glands, leaving no trace in the tonsil itself. Wood has shown by experiments on pigs, that the tubercle bacillus may pass through the tonsil in an incredibly short space of time, a few minutes only being required. Clinically the disease is comparatively rare, or at least it is not often recognized. I have seen a few cases, how many I do not know, of what I thought was primary tuberculosis of the tonsil.

Of 1986 supposedly healthy or hypertrophied tonsils reported by 28 different investigators, tabulated by Lockhard, 119 or 5.9% were found to be tubercular.

In tuberculosis of the cervical glands it is estimated that 90% originate in the tonsils.

Of 91 tonsils removed, post mortem, from children, under five years of age, and examined by Friedman, it was found:

One tonsil riddled with tubercles, bacilli present in large numbers.
THE TONSIL AS A PORT OF ENTRY.

Four and probably five other cases—primary tonsillar tuberculosis.
Seven cases, giant cells, but no bacilli.
Two cases, tuberculosis present, but not primary.
Three cases, giant cells, but not tuberculous.
Eight cases, general tuberculosis, but not tonsillar, old scars in tonsils, result of tuberculosis (early).
Two cases, similar, but less distinctive results.
Four cases, without tonsillar tuberculosis.
Three, smears from surface found t bacilli, but no tubercular changes.

Tuberculosis of the tonsil secondary to the disease in the lung is not so infrequent, and it is quite possible that some of the cases thought to be secondary, are in reality primary.

The very nature of the structure of the tonsil with its numerous crypts and lacunae, favors the lodgement of the tubercle bacillus on its surface and in its deep crypts.

The tonsil may be merely a portal of entry of the bacillus which is lying in wait for a favorable period of entrance. Latent tuberculosis of the tonsil, without any clinical manifestation, is certainly often present, and probably explains those cases in which lung or cervical glandular tuberculosis sometimes follows tonsillar operation.

Tuberculosis of the tonsil then may be primary, or secondary, active or latent. It may be merely a portal through which the tubercle bacillus passes into the cervical glands, leaving no local evidence of having done so. In the case of tubercular adenitis, infection of the cervical glands may be directly from the mouth through the bacillus finding lodgement on the tonsillar surface and in a diseased tonsil penetrating from the deep crypts through the intercellular spaces of the epithelium into the deep tonsillar structure, thence passing to the cervical gland. Or it may remain in the tonsil, setting up a tuberculous process with abscess and caseation, with or without, usually without, superficial ulceration. I am satisfied from my own experience that this latter condition is very often met with, though it may not be recognized until at the time of operation we come upon a deep abscess cavity filled with caseous material in the substance of the tonsil. Such tonsils have been the subject of active tubercular disease, caseation has taken place, superficial ulceration has not occurred, and the tonsil is regarded as being simply enlarged. Relief is sought by surgical removal, not because of
the tuberculous disease, but on account of the various local symptoms caused by the enlarged tonsil.

It is a matter of constant clinical observation, that with enlarged and diseased tonsils, not regarded as tubercular, enlarged cervical glands, thought to be tubercular, are often associated. The removal of such tonsils is usually followed by a reduction in the size of the enlarged glands. The focus of infection, or the port of entry of the tubercle bacillus has been removed, and the enlarged cervical glands cease to get their repeated infections.

With reference to the relation of tonsillar to lung tuberculosis, it is very probable that the tonsil infection is both primary and secondary. There may be a direct extension of infection beginning with the tonsil and extending through the deep cervical glands to the thoracic glands and thence through the hilus of the lung to the visceral pulmonary lymphatics, or as Grober thinks more probable, the tubercle bacillus goes from the tonsil through the deep cervical glands to the supraclavicular, thence to the parietal lymphatic vessels, where an inflammatory exudate bridges across to the visceral pleura, the tubercle bacillus taking this route to the apex of the lung.

Secondary infection of the tonsil occurs in all probability, from the lung through the lymphatics and blood supply, or from the sputum from the bronchus lodging upon the tonsil. Such infection would be a secondary one, and that it is not infrequent is shown by the fact that Strassman found thirteen tuberculous tonsils in twenty-one tuberculous cadavers.

To briefly summarize it may be said, that the tonsil is very often the seat of tuberculous lesions, which are both primary and secondary, and that latent tuberculosis in the tonsil is of very frequent occurrence.

Furthermore, the tonsil which is diseased either in its crypts or in its lymphoid structure, affords a portal for the passage of the bacillus from the mouth to the cervical glands and further, that infection may travel directly from the tonsil through the lymphatic vessels to the pleura and to the apex of the lung, or that through the reverse current the infection may pass from the lung through the lymphatics to the tonsil.

The healthy normal tonsil is a barrier against tubercular invasion, the diseased unhealthy one is a menace, and invites tubercular invasion.
DISCUSSION.

Dr. Francis P. Emerson, of Boston, said that Dr. Halsted's paper was of immense practical value, not only in regard to the tonsil being a portal of entry for the tubercle bacillus, but for other infective organisms, particularly the submerged tonsil. In many cases, in making a systematic examination, even by those who are in the habit of looking into the throat, one is often surprised to find large follicles, containing a considerable quantity of pus, which could not be seen unless the anterior pillar is drawn forwards, and the base of the tonsil examined carefully. While this matter has not been gone into thoroughly, a sufficient length of time not having elapsed to enable one to draw any definite conclusions, it seemed to him more and more that the tonsil was the portal of entry, and was very active as such, in a great many of the infections. Even tuberculous cases with advanced changes in the lungs, seemed to improve when the local pus cavity, which was a constant source of reinfection, was removed. There are some cases of endocarditis and joint troubles which seemed to be a reinfection from a local process in the tonsil. Such a portal of entry makes vulnerable all the serous membranes and justifies a radical tonsillar enucleation.
THE ETIOLOGY, PATHOLOGY, SYMPTOMS AND DIAGNOSIS OF PHLEBITIS AND THROMBOSIS OF THE BLOOD VESSELS WHEN COMPLICATING PURULENT OTITIS MEDIA.

By WENDELL C. PHILLIPS, M. D., New York City, N. Y.

ETIOLOGY: Thrombosis of the lateral sinus is induced either by means of (a) an extension of the infective process within the temporal bone through the smaller veins, whereby the latter become involved with septic thrombi which gradually extend to and infect the sinus, or, (b) because the infection in the bone extends by contiguity, directly through its internal table to the walls of the blood vessel, where its further advance is characterized by infection of the sinus walls, and thence into the blood stream with resultant thrombosis.

Furthermore, according to Boenninghaus, thrombosis may occur from infection located within the labyrinth. In these cases the sinus is usually affected below the knee, or through involvement of the superior or the inferior petrosal sinuses. In another group of cases, the infection proceeds from a labyrinthine infection directly toward the bulb, through involvement of the lymph spaces of the middle ear, or through the extension of the thrombus from the internal auditory vein.

From the tympanic cavity proper, a thrombosis of the jugular bulb may take place from direct infection through dehiscences in the floor of the tympanum. McKernon and others have reported cases of primary jugular bulb thrombosis. Boenninghaus, Körner and others report cases wherein the infection entered the jugular bulb from the tympanic cavity proper through involvement of the carotid plexus, along the anterior wall of the tympanic cavity. We conclude, therefore, that phlebitis and thrombosis of any part of the lateral sinus and internal jugular vein takes place as follows:

(1). Through anatomical dehiscences in the bone tissue which covers its parietal surface, thus affording easy access to the pathologic process.

(2). Through the direct extension, into its walls, of the active purulent lesion in the bone, and
(3). Through involvement of the smaller veins in the diseased bone, or through the involvement of intermediate anastomotic veins in the thrombotic lesion.

PATHOLOGY: When the walls of the sinus become the seat of an inflammatory lesion, and when the inflammation has penetrated to the inner, endothelial lining of the blood vessel, it causes a deposit of fibrin in the lumen of the sinus, as a result of the inflammation, the fibrin being derived from the blood current.

This deposit is attached to the vessel wall at the site of the lesion. Pathologically, there results what is designated as a "white wall thrombus", (Heine, Boenninghaus).

In the course of time, this wall thrombosis grows larger and narrows the lumen of the vein until finally it becomes completely occluded. The fibrin then becomes mixed with coagulated blood, and assumes the form of a "red obstructive thrombosis," which may obstruct the vessel's course for a variable distance.

The extent of the thrombus in a backward direction may involve the superior petrosal sinus, the mastoid emissary vein, the torcular Herophili, the longitudinal sinus, and even the lateral sinus of the opposite side, while in the opposite direction it may involve the inferior petrosal and cavernous sinuses, the opthalmic vein, and after traversing the jugular bulb continue throughout the jugular vein and its tributaries.

Thrombi, both of the wall type and the obstructive type, may either be of infectious or non-infectious character, the latter occurring but seldom.

If the thrombus is not infected it becomes organized through the advent of connective tissue. On the other hand if it becomes infected, it eventually breaks down, spreading the infection along the sinus walls, and finally destroys these walls to a variable extent.

If parts of the broken-down thrombus are carried into the blood stream, then septic emboli result. These may find lodgment in the lungs or other parts of the body, setting up inflammatory lesions at their points of lodgment.

SYMPTOMS: The symptoms of lateral sinus thrombosis are fairly constant, and for convenience of description are divided into (1) those manifested locally, and (2) those due to the infection of the general system.
LOCAL SYMPTOMS: Patients having sinus thrombosis occasionally present a swelling behind the mastoid process. (The Griesinger sign). This swelling or edema of the region behind the mastoid process usually is painful to the touch, especially at the mouth of the mastoid emissary vein. It seems to indicate at least a perisinus abscess, or a phlebitis of the mastoid emissary vein. This symptom is not to be considered as invariably characteristic of lateral sinus thrombosis.

Boenninghaus has noted a thickening of the vena mastoidea as indicative of sigmoid sinus thrombosis; and, finally, the finding of a rather thick strand which is painful upon pressure, or to the touch, along the upper portion of the jugular vein, when accompanied by other symptoms of the disease, is indicative of a thrombosis in this vein.

Rarer findings of a local nature have been noted in pain along the back of the neck. This was presented in a case where the thromboses extended to the emissary condyloidae. Edema and swelling in the skin of the scalp has been observed in connection with thrombosis of the lateral sinuses. A thrombosis which extends to and involves the cavernous sinus, induces edema of the eye-lids, chemosis and exophthalmus. Kümmell found paralysis in the larynx and of the muscles of deglutition, without local cause, in thrombosis of the jugular bulb. Unilateral laryngeal paralysis with retarded pulse have been noted in rare cases where the thrombus exerted pressure on the 9th, 10th and 1st cranial nerves in the Foramen Lacerum Posticum. (Boenninghaus).

In 1898 Voss stated that the bruit of the blood in the sinus ceases in cases of thrombosis. This local sign Körner, 1899, substantiated in personal observation. The bruit is listened for with a stethoscope, and comparison is made with the sounds heard in the healthy side.

Finally, Libman of the Mt. Sinai Hospital, New York, has published observations in which he holds that the finding of streptococcus in the blood stream, when all other possible sources of origin of the bacteremia are eliminated, indicates a sinus thrombosis. In all of his published cases the positive findings of streptococci in the blood, by culturing the blood (after withdrawal from the vein), were substantiated upon the operation by finding the sinus thrombotic. On the contrary, at the Manhattan Eye, Ear and Throat Hospital, New York, where a series of blood cultures was made from patients suffering from suppurative purulent otitis media, by Jonathan Wright and reported by Duel,
the findings showed that in the relation of streptococcemia to sinus thrombosis the finding of streptococci in the blood stream did not indicate sinus thrombosis in all the cases in which the sinus was explored; and, furthermore, streptococcemia was discovered in many patients with flat temperatures and no other coexistent signs of sinus thrombosis. Nor could endocarditis or other lesions which might have accounted for the bacteremia be demonstrated.

In the present state of the subject we do not feel that we are justified in saying that the finding of streptococci in the blood necessarily means the existence of a sinus thrombosis, even after all other sources of the bacteremia are eliminated. When, however, in addition to other classical signs, the blood shows streptococci, this finding then furnishes conclusive corroborative evidence of the presence of a thrombus, marked leucocytosis and a high polymorphonuclear percentage are among the associated symptoms.

GENERAL SYMPTOMS: Of the more general symptoms of sinus thrombosis the most important in typical cases is fever. Fever is almost a constant symptom of sinus thrombosis, but occasionally, in typical cases it is absent. The fever is the result of the invasion of the system, probably through the blood streams, by bacteria. During the early stage of the attack the fever is characteristically pyemic. Usually the patient has a distinct chill, during which the temperature suddenly rises to 103° to 105°, but after a short time it recedes to normal or sub-normal, only to rise again upon the advent of a subsequent chill, fluctuations not being marked by any period of regularity. As the temperature falls the patient sweats profusely. In the last stages sweating may be constant.

In a typical case the patient may complain of feeling chilly, and then the temperature rises to 103°, 104°, or as high as 106°, where it remains with slight variations only. This is the rarer type and is generally significant of secondary metastic involvement. Vomiting of a projectile type may accompany the chills, but it is not a constant symptom, and furthermore, it may occur in all the forms of intracranial complications of otitic origin.

The next most important symptom to that of fever is the clinical picture produced by varying metastic lesions. According to Bruger these take place in 42 per cent. of the cases. The most common secondary lesion is that involving the lungs. This
is indicated by pain in the chest and the advent of coughing. The lung lesion is often broncho-pneumonia. A rarer lesion is abscess of the lung. Then hemorrhagic sputum of foulest odor is noted. The infarct may lodge in the pleura, causing a pleurisy, pyopneumothorax, or the joints may become involved. The periarticular mucosa may be involved, and finally lesions may take place in the heart, the kidneys, or the brain, each organ portraying distinctive symptoms.

Headache usually is present during some period of the disease, and is located about the mastoid, parietal and occipital regions of the affected side. Swelling of the spleen also is commonly noted. The mentality of the patient may vary from being absolutely unaffected during the early stages to coma just preceding death. In general, the patients feel very sick, have no appetite, show a coated tongue, gradually lose weight and assume the appearance of typhoid fever patients.

Finally, the color of the skin and conjunctiva changes to a yellowish tinge, and the clinical picture of meningitis or brain abscess is intensified, which continues, unless relieved surgically, to the death of the patient.

Usually the disease runs its course in from 8 to 14 days. Cases of primary jugular bulb thrombosis when occurring in infants and young children, present typical symptoms, inasmuch as no disease of the mastoid process is present, and furthermore, the symptoms are similar to those which accompany pneumonia, malaria, typhoid fever and affections of the digestive tract. In infants and young children the chief symptom of thrombosis of the jugular bulb is a sudden and rapid rise of temperature to above 104°, followed by an equally precipitous decline. Thereafter the temperature curve fluctuates after the manner of the first rise, during which time the variations in the pulse rate follow the temperature. There is no chill. The hands and feet may be cold when the temperature rises. Meanwhile, during the earlier remissions, the child appears quite normal, playing with its mates and taking liberal nourishment.

Later on prostration ensues and all the symptoms of sepsis become apparent to be followed by a fatal issue unless an early diagnosis is made and prompt surgical treatment intervenes.

**DIAGNOSIS:** Boenninghaus lays down the four following propositions regarding the diagnosis of sinus thrombosis.
1. When, after an acute middle ear and mastoid involvement, in spite of adequate drainage (surgical treatment) the fever recurs after having dropped, then we should be suspicious of sinus thrombosis. Especially is this true if the temperature elevations persist over a number of days, and become higher as succeeding days pass.

That fever often persists for some days after a mastoid operation, and is especially prone to persist in the case of children, has been shown by Harris.

2. If the fever re-appears after an interval of normal temperature, which has followed the procuring of adequate middle ear drainage (mastoid operation, etc.).

3. When fever suddenly re-appears after a case of middle ear infection apparently has been cured for some interval of time.

4. When, in cases of chronic middle ear suppuration having marginally situated drum perforations, there is a sudden appearance of fever, then sinus thrombosis is to be suspected.

Regarding Boenninghaus' diagnosis, based upon the time and advent of fever, it must be borne in mind that all other sources of the fever first must be eliminated in order to make his four propositions hold true. Of especial significance is this observation when dealing with cases occurring among children.

In a more detailed consideration of the diagnostic points, it is found that in typical cases which present the entire category of signs and symptoms, lateral sinus thrombosis is not difficult to recognize. The characteristic temperature curve, the chills, the sweating, the vomiting, the localized pain over the sinus walls, the leucocytosis, the high polymnuclear percentage, the bacteremia, together with the history of purulent otitis media and mastoiditis, furnish an unerring clinical picture of this affection. Unfortunately, in a large percentage of even the so-called typical cases, one or more of the above-named symptoms are absent, in which event it becomes more difficult to render a diagnosis.

In atypical cases the diagnosis is difficult and requires an exhaustive consideration of the entire chain of symptoms, meanwhile taking advantage of blood culture, blood examinations and all known methods whereby other diseases may be eliminated. A high temperature continuing several days after a mastoid operation, especially when the operative findings have disclosed areas of necrosis of the bony covering of the lateral sinus, and examination of the blood shows bacteremia, leucocytosis and a high polymnuclear percentage, is indicative at least of an infective pro-
cess of sufficient severity to constitute sinus thrombosis, and the sinus should be examined.

The diagnosis of primary jugular bulb thrombosis must largely depend upon the sudden rise in the temperature range, and the subsequent fluctuation from normal or sub-normal to 104°, 105° or 106°. Usually occurring in infants and young children, and often without intercurrent mastoid infection, the early diagnosis is most difficult and must be made only after eliminating other diseases such as pneumonia, malaria, typhoid fever, and digestive disturbances. Blood examination also furnishes reliable data.

The operative findings, both when the sinus is exposed for purposes of diagnosis and when necrotic areas of its bony covering are discovered during the progress of the mastoid operation, are of considerable diagnostic value, as occasionally a thrombus in the sigmoid region is discovered only at the time of operation. Whenever an exposed area of the sinus is covered with healthy granulations, its interior should not be disturbed unless other signs and symptoms of thrombosis are present. When after removing a necrotic area of the bony covering of the sinus, should the sinus wall at one or more points present necrotic or sloughing spots and much epidural pus instead of the smooth, slightly shining blue surface of a normal sinus wall, then there is a strong probability that the infection has already invaded the blood current within. Palpation of the sinus wall is an uncertain diagnostic measure inasmuch as pulsation may still continue after a clot of considerable size has formed. If pulsation is absent and the pressure sensation is doughy, a thrombus may be expected. Voss claims that the venous bruit normally heard when a stethoscope is placed over the internal jugular vein is absent when it contains a thrombus, and Körner substantiates this view.

An occluding thrombus occupying the lateral or sigmoid sinus may exist without producing any symptoms referable to the internal jugular vein. The local diagnostic signs of thrombosis of the internal jugular vein—and they are by no means constant—are pain and tenderness extending along the pathway of the vein, the absence of venous bruit, swelling of the cervical glands, a cord-like sensation, evoked by palpation along the thrombosed vein, the fixed position of the patient’s head which bends toward the affected side, and finally reflex phenomena from compression of regional nerve trunks.

Reverting to the diagnosis of lateral sinus thrombosis in general, emphasis should be placed upon the importance of early
diagnosis, inasmuch as the mortality in cases surgically treated is in direct proportion to the duration and extent of the disease.

PROGNOSIS: The prognosis of lateral sinus thrombosis depends upon the duration and extent of the disease, and upon the stage at which further progress is checked by surgical interference. The earlier the operation the lower the mortality. A localized thrombus of short duration, when located in the region of the sigmoid, and therefore unaccompanied by involvement of the petrosal sinuses or jugular bulb, when operated upon promptly, usually results in recovery; whereas, during the later stages, after the thrombus has invaded the contributing branches the torcular, the bulb or jugular vein, the prognosis is less favorable and the mortality is high. After metastatic abscesses have formed in the lungs, brain, spleen, bowels, etc., the mortality is extremely high.

There is considerable evidence in published reports to warrant the opinion that certain individuals possess sufficient resistance to the infection to enable them to counteract its effects without the formation of thrombi. Once formed, however, a thrombus is prone to suppurate and break down, often with a partial or total destruction of the sinus wall and subsequent purulent inflammation of the surrounding tissues. The writer has during the process of operations upon the mastoid process found the sinus walls enormously thickened and its lumen nearly or quite obliterated, and still without any visible clot.

DISCUSSION.

Dr. James F. McKernon, of New York, said that, so far as the pathology of phlebitis and thrombosis of the blood vessels when complicating purulent otitis media was concerned, he had nothing to add. Having a cord-like substance along the course of the vein in cases of sinus disease and thrombosis occurred, he believed, infrequently; certainly that was infrequent in his personal experience. He said he had never met with it except in two cases; in these cases the suppurative process had gone on for a considerable period of time and the vein had contracted down to a very firm condition with its contained clot. There was tenderness along the course of the internal jugular vein, which was brought about by the inflammatory process in the sheath of the vein. This was a fact that had been demonstrated several times. The paragraphs appearing in books telling one to look for this cord-like evidence in the veins in this condition he believed to be far fetched.

With regard to cavernous involvement in cases of advanced type, Dr. McKernon said he wished to relate the history of a case that was brought to New York about two weeks ago with the diagnosis of double sinus thrombosis following a purulent middle ear. The
patient was a boy, six or six and a half years of age. The history given was that during the past eighteen months he had had five operations for the removal of tonsils and adenoids, but recurrences had followed. Only six weeks before he was brought to New York he had had another operation for the removal of the tonsillar condition and the adenoid growths in the naso-pharynx. Ten days after the patient developed an exophthalmos together with symptoms pointing to intracranial pressure. The patient had no temperature, but there was a slow pulse rate. Sinus thrombosis was excluded; there was nothing about the mastoid but a simple acute middle ear affection which was believed to be coincident with the condition. The ophthalmoscopic examination showed choked disk on both sides as well as hemorrhages. The eyes were bulging. There was a large saculation at the internal angle of the left eye. The x-ray plate showed a complete separation of every bone of the skull. The hard palate was edematous, the folds coming together in the centre; the edema extended down to the posterior pharyngeal wall and larynx, but did not interfere with respiration. A bruit was noted on the left side. The white cells numbered 4,800; the polymorphonuclears gave a percentage of 42.8, and there were a large number of lymphocytes, large and small. The blood culture was interesting from the standpoint of diagnosis. A diagnosis was made of sigmoid sinus thrombosis. An examination of the blood, however, showed 68 per cent. of osteoblasts, thus making the diagnosis of osteosarcoma.

Dr. Phillips had spoken of an atypical run of the temperature after the mastoid operation, the temperature remaining more or less high; this had not been Dr. McKernon's experience. In the cases he had met with the patients had done well for several days following the mastoid operation, the general condition being good, with the temperature low, under 100 F. Then, on the fourth to the eighth day, there would occur a gradual rise of temperature; today, 101, tomorrow, 102.5, and then 104 or 105; the temperature usually reached its highest on the fourth day, remaining so if left unmolested. In such a case there was usually disclosed a thrombus beginning well above the knee and extending to the bulb. In only one case did he excise the internal jugular vein. Therefore, in his experience, this atypical temperature had followed the operation after several days, and not immediately after.

Dr. McKernon did not know whether Dr. Phillips had spoken of the classical symptom of chill; some of the cases he had seen had a chill, while just as many had no chill. In the cases where they suspected perhaps an involvement of the sinus the nurse was instructed to watch carefully for chilly sensations. He believed that such a sensation was just as important as a chill, and should be watched for. The presence of a chill showed a greater degree of severity than did the presence of chilly sensations. He did not believe that he had ever seen a case early enough, and followed throughout the course of the trouble, but what there had been a distinct initial chill or chilly sensations at some time during the development of the disease.

The blood count he considered to be merely of corroborative value; if one wanted to back up the clinical evidences of the disease, then the blood count was, in his opinion, of value. This told the number of white cells and the resistance of the patient, while the polymorphonuclears showed the amount of absorption going on. The blood count was merely confirmatory.

There were certain cases of sinus thrombosis where, when the sinus was uncovered from above the knee to the bulb, it looked normal and made one undecided whether to molest or not. A case which brought this to his mind was one he saw with Dr. Whiting. A positive diagnosis, from a clinical standpoint, had been made of sigmoid thrombosis occurring in a child three years of age. The
blood culture was negative. The sinus was uncovered, and looked perfectly normal, judging by the eye and palpation. Dr. Whiting said: "Dr. McKernon, the sinus is not involved; if it is involved it shows a condition I have never seen." Two more blood cultures taken proved to be negative, but still there was that clinical picture. He decided, however, to open the sinus. He withdrew a clot which extended from the knee to the bulb. The clot was soft. He did not take out the vein. The patient made a good recovery.

Six weeks later Dr. McKernon said he saw another case with Dr. Whiting which was almost identical in nature. The sinus was opened and a soft clot found. In such cases he thought one had better open the sinus to learn just what the condition was.

With regard to the prognosis, he believed that it depended almost entirely upon early operations. If there were evidences of involvement of the sinus, the moment the diagnosis was made operation should be performed and the patient not kept in jeopardy. Dr. McKernon wished to go on record as stating that when a positive diagnosis was made of sinus thrombosis we should operate at once.

Dr. Percy Fridenberg, of New York, said that the question of blood cultures and the detection of bacteria in the blood was a very important one and Dr. Libman of the Mt. Sinai Hospital in New York City had devoted much time and study to this subject, taking up the value of it at the 1909 meeting of the American Otological Society, in discussion of a paper by Ducl and Wright; if one read that part of the discussion he would find that Libman's position was strengthened by it. It was not only a positive blood culture which was no important in the diagnosis of these thrombi, but the negative blood culture as well. At a recent meeting of the Otological Section at the New York Academy of Medicine, one of the gentlemen present said that a negative blood culture was of no importance whatever, and that perhaps a positive one was not, and that for a diagnosis they should depend upon the clinical symptoms. That was true, but the question arose in Dr. Fridenberg's mind, what to do in the equivocal cases. In some instances the patient seems to be doing well; then on the third day he began to run a remittent temperature or had a chill; then when one was about to operate for thrombosis, the patient got better, and one felt that he was not justified in operating. Those were the cases in which where an early bacteriological investigation might have been an aid. If no bacteria were found in the blood, or if one found immediately after the mastoid operation a decreasing number, one would hardly expect to have a subsequent infection of the sinus. Therefore, a negative, as well as a positive culture, was of value. After all, what one wanted to determine was not so much if there was an obstruction in the veins as to whether there was a systematic sepsis present; therefore, a bacteriological examination was very important. The reason why a single examination of the blood turned out negative might be a laboratory reason. But if two or more examinations were negative, that meant something. One might not see any bacteria that were circulating in the blood at one examination; the blood might have been withdrawn at a time when the bacteria were not developing rapidly or were rapidly bacteriolized by the blood. But a number of blood examinations which gave negative findings was very significant.

Another diagnostic point related to the symptomatology of metastatic deposits. When there was no diagnosis of thrombus, and one was not looking for metastatic deposits, the symptoms became equivocal. This was especially true when there was a chill, fever and enlarged spleen. One then naturally would think of malarial fever. Again there might be pain in the chest, cough and a purulent sputum, and a central pneumonia might be thought of. But no; in these cases there was a septic metastatic deposit, with very
DISCUSSION.

decided symptoms. These were the cases in which one found streptococci in the blood. Again in children, they easily ran temperatures, and a sudden jump to 103° or 104° at times meant nothing more than an acute indigestion. These bacterial examinations of the blood were really important. The main thing of value was the great saving of time. When there was a rise of temperature after the mastoid operation a blood culture taken immediately was very important. If one made a blood culture as a routine measure, as one did a blood count, one would soon get to a point where he could state definitely of what use it was. Today there was a difference of opinion as to its value.

Dr. Wendell C. Phillips closed the discussion. He said the subject was so broad that it could be discussed almost indefinitely. However, there was one point brought out by Dr. McKernon which perhaps Dr. Phillips emphasized only in a negative way, and that was, the importance of an early diagnosis and an early and prompt operation. To this he fully agreed. The appearance of the sinus when exposed during the operation could not always be relied upon as a means of determining the presence or absence of phlebitis. In a recent case operated upon the sinus was exposed and found to be covered with granulations. His assistants had asked him why he did not open the sinus in this case, and his reply was that there was entire absence of clinical symptoms of phlebitis. In the case Dr. McKernon saw with Dr. Whiting, there were positive symptoms of sinus involvement, while the local appearance of the sinus was not that of the disease. He believed that when symptoms of the disease were present, one should operate promptly. But when the sinus wall was found to be covered by granulations, it should be allowed to remain undisturbed unless presenting symptoms of phlebitis was present.
MASTOIDITIS IN SCARLET FEVER AND MEASLES.

By HENRY A. ALDERTON, M. D., Brooklyn, New York.

Whatever may be the causative agent in the production of the disease called Scarlet Fever, which agent at the present time is unrecognizable, the consensus of opinion is that the inflammations of the ear are due, in the majority of cases, to the streptococcus pyogenes.

It seems to be fairly well settled that the ear may be infected either by contiguity of structure from the naso-pharyngeal cavity through the Eustachian tube, an opinion favored by most of the general clinicians; or that the middle and internal ear may be infected as an integral part of the disease, without the interposition, necessarily, of a salpingitis—an opinion held by many aurists. The idea being, in the latter case, that the bacteria penetrate into the middle and internal ear by means of the blood and lymph channels, or indirectly from the subarachnoid space through the aqueductus cochlea, or from the subdural space through the sacculus endolymphaticus. In many of the cases examined post-mortem, the normal condition of the cartilaginous Eustachian tube lent strong probability to the view that the ear disease was a local manifestation of the general infection and not an extension of the infectious process to the ear from the throat—Moos, Holger-Mygind and others. On the other hand, such good observers as Wagenhäuser and Barth believe that infection always spreads through the Eustachian tube from the pharynx. However, it is hardly possible to accept this contention, having due regard for the work of such men as Hartmann, Siebenmann, Moos, Bernhard von Gaessler, Rudolph and Bezold. Von Gaessler, from an investigation of twelve fatal cases of scarlet fever, found the middle ear, adjoining cavities and tympanic ostium of the Eustachian tube involved in different degrees in every instance; yet, in all cases but one, the cartilaginous tube appeared normal—the deposit of membrane about the tube always ceased abruptly within the pharyngeal mouth of the tube.

To the writer it seems that those cases of otitis which develop early in the course of the disease are probably a local manifestation of the general infection, independent of the pharyngeal
infection; and that those cases which develop late in the course of the disease are as likely as not to be the result of the extension of the naso-pharyngeal inflammation, by way of the Eustachian tube, to the middle ear cavities and from thence, in certain cases, to the labyrinthine structures.

Probably in every case of scarlet fever the middle ear participates in the disease process to a greater or less degree. The internal ear may be affected either secondarily as a sequel to suppuration of the middle ear or primarily.

The pathological changes, according to Osier, in the middle ear mucosa consist in a dilatation of the blood vessels and lymphatics in the corium, and an abundant infiltration both of the corium and of the epithelium with polynuclear leukocytes; in the internal ear, according to Moos, Siebenmann and others, in a true labyrinthitis, leaving often as a sequel ossification of the various cavities with destruction of the membranous parts.

Regarding the frequency of otitis media in scarlet fever, opinions somewhat differ; the difference probably arising from the character of the epidemic as to severity and as to whether the cases observed have been seen in private practice or in institutional work. Finlayson gives the percentage as one-tenth of all cases; Caiger as 11%; Burckhart, 33%; Osler, 18%. Holt states that in scarlatinal cases with bad throats, especially in children, otitis may occur in 75%. The writer had under observation, from July 15, 1907, to July 15, 1909, at the Kingston Avenue Hospital, 1621 cases of scarlet fever; 178 cases, practically 11%, developed suppurative inflammation of the middle ear with perforation or incision of the drum membrane. Besides these there were a considerable number of cases which yielded to treatment without perforation or incision.

Osler and Welch and Schamberg both state that when the otitis develops in the first few days of the disease, the symptoms of the otitis are more or less masked by the general condition of the patient (Chart 2526-2234), but that later in the disease the occurrence of the otitis is heralded by a more or less sharp rise in the temperature (Chart 957). With these findings the writer coincides. However, there occur a goodly proportion of cases in which the otitis develops and perforation takes place with subsequent purulent otorrhoea, and yet the temperature is practically uninfluenced; the rule, though, is as above stated. This rise is more apt to occur in the initial otitis, than just before the development of mastoiditis.
**KINGSTON AVENUE HOSPITAL**

**NAME:**

Teresa Buenos Aires

**Age:**

44 years

**Admitted:**

Nov. 5, 08

**Disease:**

Ill 2 days

**Address:** 259-16th St., Brooklyn

### Table of Observations

<table>
<thead>
<tr>
<th>Date</th>
<th>Temperature (°F)</th>
<th>Pulse per minute</th>
<th>Respiration per minute</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Note:**

- Temperature readings are recorded throughout the day.
- Pulse and respiration rates are recorded at specific times.
- Other notes are not provided in the document.
| Date | April 19 | April 20 | April 21 | April 22 | April 23 | April 24 | April 25 | April 26 | April 27 | April 28 | April 29 | April 30 | May 1 | May 2 | May 3 | May 4 | May 5 | May 6 | May 7 | May 8 | May 9 |
|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Temp |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |
| HR   |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |
| SBP  |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |
| DBP  |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |
| Weight |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |
| Meals |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |
| Other |         |         |         |         |         |         |         |         |         |         |         |         |       |       |       |       |       |       |       |       |       |       |

**Disease:**

- Maria Rosa Rullo
- Age: 85 yrs
- Admitted: March 29, 1969
- Diagnosis: 
- longitude: Ellis Island

**Kingson Avenue Hospital**

**Dates of Observations:**

- April 19
- April 20
- April 21
- April 22
- April 23
- April 24
- April 25
- April 26
- April 27
- April 28
- April 29
- April 30
- May 1
- May 2
- May 3
- May 4
- May 5
- May 6
- May 7
- May 8
- May 9

**Measurements:**

- Temperature
- Heart Rate
- Systolic Blood Pressure
- Diastolic Blood Pressure
- Weight
- Meals
- Other observations

**Graph:**

A line graph showing trends over the observed dates.
Pain is usually complained of by children of sufficient age and intelligence; though in the early stages of scarlet fever, because of the mental hebetude, the patient is less likely to volunteer the information than later on in the disease, when the mind is less affected by the febrile process. It may be absent. Hardness of hearing also makes its appearance, together with an increase in the general malaise.

The otitis may make its appearance at almost any period in the course of the disease or during convalescence; the writer has seen it develop as early as the second day and as late as the 64th day; the majority of the cases, however, show evidences of the existence of this complication during the second or third weeks of the disease.

The otitis is frequently bilateral; one ear often being affected some time after the other, each attack being accompanied by the characteristic rise in temperature.

A scarlatinal otitis may bring about extensive destruction of any or all parts of the middle and internal ear, subsequently involving any of the circumjacent structures. Thus erosion of the wall of the carotid canal or of the sigmoid groove may lead to necrosis of the vessel walls, resulting in fatal hemorrhage; facial paralysis is not so very rare; sinus thrombosis, meningitis and brain abscess are at times sequels to the purulent otitis. The most usual complication is mastoiditis; Osler's statement that the process rarely extends to the mastoid cells to the contrary notwithstanding. Thus, among the 178 cases of scarlatinal middle ear suppuration observed by the writer, many developed symptoms of mastoid involvement and 47 of the cases required operation; in other words, 26%. The writer is furthermore of the opinion that the condition was unintentionally overlooked in some of the more severe cases because of the difficulty of making a diagnosis incident to the age and state of the patient.

The mortality in these operated cases approximated 25%, though this mortality is rarely attributable to the mastoid disease and the necessary operation, but rather to the fact that in the vast majority of the fatal cases other and serious complications existed, such as broncho-pneumonia, nephritis, endocarditis, enteritis (Chart Fatal Cases). The association of broncho-pneumonia with the disease process is especially unfortunate as regards prognosis, so much so that the writer is inclined to delay operative attack so long as seems possible in these cases, in the hope that the lung condition will show signs of amelioration.
-Practically all that has been said in regard to the causation of scarlatinal otitis applies to the otitis of measles. The period during which a measles patient may develop otitis seems shorter than in the case of scarlet fever; the otitis may occur as early, but usually appears at the end of the first or during the second week of the disease and seldom beyond the end of the third week in the uncomplicated cases.

Also the symptoms of otitis follow about the same type in measles as in scarlet fever, though they are less apt to be so frequently of the fulminating type, even in the early stages of the disease. Extensive destruction of the structures of the middle and internal ear and of the neighboring parts is less frequent in measles than in scarlet fever.

Downie, quoted by Welsh and Schamberg, in 501 cases of otitis, found measles causative in 26.1%, scarlet fever in 12.6%, an inversion of the usually considered relation, according to Welsh and Schamberg. The writer observed in the time given above, two years, 2106 cases of measles; 326 of these developed suppurative inflammation of the middle ear, 15% of all the cases. These findings, the comparative frequency of scarlatinal and measles otitis, would probably not apply generally; the crowded condition of the measles wards as compared with those devoted to scarlet fever possibly bore a certain and distinct influence in the causation of the complication. Of these 326 cases of otitis due to measles, 34 cases or 10½%, required mastoid operation. Compare this percentage with the 26% of scarlatinal otitis going to operation and we see that operative mastoiditis is about 2½ times more prone to occur in scarlet fever than in measles. When however, we come to study the mortality in measles following the operation for mastoiditis, ten cases are found to have resulted fatally, or 29%, while in scarlet fever the mortality was 25%.

This greater mortality in measles, in the writer's opinion, is largely accounted for by the greater prevalence of inflammatory conditions of the respiratory tract: Namely, bronchitis and broncho-pneumonia.

The diagnosis of an otitis media in both scarlet fever and measles is one easily made by inspection, but its occurrence is so apt to be masked in the early stages of the constitutional disease that the only safe rule to follow is periodic inspection of all ears, especially during the first and second weeks. Should the drum membrane show dull, lustreless, congested or bulging, then immediate and extensive incision of the membrane is in order.
Should the drum membrane be of fair lustre, but slightly or more markedly retracted, translucent and pinkish from a slight congestion of the mucous membrane of the middle ear due either to lack of ventilation or to a mild inflammatory irritation, then prophylactic treatment may be instituted by the use of mild alkaline, antiseptic nose washes, if these have not already been ordered, and the hot aural douche every two hours, combined with the local application of a hot-water bag. The writer believes the ice-bag is always a dangerous application in these cases; it masks the development of mastoid tenderness and of the superficial swelling which sometimes appears in children having a persistent masto-squamosal suture or a well-developed cellular zygomatic process. Should the ear drums have perforated spontaneously, or following incision and the establishment of a suppurative otorrhoea, then syringing is to be substituted for douching or irrigation. This syringing should be done with a large Davidson soft rubber syringe, holding an ounce or so; at least a pint of sterile water or mildly antiseptic solution at 110° F. should be used for each ear affected, the ear being held out well from the side of the head during the process so as to straighten the canal. Between syringings, the syringe should be placed in a strong bichloride solution or boiled. Syringings should be repeated every two hours during the day-time; and no cotton pledges or plugs should be placed afterwards in the ear canal. If the ear drum has ruptured spontaneously, then a free incision should nevertheless be made to enlarge the opening and to relieve tension still further. These measures, in the majority of cases, will suffice to relieve the middle ear and mastoid cavities from further destructive inflammation. If, however, the inflammation of the mastoid cells does not abate, then the tenderness often already present, or which later makes its appearance, increases and covers a greater area. Should this tenderness thus increase or persist in the original location for the few days following the establishment of a purulent discharge and incision, notwithstanding the treatment above, then should a mastoid operation be done whether the temperature rises or not. Nor should one wait for external signs of involvement, such as redness or swelling of the soft parts overlying the bone, whether over the mastoid process, the zygoma or the posterior-superior wall of the external auditory canal.

Because of the changes normally present in the blood both in measles and scarlet fever, leukocytosis and increased polymnuclear
leukocyte percentage (the latter both relatively and absolutely) being usual in the early stages, blood examinations do not offer much help in determining operation at this time. In the later stages an increased polymorphonnuclear percentage offers corroborative evidence, as normally both the leukocytosis and polymonuclear percentage fall steadily after and following the 8th or 9th day of the disease.

In the doing of the mastoid operation, the effort should be to remove as nearly as may be all of the cellular tissue of the mastoid process up to the inner table and especial attention should be devoted to zygomatic cells, to the cells overlying the knee of the sigmoid sinus, and to the cells lying below the antrum.

The association of measles and scarlet fever in the same patient seemingly resulted in a greater percentage of suppurative otitis media; viz.: in 89 cases, 27 developed abscess of the ear, or 30%; of these 27 cases, 7 came to mastoid operation, or 26%, the same as with uncomplicated scarlet fever. But when we come to compare the number of cases requiring mastoid operation with reference to the total number of cases of measles, scarlet fever and the combined diseases we find the percentages as follows: measles, .016%; scarlet fever, .029%; measles and scarlet fever, .078%; thus evidencing the greater virulence of the combined infection than of either one alone.

Early paracentesis resulted in a fall of mastoid percentage in scarlet fever from .323% to .195%, and in measles from .181% to .07%; as compared to total number of suppurative otitis cases.

**FATAL CASES.**

**Measles and Complications.**

No. 2480—Broncho-pneumonia, Albuminuria, Tonsillitis, Double Mastoid.
No. 2580—Broncho-pneumonia, double Otitis, Mastoid, Left Hemiplegia.
No. 2666—Double Mastoid.
No. 2693—Broncho-pneumonia, Enteritis, Mastoid.
No. 2702—Enteritis, Purpura, Mastoid.
No. 2758—Broncho-pneumonia, Enteritis, Mastoid.
No. 2894—Broncho-pneumonia, Cardiac murmur, Mastoid.
No. 2171—Broncho-pneumonia, Cervical Adenitis and Cellulitis, Mastoid.
No. 2373—Broncho-pneumonia, Cervical Cellulitis, Mastoid.
No. 2526—Broncho-pneumonia, Mastoid.

**Scarlet Fever and Complications.**

No. 1915—Diphtheria, double Otitis, Mastoid.
No. 2341—Broncho-pneumonia, Nephritis, Endocarditis, Measles, Cervical Adenitis, Mastoid.
No. 2412—Broncho-pneumonia, Albuminuria, Double Mastoid.
No. 2546—Double Otitis, Mastoid.
No. 2967—Albuminuria, Entero-coilitis, Mastoid.
No. 2983—Albuminuria, Mastoid.
No. 376—Mastoid.
No. 817—Nephritis, Left Facial Paralysis, Double Mastoid.
No. 1698—Broncho-pneumonia, Empyema, Mastoid.
No. 1973—Broncho-pneumonia, Nephritis, Mastoid.
No. 2127—Mastoid.
No. 2272—Broncho-pneumonia, Cervical Adenitis, Mastoid.
No. 1907—Diphtheria, Broncho-pneumonia, Mastoid.

In 22 Fatal Cases:
- Broncho-pneumonia, 14 times;
- Nephritis.................. 7 times;
- Enteritis.................. 4 times.

In 58 Cured Cases:
- Broncho-pneumonia, 8 times;
- Nephritis.................. 9 times;
- Enteritis.................. 3 times.
THE VALUE OF VACCINE THERAPY IN MASTOIDITIS, COMPLICATING ACUTE INFECTIOUS DISEASES.

Preliminary Report by
JAMES F. McKERNON, M. D., New York city.

In all of the scarlatina mastoids operated upon by me during the past fifteen years, the healing was complicated by soft flabby granulations forming with an excess of discharge from the mastoid cavity, greater than that which took place in mastoid wounds caused by any one of the bacterial invasions usually found in this disease.

When sutures were placed in the upper angle of the flaps, they invariably sloughed, leaving deep indentations or scars at these points, and the healing was always protracted, and many times the granulations had to be removed by means of the curette, when the usual method for their removal by the use of strong solutions of silver nitrate or the fused stick of silver nitrate failed. This has also been true, but in a less degree, when mastoids were operated upon during the active stage of measles, the cause for this being doubtless some systemic infection antagonistic to both bone and soft tissue repair. In many cases various methods of dressing the wound were resorted to, but the final result was the same. Even in those cases where the wounds were dressed daily there was an excess of discharge, and resolution was invariably delayed, the ultimate result obtained being an ugly scar, as compared with the results obtained in any of the other forms of infection.

About a year ago, while operating upon one of these scarlatina mastoids (the young child of a physician), he asked how long a time it generally took for complete healing. When told of the usual unsatisfactory repair in such cases he said, "Why do you not have a vaccine made from the mastoid pus, and use it to hasten repair?" Upon telling him that I would be pleased to try it, he said, "I will take a culture from the little girl's mastoid, make you a vaccine, and in thirty-six to forty-eight hours from now you can use it. I believe you will find the reparative process to be quite as rapid, if not more so, than in your ordinary cases, free from scarlatina infection."
We used the vaccine prepared from the pus in the mastoid in this case, and it has never been my good fortune to see a cleaner, healthier wound, nor one that healed more rapidly. There were three sutures taken at the upper angle of the wound, and these were removed on the fourth day after the operation, and complete healing of the mastoid wound with all dressings removed took place in four weeks' time. While this is by no means unusually rapid healing for a mastoid of the ordinary type of infection in a child three and a half years of age, it is, I believe, a rapid repair for one operated upon during the active stage of scarlet fever and as extensive a mastoid as the one in question.

Feeling, possibly, that it might have been a mere coincidence, I determined to try it with other cases as opportunity offered, and during the past year I have used the vaccine in ten cases in all, six of them being cases of scarlatina mastoids, and four of measles. In all of these cases the results have been most satisfactory and gratifying. The wounds have healed rapidly, the granulation tissue has been free of any excessive discharge, and firm and solid both at the base and on the surface. All sutures have remained intact, and there has been primary healing of the flaps, and a minimum scar with little or no depression as the result.

Another noticeable feature, and one that seems a valuable one to me, was that the discharge from the ear disappeared quickly, and there was a rapid restoration to normal of the tympanic membrane and middle ear. This feature in itself was in marked contrast to those cases where the vaccine had not been used, and in some of which even after the mastoid wound had healed, the discharge continued indefinitely.

In comparing the length of time required for healing in cases where the vaccine was used with those in which it was not, the difference, without doubt, is all in favor of using the vaccine. Three of the six scarlatina mastoids—and they were most extensive—healed completely in less than four weeks, while the other three took about ten days longer. In the measles cases the length of time was quite as favorable. The scarlatina cases were operated upon in various stages of the disease from the second to the eighth day, while the measles cases ranged from the third to the twelfth day.

In all of these cases the vaccine was prepared in the following manner: A culture of the pus was taken from the mastoid antrum and placed in a tube containing nutrient bouillon. This was placed in the incubator and kept there for a period ranging
from eighteen to forty-eight hours. In two of the six scarlatina cases the culture showed a growth of streptococci in the first twelve hours. In the other four cases smears from the middle ear prior to operation on the mastoid showed the streptococci present in the pus. Loops of this broth culture were then planted on the surface of six 1% glucose agar slants; these were left in the incubator for twenty-four hours, and the resulting growth washed off with a normal salt solution passed from tube to tube, so that the entire growth was obtained. This extract was then sealed in the sterile tube containing it by drawing out the tube in the flame. After this it is violently shaken until the chains of cocci are completely broken up. The tube is then broken and the number of organisms is determined in a manner similar to that of counting blood corpuscles. The number found will depend upon the amount of salt solution used and the degree of growth of the organisms. They usually run between twelve and five hundred million to 1 c. c.

The extract is now diluted with normal salt solution so that 2 c. c. carry fifty million of the bacteria, and is then placed in small sterile tubes, each containing a dose of fifty million of the organisms. These tubes are again sterilized by keeping them at sixty degrees c. for one and a half hours. Before sealing them a culture should be taken from them and incubated for twenty-four hours, to prove that all organisms are killed.

The serum prepared in this way is then introduced beneath the skin, a very fine needle being used. The site for its introduction varies, a favorite one being between the shoulders. It can also be used superficially in the thigh or hip.

When the smear from the ear shows the presence of pneumococci or the meningococci, it is preferable to use for their culture a 1% glucose agar rather than the nutrient bouillon, as the growth seems to develop more rapidly in the former.

The dosage administered varies with the age of the patient and the virulence of the disease. In a child two and a half years old twelve millions were given as the first dose, and this was increased every other day by six millions until thirty millions were being given.

In some of the cases in children eight or twelve years of age, where the temperature ran as high as 105° and 106° Fahrenheit, the initial dose was fifty millions, and as the temperature dropped the dosage was diminished every other day by ten millions.
VALUE OF VACCINE THERAPY.

The least number of injections given any one patient was three, the greatest number given six. The frequency with which the injections were made was usually every third day. A clinical fact of importance noticed in all but two of these cases was that when the serum was used in cases running a high temperature, there was a gradual decline each day. As far as one was able to judge there was no general depression resulting from the use of the serum. One of the patients twelve years old complained of slight headache, which lasted half an hour.

Following is a brief summary of the cases in which the serum was used:

I. Girl aged 5 years. Scarlet Fever.
Smear from ear showed presence of streptococci.
Mastoid operation performed on fifth day of disease.
First vaccine given 36 hours after operation; dose ten millions.
Second dose three days later; fifteen millions.
Third dose four days later; twenty millions.
Fourth dose four days later; fifteen millions.

II. Boy aged 6½ years. Scarlet Fever.
Smear from ear showed presence of streptococci.
Mastoid operation performed on fourth day of disease.
First vaccine given 48 hours after operation; dose 30 millions.
Second dose 48 hours later; 40 millions.
Third dose 36 hours later; 40 millions.
Fourth dose 48 hours later; 20 millions.
Fifth dose four days later; 20 millions.

III. Boy aged 8 years. Scarlet Fever.
Smear from ear showed presence of streptococci.
Mastoid operation performed on fifth day of disease.
First vaccine given 36 hours after operation; dose 30 millions.
Second dose 48 hours later; 30 millions.
Third dose three days later; 40 millions.
Fourth dose two days later; 30 millions.
Fifth dose two days later; 40 millions.
Sixth dose four days later; 20 millions.

IV. Boy aged 12 years. Scarlet Fever.
Smears from ear showed presence of streptococci.
Mastoid operation performed on sixth day of disease.
First vaccine given 36 hours after operation; dose 50 millions.
Second dose 24 hours later; 30 millions.
Third dose 36 hours later; 50 millions.
Fourth dose two days later; 30 millions.
Fifth dose three days later; 30 millions.
Sixth dose four days later; 30 millions.

V. Girl aged 9 years. Scarlet Fever.
Smear from ear showed staphylococci and pneumococci.
Mastoid operation performed on fourth day of the disease.
First vaccine given 48 hours after operation; dose 40 millions.
Second dose 24 hours later; 30 millions.
Third dose three days later; 40 millions.
Fourth dose four days later; 30 millions.

VI. Girl aged 10 years. Scarlet Fever.
Smear from ear showed pneumococci and staphylococci.
First vaccine given 36 hours after operation; dose 30 millions.
Second dose 48 hours later; 30 millions.
Third dose 36 hours later; 50 millions.
Fourth dose three days later; 30 millions.

The four cases of measles in which the serum was used ranged in age from two to eight years. The dosage was practically the same as that given the scarlet fever cases, except in one of the patients—the youngest child. Here the initial dose was five millions, and this was repeated each day for three days, and on the fifth day increased to ten millions.

The vaccine has been used in two adult cases not complicating a contagious disease. In these the infection from the ear showed the meningococci. These cases were markedly septic when seen and operated upon, one of the patients being almost in a state of collapse. The dosage given here was fifty million organisms every day for three days, and then thirty millions every second day for five doses more.

These two cases seemed to make a more rapid recovery from their general standpoint than the other cases observed in which the vaccine had not been used. They are still undergoing the process of healing, and it is too soon to say whether the vaccine will or will not hasten resolution and repair, and shorten their convalescence.
VALUE OF VACCINE THERAPY.

There was no opsonic index taken in any of these cases to determine when to use and when not to use the vaccine, the only index to guide us being the patient’s general and local condition.

CONCLUSIONS.

From observation of the cases recorded, I believe in vaccine therapy we have an aid, first in wound repair, second in hastening resolution of the accompanying purulent ear, and third in increasing the patient’s resistance to the disease, by neutralizing the poison in the system, and allowing a more rapid tissue repair.

DISCUSSION.

Dr. Arthur G. Root, of Albany, said that the two papers just read seemed to him to be of unusual value. The writer of the first paper had had such an extensive experience in measles and in scarlet fever that it would seem that his observations and his conclusions gathered from such an extensive observation, must of necessity carry great weight. Dr. Root said that he was particularly gratified in hearing emphasized the advisability for an early paracentesis in these cases; Dr. Alderton’s percentages showed very gratifying results by reducing the number of cases developing mastoiditis, both in measles and in scarlet fever. Dr. Root’s personal experience led him to believe that usually the involvement of the middle ear in cases of measles came on rather earlier than it did in scarlet fever. But as those cases were not, as a rule, as severe as those that developed during scarlet fever, it was probably due to the fact that the infection in scarlet fever was rather more virulent. If the general practitioners throughout the country could only realize that in all the cases, not only in the exanthemata, but in other diseases as well which gave rise to middle ear infection from the post-nasal spaces, the Eustachian canal or lymph nodes, an early paracentesis was advisable, making a free incision in order to give free drainage and relieve tension and facilitate irrigation, if carefully and systematically carried out, using large quantities of fluid, much benefit would be derived, and this operation would be more often performed. In his judgment the use of the cold pack was undesirable in these cases. The general practitioner throughout the country districts should know how simple this operation was and the amount of benefit to be derived from it. If they were made aware of these facts, no doubt many ears would be saved that now were sacrificed through lack of this knowledge.

Dr. McKernon’s paper brought to his mind an entirely new field for consideration. The preliminary report he gave seemed to offer hope for very good results in the future. Dr. McKernon had very gracefully given the Society this early report in order that they might give individual research along these lines.

Dr. Wendell C. Phillips, of New York, said that he wished to make two or three comments. In the first place, Dr. Alderton’s paper, so far as Dr. Phillips’ experience was concerned, without the keeping of any very accurate records as to the proportions, was not in accord with his experience, for complications of purulent middle ear disease in measles had been fully as common as in scarlet fever, and possibly more so. Dr. Alderton’s report was of the cases as they appeared
in institutions, and were institutional cases, which might account for his statistics.

