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1878 - THE AMERICAN LARYNGOLOGICAL ASSOCIATION - 1888

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PRESENTED BY D. BRYSON DELAVAN

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TRANSACTIONS
OF THE
TENTH ANNUAL MEETING
OF THE
AMERICAN
LARYNGOLOGICAL ASSOCIATION

HELD IN THE CITY OF WASHINGTON

September 18, 19, and 20, 1888

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TRANSACTIONS
OF THE
TENTH ANNUAL MEETING
OF THE
AMERICAN LARYNGOLOGICAL ASSOCIATION,
HELD IN THE GRAND ARMY BUILDING, WASHINGTON, D. C., SEP-
TEMBER 18, 19, AND 20, 1888.

First Day—Morning Session.

THE Tenth Annual Congress of the American Laryngological Association was called to order at ten o'clock, September 18th, the President, Rufus P. Lincoln, M.D., of New York, occupying the chair.

The secretary then called the roll, the following Fellows being present during the session :

RUFUS P. LINCOLN, New York, President.
JOHN N. MACKENZIE, Baltimore, Vice-President.
SAMUEL W. LANGMAID, Boston, Vice-President.
D. BRVSON DELAVAN, New York, Secretary and Treasurer.
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W. C. GLASGOW, St. Louis.
 EDGAR HOLDEN, Newark.
 E. F. INGALS, Chicago.
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 H. A. JOHNSON, Chicago.
 S. JOHNSTON, Baltimore.
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 C. C. RICE, New York.
 BEVERLEY ROBINSON, New York.
 J. O. ROE, Rochester.
 C. E. SAJOUS, Philadelphia.
 C. SEILER, Philadelphia.
 E. L. SHURLY, Detroit.
 B. F. WESTBROOK, Brooklyn.

Among the guests of the Association, present during its proceedings, may be mentioned Mr. Victor Horsley and Mr. Ferrier, of London ; Professor Henry Y. Bowditch, of Boston ; Dr. John S. Billings, and Dr. Frank Baker, of Washington.

An address of welcome was delivered by Dr. E. Carroll Morgan, of Washington.

Mr. President and Fellows :

There are few among you who can realize the gratification I experience in welcoming the American Laryngological Association to the national capital on this auspicious occasion.

For ten years our profitable and pleasant annual gatherings have been held in the medical centres of the country, and so successfully that I had wellnigh despaired of ever seeing you in Washington.

Our city, always conservative, has long needed and sought the lasting influence which your presence at this session will undoubtedly create, and, in the name of those interested in laryngology, I thank you for this visit.

You have wisely decided, for at least one meeting, to try the experiment of pursuing science in the very atmosphere of patriotism. I am sure you will have no causes of regret, and, I trust, many to induce a repetition of to-day's meeting.

This is a fortunate time for your first visit to Washington, for you come as a leading association to a great Congress which

represents the very best element of the American medical profession.

Our beautiful city greets you in all her grandeur. Her monuments, her parks, and her public buildings are more attractive than ever at this season, and both nature and art combine to render this session of the Association a notable event in our history.

Surrounded as we are by the very institutions which have rendered the Republic truly great, we should gain renewed impetus for work.

Eighteen months have passed since our last meeting, and one and all of us experience additional pleasure in this long-delayed union of mutual friends and co-workers.

The scientific work before you is extensive and the success of the Congress in this particular is already assured ; but the social features have, in accordance with the expressed wish of the Executive Committee of the Congress, been made of secondary consideration, and the entertainments will be few and unostentatious.

Much to my regret, our annual dinner must be omitted, owing to the amount of scientific work that fills our programme. The opportunities for pleasant, informal greetings, however, will be numerous.

Again, I welcome you to my native city, and wish you god-speed in the noble work of our Association.

As the formal opening of the Congress, Dr. Rufus P. Lincoln proceeded to deliver the annual

PRESIDENT'S ADDRESS.

A DECADE OF LARYNGOLOGY.

