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Transactions of the Third Annual Meeting of the American Laryngological Association. Held in the City of Philadelphia. May 9, 10, and 11, 1881

American Laryngological Association

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AMERICAN LARYNGOLOGICAL ASSOCIATION

TRANSACTIONS OF THE THIRD ANNUAL MEETING OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION. HELD IN THE CITY OF PHILADELPHIA. MAY 9, 10, AND 11, 1881

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OF THE

THIRD ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL ASSOCIATION

HELD IN THE CITY OF PHILADELPHIA

MAY 9, 10, AND 11

1881

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TRANSACTIONS

OF THE

THIRD ANNUAL MEETING

OF THE

AMERICAN LARYNGOLOGICAL ASSOCIATION,

HELD IN THE HALL OF THE COLLEGE OF PHYSICIANS, PHILADELPHIA
MAY 9, 10, AND 11, 1881.

First day, morning session.

The meeting was called to order at 10.30 o'clock by the President of the Association, Dr. J. Solis Cohen, who occupied the chair. The Vice-Presidents, Dr. W. C. Glasgow and Dr. J. O. Roe, took their places upon the platform.

The Secretary announced the following Fellows present upon the calling of the roll :

HARRISON ALLEN, M.D., Philadelphia.
MORRIS J. ASCH, M.D., New York.
C. E. BEAN, M.D., Philadelphia.
F. H. BOSWORTH, M.D., New York.
J. SOLIS COHEN, M.D., Philadelphia.
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H. A. JOHNSON, M.D., Chicago.
F. I. KNIGHT, M.D., Boston.
S. W. LANGMAID, M.D., Boston.
G. M. LEFFERTS, M.D., New York.
R. P. LINCOLN, M.D., New York.
WM. PORTER, M.D., St. Louis.
BEVERLY ROBINSON, M.D., New York.
J. O. ROE, M.D., Rochester.
C. E. SAJOUS, M.D., Philadelphia.
C. SEILER, M.D., Philadelphia.
E. L. SHURLY, M. D., Detroit.
A. H. SMITH, M.D., New York.
CLINTON WAGNER, M.D., New York.

The following candidates for Fellowship were present and afterward signed the roll :

D. B. DELAVAN, M.D., New York. E. C. MORGAN, M.D., Washington.
G. W. MAJOR, M.D., Montreal. H. MYNTER, M.D., Buffalo.

and a large number of invited guests and visitors.

Dr. Harrison Allen, the Chairman of the Committee of Arrangements, read the following address of welcome :

Fellows of the American Laryngological Association :

GENTLEMEN—It has been delegated to me by my associates of the Philadelphia Laryngological Society, to welcome you to your Third Annual Congress.

Some of the most noted medical gatherings of our time have been convened in Philadelphia. We have now to witness the opening of a congress new to her history,—a congress of physicians who are specially engaged in studying the diseases of the respiratory passages. I take, therefore, great pleasure in welcoming you on this most interesting occasion.

It is to be regretted, on some accounts, that this meeting of the Association is called at a time when the American Medical Association is barely adjourned, and the State Medical Society of Pennsylvania is about to convene. The plans of your Committee of Arrangements may be, in some measure, disturbed by these circumstances. But the committee trusts that the essential work of the congress may go on uninterruptedly and prosperously.

May your meetings here prove as valuable as have those of your previous congresses !

May your labors stimulate to renewed exertion all persons engaged in laryngology !

May the session serve to strengthen the bonds that unite a society of brothers !

May it end in crushing out charlatanism and self-seeking !

May it overcome prejudice and opposition !

May it spread the boundaries of knowledge to the advantage of the noblest of pursuits, the relief of human suffering !

The following invitations were read, viz. : from the College of Physicians, offering the use of the hall to the Association for its sessions, and inviting the members to visit the library and the Mütter Museum ; from the directors of the Academy of Natural

Sciences, to visit the academy ; from the superintendent of the Camden and Atlantic Railroad, tending the use of a special train to visit Atlantic City on Wednesday, May 11th ; and from the Philadelphia Medical Club, offering the freedom of the house. These invitations had been accepted by the Committee on behalf of the Association.

The President then read his annual address, as follows :

PRESIDENT'S ADDRESS.

GENTLEMEN—The year which has just expired, in the life of our Association, has abundantly evinced increasing attention to the department of medical science in which we are specially interested. Numerous monographs, on various topics of individual study and observation, have issued from the presses of the two great continents. New treatises have been published in Germany, Great Britain, and America, three of our own Fellows having entered the guild of authors with elaborate volumes. An additional journal, devoted to laryngology and its adjunct subjects, is being published in France ; and similar periodicals are expected, in the immediate future, from Germany and Great Britain.

The first International Medical Congress of Laryngologists has had a very successful convention at Milan, and a laryngological sub-section of medicine has been organized for the approaching International Medical Congress at London, which bids fair, by its prospective brilliancy, to outshine the parent section that denied it equality of recognition. The courtesy has been extended to several of our Fellows to invite them to take prominent part in opening the discussions on subjects selected by the local committee. In view of the fact that several members of our body contemplate being present at this meeting and taking active part in its deliberations, it would seem desirable that they be constituted a special committee of delegates to represent this Association in the sub-section alluded to, and report at our next annual meeting such points of practical utility there brought forward, as may be of general interest to laryngologists.

Our last annual meeting was one to which we can refer with pride. The simultaneous meeting of the American Medical Association in the same city, while it drew some of our own members away, from time to time, brought us, on the other hand, a number of visitors, among them some distinguished members of the profession ; and it was told your presiding officer that the decorum

and dignity of the meeting, the interest manifested in its literary and scientific work, and the uniform courtesy observed in discussion, were matters of favorable comment.

Hardly, however, had our new year begun when this Association met its first dismembering loss in the death of its founder and first Vice-President, Dr. Frank H. Davis, of Chicago, for the following obituary notice of whom, I am indebted to his fellow-townsman, Dr. E. Fletcher Ingals.

OBITUARY.

FRANK H. DAVIS, M.D., the originator of the American Laryngological Association, and its first Vice-President, died in Chicago on August 17, 1880. The deceased was born in New York, June 5, 1848, and the following year was taken by his parents, Nathan S. and Anna Maria Davis, to Chicago, where he resided until his death.

After preparation in the select schools of Chicago, he entered the University of Michigan, with the intention of taking a full classical course, but on account of poor health, he was obliged to relinquish the course at the end of his sophomore year.

He began the study of medicine in the office of his father, Prof. N. S. Davis, founder of the American Medical Association, in 1867, and in the same year began the course of study in the Chicago Medical College, from which he graduated with honors in 1871. After pursuing his medical course for two years, on account of some threatening pulmonary symptoms, he was sent to Europe, where he remained for sixteen months. On his return, he completed his medical course, when he again sailed for Europe, and spent some months in the study of diseases of the air passages, in the hospitals of Vienna.

Returning to his home in July, 1871, he began at once a general practice, which he continued until his last illness. Dr. Davis followed the course which should be adopted by all who intend to practise any specialty, by first grounding himself in the fundamental principles of general practice, which are so essential to the proper treatment of disease. Constantly holding in view his chosen specialty during the last few years of his life, the bulk of his work was done in this line.

He was an active member of the Chicago Medical Society, the

Illinois State Medical Society, the American Medical Association, and the American Laryngological Association.

He was for several years associated with his father as editor of the *Chicago Medical Examiner*, and the fruit of his literary work may be found in numerous articles contributed to its pages, and in the transactions of the various societies to which he belonged. He was an active member of the medical staffs of the Mercy Hospital, and of the South Side Free Dispensary of Chicago.

He was interested in the collateral sciences, and possessed not only a love, but also native genius, for the fine arts. The latter is illustrated in a life-size bust of his father, modelled by his own hands.

On June 3d, 1880, Dr. Davis was suddenly prostrated by the disease which, ten weeks later, terminated his useful career.

A *post-mortem* examination determined that the chief cause of his death was an acute suppurative inflammation of the left kidney, which had been attended with so much reflex irritation of the stomach, that for the last three weeks of his life he had been sustained entirely by nutritive enemata.

He left a wife, the daughter of Prof. Oliver Marcy, of Evanston, and two children. Dr. Davis, in his brief professional career of only nine years, accomplished what, to most men with his feeble physical powers, would have been an impossibility.

He built for himself a lucrative practice; he made for himself an honored place in the profession of the nation, and when, in his early manhood, he lay down for that final sleep, he left a large circle to mourn in him the loss of a genial friend, a kind and cultivated physician, and an amiable Christian gentleman.

I would ask that an appropriate position be given to this brief biographic sketch of our dead Fellow in the volume of transactions for the present year.

The close sequence of our meetings upon those of the American Medical Association is apt to interfere somewhat with the attendance. Some of our Fellows have affiliations of long standing with the American Medical Association; others find it difficult and even impossible to give such attention to both organizations as they would like to do, as attendance upon both necessitates too prolonged an absence from their duties to their patients.

Others, members of the American Medical Association, who would like to become closely associated with us, are deterred from having their claims to fellowship presented, for the same reason. It has been suggested to me, that the attention of this Association be called to this circumstance, for the purpose of taking into consideration the propriety of convening our annual sessions at a period more remote from that at which the American Medical Association meets, and without reference to the other organization. The inference is, that we might secure a fuller attendance, and thus the better promote the objects of our own organization.

It might be well for the Committee on Nominations to discuss this point, in suggesting the date for our next annual gathering.

It is a question for serious consideration whether this Association has adopted the most useful method of publishing its transactions? As a result of our dependence upon journalism, two years have elapsed without bringing us the promised volumes of the transactions of our first annual convention, and it is only within the past week that we have been presented in due form with the completed transactions of the session of last year.

This delay is entirely too great; it gives little encouragement to members to prepare important and instructive papers, and postpones too long the leisure-perusal of papers which may have excited the keenest interest a year previous. It is quite possible that our membership is now sufficient to provide for the printing of our transactions immediately after the adjournment of the session, independently of any assistance from periodicals, and without entailing undue expense upon any Fellow. The necessary addition to the treasury for this purpose might be secured by individual subscription, entitling each contributor to a proportionate distribution of the number of volumes issued. An estimate, from a reliable publishing house, of the probable cost of publishing our transactions is appended to this address, for the use of the Association.

Perhaps it may be best to publish only a mere annual record of our proceedings, indicating by title the papers presented, and allowing them to be published in detail in any journal that may be selected by their authors.

The volume of transactions presented by the Council is a credit to us, both as laryngologists and American practitioners.

The subject of increasing our Fellowship is one which should

engage our attention, inasmuch as our acceptance of the gentlemen recommended for Fellowship by the Council will increase our number to within six of the full quota.

Uniformity of terms in designating anatomical structure, morbid condition, and pathological product, is much to be desired in facilitating individual study and due comprehension of published observations.

Your Committee on Nomenclature present a report, in this connection, to which I would ask your earnest attention. In view of the fact that a similar committee is to report next year at the Convention of the International Congress of Laryngologists in Paris, it is important that American laryngologists, as a representative body, present a united front and a well-digested selection of terms. For two years your Committee on Nomenclature have endeavored to fulfil the duty assigned them. Circumstances have prevented the presentation of a complete report. The one to be submitted includes the anatomical and pathological nomenclature of the larynx and trachea only; but it will probably be as much as the Association will have time to discuss. As great difficulty exists in securing full attendance of the committee on account of the residence of its members in different cities, it appears to me that it would be judicious to discharge the present committee and select a new one to continue the work, the members of which shall all be residents of one city, so as to ensure as frequent conferences as may be requisite to perform the work in a satisfactory manner.

Among the interesting subjects presented to the consideration of laryngologists within the past year, is the use of electricity as a direct illuminating agent. Two forms of apparatus have been brought forward; one by direct incandescence of a platinum wire, the other by incandescence of a spiral vacuum tube, modelled on the tubes of Geissler. My own experience with the specimens of these apparatuses with which I had been furnished, was unsatisfactory. In the one instrument, the platinum wire melted before reaching a white heat; with the other, I could get no illumination whatever. The field, however, seems, on theoretical grounds, a promising and attractive one for the ingenuity of our younger members who may have time at their disposal for the prosecution of the necessary preliminary physical experiments.

Although irritability of the throat does not often prevent a skilled manipulator from successfully inspecting the interior of

the larynx, yet we all know that cases are occasionally encountered which, at the first interview, defy the ingenuity of the most skilled. The method of reducing this hypersensitiveness recently suggested by Rossbach, and consisting in interrupting the nervous influence by freezing the superior laryngeal nerve at the point where it penetrates the thyro-hyoid membrane, at which point it is superficial and covered simply by the integument, is well worthy of close investigation. The freezing is produced by the propulsion of a spray of ether.

Although this plan does not always succeed it will frequently be found to be satisfactory in its immediate results.

The employment of pilocarpin in diphtheria for the purpose of exciting hyper-secretion from the mucous membrane of the throat, and thus mechanically lifting the pseudo-membrane from its seat, has been resorted to by a few practitioners whose recorded observations are sufficiently encouraging to justify systematic investigation of its merits. As yet I have had no occasion to make any personal test of this effect of the remedy. The incompatibility of cardiac depressants in the treatment of systemic diphtheria makes it questionable, in my mind, on theoretic grounds, whether, on the whole, the deleterious effects of the drug may not counterbalance any special advantages it may possess.

In the constitutional treatment of chronic inflammations of the nasal and naso-pharyngeal mucous membrane, I have, during the past year, observed some satisfactory results from the use of a combination of the recent powder of cubeb and salicylate of cinchonidia ; two grains each being given in capsule three or four times a day. We all know that in many broken-down subjects of nasal and post-nasal catarrh, the cinchona alkaloids are indicated both as nerve tonics and appetizers, especially in out-door clinical practice. In the same class of practice, too, and less frequently with private patients, there is an element present due to the exposures to which these poor people are unavoidably subjected, which, for want of a more definite term, may be designated as rheumatoid. In these cases, as in ordinary chronic rheumatic affections, the salicylates are now known to be specially adapted ; the combination of salicylic acid with quinia or cinchonidia seems to answer the double purpose of controlling the rheumatic element and promoting a healthy tone in the nervous system generally. The acknowledged value of cubeb in these complaints, due, as is supposed by many, to the action of the

remedy in its elimination by the mucous membrane of the bronchial tract, makes it desirable, in many of these instances, to combine the cubeb with the salicylate. As far as I am personally concerned, I feel disposed to continue to use this combination.

Since our last meeting I have made more frequent use of the galvano-cautery than at any previous period of my practice, and in two obstinate chronic affections it appears to have given more satisfaction than any other routine treatment which I have employed. These affections are chronic follicular pharyngitis and hypertrophied tonsils. The instruments I have used, and for which I have almost discarded the use of those which I previously employed, are the admirable instruments of one of our own Fellows, Dr. Shurly, of Detroit. I have found it more convenient, however, to alter the arrangement of the spring in his handle, so that the current is closed by pressure of the finger, instead of being broken in that manner.

In the treatment of the follicular pharyngitis, I apply the probe-pointed cautery to three or four of the enlargements at each interview with the patient, and continue until a majority or all of them are destroyed. The results have, in most instances, been thoroughly satisfactory, and the patients have borne the treatment at least as well as any other manipulation.

In the reduction of hypertrophied tonsils, I use the flat-blade cautery first to the irregular prominences beyond the general outline of the enlarged gland, and then gradually burn portions of the tonsil, until the portion remaining projects little, if at all, beyond the line of the palatine folds. But one or two points are cauterized at each sitting, and usually but one tonsil is operated upon at one sitting, the other at the next. From twelve to thirty sittings are required to complete this process, which gives but little pain, and does not interfere with the prosecution of the ordinary employments of the patient. The only drawback that I have noticed is the disagreeable odor from the sloughs, and some impairment of appetite in consequence. It is quite likely that the alterative effect of the potential cautery induces some absorption of the deeper-seated indurated tissues, and thus reduces the inner portions of the tonsil, while the external portions are undergoing actual destruction.

A rare lesion has lately come under my observation in the form of prolapse of the laryngeal sac in the person of a physician in a

neighboring State. An illustrated report of the case will appear in the forthcoming number of the ARCHIVES OF LARYNGOLOGY, and I have to regret that there will be no opportunity to exhibit the case, as I had proposed to do, at this session.

And now, gentlemen, that we are about to proceed to the prescribed work of the convention, as arranged in the official programme issued by your Council, allow me again to thank you for the honor conferred upon me last year, in selecting me to preside over the deliberations of this session, and to hope that the present convention at Philadelphia will prove one to which we can all look back with pleasure and satisfaction.

In taking up the regular order of business, the President announced that, in order to facilitate and expedite discussion, the Committee of Arrangements had placed papers upon similar subjects in such a manner upon the programme that two or more might be discussed conjointly.

Dr. KNIGHT, of Boston, moved that in the discussion of papers members should be limited to five minutes, and not allowed to speak a second time without the consent of the Association.

Adopted.

The first paper and the second, being both upon the subject of lupus, were directed to be read in succession before being discussed, by an unanimous vote of the Association. The titles were as follows:

Dr. F. I. KNIGHT, of Boston, on "Lupus laryngis," and Dr. MORRIS J. ASCH, of New York, on "Lupus of the pharynx and larynx."

Dr. Knight's Paper.

CASE I.—*Lupus of the pharynx and larynx following lupus of the face.*

Miss X. stated that she was 33 years old, and was well till the age of 13, when she received a blow on the nose from the elbow of her sister, which caused her to bleed nearly to "death." The nose swelled, and afterward became red and angry-looking, and was sore to the touch, and continued to bleed at times. During 1861 the eyes were affected, so that she was compelled to give up going to school. She tried to resume study the next year, but was unable to use her eyes. Then a bunch about as large as a

small pea came on the end of the nose. This was cut off by her father, and ulceration began on the right side of the nose at the edge of cut. She continued to have nose-bleed. In 1863 the upper lip became swollen and ulcerated, and when she laughed the blood would burst from it. She continued to grow worse, and in 1865 the throat became ulcerated; she lost her voice, and was short of breath. She was much reduced in strength. She also at this time had cough. At the end of the following year (1866) she had regained her strength and voice. In May, 1867, ulceration commenced on the right cheek, and at some time during the next three years extended to the left cheek also. In 1871 she lost her voice again, and did not speak aloud for a year. In 1874 the tongue became ulcerated at its base, and a bunch appeared on the right eyeball over pupil, which was removed by the doctor. The face was a terrible sight, and "hard like a stone." In 1875 she became very weak. In January, 1880, came under the care of Dr. J. C. White, at the Massachusetts General Hospital, and her condition has much improved since. The face feels and looks much better. She has taken cod liver oil internally, and constantly used various lotions for the face. I saw her in December, 1880, and again in April of this year. There is some cicatricial contraction about the mouth and nostrils, the latter being considerably diminished in size. The skin has become comparatively smooth, that on the nose showing a white cicatrix. There is a perforation in the nasal septum. The cheeks, nose, and lips are covered with red points of the size of a pin's head, some of them raised. The whole skin in this region is red and shiny. There is an ulcer on the lower lip and one on the upper gums, which have existed for seven or eight years. The teeth have been all extracted.

Examination of the throat shows uvula absent, the back of pharynx covered by cicatricial tissue, some small cicatrices in vault of pharynx, just above septum, also in left glosso-epiglottic sinus, and extreme pallor of mucous membrane of pharynx and epiglottis. The epiglottis looks rigid, and shows considerable loss of substance on the right side. There is much irregular hypertrophy and swelling of the mucous membrane of the interior of the larynx, more marked on the left. The left ary-epiglottic fold is thickened, and above the left ventricular band is situated a swelling of the size of a large bean. The mucous membrane of the posterior wall is much thickened. The general appearance of the

interior of the larynx is rough, thick, and granular. The left cord cannot be seen on account of the swelling above. The right cord is very thick, granular, grayish in color. Above the anterior half of this cord, as if coming from the ventricle, is a mass of thickened tissue, red in color. The right ventricular band is very pale.

In regard to the family history of this patient, she states that her father and mother are alive and well; also two brothers and five sisters, while one sister has a disease of the nose similar to her own.

CASE 2.—*Lupus of the pharynx and larynx preceding lupus of the face.*

Mrs. Y., 36 years of age, gave the following history:

Father died of old age; mother living and well. Two brothers died in infancy; two living and well. One sister well; one sister insane.

Patient had scarlet fever when eight years of age, and her throat has been sensitive ever since. Serious trouble began nine or ten years ago with ulceration in the throat, apparently in the upper part, as, at this time, in attempting to swallow liquids, they passed through the nose. Ulceration began on the skin of nose about eight years ago, after the ulceration of the throat. Two years ago her voice became affected. It is now very husky, and produced with great effort.

Examination shows her nose sunken in; cheeks and nose covered by hard, white cicatricial tissue; some crusts on forehead and sides of cheeks; loss of substance in upper lip. Examination of throat shows loss of substance of soft, and cleft in hard palate. Upper pharynx covered with dried muco-purulent matter, lower pharynx with cicatricial tissue. Broad cicatricial bands run from tongue to lateral walls of pharynx; also cicatricial bands from sides of epiglottis to pharynx. There is loss of substance at tip of epiglottis, the remainder of which is thick and granular-looking. There is also a rough, granular appearance of the mucous membrane of the larynx above the vocal cords. Ventricular bands thick, especially the right. Vocal cords dirty,—reddish-white, covered in, anteriorly, on attempted phonation, by swollen ventricular bands. Mucous membrane of posterior wall much thickened; that of the ary-epiglottic folds somewhat so.

This patient has no history or signs of syphilis (unless the above be considered such). She has never had children or miscarriages. She has had no symptoms of pulmonary disease.

CASE 3.—*Lupus (?) of the pharynx and larynx without manifestation elsewhere.*

Miss Z., 17 years old, previously healthy, began to be hoarse when 12 years of age. I saw her first in 1878, she being then fourteen years old. There was ulceration of the epiglottis, and a catarrhal condition below. No other physical signs in throat, lungs, or elsewhere. She improved on cod liver oil and iodide of potash.

I saw her again in April of this year. She stated that her voice had been growing worse for a year or two, and that she had spoken mostly in a whisper for the past six months.

On examination I found the posterior palatine folds much thickened, and of a dark pink color. The uvula is absent. The mucous membrane of the posterior wall of pharynx is very pale and thickened. The base of the tongue and glosso-epiglottic sinuses pale, with some cicatricial appearance. The epiglottis is pale, thick, with considerable loss of substance at its tip, causing a median notch; thickening of ary-epiglottic folds; much swelling of posterior wall. Ventricular bands and cords rough and swollen, granular-looking, the cords being of a dirty-reddish hue. Patient feels perfectly well, and weighs more than ever in her life. She looks pale, but otherwise plump and well. Sounds derivable from percussion and auscultation of chest perfectly normal.

In family history, I obtained from the father the following facts: He himself (the father) had suffered from a phimosis many years before he could get courage enough to consult any one about it. During this time he had gonorrhea, and a suppurating bubo, but never any signs of syphilis. Years after the birth of his children he was operated on for the phimosis by Dr. J. C. Warren, with great relief, but there was always a little spot on the penis, which did not heal, and on this spot afterward developed what Dr. Warren considered an epithelioma, and excised. This was a year or more ago, and there has been no recurrence. The mother is well. A younger sister was well till six years old, and then developed epilepsy.

These cases are presented wholly with reference to their diagnostic relations.

The first one developed in the course of an ordinary lupus of the face, and presents appearances such as have

been ordinarily observed in such cases, especially the irregular hypertrophy of tissue in the larynx. The granular appearance, dwelt on by Dr. Lefferts in the *American Journal*, April, 1878, was well marked in this case. The pallor of the epiglottic region was very striking, and a sign to which I have not seen allusion before. The epiglottis looked like dough or putty.

The second case is particularly interesting, as exhibiting the development of lupus first in the throat, and afterward on the face. I think this has not been observed before. This woman has been seen from time to time for years by different dermatologists, who have had no doubt as to the nature of the disease. No one, as far as I know, has considered it syphilitic. Among others, Prof. J. C. White has presented her at his clinic as a case of genuine lupus. Dr. Tilden has also seen her this spring, and pronounced the disease of the skin lupus.

The case was of so much interest to me that I thought it would be satisfactory to invite my friend, Dr. F. B. Greenough, clinical instructor in venereal diseases, and one thoroughly familiar with other diseases of the skin, to see the woman, and his letter is worth reading here, in connection with the case:

MY DEAR KNIGHT:

I saw that case yesterday, and am much obliged to you for the opportunity.

There can be no possible doubt but that the cutaneous lesion is lupus. I must confess that had I seen the palate and pharynx, and nothing else, and had no history, I should have decidedly said that it was syphilitic. There does not, however, seem to be any evidence of any other manifestations that could be regarded as such, and I should say that it would be absolutely impossible to have syphilis produce such ravages in the mouth and throat without also having some ulcerative affection of the skin somewhere, as would be shown by scars on the trunk, arms, or legs, of which she has no sign. In a case of hereditary syphilis, perhaps, we might get the gummy formation in the palate, resulting in caries, without the same cutaneous symptoms, but her history most emphatically excludes hereditary specific disease, as it was not until

adult life that the trouble began. Whether, however, the necrosis of the hard palate can be attributed to lupus, I am by no means inclined to admit. I should be rather inclined to consider the lupus and the necrosis as results of a common cause, *i. e.*, what we call, in a loose and general way, the scrofulous diathesis. I know that scrofula is a very unsatisfactory and indefinite term, but still all surgeons admit a scrofulous necrosis or caries, and why that should not affect the hard palate as well as the tibia or femur, I do not know. But I do not see how lupus—which, as we understand it, is, practically speaking, a new formation of the cutis (or mucous membrane) that has the tendency to break down and ulcerate—can affect the bones. Histologically, I suppose the lupus tubercle, and the syphilitic gummata, are about the same thing; but (as far as we know clinically), whereas the latter can be generated from any connective tissue, the former always has for its matrix, or starting-point, the rete Malpighi.

Truly yours,

F. B. GREENOUGH.

10 CHARLES STREET
May 6th,

In the third case we have loss of substance and thickening going on in the larynx of a girl for four years, while she retains her usual general health, and has made the usual gain in weight at this period of life.

When I first saw her, I expected that the disease would prove tubercular, and that I should soon find signs in the chest; but four years have passed, and she has no signs or symptoms of pulmonary disease.

Congenital syphilis might be thought of, but I find no other evidence in the patient, and no proof of constitutional affection in the father or mother.

The development of what was considered epithelioma on the penis of the father gives an opportunity to throw another element of discord into the consideration of this case; but the appearance of the larynx, the age of the patient, and the long history (four years) will, I think, prevent any one from seriously considering this a case of epithelioma of the larynx.

Therefore, it seems fair to put this case down in the same

class as the second, a case in which we may have the same ulcerations appear secondarily on the face. Some may think it better to call this affection of the throat a scrofulous inflammation and ulceration, but that hardly alters our position, for the French, as is well known, put lupus down as a "scrofulide." All of these cases were marked, as far as the appearances in the larynx are concerned, by loss of substance, irregular hypertrophy, causing a peculiar granular appearance, and two of them by decided pallor of the epiglottis and adjacent regions.

Dr. Asch's Paper.

Nora H., æt. 18, came to me in February, 1879, complaining of sore throat and hoarseness. For four years she had suffered with it during the winters. During the past winter she had been much worse, deglutition becoming difficult, fluids passing out through the nose on her attempting to swallow them. There was a pricking sensation in the parts, and an ulceration of the soft palate, which her family physician, from its intractable nature, deemed to be an unusual form of disease, and referred her to me.

On examination the following condition presented itself: The uvula was destroyed. The free border of the velum and the posterior pillars were ulcerated. The anterior pillar of the right side, the right tonsil, and the roof of the mouth were thickened and covered with small fleshy tubercles and nodular masses. The anterior pillar of the left side was thickened, while the whole diseased surface presented a deeper tint than normal. On the posterior wall of the pharynx was a large radiated cicatrix, of the origin of which the patient could give no history. The patient is dysphonic, and the hearing distance is considerably diminished. Examination with the laryngoscope shows the epiglottis thickened, with ulceration on its left side, and with its cushion much infiltrated. The ary-epiglottic folds and the ventricular bands are covered with small tubercles, and thickened so as to prevent any view of the vocal cords. There is also a large papillated mass at the base of the tongue on the right side. The rhinoscope shows the mucous membrane of the vault of the pharynx to be thickened. The lesion gives the patient very little annoyance except in deglutition, when pain is caused by the taking of any

stimulating substance into the mouth, and fluids regurgitate through the nose. Her chief annoyance arises from her hoarseness, which has caused the loss of her singing voice which she desires to regain. Examination of the surface of the body discovers no cutaneous lesion, eruption, or enlarged glands, and the closest inquiry fails to reveal any antecedent syphilitic history, inherited or otherwise. The patient is a tall slender blonde of the type with which we are accustomed to associate strumous disease.

After a close examination the case was decided to be one of primary lupus of the throat, but it was deemed best, in order to put the question of syphilis beyond doubt, to place the patient upon the mixed treatment. This was continued for more than two weeks, at the end of which time, there being no improvement, it was discontinued. A solution of nitrate of silver, 480 grs. to the ounce of water, was applied to the ulcerated parts, and Fowler's solution in five-drop doses, gradually increased to ten drops, was administered internally. Under this treatment some little improvement was visible in the growth on the pillars and hard palate.

March 24th.—The patient complained of violent and continuous cough, the cause of which was referred to the papillated mass on the right side of the base of the tongue, which has increased, and is pressing on the epiglottis. The larynx was washed with a 40-grain solution of nitrate of silver, and the saturated solution applied to the mass. Cod-liver oil and iron was prescribed, and such palliative measures as were necessary were made use of (morphia, etc.).

The patient continued in this condition with but little change, the treatment being steadily kept up, until the latter part of August, when her general condition began to improve, the cough diminishing, and the masses on the palate and pillars becoming smaller. The infiltration of the larynx was less, and the vocal cord of the left side visible. There was at this time a worm-eaten erosion on the upper border of the epiglottis. In October the patient complained of a sensation of choking in damp weather. There was pain in the throat. The growth had increased and there was an appearance of ulceration on the right side of the larynx. There was a white spot on the right posterior pillar, and the granulations which had almost disappeared from the roof of the mouth had returned. There was also a line of redness around the gums.

In January, 1880, the epiglottis was nearly normal, the right vocal

cord was visible, the left being again obscured by the thickening of that side of the larynx. There was no dysphagia, but the voice was still impaired, principally due to the presence of a mass on the anterior surface of the posterior wall of the larynx, preventing the cords from approximating sufficiently.

Applications of a solution of perchloride of iron, 120 grs. to the ounce, were now made to the diseased parts, and from this time the case steadily improved. In April some infiltration was discovered below the left vocal cord, which has disappeared, however, in the steady march of improvement.

In November, 1880, the patient was almost entirely well. There was some slight granular roughness on the epiglottis. Both cords were visible, presenting a streaked, muddy appearance, and the voice was slightly hoarse.

At the present time, May, 1881, there is some slight infiltration, with redness of the anterior pillar of the left side, a very little thickening of the left ventricular band, the interarytenoid growth has disappeared, the epiglottis is normal, and the voice almost, though not quite, natural, being somewhat muffled. There is no cough. The patient is in good general health, well nourished, and apparently steadily progressing toward complete recovery. She still takes cod liver oil, and occasional applications are made to the parts not yet entirely restored to the normal condition.

I have deemed this case worthy of being reported to the Association, inasmuch as so few cases of this disease, unassociated with external manifestations, have been recorded, and from the fact that this case of a disease which we are accustomed to consider as of most unfavorable prognosis, has steadily though slowly progressed toward recovery.

Mackenzie, Cohen, Tuerck, and Ziemssen, in their treatises on diseases of the throat, mention but few cases—all, with the exception of two cases of Mackenzie,* and the cases of Berengier and Lefferts, cited by Cohen,† being drawn from German sources. While, in truth, the study of the disease dates from a comparatively recent period, yet it has had more attention given to it than one would suppose from the perusal of the systematic treatises on disease of the throat; but, unfortunately, the giving of different names to

* Mackenzie: Diseases of throat and nose, p. 385.

† Cohen: Diseases of throat and nasal passages, p. 529.

the same disease has caused confusion. The French school consider lupus as of strumous origin, and describe its manifestation in the throat as the result of scrofula, while Virchow* and the German school repel this theory, and consider the creation of a scrofulous lupus as something entirely arbitrary. Mackenzie† says of lupus, that it probably originates in some constitutional defect, which is either of the same nature as scrofula, or closely allied to it. Rayer,‡ in 1835, speaks of lupus extending to the pituitary membrane, involving the nasal passages and the mucous membrane of the hard palate. Alibert and Devergie also mention this extension of lupus to the mucous membranes. So, too, Cazenave,§ who also calls attention to ulcerative inflammation of the mucous membranes apart from any alteration of the skin.

Hamilton‖ (1845), in some notes of hospital cases, describes a disease which he believes to be lupoid, commencing with tubercle in the palate, and which he says is not to be mistaken. He speaks of a form in which the ulceration attacks the velum and uvula, destroying these parts gradually, and may reach the pillars and posterior wall of the pharynx, causing adhesions, the malady being accompanied by troubles of deglutition, phonation, etc. He also says, that where there is a syphilitic taint the ulceration sometimes extends to the larynx.

Bazin, in his "Traité de la Scrofule," speaks of this disease of the mucous membranes as a manifestation of scrofula. Isambert, in 1871, read a paper on scrofulous angina before the Société Médicale des Hôpitaux,¶ of Paris; Fougere,** a thesis the same year; Paul, in 1872, a paper on malignant ulcerous angina, or lupus of the throat.

Desnos,†† the same year, says: "This variety of angina is

* Virchow: Pathologie des tumeurs traduc., Aronsohn, tome II, p. 486.

† *Op. cit.*, p. 385.

‡ Traité des maladies de la peau, p. 195.

§ Traité des mal. de la peau et syphilis, tome iv, p. 171.

‖ *Dublin Journ. Med. Sci.*, Nov., 1845.

¶ Memoirs, p. 107.

** *Thèse de Paris*, 1871, No. 37.

†† Nouv. Dict. de Med. et de Chir. proligu., tome ii, p. 485.

little known as yet. It offers difficulties of interpretation." Landrieux,* in 1874, and Homolle,† in 1875, described this disease. Cazin, in the *Annales des Maladies de l' Oreille et du Larynx*, fevrier, 1880, mentions a case of lupus of the velum and isthmus of the fauces cured by an erysipelas. The French authors all consider it a manifestation of scrofula, and describe it under the name of scrofulous angina, hypertrophic tubercular scrofulide, and lupus of the throat. Homolle has given the best account of the disease in his monograph, dividing the subject into those cases in which lupus of the face is accompanied by lesion of the deeper parts, and where the alterations are seated exclusively in the mucous membrane, without any implication of the skin. Lefferts describes a case in the *American Journal of Medical Science*, April, 1878. Nearly all of these cases accompanied, or were consequent on, lupus of the face.

The functional symptoms of primary lupus of the throat are very slight. There is but little pain, and the disease may progress even to cicatrization without the patient being aware of its existence.

In three cases mentioned by Homolle, two had no knowledge of any trouble antecedent to cicatrization. One did recall some slight annoyance having been felt in the fauces, while in a case observed by M. Fougere, the velum and part of the palatine vault had been destroyed without much annoyance having been experienced.

In cases where the trouble begins in the throat, the absence of painful phenomena is not so constant.

Cough is rare, and apparently depends on the extent of the lesion. In my own case its presence was due to the tubercular masses at the base of the tongue pressing on the epiglottis.

Deglutition is usually more or less affected; and *phonation* is modified, the voice becoming hoarse or muffled.

The disease generally takes its point of departure from the velum or pillar; at all events, they are the parts first noticed as affected; both sides are not necessarily affected;

* *Archiv de Med.*, Dec., 1874.

† Des scrofulides graves de la muqueuse Bucco-pharyngienne.

sometimes only one side is so. In a case seen by me—not under my care—the disease involved but one side of the hard palate and pillars. The affected surface soon becomes changed in color and form. It assumes a deeper tint, and gradually becomes covered with little nodules and tumefactions. When erosion begins, it progresses slowly, the parts long retaining their natural form, but melting down, as it were, by a gradual process of wearing away. Lefferts describes his case as having a worm-eaten appearance. In some described cases adhesion took place between the posterior pillars and velum and the wall of the pharynx, leaving but a small aperture of communication between the nose and throat, while in the case mentioned above, this passage was entirely closed. When the epiglottis is affected, there may be simple tumefaction, with nodular masses, or masses with erosion; or there may be, as in Tuerck's case, deep ulceration, where there was a heart-shaped piece ulcerated out of its centre.

In a case of M. Desnos there was nothing left of the epiglottis but a sort of sprouting stump. The ventricular bands may be implicated in the tumefaction, and fleshy excrescences be observed on them. The vocal cords may undergo the same change, attended with redness, and nodules may even be observed below them. In the pharynx we frequently find radiated cicatrices, the origin of which may be unknown to the patient.

Certain complications may accompany this disease. The ganglia of the neck are sometimes slightly enlarged,* while according to Landrieux, an important fact in the history of the angina is that the lymphatic ganglia in no way participate in the disease, the same integrity of the ganglia being noticeable in lupus of the face. Otorrhœa—in fact any of the strumous accidents—may occur. Tubercular disease of the lung may follow, and even œdema of the glottis has been observed.† The progress of the disease is very insidious, the trouble going on for a long while before the patient is aware of it; and even then its march is usually extreme-

* Homolle: *Op. cit.*, p. 63.

† Homolle: *Op. cit.*

ly slow, though cases of rapid progression have been reported.