With regard to the vaccine therapy, he had not had experience with it, or rather, practically none. One case he wished to relate as being of interest and in which the vaccine seemed to have some effect. It was an unusually severe case of measles, and about the eighth or tenth day of the disease the patient developed a double otitis media. As soon as the pain came on he did a paracentesis. The discharge was most profuse. Within one or two days the mastoid became involved. Within three or four days the disease became so extensive as to demand an operation, which was performed. A very extensive disease of the mastoid was found. Then the patient began to have tenderness on the opposite side, and the mastoid on that side became rapidly involved. Antistreptococcus serum was injected at this time, and repeated in two days. At the time the injection was given an operation upon the opposite mastoid seemed imperative. Either because the disease subsided of itself, or because of the effect of the serum used, the otorrhea rapidly subsided and the mastoid involvement subsided. The wound healed in as short a time as it should have. His experience with vaccine therapy was confined to that one case. While he was never able to decide positively whether the antistreptococcus serum had a good effect or not, he felt that it did.

Dr. Chas. R. C. Borden, of Boston, Mass., said that it had been his good fortune to see many cases of aural complications in scarlet fever, measles and diphtheria, in the contagious department of the Boston City Hospital. In that institution there were from 150 to 400 cases of the three diseases at all times. He agreed with Dr. Phillips, that in this institution there are more aural complications from measles than from scarlet fever. The complications were also found in diphtheria, but not nearly as frequently as in the other two diseases. He said he had recently reported a number of cases, reading papers before several local societies about Boston. On every occasion the general practitioners present told him they had never seen as many complications as he reported to have observed. This was because the hospital cases were more severe and the children very sick. So far as Dr. Borden knew, they had not had in ten years in the hospital any cases of brain abscess, complicating mastoiditis, except one or two cases which were sent in from other institutions with the cranial condition already present. The house officers and resident physicians are trained to watch very carefully any evidence of aural complications, and to perform a paracentesis at once when necessary. The number of cases of mastoiditis therefore is rather small. More cases of this complication were met with in measles than in scarlet fever or diphtheria. Mastoiditis did occur, of course, in diphtheria, and in some cases the symptoms were rather obscure. In their hospital the use of the nasal douche has been discontinued, and is never used under any circumstances.

In the early days of the hospital it was an established custom, but since the practice was discontinued, the number of middle ear complications has been decidedly less. Ice bags were frequently used. He wishes to emphasize this point; that the use of the ice bag applied in the early stages, in many cases would abort mastoid symptoms.

Dr. Borden asked Dr. Alderton's opinion in regard to a certain number of cases, encountered in the contagious hospitals, where there was a tremendous aural discharge which lasted for weeks. He asked if in such cases they were not justified in doing mastoid operations, with a view to establish free drainage backward through the mastoid, rather than through a small opening in the delicate drum membrane. Dr. Borden had operated on such cases with very gratifying success. By so doing he had prevented large perforations in the drum membrane, and the destruction of tissue in the middle ear.
Dr. S. MacCuen Smith, of Philadelphia, agreed with Dr. Phillips that, in his experience, there was a greater number of complications of the middle ear and mastoid encountered in measles than in scarlet fever. He recalled that in a physician's family of six children, all of whom suffered from measles, six mastoid operations were performed on four children, two being double and two single.

This brought up the very interesting point that it was not only necessary that we, as aurists, should make a very careful and frequent examination of the ears in these cases, but that we should ever try to impress this important measure of a routine examination upon the general practitioners.

He had seen many cases of suppurative otitis media complicating not only the exanthemata, but more especially cases of pneumonia and typhoid fever, in which patients were well advanced in convalescence, when a sudden rise of temperature was noted, the patients suffering from what was termed by the attending physician a relapse, but which was, in fact, an ear complication, the latter not even being suspected until a discharge was noticed escaping from the external auditory canal.

In regard to Dr. Borden's point advising against the use of the nasal douche in these cases, this called to Dr. Smith's mind a paper read by a prominent physician, in charge of the Hospital for Contagious Diseases in Boston before the General Session of the American Laryngological, Rhinological and Otological Society, in which he stated that he had abandoned the use of all sprays or washes, as he felt that these rather favored not only middle ear, but mastoid, complications. Early and free incision, followed by aspiration, he believed to be the best means at hand of preventing such complications.

Dr. Smith wished to congratulate Dr. McKernon for presenting a paper discussing vaccine therapy, and expressed the opinion that this was not only very important, but from his experience would seem to prove most valuable in the treatment of some aural lesions, more especially those of an obscure nature, which he hoped in the near future to incorporate in an article on the subject. In connection with Dr. John C. DaCosta, Jr., of Philadelphia, who had really looked after the scientific end of this procedure, he had observed quite a number of suppurative diseases of the ear, and on several occasions brain abscess formations resulting therefrom, in which good results were obtained by the use of the vaccine therapy, which, to Dr. Smith's mind, was beneficial more especially in promoting rapid recovery after the evacuation of the pus and possibly correcting a small, satellite abscess formation which, in his judgment, was usually the cause of death in those cases where the parent abscess formation had been evacuated.

These investigations will continue to be carried out by Dr. DaCosta, and will no doubt receive consideration in the form of a paper by him at the forthcoming meeting of the American Association of Physicians, to be held in Washington in June next. Dr. DaCosta felt that the use of the vaccine was absolutely harmless, and Dr. Smith asked Dr. McKernon to confirm this opinion.

Dr. Chas. R. C. Borden, of Boston, Mass., said that one of the most striking features of aural complications in scarlet fever, measles and diphtheria was the absence of pain, and that this is a point which should be strongly impressed upon the general practitioner, and if it were made known to them, a great many cases of mastoiditis would not occur. Fully 75 per cent. of the children with these aural complications do not complain of pain. He said he had repeatedly asked the nurses and orderlies, as well as the doctors, whether or not pain was usually complained of by these patients, and all gave a negative answer. However, in middle ear diseases that resulted from other conditions than those under discussion, such as from taking cold, the children frequently cried because of pain in the ear.
Dr. Percy Friedenberg, of New York, said that all must agree as to the importance of an early paracentesis and particularly of aspiration of infectious fluid from the middle ear cavity in these aural complications of contagious diseases. But more attention should be paid to lowering the number of these middle ear complications. The nasopharynx should be more often disinfected, and one could not always get along without the use of the spray in accomplishing this. This discharge in these cases often thickened and the use of a warm spray became then an important item in mechanical removal of crusts and removing nasal obstructions. The oily spray was especially valuable. Some ten years ago Dr. Seibert of New York began to make use of a solution of resorcin and alcohol, equal parts, for direct application to the naso-pharynx in these cases and his statistics regarding the aural complications were remarkably favorable. This swabbing, however, should be used early. In the absence of pain one often knew nothing about the development of an otitis in children with measles or scarlet fever until the discharge took place. The use of this solution of equal parts of resorcin and alcohol for two or three days accomplished a great deal of good. It should be remembered that children with adenoids are very liable to infectious diseases; whether one made an absolute disinfection in these cases or not was a question, but the use of the swab of resorcin and alcohol certainly was productive of good.

Dr. Walter S. Daly, of Ogdensburg, asked if Dr. McKernon had used the vaccine in threatened mastoiditis, that was, before operation, and if so, with what results.

Dr. Francis P. Emerson, of Boston, said that his attention was called to a certain point by Dr. Borden, which he had since verified, showing the relative frequency of middle ear involvement as a late development in measles and scarlet fever. In a great many cases after the patients had been discharged from the contagious wards of the hospital, say two or three weeks after, middle ear trouble would develop. This raises the practical question as to how soon after an acute infection we were justified in operating upon the naso-pharynx, to protect the middle ear.

Dr. S. MacCuen Smith, of Philadelphia, asked Dr. McKernon if he considered the use of the vaccine entirely harmless, and whether its use might be considered in the same light as the use of the diphtheria antitoxin. Had it any ill effects upon the heart? Dr. DaCosta believed that it was absolutely harmless.

Dr. Wendell C. Phillips, of New York, said he wished to speak on the question of the cleansing discharges from the nasal and nasopharyngeal cavities during the active course of the disease. Those present had of course heard what had been stated in regard to the nasal douche and spray. During the active stage, particularly in measles, the mucous membrane of the nose and naso-pharynx was the site of deep-seated infections, and these membranes were pouring out enormous quantities of an infective material into these cavities. If this infective material was allowed to accumulate and remain in the nose and naso-pharynx unmolested, harm would result, and in his opinion these secretions should be washed away by means of the spray or douche. This was a question on which men differed. Personally, Dr. Phillips believed that in a tractable child if the spraying or douching was done intelligently and carefully by a trained attendant, it would do the patient a great deal of good, and no harm would come from it; as much of this infective secretion should be removed as possibly could be. But he never allowed it to be done except by one trained to doing it. Again, he never allowed the nasal douche to be used in children in cases of diphtheria, measles or scarlet fever in the
upright position; the children should always be turned with the face toward the nurse; then the nasal and naso-pharyngeal cavities were washed out with normal saline solution. The method was a very simple one, and was done with the idea of getting rid of the accumulated secretion. This was a procedure he did repeatedly. If the child was an intractable one, he never used it. Dr. Phillips said he wished to emphasize the fact that, in his opinion, the use of the nasal douche was not a dangerous procedure, in experienced hands, but that it should be given with the patient in the supine position with the head turned toward the nurse. Dr. Phillips said that his child had diphtheria one year ago and the nasal douche was employed by a nurse who had been trained in an institution for contagious diseases to wash out the nose and throat. In his child there occurred no struggling or disturbance of any kind. He said that it would take a great deal of argument to convince him that this was not the proper procedure to use in these cases.

Dr. Chas. R. C. Borden, of Boston, Mass., said that he had once examined about 400 children upon their admission to the contagious department, with either scarlet fever of measles. He examined them to determine whether or not they had adenoids present. He said he was surprised to learn that in all but one case there was a marked swelling of the adenoid tissue. He did not think it was possible for anyone, no matter how experienced or skillful, to wash out the nasal or naso-pharyngeal cavity without subjecting the patient to the risk of setting up trouble in the middle ear.

Dr. Henry Arnold Alderton, of Brooklyn, said that in private practice he did not know whether there was any great difference in the number of aural complications that occurred in the two diseases under consideration, measles and scarlet fever; but in institutional work there was a greater prevalence of these complications in measles than in scarlet fever. He attributed this, in Brooklyn, to the fact that the measles wards were more crowded than the scarlet fever wards.

So far as Dr. Borden's statement in regard to the aural complications in diphtheria was concerned, he agreed. These complications were much more rare in diphtheria than in either measles or scarlet fever. In a great many of the cases that had been operated upon, those cases following diphtheria in which the disease was very intense, they had an entirely different mastoid to deal with than in measles or scarlet fever; there occurred a dry necrosis. Dr. Alderton also agreed with what Dr. Borden said about the cerebral complications; they rarely saw them, although they did occasionally occur. These usually followed along the lines, however, of a lepto or pachymeningitis rather than a sinus thrombosis or brain abscess.

As we operate for prolonged suppuration, without other symptoms, in non-exanthematous cases, so should we in cases of profuse suppuration occurring in connection with the exanthemata, for we all know that children with running ears should not be discharged from the hospital; the propagation of these diseases was limited only by an arrest of the discharges; the condition should be healed before these patients are discharged from the hospital.

Dr. Alderton did not believe in the use of the douche or spray for disinfecting the nose and throat in these diseases. The idea was to remove mechanically the things in the nose and throat which obstructed breathing and not to disinfect the cavities, which was an impossibility. Judging from his personal experience he disagreed with Dr. Phillips and agreed with Dr. Fridenberg in regard to this being a valuable adjunct, and he said he was especially fond of the oily mentholated preparations; by their use one kept down the inflamed conditions, causing the mucous membrane to shrink, and the parts were kept in better shape.
DISCUSSION.

With regard to the presence of pain in the mastoid, he did not believe it should be at all depended upon in making a diagnosis; very often a mastoiditis would develop without any history of pain at all. However, it had been his experience that, in many cases, the patients had complained of pain at the inception of the aural complication, but the pain had subsided. In fact, a patient would go on and develop a tremendous mastoiditis, with a tremendous amount of bone destruction, and without any pain complained of at all. He believed this was because coincident with the large amount of bone destruction there was a relief of the tension and, therefore, a relief of the pain. However, in a large number of the cases, if one inquired carefully into the history he would find that at some time early in the history of the complication they had complained of pain. In the early stages of the disease they were so over-burdened with the infection of the disease that they did not, as a rule, complain of anything. They were in more or less of a stupid condition.

Dr. James F. McKernon, of New York, closed the discussion. He said that in listening to the discussion it occurred to him that they had fewer operative cases in children when a routine examination of the ears was made; the general practitioner should be taught to make such examinations of the ears in cases of infectious disease.

As Dr. Borden had stated, in cases of contagious type, and more particularly scarlet fever, there was a large number of them that gave no evidences at all of pain until after the damage had been done, or after a serious discharge. If these cases had received a daily examination in order to learn the condition of the ears, the aural condition would be discovered earlier than it was now in a large proportion of the cases. By making an early and free incision into the drum membrane, the number of operative cases would be greatly lessened.

Eight years ago Dr. McKernon said that he had a paper before the Section on Pediatrics, American Medical Association, and he spoke of the lack of pain in these aural complications, and all the members of that Section except two, one from Boston and one from New York, took exception to his statement; they said it was absolutely impossible to have such an involvement of the middle ear without pain sufficient to draw attention to the ear.

In reference to his own paper, Dr. McKernon thanked them for the kindly way they had received his preliminary report, and he said he hoped it would stimulate them to do this work more, or at least to try and help him in getting reports as to its practicability. He believed vaccine therapy had a certain value, especially in the repair of wounds. The method was used at first only in the hope that it would help in a rapid repair and save some of those usual deep indentations of the skin and the large sloughing which usually occurred during the healing process. In all of the cases he used the vaccines he said there was no question as to its value.

He did not believe in the use of a stock serum; when it was used, they were introducing something into the system about which they knew practically nothing. He had had no experience in its use.

Dr. Smith had asked if the use of the vaccine was harmless; Dr. McKernon replied that it was harmless; he had never seen any harmful results following its use.

In answer to Dr. Daly’s question in regard to the use of the vaccines prior to operation, he could not answer because they had not used it before operation.

A series of investigations was now under way in which they took pus from every case of acute type and they hoped to isolate an organism from which to make a definite vaccine from a particular patient; it was hoped that by the use of this vaccine they might prevent or abort future developments of the disease. This might be somewhat Utopian, but, on the other hand, it might not be. In his next report he hoped to be able to incorporate his later findings.
A NOTE ON THE AURAL MANIFESTATIONS OF MYXEDEMA.

By S. MacCUEN SMITH, M. D., Philadelphia.

My object in presenting this particular paper is not to offer anything especially new, but to again direct attention to the interdependence of all branches of medicine and surgery. In other words, those of us who confine our work to certain branches of the healing art are frequently aided, especially in our diagnosis, by the general physician, while on the other hand, the practitioner of general medicine is often the recipient of valuable help from the specialist in the recognition of systemic disease. To illustrate, in the first case of the series of three that have come to my notice, although the symptoms of myxedema were fairly pronounced, neither the attending physician (who advised the consultation because of a progressive defect in speech and hearing) nor myself recognized definitely the underlying systemic disease, which, however, was pointed out to us by an experienced internist.

Another case was brought to my notice on account of marked and progressive deafness, with distressing tinnitus aurium, while the third case came more especially on account of frequent nasal and oral hemorrhage, as well as progressive deafness. The symptoms of myxedema in both these latter cases were not very pronounced, but my experience with the first case led me to inquire very carefully into the history, which resulted in a suspicion that myxedema was the underlying factor. A further examination revealed absence of the thyroid, which confirmed the diagnosis.

In these two cases I was able to assist the attending physician in arriving at a proper diagnosis, and the application of the specific therapeutics of this disease resulted in a permanent alleviation not only of the characteristic myxedematous symptoms, but also of the secondary symptoms involving the ear, nose, and throat.

Aural manifestations complicating Bright's disease are now frequently recognized, and may occur so early that they are only secondary to the ophthalmic picture in diagnostic value. The
hemorrhagic infiltration into the tympanic mucosa, the failure to recognize high tones, the vertigo arising from degeneration of the labyrinthine nerve filaments, together with the progressive tinnitus and deafness, due, probably, to edema of the sheath of the auditory nerve, produce a picture or train of symptoms almost as characteristic as those seen in albuminuric retinitis, which, for want of a better name, may be termed nephritic otitis. Although I am not prepared to point out aural symptoms complicating myxedema as characteristic as those occurring during an attack of Bright’s disease, or even rheumatism or diabetes, at the same time the cases above mentioned will serve as an illustration of the importance of our giving constant and proper recognition to the fact that many of the ailments that we are called upon to treat are only local manifestations of a systemic disease.

Myxedema, like other conditions resulting from faulty metabolism, is often most insidious in its development, taking many months or in some cases even years, to produce a pronounced pathologic state or evoke symptoms that might lead to a proper diagnosis. This slow, destructive metamorphosis, which apparently does not yield to any line of treatment, has, no doubt, caused many physicians to prescribe thyroid extract in a purely experimental way, with surprise at the improvement resulting therefrom, especially in cases of impaired hearing, and in all probability this intelligent empiricism has been responsible for the so-called “thyroid treatment of deafness.”

We are all indebted, therefore, to the united labors of pathologists, physiologists and clinicians for the discovery of one of the greatest, most positive and definite therapeutic remedies that has been applied to the relief of suffering mankind, for where in all the range of physical infirmity is the picture more pathetic than that manifested in the physical and intellectual degeneration incident to myxedema?

The second case, that of a woman about fifty-two years of age, consulted me with her attending physician, complaining of progressive failure of hearing, severe tinnitus and much difficulty in swallowing. Her face, hands, arms, feet, and legs were moderately swollen, the skin being dry and desquamating. She suffered from declining mentality, headaches, and marked nervous irritability. Her tongue was considerably thickened. The entire auricle was swollen, being especially marked at the concha. Her voice was rough and rasping.
An examination of the membrana tympani revealed little or no change from the normal. There was, however, a distinct hyperemia of the tympanic cavity, which could be plainly seen through the translucent drumhead. Indeed, the exudate confined in the tympanic cavity reminded one of a case of hydrops ex vacuo.

The third case, a woman about fifty-six years of age, consulted me on account of a sudden complete deafness of the left ear, which, however, was secondary to a progressive loss of hearing, bilateral, extending over several months. During the first few weeks she had several attacks of bleeding from the nose and mouth. The tongue was thickened and protruded slightly. The tinnitus aurium, which had been progressive, was most annoying. The pharynx, uvula, soft palate, and larynx were edematous, the latter, no doubt, accounting for the rough, deep sounds of the voice. The condition of the extremities and skin was similar to that in the preceding case, both patients presenting evidence of well-advanced anaemia. The nervous phenomena were likewise similar to those of the other case. In this patient the membrana tympani of each ear was decidedly red and edematous, so much so, indeed, that I deemed it advisable to incise the same, which resulted in the evacuation of some sero-sanguineous fluid. It is needless to say that both of these cases promptly improved on the administration of thyroid extract, and have since remained entirely free from all symptoms incident to the myxedema. It has been necessary, however, for them to continue taking the thyroid.

The deafness and tinnitus aurium may be due to myxedematous thickening of the tympanic mucosa, or to the formation of myxedematous tissue at the base of the brain, where the eighth nerve is given off. In any event, the symptoms, both general and local, disappear as if by magic on the administration of thyroid extract.

Dr. Robert Pitfield, in the American Journal of the Medical Sciences, July, 1909, contributes an interesting history of two cases of myxedema, both of whom suffered from aural manifestations to a greater or less extent. One had deafening tinnitus and "all but total deafness." The other case, sixty-two years of age, married, was so deaf that the doctor had to shout in her ear, "but her mentality was dull and slow, and she suffered extremely from cold."

Dr. Pitfield says of one case that "she had a dull brain as well as dull hearing; indeed, her memory was so poor and perceptions
so slow that her daughter told me that she had to serve as brain and ears for her mother, and it quite wore her out to have to talk to her. Not only was her hearing bad, but she suffered from tinnitus to such an extent that she often summoned her family to answer the telephone when in reality no bell rang; she often heard pistol shots in her ears; she had hallucinations of sight, and frequently thought she saw people in her room when none were present.

"Dr. Wendell Reber examined her eyes, and he felt her poor hearing was due to poor air conduction and probably to some labyrinthine involvement. Myxedematous infiltration of the pharynx and Eustachian tube was probably the cause. Under two grains of thyroid extract three times a day her hearing was restored to the extent that she could take part in all conversation in her room in ordinary tones; her voice lost its raucous tone, and the scanning speech disappeared."

To summarize, the points of interest are that the patients suffered absolutely no pain in so far as their ears were concerned, notwithstanding that a sero-sanguineous fluid was evacuated in one case.

The sudden deafness in one case was probably due to the sero-sanguineous fluid in the tympanic cavity. Improvement in the hearing, however, was not shown until the administration of thyroid extract. The underlying cause of deafness, therefore, in each case, was probably a myxedematous thickening of the tympanic mucosa, or the formation of a myxedematous exudate at the base of the brain, or a mixed lesion in which both of these conditions were present.
DIRECT INSPECTION OF THE NASO-PHARYNX.

By PERCY FRIDENBERG, M. D., New York.

Among the most valuable innovations of modern laryngology we note the introduction of methods and apparatus which enable us to examine, without the intervening mirror and the incidental technical difficulties of reflected light, the middle, and even parts of the lower, respiratory tract. This improvement and simplification of examination methods, particularly as exemplified in tracheoscopy and bronchoscopy has promptly resulted in a decided advance in the diagnosis, and especially the treatment of injuries of the air passages, and first of all, the detection and removal of foreign bodies from the larynx, trachea, and larger bronchi. There is no doubt that this advance in practical surgery was immediately and directly dependent on the introduction of the bronchoscope by Killian, Jackson, and others, and we may, with confidence, expect a similar gain in the recognition, diagnosis, and treatment of non-traumatic affections of this important tract, once its direct inspection has become familiar to the generality of the profession. A similarly direct and accurate method of inspection has been wanting for the examination of the naso-pharynx, and the lack of a suitable, simple, and handy instrument has been the more keenly felt, as the routine examination, in some way or other, of the throats—which means also the naso-pharynx of children—has become one of the essentials in health inspection of schools and other institutions.

The diagnosis of "adenoids" and of the more common affections of the post-nares was formerly made with the mirror or by digital palpation. Neither method was accurate, both were hurried, and the latter, at least, was objectionable from the standpoint of asepsis and the comfort of the patient. The invention, by Hays, of an instrument constructed on the principle of the cystoscope enables us, at last, to examine the naso-pharynx as deliberately, and it is to be hoped as carefully, as we do the oral cavity.

The result in this field, too, I am convinced, will be a decided advance in our knowledge of the normal, no less than of the morbid conditions of the post-nares, and with it there will come a
recognition of diseased states of the pharyngeal orifice of the Eustachian tube, of the fossae of Rosenmuller, and of the pharyngeal wall itself. This is at present little better than a terra incognita. Our knowledge of the affections of the naso-pharynx, especially as they influence the middle ear, is rudimentary, hazy, and to a large extent based on tradition, and on theories which have little or nothing to support them in the way of actual observation. As I stated in a recent publication: *One of the advantages of the pharyngoscope is that it allows the routine examination of a large number of cases and thus gives us much needed data as to individual variations. This is the first step in all finer diagnosis. I have been using this instrument daily in my office for the last six months, and, as I said in demonstrating its use before the American Otological Association, at Boston, a little practice enables us to introduce it with as much ease as, and no more discomfort than a tongue depressor. Very young children and infants may have to be examined in the act of crying, when gagging spontaneously ceases, momentarily, allowing a perfect view of the parts. The application of remedies, the manipulation of instruments, and the passing of the Eustachian catheter are rendered much more exact and effectual if controlled by direct inspection through the pharyngoscope. I could not well do without it, and firmly believe it is to be of ever greater value to the laryngologist.

MEETING OF THE MIDDLE SECTION, HELD IN DETROIT, MICHIGAN, FEBRUARY 22, 1910, UNDER THE CHAIRMANSHIP OF DR. HENRY J. HARTZ, OF EAST DETROIT.

A PLEA FOR CONSERVATIVE SURGERY IN THE TREATMENT OF NASAL SARCOMA.

By J. PRICE BROWN, M.D., Toronto, Ontario.

When a case of nasal sarcoma is referred to a specialist or general surgeon for operation, the question may be asked, does he always fully consider the responsibility devolving upon him in choosing his method of affording relief? Is it not the custom to look upon the prospective operation simply on the broad basis of general surgery, bound by the same principles that would guide the removal of the sarcoma from any other part of the body?

Let us take a typical case, operable, but hopeless without operation. The surgeon simply proceeds to remove the growth in the most approved manner, taking away as wide a margin of sound tissue as the conditions will allow, controlling hemorrhage to the best of his ability, conserving the patient's vital forces and doing the work in a scientific and skillful manner.

So far as the work itself is concerned, it may justly be pronounced a brilliant operation. The patient did not bleed to death. The incised tissues were excellently adjusted. But with deformed visage and sacrifice of hard palate or both combined, the patient is put to bed, and, with thankful heart, waits patiently for the result. The parts will heal and for a few weeks or perhaps months, now and then for years, and occasionally for life, there will be no return. But in an exceedingly large majority of cases the sarcoma quickly develops again. The large first ablation has limited the field for the second, and, if again attempted, the benefit, at best, is only for a brief period and then the patient succumbs to the inevitable.

I do not think that this is an exaggerated picture. The literature in our specialty is full of the history of these cases. It is said by some that sarcoma of the nose is not so fatal as when
located in other parts of the body. Upon what is this statement founded? A few isolated instances are recorded in which the sarcoma spontaneously disappeared, and one or two others in which, after operation, it has invaded some other region by metastasis, forsaking the original site. Dr. Levy, of Denver, records one such case. But these exceptions are only limited in number. In every instance that has passed under my observation, when the tumor has been unmolested, there has been progressive, uninterrupted growth, and with the increase in size, there has been steady advance along the line of accompanying symptoms.

Several years ago when gathering material for a paper upon nasal sarcoma, I received replies to a circular letter upon the subject from a large number of leading men in our specialty. The total number of new cases reported by forty men was about one hundred and fifty. Of these not one was reported as recovering without operation, nor one as a subject of metastasis. About one hundred were represented as inoperable. These all died. The remaining fifty-one were all operated on by the usual methods, resulting in thirty-eight deaths and thirteen recoveries. The recovery meaning that the patient, to the best knowledge of the surgeon, was still alive at periods varying from a few months to ten years after operation.

One fact must not be lost sight of in considering these cases. While nasal symptoms was the predominant feature in all, the antrum in many was likewise affected, although in many others the disease was confined entirely to the nose and naso-pharynx.

Under such conditions and with such results, is it not well to reconsider our ground? With such an enormous fatality, is it in the best interests of our patients, or in the best interests of scientific surgery to continue to look upon the knife as the only instrument with which we can cope with this disease?

When treating lupus of the nose, which is certainly a surgical disease, we gladly submit our patients to the prolonged and oft repeated applications of blue-violet and ultra-violet rays, the x-ray tube and radium; although the disease is external and readily reached by the surgeon’s knife.

In tuberculosis of the nose, the use of the Finsen light, the leukodescent lamp, or some other radiant energy are beginning to take the place of the old style curette and application of arsenical paste.
But in sarcoma of the nose, originating as it usually does at the back end of the nasal passage, near the junction of the post-naris with the naso-pharyngeal vault, nearly two inches from the outside world, and separated from the mouth by the hard palate, we still pursue old lines and use old time implements of war, notwithstanding the heavy mortality which attends our efforts.

Only yesterday I received a letter from a well known London laryngologist, re-affirming the opinion that “the only treatment is a thorough operation.”

Let us examine the condition for a moment. The site of formation of the sarcoma is at the back end of a bony box situated in the middle of the face and below the floor of the skull. Although this box is fragile and split in two by a bony wall, yet each half is abundantly provided with spongy tissues, which are filled to repletion with capillaries and blood vessels, glands and lymphatic channels—more abundantly, probably, in proportion to its size than any other region of the body. In this tissue, whatever may be the cause, the sarcoma has its origin, and taking on the attributes, incident to its position, it grows rapidly, fills itself with blood spaces and bleeds easily. When the surgeon, becoming alarmed by its size, proceeds to operate, he not only removes the neoplasm but the bony tissues that surround it, in order to take away every vestige of the disease. At the same time the lymphatic channels and blood spaces, so freely opened by the operation, are ready to carry any germs that may remain to a deeper habitation; and the early recurrence of the disease in so many cases proves the correctness of this conclusion.

Realizing that the prognosis in the surgical treatment of nasal sarcoma was so hopeless, I concluded sixteen years ago to depart from the old lines and give the electro-cautery method a fair trial when I had the opportunity. The result in my first case was very satisfactory—the man recovered. There has been no return in fifteen years and he is living and well today. Two succeeding cases were treated in a similar manner with equally good results. In one there has been no return in eight years, nor in the other in two years eleven months. I have continued this method of treatment from then until now. The concrete reports upon all my cases are, I believe, in the hands of every member of our society. Hence I shall not speak of them again except to add a further report in the last two cases.
Before doing so, however, I would like, with your permission, to say a word or two about the work done by other men along similar lines.

In the January issue of the New York Medical Journal, Dr. Gillette of Toledo discusses the use of the electro-cautery in the treatment of carcinoma uteri, dealing at length with the methods of Dr. John Byrne, the noted Gynaecologist of Brooklyn. The latter reports the treatment of three hundred and sixty-seven cases of uterine carcinoma by electro-cautery operations with very successful results, in which he states that he has never known an instance in which recurrence took place in the part from which the malignant growth had been previously removed by means of the electro-cautery.

Dr. Gillette, himself, after detailing his own experience in the use of the electro-cautery in the treatment of carcinoma uteri, makes the following statement:

"In my opinion the recovery is usually prompt and the mortality low. The pain and shock are surprisingly little. I am fully convinced that the cautery exerts a most beneficial influence over cancer of the uterus, an influence greater than any that can be obtained by the knife alone."

It may be asked what bearing can carcinoma of the uterus have upon sarcoma of the nose? Simply the all sufficient one, that carcinoma is the type of malignancy that usually affects the one organ, and sarcoma the type of malignancy that usually affects the other. If the electro-cautery will materially benefit the more serious disease when located within the uterus, the same electro-cautery should equally benefit the less serious disease when located within the nose.

But even in the treatment of sarcoma by electro-cautery, converts to a good cause are coming in. Three years ago, a laryngologist of Glasgow Infirmary, I am sorry to say I have forgotten his name, reported a case of sarcoma of the nose that he had treated successfully by electro-cautery in which there was no relapse. One year ago Dr. Ross of Montreal, at the annual meeting of our Society, read a paper upon a case that he had successfully treated, quoting one of my papers in support of the plan he had adopted. One year from the completion of treatment there was no return.

One other reference I think I am entitled to make. In my last paper, issued in January, brief excerpts from different works on Laryngology appeared, the last one being taken from Packard's
new book. In it he says: "The prognosis of sarcoma of the nose is extremely bad. If removed it has a strong tendency to early recurrence. The only satisfactory treatment is thorough extirpation of the neoplasm as early as possible. For this purpose it is generally necessary to perform an external operation; intranasal operations not affording sufficient room for thorough removal."

Now he writes me under date of January 21st, in response to a pamphlet received: "I have, however, one case under observation at the present time in which I am pursuing very much the course of treatment that you outline in your third case, and am hopeful of a successful result."

Now about my last two cases already reported as Nos. 6 and 7. No. 6, Mr. S., returned to the city for examination on Christmas eve, three and a half months after the last cauterization. He felt and looked well, weighed one hundred and seventy-three pounds, the heaviest in his life, could breathe well through either nostril. But on examination I found the upper half of the back third of the right nasal passage filled with new growth. Under cocaine and adrenalin, I again resorted to the cauterizer. From then on until the first of this month, I burned the growth twenty times, removing it piece by piece until it was all gone. Let me give you an idea of his physical condition. On the fifth day after his arrival, I did the fourth operation. Half an hour later he left the office and walked a mile to apply for the position of city street car conductor. There were four other applicants. My man was entirely unknown and without references, yet they appointed him at once over the heads of his competitors. From then until now he has worked every day full time, Sundays included. I have him under observation and purpose touching, with the live wire, any suspicious spots that may yet develop. I believe, in his case, that the prognosis is excellent if I can retain control.

Case 7. Mr. W. This man returned to me three weeks ago. Like Mr. S. he was the picture of vigorous health; but at my request his physician had examined him again. found that the disease was returning, and at once sent him back for treatment. The condition was very similar to that of No. 6 and the subsequent treatment almost parallel; but the improvement has not been so encouraging. He has less staying power and the parts are most sensitive. I had to double the strength of cocaine and then double again, now using 20% Sol. There is more hemorrhage during operation than in Mr. S.'s case and the region of Meckel's
ganglion not only indicates enlargement but is also acutely sensitive. Notwithstanding all this, the growth is less than a third the size it presented three weeks ago, but there is some bony enlargement of the middle turbinal, and I am thinking seriously of removing it entirely under a general anaesthetic. The chief objection to this would be the exceedingly severe hemorrhage that would follow and the opening up of avenues for autoinfection as a result of the operation. The subsequent treatment would, of course, be on cauterY lines. This case, although not hopeless, is less encouraging than one would desire; and I purpose reporting again upon it at a later date.
WIDENING THE DENTAL ARCHES IN NASAL STENOSIS, ITS RESULTS AND POSSIBILITIES.

NELSON M. BLACK, M.D., Milwaukee, Wis.

SEPTAL DEFORMITIES.

Practically all rhinologists ascribe to irregularities of the upper maxilla an important place among the etiologic factors of septal deformities; still very few select correction of these irregularities as a means of correcting the septal deviations.

Of the rhinologists who have had ocular proof of the results obtained by spreading the dental arch in what seemed to be typical cases of deflected septa, a few have become converts; some have admitted its possibilities in selected cases; while others have said operative procedure upon the deformed septum itself was the only method.

The results obtained in the cases referred to Dr. G. V. I. Brown have without exception shown marked improvement; naturally some more than others, for reasons to be mentioned later.

Dr. D. B. Kyle rightly says that of the many operations for the correction of septal deflections, each was suggested by its author for a particular variety of deflection, and that much discussion and confusion has been caused by the fact that other operators adopt the methods for varieties of deflection to which they are not adapted. The results being unsatisfactory the method is condemned.

The varieties of septal deflection are infinite, and although some authors attempt a classification, no two are alike.

From my understanding the same may be said of dental and jaw irregularities. As a result no definite rules can be laid down as to treatment, each case being a law unto itself.

Objects to Be Obtained in Correcting Septal Deflections.

The objects to be obtained in treatment of septal deflection are:
First, to establish free nasal breathing; second, to restore the septum to the median line with its surfaces as smooth and even as possible; third, to equalize the space on either side of the septum; fourth, to leave the mucous covering of the nasal interior as little injured as possible, so that its functions may not be impaired.
The first thought that comes to one on looking into a nose having a septum with a marked deflection is that more space is needed, and that something must be removed to obtain this. There is no doubt that there is seemingly superfluous tissue in the largest percentage of these cases when compared to the nasal space in which they are found, but the fact that the nasal space is much smaller than it should be is, as a rule, not taken into consideration.

The removal of tissue such as turbinates and thickened portions of the septum in over-crowded nares, is beneficial but does not correct the deformity of the septum. In many instances, however, the removal of too much tissue (which is a fault with many operators) is a real source of danger. It would seem far better to increase the size of the nasal fossae first, and then proceed to the removal of any superfluous tissue should it be found necessary.

*This can be accomplished*, but so far as my knowledge goes *only* by widening the arch of the superior maxilla. This procedure, to be effective in enlarging the base of the nares, **MUST BE ESSENTIALLY DIFFERENT FROM THE ORDINARY EXPANSION FOR THE REGULATION OF THE TEETH IN ABNORMAL POSITION**.

Several dentists whom patients have selected to do this work have attempted to widen the upper maxilla by a slow torturing process of expansion, which exhausted the patience of the individual long before the desired results were accomplished.

Dr. G. V. I. Brown accomplished this result 11 years ago in the case which first started my investigations along this line. He is the only one with whom I so far have personally come in contact who succeeds in obtaining the results desired and absolutely without discomfort to the patient and in an incredibly short time. We have differed to a certain extent as to how the result is brought about. Dr. Brown believes it is produced entirely by separation of the median palatal suture, which is manifested by the increased space between the middle incisors.

My theory is that in addition to this separation there is a real lowering of the vault, the result of an outward tilting of the alveoli. I cannot see how the septum could be so materially straightened, which is the case in practically every instance, unless the vault is lowered and allows the septum to straighten by its own resiliency. However, when one considers the very small amount of vertical shortening found in a badly deflected
septum, it is necessary to realize that but little space is required within which it may become straight. The ever present resiliency and elasticity of a deviated septum will tend to cause straightening if the pressure at the base of the septum is relieved.

This relief of pressure occurs when the palatal suture is opened in the process of widening the superior maxilla, as evidenced by separation of the incisors. There is, however, another class of arches with deviated septa where beneficial results are obtained, in which some other movement must take place, as in this class there is no visible separation of the incisors.

What does take place must be either a separation of the median suture back of the premaxilla, or else, (and Dr. Brown says he is afraid he must concede to the latter) an actual lowering of the vault occurs. In either case 2 or 3 mm. increase of vertical space would result, which is all the septum requires within which to straighten itself.

WHY THE OLDER OPERATIONS WERE NOT EFFECTIVE IN SEPTAL DEFORMITIES WITH DENTAL IRREGULARITIES.

Before the introduction of the submucous resection for deflected septa, the various operative procedures gave but indifferent results, and in many cases there was a return of the deformity. This was due largely to the fact that the main etiologic cause remained—that is, some dental or jaw irregularity—with lessened resistance in the operated septum, the result being a consequent tendency for the deformity to return. There was no increase in width of the nasal fossae; the transmission of the force of mastication through the irregular superior maxilla and septum helped to maintain the deformity and to keep up the congestion in the nose; the result being that the turbinal bodies did not tend to diminish in size.

This latter feature is also active in the nose after submucous resection, as the dental irregularity still remains.

THE AGE AT WHICH TO WIDEN THE DENTAL ARCH FOR DEFORMED SEPTA ACCOMPANIED BY DENTAL IRREGULARITIES.

The earliest deflected septum which has been reported is by Bishop in a child of five years and nine months. Most authorities state that its occurrence is rare under six or seven years of age.

Dr. Kyle, referring to mouth breathing and its resultant developmental deformities, says, that unless perfect nasal breathing is established early in life, that is, before the fifth or sixth year, or not later than the seventh, the bony cartilaginous frame-
work becomes so firm that little can be done towards increasing the nasal space for breathing, and the individual will of necessity become a mouth breather for life.

Taking the rhinologic standpoint, this statement seems reasonable, but from an orthodontal viewpoint the situation changes. Gray states:

The superior maxilla commences to ossify at a very early period, *but the suture* between the palate processes persists until middle life.

This being the case, the jaw may be widened at any time before this.

The first patient referred to Dr. Brown for treatment in 1899 was 33 years of age. She obtained a perfect result.

**RESULTS OF SPREADING PALATAL ARCH IN DEFLECTED SEPTA.**

Expansion of the maxilla relieves the pressure on the septum which tends to straighten itself. There is an actual increase in width of the base of the nose; the breathing space, being enlarged, allows the nose to functionate. The volume of air inhaled being increased, the static congestion disappears with a reduction in the size of the turbinate bodies, resulting in a further increase in nasal space.

This state of affairs should be allowed to continue until no further increase in nasal space is noticed and the turbinated bodies have decreased in size as much as possible before deciding if any tissue should be removed.

The patient is as a rule so well satisfied with the increased breathing space and relief from the disagreeable symptoms produced by the stenosis and congestion, that he considers operative procedures in the nose unnecessary. This, however, is not always so. The removal of a spur, a portion of an hypertrophied turbinate body, is in some instances required. Very rarely I have seen cases where a submucous resection of a portion of the cartilaginous part of the septum would have improved the appearance of the inside of the nose, but the patients would not submit to an operation in their improved state.

**RESULTS OF SPREADING THE PALATAL ARCH IN CHILDREN WITH BEGINNING NASAL STENOSIS.**

The improvement physically in children with beginning nasal stenosis is very marked. This has been referred to by Dr. Brown, i.e., "Especially among growing children treated by this method has there been marked physical improvement, tendency to growth
WIDENING DENTAL ARCHES IN NASAL STENOSIS.

in height as well as general development and increase in weight. Many of these had previously been unable to attend school regularly because of the tendency of nose, throat and bronchial affections. Nervousness was almost invariably very greatly relieved, and this, it is believed, for two reasons: 1, the well understood results from the improvement in the breathing apparatus with the general healthfulness to be expected from better areation and freedom from diseased nasal secretions, and 2, the relief of that condition to which Kiernan has called attention, caused by crowding together of the dental arches with tendency to nerve irritation. This condition quite frequently manifests itself, not only in increased nervousness of a general character, but also in the development of neurotic tendencies leading to chorea, epilepsy and other similar affections, which in some instances at least might perhaps have been averted if these patients could have been tided over critical periods in their development. This has been recognized by Dr. Talbot as one of the periods of stress. Certainly it is a curious fact that even with the disadvantage of having the appliance in their months and the bar across the palate, children who are subject to such pathologic conditions almost immediately become less nervous, have increased appetites, and general development goes forward almost from the very first few days after pressure has begun to be exerted.”

RESULTS OF WIDENING THE SUPERIOR MAXILLA IN CASES OF CONSTRUCTED NAORES WITHOUT A PATHOLOGIC OBSTRUCTIVE LESION IN THE NOSE.

Patients are frequently seen who say they have never breathed well through the nose. The conditions found and the results obtained are well described by Dr. Dean, who is quoted:

“Examination of the nose shows turbinates normal in size and structure, septum slightly deflected, as is usually the case in all noses, or markedly deviated, no exostoses, but the inferior turbinates pressing against the septum, or against the floor of the nose, or usually both, which is, of course, an abnormal condition. Adenoids may not be present, but their removal does not give the usual relief. The palatal arch is constricted, and, of course, there are malpositions of the teeth.

“I have patients fifty years of age with the condition above described who have never had proper nasal respiration, and in whose cases no operative procedures on the nose is indicated. In many cases like these, turbinates have been entirely removed in the effort to secure breathing space. This procedure, because of
its serious sequela, is never indicated except for diseased turbinates. The respiratory function of the nose may be lost by such a procedure. Even if performed, it does not give good results as far as the breathing is concerned, because the anterior nares are so slit that in respiratory effort the alae of the nose are brought against the septum, and nasal occlusion, in part at least, produced.

"If the nose is constricted because of a narrowing of its walls, what is rational therapy? The only answer possible is this: The nasal walls should be separated and the cavities thus widened. This can be accomplished in only one way, and that is by widening the palatal arch. That the nose is widened by this procedure we all know. We have all had patients who have told us that widening the arch has improved nasal respiration."

INTRA-NASAL MEASUREMENTS BEFORE AND AFTER WIDENING THE PALATAL ARCH IN A GREEN SKULL.

The result of spreading the superior dental arch in a green skull which Dr. Brown and I did at Dr. Dean’s request is shown in the following measurements:

"1. Distance across the posterior nares just posterior to the inferior turbinates: before widening 22 mm.; after widening 34 mm.

"2. Distance across the posterior nares just above the posterior end of the middle turbinates: before widening 23 mm.; after widening 24.5 mm.

"3. Distance from the vomer to the outer wall of the nose in the posterior nares half way from the posterior end of the inferior turbinate to the floor of the nose on the left side: before widening 17 mm.; after widening 18.5 mm.

"4. Same measurements on the right side: before widening 24 mm.; after widening 24 mm.

"5. Distance between the anterior attachment of the inferior turbinate in inferior portion of the middle meatus of the same point on the opposite side: before widening 23 mm.; after widening 25 mm.

"6. Distance between vomer and inferior turbinate at narrowest part of the inferior meatus, left: before widening 6 mm.; after widening 7 mm.

"7. Same measurements on the right side: before widening 8 mm.; after widening 7 mm."
POSSIBILITIES OF WIDENING THE PALATAL ARCH.

Dr. Bogue has outlined the possibilities that may result from the spreading of the upper maxillary arch:

"If irregularities are found among deciduous teeth, irregularities of the same nature, but still more pronounced, may always be expected in the permanent teeth which are to follow these deciduous teeth. If no perceptible irregularities of the deciduous teeth exist, and at five and one-half or six years no separation of the deciduous incisors has taken place, we are certain that development of the arch of permanent teeth has been arrested and that there will be irregularity of the front teeth, because the permanent teeth being larger than the deciduous teeth need a larger arch in which to erupt."

Such an arrest of development is shown in the accompanying plate.

"The early diagnosis of cases of irregularity is readily made if one carefully notices the articulation of the deciduous molars. In normal cases the articulation is always correct; that is, the anterior cusp of the lower second deciduous molar articulates forward of the corresponding deciduous molar above, and the upper molar is astride the buccal row of cusps of the lower molars.

"Whenever these upper and lower deciduous molars articulate in any other way than this, there is sure to be irregularity in the permanent teeth if they are allowed to develop without interference. The reason for this is, as has already been shown, that
the crown of the permanent teeth is embraced by the roots of the deciduous molar.

"If the first permanent molars, which erupt immediately posterior to and in contact with the second deciduous molars, are not properly articulated, it will be impossible that the other grinding teeth should be. If the upper arch is abnormally small, we may be certain that there will not be room for the anterior permanent teeth unless an enlargement of the arch is resorted to.

"If such enlargement takes place sufficiently early for the roots of the permanent teeth to be formed after their crowns shall have been drawn into correct positions, there will never be irregularities in the positions of these teeth, and, it follows, of course, that they will stay where they belong.

"On the proper formation of the palatine arch and the various sinuses depends the resonance and carrying qualities of the voice, and on the accurate formation of the dental arches and the correct occlusion of the teeth depends the power of clear and distinct enunciation and the power of thorough mastication which means insalivation. This is the first step in the digestive process important to the health and strength of the individual. It has only recently become known that impending defects of the kind here mentioned may be discovered in early childhood and may be remedied while the bones are in a formative state and the teeth are in process of development.

"My conclusion is that in those cases in which a rapid spreading of the upper maxillary is applicable—that is, in which permanent teeth are sufficiently developed and erupted for the operator to be able to attach his apparatus firmly and to apply the necessary force promptly—that method is distinctly preferable for the correction of the class of nasal stenosis that has been under discussion.

"When, however, the difficulty is recognized early enough to have it corrected by means of apparatus attached to the temporary teeth, I have found that the latter method, being to a great extent preventive, becomes distinctly preferable.

"When slight pressure is brought to bear in these regions to overcome the 'restrictions in the region of the palate and alveolar structures,' it is in the direction of normality that the pressure is applied, hence the resumption of the proper functions of the parts is soon brought about, and with the performance of function comes development, and it comes so easily in many cases
that we hardly realize that the deformity has been overcome until we see before us a normal condition."

Dr. Brown has found little or no difficulty with the great majority of cases in placing the apparatus for rapid expansion upon the temporary teeth and obtaining a satisfactory result in from ten days to three weeks' time, which is a decided advantage over wearing an apparatus for seven months, as in the case of Dr. Bogue's illustrated above. However, that is a question which the oral surgeons must decide.

The thought has occurred to all of you before now that many cases of marked septal deviation have come under your observation in which the individual seems to have a perfect occlusion and there appears to exist no dental irregularity.

The question arises as to what is the proper course to pursue.

Through the discovery, by Dr. I. B. Davenport, of what constitutes a normal dental arch, and Dr. Brown's discovery of the mathematical relation existing between the width of the permanent upper incisors and the size and shape of the entire arch of the upper maxilla we have a means of determining whether or not there does exist any dental irregularity or deformity. Dr. Hawley's application, Dr. Brown's formula to orthodontia, results in being given the width of one upper central incisor, the approximate shape and size of the arch to which the tooth is a member may be outlined upon paper so accurately that one may proceed to the alteration of any arch according to such a plan with absolute confidence.

Such conditions existing, it would seem best for us as rhinologists to determine whether or not we are dealing with an individual with a normal arch (which Davenport determined was a rare occurrence in civilized communities) or one in which there has been an arrest in development, before attempting any operative interference in the nose.

The question to be settled appears to be this: given a case in which we have insufficient space for proper nasal breathing with an arch with seemingly perfect occlusion is it our duty, and have we the right, to alter the shape of the maxillae and rearrange the occlusion to allow the nose to properly function?

DISCUSSION.

Milton T. Watson, D. D. S., Detroit. Doctor Brown deserves great credit for the effort he has made to show you tangible evidence of the wisdom of his conclusions and, so far as the effects of orthodontic treatment are concerned, I endorse all that he has said. However, the
short cut he suggests can never produce the profound results, in the average case, that will follow treatment carried on along the well recognized lines which have been almost universally accepted by orthodontists. The clinical evidence of improvement of intra-nasal conditions, where such trouble is associated with actual lack of development of the bony structure of the internal face, is ot the most common occurrence in orthodontic practice. In our daily work, however, we must not fail to recognize the evil influence of pathological conditions of the soft tissues anywhere within the upper respiratory tract, and to insist upon the proper treatment of these conditions—preferably in advance of the orthodontic procedure.

The wisdom of very early interference where a lack of bony development is in evidence, is too well understood to require further discussion except, possibly, to say that we find it entirely practicable to deal with children of a very tender age, two or three years old not being too young to begin, if the retarded development is at all marked. In this connection, it is also interesting to note that decided improvement in the nasal capacity of patients fourteen or fifteen years of age is not at all unusual. With these older patients I have frequently increased all the dimensions of the dental arch to a marked degree, and have seen an improvement in the breathing capacity follow, which was as clearly evident as was the change within the oral cavity. This change, however, was not the result of a violent separation of the maxillary suture, but was due to a natural development which followed the usual plan of treatment.

In co-operation with the rhinologist I have usually met with satisfactory results, so far as developing the breathing capacity of young patients is concerned, by a mild but long continued stimulation. I have on the other hand had some disappointing results with children who were still comparatively young—nine or ten years of age—but who had been confirmed mouth breathers long enough to have acquired the "habit" and who would relapse into the old way again as soon as the intermaxillary elastics (which are worn to correct the occlusion of the teeth) were removed and this, too, in spite of the fact that a practically normal nasal capacity had apparently been established. The real difficulty, to my mind, is to keep the upper respiratory tract free from irritating influences and thus prevent the patient from acquiring abnormal breathing habits, or to overcome these habits where they already exist and not, as one would infer from the paper, because of the difficulty of establishing a renewal of developmental activity.

Let me make myself clear—I quite agree with the doctor that the maxillary suture can be opened and without special difficulty, from the operator's point of view, but I want to go on record as being opposed—most emphatically—to such heroic methods as he suggests when dealing with young children. In the natural unhindered development of the structures of the internal face there is never any such almost volcanic activity as he recommends. It is a matter of common knowledge that gratifying results have usually been attained when we have more nearly followed Nature's plan and have allowed time to be a conspicuous factor.

It is a fact, which you gentlemen well understand, that comparatively mild forms of stimulation—such as normal breathing, the act of mastication, and the activity resulting from the eruption of the teeth—afford all the stimulation necessary to produce normal development in this region unless some marked disturbing influence comes into play, and interferes with these functions. It is, therefore, my contention that we are not called upon to adopt heroic orthodontic treatment, but simply to overcome, so far as possible, pathological conditions that disturb these normal functions, and then by mild mechanical methods, continued for a considerable length of time, produce a degree of stimulation only a little greater than that produced by the normal functions, when vigorously active, and continue this in connection with other
corrective measures until satisfactory development and occlusion results.

It seems rather inconsistent for anyone to believe that the means usually employed in orthodontic practice simply cause an absorption of alveolar process around the teeth, and a redeposit about them in their new position, with little influence upon the maxilla proper. It is, as a matter of fact, inconceivable that a stimulating influence which produces such marked changes in the dental arch stops with the alveolar process—in fact, observation forces the conclusion that this influence extends to all adjacent bones—and that you can no more locate its limit than you can locate the point at which the alveolar process stops and the maxilla proper begins. The disappearance, soon after orthodontic interference, of some disturbances of vision which are associated with restricted bony development, would seem to demonstrate the far-reaching influence of the stimulation thus produced. In addition to this it can be taken for granted that nature never builds a normal dental arch on a miniature maxilla, and we need have no fear of establishing such an incongruous condition.

I so thoroughly believe in the milder methods of stimulation that I am now keeping patients under active treatment from twice to three times as long as I did but a few years ago. This is a point which has received much consideration recently by the members of the American Society of Orthodontists, and it is noteworthy that the more experienced men all agree that the slower treatment produces more satisfactory results from every point of view.

The relationship and interdependence between the development of the nose, mouth, jaws and teeth, which Doctor Brown recognizes and especially speaks of, leads naturally to the conclusion that any process which induces a normal development of any considerable portion of this region must, in time, react most favorably upon the remaining area, and hundreds of cases responding favorably to such treatment would seem to prove it.

It is difficult to discuss the comparative merits of the method of widening an arch recommended by Doctor Brown and the methods usually employed by orthodontists, without going into technical details which would be out of place before this society. It will, however, be of interest for you to know that we meet with many cases where the evil influences of retarded development are much more in evidence on one side of the jaw than on the other and we feel that it is a matter of importance in these cases, to bring about a more profound change on the affected side, which it is entirely possible to do by the methods usually employed and which Doctor Brown's appliance will not do.