Fellows of the American Laryngological Association :

Through your favor it becomes my agreeable duty to offer a few words of greeting and congratulation on this opening of the Tenth Annual Meeting of the American Laryngological Association.

We assemble this year under new auspices, in common with other special societies, in the capital of our nation, which, already its political centre, seems destined to become a focus to which scientific and literary labors are to converge. Whether this spot shall become our Mecca, where we are to establish our shrine and

to which we are to make our future pilgrimages, our experiences this year will do much to determine.

That we are to live on, however, is no longer a question. We cannot be said to have been born Minerva-like, but at ten years of age our work shows a healthy and vigorous growth that bespeaks a long life, and one that our patients and the medical profession at large are bound to respect.

A present welcome, then, to the Congress of American Physicians and Surgeons, with whom we join hands in our common labors for the advancement and improvement of means for the alleviation of human suffering.

The position of any specialty, and its relation to the general practice of medicine, have lately been questioned by a former member of this Association.

I am confident every Fellow present is ready to defend our cause. But whether the existence of this Association and its continuance on its present basis are justified, a brief review of what has been accomplished in our department, during its first decade, will, I believe, furnish a favorable reply, conclusive to any unprejudiced person.

Our lamented Elsberg, in the first annual address before this Association, with the enthusiasm and foresight which were among his characteristics, formulated certain principles and aims, defining its object and purpose. They were, in brief: That this Association should become the means of introducing those of kindred tastes in the practice of medicine, and the fostering of friendships thereby made; that it should have annual meetings for the contribution and promulgation of original work, and for the discussion of subjects pertaining to laryngology; that its proceedings should be published in a suitable form for our own personal convenience, and offered to the profession at large; that it should initiate a laryngological library; that a prize should be offered for a valuable contribution to the science of laryngology; that special hospitals, or wards in hospitals already established, should be devoted to throat-patients; and that its members should seek recognition in the different medical colleges throughout the country by the assignment of a special chair for instruction in this department.

Except the offering of a prize, I believe all these requirements have been realized, if not to the degree of perfection we desire, yet with a measure of success that promises greater progress in the future.

Annual meetings have been held, to which more than half the active members contributed papers, there being present a majority of the Fellows. Intercourse between common workers in distant parts of our continent has thus been secured, and friendships formed, that could not have otherwise been realized. When, therefore, I cordially bid you welcome here to-day, as fellow-laborers in a common field, it is as a band of mutual friends without, I believe, jealousy or ill-will in the heart of anyone toward another. This harmony and this good-will, resulting from personal acquaintance, could not have existed but for the formation of this Association. Nearly every medical college in the land has its professor of laryngology. Several hospitals have assigned a recognized laryngologist to their staff of attending surgeons. Our librarian will testify to the collection of a library of no mean proportions; while our annual volume of "Transactions" is a source of pride to ourselves, and sought for by every medical library. It will be well for us to still make Elsberg's sentiments our guiding principle; and I trust the time is not far distant when the offering of a prize shall be an accomplished fact.

A record of the amount of work done by this Association, later referred to in these remarks, I rely upon to confirm many of my statements. Certainly the achievements accomplished in this department of medicine, during this decade, have never been equalled. Indeed, it is not too much to claim that the progress we have made exceeds that of any other department. Additions are being constantly made to our coterie; while, at the same time, the field is broadening, and an honorable recognition is being accorded us by both the profession at large and the laity. But let us not forget our watchword as promulgated in our constitution—"the promotion of knowledge in all that relates to diseases of the upper air-passages." When this was subscribed to by each of us, the principle seemed simple; but later soundings disclosed a depth that can never be fathomed. Our aim is perfection; though no one expects to attain it, yet we have a firm and broad foundation that supports a never-ending ladder, always pointing upward; and as each succeeding round is reached it adds to our glory and success, but at the same time enlarges the circle of the unknown.

The organization of this Association was the beginning of a new era in laryngology. It afforded opportunity for concerted action, and stimulated labor and thought that otherwise would have been spasmodic and erratic.