The disease is chiefly observed among young people. In 23 cases,* where the beginning of the disease was noted, there were:

4	cases	beginning	before 10	years of age.
6	"	"	between 10 and 15	years of age.
8	"	"	" 15 and 20	"
3	"	"	" 30 and 40	"
1	case	"	at 40	"
1	"	"	at 44	"

Females seem to be more liable to the disease than men.

Diagnosis.—The diagnosis between lupus and syphilitic ulceration is sometimes extremely difficult in those cases where there is no external manifestation of disease.

Landrieux † says that "the diagnosis of this disease presents the greatest difficulties. In some cases it is impossible to distinguish it from syphilitic trouble—in cases where a strumous person has contracted syphilis." Homolle (p. 100) says that "the diagnosis is always difficult. We must continually bear syphilis in mind, and make a complete examination of the patient." No conclusion can be drawn from the site of the lesion, as syphilitic troubles are very likely to occur in the same localities, though we may more correctly diagnose syphilis when the ulceration is primarily found on the pillars or tonsils. The velum is the spot where we almost exclusively find primary lupus of the throat, the pillars, tonsils, and pharynx being attacked secondarily.

The papillated or nodular appearance which lupus presents on the velum and pillar, with the tendency to ulceration and adhesion to the wall of the pharynx, is not common in syphilis, though syphilides of this character have been observed. It will always be well to examine the ulcers themselves in cases where they exist. In syphilis the tertiary form of sore throat is more like the one under consideration, but in syphilis the ulcers are more cleanly cut,

* Homolle: *Op. cit.*, p. 69. † *Op. cit.*

deeper, and more penetrating. The suppuration is more abundant, and the ganglia are more or less involved. The mucous membrane around a syphilitic ulcer is tumefied evenly; in the lupus ulceration, it is swelled also, but it is more likely to be irregularly so. In syphilis the color of the mucous membrane is deeper, and the bottom of the ulcer is more apt to be fungous than purulent. Besides, as Virchow * remarks, the very slow progress of lupus, which often extends through entire years; its seat, which for the most part is limited; the absence of pain; the little effect it has on general nutrition,—all suffice to distinguish it from syphilis. The functional symptoms amount to nothing in making a diagnosis. The length of time that the disease has lasted must be taken into consideration, an ulceration that progresses slowly and has lasted for years being more likely to be lupus than syphilis. Treatment has been used as a means of diagnosis from syphilis. The results of the method may evidently be deceptive, as scrofula is sometimes improved by the mixed treatment, while syphilis may resist it. In order to make a thorough diagnosis of this affection, it will be necessary to examine carefully not only all the symptoms connected with the lesion itself, but all accompanying ones. The whole body should be inspected for eruptions or cicatrices; the state of the eyes, ears, and nose taken into consideration; and, above all, inquiry should be made into the family history of the patient for evidences of antecedent disease.

Lupus might be confounded with epithelioma of the pharynx. Epithelioma differs, however, in having the vegetations more unequal, harder, and paler. And there is usually a large ulceration with everted edges and an ichorous base. No diagnostic value can be placed on the presence of a radiated cicatrix in the pharynx. Virchow† regards it as an evidence of syphilis, but such cicatrices undoubtedly exist in cases where no hereditary or acquired trouble can be demonstrated.

The *prognosis* of lupus is not a favorable one. The dis-

* Virchow: *Op. cit.*, p. 485.

† "Syphilis Constitutionelle," p. 61, obs. vi.

ease may not destroy life, but its complete and permanent cure is a matter of great uncertainty.

Treatment.—The treatment of lupus must necessarily be constitutional as well as local. Internally, cod liver oil, syrup of the iodide of iron, and iodide of potash have been recommended. The iodide does well in the cases where a syphilitic taint exists. Cod liver oil is particularly advised where the disease is limited to the throat. Fresh air, exercise, generous diet, sea bathing,—all are important adjuncts in the treatment of this disease.

Locally, various methods are employed.

Tincture of iodine,* solid nitrate of silver, solutions of chromic acid, chloride of zinc, and nitrate of silver,† diluted more or less according to circumstances, have all been recommended. In the case reported I found that solid nitrate of silver, or a saturated solution, did well. After improvement was manifested, a solution of perchloride of iron, ʒ ii to water ℥ j, was used, under which the tendency to recovery continued.

From this sketch it will be seen that this disease presents many difficulties to the practitioner, and it is with the hope that some of the doubtful points will elicit a discussion, which will throw some light on the subject, that I present this case.

Is lupus of the throat a disease of strumous origin as the French writers declare, or is it a distinct disease as Virchow believes? Is it always possible in cases where there is no cutaneous lesion to draw the distinction between it and the lesions of syphilis? And what is the prospect of recovery? These are the questions which I hope the experience of the members will tend to solve.

For my own part, it seems to me that the following conclusions can be fairly stated:

1. That lupus of the mucous membrane may and does exist independent of any cutaneous sign of the disease.

2. That in cases where the disease exists only in the throat it shows itself first usually in the velum, while its extension to the larynx is rare.

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* Mackenzie, *op. cit.*

† Homolle, *op. cit.*

3. That while its diagnosis is difficult, yet careful study of the case, in all its bearings, will enable us to distinguish it from syphilis.

4. That treatment affords some reasonable hope of cure, and that its prognosis is not altogether hopeless.

Discussion upon the Papers of Drs. Knight and Asch.

Dr. H. A. JOHNSON, of Chicago, being invited to open the discussion, said that he had never had the opportunity of studying the subject personally. He had seen lupus of the face, as doubtless all the Fellows had, but he had never met with a case of lupus invading the larynx, in many years' experience.

Dr. GEORGE M. LEFFERTS said that, to him, the principal interest lies in the question of diagnosis; that recently an element of doubt and uncertainty has been introduced into the subject by the papers of Homolle, and others, who class lupus among the *scrofulides.*

The diagnosis lies mainly between lupus, phthisis, and syphilis of the larynx. In a paper on the subject, published about three years ago, he had arrived at the conclusion that the differential diagnosis is narrowed down to the former two. Syphilis is easily eliminated, but the question of phthisis is sometimes extremely difficult to decide.

He had seen certain cases that were considered as lupus of the larynx; but had doubted the diagnosis where there were no external appearances of lupus upon the face, or elsewhere. The case of Dr. Asch had been shown to him, and he had pronounced it a case of hereditary syphilis. The case of Dr. Knight, with destruction of the velum and uvula, presents features entirely at variance with the clinical history of the cases of true lupus that have been put on record. It is particularly noticeable in the reported cases that no reparative action has occurred. In his own case there had not been extensive ulceration, but, as has already been stated, there was a superficial erosion, "a worm-eaten appearance," of the epiglottis.

There are unquestionably met with in practice cases of erosion in the pharynx and larynx, occurring in broken-down subjects, chiefly in young people, improvable by tonics and fresh air, and attendant upon what is generally known as a scrofulous diathesis. These cases come very well under the head of the scrofulous

lupus of Homolle. True lupus is entirely distinct from these; it is essentially a neoplastic deposit in the deep layer of the mucosa, this neoplastic tissue subsequently degenerating and breaking down. In his own case this was very evident. In regard to the use of mixed treatment as a means of diagnosis, it is often inconclusive, because not persisted in for a sufficient length of time; certainly absence of improvement at the end of two weeks would not exclude a diagnosis of syphilis.

To recapitulate: the differential diagnosis lies mainly between lupus and phthisis of the larynx. He would not accept the diagnosis of lupus of the larynx or pharynx, unless accompanied by lupus of the face; he would exclude all cases of extensive, deep, and destructive ulceration, and also all cases in which there was marked improvement under local treatment, for he regarded lupus of the larynx as incurable.

Dr. KNIGHT, in reply, observed that too much reliance should not be placed upon the records, as the cases that have been reported, which the last speaker would accept as illustrations of genuine lupus, are too few to warrant the exclusion of others which have not exactly the same features. We should be willing still to accept evidence as to the characters of lupus, and not consider the question finally settled.

There was no doubt in the speaker's mind that one of the cases alluded to in his paper was a genuine one of lupus, and the lesions upon the skin confirmed this view; certainly the manifestations appeared too late to be considered as due to congenital syphilis, and acquired disease was out of the question.

In the first case which he had reported as lupus, the uvula was gone and part of the epiglottis, but in the second case there was loss of substance alone. He believed that there might be very great loss of substance in this disease. Dr. Asch's case proved that there could also be decided improvement. Moreover, cases had been published in which cicatrices have been found, which will be generally acknowled as evidences of improvement and repair.

Dr. ASCH thought that Dr. Lefferts had taken too broad a ground in his statement that lupus could not exist in the throat without external manifestations; medical literature says that it can. Cases have been reported by Isambert, Bazin, Hamilton, Landrieux, Homolle, and others, where primary disease of the mucous membrane was declared to exist, and the views of these competent observers must be accepted.

He was of the opinion that nearly all of the diseases of the skin may exist on the mucous membranes. The question, after all, is quite independent of any cutaneous manifestation. Is the disease one, *per se*, or is it to be regarded as a scrofulous manifestation? In his own case, he did not wish the Association to understand him as stating that there was great ulceration; he had said that there were slight ulcerations upon the border of the velum palati; there was new formation also, the velum being covered with comparatively large tubercular masses, which were soft, like granulations. Dr. Lefferts did not appear to think that the specific treatment had been given a fair trial, although it was continued for two weeks without benefit; the case afterward improved under topical applications of iron, and cod liver oil internally. The amelioration, under non-specific treatment, he regarded as strong an evidence against the syphilitic character of the disorder, as the failure of the specific treatment would be.

Dr. A. H. SMITH, of New York, expressed the opinion that the limiting of lupus to those cases only where there are accompanying external appearances, was taking too restricted a view of the subject. The two factors of the disease, as stated by Dr. Lefferts, *i. e.*, new deposit and progressive destruction of the new tissue, are not incompatible with extensive ulceration, and they would necessarily vary so much at different stages of the disease that their absence can hardly be understood as militating against the diagnosis of lupus in any given case.

There being no further discussion, the next paper in order, that of Dr. A. H. Smith, entitled "Neuroses of the Throat," was read.

Dr. Smith's Paper.

I DO not propose, in this paper, to touch upon all the different forms of derangement of nervous action which may occur in the throat, but merely to refer to two or three, the nature of which is not always clear at first sight, and the phenomena of which, perhaps, may not be rightly interpreted.

Neuralgia.—It is not very uncommon to meet with a patient who complains of a "sore throat," which has lasted for a considerable time, perhaps months or even years; which is somewhat intermittent or, at least, remittent; which is at

no time *very* distressing, but which gives a certain amount of almost constant discomfort, while, under special circumstances, it becomes aggravated. There will be, nearly all the time, a more or less severe aching pain; while muscular movement, as in speaking or swallowing, develops a decided soreness.

Examination of the throat shows nothing abnormal, or, at most, a slight degree of venous congestion entirely inadequate to account for the symptoms complained of. Inquiry elicits the fact that the difficulty is greatly aggravated by fatigue, long fasting, the menstrual period, etc. Generally, the patient will tell you that a great many applications have been made to the throat, some of which seemed, for a time, to do good, but that in the end nothing had been accomplished by their use. Now if a case like this be treated, as a catarrhal sore throat, with astringents or nitrate of silver, very little if any benefit will result. Possibly the slight venous congestion, if any exist, may be removed, and the parts presenting a healthy appearance the practitioner will be puzzled to account for the continuance of the symptoms. But if the neuralgic element be recognized and such remedies applied as are suitable for neuralgia elsewhere, the case will be found to present no special difficulty. Quinine, arsenic, and iron will probably suffice for a cure, without any local applications whatever.

The following case will serve as a type of this class:

Miss W., of Boston, aged 23, was referred to me, some years ago, by the family physician of friends whom she was visiting in this city. For more than three years she had suffered from an aching pain in the throat, shooting at times up into the ears. There was some pain in swallowing, and continuous speaking, even for a short time, caused an intensely tired feeling in the throat. She had had a very fine and very powerful voice, and had sung in a choir, but had been forced to give up singing entirely. She had had a great deal of local treatment in this country, and had spent two years travelling in the south of Europe, with a view to getting rid of her "sore throat." But none of the means employed resulted in any material improvement, and she had returned home quite discouraged.

I found, on examination, a slight passive hyperæmia of the fauces, for which I used astringent applications. An improvement of the local condition followed, but the subjective symptoms remained the same. Faradization was then tried, but without benefit. By this time I became alive to the neurotic element in the case, and began with full doses of quinine. Almost immediately a decided improvement was noticed, and within three weeks the patient returned to Boston completely relieved. I heard from her some weeks after, and there had been no relapse up to that time.

Since then a number of similar cases have come under my observation. They have nearly always occurred in persons whose health was not robust; in short, in the class of patients who are generally predisposed to neuralgia.

This fact, in connection with the disproportion between the subjective symptoms and the apparent local changes, has enabled me to appreciate the true nature of the case. It is to be borne in mind, however, that where a neuralgic tendency exists, a catarrhal condition of the mucous membrane will sometimes act as an excitant and tend to keep up the irritability of the nerves. In these cases local treatment will be required in aid of the general measures employed.

This condition, however, is exceedingly difficult to treat satisfactorily among the poorer classes. The bad hygienic surroundings with which one has to contend make it very difficult to lift the patient into that plane of health in which recovery from the neuralgic habit is to be hoped for. If, however, the patient be removed to a well-ventilated and not over-crowded hospital, where he can have rest and an abundance of good food, the complaint will, as a rule, readily yield to treatment.

Deceptive Sensations in the Throat.

These assume a great variety of forms, the most common being that of a "fulness in the throat."

Patients will aver that the pharynx is occupied by a swelling of some sort, which encroaches upon the passage, and gets in the way when they try to swallow. Yet, when ques-

tioned as to whether the bolus of food is actually arrested, or even retarded by the obstruction, they will admit that it is not, but that there is merely a sensation as if it were about to be. In other cases, the feeling is as of a hand grasping the throat. Others still complain of a string across the throat, or of something pressing back upon the posterior wall of the pharynx. Now, in all these cases, inspection and palpation will probably reveal nothing abnormal. Yet, it will be almost impossible to convince the patient that there is not something in the throat that ought not to be there; and he will probably have formed the habit of feeling with the finger to ascertain what is the matter. In one instance in my practice, a woman had acquired the power of exploring her throat with her finger to almost any extent without exciting reflex action. Finally, her diligence was rewarded by finding the arytenoid cartilages, which her imagination at once converted into cancerous growths. All attempts to reassure her were useless, until I placed before her a model of the throat and pointed out the natural protuberances which she had felt.

The following case will illustrate one form of this difficulty:

Mrs. S——, aged 55, was seen by me in consultation about two years ago. She was a thin woman of a nervous habit, and six months before had suffered greatly from a prolonged attack of inflammation of the middle ear. During the summer following she had very little appetite and lost flesh notably, especially about the neck and throat. For the past month she had been complaining of a sense of fulness in the throat, and of something pressing backward and lessening the space in the pharynx. There was also a sensation as of something pulling up in the throat toward the ear. She fancies, too, that she can perceive externally an increase of the size of the larynx and trachea. A thorough examination of the throat showed a perfectly natural appearance both within and without. The supposed enlargement of the larynx and trachea was evidently due to loss of adipose tissue from the neighboring parts, giving greater prominence to the pomum Adami and to the windpipe, both of which were perfectly normal in form, and did not exhibit tenderness on pressure.

In carefully considering this case it seemed to me that the phenomena might be explained by assuming that there was a slight paresis of some of the muscles of the throat, leaving others without sufficient antagonism. The position of the hyoid bone, and, consequently, of the base of the tongue and of the larynx, which are attached to it, depends upon the action of several groups of muscles. Among these, the mylo-hyoid, the genio-hyo-glossus, and the genio-hyoid, together with the anterior belly of the digastric, tend to pull the hyoid bone forward, away from the spinal column, while the stylo-glossus, the stylo-hyoid, the middle and inferior constrictors, and the posterior belly of the digastric, draw it backward.

Now, if the first-named muscles are from any cause weakened in their action, the second group remaining in full force, the result will necessarily be that the hyoid bone, and the structures connected with it, will be approximated to the vertebral column, and a sense of something pressing backward will be felt. The direction of the stylo-hyoid is upward and backward, and its action, if not sufficiently antagonized, would give rise to the feeling of something pulling upward toward the ear. Now, it happens in confirmation of this view, that the nervous supply of these two sets of muscles is from entirely different sources.

If we except the genio-hyo-glossus, the lower fibres of which tend to draw the hyoid bone forward, and which is supplied by the hypoglossal nerve, all the muscles having this action are supplied by branches of the fifth. On the other hand, the antagonizing muscles are supplied by the facial and glosso-pharyngeal, except the stylo-glossus, which is supplied by the hypoglossal. Even the digastric muscle, the two bellies of which act in opposite directions, shares in this arrangement, the anterior belly being supplied from the fifth nerve, while the posterior belly derives its supply from the facial and glosso-pharyngeal.

This difference in the nerve supply would render it very easy for one group of muscles to be affected without the other, and a very slight paresis of the anterior group would

be sufficient to cause the sense of pressure backward. Paresis of separate muscles would cause modifications of this sensation, such as the feeling as of a string pulling in one direction or another.

The pathological condition lying back of this and giving rise to the paresis might be very different in different cases. It might be reflex in its character, and have its seat in some distant organ, as the stomach or uterus. Carious teeth, hypertrophied and diseased tonsils, chronic naso-pharyngeal catarrh, irritation in the ear, are well-known sources of reflex cough, and might very well be the exciting cause of the condition in question. But in other cases the cause might entirely elude our search, and we should then have to treat the case as a neurosis on general principles.

In the case which I have narrated, I advised the use of strychnine and the passing of the faradic current through the floor of the mouth, thus acting upon all the muscles which draw the os hyoides forward. Under this treatment, combined with the use of tonics, complete relief was obtained.

Another form of neurosis is a sense of tickling in the throat, which is often the source of very obstinate cough. It is true that in many cases tickling of the throat is dependent upon hyperæmia of the mucous membrane or elongation of the uvula, but in other cases the most careful examination fails to show any local morbid condition whatever, and they must, therefore, be regarded as of neurotic origin.

Reflex irritation probably often lies at the bottom of such cases, arising, perhaps, in some part more or less distant. In one instance in my practice, a catarrhal condition of the external auditory meatus gave rise to a distressing tickling or prickling in the corresponding side of the larynx, which provoked a dry double cough, repeated every thirty or forty seconds. Appropriate treatment to the ear gave immediate relief to the tickling and the cough.

In my own person, irritation of the posterior wall of the right auditory meatus is immediately felt in the larynx, and induces cough. The same is true of the left ear, but in a much less degree.

I have observed this tickling as a very annoying and persistent condition in the early stage of phthisis, and confined to the side of the throat which corresponded to the affected lung. I am not sure whether this is an indication of the beginning of the pathological process which later on shows itself as phthisical laryngitis, and which has often at the outset the same unilateral character, or whether it is merely another manifestation of the mysterious nervous influence which, in other cases, causes the flushed cheek on the same side as the tuberculous lung.

In these cases of tickling which I have assumed to be neurotic in character, astringents are of no value whatever, and demulcents fail to give more than a momentary relief. The only immediate relief is obtained by the use of sedatives in frequently-repeated small doses. Permanent relief, in cases not connected with phthisis, is pretty sure to follow a few days' change of air, owing, probably, to its tonic influence.

When this cannot be had the use of tonic remedies will be of service. Of course, any source of reflex irritation which may be discovered should be removed, if possible.

Discussion on Dr. Smith's Paper.

Dr. JOHNSON said that the subject presented was a very wide one, and every Fellow of the Association could contribute cases in illustration. The fact that the throat could be the seat of reflected irritation from uterine disorder, had long been familiar. He had lately had two cases under his care: one of vaginismus, and the other of stricture of the cervix, causing dysmenorrhœa; both complaining of long standing throat trouble; and in both the symptoms of laryngeal disorder disappeared after proper attention had been paid to the seat of the remote trouble. In one case, that of a professional singer, it was noticed that her voice was always better, her general health improved, and her sexual feelings stronger, directly after the menstrual period. After a few days again it was found that her health was less vigorous, and her voice failed so that she could not sing as high as before. After proper treatment by a gynæcologist, her health was completely restored. In like manner, the case of vaginismus was relieved of an explosive cough by treatment directed to the original disorder,

and all the symptoms disappeared. This connection between uterine disease and laryngeal disorder, had often attracted his attention, and he had observed that patients go out of his hands into the care of the gynæcologist, and after leaving the gynæcologist they often return for laryngeal treatment. This shows the intimate connection between the nervous supply of the throat and the female sexual organs as a physiological, if not an anatomical, fact.

Dr. HARRISON ALLEN said that he had been especially interested by the statement of the lecturer regarding the frequent unilateral character of laryngeal neurotic affections. He had very often noticed the coincidence of disease in the lung, larynx, and nasal chambers of the same side.

He alluded to a case which he had reported last year as bearing upon the causation of the class of affections referred to. A lady, who had suffered from complete aphonia in girlhood, from which she had apparently recovered under general treatment, came into his hands years afterward, suffering with a return of the aphonia, which he ascertained was accompanied by paresis of the left vocal cord. It was associated with decided narrowing of the left nasal passage; there was also very decided tinnitus in the left ear. The aphonia was partially relieved by treatment, but the paresis of the vocal cord continued, and the tinnitus also persisted, being probably due to some change in the mucous membrane about the articulation of the ossicles.

There is no direct nervous connection between these various parts to account for this association of organs in common disorder. It should be borne in mind that the body is developed in lateral parts; the two sides being symmetrical in corresponding organs and tissues. The moment that this fact is recognized, and the relation of organs upon the same side of the body acknowledged, he believed the association of diseases of the ear and larynx would be better understood, and those cases explained where laryngitis is so likely to be accompanied by pain in the ear of the same side. The more we study the distribution of nerves, after the plan of Hilton in his work on "Rest and Pain," the more light will be thrown upon the obscure troubles connected with the question of nervous distribution, with which we all are so much interested.

In conclusion, he called attention to ovarian disease as a cause of reflex irritation and as a source of laryngeal neurotic affections.

Some admirable illustrations of this class of case occur in Dr. Elsberg's paper on the "Curiosities of Cough."

Dr. ASCH said that his experience in these cases was limited to two; in each there was violent explosive cough supposed to be due to laryngeal trouble. Upon examination, the larynx was found in each case to be normal. Both were found to be suffering with serious uterine disorder, and in both, the laryngeal cough disappeared when the uterine trouble was properly treated.

Dr. GLASGOW said that all would agree with Dr. Smith, that these nervous disorders of the larynx are very common. Two classes are observed: (1) the purely idiopathic; (2) the neuralgic, caused by some irritant, near or remote. The source of irritation which he had commonly observed was a very small patch of inflamed tissue or an ulcerated gland, which is so small as to generally escape detection unless carefully sought for. This may exist in the tonsil or pharynx. He referred to a case of a gentleman who complained of most excessive pain over the larynx, which radiated upward, extending to the nose, and generally came on in the evening. His suffering was so great as to keep him awake, and to prevent his rest. It was accompanied by tremor, and dizziness in the head. He had been treated by several physicians and taken a great deal of medicine without relief. Upon careful examination of the throat there was nothing found to account for the trouble; but in the nose, a condition of the mucous membrane was discovered similar to that which so often accompanies idiopathic neuralgia, hyperæmia and puffiness of the mucous membrane, but no inflammation; and in the naso-pharyngeal space posteriorly, the whole surface appeared as if sown with red inflamed patches. He had never seen a case of this kind before, and considered it, at first, as one of herpes, but could find no vesicles; it resembled granular sore throat. The interesting point about the case was the fact that the whole pain and nervous disorder disappeared after using an injection of a weak solution of carbolic acid and morphine in the naso-pharynx. After using the wash, the patient slept at night for the first time in seven weeks. There was a gradual súbsiding of the pain as the swelling in the nose yielded to treatment, but the injections subsequently lost their effect, and the patient was only restored after a change of climate. The disease was plainly a neurotic affection of the throat, due to reflex irritation from the posterior nasal and pharyngeal affection.

Dr. J. O. Roe said that there was one class of nervous affections which had not been spoken of, where the difficulty seems limited to the arytenoid cartilage, associated with a dry feeling of the mucous membrane of the larynx and neuralgic pain around the throat. The cause is probably a debilitated condition of the system; the symptoms are relieved by putting the patient upon constitutional treatment (quinine is most efficacious), and making mild applications to the parts. He had seen most annoying and persistent cough associated with neuralgic pain, and without a careful examination of the arytenoid cartilages and this particular region of the larynx, nothing abnormal would have been detected.

Dr. Lefferts alluded to two curiosities in connection with this class of disorder; these cases he would not attempt to explain, but would leave the nut for the neurologists to crack. The patients were both ladies with absolute aphonia, in whom it was discovered that, by making pressure upon a particular spot in the back immediately under the angle of the scapula, the voice would at once return. They subsequently learned to take advantage of this fact, and whenever they desired to speak would sit so that the back of a chair would press upon the special region; the effect would at once follow, like pressing upon an electric bell.

Dr. Sajous reported a similar case from his practice, in which the patient was aphonic, but voice was restored by pressure under the left mammary gland.

Dr. Delavan said that the lecturer had discussed a very important question,—the neurotic origin of laryngeal trouble. There is no question but that laryngeal affections often indicate and are dependent upon a relaxed condition of the entire nervous system. In treatment, this fact is acknowledged, for patients are directed to avoid all depressing causes.

As the lecturer pointed out, there is often ulceration of the larynx and deposit in the lung upon the corresponding side, and it not infrequently happens that the pressure of consolidated lung tissue upon the recurrent laryngeal nerve produces paralysis of the vocal cord. If the effect can be so great as to cause paralysis, it is possible that a lesser degree of irritation may lead to defective innervation, inflammation, and ulceration.

The cases of Dr. Smith may be explained in this way. Possibly the whole origin of tuberculous laryngitis consecutive to disease of the lung may thus be accounted for. He believed that

modern authorities upon phthisis seem more and more disposed to acknowledge its dependence upon the nervous system.

Dr. SMITH, in closing the discussion, said that he felt it was due the Association that he should offer some explanation for calling attention to so common an affection as neuralgia of the throat, but he was led to do it by the occurrence of several cases in which the pain was not sharp, but dull and aching in character, and in which, as further examination showed, the neuralgic character was not well borne out.

In regard to the ovarian origin of irritation of the larynx, it is a well-known fact that many prominent singers are obliged to give themselves rest during their menstrual periods, on account of failure of voice at this time ; they have to make their engagements accordingly.

In conclusion, he begged the members to bear in mind the fact to which he had directed their attention, that while tickling in the larynx might not invariably indicate incipient tuberculous laryngitis, yet it should always excite suspicion, and lead to an examination of the lungs ; it is, therefore, a symptom of importance.

COMMITTEE ON NOMINATIONS.

The President appointed Drs. Hartman, Smith, and Langmaid a committee for the nomination of officers for the ensuing year ; and Drs. Shurly and Lincoln an Auditing Committee, after which the Association adjourned.

MEETING OF COUNCIL.

At the close of the morning session a meeting of the Council of the Association was held.

Afternoon Session, May 9th.

The Association was called to order by the President at 3.15 P.M.

Papers were then read in the order, as follows :

"The Laryngeal Affections of Pulmonary Phthisis," by Dr. Beverley Robinson, of New York.

"The Prognosis of Laryngeal Phthisis," by Dr. Wm. Porter, of St. Louis ; and

"Tubercular Ulceration of the Mouth, with a Report of Cases," by Dr. Frank H. Bosworth, of New York.

Dr. Robinson's Paper.

TWO opinions, it appears to me, in regard to laryngeal disease as a complication or intercurrent affection of pulmonary phthisis, prevail amongst general practitioners of medicine: the first is that this disease is generally the same; the second, that it is usually, if not always, incurable. There are other erroneous notions of minor importance which we encounter even in the writings of professed specialists in throat affections, and to which I shall direct attention as I proceed. The objects of this paper are: first, to mention the varieties of laryngeal difficulty I have encountered in the care of phthisical patients; second, to describe some of the symptoms and pathology of each of these somewhat in detail; third, to point out a few signs of differential diagnosis and prognosis; and, finally, to dwell upon certain indications of a rational and judicious treatment.

Dysphonia, or aphonia, in pulmonary consumption, in so far as it may depend upon interference with the integrity of the vocal function, will be explained by: 1, a purely functional affection of the vocal cords; 2, a catarrhal inflammation of the laryngeal mucous membrane; 3, a degeneration of the intrinsic laryngeal muscles, or an interstitial deposit between the primary muscular fascicles; 4, incomplete or complete paralysis of one or other true vocal cord; 5, ankylosis, or luxation of the crico-arytenoid articulation; 6, infiltration and ulceration of different portions of the intralaryngeal structures, accompanied or not with a papillary development of tissue. In these six categories may be found, in my opinion, the very large majority, if not all of the laryngeal affections which are encountered in pulmonary phthisis, and which have a more or less direct relationship with the march of disease in the lungs. It may be remarked at once that of these six divisions I hold that at least five are not as a rule connected with any local deposit of tubercle, and that in the sixth category it is unusual in the United States to find it when research is made by a skilled microscopist.

1. *A purely functional affection of the vocal cords.*—It

is known and admitted that in patients suffering from pulmonary phthisis at an advanced stage, respiratory power is much diminished. At times this is so great as to prevent sufficient vibration of the lax true cords for the production of ordinary vocal sounds. Hence the voice is reduced to a mere whisper. But there are numerous cases in which dysphonia, or aphonia, will appear rapidly or suddenly, and when the patient, though affected with incipient or even quite advanced pulmonary phthisis, nevertheless enjoys such a degree of relative strength and respiratory power that the explanation just given for notable impairment of vocal function will not prove satisfactory. If the larynx be examined with the small mirror there is no evidence of diseased structure, or action, during normal respiration. If now the patient attempts to phonate, the vocal cords approximate imperfectly and leave between their free margins, even whilst a specially strong vocal effort is being made, an oval space of more or less length and width, and hence a hoarse or feeble sound is produced.

2. *A catarrhal inflammation of the laryngeal mucous membrane.*—In the majority of instances in which the larynx will afterward become the seat of œdematous infiltration and ulceration, or so-called laryngeal phthisis, the mucous membrane of this organ is extremely pale and anæmic. And so striking and special is this pallor, that by its presence alone the actual condition of the lungs may almost be predicted, even before auscultation and percussion of these organs have been practised. Whilst such instances are frequent, they are not the only ones. The laryngeal membrane may be red, inflamed, somewhat swollen, prior to the debut of other phthisical signs either in this organ or in the lungs. This redness affects more particularly the epiglottis, ary-epiglottic folds, arytenoid cartilages, and inter-arytenoid commissure. Then come the ventricular bands, which are oftentimes much thickened and infiltrated, and thus prevent a proper vibration of the true vocal cords during phonation. The result, therefore, of this condition is more or less hoarseness. Finally the vocal cords are pink, or even deep red in coloration. In these instances questions of differ-

ential diagnosis will always arise: *e. g.*, Is this inflammatory condition of the larynx under the dependence of the phthisical condition? Does it mark the incipient stage of future phthisical ulcerative laryngitis? Is it a pure catarrhal inflammation of accidental occurrence? Is it possibly caused or influenced by syphilitic disease in the individual? All of these questions I shall endeavor to solve further on.

3. *A degeneration of the intrinsic laryngeal muscles, or an interstitial deposit between the primary muscular fascicles.* —It has been known for several years past, indeed since Fränkel first published his researches (1875), that in many instances in which dysphonia, or aphonia, was a marked symptom in patients affected with pulmonary phthisis, the intramuscular condition of the intrinsic muscles of the larynx served amply to explain it. In many instances he found the contractile substance, the muscle corpuscles, and the sheaths of the fascicles the seat of degenerative changes, more or less advanced. In some the connective tissue between the primary muscular fascicles was increased in quantity, and the separate fibres had undergone atrophy through compression. Miliary tubercles, though infrequent, have been discovered in the muscles of the larynx by Heinze. Even in these rare instances, however, there appears to be no direct connection between their presence and the other changes which have been mentioned, and evidently have become developed quite independently of them. The former would appear to be the result of nutritive changes going on slowly or rapidly, and which in some phthisical patients affect particularly the intrinsic laryngeal muscles. It would be unsafe to conclude that there is always a special affinity of this kind for the vocal organs, inasmuch as latterly muscular changes, such as extreme friability, degeneration, disappearance of transverse striation, as well as consecutive atrophy, have been found in many other muscles amongst phthisical subjects (Posadsky, *vide London Lancet*, Jan. 22, 1881). The frequency of these alterations in the intercostal muscles and diaphragm is something quite remarkable, especially when we remember how frequently we encounter a low, whisper-

ing voice amongst consumptives, quite irrespective of any laryngeal affection and out of proportion with their relative amount of bodily strength. Moreover, according to Posadsky, it appears that "cases with and those without the change presented nearly the same conditions and nearly the same visceral changes." The muscular change in the larynx to which I have directed attention, may follow upon one or more repeated attacks of cold in a phthisical patient, in whom the larynx may on each occasion have been slightly affected, or it may have come on insidiously, by degrees, and without any outward manifestation, or interior physical change apparent in the small mirror. Finally, it is remarked that the voice becomes more easily fatigued, hoarse, or squeaky at times, especially in the afternoon or evening. This vocal fatigue instead of improving with time, or rest, remains either stationary or progresses. In a few rare instances in which I have inferred from the obstinacy of the aphonia under treatment (meaning by this its long duration) that this condition of change had begun, although probably not far advanced, I have finally had reason to believe its march was stopped for a while. At all events the voice has been strengthened, if not perfectly restored, and the patient ceased to claim my professional care.

4. *Incomplete or complete paralysis of one or other true vocal cord.*—This condition, familiar to laryngoscopists as due apparently in the majority of instances to pressure upon one or other of the recurrent nerves by deposit of cheesy or tubercular material at the apex of the lung, is readily observed when present. There are a few points in regard to it which are the outcome of personal experience.

a. The paralysis of the left cord I have seen more than once; paralysis of the right I cannot recall. The cord was in an abducted position, although not as far removed from the median line as if the paralysis of the adductors of the same side were complete. The affected cord was never of normal coloration. There was congestion of the posterior or anterior portion of the cord. Unless there was concomitant catarrhal laryngitis, the central portion of the true cord

was not red or inflamed in appearance. The affected cord did not correspond in situation, as a rule, to the lung most involved. Whenever I have seen the left cord paralyzed, I have found the right lung at a more advanced stage of phthisical disease. These affirmations are not wholly in accord with the statements recorded in some text-books which speak of this subject. My observations would even seem contrary to natural inference, since the relations of the left recurrent nerve with the apex of the left lung are not by any means so near as those of the right recurrent with the summit of the right lung. I make bold to affirm that the existence of enlarged glands was likewise more than problematical: 1. because percussion did not reveal them; 2. because symptoms of spasmodic cough, due to irritation under pressure, were not present, such indeed as Barety, Gueneau de Mussy, and other observers have so clearly connected with the enlarged cheesy degeneration of the tracheo-bronchial ganglia.

b. One cannot assume in advance either the presence or absence of the paralytic condition of one of the vocal cords by the amount of interference with the normal voice which exists at the time. Several times already I have discovered the condition of paralysis almost by accident, as the patient's voice was so nearly natural that until I examined the larynx with the aid of the mirror I did not believe in the existence of any intralaryngeal affection of much importance. In these cases there was no local pain and no dysphagia. During phonation the healthy cord simply went beyond its ordinary limit, and so closely approximated the paralyzed cord that the vibration of the margins of both of the cords was rendered possible, and the phonetic sounds produced were not very notably changed. We can at once perceive the very great importance of a laryngeal examination in a diagnostic point of view where such a condition prevails, and where the condition of the lungs themselves is doubtful. In these cases, where the paralysis was situated on the left side, I have now the suspicion that the paralysis was due, not to the pressure of the left recurrent nerve in the chest, but to changes of the in-

trinsic muscles of the larynx, more particularly, if not wholly, developed on the left side. Analogy with the unequal distribution of changes which have been found in muscles elsewhere situated, and the deduction from the lack of spasmodic symptoms should, to a certain extent, justify this assumption.

5. *Ankylosis, or luxation of the crico-arytenoid articulation.*—Whilst ankylosis and luxation of the crico-arytenoid joints are not a very infrequent result of the ravages of tertiary syphilis, and have also been encountered as a consequence of typhoid fever, gout, carcinoma, and purely mechanical lesions, these conditions are at least doubtful in phthisis. Some authors, indeed, assume their existence, basing their convictions on mere clinical observations (Poyet, Stœrk, Kock). Others deny their presence on the ground that the cachexia of phthisis must, of necessity, lead to suppurative degeneration of tissue so soon as the laryngeal perichondrium is involved by infiltration of this origin (Fränkel, Eppinger, Michael, Schottelius). Nowhere, however, is this subject so ably and exhaustively treated as in a pamphlet "On Mechanical Impairments of the Functions of the Crico-Arytenoid Articulation" by Sémon, which is reprinted from the *Medical Times and Gazette* of 1880. In it he states that there is not, in his belief, "a single case of phthisical ankylosis on record." In view of a late paper, however, by Dr. M. Schmidt, of Frankfort-on-Main, "On Laryngeal Phthisis and its Treatment" (*Deutsches Archiv für Klin. Medizin*, vol. xxvi, 1880, page 325, *et seq.*), in which great stress is laid upon the importance of the affections of the crico-arytenoid articulation occurring during this disease, Sémon's opinion appears too exclusive. For my own part, I confess that I cannot recall a single case of laryngeal disease in a phthisical patient in whom I have been able to affirm the existence either of a true ankylosis or luxation of this joint. Almost invariably the patients observed, in whom I might have inferred the existence of one or other of these conditions, have shown such an amount of infiltration of the soft tissues as to explain by mechanical obstacle the impairment of their voice. Hence, I have concluded

that to this was chiefly due the imperfect approximation of the vocal cords during the effort of phonation. I cannot subscribe at all to the assertion that the phthisical condition present will render it essential that the infiltration of tissue should have a rapid, inevitable march toward suppuration. Many of these patients present the smooth, œdematous, "club-shaped" arytenoids to the inspection of the specialist during many months, and whilst the accompanying pulmonary affection offers undoubted signs of large cavities, without undergoing suppuration, in the submucous layer. In this statement it will be remarked that I hold an entirely different opinion from Heinze, who does not even mention the possibility of phthisical perichondritis of the laryngeal cartilages without suppuration. That this question merits further study and research is assured, to my mind as to Sémon's.