As a matter of fact, Doctor Brown has discussed but one phase of the work, namely, the widening of the arch, that must necessarily receive consideration at the hands of the orthodontist, and if it is the most simple of any of the extended changes we are required to make. It would not shorten the period of time during which most cases have to be under observation, if we were always to widen the arch rapidly, instead of slowly, for all the more tedious details would still require the same attention, if we are to bring about an occlusion of the teeth that will be permanent. Let it be understood that all I have said up to this point refers to young children. In dealing with adult patients the actual separation of the maxillary suture offers the only probable solution of the question so far as orthodontic interference is concerned for, of course, with these patients we cannot expect to produce any profound developmental changes. In my own experience, however, the opening of the maxillary suture for adult patients is not the simple procedure outlined by the essayist. This point is now conceded by some men who formerly advocated radical separation of the suture instead of the usual methods employed by orthodontists. Doctor Brown's experiment on the green skull has, to my mind at least, no important bearing on the subject, for no other result than the one shown could be expected except in the living subject.
I want to briefly call your attention to a plan now largely in use by orthodontists—for correcting a type of mal-occlusion which at some time in its history is always associated with abnormal breathing—which has the distinct advantage of inducing a closure of the mouth during treatment, thus stimulating the habit of normal breathing and giving to the patient all the advantages that naturally follow in the wake of functions properly performed. This same method in a simplified and less conspicuous form is worn during the long period of retention of the teeth which must always follow extended orthodontic measures.

We are often asked how intra-nasal development is brought about and how a deflected septum can be influenced, and whether or not the crest of the dome of the arch is actually lowered by the means employed. In answer let us recall for a moment the enormous descent of the lower half of the face in a normally developing child, and then try to realize the changes that naturally follow the restoration of normal functions and normal development, and it will be clear at once that there is not only a descent of the dome of the arch but rather of the entire region. This, I believe, is the natural and logical result of renewed developmental activity, and is much more reasonable than the idea that the dome is lowered in its immediate relation to the occlusal plane of the teeth.

There seems to be some reason for believing that in certain sections of the country one type of mal-occlusion of the teeth prevails, and in other sections some other type will be more common. This may, in a measure, explain why Doctor Brown dwells so upon the one orthodontic procedure of widening the arch. In this region, however, in harmony in the mesio-distal relation of one jaw to the other is a most complication and absolutely must be corrected before a normal development, accompanied by normal breathing, can be hoped for. In going over by own collection of models, the percentage of cases that could possibly be successfully handled by a mere widening of the arches is extremely small.

The most perplexing question in connection with this subject is, of course, the problem of dealing with the great number of people who cannot afford the expense incident to the long course of treatment which most of us believe offers the only means of really successful treatment. I anticipate that the solution of this problem which I shall offer you may, at this time, seem quite as radical as did a statement I made before a dental convention some nine years ago, when I stated that the extraction of permanent teeth from the mouths of children, and the premature loss of the deciduous teeth, were conspicuous factors in rendering people more susceptible to tuberculosis. It is now generally recognized, however, that a markedly lessened breathing capacity is in evidence in these cases because the jaws and nasal spaces do not, usually, develop to a normal size unless all the teeth remain in place until the individual is fully developed and no one, I think, questions the fact that subnormal breathing lessens ones resistance, especially to throat and lung infection.

You gentlemen, who recognize the truth of the above statement, will agree that it is highly important for us to educate people—the common people—to preserve their teeth, both deciduous and permanent as a preventive measure. To relieve those who are already sufferers we must induce philanthropists to endow hospitals for the exclusive use of rhinologists and orthodontists—where post graduate students, under competent instructors, will give their services to the poor and where only a small charge will be made to those of limited means.

Dr. H. W. Loeb, St. Louis. Mr. Chairman and gentlemen: After listening to the papers of Dr. Brown and Dr. Black, the rhinologist is very apt to wonder if perhaps we have been too active in adopting the wonderfully easy septal submucous resection. They have told us of a method of straightening the septum by opening the dental arch.
I would like to ask some questions. Does the widening of the dental arch change the occlusion? What about the permanence of the results? Will the conditions remain? What about deflections where the median incisors are already separated? How about anterior deflections that are extreme, perhaps resulting from accident?

Dr. Willis S. Anderson, of Detroit, called attention to some of the reasons why we did not get good results in some cases following operations for the relief of nasal obstruction. They were, first, an abnormal arching forward of the vertebral column, making the anteroposterior diameter of the nasopharynx small; second, high arched palate, with or without a narrow superior maxilla; third, irregularly placed teeth; and fourth, an abnormally narrow nose. In the cases with any one of the above named conditions the nasal breathing was not always satisfactory after our operations. If by widening the nasal maxilla, as done by Dr. Brown, we can gain additional space, it will be a great help in certain cases.

It will also add greatly to its value if the method allows us to accomplish our object in a short space of time; heretofore, most of the methods suggested by Orthodontists have taken so much time that it was not within the reach of the large majority of our patients. We would all welcome a simpler and quicker method.

Dr. Anderson exhibited a patient, 32 years old, who had marked nasal obstruction following a severe injury to the nose when he was between seven and eight years of age. Narrowing of the upper jaw resulted, with misplaced teeth. The case also presented a unique example of the possible relation between nasal obstructions and the loss of hair. About a year and a half after the accident his hair commenced to fall out, first on his head and later from other parts of his body until his whole body, including the eyebrows and eyelashes were gone. Recently he has had his breathing improved, and there is an evidence of some return of the hair. It is too early to make a definite statement as to whether there will be a return of not of the hair, but the case is interesting as illustrating in a human being what Dr. Anderson has found to occur frequently in his experimental work upon animals.

Dr. Barnhill could not see, he said, how widening the palatal arch was going to have any effect upon a bony septum, though he saw how it might have the desired effect upon a cartilaginous septum.

Dr. Brown, in closing the discussion, spoke of Dr. Milton T. Watson as an authority on orthodontia. The speaker stated that the basal principal of his work was to do gradually and by natural process what he could before he began operation. If one has to deal only with a simple deviation of the septum, the natural resiliency of the septum, depending upon the age of the patient, will cause it to become straightened if given the opportunity. The parts, that is, the dental arches, must be held apart which is an exceedingly simple procedure. Any dentist can fit a simple device that will serve the purpose. Many patients were in such condition that it was very wrong to cause them to wait for a year or two to accomplish the result. They needed immediate and prompt relief. By the methods he employed he was able to accomplish this in a comparatively short time.

Dr. Nelson M. Black, in closing the discussion, stated that the results were permanent to a very marked degree. His theory was in effect that the stimulus to the periosteum caused the space made between the dental arches to fill in with osseous material, which kept the parts separated. The widening process produced a decided straightening of both the bony and cartilaginous septum.
THE EFFECT OF MAXILLARY READJUSTMENT UPON THE DEVELOPMENT OF NASAL CHAMBERS AND FACE.

By GEO. V. I. BROWN, A. B., D. D. S., M. D., C. M., Milwaukee, Wis.

So much has been written during recent years, more especially perhaps in the last year or two, of the close relation existing between oral and nasal deformities resulting in more active co-operation between Rhinologists, Oral Surgeons, Orthodontists and Dentists, these in turn being brought more frequently into consultation with the general practitioner, that I feel it to be quite unnecessary to submit proof of the generally accepted fact that contracted dental arches and high arched palatal vaults are often associated with deviated nasal septa, contracted nares and other nasal defects, commonly found together in individuals who have adenoids and enlarged tonsils. The effect of any one or all of these conditions upon health and development, both local and general, as well as upon nervous conditions and pathologic alterations of the tissues directly affected, may also be taken for granted as being so fully and generally understood as to preclude the necessity of elaboration. Our subject stripped of these divisions, presents for consideration at this time the following features which demand attention. First: Can direct improvement of intra nasal conditions be effected by treatment of dental and maxillary conditions? Second: How may this best be accomplished?

Embryonic Growth. The consideration of these two questions elementary as they are, requires at least a cursory study of developmental principles from the very beginning of embryonic life, and of both, pre-natal and post-natal factors in development of the parts directly under consideration and the organism as a whole.

Fifth to Seventh Week. In the short period between the fertilization of the human ovum and the fifth to the seventh week of embryonic life we find upon examination of a section through a foetal head that important changes have already taken place which even at this early date are indicative of the principles that
must govern our treatment in correction of deformities during the entire period of development of the individual.

Cause of Hare-Lip and Cleft-Palate. It is important to note, that complete coalescence of the divisions of the forming face and the mouth, resulting from progress in this direction of the several centers from which development of the head of the embryo takes place, has not yet been completed. If therefore, between approximately the fifth and ninth week of embryonic life, arrest of development takes place, there will be failure to unite in this particular region the result of which will be hare-lip, cleft-palate or both in any of the various forms in which these mal-developments appear. Re-establishment of growth in its natural course may and usually does result in correct form of other divisions of the head and face, except in so far as they may be influenced by the effect of the disarrangement of muscular and other physiological action through the deformity which has now become established.

Situation of Tooth Germs. Inspection of a section through the jaws at this period, under higher magnification, shows the epithelial cord which marks the appearance of the first indication of the toothgerms.

Relation of Nares, Maxillary Antrum and Face. Passing in succession through a series of similar sections at important periods until birth, we find, that in the absence of arrest or other interference with normal growth the divisions of the palate become completely united, and the spaces for the nares so much enlarged, that with those of the maxillary sinuses they occupy a very considerable portion of the facial division. The palatal surface at this time is flat because development of the alveolar regions has not yet taken place to any considerable extent.

Effect of Compression. As the tooth follicles increase in size and their eruption thus becomes more completely established, some of them are situated high up and just outside the nares. If growth of the alveolar ridges takes place in natural form unimpeded by any factor which may tend to restrict the natural size of the arch, the developing tooth crowns, the germs for both, temporary and permanent sets of which are in place before birth, can pass on downward and outward in the natural course of their eruption, thus making it possible for the nares and their dividing septum, as well as turbinal and other nasal structures to assume
in due course normal form and proportions. If, however, from any cause, whether it be surgical, mechanical, developmental, or pathologic, there is interference with the natural expansion of the arch, which represents the alveolar ridge and later the dental arch, it naturally follows that there must be crowding through want of space for the tooth crowns to assume their rightful positions in relation to others that are being pushed onward by forces through the action of which tooth eruption takes place. The first effect of pressure from crowding must react upon the upper regions of the maxillae in which the tooth crowns at this time are located. Effort at readjustment naturally takes place in the direction of least resistance. This must be in the direction of the nares and causes in greater or lesser degree abnormality of form, chiefly evident in their restricted size.

The second effect is overlapping of the tooth crowns evidenced by their eruption on the outside or the inside of the true line of the arch, resulting in labial, buccal or lingual occlusion. When the process of eruption has continued to a point where the cusps of the teeth in the occluding jaws can come in contact with each other, the muscular forces of jaw movement acting upon the inclined planes of the cusps and the crown surfaces of the teeth, bring into play the active factors through which regular or irregular forms of dental arches are determined.

Influence of Respiration. Glancing for a moment upon the obverse side of this developmental picture, we must recognize the fact that from the moment of the very first respiration at birth, one of the most potent influences upon which this jaw expansion and development depends, is the physiologic action of correct respiration thus we have established backward and forward, an inter-relation of growth so evenly balanced that it would naturally seem to preclude its being unusually important to any one division more than the other.

Relative Size of Tongue and Jaws. Another interesting feature of the embryonic stages is noticed in the large size of the tongue in proportion to the jaws. This is important in its influence upon the maxillary ridges and is of great significance in calling attention to the fact, that being so out of proportion in size if the growth of the jaws be arrested, and consequently fails to give space during the early childhood, which will enable free use of the tongue in speech, such children learn to speak with great difficulty if at all, or, as might be expected, are reluctant to make
the unusual effort required of them in learning to form certain words. Thus the brain cells, directing this action, do not develop and in the course of time such children come to be considered defective and ultimately are really so, because the speech centers are arrested in their natural progress. Undoubtedly many of these might have been at least approximately normal, if this condition had been corrected at a sufficiently early date.

*Changes Noted in Skulls from Fifth to Sixth Year.* In this series of skulls shown in Figs. 1, 2, 3, which were collected by Professor Prentiss of the State University of Iowa, one at about term and the others at different stages, until approximately the sixth year, viewed from front, profile and their basal aspects, we note the same progressive changes begun in embryo, becoming even more and more marked as growth takes place and the modifications due to eruption of the deciduous teeth become apparent and these in turn are affected by the development of the germs of the permanent set, until governed by the eruption of the first permanent molar, which Bogue has so ably called attention to as being one of the chief determining factors in the establishment of correct or incorrect occlusion of the permanent teeth.

*Fissures in Lip with Hard Palate Perfect.* With cases such as Figs. 5 and 6, where the hard palate is perfect, with deformity of the lip on one side, the fissure extending through the alveolar ridge, there is both deflection of the nose and in the absence of yielding through the line of the fissure with consequent widening such as usually marks this form of cases, also a forward projection of the premaxilla brought about through increased growth of bone, which takes place in the maxilla just behind the alveolar ridge.

In precisely the same way, when double hare-lip exists as in Fig. 6, the projection of the premaxilla and the deformity of the vomer are accomplished by unusual growth of maxillary and other bone structures, caused by adverse muscular action. Thus we find, that the result of any of these defects brings about, not only asymmetrical form but change in actual bone growth as well, and while non-surgical corrective measures applied to readjustment of form may be necessary and sufficient in many cases, when actual change in bone growth has been brought about, and there is consequently either more or less than normal bone structure in a region, measures must be adopted upon the one hand to cause an increased growth, or upon the other to accom-
7. Man of 22, burned at three years old. Elongation of lower jaw due to strain of scar tissue.

9. Boy of 14 years, burned at 3 years old, the scar tissue in this case prevented growth of the lower jaw.

8. Same individual shown in No. 7 after external jaw bone had been removed from the bicuspids teeth forward and the chin moulded out of its unusual thickness.

10. The same boy after correction by skin grafting and moulding of the soft tissue to form the chin.
plish the removal of superfluous bone, before natural conditions can be restored.

Effect of Scar from Burns. A rather striking example of this is shown in Figs. 7, 8, 9, 10, both individuals were burnt at three years of age. Each was left to grow up with tension of scar tissue contracting muscles in the same region. In one case the muscular tension happened to be such as to cause elongation of the jaw, to correct the deformity of which a considerable portion was resected. In the other, muscular action stopped jaw growth, and in order to give the appearance of a mental process the soft tissue had to be molded to produce this effect.

Conclusions. If our line of reason and illustration has been sufficiently clear, it should be apparent that any influences which can affect intra-uterine growth, and this includes arrest of development from any cause, be it hereditary, metabolic, incidental or accidental, can directly bring about, or predispose to malformations of nose and mouth.

The result of adverse muscular action may be apparent at the time of birth. With the beginning of extra-uterine influences all the conditions of the physiologic action of each or all parts concerned, become active in determining normal or abnormal results. Whether adenoids and enlarged tonsils be the result of an already pre-existing tendency to irregular cell development and asymmetric form growth in the individual, or are due to restricted respiratory action or to some other influence, it is perfectly evident, that with obstructive influence activity against natural respiration correct nasal and oral form would be practically impossible.

Summary. To summarize the results of our investigations thus far, we admit all of the etiologic factors that have been commonly, variously and individually urged by writers with the statement that any interference with continuous and complete embryonic growth will manifest itself, in imperfect form directly due to the arrested development and in imperfect exaggerations thereof, including alteration in both form and structure by the imperfect physiologic action of the immediately affected and surrounding parts.

Second: After birth, any normal muscular activity, whether due to the unusual stress of habit, accident or other cause, will
make its influence manifest in distortion of the form of the growing parts.

Third: With obstruction of the upper air passages, complete symmetrical form of the palate and upper maxillary arch, cannot as a rule be expected.

Conversely, any factor which tends to contract the form of the palate in such a manner as to bring about crowded and high-arched condition of the palatal vault with the usually attendant saddle shaped narrow dental arch, must in greater or lesser degree tend toward contracted nares, deviated nasal septa and commonly associated nasal defects. For these reasons it is manifest that adenoids and enlarged tonsils whether first or second in etiologic succession, are always and invariably contributing factors of first importance. The propriety of their removal as a corrective measure is obvious. We therefore waive discussion of the question of etiologic precedence since all treatment must resolve itself into procuring increased space for the purpose of more complete physiologic action in respiration and also room for development in the dental region.

Father and Child. In this relation the illustrations in Fig. 11 have unusual interest because they admit all sides of the question. The father shown with the child in his arms, is one who suffered from nasal trouble that required much treatment in attempted relief. The little one, still in infancy, too young apparently for many of the important factors, commonly held responsible for these conditions to become actively operative, shows unmistakable tendency in the same pathologic direction as the father.

Adaption of Well Known Principles. As I have made it clear in previous writings, upon this subject, the appliance I use, for separating the maxillae, is merely an adaptation of well known orthodontic appliances and principles for this purpose, and the space that appears between the central incisors which is indicative of division through the median maxillary suture, has been frequently noticed by many dentists and orthodontists, who have had it occur accidentally in the course of their treatment.

Need of Orthodontic Measures Reduced. My only claim for originality lies therefore in the application of these principles, in this way, for the specific purpose of producing maxillary separation, in order that widening of the nares and correction of nasal
defects might be the direct result. It is undoubtedly true, that having thus obtained the increased size in the dental arch through expansion the proper space allowed, enables nature to correct many dental irregularities in considerable measure without further interference. In all cases, unless locked in lingual, labial or buccal occlusion, or for some other reason held in mal-position by forces or factors which cannot thus be overcome, the natural tendency of all teeth is to seek their rightful positions in the dental arch and to assume proper occlusal relations.

I have previously estimated, that about 75 per cent of the orthodontia now considered as being required, would be unnecessary if this simple procedure were performed at a sufficiently early date. Others have made somewhat higher estimates. Notwithstanding all this, I wish it to be clearly understood, that, this method is in no wise brought forward as a complete substitute for well-known orthodontic systems because the principles and methods of orthodontia are often necessarily employed to complete what has been accomplished by maxillary separation in order that the improved condition thus secured, may be made permanent by correct occlusion of the teeth in both jaws. At the same time it is necessary to emphasize the fact that the movement of the teeth under the kind of pressure exerted in the ordinary course of tooth regulation by orthodontists and dentists will not give the increased intra-nasal space or make possible the correction of nasal defects, in anything like the same degree, even in young children, and in adult cases it is extremely doubtful if any improvement of sufficient value to improve marked deflection of the septum, could be secured in any other way than by direct pressure which will cause separation of the maxillary bones.

Effect of Slow Movement Not Sufficiently Beneficial. The reasons for this statement are exceedingly simple. The principles of the various orthodontic systems now in vogue require pressure which will cause a gradual movement of the teeth. The result of pressure so exerted, is to cause bone absorption. This Talbot has amply proven.

There are many reasons why this is advantageous, when applied to the correction of dental irregularities, but in order to carry the effect into the higher region of the nose, the less movement of the teeth through the alveolar structures takes place, the better the result will be insofar as widening of the nares is concerned. It is because of this fact, that more or less disappoint-
nient in results has occurred in some instances, when rhinologists have referred these cases to orthodontists and dentists, for although the teeth in the course of time may have been beautifully straightened, and symmetrical dental arches secured, the nasal improvement has not been such as it might have been had the process of direct pressure here recommended been applied and a positive result obtained within a period of approximately two weeks.

Our practical illustrations of the truth of this statement are almost unlimited and could be multiplied by descriptions of cases in practice that have been cared for during the past few years in almost any number that might be desired. The pathologic explanation seems to be established with equal certainty, when we consider Talbot's experiments on dogs, and my own results of expansion upon green skulls, both of which are herein given.

Talbot's Experiments. Talbot's experiments with regulating appliances in the mouths of dogs, were as follows: The screws, which were given one fourth, one half and one full turn every evening, were 60 threads to the inch. The teeth of three dogs were moved 1-240, 1-120 and 1-60 of an inch daily, respectively. The process in which the screw was turned one fourth and one half turn each day, was continued for seven days; the one in which the screw was turned one full turn was continued for two weeks. The object was to set up pathologic changes in the alveolar process similar to those produced in the human mouth. Talbot's findings, proven by microscopic sections of jaws of the dogs thus treated, show beyond question that movement under these conditions is effected by the ordinary processes of bone absorption.

Study of Hare Lip and Cleft-palate Cases. By reason of the surgical division, to which my practice is limited, through constant observation of the marked nasal and maxillary deformities, which occur in hare lip and cleft palate cases, it has been impressed upon my mind that there are some principles having a direct, bearing upon our subject, the rationale of which in naso-maxillary developmental relation can be more readily and more accurately observed in those cases, than in the course of normal growth, because through the opening in the palate and in the lip the form of the nasal septum as affected by abnormal conditions, can be directly studied with the entire field in view. The result-
ing changes in form and structure of both osseous and cartilaginous nasal structures by adverse muscular action can also be plainly seen.

Although conditions may in many respects be radically different when there are no fissures through the palate or lip, the factors which play a part in determining both, intra and extra-nasal form results though modified, in degree are in effect precisely the same.

The study of the illustrations of a few of these cases and the results of their correction with description of the principles, which guided the method of their treatment would seem to be advisable in order to lay a foundation, upon which the explanation of the method of correction, which is the subject of this discussion, must depend since it is through the study of those cases and effects that we have been led to the adoption of this kind of treatment.

A few conditions in hare-lip and cleft-palate cases appear to be invariable, notably in single fissure through both hard and soft palates as in Fig 12. When the division extends completely through the naris on one side, we find the premaxilla attached to the opposite side and through want of proper muscular control by reason of the lip being open in all cases it projects forward and is turned in the direction of the side to which it is attached. The maxilla upon the opposite side is drawn away from its fellow and backward through want of muscular tension in a forward direction, thus widening the fissure. The nasal septum in these cases is attached to the side upon which the premaxilllary portion is united. The cartilaginous portion of the nose is always deflected to that side, also the ala upon the opposite side is flattened and more or less spread out, because its external angle is joined to one side, while the dividing cartilage is adherent to the other. In some cases the hard palate in the course of its formation extends upon each side of the fissure to a point where it forms a complete and clearly outlined border, from which upon one side the nasal septum extends more or less directly upward with a noticeable though not severely marked bulging in the direction of the open side upon which of course there is no floor to the naris.

In other cases of practically the same type, the septum is so bulged as to appear to extend out upon the surface of the palate (See Fig. 13) until the clearly outlined border which should mark
the line of demarkation between palatal and nasal tissues, has become almost obliterated.

In double hare-lip cases (See illustration Figs. 14, 15) the premaxilla is completely separated from attachment to the upper maxilla upon each side therefore no continuous action between the labial and facial muscles is possible. In such cases there is an elongation of the vomer and of the lower border of the triangular cartilage, which causes the projection forward and typical deformity of the premaxilla and nose. The anterior portion of the upper lip, which is attached to the premaxilla also fails to assume its proper size and shape. This defect is so marked in many cases as to give the appearance of lip and nose forming a straight line in a forward and upward direction. Where there is complete fissure upon one side with incomplete division upon the other, there is always a deflection of the projecting premaxilla which carries with it the attached nasal structures toward the side upon which the fissure is incomplete. When this occurs, there is always bulging of the nasal septum toward the side of the wider fissure. Figs. 16 and 17 show the effect of failure to recognize these principles in surgical operation and the
possibilities of later correction by surgical restoration through observation of natural conditions. This is not an exaggerated example for I have had many such.

Illustration No. 18 is of particular interest in proving the possibility of complete fissure throughout the central median division in development of the face.

The infant here shown, had not only fissure through the palate and central portion of the lip, but completely upward through the nose as well, the nasal septum being completely separated into two distinct divisions. A large tumor, evidently a cyst, containing cerebro-spinal fluid, completely filled the central por-

![Illustration Xo. 18](image)

16. No. 16 shows typical deformity where the deformed parts are not properly corrected at the time of the operation. Part of the upper lip in this case is attached to the nose.

![Illustration Xo. 17](image)

17. The same individual shown in No. 16 after reoperation and adjustment of the parts to their normal positions.

tion of the mouth. The character of the fluid was not actually demonstrated for fear of fatal result but the anatomical form in mal-development was established beyond question in the operations which were performed to overcome the deformity.

I believe that defects to be accounted for by this double development of the nasal septum occur more often than is commonly realized. not only is the effect noticeable in bulging or buckling on opposite sides of the same septum, but I have recently had under my care an infant, born with double hare-lip and cleft palate, in which there was a continuous line of attachment from the nasal septum to the maxillary division of the palate upon each side. The entire central portion being open and apparently not connected with the nares. This condition
was discovered in an effort to pass a catheter through the nose for the purpose of continuing anaesthesia during the operation for closure of the palate. The catheter, when inserted and passed through the nose, appeared quite close to the eustachian opening, and very much to our surprise, could not be passed directly through into the wide open space in the centre of the palate.

*Double Development of Septum.* The best description of the double development of the anatomical parts of the nasal septum, the nasal processes, the vomer, the vertical palate of the ethmoid, the upper maxillary, the triangular cartilage, and its caudal prolongation and the relation of the premaxillary wings, as effected by developing tooth germs, reflecting upon the form of the septum, has been given with supporting evidence from the anatomical room in an exceedingly complete series of illustration by Prof. Harris Peyton Mosher, of Boston, who states that "The septum at birth is almost cartilage. The only bony parts are the vomer and the two premaxillae and their processes. The vomer consists of two leaves of thin bone, which are united below, but are open and flaring above. This formation is a relic of its double origin, evidences of which the vomer never entirely loses. The premaxillary wings spring from the posterior half of the upper face of the premaxillae. In the groove which they form, rests the tip of the vomer. Two other processes spring from the superior surface of the premaxillae, one from each, namely the nasal spines. These again make a slight gutter, into which in its turn fits the tip of the premaxillary wings. The tip of the vomer rests in the gutter of the premaxillary wings, and the tip of the premaxillary wings rests in the gutter of nasal spines, like the arrangements of the sections of the old-fashioned wooden drain. The upper border of the adult vomer is gutter-shaped like the vomer at birth, the gutter not being so deep.

A large number of deviations of the septum are caused by asymmetry in the development of the bones which make the hard palate. This inequality of the development is usually due to delayed or irregular eruption of the incisor teeth, especially of the middle incisor. When the eruption of one central incisor is sufficiently belated it causes a deformity or hypertrophy of the maxillary wing above it. This distorts the retaining groove made by the premaxillary wings. As a result, the septum slips from its bed in the vomer, and the grooves made by the two leaves of the vomer spreads open, one leaf on the side of the V disappearing.
This produces a spur along the upper edge of the vomer. As the cartilaginous part of the septum slips from its bed, the lower edge curls upward and outward, so that its lower portion becomes concave. Higher up on the septum, this concavity gives place to a compensatory convexity. The convexity generally is towards the spur. On the side of the delayed tooth, a short basal spur indicates the enlarged premaxillary wing. The upper wisdom tooth may deform the septum posteriorly. This asymmetry shows in the nasal notches anteriorly and in the choanae posteriorly and in the mouth. Abundant dissecting room findings prove that deviations so started may extend far backward on the septum and become obstructive."

It is interesting to note that this evidently painstaking and exhaustive study of embryonic and later anatomical study supported by evidence from the dissecting room coincides so perfectly with the results of our study of mal-development and clinical experience in this region. With Mosher's illustrations and descriptions before one, there can no longer be a doubt of the practical corrective efficiency of a method which would separate the halves of these developing parts, sufficiently to supply space for their assumption of the normal form, which has been denied them through insufficient room for proper development. The elaboration of the gutter form of the premaxillary wings and vomer, and other evidence submitted showing that with deviations of the septum the first tendency is to slip out of the trough which forms its natural resting place, makes plain the reason why straightening of the septum, even in adult patients, takes place in such marked degree, when the maxillary bones are separated, a fact that has been proven over and over again in our clinical experience, but which we have been somewhat hesitant about claiming to such an extent, as our results seemed to warrant, for we may now assume that the separation must necessarily re-establish the gutter form and allow the naturally resilient septum to seek its proper resting place.

My Method of Correction. Obviously the simple and most natural method of correction must lie in so far as possible, in the application of force, which will directly overcome, not only the first causes but the secondary results as well.

The appliance that I use, as shown in Fig. 19, is constructed by attaching metal bands which fit the cuspids and one molar tooth upon each side of the mouth. These are attached by rigid metal bars which rest against the lingual sides of all intervening teeth.
To these are attached a tube upon one side into which fits a threaded bar with nut adjusted to fit. These are so arranged as to make direct pressure across the palate at the point of greatest constriction when the nut is turned. Force thus applied is distributed against all of the teeth upon each side of the dental arch, and by turning the nut twice daily, continuing each time until firm pressure is felt but no pain whatever experienced, the maxillae can be separated through the median suture of the palate, and division between the central teeth. When this occurs, the incisor teeth are moved apart and since the appliance does not touch

![Skull with appliance in position and median suture separated.](image)

them in any way, the only explanation is, that the bones in which their roots are embedded have been moved away from each other. Both intra and extra-nasal measurements prove that in this movement the nasal bones and other attached parts have also been included, and the result is that there is a direct and immediate increase of space within the nares. To prove this definitely, similar appliances were adjusted to green skulls, an experiment which was made possible through the courtesy of Dr. Lea W.
Dean, of the State University of Iowa. Its result is shown in figures 20 and 21, in which the parted sutures can be plainly noticed with increase in actual measurement of one-eighth of an inch across the base of the nose and one-sixteenth across the upper third.

The following cases, though previously reported, are fair examples of the usual clinical results and are submitted as additional evidence of the truth of our theoretical foundation and the practical efficiency of this method of treatment.

20. Another view of the same skull shown in No. 19. The division between the central incisors and separation of the suture up to the nose is shown.

Figure 22 shows a young man aged 29, whose nose was injured by a baseball in early youth. Dr. Nelson M. Black, by whom the patient was referred to me, found the septum buckled in such a manner as to give almost complete stenosis of one naris, the turbinal bodies much enlarged, and hypertrophic conditions generally marked. The patient was greatly troubled by attacks of sneezing when he bent his head downward. The appliance was adjusted April 6, 1908. Within two weeks the space between the central incisors appeared as shown in Fig. 23. Actual enlargement of the nares was confirmed on examination by Dr. Black, and by the improved breathing experienced on the part of the patient himself, thus proving that even at this patient's age the
desired result had been quickly accomplished. Most of the time the patient, who resides in another city, was at a distance from me, and had the appliance turned by one of the members of his family. Fig. 25 shows a young man of 21 whose central incisors show the same separation and for whom the maxillae were parted, with marked improvement in the nasal width in approximately two weeks time. The other illustrations are of patients referred to me by rhinologists, in all of whom the desired nasal space was secured promptly.

22. Young man whose nose was broken with consequent traumatic deflection of the septum in early life.

23. The same individual after the maxillae had been separated and nasal breathing improved. The space between the incisors shows plainly.

Figure 26 gives the actual measurement with a millimeter gage of two casts of the mouth of a lad of thirteen years old, one taken before the arch was separated, the other at the time when the division through the central incisor was evident, and his rhinologist, Dr. Bach, of Milwaukee, reported sufficient improvement of his nasal condition. This is a fair example of the approximate increase in width of the palate that is required in such cases.

To these might be added a long list of other patients who have received the same treatment with precisely the same result in
my practice during the past few years if repetition by citation of other cases were necessary or advisable. All these cases show deviation of the nose from the central facial line, an imaginary, though clinically a very useful line, to which I have previously called attention, taken through center of forehead, tip of nose and center of chin. Deviation from this line, one way or another, is a fairly certain indication of perverted nasal and maxillary growth, leading almost invariably to pathologic nasal conditions.

Especially among growing children treated by this method has there been marked physical improvement, tendency to growth in height as well as general development and increase in weight. Many of these had previously been unable to attend school regu-

26. Two casts of the mouth of a boy of 13 years old with millimeter gage in place, showing change caused by the expansion.

larly because of the tendency to nose, throat and bronchial affections. Nervousness was almost invariably very greatly relieved, and this it is believed, for two reasons. First, the well understood results from the improvement in breathing apparatus with general healthfulness to be expected from better aeration and freedom from diseased nasal secretions: and second, the relief of that condition to which Kiernan has called attention, caused by crowding together of teeth in the dental arches with tendency to nerve irritation. This condition quite frequently manifests itself, not only in increased nervousness of a general character, but also in the development of neurotic tendencies leading to chorea, epilepsy and other similar affections, which in some instances at least might perhaps have been averted if these patients could have been tided over critical periods in their development. This has been recognized by Dr. Talbot as one of the periods of stress.
Certainly it is a curious fact that even with the disadvantage of having the appliance in their mouths and the bar across the palate, children who are subject to such pathologic conditions almost immediately become less nervous, have increased appetites, and general development goes forward almost from the very first few days after pressure has begun to be exerted.

I cannot help feeling that this treatment can be made a very great factor in safeguarding against tuberculosis. It is so easily accomplished and the results are so greatly beneficial that it should be applied to hundreds and thousands of growing children who are unquestionably more susceptible to pneumonic and bronchial affections because of imperfect breathing. It offers a possibility of relief which is especially important on account of the fact that such defects are well known to be on the increase, arrested development in the maxillary region being more marked in each generation under the conditions of our so-called civilization.

The discussion on this paper appears in connection with Dr. Black, and begins on page 269.
A CASE OF TRAUMATIC HEMIPLEGIA FOLLOWING FRACTURE OF THE SKULL WITH PERIODIC LOSS OF CEREBRO-SPINAL FLUID FROM THE LEFT FRONTAL SINUS. OPERATION: RECOVERY.

R. BISHOP CANFIELD, M. D., Ann Arbor, Mich.

The case was one of traumatic hemiplegia in a patient who had fallen from a ladder a distance of sixteen feet, striking the front portion of his head. He did not immediately lose consciousness, but walked home. He had a nasal hemorrhage. The entire forehead had been crushed in. He began to have trouble in moving his arm and leg, there was also aphasia. He was in bed about two weeks, and when he began to sit up he lost about two ounces of clear fluid from the nose. He complained of a severe dull headache on the left side of the head. His tongue was protruded slightly to the left; knee jerks were exaggerated; Babinsky present; eyes, negative. The X-ray picture showed that the brain was luxated backward about an inch.

A large U shaped flap was turned down and an exploratory operation made. The dura was found firmly adherent. The small opening was enlarged and the falx found badly torn, the sole remnant being a small strand of dura carrying a couple of blood vessels. With some difficulty several sutures were inserted and the dural wound closed. The avenue of exit of cerebro-spinal fluid was disclosed. The brain was soft, but showed no presence of inflammation. Primary union followed the plastic operation. The facial paralysis and also the aphasia cleaned up. While in the hospital the patient was kept flat on his back, so that when he left the hospital he was naturally in a somewhat weakened condition on the non-paralyzed side. Later he developed symptoms of general paresis, though he was able to resume his work as mail carrier. Dr. Camp, of the University of Michigan, stated that the paretic symptoms were not due to his former injuries.

Dr. Canfield produced a number of skiagraphs showing the changes that had taken place in the skull and brain, resulting from the accident.

Dr. Amberg, of Detroit, stated that the suturing of the dura thus preventing infection would account for the remarkable recovery.
Dr. Beck suggested the disinfection of the cerebro-spinal fluid by means of urotropin. The doses should be large. The detection of urotropin in the fluid which escaped would have proved positively that the material was cerebro-spinal fluid.

Dr. B. R. Shurley, Detroit, stated that he had seen a demonstration of disinfection of the cerebro-spinal fluid at Johns Hopkins University. One minute after urotropin had been administered its presence was detected in the cerebro-spinal fluid obtained by lumbar puncture.

In closing the discussion, Dr. Canfield referred to the fact that formaldehyde could be detected in the cerebro-spinal fluid after the administration of urotropin. While all this was interesting, it had not been proven that it was sufficiently strong to be germicidal. In the case he reported, infection did not take place owing to the fact that the fracture was a considerable distance from the nose.
SOME PRACTICAL POINTS IN THE EXTRIPATION OF THE TONSILS FROM AN EXPERIENCE OF FIVE HUNDRED CASES.

By WM. B. CHAMBERLAIN, M. D., Cleveland, O.

The tonsillotome, long so conspicuous in the armamentarium of every laryngologist, like many another instrument which has been supplanted by a better one, seems on the road to partial or complete disuse. In certain selected cases, the tonsillotome is still of value, but the number of such cases grows more and more limited and the opinion seems to prevail, not only in the minds of the profession, but in those of the laity as well, that if tonsils are to be removed at all, they should be removed completely. This change in operative procedure has necessitated not only a complete change in the operative technique, but also in the armamentarium. An operation comparatively simple has been supplanted by one attended with considerable difficulty; so it has seemed to the writer that a presentation of some of the practical points in the technique of the operation might awaken discussion of a topic, considerably hackneyed, but nevertheless of interest.

First the anaesthesia. Ether, for well known reasons, seems to be the anaesthetic of practically universal choice today. I will simply mention the reasons for its use, as no discussion seems necessary. First of all, I would place the element of safety, next complete relaxation, and, lastly, ample time in which to operate. My own preference is for the drop method, though in certain cases difficult to anaesthetize completely, I still resort to the cone. The anaesthesia should be carried to complete relaxation, as it is difficult to continue the administration during the operation, while if the patient is not completely under, the frequent gagging may interfere decidedly with a clean and careful dissection. In this connection I should like to call attention to a point of frequent clinical observation, namely, the remarkable toleration of children and even infants to ether—a far greater amount being necessary than one's experience in administering ether to adults would indicate. The amount of ether requisite to anaesthetize a six months infant is frequently surprising.

For local anaesthesia pure cocaine moistened in adrenalin possesses decided advantages. No more cocaine is required for
the anaesthesia than if a five or twenty per cent solution is used, while the operative field alone is anaesthetized and little or none of the surrounding tissue. The local applications of cocaine are followed by deep injections of one-half per cent cocaine to the drachm of which five to ten drops of adrenalin are added.

POSITION. The positions for operation are three: (1) the patient lying on the back with head vertical; (2) the head to the side, to right or left, according to the preference of the operator; (3) the head hanging over the end of the table at an angle to forty-five degrees to the main axis of the body. My own preference is for the last position, and for the following reasons. With either the first or second positions, the artificial illumination of the field is almost essential, the operator sits or stands in a more or less constrained or awkward position and the field is frequently obscured by blood to a very annoying degree. With the head in the Rose position the relation of the two tonsils to the operator is the same, while a considerable portion of the blood gravitates to the naso-pharynx and escapes through the nose. If the operator sits facing the top of the patient's head, he has at all times a most complete view of the field of operation, is in a comfortable position, and assistant, as well as operator, has ample opportunity to keep the field clear if bleeding is excessive. Furthermore, no artificial light is necessary, as the field, even on a cloudy day, is abundantly illuminated by the light which falls directly into the mouth over the operator's shoulder. The majority of my operations are performed at the homes, where gas, not infrequently, is the sole method of illumination, hence the artificial light would be impossible. The assistant stands on the patient's right, depresses the tongue with depressor held in the left hand, and sponges with the right hand. A second assistant sits on the patient's left and holds the head firmly in the desired position, the left hand being beneath the occiput, the right on the forehead.

There are two principal objections to this position: the first is the number of assistants—an objection which would seem to spring from pecuniary rather than logical grounds. No operator should attempt to perform a tonsillectomy, or even a tonsillectomy, who is not capable and prepared to cope with tonsillar hemorrhage. Should this occur, he will certainly find the services of two assistants quite valuable. The second objection is, that the relation of the operator to the field of operation is reversed.
This, I admit, is more or less awkward at first, but not more so than if the head is turned on the side and one tonsil is operated upon from above, the other from below. A versatile operator will soon accustom himself to the changed relations and, I firmly believe, will be more than compensated by the many advantages which this position affords.

ARMAMENTARIIUM. The first essential instrument in the operation is a suitable gag. The gag of Whitehead seems an ideal instrument. It is most serviceable without the tongue depressor attachment. This attachment, in certain conformations of the mouth, seems absolutely ideal; in others it is completely useless, obstructing the field of operation and forcing the base of the tongue into the pharynx, thereby interfering with free respiration. The advantages of the Whitehead gag are manifold, and are possessed to such a degree by no other instrument. It is light, adaptable to any mouth, and does not obscure, to the slightest degree, the field of the operation. Furthermore, if the jaws have been completely opened, it always remains fixed in position and no assistant is required to maintain it in place.

The tongue depressor should be broad and not too long. It should have a fenestrum in order to firmly engage the tongue and prevent slipping. The depressor of Sass well satisfies these requirements.

After trying practically all of the tonsil knives on the market, I have discarded knives entirely, and though I realize that an excellent tonsil operation can be done with a knife, scissors, for most reasons, seem preferable. The mucous membrane and connective tissue around the tonsil is tough, loosely connected and very elastic. An incision with a knife can hardly be made without exerting considerable traction, with resulting distortion. Scissors cut clean, leaving the tissue practically in situ. The ordinary angular nasal scissors satisfy all requirements, though the scissors of Kirkpatrick, with serrated edges, will often be found useful. After the primary incision through the mucous membrane at the middle point of the free border of the anterior pillar, the remainder of the dissection should be blunt as far as possible, scissors occasionally being resorted to when especially resisting tissue is encountered. For this blunt dissection I have found no instrument superior to the double end sub-mucous elevator of Hajek and Ballenger. The sharp end is as free cutting as any instrument should be for work in this location, while the blunt
end will be found sufficiently sharp for most cases. The point of
election for the primary incision is best determined by grasping
the tonsil firmly with the forceps and making gentle traction
forward and inward. There are many good tonsil forceps on the
market. My preference is for a modification of the nasal forceps
of Fein, which I use as an ordinary dissecting forceps would
be used in other parts of the body. No tearing can result from its
proper use, while the angular shaft keeps the hand at all times
free from the field of operation. If hemorrhage follows the re-
moval of the tonsil this instrument will be found a ready and
effectual hemostat—no other being required. It thus serves a
double purpose. When the pedicle of the tonsils is to be snared,
the loop of the snare may be passed over the handle of the forcep,
or the blades may be inserted through the snare loop before the
tonsil is grasped.

Under general anaesthesia the snare of Marquis is a most ser-
viceable instrument, but for operations under local anaesthesia, I
prefer the snare of Peters. It is a more powerful instrument,
and can be used with less traction on the tissues, cuts more quickly
if speed becomes necessary, and I am sure, causes less pain. For
operations under local anaesthesia, blunt dissection is hardly
advisable, on account of the increased pain. Here one is operat-
ing in a completely bloodless field, and a clean dissection can be
made with scissors alone. I have found no scissors so useful for
this operation as the serrated scissors of Kirkpatrick. The right
and left angles enable one to work in any location or position,
while the serrations prevent the tissue slipping from the bite of
the blades. They also cause less hemorrhage.

As the dissection is carried upward the extent of the tonsil,
especially the velar lobe, is disclosed by the continued traction of
the forceps. A difficult and most important step in the operation
is reached when the velar lobe has been freed and the dissection
is to be carried posteriorly between the tonsil and the posterior
pillar. The attachment of the pillar to the posterior corner of the
base of the uvula is thin and exceedingly delicate. Cutting of this
attachment will most surely destroy the symmetry of the palatial
arch, and, if extensive, will lead to unsightly as well as trouble-
some adhesions and contractions. During this part of the dissec-
tion the field should be kept absolutely free from blood, and if
scissors are used at all, they should be used only when the
posterior part of the superior pole and capsule are clearly in
view. Cutting should at all times be toward the tonsil, rather
than from it. In this way the injury of the surrounding tissue will be almost completely avoided. After passing the superior pole, the remainder of the posterior dissection is entirely blunt, and is extremely easy. It is usually well to nick the inferior attachment of the tonsil with scissors, so that the lower part of the snare loop may engage the whole tonsil successfully.

The tonsil is now free, above, below, in front and behind, and is attached externally by a very narrow pedicle embracing the lower two-thirds of the external surface. By its own weight or by very gentle traction, the tonsil should now prolapse almost completely into the mouth. If strong traction is necessary to bring it readily into the snare loop there can be no surer sign that the preliminary dissection has been incomplete. Strong traction can only result in shredding of the tonsillar tissue and a resulting incomplete operation. The tonsillotome might better have been used in the first place.

The snare seems the preferable instrument for the severing of the pedicle. If the dissection has been properly done, the wire follows the line of least resistance, which is immediately external to the capsule. The snare should never be applied unless it can be freely passed externally to the greatest diameter of the tonsil. If the wire loop closes across the greatest diameter of the tonsil, or internal to it, the enucleation must be incomplete, whereas, if not tightened until the proper position has been reached, the tonsil, with capsule intact, is completely shelled from its bed. Another advantage of the snare is certainly decreased bleeding. I cannot substantiate the contention of Jackson that the snare predisposes to secondary hemorrhage.

FAILURES AND ACCIDENTS. The former have been discussed, in part, in the preceding paragraphs. I believe that one potent cause of trouble is the lack of knowledge of the true depth of the tonsillar capsule below the mucous membrane. My incisions, in my first operations along the margin of the pillar, were carried far too deep, and the capsule was not infrequently lacerated. The primary incision should be a mere nick through the mucous membrane, barely large enough to admit the end of the dissector. Through this nick, unless the tissue is especially vascular, the white, glistening capsule can always be seen. The tonsil operation can best be compared to another operation—simple, if done properly—difficult, if not. I refer to the removal of a sebaceous cyst of the scalp. If the capsule is not wounded, the cyst pops from its bed almost like the pulp of a grape from its skin under
pressure; so with the tonsil. But if the capsule is lacerated, the tonsil tissue invaded and shredded by forceps and scissors, a successful operation may be well nigh impossible.

Not only should the tonsil be well pedunculated, but the field should be free of blood when the snare is adjusted and tightened—otherwise the uvula, or large portion of pillars, or both, may be engaged and amputated as the snare is closed. The affinity which the uvula shows for the interior of the snare loop is surprising. Pierce advises grasping the tip with forceps and holding it free as the snare is adjusted and tightened. I always resort to this procedure unless the field is so free from blood that I can keep the uvula clearly in view at all times. The amputation of the uvula may not, and does not usually, cause any difficulty to the patient. Fortunately he rarely knows it. Such an accident, however, does not contribute to an operator's peace of mind at the time, or even later. It is a decided jolt to his confidence in his own ability.

The possibility of hemorrhage is ever present in any tonsil operation, although the old bugbear of cutting the internal carotid has been fairly well banished. It must be a bungling operator who could successfully accomplish this. The bleeding is usually from the tonsillar artery or an anomalous blood vessel along the posterior pillar. I have encountered hemorrhages—some of them fairly severe. I expect to encounter more. Hemorrhage from the tonsillar fossa should be treated like hemorrhage in any other part of the body, the bleeding point should be grasped with forceps and either ligated or crushed. Tonsillar oozing is, in my experience, a myth. Oozing is simulated because the blood stream strikes the anterior pillar and the fossa is flooded. If bleeding occurs after the tonsil has been removed, a sponge large enough to fill the fossa is pressed tightly into it and held in position by the index finger of the appropriate hand. After a few moments the sponge should be removed. If bleeding follows a few attempts at compression, the pillar should be retracted, the field cleared of blood by sponging and the bleeding point grasped with forceps. The forceps should be left in position a few moments and then removed by torsion. I have not found it necessary to ligate the bleeding vessel, though ligation has been resorted to by one of the assistants in the clinic on several occasions.

The after treatment is largely a matter of individual preference. I make no local applications—neither do I advise the use
of washes or gargles. I am firmly convinced that the convalescence is much slower after tonsillectomy than after tonsillotomy. Some soreness or even unhealed granulating patches are not unusual at the end of ten days or two weeks.

In closing I should like to repeat the following points, mentioned in a previous paper:

I. Tonsillotomy may give relief in certain cases, but tonsillectomy affords the surest promise of cure.

II. There is no greater danger of hemorrhage in tonsillectomy than in tonsillotomy. There is always a danger of hemorrhage in any tonsil operation.

III. Any method is a good one so long as it aims at complete removal. The choice of method is a matter of individual skill or preference.

DISCUSSION.

Dr. J. M. Ingerson, of Cleveland. We all seem to be agreed as to the method of operation, but there is some difference of opinion in regard to the treatment of the patient after the operation. To keep inflamed tissue at rest as nearly as possible is a well recognized surgical principle. For this reason, it seems to me to be wise to use as little after treatment as is necessary following the enucleation of the tonsils. The patient should be seen daily or every other day and the temperature taken regularly. Gargles and sprays, I think, are contra indicated, because in using them, muscles which are inflamed and sore are brought into play. Forelible application of the spray may dislodge the clot and cause secondary hemorrhage.

The toilet of the mouth should, of course, be attended to regularly. The teeth should be cleaned after eating and a mild antiseptic wash used without any attempt to gargle.

I have never used a strong silver nitrate application after a tonsil operation. It seems to me that such an application would be irritating.

If one intends to dissect out the tonsils with the finger, I should think it would be wise to wear rubber gloves and in this way decrease the danger of a possible infection.

Dr. John F. Barnhill, Indianapolis, stated that he used alypin and adrenalin injections into the tonsil in adult patients. He made the patient his first assistant, which had the effect of keeping him from interfering and employing his attention during the operation. When the tonsil was dissected free, he exercised great care to preserve the capsule intact. The operation was one which he performed in his office. By employing the method of injection and sparing the tonsillar capsule the operative field was bloodless. By means of a curved instrument he mopped between the tonsillar pillars, for in cases in which the tonsil had been many times the seat of inflammation, there were sure to be adhesions. The doctor spoke of the employment of silver nitrate in preventing adhesions.

In tonsil operations on little children, the speaker always gave a general anaesthetic. He disagreed with those who maintained that after-treatment was unnecessary. Occasionally adhesions and granulation tissue were present which needed attention. After-treatment was especially indicated in operations on singers and public speakers.
Dr. Perry G. Goldsmith, Toronto, Canada, preferred the finger to "blunt" dissection with instruments. Concerning after-treatment, he said he usually found the patient running a temperature. A clot could be discovered, which he turned out and the patient promptly recovered. He considered the after-treatment quite as important as any part of the operative technique.

Dr. Mason, in reply to Dr. Barnhill. In young children in whom the abnormal size of the tonsil constitutes the entire difficulty, the tonsillotome is of value and I use it not infrequently. In adults and even in children who are tractable, I never resort to general anaesthesia unless an adenotomy is to be performed after the tonsil operation. In such cases it is certainly advisable. I have had little or no experience with alypin in tonsil surgery, but in the nose, where I have given it a prolonged trial, I have discarded it, as the anaesthesia seems insufficient.

I can hardly see how Dr. Barnhill can prevent adhesions by the use of strong solutions of nitrate of silver. In my mind, the time to prevent adhesions is at the time of operation, and not later. If the pillars have been lacerated, adhesions are bound to occur. The nitrate of silver would undoubtedly be of value in keeping down granulations. However, I have not found these troublesome.

The finger is frequently of value at certain points in the enucleation—the complete enucleation of the tonsil by the finger alone does not seem to me good technique or good surgery.
ABSCESS OF THE NASAL SEPTUM.

By GEORGE F. KEEPER, M. A., M. D., Lafayette, Indiana.

This condition is rather rare, and the recital of a case with the comments, that may accompany it, gleaned from the experience of others, may better fit us for the treatment of this condition when met. So far as the writer can ascertain, by reference to the Library of the Surgeon General’s Office of the United States Army, supplemented by articles since the publication of the catalogue of that office, but thirty-two articles have appeared upon the subject in hand. Of course this means more than that many cases, for some articles, such as Kicer’s, deal with as many as a dozen.

ETIOLOGY. The usual cause of abscess of the septum is traumatism, i.e., by blows upon the nose or falls thereon. The traumatism produces a hematoma, which dissect up the mucous membrane upon both sides of the septum, in the majority of the cases, and forms the tumor. This clot soon degenerates and forms pus with great damage to the septum, from necrosis, because it is deprived of its blood supply.

It may be stated that every case of hematoma of the septum does not go on to pus formation, for out of thirteen cases of hematoma reported by Kicer but five did so.

Diabetes, typhoid fever and erysipelas have also been noted as causes.

G. Killian reports a case due to a dental cyst connected with the second left upper molar; Ballenger, a case due to the removal of a septal spur; Parsons, a case evidently due to anthrax infection.

SYMPTOMS. The symptoms are those of severe inflammation. The temperature is usually but slightly elevated, though it may run as high as 103° F., as in Cline’s and Richard’s cases.

The swelling is marked, bilateral and occluding the nostrils. Breathing is out of the question through the nose. The upper lip is liable to be swollen. In a case of Gougenheim reported by Kicer the swelling was unilateral, occupying but one nostril.

The pain is quite severe, especially across the bridge of the nose and in the writer’s case of a boring character in the frontal region.
The nose is red from the inflammation and quite hot. The local temperature in the writer's case was one-half degree above the body temperature.

Inspection of the nostrils reveals the bulging tumors in each side. They pit readily to the probe. If a hypodermic needle be inserted into the tumor, pus may be drawn therefrom, or, if the case be seen early enough, blood.

DIAGNOSIS. The disease is to be differentiated from syphilis of the septum, in which disease pus is present in but small quantity, comparatively, from the ulcerations that accompany the syphilitic process.

The history of injury will also aid in clearing the diagnosis.

Finally Kalium Iodide may be tried as a last resort, and the Wassermann reaction.

FREQUENCY AS TO AGE. The cases reported have occurred at all ages. Very frequently it occurs in children. In four cases reported by Grünwald, three were children and one a young man.

PROGNOSIS. The prognosis for preserving the integrity of the nose is good if seen early enough, i.e., before the pus has eroded the cartilage of the septum to any extent. For as long as a complete ring of cartilage is left, the saddle-back nose is not liable to take place. According to Kicer, Jurasz reported a case involving the septum by necrosis, with collapse of the dorsum of the nose, followed by healing of the perforation. In Casselberry's case the septum reproduced itself under the evacuated perichondrium.

However, the septum is, as a rule, perforated before we see the case, and to make a prediction is hazardous until we have evacuated the abscess and determined the condition of the septum by the probe.

COMPLICATIONS. In Cline's and Culbert's cases, septicemia followed the injuries, due to the pus being absorbed into the general system. Cline's case had been diagnosed as typhoid fever before he saw it.

In Richards' case, it was several months before the patient was able to return to his work, so profoundly was he poisoned by the purulent process.

In nearly every case systemic pus absorption is to be expected, with all the symptoms accompanying such absorption.