Thought is said to originate want ; and thought can never be at ease until the want is met. To write a history of the progress of medicine in this country during this period would be to quote largely from the contributions to its literature made by members of this Association. During this decade a larger and continually increasing number of gifted and zealous workers have availed themselves of the fruits of botanical and chemical research, and pushed their investigations further and further into the unknown territory into whose borders the earlier workers had only penetrated. The science of physics, too, has been growing along with chemistry and botany, while surgery and electricity, by their many modifications, have been made to contribute notable results.

But, to be more definite—what has this Association actually contributed to this progressive work ? I have looked through the volumes of our published “Transactions,” including also the programme of the present Congress, and I have classified, in an arbitrary method, the various papers, with the following result :

Without including the Annual Addresses by your respective presidents, which introduced the different sessions of this Association, and which embodied material for reflection and practical suggestions for insuring its successful growth and the realization of the object of our conventions, I find there have been 194 scientific papers read at our meetings. Of those that related to the anterior nares, 18 were upon diseases of the mucous membrane and submucous tissue ; 5 on tumors ; 10 on deformities ; 9 on neuroses ; and 2 on the cavity of the antrum. Of the naso-pharynx, 5 referred to diseases of the mucous membranes and submucous tissue ; 7 to tumors ; and 3 to deformities. Of the oro-pharynx, 18 referred to diseases of the mucous membrane and submucous tissue ; 6 to tumors ; 2 to deformities ; 6 to neuroses ; and 1 was anatomical.

Of the larynx we have 20 papers on diseases of the mucous membrane and submucous tissue ; 18 on tumors ; 6 on strictures and stenoses of the larynx and trachea ; 4 on diseases of the cartilages ; 18 on diseases of the nerves ; 3 on fractures and wounds ; 8 on anatomy and physiology ; 5 on therapeutics ; 2 on syphilis ; 4 on vocalization ; 3 on intubation and tracheotomy ; 1 on foreign bodies ; 1 on laryngectomy ; 4 on photography ; and 5 general.

There were also exhibited more than fifty new instruments, or modifications of old ones.

Most of these papers were followed by discussions by the Fel-

lows of the Association, and elicited ideas and opinions hardly second in value to the original paper. The fact that our members are from different sections of our country afforded opportunities, in these discussions, for acquiring a precise knowledge of its climatic characteristics in their influences upon the modification of disease, and the behavior of remedies.

Many papers were illustrated by sketches, photographs, pathological specimens, or microscopical exhibitions. Often the demonstrations of the disease upon the patient himself accompanied the reading of a paper; while another would be illustrated by displaying the effect of an operation on the living subject.

Another valuable feature of our meetings has been the exhibition of instruments and the method of their manipulation, as the devices for galvano-cautery, the electric lamp, the electric motor, the wire snare, etc.; and also the demonstration of new remedies and their effects, as cocaine, iodoform, and the improved methods of using those long tried, or the new uses to which they are applicable. I have not time to enumerate all the important instruments or valuable remedies that this decade has brought to light; but I have said enough to remind you of the important and leading part taken by members of this Association in the advancement of our science. Not only have members of our Association experienced the advantages of the labors of its Fellows, but by means of the prompt publication of our papers in a leading journal of large circulation, afterward compiled in a single annual volume, the profession at large has had access to them—an advantage, I am sure, that has been fully appreciated. The editor of a medical journal is the best judge, *prima facie*, of the literary demands of the profession. The fact that such a one has been always ready, without compensation, to publish our papers, and afterward republish them in the annual volume of our "Transactions," is further evidence of the estimation in which they are held.

When, then, one disparages the specialist, or, rather, criticises his relation to his patient and the family physician, I refer with confidence to the work done by this Association as an answer, and reply, further, that if there is a want of harmony it must be the fault of the individual rather than of the principle. The more strictly one is a specialist and the less a general practitioner "with a preference," the less chance there will be for discord between the expert and the family physician.

Someone has written: "Through a curious mental infirmity

busy men sometimes speak or write words which have been lingering in the background of consciousness instead of those that belong to the train of action and progressive thought."