6. *Infiltration and ulceration of different portions of the intralaryngeal structures, accompanied or not with a papillary development of tissue.*—In this division we find the most usual forms of laryngeal disease in phthisis. The infiltration may implicate one portion of the larynx more than another, and particularly is this true in the earlier stages. At an ultimate period all sections of the larynx become involved. Beginning frequently in extreme pallor of tissue, by and by the mucous membrane and submucous layer are thickened and œdematous. The surface of the membrane is ordinarily smooth and glistening. Upon moderate pressure with the laryngeal probe a considerable amount of resistance is felt, and no permanent impression is left which ocular inspection can detect. At once we have a distinguishing feature of great value between this form of swelling and that which characterizes œdema due to other usual causes. Moreover, the larynx takes certain typical appearances, first most graphically described by Dr. Mackenzie, of London, since that time given by most writers on this subject who aimed at perfect accuracy.

These forms are: 1. The turban-shaped epiglottis; 2. the club-shaped or pear conformation of the arytenoid cartilages and ary-epiglottic folds. The base of these swellings

looks inward and posteriorly, whilst their distal extremities taper outward and forward. There is a third form of disease, which is none the less pathognomonic when recognized. This is the carious form, in which a number of small superficial ulcerations are seen along the vocal cords and ventricular bands. They are at first small and lenticular; soon they coalesce, are of serpiginous outline, carry their ravages deeper and broader into the tissues beneath, and present an aspect which closely resembles that left by a worm which has slowly but surely undermined neighboring structures. It is a habit amongst writers upon throat affections to describe perichondritis as complicating these different forms. If by this term we would name a thickening of the perichondrium directly occasioned by an increase of the fibrous tissue, which is so important a part of its intimate formation, I unhesitatingly agree with them; but if we go further, and admit that this first stage is but a commencing stage of what goes on rapidly to form softening and abscess, I here remain in complete disaccord. Perichondritis in laryngeal disease may possibly cause suppuration of the cellular structures, but such result is by no means habitual. Ordinarily the morbid march of laryngeal œdema is to make a certain progress toward suppuration, but too often, fortunately, this tendency is stopped in time, and the disease never gets much beyond the period of infiltration. The instances are rare, indeed, in which the cartilages of the larynx in this disease become either carious or necrosed. Not that we do not now and then encounter cases where the autopsy shows, by section of the cricoid and thyroid, a marked change in coloration, and perhaps also in density and consistence. But if we look to find the cartilages very notably softened, or separated completely from their fibrous covering, and acting merely as a foreign body in the vocal organ, we shall not have frequent opportunities of examining such cases. In this matter there are, I fear, some theoretical descriptions adhered to in our text-books; but if one has the privileges of extensive clinical opportunity and of frequent visits to the dead-house of a large public hospital, it is found that they are erroneous. The œdematous swelling of soft tissues

in this form of affection is important, partly by reason of its amount, partly in view of its location. If very considerable, no matter where it is located in the larynx, it will inevitably cause dyspnœa, more or less intense and painful in character. If moderate in amount, it may not occasion much difficulty of breathing, but will probably cause aphonia or dysphagia.

Whenever the soft tissues covering the arytenoid cartilages are thickened, the posterior portions of the true vocal cords cannot perfectly approximate during vocal effort, and hence they do not vibrate normally. Thus imperfect vocal sounds are produced. In some instances it is due merely to a mass of infiltrated tissue, which prevents complete adduction; in others there is an additional obstacle in the diminished rotatory function of one or other of the crico-arytenoid joints. In such cases the limited area of motion is, I believe, dependent upon stiffening of the articular ligaments, and incipient muscular alteration. In granting this, we have a rational explanation as to why, in patients whose arytenoid cartilages are not much swollen, a wide triangular space is visible during phonation, in the intercartilaginous portion of the glottis. It should be understood that I am alluding here only to cases in which, from the presence and location of œdematous swelling, it is probable that the neighboring joint is to some extent involved. Now then, the ligamentous attachments are the parts affected, not the articular surfaces. The latter, indeed, are rarely the seat of visible changes. There are but few instances, however, where the thickening of the soft tissues is confined to the region of the arytenoid cartilages. Habitually, the interarytenoid commissure is more or less infiltrated, and in this condition we have another obstacle to the production of normal vocal sounds.

Whenever the epiglottis is particularly involved, we are apt to have a considerable degree of dysphagia. Not only is there a certain difficulty of swallowing, there is likewise more or less pain accompanying the act. If there be ulceration of the epiglottis in any part, either upon the cushion, on the posterior surface elsewhere, or along its free margin,

the pain of swallowing is greatly increased. But this is not all, for owing to the imperfect shutting of the upper laryngeal orifice by this valve, food and drink will occasionally or habitually penetrate the larynx or trachea during a meal, and produce the most painful attacks of cough, followed or not by vomiting. The ulcerations of this form of laryngeal affection in phthisis show themselves at different periods. In the carious form of the disease they are essentially the feature of it. Here indeed the œdema is inconsiderable, and the soft tissues are never much swollen or infiltrated. From their position, however, along the false and true cords, whilst they occasion hoarseness and loss of voice, they give rise to slight pain, and no dysphagia. If the ulcerations be situated over the arytenoid, or ary-epiglottic folds, it has never seemed to me that they increased notably the pain of swallowing. They do, however, add to the frequency of the cough, especially if they are numerous, or considerable in extent. In this event they are the source of much muco-purulent material, which, remaining within the larynx, excites cough and expectoration, and no sooner is it expelled than a fresh quantity is produced, As regards the appearances of these ulcerations, I am of opinion with Browne, Grant, and others, that they are clinically distinctive and characteristic. To hold, as Heinze does, that the microscope must be the interpreter of their significance, is to my observation unfounded. It is a great mistake, I am satisfied, to permit *post-mortem* examinations to fix our belief with respect to many intralaryngeal conditions occurring during life. The red areola which distinguishes the syphilitic from the tubercular ulcer during life, has almost disappeared in the dead-house before the body is examined, and in the same way the general appearance of the membranous covering of the larynx, and, to a less marked degree, the coloring of the ulcers themselves.

During life, on the contrary, the laryngeal ulcerations in phthisis have characters which, to the inspection of the skilled laryngoscopist, are sufficient to establish their existence. As this belief, though accepted by many specialists, is still combatted by some, I shall describe their main

features: The ulceration of the larynx in phthisis, has, at first, a regular, lenticular outline, its configuration becoming irregular and more or less festooned with time, and when several primary ulcers coalesce. It has a gray fundus, never very deep, with an undermined margin. The secretion from it is abundant in proportion to its extent, and is of muco-purulent nature. There is no red areola about it. Never in its ravages does it penetrate the tissues very deeply. All these characters differentiate it with the syphilitic or carcinomatous ulceration. The above is a type: Now, then, there are variations from it. First, and most important, are those instances in which a syphilitic dyscrasia complicates the cachexia peculiar to phthisis. Of course, the appearances of the ulcerations are modified, and at times to such a degree that we are obliged to refer to the general symptoms and the commemorative data in order to seat our diagnosis firmly.

Second, the very few and rare cases in which ulcerations very superficial in character accompany or precede an outgrowth, sometimes benign, sometimes malignant, in nature. These latter cases have at times left me in doubt during several months as to whether the patient had phthisis or not. As time elapsed, fortunately, the different cachectic condition of a patient suffering from a malignant outgrowth in the larynx, the frequent absence of febrile exacerbations, of pulmonary symptoms, and the presence occasionally of enlarged indurated ganglia in different regions of the neck and elsewhere, have fixed me in my belief, and this leads me to considerations which have their clinical importance, both from a diagnostic and prognostic point of view. There are a certain number of instances of laryngeal disease in phthisical patients in which there will be found, even at an early stage of disease, a papillary outgrowth of tissue. At times this is almost the first objective condition which is observable and which indicates a morbid process in the vocal organ. The warty production may be seated along the false and true cords, but it is extremely frequent relatively in front of the arytenoid cartilages and interarytenoid commissure. This latter is in reality its seat of pre-

dilection. At first the warty growth is small, pale, or pinkish in coloration, and resembles so many little promontories or acuminated projections of pyramidal shape, which project into the interior of the larynx. They may spring from the fundus of an ulcer; quite as frequently there is no ulceration either prior to or during their period of duration. After several weeks or months, the likelihood is that the mucous membrane at and about their base becomes visibly thickened. If left to themselves these warty excrescences will augment in size, and tend more and more to occupy the entire surface of the interarytenoid commissure, and attack the soft tissues in front of the arytenoid cartilages, which also become more or less infiltrated. It is more than difficult at times to pronounce certainly whether the intralaryngeal condition just described be a proof of phthisical deposit in the lungs or not. Of course, if we find physical signs of pulmonary phthisis the diagnosis is affirmed. If, indeed, physical signs of lung disease are lacking, and the general symptoms of fever, emaciation, loss of strength, appetite, etc., are markedly developed, we might still consider the intralaryngeal affection confirmative of our probable view of the case.

But if, as I have seen more than one case, both the general symptoms and physical signs give us no positive information, certainly the laryngeal appearances are confusing. The examination of the tissue of such outgrowths under the microscope does not always tend to establish our convictions, inasmuch as they have simply the structure of an ordinary papilloma. The results of treatment, fortunately, however, for the physician, bring useful information with them. If the warty outgrowth be a simple papilloma, we can hope by evulsion and cauterization of the base to rid the patient of it definitively. Not so with the warty excrescences which appear in a phthisical patient. If torn away with the laryngeal forceps they are sure to grow again in a short period of time. Cauterization after evulsion is not seemingly more efficacious, and, in fact, both evulsion and cauterization seem to me to hasten their reappearance, and when they are so situated as not to be completely brought

away with the forceps, their tendency to pullulation is much increased. Moreover, unless one be remarkably skilful, the complete evulsion of these growths requires several sittings at least, during which the larynx is apt to become sore and irritable. Doubtless this can be explained by clumsy or repeated efforts to grasp the growth. The conclusion to these considerations is, according to me, to let such growths alone as far as may be by operatory procedure, unless they are of a size and in a situation such that complete ablation is assured in one, or at most a few sittings. If, on the contrary, it be not possible, we should, in my opinion, avoid attempts at evulsion, unless they become so large as to fill the lumen of the larynx to a considerable degree, and thus interfere notably with respiration. In this event, of course, immediate evulsion becomes a matter of necessity. There is one peculiarity about these growths which I have frequently remarked, and that is, the fact of their connection with violent paroxysms of cough. This is true, in my experience, only of those situated at the interarytenoid commissure. I have been able in a few cases to arrest these paroxysms almost completely, for a limited period, by applications of sulphate of copper directly to them. When the warty excrescence was small and the pulmonary condition good, I have more than once felt convinced that I had not only stopped the cough by this means, but also rid the patient completely of the condition causing it. It will be well to keep this in view when I report my conviction as to certain cases of laryngeal disease being the starting-point in the causation of pulmonary phthisis.

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As regards the differential diagnosis of catarrhal laryngitis in a phthisical patient with the inflammatory appearances seen in secondary syphilis, we shall be guided, without question, in many instances, by the previous history of the patient, and also the various symptoms and signs present at the time of examination. Apart, however, from the commemorative and other facts which are revealed to us by rigid questioning, we have certain appearances in the laryngeal mucous membrane, which are said to have much diagnostic value. These are, 1, the COLORATION is

of deeper, more nearly purplish hue at times, than is ever seen in closely analogous affections; 2, the *distribution* of the color is not regular and continuous throughout the interior of the larynx, or even upon the vocal cords, but is marked by its patchy appearance, very much like a roseola upon the integument. I do not remember to have seen these appearances so characteristic in themselves as to enable me to affirm the diagnosis, but in a lesser degree, and when combined with notable congestion of the pillars of the fauces, as Mackenzie has remarked, they have made me strongly suspect the nature of the affection, even when the history of the patient was doubtful. Following out the indications by giving the mixed anti-syphilitic treatment, has, then, become the true touchstone of the situation.

To distinguish such cases from purely catarrhal ones is at times very difficult, and there is, in fact, in the local condition, nothing which of itself is at all characteristic.

We are obliged to recur to the previous history of the patient, and to his actual general symptoms, in order to hold a positive opinion in regard to the nature of the intralaryngeal difficulty. Of course the obstinate duration of catarrhal appearances in the vocal organ, in spite of careful and continuous treatment, will make us justly suspicious in regard to an influencing constitutional state. But the more difficulty we have in the successful treatment of this intralaryngeal catarrhal aspect, the more we should insist upon its being carried out effectually. Whatever opinion one may hold as to the nature of certain forms of intralaryngeal disease in patients affected with pulmonary phthisis, it is certain that the catarrhal form should not be neglected, either when the intrapulmonary condition is *apparently* healthy, or when, on the contrary, it is obviously diseased. It is to me an assured fact that many cases of catarrhal phthisis are no more than the rapid and direct consequence of a neglected and obstinate case of simple catarrhal laryngitis. Even if remedies be employed, the patient may be still a neglected one, because the agents of cure are improperly applied.

An old inflammatory affection of the larynx will not

usually get well in our climate solely through internal remedies and hygienic surroundings. Something more is required, and this something is systematic medication by means of topical applications with the laryngeal brush. If these be not made two, three, or more times in the week, other remedial measures will remain abortive, and in search of a cure the patient will be told finally, by his or her family adviser, to go to a warmer and more equable climate. In my observation of the effects of these transmigrations, whilst they are, without question, beneficial, they are not always curative unless local astringents still be applied to the vocal cords. We perceive the wisdom, therefore, of physicians who frequent the sanitaria in the South and West, making themselves familiar with the practical use of the laryngoscope.

In regard to the *nature* of the different forms of intralaryngeal disease treated of in this contribution, I do not consider it necessary to make extended remarks. For all except the last division of my subject, in which are found those forms combining œdema and ulcerations, I hold a very clear and absolute opinion, viz.: that tubercular deposit has very little directly to do in their causation. Of course, as in the catarrhal variety, there may be an underlying cachexia, and this cachexia, whilst it influences and prolongs the existence of the catarrhal laryngitis, is also promoted, and tends to manifest itself, by reason of a tedious and wearing affection which occasions very frequent cough and expectoration. But that tubercular deposit within the soft tissues of the larynx influences the origin and progress of these forms of disease, that I do not believe. I have also held, in a paper read before the State Medical Society more than two years ago, that the evidence of miliary tubercle being present in the larynx, even when present in other organs, and when the larynx itself was the seat of ulcerative phthisical laryngitis, had not been sufficient, in my experience, to make me admit it. Since that period I have had frequent and renewed opportunities of observation, and whilst I am perhaps less radical in my views than I was at the time referred to, I still believe that tubercular laryngitis is a very

rare form of disease, at least in New York City. And yet, on the other hand, we have testimony of the very best kind to its great frequency in all cases in which the larynx is affected in pulmonary phthisis. Such weighty support as the names of Mackenzie, Heinze, and other late foreign writers lend to this belief, is calculated to make me hesitate in adhering to views so much opposed to theirs. And yet I cannot doubt what my own careful investigation shows, any more than I am inclined to throw doubt upon the testimony of eminent observers who are opposed to my hitherto sustained view of phthisical laryngitis of ulcerative form. There are two ways to reconcile these apparent discrepancies. The first is to agree upon the exact definition of what shall be called a tubercular lesion. The second is to recognize the fact that types of diseased action vary in different countries, and that a particular disease may not resemble closely the same affection in another and perhaps distant land.

The first opinion has been more than once suggested in regard to tubercular deposits elsewhere than in the larynx. Whether or not it has been particularly considered with respect to the vocal organ, I am not prepared to state. Certain is it that it would help laryngologists very considerably in their estimate of the frequency of tubercular laryngitis, to have it rigidly fixed as to what are to be generally admitted as sufficient proofs of the existence or non-existence of tubercular laryngitis. These proofs can scarcely be, for practical purposes, merely based upon pathological investigations under the microscope and in the dead-house, for the reason that practitioners of medicine wish to have signs and symptoms by which they may judge the situation prior to death. Evidently, thus far, there is not an unquestioned adherence by all to any pathognomonic evidence of its existence during life. Opinions differ. I have seen ulcerations in the larynx with concomitant localized œdema pronounced tubercular by some, doubted by others. And the very fact of the cure will not invariably settle the matter, because there would not appear to be any valid reason why even a tubercular ulcerative disease should not be

capable of cure in the larynx, since there is tolerably convincing evidence that it has been cured, though infrequently, in other viscera of the body.

As to our second proposition, this much at least can be affirmed: Certain affections commonly recognized as similar, differ very materially in different countries. And I am not speaking now merely of epidemic diseases, which we all know afflict certain localities at different periods with a very profound difference in their virulent manifestations; witness certain classic epidemics of influenza, of diphtheria, smallpox, and scarlatina. Nor do I refer particularly to affections which were formerly considered more or less endemic on account of some peculiarity of soil or climate, or both, and which we now believe to be due to some definite well-ascertained cause which would ordinarily, if not always, be discoverable if our means and opportunities of investigation were more perfect and thorough. In this class I would mention especially, typhoid fever, and certain forms of malarial poisoning. I have in view, and refer particularly in this connection to forms of disease of which lupus is a type, grafted doubtless upon a highly strumous constitution, but caused originally, as phthisis frequently is, by bad physiological conditions and hygienic surroundings.

Now, then, lupus, in my limited observations, is no more the same, in its outward manifestations, when observed in Vienna, Paris, London, and New York, than many affections which in truth have little in common with one another. Let any one who has visited Hebra's wards in Vienna, Bazin's in Paris, Wilson's or Fox's in London, and the wards of Charity Hospital in New York, reflect a few moments upon what he has witnessed, and I will venture to affirm, dermatologist though I do not profess to be, that between the types of this disease, seen in different places, he will have noticed many salient distinguishing features. This assertion is none the less true of tubercular disease. Tubercular disease is, I believe, more frequent in London and Paris than it is in New York; but, further, my observation would lead me to affirm that it is more *virulent*, so to speak, extends its ravages farther and deeper, and attacks organs

abroad quite frequently which in New York at least are left intact, as a rule, in its destructive onward march.

Not only do I base my opinion in making this statement upon what I have seen in the dead-house time and again, but also upon my daily clinical observations. One does not witness *post-mortems* in which miliary tubercle has been deposited to a large extent and in numerous organs in any thing like the same number of cases relatively that one sees them abroad. And certainly, so far as the larynx is concerned, one does not see in our throat clinics nearly so many cases of phthisical ulcerative laryngitis as I remember to have seen in Europe. Our type of pulmonary and laryngeal difficulty is emphatically a catarrhal one. The majority of people, even in the lower strata of society, are relatively well housed, well clothed, and well fed. They have fewer hours to work and more rest during the week, and particularly on Sunday, than the same classes of people in England and on the Continent; and, hence, in my opinion, like efficient causes of the growth of miliary tubercle do not exist, fortunately, to the same degree with us as with them. When, however, one has a catarrhal affection of the throat, the larynx, or the bronchial tubes, one is by so much more in a condition of pathological danger. And nothing is more frequent, according to my later observations, than to witness the effects of repeated and neglected colds, both within the lungs and primarily or secondarily in the larynx itself. In the pulmonary structure such attacks far too often tend, more or less rapidly, to cheesy pneumonia; in the larynx, toward so-called laryngeal phthisis, which in reality is often a wasting affection, but one which is essentially catarrhal in type, and should be capable of cure unless it has advanced too far, and beyond the limits which can be influenced favorably by the most rational and best-directed medication, general and topical. It will be understood, therefore, from what precedes, that whilst I am inclined to believe to-day in the existence amongst us of a certain number of rare instances of tubercular disease within the larynx, I hold more and more to the conviction that the great majority of cases of all kinds of laryngeal affection of

my sixth division, intercurrent with pulmonary phthisis, are catarrhal in their origin, progress, and intimate nature. Of course, I am free to admit that *miliary tubercle* may be found, and even quite frequently, as a secondary deposit or infiltration in the vicinity and at the base of catarrhal ulcerations of the larynx, in precisely the same way that we recognize it in the lungs about a cheesy nodule in a softened or fluid condition; but this is a mere consequence of transport or auto-inoculation, and does not in any manner interfere with the soundness of views held by me in the preceding remarks of this paper. The same opinion might be and is held in regard to any purulent focus, and so prevalent is this opinion that, outside of the lungs, if we recognize the existence of tubercle, we are not satisfied until we have searched everywhere and found the original cause of auto-infection.

Now, then, what shall I say of the treatment of these different affections? Are they curable or not?

In reply, I would say this will depend, to a great extent, upon the stage at which they have arrived before treatment is fairly begun. It will depend also very much upon the method according to which treatment is conducted. If the treatment be the time-honored one of the old practitioner, with good hygienic surroundings, rest, nourishing food, moderate exercise in the open air, and cod-liver oil, or the hypophosphites, our hopes will be vain indeed of a permanent cure, or even a temporary arrest of the local manifestations of disease, but if to all this we add a well-directed, methodical, and judicious use of local detergents, astringents, and sedatives, the outlook is perhaps not so dark. Indeed, there are a number of well-recorded cases, which go to show that even phthisical ulcerative laryngitis, though it be at a somewhat advanced stage, may yet be entirely cured. Amongst those who have had gratifying results from local treatment, no one appears to have been so successful as Dr. F. H. Bosworth, of New York City. If we read the carefully recorded histories of Dr. Bosworth, we can but be struck by the very assiduous and careful local treatment which he gives to such patients. He does not

merely content himself, as most practitioners do, with the application two or three times a week of some local astringent, such as iron or zinc in solution, to the larynx. He first prepares the way for these applications, by the use of a disinfecting and detergent spray; he then makes his astringent application; and, finally, if there be painful symptoms present, indicative of ulcerations, he makes use of anodyne, or alterative powders locally applied. The successes from Dr. Bosworth's conscientious method of treatment have been very encouraging, and have made me anxious to follow a similar course in like cases. Thus far I have never been gratified by curing an advanced case of ulcerative laryngitis of pulmonary phthisis. What I have been able to accomplish was to retard the progress of advanced cases, and prevent cases at the first stage advancing any further. And herein lies, it seems to me, one of the most important considerations with respect to *local* treatment, viz.: to seek, if not the complete cure of diseased action, at least an arrest of its march. It may be that the disease is kept in abeyance but a short period, a few months, or a few years. But even then the patient will suffer considerably less from cough, expectoration, not to mention localized pain and dysphagia, than if permitted to go on without frequent local applications to the throat.

Those practitioners who do not make use of the laryngoscope, or if they do, are not skilful in its manipulation, often prescribe warm inhalations of some volatile and sedative agent, with a view of quieting cough, and sometimes lessening the quantity of sputa. It is my conviction, at the present time, that this is bad practice, excepting where it is rendered absolutely necessary, for though the patients frequently find temporary relief from their painful paroxysms, they are apt to catch severe colds after making a trial for a while of these inhalations.

There is another and most important category of cases: they are those in which the morbid process in the larynx has not advanced sufficiently for us to determine positively whether or not it be phthisical in its nature. What we can safely affirm, however, of many such instances is that

they are likely to become phthisical unless cured within a limited period, and that, too (more than by other means), by the frequent topical use of astringents. Such cases are seen amongst young people usually, between 20 and 35 years of age, who, already rather delicate in appearance, with a phthisical family history, contract an inflammatory affection of the respiratory tract, but especially implicating the mucous membrane of the larynx. I have known such patients, under general treatment alone, continue indefinitely without getting well, when by a systematic local treatment of a few months they have entirely recovered.

In view of what I have already seen, and what appears most probable and rational, I hold to-day that these patients would develop both laryngeal and pulmonary phthisis, if permitted to remain without systematic local treatment. It is an error, as clinical experience frequently shows, to hold that pulmonary phthisis invariably begins within the lungs, and that laryngeal phthisis is but a secondary phenomenon. Undoubtedly this is often true—undoubtedly we can diagnose readily at times pulmonary destructive lesions when the inflammatory appearances within the larynx are still present; undoubtedly there are examples where, during life, physical methods of examination have left the condition of the lungs undecided, although the larynx was evidently involved, and yet after death an autopsy has revealed consolidation of tissue and deposit of tubercle.

Opposed to these frequent examples in the daily experience of almost every practitioner, which go to show that pulmonary phthisis in one of its forms has possibly or probably existed prior to or concomitant with commencing laryngeal disease of phthisical nature, there are infrequent cases in which the contrary holds true. I have seen and closely watched during many months more than one case in which the most rigid physical examination discovered no evident signs of pulmonary phthisis, in which no sufficient general symptoms were present which could not fairly be attributed to another and obvious cause, in which there was very slight elevation of temperature, but little loss of flesh or

strength, and only a moderate amount of sputa. Such a patient, however, has had dysphonia, slight dysphagia, cough, and the physical evidences of chronic laryngeal catarrh,—all of which, by their obstinate duration under treatment, in an individual with a hereditary tendency to pulmonary disease, and impoverished nutrition (due to fatigue, anxiety, and bad hygienic conditions generally), convinced me that unless the laryngeal affection were faithfully and properly treated, it would slowly, but surely, be the efficient cause of pulmonary phthisical development. Of course, few autopsies can or ever will exist, to justify this belief. Of necessity, it rests almost solely upon a clinical basis. Patients of this sort do not die either of the laryngeal catarrh, nor yet again of a pulmonary disease at an advanced stage which is not yet present. But wait one, two, three, or more years, and they may then fall victims to pulmonary consumption, and if the laryngeal affection has not, to pathological research, advanced *pari passu* with the pulmonary disease, the verdict of the autopsy will be: "Patient died of pulmonary phthisis; examination of larynx shows phthisical ulcerative disease at an earlier stage of development," and this opinion, I sustain, is in part erroneous. The morbid lesions within the larynx are not really at an earlier stage of development, at least they are not so in one sense: for they actually opened the scene of phthisical disease, but, owing to one cause or another, they have at a certain period become delayed or arrested in their destructive march, whilst the pulmonary affection, which began subsequently to them, has, from the time of its origin, taken a more rapid course.

The practical conclusion of the foregoing statements is: treat all cases in the beginning of laryngeal disease, in patients threatened with phthisis, by local applications properly made, and *some* patients at least will never develop pulmonary phthisis, either of the catarrhal or tubercular form. Whenever a case of laryngeal phthisical disease has advanced to the stage of œdema and ulceration, hope of ultimate cure should not even then be abandoned, but our duty plainly is to follow up suitable local treatment,

combined with general medication, as long as the patient derives the slightest apparent benefit from it. Whenever "the nature of the disease is obvious, and other measures appear of no avail," I believe now, as formerly, that the operation of tracheotomy should be performed.

1. Because it "is certainly a palliative procedure of much value."

2. "It may ultimately be found a direct curative means yielding very favorable results."

"To obtain these latter," as I have elsewhere affirmed, "it seems indicated not to delay the operation to a late date" (*Am. Jour. Med. Sciences*, April, 1879, p. 416).

Dr. Porter's Paper.

HOWEVER much opinions vary regarding the pathology and treatment of laryngeal phthisis, the question of prognosis meets an all but universal answer. My purpose in presenting this subject is to call forth an expression from this Association, which, clothed with authority, will have weight as a standard for future reference. For this reason I shall raise the question, rather than discuss it at length: *Is laryngeal phthisis necessarily fatal?*

The readiness of the answer as to any given instance will depend upon the amount of complication, the extent of the disease, the age of the patient, and many other considerations. These have to do with the verdict in every case, but as an abstract conclusion, can we say that, in any event, laryngeal phthisis, as now defined and recognized, may end in recovery?

There has been practical result obtained, so far as the preservation of life is concerned, since phthisis became a study, and we are now justified in the hope that of a certain number of cases of pulmonary tuberculosis, some will recover. The reports of the British Registrar-General during the last few decades show a marked reduction in the percentage of deaths from phthisis to deaths from other causes. Heitler found on the *post-mortem* table 780 subjects with healed (cured) tubercular patches; Flint's elaborate record is well known to us; McCall Anderson has even reported

three cases of recovery from acute tuberculosis; more than this, I doubt not but that in the experience of each one here, there are instances of unchallenged pulmonary tuberculosis in which the disease was arrested and the patient lived out his expectancy. The literature of yesterday doomed the phthisical patient almost without a hearing, and "consumption" was synonymous with death. To-day we hold a better faith—one, we think, well founded.

At present the recorded opinions of authority teach that laryngeal phthisis may only be retarded; that it is progressive, and ultimately fatal. In his scholarly essay of 1879, Heinze's third and last conclusion is that "a cure of laryngeal tuberculosis will most probably never be made." Lennox-Browne voices the generally-received opinion in a recent number of these ARCHIVES, when he says: "Not even the most sanguine throat specialist is yet justified, according to our experience, in giving even a moderately hopeful opinion as to result."

I cannot subscribe to this doctrine of the inevitable fatality of laryngeal phthisis, and will be happy if sustained by this Association, or even by a minority of those present; but if those of you best qualified to judge, deny the position I assume, and affirm that our best practice here is but palliative, I will yet hope, remembering how great has been the change in the conclusions but recently held by many of our guild concerning laryngeal phthisis, especially as to pathology.

(*a.*) *Theoretically*, laryngeal phthisis is not necessarily fatal. Phthisis, you will admit, and I shall not wait to prove it, is a constitutional disease. "Pulmonary tuberculosis is not primarily a disease of the lungs or air passages." "The tuberculous products proceed from a prior morbid condition of the system" (Flint), having most frequently its local expression in the lungs. We believe, however, if the record is worth any thing to us, that from this, recovery is possible. Does, then, the determination of this local expression to other parts—to the larynx, if you please—admit of no release?

Phthisis in the lung and phthisis in the larynx are like

morbid processes, though modified by the formation and function of the parts involved. The pulmonary and laryngeal complications are the outgrowth or localization of the same systemic fault, occurring in the same great tract. Indeed, the pathological conditions are not only in each alike, but, as shown by Foster, may extend from the lungs to the larynx by continuity of surface. We know, further, that a catarrhal change may often be the exciting cause of tubercular disease in the lung, and that the larynx is also readily involved in catarrhal inflammation. Many other points of resemblance and identity in the etiology and pathology of the pulmonary and laryngeal diseases, I need not refer to in this presence.

Let me repeat that if from the local expression of phthisis in the lung patients recover, in theory, at least, such a result may follow the laryngeal complication. It seems the more probable because, while using general remedial agents, the larynx is comparatively easily reached by local applications. Shall we say that phthisis in the lung may yield to generally directed effort, while the same effort, together with our best local and special treatment, avails nothing when phthisical change is found in the larynx; and this, even though it be of the same character, and in the same tract as the other—in fact, the same disease? If this is true, it were better, perhaps, for the patient that his disease be beyond our immediate reach.

(*b.*) But theory is valueless if not in accord with fact. What *practical* argument can be adduced to show that laryngeal phthisis is not necessarily fatal? In all candor, and yet confidently I say, the best. I am glad, indeed, that my experience has not been an exceptional one. Schmidt and especially Rossbach have placed themselves on record in this matter, and of our own number are some who have given valuable evidence as to the possible favorable termination of laryngeal phthisis.

Bear with me while I briefly relate two cases selected as typical, and a third which is scarcely less indicative.

Case 1.—Mr. H., æt. 41, of Arkansas, first seen October 9, 1878. There was no history of phthisis in his family. Ten months prior

to date given, he had pain in his chest, recurring fever, and continuous hacking cough. Had lost flesh and appetite, and for three months had been hoarse. A week before I saw him he had slight hæmoptysis. When examined there was thickening over the arytenoids, and marked infiltration of the ventricular bands. The intra-arytenoid mucous membrane was eroded and the cords inflamed and roughened. The left pulmonary apex was comparatively dull with prolonged expiration and whisper. Pulse and temperature slightly heightened.

The patient responded to treatment both general and local, and in March of present year—two and a half years after—called to see me with this report: "During the last year have been entirely free from evidence of disease, and have not lost a day from business." I examined the larynx carefully, and found no trace of disease save slight congestion of the cords, due probably to exposure the night before in travelling. I could detect no indication of pulmonary lesion.

CASE 2.—Miss N., of St. Louis, æt. 23, examined November 25, 1878. Her mother had died of phthisis; the rest of the family being free from lung trouble of any kind. The patient had cough, had been losing flesh for six months, and of late had night sweats. During two months had been unable, on account of hoarseness, to continue her work as a music teacher. There was no ulceration in the larynx but much thickening, especially upon the right side. The mucous membrane over the right arytenoid was greatly infiltrated, preventing approximation of the cords. There was infiltration of the right ventricular band, and slight roughening of the edge of the corresponding cord. Dulness with feeble respiration and subcrepitant râles were found at right pulmonary apex.

Thirteen months afterward I saw Miss N. for the last time. She had recovered in weight and strength, and her voice was almost normal. There was still some slight thickening of the arytenoid, but the other appearances of disease in the larynx could not be seen. In the lung the only evidence of lesion I could find was slightly prolonged expiratory murmur. Within the last fortnight her physician, a most competent diagnostician, told me that she was well, and, six months before, had resumed teaching.

The third and last case I shall mention is more recent, hence less important as testimony, but to me it has been so

instructive and the favorable changes so rapid that I will briefly report it.

CASE 3.—Miss S., of Illinois, a tall, slender girl of 22, consulted me September 26, 1880, on account of hoarseness, cough, and loss of flesh. She had been sick for a year from the effects, as she thought, of a cold contracted by an open window in the school-room. The hoarseness had existed six months, and of late she was almost aphonic. There was no history of phthisis in any other member of her family.

I found great irritation over the left arytenoid and of the left ary-epiglottic fold, while the cord of the same side was thickened and irregular. There was incomplete movement of the left side, owing to the condition of the arytenoid. There was disease plainly evidenced in left pulmonary apex.

The patient remained in the city under constant care, and did badly for a while. Her appetite was poor, and loss of flesh and cough continued. October 20th, while waiting in my office, she had a severe pulmonary hemorrhage. Soon afterward she began to improve, and so continued, though three weeks later there was again hæmoptysis, but slight and without ill effect. I need not trace the successive steps of her progress, which was constant but slow.

I saw her last three weeks ago. She had almost regained her normal weight; her appetite was good, there was but little cough, and her voice, though weak, was clear and distinct. There was yet some thickening in the arytenoid region—the only evidence of disease remaining. The ary-epiglottic fold seemed normal, and the cord was free. The lung showed like improvement, slight dulness and prolonged expiratory murmur being all the indications of disease present. A few days prior to this writing she sent me the message that her improvement was uninterrupted.

It is true that this history does not, as do the others, show complete restoration, but so marked has been the recent change that it is certainly promising, and I would do no violence to my belief were I to predict entire recovery.

Reflecting upon these cases, all of them undoubtedly belonging to the sixth class of Beverley Robinson,[1] and upon others less favorable in result, I have been led to doubt the

[1] "Laryngeal Affections of Pulmonary Phthisis." *Ante* p. 44.

doctrine of the necessary fatality of laryngeal phthisis. It is more than probable that the diagnosis in these cases will be disputed. Be it so, I have not met with better-defined types of disease, and upon the laryngoscopic evidence alone, aside from the fact of coëxisting pulmonary lesions, the diagnosis would be unquestioned by any one, had the patients died. But they lived; therefore, some may say the diagnosis was wrong. Such a test is easy to apply, but it is unscientific, if nothing else, to frame conclusions from it. I grant you these are exceptional results, at least in my experience. All I claim is that some cases of laryngeal phthisis end in recovery, and this I have tried to prove.

You will pardon me in that I have omitted all reference to special treatment, when so much has been written, and well written, upon the subject by members of this Association. What has been said is for mutual encouragement to persevere in such cases, and not to claim special skill or tact in conducting them.

Let me conclude with the wish that each of you may have proof in his own experience of the truth of the position here taken, and find more cases of recovery from laryngeal phthisis than those I have, by your kindness, been permitted to report.

Dr. Bosworth's Paper.

I REPORT the following case, not only for the essential interest which attaches to it, but also from the very important bearing which this form of ulcerative disease, occurring in the pharynx or mouth, has upon the vexed question of laryngeal phthisis, as enabling us to study its clinical characters and progress in a region more open to direct ocular inspection, and, at the same time, one in which the disease is not subjected to the untoward influence of the constant functional activity which is inseparable from the morbid process in the larynx.

H. T. W., a carpenter, æt. 41, was referred to me on March 20, 1881, by Prof. J. W. S. Gouley, of New York, presenting the following history: He comes of a healthy family, in which

he has never known of any lung troubles. His own health has always been good, although he has never been thoroughly robust.

In July, 1877, he had an attack of hæmoptysis, the source of which was undoubtedly in the lungs. After this ceased he commenced to suffer somewhat from a cough, with loss of flesh. During the summer of 1877 he continued to expectorate bloody sputa, but in the fall of the same year the bloody expectoration ceased, and has never recurred, although his cough has continued somewhat ever since. In September of 1878, a little over a year after his first hemorrhage, there appeared on the left side of his tongue, and about one inch from its tip, a small blood-blister, as he describes it, about a half inch in diameter. This soon broke into an open ulceration, which, by a slow progress, eroded tissue and produced an excavation in the substance of the tongue, while at the same time it extended its borders. This ulceration was described as being exactly similar in appearance to the ulceration which came under my observation later. The only local treatment which was resorted to at the time was daily cauterization with nitrate of silver. This ulceration lasted eight months, and finally cicatrized in the spring of 1879, his general health having in the meantime markedly improved.