In Culbert's case, a piece of the ethmoid was extruded.
The worst complication, from the standpoint of looks, is sinking of the bridge of the nose, forming the saddle-back.

TREATMENT. According to Coakley, it may be resolved under two heads:

1. Evacuation of the abscess cavity.

The septal cartilage receives its nutrition from its overlying mucous membrane, which in this disease is dissected up from the cartilage; hence the earlier the abscess is opened, the better. In fact, if patients came before the hematoma became purulent, it would be all the better, for it does not take long for a septal cartilage to melt away into pus. A free incision is necessary, and in the writer's case one was made in each nostril to secure prompt and efficient drainage. Coakley suggests, after making the incision, passing a probe into the back of the nostril and drawing it forward, making pressure against the septum, thus stripping the abscess cavity of pus. Then he inserts a Simpson tampon into the nostril, so that its anterior end rests just posteriorly to the incision. Wetting the tampon will cause it to swell, and thus to press more firmly against the septum. In a few days the tampon is removed and replaced with hollow splints.

It is regarded as bad practice to curette the abscess cavity, as thereby more damage results to the cartilage of the septum than that which has been done by the abscess.

In the writer's case simple drainage with gauze was all that was required.

WRITER'S CASE. Mrs. Clarence N., age 28, consulted the writer August 11th, 1909, with both nostrils occluded and suffering much pain inside the nose and across its bridge, and in addition boring pains running towards the forehead. A week before she had been struck across the nose by a thug and rendered unconscious. Inspection of the interior of the nose showed a bulging bilaterally into each nostril, nearly occluding them. Each tumor pitted to the probe. The temperature under the tongue was 101 degrees, and in the nose, one-half degree higher. Feeling that pus was present, incision was advised. It was accordingly made in each nostril, and a large quantity of pus was evacuated from both sides of the septum. The probe showed a hole in the septum. A small gauze drain was inserted in both incisions, and left in for a couple of days and then removed. The mucous mem-
brane resuming its normal position, no tampons were inserted. In two weeks the nose was perfectly normal in appearance. The outcome was very happy, considering the amount of pus evacuated.

BIBLIOGRAPHY.

Grünwald, L. Nasal Suppuration, 1900.
Ilyin, P. V. Gorychiye gnvimki nosovoi peregorodki, Khirurgia, Mosk, 1900, VII, 323-334.
Dr. B. R. Shurly, of Detroit. Dr. Shurly spoke of a case of traumatic abscess which had come under his observation. The patient had chills and a temperature of 104. He had found the infection to be of staphylococcus albus and aureus origin. He opened the abscess and instituted drainage and the patient immediately recovered.

Dr. W. B. Chamberlain, Cleveland, reported a case of death due to traumatic injury of the septum.

Dr. Thompson mentioned a case of septal abscess where a child had injured its nose while playing. On one side of the septum was a hematoma; on the other side, pus formation. The case progressed to recovery.
"A METHOD OF PROCEDURE IN SEPTAL WORK."

By PERRY G. GOLDSMITH, M. D., of Toronto, Ontario.

That the submucous resection operation is the operation of election in almost all septal deviations may, I think, be taken without question. To that angelic individual who never has a perforation in doing this operation my remarks will have little or no interest. To many, however, who find during the denudation of the cartilaginous and bony deflection, something has happened by which a perforation is inevitable, any suggestion looking toward obviating this unpleasant result may be of interest.

It does not follow because a small perforation ensues that the patient is any the worse off for having it. Slight crustings, small hemorrhages and occasionally whistling sounds are all, I think, one apprehends. When one has been unfortunate enough to have a condition of affairs which preclude the possibility of his having an intact septum, there are not many measures at his disposal for lessening this liability. Suturing the flaps by Yankauer's needles is about all one can do and in suitable cases this may be sufficient to give a complete partition. Sometimes, owing to former operative procedures, such as cautery, etc., one has a septum which on the one side, usually the convex, has a septal covering which consists of little more than scar tissue, extremely thin and easily torn because of the loss of elasticity. In such cases we may have a small perforation on the concave side or vice versa, which ordinarily would be well covered by the convex membrane. This scar tissue not infrequently melts away and we may have ultimately a perforation which we had no reason to anticipate earlier.

Now the method of procedure which I wish to bring to your attention is one by which you will be able to avoid permanent perforations. I cannot detail you a series of cases in which I have used the method, simply because my experience is limited to two only. Recitation of one case will suffice. A young girl 16 or 17 years of age presented herself a few years ago to me regarding nasal obstruction unilateral and constant. A history of severe injury due to a fall was elicited. Family and personal history unimportant. The nasal obstruction was found to be due
to a very sharp deflection of the cartilaginous septum, the septum being fractured vertically and pushed into the left nostril. The concavity of the deflection in the other side could only be seen by standing to one side of the patient and looking directly at the long axis of the septum rather than from before backward.

The submucous operation was selected for a later time, possibly some other method might have been better, that does not concern us now. At any rate, while I succeeded in getting away all the deflection, I did so at a loss of mucous membrane on both sides of the septum and opposite one another. The convex side had a small tongue which, however, I could not suture to cover this hole.

A large perforation was now apparently inevitable. The device adopted, and this is the point in my remarks, was to utilize the deviated cartilage which I had removed. This was trimmed and fractured so as to be quite straight and re-inserted in its former position so that it covered up the gap. The edges of the mucous membrane were replaced as well as possible and slight support given by a gauze tampon soaked in oil. The cartilage shifted its position a little towards the posterior part, allowing a small hole to persist, but this was insignificant compared with the original hole. This was done several months ago. Mucous membrane has grown over this cartilage as it does when it has been denuded in traumatism. There has been no pain or inconvenience of any kind and the patient has a straight septum but with a small hole, which in other cases will be easily avoided by taking care to anchor the cartilage by suture or metal flap clamps of Breings.

Large deviations without thickening may be bent and replaced without, I think, any hesitancy. Furthermore, we may be about to operate on a case in which we fear a perforation, so we may remove a thin cartilage from another patient and utilize it at once if necessary, or take sheep's nasal cartilage, which I see no reason against, though I have not done so. Prof. McKenzie tells me they may be kept in saline solution for at least a week and still be serviceable.

Take another class of case, when we are desirous of closing a perforation. If it is situated well back it probably does not matter and is left alone, but if well forward, may cause no little inconvenience. My own suggestion in such cases, a suggestion merely because I have not had an opportunity of doing so myself, is to find a thin deviated septum requiring resection and with Ballanger's knife remove as large a piece as possible, going well
back so as to get length. Now remove all unhealthy edges from the perforation you wish to close and if any necrose is in the margin of the perforation, cut well behind it as in Goldstein's septal perforation operation. Dissect the mucous membrane well away from the perforation in all directions and especially so in front so that you can slip your thin cartilage under the mucous membrane in front along and over the perforation until it is well beyond. There is almost no likelihood of any slipping of the cartilage, but it should be supported for a day or two. Now all that has to take place is for the epithelium to spread across the exposed cartilage. It could not do so with a hole, because there would be no support.

These points, gentlemen, require a great deal more experience to speak positively upon them, but they seem to me reasonable, and I offer them in the hope that they may appeal sufficiently to some of you to assist us in making a further septal operation constructive rather than destructive.
A SAFE INTRA-NASAL METHOD OF OPENING THE
FRONTAL SINUS.

By JOHN A. THOMPSON, M. D., Cincinnati, Ohio.

In a certain proportion of suppurative inflammations in the
frontal sinus, the local conditions are such that a cure can be
obtained by drainage. In advanced cases where the walls of the
frontal sinus are necrotic, or where polypi have grown upward
from the anterior ethmoid cells into the frontal, nothing but an
external operation can be considered. It is the only means by
which we can gain free access to the cavity and remove either the
dead bone of the neoplasms. These are, though, a minority of
the cases, and if a safe intra-nasal method of securing drainage
could be found, many cases would escape the dangers of the
external operation. The anaesthetic required for the operation
above the eyebrow adds an element of risk. The confinement in
the hospital and the scarring from the operation are objectionable
also in the mild cases.

The best of the methods now known for opening the frontal
sinus from within the nose are those of Ingalls and Goode. Most
ingenious of all, is that of E. Fletcher Ingalls, of Chicago, where
a curved guide is passed through the naso-frontal duct into the
sinus then a drill driven by an electric motor is guided up into the
sinus by sliding over the probe. This method is effective and has
resulted in a cure in many cases. It does not disable the patient,
and requires confinement to the house not over twenty-four or
forty-eight hours.

To me, there are two objections to the Ingalls' method. The
most important is, it destroys all the mucous membrane about the
naso-frontal duct. To prevent the occlusion of the opening made by
the drill, it is necessary for the patient to wear a gold drainage
tube for at least four months. The presence of the tube gives
rise to more or less discomfort and a slight, offensive discharge
while it is in position. There is some danger, too, in the Ingalls'
operation, of penetrating the cranial cavity, because the burr
cuts behind, as well as in front of the probe in the naso-frontal
duct. To obviate this danger, Goode, of Chicago, has devised
a method where, by passing a protector into the sinus through
the natural opening, he cuts away the bone in front of it with chisel and rasp so as to enter the frontal through the nose. Goode’s method is safe, but it requires the destruction of more or less healthy bone. It must be done under a general anaesthetic and requires a period of time in a hospital.

It has occurred to me that the objections to these two operations could be overcome and a perfectly safe one made by combining the best features of the two methods into a simpler operation. The method devised is, after removal of the anterior end of the middle turbinate, to pass a probe into the frontal sinus after injecting cocaine to secure anaesthesia as is done by Ingalls. Instead of chiseling away the bone in front of the probe, a pointed rasp similar to the one devised by Goode, but with a groove in the back, so that it fits neatly and snugly over the

probe, is guided up along the naso-frontal duct as far as it can be pushed by a reasonable pressure and then withdrawn, cutting away the bone downward and forward. By a repetition of this movement, inserting the rasp higher into the duct each time as the resistance is lessened by cutting away the bone, it is possible to work through into the frontal within a very few minutes and with practically no pain to the patient. The bone is softened by the suppurative inflammation until its removal is very easily accomplished. As soon as the frontal is opened different sized rasps, curettes or forceps can be used to cut away all of the diseased bone in the anterior ethmoid cells without destroying the mucous membrane on the posterior wall of the naso-frontal duct. With a portion of the mucous membrane left in its natural
position and with its nutrition unimpaired, no drainage tube is necessary, because the bare bone will be covered by membrane extending from the edges of that left in position. The healing of the wound with a free opening into the frontal sinus occurs quickly, and with the relief of pressure there is immediate relief of the severe headaches attendant on suppuration in the frontal.

An illustrative case, showing the ease by which the operation can be made was that of Chas. H. ——, aged 43, Rural Mail Carrier. This patient has had recurrent polypi growing from the ethmoid for 18 years. He had refused to have any radical operative work done for the cure of the ethmoid suppuration and the prevention of the future growth of the polypi. Recently the inflammation has extended to the frontal sinus producing suppuration in that cavity. The intense headache from the frontal suppuration caused him to return asking for relief, but he was still unwilling to have any radical operative work done.

Saturday, December 18th, 1909, I opened the frontal sinus by the method described. The work was easily and rapidly done under cocaine anaesthesia and the patient complained of no pain until I had removed all of the diseased bone and the rasp began to grate on the healthy bone. There was practically no reaction following the operation and the patient returned to his home the second day, saying that while the head felt sore, he was relieved of the intense headache from which he had previously suffered.

When examined two months after the operation there was a free opening into the frontal. The bone was covered with membrane and all subjective symptoms had been relieved.

The straighter of the two rasps shown is very useful in operations on the maxillary antrum. The nasal wall of the antrum is penetrated well back under the inferior turbinate by a trocar. The point of the rasp is introduced through this opening and the nasal wall cut away forward until the junction of the nasal and lateral walls is reached. This makes a free opening into the antrum near the floor for irrigation and drainage without injuring the turbinate. Only local anaesthesia is required.

DISCUSSION.

Dr. W. L. Ballenger, Chicago. Dr. Thompson removes a very small portion of the anterior turbinal. The speaker was in the habit of removing the anterior half of the anterior turbinate and curetting. He had obtained admirable results. He employed this method in removing the tissue from the so-called vicious circle. Personally he did not think it necessary to attempt to open the floor of the frontal
sinus. From an anatomical point of view he thought there was an element of danger in introducing instruments into the frontal sinus, where the instrument might enter the frontal lobe of the brain. He had obtained excellent results by removing a portion of the anterior turbinate and curetting. Where it was impossible to obtain good intranasal drainage he would do an external operation. He emphasized the importance of the skiagram. The Killian operation was the least disfiguring of external operations.

Dr. H. W. Loeb stated that the operation described by Dr. Ballenger was very satisfactory in relieving the majority of cases.

Dr. Joseph Beck, Chicago, thought there was a distinct indication for Dr. Thompson's operation, when one had a clear radiogram and where there was a clear posterior nasal spine, there was no reason why one could not pass a probe since it might be done under the x-rays. He thought Dr. Thompson was running a big risk if he did it without the aid of the skiagram.

Dr. Thompson said, in closing the discussion, that he would not attempt an operation on an obscure case without the aid of the x-ray, but while the x-rays were of advantage it must be remembered that they were not infallible.
LABORATORY METHODS AS AIDS IN DIAGNOSIS OF NOSE, THROAT AND EAR AFFECTIONS.

By JOSEPH C. BECK, M. D., Chicago, Ill.

The laboratory is growing in influence in the diagnosis and treatment of disease in practically the entire domain of medicine. Our department has not been entirely lacking in this respect. Nevertheless, it must be admitted that the great mass of specialists have not given this valuable aid the attention that it deserves. It is for this reason that I bring this subject before you in order to stimulate those who can see with me the importance of laboratory methods; and to show how everyone may take advantage of a practical working system in order to obtain better results. All men who have been graduated from college since the laboratories were made an important part of the teaching curriculum may become qualified laboratorians, and all that is required is sufficient interest and time. The technic, while important to understand, need not necessarily be carried out by the clinician himself. In fact, it is almost imperative that he have a technician with whom he co-operates in what is known as "team-work." This team-work is of benefit to the clinician, technician and the patient as well, and I can state without question that this method is far more satisfactory than where the clinician does the entire work himself. It has been customary for one to take a specimen of tissue, blood, etc., to refer it to the laboratory and to receive a written report of the technician's or pathologist's findings. Of course, there is considerable information to be gained from such a report, but the confirmation by one's own examination of the slide, culture, etc., gives so much additional assurance and interest that it makes the work more satisfactory to everyone concerned.

I divide my laboratory work into seven departments, as,
1. Hematologic and serologic.
2. Bacteriologic.
3. Pathologic.
4. Chemical and analytic.
5. Radiologic.
6. Photographic and illustrative.
7. Experimental.
I shall attempt to demonstrate from some of them certain results, not desiring to discuss the various subjects presented, since they serve only as examples. This material, is however, out of my own practice.

1. Hematologic and Serologic.
   (a) Blood counts in septic sinus thromboses as to leukocytosis.
   (b) Blood cultures in the same condition.
   (c) Cerebrospinal fluid examination in meningitis.
   (d) Coagulation test in bleeders.
   (e) Hemoglobin test in anemia.
   (f) Blood counts as to red cells in anemia.
   (g) Wassermann's and Nogouchi tests in syphilis.
   (h) Blood of a malaria (Lavaran's) organism.

2. Bacteriologic.
   Cultures and smears of,
   (a) Staphylococcus albus, aureus and citreus.
   (b) Streptococcus.
   (c) Pneumococcus.
   (d) Bacillus influenzae.
   (e) Bacillus diphtheriae.
   (f) Bacillus pyocyaneus.
   (g) Bacillus typhosus.
   (h) Bacillus tuberculosis.
   (i) Bacillus rhinoscleroma.
   (j) Ray fungus of actinomycosis (smears only).
   (k) Spirocheta pallida (Dunkel Kamener).

3. Opsonic Index Determination.

4. Pathologic.
   (a) Gross specimens.
   Tonsils and adenoids of children (two varieties).
   Tonsils of adults (two varieties).
   (1) Middle turbinated body; (2) With nasal polypi, and
   (3) ethmoid curettements.
   Inferior turbinated (two varieties).
   Septum (three varieties).
   Larynx, tubercular, syphilitic, carcinomatous.
Goitre (three varieties).
Glands of neck, tubercular.
Ossicles of ear (removed during radical operation).
Mastoid chips.
Cholesteatoma masses.
(b) Microscopic specimens.
Tonsils (two varieties).
Adenoids (two varieties).
Middle turbinated body (two varieties).
Nasal polypi (three varieties).
Ethmoid cell (one variety).
Inferior turbinate (two varieties).
Septum (two varieties).
Neoplasm of tonsils: sarcoma, carcinoma, endothelioma.
Carcinoma of larynx, epithelioma of the external ear.
(c) Microscopic specimens.
Goitre (two varieties).
Glands of neck (two varieties).
Ossicles (two varieties).
Mastoid chips (six varieties).
Cholesteatoma.
New-formed epithelium after radical mastoid operation.
Keloid scar treated with fibrolysin injection.

5. Chemic and Analytie.

(a) Secretion: saliva, tears, cerebrospinal fluid, gastric.
(b) Excretions: urine, feces.
(c) Discharges: pus and mucus from nose, throat and ear,
or externally about the mastoid, face and neck.

6. Radiologie.

An atlas containing descriptive matter as to the technic of
radiography and interpretation of twenty-six typical pictures of
nasal accessory sinuses of the nose and mastoid region; special
attention is paid to the stereoscopic radiography and is further
illustrated by a number of stereos. The purpose of this atlas is
to enable any oto-rhino-laryngologist to have a radiologist take
a picture of the sinuses or mastoid correctly, and be able to
interpret the plate in connection with his other clinical mani-
festations himself. The interpreters accompanying each plate are
of the utmost value to one not accustomed to the interpretat-
tion of radiograms, and this idea has been adopted from Killian's Atlas of the Accessory Sinuses.

7. Photographic and Illustrative.

Stereoscopic photographs of cases.
(a) Electric burn (live wire) of alae of nose and face.
(b) Tubercular osteoperiostitis of zygoma and external auditory canal.
(c) Carcinoma of superior maxilla, postoperative.
(d) Congenital lap ear (yellow kid).
(e) Luetic destruction of nose (external deformity).

Stereoscopic colored photograph (Lumiere's process) of cases.
(a) Congenital lues (external nasal deformity).
(b) Lupus vulgaris (external portion of nose and cheeks).
(c) Head dissection (injected with colors).
(d) Neck dissection (injected with colors).
(e) Dissected tonsils.
(f) Septum nasi.
(g) Tonsil tubercular.
(h) Nasal polypi.
(i) Middle and inferior turbinate bodies.

Illustrations in pen and ink, wash, oil of macro- and microscopic specimens, operations, etc.

This photographic and illustrative department of the laboratory is one of the most instructive and interesting parts. In keeping a record of cases it completes the same to a nicety. In having an artist in the laboratory it facilitates matters a great deal.

8. Experimental.

In connection with every well-equipped laboratory there must be some animals for experiments. Outside of the general laboratory is a place where a number of cages are situated with guinea pigs. These require good attention in order to exclude possible error when inoculating them.

I am satisfied that I have presented nothing new, but am sure that the time given to the consideration of a practical solution of the problem of laboratory work will not be amiss. Most laryngologists and otologists are connected with institutions that have
laboratory facilities with good technicians, so that they can study their specimens, etc., in a very satisfactory manner. The pres-
ervation of pathologic structures removed from the nose, throat
and ear, of which material there is so much, makes an excellent
museum, and serves as good teaching material in the pathology of
our specialty. It is about time that the waste jar should be
deprived of this rich material. If one has not the hospital
laboratory facilities, then one can with very little expense have
his own private laboratory in connection with his office or
operating room.

I know a number of men in other branches of medicine who
employ a young girl to carry out the technic of the most im-
portant branches of the laboratory, as bacteriology, pathology
and analyses, with satisfaction, and if one has an assistant, this
is of easy execution.

In conclusion, I wish to express my regrets that the medical
profession of this country is denied one of the most important
parts of laboratory work, namely, postmortem examinations.
Our foreign brethren, to whom this obstacle is unknown, have
the tremendous advantage over us in the study of the pathology,
and I hope the day is not far distant when we may be able to
post our cases, at least in the large cities, in the public hospitals.
These postmortems, that are made in our hospitals, are per-
formed by the general pathologist, who, as a rule, is not com-
petent to make a satisfactory examination of the special organs,
and consequently the results are very unsatisfactory. It seems
to me that when a case is posted where the nose, throat and ear
and their adnexa are the chief factors in the causation of death,
there a specialist should be the one to make the autopsy, at
least of the head.

DISCUSSION.

Dr. B. R. Shurly, of Detroit, Mich. It is our privilege to realize with
Dr. Beck the great importance of laboratory aids in our specialty. It
is impossible to separate laryngology or otology from internal medicine
along any sharp and definite lines. It is necessary for us, therefore,
to be continually informed upon all the latest findings in laboratory
research, and to make the proper application to the proper case.
The possibilities of individual work in laboratory diagnosis become
classified immediately according to the education and location of the
specialist. A city of the larger size will offer opportunities to refer
work to a clinical laboratory where research problems may be under-
taken. A teacher in the medical college is offered additional oppor-
tunity whereas, the specialist in a sparsely settled district is thrown
upon his own individual resources and enthusiasm.

The progress in laboratory research has advanced so rapidly in the
last three years, that the time afforded for a discussion is scarcely
sufficient to more than mention some of our valuable aids. The X-ray field has made scientific observations possible, and both pre- and post-operative observations have become accurate and exact. The diagnosis of necrosis of the bone has become possible. The various anomalies of sinus formation may be studied, and the mastoid may be accurately outlined.

The Wasserman reaction has proved an accurate diagnostic aid in luetic conditions. The various tuberculous manifestations may frequently be confirmed in their infancy by the ophthalmic or cutaneous tuberculin tests.

We are all familiar with the various laboratory aids, yet as Dr. Beck has mentioned, the value depends, frequently, upon the personal equation of the laboratory worker and the accurate deductions and classification of the various laboratory phenomena observed. Dr. Beck has shown us many beautiful pathologic specimens and slides and he has certainly stimulated our enthusiasm along this line. It is true, however, that the very active worker in laryngology and otology must regulate his laboratory work to assistants and other experts.

It is necessary for scientific deduction that this work should be carried on as a habit, after proper preliminary training. It is unfortunate that the active clinical worker must necessarily be detracted from actual laboratory work, yet as Dr. Beck has stated, it is essential that every laryngologist and otologist must have a complete knowledge of the value and proper deductions of laboratory findings.
MEETING OF THE SOUTHERN SECTION, HELD IN WASHINGTON, D. C., FEBRUARY 12, 1910, UNDER THE CHAIRMANSHIP OF DR. O. A. M. McKIMMIE, OF WASHINGTON.

THE TRUTH ABOUT TONSILS AND ADENOIDs.

By J. W. Jervey, M. D., Greenville, S. C.

Not "the truth, the whole truth and nothing but the truth" about tonsils and adenoids, Mr. President and Gentlemen! Such a feat in this day and generation were hopeless of achievement. The man has not yet been born who could appear before this learned society and relieve himself of such a burden in a way that would win the endorsement and final acceptance of any large proportion of its members, or indeed, of laryngologists anywhere. In other words, so far as the whole truth about tonsils and adenoids is concerned, we have not yet "arrived." Nevertheless, experience and reasoning—yours, mine and all the rest of the world's laryngologists—impress me forcibly with the truth of the following statements of fact and theory.

To the stranger within your gates the inference is well nigh inevitable that a very large, if not the greater, part of this society embraces more or less undeviating followers of the bloody trail of tonsillar evulsion—some literally, and some advocating true instrumental dissection. Yet, while I may err, some indefinable sense persuades me that this is not the real, practical, everyday attitude of the members of this organization, and I bring this paper to you in the hope that the freest kind of reflections of the true light may be forthcoming from you. Let us try, and keep trying, until we do get at the truth of this matter. My own beliefs in the circumstances, are not important, but inasmuch as I hold to them, at least tentatively, for reasons which have so far been satisfying to me, I state them without fear.

Not all adenoids are bad adenoids; and not all tonsils are bad tonsils.

The common appearance of highly complex tonsillar tissue occurs only in the highest types of animal development. Its noticeable presence occurs in the very large majority of persons.
It is fair to assume that the development of the tonsils is a detail of highly civilized type variation which is becoming, if indeed it has not already become, a characteristic. If the presence of this development were detrimental: if the tonsils were the frightful bugaboo they are often pictured by enthusiastic enucleators, they would long ago have disappeared with their owners under the law of survival, instead of appearing now in their most complex form almost universally in the highest types of human kind, as the sturdy guardians of the dangerously exposed introitus of the two great systems of digestion and respiration. I say "highest types of human kind" advisedly, and it is interesting to note, for perhaps it adds a little weight to the argument, that the embarrassing presence of tonsillar tissue in the negro, for instance, is not common, and I have never once seen it, that I can recall, in the pure black. It is occasionally seen in the mulatto, and oftener as the mixed type approaches nearer to the pure white stock. At all events, it has been shown [Packard] that the tonsil is not a vestigial remnant, for its presence has been demonstrated from its simplest form in the lowest of the vertebrates, to its most complex form in man.

Systematic inspection of the throats of hundreds of school children convinces me that the noticeable presence of tonsillar tissue is normal, at least up to the age of puberty, and probably later. Furthermore, I have been unable to observe that there is any fixed, or even approximate, period of life at which tonsillar atrophy occurs,—it may take place at any age according as artificial or natural influences may bear upon the condition.

In a very large number of cases the swollen tonsils are a purely compensatory hypertrophy—a line of defence thrown out by Nature to protect the mouth-breather, taking up in a measure the functions of the nasal turbinals, and when proper nasal breathing is re-established, behold the hypertrophied tonsils shrivel and withdraw. These are essentially the lymphatic type of hypertrophy; but even the evidently fibrous type often exhibits an astonishing tendency to shrink. Such compensation is not unique. It occurs variously in the human economy; and, indeed, all Nature is full of such automatic manifestations.

Modern research has made us familiar with certain principles of immunization. We know that we are constantly exposed to the deposition of pathogenic bacteria upon the surfaces of the upper respiratory and alimentary tracts. We know that comparatively few of us develop systemic infection. Furthermore,
we know that imprisoned colonies of these bacteria are very frequently, if not constantly, found in the tonsillar structure. In the light of our present knowledge it is then apparently certain that the absorption of toxins from the imprisoned colonies must effect a certain systemic immunization. There appears to be no alternative to the deduction. This theory is in no sense controverted nor is its force weakened by the fact which we must all admit, viz., that there are times when, owing to weak resistance or to an excessive amount or excessive virulence of the infection, the tonsillar barrier is broken down and the lymph structures are overwhelmed by the poison. There are two theories extant regarding the possible tonsillar obstruction to infection, one being that this tissue presents a mechanical barrier to the entrance of the bacterial entities, and the other that the bacteria are destroyed in the tonsil by some process of phagocytosis. Granting the partial truth of these theories, it must be admitted that they contain certain weaknesses, and I beg that you will note their essential difference from the theory of the tonsil as an agency for immunization which I offer for your consideration.

The hypertrophied tonsil oftentimes cannot be distinguished by the naked eye, or by palpation, as being of the fibrous or the lymphatic type. It may combine the features of both forms. The fibrous tonsil is usually seen in the adult. Ten years ago, whenever I saw one I immediately and relentlessly urged operation. Not strangely, many adults decline operations upon themselves, even as you and I, unless some immediate and dire danger is presenting. As a result, I have seen many and many a protruding member in the fauces of adults which never had caused, and in my best and sincerest present belief never would cause, serious trouble of any sort—provided, as I have said before, that nasal breathing is free and unobstructed, the preservation of which latter function, it is my conviction, is the real crux of a very large proportion of this vastly important tonsil problem.

In my modest experience the overwhelming majority, if not practically all, of the cases of recurrent quinsy which have come under my observation have been associated with the so-called submerged and ragged tonsils, or the roughly flat formations densely adherent to the pillars. These are the cases which merit prompt and thorough surgical attention, but on account of the difficulties involved, and with which we are familiar, these are also the cases in which too much careless and incomplete work is done upon the tonsils. And, per contra, on account of the com-
parative ease with which the firm protruding type is handled. there is, I believe, entirely too much radical work done upon them.

So, too, in the case of the adenoid. A relatively small adenoid formation in Rosenmüller’s fossa can and will do much more mischief—to the ears, throat and entire economy—than a much larger hypertrophy in the vault or on the posterior pharyngeal wall, which does not cause obstructive or irritant symptoms. In the absence of the latter I never remove an adenoid from the vault or the posterior wall, but I do always see to it that the fossae are clear. Even slight obstruction of these tracts is fraught with far-reaching consequences. So then, if these premises be true, even in an adult a tonsil or an adenoid, just because it is a tonsil or an adenoid, should not of necessity be removed.

As I have adverted to the frequent incomplete surgery of these tissues, I may be pardoned for referring to a point that is, to my mind, of great importance in the technique of the adenoid operation, but which, singularly enough, appears to be almost universally overlooked or neglected. I allude to the advantage, when removing an adenoid, of first introducing the finger through the mouth, into the naso-pharynx, and thoroughly breaking up the lateral attachments of the growth throughout the entire length of Rosenmüller’s fossae and from the posterior lip of the Eustachian cushion. One can never tell with certainty from a study of the rhinoscopic picture just how much these important structures are involved, and not until the finger has swept through these spaces right and left, to their very depths, is it possible to be assured that their surfaces are freed. Most operators appear to depend upon their curettes for this service, but the curette has never been fashioned, and it is unlikely that it ever will be, that can sweep at varying depths through the semi-

[Note: Accepting the foregoing briefly outlined premises, my belief and practice, specifically, is [1] that tonsillectomy is an efficient and properly conservative procedure in persistently obstructive simple chronic hypertrophy; in obstinate cases of chronic lacunar tonsillitis; and in the interval of acute recurrent lacunar tonsillitis—these comprising, it may be noted, by far the larger majority of all tonsillar conditions demanding operative interference; [2] that tonsillectomy is the wisest and safest procedure in phlegmonous tonsillitis and peritonsillitis; in primary tuberculosis or malignant neoplasm of the tonsil [neither of which is common]; and when there exists a persistent tonsillar irritation concomitantly with cervical adenitis or other remote conditions, such as acute articular rheumatism, which may be reasonably and justly suspected of tonsillar pathogenicity. In all other cases removal of the tonsil, either partially or completely, is not indicated.]
circle from above the Eustachian orifice, behind it, and down to immediately behind the posterior facial pillar, at the same time transmitting to the hand that holds it anything like the perfect interpretation of existing conditions that is imparted by the direct application of the finger itself. But aside from the information gleaned, and the satisfaction of thorough accomplishment, this little manoeuvre greatly facilitates the operation. By the loosening of the lateral attachments the curette is better permitted to engage the growth, and where an instrument of sufficient breadth is used the mass is often brought away in its entirety at one stroke—an advantage not lightly to be ignored, it would seem.

To return now to the tonsil: I doubt if there is a single surgeon present who will not admit having seen many excellent and permanent results following tonsillotomy; yet, unless I am sadly misinformed, many of you, in your papers before scientific societies, your discussions and your books, will plead for tonsillectomy as a routine procedure. Do you practice what you preach? If you do are you not wrong, for you admit the frequent efficacy of the simpler measure? And if you don't, are you not again wrong, for are you not then misleading those whom you should teach aright? That, at least, is the seemingly reasonable conclusion of an inexperienced and groping intelligence. I ask that the light may be given.

That the tonsil sometimes transmits infection—being the familiar "portal of infection"—we cannot doubt, but that its presence in the highest type of life is undesigned in Nature's scheme of type variation, and its elimination from the complex organism of man immaterial, is at least open to very serious question.

DISCUSSION.

Dr. H. S. Hedges, of Charlottesville, Virginia. Just a word as to the presence or absence of tonsils in the negro. We see a good deal of that in our section. Of course, and I find there are a great many of the large round type of tonsils that are very large, that they are mechanically obstructive, so large that we have to get them out of the way to get the child breathing space at all. I have seen children brought in with absolute dyspnoea, struggling for breath, from enormous hypertrophies. Dr. Jervey's experience is rather different from ours in that line. I think the prevalence of tuberculosis among the negroes can be explained on different grounds entirely.

As to the manner of doing tonsillectomy or tonsillotomy, that is one of the old, thrashed out subjects. We are often put in an embarrassing position when a patient is sent to us with a note that his tonsils need to be removed, when after careful study of the case we can relieve the patient without subjecting him to a radical operation. But if a
DISCUSSION.

case comes in, in which I believe that a tonsillectomy is justified, I never feel satisfied unless I have gotten out the whole tonsil with its fibrous capsule. There is a great deal of dispute concerning tonsillar work because so much incomplete operating has been done. So many bases are left in, so many bad adhesions are left behind in the tonsillar pillars, that often the after state is worse than the first. It is not easy to get out the fibrous capsule, especially if you have got a soft, mushy tonsil. It is extremely difficult to get the fibrous capsule out clean, and I always feel that I have to be very charitable when a patient comes in with a hard base left in. I have had to let the patient go away, telling him to come back some time later, and then perhaps dissect out the capsule itself. I have done that in a great many cases, with great satisfaction to the patient.

As to the rôle of the tonsils in the human economy, I believe we know little. In adult life it is clearly a vanishing quantity. It seems to share the fate of the lymphoid tissues in other parts of the body. This is true of Peyer's patches, for instance. I believe the normal condition of the tonsils is to atrophy.

I have never seen the shrinking of the tonsil after nasal breathing is restored. Our experience in children has been this, that if the adenoids are removed we do not get good nasal breathing unless the tonsils come out, too. In almost all those cases the tonsil is pushed way in the supratonsillar fossa, and they almost invariably come back later on for a complete operation.

As to the remains of Rosenmueller's fossa, I do not believe there is any question at all. Any man who operates with forceps and curette, without the finger, does not do justice to his patient. No instrument can get into the fossa without doing damage,—not only the finger, but the finger guarded with gauze is one of the most valuable means, I think, of cleaning the fossa. After the finger nail has done its best, then the finger with the gauze wrapped about it will smooth away and clean away a great many little bits that must be left behind.

I think we all feel that no one will disturb a healthy tonsil. We all see tonsils that are healthy; we all see adenoids that give no trouble. But the sooner a diseased tonsil is removed the better the patient is off.

Dr. Joseph A. White, of Richmond. As I understand Dr. Jervey's paper, it is a plea for letting the tonsils alone, unless it is absolutely necessary to operate. He claims that we do too much, operating on the tonsil. I do not think there is any question that we do. I think that surgeons do too much operating everywhere. We get in the habit of operating, and we do a great many operations that are unnecessary. I have taken that view for a long time in regard to operations for suppuration of the middle ear. And I think Dr. Jervey is correct in saying that we remove tonsils frequently when it is unnecessary. I have been operating as long as any man in this room, I suppose. I have removed a great many hundreds of tonsils and adenoids, and I think I have done it, very often, unnecessarily. I have come to the conclusion that we ought never to remove adenoids unless they are obstructive, and that we should never remove tonsils unless they are giving trouble. I do not apply that rule strictly. When I have to operate on children for removal of adenoids, if the tonsils are enlarged I am in the habit of removing them as well. Whether I remove them by tonsillotomy or tonsillectomy depends on circumstances. For many years I did only tonsillotomy. Tonsillectomy was not known. Today, in looking back, I find that in the hundreds and hundreds of operations in which I have done a simple tonsillotomy, I have had very little regret that I did it in that way, because I have seen very few cases of so-called regrowth of the tonsil, and very few cases among these hundreds of cases that have given any subsequent trouble. Today, I operate in children, in connection with the removal of adenoids, mostly by simple tonsillotomy. In adults, I nearly always do a tonsillectomy.
But in any case, I never remove a tonsil in children or adults that has not given trouble by attacks of tonsillitis.

In regard to the tonsil as a portal of infection, I do not know whether it has been satisfactorily demonstrated that the tonsils are always a menace to the general health, even when we have had tonsillitis and open crypts. Probably the most satisfactory explanation of immunization is that given by Jonathan Wright as the result of his investigations. He claims that immunization is due to the process of bacteriolysis, which is the destruction of micro-organisms by a peculiar ferment thrown out by the epithelium under the stimulation of the bacteria. Now, if anything happens to this epithelium, if it becomes defective, then we are liable to have infection through the tonsils. Of course, if we have repeated attacks of tonsillitis, with open crypts, I admit that then the tonsils become a possible source of danger from infection. Otherwise I do not see why the tonsils should be any more dangerous to the general economy than any other mucous surface.

If I can judge by what has been said, I think Dr. Jervey has made a bold stroke at what we might call the "tonsillar phobists," those who say that every tonsil that exists in a child is an abnormal quantity and should be removed forthwith. These radical men have taught us one thing, however, and that is to do more efficient work where the tonsils require removal. There is no doubt that in previous years, before excessive radicalism became rampant, we were not doing thorough work in removing tonsils by tonsillotomy. If a tonsil demands removal on account of a diseased condition, it should be removed in the most thorough manner. There is no necessity for leaving any of the mass.

This mass can be removed most thoroughly in various ways. The removal of the tonsil by the method which is known as finger dissection will show Dr. Jervey if he has not attempted it, and if he has he will agree with me, that adhesions as such exist in very few cases. Occasionally we will find adhesions between the pillars and the tonsil, but in the great majority of cases there are none of what you might call adhesions between the pillars and the tonsillar masses. In fact, I have said often since I have been doing tonsillectomy by finger dissection that adult tonsils—those in which you would expect to have firm adhesions on account of frequent attacks of tonsillitis, both of the follicular and suppurative type—come out as easy as, if not easier than, tonsils in children, and as completely. I do not know why, but I find that it is at times more difficult to get in between the anterior pillar by this method in very young children than it is in older children and adults—I mean children two, three, or four years of age.

I think there is no method that is so satisfactory in the removal of tonsils, from the results gained, as the removal of the tonsil with its capsule, entirely by finger dissection. It is done quickly, it is done easily, and it gives a most satisfactory result. The only unpleasant feature of it is that there seems to be more traumatism, and that the after period of recovery is more protracted and more painful than by tonsillotomy or other methods.

I agree with Dr. Jervey most emphatically with regard to the use of the finger in all cases of adenotomy. It is a procedure which I have always adopted and always carried out. In fact, I examine and make these inspections with my finger before, while I am working, and after I am through. My finger is in the pharynx most of the time while I am working.

Dr. Christian R. Holmes, of Cincinnati. I was very much interested in the statement that the blacks seldom had enlarged tonsils, but that has been controverted by other gentlemen in the discussion. We know as ophthalmologists that the blacks do not suffer much from trachoma. It occurred to me that as there is a gland tissue in trachoma, the absence of this disease in the colored race might have some connection with the infrequency of tonsillar enlargements in that race.
DISCUSSION.

When the tonsil is once diseased, it becomes a pathological laboratory, as we might call it, becoming infected from time to time, creating fever, relaxation and great depression after each attack. Then it is a different question. Those of you who have studied the matter thoroughly will realize that in a very large percentage of these cases they are well for a few weeks or months, but they have two or three attacks a year, or sometimes more, and if it happens to be a streptococcus infection, you know that they have a protracted depression that lasts for weeks afterwards. Now, if it is diseased, why should it not be operated on just like disease of any other part of the body. And then comes the question of removal. That is a matter of opinion. I do not care how you remove them if you remove them thoroughly. But if we have pathological tissue, why should we remove a part of it and leave the rest to give trouble afterwards. If you have a cancerous growth (or if you have a non-malignant tumor that is likely to occur again after you remove a part of it, you are going to be mighty careful to remove all of it. You are going to remove every vestige so as not to be troubled again. I would apply the same practice to the tonsil. I am a firm believer in the radical removal of the tonsils. I did not rush into it in a hurry, for I have operated for twenty-odd years, and not until two years ago did I begin the radical removal of the tonsils. I am as firm a believer in that now as I am in the radical mastoid operation. If I am going to remove a tonsil that is diseased, I am going to see that it is all out, because no one can convince me that a part of a diseased tonsil is necessary in the human economy. I do not believe any one can show me a case that has had any deleterious results from the radical removal of pathological tissue in the tonsillar region. Now, those factors being brought out, I see no excuse for not making the operation if it is necessary, always, however, with the reservation that we do not operate on non-pathological tonsils. So I am a firm believer in the radical removal.

I have not done the finger dissection. Dr. Richardson this morning showed some specimens taken out that were very beautiful. They looked like small walnuts, and the capsule was there. I have seen the operation attempted by some men—not by Dr. Richardson—and it was not sufficiently surgical to induce me to attempt it so long as I had instruments to do it with. I do not quite see how you can take out some of these mushy, broken-down tonsils with your finger as well as you can with the proper instruments. At the same time, that does not mean that I am not open to conviction.

I have recently learned from Dr. Neumann a point in the removal of the tonsil that was of great interest to me and which I shall use hereafter. That is, in the adult when we remove the tonsil you know that we have all been in the habit of making three or four injections of cocaine and adrenalin. Now, he saw me operate, and he said he thought his method would be a little simpler. He takes one c.c. of a 1 per cent. cocaine solution, one-half of which is normal salt solution, and to this he adds two drops of a 1 to 1,000 solution of adrenalin or suprarenalin. Then he injects with a curved needle right into the centre of the tonsil and pushes the needle clean down to the capsule, or even through it, injecting this quantity into each tonsil. The patient—and there is the secret, gentlemen—must wait twenty minutes. If you have several of them you can make two or three injections and have them wait. It does not matter if they wait thirty minutes. They should not wait less than twenty minutes. When you come to operate you will find that it is blanched around the tonsil. I have made the other operations right along, but they are not free from pain. But with this method all the patients except a very nervous woman will declare it to be absolutely painless. I mention this for the benefit of the gentlemen who have not used it. I have used it eight or ten times, and it has been entirely satisfactory.

The function of the tonsil is not known certainly. We do know that patients are perfectly well after having it removed. They never
THE TRUTH ABOUT TONSILS AND ADENOIDS.

have any symptoms afterwards. If the tonsil is pathological and a menace to health, we are justified in removing it. In my experience, the tonsil is a menace to the middle ear and the eustachian tube, and since I have begun the radical removal of the tonsil I have had the best results, something beyond anything I had ever hoped for in chronic middle ear catarrh and in tinnitus, and if for no other season, I shall make that operation in all of those cases, submerged tonsils or otherwise, especially the submerged, of course. Wherever there are tinnitus, frequent attacks of tubal swelling, and well advanced cases of catarrhal middle ear trouble, the best thing we can do for that ear is to remove the tonsils if they are radically diseased.

Dr. I. M. Hurd, of New York city. The general impression seems to be that interference with breathing is the main indication for removing the tonsil. I think what is more important is whether the tonsil is diseased. A manifestation of that diseased condition is septic absorption by the cervical glands. Most of the tonsils I take out are of the small submerged variety. Children are sent to me by the school inspectors for removal of their tonsils, and I send them back right along with a note that they do not need removal. They may be large, but if they are perfectly free in the fauces, with no history of tonsillitis, I consider them normal tonsils. The size has nothing to do with it. The smallest tonsils I have taken out have often been the most diseased. Where a tonsil has lost its resistance to such a degree that the tonsillar lymphatic glands at the angle of the jaw are enlarged I consider that that tonsil should come out, and should come out in its entirety.

I do not find many adhesions. The attachment of the tonsil to the pillars is quite strong, and after you once get through the attachment to the pillars the fibrous capsule of the tonsil is very weak indeed. I do not remember having experienced any adhesions, except in cases of chronic quinsy. There we have fibrous contraction and adhesions from the old abscess. But in the ordinary tonsils, where they are chronically inflamed they do not have adhesions of the capsule to the constrictor muscles.

I think that one of the most important indications in both adenoids and tonsils is the condition of the cervical glands. Every child has an adenoid. That adenoid may obstruct breathing. Take it out. It may not obstruct breathing, but that child may have a chain of glands running down posterior to the sterno-mastoid muscle which are enlarged. That adenoid ought to come out regardless of its size. The same with the tonsil. I feel the neck first and look at the adenoid and tonsils afterward.

Dr. Thomas Chew Worthington, of Baltimore. I think the conclusions which men reach are very remarkable. Here are a number of men working in the same specialty and they have reached entirely different conclusions. I think in this case it is in a measure geographical. Dr. Jervey lives in a much better climate than we do who live further north. Certainly the Maryland negro is blessed or cursed with tonsils. They almost universally have large tonsils and frequent inflammation of these glands.

Now, about the tonsillar operations. To my mind, no surgeon would operate on what he believes to be a normal tonsil, unless it is obstructive, and then it becomes an abnormality. So, I think the question of universal tonsillectomy or tonsillotomy should not be brought up. It is a matter of judgment.

I am very glad to see Dr. Holmes take the stand which he has, because while, like Dr. White, I have worked for many years and in former times taken out many tonsils with the tonsillotome, I do not do this operation now, because it has been clearly demonstrated that tuberculosis, rheumatism and other diseases may enter the body through the tonsil. It would, therefore, (to me) be simply ridiculous to amputate a tonsil when it should be removed.
DISCUSSION.

As to the adhesions, I frequently find the margin of the anterior and posterior pillars adherent to the tonsil, so that my experience again differs from that of some of the gentlemen who have spoken on this subject. I have never felt like doing a tonsillar dissection with my finger, because I feel that I can do it cleaner and with less reaction with a knife as sharp as it can be made.

The secondary hemorrhages which I have had have been only in those operations done under local anaesthesia with cocaine and suprarenalin. I now use ether entirely, have a good anesthetist and assistants, and have practically no bleeding. Any vessels that bleed can be caught up and tied if necessary, so that I want to be put on the side of Dr. Holmes, that this is a surgical operation, and that we should do as near a tonsillectomy as we can. My cases, however, sometimes astound me, for when I have evidently removed the tonsils thoroughly, after a certain time has elapsed I may find that I have either not done a complete operation or there has been a return of tonsillar tissue. I have found it sometimes very difficult to remove the stump of an old tonsil, and if much bleeding occurs it is usually in these cases. But with properly constructed forceps the vessels can be taken up or clamped, which gives an almost bloodless operation.

Dr. Joseph C. Beck, of Chicago. With me the question of whether or not a tonsil is diseased is determined in the laboratory after operation. I find that there are very few healthy tonsils that I have ever removed when judged from the standpoint of their epithelium, as brought out by Dr. Wright. The epithelium in these tonsils is invariably diseased. Such a tonsil is a portal for pus infection and should come out. I think the indications are very clear in these cases, with a history of repeated attacks of tonsillitis and other general pathological conditions.

The condition of the glands in the neck is a very important point, for when the tonsil has lost its function of arresting infection, the glands do the rest of arresting the infection. We all know how these glands in the neck disappear after removing the tonsils and adenoids. That is a very important fact in doing radical work. If you do an imperfect operation, leaving a stump in for infection, these glands will persist and increase in size, suppurate, and they are then often called tubercular glands. You will find in many instances there is no tuberculosis in them. It is simply a low grade of staphylococcus infection. It undermines the vitality of the patient, and there may then be a secondary infection with tuberculosis.

As far as the adenoid is concerned, I am a stickler for the forceps of Brandagee, and I am sure with that operation you do not leave anything of importance behind. You use force enough to engage the adenoid. An unfortunate thing is that you sometimes have to tear the tissue away. I believe there are pieces of lymphoid tissue around Rosenmueller's fossa left after operation, which are of no importance. There are lymphoid masses where no instrument will engage them, but they do not play any great part in the pathology, when left behind.

In children it is necessary to use an anaesthetic. An adult will sit up and allow you to operate under local anaesthetic, in almost every instance.

I use the finger in my dissection on children, but guard the finger with gauze. After the initial incision is made up to the capsule, if you will put a piece of gauze over your finger you can dissect the tonsil out easily. There are no adhesions except the natural fibrous attachments to the anterior and posterior pillars. At the base, where the fascia is, there is a natural adhesion, and at this point is the difficulty in doing the complete finger dissection operation.

The Doctor spoke about secondary hemorrhage. In adults I use Dr. Pynchon's tonsil syringe principally. By making the injection into the tonsil opposite the alveolar process you seem to meet the descending palatine nerve, and if you happen to hit the proper spot you have
less pain than if the injection is made elsewhere. I have noticed that in a number of cases. I use a few drops of a 1 to 1,000 adrenalin solution along with a 1 per cent. cocaine solution. A month or six weeks ago I had three cases in which I used the injection. In two of them I had considerable secondary hemorrhage, one of them rather alarming. The hemorrhage at the time of operation was very slight. I finished the operation at half past eight. At half past eleven I had a telephone message to come at once, that the patient was having a severe hemorrhage. This girl had had no hemorrhage for the first few hours. I have noticed secondary hemorrhage in a number of cases where I had used adrenalin. I must say I do not like to use it on that account.

No one has said anything about the position of the patient during the operation. I prefer to have the head low, because then the hemorrhage does not run into the larynx and the patient breathes better. The head of the table is placed at an angle of thirty or forty degrees. If not in that position, we have a sand bag put under the neck. In this position I notice the respiration is much better.

Dr. LaFayette Page, of Indianapolis. To determine when tonsils are diseased and when removal is necessary are constant problems before us that call for the exercise of our best and most experienced judgment, and I am glad Dr. Beck has directed the discussion to these points. We often find upon the removal of the most innocent looking tonsils that deep down in their structure necrosis has taken place; that they have been fruitful of unsuspected septic conditions. It has been so often demonstrated beyond question that tubercular infection, acute-articular rheumatism, and other general septic conditions are directly traceable to invasion through the tonsillar crypts that I question whether we are ever justified in leaving a tonsil without removal in any child subject to tonsillitis. The danger of the operation of removal is so insignificant compared with the ever present danger of infection that removal would be justified in every case.

In my mind there is no doubt about the method of removal in children. Complete enucleation with capsule intact is the ideal operation. In adults when the tonsils have undergone all sorts of inflammatory changes involving the pillars and surrounding structures we have a different problem. Complete enucleation of the adult tonsil is not so ideal in its results as some would have us believe. There is more or less contraction of the muscles and surrounding tissues, causing dryness and discomfort, following enucleation with the capsule. I have had singers and public speakers occasionally complain of these symptoms following the complete removal.

As to the frequency of enlarged tonsils and adenoids in the negro race, we have unusual opportunity for observation in our Indianapolis clinics, and find that hypertrophied and degenerate tonsils are very common in that race.

Dr. Linn Emerson, of Orange, N. J. With reference to the use of cocaine, I have been using alpyrin for the past year and a half with impunity, and do not have any of the effects I formerly had with cocaine.

Relative to the use of adrenalin I do believe, from observation of a great many cases four or five years ago, that its use is conducive to secondary hemorrhage. For the past two or three years I have made it a rule to give patients a weak solution of adrenalin, 1 to 10,000, to take home, eight or ten drops being put in the nose every two hours for two or three days. Since doing that I have not had any secondary hemorrhages. I believe it is perfectly harmless, and I believe it does away with the tendency to secondary hemorrhage following the use of adrenalin in nose and throat work.

Dr. John McCoy, of New York city. I have had a good deal of experience in teaching post-graduate students in the removal of tonsils, and the weak point that has been dwelt on here, in the finger enuclea-
tion, is the traumatism that is necessary. It has seemed to me that if the incision between the anterior pillar and the tonsil is properly made, there is a very slight amount of traumatism necessary, and the tonsil peels out of its bed like a nut out of its shell. Those men who are having trouble, if they will make a special point of seeing that the incision does not go into the tonsil, but between the tonsil and the pillar, will find it will peel out readily.

**Dr. R. Johnson Held,** of New York City. I expected to hear more discussion about the dry throat following complete enucleation of the tonsil, because that is quite an important thing, especially in singers. In many of these cases, especially where the constrictor muscles have been disturbed, it not only results in some dryness of the throat, but inability on the part of that individual to use his voice as well as before operation. I believe if a person is a singer, depending on his voice for a living, when removal of the tonsils is necessary that great care should be taken not to injure the anterior pillars.

**Dr. Sylvan Rosenheim,** of Baltimore. Two points that I wish to speak of are the technique of the operation and the secondary hemorrhage. To my mind, the dangers of the operation are the hemorrhage and the anaesthetic. Usually I do my operations under ether, and that danger can be largely eliminated by having an experienced anaesthetist.

The question of hemorrhage, I think, we can do away with altogether if we adopt the method described by Dr. Cohen; that is, after the operation is completed, sponges held on Kelly clamps are put in the fossa, and after being held there a second or two, one of the sponges is removed at a time, the fossa is observed closely, and if there is a bleeding point, it is seized with a Jackson forceps and then tied. I have slightly improved this Jackson forceps by adding to it Shoemaker's attachment, a little notch at the end to hold the ligature fixed and an attachment at the upper part of the forceps by which the ends of the ligature are held. It makes it extremely easy to tie the vessel. You simply put one finger down at the point where you have the ligature and bring the ligature taut as your assistant lifts the forceps a little. Usually I find that there are two or three places where you get bleeding. In dissecting out the tonsils very often at the base of the tonsil the fibrous tissue is very thin and you get right down to the muscle which is severed; running up and down the fossa vertically is a large vein, and that is frequently injured and is the source of a great amount of hemorrhage that comes suddenly. But by putting these sponges in as I have described, and then removing one at a time, the vessel can be easily bound and tied; frequently a small spurted is encountered about the middle of the fossa.

In regard to the dryness of the throat, I have never gotten that. All the cases I have had, I have asked in regard to their voice, whether it tires more readily, and they all say it is better.

**Dr. Jervis,** in closing. As to adhesions, I take the emphatic stand that they are observed in many cases. I do not refer to adhesions at the base of the tonsil, but to the very firm adhesions which are to be seen between the flap tonsil and the anterior and posterior pillars.

In regard to the presence or absence of tonsillar tissue in the negro, I do not deny its existence in the negro, but simply mentioned that I had observed the absence of embarrassing amounts of tonsillar tissue in the negro.

Dr. Holmes, I think, struck the key-note of the whole situation when he said that no man should operate on tonsils that are not pathological.
CALCIUM SULPHIDE IN THE TREATMENT OF AURAL SUPPURATION.