What we have said, so far, relates to what the members of this Association have done as specialists. Your successes, therefore, richly merit my heartiest official congratulation.

I wish to add a few words of encouragement for perseverance. Much has been accomplished, but much more remains to be done. We have secured a footing—yes, a firm foundation—for our specialty; but the idea of specialism must be promoted and nurtured in the minds of the profession and of the public. But a few years ago the patient was looked upon as unthinking clay, the private property of his physician. The principle of the subdivision of labor is permeating more and more all classes of effort; while in the profession, in addition to this the principles, the old and the new code, are being merged into the Golden Rule. Let this principle always actuate us, and let our deeds justify it, and the family physician will enlist us in his cause more and more frequently.

The experienced master of the ship is, of course, most competent to command, so long as his voyage lies in the open sea; but when he approaches a strange harbor on a dangerous shore, and feels the full weight of responsibility that a valuable cargo and precious lives impose, he will certainly take on a pilot who is especially familiar with the channel and its peculiar perils.

A feature of our specialty which, I think, could be enlarged upon with profit is, the prevention of disease in the upper air-passages. The word "cure," as now used, means the care of the disease. Would it not be better to "care for" the patient, and thus prevent the disease? There is no department of medicine to which this principle could not apply, but there is probably no field of medicine where a disregard of the laws of health is followed by severer penalties than in that pertaining to the upper air-passages. I need only refer to pulmonary, ear, and eye affections, not to instance many remoter consequences, excited by defects in the throat and nose.

You may very naturally say that this is intruding upon the province of the family physician. True, but it is within our province to sound the alarm. It has already been done, but I fear it has not been sounded loud enough to attract the attention the subject merits.

Another subject to which I invite your attention is one upon which your official action will give expression during this session. I refer to the increase of membership in this Association—a subject which everyone will acknowledge is a matter of vital importance to our future welfare.

I believe I am correct in interpreting the sentiment of the founders of this Association when I state that they did not contemplate the foundation of a society large in numbers, but of one that should embrace zealous and recognized workers in the field of laryngology ; and that ultimately the membership should be exclusively of such. Whether the opinion of the majority has changed will be reflected in your votes.

No one of us is willing to see a name added to our rolls which fails to meet whatever standard is established ; and I am equally certain each of us desires to place there every name that deserves such inscription. It is a delicate task you have before you. Conservatism and discretion are needed to determine the action which the interests of this Association require. We have now four vacancies to be filled, to complete our limit of fifty.

With the increased facilities for instruction, both at home and abroad, each year more and more physicians are perfecting themselves in our specialty, and they naturally desire to be recognized as specialists. Shall such expressed wishes entitle them to an election, or shall the test be consistent and intelligent work, with results that commend their author to the recognition of the profession? An Association of this kind constantly requires new blood. Let it be of good quality, and whether the number to be received be few or many, let us so keep our standard that a membership shall be held as a place of aspiration and one of the honorable rewards of the profession. Up to this time, by reason of death, resignation, or failure to comply with the requirements of our By-laws, vacancies have occurred, affording opportunities for the addition of new members each year.

The last consideration to which I wish to invite your attention is an omission in our By-laws that, I believe, it will be the sense of this Association, when its attention is called to it, to remedy without unnecessary delay. This defect has been taken advantage of but twice since our organization. It then proved to be the occasion of much annoyance to the officers of the Association, and resulted in a loss that cannot now be repaired. But for these two incidents our published “Transactions” to this date would be com-

plete. One paper read at the session of 1883 was absolutely refused for publication by its author, and consequently the volume for that year is defective. A similar refusal on the part of another member made the volume for 1880 also incomplete. There is a written law that every paper accepted and read at any session thereby becomes the property of the Association; there is an unwritten law that its first public appearance in print should be as a part of our "Transactions." If the method of publication hitherto followed is to be continued, a clause should be added to our By-laws enacting that this society shall have the right of first publication, and imposing some penalty for a refusal to comply with this provision.

Before bringing my remarks to a close, I have yet to fulfil one sad duty.