In the fall of 1879 the ulceration recurred in the same spot, and the experience of the former winter was repeated, the ulcer remaining open during the winter, and, being subjected to the daily cauterization, cicatrized with the return of the warmer weather of the early summer of 1880, his general condition also improving.

In October, 1880, the ulceration recurred again in the same locality, and extended somewhat more rapidly than before, and now his general health commenced to be more affected. During this whole time, from the original occurrence of the disease, he had continued to be troubled with a cough, together with apparently a laryngeal catarrh. He was subject to hoarseness and more or less secretion from the throat, but never experienced any special discomfort referable to the larynx.

About the first of January last he commenced to suffer more prominently from pain in his throat, with difficulty in swallowing, and more marked impairment of voice ; he also commenced to lose flesh more rapidly, and the ulceration of the tongue to extend. The tongue became swollen, red, and extremely sensitive. Small whitish-gray spots or patches commenced to appear beyond the

ulcerated surface, some of which occasionally would disappear, while others would develop into open ulceration.

On March 21st he came under my care, at which time his condition was as follows : He was pale, anæmic, markedly emaciated, and with all the appearances of one suffering under some profound dyscrasia. The examination of his chest revealed a moderate amount of dulness over the apex of the left lung, with numerous soft, moist râles, while over the apex of the right lung the respiratory murmur was somewhat harsh and rude in character.

The laryngoscopic examination showed the mucous lining of the larynx markedly pale and anæmic, and the arytenoid cartilages of each side swollen and club-shaped, the swelling extending to the ary-epiglottic folds. Extending from the left arytenoid cartilage to the thyroid there was a broad ulcerated surface, involving the true cord and ventricular band, and presenting all the appearances of true laryngeal phthisis. The epiglottis was not involved. The main point of interest in the case, however, was found in the tongue, for on this organ was found the most serious and extensive morbid change. The left side of the tongue, from the anterior faucial pillar to its tip, was found to be the seat of an ulcerative process, whose appearance was both striking and characteristic. It was of a grayish-pink color, and covered with a thick, tenacious, ropy muco-pus. It showed a progressive erosion of the organ, by which fully one third of the left segment of the tongue had been destroyed. This destructive process seemed to have been a melting down, as it were, of the tissues, an essential waste or phthisis of the organ. There was no excavation, and no reddened areola surrounding the ulcer, and the appearance was exactly similar to that which we see in the larynx in advanced cases of laryngeal phthisis. Beyond the border of the large ulcer there were several smaller points of isolated ulcerative action, and also a number of patches, varying in size from one to five lines in diameter, which were peculiar; they were dirty grayish-white patches, which seemed to infiltrate the epithelial layer of the membrane, and were slightly raised above the surface ; they were seemingly, and, I think, in reality, small patches of fibrinous exudation.

This patient has been under my observation now seven weeks, and during that time I have watched his progress with no little interest. His general condition, bad when I first saw him, has grown steadily worse. The pulse has varied from 100–120, the

temperature from 100° to 101°, with marked evening exacerbations, which showed occasionally a temperature of 103°.

On April 13th there occurred a serious mishap, which it may be of interest to record, viz. : the setting in of a persistent and obstinate hiccough, which lasted for ten days without intermission night or day, thus robbing him of rest and sleep, and under which his strength failed rapidly. In connection with the hiccough there was also obstinate vomiting, he being able to retain nothing whatever on his stomach for five days. After trying every thing which my ingenuity could devise, I suggested buttermilk, which he took and retained, and on which he has lived almost solely ever since. For the hiccough I found nothing gave him any relief except the inhalation of chloroform, under the liberal use of which this distressing and obstinate symptom left him.

His general condition grew worse, his laryngeal symptoms became more distressing until, when I saw him yesterday, he was extremely averse to taking any food merely from the pain in swallowing. The ulceration of the tongue has slowly progressed, attended with all the symptoms of laryngeal phthisis, exquisite pain on motion, and tenderness on pressure.

The appearance of the lingual ulcer I need not attempt to describe more minutely ; it was unmistakably the same disease which in the larynx we call tuberculosis or laryngeal phthisis ; it is typical and characteristic, and resembles no other form of ulcerative action. I fully endorse all that Lennox Browne has said on this subject, in commenting on the assertion of other writers, that " phthisical ulcerations present no signs by which they can be recognized as such." Browne says that, " with the exception of laryngeal growths, we know of no disease in which we can be so sure of our diagnosis."

In the chapter on laryngeal phthisis, in the " Diseases of the Throat and Nose," recently published by myself, I described three stages as attending the development of that disease : *the first*, of pyriform thickening of the arytenoid ; *the second*, that of infiltration of the epithelial coat of the mucous membrane ; and *a third*, of fully developed ulceration. In tubercular ulceration of the tongue, of course, the first stage of laryngeal phthisis has no counterpart, and the first stage will be that of infiltration. In the chapter above al-

luded to, this second stage was described as " a small whitish-gray patch, slightly raised above the surface, and seemingly an infiltration of its epithelial layer." In the third stage, or the stage of ulceration, I wrote: " The grayish patch gradually changes from an apparent quiescent state to one of active discharge; the superficial layer of epithelium being thrown off and new cells being produced, they gradually degenerate into pus cells; the surface of the former gray patch becomes yellow in color, the discharge becomes purulent in character, and the ulcerative action becomes fully established." In the case whose history I have given above, there was afforded me an opportunity of verifying the above observation in a most marked manner, and one which I have never before enjoyed in such a satisfactory degree. It will be recalled that I spoke of small gray patches making their appearance in the mucous membrane beyond the border of the large lingual ulcer. These I could watch very carefully and individually; occasionally they would appear and subsequently seem to be exfoliated, leaving fairly healthy membrane beneath; while in other cases they underwent the degenerative process above described, and developed into small points of ulceration, which coalesced with the larger ulcer, or established new centres of destructive action. This process I saw repeated in a number of individual instances, and it was certainly most interesting and instructive; and mainly so, as verifying in my own mind certain conclusions which I have for a long time entertained as regards the nature of phthisical ulcerations in the larynx and upper air-passages, viz., that they are not due primarily to a deposit of tubercle, but are of inflammatory origin; and that if tubercles play any part in their progress, it is only secondary; and that the tubercular deposits found in the examination of these cases are simply the scattered gray nodules which are found, as a rule, about the base of any ulcerative process of long standing.

To recur somewhat: the clinical history of these cases is sufficiently indicated in the one reported. This form of ulceration is a local outbreak of that peculiar and profound dyscrasia or diathesis which we call the tubercular. The

most frequent local manifestation of the disease is in the lungs, after that in the larynx, and more rarely in the pharynx and oral cavity. It may occur in the upper air-passages before the pulmonary disease has developed, or it may make its appearance during the course of pulmonary phthisis; but when it does occur, and this is the point which I would urge with emphasis, it presents appearances which are almost pathognomonic. These appearances may be briefly stated as a pinkish-gray surface, with an appearance which is well described by La Boulbene as worm-eaten; the ulcerated surface is not depressed; there is no areola of redness in the surrounding membrane; the discharge is a thick, tenacious, ropy mucus or muco-pus; the outline is fairly well marked, with an approach usually to an oval shape, the general coloration of the ulcerated surface and the surrounding membrane being much the same; and there is a loss of substance by a progressive waste or melting away of the tissues,—the whole completing a picture so typical that, in my view, there need be no uncertainty in the diagnosis; and we should recognize a phthisical or tubercular ulcer as such, and with the same positiveness as we recognize the syphilitic.

As regards the prognosis and treatment of this form of ulceration as occurring on the tongue, it may be comprehended in the assertion that the literature of the subject contains no single case which has terminated otherwise than fatally.

NOTE.—The patient died of exhaustion on May 15, 1881, about a week after this paper was read. At the time of his death the pulmonary disease had not progressed sufficiently to have caused a fatal termination. He died apparently from the general dyscrasia, which had led to the development of local lesions in the lungs, larynx, and tongue. A *post-mortem* examination was not permitted.

Discussion of the Papers of Drs. Robinson, Porter, and Bosworth.

Dr. A. H. SMITH said that it is important, at the outset, to distinguish clearly the cases of catarrhal character from those of tubercular origin. Tubercular laryngitis should be preceded

by deposit, thickening within the larynx, with general dyscrasia, and associated, sooner or later, with trouble in the lungs. Whether there are many cases of laryngeal disease in which the difficulty depends primarily upon a deposit of lymphoid substance, recognized as true tubercle, is a matter of considerable doubt. He could not recall a case coming under his own observation.

Of the fact that true tubercle may be deposited in the larynx, there can be no manner of doubt, but he agreed with Dr. Bosworth that it is often of a catarrhal character at the outset. Whether the disease ever makes its first appearance in the larynx before invading the lungs, is a matter of question, although it is possible that a focus of irritation might induce a preliminary deposit in the larynx in some cases.

As soon as the infiltration takes place in the larynx there is at once mechanical obstruction; the swelling of the laryngeal mucous membrane and the thickening of the inter-arytenoid fold interfere with the movements; inflammation and ulceration result, from the rule that whenever there is irritation there is afflux of blood. The effects of the dyscrasia, and those of the local inflammation, are so intimately bound together that it is a matter of great difficulty to separate the action of the two factors, if indeed they are capable of being separated entirely.

With reference to the prognosis, it would seem as if in the early stage something may be done in the way of treatment, but in advanced cases the prognosis is very bad. Where the lungs are already much involved the additional difficulty in the larynx makes the prognosis almost hopeless. In going through the wards with his students, in speaking of these cases, he tells them that he almost envies the veterinary surgeons who, after making careful pathological and diagnostic observations, sum up the treatment in two words: "Axe to os frontis."

Dr. GLASGOW was decidedly sceptical as to the existence of laryngeal tubercular disease, or of the deposit of true tubercle within the larynx. He had seen many cases of throat affection in phthisis, but he had seen very few, if any, in which the trouble was really due to the local deposit of tubercle. It had just been stated that some of these cases get well. How can this occur if they are tubercular? Tubercle is a dead product; it must be thrown off from the body before they can get well, and the only way in which this can occur is by ulceration.

All depends upon what is called tubercle. Some pathologists say that in the vast majority of cases of phthisis, tubercle is found in the larynx; others, equally good authorities, say it is among the rarest of events. Which shall be believed? The uncertainty arises from the fact that the same things are called by different names. What one calls tubercle, another calls a cheesy gland. He believed himself that there is very little difference between them. If any one should state, as had been done to-day, that acute miliary tubercle had been cured, we should say that the diagnosis had been at fault. The same would hold true as regards tubercle of the larynx. He believed that the vast majority of these cases belong to the sixth class of Dr. Robinson, and are inflammatory in their origin. The continued irritation results in infiltration of tissue, with hyperplasia of cells. Under the microscope, we find a great many small round cells, considered by some peculiar to tubercle, and enlarged glands. These cases we have seen recover; they have nothing to do with tubercle, but are simply inflammatory, and should not be cited as evidence of the curability of tubercle of the larynx.

Dr. SEILER said that there are certain qualities which should be taken into consideration in speaking of tubercle. In the first place we cannot recognize tubercle by any specific characters under the microscope, but find only adenoid tissue and giant cells in addition to the ordinary structural appearances of the part. A simple collection of small round cells and inflammatory products is never called tubercle. He could not agree with the last speaker that there is no such thing as true tubercle of the larynx, for he had too often seen it himself, and it was shown in the specimens of the larynx presented by the President at the meeting in New York. Moreover, he did not think that Dr. Porter had intended to refer to acute miliary tubercle in the cases reported, but to the catarrhal phthisical inflammation of the larynx due to disease in the lungs; and the question whether or not we accept the recent views of the pathology of tubercle does not matter in these cases, as they are not tubercular in their nature. We recognize the pyriform arytenoid swelling and worm-eaten epiglottis as due to chronic inflammation; but, on the other hand, there are undoubtedly cases of true tubercle in the larynx. Why should it not occur? The larynx is lined by mucous membrane, it is the seat of constant motion with every act of respiration, and since tubercles may be deposited in all the other tissues, there is no

reason why the larynx should be exempt. He also must take exception to the remark that tubercle is a foreign substance, and must be expelled by ulceration. On the contrary, it may become encysted and undergo calcareous change. Trichinæ are larger than tubercle, and they may remain encysted for years. Foreign bodies of considerable size may also remain in the tissues without causing ulceration. *Post-mortem* examinations of the lungs often show calcareous nodules that were originally tubercular deposit.

Dr. J. O. Roe said that the prognosis would depend upon what is called tubercular disease of the larynx. If the name is restricted to laryngeal tuberculosis in the state of ulceration, no one has seen such a case get well; he, certainly, never had; but if we consider the swelling which precedes the ulceration as coming under this title, then we have all seen such cases recover. It depends altogether upon the stage at which the treatment begins whether the case is curable or not. In the diagnosis we should interrogate the systemic conditions; if there is an elevation of temperature, a depressed state of the system, and pulmonary symptoms, the prognosis is poor; such a case of tubercular laryngitis will lead to a fatal result.

Dr. Johnson said that the question was one of much practical interest. It is stated by authorities that the diagnosis of laryngeal phthisis is one about which there should be no manner of doubt. This is true as regards the later stages, but in the incipiency there is great difficulty in deciding the question. In his section of the country there are constantly a large number of cases of catarrhal disorder of the larynx not generally developing into phthisis. In the early stage of phthisis we sometimes find an inflammation of the larynx which it is very difficult to diagnose from a catarrhal affection.

The last speaker alluded to a point upon which he (Dr. Johnson) was accustomed to rely: whenever, in cases in which there is no other trouble to account for the increased bodily heat, he finds chronic laryngitis associated with an irregular elevation of temperature, he gives a more serious prognosis than where the temperature is normal; and where the temperature of the body is not elevated, although the larynx may present the appearance of tubercular phthisis, he is accustomed to consider the affection as catarrhal.

He could only recall one case of tubercular laryngitis coming

under his observation which he could consider cured. In this case there was ulceration and loss of the posterior portion of one of the ventricular bands. The disease was arrested, and the patient was free from it for many years. Some years afterward he developed pulmonary disease, of which he died. At the time of first treatment it was presumably a case of laryngeal phthisis. It is an interesting question whether or not laryngeal tubercle is always consecutive to pulmonary disease. He knew of a case with persistent aphonia, whose lungs were examined and pronounced to be in good condition by Dr. Austin Flint, and she also consulted Dr. Elsberg, who considered it a case of catarrhal trouble, and curable. A short time afterward the speaker saw her, and, upon examination, found a well-marked condition of laryngeal phthisis, with loss of tissue ; she subsequently developed cavities in the lungs, and died of consumption four months afterward, with all the signs of tuberculosis. He was unwilling to make the statement that any case could not recover, as long as the machinery of life was able to carry on its functions, and, therefore, would not declare that a case of laryngeal phthisis may not get well, just as cases of pulmonary phthisis sometimes are cured ; but he did not consider the prognosis very hopeful.

Dr. KNIGHT said that the question had been so well discussed that there remained but few points undeveloped. General impressions are of very little value, and unless an accurate record of the appearances from day to day is kept, an opinion is of very little weight as regards the effects of treatment ; so that, in saying that he never had had a patient under treatment for simple catarrhal inflammation of the larynx, who afterward returned with laryngeal phthisis, he merely meant that he could not recall such a case ; it may be that they have done so, for certainly simple inflammation is no protection against subsequent tubercular disease. It seemed that catarrhal inflammation cannot, on the other hand, be regarded as a very potent factor, or cases which we have had under treatment and observation for many years would more commonly return with laryngeal phthisis.

With regard to the diagnosis of laryngeal phthisis, especial stress had been laid upon the pyriform swelling as a typical appearance, and it is so of one form ; but there is another form in which the disease occurs lower down in the larynx, where there is no apparent swelling over the arytenoid cartilages.

As regards the results to be obtained from treatment, it would

seem that the generally unfavorable prognosis, when it occurs in the mouth, where it is so accessible to treatment, might point to the conclusion that in laryngeal phthisis it should be equally poor, unless we are dealing with a different pathological process; while in the mouth it is true tubercular disease and not a catarrhal inflammation, in the larynx the reverse being the case.

Dr. SHURLY considered it of primary importance to make a correct diagnosis. There are many cases of chronic inflammation, with or without much swelling, that are sometimes very slow in their course; there are others where the general appearance of the mucous membrane leads to the suspicion of tubercle, but which are also only catarrhal in character. Necrosis takes place sometimes with very little hypertrophy and swelling, but at other times there is a great deal of local swelling and œdema. Now to determine the exact nature of these cases is often very difficult.

As regards the prognosis, general tuberculosis, with local expression in the mouth, larynx, or anywhere else, he believed to be universally fatal; he had never known such a case to recover. In these cases of true laryngeal phthisis, it is a matter of observation that there is also tubercular deposit in other organs of the body. It is true that tubercular deposit may take place, and no physical signs be manifested; in the lungs, for instance, it has been found after death, when no ear had been acute enough to detect it during life.

In Michigan he often sees cases of chronic laryngitis and thickening, due to malarial toxæmia, even going on to complete aphonia, without any deposit in the lungs, the trouble in these cases seeming to be chiefly in the liver. Although a few have been diagnosed as laryngeal phthisis, his own observation had been that they are of the character just spoken of. In his experience, in cases of true laryngeal phthisis, the prognosis is always a grave one.

Dr. ROBINSON, in closing the discussion, said that no amount of negative evidence will stand in the face of positive results. Authorities have stated that laryngeal phthisis is hopeless, but results show that it is safest to go on the ground that these cases are sometimes curable; even if treatment fails a thousand times, it may save the thousand-and-first case.

As regards pathology, he believed that the very best microscopists are often wholly unable to determine whether a certain lesion is tubercular or not; the only way to decide the question is by in-

oculation. If this is where science stands to-day, let us take the situation for what it is worth. It is, therefore, more rational to go on the ground that these cases are amenable to treatment. He agreed with all the speakers that the diagnosis is difficult to make, and, after improvement, it is often more difficult to satisfy ourselves that the diagnosis was correct.

Dr. PORTER felt gratified that the position he had taken, and in which he had expected to stand almost alone, had been so well supported by the last speaker in his paper, and in the experience of the different Fellows who had discussed the subject, as the views given in the text-books are generally adverse to his proposition that some cases of laryngeal phthisis are curable. The cases which he had reported from his own practice were such as to satisfy him that they were laryngeal phthisis. All the authors and writers agree as to the character of this disease ; and the condition of the lung also confirmed the diagnosis. These cases are now doing well. Without entering upon the discussion of the question of the curability of tuberculosis, he would merely take the position that these cases may get well, and indeed offer much encouragement. He believed that the observations were worthy of credence and attention.

Dr. BOSWORTH said that in the diagnosis, the club-shaped arytenoids and appearances of infiltration were of value in deciding the presence of tubercular laryngeal phthisis, in its early stage particularly. In treating such cases he believed that the introduction of sponges and brushes into the larynx only increases the tendency to ulceration, and hastens a fatal issue. During the last few years he had not touched the larynx with instruments, in these cases, and in the light of his early experience, he had come to the conclusion that now his patients do much better than before. In reference to pathology, he believed that catarrhal ulceration of the larynx does not exist without some antecedent constitutional cause to account for it. As to prognosis, if these cases are treated by harsh and unjustifiable means the prognosis is bad ; if the larynx is left alone, except the injection of medicated or detergent sprays, the prognosis is better. If the least irritating method of local treatment be adopted, and the patient experiences relief and comfort after the sitting, then the treatment is doing good.

Three years ago he had reported 37 cases of laryngeal phthisis, as arrested ; among them were several in which the club-shaped

arytenoids were present, and in one there was ulceration of the epiglottis. He had now increased his list to sixty cases; and out of it he had seen two or three cases of ulceration of the epiglottis recover, and seven or eight in which there was laryngeal ulceration.

Even in cases in which the progress is not arrested, and improvement does not take place, it is worthy of note that good is done to the patient by relieving the symptoms, and enabling him to eat and sleep in comparative comfort.

He never claimed more in laryngeal phthisis than this: in the early stage we can arrest the disease; but even where ulceration has occurred, he had seen cases get well. In cases where there is well-marked elevation of temperature, he had never seen a case in which, after a while, lung symptoms did not develop and carry off the patient.

Upon motion of the Secretary, the Association adjourned at 5.30 P. M.

In the evening the Association was entertained at a dinner, given by the President, at his residence.

Second day, morning session.

The Association was called to order by the President at 10 A.M.

BUSINESS MEETING.

Present—Drs. Allen, Asch, Bean, Bosworth, Cohen, Daly, Elsberg, Glasgow, Hartman, Jarvis, Johnson, Knight, Langmaid, Lefferts, Lincoln, Porter, Robinson, Roe, Seiler, Shurly, Smith.

Election of Active Fellows being first in order, the President appointed as Tellers Drs. Knight and Bosworth.

The minutes of the last annual meeting, and of meetings of the Council of April 2d and May 9th, were read as follows:

Meetings of the Council during the year 1880–81.

Saturday, April 2, 1881, *New York.*

Present—Drs. Cohen, Lincoln, Bosworth, and Lefferts.

The Clerk presented the names of certain gentlemen for the recommendation of the Council to the Association for election to Active Fellowship.

Ordered: That the following names, with those of their proposers and seconders, and the titles of their inaugural theses, be recommended to the Association, at its next meeting, as proper ones for election to Active Fellowship :

CANDIDATE.	PROPOSER.	SECONDER.
D. B. DELAVAN.	Dr. LINCOLN.	Dr. LEFFERTS.
U. G. HITCHCOCK.	" LEFFERTS.	" BOSWORTH.
G. W. MAJOR.	" COHEN.	" ROBINSON.
E. C. MORGAN.	" COHEN.	" HARTMAN.
H. MYNTER.	" SEILER.	" COHEN.
J. W. ROBINSON.	" SHURLY.	" BOSWORTH.

and that the following gentlemen, not having complied with the requirement of Par. 3, Sec. III of the Constitution, be notified that action in respect to their application is deferred until this requirement is complied with. Said names to lie over for one year :

CANDIDATE.	PROPOSER.	SECONDER.
C. W. CHAMBERLAIN.	Dr. ROE.	Dr. HARTMAN.
F. L. IVES.	" LEFFERTS.	" BOSWORTH.
S. H. CHAPMAN.	" COHEN.	" BOSWORTH.

The Clerk read a letter of explanation from Dr. Wm. Porter, in reference to his failure to present his promised paper, at the meeting of the Association in 1880, requesting that a definite time and place be assigned one, to be read at the forthcoming meeting, 1881.

(See *Archives of Laryngology*, vol. ii, No. 1, p. 66.)

Explanation accepted and request granted.

A similar prohibition, and for the same reasons, existing in the case of Dr. Thos. F. Rumbold, and no explanation having been received, although requested,

Ordered : That no definite time nor place in the published programme of the exercises at the forthcoming annual meeting can be assigned to the paper of Dr. Rumbold, and that said paper can only be received with the understanding that it is to be placed among the volunteer papers to be read at the end of the session.

The Clerk presented the bill of Dr. Roberts for services as stenographer at the last meeting of the Association. Ordered paid.

The Council endorsed the action of Dr. Cohen in securing the

services of Dr. Woodbury as stenographer for the meeting of 1881, at a fee of $75 for the three days' session.

The Council ordered from G. P. Putnam's Sons, publishers, one hundred copies of the Transactions of the Association for 1880; fifty copies to be bound, and fifty unbound.

And the Treasurer was empowered to pay for the same.

The question of publishing as a part of the Transactions of the Association the inaugural theses of candidates was by vote referred to the Association for their decision.

On motion, adjournment.

May 9, 1881, *Philadelphia.*

Present—Drs. Cohen, Glasgow, Hartman, Smith, Lefferts.

It was moved, after the statement of the Treasurer, that the By-Law VII, relating to the non-payment of dues, be enforced in the case of Dr. E. Cutter.

May 10, 1881, *Philadelphia.*

Present—Drs. Cohen, Lincoln, Smith, Hartman, Glasgow, Roe, Shurly, Bosworth, Lefferts.

On motion,

Resolved: That the Council recommend to the Association the names of the following gentlemen for election to Honorary Fellowship:

Morell Mackenzie, London. L. Mandl, Paris.

Karl Stoerk, Vienna.

and the following for election to a Corresponding Fellowship:

M. Krishaber, Paris. L. Schroetter, Vienna.

R. Voltolini, Breslau. Felix Semon, London.

Dr. Daly's excuse for the non-reading of his announced paper was received and accepted.

GEORGE M. LEFFERTS,
Clerk.

On motion, the minutes were adopted.

The Treasurer, Dr. Geo. M. Lefferts, of New York, read his report, which showed a balance to the credit of the Association of $123 28.

Receipts, $303 60. Expenditures, $180 32.

Dr. SHURLY, Chairman of the Auditing Committee, reported that the Treasurer's account had been examined and found correct.

REPORT OF TELLERS.

The election for Active Fellows having been held, the Tellers reported all the candidates elected, viz. :

D. B. Delavan, New York. E. C. Morgan, Washington.
U. G. Hitchcock, New York. H. Mynter, Buffalo.
G. W. Major, Montreal. J. W. Robinson, Detroit.

Drs. Delavan, Mynter, and Major then entered the room.

Dr. BEVERLEY ROBINSON, Chairman of the Publication Committee, reported that the committee were unable to state why the first volume of the Transactions had not yet appeared, but hoped that it would be issued within a very short period. Much correspondence had been carried on with Dr. Rumbold, and also with the authors, soliciting copies of papers read at the first meeting; a number of proofs were read, and altogether the committee had gone to a great deal of trouble. The committee suggested that it should be authorized to have the volume reprinted, in case it should not appear in uniform style with the second volume.

The report was accepted, and the committee continued for another year, on motion of Dr. Shurly.

The Committee on Nomenclature, consisting of Drs. Cohen, Knight, Robinson, Cutter, Hartman, and Smith, presented a report, which was read by Dr. Knight.

On motion of Dr. Bosworth, it was resolved that seventy-five copies of this report be printed for distribution among the Fellows and Corresponding Fellows for their consideration prior to the next meeting of the Association. It was further resolved that the committee should be empowered to complete the report by including the regions of the pharynx and nose, and incorporate these terms with the report presented prior to its publication.

Dr. FRANK H. BOSWORTH presented his annual report as Librarian as follows :

The Librarian would report that since the annual meeting in 1880, there have come into his possession some 35 papers and pamphlets, the titles of which are contained in a supplementary list to this report.

The Librarian regrets to say that there has not been the same amount of interest shown this year in the project of the formation of a library as seemed manifest last year, and that the contributions have not been large; especially is this true of the

active members of the Association. This is much to be regretted, as we have in the library a permanent place of deposit for our various contributions to current literature, and where it should be a matter of especial interest and duty for each member to add his quota to a collection, the value of which will increase every year.

On motion, the report was accepted.

The Nominating Committee presented the following report:

For President, Dr. F. I. Knight, of Boston.

For Vice-Presidents, Dr. E. S. Shurly, Detroit; Wm. Porter, St. Louis.

For Member of Council, Dr. Harrison Allen, Philadelphia.

Next place of meeting, Boston.

(The committee subsequently asked permission to withdraw so much of the report as referred to the place of meeting, which was granted.)

On motion of Dr. Elsberg, the same committee was authorized to nominate delegates to attend the session of the Sub-Section on Laryngology of the International Medical Congress, at London.

The President announced that the Council had referred to the Association, the question "Shall the Theses of Candidates be published as parts of the Transactions of the Association."

After considerable discussion it was resolved, on motion of Dr. Elsberg amended by Dr. Roe, that the question of the publication, in the Transactions, of inaugural theses, shall be left in each individual case to the discretion of the Council, at each annual meeting.

The list of candidates for Honorary and Corresponding Fellowship was now presented by the Council.

On motion of Dr. Elsberg, the election of Honorary and Corresponding Fellows was appointed to take place immediately after the election of officers on the last morning of the meeting.

Dr. JOHNSON, of Chicago, nominated M. Mannheimer, of Chicago, for Active Fellowship in the Association.

There being no further business, the regular order of exercises was resumed.

The first paper was that of Dr. L. Elsberg, of New York, a "Contribution to the histology of the thyroid cartilage"; he also gave an "Exhibition and description of a new laryngo-

scopic apparatus and of a galvanic accumulator for illumination and cautery purposes." The latter was the apparatus of Trouvé, which the lecturer recommended for the purposes named; the former consisted of a lantern, bearing lenses and a reflector, with attachments for either an oil lamp, gas or lime light. The application of the calcium light, a water diaphragm being introduced to intercept the heat rays, was stated to be essentially the same as in the apparatus of Lennox Browne slightly modified by the lecturer, who considers it perfectly safe, manageable, and entirely satisfactory.

Dr. Elsberg's Paper.

SECTION I.—*Historical.*

FROM the earliest time of histology to the present, true cartilage, such as the thyroid cartilage, has been looked upon as one of the simplest tissues. To distinguish it from other kinds of cartilage, in which either a fibrous or a reticular aspect has been recognized, it is called hyaline, *i. e.*, resembling glass. The description of its structure, by MECKAUER in 1836,[1] is essentially as that by KLEIN in 1880,[2] viz., that it consists of a firm homogeneous basis-substance, in which are imbedded numerous small cartilage-corpuscles. Meckauer wrote before the cell-doctrine, which has exercised so powerful an influence upon the medical mind, had been thought of. Indeed, that doctrine itself, as its founder, Schwann,[3] has recorded, was based to a large extent upon investigations of the constitution of cartilage. After J. Müller had described cartilage-corpuscles that were hollow, and Gurlt had spoken of some as vesicles, when Schwann had succeeded, as he thought, "in actually observing the proper wall of the cartilage-corpuscles, first in the branchial cartilages of the frog's larvæ, and subsequently also in the fish," he was led by these and other researches to conjecture "that the cellular formation might be a widely extended,

[1] De penitiori cartilaginum structura symbolæ. Diss. anat.-phys., auctore M. Meckauer, M.D. Breslau: Schultz & Co., 1836, Tab. 4, pp. 16.

[2] Atlas of Histology. London: Smith, Elder & Co., 1880, p. 48.

[3] Mikroskopische Untersuchungen über die Uebereinstimmung in der Structur und dem Wachsthume der Thiere und Pflanzen., von Dr. Th. Schwann. Berlin: G. E. Reimer, 1839, pp. 270. Microscopical researches into the accordance in the structure and growth of animals and plants. Translated by Henry Smith. London: Sydenham Society, 1847. Introduction.

perhaps a universal principle for the formation of organic substances."

Schwann considered that the cartilage-corpuscles, or cartilage-cells as they were thenceforth called, are imbedded in a matrix which is capable of producing the cells, and which he therefore called cytoblastema. Goodsir, Naegeli, and finally Virchow advanced the histology of cartilage in so far as they claimed that the cartilage-cells can not possibly arise from the matrix or intercellular substance. Even Virchow adhered, however, to the idea of Schwann, that the cartilage-cell is a vesicle filled with a more or less transparent fluid, in which is suspended the nucleus; and, although he was aware of the life of the cell in general, nothing was suggested by him as to the life of cartilage. It is true Donders and H. Meyer had observed that the cells of hyaline cartilage were capable of proliferation[1]; nevertheless the idea became prevalent, more perhaps from implication, because on account of the absence of blood-vessels it was believed not liable to inflammation, than from any direct statement to that effect, that cartilage was devoid of life. The vitality of cartilage-corpuscles was made clearly probable by the observation of the effect of electrical shocks upon them, by Heidenhain,[2] and by Rollett,[3] and the investigations of Reitz,[4] Boehm,[5] Hutob,[6] and Bubnoff,[7]—investigations which, except Boehm's, were made under Stricker; it was proved positively by Heitzmann in 1873.[8]

With the question whether or not the so-called cartilage-"cell" is alive, another question arose, viz., how can so

[1] (Mueller's) *Archiv für Anatomie*, 1846.

[2] Studien aus dem physiologischen Institut zu Breslau, ii Heft, 1863.

[3] Stricker's Handbuch der Lehre von den Geweben: Article "Knorpelgewebe," 1868.

[4] Sitzungsber. der K. K. Akademie der Wissensch. in Wien., Bd. 55, 1867.

[5] Beiträge zur normalen und pathologischen Anatomie der Gelenke. Inaug.-Dissertation, Würzburg, 1868.

[6] "Untersuchungen über Knorpelentzündung." *Wiener. med. Jahrbücher*, 1871, p. 399.

[7] Beiträge zur Kenntniss der Structur des Knorpels. Sitzungsber. der K. K. Akad. d. Wiss. in Wien., Bd. 57, 1868.

[8] "Das Verhältniss zwischen Protoplasma und Grundsubstanz im Thierkörper." Sitzungsber. d. K. K. Akad. d. Wien. Wien., Bd. 67, 1873, and *Wien. med. Jahrbücher*, 1873.

isolated a corpuscle (imbedded in a firm "intercellular" substance) obtain nutrition? It was assumed that the nourishing liquid reaches the corpuscle either by diffusion or else through canals, or clefts, or fissures in the homogeneous basis-substance. The idea of the existence of juice-channels originated with Von Recklinghausen. He found in silver-stained preparations of the cornea, communicating colorless spaces on a dark background, and believing that the cornea consisted of fibrillary tissue knit together by a cement-substance, he thought that this cement-substance was tunneled by a system of communicating canals, "*Saft-Kanälchen*," and that it is this system of canals which is not stained by silver. Innumerable investigations, under all sorts of circumstances, have been undertaken to settle satisfactorily whether preformed juice-channels exist in cartilage, or whether juices can be imbibed without such. In lower animals corresponding canals had long been reported to be found, by Queckett[1] and by Bergmann[2] in cephalopodes, and by Leydig[3] in various fishes; and certain pathological observations by Virchow,[4] Zahn,[5] Cornil and Ranvier,[6] and Rindfleisch,[7] as well as senile changes studied by Weichselbaum,[8] seemed to point to their presence in man. Pigment particles were introduced into the circulation in the hope of discovering the manner in which they penetrate the tissue of cartilage, by Gerlach,[9] Maas,[10] Arnold,[11] and Nykamp and

[1] Catalogue of the historical series in the museum of the Royal College of Surgeons, 1850, vol. i, p. 102.

[2] Disquisitiones microscopicæ de cartilaginibus in specie hyalinicis. Inaug.-Dissert., Dorpat, 1850.

[3] "Zur Anatomie und Histologie der Chimæra monstrosa." *Mueller's Archiv*, 1851, p. 242.

[4] "Ein Fall allgemeiner Ochronose der Knorpel und knorpelähnlichen Theile." *Virchow's Archiv*, xxxvii, 1866, p. 212.

[5] "Über Pigmentinfiltration des Knorpels." *Ibid.*, lxxii, 1878.

[6] Manuel d' histologie pathologique, Paris, 1869, p. 427.

[7] Lehrbuch der pathologischen Gewebelehre, Leipzig, 1878, p. 553.

[8] Sitzungsber. der K. K. Akademie d. Wiss. in Wien., Bd. 75, 1877.

[9] Ueber das Verhalten des indigschwefelsauren Natrons im Knorpelgewebe lebender Thiere. Erlangen, 1876.

[10] "Ueber das Wachsthum und die Regeneration der Röhrenknochen." *Archiv für klinische Chirurgie*, xx, 1877.

[11] "Die Abscheidung des indigschwefelsauren Natron im Knorpelgewebe." *Virchow's Archiv*, lxxiii, 1878.

Treub;[1] Küttner, with the same end in view, introduced solutions into the trachea and examined the bronchial and tracheal cartilages[2]; and Hénoque,[3] Budge,[4] Tizzoni,[5] and others, forcibly injected liquids as well as solid particles into the tissues. The results of these experiments, and of examinations with various reagents, are contradictory of each other: For instance, while Bubnoff,[6] Hertwig,[7] Hénoque,[8] Loewe,[9] Thin,[10] Ewetzky,[11] Petrone,[12] Budge,[13] Nykamp,[14] Fürbringer,[15] and a number of others consider the existence of canals in the basis-substance of cartilage proved by their experiments and treatment of their preparations with silver nitrate, gold chloride, hyperosmic acid, chromic acid, ammonia bichromate, etc., etc., investigations by exactly the same means have convinced Sokolow,[16] Retzius,[17] Colomiatti,[18] Brückner,[19] Toldt,[20]

[1] "Beitrag zur Kenntniss der Structur des Knorpels." *Archiv für mikroskop. Anatomie*, xiv, 1877.

[2] "Die Abscheidung des indigschwefelsauren Natron in den Geweben der Lunge." *Centralblatt f. d. med. Wiss.*, 1875, No. 42, p. 268.

[3] "Structure des cartilages." *Gazette médicale*, 1873, p. 589; p. 617.

[4] "Die Saftbahnen im hyalinen Knorpel." *Archiv für mikroskop. Anatomie*, xiv, 1877; xvi, 1879.

[5] "Sulla istologica normale e patologica delle cartilagini ialini." *Archivio per le Scienze Mediche*, ii, 1877.

[6] *Loc. cit.*

[7] "Ueber die Entwickelung und den Bau des elastischen Gewebes im Netzknorpel." *Archiv für mikroskop. Anatomie*, ix, 1873, p. 80.

[8] *Loc. cit.*

[9] "Ueber eine eigenthümliche Zeichnung im Hyalinknorpel." *Wiener med. Jahrbücher*, 1874.

[10] "On the structure of hyaline cartilage." *Quarterly Journal of Microscopical Science*, vol. xvi, 1876.