By GEORGE E. STEEL, New York, N. Y.

Calcium sulphide is a white, amorphous powder, having a disagreeable, characteristic odor, and alkaline in reaction. Exposed to light it possesses the property of remaining luminous in the dark, which has given it the name of Canton Phosphorus. It is decomposed by boiling water into calcium hydrate. In cold water the carbonic acid sets free sulphuretted hydrogen, leaving calcium carbonate. When taken into the stomach during the period of acid digestion, the sulphur is decomposed, setting free sulphuretted hydrogen, part of which may be ejected in eructations. Of the residue, the resultant sulphurous acid is absorbed, as well as the undecomposed portion. Both are good, for both are active, but the undecomposed product is the most disagreeable. Absorbed into the body, it is broken up, the sulphur appearing as hydrosulphuric acid eliminated by the lungs and skin, while the urine contains an excess of the sulphate. It stimulates the circulation and increases secretion, which is particularly noticeable in all glands and gland-bearing membranes. To obtain the best results, the drug must be in good condition. The preferable form of administration is in pills made by some reputable house.

The clinical studies recorded in the following paper were prompted by reading an article in the Medical Record of September 25th, 1909, by Clarence Usher, of Van, Turkey. Employment of the various calcium salts in many morbid states has received a new impetus since Wright's investigation of their influence on the coagulability of the blood. The calcium salts, particularly the lactate and chloride, possess, according to students of the blood, a very definite power to increase the coagulability of this fluid, and besides its employment as a prophylactic in hemorrhage, calcium has been tried in such widely diverse conditions as epilepsy, giant urticaria, and chilblains—whenever a lowered coagulability of the blood could be demonstrated.

The iodide of calcium has also received mention in the literature as a specific against pus processes in the body. The chloride
and sulphide have enjoyed alternate periods of popularity and obsolescence in general diseases as alteratives and resolvents; only the dermatologists have remained faithful. In skin diseases these drugs seem to possess a certain value. Furuncle, acne pustules, lupus, etc., are said to be favorably influenced.

As this paper is limited to a consideration of calcium sulphide and its action upon the ear, I will confine my remarks to this subject. Ussher's paper was so laudatory, and he seemed so positive of the remarkable effects obtained in all diseases which produce pus, that I looked up the literature to see if there was any authority for using it in chronic otitis; a considerable number of cases, of a very intractable type, being under my care at the Children's Hospital on Randall's Island. The first mention I found was a thesis written by Dr. James Archer, of Maryland, in 1864. This writer employed the carbonate, dry, and locally, in running ears, with a high percentage of cures. The use of the sulphur salt internally for controlling the process of suppuration was probably first noticed by Dr. Sydney Ringer, and published in his article in the Lancet in February, 1874. In 1879 Dr. Samuel Sexton, in the Am. Journal of Otology, advocated the administration of calcium sulphide in furuncles of the ear, even in presence of caries of the bone, periostitis, or extensive destruction of tissue. Adolphus Rupp, in the same Journal, (1882), reported 6 cases of acute purulent otitis media successfully treated with calcium sulphide. Dr. Gorham Bacon, in the Archives of Otology, 1883, in connection with a report of several cases treated with the drug, says: "In diffuse inflammation of the external auditory canal, and in mastoid disease, whether affecting the pneumatic cells, the periosteum or the tissues externally, great benefit will be obtained from its use." Bacon considers calcium valuable in patients of poor general health and lowered nutrition.

Most of the above reports, it will be noted, were of cases of acute otitis, and little mention was made of chronic suppurring ears. I find no report bearing on this phase of the subject subsequent to that of Bacon in 1883.

With the above data in mind I selected a number of the worst cases of children from my service on Randall's Island for experiment. It may be stated that these children are city charges and show, as a class, all the physical and mental stigmata, incident to their unfortunate condition. Alcohol, syphilis and tuberculosis contend for supremacy in their heredity, and consistent neglect
TREATMENT OF AURAL SUPPURATION.

has been their portion since birth. Aural suppuration in such children assumes a most intractable character. Before reaching the hospital the disease has often gone untreated for several months or years and dates usually from an attack of measles, scarlet-fever or diphtheria. Diseased tonsils and adenoids are present in at least 90% of the cases with running ears, but removal of these alone rarely results in a cure, because the destruction has gone too far or there is a chronic mastoiditis, or the child does not possess sufficient vitality to resist the progress of the disease. For the latter reason, also, operative measures directed to the ear itself show a smaller percentage of cures and a greater number of relapses than among children of a higher social condition.

Under these circumstances it was thought that calcium sulphide had a fair prospect of usefulness, since it is in just such cases that the drug is supposed to exercise its tonic and alterative virtues.

In all there were 9 cases to which the drug was given. The dosage was a quarter grain every 3 hours.

During the period of calcium sulphide medication all other internal medicines were suspended, but local treatment was kept up. Of the 9 cases 2 were cured, i.e., the ear stopped running. It must not be inferred that these damaged organs recovered to any greater extent than that which is represented by a cessation of suppuration. But this did occur in a very encouraging percentage of the cases.

Improvement was noted in all but one case. This improvement consisted either in a diminution in the amount of the discharge or a lessening of its offensiveness, or both, and was of sufficient importance to encourage us in the further use of the drug. No serious gastrointestinal disturbance was reported by the attendants. It is to be remembered, however, that a large dosage of calcium sulphide will produce unpleasant emanations from the stomach and skin. In order to give a concrete picture of the type of case likely to be benefited, I detail the following history. To multiply histories would be a waste of time, since all the cases present essentially the same clinical features.

Case Report. J. A., age 5, was admitted to the hospital in June, 1905, with chronic otitis media. Family history not obtainable. After a months local treatment without benefit, both tonsils and adenoids were removed. No diminution of the discharge was noted. From time to time the local treatment was
changed. Irrigations with bichloride solution, applications of silver nitrate, boric acid powder, 4 per cent formalin, hydrogen peroxide, and equal parts of alcohol and hydrogen peroxide were used in succession during four years without noticeable effect. In August of last year a double radical operation was done, but the discharge soon recurred, apparently from infection via the Eustachian tubes. In November he was placed on calcium sulphide, gr. 1/4 q. 3 hours, and within a week improvement was noted. This improvement continued until, at the present time, all discharge has stopped.

This case differs from the other, in showing improvement in postoperative suppuration. Cases of double suppuration in which operation had been done on one ear, showed as a rule greater improvement in the unoperated side, under calcium medication. As stated above, with one exception, there was marked improvement in all cases.

In conclusion, I believe it may be safely said that in calcium sulphide we possess a drug which will help us out in many cases of suppurring ears of an intractable nature. It should only be used as an adjunct to local treatment and not supplant this in any way. Nor should it replace other tried remedies such as iodide of iron, cod liver oil, etc., when these are plainly indicated. The drug will find its best application in children of the type indicated above. In the acute aural disease of the well-nourished child or adult it is less valuable. Finally, the drug should be fresh and kept under conditions that will preserve its activity.
FURTHER OBSERVATIONS ON SOME OF THE NEWER THERAPEUTIC MEASURES IN EAR, NOSE AND THROAT AFFECTIONS.

By JOSEPH C. BECK, M. D., Chicago, Ill.

At the present day, when enthusiasm is so great on account of the success of surgical intervention in our specialty, the nonsurgical measures fail to attract the average man unless positive results can be demonstrated by their employment. Unfortunately, there are but few specific remedies for specific diseases, such as, for instance, mercury, quinin and some of the antitoxins. Nevertheless, the diligent therapeutist who will conscientiously employ remedial agents which have been given to him by scientific men will find considerable satisfaction from their use.

While it is true that the greater number of chronic affections in ear, nose and throat are only to be relieved by surgical intervention, there still remains room for local and medicinal treatment, as for instance, where operation is contraindicated by some general condition or where operation is refused. Again, there are remedies to be used in after-treatment to operations, for it can be said without question that even operations do not always occasion the cure.

I have mentioned "chronic affections" because this paper deals with therapeutic measures principally employed in such rather than in acute diseases. It is not my purpose to go into great detail in any one subject, but simply to make a resume of my personal observations in the employment of these various remedial agents, hoping that the discussion will bring out some more points.

I have in previous papers made reports in extenso on several of these remedies; I now present my further observations, believing these to be of value, because every observer is more or less enthusiastic when trying something new, but later he becomes calmer and finds the true limitations of his experiments. I have divided this subject into six groups, as follows:

1. Therapeutic measures in chronic suppurative inflammations.
2. In chronic nonsuppurative inflammation.
3. In destruction of new cell formation or neoplasms.
4. In the production of new cell formation or epithelialization.
5. In the prevention of local and general infection.
6. In the influence of blood coagulation.
GROUP I. THERAPEUTIC MEASURES EMPLOYED IN CHRONIC SUPPURATIVE INFLAMMATION.

(a) Bier's Treatment.—After a thorough trial of this mode of treatment in chronic suppurative sinusitis, middle-ear suppuration and chronic follicular tonsillitis, I can positively state that many of my cases were influenced beneficially. Whether this improvement was due to the induced hyperemia and leukocytosis, or simply to the mechanical removal of the secretion, I am not prepared to say. I make use of the Bier's pump, to which there is attached a stiff-walled rubber tubing, and to this the various ear, nose and tonsil attachments, as shown in Figure 1. The construction band around the neck I have abandoned, as it is not so effective as the method employed.

(b) Vaccine Therapy.—After two years of faithful application in selected cases of chronic suppuration of the accessory sinuses, middle ear and chronic follicular tonsillitis, I am convinced that positive results or cures can be counted among the greatest rarities. I am equally convinced that the employment of vaccines in these conditions, associated with other treatments, is of marked benefit in
quite a number of cases. It appears to aid in the healing process as a general tonic, and it is with that point in view that I am making use of the vaccine therapy.

Establishing first the most predominating microorganism present in each individual case by cultures and smears, I obtain a vaccine of that variety, either by using one made directly from the culture, an autovaccine, or a stock vaccine which is generally of the polivalent variety. Since the staphylocoecus pyogenes aureus, albus, and citreus are the most frequent microorganisms found in these infections, I make use of the stock vaccine of these three types. I have discontinued the aid of the opsonic index and only go by the clinical manifestations, a rule that I have found practical, viz.: making injections about ten days to two weeks apart. It occurs sometimes that an injection is made at the wrong moment, known as the negative phase, when the patient will react locally and generally, so that his condition appears aggravated. This, however, lasts only a short time, when the beneficial results from the injection become manifest.

(c) Bismuth Paste.—The application of this remedy requires so much detail in carrying out the technic, filling the cavities of the nasal accessory sinuses and middle ear, that, unfortunately, it has not become popular. Thus far very few reports, except by myself, have been published as to its value or negative results in our special field; but in other fields of surgery there are so many splendid recoveries reported that I cannot help but make the following statement: I have been in personal communication with men who will say that they have treated sinuses diseases by the aid of the paste with absolutely negative results, when, on closer questioning, I find that they have attempted to fill the cavities by the aid of a collapsible tube introduced into the anterior naris. Having never read the technic of its application into these cavities, they certainly cannot expect to obtain any results. Again, there are gentlemen, who know all about the technic, who expect results which are impossible and never have been claimed for this treatment. About a year ago I made my first report on my experiments with this remedy, and today I can make the following positive statements, after very careful observation:

1. In the routine treatment of filling the cavities of the accessory sinuses and middle ear I use the bismuth paste No. 1, which consists of bismuth subnitrate, 33 per cent., and vaselin, 67 per cent. It does not require heating.

2. The original instrument for injection has been discarded because it was not practical, not made well, and a new one sub-
stituted. (Fig. 2.) This obviates the need of an assistant, is readily filled and the various tips and canulae are easily attached.

3. The small calibre canula is first introduced into the frontal, sphenoid or antrum, as any other canula would be, and the syringe attached by means of the bayonet joint. When injecting the middle ear the olive tip is used. A small rubber tubing is passed through the small side opening to permit the air to escape, and then the paste will return the same way, showing that every crevice as far as the aditus ad antrum has been filled. This I have proved in cases that I have operated on, as well as on a cadaver. The only exception is when there is a large eustachian tube. Then some of the paste will flow into the naso-pharynx.

4. When treating a case of chronic sinus disease in which such pathologic changes as polypoid degeneration of the mucosa or eventually necrosis of the bony walls have taken place, then the use of the paste, as well as any other non-surgical treatment, will have very little curative effect. I can say, however, without the least possible doubt, that while such sinus is filled with the paste there is less discharge and practically no odor.
5. Since the ethmoid cells are the most frequently involved or associated with suppuration of the other sinuses, and since these multicellular structures cannot be treated by the aid of the paste, it goes without saying that the middle turbinated body, as well as the ethmoid cell in most cases, are first removed.  

6. The thorough curettment of the antrum and frontal sinuses by external operation (Caldwell-Luc or Coakley), and subsequently filling with paste No. 2, consisting of bismuth subnitrate 30 per cent, vaselin 60 per cent, white wax 5 per cent, paraffin 5 per cent, has been absolutely satisfactory in eight cases out of eleven. I have had the opportunity to open an antrum secondarily, that I had thus treated, and found after five months the cavity was entirely obliterated by a mass of connective tissue.  

7. As a primary dressing, after removal of the middle and inferior turbinate bodies, cautery of the inferior turbinate body, cauterizing bleeding septal ulcer, I have never had better results from any other means of treatment than this one. It aids in the clotting of the blood and prevents adhesions from forming. It does not prevent drainage—in fact, aids it—and secretions will not so easily decompose. It is disagreeable to some patients when the paste drops into the pharynx; however, that is only for one treatment, and it cannot be classed as a valid objection. As a primary dressing I use No. 2 bismuth paste, and employ the olive tip attachment to the syringe. Patient closes postnasal space by the act of swallowing.  

8. In atrophic rhinitis, dressing after submucous operation, I have discontinued its use, because it is not as good as other accepted methods.  

9. Results from chronic suppuration of the ears have not been any more successful by this means of treatment than any other local measure, and the pathologic anatomy is sufficiently well known to explain the reason. At the same time this treatment is certainly as effective as any other palliative measure, and, as for the odor, I have found that it is very well influenced in many cases by the paste. The objections to the possible blocking of the drainage is absolutely not valid; if anything, the drainage is promoted, and in several hundred injections I have never had the least symptom of retention or of bismuth poisoning by this mode of treatment.  

10. It must not be forgotten that injection after a time must be suspended, the ear dried and packed with gauze, so that one may
see if it is healed. As long as injections are made, there will always be some secretion.

11. In the mastoid operations I discontinued its use as a primary dressing, but in subsequent dressings I use gauze impregnated with the paste as a packing with good results. Here, too, I stop after a time to substitute either dry gauze pack or gauze impregnated with scarlet red powder or salve.

12. I have discontinued its use in chronic follicular inflamed tonsils, which I had injected a number of times, owing to the fact that patients were not cured of their repeated acute attacks; I recommend removal of the tonsils.

(d) Superheated Air or Oxygen.—About eight years ago I made a report on the use of superheated medicated air in a number of chronic suppurative conditions of the nose and ear, with demonstration of an instrument for that purpose. I had some good results from its use, but inadvertently dropped it, until I began to notice the reports of Prof. Bier, Lermoyez and others, when I again took it up. Instead of using air, I have a tank of oxygen, which
FL'RTHER OBSERVATIONS.

348

has additional therapeutic value. I have also since modified the heating apparatus, using a miniature oven instead of an electric lamp. (Fig. 3.) The air and current pass through one tube, simplifying its handling, and the air and electric current cut-off can be made independently.

I have found this treatment of particular value in the cases where the secretions were thick, scanty and where considerable pain was associated.

I believe that the heat acts as the Bier treatment by hyperemia and leukocytosis, and the oxygen as a possible bactericide.

(c) Vapor Therapy.—This very much neglected but valuable therapeutic measure in chronic suppurative diseases of the nose and throat is, I believe, worthy of more attention. In cases of laryngotracheitis suppurativa this treatment is of a special value.

In cases of atrophic rhinitis, especially where the symptoms of odor predominates, I have found the use of the vapor of distinct value to control the same.

I employ the Bullings thermo-regulating inhalation apparatus (Fig. 4), which permits of giving the patient different degrees of heated medicated vapor. Compound tincture of benzoin, normal salt solution or Ems water has been the vehicle I used. For the past three months I have experimented with a solution of radiolum, a radioactive water, but it has not had any better effect than the other remedies.

GROUP II. THERAPEUTIC MEASURES IN CHRONIC NONSUPPURATIVE INFLAMMATION.

(a) Fibrolysin.—In 1902 I reported on the use of thiosinamin in the adhesive inflammations of the middle ear, with the report that the tinnitus aurium appeared to be favorably influenced in some of the cases. I also called attention to the disagreeable symptoms, as well as the painfulness of the alcoholic injection. I was compelled to discontinue its use in a great measure. About two years ago Mandl brought out the purer remedy—salicylate of thiosinamin—which he calls fibrolysin, for the same therapeutic purposes. I at once began to use it in my practice, and found it to have none of the disagreeable effects that the pure thiosinamin has. In order to determine the value of this remedy, I have tested each case carefully and controlled these tests from time to time, making exact records. All kinds of middle-ear inflammations of the adhesive type were treated. that is, recent as well as old, those that had other treatment and those that did not.
Also some cases of pure and clearly diagnosticated otosclerosis. It is needless to say that they were classified, but it is not necessary for me to make a detail report here. I have also watched with interest reports of this remedy in the non-suppurative inflammation of the ear by other men (England and Austria), and find great difference between their results and my own in that they seem to be so successful, while my results were far from that. In 48 cases, 876 injections were given into the muscles of the arms. Usually one ampulla every other day. My procedure is as follows: Rx. fibrolysin (Merk's)—one original box (10 ampullae).

**FIGURE 4.**

Sig.: for physicians’ use. The patient’s name is written on this box and kept for him only. When the 10 ampullae are used up (within three weeks), another hearing test is made. A second box is employed in the same way, only at each injection a local treatment, as inflation, etc., is given in addition. At the end of the next three weeks, when the second box is used up, another hearing test is made for control. If no improvement follows at the end of this period, one may put that patient in the class of "doubtful improvement" and continue the treatment for another six weeks. If at the end of that period no improvement follows, then treatment may be discontinued. If it is found, after the one
box is used up, that there is a marked improvement, that is, before inflation is employed as an adjunct, the case is in the "curative class," and one may expect definitely good results. The injections in these cases are continued until the patient is cured or until the hearing remains stationary. Unfortunately, this class of cases belongs to the greatest rarities. As to the symptoms of tinnitus aurium and dizziness and vertigo associated with deafness, I can positively state that these symptoms have been markedly influenced in quite a number of my cases. Summing up, I may say that, like so many panaceas for this chronic affection that have been advanced, this, too, falls far below its expectation. If, however, the pathology of adhesive inflammation of the middle ear and secondary labyrinth involvement is correctly interpreted, then this remedy, which is positive and specific in softening scar or connective tissue, is the proper agent to be employed. Of course, the products of the chronic inflammation are expected to be absorbed, and to this end an addition of idodin has been suggested. My own experience with a remedy, known as tiodin, is given below:

In the cases of pure otosclerosis, four in number, I have had absolutely no result on any of the symptoms after a very long-continued treatment.

(b) Tiodin.—This preparation is composed of thiosinamin, pure, and iodin, in ampullae, the same as the fibrolysin. The technic in the treatment is the same as when using fibrolysin. In nine cases in which I employed tiodin there was absolutely no effect from this treatment, whereas, when, after some months passed, I started with the fibrolysin, I had two cases react favorably, and four more improve considerably. The usual symptoms accompanying the use of thiosinamin or fibrolysin, as burning along the arm after injection, the tired and sleepy feeling, followed by the sense of well-being, were entirely wanting, and I must say that many a time I looked with suspicion on this fine French preparation.

(c) Dionin.—This preparation is better known to the ophthalmologist than to the otologist as to its action on the conjunctiva. There it produces an artificial edema lasting from five to thirty minutes. Arguing from analogy, I decided to employ it by injecting it through a Weber-Loehl catheter into the middle ear, and in two cases directly through the perforations into the cavity of the middle ear. I could never observe any such action in the ear as
in the eye, nor were there any results from these experiments. I
desire to mention this negative result simply because Randall,
some time after I had made my experiments, but before I pub-
lished them, described the action of this agent and his results.

GROUP III. THERAPEUTIC MEASURES IN THE DESTRUCTION
OF CELL FORMATION AND NEOPLASMS.

(a) X-rays, Radium and High Frequency Currents.—The em-
ployment of these three remedial agents has in the last few years
been very much advocated in our specialty in cases of local tuber-
cular diseases and neoplasms, especially the malignant types. I
have treated quite a number of cases of glands of the neck, sup-
posedly tubercular, with very slow and not permanent disappear-
ance of them, by the aid of the X-rays; malignant disease, as car-
cinoma of the auricle, external nose and lip, mouth, tonsil, tongue
and larynx, without any effect. Some of these cases were treated
also by means of radium of one million radioactivity without the
slightest effect. The case of carcinoma of the middle ear, follow-
ing recurrence after operation, I treated by the high frequency
currents and by the method spoken of as fulguration. It was
necessary to cocainize the parts thoroughly before treatment, be-
cause the sparking required is very painful. This treatment
appeared to be effective for a while, but the final outcome was
fatal. Therefore I may state that, with the exception of lupus,
which is very well influenced by the X-ray treatment, the other
affections mentioned are either slightly or not at all benefited by
the radioactive treatment in my hands. I may say that this treat-
ment is carried out painstakingly by my radiologist under my
care and observation. Furthermore, the one condition that is
benefited by the X-ray treatment that I have mentioned, namely,
lupus, is much better treated by what I shall next describe.

(c) Carbon Dioxide (Snow).—This remedial agent, principally
used by dermatologists for removal of moles, warts and other
blemishes, has also been advocated in lupus vulgaris. I have
treated one case that resisted all other means of treatment, includ-
ing the X-ray, which is now practically well by the aid of snow.
The technic is to prepare sticks of compressed snow from a tank
of carbon dioxide, either in a chamois skin or a specially devised
compression apparatus that I use. Pressing these pieces of snow
over the affected area firmly for a few seconds (3 to 5) until this
area is snow white constitutes one treatment. Different areas are
FURTHER OBSERVATIONS.

thus treated at one seance. After one week the treatment is repeated, and so on until the condition is either better or worse, when the intervals for treatment will be lengthened. If the parts develop too great an erythema or reaction, one must wait until that disappears, although a certain amount is to be expected. I have also treated successfully by this means a mole of the pinna and a bleeding papillomatous polyp of the vestibule of the nose.

GROUP IV. THERAPEUTIC MEASURES TO INFLUENCE COAGULATION OF THE BLOOD.

Serum.—It was found that when pure serum or any of the antitoxins of diphtheria or the streptococcic serum are injected into the system of the patient his blood is more active in clotting. Having noticed some reports of the value of this remedy in grave hemorrhages, I had occasion to try it in a small number of cases. It is very difficult to prove my contention, unless I would have employed the clotting tests by the elaborate methods, but I am quite certain that the cases were very materially influenced by the injection of 10 c. c. of serum, once anti-streptococcic and twice anti-diphtheric.

GROUP V. THERAPEUTIC MEASURES IN THE PRODUCTION OF EPIDERMIS.

Scarlet Red.—The interesting experiments that led to the discovery of the action of this remedy are too lengthy to dwell upon here, but I may say that they were scientifically proven and accepted. When a quantity of scarlet red, which is an anilin dye, comes in contact with a granulation surface, and there is in the vicinity an epithelial margin, there will result a positive and rapid migration of epithelial cells. After having read of the splendid results in amputation stumps and ulcerations of the leg, I decided to employ it, and am prepared to state that in every instance have I demonstrated rapid epidermization of raw surfaces. The conditions in which I used it are:

1. After-treatment after radical mastoid operation.
2. Small perforations of the tympanic membrane.
3. Small ulceration of the septum, especially after operation in one case of a small perforation, causing whistling.
4. Tubercular ulcer of the skin in an incision following resection of tubercular glands.

The technic is to apply either the powder or a 10 per cent. ointment over the area and keeping it in contact for forty-eight hours.
when it is again changed. In the perforation of the tympanic membrane there was no trichloracetic acid used.

**GROUP VI. THERAPEUTIC MEASURES IN THE PREVENTION OF LOCAL AND GENERAL INFECTION.**

(a) *Tincture of Iodin.*—This old therapeutic remedy has in the last two years sprung into great prominence in the preparation of the field of operation. I have in all my cases in the last year and a half, just before operation, covered the surfaces with 10 per cent. of the tincture of iodin in alcohol without first scrubbing or washing the parts. If it is an operation of choice, that is, a mastoid, external sinuses, face or neck operation, then the parts are thoroughly scrubbed the day before, but in emergency cases I do not scrub at all—only wash with alcohol and ether, followed by tincture of iodin. There results less infection of the skin after operation. I have lately adopted the practice of painting the mucous membrane of the nose and throat with the tincture of iodin before operating, after the parts are thoroughly cocainized; also the vestibule of nose and external auditory canal before operating in the nose or ear.

(c) *Urotropin.*—The second remedy is the routine employment of urotropin before and after operations on the nose and ear. Cushing and others of Johns Hopkins Hospital found this remedy of value in preventing and curing infection of the cerebrospinal fluid when given in very large doses, say about 100 gr. daily. They advanced the idea that this drug, in liberating a free formalin in the blood, reached the cerebrospinal fluid and caused it to become less liable to infection.

Since the reports of these gentlemen I have employed urotropin in large doses before and after each operation of the ear and nose, especially mastoid and sinus diseases. The proof that any case of infection was prevented is impossible in my experience, except that I have had no ease complicated by meningitis, and some cases that came with this symptom appeared to be beneficially influenced by urotropin.

**DISCUSSION.**

Dr. Christian R. Holmes, of Cincinnati. I have had a very great interest in the hot air treatment for many years. In fact, if any one will produce an apparatus which will deliver a continuous stream of hot air, medicated or plain, at a given temperature, I will give five hundred dollars for it. I have made that offer before, but no one has taken me up. I have never seen an apparatus that will do it. You can get the hot air for a moment, and then it gets so very hot that the
patient complains, or the temperature lowers the moment you begin
to use it. The trouble is that the air is sent in under a pressure of
fifteen to thirty pounds to the square inch, and the moment that it is
liberated the temperature drops. Years ago a gentleman in Cleveland
had a big cylinder wound with electric wires, and the current passed
through there, and I used that. I have used some I found abroad.
Another one that I have used is one that I found at Atlantic City at
one of the air exhibits there. I believe it would be a very valuable
adjunct in acute sinusitis and middle ear trouble. But the difficulty
is that we cannot deliver the hot air at a given temperature. Perhaps
it is better to use it, inefficient as it is. But I have discarded it, for
the present at least, hoping we shall soon get an apparatus that will
do the work continuously.

I have had some experiments carried out by my assistants with
thiosinamine, especially for tinnitus. The results were absolutely
negative in my hands.

I have had little experience with the X-ray. I say little, because I
have never received much encouragement from it. I have, however,
seen some very serious results because enthusiastic X-ray advocates
had promised the patient relief. I have seen several malignant cases
that might have been radically removed, go on for five or six months
under ineffectual X-ray treatment. If these had been operated upon
there would not have been a question but what they would have been
saved. As Dr. Beck has said, in lupus it is a different proposition, but
unfortunately we have many men who are led astray and believe the
X-ray will cure almost anything, and I have seen some disastrous
results following that.

Dr. Dunn. I should like to ask Dr. Beck if he knows the chemical
composition of the scarlet red.

Dr. Beck. Yes, I do.

Dr. Dunn. Is it one of the anilin dyes, and is it acid or alkaline?

Dr. Beck. It is acid in reaction.

Dr. Dunn. The reason I ask the question is that the anilin colors
with an alkaline base, if left in contact with the mucous surfaces for
any length of time are escharotic, and those with an acid base are only
slightly so, or not at all. I was interested to know which this scarlet
red was.

Dr. J. W. Jervey, of Greenville, S. C. I did not have the pleasure
of hearing all of Dr. Becks paper, but in view of some very remarkable
results I have recently had in a limited number of cases with the use
of the preparation of the bacillus bulgaricus in chronic middle ear
suppurative conditions, I should like to ask Dr. Beck if he mentioned
that among the newer remedies, and if he did, if he has had any
experience with it—the preparation I refer to is known as massolin,
put up by Schieffelin & Co. The results I have had with it in a few
cases have been in some measure astonishing, though my experience
with it has not been large enough as yet to draw conclusions, and I
would like to hear if any of the gentlemen present have used the
preparation.

Dr. D. A. Kuyk, of Richmond. I have used the massolin, and my
experience with it is diametrically opposite to that of Dr. Jervey. I
have used it faithfully in chronic suppurative conditions about the ear,
and in three cases of antrum trouble, and without any results that I
could notice. If the doctor would give us the technique that he
employs. Perhaps it is entirely different from the manner in which I
used it. I should like very much for him to tell us just how he
used it.

Dr. John McCoy, of New York City. As to the use of serums for
producing coagulation of the blood: I should like to report that in a
talk with Dr. Welch, who is a pathologist at the New York Lying-In
Hospital, he informed me that at that hospital they were now using injections of human serum in babies who were afflicted with hemorrhages—that is, a certain proportion of babies, I believe, have a hemorrhagic diathesis, and they bleed from the cord, the intestines, under the skin, etc., and in many cases it seems almost impossible to stop the bleeding. He has had very remarkable results in curing these babies who otherwise would bleed to death. However, he attributes the results to the effect of the serum on the endothelium, rather than to any clotting effect on the blood itself.

Dr. S. J. Kopetzky, of New York. I spoke this morning about the use of the bacillus bulgarici in the ear, and said that my experiences with it had not been pleasant. I simply referred in the discussion to its use in the nose, and incidentally cited the bad effects I had had with its use in the ear. In some of my cases a general infection resulted, but whether the growth was contaminated or not, I do not know. They were prepared by our hospital pathologist and used in chronic ear suppurations, but gave no good results at all.

In reference to all of these newer remedies, the gentlemen must bear in mind that when we use a remedy for experimental purposes we follow the cases a great deal closer than we do cases under the usual routine treatment. Perhaps the more enthusiastic reports are due in part, at least, to a closer attention to these cases while we are in the experimental stage with our new agent. For instance, the cases that Dr. Steel reported which cleared up under the use of calcium sulphid after having had no treatment for months, and then after being operated on in one ear, the other ear cleared up following internal administration of calcium sulphid—the fact is, that those cases were receiving a great deal more attention during that particular time, because he was interested in the drug, and a certain amount of success must be put to the fact that they received closer attention than under routine treatment.

As to fibrolysis, after the enthusiastic reprint we received from abroad about a year ago, I used it both by local injections and through the eustachian tube, but without any good results. However, I think it is a good thing to try these things, because we know nothing about them until we have tried them.

Dr. John F. Culp, of Harrisburg, Pa. In regard to the use of radium, I recall a case now of cancer of the ear in which the entire ear and all the tissues adjacent were removed by operation. There were two or three operations with recurrence. Finally, in despair, this lady was exposed to the radium treatment, and for a while it seemed to do quite a little good. It cleaned up all the tissues, and made apparently a healthy granulating surface. But that was only a temporary condition, and in the course of a little while the disease came back worse than ever.

Dr. E. B. Dench, of New York City. In regard to the use of radium, I wish to mention a case in which Dr. Abbe asked me to do the operative bone work. It was a case of extensive carcinoma of the temporal bone and of the soft tissues in the ear. I removed the bone as I thought very thoroughly and exposed the dura in the middle fossa. When the dura was exposed there we found it covered with granulations, undoubtedly due to an extension of the malignant disease. Dr. Abbe said that would do no harm, because he could take care of anything in the soft tissues with radium. And he made good. There has been no recurrence there. At the lower angle of the wound there was a recurrence in the bone, and about four or five weeks ago I removed the bone posteriorly, and found that the disease had involved the sinuses. The radium is now being used in that region with absolute success. Apparently in certain malignant growths the radium is good if the disease is confined to the soft tissues. It has absolutely no value if bone is involved.
Dr. Beck, in closing. I made this report today at the instigation of a number of gentlemen who tell me that I am out with something new all the time, but that they wished to hear about it again. If you will look over my original report with reference to some of these remedies, you will see a great deal of difference. I am not ashamed to change my mind if I am mistaken. As Dr. Kopetzky said, we do get enthusiastic and pay more attention to the cases when we are trying out a remedy. That point was brought out in one of the New York Society meetings in regard to the bacillus bulgarici. One of the gentlemen said you watch the case more and that is the reason it gets better. That struck me very forcibly.

Now, my report today is adverse with reference to some of the remedies that I have reported upon previously, and still there are a good many good things about all these remedies that I hold onto just the same. But where I find they are of no value I throw them out and pick up something else. We all know that one remedy is not a panacea. We try one thing and it is no good, and then we try something else that is good. Prof. Neuman says to me, "Beck, you try everything." That is true. I have the opportunity and the clinical material, and I see no reason why I should not. But I try only those things that are given to us by scientific men. I have, however, never tried the bacillus bulgarici to the extent that I could give any opinion of value.

I asked Dr. Neuman to speak about the scarlet red, because he made the statement to me personally that it covers over unhealthy bone, and I am watching that. I can see clearly that the mastoid cases I have dressed in this way show a very rapid epidermization, which may not be a desirable thing if the bone is not entirely healthy.

Now, as to this heating apparatus: This apparatus that I showed you will regulate the heat better than any other. An irregular amount of heat in chronic cases will produce a hyperemia and leukocytosis, and that is what I use it for. I use it directly through the perforation. In acute cases I think it would be contraindicated. In such cases the heat would relieve the pain, but you already have an excess of hyperemia.

As to the composition of the scarlet red: It is an acid base, and the result is from the amidazoletolinol. That is what causes the epithelial formation. Just like the malachit green that Herring uses in tuberculosis. The color has nothing to do with it. Unfortunately, it is colored, and stains the ear, but can easily be cleansed.

As to fibrolysin, I have had benefits from its use in tinnitus aurium and dizziness. Dr. Kopetzky says he does not see how it could have any effect. As a matter of fact, by its use you can stretch a Dupuytren contraction of the hand or a stricture of the urethra, which proves its fibrolytic action. You can prove that it does act by examining the blood. It produces a mononuclear leucocytosis, and it should act on the ear as well as any other place, if the change is a fibrosis, and Neuman and others have shown histologically that such is the case.

Urotropin has been alluded to by several of the gentlemen. Dr. Neuman has stated that he did not see any results. From the reports and the few cases I have had I am convinced that it does do good.

The serum in the treatment of bleeding must be free from anaphylactic properties. If you use pure serum or horse serum which has not been properly prepared you will have the unpleasant effect of a deep cyanosis following the injection. I had one case of bleeding from an epulis in which I used the serum with excellent results.

Dr. Kopetzky. Do I understand Dr. Beck to say that fibrolysin acts in so-called oto-sclerosis?

Dr. Beck. I stated definitely that there is absolutely no change then. It should not act if oto-sclerosis is what we understand it to be, not a fibrosis but ostetic changes of non-inflammatory type.
SOME OBSERVATIONS UPON THE REMOVAL OF THE MIDDLE TURBINATED BODY.

By JOHN J. KYLE, M. D., Indianapolis, Indiana.

I desire to present the following observations upon the middle turbinated body, relative to the difference in opinion as to the best method of operation and technique, and also some exceptional conditions following operation upon the middle turbinated body.

There is a presumption, at least upon my part, that the size and form of the cells and their relationship to one another are very important factors in the longevity of disease of the cells, and also that many diseases of the ethmoid cells may be due primarily to extraneous conditions, that is, to disease of the nasal mucosa, disease of the turbinated body or natural or acquired malformation of the turbinated body, and when these conditions have been corrected, the disease has a tendency to disappear naturally. This is especially true in cases where the cells are narrow and not large and diverticulated. In the large cells we have a greater tendency to find dehiscences in the bone, due to faulty drainage, and subsequent brain or eye complications.

A long continued inflammation in the cells has a like tendency to sclerosis as is observed in inflammation of the mastoid process. There is also the same tendency to brain complication from exacerbation of a chronic slumbering ethmoiditis as observed in the mastoid process.

I am rather inclined to believe that the removal of a sclerosed middle turbinated body is attended with greater danger than the removal of a soft and pliable middle turbinate, even though the latter be the site of suppurative disease. The density of bone varies in individuals: thus one turbinate may be solid and immovable while another is flexible. The choice of an operation should thus be governed by the density of the structure and the stage of the inflammation.

A sclerosed turbinate body is naturally not attended by the same inflammatory reaction that is observed in a hypertrophic condition. In the sclerosed form there is little or no discharge, whereas in the hypertrophied form, crusts, mucopurulent secretion, and recurrent attacks of cold are observed.
Removal of the Middle Turbinated Body

Polypi are frequently present, especially while inflammation and necrosis are in progress. According to Killian, the presence of two or more polypi in the region of the middle turbinate body is indicative of suppurative in the ethmoid body. Small polypi are not infrequently present in the superior or middle meatus and cells of the ethmoid body and are only discovered after the middle turbinate body has been removed and the cells exposed to view.

The physiology of the middle turbinate body is somewhat obscure, at least to me. Dr. Joseph Beck said to me a short time ago while discussing the subject, that he believed the middle turbinate body has the function of regulating atmospheric pressure in the nose and that when the turbinate body is removed, the bulla ethmoidalis takes on a compensatory change, enlarging perceptibly. To this theory of compensatory enlargement I cannot subscribe. In my opinion, any swelling or change in the mucous membrane covering the anterior and superior portions of the lateral wall of the nasal cavity, is not compensatory in character but is due to inflammation.

After the removal of a diseased middle turbinate, there is a tendency to a more normal drainage and atmospheric pressure in the nose and thus a normal physiological blood pressure.

The question of the extent of any operative procedure thus presents itself. Shall we remove only a portion of the turbinate body, that is, the anterior tip, or the whole body? Shall we try to preserve any physiological function of the turbinate body or sacrifice it? Were it not that the removal of the anterior tip of the middle body is such an empirical operation, I should subscribe to the advisability of removing only that portion, unless positive indications existed for the removal of the entire body.

As a rule, the anterior tip, or the entire middle turbinate body is removed to relieve intranasal pressure, establish free drainage, or expose the accessory cells and their ostia. The removal of the anterior tip with scissors and snare necessarily produces more or less traumatism and slivering of the turbinate body, and sometimes produces fracture. The middle meatus is only partially exposed and polypi may remain hidden, as well as obstructions of the ostia of all the cells. The infundibulum is only partially exposed and drainage can only be promised for the frontal cells. However, inflammatory reaction may sometimes be so great as to even predispose to an acute exacerbation of a chronic inflammation of the frontal cells.
My contention is that since the removal of the anterior tip promises such uncertain results, the whole body should be removed. In the majority of cases, this can easily be done with scissors, leaving a smooth surface which heals without any inflammatory reaction. Subsequent hemorrhage is usually trivial and requires no packing. For the establishment of free drainage and the relief of pressure, this simple operation is preferable to any surgery of the tip. If indicated, the cells can be completely and thoroughly opened.

I like Ballenger’s method, applicable only in selected cases, of removing the ethmoid body and cells en masse. However, his statement that the cells and their contents can thus be better examined, is open to question. Certain brilliant objective results of ethmoidal cells en masse are now and then obtained by the operator, but as a rule the mass removed is crushed beyond recognition. In some few cases observed, the subsequent cicatricial change in the attic of the nose was as great and even greater than after the use of the punch forceps. By using the punch forceps we have the field of operation in view, whereas in the Ballenger operation, the whole procedure is done practically in the dark. The removal of a sclerosed turbinated body and cells is a serious undertaking when performed other than by the scissors operation. Severe traumatism may result and a latent meningitis may be brought into activity.

The method of dressing is decided by the character of the operation. In the description of his operation, Ballenger (Transactions of the 15th Annual Meeting A. L. R. and O. Society) says: “The upper or ethmoid region of the nasal chamber should be firmly packed with a one-half inch strip of gauze impregnated with the subnitrate of bismuth powder,” and this is afterward pressed firmly upward with a stout dressing forceps. Not only Ballenger, but other eminent surgeons recommend firmly packing the attic of the nose after this procedure.

Remembering Onodi, Zuckerkandl, and Killian’s description of the intrinsic blood supply of the sinuses with the meninges, I believe packing the attic of the nose predisposes to embolism, thrombophlebitis, and the direct entrance of infection into the meningeal venous plexus, whereas, by placing the patient in bed, leaving the attic open, spraying the nose frequently with equal parts of adrenalin, Dobell’s solution and saturated boric acid solution for a period of six to eight hours, and the application of cold compresses to the bridge of the nose, hemorrhage will be pre-
vented and good drainage will be assured. The day following the operation, the nose is sprayed frequently with Dobell's solution. Any crusts which may form are removed daily under good illumination. Thus there will be no interference with drainage and less likelihood of infection.

As a rule I operate under twenty per cent cocaine anesthesia, taking all the necessary precautions against infection. The patient is placed in a recumbent position with head elevated. The instruments used are Beckman's scissors, sometimes Holmes scissors, the Luc forceps and punch. I do not allow my patient to walk or exert himself in any way after the operation and keep him confined to bed for at least twelve to eighteen hours. I have performed simple turbinectomy in the office, but think it inadvisable and dangerous.

The following is a report of a very interesting case of basilar meningitis following middle turbinectomy and exenteration of the right ethmoid cells plus a neoplasm of the brain exposed at time of operation.

During the year 1907, Mr. H., age thirty-seven years, consulted me a great many times for pain in the head, which extended over the entire cranium and was periodic in character, and which from general appearances, was suggestive of intranasal pressure. During these spasms of pain he frequently came to me for intranasal treatment and apparently believed the treatment gave him relief. At times the distress became so great that he was compelled to remain in a dark room for several days and also required the administration of morphia hypodermically. In a few days the irritation would pass away and he would be apparently quite well.

Examination of the right nares showed the enormous middle turbinated body completely filling the attic of the nose and pressing against the septum. I suggested that this be removed, believing the pain originated in the nose. In November of 1908, he submitted to the operation and insisted upon a general anesthetic. Ether was administered.

When he came to the operating table, the pupils were contracted to the size of a pin-head and this condition continued all through his subsequent illness. When he returned from the surgery at 1:40 P. M., his temperture was 97.6°. At four o'clock he was found to be suffering from the most excruciating headache and crying with the pain in the top of his head. The symptoms being so exaggerated, we presumed he was suffering from nervous
J. J. KYLE

shock, allied to hysteria, and gave him one-quarter grain morphia, hypodermically. The pain in the head continued with hardly a moment's interruption day or night. Whenever moved he complained of the most excruciating pain in the back of the head, supported the head with the hand, and held the head rigid and to the right side. Treatment seemed to give no relief. His temperature varied from subnormal to 101.2°, and on the fifth day the pain became so severe that I attempted to do a second operation, presuming there might be some area of pressure in the nose that had been overlooked.

At this time I discovered in the region of the roof of the anterior ethmoid cells, a pendulous mass, soft and necrotic. It seemed at first as though it might be a bony excrescence. Biting through this soft mass, I removed a slight amount of tissue, but suspended operation, believing I had exposed the cranial cavity. The symptoms, however, were not relieved and he continued to suffer as before. We irrigated the nose as best we could, with mild alkaline washes.

All these symptoms continued without any amelioration until the fourth week, when the patient died.

Not until the postmortem were we able to diagnose this case. My presumption all along had been that there was a tumor in the cerebellum, but this was not verified at the postmortem.

The following is a complete report of Dr. Helene Knabe, who performed the autopsy, and gives a vivid impression of the complications or sequelae which sometimes follow operative procedures upon the middle turbinated body. My impression is that the administration of ether played a very important role in exciting into activity what must have been a latent meningitis. This patient had evidently been suffering from recurrent attacks of meningitis, which would account for the excruciating pain suffered at times.

POSTMORTEM. In opening the calvarium, the dura was found to be slightly adherent to the surface of the cerebrum on either side of the superior longitudinal fissure. Left Hemisphere: meninges deeply congested and partly distended with straw-colored fluid. Following the course of the fissure of Rolando, a thick purulent exudate of greenish-yellow color covered the surface of the brain. Right Hemisphere: meninges deeply congested and in part edematous. The brain substance throughout was firm to the touch.
On lifting the cerebrum, the right internal orbital convolution was seen to be deeply congested and part of its substance protruded downward into an opening caused by the absence of the right cribiform plate and a portion of the adjacent frontal bone. The base of the brain was covered with a purulent exudate, the latter filling the interpeduncular space, extending laterally over the surface of the crura cerebri and posteriorly over the pons and medulla oblongata.

On the upper surface of the cerebellum and the inferior surfaces of the occipital lobes of the cerebrum, traces of pus were likewise found.

The right olfactory lobe and part of the internal orbital convolution were adherent to each other, dark red in color and apparently in a state of necrosis.

Incisions into the right cerebral hemisphere were made, but no microscopical evidence of a tumor could be found. The right ventricle contained the normal amount of fluid and was free from pus or blood.

An examination of the inner surface of the skull revealed the following: The dura was smooth and glistening with the exception of the area extending over nearly the entire cribiform plate on the right side and the adjacent part of the frontal bone. This area was about 8 x 11 mm. in diameter. There was at this place a direct communication between the cranial cavity and the interior of the nose. The opening was oval, with a smooth rim and funnel-shaped, the smaller diameter being on the nasal side.

**Microscopical Examination.**

1. **Pus:** This revealed the existence of a mixed infection of pneumococci and streptococci, the former predominating. Examination for B. Tuberculosis negative.

2. Several small, whitish nodules found on the cerebellar meninges and about the base of the brain, which had been suspected of being miliary tubercles, were sectioned and found to be bullae, filled with clear fluid.

3. **Choroid Plexus:** Purulent meningitis, as evidenced by large collections of pus cells and round celled infiltration. Many corpora amylacea.

4. Sections from different parts of the cerebellum gave no evidence of involvement of the brain substance, the only pathological lesion being the meningeal inflammation.

5. **Internal orbital convolution:** The brain tissue was infil-
trated with round cells (inflammatory) and considerable hemorrhage and small areas of degeneration were found in the sections.

6. Olfactory lobe: The meningeal vessels were widely distended with blood; the subarachnoid space was filled with small round cells and blood corpuscles.

The brain tissue, wherever the normal relation of the cells was preserved, was the seat of many small hemorrhages. All the vessels were engorged with blood.

There was a growth of cells, unlike the normal brain substance, infiltrating the latter, and for the most part, replacing it. This growth was very vascular, the vessels being well developed and lined with endothelium. The endothelial cells in two of the large vessels at the margin of this growth were in a state of active proliferation. The cells of which this new growth was composed were uniformly round, but of variable size. The nuclei were round, centrally located and the majority of them were rich in chromatin. There were also to be seen some very large, multinecleated cells, the number of nuclei varying between two and eight per cell. The Protoplasm of these large cells stained more deeply than that of the cells with a single nucleus. A network of connective tissue fibres was present in this neoplasm, giving a resemblance to formation of alveoli.

Anatomical Diagnosis: Necrosis of bone and purulent meningitis.

Microscopical Diagnosis: Endothelial sarcoma, and secondary infection with pneumococci and streptococci.

DISCUSSION.

Dr. Thomas Chew Worthington, of Baltimore. I think Dr. Kyle is a brave man to report his unfavorable cases, but we should all do the same. I do not believe any man can work in this field unless he does expect unfavorable cases, because, first, the lymphatic system and venous connection is so active in this region; secondly, the dura is often exposed either from a congenital defect in the roof of the ethmoidal bone, or from chronic inflammatory change causing destruction of the bone. As for removing the middle turbinate, if it is normal there is nothing to remove, but when it becomes obstructive or diseased, it simply loses its function and should be removed by one of the several different methods. Dr. Kyle was more fortunate than I. I neglected to get post-mortems in three fatal cases. The pneumococcus was the cause of trouble in each of my cases.

I speak of this subject again, principally to repeat a statement which I made at the last general meeting at Atlantic City, that is, that these operations are rendered very much safer by the use of some one of the hexamethylenamin preparations as brought out by Doctors Cushing and Crow in their experimental laboratory brain work. I give ten grains of this drug every three hours for two days before the opera-
tion; after operation, twenty grains every third hour for six or seven days. I keep the patient in bed until all reaction has passed, or until the temperature has been normal for some days. I do not do any nasal work except in hospital. I tell my patients when they come into the hospital to remain until discharged whether that is one, three, or four weeks. By pursuing this practice the reaction has been very much less. There is sometimes almost no rise of temperature under the use of hexamethylenamin.

Dr. Joseph C. Beck, of Chicago. Dr. Kyle's report is so nearly similar to a case of my own that I had six years ago that I wish briefly to report it in order to bring out some of the points in the diagnosis. The pain in my case was terrific, spreading across the face and head, and was entirely out of proportion with the ordinary pain of chronic sinusitis. The rhinoscopic examination showed very little so far as any growth was concerned. My patient showed an additional interesting symptom in that she had never menstruated until she was twenty-five years old, and the point was brought out that this was an etiological factor in endothelial sarcomata. Dr. Kyle did not mention anything of that kind in the history of his case, and I wish he would say something on this point in closing.

I prefer to do a complete operation, but I do not remove the entire turbinate in every case. It depends on the indications. Where there is respiratory interference I believe a partial operation is indicated, and leave the remainder of the turbinate because it has a function. There is erectile and functioning tissue there. So it is with the ethmoid bone and ethmoid cells.

I would like to ask the doctor why he did not puncture the spine to make the diagnosis definite as to whether there was a meningitis or not. That possibly would have cleared up the point.

I have, in my papers, reports on the use of urotropin, and I think if there is anything I use with the belief of positive results it is urotropin before and after operations on the nose and ear. Of course, I have not had enough experience, but Cushing's test of trying to infect the cerebro-spinal fluid is so striking that I think it must appeal to any one. My case was one of basilar meningitis, in which I administered not ten or twenty grains, but one hundred and twenty grains a day, and six weeks afterwards I examined the spinal fluid, the result of which was most interesting and will be reported later.

Dr. Joseph A. White, of Richmond, Va. The paper just presented shows that even the slightest operations we have to do are at times attended with danger. We all know that the middle turbinate is part of the ethmoid bone, and its removal may at any time awaken into activity disease that is latent in the ethmoid labyrinth. Some years ago, I reported a death following such an operation. Only two men are here who were present when I made the report, Dr. Richardson and Dr. Dench. Those present reached the conclusion that death in that case was due to uraemia. The operation was performed in the morning, and that same evening the patient was found in a state of coma. He was taken to the hospital, the urine drawn off and found to be loaded with albumin. He never recovered consciousness, and died the next day. I reported the case as one of interest. I could not see how meningitis could have developed in a few hours. His death followed closely on the removal of the middle turbinate, but whether death was due to that or a mere coincidence I could not say, but those discussing it all came to the conclusion that his death was probably due to uraemia from an accompanying kidney trouble quite independent of the operation.

Shortly after that I had another death following removal of the middle turbinate. The man was taken within less than twenty-four hours with symptoms of meningitis, and died in two days. No post-mortem was allowed, and, therefore, we could not tell exactly what
followed the operation. But these cases show that all these operations are attended with more or less risk. I do almost all operations for simple removal of the turbinate in my office, never making hospital cases of them, and there is little or no trouble afterwards. I never confine them to bed after operation as Dr. Kyle has suggested. With the exception of these two fatalities, I have been exceptionally free from any after effects from the operation.

Dr. Kyle, in closing. In regard to Dr. Beck's question, we made no spinal puncture, and that was unfortunate.

This patient happened to be the son-in-law of a very prominent physician in Indianapolis, and we had the leading neurologists in on the case, and one or two general men, and the different visiting surgeons of the hospital would frequently drop in to see the case, and we were all absolutely at sea as to the diagnosis. When I operated on this case, it was remarkable the amount of noise that occurred when we cut through that turbinate bone. I never was so surprised as at the hardiness of that turbinated body. You could hear it crack all over the room. Of course, when this pain continued I became very much alarmed, and when the patient died I certainly spent two very sleepless nights, because I thought I had fractured the base of the skull. And I had to submit to a post-mortem before all my confrères, and I was in the most embarrassing position I was ever in, and when we discovered this unique situation, of course, I was not only relieved, but very much surprised.

I think that the great misfortune is that many of these cases of headaches and pains come to the office and we treat that and they seem to get relief, and they come back again, and if we attempt to treat the case without going into it and without being able to differentiate an intra-nasal pressure from an intra-cranial condition, we will necessarily be somewhat in the dark.

One point I want to bring out particularly in this case is, that I think it would be better in intra-nasal operations to rely somewhat upon local anaesthesia rather than general anaesthesia. I think if I had performed this operation under local anaesthesia I might have got through without setting up this meningitis which we afterwards discovered. You all know that certain meningal troubles can be excited by ether, following the profound anaesthesia that you have to use, whereas the local anaesthesia might have lessened the irritation to the brain and I might have got through all right. But, of course, the subsequent results would have followed just the same.

Now I do not want any of you to infer that I am at all condemning Dr. Ballenger's operation. I simply spoke of one or two cases in which I had seen marked cicatricial change, and that is not sufficient to condemn the operation. I think it is a beautiful operation, and in the hands of Ballenger it is certainly unique and artistic. I have undertaken it once or twice, but before I could complete the operation I invariably decided to complete the operation in the old way. I have the instruments, and all I need is the courage. But I think I shall hesitate some time before resorting to this radical operation when I think that removal of the turbinated bone alone will do the work. Now, I have seen Ballenger operate where there were symptoms of intra-nasal pressure alone; that is, the ophthalmologist would send the patient to Dr. Ballenger with the report that the eye examinations were negative, and suggesting the removal of the turbinated body.

Now, these were the cases of what were apparently intra-nasal pressure in which removal of the turbinate would have apparently relieved the irritation. In these cases he submitted them to the radical operation. The subsequent history may prove that that was all right. But I have seen so many cases of intra-nasal pressure that were relieved by simple removal of the turbinated body alone, or with submucous resection of the septum, that I certainly would hesitate a long time before submitting my patients to this radical operation as devised by Ballenger.
AN UNUSUAL COMPLICATION FOLLOWING THE RADICAL OPERATION FOR MIDDLE-EAR SUPPURATION.*

By EDWARD BRADFORD DENCH, M. D., New York, N. Y.