At the time of our last meeting death had laid its hand on one of our members, and soon carried away its victim. Woolsey Johnson was not known personally to the most of us, yet the few who had the pleasure of his acquaintance will ever retain a pleasant recollection of his manly beauty, genial friendship, and well-trained and fully developed intellect. With an evenly balanced mind and strong force of character, it was not difficult for him to surmount obstacles to his ambition. Dr. Johnson graduated in medicine from the College of Physicians and Surgeons, New York, in the class of 1863, and lectured in that institution on diseases of the larynx and laryngoscopy in 1869 and 1870.

Though one of the founders of this Association, the demands made upon him soon led him into another department of medicine. At the time of his death he was one of the Commissioners of the Health Department of the City of New York, and one of the attending physicians to the New York Hospital.

I conclude this review of our ten-years history with the heartiest congratulations upon what this Association has already accomplished, and with warmest wishes for its and your future prosperity. At the same time, sincerely requesting your kind indulgence and support in the discharge of my duties during this session as your presiding officer, I now declare our Tenth Annual Meeting open, and ready for business in accordance with the programme before you.

Paper.

IMAGINARY LINGUAL ULCERATION.

BY GEORGE M. LEFFERTS, A.M., M.D.

“IMAGINARY lingual ulceration,” with its demoralizing pain and indefinite terrors, is very real to the sufferer, while to the physician the almost utter futility of his present therapeutic resources for its relief renders the affection one of more than passing interest and importance.

These two reasons alone, even if others did not exist, would justify my bringing the subject briefly before you for discussion, which I now do, in the hope and belief that light may be shed especially upon the vexed questions of etiology and therapeutics.

“Imaginary lingual ulceration”—recently so named by Verneuil—although a comparatively rare affection, is doubtless well known by some name or under some form to many of you. It presents no complex symptoms; its local lesions, if any exist, are often indefinite; still the diagnosis usually admits of no doubt, and the clinical history, taken alone, is distinctive.

A patient, male or female, as the case may be, for the affection occurs with equal frequency in the sexes, and from thirty-five to fifty years of age, presents himself complaining of intense pain, usually of a lancinating or darting character, limited to one-half of the tongue, usually the left, and extending from its base, just opposite and below the tonsil forward to its tip, or the pain may be more circumscribed and limited to the junction of the posterior with the middle third of the organ, at or near the location of the posterior lenticular papilla. It is more or less intermittent, rarely constant; is aggravated by movements of the tongue, although these are free; is often increased by the act of mastication and excited by hot or irritating articles of food. Its effect upon the patient is demoralizing, his imagination plays him false, his terrors are aroused, and injudicious medical or surgical interference and advice, instead of allaying both mental and physical disturbance, not infrequently excite them; the fear of cancer, and the belief, which remains unshaken, that ulceration actually exists, constitute an integral part and important factor in this curious affection.

Such patients, however, are not invariably hypochondriacal,

as has been asserted ; on the contrary, the affection is met with in those who present no evidences of a neurotic or even nervous temperament ; it is occasionally seen in individuals possessing and presenting all the signs of robust health, and the mistake has been made, and is made to-day, of ascribing alone to the imaginative fears of the patient what actually exists as an undoubted, if not always demonstrable, physical and painful fact.

Subjective symptoms, other than the pain as described and occasionally slight salivation, if it be excessive, do not exist.

Careful physical examination reveals but little or nothing to guide us to a diagnosis, especially if the tongue, at its affected point, has not been tampered with by local and irritant applications. If drawn forth from the mouth and extended to the opposite side from that on which the local point of pain is complained of, it usually presents a normal appearance ; the surgeon's attention being directed, as it always is, by the patient to a point on the line of demarcation between the roughened epithelium of the dorsum of the organ and the smooth mucous membrane below, a lateral line, which is marked near the tonsil by the invariable presence of a few delicate papillæ. These will be found of natural number, size, and color, subject to normal variations in different individuals. If irritation has been caused, these papillæ will be seen swollen, reddened, and associated with lateral inflammatory enlargement of the tongue to a greater or less extent, while pain is increased and constantly aggravated by the swollen tongue being impinged upon by the teeth during mastication. Lesions of a catarrhal nature, which commonly coexist in the naso-pharynx, pharynx, and perhaps the larynx or tonsils, are not of such a character or grade, as a rule, as to influence a part so remote and indirectly connected, nor are they such as to excite a plausible suspicion as to a possible reflex character of the tongue-disturbance.