[11] "Entzündungsversuche am Knorpel," Vorläufige Mittheilung, *Centralblatt f. d. med. Wiss.*, 1875, No. 16; Untersuchungen aus dem path.-anat. Institut zu Zürich, iii Heft, 1875.

[12] Sulla struttura normale e patologica delle cartilagine e degli epitelii. Napoli, 1876.

[13] *Loc. cit.* [14] *Loc. cit.*

[15] "Ueber das Gewebe des Kopfknorpels der Cephalopoden." *Morpholog. Jahrbücher*, iii, 1877, p. 453.

[16] Ueber den Bau des Nasenknorpels," etc., ref. Canstatt's Jahresbericht, 1870, p. 24.

[17] "Bitrag till Kännedomen um brusknäfnaden." *Nord. med. Arkiv.*, iv, 1872.

[18] "Sulla struttura delle cartilagini ialini e fibroelastica reticolata." *Gazetta Cliniche di Torino*, 1873, No. 32; *Rivista Clinica di Bologna*, 1874, No. 5; *Giornale della Acad. di Torino*, 1876.

[19] "Über Eiterbildung im hyalinen Knorpel." Inaug.-Dissert., Dorpat, 1873.

[20] Lehrbuch der Gewebelehre, Stuttgart, 1874, p. 143.

Genzmer,[1] Gerlach,[2] Tillmanns,[3] Tizzoni,[4] and others, of just the contrary; and there is a third party which believes with Arnold[5] that the basis-substance is made up of fibrillæ, that there are delicate fissures between the fibrils, that these fissures penetrate the capsule, and that "the nutrient material passes through these interfibrillar and intracapsular fissures into the pericellular space." Flesch, the latest writer on the subject, adds[6] that these fissures need not necessarily be, and in fact are not, empty, but that they are occupied by the interfibrillar cement-substance, which, being of a "viscous-soft" (*zähweich*) material, permits the imbibition and conveyance of the nutrient liquid.

It is claimed that hyaline basis-substance consists of fine fibrils so closely held together by a cement-substance that the mass appears to be homogeneous. This idea, though not entirely novel, as the older anatomists seem to have had it,[7] has been brought forward by Tillmanns, and is doubtless original with him.[8] It is said that the interfibrillar cement-substance can be dissolved out by certain reagents and then the fibrillation seen under the microscope. According to the varying arrangement and interrelation of the fibrillæ, Tillmanns speaks of three types of cartilage tissue, viz., parallel-fibery, netform, and lamellous. No doubt he saw under the microscope appearances which underlie the distinction which he thus made, but, unfortunately, he misinterpreted these appearances. Nevertheless, he has had followers. Thus Baber reported[9] that, having undertaken

[1] "Ueber die Reaction des hyalinen Knorpels," etc. *Virchow's Archiv*, lxvii, 1875; *Centralblatt f. Chirurgie*, 1875, No. 146.

[2] *Loc. cit.*

[3] "Beiträge zur Histologie der Gelenke." *Archiv für mikroskop. Anatomie*, x, 1874, pp. 354, 435.

[4] *Loc. cit.*

[5] *Loc. cit.*

[6] Untersuchungen über die Grundsubstanz des hyalinen Knorpels. Würzburg: A. Stuber, 1880.

[7] See: Wm. Hunter "On the structure and diseases of articular cartilages," Philosoph. Transactions, vol. xlii, p. 514, London, 1742–43; M. de Lasone, "Second memoire sur l' organization des os," Mem. de l' Academie Roy. des Sciences, Tome 69, Paris, 1752; more recently also: Hoppe, *Virchow's Archiv*, v, p. 175.

[8] *Loc. cit.*, p. 401; and "Ueber die fibrilläre Structur des hyalinen Knorpels." *Archiv f. Anatomie u. Physiologie*, Anat. Abth., 1877, p. 9.

[9] "On the structure of hyaline cartilage." *Journal of Anatomy and Physiology*, vol. x, part i, October, 1875.

to test the accuracy of Tillmanns' assertions, and not succeeding in finding the fibrillation, although he had followed Tillmanns' method of maceration, he accidentally made momentary pressure on the glass cover, and thereupon obtained satisfactory proof of the fibrillar constitution of the basis-substance. Reeves[1] has also convinced himself of the existence of normal fibrillation in human cartilage. Ziegler seems to have done the same[2]; and Flesch regards it as a matter beyond question. He speaks of it as "generally known and most easily demonstrable."[3] Furthermore, he thinks that some portions, or perhaps layers, of the basis-substance are more compact than others, and that this may also account for the facility of cleavage in determinate directions.

Leidy insisted[4] that the basis-substance of hyaline cartilage has a peculiar filamentous structure, but his interpretation, that the granular filaments run simply parallel to each other, does not cover the truth and has not attracted any attention. With the exception of Leidy, however, no one, until nine years ago, seems to have questioned the homogeneousness of the mass of basis-substance in which the separate corpuscles were supposed to be imbedded. In 1872, Heitzmann[5] first proved the presence of a network structure in the basis-substance; one year later he discovered the structure of so-called protoplasm to be reticular, and claimed that both the reticulum of the protoplasm and that of the basis-substance are identical in nature; viz.: that both consist of the living matter proper. Heitzmann says that examination, by means of an immersion lens No. 10, of a thin section of fresh articular cartilage, placed in a one-half-per-cent. solution of common table-salt reveals details heretofore overlooked, viz.: The bodies of the cells appear finely granular, bounded by a somewhat denser

[1] "On the structure of the matrix of human articular cartilage." *British Medical Journal*, Nov. 11, 1876, p. 616.

[2] Bericht der 50. Naturforsch. Versammlung zu München, 1877.

[3] *Loc. cit.*, p. 74.

[4] Proceedings of the Academy of Natural Sciences of Philadelphia, vol. iv, No. vi, 1848; and *American Journal of Medical Sciences*, April, 1849, p. 282.

[5] *Wiener Medizin. Jahrbücher*, Heft iv, 1872.

layer. The contour of a cartilage-cell being accurately in focus, there appears between it and the basis-substance a light, very narrow rim, which is traversed by numerous extremely delicate, radiating, grayish thorns or streaks. All these thorns are conical, the broad base emanating from the body of the cell and the thin point directed toward the basis-substance. Wherever two cells lie close together, the light rim between them is pierced by grayish threads. When in a cell the nucleus is distinctly seen, a narrow light rim is found to surround it, which on being sharply focused, also shows radiating thorns, the basis of which emanate from the nucleus and the points of which blend with the protoplasm of the cell. On carefully examining the basis-substance, a very delicate, as if granular, configuration is recognizable, dark fields alternating with light ones, and in some places the impression is given that the light fields form ramifications, or even a delicate network. Heitzmann also described and figured specimens stained with silver nitrate and gold chloride, and announced the following conclusions: viz.: "The bodies of cartilage-cells have radiating offshoots. These offshoots form a delicate granular reticulum in the basis-substance. At the points of junction of hyaline cartilage with fibrous cartilage and with periosteum, the offshoots are very large and broad. They connect neighboring cells either directly or else indirectly through intervening delicate offshoots." Somewhat similar appearances had previously been more or less vaguely described, but not properly interpreted or appreciated, by Remak,[1] by Heidenhain,[2] by Broder,[3] by Fromann,[4] and possibly by others.

After Heitzmann, Hertwig[5] observed processes of living matter penetrate the basis-substance of reticular cartilage; and Colomiatti stated[6] that he had repeated the investiga-

[1] "Ueber die Entstehung des Bindegewebes und des Knorpels." *Archiv für Anatomie*, 1852, p. 63 *et seq.*

[2] *Loc. cit.*

[3] Ein Beitrag zur Histologie des Knorpels. Dissert., Zürich, 1865.

[4] Untersuchungen über die normale und pathologische Anatomie des Rückenmarkes. II Theil. Jena, 1867, pp. 29, 30.

[5] *Loc. cit.*

[6] *Loc. cit.*

tions of Heitzmann, but had failed to find cell offshoots in hyaline cartilage either after treatment with gold or silver or *in vivo*, although he had seen cartilage-cell offshoots in other than hyaline cartilage.

I have had the opportunity to repeat Heitzmann's investigations under his own eye and with his assistance, but the results as to their correctness at which I arrived, were, to the best of my belief, uninfluenced by him. I reported in 1875[1] that I had seen the network structure in the corpuscles of hyaline cartilage, in the nucleus and in the basis-substance, exactly as Heitzmann had described it two years previously.[2] "If the nucleus of the cartilage-corpuscle be visible, it appears either homogeneous or composed of a dense meshwork of living matter. From its periphery proceed fine conical thorns, which lead to a meshwork pervading the whole corpuscle, the threads of which form, at the point of intersection, thickenings, granules, or small clumps of living matter. In the lighter-looking narrow seam, existing between the corpuscles and the surrounding matrix, we may also recognize fine threads which go from the periphery of the corpuscle and are lost to the view in the matrix. On examining such a fresh preparation upon the heated stage, we recognize, at a temperature of 86° to 95° F., a continual but very slow change in the living matter of those cartilage-corpuscles which distinctly show the network; the points of intersection of threads move nearer together or go further apart; sometimes a few granules lying close to each other unite into one little lump, so that the threads between them disappear, then the latter reappear, lengthen and shorten; and this change in the form of the interior network continues for some little time, and without any perceptible influence upon the form of the corpuscle as a whole.

"Careful examination of the matrix reveals throughout its whole extent the existence of a very delicate, more or

[1] Transactions of the American Medical Association, vol. xxvi, 1875, pp. 163 and 164.

[2] Untersuchungen über das Protoplasma. II. Das Verhältniss zwischen Protoplasma und Grundsubstanz im Thierkörper. Sitzungber. d. K. K. Akad. d. Wiss. in Wien, lxvii, May, 1873.

less distinct network of living matter; and in many instances the connection of the threads proceeding from the corpuscles with this delicate network can be traced.

"To show the structure of both the cartilage-corpuscles and the matrix still more plainly, we may resort to the method of tinction of preparations by nitrate of silver and chloride of gold, as well as the examination of cartilage during normal calcification, and in its inflamed conditions.

"It is well known that chloride of gold stains living matter dark violet, while nitrate of silver acts upon the matrix, and by darkening it, makes the living matter appear of a light color or colorless. The appearances obtained thus complement each other; and the network proceeding from the corpuscles and ramifying all through the matrix, is seen, with the same magnifying power, as constituted by violet threads and granules in the first case, and by white processes or empty spaces in the second case. [Drawings illustrating both these appearances accompany my article in the American Transactions.] As the deposition of lime salts takes place only in the matrix, the living matter itself remaining free, careful examination during such depositions, especially in cases of artificially produced inflammation, also brings to view the fine network of living matter traversing the matrix."

In January, 1876, Thin's memoir was published,[1] in which he reported that, in particular preparations, he had seen "fine glistening fibres enter the cartilage substance, into which, however, he has not been able to follow them." Again: "The ordinary granular protoplasmic cells of hyaline cartilage are analogous, according to the views of the author, to the stellate cells of the cornea and connective tissue generally." Thin obtained, by silver staining, appearances similar to Heitzmann's, but unfortunately misinterpreted them. He says: "Heitzmann believes that the appearances which he has reproduced are those of a cell and its protoplasmic processes. The author interprets the appearances shown in Heitzmann's own drawings as representing stellate spaces, and sees nothing in them that he can interpret as cell pro-

[1] It is dated August, 1875. *loc. cit.*

cesses; being thus at one with him as regards the fact observed, but differing from him in regard to its interpretation." [1]

In 1879 Spina reviewed the subject.[2] He accorded to Heitzmann the merit of the discovery, but as in the intervening seven years I alone had publicly corroborated it, and he was not aware of that corroboration, he thought that "the existence of cells with solid offshoots in genuine hyaline cartilage is not definitely proved," and undertook to settle the question. After many fruitless attempts he found out a method of examination "by which ramifying cells in hyaline cartilage can be demonstrated not only with ease, but also with certainty." The method and the results, as he has described them, are as follows: "The cartilage, best the articular ends of bones, is placed into alcohol for three or four days; then the sections are made and the examination is conducted in alcohol. From such specimens positive proof is obtained that the cells of hyaline cartilage have solid offshoots. These offshoots emanate mostly from the body of the shrivelled cells, penetrate the basis-substance, and inosculate with offshoots of other cells. Their number and thickness are subject to numerous variations. * * * The cell offshoots do not, as a rule, ramify. * * * Examination with powerful immersion lenses (Hartnack, No. 15) teaches positively that the cell offshoots not only pierce the capsule, but that the capsule extends also to the offshoots themselves, so that at their origin they are surrounded like the cell body by a wall. * * * Upon adding a drop of glycerine to the alcohol specimen, or on staining it after one of the usual methods, the cell offshoots disappear more or less rapidly; hence, it is clear that the hyaline, structureless aspect of the cartilage basis-substance, is really due to the methods of preparation hitherto in use, while, when examined in alcohol, as above described, the cell offshoots invariably become visible." He added that he has succeeded a few times in seeing—faintly only, it is true—the same structure in living hyaline cartilages. On incorporating, for a

[1] *Loc. cit.*, p. 22.

[2] "Ueber die Saftbahnen des hyalinen Knorpels." Sitzungsber. der K. K. Akad. d. Wiss. in Wien, lxxx, Abth. iii, Nov., 1879.

sufficient length of time, carmine into the body of frogs, Spina found cartilage-corpuscles of which the nuclei, the body, and the offshoots had taken in some of the coloring matter. As the offshoots disappeared and the carmine granules seemed to lie in the hyaline basis-substance when a drop of glycerine was added, it is easy to see how previous investigators came to be misled into supposing the coloring matter to have passed into the hyaline substance, and into interfibrillar fissures. With excessive caution, Spina adds: "Whether they (the coloring particles) can also move along outside of the cell offshoots has not yet been proved."

In the same year Prudden,[1] and, in 1880, Flesch,[2] also described cilia-like processes of cartilage-corpuscles; and the latter admitted that in exceptional cases he had succeeded in tracing them more or less distinctly into the basis-substance.

Section II.—*Personal Investigation.*

I. Having, as already detailed, familiarized myself with the investigation of cartilage tissue, I entered upon the examination of the laryngeal cartilages. Of the many specimens examined, I shall now describe a few of the thyroid. Longitudinal sections through the lateral plates of the thyroid cartilage of a man of about 25 years, hardened in chromic acid and stained with an ammoniacal carmine solution, exhibit with low powers of the microscope (150 to 200 diam.) the following: The cartilage-corpuscles, either single, in pairs, or in groups of from three to six, or even more, are imbedded in a basis-substance which, for the most part, is homogeneous-looking or indistinctly granular, but in some portions finely striated. The homogeneous or indistinctly granular-looking basis-substance is that which bears the name hyaline basis-substance; the striated is termed fibrous, although actual fibrillæ appear only on the edges of the specimen, or when the tissue is torn and mutilated. The fibrous

[1] "Beobachtungen am lebenden Knorpel." *Virchow's Archiv*, lxxv, 1879, p. 185.

[2] *Loc. cit.*, pp. 59–63.

basis-substance is intermixed, without any regularity, with the hyaline, and usually sharply separated from it. Not infrequently a number of cartilage-corpuscles, or groups of cartilage-corpuscles, are surrounded by fibrous basis-substance, the striations of which run, as a rule, in a sagittal direction, *i.e.*, vertical to the surface. Within the fibrous basis-substance the cartilage-corpuscles are at most points sparsely scattered or absent; here and there, however, they are more numerous, in rows or elongated, corresponding to the direction of the striations. It also occurs that striated portions of the basis-substance contain very minute globular or oblong corpuscles, sometimes to such an extent that the striated structure is concealed by the large number of these corpuscles.

Fig. 1 exhibits the appearance of the constituent parts, with an amplification of 100 diam. The fibrous portion is seen to occupy the centre of a longitudinal section of one of the plates of the thyroid cartilage. This is not regularly the case in every cut, and was exceptionally well marked in the section from which the drawing was made. In some sections the fibrous cartilage is altogether absent, but every laryngeal cartilage contains some fibrous mixed with hyaline portions. *A*, perichondrium toward the mucous membrane. *B*, perichondrium toward the skin. *F*, fibrous portion of cartilage. *H*, hyaline portion of cartilage.

Under higher magnifying powers (500 to 600 diam.) single cartilage-corpuscles exhibit features, frequently before described, with coarsely granular nuclei. Around the nucleus finer granules are visible. At the periphery of the cartilage-corpuscle there are several strata of higher refracting power, especially the zone nearest the basis-substance, which, as a rule, appears very shining and is what is termed the capsule of the cartilage-corpuscle. Not infrequently the cartilage-corpuscle is very indistinct, being but slightly more granular than the surrounding basis-substance; then almost nothing but the nucleus marks its presence and its place. In twin formations of cartilage-corpuscles, which are often met with, the zone of division between the two corpuscles is identical with that surrounding both, in the shape of a

capsule. Of the same nature are the zones of division that are seen in clusters of cartilage-corpuscles.

The so-called hyaline basis-substance throughout its whole extent now appears finely granular; as a rule, the granulation is more distinct midway between the corpuscles than in their immediate vicinity. The fibrous portions of the basis-substance are seen to be made up of extremely minute spindles, which, by being grouped longitudinally, produce the aspect of striation. The spindles or fibres are separated from each other by light rims, and both the spindles and the rims look finely granular. Between the spindles may often be seen small globular bodies, sometimes scattered, sometimes in clusters, of which the size and shape greatly vary, reaching occasionally the size and shape of a regular cartilage-corpuscle. In some striated fields blood-vessels, both arterial and capillary, can be seen; the former with the characteristic muscle-coat, the latter with the endothelial wall, besides holding red blood-corpuscles in their calibres.

Fig. 2, representing the fibrous portion of thyroid cartilage amplified 600 diam., shows *C*, a cartilage-corpuscle surrounded by a dense basis-substance; *G*, granules of living matter in a dense fibrous structure; *B*, a capillary blood-vessel; and *V*, a small vein.

The highest powers of the microscope (1000 to 1200 diam.) reveal the reticular structure of cartilage-corpuscles, as it is known since 1873. All granules within the nucleus and all granules within the corpuscle are uninterruptedly connected by delicate threads. The intranuclear network is connected with the corpuscular reticulum by radiating conical spokes traversing the light rim around the nucleus; and, at the periphery of the corpuscle, similar conical spokes pierce a narrow light rim and enter the basis-substance, in which, especially in the highly refracting zone, termed capsule, they are usually lost to sight. Cartilage-corpuscles even which have become so pale as to leave only a dim trace of their former contour visible, still exhibit more or less distinct traces of the reticular structure.

The same structure may be seen throughout the so-called

hyaline basis-substance—more distinct in the middle of the space between the corpuscles than immediately around the corpuscles themselves. The fibrous portion of the basis-substance has also a reticular structure. The bodies of the slender spindles show a network without the application of any reagent, and the light rims between the spindles are traversed by delicate threads running in a vertical direction to the longitudinal diameter of the spindles. All granules and lumps scattered through the fibrous basis-substance are surrounded by light rims, which are pierced by conical spokes inosculating with the reticulum of the neighboring spindles.

The reticular structure of cartilage-corpuscles, *C C*, twin-formations; the indistinct reticulum in hyaline basis-substance, *B*; and a number of small granules of living matter in fibrous basis-substance, *F*, the spindles and granules being connected by fine threads, are exhibited in fig. 3 which represents a sagittal section of the thyroid cartilage of an adult amplified 1200 diam.

I have treated sections of the same cartilage after they had for several days been washed out with distilled water, with a one-half-per-cent. solution of gold chloride, whereupon they assumed a dark purple color, and showed all the features described, somewhat more distinctly than simple carmine preparations. I deem their detailed description unnecessary.

II. When I became acquainted with Spina's researches, cited in my historical sketch, I deemed it of importance to repeat the examination according to his method. I therefore placed a larynx immediately after removal from the body of a girl, aged 24 years, into strong alcohol, and after four days made thin sections from the thyroid cartilage in a horizontal direction, transferred them in alcohol to the slide, and examined them with both low and high powers, adding from time to time a drop of strong alcohol to prevent the specimen from drying. The appearance presented by such a specimen is truly surprising. As a matter of course, the cartilage-corpuscles are shrivelled up so that more or less space is left between their jagged periphery and the border of the basis-substance. With an amplification

of 500 diam., the basis-substance is seen pierced by light filaments, which, in many instances, can be traced through the intervening space into the body of the cartilage-corpuscle. Most of these filaments radiate around the corpuscle, and immediately after penetrating the basis-substance, diverge and form a reticulum throughout its extent. Cartilage-corpuscles located near each other, are directly connected by non-ramifying and occasionally by ramifying offshoots, or by bundles of such offshoots of a more or less parallel course. The reticulum in the basis substance is either radiating or irregularly arranged around the corpuscle. Contrary to the assertion of Spina, the filaments or offshoots do, as a rule, ramify, except those that directly connect the neighboring corpuscles. Sometimes thick bundles of offshoots emanate from opposite poles of the corpuscles, while intervening portions of the periphery are almost devoid of offshoots. Toward the periphery of the thyroid cartilage, —where, as is well known, the cartilage-corpuscles elongate, becoming smaller and spindle-shaped and more or less parallel to each other,—the offshoots are given off rectangularly to the axis of the corpuscles.

High magnifying powers, immersion lenses No. 10 and No. 12, conclusively prove the connection of the offshoots with the cartilage-corpuscles. Portions of the basis-substance which, with lower powers, looked only granular, now show a delicate reticulum, which, even when coarser offshoots are wanting, is connected with the cartilage-corpuscle through delicate, and more or less conical, offshoots from the surface of the corpuscle.

The light interstices between the fibres of striated basis-substance, are also traversed by delicate grayish thorns. Such thorns are visible even in the perichondrium. Through the fibrous bundles of the perichondrium run, in a nearly rectangular direction, delicate light streaks, while the interstices between the bundles and the spaces left between the corpuscular elements and the bundles, exhibit delicate conical grayish threads, the direction of which corresponds to these light streaks.

The highest powers of the microscope disclosed in one of

the specimens examined another feature in the hyaline basis-substance, viz., the presence of a number of granules or minute lumps of varying shape, some interwoven with the direct offshoots of the corpuscles, and some with the threads forming the finer network of the basis-substance. They appeared to be thickened points of intersection, knots or nodes, composed of the same material as the offshoots and threads themselves. They were unquestionably granules of living matter. I found their greatest development in a case examined without Spina's method, a case which I shall describe presently. Fig. 4 shows a horizontal section of a thyroid cartilage, which was hardened in alcohol and examined by the method of Spina, with an amplification of 1200 diam. *C*, shrivelled cartilage corpuscle; *O*, longitudinal offshoots connecting cartilage corpuscles; *R*, reticulum in the hyaline basis-substance; *G*, granules of living matter, which are seen to be part and parcel of the reticulum.

III. The observation which I am now about to record, was made in specimens of the thyroid cartilage removed from the body of a rather stout man, 48 years old. After having been hardened in chromic acid solution, without any other reagent, they exhibited formations in the basis-substance which, so far as I am aware, have never before been described. I have alluded to them as found in one of the specimens examined, with the highest powers of the microscope, by the alcohol method of Spina. These formations are shown in fig. 5, with an amplification of 600, and in fig. 6, with an amplification of 1200 diameters.

As to the cartilage corpuscles in these specimens, many of them were larger and more coarsely granular than are commonly observed: otherwise, their characters and the arrangements of the basis-substance, both so-called hyaline and fibrous, were like those described before. The intranuclear, intracorpuscular, and intercorpuscular networks were with high powers well shown.

The very remarkable feature was that with quite low power the basis-substance was seen to be speckled and studded with granules or lumps varying from that of a point at the limit of the visible to that approaching the dimensions

of a regular cartilage corpuscle. Of course, no one must for a moment think of any thing like the pathological conditions that have been described either as granular degenerations of the cartilage basis-substance, or as incrustations of the corpuscles. Not only were the appearances entirely different and the cartilage healthy—as otherwise ascertainable as well as from the known condition of the man and of the cause of his death—but the true nature of the lumps was made perfectly clear by examination with higher powers.

When magnified to the extent of 600 diameters, the same relative appearance was preserved. The lumps in the basis-substance still varied in size from the limit of the visible to the magnitude of ordinary cartilage corpuscles; but in all the larger lumps, differentiations were visible which approached them in structure as well as in size to cartilage corpuscles. In some, one or more vacuoles, in others, a small or large nucleus, or even two nuclei, could be made out; and a few (*i. e.*, occasionally one in some fields) showed irregular twin, or even triplet formation.

The highest power threw a wonderful light upon these lumps. They were seen to be masses of living matter. The larger showed a network in their interior, some without and some with a nucleus, and the latter, when present, was sometimes homogeneous and sometimes reticulated. All the lumps, except the smaller, were surrounded by a distinct light seam, through which radiating conical offshoots passed to the network in the basis-substance; and all of them, even the smallest, sent delicate offshoots connecting them with that network, or were themselves part and parcel (*i. e.*, thickened points of intersection of the threads) of that network.

After having studied such a specimen, it was easy to interpret correctly the intrareticular granules seen in the alcohol specimen represented in fig. 4.

Fig. 5 shows a horizontal section of the thyroid cartilage of a robust, rather stout man, 48 years old, amplified 600 diam. *C C*, cartilage corpuscles; *G*, granules or lumps scattered through the hyaline basis-substance; *F*, fibrous portion of cartilage.

Fig. 6 shows a field of the same specimen with an amplification of 1200 diam. *C*, cartilage corpuscle with distinct reticular structure surrounded by a dense basis-substance, the so-called capsule; *B*, hyaline basis-substance with faint reticular structure; *G*, granules or lumps scattered through the hyaline basis-substance, connected with its reticulum.

Section III.—*Deductive.**

I.—Regarding the essential structure.

Instead of being a mass of basis-substance in which a number of cartilage corpuscles are imbedded, hyaline cartilage is a filigree of living matter, in the meshes of which lumps of basis-substance are imbedded.

The difference between the former and the present view of the essential structure is a radical one. Of its full import I shall say more before the end of this Section.

The number of investigators who have hitherto succeeded in observing cartilage corpuscles sending offshoots into the basis-substance, is very small; the number of those who have succeeded in tracing such offshoots far enough into the basis-substance to observe their forming a network is smaller still. As a rule, this network can be seen only very faintly in fresh specimens, and in specimens obtained either after hardening in chromic acid solution or by other methods; but the staining with gold chloride, as practised by Heitzmann in 1872 brought it more plainly into view, as did also the alcohol method of examination devised by Spina in 1879. The fact that in the intervening seven years many observers have endeavored to see it and failed, may be due, as claimed by Spina, to the method employed. I certainly accord great merit to Spina for his discovery of the effect of the alcohol treatment. Not only is it far simpler in every way than the gold-chloride treatment, but being very easy of employment it is also invariably, so far as my experience hitherto has gone, attended with success. Although many have failed with former methods, I venture to say that no one who follows the directions given

* Read in part before the New York Academy of Medicine, Nov. 17, 1881, and the New York Academy of Sciences, Nov. 21, 1881.

by Spina, but will see the offshoots and the network. A different question, however, than the mere seeing, is the correct interpretation. Spina himself does not follow out the logical consequences of his observations, and Flesch, the author of the latest publication on the subject, goes only so far as to say "the offshoots are lost in the basis-substance, their continuation forms the cement-substance."[1] Perhaps it needed the occurrence of so convincing a case as that recorded in the present paper to place the matter of interpretation beyond dispute. At all events, so far as I am aware, no such clear demonstration of the correct interpretation of the structure of cartilage was ever had before. It is the case which figs. 5 and 6 illustrate. The basis-substance is crowded with lumps visible with even low powers of the microscope without any other reagent than that the larynx had been preserved in chromic acid solution. The lumps are proved to be living matter by all the tests applied to them. Their identity in this respect and uninterrupted filamentous and granular connection with the cartilage corpuscles on the one hand and with the granules and threads of the intercorpuscular network on the other, render doubt as to the interpretation impossible. In other words, we have in hyaline cartilage before us a mass of living matter arranged principally in the form of a granular network with large and small meshes; the large meshes contain chondrogenous firm basis-substance, the small meshes contain liquid, and with their usual but perhaps not essential limiting layer constitute the cartilage corpuscles; thickened points of intersection of the filaments of the network constitute granules; comparatively smaller and larger lumps of living matter exist 1) in the corpuscle as nucleoli and nuclei, the latter also usually already reticulated, and 2) in the basis-substance as granules and small corpuscles.

II.—Regarding the so-called "juice routes" or "lymph-channels."

In my historical sketch I have given a very slight idea

[1] *Loc. cit.*, p. 85. Though published in 1880, Flesch tells us that his work was finished by the end of 1878. Spina's communication is not referred to. Flesch employed gold chloride and other methods.

only of the many and elaborate researches to explain how nutrient juice might reach the cartilage corpuscle, isolated and enclosed in the hard basis-substance. But the truth being that the corpuscle is not isolated and so enclosed, much of the laborious investigation and ingenious reasoning was inapplicable to the case. Of course I do not agree with those who think that cartilage contains a system of tubular or other-shaped channels, either with or without a lining membrane, or that it contains fibrils with interfibrillar cement-substance; *i. e.*, I do not agree with the advocates of either of these views in the sense in which they hold them. But I can see how, in the absence of the guiding knowledge which was supplied by Heitzmann's great discovery of the arrangement of living matter, these different investigators arrived at their conclusions. The minute blocks of basis-substance are separated from each other, and at the same time joined together, by the living matter between them. This is the ground for the interpretation, on the one hand, that there exists a "viscous-soft" cement-substance in the intercorpuscular space capable of conveying juices, and, on the other, that there are canals which hold offshoots of the corpuscles. There is no good reason that I know of, for denying that, in addition to the living matter, a certain amount of liquid may be circulating in such canals, *i. e.*, in the interstices between blocks of basis-substance in the intercorpuscular spaces (and perhaps also around the corpuscles themselves), and that such liquid may carry particles of foreign bodies as charcoal, carmine, cinnabar, etc., far into the cartilaginous tissue; but the liquid is not the essential portion of the contents of these canals, and if experimenters have succeeded in injecting them, the high pressure exerted upon the cartilage must have pushed aside or compressed the living matter. What the "juice routes" are, is clear enough. When Spina had demonstrated that coloring matter is absorbed into cartilaginous tissue by means of the offshoots of the cartilage corpuscles, he need not have added the remark that proof is wanting that the coloring matter can pass through cartilage outside of such offshoots. Such proof will ever remain wanting.

Every cartilage corpuscle, no matter how far removed it be from the source of nutrient supply, is more or less directly connected therewith by means of the filigree of living matter; and this filigree itself constitutes the system of juice routes.

III.—Regarding the intermixture of fibrous basis-substance.

The laryngeal, as well as the tracheal and the costal cartilages, invariably contain, irregularly intermixed with hyaline basis-substance, a number of small or large portions of striated or fibrous basis-substance. Now, notwithstanding the constancy of this occurrence, all authors on the subject describe it as the result either of a degenerative process (Rheiner, Luschka, Schottelius, etc.), or of atrophy (Rokitanski, etc.). According to Schottelius,[1] the process commences in about the tenth or twelfth year of life, and immediately introduces profound destructions of the tissue. He says that the fibres are cylindrical filaments, arranged in general in a parallel direction, but somewhat interlaced. It seems to him that the formation of these fibres occurs when, in a degenerated basis-substance, the cartilage corpuscles perish; perhaps by a coagulation process similar to that by which fibrine is formed. I shall show in the next chapter that Schottelius is mistaken in believing that the intermixture of striated basis-substance is not found until the approach of puberty. But even were he right, I should still contend that I have met with fibrous basis-substance in healthy as well as in diseased hyaline cartilage, and that investigation has not led me to believe that its presence necessarily results from a degenerative process. When, *f. i.*, I find it in every healthy thyroid cartilage that I examine, I cannot but regard its development as normal. Is it not supererogation to look upon a phenomenon as degeneration which is present—as is this, at least so far as my experience goes—in every individual, without exception? I think the presence of fibrous portions must be considered normal in cartilages that appear healthy in every other

[1] Die Kehlkopfknorpel. Untersuchungen über deren physiologische und pathologische Texturveränderungen. Wiesbaden, J. F. Bergmann, 1879, pp. 20, 21.

respect; but I do not mean to deny the possibility of fibrous degeneration with other pathological conditions. In such a case of transformation there must be an intermediate state. All recent researches tend more and more to show that one tissue is never directly changed into another, and I cannot easily believe that what is first a hyaline basis-substance can directly become a fibrous one. Attempts to explain any such direct transformation have proved failures, I believe; and even with our present knowledge of the existence of living matter within the basis-substance, it would be a difficult task to realize that the firm, solid, chondrogenous basis-substance can assume the striated form. The least that would have to be admitted is a melting, *i. e.*, a solution or softening of the basis-substance in certain territories of hyaline cartilage, with accompanying fusion of the living matter, and subsequent splitting up of the mass or masses of the latter into delicate spindles.

That striated portions of hyaline cartilage have in the course of normal development arisen from medullary tissue, present in the fœtal condition, seems far more probable. If this view be adopted, we need not assume with Schottelius and others, that all the blood-vessels found after puberty are necessarily newly formed, but that some have been preserved from the infantile state. Indeed, I have met with appearances in my specimens which seemed strongly to indicate that some of the blood-vessels formerly present in the medullary tissue are now present between the fibres, while others have become obliterated, solidified, and transformed into the basis-substance themselves.

IV.—Regarding the cell-doctrine and the bioplasson-doctrine.

Just as the study of cartilage led to the cell-doctrine, which at the time of its establishment was a great advance in biological science, so the further study of cartilage supplied the basis for a generalization which is a further development, and must take the place, of the cell-doctrine. This is Heitzmann's doctrine of living matter, or, as I have named it, the *bioplasson-doctrine*.[1]

[1] "Notice of the Bioplasson-Doctrine." *Transactions of the American Medical Association*, vol. xxvi, 1875.

When the term "cell" was introduced, by Schleiden and Schwann, into histology, it was believed that the body on ultimate morphological analysis was found to consist of a number of minute vesicles or sacs, enclosing liquid contents in which is suspended a more solid body, the nucleus (this latter frequently containing a smaller similar body, the nucleolus, and this sometimes a still smaller one, the nucleolinus). For fully twenty years this idea has been known to be erroneous. Indeed, Goodsir nearly forty years ago—only a few years after Schwann had established the cell-doctrine and attributed the so-called metabolic or vital power to the cell-membrane—had experimentally determined that the seat of the vital process of secretion is not in the vesicle as such, but in the so-called cell-contents; Naegeli, in 1845, and Alexander Braun, in 1851, had also shown the cell-wall to be comparatively unimportant; and in 1857 Leydig had declared the "cell" to consist only of a soft substance enclosing a nucleus. Certainly, twenty years ago it was proved beyond dispute by Max Schultze, Beale, Hæckel, and others, that what was called a "cell" was not a vesicle, but essentially a jelly-like lump of living matter characterized by the presence of a nucleus; soon after, Robin, Brücke, Kühne, Stricker, and others, conclusively showed that not even a nucleus is an essential constituent of an elementary organism; and biologists were compelled to transfer the power of manifesting vital properties to "living matter" instead of restricting this power to any definite form or element. As long ago as in 1861, Brücke proposed to discontinue the use of the word "cell" as being a misnomer and misleading, and offered as a substitute the expression "elementary organism." Beale proposed, instead, the term "bioplast" to designate any definite mass of living matter, and Hæckel the term "plastid."[1] From the latter I devised the word

[1] The term "Plastid" was intended by Hæckel to include every form-element, whether a cell in the older sense or a lump of living matter without an investing membrane, and whether nucleated or unnucleated. For the nucleated plastid he retained the word cell or cyte, the unnucleated he called cell-like or cytode; and, according to his precise discrimination, there are therefore four kinds of plastids, viz.: 1. Gymnocytodes, or nude cytodes, *i.e.*, unnucleated lumps of living matter without membrane; 2. Lepocytodes, or covered cytodes, *i. e.*, unnucleated plastids with investing membrane; 3. Gymnocytes, or nude cells, *i. e.*, nucleated plastids without investing membrane; 4. Lepocytes, or

"plastidule" as synonymous with ultimate molecule of the substance of living matter.[1] Elementary living matter is called with Dujardin "sarcode," or with Von Mohl "protoplasm," or with Beale "bioplasm," or, still better (because it is a designation etymologically more nearly meaning living, forming matter), "bioplasson."[2] Of these four synonymous terms, protoplasm is best known, but has been used in other senses than to designate merely elementary living matter. I, therefore, think that bioplasson is to be preferred.

According to Drysdale,[3] Dr. John Fletcher of Edinburgh was the first[4] who clearly abandoned the idea that the material elements of an organism require the addition "of an immaterial or spiritual essence, substance, or power, general or local, whose presence is the efficient cause of life," and who arrived at the conclusion that "it is only in virtue of a specially living matter, universally diffused and intimately interwoven with its texture, that any tissue or part possesses vitality." He denied vitality to any gaseous or purely liquid fluid, and any hard or rigid solid; and thought the only truly living matter consisted "of the gray matter of the ganglionic nerves, which he held to be universally diffused, and the gray matter of the brain and spinal marrow." He described it as a "nitrogenous, pulpy, translucent, homogeneous matter, yielding, after death, fibrin." "Chemical analysis, accordingly, must be considered as useful in showing us, not what such matter *was composed of* while it possessed vitality, but what it is composed of *afterward*." "Not only is every vital action traced to molecular change, and to consumption and regeneration of this struc-

covered cells, *i. e.*, cells with a cell-wall. The progress of histology has made these distinctions for that department of less value than they were when originally made, but they are still very useful for natural history purposes.

[1] See *London Monthly Microscopical Journal*, 1872, p. 182; "Proceedings American Association for the Advancement of Science," 1874; and "On the Plastidule Hypothesis," Proceedings of the same, 1876.