As conducted at the present time, the radical operation for chronic middle-ear suppuration is usually followed by absolutely no complications. I know of no condition where the surgeon operates with more certainty of a perfect result, than for chronic suppurative otitis media. Given a healthy subject, we can ordinarily promise the patient that he will leave the hospital with the posterior auricular wound completely closed by primary union, at from five to ten days after the operation. If primary grafting is employed, the middle-ear cavity is usually practically dry at the end of the second or third week. It is true that, at this time, some superficial eroded areas may remain in a small proportion of cases. These eroded areas are, however, of no significance either to the patient or to the surgeon, as they quickly become covered with healthy epithelium.

In the case which I am about to narrate, the progress of the case was so unusual, and was fraught with so many complications, that I deem it worthy of report in full.

The patient was a man, 59 years of age, and was rather poorly nourished when he came under observation. There had been a discharge from the left ear for eight years, and probably for a longer time than this. The hearing upon the left side had been impaired for twelve years. During the past eight years the drum membrane had been incised several times, apparently, for acute exacerbations of a chronic suppuration.

When the patient first came under observation he had been suffering from severe pain in the left ear for ten days, and this pain was gradually increasing in severity. There was marked bulging of the drum membrane and sagging of the upper and posterior wall. The external auditory meatus was filled with a purulent discharge. There was moderate tenderness over the mastoid emissary vein.

The patient was seen by my associate, Doctor Robinson, during my absence abroad. The left drum membrane was freely incised and irrigation with a solution of bichloride of mercury (1-10,000) at once instituted. The pathologist’s report showed a mixed infection of staphylococceae and pneumococceae. The acute symp-
toms gradually subsided, and the patient returned to his home. I saw him first on the 23rd of September, at which time I found the following condition: The left external auditory meatus very narrow, due to sinking of the upper and posterior wall of the canal and the presence of some granulation tissue lying deep in the fundus. The point of attachment of granulation tissue was undetermined. The patient complained of slight dizziness, and walking with his eyes closed, was inclined to fall to the opposite side. All other equilibrium tests showed a tendency to fall towards the diseased side. There was slight spontaneous nystagmus on looking toward the healthy side. Cold-water reaction positive; that is, syringing with cold water increased the nystagmus on looking toward the healthy side. Whispering distance, left side, four inches. Bone conduction normal on the left side. Lower limit, 512 double vibrations. Upper limit, 7 Galton.

I advised immediate radical operation. This was performed on Sept. 30th. At the radical operation I found the tegmen antri and tegmen tympani carious, and the dura was exposed during the operation. The aqueductus Fallopii had been eroded, as the result of the disease, and the facial nerve lay exposed in the field of operation. A fistulous opening was found in the horizontal semi-circular canal, just at its point of fusion with the aqueductus Fallopii. The oval window was found closed, the foot-plate of the stapes being present. The opening in the horizontal semi-circular canal was enlarged and the vestibule opened through the horizontal semi-circular canal. A thick clot of purulent material was evacuated from the vestibule. The vestibule was drained through the horizontal semi-circular canal. The ordinary meatal flap was then made, and the tympanic cavity and the facial ridge were covered with a skin graft. The exposed dural area and the vestibule were drained with strips of ganze. The posterior wound was closed and a mental graft was applied to the cut edge of the concha. The patient’s progress was uninterrupted for a number of days. The Michel clamps closing the posterior wound were removed on the third day after the operation, and the union seemed fairly good. There was slight puffiness, however, at the lower angle of the wound. Two days later a small sinus made its appearance at the lower angle of the wound. The pledgets holding the graft in position were removed on the fifth day, and the graft was found to have applied itself completely to the tympanic cavity and to the facial ridge. On the fifth day after the operation a small fragment of
bone, about the size of a pin-head, was removed from the lower angle of the wound, and, at the time, this was supposed to be the cause of the sinus in this situation. From this time on the wound did badly. It gradually re-opened throughout its lower two-thirds, and a constantly-increasing purulent discharge appeared. The middle-ear cavity, during this time, was progressing favorably. The posterior wound continued to break down, until two weeks after the operation it was open throughout its entire extent. There was swelling at the upper angle of the wound, and a probe could be passed from the upper angle, forward, and then directly downward, to a point in front and about half an inch anterior to the tragus. This sinus was deeply situated, and the probe passed beneath the zygomatic process. The patient was anaesthetized, and the superficial portion of the wound opened most freely. At this time, there was also some burrowing found at the lower angle of the wound, beneath the superficial tissues of the neck. The superficial sinuses were laid open, and a drainage tube passed from the lower angle of the wound downward and beneath the deep muscles of the neck, to the most dependent portion of the posterior sinus. A drainage tube was also introduced from the upper angle of the wound, and was brought out beneath the zygoma, at a point about an inch and a half below the zygoma, through the tissues of the cheek. As soon as the line of incision broke down, extensive sloughing of the subcutaneous tissue occurred, and at the time of the second operation, all of these sloughs were carefully removed by means of the curette. The bony structures were found intact. In other words, the operation upon the bony tissues had apparently been complete. As in nearly four hundred radical operations, I had never met with a condition of this kind, I was naturally at a loss to account for the unusual wound condition presented by this case. The operation had been performed under the most careful asepsis, in one of our best hospitals, and every precaution had been taken to prevent wound infection. I was particularly at a loss to understand the extensive sloughing of the subcutaneous tissues. In all radical operations it has been my invariable practice to use solutions of adrenalin chloride quite freely in order to check oozing, both from the bone and from the superficial tissues, so as to favor the perfect application of the Thiersch graft. I remembered afterwards that a strong solution of adrenalin had been used in this case, and had been applied very freely to the wound. This, I think, explains the superficial
sloughing. Soon after the wound had been thoroughly drained, the discharge became very profuse, and was of a peculiar greenish-yellow color. Cultures were taken of the pus from the wound, and also fragments of the superficial sloughs were sent to the laboratory for examination. In every instance the bacillus pyocyaneus were found in pure culture. Knowing that this germ is occasionally present in the integument, it occurred to both Doctor Flexner,—through whose courtesy I was able to secure the bacteriological examinations—and myself to secure cultures from the skin of the thigh, both on the side from which the graft was taken, and also from the thigh of the opposite side. Cultures taken both from the sterilized thigh and from the thigh of the opposite side, showed pyocyaneus in pure culture. In other words, this patient’s skin seemed to be so impregnated with this particular germ, that despite the most careful efforts at sterilization, the skin graft introduced into the cavity had become a source of infection. The deeper layers of the graft adhered to the bone and the graft, so far as the surgical procedure was concerned, was perfect. The superficial layers of the graft, however, as they were cast off, in the natural process of repair, simply infected the superficial wound, and led to the extensive infection which subsequently resulted.

The unusual progress of this case can, I think, be attributed, first, to the free use of adrenalin, which undoubtedly lowered the resistance of the tissues, and was responsible for the extensive sloughing of the superficial tissues. Added to this, we had actually introduced into the deep tissues a source of pyocyaneus infection, namely, the infected skin graft, and it was the combination of these two factors which led to the unusual course pursued by this case. The age of the patient must also be taken into consideration. The man, as I have said, was under-sized, and was somewhat poorly nourished. His arterioles were undoubtedly somewhat calcareous, and consequently, the nutrition of the tissues was hardly as good as one would expect in a younger patient. This condition also added, probably, a contributory factor to the unusual progress of the case.

The patient has made a slow, but uninterrupted recovery, and has exhibited no untoward symptoms.

It is rather interesting, in this connection, to state that, in no instance, was the temperature ever elevated above 100°, even at the time when the suppuration was profuse. At the present time the middle-ear cavity is entirely dermatized.
DISCUSSION.

Dr. Joseph C. Beck, of Chicago. At the last meeting of the Middle and Western Section I presented a case of that kind, calling Dr. Holmes' attention to it. It was a case of pyocyaneus infection, with green pus and symptoms very similar to those Dr. Dench mentioned, namely, an undermining of the tissue such as you would find from an infection with the bacillus aerogenes. A most disagreeable condition developed, almost a fulminating type of infection. It was not so chronic. But it soon took on this chronicity which the pyocyaneus produces. There was a chondritis and a perichondritis which, however, left no deformity of the auricle, but deposits in the temporal region, that looked like cartilage-fibrous masses. The pyocyaneus infection continued. It was the most difficult task to destroy this infection. I made an auto-vaccine from this pus, and to my sorrow, and the patient's, I had a most virulent local infection from the vaccine. This shows that vaccines themselves are not so inoffensive, even sterilized, as one may believe.

Prof. Heinrich Neuman, of Vienna. My experience with the Thiersch skin graft is that it is dangerous in exposure of the dura or exposure of the labyrinth, especially if the latter are healthy, because the skin is frequently the habitat of the bacillus pyocyaneus. This germ also inhabits the axilla and the groin, and if the individual rubs himself in those regions and then scratches himself in the ear he may infect his ear in that way. This bacillus is one that lives deeply in the tissues, as has been shown on sections. The bacillus pyocyaneus wall frequently dry up a middle ear disease. For instance, if a patient has middle ear disease and develops a pyocyaneus infection of the external ear, the middle ear disease will cease for the time being, but will start up again, when the non-virulent micro-organisms in the ear will become very virulent. This is a very important point. If you are going to use Thiersch grafts, use a five per cent. solution of nitrate of silver, because the pyocyaneus does not survive this application. Also treat the ear by packing it with gauze impregnated with the same solution for a week before the operation.

Dr. Dench, in closing. I want to draw attention to the fact that the pyocyaneus infection was not the one causing the discharge, but the pyocyaneus was introduced by the skin graft. Also to speak about the preparation of the external auditory canal which I employ in these cases, that it, to scrub them thoroughly with alcohol and bichloride daily before the operation. I did not know that nitrate of silver was better for pyocyaneus, and hereafter I shall use it. I also want the gentleman to understand that the graft was not placed over the labyrinth or the exposed dura.
REPORT OF A CASE OF CHRONIC SUPPURATION OF THE ANTRUM OF HIGHMORE. PUNCTURE, FOLLOWED BY SEPTIC PEMPHIGUS AND DEATH.

Dr. WILLIAM LEDLIE CULBERT, of New York, N. Y.

Mrs. S. M., aged 57, a native of the United States, married, was referred to me by Dr. J. Huddleston on December 9, 1908. Her general condition was good, but she had complained for some time back of languor and a lack of ambition. During the previous winter she had suffered from a number of attacks, thought to be La Grippe, which were attended with fever and pains in her head, back and extremities, with a "stuffed-up" feeling in the nose and difficulty in breathing through the nostrils. Since the acute attack, there had been a steady discharge of pus, particularly from the right nostril, with, at times, a dull, heavy pain over the right eye and cheek. During the summer she had noticed an unaccountable bad odor when leaning over to pick flowers. This odor was noticed on several occasions, always when leaning forward.

Examination of the nose showed a thin stream of pus running down over the right inferior turbinate. The latter was swollen and red.

The left side showed no gross deviation from the normal. There was some secretion visible on the posterior pharyngeal wall. The mucous membrane was congested and inflamed.

Transillumination was negative on the left side, but the right frontal sinuses and maxillary antrum gave deep shadows. On shrinking up the tissues of the right nostril with cocaine and adrenalin, pus seemed to issue from both frontal and maxillary openings. Examination of this pus showed a mixed infection of streptococci and the influenza bacillus.

Puncture and washing out of the antrum was advised at this time, but milder palliative measures were requested by both patient and her physician. At this time I was trying Dr. North's suspension of lactic-acid bacilli on various nasal suppurations, and some of this accordingly was used locally. Some temporary improvement was felt by the patient. The odor was stopped and the amount of discharge apparently diminished.
On December 21, however, (12 days after her first visit), her condition was rather more uncomfortable, and this she attributed to the lactic-acid bacilli. This is about the only instance in my experience in which complaint has been made after the use of this preparation. An attempt was now made to wash out the diseased sinuses through the natural openings, and the patient was shown how to use a saline nasal douche. This gave considerable relief, and on January 4th, there being no pain and little discharge, she decided to go South. I had favorable reports from her on several occasions during the winter. The douche kept the nose free and clean.

On May 11, she returned. Transillumination showed the same condition as before. The antrum was now punctured under cocaine and washed out with a solution of bicarbonate of soda and salt, through a good-sized cannula. A quantity of exceedingly foul-smelling pus came away. Some bleeding attended this procedure. A severe chill and a rise of temperature followed on her return home. She was seen at her home on the following day, and the antrum was again irrigated with the same solution, to which a little tincture of iodine and carbolic acid were added. On this occasion the pus evacuated was less in amount and had no odor. No chill followed.

Two days later (May 14), irrigation was repeated, with a smaller cannula, and still less pus appeared. No bleeding. A number of colorless blebs now appeared on the lips, which were swollen. These subsided in three or four days and no significance was attached to the phenomenon.

On May 21st, the antrum was washed out for the last time, the solution returning perfectly clear, no depression or reaction followed, and there was no return of the blebs.

One week subsequently an eruption appeared. The medical history of the case, kindly furnished by Dr. Huddleston, I give in condensed form from his notes.

"Mrs. S. A. M. had an attack of probable influenza in January, 1908, lasting about two weeks. In December of the same year she was found to have infection of the right frontal sinus and right antrum. On May 11, 1909, the antrum was opened by a trocar.

"On May 26, 1909, the patient reported that, though feeling well the day before, she had awakened with secretion in the eyes, chapped lips, and a dry throat. She showed then a moderate injection of the conjunctivae and a reddened throat. On the 27th,
an itching, papular, red eruption appeared on the face, chest, abdomen and arms, and the mouth showed patches of desquamation of the mucous membrane over the palate. The conjunctivae were more injected, were discharging muco-pus, and there was a question of iritis. In the afternoon the eruption became slightly vesicular. On the following day, the 28th, two diagnosticians of the Health Department examined the patient, the vesicles were considered typical of chicken-pox, but the constitutional condition and the oral desquamation were too serious for this disease. Dr. W. E. Lambert was called in consultation on account of the eyes, and made a bacterial investigation, finding only a few large staphylococci. He considered the trouble in the eyes probably an extension from the antrum.

"Superficial ulcers appeared on the mucous membrane of the mouth and at the mouth of the urethra and on the mucous membrane of the anus. The vesicular eruption on the skin extended to cover the entire body and was apparent on the palms and soles. The vesicles varied in size from a pea to confluent areas covering several square inches. These broke, discharged and left extremely foul-smelling superficial ulcers. The patient became unrecognizable. On June 11th, petechiae appeared and the existing ulcers took on a hemorrhagic appearance.

"From the earliest days of the illness there was a constant abundant discharge from the mouth of a bloody muco-pus, ropy in consistency, tenacious, and removed with the greatest difficulty. There was later a discharge of similar character, but less in amount, from the vagina and anus. The illness was characterized throughout by fever and constitutional depression. After the first few days the diagnosis was supposed to be septicaemia of some form, but the name septic pemphigus was not given until the visit of Dr. G. T. Jackson, on June 9th.

"The temperature ran an irregular course. The pulse varied from 120 to 100 in the early fever, and later rose to 130. The respiration varied from 20 to 28, early, and at the end was 34.

"The urine after June 5th, was that of an acute nephritis. Vomiting, which began with attempts to clear the throat, became so frequent, that no food could be retained after May 30th, and rectal feeding was substituted until rectal intolerance developed on the day before death. Mentally, the patient was clear and courageous for about four days, and then sank into a delirium which alternated with a stuporous condition until death. There was extensive bronchitis but no pneumonia.
"Emaciation was rapid and the final picture was memorable for the foulness of the disfigurement."

Quite a number of cases of septic pemphigus appear in literature. In the Journal of Cutaneous Disease for June, 1904, Dr. Bowen, of Boston, reports a case and gives a resume of the recent literature. Bowen’s case was that of a butcher who injured his hand while killing cattle, during an epidemic of foot and mouth disease. Pernet, in a valuable contribution in the British Journal of Dermatology for May and June, 1896, collected eight cases in butchers, who were infected through wounds, and of whom six died.

Whiphum (Lancet, May 2, 1896), reports a case occurring in a child following the scratch of a cat, and Allen, in the Journal of Cutaneous and Genito-Urinary Disease, April, 1888, cites a case in a blacksmith.

It appears that nearly all cases of septic pemphigus are referable to animal infection, although Dr. Whitehouse in conversation, informed me that he had seen a case following pus absorption in a neglected appendicitis. The relation between the disease in man, and foot and mouth disease in animals, seems reasonably clear.

I have not been able to find a counterpart of my own case, in which the infection doubtless gained entrance from opening the antrum of Highmore.

DISCUSSION.

Dr. Joseph A. White, of Richmond, Va. This is a very interesting and unique case, but I think we ought to have a dermatologist to discuss it. The only thing that strikes me particularly in the case is what the opening of that antrum had to with the infection. Was not the infection probably due to the secretion being retained so long in the antrum? Would the patient not have been better off if the antrum had been opened and drained when the doctor was first satisfied there was pus present, and would it not have given the patient a better chance? Was not the long delay in getting the antrum drained the possible cause of the infection. Of course, those are questions that neither he nor anybody else can answer. It seems to me that if the antrum had been drained after the doctor satisfied himself of the presence of pus this outcome could have been avoided. It is something entirely unique. I have never had and I doubt if any one here has ever had an experience of that kind.

I have never had any fatalities attending the opening of the antrum up to the present time. Whilst we know perfectly well that troubles in the antrum can bring about serious complications, resulting in death, yet up to this time a simple purulent secretion in the antrum has never brought about any fatalities in my experience.

I wish to say a word about transillumination. The doctor made the examination twice by transillumination, and both times the shadow convinced him that pus was present. Transillumination with me has not been satisfactory. I have never been able to assure myself of the
presence of pus by transillumination. I have sometimes found the shadow on the side where there is no trouble, the side where trouble was being perfectly clear. I want to relate a curious experience I had in New York with my friend Dr. Coakley, who is a champion of transillumination and who has had more experience with it than any other man in the country. He had a very distinguished surgeon present in the office who he decided positively had pus present in his antrum. This gentleman is one of the best known surgeons in the country, and his surgical experience seemed to render him doubtful of the propriety of being operated on himself. I told him of my experience, that puncturing the antrum was of no consequence, that I had punctured a great many, my own among the number. In this case the shadow seemingly proved that pus was present, and with his consent it was punctured, and there was nothing at all in it, thus giving another instance that transillumination is very uncertain in examining the antrum.

Dr. S. J. Kopetzky, of New York City. There is just one point in the paper to which I wish to refer, not that I believe that it had anything to do with the fatal outcome, but because of a few similar experiences that I have had. I refer to the use of suspension of the lactic acid bacillus. When Dr. North sent specimen of this agent around to various men for trial I received a number of them, and I thought we could try some of it in chronic suppurative ear conditions. In a number of cases in which I put this suspension to combat suppuration a general infection of the external auditory canal resulted. Now, I cite that as a possible source of adding an infection to one already present, though I am not competent to say whether that had anything to do with the special infection that finally developed this disease. In one of my cases in which the suspension was used the infection spread so that a radical operation was undertaken, but labyrinthine disease ensued and death followed. In that case I have always felt that the addition of the lactic acid bacilli had something to do with the fatal outcome. The case was one which I had had under observation for some time, and there were no particularly imminent symptoms of intra-cranial complication at the time I operated. I put the suspension in the ear and followed the case every day. I simply cite this in connection with the case of Dr. Culbert, and I believe that this is the only source as far as we can see, whereby an additional infection could have been added to that which was already present in the case.

Dr. L. M. Hurd, of New York City. My opinion is that the pemphigus must have been a mere coincidence. Dermatologists tell us, as nearly as I can find out, that pemphigus is due to an intestinal toxemia. It rather looks as though the woman was about ready to have pemphigus, that he washed out the antrum, stirred up the bacteria, and it came on.

I should like to refer to a case I saw last fall. I was called to see a gentleman fifty-five years of age who complained of soreness in the throat. In the larynx and on the aryteno-epiglottic fold there was a little white exudate. The man stated that he had lymphatic leukemia. I thought perhaps it was some leukemic manifestation. Three days later he called me and I found this whitish exudate in the pharynx, in the mouth, and on the hard and soft palate. There were also blebs. I made a diagnosis of pemphigus. The man was an invalid and nervous, and he wanted to go on an automobile trip. He was gone three days, and he came back with an acute pemphigus all over the body. He called in the family doctor, and the latter promptly made a diagnosis of chicken-pox. The eruption looked as though he had chicken-pox. He got up some bronchitis, and died about ten days after the eruption appeared on the body.

Dr. John McCoy, of New York. When I read the title of Dr. Culbert’s paper it occurred to me that a colleague of mine in New York a few years ago had told me of a case where he had punctured the
antrum and it was followed by death, so I was very much interested to hear what Dr. Culbert had to say. This man's case, however, differs very considerably from Dr. Culbert's, in that death followed within twenty-four hours. The history, so far as he was able to recall it, was that it was an individual in middle life who had a chronic suppuration, and with the idea of determining whether pus was in the antrum, he made a puncture of the antrum, which he had done in other cases many times before. He stated that the only thing noticeable that was unusual from his other punctures was the fact that after the trocar and cannula were in and he had withdrawn the trocar, and attempted to wash out the antrum he noticed that the fluid did not flow properly, and that there was apparently some stoppage. However, on slightly withdrawing the canula, the solution passed through, and the patient went home and was apparently relieved. That afternoon she had a sharp rise of temperature, and he is rather indistinct as to the subsequent history. But the facts are that she had a sharp rise of temperature and the next day she died. He was unable to secure an autopsy. The coroner's view of the matter was that she had died of hemorrhage, but he was quite sure that no such thing occurred. The only symptom she complained of was a great deal of pain around the cheek and eye. I merely wished to report this as another accident in what we usually consider a very simple operation.

Dr. Culbert, in closing, said: In regard to Dr. White's question as to whether the patient might not have escaped septic infection and have been relieved, had the antrum been punctured and washed out when pus was first discovered, I would say, that this is problematical. It must be remembered that the sinusitis was already chronic, and, while I advised the above procedure, the patient's nervous condition was such that I felt constrained to yield to her own and her physician's desire that nothing be done which might interfere with her plans for going south for a rest.

In regard to transillumination, I think we are all agreed that too much reliance must not be placed on this test alone. Taken in conjunction with other well-tried and positive diagnostic signs, transillumination is a valuable help. The thickness and density of the bone must modify appearances somewhat and must be allowed for. An antrum may give a clear illumination, and pus will be obtainable on puncture.

As to Dr. Kopetzky's suggestion that the lactic acid bacilli might have been responsible for the infection, I believe they are absolutely non-pathogenic, and, moreover, there was too great a lapse of time between their use and the development of the pemphigus. The lactic acid bacilli do not set up irritation. In respect to blood cultures: On the development of the pemphigus, the case naturally came under the direction of the family physician, Dr. Huddleston, who is well informed in these matters, believed that little practical information would be gained from it—not enough to compensate for the mental and physical disturbance in an already depressed and nervous patient. So I believe none was made.

In regard to the cause of pemphigus, I think intestinal toxemia plays a part, directly or indirectly. Dermatologists are not agreed, I believe, as to its cause, and do not attribute much importance to intestinal poisoning. Different bacteria have been found in the secretions of pemphigus blebs, mostly a diplococcus and in some cases a streptococcus. In a smear taken from the nasal pus of the case just reported, there were found both streptococci and the influenza bacillus. The infection may have occurred through the entrance of these streptococci into the circulation. I cannot offer any better theory than this. When the puncture was made there was a little bleeding, such as usually attends this operation, and, I imagine infection may have occurred at that time.

In most of the cases I have looked up as to the bacteriological causation there have been streptococci or diplococci.
REPORT OF TWO CASES OF BRAIN ABSCESS IN THE FRONTAL LOBE, SECONDARY TO ETHMOIDITIS AND FRONTAL SINUSITIS.

By JOHN McCOY, M. D., New York, N. Y.

Brain abscess of nasal origin is of comparatively infrequent occurrence, according to a study of the literature of this subject. The writer feels, however, that it is more frequent than is generally conceded, and that by a detailed recital of the histories of such cases as come into our practice, be they of favorable or unfavorable issue, we shall be able to recognize the affection at an earlier stage and therefore secure increasingly better results, and we shall be able to employ such surgical experiences as may have been found useful by other observers. The following cases came into my practice during the past year and were found to be so absorbingly interesting that a detailed report was thought worthy of recording. The first case was referred to me on October 15th, 1909, with the following history.

John L———. Age one year six months. The family history was negative as to Syphilis, Cancer, or Tuberculosis. Previous history: had always been in good health until he had an attack of pneumonia six weeks before coming to my office. One week after he had been cured of the pneumonia, which lasted about seven days, his left upper eyelid became red and swollen, and three days later the right upper eyelid also became red and swollen. He was seen by an eye specialist who incised the swellings in the eyelids on the outer and inner aspect of each. The incisions evacuated pus and the wounds were dressed every other day for six weeks, while a constant discharge of pus came from them. Toward the end of this time the forehead also became oedematous. The case was then referred to the writer and on examination the baby presented the following appearance: Both upper eyelids oedematous and each had two fistulous openings which were discharging pus. The forehead was oedematous. A probe introduced into the fistulous openings discovered eroded bone. Examination intra-nasally showed the middle turbinates tightly wedged between septum and outer wall. No pus was to be seen in the nose. A diagnosis was made of ethmoiditis on both sides
perforating the orbital plate and the child was sent to have an x-ray picture made. (See Fig. I.) Operation was advised, and on October 19, 1909, performed. Operation was made through the incision as indicated in dotted lines in Fig. II. First the right frontal and ethmoid region were exposed. While there was not a distinct frontal sinus on either side, still there was a distinct cavity between outer and inner plate with a distinct fronto-nasal duct. The outer plate was found necrotic over this frontal area and extending up on the forehead as high as could be followed through incision, the orbital plate of the ethmoid was found to have two perforations. The right frontal and ethmoid region were now thoroughly cleaned out and the left side was next attacked. Here a very similar condition was found with three perforations in the orbital plate and extensive necrosis of frontal and forehead region was found. This side was also cleaned out thoroughly. Then an incision was made from mid-forehead region to vertex and from the middle of this incision a horizontal incision across the forehead. This incision disclosed an osteomyelitis extending clear up to the vertex, also an epidural abscess on left upper forehead and vertex region, 1½ in. vertically and 1 in. transversely. (See Fig. III.) The whole diseased area was thoroughly curetted and cleansed and the wounds drained. There was a post-operative rise of temperature to 103°, but it subsided to normal in four or five days. The wounds were dressed every other day and on the tenth day after operation (October 29th) the child left the hospital in good condition and was brought thereafter to my office for future dressings.


November 9th. Child had a spell of vomiting and has been drowsy for past twenty-four hours. At the dressing the right arm and leg seem to be much weaker than left.

November 11th. Parents say the right arm and leg are completely paralyzed. Child bright, taking its nourishment well. Wounds healing splendidly. Referred to neurologist.

November 13th. Has been seen by prominent neurologist, who says that there is no indication of intracranial involvement. He thinks the paralysis due to pressure by the dressings upon the brain in the region of the epidural abscess and that it would clear up when the dressings were discontinued. Eye grounds were not examined and no blood count made.

November 17th. Paralysis still continues. Baby bright and
takes nourishment well. Wounds healing splendidly. Temperature 99.2°.

November 21st. Baby began vomiting in the morning, this continued until the next day when he sank into coma; called to the home and found the child in a state of complete coma, pulse 160, extreme pallor, cold extremities.

The baby was immediately removed to the hospital, where the old wounds were first opened to see if any path into the brain existed. It seemed too bad to have to reopen them however, they had healed so nicely. The frontal lobe was then entered through the dura uncovered over the epidural abscess at the original operation. Immediately there gushed forth a great quantity of pus, toward the end mixed with cerebro spinal fluid. On inspection through the encephaloscope it seemed as if the entire frontal lobe had disintegrated. The cavity was packed with iodoform gauze and under stimulating treatment the child rallied for 24 hours so that when it was dressed next day it was semi-conscious. He sank rapidly after this, with all the indication of rapid involvement of the ventricles and died the following day. Pneumococcus was found in the ethmoid pus and in the pus from the brain abscess.

CASE II. Herbert E———. Age ten years. Family history was negative as to syphilis or tuberculosis. Had pneumonia twice when a baby, also has had measles and chicken pox. About July 25th, 1909, began to have pain over the left eye. After suffering with this for four or five days, the upper eyelid became red, painful and very much swollen. This swelling was poulticed for one week at the suggestion of the local physician, and on August 6th the swelling was incised at the outer angle of the eye. On August 13th, he was seen and operated on by a very competent eye surgeon. The frontal sinus was exposed through a Killian incision. The frontal sinus was relieved of considerable pus and thoroughly curetted together with some anterior ethmoidal cells and the front nasal duct was enlarged. A piece of gauze drain was passed down through this duct and allowed to remain. The external wound was completely sewed up and healed by primary union. The gauze drain through the nose was removed little by little in several days. The boy apparently did fairly well for a period of five weeks, having, however, during this time, more or less constant headache and intermittent discharge of pus through the initial small incision in the upper eyelid. On September 20, the writer saw the patient for the first time. At this
TWO CASES OF BRAIN ABSCESS.

Figure 1. Represents area of osteomyelitis as shown on X-ray plate.

Figure 2. Dotted lines indicate the incisions made at operation.

Figure 3. Represents the area of epidural abscess.

Figure 4. Area of epidural abscess.

Figure 5. Indicates place of counter opening in temporal region.
time he had developed a swelling on the left forehead about
\( \frac{3}{2} \) inch below the hair line. This swelling was incised and a large
epidural abscess (See Fig. IV.) was found leading down to, and
connecting with, the frontal sinus. An area of necrotic bone was
removed about 1\( \frac{1}{2} \) inches wide and about 2 inches long, down
to and including part of the posterior wall of the frontal sinus.
The dura, which was covered with thick granulations was
curetted and was found to be intact. The wound was allowed to
heal by granulation, which it did very kindly except at the
extreme lower end where a fistula, which led from the frontal
sinus down into the ethmoid cells, persisted. During the healing
of this wound, however, the headache which at first disappeared
totally, later came on intermittently. The boy would go for a
period of a week or ten days or two weeks, feeling in splendid
health, eating well, sleeping well and was very bright and active.
Then suddenly he would be attacked with severe headache re-
ferred to the region over the opposite eye. He would become
drowsy and have nausea and some vomiting. These attacks
lasted for a period of from twelve to twenty-four hours and
would as suddenly cease and again the boy became bright and
active. His temperature and pulse and urine were normal.
This continued until November 18th, when it was decided to more
thoroughly remove the ethmoid cells than had been done at the
first operation, with the feeling that perhaps there was an epi-
dural collection of pus in this region making intermittent pres-
sure on the dura and discharging through the fistula. On
November 18th, the ethmoid labyrinth in which polypi and
granulations were found, was thoroughly removed. A small
area of dura was found uncovered over the anterior ethmoid cells.
The patient did remarkably well after this operation, and in two
days was as bright and alert as usual. On November 24th,
however, six days later, he had another spell of severe headache,
drowsiness and vomiting and this continued until the next day.
November 25th, when he was seen by a neurologist, as the writer
now felt that the trouble was in the brain. When seen by the
neurologist, his attack had passed off and the boy was so bright
and alert mentally that he decided that there was no brain abscess
present. The eye grounds showed slight congestion of the discs.
That night, however, the patient had two convulsions and on the
following day, the writer felt justified in entering the brain Ac-
cordingly the skin was raised from the dura over the old epidural
abscess near the outer end of the eyebrow. After penetrating
the brain for about 1/2 an inch. a large abscess was found containing about one and one half ounces of pus. A rubber tube was inserted for drainage and the boy returned to bed. The wound was dressed daily, but he did not do well, the rubber tubing became clogged with brain tissue and the abscess did not drain. Iodoform gauze covered with gutapercha tissue was next tried and this also seemed to fail. as the boy’s condition steadily grew worse, his temperature mounted to 105, his pulse. to 140 and his general condition was somnolent or delirious. On the fifth day after opening the abscess a second connecting abscess was found containing an equally large if not larger amount of pus. It extended deeper into the brain and more toward the base. The boy was returned to bed in a very precarious condition. The writer felt that the downward trend of the patient and the second abscess were a result of incomplete drainage of the first, and that if anything were to be accomplished it would be as a result of more efficient drainage. Accordingly on the following day, while the patient was in a very low state, at times it was almost impossible to feel his pulse, a section of bone 3/4 in. in diameter was removed from the side of the skull in the temporal region (See Fig. V), about two inches back from the outer end of the eyebrow and on a line just above it. An opening was then made into the abscess cavity from this point. Iodoform gauze was now inserted into the abscess cavity both from the front and from the side opening. An estimate of the size of the cavity may be obtained from the fact that two strips of gauze each 12 inches long and one inch wide, were almost all packed into it. Practically from this moment on, the patient progressed to recovery. The wounds were dressed daily. The cavity was swabbed with peroxide and iodoform gauze inserted in both openings. Two smaller subsidiary pockets were found during the first two weeks, one passing in toward the median line, and one passing up toward the vertex. The temperature gradually sank to normal and the patient gradually recovered the use of all his faculties. At first he was troubled with dreadful nightmare and with loss of memory for recent events, also incontinence of urine during sleep. These, however, have all disappeared. The drainage was entirely withdrawn from the front wound at the end of five weeks and from the side wound at the end of eight weeks. There is a hernia cerebri from the front wound, which at first was the size of a large walnut, but which has gradually diminished until today it is the size of a chestnut. There has never been a hernia from the
side wound. It was deemed best not to interfere with the hernia from the front wound as it was impossible to cover it with bone or skin on account of the large removal of bone at the time the epidural abscess was treated.

The eyegrounds were looked at about two weeks after first opening the brain and showed well marked choke disc. The vision today is 20/40 in the right eye and about 5/200 in the left eye.

There was no aphasia at any time during the illness.

A critical review of these two cases leads the author to believe:

1) That the path of infection in both of these cases was by way of necrosis and destruction of inner plate leading to epidural abscess, and thence to the frontal lobe by way of the blood vessels.

2) That the abscesses both went through a latent period and that the symptoms which ushered in the manifest stage were those of drowsiness, vomiting and headache, and that these symptoms were intermittent and delayed, because in each of these cases a certain amount of skull had been removed, owing to the presence of epidural abscess, and this produced a state of decompression.

3) That because of this, the abscess in the first case, insidiously enlarged until it finally invaded the lateral ventricle and therefore produced symptoms so severe and so quickly fatal.

4) That the surgical expedient of making a counter opening in the temporal region in the second case was unquestionably the means of bringing about a favorable issue in that patient.

**DISCUSSION.**

**Dr. Joseph A. White,** of Richmond, Va. This is a paper that presents an interesting subject for us. I have just had a personal experience with a similar case in an adult. I was sent for to see a gentleman five or six weeks ago, and found a large swelling over the frontal bone, involving the eyelid. The parts were tremendously swollen, and the temperature was 103. The family physician told me that he had been in this condition for ten days, and in the meantime he had suffered great pain. The pain had only ceased the day before he sent for me. I diagnosed at the time a sub-periosteal abscess, probably resulting from a frontal sinusitis, and stated that from his condition I would not be surprised to find the frontal lobe involved as well. I incised the swelling, emptied a great quantity of fetid pus, and requested them to bring him to town and let me operate on him the next day. He came in town the next day, but his temperature was normal and he felt as well as he ever felt in his life. Except for the draining of the pus from the cavity, he was apparently perfectly well, and declined further operation. I begged his wife, himself and the physician to
TWO CASES OF BRAIN ABSCISS.

submit to operation. He said he would as soon as he got his affairs straightened out. In the meantime there were no evidences of mental trouble, and no fever. There was a perfect absence of symptoms of all kinds except the draining of pus from the cavity. One week afterwards, after he had gone home, he was brought to me with some hebetude, loss of self-control and dulness of intellect, but no focal symptoms that I could make out. I had him taken to the hospital the same day and operated on him. I found when I uncovered the bone that the periosteaum was stripped up probably as high as the middle of the forehead, and on opening the frontal sinus I found it filled with foul smelling pus, but there was no communication with the brain cavity. I made an independent opening through the frontal bone at the front, found the dura covered with granulations on the lower part, and enlarged the opening upwards until I found healthy dura. I then incised the dura, evacuated a large abscess containing foul smelling pus in the frontal lobe. How long that had been there I do not know. Probably for some time. There were no symptoms at all except those I have mentioned. An abscess can be present in the frontal lobe probably indefinitely without showing any symptoms. Reports have been made showing encapsulated abscesses that must have been there for a long time. All the frontal lobe in front of the coronal suture presides only over the intellectual functions, and the only symptoms we would have would be probably some dulness of intellect. This anterior portion of the superior, middle and inferior frontal convolutions, as far as we know, does not control motion at all, and, therefore, we should have had no symptoms of defective motion, and in fact in this case, we had no symptoms of this kind when I operated. His temperature kept up, and he did not return to consciousness. Two days after he lost the use of the right arm; and the muscles of the face became involved; so we concluded that the ascending frontal convolution, the motor area for the arm and the contiguous region. We trephined at a point just over the fissure of Rolando and evacuated another large abscess. As soon as the operation was performed to empty the second abscess in the posterior part of the frontal lobe, he recovered use of his arm, but there was such an amount of destruction of brain tissue that he sank rapidly and died the same evening of the second operation. This case shows the result of delaying operation, although I think it probable that I would have still found the frontal abscess even if I had operated the first day I saw him. I do not think this abscess came from direct involvement of the tissues from the frontal sinus. I rather think the infection was carried by the veins, and probably the second abscess was there when I operated on the first. But there were no indications to go deeper into the brain at that time.

Dr. DENCH, of New York. I was very much interested in the counter opening. I had one case. It was a case of cerebellar abscess which came on as the result of an old middle ear suppuration. Strangely enough the perforation through the dura and the presence of the cerebellar abscess had been overlooked. I demonstrated the area in the dura and passed a probe directly into the abscess cavity. The same night we operated, evacuated the abscess and put in a drain. I told them at the time that if all other symptoms did not immediately disappear to make a counter opening at the base of the skull—in other words, directly through the cerebellum. The case did very nicely for about a week. Then the temperature rose suddenly, and headache returned. I was out of town. The surgeon took my advice, and went in and made a counter opening. The case recovered. I think drainage by a counter opening in these brain abscesses offers a good deal of promise. I think we have been afraid to take away enough bone, afraid to make an opening for sufficient drainage; that is, to do a through and through drainage as in any other part of the body. I think this case of Dr. McCoy's illustrates that very nicely.
Dr. L. M. Hurd, of New York. May I detail very briefly a case I recently had of frontal abscess? Last April I saw a young woman twenty-six years old who had extensive sinusitis on both sides following grip two years before. The upper part of her nose was entirely filled up with reddish granulations. Dr. Wright saw the case and advised internal operative procedures rather than external. I did not agree with him. As fast as I took out these granulations they would come back. This woman complained dreadfully all summer long of intense headache. In the fall I brought the case to his attention again, and he consented to an external operation. I did a radical sinus operation under hyoscine and morphine on one side, which promptly healed up, and at the end of a week or ten days she left the hospital and I did not see her again. She could remember some parts of this hyoscine operation, and she did not like it. About five weeks later she suddenly turned up in my office with a swelling in the corner of the opposite side. I had her go home and use cold compresses that night, and she came back next day no better. I sent her to the hospital, put on cold compresses, and at the end of the next twenty-four hours she was better. I let her go twenty-four hours more, and in that twenty-four hours the condition had extended over the forehead and she had a puffiness of the forehead and in the eyelids, and pus and thick mucus began to pour through the openings we had made in the other side in the radical operation on that side. I immediately did a radical operation on this side, found much pus and granulations and cleaned it out. It was left open for forty-eight hours, but the puffiness of the face did not go down. At the end of forty-eight hours I closed the wound. The temperature varied from 99.5 to 101. At the end of a week I ran a knife from this incision up into the puffiness over the forehead but could find pus nowhere. A day or two later, on looking into her nose, to my surprise I found an abscess of the septum. I incised the septum on both sides. She went on, and Dr. Wright saw the case, and he did not think it worth while to do anything more. He thought she had meningitis. She went on for about a week, and then her temperature went up one night. Then I went in and found she had necrosis of the frontal bone, necrosis of the bridges of Killian, necrosis of the nasal bone, and necrosis of the bony septum, which I removed. Then she went on, still running some temperature. At night she complained of headache, in the day she felt fairly good. The mind was fairly clear. There was another case of brain abscess in the ward who was delirious and later died, and one day the nurse said she believed my patient was imitating the other woman. She became restless and unconscious in about three hours. I immediately put her on the table, made an incision, and the dead bone was like ivory. I could find no pus anywhere. After getting the periosteum up at the external end, there was a softened spot in the bone. We found an epidural abscess, which had ruptured with pus generally over the meninges. She died of pachymeningitis.

Dr. Dunn. I should like to ask Dr. McCoy if, in his second case the periosteum was separated from the bone above the opening.

Dr. McCoy. I did not do the original Killian operation. The eye man did that. He sewed it up completely, and there was left at the site where a small incision had been made a fistula which was discharging pus. When I was called in there was a swelling, and I removed the diseased bone.

Dr. Dunn. The reason I asked this question is this: I witnessed the operation that Dr. White did, and the posterior wall of the frontal sinus was perfectly healthy. I wondered how the pus had gotten into the cranial cavity. The periosteum over the frontal bone on this side was separated for a considerable distance. The small channels through which the veins pass from the inner to the outer side of the skull, or vice versa, at the upper angle of the eye, were all evidently
inflamed, so that in Dr. White's case I think it is likely that the abscess first infected the orbital tissues and got between the periosteum and the bone, and then passed up into the cranial cavity through these bones. At no part of the skull except along the channels marked by the sinuses do we find the inner table of the bone as fully marked by small vascular channels as that region overlying the upper wall of the frontal sinus. A great many of these vascular channels turn outwards toward the region directly behind the external angle of the eye, where there is a considerable amount of diploetic structure. I was interested when Dr. McCoy read his two cases to see that in both of them it is very probable that the intra-cranial cavity was infected by the pus first finding its way to the outer side, then along the periosteum, and then carried into the brain, and not directly through the upper wall of the frontal sinus.

Dr. Christian R. Holmes, of Cincinnati. It seems to me, after listening to the description of all of these cases here, that it all comes back to the sinus infection as the primary cause, and if there is any lesson to be drawn from the results in these cases, it is early interference in sinus disease, free drainage. Unfortunately, these cases had been seen by men—I am not speaking now of Dr. McCoy's cases—who simply made a little puncture, probably with a cataract knife at the outer angle of the lid, hence in the meantime letting the frontal sinus, the anterior and posterior ethmoid cells, and probably the sphenoid go on to suppuration. And then when we do make the operation, I feel that these cases show that we should not only go in above, but also below in order to establish free drainage. Unless we do that we are certainly likely to have secondary results.

Dr. Dunn spoke about the method of infection. Of course, you all know, as well as I do, that when you go in and operate on the ethmoid cells, you come in close proximity with the cribiform plate. You know that the olfactory nerves pass down through that region, that every nerve has a lymph sheath around it, and that when you go in there you have a direct communication with the cranial cavity, and unless we establish absolutely free drainage below that area it is the easy and natural way for the infection to enter the cranial cavity. Consequently we should always try to establish thorough drainage of this region.

Dr. Dunn. I often wonder in cases of ethmoidal and sinus disease why the brain is not more frequently infected, and I recognize well the fact to which Dr. Holmes has just called my attention. But in the case of Dr. White's directly behind the frontal bone there was a thick, inflamed, adherent dura, and the dura was softened, and Dr. White cut away the bone, removing the bone well up towards the hair line to get beyond this area of inflamed and adherent dura, showing in Dr. White's case at least that the infection did not pass by means of the filaments of the olfactory nerve, but passed through the veins that go through the bone somewhere over the frontal region. In these other two cases there was pus under the periosteum over the frontal region, and that is the reason I made the comment I did.

Dr. White. Dr. Holmes' remark reminds me that a great many of these cases die before a specialist has an opportunity to see them, or if they do not die they are in a precarious condition. It reminds me of another case I operated on several years ago. I was called into the case without the knowledge of the attending physician. When I saw her first and gave my opinion the doctor protested that she did not need an operation because all the symptoms present were found with a disclosed liver. He was satisfied that she had had the same condition of affairs frequently before from her liver being out of order. I insisted on the operation, and when I opened the cranial cavity I evacuated a great quantity of pus. The whole anterior portion of the frontal lobe was broken down, notwithstanding she had just begun to
show cerebral symptoms the day I operated. The physician was present, and I said to him, "There is your liver." Even then he was very loath to believe that it was not her liver.

Dr. McCoy, in closing. If we would just report every case that we get, whether it dies or whether it gets well, after a while we would get a line on these cases and would be able to recognize them better than we do now. I think these two cases point the lesson that when a certain amount of the skull has been removed a condition of decompression of the brain arises, which obscures symptoms of brain abscess. So that in those cases we should be very careful in scanning the symptoms of the patient, and perhaps enter that brain a little earlier than we would in another case.
SIGMOID SINUS THROMBOSIS.

Report of Cases.

By W. B. MASON, M. D., of Washington, D. C.

Case I. (W. E., male, age 6½). Delicate child from birth. I removed his tonsils and adenoids on January 4th, 1909, and he made a rather slow though perfectly satisfactory recovery. His last visit to my office was on January 26th. I found his throat entirely healed and discharged the case. On Sunday evening, February 28th, the father telephoned me that he had a slight earache. I offered to go at once to see him but his father said, as it was a bad night and late, he had rather have me suggest something to do, as he did not think the earache was serious. I suggested the application of hot boric acid drops and told him to notify me if the pain was not relieved within an hour. I heard nothing more from the case until one week later, Sunday evening, March the 7th, when I was called in consultation by the family physician, Dr. Bowen, who gave me the following history:

"I was called in to see the boy on Tuesday evening, March 2nd. Found he had a slight bronchial cold, and a temperature of 100.6 and was apparently not very sick. I called again at noon the following day, March the 3rd, and found him better; temperature only 100.2. Later in the evening the temperature became normal and the child seemed perfectly well. The temperature was normal all day Thursday, March the 4th, but on account of the very bad weather he was kept in the house. On Friday morning, March the 5th, he seemed well and not feverish (temperature was not taken). About noon he became fretful and seemed hot. His mother took his temperature and found it 102.4. He seemed to get steadily worse. The temperature taken at 2.30 P. M. was 103; at 3.30, 104.4, and at 5 P. M., 104.7. He had developed a slight dry cough and had a vomiting spell at this time, but had no chill. I called at this time and on examining his lungs found positive pneumonic signs and diagnosed pneumonia. During that night temperature remained between 104 and 105. By noon of the next day (Saturday, March the 6th) it had dropped to 102.3 and remained below 103 until 6 P. M., when it went steadily up
to 105. By 11 P. M. it had fallen to 101.3. At this point the patient perspired freely but had no chill."

"Sunday, March the 7th, at 1 A. M., the temperature was 103; at 7 A. M. down to 100. At 7.45 A. M. he had a sharp chill lasting 10 minutes, followed in three hours by another chill less severe, temperature rising by noon to 105. The temperature has fallen steadily until now it is 100 at 9 P. M."

Dr. Bowen went on to say: "I have repeatedly examined his ear and mastoid during the illness and questioned him and his mother daily in regard to ear symptoms and except for the history of the slight earache one week ago and a slight swelling of the post auricular gland (which has subsided) there have been no symptoms pointing to the ear. But as this is a complicated case of pneumonia and the child is very septic I have called you in to examine the ears and see if I have overlooked any symptoms. The pneumonia does not satisfactorily explain this septic temperature and the child did have an earache one week ago."

Aural examination showed perfectly normal ear-drums on both sides. There was entire absence of mastoid tenderness or any other signs of inflammation, except a very slight impairment of hearing (such as you might expect to follow an acute catarrhal inflammation) in the ear that had had the pain one week before, (left ear). Child was irritable and fretful, complained of headache, scalp was very sensitive but denied having any pain in or around the ears; eyes very sensitive to light. A white blood cell count was made and showed a leucocytosis of 20,000.

I strongly suspected that the ear was primarily the seat of the trouble and that the case was one of sigmoid sinus thrombosis, to which the pneumonia was secondary. I stated my suspicion to Dr. Bowen, although I had to admit the almost entire absence of ear symptoms. On account of the lack of localized symptoms I did not feel justified in advising an exploratory operation unless the attending physician was positively sure that the pneumonia could not explain the temperature chart.

We decided to call for help in the shape of another consultant. A consultation was arranged with Dr. Acker for the following morning, March the 8th. I stated my suspicion to him as I had to Dr. Bowen, but after examination of the lungs, Dr. Acker felt that they might be entirely responsible for the very septic temperature curve. It was decided that we should see him again in the evening. Temperature at that time was 103.5 and dropped by 2 P. M. to 99.8, when the child perspired freely but had no chill.
When we returned at 8 P. M. the temperature was 103 and the patient's condition unchanged. Dr. Acker still felt that the lung signs were sufficient explanation of the temperature chart. We met at the house again at 3 P. M. the following day, March the 9th, and learned that at 10 P. M., the night before, the temperature had gone as high as 104 and had fallen as low as 102.2 by 8 A. M. of that morning. At 7.45 A. M. the child had had another chill which lasted 8 minutes. A deep red and very sensitive spot had appeared on the back of the left hand.

Barring the lungs no other signs of metastasis had appeared in any part of the body. At this consultation both Dr. Acker and Dr. Bowen admitted that the lung condition was improved and that they no longer felt that the pneumonia could account for the condition of the case.

I advised exploratory opening of the mastoid, which the parents readily accepted. The operation was done two hours later at the Episcopal hospital.

OPERATION. Mastoid cortex of normal color and hardness. The cellular portion was slightly congested but no pus was found until the antrum was opened; then a few drops of creamy pus oozed out. The bony wall of the sigmoid groove was not softened and when the sinus was uncovered it seemed to be normal in appearance and feel. The sinus was exposed from one inch posterior to the knee well down into its horizontal portion. It was then incised for one-half an inch along the anterior aspect of the descending portion and there was no bleeding. Pressure was applied above and below and this incision was prolonged upward and downward until about an inch in length. A liver colored clot was then lifted from the sinus (about an inch long and of the size of the lumen of the vessel). Pressure was then released above and no bleeding occurred. The incision was prolonged backwards three-quarters of an inch behind the knee and more clots picked out. Finally a flexible curette was introduced backwards two-thirds of the distance to the torcular and several clots were dragged out before a free gush of blood occurred washing out the vein. Pressure was re-applied with slight loss of blood and attention was then directed to the lower end of the sinuses. Its bony covering was removed as far forward towards the bulb as was possible. Pressure was released and the vessel wall incised to the limit of its exposure and no bleeding occurred. More clots were picked out of the remaining incised
part of the horizontal portion of the sinus and no bleeding occurred. The wound was temporarily packed and the internal jugular vein was resected from one inch above its facial branch down to the upper margin of the clavicle. The neck wound was dressed open; the bulb end of the sigmoid sinus was then curetted and no bleeding occurred. A cigarette drain was introduced. Time of operation 55 minutes, chloroform anesthesia, and shock from operation was not marked. Patient reacted well; pulse rate increased, but of good character. No nausea, mental condition brighter, slept at intervals during the night; took nourishment three times. Temperature, which was 193 at the time of the operation, fell to 100 three hours later and at midnight had risen to 102.8; dropped two hours later to 98, then rose to 102.1 by 4 A. M., and remained between 101 and 102 until the child died at noon. High saline enemata were started immediately after the operation and were retained fairly well but with slight benefit. Pulse varied from 130 to 150 during the night and early morning and his condition seemed fairly good until 11.30 A. M., when he suddenly became very weak; pulse went to pieces, failing to respond to the most vigorous stimulation and the child died within an hour.

Bacteriological examination showed that it was pneumococcus infection.

Besides the lesson it teaches: never to prescribe for an earache over the telephone, if you have not examined the ear; the case presents several points of interest:

The almost entire absence of middle ear and mastoid symptoms.

The probability that the pneumonia was septic and secondary to the sinus thrombosis; and assuming this to be true the rapidity with which the sinus thrombosis occurred after a slight earache lasting less than an hour.

The fact that the mastoid process was free of suppuration, except in its antrum, which undoubtedly accounted for the lack of tenderness and other local symptoms.

The apparent healthy condition of the bony covering of the sigmoid sinus and of the sinus wall itself which contained an occluding clot fully two inches in length.

Case II. (M. G., female, age 13.) I was called in consultation on this case on the afternoon of April the 19th, 1909, by Dr. Mundell, who gave the following history:

"I first saw this patient on March 22nd, 1909, and learned that she had been complaining of headache, backache, loss of appetite
and drowsiness for the past two weeks. She had some pain in the left ear that day and the left mastoid was tender under moderate pressure. The ear discharged two days later. Then the right ear began aching and discharged the following day. Within ten days, discharge and tenderness had disappeared from both ears. She was very deaf. From March 22nd to 25th her temperature was 101 in the morning to 104 in the afternoon. She had occasional chilly sensations. On the 25th temperature was normal in the morning and went up to 104.6 in the afternoon. March 26th the temperature was 103 in the morning, 105 in the afternoon. Blood examination showed Widal reaction negative, leucocytes 6,000. March the 26th, temperature was 103 in the morning, 105 in the afternoon; the same on the 27th but had a chill during the day; 28th, temperature the same; 29th, blood culture (specimen from right median basilic vein) made and laboratory reported colonies of typhoid bacilli found.* On April the first she developed pneumonia and became delirious. Right arm was swollen, swelling extending down into hand but after five days had subsided except in the elbow, (the point from which the blood culture was taken) and has remained swollen until now. Tissue is soft, slight crepitus in the joint and no fluctuation. On April the 5th she had a marked and sudden abdominal distension and pain in the right iliac region, marked shock, weak and rapid pulse, and I suspected perforation. Temperature was 106.2 at 5 P. M. and 101.8 at midnight. April the 12th, pneumonia entirely cleared up. On April the 13th, temperature 99 at noon, 103.6 at 3 P. M. April the 14th, temperature 97.8 in the morning and rose steadily to the morning of April the 15th, when it was 102.4, and fell to 97.8 by that afternoon. April 16th, temperature rose slowly during the day to 102 and by 4 P. M. on the 17th had reached 104.8. Since then it has fluctuated between 102 and 104.