Such is a brief physical sketch of the affection which we have named "imaginary lingual ulceration." A fanciful term, perhaps, as ulceration rarely if ever exists, but certainly descriptive enough from our, and truthfully exact from the patient's, point of view, to warrant its being retained.

In passing to the question of causation, we are at once involved in a multitude of hypotheses, bewildered by more or less plausible explanations, and confronted by a variety of views. No unanimity of opinion exists. From the little that is found in literature concerning the affection, I select the following, first recording

my own opinion, based upon experience, that to regard it and to dismiss it at once as a fanciful conceit on the part of the patient is a grave mistake, and that relief of the real suffering that undoubtedly often exists—granted that this may be in part mental—is not and cannot be attained by such a course.

Verneuil ("Acad. de Méd. de Paris," July 27 and October 4, 1887) and, I believe, Labbé, regard the disease as a purely neuralgic affection of the tongue, and compare it to an affection of the breast, described by Velpeau under the name of imaginary tumor of the breast, which, like the above-named disease, is also characterized by intense local pain without any appreciable lesion.

Fournier, Lollé, Hardy, Luys, and Magitot all agree to regard the symptoms as hypochondriacal.

Poyet ("Journ. des Conn. med.," October 20, 1887), from whom I quote, says that the delusion may almost always be referred to one of four causes. In the first class of cases there is a neuralgia of the tongue, and the pain leads the sufferer to believe that ulceration exists. In the second class are patients who have read or heard of some person afflicted with cancer, and have been led thereby to examine their own tongues. They notice, perhaps, a somewhat prominent papilla, and their fears lead them to the conclusion that it is the edge of an ulcer or a commencing cancer. Others are hypochondriacs, pure and simple, and are so convinced that there is an ulcer present that no amount of argument or demonstration can convince them of their error. Finally, certain patients, with lingual psoriasis, discover the white patch on their tongue and think that ulceration is present.

These old-time views, representing but one side of the question, I present, for the moment, without comment.

Albert ("Wiener med. Presse," Nos. 1 to 6, 1885) ascribes the pain to the presence of "irritable papillæ in the *regio foliata*." But cases are certainly met with in which none of these hypotheses covers the diagnostic ground. Cases such as I have described above, not neurotic, not imaginative, of good general physical condition, cases in which all possible or probable sources of local irritation have been removed, such as decayed, irregular, or ragged teeth which press upon the tongue, teeth filled with amalgam, which possibly chemically affects it, diseases of the gums, which have been claimed by recent writers to be efficient cause for reflex neuroses of distant parts, but still pain persists. *Why?* is the question that we must ask ourselves. Are general causes

at work of which we at present know nothing? Can a rheumatic or gouty diathesis with such local manifestations be at fault? Doubtless such cases exist. I have seen and treated them successfully; but they are limited in number. Must we then be driven, by our etiological uncertainty, into that indefinite and unsatisfactory but comfortable diagnostic haven of "neuralgia?"

I have alluded to the common plan of treatment; the patient is classed as hypochondriacal, nervous, fanciful; his sufferings regarded as unreal and possessing actuality in his imagination alone, and as a *placebo* local applications of a caustic nature are made to the lingual papillæ, whether these be enlarged or not, in the hope of curing the supposed growth. The results are such as to increase rather than alleviate pain, and only serve to confirm the patient in his delusion, should this exist. Still more, these results of injudicious treatment may pass, as I have seen, beyond the limit of mere irritation into a stage of actual ulceration, suspicious induration, and dangerous extension, with glandular involvement.