[2] Of course, dead bioplasson is a contradiction in terms: bioplasson deprived of vitality is no longer bioplasson at all, but merely the chemical remains of what once was bioplasson. If this be remembered there will be no confusion, even if the word be used in describing tissues, etc., after death.

[3] The Protoplasmic Theory of Life, London, 1874.

[4] Rudiments of Physiology, Edinburgh, 1835.

tureless, semi-fluid matter, combined in a way entirely *sui generis*, but the initiation of these changes is brought by Fletcher into absolute dependence on stimuli, and all spontaneity or autonomy is denied to matter in the living just as in the dead state."

As Fletcher's work was published in 1835, several years before even the establishment of the cell-doctrine, we cannot but agree so far with Drysdale as to say that Fletcher has framed "a hypothesis of the anatomical nature of the living matter which anticipates in a remarkable manner" its discovery! In 1850, Cohn[1] recognized the protoplasm "as the contractile element, and as what gives to the zoöspore the faculty of altering its figure without any corresponding change in volume." He concludes that protoplasm "must be regarded as the prime seat of almost all vital activity, but especially of all the motile phenomena in the interior of the cell." In 1853 Huxley[2] said "vitality, the faculty, that is, of exhibiting definite cycles of change in form and composition, is a property inherent in certain kinds of matter." In 1855 Unger[3] thought that "the proximate cause of the movements of the sap in the cells is to be sought neither in diosmosis, nor in the action of the nuclear vesicle, nor in any mechanical contrivance, such as cilia, but it lies rather in the constitution of the self-moving protoplasm, which, as an especially nitrogenous body of the nature of that simple contractile animal substance called sarcode, produces the rhythmically advancing contraction and expansion."

In 1856 Lord S. G. Osborne discovered carmine staining, and distinguished by means of coloring it the living formative matter from the formed material, a means which has borne important fruits in the discovery of Cohnheim's staining of living matter by gold chloride, and in that of Recklinghausen's staining all except living matter by silver nitrate.

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[1] "Nachträge zur Naturgeschichte des Protococcus pluvialis." *Nova acta Acad. Leop.-Carol.*, vol. xxii, part i., p. 605.

[2] "Review of the Cell-theory." *British and Foreign Medico-chirurg. Review*, Oct., 1853.

[3] Anatomie und Physiologie der Pflanzen, 1855, pp. 280, 282.

In 1858, and in a number of later articles,[1] Max Schultze, by showing that, as had been hypothetically supposed by Unger, the movements of the pseudopodia and the granules are really produced by active contractile movements of the protoplasm, and by other observations, contributed much to the establishment of the theory of living matter. Hæckel has also for many years, and in various publications,[2] labored to maintain and extend the same theory, of which he thus expresses himself.[3] "The protoplasm or sarcode theory, that is * * * that this albuminous material is the original active substratum of all vital phenomena may, perhaps, be considered one of the greatest achievements of modern biology, and one of the richest in results." And says Drysdale[4]: "If the grand theory of the one true living matter was, as we have seen, hypothetically advanced by Fletcher, yet the merit of the discovery of the actual anatomical representation of it belongs to Beale, in accordance with the usual and right award of the title of discoverer to him alone who demonstrates truths by proof and fact. * * * The cardinal point in the theory of Dr. Beale is not the destruction of the completeness of the cell of Schwann as the elementary unit, for that was already accomplished by others. * * * But that, from the earliest visible speck of germ, up to the last moment of life, in every living thing, plant, animal, and protist, the attribute of life is restricted to one anatomical element alone, and this homogeneous and structureless; while all the rest of the infinite variety of structure and composition, solid and fluid, which make up living beings, is merely passive and lifeless formed material. This distinction into only two radically different kinds of matter, viz., the living or ger-

[1] "Ueber innere Bewegungs-Erscheinungen bei Diatomeen," *Müller's Archiv*, 1858, p. 330; "Ueber Cornuspira," *Archiv f. Naturgesch.*, 1860, p. 287; "Ueber Muskelkörperchen und das was man eine Zelle zu nennen habe," *Reichert und Du Bois-Reymond's Archiv*, 1861, p. 1; Das Protoplasma der Rhizopoden und der Pflanzenzellen, Leipzig, 1863.

[2] Monographie der Radiolarien, 1862, pp. 89, 116; "Ueber den Sarcodekörper der Rhizopoden," *Zeitsch. f. Wissensch. Zoölogie*, 1865, p. 342; Generelle Morphologie, vol. i, pp. 269, 289.

[3] Monographie der Moneren," *Jenaische Zeitschft. f. Medicin und Naturwissenschaft*, 1868, iv, 1; translation in *Quarterly Journal of Microscopical Science*, London, 1869, vol. ix, p. 223.

[4] *Loc. cit.*, p. 42, *et seq.*

minal matter and the formed material, gives the clue where by he clears up the confusion into which the cell-doctrine had fallen, and gives the point of departure for the theory of innate independent life of each part, which the cell-theory had aimed at but failed to make good. The one true and only living matter—called by Beale germinal matter, or bioplasm— is described as 'always transparent and colorless, and, as far as can be ascertained by examination with the highest powers, perfectly structureless; and it exhibits those same characters at every period of its existence.' * * * The living matter of Beale corresponds to the following histological elements of other authors: The viscid nitrogenous substance within the primordial utricle, called by Von Mohl protoplasm; the primordial utricle itself, in Naegeli's sense of that term, viz., the layer of protoplasm next the cell-wall; the transparent, semi-fluid matter occupying the spaces and intervals between the threads and walls of those spaces formed by the so-called vacuolation of protoplasmic masses; the greater part of the sarcode of the monera, rhizopoda, and other low organisms; the white blood-corpuscles, pus-corpuscles, and other naked wandering masses of living matter; the so-called nucleus of the secreting cells, and of the tissues of the higher animals, and many plant-cells; the nuclei of the cells of the gray matter of the brain, spinal marrow, and ganglions, and the nuclei of nerve-fibres. The term of true living or germinal matter can never be given to the following parts, although to some of them the word protoplasm has been erroneously applied, viz., the cell-wall of plants or animals, however delicate or gelatinous; the threads or filaments and walls of the vacuoles within protoplasmic masses or cells; the wall of the primordial utricle; the true fibrous, connective, elastic, bony, or other tissues generally included among the living parts of animals; even the proper contractile fibre of the muscles, the radiating fibres of the caudate nerve-cells, and the outer coat of those cells, besides the nerve-fibres in general; the hard parts of epithelial cells, and all liquid secretions; the cilia; the tissue of cuticle, hair, nails, horn, and all analogous parts in plants; the granules in sarcode; all coloring

matter; and, lastly, all pabulum, including the fluid part of blood, lymph, and chyle, and corresponding matters in plants. In short, the name of bioplasm, given by Beale, or protoplasm (in a restricted sense as it will probably be ultimately accepted by biologists), as indicating the ideal living matter, cannot be given to any substance displaying rigidity in any degree, from the softest gelatinous membrane up to the hardest teeth-enamel; nor to any thing exhibiting a trace of structure to the finest microscope; nor to any liquid; nor to any substance capable of true solution. Thus, 'nothing that lives is alive in every part,' but as long as any individual part or tissue is properly called living it is only so in virtue of particles of the above-described protoplasm freely distributed among, or interwoven with the textures so closely that there is scarcely any part $\frac{1}{500}$ of an inch in size but contains its portion of protoplasm. Thus we see realized the hypothesis of Fletcher, that all living action is performed solely by virtue of portions of irritable or living matter interwoven with the otherwise dead textures. According to Beale, 'of the matter which constitutes the bodies of man and animals in the fully-formed condition, probably more than four-fifths are in the formed and non-living state. All this was, however, living at an earlier period of existence.' This is on an average, for some tissues contain much less living matter; the bones, for example, only $\frac{1}{20}$th, and some textures, when old, not more than $\frac{1}{100}$th."

I have made this long quotation from Drysdale's book, because I am anxious to do full justice to Beale, and I could not find a statement of his views so succinct for quotation in his own writing. The objection, however, urged by Bastian to Beale is so very pertinent, that it must also find a place here, but I shall not dwell upon other points on which Beale differs from the bioplasson doctrine; such as, that living matter exhibits the same characters at every period of its existence, and, that it is always perfectly structureless. "It has always appeared to me," says Bastian,[1] "to be a very fundamental objection to his theory,

[1] The Beginnings of Life: being some account of the nature, modes of origin, and transformations of lower organisms. London, 1872, vol. i., p. 155.

that so many of the most characteristically vital phenomena of the higher animals should take place through the agency of tissues—muscle and nerve, for instance—by far the greater part of the bulk of which would, in accordance with Dr. Beale's view, have to be considered as *dead* and inert."

In 1873 the morphological knowledge of living matter became exact. In that year Heitzmann discovered the manner in which bioplasson is arranged throughout the body, and announced the fact that what had until then been regarded as separate form-elements in a tissue are really interconnected portions of living matter; that not only are there contained no isolated unit-masses in any one tissue, but no tissue in the whole body is isolated from the other tissues; and that the only unconnected particles of living matter are the corpuscular elements of liquids, such as blood, sperm, saliva, pus, etc., and so-called wandering corpuscles; so that, to use his own words: "The animal body as a whole is a connected mass of protoplasma in which, in some part, are imbedded isolated protoplasma-corpuscles (wandering corpuscles, colorless and red blood-corpuscles) and various not-living substances (glue-giving and mucin-containing substances in the widest sense, also fat, pigment-granules, etc.)." This announcement marked the commencement of a new era in biology.

Heitzmann had "investigated the condition of living matter in so-called infusions.". There had at first appeared "a number of very minute granules, just perceptible to the highest powers of the microscope," granules that were homogeneous, yellowish, shining, and motionless. Such a granule represents the juvenile phase of living matter; growing larger in size it becomes vacuolized, *i. e.*, shows "a central hole, enclosed on all sides by a yellowish shining substance." "The cavities in the interior of the shining lumps, apparently filled with some fluid, differ in their refracting power from the surrounding mass; they show a slight rosy color." Still later, "some granules look as if perforated by vacuoles, like a sieve; the differentiation between the two substances within the lump—the yellowish shining and the colorless rosy-refracting—has apparently

advanced." Vacuolation produces the appearance at first of a trabecular framework, and then of a filamentous network in the interior of the lump. "Such a minute transparent corpuscle, floating in the water of the infusion, constantly changes its outlines by throwing out offshoots or processes, mostly in the form of hyaline flaps; and we are sure we have an amœba before us." Heitzmann discovered that the living matter as seen in an amœba is not without structure, as had, before his accurate investigations, been supposed; and that its structure, in all cases when developed, is that of a network, in the meshes of which the bioplasson fluid, or the not-contractile, not-living portion of the organism, exists. When there is a nucleus, which may be either homogeneous (*i. e.*, compact) or vacuolized or reticulated, it is connected by delicate threads with the extranuclear network; nucleoli and nucleolini inside of the nucleus, as well as granules outside, are portions of living matter: sometimes in lump, sometimes mere points of intersection of the threads constituting the intranuclear and extranuclear living networks, sometimes terminals of section of such threads, as first explained by Eimer,[1] and after him by Klein.[2]

Heitzmann discovered that what is true of the structure of bioplasson in the amœba, where a single small unit-mass of living matter constitutes the entire individual, is true also of the structure of bioplasson of all, even the highest, living organisms.

It was known that the ideas originally connected with the term "cell" were erroneous, and that the essential constituent of "cells" was living matter individualized into small distinct masses; the existence in such form-elements of granules, aside from membrane, nucleus, nucleolus, and

[1] "Weitere Nachrichten über den Bau des Zellkerns." *Archiv f. mikrosk. Anatomie*, xiv, 1877, p. 103.

[2] "Observations on the Structure of Cells and Nuclei," *Quarterly Journal of Microscopical Science*, Jan., 1879, p. 128. "The intranuclear as well as the intracellular network having, of course, three dimensions, includes fibrils that lie in the two dimensions of the plane of the field of the microscope, as well as fibrils placed vertically to it. The former appear, of course, as fibrils; but, I should like to ask, as what do the latter appear, *i. e.*, those situated vertically. Clearly as dots, because they are seen endwise; and for obvious reasons most of them lie in the nodes of the network."

nucleolinus, was known; "thorns" and offshoots, processes and prolongations from them had even been occasionally observed; and Frommann[1] is even said[2] to have observed "clear shining fibrils proceeding from the nucleolus joining themselves to others proceeding from the nucleus and protoplasm," and to have believed "that the granules of the nucleus and protoplasm are the nodal points of a very fine fibrous network, from which fibrils go off and leave the cell." But all this knowledge was fragmentary until Heitzmann demonstrated not only that membrane, nucleus, nucleolus, granules, and threads are really the living contractile matter, but also 1) that this matter is arranged in a net work, containing in its meshes the non-contractile matter, which is transformed into the various kinds of basis-substance, characterizing different tissues; and 2) that the tissue-masses of bioplasson throughout the whole body are interconnected by means of fine threads of the same living matter.

Unless these facts of Heitzmann's discovery are accepted, there cannot be urged much against the continued use of the word "cell," misnomer though it be. Ranke,[3] after speaking of the "cell-wall," "cell-nucleus," etc., says: "Of these component parts of the cell, one or other may be wanting without the totality ceasing to be a cell. The nucleoli, the cell-wall, or the nucleus may be wanting, and yet we must designate the microscopic form a cell, or elementary organism." Now, although Drysdale thus comments upon this quotation, viz.: "If any one choose to describe a gun-barrel as a stockless gun without a lock, he is free to do so; but what good purpose can it serve? Or is there even any fun in it? The truth is, this clinging to the mere name of the cell-theory by the Germans seems to arise from a kind of perverted idea of patriotism and of *pietas* toward Schwann and Schleiden." Nevertheless, I think Tyson[4] has the better of the argument, in saying: "The word has, how-

[1] "Untersuchungen über die normale und pathologische Anatomie des Rückenmarks," 2 Theil, Jena, 1867.

[2] As I have at present no access to Frommann's pamphlet, I must content myself with this expression and make the following citations from Tyson, The Cell-Doctrine: its history and present state. Philadelphia, 1878, p. 117.

[3] "Physiologie, 1872," quoted by Drysdale, *loc. cit.*, p. 104.

[4] *Loc. cit.* (see footnote 2, on p. 31), p. 128.

ever, become so intimately associated with histology, that it is doubtful whether it will ever fall into disuse, nor does it much matter, so long as correct notions of the elementary part are obtained." If there were any separate and distinct "elementary part," it certainly would matter little or nothing whether it were called " cell " or by any other name, provided the name be properly defined and agreed upon. It is not against the name but against the idea of any isolated individualized form-element that the objection lies. Virchow maintains[1] "that the cell is really the ultimate morphological unit in which there is any manifestation of life, and that we must not transfer the seat of real action to any point beyond the cell." Against this statement nearly every author nowadays protests, and insists that vital power must be transferred from the " cell " to " living matter "; yet, after all, the disagreement, though ever so strenuously declared, is a mere verbal one: so long as both parties hold that " every higher animal presents itself as a sum of vital unities" — no matter what these unities are called or how defined. Hæckel, one of the most avowed advocates of " the protoplasm or sarcode theory," clings to Virchow's politico-physiological comparison, that every higher organism is like an organized social community or state, in which the individual citizens are represented by the " cells " [no matter how he may define these], each having a certain morphological and physiological autonomy, although on the other hand interdependent and subject to the laws of the whole. Heitzmann's views necessitate the comparison of the body to a machine, such as a watch or a steam-engine, in which, though there are single parts, no part is at all autonomous, but all combine to make up one individual. According to Hæckel the body is composed of colonies of amœbæ; according to Heitzmann the body is one complex amœba.[2]

[1] Die Cellularpathologie in ihrer Begründung auf physiologische und pathologische Gewebelehre, Berlin, 1858, p. 3. (Translation by Chance, London, 1859, p. 3.)

[1] Since this was written, even Huxley, the popular champion of protoplasm as the physical basis of life, who, as Bastian (*loc. cit.*, p. 58) says, so far back as in 1853, had put forth a powerful remonstrance against the then all-prevalent "cellular theory" of organization, has delivered an address before the Inter-

There is no better test of the truth of the bioplasson doctrine than the structure of hyaline cartilage. If hyaline cartilage consists, as "is generally believed," of "a homogeneous ground-substance in which are closed cavities harboring nucleated cells,"[1] the bioplasson doctrine is erroneous. If it merely contains lymph- or juice-channels, no matter what their character, whether open or closed, whether lined or unlined, whether in "homogeneous basis-substance," or "between layers of cells," or "in cement-substance," the bioplasson doctrine is erroneous. On the other hand, the more or less convincing observations by Frommann, Heitzmann, Hertwig, Thin, Prudden, Spina, and Flesch, that cartilage-corpuscles have offshoots, or prolongations, extending more or less far into the basis-substance, even that these prolongations anastomose with each other and connect neighboring corpuscles, are by no means sufficient to establish the doctrine. Of the three authors whose accounts are most satisfactory, Heitzmann himself, though influenced by these observations, did not depend upon them, but upon confirmatory investigations of other tissues; Spina—though he might logically have followed the consequences of his observation and reasoning—is entirely silent on the subject; and Flesch distinctly repudiates the doctrine thus: "The views here presented agree in many respects with those of Heitzmann. It shall be reserved for an intended speedy continuation of these investigations to enter into a discussion of questions concerning the general cell-doctrine. Only this I must emphasize here in opposition to Heitzmann, and in accord with Max Schultze, that the independence (selbstständigkeit) of the cell in the finished tissues does not suffer by the portrayed arrangement, although its connection, both with the surrounding basis-substance and, through the latter, with

national Medical Congress in London, August 9, 1881, in which he used the following language: "In fact, the body is a machine of the nature of an army, not of that of a watch, or of a hydraulic apparatus. Of this army, each cell is a soldier, etc., etc., etc.

[1] This statement of the general belief is quoted from the introductory paragraph of Thin's memoir "On the Structure of Hyaline Cartilage" (*loc. cit.*), in which Thin's own views are laid down to the effect "that layers of cells epithelial in arrangement exist in the substance of cartilage," "that both the stellate and the parallel systems of lymph-channels exist," etc.

neighboring cells, is more intimate than, perhaps, appears from customary descriptions." [1]

The observations I have recorded in the second section, and especially those illustrated in figs. 4, 5, and 6, admit of but one interpretation, and that an interpretation favorable to the bioplasson doctrine. It is unnecessary to more than mention that although I have placed on record so few, I have made many different examinations, under many different circumstances, and with varying powers of amplification. I need occupy myself here with only the two fields drawn in figs. 5 and 6, with an amplification of 600 and 1200 respectively. The remarkable specimens from which they are taken show more conclusively than it was ever before shown what the structure or constitution of hyaline cartilage really is. I have explained this sufficiently under the proper heading. Its full significance now appears in its corroboration of the bioplasson doctrine. To be able to uphold the cell-doctrine, cartilage would have to be, using a homely comparison, like a cake composed of hard dough with raisins. No matter how widely we may extend the definition, to remain within the boundary of that doctrine this metaphor must be applicable. Innumerable painstaking researches have led to various modifications of notions entertained regarding the structure of these two constituents and their relation to each other. As we have seen, especially by the most recent publication on the subject, viz., that of Flesch, the acceptation of the existence in the dough of cleavage in certain directions, of interlaminary and interfibrillar spaces, and of offshoots, even ramifying prolongations of the raisin-substance, or, at all events, of an ingredient of the raisins, is held to be not incompatible with that doctrine. If, however, we can represent cartilage as a filigree or framework of raisin-substance, with here and there larger and smaller accumulations of this substance, in the meshes or interspaces of which framework blocks of dough are imbedded, certainly the fundamental view of the ultimate construction of the tissue is changed, and we are no longer in accord with the cell-

[1] *Loc. cit.*, p. 86.

doctrine, even though we be inclined to use that term in the widest possible sense.

In regard to a name as a substitute for the term "cell," I would say that all corpuscular masses may be called, simply, corpuscles. For all the accumulations of living matter within the ordinary fields of basis-substance, but more especially for those smaller masses which, having as yet developed neither a network structure nor much vacuolation, are still homogeneous, or nearly so,—I am quite willing to adopt either the designation of "plastids," proposed by Hæckel, or that of "bioplasts," proposed by Beale. Perhaps it would be best to restrict the word "bioplast" to a small mass of living matter exhibiting no differentiation, and to distinguish from it as "plastid" the larger mass showing an interior structure more or less like the fully developed corpuscle. Thus, I would always use the term "plastid" in the place of "cell."

The result, then, of my investigations as to the structure of cartilage is that in this tissue, beyond the possibility of a doubt, the living matter is arranged in the form of a network containing in its meshes the non-contractile matter. How is it with regard to the other proposition of the bioplasson doctrine, viz., that the living matter of the different tissues is interconnected? Examinations with high powers of such a specimen as that represented in fig. 1, showing the perichondrium, of horizontal sections through the larynx, or the neck, with skin and more or less of other tissues included,—and here I desire to say a word in appreciation of Dr. Carl Seiler's section-cutter, and of this gentleman's kindness in preparing some very fine sections for me,—enable me to answer this question to the effect that fine filaments of living matter pass from one tissue to another in connection with the network of living matter in each. The details of such examinations are reserved for another publication.

Discussion of Dr. Elsberg's Paper and Remarks on the Apparatus Shown.

Dr. MYNTER inquired concerning the liability to explosion.

Dr. SEILER said that he had been accustomed to the lantern for many years, and with ordinary care considered it perfectly safe. In the form presented by Dr. Elsberg, no explosion could take place.

Dr. COHEN had tried the Trouvé apparatus for illumination, and could not obtain as much light as from ordinary gas; in several experiments the platinum melted before it got to a white heat. Dr. SEILER had had the same experience.

Dr. COHEN had not succeeded with the Trouvé apparatus for galvano-caustic purposes. He inquired whether Prof. Elsberg would give up his ordinary method of illumination in favor of this new plan of Trouvé's.

Dr. ELSBERG replied he would not. He did not think that the apparatus of Trouvé would ever amount to any thing for ordinary laryngoscopic illuminating purposes, but for galvano-cautery it would be very useful. With the aid of the rheostat the amount of heat could be regulated with as much ease as the size of the flame by the ordinary stop-cock of the gas-light; and for all the minor galvano-cautery operations it offers decided advantages. As regards the lime light, he assured Dr. Mynter that it was perfectly safe in the form recommended; unless a person was very careless or tried very hard, it would be difficult to have any accident.

There being no further discussion, the next paper in order, that of Dr. Wm. C. Glasgow, of St. Louis, on the "Operation for the deviation of the nasal septum," was called for in its regular order; the Dr. also exhibited an instrument designed for the purpose of operation.

Dr. Glasgow's Paper.

MY object in presenting this paper to the Association is to draw attention to an operation for the rectification of a deflection of the cartilaginous nasal septum. I believe this operation to be of merit, and it seems to me to be preferable to any hitherto proposed. I make no claim to originality, as it was proposed and first performed by Dr. A. J. Steele, a surgeon of St. Louis. A report of the

first operation will be found in the May (1879) number of the St. Louis *Courier of Medicine.*

The operation might be called a modification of that proposed by Mr. Adams, although the principle involved is entirely different. In many cases the resiliency of the septum is so great that the method as advised by Mr. Adams will not suffice, and only partial success is obtained. When the plugs are properly fitted, the pain and discomfort are trifling; as little pressure is given by the plugs, they are worn with greater comfort than is possible under other forms of treatment.

Goodwillie's proposition to perforate the septum by means of Blandin's punch, and the excision of a portion of the septum by scissors, or knives, is open to serious objection. Whatever may be said to the contrary, the excision of a large part of the septum does lead to a deformity of the nose. We see this in cases where the septum has been destroyed by disease. I recall a case of this character where the constant use of the handkerchief in the right hand produced a twisting of the tip of the nose to the right. Another serious objection to this method lies in the tendency of the edges of the perforation to scabbing. This is found especially in strumous persons, and is most distressing and annoying to the patient. I have no doubt but that we have all had a similar experience on the subject.

Steele's operation consists in making a stellated division through the mucous membranes and cartilage; a forcible reposition of the divided septum, which is retained in position by plugs. The division of the cartilage destroys, in a great measure, its resiliency, and the plugs are more to give support than to exert pressure. The instruments necessary for the operation are stout forceps shod on one blade with knives set in a stellar form. The two blades are united after the manner of obstetrical forceps, to facilitate the introduction and withdrawal. The cutting-blade is covered by a thin sliding shield, to protect the nostril from laceration during insertion. Any strong, stout blade, or Mr. Adams' septum forceps, may be used to push back the

divided septum to the natural line. The plugs are made of ebony or ivory, and must be made to suit each individual case. They should be made thick enough to give support to the reposed septum, and sufficiently long to reach from the inferior meatus to the tip of the nose. An important feature of the plug lies in the pointed shoulder which is inserted in the sulcus at the tip of the nose. It is thus retained safely in position; it is concealed from view, and can easily be withdrawn by the patient.

The patient is first etherized, or put under the influence of nitrous oxide. The cutting-blade of the forceps, covered by the shield, is introduced into the *unobstructed* nostril and the shield withdrawn; the second blade is then introduced into the closed nostril, and the blades securely locked; forcible pressure is brought to bear and the cartilage divided; after unlocking, the blades are withdrawn; the septum is then forcibly crowded back and a proper plug immediately inserted.

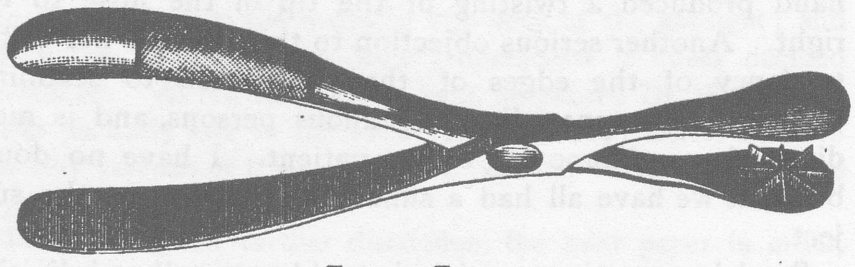

FIG. 1. Forceps.
Figure represents instrument reduced one half.

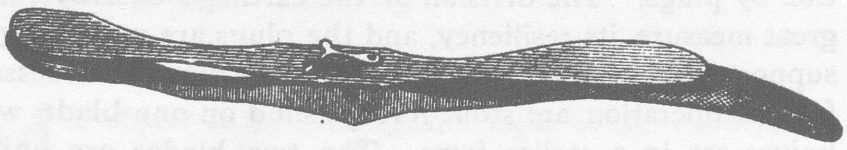

FIG. 2. Shield.

FIG. 3. Plug.

The bleeding is not excessive, and soon ceases; if prolonged, the application of ice will check it.

As a rule, the plugs should be retained in place four days. Afterward they can be removed during the day and replaced at night for five nights. The plugs should excite little or no pain, if properly fitted. If they are too long, they will press on the turbinated bone and give rise to pain. They are completely hidden within the nostril, producing slight distension with little deformity. The following case is illustrative of this operation.

J. G., a young man, had suffered for several years with an occlusion of one nostril and a discharge. On examination, the septum was found deflected so as to close the nostril. On forcibly replacing it, numerous small gelatinous polypi were visible. The operation was performed under ether, and the plug inserted. The bleeding soon ceased, and the patient left the office after recovering from the effect of the ether. The next day he returned, stating that he had suffered considerable pain of a neuralgic character, spreading from the nose over the brow. Ice-cloths were ordered to be placed on the nose. The following day, the plug caused a slight pain and he removed it in the evening. On re-inserting it the next morning, I discovered that the plug was a little too long, and that when brought in proper position under the tip of the nose, pressure was brought to bear on the turbinated bone. After remedying this, the plug was worn for two days without pain or discomfort. During this time he was able to perform his business duties. During the next three days the plug was worn only at night, the patient inserting it and removing it himself.

The result of the operation was an almost straight septum with perfect patency of the nostril.

Dr. Steele has operated on two cases—one a boy of twelve, under ether (reported at meeting of St. Louis Medico-chirurgical Society), and one, a young lady of seventeen, under nitrous oxide gas. In both cases the result was perfect.

The question of the need of an anæsthetic is an open one; the pain cannot be very severe, and it may be that the simple hypodermic injection of morphia will suffice, or even this may possibly be omitted.

Discussion on Dr. Glasgow's Paper.

Dr. J. O. Roe said that the operation seemed to be merely a modification of the method presented by Dr. Weir at the last meeting of the Medical Society of the State of New York, the essential part of which is the elevation of a portion of the mucous membrane over the projecting portion of the cartilage, and the division of the septum with the chisel.

Dr. Glasgow said that the operations were entirely different. In the plan he had advocated there was nothing said about the elevation of the mucous membrane ; the instrument is introduced and a stellate series of incisions made in the cartilage, which is then to be crowded back into its proper place.

Dr. Jarvis said that it is difficult to bring forward any operation that will relieve all cases of deviation of the nasal septum, since the conditions vary in different cases. He divided the conditions into three varieties of projection : (1) localized deflection of the cartilaginous portion of the septum ; (2) a general deviation of the septum as a whole ; and (3) hypertrophic enlargement of the tissues overlying the septum ; each of which require a different treatment. The first form is very commonly met with ; the projection may be on either side, but is generally to the left ; it is in the anterior portion of the nostril, and the posterior limit of the curve can be seen as distinctly as the anterior. This, like the hypertrophic variety, is very easily treated by transfixing with fine curved needles (which he had devised for the purpose, and had made of different sizes), under which may be passed a fine steel wire (about No. 32), and the redundant portion removed with the écraseur. The wire must be well annealed, very fine, and of great strength. The second variety is more difficult to treat, and it may be necessary to operate two or three times, but the curved needle and wire will generally accomplish the purpose ; he had been able to do this in several instances.

Dr. Shurly said that he had always operated in the manner referred to by Dr. Roe : dissecting the mucous membrane off with a knife and a tenaculum, and chiselling out some pieces of cartilage ; then replacing the flap and packing the nasal passage with absorbent cotton. The objection is that occasionally ulceration results. He believed the operation to be preferable as recommended by the lecturer.

Dr. Bosworth said that he had been content with Adam's operations ; the method now proposed merely substitutes a stellate

cut for the irregular fracture of the cartilage with the forceps; he could not see much advantage in the change. He had found great difficulty in making the plugs work properly, and was much obliged for Dr. Glasgow's hint about how to keep the plugs in; he had been obliged to resort to plugs of cotton, although it had been condemned by the authorities, but he had obtained good results.

Dr. MYNTER asked if it would be possible to introduce the forceps if there was much deviation. It is quite a large instrument; it seemed as if in some cases it would be impossible to use it.

Dr. LINCOLN had performed several operations with the instrument devised by Dr. Goodwillie; he had never seen any deformity or permanent contraction of the nostril produced by the removal of a piece of the cartilage. Even in cases where the chamber remains obstructed, the perforation in the septum enables the patient to draw the air into the anterior portion, and the sensation of the air entering the nostril gives great satisfaction.

Dr. GOODWILLIE, by invitation (drawing a diagram of the septum upon the blackboard), explained that when the septum bends sharply over against the inferior turbinated bone, almost as far as the vestibule, the result will be a closure of the corresponding nostril, and in such cases the septum bends because it has been extended in length as a result of an error in development commencing early in life. He had found no operation for its relief so useful as removal of a small portion of the bony septum. Of course, the object is to get air into the nostril, particularly through the inferior meatus, and also to allow of the escape of mucus from the nose. The section should be made high up, so that if the patient does not get air through one nostril he will through the other. The operation should be followed by the use of antiseptic plugs, not cotton as had been once referred to.

Dr. GLASGOW thought there might be some misconception concerning his remarks as to the application of the instrument. Dr. Mynter did not think that the large blade could be introduced where there was occlusion, but the method of application was to insert this into the unobstructed nostril; only the small, smooth, thin blade is passed into the affected side. In regard to ulceration and scabbing, after the operation in a certain class of cases, this would occur. He referred to those of a strumous character.

In regard to Dr. Jarvis' operation, in which tissue is removed, he believed that any operation in which tissue is separated and replaced is better than one where it is destroyed. In Adam's opera-

tion there is a crushing or breaking of the cartilage; in the one he proposed a clear cut is substituted. If inflammatory thickening would be expected to follow any operation, he thought that it would be more likely to follow Adam's method than the one recommended in his paper.

Dr. CARL SEILER, of Philadelphia, read a communication entitled "The effect of the condition of the nasal cavities upon articulate speech."

Dr. Seiler's Paper.

BEFORE I can enter upon the consideration of the part played by the nasal cavity in vocalization and articulate speech, it will be necessary to set forth in a few words the different portions of the process of vocalization in general. The sound of the voice originates in the vibration of the vocal cords, whose edges are brought close together and are thrown into rapid vibratory motion by a current of air from the lungs. These vocal cords act both in the capacity of a double reed and of strings, inasmuch as both cords vibrate together, and the current of air is thereby cut up into pulses, as is the case in the double reeds of the hautboy and the bassoon, and because they may be stretched, made thinner and shorter, thereby changing the rapidity of the vibrations, as is done with the strings of the violin and kindred instruments. They do not, however, divide into nodal points and ventral segments, and the tone produced by the cords alone and separated from a resonant cavity, is devoid of overtones, like that of a tuning-fork not in connection with a resonant cavity or sounding-board. The surface of the vocal cords, furthermore, is so small that but little air is in immediate contact with them, and they therefore give rise to air-waves of but small amplitude. This can readily be observed in a larynx excised from a cadaver soon after death, the vocal cords of which are approximated and stretched, and are set in vibration by a current of air forced through the trachea, as was done by many experimenters before the invention of the laryngscope.

The air contained in the continuous cavity, which is anatomically divided into the laryngeal, pharyngeal, and oral

cavities, is set in vibration by the motion of the cords, and this vibrating column of air divides into nodal points and ventral segments, thus adding overtones, and, in consequence, character or quality to the fundamental sound. By the formation of what is termed a stationary wave in this cavity, the air in it becomes a self-sounding body of large dimensions, and is able to cause sound-waves of great amplitude in the outer air, thus increasing the loudness of the tone. This cavity may be tuned to any pitch the vocal cords can produce, by increasing its volume through the rise and fall of the larynx and tongue, and also by the increase and decrease in the size of the external opening. This tuning of the cavity is necessary, for if its pitch is not in unison with that of the tone produced by the vocal cords, the stationary wave cannot be formed, and the tone loses in volume. The same results from too great an amount of air, more than is necessary to set the vocal cords in vibration, being forced through the larynx. This is true, however, only in pure vocalism, that is, singing without words, while in articulate speech the fulness and character of the tone are sacrificed for the character of the component parts of articulate speech. Here we have no formation of a stationary wave in the oral cavity, and we need more breath than is necessary in singing for the formation of those noises which are recognized as consonants. In articulation we have not only a tone started by the vocal cords and intensified by the resonant cavity, but we have a peculiar modification of the character of the vocal sound, which modification we find in endless variety. Heretofore physicists and physiologists have followed the well-beaten path first laid out by grammarians, who divided the sounds of articulate speech into vowels and consonants, and they have examined these sounds separately and independently from each other. Thus they found that the consonants were nothing but noises produced by the breath rushing past obstacles presented to it in the cavity of the mouth and pharynx, and in two instances in the nasal cavity (M and N), and that these consonants could be produced in the absence of any possibility of vocalism, or even of breath com-

ing from the lungs. (See E. Seiler, "Voice in Speaking." They further found that the vowels could be reduced to five elementary or fundamental vowel sounds, which might form combinations with each other and thus become modified. They also proved experimentally that in pronouncing each of these five elementary vowels, the cavity of the mouth is tuned to a definite pitch which is independent of the pitch of the vocal cords, just as the pitch of the reed, of the clarionet, or bassoon is independent of the pitch of the column of air to be set in vibration to give a certain tone; and this pitch of the cavity of the mouth remains always the same, no matter what the age, sex, or nation of the individual may be who pronounces the vowel, provided he pronounces the same one. In the same manner it was found that the characteristic noises causing the consonants had a definite pitch independent of the vocal sound, which could be varied but little without destroying the character of the consonant. Thus articulate speech was divided into distinct parts—vowels and consonants—which were studied separately, and definite laws regulating their formation were laid down. Yet, if we attentively listen to a speaker we shall find that he does not pronounce the vowels and consonants making up the syllable or word separately, but that they together form series of sounds essentially vocal in character, but differing from each other by variations of timbre, which enable us to distinguish them from one another, just as we distinguish one instrument from the other, or one voice from another.

In order to arrive at a definite conclusion in this matter, I undertook a series of experiments, and found that the shape of the sound-wave (timbre or quality of the sound) was altered by the mixture of two vowels—as, for instance, in pronouncing *ou* in *cough*, the shape of the wave differing both from that produced by the elementary *o*-sound, as in *hot*, and from that produced by the *u*-sound, as in *pool*, the pitch of the cavity of the mouth also differing from either. Having found this to be true of all the combinations of the vowel sounds, I directed my attention to the combination of a vowel with a consonant, and found that here also the

sound-wave produced by the combined sound differed in shape essentially from the wave of either the vowel or consonant, and the pitch of the cavity of the mouth was also different. The addition of more than one consonant to the vowel made a still greater difference in the shape of the wave. In those consonants in which the characteristic noise is very loud, as, for instance, in *s*, *f*, or *th*, I found that this noise produces its characteristic wave either before or after the altered vowel sound, according to the position of the consonant, either before or after the vowel. I have thus been forced to believe that the sounds of articulate speech are vowel sounds, deviating more or less from the elementary or non-articulate *a*-sound, this deviation being the result of the combination of vowel and consonant sounds, together with the admixture of characteristic consonant noises. The nasal cavity exerts a very great influence upon the sound of the voice, and especially so in articulation. Being separated from the oral cavity by but a thin partition, the air contained in it participates in the vibratory motion, and thus acting as a resonant cavity adds both volume and character to the sound. In order to exert its full influence, however, it should have free communication with the outer air through the anterior nares, and should be closed behind, except in the already mentioned instances of the pronunciation of *m* and *n*, in which case the nasal cavity does not act as a resonant cavity, but simply as an outlet for the breath.