She complained of pain in the left mastoid last night and this morning, for the first time in three weeks. Has continued very deaf from the time her ears discharged, and delirious a greater part of the time since April the 1st.

Aural examination showed a scanty, foul, purulent discharge (which did not show externally) from both ears. Moderate sagging of both posterior superior canal walls. The tympanic

*One week after I reported this case Dr. Mundel learned by the merest accident that a mistake had been made at the laboratory, and that this culture was negative. This discovery upsets my theory that the absence of leucocytosis was due to typhoid complication, and goes to show that sepsis is not always accompanied by a high leucocyte count.
membranes were thickened and inflamed but no perforation was visible. Both mastoids were tender on deep pressure, the tenderness being more marked over the left. There was a hard cord-like swelling along the course of the left internal jugular vein which was very tender. Temperature was 104, pulse 146. Patient was very deaf, could not hear a watch at all and could be made to hear the voice only by shouting at her. She was semi-delirious, moaning a good deal of the time, fretful and irritable. Would answer some simple question and then wander off into delirious ramblings again. There were apparently no eye symptoms; no ophthalmoscopic examination was made.

Diagnosis of double mastoiditis with sigmoid sinus thrombosis complicating the left mastoid was made and immediate operation advised. Child was moved to Providence Hospital as promptly as possible, and I operated about midnight.

OPERATION. The left mastoid seeming to me to be the most urgent was opened first. I found the entire process involved and after cleaning it out thoroughly I exposed the sigmoid sinus from the middle of its horizontal limb to one inch behind the knee. As soon as the bony covering of the sinus was removed the odor was almost intolerable and the sinus wall almost black. The sinus was incised and no bleeding occurred. A well organized occluding clot was removed from the exposed portion and then a flexible curette was introduced backwards into the lateral sinus to within one-half an inch of the torcular and several clots were dragged forward before bleeding occurred from that end. It finally gushed out freely and the sinus was packed off. There was no bleeding from the lower end and I went immediately into the neck and ligated the internal jugular vein just above the clavicle and dissected it out up to three-fourths of an inch below the jugular foramen. The vein contained no clot and its lower half was normal in appearance, but the walls of the upper half were so thickened that its lumen was narrowed to one-quarter of the size of the lumen of the lower half. In dissecting out the upper third of the vein I found around its sheath an accumulation of about one ounce of thick, creamy pus of the same foul odor as was noticed in the sigmoid sinus. The neck wound was dressed open.

After curetting more clots out of the bulb end of the sigmoid sinus a cigarette drain was introduced and a mastoid dressing applied. The operation consumed one hour and fifty minutes,
and as the patient's condition was very bad, pulse 150 and barely perceptible, I decided to postpone opening the right mastoid for a few days.

Her condition was unimproved for the next three days, but on April the 24th she seemed slightly stronger and I operated on the right mastoid and found limited necrosis had occurred on that side. The operation was followed by a rise of temperature to 104.6 and an increased pulse rate to 160. The following morning the temperature was down to 99.6 and pulse 118. For the next three days temperature remained between 100 and 103, pulse 120 to 140. On April 27th fluctuation was detected in the swollen elbow; an abscess was incised and four ounces of thick foul pus was evacuated. April 28th to May 6th condition remained unchanged, pulse 120 to 140 and temperature ranging between 101 and 104. Child continued almost continuously delirious, sleeping very little, crying out a great part of the day and taking nourishment poorly. On the 6th of May right shoulder became swollen and painful, and by the 9th fluctuation was present and another large abscess (several ounces) was incised and evacuated. Her condition remained unchanged for four days when a tremendous abscess was discovered on the inner aspect of the right thigh. This was evacuated and the temperature immediately went down to normal and pulse rate was correspondingly decreased. Temperature has never risen above 100 again. The delirium, which had continued for 43 days, cleared up immediately and the patient began eating and sleeping well. From that time on she made an uneventful recovery and she is in perfect health now, the only ill effects of the operation being the ankylosed elbow, resulting from the metastatic abscess at that point. Bacteriological examination showed it to be a pure streptococcal infection.

The vitality of this case, withstanding a pure streptococcal pyemia for nearly a month and a half, was a remarkable feature.

The pneumonia was undoubtedly metastatic and secondary to the thrombosis.

DISCUSSION.

Dr. Joseph C. Beck, of Chicago. I did not hear all the papers, so I may have to speak from my own experience in these cases. I was interested in the report of the first case. The difficulty of diagnosis brought to mind a case I had last year in which there was a post scarlatinal infection of the ears. I will briefly state the history. A child in the third week of scarlet fever, which had run a normal course, developed an otitis media suppurat without any marked symptoms
from the ears. It also had a slight broncho-pneumonia. All of a sudden the temperature shot up to 106, with no chill reported. The physician called in a specialist, since the lungs showed only a slight degree of broncho-pneumonia. The specialist was one of our best ear men. He said he would operate on the child's right ear, if the thrombosis was not there then he would go into the left. The father would not permit this. I was then called into the case, and if I had not heard what the other man had said perhaps I might have said the same thing in a different way. I examined but could not make any diagnosis as to where the thrombosis was. I sent the case to the hospital and had radiographs taken, which definitely showed the outline of the thrombotic sinus on the right side. This method of diagnosis helped me tremendously, for I opened that side and found the thrombus. There was no other possible way of making a diagnosis at the time. I would have had to wait for developments. Blood cultures were made by an excellent laboratory man, but were negative, and yet we rely so much on these. This case got well without touching the jugular.

I want to call attention to an operative measure in the cases of thrombosis of the bulb. Dr. Neuman was surprised to hear in Chicago that his operation of passing a Nelaton catheter containing a gigli saw through the bulb, was used in this country. Two years ago I reported such a case with recovery. In a limited number of cases that operation is possible. When you have gone as far as you can towards the bulb, you then pass a rubber catheter, and if the curve of the knee under the middle ear is not too marked the Nelaton will come out at the other side in the neck. You slip off the catheter, saw out the bone and do a complete operation. While most of the cases will not require a bulb operation, there are some that do and this case was one in which I thought I should do a complete operation.

These cases of sinus thrombosis are certainly very interesting. Most of them die. I have operated in the Cooke County Hospital the past three years on eighteen cases, with three recoveries. Naturally these cases come to us very late; they are extreme cases, and I think I am very fortunate in having so many recoveries under the adverse circumstances existing there. In my private practice I have had two cases the past year. One case recovered, and one died.

Dr. E. B. Dench, of New York. I do not think there is very much to add to the very interesting paper. Of course, the chief point of interest in the first case is the almost absolute absence of ear symptoms, and that. I think, is a condition we must be prepared for in certain of these cases. I remember a case which was not quite so serious as this one, but it shows how even in an adult a very slight ear infection may lead to a very serious infection of the mastoid. This was the case of a gentleman seventy years old, who in January of a certain year had an ear ache which lasted one night. He called his physician in, and whether he incised the drum or not I do not know. The patient said he pricked it. There was a watery discharge from that ear lasting one night. Three months later he consulted me on account of his impaired hearing. I found nothing upon which to base a diagnosis. However, I opened up his mastoid and let out a drachm of pus. I cite this case to show that a very slight ear ache may be followed by a severe infection of the mastoid. My impression in all of these cases is that the infection of the mastoid does not follow, but occurs at the same time as the infection of the middle ear.

There was a case reported at the last meeting of the New York Otological Society in which a sinus thrombosis was found in a patient where the drum membrane was absolutely normal. That man had probably had a slight aural infection, so slight as to cause no symptoms, and yet the man had sinus thrombosis and recovered after operation.

I remember very well in my own service at the hospital a man who came in with an ear ache and pneumonia. We incised the drum membrane, and the ear cleared up perfectly. He then had a septic tem-
temperature. We opened the mastoid and excised the jugular. The sinus was filled with pus. A broken down and horribly fetid clot was present. He did well for two weeks, but finally died of sepsis.

The lesson from these cases is that in a doubtful case we must investigate the lateral sinus in every instance. And I always do that except in the case of very young infants. I refused to operate in a child about ten days ago in which the drum membrane was absolutely normal. There was a history of earache, and that child was running an irregular temperature, and I simply would not expose the sinus. Both drums were normal. The child was only seven months old. Another man came in the next day operated and found nothing. I believe in an infant seven months old, without definite signs, you are rather foolish to do anything. But with an older patient I should not hesitate.

Prof. Heinrich Neuman, of Vienna. It is very important to study the chart. The temperature in this case rises and falls several times in one day. thus differentiating the condition from malaria. In typhoid fever there is always a diminution in the white blood cells. In sinus thrombosis there is always an increase. There must be a natural relation between the pulse and the temperature. If the temperature is high, the pulse must be high. If one has a case of sinus thrombosis where the temperature is high and then drops, and the pulse does not drop correspondingly, it is a very serious symptom.

I would not attack the bulb, but would wait two or three days. I have operated five times, with three deaths and two recoveries. At the same time I am not a great enthusiast with regard to the bulbous operation, unless it is fairly demonstrated that it must be done, because I am not sure that those cases that die after this bulbous operation would have died in spite of everything, and that those that recover would not have recovered in spite of the operation. In the case of an old Hebrew woman, I insisted on operating. She said she would first write to her rabbi somewhere in Hungary. He wrote back not to operate, that she would get well without it, and she did.

Dr. Dench. Dr. Neuman has brought out one point which influenced me in refusing to operate in the case I mentioned, that is, we had a hypoleucytosis of 2,500, and that pointed strongly against operation. Widal and blood cultures were negative.

Dr. Mason, in closing. I was very much interested in what Dr. Beck had to say in regard to the blood count. He emphasized a point there which I failed to do in the report of my cases. In case No. 1 the leucocytes were 20,000, and that, with a septic temperature, and the exclusion of other things, was what I based my diagnosis on in advising an exploratory operation. But in case No. 2 there was no leucocytosis. There was a white blood count of 6,000. That was taken on the 27th of March, and all other symptoms indicated that at that time the child had already a thrombosis in the sinus and was already decidedly septic. So I thought it simply demonstrated the fact that the case was undoubtedly complicated by a typhoid which had an opposite effect on the leucocytes. For that reason, the leucocytosis was not marked in the second case.

I am very much obliged to Dr. Dench for his indorsement, and for saying that he finds cases of this kind without symptoms sometimes. It is very comforting to find a man of his experience who runs up against the same thing that I did.

As to the differential diagnosis from malaria. I suggested at the first examination that the Widal reaction be made and a search made for the plasmodium, but the attending physician said at that time that he considered it useless because no malaria would ever run any such temperature as that, up and down two or three times in one day. That is the reason it was not done.
AN UNUSUAL CASE OF CEREBRAL TUBERCULOSIS FOLLOWING TUBERCULOUS OTITIS MEDIA. AUTOPSY FINDINGS.

By H. O. REIK, M. D., Baltimore, Maryland.

James Nelson, colored, three and a half years of age, was brought to the Dispensary of the Baltimore Eye, Ear and Throat Charity Hospital, April 5, 1909, with the following history. When about two years old his mother first noticed a purulent discharge from the left ear; there was no apparent preceding discomfort nor febrile condition. The family physician was consulted but, in spite of treatment by irrigation and an operation through the external auditory canal, performed at one of the hospitals, consisting probably, from the parent’s description, in the removal of a polyp, a profuse otorrhoea persisted. In January, 1909, the child commenced to have muscular twitchings of the left side and spasmodic movements of the left leg and arm, followed by a growing inability to use these limbs. Such attacks recurred at irregular intervals, with increasing frequency, until on the fourth of April there was a pronounced convulsion; the spasmodic movements then involving the entire body but, the mother thought, beginning in the left leg and continuing more pronounced on the left side; there was slight, if any, retraction of the head and the child made no outcry, though it was not completely unconscious. This attack began at 4 p.m. and lasted two hours or more, there being short intervals of quiet. Suspecting a connection between the convulsions and the ear disease, the family physician advised referring the child to the above-named hospital.

On admission, the child appeared to be of normal size but poorly nourished. He was perfectly conscious, rather apathetic, understood and obeyed the simpler questions and commands, and showed no irritation at the examination. The head was persistently held to the right side but there was no retraction and no stiffness of the neck. Voluntary movements of the right leg and arm were freely made but he showed no inclination to move the left leg and, when the left arm was moved, supported it with the right hand. On manipulating the left leg or arm there was at first a feeling of limpness which at once gave way to a spastic condition in which extension and flexion of the joints seemed
retarded, as if the joints were stiff. The left eye could be closed but there was a condition of lagophthalmus and when observed later, in sleep, the eye was partly open. Ophthalmoscopic examination showed nothing of importance; it was thought at first that there was a slight venous congestion but repeated examinations led to the conclusion that this was a mistake. The temperature at that time was subnormal, 97.5°F.

Before referring to the aural examination it may be well to present the notes on the neurological investigation made the following morning by Dr. Henry M. Thomas. In brief, his report was as follows: "Patient lies with the head drawn to the right but if turned to the left does not seem to suffer any pain. The neck is a little stiff but can be turned in all directions without giving any discomfort. Visual axes equal and ocular movements good. Pupils small but respond to light. Reflexes: abdominal, active on right, present but not marked on the left. Cremasteric active on both sides but more marked on the left; tendon Achilles active on both sides but more so on the left; patellar active on both sides, suggestion of a clonus on the left; plantar stimulation causes response on both sides, as does also descending tibial pressure. Kernig's sign absent; Babinsky and Oppenheim negative.

Diagnosis: Left hemiparesis with active reflexes."

Aural examination: Right ear perfectly normal. Left external auditory canal filled with pus that seemed to form almost as rapidly as it could be wiped away. The tympanic membrane and ossicles apparently completely destroyed and the tympanic cavity partially filled with granulation tissue. In the superior wall of the canal, close to the annulus, a fistulous tract from which pus could be seen oozing into the canal, and pressure above the auricle, over the squamous portion of the temporal bone, increased this flow. The preauricular and supramastoidal glands were considerably enlarged and pressure over the antrum caused some little pain, though the tenderness was either not of high degree or the child was not in a very sensitive condition. Pus from the ear showed a mixed infection, pneumococci predominating, a few streptococci and some bacilli that morphologically resembled the tubercle bacillus. Under special staining, one slide showed what was believed to be a single instance of the tubercle bacillus; repeated efforts later failed to produce more positive evidence of this and, unfortunately, cultures were not successfully grown.
Blood examination showed a leucocytosis of 12,500, in which the differential count gave 60% of polymorphonuclear cells.

Lumbar puncture produced a specimen of perfectly normal spinal fluid; clear in color, under no pressure, and smears and cultures proved negative.

The Calmette conjunctival tuberculin test was employed, with no resulting reaction.

There having been no recurrence of the convulsions and no markedly urgent symptoms the patient was kept under close observation for the next four days. During that time the temperature varied from 99° to 102° F., there was no nausea and no apparent suffering: the principal symptoms being fever and a profuse discharge of pus from the ear.

From the above history and examination it was apparent that we had to deal with a chronic suppurative otitis media, possibly of tubercular origin, which had certainly invaded the mastoid and probably the intracranial structures. An operation was certainly indicated but how extensive would it probably be? The fever, profuse discharge of pus, fistula in the external auditory canal and partial facial paralysis did not necessarily mean anything more than mastoiditis. The convulsions and the paretic condition of the left side were difficult to explain; the first might be due to a general septic condition accompanying mastoiditis or to an extradural collection of pus; the increased intracranial pressure produced by the latter lesion might explain the existence of both the convulsions and the paresis. Leptomenignitis was ruled out by the normal condition of the spinal fluid. A cerebral abscess was considered possible but there were no strong supporting symptoms; only once, at the time of admission, had the temperature been below normal and that might be readily accounted for otherwise; differential blood count did not indicate it; there were no localizing symptoms: the muscular impairment of the left side suggested a cerebral lesion on the side of the brain opposite the affected ear, but we have previously reported a case in which typical Jacksonian convulsions were caused by an extradural abscess of the same side. The only possible conclusion then seemed to be to perform a mastoidectomy and explore the base of the brain through this wound.

The operation was performed April 10th and proved very interesting. An incision through the soft parts was made slowly, layer by layer, as is our custom, and in this instance it was particularly well that the general advice, to plunge the knife
down to the bone at once and make an incision completely through all the soft structures and the periosteum at one cut, was not followed, for by so doing the brain would almost surely have been injured; in cutting the deeper subcutaneous tissues there was a sense of giving way before the pressure of the knife blade as though there was no bony support, and this was practically the case. When the soft tissues were retracted it was found that nature had done a fairly complete exenteration of the mastoid and that, in addition, there was a large sequestrum of the squamous portion of the temporal bone: the postero-superior bony wall of the canal and the superficial cortex of the mastoid, down nearly to the tip, had necrosed away and were represented by a mass of necrotic tissue only; the sequestrum included the temporal ridge and the squama from above and measures 20mm square. Between this and the dura was a considerable collection of pus.

We had then a mastoiditis with extensive bone destruction and an extradural abscess, the margins of the abscessed area being completely walled off by inflammatory adhesion of the dura all around to healthy bone. Cleaning away the visibly diseased tissues, recourse to chisel or gouge being unnecessary, we found that the sigmoid portion of the lateral sinus was exposed and that, above, the temporo-sphenoidal lobe of the brain was exposed both on its lateral and under surfaces, the roof of the tympanum and antrum having completely disappeared. The area of exposed dura measured 25 by 33 mm and it, as well as the sinus, had seemingly resisted the disease. During the investigation the sinus was injured and bled rather freely for a moment but the hemorrhage was promptly controlled by rapidly enlarging the opening in its bony wall, so as to permit the brain pressure from within to close the wound of the soft vessel wall.

It must be remembered that all this exposure of dura and of lateral sinuses, and the destruction of the postero-superior canal wall, the roof of the middle ear and antrum and the complete exenteration of the mastoid process, was done by the disease and the operation consisted in doing little more than cleaning away the debris. The wound was lightly packed with sterile gauze from behind the auricle, the area being adjudged too large to attempt closure as in the ordinary so-called "radical" operation, and, because we thought it possible that further exploration of the brain might become necessary.
The immediate result of the operation was most satisfactory. The temperature dropped, with some irregularity, until it reached normal on the third day and there was a steady improvement in his general condition. At first the facial paralysis seemed to be somewhat increased and he coughed a great deal, but, possibly aided by the administration of syrup iodide of iron and careful feeding, these symptoms disappeared and he gained rapidly. There were no more convulsions, he began to take an interest in his surroundings, and gradually developed an inclination to use his left arm and leg, so that in the course of a few weeks he could walk and could use the left hand quite freely. The purulent discharge from the aural wound continued to some extent, but he seemed to be on the road to complete recovery and on June 2nd, the local condition had so far improved that an attempt was made to close the post-auricular wound by a plastic operation.

This operation was successfully performed by my associate, Dr. J. W. Downey. On June 21st the patient had a sudden rise of temperature to 103.5°F. and for the next ten days ran a mildly septic fever; the cause for this condition we could not determine. On the 1st of August his parents were permitted to take him home with the understanding that he should be brought to the Hospital at least once a week for examination; there was still a slight discharge from the ear. He was not well cared for at home, however, and early in October was re-admitted to the Hospital ward, the ear being in a filthy condition from accumulated purulent secretions and a fistula having been established by a partial breaking down of the scar tissue behind the auricle. A thorough cleansing and curettage was performed and he was soon making good progress once more. He had now recovered good use of the arm and leg and we had come to hope that he might be restored to perfect health, although he had occasional unaccountable rises of temperature.

From the 23rd of October to the 12th of November his temperature was practically normal and then suddenly arose to 102°F. and he became listless and drowsy. The mastoid wound was re-opened and the temporo-sphenoidal region again explored but nothing of importance was disclosed. Dr. John Ruhrah, the paediatrician, was kind enough to visit the hospital and make a general examination for us. He found no evidence of pneumonia, a complication we had thought possible, and could only say that the condition was one of sepsis. At the next dressing of the mastoid wound, the septic temperature having continued, and the
child being evidently critically ill, we decided to search the brain for an abscess although there were still no clear evidences of the existence or localization of such a lesion. A long narrow scalpel was passed into the temporo-sphenoidal lobe in various directions and a grooved director employed likewise, but no pus was obtained. The general condition gradually became worse and the patient died November 26th.

An autopsy was performed within a few hours by the Resident Physician, with the following results:

The heart was apparently normal. The lungs, unfortunately, were not as carefully examined as they should have been and for some unaccountable reason were not preserved; they were believed to be normal. The liver, spleen and brain presented very interesting lesions. These organs were preserved in a 5% Formalin solution and, later, Dr. Benjamin McCleary, of the College of Physicians and Surgeons, mounted the specimens and made sections for me.

The liver was found to be permeated with vacuoles of varying size, as seen here in the specimen, and Dr. McCleary’s conclusion that this peculiar condition was probably due to infection by the Gas Bacillus was confirmed by Professor William R. Stokes, State Bacteriologist.

The spleen contained two large areas of caseation, typical tubercles.

The brain was, naturally, in view of the clinical history, the centre of attraction and the specimen seems worthy of consideration. The dura was healthy-looking, in the main, being but slightly adherent at several small points on the right hemisphere. The left hemisphere presented a large abscess cavity involving almost the entire temporo-sphenoidal lobe. The incisions made during operative explorations had passed directly through this cavity but the non-appearance of pus may be accounted for by supposing that the abscess had discharged itself through the middle ear.

The dura was easily stripped away from its points of adherence to the right hemisphere, disclosing yellowish, roughened areas, which, when incised, proved to be solitary tubercles. Cutting into the brain substance through the diseased-looking spots on the external surface exposed large areas of tuberculous caseation that involved the greater portion of the temporal and parietal lobes. A cross section of the hemisphere, just posterior to the Rolandic fissure, showed considerable destruction of the cortex of the pos-
terior central convolutions, and, almost complete destruction of the paracentral lobule on the mesial surface.

REVIEW. It would seem probable that this was originally a case of tuberculosis otitis media and that the mastoid disease and the cerebral abscess were direct sequellae of this infection. It is possible, of course, though difficult to prove with certainty, that the cerebral tuberculosis of the opposite hemisphere was, likewise, the result of infection from the aural focus. The extensive destruction of brain substance in the motor region will explain the early paralysis of the limbs but it is not so clear why there should have been so marked an improvement in function after a mastoid operation of the opposite side. Solitary tubercle of the brain is a very rare condition, especially to such an extent as is observed here. How and why the meninges should have escaped in such a case is a mystery.

DISCUSSION.

Dr. S. J. Kopetzky, of New York. I have had only a very limited experience in brain tuberculosis, but in those cases which I have had where tuberculosis was demonstrable in one or another part of the body and which later developed ear lesions, my findings in the mastoid were usually the same as Dr. Reik reports; that is, we were not able to demonstrate the tubercle bacillus. The fact that the dura does sometimes escape, and that the infection may spread along the blood vessel routes, has yet to be cleared up. The lymphatic channels between the ear and any of the bony sinuses and the brain itself are still unknown territory. We can only compliment Dr. Reik on the presentation of these cases and the details that have been worked out, and envy him the autopsy material from which he can get these specimens. The paralysis occurring on the same side as the lesion is a most disconcerting symptom. One case wherein I could not get an autopsy, but where, after a mastoid operation, convulsions and paralysis occurred at the same time in my own experience within the last year because of lack of autopsy material has not been cleared up. In discussing it with a number of medical friends—the case was examined on the operating table for abscess, the knife and probe being passed in various directions and also an exposure of the fissure of Rolando made, and no abscess found, the case eventually dying, we could only conceive that the collection of pus must have been in the internal crrus. However, that is simply a supposition.
THE RESPIRATORY AND VOCAL SYMPTOMS IN PAPILLOMATA OF THE LARYNX.

By G. Hudson Maken, M. D.

Papillomata of the larynx interfere with respiration and vocalization in two ways. First, they have an obstructive influence by diminishing the lumen of the larynx, and second, they interfere with the normal and delicate automatic action of the intrinsic musculature. The obstructive influence, as well as the influence arising from the interference with the muscle action, varies with the character and location of the tumors.

In order to appreciate fully the respiratory and vocal symptoms which arise from papillomata of the larynx it may be well to recall for a moment some points with reference to the physiology of this organ. The problem, which nature seems to have solved so well, was to place the vocal bands within the respiratory tract in such a manner as not to encroach upon its lumen during ordinary respiration. This was done by the insertion of a group of muscles, whose automatic function it is to project themselves into that portion of the respiratory tract known as the larynx during phonation, and to modestly withdraw again during respiration.

In a sense, therefore, phonation may be regarded as an incident in respiration. It is, in fact, a modified or an elaborated form of respiration.

I have ventured elsewhere to define voice as a moving column of breath set in vibration by its own impact with the vocal bands and reinforced by its diffusion through the various resonance chambers into the surrounding atmosphere. If this definition be a correct one, it is evident that anything which interferes with respiration must also interfere with vocalization.

A feature of the larynx, which is often overlooked in studying the physiology of voice, is its function as a resonator. The vibrations imparted to the moving column of breath during voice production extend in both directions from the vibratory bodies, and the infraglottic as well as the supraglottic space becomes resonant with voice. Moreover, that the trachea, bronchi and bronchial tubes also share in this function may be demonstrated by simple auscultation.
Another feature of the larynx, which should be mentioned in this connection, is what some physiologists (among whom Czermak I think was the first) have called its double valvular action. This may be made to appear both in inspiration and expiration. It is well known that when the edges of the true vocal bands are approximated, their superior surfaces on either side of the rima-glottidis are slightly concave, and an attempt at inhalation will tend to keep the bands closed and prevent the influx of air. This forms the inspiratory valvular action of the larynx.

Moreover, it has been shown that the ventricular bands may be adducted while the vocal bands are in the position of abduction, and that an attempted expiratory blast, such as is used in phonation, taking place during this adduction of the ventricular bands, will tend to inflate the ventricles on either side and thus mechanically to hold the bands in apposition, and the stronger the expiratory effort, the tighter will be the apposition. This is called the expiratory valvular action of the larynx and it is made use of to explain the physiology of coughing and certain spasmodic phenomena giving rise to defects of voice and speech.

Keeping in mind the various functions of the larynx which I have mentioned, we shall be in a position to understand more fully the respiratory and vocal symptoms which arise from interference with these and other functions by papillomata of the larynx.

RESPIRATION. The respiratory function of the larynx is not noticeably interfered with by papillomata until the lumen of the larynx is encroached upon by the large size, the shape or the position of the growths, and it is surprising oftentimes to what extent these tumors may grow without appearing to obstruct the breathing, so great is the adaptability of the parts. On the other hand, a very small tumor may be so situated as to seriously impede breathing when the patient has a cold and is obliged to cough, or during certain changes in the position of the body. It is in the reclining position that difficulties in respiration usually first appear.

The respiratory symptoms are of gradual onset, and they are not often observed until some time after the vocal symptoms are well established. As the tumor increases in size the breathing becomes more and more difficult, and we all know that labored respiration is the most serious of all the symptoms, calling sometimes for prompt surgical interference. Coughing and choking at night may usher in an attack of dyspnœa and, as some one has
said, a child will often rise up in bed and stretch out his arms as if pleading for breath. The mechanism of this alarming dyspnoea may best be explained on the principle of the valvular action of the larynx to which I have referred. The act of coughing closes the valves and the combined pressure of the breath and tumor keeps them closed. A freely movable cauliflower-like growth is thrust up into one or both ventricles already inflated by air pressure, and the patient is unable to dislodge it. The valves will not open to admit air and the child becomes cyanotic.

VOCALIZATION. The first symptom of papillomata of the larynx is generally some interference with vocalization, and this interference may be of any grade, all the way from a slight hoarseness to complete aphonia. The vocal symptoms also begin insidiously and their origin may be attributed to other less serious conditions, such as enlarged faucial or pharyngeal tonsils.

Papillomata of the larynx in very young children may interfere with the development of speech by rendering vocalization difficult or even impossible, and when they appear before the age of two or three years attempts at speech result in little more than a hoarse whisper. The hoarseness in papillomata of the larynx, although not characteristic, differs somewhat from that in other tumors of this organ because papillomata are generally more movable, and they have their origin in the mucous membrane, while other tumors invade the muscles, cartilages and joints of the larynx. The hoarseness in papillomata of the larynx, like the difficult breathing, varies at times with the rapid variations in the size, position and mobility of the tumors, and there is a distinct effort in attempts at phonation which I think is quite characteristic. The vocalization at times is a whisper with a moist whistling sound. The absence of pain is another feature which distinguishes papillomata from other diseases of the larynx, and fever is also rarely found. Other clinical symptoms of papillomata of the larynx, their etiology, pathology and treatment, although exceedingly interesting, do not properly come within the scope of this paper.

DISCUSSION.

Dr. Lafayette Page, of Indianapolis. It seems to me that too little attention has been given to papilloma of the larynx of recent years, since in adults it constitutes by far the most frequent form of neoplasm occurring in that organ. As stated by the essayist, papilloma is not so frequent among children as in former years, since more careful attention has been devoted to the treatment of obstruction in the inflammatory conditions of the upper air passages.
Many cases in small children are never recognized because laryngoscopy is difficult and troublesome. I find that direct laryngoscopy is of inestimable value in the diagnosis of these cases. Recently I have had under my care a child two years old with papilloma of the pediculated variety which acted as a valve in the glottis, causing most difficult inspiration with easy expiration. I was able to diagnose and remove this papilloma by the direct method.
A FORCEPS FOR THE CONTROL OF TONSILLAR HEMORRHAGE.*

By SYLVAN ROSENHEIM, M. D., Baltimore.

The two dangers of the modern method of removal of the faucial tonsils by dissection are the anesthetic and hemorrhage. The former can be guarded against by the employment of ether in the hands of an experienced anesthetist. He should keep the patient just enough asleep to allow the operator to work. After such an anesthesia, the patient awakens in a very short time after completion of the operation.

The forceps, illustrated here, are modeled closely after those of Jackson, the bite, however, being stronger. An attachment like that on the Shoemaker forceps, facilitates tying after the bleeding point is caught.

The tonsils are dissected out with capsule intact, after the method of Worthington, using seizing forceps and Seiler's septal knife, strengthened for this particular purpose. After removal of the tonsil, one or more sponges, held on Kelly clamps, are placed in the fossa and held there for a while. The fossa is then inspected for bleeding points as described by Cohan. Sometimes a spurtling artery is seen on the anterior surface of the posterior pillar or the posterior surface of the anterior pillar. The hemorrhage frequently comes from a large vein running from above down, in the center of the tonsillar fossa. This vein is responsible for the severe hemorrhage which often occurs just as the tonsil is removed, and is soon controlled by pressure. In a recent case this vein was torn away in the lower portion of the fossa and flopped around in the fossa, causing considerable bleeding until clamped and tied. A comparatively large artery is frequently severed about the center of the fossa and the blood spurts almost out of the mouth.

The bleeding vessel or point is grasped with the forceps, while an assistant depresses the tongue and retracts the anterior pillar. The assistant then holds the forceps, while the operator introduces one finger to the end of the forceps, holding one end of the ligature there and drawing on the other one with the other hand, which need not be introduced into the mouth. As the ligature is tightened, the

*Presented to the American Laryngological, Rhinological and Otological Society, Washington, D. C., April, 1910.
assistant elevates the forceps slightly from the floor of the fossa. This is readily done as the tissue is very loosely attached there. Sometimes but one bleeding point on each side is tied and sometimes none. It is rarely necessary to make more than three ties in the case of severe bleeding, and this is usually the case when a small amount of muscle is accidentally removed.

The most difficult places to tie are at the base of the tonsil and high in the supratonsillar fossa. The act is facilitated in the latter location by inverting the fossa and by grasping the soft palate with a long dressing forceps.

Since using this method of controlling hemorrhage, in a period of over half a year, the writer has had but one case of secondary hemorrhage. In this instance the operation was performed under cocain-adrenalin anesthesia and the use of the adrenalin so con-

tracted the vessels that the latter did not bleed at all at the time of the operation. Professional friends have told me that most of the cases in which they have had secondary hemorrhage have been in cocain cases. For this reason, as well as on account of the disagreeable effects frequently caused by cocain, ether narcosis is to be recommended.

BIBLIOGRAPHY.

PERSONAL HYGIENE IN INFANCY AND CHILDHOOD.

By WM. C. BANE, M. D., Denver, Colorado.

The preservation of health in the home is vital for the development of strong, robust individuals. We are confronted with numerous problems and perplexing conditions when we undertake to overcome the many faults and handicaps of the parents and adults in order to preserve the health of infants and children. It is important to commence with the pregnant woman, giving her the necessary instruction and aiding her in having proper surroundings, ventilation, food, etc.

Recent experiments on guinea pigs, rabbits and dogs by Dr. Willis S. Anderson of Detroit, Mich., have proved the necessity of normal breathing through the nose in order for health, for strong resistance, and for healthy offspring. By closure of the nostrils, the guinea pigs would die in from twenty-four to forty-eight hours. Rabbits manifested more resistance owing to better mouth-breathing, and yet their lives were cut short. The most instructive part of the experiments was perhaps that upon dogs. The closure of the nostrils in great part, or entirely, thereby enforcing mouth-breathing and limiting the inspiration of air, caused the dogs to become listless and dull, the hair to drop off their legs and abdomen, and the skin to become wrinkled. The respirations became labored and asthmatic in type. One bitch experimented upon by Dr. Anderson gave birth later to a litter of 8 pups, all but one apparently healthy, and that one dead born. The living pups thrived about four weeks, and then began to show effects of the experiments upon the mother before their birth. The hair began to come off their legs and the skin to wrinkle, and by the end of eight weeks all were dead, having a dried, wizened appearance.
I cannot conceive of anything more instructive than Dr. Anderson's experiments as showing the vital importance of normal nasal respiration and of the inspiration of pure air.

It has been observed that freedom from care, and proper rest of pregnant women for ten days or two weeks, previous to confinement, shows a marked increase in the weight and healthfulness of the offspring. This is a very important factor in relation to the child's health and power of resisting disease, especially diseases of the respiratory organs.

The acute respiratory and acute contagious diseases, particularly measles, are most common in the latter part of the winter and spring, seasons of the year when the infants and children are rather closely confined indoors, breathing vitiated atmosphere that weakens their resistance of disease.

Poverty plays a very important part, in that the children of the poor are not sufficiently protected to withstand the sudden changes in the winter season. Too often the feet are not protected against wet and mud, and after exposure there follows inflammation of the naso-pharyngeal mucous membranes, adenitis, tonsillitis and otitis media. The sudden checking of the perspiration and chilling of the feet throws an extra burden upon the respiratory tract.

Personal cleanliness, by systematic bathing to remove the waste matter from the skin, is essential to health. Daily ablutions are desirable. It is not necessary that much water be used, but ample for cleansing, to be followed by friction with a moderately coarse towel. Too often children are neglected through ignorance or indifference, hence their bodies are not kept clean during the season when it is most important; that is, the winter. It is the poor and neglected children that furnish the soil for the eruptive diseases of the severest types, and it is with this class that we observe the greatest number of cases of otitis media by which the organs of hearing are permanently damaged. These children lack the necessary resistance owing to the enfeebled state of their systems. Ignorance, however, is not confined wholly to the poor. In addition to personal cleanliness, it is important that the food be nutritious, properly prepared, and taken at regular intervals. In the case of an infant, granting that the mother is healthy, only breast-feeding should be allowed. Statistics show that of babes under three months of age, the death rate of breast-fed infants is twenty per thousand as compared to three hundred per thousand of bottle-fed infants. The nursing mother should
always be careful in the selection of her food owing to its effect, through the milk, upon her babe.

Breast feeding requires but little experience; but artificial feeding requires intelligence, experience and money to get reliable materials, especially pure milk. The child's nutrition, dependent largely upon the manner of feeding, affects greatly the ability to resist acute diseases. Overcrowding affects all diseases, but more particularly those of the respiratory tract.

Much good can be accomplished by teaching parents the importance of an abundance of fresh air and removing the traditional fear of taking cold by having the necessary ventilation.

Persons affected with pulmonary tuberculosis should not be entrusted with the care of infants.

Dr. L. Emmett Holt (Jour. A. M. A., Feb. 26, 1910, page 688) states that: 'The prevalence of tuberculosis is closely associated with overcrowding and unsanitary dwellings. The exciting cause in infants is usually exposure to adult cases of pulmonary tuberculosis. It is to the sick father, mother or other member of the household that the care of the baby usually falls when the healthy members of the family are away at work. Such close contact usually leads to infection of the infant. To such exposure we have been able to trace definitely nearly one-half of the cases of tuberculosis in infants admitted to the Babies' Hospital in recent years, and it certainly exists in a very much larger number than we are able to demonstrate it.'

The pernicious habit of kissing babes in the mouth should certainly be forbidden.

Children should be taught how to cleanse and blow the nose without forcing air into the Eustachian tubes.

Tooth brushes ought not to be kept in a common receptacle.

Children should be taught never to dine without first cleansing the hands.

It is desirable to keep children off a dusty floor.

It would seem superfluous to impress upon parents the great need of keeping a discharging ear clean or having "a running nose" freed of excess of secretion, yet both are very important for the child's hearing, breathing, and general health.

DISCUSSION.

Dr. Solenberger, Colorado Springs. We must admit that the laryngologist neglects the infant almost altogether: also that the foundation of many diseases of the upper respiratory tract are laid in childhood; that infants are victims of hyperplasia of the lymphatic tissues to a
DISCUSSION.

degree that greatly interferes with normal nursing and normal pulmonary aeration.

It is noticed thus, too, that many infants are born with a "cold in the head," "This child was born with a cold" and has had inflammation in the head ever since birth," the mother says. The treatment such infants receive are the most perfunctory—no treatment often other than a nasal wash or ointment with uncertain ingredients, prescribed by the pediatrician or accoucher during acute exacerbations.

The eye troubles do receive prompt attention. Why more quickly than the throat, ear or nose? Eye defects are on the surface, not in the dark cavities. The cause is sought and found.

Has it ever occurred to the accoucher that congenital defects—some deformities in the ear, nose or throat, some irritant or infectious force, act upon the tender tissues with the same frequency and with the same pernicious results, as in the case of the eyes?

I urge, therefore, that all who have to do with the care of infants, to care for the health of the upper respiratory tract as they would for the eyes; for in the neglect of the former there is surely laid the foundation of many diseases of the other organs of sense.
Surgery of the Frontal Sinus.

Thomas J. Gallaher, A. M., M. D., Denver, Colorado.

Exclusive of the neoplasms affecting the frontal sinus, the diseases demanding our attention are, acute catarrhal inflammation, acute and chronic suppuration.

Of all affections of the frontal sinus, acute catarrhal inflammation is vastly in excess, and although the treatment of this disease is not properly included under the surgery of the frontal sinus, we beg your permission to briefly consider it.

Obstruction to nasal respiration and interference with drainage of the adnasal cavities are the predisposing causes, while acute rhinitis, variously produced, is the exciting cause. Obstruction to the duct may be caused by any or all of the following: hypertrophy of the uncinate process anteriorly, enlarged bulla ethmoidalis posteriorly and medially, the encroachment of the middle turbinate or septum.

The indications for treatment, therefore, are, a subduing of the acute inflammation and removal of the obstructions as far as possible. Cocaine is the most useful remedy to lessen the swelling and relieve pain. Acting through the vaso-motor nerves its reaction is infinitely less than adrenalin. Adrenalin produces in many cases so much pain and secondary swelling that its use is questionable. The accurate application of cocaine on a pledget of cotton beneath the middle turbinate in contact with the duct often brings immediate relief. Effort should be made to carry cocaine into the duct by means of an applicator, cotton-wrapped and properly curved. In addition to the above, the frequent douching of the nose with a fountain syringe, using a comfortably warm solution of borax and salt, a teaspoonful of the former and a half teaspoonful of the latter to the quart, is grateful and beneficial. In using the douche the head is held forward, mouth closed and nose blown afterward with both nostrils open, in order to prevent the solution from entering the eustachian tubes. If relief is not obtained in from one to three days, the anterior portion of the middle turbinate should be removed without delay.

*Read at the meeting of the Western Section of the Laryngological, Rhinological and Otological Society, Colorado Springs, March 5, 1910.*
Then it is our custom to introduce a small silver cannula into the sinus and gently wash it with a warm, normal salt solution, and to keep the cannula in the sinus for twenty-four hours. The cannulae are of different lengths and can be secured to the upper lip by means of adhesive strips. The reintroduction of the cannula and the washings are continued as occasion demands. If recovery occurs, the rhinologist should correct all obstructive defects as soon as conditions permit, so that physiological nasal breathing may be performed.

Our next consideration is the surgical treatment of acute and chronic suppuration. This is embraced in the endonasal and external operations. The Ingals operation and Halle’s operation are the classical endonasal ones and we will first discuss them.

The Ingals operation consists in enlarging the naso-frontal duct by means of a hollow burr on a flexible shaft which is passed over a pilot into the sinus. After an appropriate opening is made, the cavity is packed for a few minutes with gauze saturated with chloride of zinc solution. After removal of the gauze a flanged gold tube, over the end of which a capsule covered with parafine is placed, is inserted into the sinus. Subsequent treatment consists in occasional washings by the patient or surgeon to keep the tube patent.

The Ingals operation has been strenuously attacked by surgeons and anatomists as being very hazardous, owing to the possibility of penetration of the internal table or olfactory fissure. If the Ingals operation is done it is necessary that Dr. Ingals’ directions be implicitly followed. As he advises, the x-ray photographs in different positions should be taken and also use made of the fluroscope, as indeed should be done before any operation is performed upon the frontal sinus, either endonasal or external.

Dr. Ingals has contributed to the further safety of the operation by advising the use of a shield over the burr posteriorly and also pulling the burr well forward by means of a ligature attached to the flexible covering of the drill. While the burr is cutting its way into the sinus, traction is made anteriorly to assist the burr cutting to the front. The shield, however, is often cumbersome and impracticable.

It may be necessary to correct a deflected septum, and the middle turbinate anteriorly is, of course, always removed. In some cases, notwithstanding all our effort to clear the nostril,
the wearing of the tube is attended with discomfort, on account of the narrow nostril. It should be worn for from three months to a year. Notwithstanding the objection raised to Ingals' operation the fact remains that he has successfully performed it in about fifty cases. The only death he reports followed the forcible injection of peroxide of hydrogen into the sinuses.

No endonasal operation may be expected to cure where great pathological change of the membrane has taken place, where there are numerous septa or where diseased ethmoid cells extend unusually forward into the sinus. We are therefore forced to the conclusion that the Ingals operation has a definite place in endonasal surgery.

Personally, I have performed four Ingals operations. In two cases cure followed within four to six months. The trouble had lasted one year and two years respectively. The third case, which was very acute, after the tube had been worn about a week, the external operation was performed which resulted in prompt cure. This became necessary owing to intense pain, swollen eyelids and elevation of temperature to $103\frac{1}{2}^\circ$. In the fourth case I did a modification of the Ingals by rasping away the naso-frontal spine with a Goode rasp, after having entered the sinus in the usual way. Such a large opening was made into the sinus that by treating the granulations carefully, we dispensed with the tube entirely. This patient is sixty years old and has remained practically well for two years. There were no accidents in any of these cases incidental to the operation.

We will now briefly consider the Halle operation and compare it with the Ingals.

Halle first introduces a probe into the frontal cavity, over which he slides a protector of soft flexible metal. A bore-drill is passed along this protector in a forward and upward direction, taking care to always keep close to it. After a sufficient opening is made, a drill with a blunt point is introduced. This is followed by a pear-shaped drill, by which the naso-frontal spine is removed. No tube is usually kept in the sinuses, but the patient is instructed to introduce a large canula from time to time.

It is certainly an advantage to dispense with the tube if possible. Ingals overcomes the objection to the small opening into the sinuses by wearing the tube long enough to make a permanent, smooth canal. I believe, in most instances, that from a standpoint of cure, these operations are about equal in merit. After entrance is gained to the sinuses by Halle's method, the rest is com-
paratively simple and safe. It is this entrance into the sinus that is somewhat hazardous in both operations. The sharp drill of Halle, the first instrument which he uses, may pierce the guide and penetrate the internal table. He therefore emphasizes the importance to always press firmly toward the front. The danger to the olfactory fissure is present in both cases. I have never performed the typical Halle operation, but instead, have enlarged the duct with the Ingals burr until I could introduce a small Goode rasp. With the finger in the orbit as somewhat of a guide, the spine is quickly removed. This rasp can be made smooth posteriorly and on the sides, so that it will cut only to the front. We believe that when the opening of the frontal sinus is indicated that most serious consideration must be given endonasal methods, and that where conditions are favorable for its performance, that the patient should be given the benefit of this method. The ascertaining of the presence of the probe in the sinus and the outlines of the sinus itself, by means of X-ray photographs and fluoroscope, have been mentioned above.

When shall we perform the external operation?

First: When the endonasal operations have failed.

Second: When there are symptoms of intracranial complications.

Third: When there are indications of necrosis shown by the presence of external fistula.

Fourth: When there is intolerable headache, accompanied by nasal discharge, which is not relieved by intranasal treatment.

A great number of external operations have been suggested, chief among which are: Ogsten-Lac, Kuhnt, Kuster, Coakley, Hajek, Jansen, Killian and others. To all of these methods with the single exception of Killian, there is the great objection that the ethmoid cells are not sufficiently considered and the importance of a large permanent opening into the nose is almost ignored.

The Killian operation, in brief, consists in the removal of the anterior and inferior walls of the sinus, leaving a bridge between them (the orbital arch), and, in addition, the removal of the nasal process of the superior maxilla. The mucous membrane is thoroughly removed, the ethmoid cells exenterated, and after an incision is made in the nasal mucous membrane, a very large, permanent opening is established into the nose. It appears that the Killian operation approaches more nearly a universal frontal sinus operation than any other which has as yet been proposed.
It redounds to the credit of this great master, that as surgeons become more familiar with the details of this operation and more skilful in its performance, the more they appreciate its great merit. It is practically always successful and after treatment almost nil.

Instead of using atropine after the operation, we instill one drop of one per cent solution of homatropine, daily, for five days, as its action can be more quickly counteracted by means of eserine in case of increased intraocular pressure.

In this operation, as in others, there is danger of wounding the inner table and the limits of the resection below the arch must be carefully observed. They are namely: the pulley above, ethmoid vessels posteriorly, the lacrimal groove below, and the naso-maxillary suture anteriorly.

Provided the operation has been properly performed the only objection that can be raised to it is that of deformity. While this is slight in some cases, in others it is marked. The importance of deformity depends upon one's social position and whether the patient is a man or woman. Some operators have endeavored to prevent this deformity by preserving the anterior wall. The investigation of many frontal sinuses in the cadaver as well as in the living, has convinced me that it is by no means always necessary to remove the anterior wall to reach all parts of the sinus.

In the last year I have performed three external operations in which we preserved the anterior wall. The resection below the arch was the typical Killian. The ethmoid cells were curetted and by means of various shaped curettes, the mucous membrane and debris were removed as thoroughly as possible. These three cases made a prompt and uninterrupted recovery.

Just as endonasal methods should be given a reasonable trial before resorting to the external operation, so I believe the lower resection in the Killian operation should be first attempted before the removal of the anterior wall. As the lower resection constitutes the most important and most difficult part of the Killian operation, it must not be thought that this procedure requires any lack of care on the surgeons part.

Case No. 1. Was a man 42 years of age who had had suppuration of the frontal sinus for three years and had suffered periodically from great pain. It was for relief of pain that he desired the operation. We advised the lower Killian resection, owing to the chronicity of the suppuration, his intense pain and the
DISCUSSION.

patients being a man. After operation his recovery was complete, no deformity, and the scar barely visible.

Case No. 2. A man 30 years of age, had suffered intense frontal sinus pain for two weeks. When he presented himself, his left eye was entirely closed, lid oedematous and purple, with slight fluctuation over inner wall of the orbit. Temperature 102°; felt chilly. His condition appeared so serious that I operated on him at once, 10 P. M. After making the classical Killian incision, with the customary right angle nicks for better coaptation, we performed the lower Killian resection, saving the supra-orbital wall. The sinus was full of pus and granulation tissue. This was carefully removed, the ethmoid cells curetted and the usual large opening made into the nasal cavity. The pus had broken through the Os Planum into the orbit. Recovery was uneventful. No deformity, scar very slight. Had slight double vision for five days.

Case No. 3. A woman, 68 years old, frontal sinus suppuration of twelve years standing. During the last year suffered great pain every morning for two or three hours, which ceased with the occurrence of free discharge. Two years ago the ethmoid cells, antrum and sphenoid, were operated by a rhinologist in a distant city. The lower Killian resection was done. Sinus found full of pus and granulations and also a large septum, transforming the sinuses into practically two. Recovery has been perfect, both as to cessation of discharge and freedom from pain. No deformity. A case of this kind illustrates the utter futility of endonasal operation upon the sinuses presenting these conditions.

While the lower resection of Killian may not suffice in all cases to cure, yet, owing to the strong probability of obtaining a cure by this method, and its freedom from deformity, the author would commend it in suitable cases.

California Building.

DISCUSSION.

Dr. Levy, of Denver. The subject of sinus surgery is always an interesting one. Dr. Gallaher's paper illustrates the futility of attempting to apply one operation to all diseases of the sinuses. It also emphasizes, and I should like to do so again, the importance of making careful and thorough examinations of all cases whether operation be by the extra or intra nasal method. The concensus of opinion seems to be that where the radical operation is necessary the external plan is the one that ought to be adopted.

I should also like to call your attention to the gravity of operating upon acute suppurative frontal sinusitis by anything like a radical procedure. I am sure you will find that operation upon acute frontal sinusitis, except in certain special conditions, is not recommended.
Killian himself is opposed to anything approaching radical procedure in these acute cases, except where intracranial complications, or other serious manifestations are present, because of the danger of osteophlebitis, myelitis, and death. I have heard the matter discussed and the sentiment is much more in favor of conservative measures in acute inflammations of the accessory cavities; in acute suppurative frontal sinusitis one should, if possible, avoid removing even the middle turbinate on this account.

The results Dr. Gallaher has reported are certainly gratifying. Perhaps his uniform success is better than that of the majority of men. I saw a number of these cases in Killian's clinic that persisted in having suppurative discharges from the nose long after the operation, but Killian said it was the best he could do for the case.

If we remember the very great number of anomalies in the anatomy of the ethmoidal labyrinth, we will see that there is thus a reasonable excuse for re-infection from an unopened focus which may have escaped attention. So, also, in the matter of secondary operations. I am sure the Killian operation is not always attended by such complete results that secondary operations are not necessary. The secondary infection is easily explained. No matter how well you clean out the frontal sinus or sphenoidal cells and irrigate, curette and drain the frontal sinus through the fronto-nasal duct, if there is but one ethmoidal cell that has remained unobserved infection will relight the entire area and cause a secondary infection.

In regard to deformity: My impression has been that one of the main advantages of the Killian operation over other radical operations was that the deformity was decidedly less. While there is some deformity after the Killian operation the amount of deformity is little because of the preservation of the superciliary ridge. Killian recommends the correction of this deformity by paraffin injection.

Dr. Solenberger, of Colorado Springs. I recall a case which had been operated for bilateral frontal sinusitis three times, twice for bilateral maxillary sinusitis and once for bilateral sphenoiditis. This patient having gone through so much operative work was still discharging pus from all the cavities, was not relieved of his asthma and bronchitis. The one work that seemed thoroughly done was the exenteration of the ethmoidal cells. Two operations on the frontal sinuses had been done by the external method. In spite of his multiple sinuses, asthma and bronchitis, this patient was in good physical condition. He had read that in Germany they obliterated these cavities. He was very insistent that this be done in his case. He had plenty of time and abundant means. I thought here the indications for radical work were clear. I knew hardly anything about the Killian method at this time. Dr. Coakley had done some obliteration work. Following somewhat this method I began on the frontals, took next the sphenoid and last the antrum. The frontal sinuses were 7 weeks in healing up solidly from the bottom; the sphenoids 6 weeks and the antrum 9 weeks. The results justified the means in this case. The effect upon the asthma and bronchitis was immediate and permanent. I report this case at some length because of what I found in the ethmoid region. There were found several ethmoid cells far forward and running down along the naso-frontal duct, which had been untouched at the previous operations. The case, also, I think, shows what are some of the conditions which clearly call for the most radical work.

I think Dr. Gallaher very clearly sets forth the indications which call for the external operation. I had often thought that in many cases the very method by which he has so admirably succeeded, ought to give these results, but I have not had the courage to try it. I think I will do so now.

One more point in regard to the indication for the choice between the internal and external methods or more radical work. The degree of chronicity, if it can be determined, as was possible in the case above
described, is one of the best guides. Added to this, if there is a history of mental depression or melancholia, and especially mental states bordering on suicide, which are not infrequently met with in affections of these cavities, the indications point strongly for the external operation,—because, too, these symptoms usually mean that there is present extensive necrosis of the lining and even of the bone in these cavities.

Dr. Gallaher, in closing. Dr. Gildea is of the opinion that this affection is rare. It is not so rare as we think, for most of the cases of so-called nasal catarrh, with purulent discharge, are due to disease in some of the adnasal cavities.

Dr. Levy believes that all operations in acute inflammation of frontal sinuses should be avoided if possible; and questions the advisability of the early removal of the anterior portion of the middle turbinate. I differ strongly with Dr. Levy in this opinion and am convinced that the failure to remove the anterior portion of the middle turbinate, which obstructs the duct, is directly responsible for so many of these cases not being cured in the early stage. Some acute cases are so violent that surgical interference is imperatively demanded. After free drainage has been established, with continuance of the discharge, the vaccine treatment has proven a most valuable adjunct in some cases.

The deformity in the Killian operation, although less than in any other frontal sinus operation, is dependent upon the size and contour of the sinus, and may not be apparent for many months after the operation.