Let us now consider what results will be produced upon articulate speech by an alteration of the normal condition of the parts concerned in articulation, as, for instance, when paralysis or perforation of the soft palate exists. In such a case speech will have what is called a nasal sound, which is caused by too strong a resonance in the nasal cavity, for the air set in vibration by the vocal cords enters it directly, and a stationary wave is probably produced, which, as a self-sounding body, interferes with the resonance of the oral cavity, and in a measure destroys the character of the vowels. The formation of the vowel-modifying noises, commonly called consonants, is

also interfered with in such a case, because most of the air current escapes through the nose, and not enough through the mouth to produce them sufficiently loud and distinct. For this reason articulate speech becomes almost impossible in cases of fissure in the hard palate. On the other hand, if stenosis of the posterior opening of the nasal cavity exists, caused either by tumors or by cicatricial adhesion of the soft palate to the posterior wall of the pharynx, very little alteration in the speech of the patient is noticed, except that he cannot pronounce either *m* or *n*. The contrast between the two conditions was very well illustrated by two cases exhibited at one of the meetings of the Philadelphia Laryngological Society, the one by Dr. J. Solis-Cohen, and the other by myself. In Dr. Cohen's case complete stenosis of the posterior opening of the nasal cavity was produced by cicatricial adhesion of the soft palate to the posterior wall of the pharynx, following syphilitic ulcerations. In my case the same lesions existed from the same cause, but the stenosis was not complete, and a small opening on one side allowed free communication between the nasal and oral cavities. Articulate speech in Dr. Cohen's patient was perfect, except that he pronounced *n* like *d*, and *m* like *b*, while my patient could hardly be understood. If stenosis of the anterior nares exists, the effect is an entirely different one, although it also is called speaking through the nose, because then free communication between the air contained in the nasal cavity and the outer air is cut off. Under such circumstances the vibrations of the air within the cavity cannot come out, and therefore remain inaudible to another person, although they are carried through the bones of the skull to the ear of the speaker with great force, and the sound of the voice reaches the listener without being qualified and intensified by nasal resonance. No difficulty is experienced by the speaker in forming the component parts of articulate speech, except in the pronunciation of the *m* and *n*, which, as in posterior stenosis, is changed into *b* and *d*. The more complete the stenosis the more marked will be the change in the voice, but I have found that even a moderate amount

of obstruction in the anterior nares will give rise to alteration of the character of the voice.

Discussion on Dr. Seiler's Paper.

Dr. LANGMAID said that the paper just read contained some interesting and important points which, prior to discussion, required time for consideration. With regard to the experiments alluded to as made with the phonograph, they had been detailed before; they require, in order that they may be made useful for comparison, that in the different experiments the same pitch be preserved, and the greatest care observed that no distortion in the pronouncing of vowel sounds should occur. We know very well that double vowels are not true diphthongs, but that in them one vowel sound is followed by another different diminishing one; the primary vowel should not be affected in its pronunciation by the diminishing vowel. In speech the stress is generally upon the first vowel sound, and much less upon the latter one.

Dr. JOHNSON enquired into the method of the production of the falsetto voice.

Dr. SEILER, in reply, said that Dr. Langmaid had misunderstood him in regard to his experiments; they had not been made with the phonograph, but with the telephone, which reproduced every accent perfectly. It is true that diphthongs are a succession of vowel sounds, and not a combined sound; but there are sounds which are not double, but modified vowel sounds, such as different modes of pronouncing *ah*, *oo*, *ou*, etc., modifications difficult for uneducated ears to detect sometimes, but which are perfectly manifest to a musical ear. For instance, in pronouncing the vowel *à* with the mouth open, there is no interference with the sound-wave, but if we change the shape of the mouth, we obstruct the wave, and get a modified sound. This is what was meant by the effect of singing in modifying the vowel sounds.

With regard to the production of the falsetto voice, the subject was discussed at the last meeting of the Association. The speaker holds that it is produced by the vibration of the free edges of the tense vocal cords as an effect of the contraction of the posterior crico-arytenoid muscles and the thyro-arytenoids. He had noticed a peculiar failing in the head notes in singing the falsetto voice, so that persons were obliged to give it up after being accustomed to it for several years.

Dr. KNIGHT inquired in regard to the production of modified

vowel sounds where there was not a change in the shape of the mouth cavity.

Dr. SEILER replied that there is an adaptation of the shape of the mouth cavity to the successive changes in sound, made with great rapidity; and it is wonderful to notice the facility and accuracy with which this is almost unconsciously performed.

He asked and obtained permission to present for examination a modification of a galvano-cautery instrument, which was peculiar in being insulated by a substance called vulcanized fibre, made of vulcanized rubber and paper. It answered excellently for the purposes of insulation, being unaffected by heat and very durable.

Second day, afternoon session.

The Association was called to order by the President at 3 P.M.

Before proceeding to the regular order of the announced papers, Dr. J. O. Roe, of Rochester, by permission, read a volunteer paper, entitled a "Report of a case of laryngeal whistling."

Miss Julia C., æt. twenty-one years, the daughter of a clergyman, was referred to me for treatment for a mild pharyngo-laryngeal catarrh, Nov. 26, 1880.

While examining her for the above difficulty she called my attention to a peculiar power that she possessed, viz., that of whistling with the lower part of her throat at will, without the aid of her lips or any portion of the buccal cavity.

On requesting her to give an exhibition she at once whistled a tune through for me as perfectly as one can with the lips. The only difference noticeable was that it was in quite a low key, and sounded as if she was at quite a little distance from me or in another room.

To ascertain positively where this sound came from I had her whistle "Yankee Doodle" while I watched the movements of the larynx in the laryngeal mirror.

On producing the whistle, the vocal cords were drawn tense and the chink of the glottis nearly closed. The ventricular bands were approximated and puckered up, leaving an elliptical opening in the centre through which the vocal cords could be seen with their thin edges vibrating. The contraction of the ventricular bands was assisted by the contraction of the thyro-ary-epiglotticus, as the epiglottis and arytenoid cartilages were more or less

approximated; but on producing high tones the arytenoid cartilages were drawn up under the epiglottis instead of the epiglottis being drawn downward.

Thus it could be distinctly seen that the fundamental tones of the laryngeal whistle were produced by the vibrations of the edges of the vocal cords, the tone being modulated by the minute adjustment of the ventricular bands which regulated the laryngeal opening above the cords.

In addition to the assistance of the ventricular bands in modulating the tone they also pressed firmly down on the vocal cords, closed the ventricles, and acted as a damper in preventing the cords from vibrating except for about one third of their length in the centre. This sphincter-like action of these muscles corresponds with the position which Gordon Holmes[1] believes the larynx to assume in the production of the falsetto notes.

This young lady says she has been able to whistle in this manner since childhood, and previous to two years ago, when her throat began to give her trouble, she also possessed some ventriloquial powers.

In order to ascertain if this phenomenon was due to the fact of her possessing this ventriloquial power, I have since taken the occasion of examining the larynx of a professional ventriloquist.

I discovered in him that he produced the primary ventriloquial tones in precisely the same manner, *i. e.*, the larynx assumed exactly the same shape that the young lady's did while whistling. He was unable to produce a laryngeal whistle, but he told me of two other ventriloquists who were able to whistle very loudly with the larynx alone, the mouth being closed, and who could give beautiful imitations of canaries and other whistling birds.

This shows the ventriloquial power to be due to the ability of modulating the tones in the larynx with little or no assistance of the organs above, except to deflect the sound or "throw the voice," as they term it, in the direction from which the performer wishes it to appear that it originated.

This phenomenon of laryngeal whistling is certainly a very interesting physiological and vocal curiosity, occurring as it

[1] "Vocal Physiology and Hygiene," London, 1879, p. 116.

does in a person who has never cultivated any fancy vocal gymnastics, as is the case with ventriloquists.

No cases of the kind that I have been able to find are recorded.

On inquiring of other physicians I have found but two who have seen cases of this kind, viz., Dr. Elsberg, of New York, and Dr. Moore, of Rochester.

Dr. Elsberg has seen two cases, both young ladies between twenty and thirty years of age, who could whistle with the larynx alone moderately loud.

Dr. Elsberg also stated to me that my observations in regard to the manner in which the sounds were produced and the position assumed by the larynx, as detailed above, corresponded exactly with the observations which he had made in his cases.

Dr. Moore has seen one case, that of a girl five or six years old, who could whistle in a medium tone with the larynx at will, and could imitate a bird-call. When quite young she could whistle in this manner any tunes that were familiar to her, but as she grew older she lost this power, from want of cultivation, but retained the ability to produce different sounds and the bird-call.

No laryngoscopical examination in this case was made.

Since writing the above I have heard of another case of laryngeal whistling through a non-medical friend, that of a little boy being able to whistle very loudly with his mouth wide open.

Discussion on Dr. Roe's paper.

Dr. ELSBERG said that he had seen the case referred to, and had had the opportunity of seeing two other cases of this peculiar laryngeal whistling. He was glad to learn that the later observations of the reporter had led him to agree with the opinion as regards the mode of production of laryngeal whistling, which the speaker had formed when he first saw the case.

Dr. WM. C. GLASGOW, of St. Louis, by permission, read a volunteer paper on a "Case of paralysis of the abductor muscles of the larynx."

IN August, 1876, I was consulted by Dr. J. B., of Mississippi, a most intelligent gentleman and a physician of extensive practice, and from him I obtained the following history:

After exposure to a heavy rain in August, 1872, he was attacked with a severe spell of malarial fever with bilious complications. When the fever ceased, he discovered that he was quite hoarse, and had difficulty in speaking above a whisper. During the fall and winter of 1872 the voice remained husky, and a difficulty of respiration was apparent, especially in damp weather. He was greatly prostrated and suffered from general debility.

In May, 1873, he visited Europe; had an attack of bilious remittent fever, and, after some prostration, recovered a fair amount of strength. There was a partial loss of voice, but there was little interference with respiration.

After his return home in Jan., 1874, he rode twenty miles through a cold rain and sleet, slept in an open room, and from that time he began to suffer with soreness of the throat, difficult deglutition, troublesome breathing, and increased aphonia. During the spring all these symptoms became greatly increased, and to them was added an incessant dry, croupal cough; the breathing became stridulous, and so loud that persons in the adjoining room were awakened by it. He was given by New Orleans physicians large doses of iodide of potash, and took chloral and bromide of potash day and night, without the slightest relief.

In July, 1874, he visited Colorado and California, where he remained until April, 1875. During this time, all his symptoms were alarmingly increased. Deglutition became almost impossible. The food seemed to lodge in the fauces, solids were expelled through the mouth, and liquids were regurgitated through the nose. The greatest care was necessary in drinking, as a portion would enter the larynx and cause violent paroxysms of coughing, which would continue to almost complete exhaustion. The stridor was excessive, and to this was added a peculiar loud snoring when asleep, which could be heard in a distant part of the hotel. At this time he became greatly troubled with somnolence, and

found it difficult to carry on a conversation without falling asleep. He noticed also a loss of memory and an inability to walk directly from one point to another; the movements were jerky and nervous. His weight had been reduced from 150 to 110 pounds. He returned home in April, and this condition continued during the summer, autumn, and winter of 1875.

During the spring of 1876 a marked and gradual improvement was apparent, and in August of this year the patient consulted me.

When he had ascended to my office on the second floor the respiratory stridor was intense, and he could not speak for several moments; his voice was slightly husky, but not at all hoarse.

A laryngoscopic examination showed a paralysis of the crico-arytenoidei postici muscles, the cords remaining immobile at the median line. The larynx was slightly congested. The movements of the epiglottis were sluggish on phonation, and insensitive to touch. The soft palate seemed to be paralyzed, and I fancied I noticed a slight paralysis of the side of the face, with a drooping of the angle of the mouth. I advised tracheotomy, or, at least, that he should always carry the instruments with him, as in his isolated position on a plantation, help could not be readily obtained. I also advised the internal use of strychnia and the application of the faradic current.

Shortly after this Dr. B. visited New York and consulted Dr. Flint, who diagnosed an enlargemeut of the bronchial glands and advised iodide of potash in large doses. He also consulted Dr. Elsberg, who examined his throat and pronounced it a case of paralysis of the crico-arytenoidei postici muscles. Dr. Elsberg advised tracheotomy, but the patient was averse to the operation and preferred to wait until more urgent symptoms should demand it.

Dr. B. again consulted Dr. Elsberg in Sept., 1877, who noticed a slight improvement in the muscles, although the paralysis of both muscles continued.

Dr. B. consulted me again in Sept., 1880, and I was extremely surprised at his improved physical condition and

his good respiration. There was no stridor, although when hurried, breathing was impeded. A laryngoscopic examination showed imperfect immobility of the left cord in the median line; *the right, however, moved in a perfectly normal manner.* The action of the palatine and pharyngeal muscles was good.

The patient's present condition may be best given in his own words, as expressed in a recent letter: "I am at this writing comparatively a well man. Enjoy life as much as any one. Can ride, drive, shoot, and indulge in any manly sport. Cannot run or walk rapidly without inconvenience. Excitement of any kind renders respiration troublesome. Deglutition good, but mastication must be slow and complete. My sleep is still interrupted on account of dryness of fauces, as I am compelled to sleep with mouth partially open. Any attack of catarrh will produce cough, which is always croupy."

Dr. B. ascribes his fast impairment of health to exposure during long rides in the practice of his profession, combined with great mental distress. He knows of no taint in his system, either inherited or acquired. He has never used tobacco in any form.

During the whole time from 1872 to the present time the patient has taken no medicines which could favorably influence the disease, with the exception of the iodide of potash, which he took in 1873 under the advice of his New Orleans physicians. This gave him no relief, as his symptoms were all greatly increased during that and the following year. My recommendation of strychnia was not observed, as he was then travelling.

I have reported this case minutely, as I think the symptoms throw a great deal of light on the cause of the paralysis, proving it to be of central origin. It is certainly of interest as showing that our prognosis should not be always so unfavorable as it is generally believed, and it is remarkable that the present improvement, as shown by laryngoscopic examination and the symptoms, should have taken place after such a long space of time.

The first paper in regular order was that of Dr. Clinton Wagner, of New York, on "Subhyoidean pharyngotomy for the removal of the epiglottis, with illustrative cases."

NOTE.—Dr. Wagner having published his paper in the *N. Y. Medical Record*, May 21, 1881, contrary to the requirement of Par. iv, Sec. v of the By-laws of the Association, the Council have ordered that said paper, with its discussion, shall not appear in the published Transactions.

The next paper in order was that of Dr. George M. Lefferts, of New York, "On the question of hemorrhage after tonsillotomy."

TWO widely different views are to-day held concerning the important and practical question which forms the title of my paper. Many general practitioners, on the one hand, if I may judge from my experience, regard the operation of tonsillotomy as one likely to be followed by a profuse, if not dangerous hemorrhage; therefore naturally shrink from its performance, even in cases where good judgment tells them that it is indicated; and recommend, in its stead and as a substitute, a local treatment by caustics or astringents; sometimes even informing the parents or the patient of its formidable nature and results, thus creating in their minds a strong prejudice against it, which the specialist, in subsequent turn, perhaps vainly strives to overcome.

On the other hand, our works on diseases of the throat, almost without exception, are, I hold, misleading in their general statement,—depreciating the idea that the operation is attended by any remarkable loss of blood, and giving in support of the assertion only the most favorable statistics which bear upon the question. It is not uncommon to find it stated that some named authority has amputated a certain number of tonsils and has never encountered, or not more than once or twice, an excessive hemorrhage. The inference naturally is that it does not occur, and here the matter is left to confuse or create a false impression in the mind of the non-practised operator, who cannot reconcile the diversity of the views which he

knows to exist in regard to the question, until experience has taught him, individually, its proper status.

What we need is more clinical light upon the matter. Large numbers of the profession have had experience in this operation at least ; that experience to us is unknown. We depend alone upon the facts put forth by a few. A general collation of results would, I believe, lead to a modification of our present views, for it has long seemed to me that the truth of the question—and that it possesses a practical importance cannot be denied—lies midway between the two extremes that I have sketched, and that it may be thus summarized.

1. A fatal hemorrhage after the operation of tonsillotomy is very rare.

2. A dangerous hemorrhage may occasionally occur.

3. A serious one, serious as regards both possible immediate and remote results, is not very unusual ; and

4. A moderate one, requiring direct pressure or strong astringents to check it, is commonly met with.

But still in a large percentage of cases, certainly a majority, no trouble, after the operation, is experienced, the bleeding quickly ceasing either spontaneously or by the use of a little ice.

In other words, facts have taught me that though the operation of tonsillotomy, thoroughly performed, is usually unattended by untoward result, still it is not entirely free from alarming, sometimes dangerous results ; and that though these be the exception they should not be ignored ; and that the surgeon must always be prepared, both mentally and manually, to cope with a hemorrhage that may unexpectedly occur.

The practical deduction is obvious.

I do not think that my experience has been an exceptional one. Yet it has, upon a basis of some 500 tonsillotomies, illustrated all the classes which I have mentioned, with the exception of the first, and this in about the rough proportion that I have indicated. My object, then, in thus calling the attention of an audience of experts to the question, is to elicit their expressions of per-

sonal belief, and such results of clinical experience as may corroborate, as I believe they will, or disprove the view that I take of the matter.

In any event, this will be placed upon a more satisfactory and certain basis than at present.

I do not regard it as necessary to give in detail the clinical histories of many cases to prove my assertions—one or two typical ones, illustrative of each class, will answer my purpose. The first, a fatal or uncontrollable hemorrhage from the internal carotid artery—the result of any direct surgical procedure,—is very rare, and need not, on account of its very rarity, concern us, except in bare allusion. At the present moment the majority of cases of this accident which are upon record, contrary to what is generally supposed, do not concern the operation of tonsillotomy, but have occurred during an operation upon the tonsil, or in its neighborhood, for other causes, such as the puncture of a retro-pharyngeal abscess, opening a pulsating tumor of the tonsil, opening of a supposed abscess, the operation for sarcoma of the tonsil, for malignant disease, etc. In those few cases where profuse hemorrhage has occurred after the removal of a portion or of all of the tonsil with the knife, and where the common carotid artery has been tied to check it, the question is an open one (except perhaps in the instances reported in Velpeau), whether the lesion was of the internal carotid and not of some other vessel. For, as will be shown, hemorrhage to an extent requiring operative interference for its arrest, does not always proceed from the internal carotid after such accidents as the above. It may come likewise from the large tonsillar branches of the important ascending pharyngeal artery, or from this artery itself, and likewise in good quantity from the tonsillar branches of the facial (or external carotid), to say nothing of the venous hemorrhage, profuse in its outset, which comes from the abnormally enlarged and dilated blood-vessels in an old hypertrophied and long-inflamed tonsil. The facts alone, then, established as they are, in relation to the internal carotid, will go far to reassure the timid operator, for the great rarity of the accident is certainly remark-

able, when the close proximity of the artery to the tonsil, and the frequency with which the operation of tonsillotomy is performed, are considered. Let him remember that it has never thus far happened when the tonsillotome has been used. Still the good surgeon prepares, as far as lies in his power, for all contingencies, and it is well, therefore, to bear in mind at least, that if a hemorrhage is from the internal carotid, it must of necessity be profuse, and will demand primarily immediate arrest, if possible, by direct pressure, or by hooking up the tissues by means of a tenaculum and ligating them *en masse*, and, secondarily, if these means fail, ligature of the internal—*not* the common carotid,—though in making this statement I am forced to admit that ligation of this latter artery has in certain instances successfully controlled a profuse bleeding from a tonsillar wound, though the question as to its exact source was undetermined. The most recent views are in favor of ligature of the internal carotid in such injuries, and this on both sides of the lesion. Two reasons appear to commend this procedure, although its difficulty, compared with that of ligature of the common carotid, will alone, probably, often lead, specially while the question of selection is an open one, the operator to favor the latter locality. Ligation of the internal carotid does not certainly cut off the supply of blood to the brain to such an alarming extent as ligature of the common trunk, since the free anastomosis between terminal branches of the external carotid in the orbit with the ophthalmic artery and its branches, secures an important collateral blood supply to the brain, which of course is lost in ligature of the primitive trunk, and the double ligature is rendered necessary by the abundant, in this instance, recurrent circulation (Wyethe).

Fortunately the chances of our being called upon to perform either operation are in any event infinitesimal.

Of the second class of case alluded to above, I have been unfortunate enough to meet with two examples.

The first concerned a physician, aged 25, for whom I amputated both excessively hypertrophied tonsils with the

tonsil bistoury. My incisions, I may say here, were made with care, and were such as I had made many times before, in other instances. A few moments after the operation, an inspection of the throat having shown no excessive bleeding, I left the dispensary where the operation had been performed, and my patient, who was using an ice-water gargle. I did not see him again for several hours, and then found him almost exsanguinated and pulseless. Profuse bleeding commenced almost immediately upon my departure, occurring very suddenly. The flow was so rapid that the patient could not clear his mouth of it. Blood passed into the stomach, giving rise to repeated attacks of vomiting, and into the larynx, causing strangulation. As described to me, his condition was for a time a dangerous one. All the resources at hand at the moment that suggested themselves to the doctors present, except pressure, were tried without avail. The hemorrhage persisted. I was sent for but not found, and finally my colleague, Dr. McBurney, fortunately reached the case some three hours after the commencement of the bleeding. He at once did what should have been done before, cleared all blood clot out of the pharynx, differentiated the source of the hemorrhage, and applied direct pressure over the spot on the right side from whence it was found to come. In a short time it had ceased. I arrived later, and found my patient stretched upon a bench, as I have said, white, bloodless, and almost pulseless. After an anxious night spent with him where he lay, he was carried in the morning to his home, and slowly convalesced during the following month. There was at no time a recurrence of the bleeding.

A second case was sent to me by Dr. Sexton, for the removal of both greatly hypertrophied tonsils. The patient was a man of about 35. I operated upon the right tonsil with the Mackenzie tonsillotome, and the section of the gland was immediately followed by a profuse hemorrhage. The blood literally streamed from the mouth, and running likewise down the throat, gave rise to violent vomiting and a sensation of impending suffocation. His condition was for the moment critical. He lost all control of himself,

struggled, beat my hands away, and would not allow me to approach him. The outpour of blood was so rapid, that he could not sit erect for the moment necessary for me to see into his mouth. I finally managed, despite his struggles, to get two fingers into his throat and over the site of the wound, where I exercised what pressure I could, of course but imperfectly, as his efforts at retching constantly displaced my fingers from their position. Assistance arriving, a sponge-holder was prepared, and by its means the hemorrhage was partially controlled. Persulphate of iron upon the sponge, and direct and prolonged pressure, the patient being meanwhile held, finally succeeded in checking the flow, but not until my patient had lost considerable blood, and was faint and weak. The next day moderate hemorrhage recurred, and despite my earnest directions of the day before, he did not send for any physician until it had continued for two or three hours, and had alarmed him by its persistency. It was finally controlled by the persulphate of iron and pressure. On the following day I again saw him, and again he was bleeding. The pharynx and the right tonsillar region were filled by a large, hard mass of dried blood and persulphate of iron, which obscured all view of the parts (the usual result). From beneath this the blood welled up. I cleaned it all out of the throat, washed the parts clean, drew the right anterior pillar of the fauces outward by means of a bent probe, thus gaining a clear view into the depth of the recess between the palatine folds, and at once discovered a large artery spurting, its mouth being diagonally cut across and somewhat lacerated. A nitrate of silver point passed into its opening failed to check the outpour, and after some trouble the vessel was seized with forceps, thoroughly twisted, and the hemorrhage checked.

It did not again occur, nor did I operate upon the remaining tonsil.

In both of these cases the hemorrhage would have been regarded, taking into consideration its amount, locality, and the difficulty of reaching its source, as dangerous by any surgeon; both immediate and remote effects were such as to

excite apprehension. I have rather under- than overstated the matter. I have tried not to draw too vivid a picture. That it came from no small vessel is proven by its quantity, violence, and persistence; the exact source can only be surmised, but to my mind it must have been from the ascending pharyngeal artery, a vessel of large calibre and in intimate relation to the tonsil. It has been a matter of wonder to me that this artery, with its peculiarly close tonsillar relations, has not received more attention than it has from those who have written upon the subject of tonsillar hemorrhage. It deserves marked consideration, yet practically it is ignored. I believe it to be one of the most, if not the most, prolific sources of severe bleeding after tonsillotomy. On this account alone it deserves consideration and special study of its anatomical relations. I simply recall to your recollection that Luschka—no mean authority—regards it as the most important as well as the largest of the pharyngeal arteries. Gray tells us that it ascends in the neck between the internal carotid and the side of the pharynx, and that the largest of its pharyngeal branches goes to the tonsil. You know how directly it is given off from the main trunk of either the external or, more rarely, the internal carotid. With such a source, course, and tonsillar relation it assumes for us an important interest, and I call your special attention to the fact.

In both of the cases just narrated direct pressure was efficient in controlling, in one case in checking, the hemorrhage. I mention pressure exclusively because I place little reliance upon the use of the persulphate of iron. In one case where the bleeding point could be seen (it was not sought for in the other,—and let me say here that it is always a matter of difficulty to search for a bleeding point in a deep tonsillar wound, and specially in an irritable throat) the twisting of the artery by forceps permanently effected what pressure alone could not do.

The surgical lesson thus taught is obvious; still it is possible that in some future instance the same success may not attend the same means, and if it be determined that the

source of the hemorrhage is from the ascending pharyngeal artery or the tonsillar branches of the facial or pharyngeal —a fact which its quantity and persistence will establish— ligation of the external carotid one half inch above the bifurcation (with the ascending pharyngeal or any other branch in the immediate vicinity) constitutes the sole resource. If this does not arrest the bleeding, the common trunk and the internal carotid should be tied. In such cases the ascending pharyngeal will probably be found to be derived from the internal carotid within the first inch of its course. Wyethe has found this relation to exist in 7 out of 120 dissections of the parts which he has made. I do not wish to give the impression from these remarks that any such operation will at all commonly be found necessary, but still forewarned is forearmed.

I turn now to the less serious and more common forms of tonsillar hemorrhage.

In defining the first of these, the form which I have termed serious, I have had in mind two classes of case, and more, perhaps, the possible dangers of secondary hemorrhage, with its results, than a primary one occurring immediately after an incision through the tonsil and under the eye of the surgeon.

The first of these classes relates to a danger not perhaps generally appreciated, which lies in the possibility of opening into a part of the rich venous plexus which lies at the bottom of the tonsillar fossa, and which may be easily wounded when the tonsil is removed entire, or, from its peculiar position, obliquely cut away. The bleeding from this source is sometimes extremely profuse, and is kept up, as all other forms from this locality are, by the movements of deglutition and efforts at clearing the throat which the patient makes. The bleeding here, moreover, is not always primary, hence it is necessary to keep the patient under observation for a time, as in the next class of case to which I now call your attention. It is that in which an arterial branch is directly cut across in making the section of the tonsil. Such a hemorrhage, primary or secondary, in either case, occurring in a cool and collected patient—one with a

tolerant throat,—is readily checked either by direct pressure or, in the latter instance, by seizing the bleeding point—always a small artery—and twisting it. Should, however, the source and character of the bleeding not be appreciated, it temporarily checked only and the patient dismissed, its recurrence within a short time may lead to considerable loss of blood. I have known of more than one such instance. The practical deduction need not be insisted upon. Should a hemorrhage persist or be of more than the usual moderate amount, and should it specially occur from the face of the cut tonsil, a differential diagnosis as to its source must be made. Usually it will be found in a single bleeding point and can then be appropriately treated. Above all, the patient should be kept under observation for a time, at least until the question of immediate recurrence is beyond doubt.

The following two cases will illustrate one of these classes of case.

A young lady had one small tonsil—the left—amputated by me with the tonsillotome. The first bleeding was followed by a persistent filling of the throat with blood. A glance showed the cause. In the upper part of the cut surface of the tonsil a small artery was spurting directly outward, throwing its stream nearly half way across the pharynx. It was readily seized, twisted, and controlled; no recurrence.

In the case of a gentleman I operated upon the right tonsil moderately hypertrophied, using the tonsillotome. Persistent bleeding followed from the cut surface of the tonsil. An artery of small size was seen, its mouth obliquely cut across, so that the stream was directed downward, and the blood ran out of the lower edge of the depression left by the removal of the gland. Seized, twisted, checked.

In such instances as these latter pressure alone may answer; it has done so in my hands, and may be the only available means in an intolerant throat; and, again, probably will be in cases where the venous plexus at the base of the tonsil has been opened into. If the patient will

allow of it, however, direct seizure of the artery—where it can be seen—is preferable, and the safest means. In any event, in such a case, I repeat, the liability of secondary hemorrhage must not be forgotten.

Finally, a moderate hemorrhage—one requiring more than the ordinary means to control it—is not uncommon. It constitutes a form with which we are all very familiar. We have all experienced it, and know with what anxiety we have, in children unruly and terrified, watched its course during the first few seconds after the operation.

I propose to call your attention alone to two causes for it, one of which is, I believe, not generally appreciated. An old, much indurated, and hypertrophied tonsil, one long chronically inflamed, will have large nutrient vessels, and their section will be followed by an immediate, more or less profuse, flow of blood. This hemorrhage is, commonly, mainly of venous blood, and, as a rule, quickly ceases. We can predict from the appearance of the tonsil its occurrence, and, forewarned, are again forearmed. I need not dwell further upon it; the second cause is more important. It is not an uncommon thing, when the tonsil is greatly hypertrophied, so that it fits with difficulty into the largest tonsillotome, and the faucial pillars, especially the anterior, are tightly spread out over the surface of the gland, to cut away a portion of the latter (its anterior surface, or, more rarely, a portion of its edge) as you make the section. The tissues immediately retract, and the small arterial branch which runs in the faucial pillar is held open, giving rise to a persistent bleeding, small in amount as a rule—though I have seen it profuse—but enough to alarm your patient and require direct treatment at your hands. This accident is often, I will admit, difficult to guard against, but that it often happens—oftener than is necessary—I do not doubt. The liability to it demands, then, recognition, and care is necessary for its prevention. I may mention here that such a lesion is one of the commonest causes of *excessive* sore throat after the operation of tonsillotomy. A well-performed operation does not leave a very sore throat as a result. It may be asked here what I consider a well-performed

operation. This question I have elsewhere answered (*Medical Record*, Dec. 27, 1879).

Simple astringent washes or cold will not check this latter form of hemorrhage. Direct pressure, or, as I have had to do in some instances, the application of silver nitrate in substance to the bleeding points, must be resorted to. The position of the patient's head and his abstaining from efforts at clearing the throat have their direct bearing here, as in all of the other forms of hemorrhage of which I have spoken. The first form of hemorrhage just alluded to usually ceases spontaneously in a few moments, or will yield readily to pressure.

I have not desired in my foregoing remarks to play the part of an alarmist. On the contrary, I have but given the views that experience has taught me, and which are at variance with some of those now held, for, as you have heard, they are not based upon either extreme of the question. Whether the medium that I have indicated is clinically the correct one, is for you, from your experience, to determine. The question is before you.

Discussion on Dr. Lefferts' Paper.

Dr. SHURLY inquired whether the lecturer always removes more than the projecting part of the tonsil.

Dr. LEFFERTS replied that he always did.

Dr. SHURLY said that he only removed the projecting portion of the tonsil, or the part in advance of the palato-glossal fold. He recalled a case of a little girl in which he had removed more than this, and as it was followed by severe hemorrhage requiring ligatures, he believed that the bleeding had been caused by removing too much. In removing the hypertrophied tonsils he prefers the tonsillotome, and very rarely uses the bistoury.

Dr. HARRISON ALLEN had for a long time given up the use both of the bistoury and the tonsillotome in the treatment of enlarged tonsils, very largely on account of this risk of hemorrhage. He belonged to the class of timid operators in such cases, and thought that it would be very little consolation to a patient whose carotid artery required ligation to be told that this was a very rare accident.

He believed that equally satisfactory results could be obtained

by the use of the galvano-cautery as with the cutting operation, and without the risk of bleeding. It requires several sittings to remove the gland by this latter means.

A great cause of hemorrhage after section is the wounding of a very vascular portion of mucous membrane, partly overlying the tonsil, which he had, therefore, in 1873 called the "opercular fold," which cannot be avoided in using the tonsillotome. In his own practice he never attempted to remove a large portion of the gland, but merely enough to permit free passage of air in breathing; but in the last few years it had been his custom to treat them all without any cutting operation.

Dr. ELSBERG spoke of the frequency with which the subject of tonsillotomy is brought up for discussion, and the remarkable want of unanimity expressed in regard to methods of treatment, how much or how little should be removed, whether by bistoury, guillotine, or caustic, etc. The question was brought before the International Laryngological Congress, at Milan, by Dr. Capart, of Brussels.* It was there discussed by men of great experience, and some, who ordinarily do not shrink from any surgical operation, avowed their unwillingness to apply any sharp instrument to an enlarged tonsil. A number of deaths by hemorrhage from tonsillotomy were reported, and such men as Schnitzler, of Vienna, Schmidt, of Frankfort, Michel, of Cologne, and others equally eminent, said that they never, under any circumstances, cut an enlarged tonsil. The speaker said he had removed tonsils over eleven thousand times; most of these were cut. Fortunately he had never had a fatal hemorrhage, but he had had two cases in which he feared it would be necessary to tie the carotid, and every thing was prepared for such an operation; also several which were quite dangerous, and blanched the patients (and, indeed, his own cheeks) before the hemorrhage could be controlled; and altogether perhaps ten very serious cases of profuse and persistent bleeding, which required vigorous treatment,—pressure, with astringents, such as powdered alum in a finger-like bag, ice, etc., etc; and there is a French instrument for making direct compression of the tonsil, one blade pressing against the tonsil, and the other outside, which he had found very efficient. Although, as a rule, the bleeding following tonsillotomy was not alarming, and required nothing more than cold water, or a little ice and an astringent solution to stop it, nevertheless as to the

* See these ARCHIVES, vol. i, p. 383.

occasional occurrence of serious hemorrhage—but exceptionally only—his larger experience corroborated the conclusions arrived at by Dr. Lefferts from his five hundred cases; and he would add that no one should ever cut a tonsil, by any method, without being prepared for subsequent hemorrhage.

Then, having enquired whether he had correctly understood Dr. Lefferts to state that no death had ever occurred after the use of the tonsillotome, and being assured that he had, Dr. Elsberg said that this statement must be changed, for several of the deaths reported in Milan, and probably others, had been of this kind. By far the largest number of all his own operations have been made with the tonsillotome, and he has devised several practical modifications of that instrument to suit individual cases, and to give the surgeon more control over the operation. But in cases in which he had beforehand been afraid of hemorrhage, he had not used the tonsillotome, but had either enucleated, or else had amputated, by means of a chain *ecraseur*, made either in Vienna or in Berlin, he did not know which. Many persons might suppose that the tonsillotome acts like the *ecraseur*, but this was a mistake. The tonsillotome usually cuts through the tissues like a knife, and he believed that we would be more likely to have a fatal hemorrhage from such a blind cut, in one plane, of whatever was caught in its opening, than from the careful dissection of tissues, in the precise line and to the amount required, with a knife in the surgeon's hand.

The palato-glossal fold has been justly referred to by Drs. Lefferts and Allen as a source of bleeding. Now, this fold is sometimes found firmly attached to or grown over the tonsil, and in such a case, even if the fold be first detached by probe or knife, hemorrhage can hardly be avoided in the removal of the tonsil with the guillotine. Altogether, he would say what he had said at Milan, that he believed that a good deal of the hemorrhage sometimes is caused by the way the operation has been performed. If, for instance, you cut through the turgid swollen tissue of an enlarged tonsil with the tonsillotome, you are more apt to have immoderate hemorrhage than if you select your points of discission with the bistoury. In some cases enucleation of the tonsil by traction and torsion with finger, or his tonsil forceps, avoided hemorrhage, and was the proper way to do the operation; the gland was imbedded in an amount of connective tissue which separated it from the parts below. Sometimes, by a careful dis-

section, you are enabled to remove the tonsil without the bleeding that would otherwise be caused. The operation by either method seldom requires more than a few seconds. Whenever applicable, the bistoury is to be preferred, as a more surgical instrument, to the tonsillotome, which substitutes the unvarying, straight guillotine-cut of a mechanical contrivance for the predetermined, perhaps curvilinear, cut of the skilful operator.

Dr. LINCOLN thought that no rule could be laid down which would cover all operations; some surgeons believe that the tonsils can best be removed by the bistoury, others by the tonsillotome, others by different methods. But in regard to the relative merits of the bistoury and tonsillotome, he thought that, when the tonsil is of such a shape that it can be readily grasped by the tonsillotome, with this instrument there is less liability to hemorrhage than with the bistoury, because the tonsillotome divides the vessels less cleanly than the bistoury. In performing the operation he is in the habit of separating the anterior faucial fold from the tonsil by a probe, and believes that by so doing he had escaped dividing it, and consequently had much less bleeding, and had also avoided the subsequent sore throat caused by this open wound.

The age of the patient should also be taken into consideration in selecting the proper operation. He had observed that at puberty hypertrophied tonsils are apt to atrophy, and the removal of a very small portion may be followed by complete disappearance of the growth.