Dr. Solenberger’s case of pan-sinusitis illustrates the well known fact that in disease of the frontal sinus the ethmoid cells as well as the other adnasal cavities are very frequently involved.
THE ETIOLOGICAL RELATION OF DISEASES OF THE EAR, NOSE AND THROAT TO DISEASES OF THE HEART, LUNGS AND BLOOD VESSELS.

By ROBERT LEVY, M. D., Denver, Colo.

Taking a casual view of this subject it would seem as though one might dispose of it easily and briefly. On second thought, however, and especially after reviewing available literature, one is impressed not only with the importance of the topic but also with its unsatisfactory and unscientific status. Clinical evidence points strongly to the fact that diseases of the lungs and heart occur in connection with affections of the upper respiratory tract as complications and also as sequels to such affections. Other clinical evidence points to affections of the upper respiratory tract occurring as complications and sequels to diseases of the heart and lungs. There appears to be a marked co-relation which it is difficult to analyze and which scientific investigation has not as yet satisfactorily explained. If one could positively determine a local cause for certain respiratory affections how important this would be in determining the line of treatment. For many years asthma and emphysema have been known to be associated with and in a measure dependent upon diseases of the nose. These affections have not always been obstructive in character. Chronic ethmoiditis with moderate or extensive polyp formation has been supposed to be an important cause. A few men hold to the view that in such cases asthma is positively the result of the local cause. This can not be substantiated by the results of treatment. Case after case may be presented to prove its fallacy. Acting, however, upon the hope that by thoroughly remedying the intranasal condition the asthma would be cured, radical surgical measures have been instituted. The sum total appears to be, cure in a few cases, relief in many, no improvement or increase of trouble in others. As to the process by which asthma and emphysema are caused by diseases of the nose we have a variety of views. The reflex cause through the fifth and pneumogastric nerves has been generally accepted. Francis1 has

1. Francis. Asthma in Its Relation to the Nose. 1903.
tried to show that the nose maintained a certain respiratory equilibrium which was disturbed in asthma. He believes that operative interference is never indicated and in fact states that the cases in which no operation has been performed are those in which the best results have been obtained.

When the lesion in the nose is obstructive in character it is believed by some that this in itself may act as a cause. The valuable and elaborate experiments of Anderson of Detroit furnish much evidence in proof of this contention. Anderson² writes that "partial closure of the nostrils in dogs is followed by symptoms resembling asthma and emphysema."

Adenoids have been recognized as a cause of asthma and sufficient cases have been observed to prove at least some relationship. It is my belief that adenoids may have a bearing upon the development of asthma, especially in children in whom a hereditary hay fever or asthmatic history exists. The cases of this kind that have come under my observation have not presented adenoids of sufficient degree to produce obstruction and have therefore led me to believe in the reflex influence. It is surprising to see how small an amount of adenoid hypertrophy is apparently causing symptoms and one would hesitate to ascribe such symptoms to the presence of these small masses were it not for the very pronounced relief obtained by operation.

Recurring attacks of bronchitis in children may often be ascribed to adenoids. The manner in which these are brought about is also open to speculation. Freudenthal³, who has done so much along this line, in an article "On the Etiology of Pulmonary Tuberculosis in Its Relation to Diseases of the Nose and Throat," states that the "naso-pharynx would form a reservoir in which foreign bodies, etc., would be retained for the protection of the whole organism." He also stated that "we should expect to find bacteria there in normal conditions, but much more so in pathological conditions." If this is true it is easy to understand the views of many other authors who believe infection of various kinds may take place through this source and that bronchitis might be one of the most frequent manifestations. Bero⁴ describes under the name of adenoid pneumonia, certain types of this disease occurring with adenoid growths and believes that relapses are very likely to take place unless the growths are removed.

2. Anderson. Local and Systemic Conditions Due to Nasal Obstruction.  
Infection through the lymphatic tissue constituting Waldeyer's ring have long been recognized as the most reasonable explanation of certain diseased conditions. We have seen endocarditis, septic in character, follow tonsillitis. The laboratory has demonstrated the presence of tubercle bacilli in apparently non-tubercular tonsils and adenoids, and the development of cervical lymph adenitis and pulmonary tuberculosis. The question, however, is far from settled, for it has been shown by anatomical investigations that enlargement of cervical glands can be more easily explained by infection from below than infection from above.

Our beloved and lamented colleague, Dr. Solly, often stated that he believed there was a definite relation between nasal obstruction and pulmonary tuberculosis, that the lung involvement was in a measure influenced by the nasal cavity obstructed. That this observation has a basis of fact is also believed by Freudenthal who states that "we can not help noticing at the first glance how often the pulmonary and nasal lesions are on the same side." Not only is this true of obstructive lesions in the nose but one must also be impressed with the frequency with which tuberculosis and other nasal lesions are associated. In Freudenthal's cases, one-fourth had atrophic rhinitis. Harland calls attention to this point in an article on the "Diagnostic and Prognostic Value of An Examination of the Throat in Pulmonary Tuberculosis." The dryness of the nasal and pharyngeal mucous membrane, in these cases, is our daily observation. One can not, however, conclude from this that the chronic rhinitis is an important factor in the development of tuberculosis. It may, when existing for many years prior to the tuberculous infection, lower the resistance of the mucous membrane of the entire upper air tract and may, thereby, offer excellent opportunity for the invasion of pathogenic bacteria. It would seem more reasonable to explain the dryness of the nose and pharynx by the general lowered vitality and lack of nutrition from which tuberculous patients suffer not only when the affection is well established but also for a considerable period before pronounced symptoms are detected. On this same hypothesis may be explained the congestive and consequent obstructive lesions of the nose which are manifestations of lowered vasomotor tone.

There have not been many accurate observations bearing upon the relation of diseases of the upper air passages to the heart and

5. Freudenthal. Ibid. P. 1168.
blood vessels. Septic endocarditis which has already been referred to, interference with the nerve supply of the larynx from aortic aneurism are sufficiently well recognized. Obstructive lesions of the heart are capable of so interfering with the circulation that congestive disturbances of the nasal and pharyngeal mucous membrane become prominent symptoms. It is useless to treat certain forms of chronic pharyngitis by local measures, especially when the mucous membrane presents a purplish red almost cyanotic appearance. In these cases one should not fail to investigate the circulatory system.

As to the relation between diseases of the ear and lungs, heart and blood vessels, the most familiar example is found in the complications of sinus thrombosis.

It will be seen by this short paper that it has not been my purpose to clear the atmosphere of the unscientific state of our knowledge but rather to emphasize that there does exist an important etiological co-relation between diseases of the ear, throat and nose and those of the lungs, heart and blood vessels.
The Sixteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society convened at the New Willard Hotel, Washington, D. C., June 28, 1910, at 10 A. M.

The Society was called to order by the President, Dr. James F. McKernon, of New York City.

The following members registered during the sessions of the sixteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society:

ALVA E. ABRAMS, M. D. Hartford, Conn.
JOHN L. ADAMS, M. D. New York, N. Y.
JOHN H. ALLEN, M. D. Portland, Me.
F. C. ARD, M. D. Plainfield, N. J.
HUBERT ARROWSMITH, M. D. Brooklyn, N. Y.
WILLIAM L. BALLenger, M. D. Chicago, Ill.
JOSEPH C. BECK, M. D. Chicago, Ill.
T. PASSMORE BERENS, M. D. New York, N. Y.
W. C. BRAISLIN, M. D. Brooklyn, N. Y.
JOHN E. BROWN, M. D. Columbus, Ohio.
TALBOT R. CHAMBERS, M. D. Jersey City, N. J.
WALTER F. CHAPPELL, M. D. New York, N. Y.
LEWIS C. CLINE, M. D. Indianapolis, Ind.
FREDERICK C. COBB, M. D. Boston, Mass.
CHARLES N. CON, M. D. Brooklyn, N. Y.
ROBERT H. CRAIG, M. D. Montreal, Canada.
WM. LEDLIE CULBERT, M. D. New York, N. Y.
JOHN F. CULP, M. D. Harrisburg, Pa.
H. HOLBROOK CURTIS, M. D. New York, N. Y.
WALTER S. DALY, M. D. Ogdensburg, N. Y.
EDWARD B. DENCH, M. D. New York, N. Y.
ARTHUR B. DUEL, M. D. New York, N. Y.
HERBERT S. DYE, M. D. Washington, D. C.
LINN EMERSON, M. D. Orange, N. J.
ERNEST W. FLEMING, M. D. Los Angeles, Calif.
WOLFF FREUDENTHAL, M. D. New York, N. Y.
Percy Fridenberg, M. D. New York, N. Y.
MAX A. GOLDSTEIN, M. D. St. Louis, Mo.
THOMAS J. HARRIS, M. D. New York, N. Y.
HENRY J. HARTZ, M. D. Detroit, Mich.
WILLIAM H. HASKIN, M. D. New York, N. Y.
HALSTEAD S. HEDGES, M. D. .................................. Charlottesville, Va.
EDGAR M. HOLMES, M. D. .................................. Boston, Mass.
FRANK H. ATT. ............................................. Washington, D. C.
CHEVALIER J.ackson, M. D. .................................. Pittsburgh, Pa.
OLIVER H. JACkSON, M. D. .................................. Fall River, Mass.
J. W. JERVEY, M. D. ....................................... Greenville, S. C.
WALTER R. JOHNSON, M. D. .................................. Paterson, N. J.
GEORGE F. KEIPER, M. D. ................................... Lafayette, Ind.
JAMES L. KENT, M. D. ....................................... Lynchburg, Va.
PHILIP D. KERRISON, M. D. .................................. New York, N. Y.
IRVING E. KIMBALL, M. D. ................................... Portland, Me.
FRANK E. KITTREDGE, M. D. ................................... Nashua, N. H.
W. F. KNOWLES, M. D. ....................................... Boston, Mass.
SAMUEL J. KOPETZKY, M. D. .................................. New York, N. Y.
JOHN J. KYLE, M. D. ......................................... Indianapolis, Ind.
ROBERT LEVY, M. D. ......................................... Denver, Col.
HANAU W. LOEB, M. D. ....................................... St. Louis, Mo.
STEPHEN H. LUTZ, M. D. ..................................... Brooklyn, N. Y.
JOHN S. MABON, M. D. ....................................... Allegheny, Pa.
D. MACPHERSON, M. D. ....................................... New York, N. Y.
WILLIAM BEVERLY MASON, M. D. ......................... Washington, D. C.
HARRIS P. MÖSHER, M. D. ................................... Boston, Mass.
HENRY L. MYERS, M. D. ..................................... Norfolk, Va.
ROBERT C. MYLES, M. D. .................................... New York, N. Y.
JAMES F. McCAW, M. D. ..................................... Watertown, N. Y.
JAMES F. McKERNON, M. D. ................................... New York, N. Y.
O. A. M. MCKIMMIE, M. D. .................................. Washington, D. C.
FRANK H. McCaury, M. D. .................................. New York, N. Y.
WENDELL C. PHILLIPS, M. D. ................................ New York, N. Y.
NORVAL H. PIERCE, M. D. ................................... Chicago, Ill.
JOHN R. RAE, M. D. .......................................... New York, N. Y.
ANDREW J. N. REIK, M. D. .................................. Baltimore, Md.
HENRY O. REIK, M. D. ....................................... Baltimore, Md.
GEORGE L. RICHARDS, M. D. ................................ Full River, Mass.
CHARLES W. RICHARDSON, M. D. ......................... Washington, D. C.
SYLVAN ROSENHEIM, M. D. .................................. Baltimore, Md.
J. E. SHEPPARD, M. D. ..................................... Brooklyn, N. Y.
B. R. SHURLY, M. D. ........................................ Detroit, Mich.
HARMON SMITH, M. D. ....................................... New York, N. Y.
HERBERT E. SMYTH, M. D. ................................... Bridgeport, Conn.
CHARLES N. SPRATT, M. D. ................................... Minneapolis, Minn.
GEORGE E. STEEL, M. D. ..................................... New York, N. Y.
JAMES A. STUCKY, M. D. ..................................... Lexington, Ky.
JOHN A. THOMPSON, M. D. ................................... Cincinnati, Ohio.
JOHN J. THOMSON, M. D. ..................................... New York, N. Y.
ANTONIE P. VOISSLAWSKY, M. D. ......................... New York, N. Y.
JAMES S. WATERMAN, M. D. ................................ Brooklyn, N. Y.
GEORGE A. WEBSTER, M. D. .................................. Boston, Mass.
WALTER A. WEILS, M. D. .................................... Washington, D. C.
JOSEPH A. WHITE, M. D. .................................... Richmond, Va.
NORTON L. WILSON, M. D. ................................... Elizabeth, N. J.
JOHN R. WINSLOW, M. D. ................................... Baltimore, Md.
JOHN F. WOODWARD, M. D. .................................. Norfolk, Va.
THOMAS C. WORTHINGTON, M. D. ......................... Baltimore, Md.
SIDNEY YANKAUER, M. D. ................................... New York, N. Y.
Dr. James F. McCaw, Chairman of the Eastern Section, presented the following report:

Mr. President and Fellows of the American Laryngological, Rhinological and Otological Society:

I have the honor to report that the Eastern Section meeting was held at the Roswell P. Flower Memorial Library, in Watertown, N. Y., January 15th, 1910. A most excellent programme was promised, consisting of seventeen papers on the several topics comprising our specialty, but the weather conditions at that particular time were such as to tie up traffic throughout the entire East, the result being our meeting was necessarily cut down in numbers. However, eight papers were read, one on "Mastoiditis in Scarlet Fever and Measles," "The Value of Vaccine Therapy in Mastoiditis Complicating Acute Infectious Diseases." A Preliminary Report. "A Note on the Aural Manifestations of Myxedema," "Removal of a Rhinestone from the Middle Ear of a Child—Exhibition of Specimen," "Sarcoma of the Nose and Naso-Pharynx." "The Etiology, Pathology, Symptoms and Diagnosis of Phlebitis and Thrombosis of the Blood Vessels when Complicating Purulent Otitis Media," "The Tonsil as a Port of Entry for the Tubercle-Bacillus and Other Infections." "Direct Pharyngoscopy with Demonstration," with free and full discussion on each. A luncheon and dinner was served the Fellows at the Black River Valley Club. It seemed to be the consensus of opinion that although our meeting was small in numbers, it was large in interest and enthusiasm.

I wish here to extend my thanks to the gentlemen who contributed toward the meeting not only by reading papers but also by their presence.

Respectfully submitted,

JAMES F. McCAW,
Chairman.

Dr. Henry J. Hartz, Chairman of the Middle Section, presented the following report:

"It gives me pleasure to report to you that the meeting of the Middle Section at Detroit, February 22, 1910, was declared a success by the visiting members of our Society, of whom seventeen attended.

"Considerable local interest was manifested, the number of
guests being over twenty-five. The Wayne County Medical Society of Detroit set apart an evening prior to the day of meeting and invited our member, Dr. J. A. Stucky, of Lexington, Ky., to address them on the subject of ‘Diseases of Nose, Throat and Ear from the Practitioner’s Point of View.’ Aside from the local interest aroused in the medical profession the scientific interest was not lacking. The two papers (by invitation) of Drs. Brown and Black, of Milwaukee, proved valuable in emphasizing the close relation of Rhinology to Orthodontia. The gentlemen demonstrated the apparatus for the gradual but forcible spreading of the high arched palate for the correction of deviated septum, the production of increased nasal space and increased growth of the facial structure as a whole. Ten papers were read in all and the discussion was participated in by both members and guests.”

Dr. O. A. M. McKimmie, Chairman of the Southern Section, presented the following report:

“I have the honor to report that the annual meeting of the Southern Section was held in Washington, D. C., February 12, 1910, at the New Willard.

“Thirty-three Fellows attended the sessions of the section, and the discussion of papers read was participated in by nearly all present.

“Dr. Heinrich Neumann of Vienna, attended both sessions and added much to the interest of the meeting by taking part in the discussion of three papers on the program.”

The Annual Meeting of the Western Section of the American Laryngological, Rhinological and Otological Society was held at the Antlers Hotel, Colorado Springs, March 5, 1910. Dr. A. R. Solenberger, Chairman.

Dr. Solenberger opened the meeting by an address. He also showed a tissue forceps, an aseptic instrument case, and an oblong mirror for introduction into narrow cavities. The following papers were read: Personal Hygiene in Infancy and Childhood, Wm. C. Bame, M. D., Denver, Col.; Restoration and Maintenance of the Physiological Function of the Nose as a Prophylactic Measure, Frank L. Denis, M. D., Colorado Springs, Col. (by invitation); Prevention of Diseases of the Ear, Nose and Throat by Vaccines, Gerald B. Webb, M. D., Colorado Springs, Col. (by invitation); Prophylaxis of Diseases of the Ear, Nose and Throat in

The Committee appointed to formulate an obituary of the late Dr. Frank B. Sprague, of Providence, R. I., presented the following resolutions:

Dr. Frank B. Sprague, a member of this Society since 1896, died at his home in Providence, R. I., November 17th, 1909, from blood poisoning contracted while performing an operation on a patient at the Rhode Island Hospital.

He was born in Cranston, R. I., March 24th, 1865. He graduated in medicine from the University of Vermont, in 1889, and began the practice of medicine in Providence. He continued in general practice until 1895, when he took up the study of ear and throat diseases. He studied at the Universities of Berlin and Vienna and in the London hospitals, beginning the practice of his specialty in Providence in 1896. From that time to the time of his death he was known in a constantly wider field.

He was a member of the Staff of the Rhode Island Hospital, and at the time of his death was in charge of the Ear Department of the hospital.

He contributed much to the literature of our specialty, and was prominent in the meetings of this Society. In 1907 he was the Chairman of the Eastern Section.

He designed several new instruments, among them a tonsillotome and an ice bag, the latter being known under the name of the Sprague Ice Bag by physicians all over the world.
Dr. Sprague was a man of high ideals and keen insight, and aided in the advancement of the science of laryngology and otology. He was a frequent attendant at the meetings of this and the other societies of which he was a member, often taking part in the discussions, and always in a clear, elucidating way. In his death this Society sustains the loss of one of its most active and ardent members.

GEO. L. RICHARDS,
THOS. J. HARRIS,
C. R. HOLMES,
Committee to Prepare Obituary.

The following obituary of the late Dr. Charles F. McGahan was prepared by a special committee appointed by the society, consisting of Dr. George L. Richards, Dr. Henry W. Love, Dr. S. Mac Cuen Smith.

Dr. Charles F. McGahan, a member of this society, died of pneumonia at his home in Aiken, S. C., on February 15th, 1910.

Dr. McGahan was born in Charleston, S. C., July 25th, 1861. He graduated from Georgetown University in 1881, and from the Dartmouth Medical College in 1885, at which institution he was the valedictorian. He then spent several years in Europe. Returning to America, he established himself in Chattanooga, Tennessee, where he became an active member of his profession.

On account of his failing health, he was compelled to abandon his practice there, and removed to Aiken, S. C., where he spent the winter months, the summer being spent at Bethlehem, N. H. In these localities he impressed his strong personality upon his friends and patients.

Himself a victim to tuberculosis, he made this department of medicine his special study, and was recognized in it as an expert. He was instrumental in establishing the Aiken Cottage Sanatorium, became its medical director, and always took the deepest interest in it.

Dr. McGahan was a member of the Climatological Association of American Medical Association, Missis-
sippi Valley, South Carolina and Aiken County Associations, Director of the National Association for the Study and Prevention of Tuberculosis, and Vice-President of the Second Section of the International Congress for Tuberculosis.

Dr. McGahan was of pleasing personality, of excellent scientific attainments, and his early death is deeply regretted by the members of this Society.

Dr. Edward B. Dench moved that the resolutions be incorporated in the Transactions, and that a copy be sent to the relatives of the deceased. Seconded and carried.

SECOND SESSION.

Thursday, 3 P. M.

The first order of business was the election of Fellows. The Secretary announced that the following candidates had been recommended by the Council for election: Dr. Ross Hall Skillern, of Philadelphia, and Dr. F. E. Kittredge, of Nashua, N. H.

It was moved, seconded and carried that the Secretary be instructed to cast an affirmative vote for the candidates named. The Secretary did so and Drs. Skillern and Kittredge were declared duly elected.

On motion the Chair was empowered to appoint an Auditing Committee. The following Fellows were appointed: Drs. S. MacCuen Smith, Edward B. Dench, and John L. Adams.

On motion the Chair was empowered to appoint the Nominating Committee for 1910-11. The following Fellows were appointed: Drs. D. Braden Kyle, William L. Ballenger, Frederick C. Cobb, George L. Richards, and Norval H. Pierce.

Meeting adjourned.
THIRD SESSION.

Friday, 10 A. M.

The following report was read and accepted:

SECRETARY'S REPORT.

The Secretary would report that since the last Annual Meeting two Fellows of the Society have died, Dr. Frank B. Sprague of Providence, R. I., on November 18, 1909, of septicaemia, and Dr. Charles F. McGahan of Aiken, S. C., on February 14, 1910, of pneumonia. The death of Dr. Peter V. Burnett of Brooklyn, N. Y., occurred during 1908, but was not reported to the Secretary and accordingly was not announced at the last meeting.

There have been no resignations.

The present membership of the Society is 249 Active and 24 Honorary Fellows.

The attendance at the Section Meetings, as shown by the reports of the several Chairmen, was large and the quality and number of the papers presented in every way satisfactory.

There have been two meetings of the Council during the past year, the midwinter meeting held in New York City, February 5th, when all but two members were present, and the second meeting held in Washington, April 27th, at which 12 members were present.

The Transactions, published for the first time in a number of years by the Society, appeared early in November.
REPORT OF TREASURER.

EWING W. DAY, TREASURER, IN ACCOUNT WITH THE AMERICAN LARYNGOLOGICAL RHINOLOGICAL AND OTOROLICAL SOCIETY.

Receipts.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash on hand June 1st, 1910</td>
<td>$1,518.00</td>
</tr>
<tr>
<td>To 1 initiation fee, at $5.00</td>
<td>$5.00</td>
</tr>
<tr>
<td>5 initiation fees, at $10.00</td>
<td>50.00</td>
</tr>
<tr>
<td>8 transactions, at $2.50</td>
<td>20.00</td>
</tr>
<tr>
<td>34 back dues, at $10.00</td>
<td>340.00</td>
</tr>
<tr>
<td>208.5 current dues, at $10.00</td>
<td>2,085.00</td>
</tr>
<tr>
<td>Allowed on checks for collection</td>
<td>.45</td>
</tr>
<tr>
<td>Fetzer Press overpaid</td>
<td>33.80</td>
</tr>
<tr>
<td>Dr. T. C. Worthington, production of plates</td>
<td>16.50</td>
</tr>
<tr>
<td>Dr. George Colt, production of plates</td>
<td>4.27</td>
</tr>
<tr>
<td>Dr. L. Iglesius, production of plates</td>
<td>5.98</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$2,561.00</td>
</tr>
<tr>
<td></td>
<td>$4,079.50</td>
</tr>
</tbody>
</table>

Disbursements.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting Annual Meeting, '08, '09</td>
<td>$184.68</td>
</tr>
<tr>
<td>Expenses of Officers, Clerical Hire, etc.</td>
<td></td>
</tr>
<tr>
<td>Secretary</td>
<td>365.99</td>
</tr>
<tr>
<td>Treasurer</td>
<td>15.00</td>
</tr>
<tr>
<td>Printing and Stationery</td>
<td></td>
</tr>
<tr>
<td>Fetzer Press</td>
<td>237.90</td>
</tr>
<tr>
<td>P. F. McBreen</td>
<td>16.20</td>
</tr>
<tr>
<td>Murdock Kerr</td>
<td>8.00</td>
</tr>
<tr>
<td>Transactions</td>
<td></td>
</tr>
<tr>
<td>Mercury Publishing Co</td>
<td>874.17</td>
</tr>
<tr>
<td>Manhattan Storage</td>
<td>194.93</td>
</tr>
<tr>
<td>Reporting Middle and Western Sections</td>
<td>50.00</td>
</tr>
<tr>
<td>Atlantic City Exhibition Co., lantern, etc.</td>
<td>50.00</td>
</tr>
<tr>
<td>Hotel Chelsea, Prof. Chiari</td>
<td>72.85</td>
</tr>
<tr>
<td>10 shares Union Switch, preferred</td>
<td>991.25</td>
</tr>
<tr>
<td>Dr. Sargent Snow, dues refunded</td>
<td>10.00</td>
</tr>
<tr>
<td>Total expenses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$3,970.97</td>
</tr>
<tr>
<td></td>
<td>$1,008.63</td>
</tr>
</tbody>
</table>

Audited and found correct.

S. MacCuEN SMITH,  
EDWARD B. DENCH,  
JOHN L. ADAMS.
The Committee on Nominations reported as follows:
For President—Chevalier Jackson, M. D., Pittsburg.
Vice-Presidents and Chairmen of Sections:
Eastern Section—H. P. Mosher, M. D., Boston.
Western Section—W. H. Dudley, M. D., Pasadena, Cal.
Middle Section—Lafayette Page, M. D., Indianapolis.
Southern Section—J. L. Kent, M. D., Lynchburg, Va.
Secretary—Thomas J. Harris, M. D., New York.
Library Committee:
Holbrook Curtis, M. D.,
M. A. Goldstein, M. D.,
E. M. Holmes, M. D.
Publication Committee:
Francis R. Packard, M. D.,
Philip D. Kerrison, M. D.,
George L. Richards, M. D.
Council:
James F. McKernon, M. D.,
J. A. White, M. D.,
Norton L. Wilson, M. D.

It was moved, seconded and carried that the report of the
Nominating Committee be received.

Dr. Max A. Goldstein suggested that a sinking fund be incor-
porated in the Treasurer's report in the Transactions. It was
moved, seconded and carried that this suggestion be left to the
discretion of the Treasurer.

Dr. Thomas J. Harris moved that the Chair appoint a Com-
mittee of three to formulate an obituary on Dr. McGahan.

Seconded and carried. The Chair appointed the following
committee: Drs. George L. Richards, Hanau W. Loeb and S.
MacCuen Smith.

BUSINESS MEETING.

Friday Afternoon at 2.30.

On motion of Dr. Charles W. Richardson the report was ac-
cepted and the appropriation asked for granted.

The President proposed the name of Dr. James Kerr Love, of
Scotland, as an honorary member. Seconded by several members
and carried.
MINUTES.

Dr. Harris moved that the Publication Committee be given authority to conclude suitable business arrangements for the publication of the transactions for the year. Seconded and carried.

The President proposed the name of Dr. Alex. Graham Bell for honorary membership. Seconded by several members and carried.

The business session then adjourned.

The report of the Library Committee was read by the Chairman of that Committee, Dr. H. Holbrook Curtis.

REPORT OF LIBRARY COMMITTEE.

Reprints in Library—Filed and cross indexed. 2,025
Bulletins and catalogues. 75
Books presented. 25

2,125

The Librarian asks an appropriation of $47.00 for a new cabinet and index cases.

It is also requested that books and monographs by members be sent to the Library.

Dr. Phillips has presented a full collection of programmes.

H. HOLBROOK CURTIS,
Librarian.

FOURTH SESSION.

Saturday, 12.30 P.M.

The first order of business was the election of officers for 1910-11. It was moved, seconded and carried that the Secretary be empowered to cast an affirmative vote for the officers as nominated. The Secretary then declared the officers elected as proposed.

Dr. Edward B. Dench made a motion, which, as amended by Dr. Ballenger and Dr. Goldstein, is as follows: That the President be authorized to appoint a committee of three whose duty it shall be to endeavor to secure in every medical school in the United States and Canada the delivery of at least one lecture during the course on the educational problem presented by the deaf child. That this committee be a standing committee, and that it be requested to report at the next annual meeting of the American Laryngological, Rhinological and Otological Society, and all subsequent meetings.
The Chair appointed the following Fellows to act as this committee:

Drs. Edward B. Dench,
H. S. Birkett,
G. Hudson Makuen.

Dr. George L. Richards proposed a vote of thanks to the Washington members for the hospitality accorded the Society. Seconded and carried.

Meeting adjourned.
FELLOWS.

Abraham, Joseph H. .......................... 130 West 58th St., New York
Abrams, Alva E. ............................. 78 High St., Hartford, Conn.
Adams, John L. ............................... 38 East 51st St., New York
Alderton, Henry A. ........................... 142 Clinton St., Brooklyn, N. Y.
Allen, John H. ............................... 711 Congress St., Portland, Me.
Allport, Frank A. ............................. 72 E. Madison St., Chicago, Ill.
Ard, F. C. .................................... 604 Park Ave., Plainfield, N. J.
Arnold, J. Dennis ............................ 391 Sutter St., San Francisco, Cal.
Arrowsmith, Hubert ........................... 170 Clinton St., Brooklyn, N. Y.
Atkinson, William J. .......................... 111 North Main St., Paterson, N. J.
Ballenger, William L. .......................... 100 State St., Chicago, Ill.
Bane, William C. .............................. Commonwealth-Bldg., Denver, Col.
Barnhill, John F. ............................. Pennway, Indianapolis, Ind.
Beck, Joseph C. .............................. 1220 N. Clark St., Chicago, Ill.
Bereau, Bernard ............................... 2041 Chestnut St., Philadelphia, Pa.
Berens, T. Passmore ............................ 35 Park Ave., New York
Birkett, H. S. ................................. 252 Mountain St., Montreal, Can.
Blake, Clarence John .......................... 226 Marlboro St., Boston, Mass.
Booth, Burton S. ............................. 21 First St., Troy
Braislin, W. C. ................................. 556 Washington Ave., Brooklyn, N. Y.
Brown, John E. ............................... 289 E. Town St., Columbus, O.
Brown, J. Price ............................... 37 Carlton St., Toronto, Ont., Can.
Bryant, W. Sohier ............................. 41 East 33rd St., New York
Calhoun, A. W. ............................... 62 Marietta St., Atlanta, Ga.
Campbell, Wm. E. ............................. 606 Century Bldg., Atlanta, Ga.
Canfield, R. Bishop ........................... Ann Arbor, Mich.
Chamberlain, William B. ........................ 318 Euclid Ave., Cleveland, Ohio
Chambers, Talbot R. ............................ 490 Jersey Ave., Jersey City, N. J.
Chappell, Walter F. ............................ 7 East 55th St., New York, N. Y.
Cheatham, Wm. ............................... 303 West Chestnut St., Louisville, Ky.
Chenery, Wm. E. ............................... 222 Huntington Ave., Boston, Mass.
Chisholm, W. Alexander.............62 West 53rd St., New York
Christy, T. C......................99 N. Hudson Ave., Pasadena, Cal.
Clemens, Jas. B....................15 East 48th St., New York
Cline, L. C........................224 North Meridian St., Indianapolis, Ind.
Coakley, C. G......................53 West 56th St., New York
Cobb, Frederick C..................11 Marlboro St., Boston, Mass.
Coffin, Lewis A.....................156 West 58th St., New York
Coggleshall, Henry..................40 East 58th St., New York
Collins, Burnett...................645 St. Marks Ave., Brooklyn, N. Y.
Corwin, Theodore...................5 West Park St., Newark, N. J.
Coolidge, A........................613 Beacon St., Boston, Mass.
Cott, Geo. F.......................1195 Main St., Buffalo, N. Y.
Cox, Chas. N.......................257 Jefferson Ave., Brooklyn, N. Y.
Craig, Robert H....................186 Peel St., Montreal, Can.
Crockett, Eugene A................298 Marlboro St., Boston, Mass.
Culbert, Wm. Ledlie...............16 East 54th St., New York
Culp, John F.......................211 Locust St., Harrisburg, Pa.
Curtis, II, Holbrook..............118 Madison Ave., New York
Dabney, Wm. R.....................282 Front St., Marietta, Ohio
Daly, Walter S.....................Ogdensburg, N. Y.
Dench, Edward B...................15 East 53rd St., New York
Dudley, Wm. F.....................32 Livingston St., Brooklyn, N. Y.
Dudley, Wm. H.....................610 Exchange Bldg., Los Angeles, Cal.
Duel, Arthur B.....................27 East 57th St., New York
Dunn, John.........................314 East Franklin St., Richmond, Va.
Dye, Hobart S......................1404 L St. N. W., Washington, D. C.
Eagleton, Wells P..................15 Lombardy St., Newark, N. J.
Ellis, H. Bert.....................245 Bradbury Bldg., Los Angeles, Cal.
Emerson, Francis P................657 Boyleston St., Boston, Mass.
Emerson, Linn.....................234 Main St., Orange, N. J.
Farrell, Thomas H..................236 Genesee St., Utica, N. Y.
Fetterolf, Geo.....................328 South 15th St., Philadelphia, Pa.
Fitzpatrick, T. V..................26 Garfield Place, Cincinnati, Ohio
Fleming, Ernest W..................214 Bradbury Block, Los Angeles, Cal.
Foster, John M.....................11 Stedman Bldg., Denver, Colo.
Freudenthal, Wolff................1003 Madison Ave., New York
Fridenberg, Percy..................60 East 58th St., New York
Friedenwald, Harry...............1029 Madison Ave., Baltimore, Md.
Gallaher, Thomas J.................California Bldg., Denver, Colo.
<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gildea, Patrick F.</td>
<td>2 No. Cascade Ave., Colorado Springs, Col.</td>
</tr>
<tr>
<td>Goff, Waldo, P.</td>
<td>Clarksburg, W. Va.</td>
</tr>
<tr>
<td>Goldsmith, Perry G.</td>
<td>84 Carlton St., Toronto, Canada</td>
</tr>
<tr>
<td>Goldstein, Max A.</td>
<td>3858 Westminster Place, St. Louis, Mo.</td>
</tr>
<tr>
<td>Gradle, Henry</td>
<td>100 State St., Chicago, Ill.</td>
</tr>
<tr>
<td>Graef, Charles</td>
<td>1076 Boston Road, New York</td>
</tr>
<tr>
<td>Grayson, Charles P.</td>
<td>251 South 16th St., Philadelphia, Pa.</td>
</tr>
<tr>
<td>Greene, D. C., Jr.</td>
<td>12 West Cedar St., Boston, Mass.</td>
</tr>
<tr>
<td>Griffin, Edwin H.</td>
<td>55 West 47th St., New York</td>
</tr>
<tr>
<td>Gruening, Emil</td>
<td>36 East 57th St., New York</td>
</tr>
<tr>
<td>Halsed, Thomas H.</td>
<td>831 University Block, Syracuse, N. Y.</td>
</tr>
<tr>
<td>Harris, Thomas J.</td>
<td>117 East 40th St., New York</td>
</tr>
<tr>
<td>Haskin, Wm. H.</td>
<td>11 East 48th St., New York</td>
</tr>
<tr>
<td>Hastings, Hill</td>
<td>Braly Bldg., Los Angeles, Cal.</td>
</tr>
<tr>
<td>Hedges, Halstead S.</td>
<td>Charlotteville, Va.</td>
</tr>
<tr>
<td>Held, R. Johnson</td>
<td>616 Madison Ave., New York</td>
</tr>
<tr>
<td>Hinkel, F. W.</td>
<td>581 Delaware Ave., Buffalo, N. Y.</td>
</tr>
<tr>
<td>Holmes, Christian R.</td>
<td>8 East 8th St., Cincinnati, Ohio</td>
</tr>
<tr>
<td>Holmes, Edgar M.</td>
<td>531 Beacon St., Boston, Mass.</td>
</tr>
<tr>
<td>Hopkins, Wm. F.</td>
<td>803 Sutter St., San Francisco, Cal.</td>
</tr>
<tr>
<td>Hubbard, Thomas</td>
<td>205 Ontario St., Toledo, Ohio</td>
</tr>
<tr>
<td>Hurd, Lee M.</td>
<td>15 East 48th St., New York</td>
</tr>
<tr>
<td>Hyatt, Frank</td>
<td>1022 14th St., N. W., Washington, D. C.</td>
</tr>
<tr>
<td>Iglauer, Samuel</td>
<td>22 W. 7th St., Cincinnati, Ohio</td>
</tr>
<tr>
<td>Ingals, E. Fletcher</td>
<td>34 Washington St., Chicago, Ill.</td>
</tr>
<tr>
<td>Ingersoll, John M.</td>
<td>318 Euclid Ave., Cleveland, Ohio</td>
</tr>
<tr>
<td>Jackson, Oliver H.</td>
<td>34 North Main St., Fall River, Mass.</td>
</tr>
<tr>
<td>Jervey, J. W.</td>
<td>Greenville, S. C.</td>
</tr>
<tr>
<td>Johnson, Walter B.</td>
<td>170 Broadway, Paterson, N. J.</td>
</tr>
<tr>
<td>Jones, Clarence Porter</td>
<td>118 32nd St., Newport News, Va.</td>
</tr>
<tr>
<td>Keiper, Geo. F.</td>
<td>Lafayette, Ind.</td>
</tr>
<tr>
<td>Kenefick, Jos. A.</td>
<td>78 E. 54th St., New York</td>
</tr>
<tr>
<td>Kennon, Beverley R.</td>
<td>64 Granby St., Norfolk, Va.</td>
</tr>
<tr>
<td>Kent, J. L.</td>
<td>811 Church St., Lyneburg, Va.</td>
</tr>
<tr>
<td>Kerrison, Philip D.</td>
<td>58 West 56th St., New York</td>
</tr>
<tr>
<td>Kimball, Irving E.</td>
<td>717 Congress St., Portland, Me.</td>
</tr>
</tbody>
</table>
Kirkendall, J. S. .................................. Ithaca, N. Y.
Kittredge, Frank E. .......................... Masonic Temple, Nashua, N. H.
Kopetzky, Samuel J. .......................... 616 Madison Ave., New York
Koyle, F. H. .................................. 199 Main St., Hornellsville, N. Y.
Kuyk, D. A. .................................. 506 E. Grace St., Richmond, Va.
Large, Secord H. ............................... 536 Rose Building, Cleveland, Ohio
Lasalle, J. J. .................................. 226 Michigam St., Toledo, Ohio
Leonard, Z. L. .................................. 19 West 120th St., New York
Lester, John C. .................................. 179 Schermerhorn St., Brooklyn, N. Y.
Levy, Robert .................................. 300 California Bldg., Denver, Colo.
Lewis, Robert, Jr. .............................. 48 West 40th St., New York
Lincoln, Wm. R. ................................. Lenox Bldg., Cleveland, Ohio
Linhart, C. P. .................................. 106 East Broad St., Columbus, Ohio
Loeb, H. W. .................................. 537 North Grand Ave., St. Louis, Mo.
Logan, Jas. E. .................................. 1208 Wyandotte St., Kansas City, Mo.
Lowman, John B. .................................. 142 Park Place, Johnstown, Pa.
Lutz, Stephen H. ............................... 284 Hancock St., Brooklyn, N. Y.
MacPherson, D. .................................. 467 Manhattan Ave., New York
Malcolm, Percy E. D. ......................... 55 West 55th St., New York
Martinez, Emilio ............................... 32 Neptune St., Havana, Cuba
Mason, Wm. Beverly ........................... 812 Connecticut Ave., Washington, D. C.
Means, Chas. S. .................................. 715 North High St., Columbus, Ohio
Mial, Leonidas L. .............................. 139 West 12th St., New York
Miller, Frank E. .................................. 22 West 31st St., New York
Mooney, Jas. J. .................................. 393 7th St., Buffalo, N. Y.
Moore, Thomas W. .................... 1048 Third Ave., Huntington, W. Va.
Morgenthau, Geo. .............................. 34 Washington St., Chicago, Ill.
Mosher, Harris P. ............................ 828 Beacon St., Boston, Mass.
Moss, Robert E. ............................... Hicks Bldg., San Antonio, Tex.
Munger, Carl E. ............................... Waterbury, Conn.
Murphy, John W. .............................. 4 West 17th St., Cincinnati, Ohio
Myers, Henry L. ............................... 151 Granby St., Norfolk, Va.
Myles, Robert C. .............................. 46 West 38th St., New York
FELLOWS.

McCaw, James F. . . . . 114 Sterling St., Watertown, N. Y.
McClelland, Lefferts A. . . . 78 McDonough St., Brooklyn, N. Y.
McCoy, John J. . . . 157 West 73rd St., New York
McCullagh, Samuel . . . . . . . 35 Park Ave., New York
McKernon, Jas. F. . . . 62 West 52nd St., New York
McLaury, Frank II. . . . . . . . 252 West 139th St., New York
McReynolds, John . . . . . 121 South 18th St., Philadelphia, Pa.
McCullagh, Samuel . . . . . . . 35 Park Ave., New York
Page, John R. . . . 27 East 57th St., New York, N. Y.
Page, Lafayette . . . 224 N. Meridian St., Indianapolis, Ind.
Park. J. Walter . . . . . . . . . 32 North 2nd St., Harrisburg, Pa.
Reik, Andrew J. N. . . . 506 Cathedral St., Baltimore, Md.
Reik, Henry O. . . . . . . . . . 506 Cathedral St., Baltimore, Md.
Renner, W. Scott . . . . 341 Linwood Ave., Buffalo, N. Y.
Richardson, Chas. W. . . . . 1317 Connecticut Ave., Washington, D. C.
Roberts, W. Humes . . . . . . . . . 461 East Colo. St., Pasadena, Cal.
Robinson, John A. . . . . 200 West 86th St., New York
Roe, John O. . . . . . . . . . . 28 Clinton Ave., N., Rochester, N. Y.
Ross, George T. . . . . . . . . . 623 Dorchester St., Montreal, Can.
Roy, Dunbar . . . . . . . Grand Opera House Block, Atlanta, Ga.
Seiss, Ralph W. . . . . . . . . . . 213 South 17th St., Philadelphia, Pa.
Sharp, J. Clarence . . . . 62 West 46th St., New York
Shattuck, Warren S., Jr. .......................... 160 Clinton St., Brooklyn, N. Y.
Sheppard, J. E. .................................. 130 Montague St., Brooklyn, N. Y.
Smith, A. John ..................................... Yonkers, New York
Smith, Harmon ...................................... 44 West 49th St., New York
Smith, W. Harvey ................................... 250 Donald St., Winnipeg, Manit.
Smith, E. Terry ..................................... 75 Pratt St., Hartford, Conn.
Smyth, Herbert E. ................................... 376 John St., Bridgeport, Conn.
Solenberger, A. R. ................................. 106 E. St. Vrain St., Colo. Springs, Colo.
Sondern, Paul F. ................................... 52 South Fitzhugh St., Rochester, N. Y.
Spratt, Chas. N. .................................... 310 Syndicate Arcade, Minneapolis, Minn.
Steel, Geo. E. ..................................... Broadway and 79th St., New York
Stein, Otto Jacob ................................... 100 State St., Chicago, Ill.
Stillman, F. L. ..................................... 118 East Broad St., Columbus, Ohio
Theisen, Clement F. ............................... 172 Washington Ave., Albany, N. Y.
Thigpen, C. A. ...................................... 13 So. Ferry St., Montgomery, Ala.
Thigpen, F. M. ....................................... 13 So. Ferry St., Montgomery, Ala.
Thompson, John A. ................................ 628 Elm St., Cincinnati, Ohio
Thomson, John J. ................................... 40 West 47th St., New York
Thrasher, A. R. ..................................... N. E. Cor. 7th and Race Sts., Cincinnati, Ohio
Thrasher, Wade ...................................... N. E. Cor. 7th and Race Sts., Cincinnati, Ohio
Trowbridge, D. D. .................................. Fresno, Cal.
Tyson, Henry Hawkins .............................. 47 West 51st St., New York
Vail, Derrick T. .................................. 24 East 8th St., Cincinnati, Ohio
Voislawsky, A. P. ................................. 128 West 59th St., New York
Wagner, Henry L. .................................. 2303 Bush St., San Francisco, Cal.
Wales, Ernest DeW ................................. 320 No. Meridan St., Indianapolis, Ind.
Waterman, Jas. S. .................................. 676 St. Marks Ave., Brooklyn, N. Y.
Webster, Geo. A. ................................... 419 Boylston St., Boston, Mass.
Wells, Walter A. ................................... The Rochambeau, Washington, D. C.
White, Joseph A. .................................. 290 East Franklin St., Richmond, Va.
Wiener, Alfred ...................................... 616 Madison Ave., New York
Wilson, Norton H. ................................ 410 Westminster Ave., Elizabeth, N. J.
Winslow, John R. .................................. 114 Franklin St., Baltimore, Md.
Wishart, D. J. Gibb.................47 Grosvenor St., Toronto, Can.
Worthington, Thos. C..............1022 Madison Ave., Baltimore, Md.
Yates, D. G. ........................79 West 104th St., New York
Yankauer, Sidney ..................616 Madison Ave., New York

HONORARY FELLOWS.

Bell, Alexander Graham................Washington, D. C.
Chiari, Ottokar...............................Vienna, Austria
Gradenigo, G. ..............................Turin, Italy
Grant, Dundas...............................London, England
Hering, T. ................................Warsaw, Russia
Jansen, A. ................................Berlin, Germany
Joel, J. ....................................Paris, France
Karwowski, Constantine ..............Warsaw, Russia
Killian, G. ................................Freiburg, Germany
Law, Edward ...............................London, England
Love, James Kerr ........................Glasgow, Scotland
Lue, H. ......................................Paris, France
Macintyre, John .........................Glasgow, Scotland
Martin, A....................................Paris, France
Moure, E. J. ..............................Bordeaux, France
Onodi, Adolph ............................Budapest, Hungary
Politzer, A. ...............................Vienna, Austria
Poyet, George ............................Paris, France
Semon, Sir Felix .........................London, England
Schmiegelow, E..........................Copenhagen, Denmark
Sendziak, J. ..............................Warsaw, Russia
Turner, Logan ............................Edinburgh, Scotland
Woakes, W. ...............................London West, England
Wolfenden, R. Morris ..................London, England
Ziem, C. H. ................................Danzig, Germany
VICE-PRESIDENTS OF THE SOCIETY.

Eastern Section.

1896 Joseph O'Dwyer, M. D.
1897 F. L. Jack, M. D.
1898 A. G. Root, M. D.
1899 C. W. Richardson, M. D.
1900 G. H. Makuen, M. D.
1901 W. S. Renner, M. D.
1902 H. H. Curtis, M. D.
1903 F. C. Cobb, M. D.
1904 G. L. Richards, M. D.
1905 S. MacCuen Smith, M. D.
1906 T. H. Halstead, M. D.
1907 F. B. Sprague, M. D.
1908 E. A. Crockett, M. D.
1909 F. R. Packard, M. D.
1910 J. F. McCaw, M. D.
1911 H. P. Mosher, M. D.

Southern Section.

(Only one Vice-President elected).

Wm. Sheppegrell, M. D.
J. A. Stucky, M. D.
J. A. White, M. D.
C. F. McGahan, M. D.
Dunbar Roy, M. D.
J. F. Woodward, M. D.
Wm. Cheatham, M. D.
H. L. Myers, M. D.
J. M. Ray, M. D.
H. O. Reik, M. D.
John Dunn, M. D.
O. A. M. McMinnie, M. D.
J. A. Kent, M. D.

Middle Section.

J. S. Mabon, M. D.
J. A. Thompson, M. D.
Max Thorner, M. D.
H. S. Straight, M. D.
N. H. Pierce, M. D.
H. W. Loeb, M. D.
L. C. Cline, M. D.
C. Jackson, M. D.
Thomas Hubbard, M. D.
W. L. Ballenger, M. D.
J. M. Ingersoll, M. D.
J. F. Barnhill, M. D.
R. B. Canfield, M. D.
H. J. Hartz, M. D.
La Fayette Page, M. D.

Western Section.

J. E. Logan, M. D.
J. E. Schadie, M. D.
H. L. Wagner, M. D.
Robert Levy, M. D.
J. O. McReynolds, M. D.
E. W. Fleming, M. D.
P. F. Gildea, M. D.
R. W. Payne, M. D.
M. A. Goldstein, M. D.
H. B. Ellis, M. D.
W. C. Bane, M. D.
W. H. Roberts, M. D.
J. C. Beck, M. D.
A. R. Solenberger, M. D.
Wm. H. Dudley, M. D.
OFFICERS.

SECRETARY AND TREASURER.

1896 to 1900
Robert Cunningham Myles, M.D.  
1901 to 1906
Wendell C. Phillips, M.D.  
1907 to date
Thomas J. Harris, M.D.

1901 to 1907
Ewing W. Day, M.D.

1901 to 1906
Wendell C. Phillips, M.D.

1901 to 1907
Robert Cunningham Myles, M.D.  
1907 to date
Thomas J. Harris, M.D.

1908 Chevalier Jackson, M.D.

1909 to date
Ewing W. Day, M.D.

COUNCIL.

1896—T. P. Berens, M.D.
J. H. Billings, M.D.
D. L. Hubbard, M.D.
H. H. Curtis, M.D.
W. C. Phillips, M.D.
R. C. Myles, M.D.

1897—G. H. Makuen, M.D.
T. P. Berens, M.D.
W. C. Phillips, M.D.
H. H. Curtis, M.D.
E. W. Day, M.D.
D. L. Hubbard, M.D.

1898—J. E. Nichols, M.D.
H. H. Curtis, M.D.
L. A. Coffin, M.D.
W. C. Phillips, M.D.
E. W. Day, M.D.
C. W. Richardson, M.D.
S. E. Solly, M.D.

1899—W. H. Daly, M.D.
W. C. Phillips, M.D.
T. H. Halsted, M.D.
J. O. Roe, M.D.
W. H. Loeb, M.D.
T. C. Christy, M.D.
F. L. Jack, M.D.
D. L. Hubbard, M.D.

1900—S. E. Solly, M.D.
W. H. Daly, M.D.
A. W. Calhoun, M.D.
J. B. Clemens, M.D.
J. F. McKernon, M.D.
W. C. Phillips, M.D.
J. E. Sheppard, M.D.
Price Brown, M.D.
Max Thorner, M.D.

1901—D. B. Kyle, M.D.
S. MacCuen Smith, M.D.
S. E. Solly, M.D.
Price Brown, M.D.

1902—D. B. Kyle, M.D.
S. E. Solly, M.D.
J. F. McKernon, M.D.
S. MacCuen Smith, M.D.
F. C. Cobb, M.D.
N. H. Pierce, M.D.
T. P. Berens, M.D.
J. A. White, M.D.

1903—C. W. Richardson, M.D.
R. C. Myles, M.D.
D. B. Kyle, M.D.
J. F. McKernon, M.D.
S. MacCuen Smith, M.D.
F. C. Cobb, M.D.
N. H. Pierce, M.D.
T. P. Berens, M.D.
C. R. Holmes, M.D.

1904—J. A. Stucky, M.D.
C. W. Richardson, M.D.
R. C. Myles, M.D.
A. G. Root, M.D.
T. P. Berens, M.D.
C. R. Holmes, M.D.
E. B. Dench, M.D.
F. L. Jack, M.D.
J. E. Schadle, M.D.
F. R. Packard, M.D.

1905—N. H. Pierce, M.D.
J. A. Stucky, M.D.
C. W. Richardson, M.D.
L. A. Coffin, M.D.
T. H. Halsted, M.D.
C. R. Holmes, M.D.
E. B. Dench, M.D.
F. L. Jack, M.D.
OFFICERS.

1897-1898 - F. C. Cobb, M. D.
1898-1899 - J. A. Stucky, M. D.
1899 | 1900 - E. B. Dench, M. D.
1900-1901 - F. L. Jack, M. D.
1901-1902 - F. R. Packard, M. D.
1902-1903 - L. A. Coffin, M. D.
1903-1904 - T. H. Halsted, M. D.
1904-1905 - J. F. McKernon, M. D.
1905-1906 - H. W. Loeb, M. D.
1906-1907 - J. E. Logan, M. D.
1907-1908 - F. C. Cobb, M. D.
1908-1909 - J. F. McKernon, M. D.
1909-1910 - H. W. Loeb, M. D.
1910-1911 - C. W. Richardson, M. D.
1911-1912 - D. B. Kyle, M. D.

J. F. McCaw, M. D.
D. B. Kyle, M. D.
C. W. Richardson, M. D.
W. C. Phillips, M. D.
J. F. McCaw, M. D.
W. R. Lincoln, M. D.
G. L. Richards, M. D.
J. F. Barnhill, M. D.
G. H. Makuen, M. D.
C. R. Holmes, M. D.
G. L. Richards, M. D.
J. F. Barnhill, M. D.
G. H. Makuen, M. D.
N. H. Pierce, M. D.
W. C. Phillips, M. D.
A. B. Duel, M. D.
F. R. Packard, M. D.
Robert Levy, M. D.
J. A. White, M. D.
N. L. Wilson, M. D.
C. R. Holmes, M. D.
F. R. Packard, M. D.
A. B. Duel, M. D.
Robert Levy, M. D.
G. L. Richards, M. D.
N. H. Pierce, M. D.

DECEASED WHILE MEMBERS OF THE SOCIETY.

Resident Fellows.

Noyes, J. I., M. D. .......... 1896
O'Dwyer, Joseph, M. D. ... 1897
Hengst, D. A., M. D. ....... 1898
Nichols, J. E. H., M. D. . . . 1899
Hopkins, Woolsey, M. D. ... 1899
Thorner, Max, M. D. ....... 1899
Rankin, D., M. D. ......... 1900
Wenner, R. J., M. D. ...... 1900
Chapman, S. Hartwell, M. D. 1903
Friedenberg, Edward, M. D. 1903
Kibbe, A. B., M. D. ....... 1903

Hoople, H. Nelson, M. D. ... 1905
Brandegee, Wm. P., M. D. . 1906
Solly, S. E., M. D. ......... 1906
Harland, W. G. B., M. D. . . 1907
Burnett, Peter V., M. D. . . 1908
Roosa, D. B. St. John, M. D. 1908
Schadle, J. E., M. D. ....... 1908
Pette, C. H., M. D. ......... 1908
Sprague, F. B., M. D. ...... 1909
Mullins, John B., M. D. .... 1909
McGahan, C. F., M. D. .... 1910

HONORARY MEMBERS WHO HAVE DIED.

Whistler, W. McNeill ........ 1899
Gougenheim, Achille ....... 1901
Gruber, Joseph .......... 1901

Brown, Lennox ........... 1902
Smyly, Sir Philip ........ 1904
Joal, Joseph ...........
American Laryngological, Rhinological and Otological Society Transactions

Biological & Medical Serials

PLEASE DO NOT REMOVE CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

STORAGE