The tonsil can be removed thoroughly, effectively, and without danger by the application of Vienna paste in from three to seven sittings; even a very large tonsil will rarely require more. The pain and soreness by this method are comparatively slight. There is almost no inconvenience attending it when skilfully applied, possibly less than with the galvano-cautery. Over excision, it has the great advantage of being entirely free from danger of hemorrhage.

Dr. ELSBERG did not wish to be put upon record as advocating only one plan of treatment for all cases of enlarged tonsils that are to be removed. He sometimes uses London paste or chromic acid, sometimes galvano-cautery, of which he spoke very highly except that it is tedious; he has used electrolysis, and oftener the *écraseur;* but of late years he has more frequently removed the tonsil with a bistoury than with a tonsillotome, except in the case of children, for whom he prefers the latter instrument,

and when he uses an anæsthetic, as he sometimes, though seldom, does.

In commenting upon Dr. Allen's recommendation to remove just enough to permit the passage of air, he said he had in his own practice generally removed more.

Dr. WAGNER said that, after having operated hundreds of times, he had never seen a case where it was necessary to apply astringents after tonsillotomy, much less to institute measures for active hemorrhage. In the preceding six weeks he had operated sixteen times, without any bad results. He always uses the guillotine in preference to the bistoury; he believes that it acts by pressure closing the smaller vessels of the enlarged gland, just like the *écraseur*, for by the crushing or torsion the bleeding is arrested. In cases where annoying or serious hemorrhage results, it will generally be found that the bistoury has been used.

As regards local treatment in place of tonsillotomy, he had applied all kinds of caustics and astringents without the slightest benefit, and he now refuses to take charge of a case unless he has obtained full authority to proceed as he thinks best.

Dr. JOHNSON does not now perform the operation so frequently as he did some years ago, when it was the fashion to remove all enlarged tonsils. When a case is presented in a child in which the enlarged glands give little inconvenience, he now advises the parents to wait, as they are likely to atrophy at puberty. After this age, especially if there is interference with breathing and much encroachment upon the faucial space, he operates using the tonsillotome or galvano-cautery.

He had seen dangerous bleeding only in one case, and that had followed the use of the bistoury. He believed the galvano-cautery to be without such danger, but it is more tedious, requiring several sittings, which makes it difficult of application to children. He believed with the previous speaker that the danger of hemorrhage is very much less than was feared.

Dr. HARTMAN had seen many cases, preferred the tonsillotome, and removed only what was absolutely necessary to allow breathing; when hemorrhage occurred it followed removal of a greater portion of the gland. He used Mackenzie's instrument, and condemned those tonsillotomes which are furnished with hooks which draw the tonsil through the ring while cutting; such instruments are dangerous and likely to cause hemorrhage. If the patient is tractable the bistoury may possibly be equally efficient. He did

not consider the tonsillotome purely mechanical in its operation, as it required judgment and skill in its application; he did believe that it facilitated the operation and rendered it safer.

Dr. ELSBERG, in reply to a question from Dr. Glasgow, replied that the effect upon the singing voice of removing hypertrophied tonsils was a very good one.

Dr. HARRISON ALLEN inquired what effect, if any, the operation would have (leaving, as it does, open wounds in the throat) upon the communication of diseases such as diphtheria.

Dr. LEFFERTS in conclusion said that questions had been raised of great interest and importance in the discussion; some, however, very wide of the object of the paper. In reply to the last speaker he would say that in one case, where both tonsils were immensely enlarged, causing great dyspnœa and covered with diphtheritic deposit, he had not hesitated to remove the tonsils; the wound was afterward covered with membrane. In another case, with local syphilitic patches, he had likewise operated upon enlarged tonsils to relieve dyspnœa. But to answer the question—in such instances we substitute a lesser danger for a greater.

He differed with some and agreed with others of his colleagues in their views, specially as to how much of the tonsil to remove. He was decidedly of the opinion that if we take away a little slice of the gland we do no good whatever; but, on the other hand, it has been said that if we remove more we get hemorrhage! Too often this fact is applied as a sop to the conscience of timid operators, and as an excuse for an incomplete operation. Now, how far shall we cut? If we only remove, as has been said by Dr. Allen, enough to allow a small chink between the uvula and tonsil, it is not enough. We should cut down to the line, or just below the pillars of the fauces; but, on the other hand, we should not enucleate. The operation should be done with the tonsillotome; with the bistoury there is greater risk of hemorrhage.

He condemned the use of the persulphate of iron as a styptic, as it covered up the bleeding parts with a thick, black crust, obscuring them, and was much inferior in results to pressure and torsion. He also questioned the utility of the galvano-cautery, especially pointing out the difficulties in the case of a struggling child, who could scarcely, under the circumstances, be induced to have a second sitting; for himself he would prefer the quicker and less painful operation with the tonsillotome, one which caused less subsequent irritation and sore throat, and what he would prefer

for himself he would choose for his patients. There are cases, however, in which, for reasons that need not be entered into now, the tonsillotome cannot be used; he would restrict the knife to such cases. In young children the knife is out of the question.

In conclusion, although not wishing to act the part of an alarmist, he had tried in the paper to show that the operation is followed, in a certain proportion of cases by results more or less serious; and he therefore insisted upon the recognition of the fact he had raised. Let there not be an undue dread of the operation; but, on the other hand, it should not be considered as trivial, as taught by the books; the true course lies between the two extremes. In a certain number of cases there will be hemorrhage; how best to be prepared for this accident he had endeavored to point out, and to indicate the rational treatment.

The next paper on "Paralysis of the vocal cords due to lead poisoning," by Dr. E. C. Sajous, of Philadelphia, was read by title and referred.

Henry A., aged 26, painter, came to the throat clinic of Jefferson Medical College Hospital complaining of difficulty in breathing. His trouble had come on gradually, and was now of a nature to make him feel as if he were about to choke when swallowing too rapidly or when using his voice for any length of time. There was but slight pain in the larynx, increased by pressure over the thyroid cartilage, and an occasional spell of coughing, which would cease when an accumulation of mucus below the cords would be expectorated. He experienced a sensation of constriction, as if "some one held him by the throat." Inspiration was prolonged, and in speaking he was obliged to take breath frequently, this causing great fatigue. The recumbent position increased the dyspnœa. The voice, somewhat hoarse, had not lost much power in the high notes, while the low notes were almost inaudible. He complained of chronic constipation and loss of appetite. General appearance indicated marked anæmia.

The family history was good, and the patient had never had venereal trouble. He could not remember having exposed himself to cold, and it being midsummer, there was no likelihood of such being the cause. All questions purporting to a traumatic origin, inspiration of irritating gases, etc., were answered negatively. He had had lead colic twice, and had been using white paint five weeks previous, in painting the doors and sashes of a new dwelling.

Examination of the chest revealed no morbid condition, excepting a slight systolic murmur. Breath very offensive and tongue covered by a thick white fur. The gums presented the characteristic blue line. Hard and soft palate anæmic, with the exception of the free border of the latter, which appeared, in company with the sides of the uvula, somewhat congested. The pharynx, epiglottis, and the whole laryngeal cavity were also congested, but to a much greater degree. On inspiration the cords were separated by a slit a line and a half in width, and were approximated when a sound was emitted, vibrating, to all appearances, normally.

He was ordered 40 grains of the sulphate of magnesia night and morning, continued until more than three stools per day were caused; iodide of potassium five grains three times a day the first two days, then adding two grains per dose each day, until twenty grains three times daily were given. This was kept up three days, then the doses were gradually diminished as they had been increased, replacing the grains of the iodide by minims of the tincture of nux vomica. No change in the position of the cords was noticed until the beginning of the second week of treatment, although the tongue had cleared and the congestion had become almost imperceptible. The tenth day there was a slight increase of space between the cords, and this gradually increased. The patient was discharged cured nine weeks after, when all symptoms had disappeared. He subsequently changed his occupation, and seven months after his discharge no recurrence of the trouble had taken place.

On motion, adjournment at 5:30 P.M.

In the evening the Association was the guest of the Philadelphia Laryngological Society at a general reception of the medical profession of Philadelphia.

Third day, morning session.

The Association was called to order by the Vice-President, Dr. Glasgow, at 10 A.M.

A paper on "Chronic Irritative Hyperæmia of the Larynx," by William C. Jarvis, M.D., of New York, was read.

Dr. Jarvis' Paper.

I WISH to call your attention to an affection of the larynx which, though it may fail to excite much interest when taken in a pathological or physiological point of view, from its containing few of the complicated causes and effects that sometimes induce the physician to attach so much importance to diseases of infrequent occurrence, nevertheless demands earnest consideration by reason of its frequency, persistence, and the distress it occasions.

Hyperæmia of the larynx, as is well known, occurs in connection with a number of laryngeal diseases, and is often due to an atonic condition of the mucous membrane, brought about by certain laryngeal paralyses and other affections in this part of the respiratory tract. The form of hyperæmia I have reference to, is that which accompanies almost every case of chronic nasal catarrh, and is caused by the action of irritating secretions. I will therefore speak of it as an irritative hyperæmia, since the expression will serve to separate the affection from the other forms of laryngeal hyperæmia. I have observed a tendency on the part of some practitioners to include hyperæmia of the larynx under the head of chronic and subacute laryngitis. Chronic irritative hyperæmia of the larynx differs in several respects from these affections.

The distinction between chronic hyperæmia of the larynx and subacute and chronic laryngitis is, I think, a well-marked one, and of much importance as bearing upon the treatment of the former affection.

In the so-called subacute and chronic laryngitis the laryngeal and perilaryngeal mucous membrane is deeply congested and of an angry red color; there is often much cough, which is sometimes deep and painful. The attack

generally comes on suddenly, and may disappear in a few days. Sometimes it is ushered in by an acute naso-pharyngeal catarrh; at other times a preceding catarrhal inflammation of the kind may not be discoverable. Localized thickenings of the laryngeal folds, ventricular bands and true cords are of common occurrence in chronic laryngitis. A raucous voice, is, as a rule, associated with these affections.

On the other hand, in chronic irritative hyperæmia of the larynx, the laryngeal mucous membrane is, in the majority of cases, not markedly congested, the discoloration in many instances being so slight as to be only distinguished by its contrast against the whiteness of the true vocal cords. Cough is not always associated with this complaint. A sharp sound made in clearing the larynx of mucus is, in most instances, the only annoyance of the kind complained of.

The hyperæmia may be sometimes so intense as to take on a subacute inflammatory condition.

Chronic irritative hyperæmia of the larynx, as the term implies, is always a secondary affection, and invariably follows in the train of troubles brought about by the existence of chronic postnasal catarrh. The existence of a postnasal catarrh, does not, however, always imply a state of laryngeal hyperæmia. The occurrence and extent of the hyperæmia seem to be dependent upon the amount of the secretions poured into the pharynx. A slight excess over the normal amount may find an exit through the œsophagus. It is when the accumulated mucus becomes so large in amount, or the secretions so thick, they cannot be received through this natural channel, that an overflow takes place upon the delicate structures of the larynx. Once in contact with these parts, the glutinous mucus acts as a foreign body, and by its constant presence provokes a hyperæmia.

Sometimes the mucus becomes inspissated or even solid, in which case it not only acts more powerfully as an irritant, but also interferes with phonotion. I have in mind a case of the kind, in which the movement of one cord was so much interfered with as to give rise to a diagnosis of recurrent laryngeal paralysis. I was unable in this instance

to dislodge the obstruction with the spray, but accomplished the result by means of a probe. This tendency of the mucus to dessicate is especially noticeable in laryngitis sicca.

Diagnosis.—The diagnosis of hyperæmia of the larynx is based upon discoloration of the true cords. Sometimes careful inspection will only show fine markings of congested capillaries, running along the free edges or outer margins of the cords. In other cases the congestion of the cords will be found to be so great as to take on a purplish hue. Even in these cases one may fail to discover any marked change in the appearance of the mucous membrane in the vicinity of the cords. It is this intense form of hyperæmia that sometimes gives rise to a most distressing choking sensation. The feeling, as if of impending suffocation, is most apt to come on in the night, awaking those afflicted, and sometimes occasioning much loss of sleep.

An early recognition of this affection is especially important in the case of vocalists, who are subject to attacks of naso-pharyngeal catarrh. By promptly attending to the nasal trouble, one may remove the cause, and thus ward off a hyperæmia of the true cords, which is almost certain to follow the catarrh if it is neglected. A very slight congestion, by blunting the sharpness of the true cords' edges, may lower the vocal register to an extent seemingly out of proportion with the amount of existing hyperæmia. In confirmation of this fact I have observed elevation and strength of voice return, proportionate to the gradual disappearance of the hyperæmia and clearing up of the edges of the true cords. The treatment of this affection, I think, should principally be directed to its cause. The indirect cause, in this instance, being a naso-pharyngeal catarrh, and the direct one an irritating secretion, immediate relief from the latter, and subsequent removal from the former agent are called for. If it were possible by means of sprays to keep the upper surface of the larynx free from the foreign secretion, the hyperæmia might be kept in abeyance until the cause is removed. The rapid and incessant accumulation of mucus makes this impossible.

Turning attention to the nasal catarrh, more or less tur-

binated hypertrophy will be discoverable, with its attendant irritating secretions. The first indication is, naturally, to remove every vestige of hypertrophy that may, in accordance with sound judgment, be productive of this secretion. I invariably make use of the wire-snare nasal écraseur invented by me for this purpose, with which you are acquainted. It seems to me more stress should be laid upon the removal of small hypertrophies which, on account of their non-interference with nasal respiration, are permitted to remain undisturbed. I have known discharges, kept up by hypertrophied superior turbinated tissue, in no way interfering with breathing, to cease soon after removal of the growth. By means of the écraseur, and transfixion needles devised by me to go with it, I have never found any difficulty in removing nasal hypertrophies, no matter what may be their size or variety. My efforts in this direction have been followed by most satisfactory results, but I will refrain from giving a history of the cases, as it would lead me too far from my subject.

Next in order comes thorough and frequent cleansing of the nasal cavities, followed by the application of astringent solutions. In my hands insufflation of powders has been followed by so much irritation as to discourage me in their general use. Iodoform, provided its odor be properly disguised, seems to possess few of the objections that contraindicate the use of the other powders. In connection with the nasal therapeutics, it is often advisable to spray the larynx with mild astringent solutions, their application to be preceded by the use of a cleansing fluid. Coarse and powerful cleansing sprays for the nose, and fine cleansing and medicated sprays for the larynx, have given me the best results. A fair trial of fine and low pressure cleansing sprays for the nose has induced me to abandon them as being of little use. The brush and sponge brought in contact with the delicate vocal structures are, in my experience, even when lightly applied, too irritating. I, however, use the brush to apply nitrate of silver to the larynx, but saturate it well with fluid, and gently press out the solution against the edge of the epiglottis. The medicated solution will trickle into the larynx and give the desired effect.

Discussion on Dr. Jarvis' Paper.

Dr. SHURLY thought the subject should receive proper attention, since chronic irritative hyperæmia might result in chronic hypertrophy. He had observed in plethoric individuals, during laryngeal inspection, a more intense coloring of the laryngeal mucous membrane, without increase in secretion or obvious structural changes, the general health being good; this appearance is more marked at some times in the day than at others.

In regard to treatment, he believed that local applications, especially with the brush, only aggravated the condition; he was accustomed to rely upon saline mineral waters and mild anodyne lozenges. He did not even employ the spray.

Dr. ELSBERG said that the subject of laryngeal hyperæmia is both interesting and important; the reader of the paper has, however, limited his theme to the cases of hyperæmia of the vocal bands caused by descending secretions from naso-pharyngeal catarrh, only incidentally stating that some practitioners include hyperæmia under the head of laryngitis. He would say that pathologically there is a distinct boundary between hyperæmia and inflammation—a boundary which is occupied by the condition of inflammatory œdema. Mucous membranes are endowed like the skin with a property somewhat analogous to that possessed by erectile tissues, viz.: they can become highly turgid with blood and rapidly return to their ordinary condition without leaving a trace of the vascular injection. In the skin, this "blushing" is well known, as it occurs in delicate cheeks; and in the larynx this "flushing" occurs and passes off with as little injury, unless it passes beyond a certain degree or is too frequently repeated. When it is very great it requires increased secretion or transudation of serum for its relief; then it has approached or perhaps reached the limit between it and inflammation. Active hyperæmia may be caused by various irritants: long-continued speaking or singing, crying or weeping, inhalation of dust or smoke and of otherwise impure or too cold or too hot air, the being subjected to laryngoscopical examination, and certainly, also, the irritation cited by Dr. Jarvis, may cause it. The epiglottis is the most frequent seat of hyperæmia, next the posterior wall of the larynx and the vocal bands. Aside from the removal of the irritating cause, which in the cases referred to by Dr. Jarvis, would be the cure of the naso-pharyngeal catarrh or at least the prevention of the entrance of secretion into the laryngeal aperture, treatment of laryngeal hyperæmia

consists in rest—if possible, absolute rest of the voice, and quiet, unexcited breathing. This is of the utmost importance, and very soothing astringents may be deemed necessary, always bearing in mind the tendency of hyperæmia to pass into inflammatory œdema, and thence into actual inflammation with its consequences.

Dr. A. H. SMITH mentioned a case showing that the vocal cords can be temporarily congested and again depleted. The patient, a lady, complained of laryngeal trouble, and upon examining the larynx the vocal cords were seen to be congested. During the time of the examination the bands gradually became white, but again were made red by slight effort at speech. He saw this process go on a number of times, the cords becoming alternately pink and white.

Dr. SEILER said that in singing, hyperæmia is produced by improper use of the voice; when the singer passes the limit of his register, hyperæmia of the cords appears, the injection beginning on a line on the free border of the vocal bands, and spreading. In striking falsetto this hyperæmia passes off. Rest also relieves it temporarily, but it will return on repeating the effort. Singers should be taught to observe this rule, for persistence in singing beyond the register favors laryngitis; thus straining of the voice may lead to pathological conditions.

Dr. COHEN said that he had often observed the transient flushing in the vocal cords and larynx, and had also seen it in the pharynx and even the hard palate, due to the mechanical irritation of the laryngoscopic mirror.

In the treatment he advised mineral and alkaline waters, and locally, weak sprays, such as sodium bicarbonate or biborate, potassium bromide, or potassium chlorate. He usually allowed his patients to use this spray at home three or four times daily. Rest to the larynx is essential; singers should merely whisper, until the condition is relieved and they regain the proper use of the voice.

Dr. BOSWORTH noticed the close relationship existing between the catarrhal conditions of the nasal cavities and hyperæmia of the larynx. This point had been forced upon his mind by the unsatisfactory results he had obtained as long as he confined his treatment solely to the larynx; he now treats the nasal catarrh and pays less attention to the larynx. This suggestion is a valuable one, and has hitherto received insufficient attention; since

the laryngeal trouble may be often caused by the irritating nasal secretion pouring into the pharynx, and by the mouth-breathing due to the catarrh.

Dr. ELSBERG agreed so far with the last speaker as to say that it is very important to pay attention to the condition of the nasal cavities in treating all laryngeal affections.

In regard to the President's suggestion, he remarked that whispering required more effort than ordinary speech, and would therefore be likely to increase the hyperæmia rather than relieve it.

Dr. COHEN said that he referred to the labial and not to the laryngeal whisper, and even this should be restricted.

Dr. ELSBERG maintained his position, and said that in the case of such patients he considered the labial nearly as bad as the laryngeal whisper and worse than easy, unexcited, ordinary speaking. Besides, it was almost impossible for patients to make the difference between the two kinds of whispering and to limit their practice to the one kind.

Dr. SEILER remarked that in his opinion the whispering voice was produced by the current of air from the lungs rushing with great force through the but partially closed glottis, thereby giving rise to the friction sound. This sound, like the musical sound produced by the vibration of the vocal cords in loud speaking, was then articulated in the oral and nasal cavities. He thought that there was more strain upon the vocal cords in whispering than in ordinary loud speaking, because in the former the vocal cords were thrown into irregular, non-periodic vibrations and more breath was used, while in loud speaking less breath was necessary and the periodic vibrations of the cords were less likely to produce or aggravate hyperæmia. He, therefore, always cautioned his patients against whispering, and told them that if it was necessary for them to speak, to do so in the ordinary tone of voice.

Dr. BOSWORTH could not account, on the last speaker's theory, for the whispered voice where there had been complete absence of the vocal cords. He also referred to a case of stenosis of the larynx which was able to speak in a whisper.

Dr. SEILER, in explanation, said that there was a difference between whispering and the toneless articulation that occurs in cases of complete stenosis of the larynx. In such cases most of the characteristic consonant noises could be produced by the air contained in the cavity of the mouth being forcibly expelled by the

action of the tongue and cheeks, but the pronunciation of vowels is impossible. Experiments had been tried by Prof. Stoerk and Dr. Seiler several years ago in Vienna, which proved, beyond doubt, what had just been said in regard to toneless articulation.

Dr. A. H. SMITH, by permission of the Association, presented and explained an instrument for removing hypertrophied tissue from the inferior turbinated bone.

Dr. J. O. ROE, of Rochester, N. Y., read an abstract of a paper "On the comparative value of atomized fluids in the treatment of diseases of the larynx."

Dr. Roe's Paper.

THE use of nebulized fluids in the treatment of diseases of the air passages slightly antedates the introduction of laryngoscopy, when Sales-Girons, in 1856, presented to the Parisian Academy of Medicine his "*Pulverisateur*" for the mechanical subdivision of liquids for inhalation, in imitation of the fine spray produced as the natural result of water falling on a rock.

So rapidly did this new process, as it was then called, come into favor, that it was considered by its advocates that every known disease of the respiratory organs must yield readily to this new method of local medication, the inhalation of finely pulverized solutions into every portion of the bronchial track.

The value of this method of reaching diseased surfaces of the otherwise inaccessible portion of the bronchial tract, when properly conducted, can scarcely be over-estimated, but there is a portion of this bronchial tract, the larynx, which cannot by this method of treatment, except in the minority of cases, be sufficiently and properly medicated when invaded by disease requiring decided treatment.

A large majority of diseases of the larynx are more or less localized. Even in that most common form of laryngeal disease, chronic laryngitis, it is quite common to find that the greater portion of the resultant thickening is more or less defined and limited to certain regions of the laryngeal mucous membrane. In other cases the disease will

be found invading every portion of the laryngeal cavity. For the successful treatment of these diseases, if localized, the medicament should be applied only to the diseased surface, since the necessary strength of the agent employed would usually be entirely too great to be applied to the surrounding parts which are but little or not at all diseased. If the disease is general, it is of the greatest importance that the remedial agent should be applied to every portion of the diseased surface, often into the sinuses of Morgagni as well as to the most prominent and projecting parts, and in sufficient strength to produce the desired effect.

However well theoretically the spray may seem to be adapted to fulfil the latter indication, it will be found to be practically inefficient; and in the former cases it is contra-indicated, except for the application of cleansing and sedative solutions.

Spraying the larynx under favorable conditions is ordinarily accomplished as follows. The tongue is gently drawn forward with the thumb and forefinger of the left hand while being held in a napkin; with the right hand the spray tube is introduced until the point is beyond the border of the epiglottis. The patient is now directed to sound "Ah" or "E," when the air pressure is quickly let on and the spray is thrown directly down to the larynx. There are encountered, however, impediments to the accomplishment of this apparently simple and easy procedure. We frequently meet patients with pendant and deformed epiglottides, thick and rebellious tongues, or an excessively sensitive throat with practically no control over it. They will often cease breathing or making a laryngeal sound, or will begin gagging or swallowing the moment the instrument enters the mouth; or, the moment the spray current strikes the epiglottis this valve is forced downward, closing the larynx against the possible entrance of any portion of the spray. It is an experience with these cases that has led some laryngologists to assert that the laryngoscopic mirror is as necessary in spraying the larynx as in using the laryngeal brush.

It is evidently these cases of irritable throats and pendant

or deformed epiglottides in which Lennox Browne describes the patient as giving, "all the time of inhaling, short gaspy coughs, with intervals of more severe paroxysms whenever the epiglottis is momentarily raised."

This author also objects to the use of sprays to the larynx, on the ground that they are unphysiological and are foreign to the natural function of the organ, that being only to afford passage to air.

In this respect the argument against the laryngeal spray is entirely groundless, for it also would hold against the use of nebulized fluids in any portion of the respiratory tract, whereas their value in the treatment of chronic diseases of the bronchi is established beyond question. Other writers and practitioners recommend the use of the spray for the treatment of diseases of the larynx to the almost entire exclusion of the brush, sponge, or cotton.

Not long since, a prominent laryngologist in a very able review of Mr. Browne's work on "The Throat and its Diseases," said: "The laryngeal spray tube, used with a high pressure of compressed air, has entirely superseded in our hands the use of the laryngeal brush, and with the best results. There can be no question regarding the thoroughness, comfort, and even elegance of the method." (*Am. Jour. Med. Science*, Oct., 1878, p. 456.)

There can be no question in regard to the elegance of the method, and scarcely any in reference to the comfort to the patient, although in some instances patients have requested that the applications of the remedies be made to their larynx with the brush, sponge, or absorbent cotton in preference to the spray, on account of its unpleasantness to them.

In regard to the thoroughness of the application made by the laryngeal spray, I question it, as already stated, and for two reasons: 1st. From its apparent want of thoroughness, as judged by observations with the laryngeal mirror after the application has been made. 2d. By its real effects, as evinced by the tardiness or almost lack of improvement in many cases so treated.

Experiments with salt and silver, iodine and starch solu-

tions show conclusively that the particles of the spray only reach the portion on which they strike directly; that there is no bounding as it were, of the particles; and that the ventricles and other portions of the larynx which are shielded from the direct contact of the spray are, therefore, not medicated.

Also, in cases where the patients were suffering from mild forms of general chronic laryngitis I have perseveringly used the spray in the most thorough manner possible, but with little or no perceptible improvement, when, after a very few direct applications of the same remedy with the laryngeal brush, sponge, or absorbent cotton thoroughly into the ventricles and whole interior of the larynx, improvement and cure quite speedily followed.

Thus, in the treatment of laryngeal diseases the probang (the various laryngeal brushes, sponge-holders, and cotton-carriers being but modifications of it) is still an indispensable instrument, and cannot be superseded by the spray, not only when it is desired to apply a remedy to a limited portion alone, but when a general and thorough application to the whole interior of the larynx is necessary.

Discussion of Dr. Roe's Paper.

Dr. D. BRYSON DELAVAN, of New York, described a new instrument, which he passed around, designed for spraying the upper pharynx and posterior nasal cavities, consisting essentially of an inverted Sass tube having an additional bend.

Dr. JARVIS questioned the utility of the upward spray; in some cases there are objections to it on account of the sensitiveness of the throat; indeed, in the majority of cases it cannot be used on account of the "gagging" it produces as soon as the spray is turned on. Any benefit could be equally obtained from the spray, introduced anteriorly, passing through the nasal cavities. With eight or ten pounds pressure the pharynx is very readily reached in this way.

Dr. ELSBERG believed the upward spray might be of service, as it pushes the secretions forward toward the anterior nares; the device presented obviated some difficulties usually encountered, and might be successful; he promised to give it a trial.

By permission, Dr. W. C. JARVIS exhibited instruments for removing hypertrophied tissue from the inferior turbinated bone, and described his method of operating.

Dr. WM. H. DALY, of Pittsburg, read, by title, a paper "On the relation of hay asthma and nasal catarrh," which was referred, with the preceding papers of the Congress, to the Publication Committee.

Dr. Daly's Paper.

SOME observations hereafter to be briefly detailed have suggested the pertinent question:

"Whether we are warranted in believing any case of hay asthma purely a neurosis, without first eliminating the possible causation due to local structural or functional disease in the naso-pharynx."

Much of the tone of literature upon the subject of hay asthma, hay fever, rose cold, June cold, summer catarrh, autumnal catarrh, or by whatever name it may be called, is most doleful, with the dull echoes of clergymen, spinsters, bachelors, and others in the easier pecuniary circumstances of life wailing their experiences to one another much like good people at a class-meeting.

A large proportion of the afflicted have a sort of valetudinarian pride in relating their symptoms, the date of their annually recurring attacks, the geographical limits and altitude of the regions of immunity, and other matters valuable to the tourist chiefly. But few, if any, however, have told us any thing satisfactory about the results of proper inspection of their naso-pharyngeal cavities at the time of their suffering, or during the period in which the exciting cause is not present in the atmosphere.

How many recorded cases are there where any endeavor has been made to obtain positive knowledge of the non-existence of chronic naso-pharyngeal disease that is sure to render them more liable to the irritating influence of the annually ripening bacteria or sporules of which they love so learnedly to talk and write about as affecting them so distressingly from the latter weeks in May till September?

Thoroughly practical rhinoscopy is yet in its infancy. This is to some extent proven by the fact that in 1878, in

one of the two London hospitals devoted to diseases of the throat, the writer saw but two rhinoscopic inspections (posterior) made during a period of three months' attendance upon the active work among the "out" and "in" patients. Every special worker in diseases of the upper air-pasages knows full well how large a number of cases fall under his care ultimately, that have been treated for months or years with the various snuffs and douches without the slightest attempt on the part of their medical attendant to inform himself of the actual condition of the parts by either anterior or posterior inspection by means of the rhinoscopic mirror.

The recorded histories of examinations for local chronic naso-pharyngeal disease in cases of hay asthma, among all the works the writer has consulted, have been conspicuous by their absence. It will therefore not be underrating the character of much of the literature on the subject to regard it as of little value to the practitioner who seeks for reliable information respecting the pathology and medical or surgical treatment of the disease. The first deals almost exclusively with the exciting or external causes; the second deals in a multitude of remedies, which at best rarely serves more than to divert the minds of patients with occupation about themselves.

That diseases have symptoms by which we recognize their characteristics, progress, and peculiar manifestations, is a postulate which is no less true than that they also have a distinctive pathology, and for a knowledge of the latter we ought to seek, in each individual case, whether the teachings we have received or the preconceived notions we may have entertained are satisfactory or not. It seems, however, that the real pathology of hay asthma has invariably been obscured by leaving the subject of the possible existence of intrinsic local disease to take care of itself, while the investigator has, with the microscope, endeavored to work out the exciting external or atmospheric causes. It is a simple matter to look into the naso-pharyngeal cavities; then why is this proper measure so neglected? It would consume but little of the time required to construct or

study abstruse theories that are practically useless since they have led to no valuable results.

Let me ask that patients suffering from hay asthma be thoroughly inspected, and if evidence of chronic inflammatory naso-pharyngeal disease and its resultant derangement of sensibility and secretion exists, treat it, losing sight, as far as possible, of the exciting or atmospheric cause, that can in no wise be removed without removing the patient.

If hypertrophic enlargements of the mucous membrane in any part of its distribution are found, reduce them or remove them entirely.

If polypi or polypoid growths are found, remove them, cauterizing thoroughly the bases of the growths.

If there is chronic disease of any kind whatsoever, put the parts in order, and thereby enable them to withstand the exciting influence of the next recurring crop of bacteria. As peternaturally irritable condition of the parts, from any disease whatsoever, will render them liable to respond to the effect of influences that would be entirely innocuous if applied to healthy tissues. If we restore the diseased tissues to a healthful condition, and hay asthma recurs, then we are warranted in considering the individual case a neurosis, and not otherwise.

The histories of the following cases show beyond doubt that the annually recurring attacks of hay asthma were not so much the result of the mere presence of bacteria in the atmosphere as the fact that these bacteria had their peculiar effects upon parts rendered susceptible to their irritating influences by chronic local disease of the naso-pharynx.

The correctness of this view is proven by the immunity enjoyed after the patients had been successfully treated for chronic local disease of the naso-pharynx. And it is this rather unexpected and gratifying result which must serve as my excuse for drawing the attention of the profession to this class of patients, with the desire of stimulating more extended observation with reference to what I have denominated the intrinsic causes of hay asthma, as distinguished from the extrinsic or exciting causes.

The intimate relationship existing between hay asthma and chronic naso-pharyngeal catarrh in a large proportion of cases I firmly believe, and my belief is based upon the following cases that have, up to this time, been permanently cured, in addition to others in whom the treatment was unsatisfactorily prosecuted, but who also bid fair to have attained results equally flattering.

Case 1.—J. M. A., merchant, ætat. 41, had been affected with hay asthma annually for 21 years, requiring him to leave his home for one of the many reputed regions of safety before the 15th day of June, or suffer the consequences. Circumstances had more than once compelled him to endure the latter, to his serious discomfort. Consulting me during December of 1878 for some impairment of hearing in the left ear caused by impacted cerumen, the history of his case was casually given me regarding his annual attacks of hay asthma. Inspecting his nares, I found, notwithstanding good breathing capacity, he had a hypertrophic growth upon each of the inferior turbinated bones at their anterior ends, the slightest touch of which with the probe caused bleeding and severe fits of sneezing. He gave a history of alternate dryness and discharge from the nares, but had never suspected the existence of any chronic disease of the parts sufficient to cause structural change. Destruction of the growths was accomplished with the galvano-cautery, and treatment during the next three months resulted in a great diminution of the hypersensibility of the nasal mucous membrane. The question was later asked, as to what would be the prospect of immunity from the expected attack of hay asthma. While giving him no encouragement, I advised him to wait and see. The dreaded 15th of June, 1879, was passed at home. The summer and autumn passed also, and the spring and summer of 1880–81 were all passed at home, without any recurrence of hay asthma.

Case 2.—D. T., manufacturer, ætat. 29, an acquaintance of the former patient, presented himself for consultation in January of 1880, giving a history of recurring hay asthma for 6 years. He had a hypersensitive nasal mucous membrane, and dipping middle turbinated bone of left nasal cavity, upon which was a sessile mucous polyp the size of an army bean. He had also a generally thickened condition of the mucous membrane of the naso-pharynx. The polyp was removed by evulsion, its base

On motion of Dr. BOSWORTH, it was resolved that the number of copies of the forthcoming volume of Transactions shall be left to the discretion of the Council.

On motion of Dr. KNIGHT, the Secretary was directed to have printed and distributed to all Fellows the amended Constitution and By-Laws of the Association, together with a complete list of the Fellows.

Dr. KNIGHT, in a verbal communication from the editors of the ARCHIVES OF LARYNGOLOGY, offered to publish the Transactions of the Association without the minutes of the business meetings.

After considerable discussion in regard to the propriety of publishing the private proceedings of the Association in a medical journal, it was, on motion of Dr. JOHNSON, of Chicago—

Resolved, That the whole matter of the manner of publication of the Transactions be referred to the Council with power to act.

Dr. ELSBERG called attention to the absence of Index and Table of Contents in the volume for 1880.

Dr. DALY moved that the Index and Table of Contents for volume ii be published in the succeeding volume. Motion lost.

On motion of Dr. JOHNSON, the Council was instructed to prepare a table of contents for the volume which has just been issued, and to send it out to every member of the Association.

Dr. A. H. SMITH moved that the place of meeting be stricken out from the report of the Nominating Committee, and that the annual meeting for 1882 shall be at Niagara during the month of June, 1882; and that the Council shall be instructed to make the proper arrangements therefor and to determine the date.

After much discussion this resolution was adopted, with the following amendment offered by Dr. ELSBERG, "provided that the time of meeting shall not conflict with that of the meeting of the American Medical Association."

On motion of Dr. F. H. BOSWORTH the Council was requested to provide a seal for the Association, and a certificate of membership to be issued only to Honorary and Corresponding Fellows.

Dr. JOHNSON announced the death of Dr. Frank H. Davis, and moved that a committee be appointed to draft a proper memorial to be published in the Transactions. The motion was adopted, and the President appointed Drs. Glasgow, Johnson, and Elsberg for this duty.

Dr. HARTMAN moved that a committee be appointed to prepare a resolution of thanks to the College of Physicians, the Camden

and Atlantic Railroad, the Academy of Natural Sciences, and others, who have contributed to the success and pleasure of the meeting. The motion prevailed, and Drs. Hartman, Smith, and Bosworth were named by the President.

On motion, the delegates to the International Medical Congress were instructed to present a report at the next meeting of this Association.

The Nominating Committee recommended as delegates to the sub-section on Laryngology of the International Medical Congress of 1881, Drs. Cohen, Lefferts, Lincoln, and Bosworth.

On motion, the report of the Committee was accepted.

The Tellers appointed to conduct the election reported the following result:

President, Dr. F. I. Knight, of Boston.
1st Vice-President, Dr. E. I. Shurly, Detroit.
2d Vice-President, Dr. Wm. Porter, St. Louis.
Member of Council, Dr. Harrison Allen, Philadelphia.

The Council having recommended the names of several gentlemen for Honorary and Corresponding Fellowship, an election was held with the following result:

Dr. Morell Mackenzie, of London, Honorary Fellow.

CORRESPONDING FELLOWS.

Prof. M. Krishaber, Paris,	Prof. Leopold Schroetter, Vienna,
Dr. L. Mandl, Paris,	Dr. Felix Semon, London,
Prof. Karl Störk, Vienna,	Prof. R. Voltolini, Breslau.

Drs. ASCH and LANGMAID were appointed a committee to conduct the newly-elected officers to their seats.

Dr. KNIGHT, upon taking the chair as presiding officer of the Association, thanked the Fellows for the compliment paid him so early in the history of the Association, and expressed the hope that he might perform the duties of the office as faithfully, efficiently, and energetically as both of his predecessors.

Upon motion of Dr. ELSBERG, a vote of thanks was tendered the retiring President, Dr. J. Solis Cohen, for the urbane manner and uniform courtesy with which he so satisfactorily performed the duties of the office which he had just vacated.

Upon motion of Dr. ASCH, it was resolved that the thanks of the Association are due, and are hereby tendered, to the

Philadelphia members for the hospitable manner in which the Association has been entertained; and on motion of Dr. Hartman the thanks of the Association were tendered the members of the Philadelphia Laryngological Association for the satisfactory manner in which they have aided the proceedings of this Congress.

The meeting then adjourned.

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