To such a vulnerable organ as the tongue, the danger of such a course cannot be overestimated, nor its adoption too strongly condemned. That it is unscientific and ineffectual requires no demonstration.

Applications of cocaine or of aconite sometimes succeed, often fail; and the same is true of the various treatments with which we are familiar, usually pursued in neuralgias of other parts of the body. Electricity is usually of service. Hypodermatic injections of analgesic drugs have been recommended. More radical procedures have their advocates in cases in which milder means have failed—cauterization with the thermo-cautery and destruction of the calciform papillæ sometimes, not always, found upon the tongue in such cases. Poyet recommends such a course, or some other painful application, solely for its moral effect; the danger and futility of such a procedure we have seen.

Neurotomy must be discarded, not alone on account of the difficulty attending such an operation in this particular locality, but mainly because of the impossibility of proving whether the lingual or the glosso-pharyngeal nerve is the one at fault.

While thus criticising my own treatment, with its few successes and many failures, and reviewing that of others, I regret that experience has taught me nothing that is uniformly successful in its results to recommend, and my intention has been, in

bringing this rare and curious affection before you for discussion, to place it in what I regard its true light and to profit by your therapeutical experience in its treatment.

Ample room exists to-day for improvement in our methods and increase in our means directed toward this end.

Discussion.

Dr. BOSWORTH had seen a few cases such as Dr. Lefferts had described. The only lesion he had observed to be at all constant was an enlargement of the papillæ upon one side of the tongue, accompanied by an intense degree of hyperæsthesia, with a mental condition of marked hypochondria. This was scarcely sufficient to base a definite diagnosis upon. Hence he thought it better that the name usually given to it, Verneuil's disease, should be retained.

Dr. INGALS said that the reader of the paper did not speak of one cause which, in the speaker's experience, was a comparatively frequent one, namely, rheumatism. Such cases had come under his own observation which only yielded to rheumatic remedies. He thought that a certain number of cases are really neuralgic in character. He recalled the case of an elderly man who was shot through the chest, who suffered from this peculiar condition after his recovery, and who continued to be annoyed by it as long as he remained under observation. There is some resemblance between this condition and that known as tobacco sore-mouth, which gets better as soon as the tobacco-habit is broken off. Some cases may be caused by the use of tobacco.

Dr. LINCOLN mentioned the case of a lady of a robust and not neurotic type in which rheumatism coexisted with this condition of the tongue, and in which the general rheumatic affection was relieved by appropriate remedies, while the local condition in the tongue was only temporarily relieved. He could scarcely resist the idea that the condition of the tongue and the affection of the muscular tissues were not influenced by the same diathesis.

Dr. HOLDEN said that he had had during the past year six cases of this kind, which, after the failure of other means, were treated upon the assumption that they were of rheumatic or of gouty character. Three were treated successfully; two by the long-continued use of arsenic, and one by lithia waters.

Dr. LEFFERTS believed that the suggestion with regard to rheumatism was a good one. The cause of the affection is obscure and unknown; possibly a certain proportion of cases are rheumatic in their nature. This, however, is not a common cause, as most of these cases are otherwise in robust health, and without any suspicion of rheumatism. As regarded the tobacco-habit, it is observed that many cases are in women, who usually do not smoke. The question he especially wished to bring out was the one as to treatment.

*Paper.*A CASE OF SUBGLOTTIC CHRONIC STENOSIS OF THE LARYNX,
TREATED BY DILATATION.

By FRANK DONALDSON, M.D.

I INVITE the attention of the Association to the history of a case of subglottic chronic stenosis, which to me has been of special interest, with a view to eliciting the opinion of others of larger experience in regard to its pathology and its treatment.

Mrs. R., aged thirty-four, light hair, blue eyes, with a clear, healthy complexion; height, five feet three inches; weight, one hundred and ten pounds. Married for ten years and had given birth to four children, all of whom she had nursed. They were healthy at birth and continued to be so. She had spent all her life in the country, and had had excellent health. Early in July, 1887, when she awoke in the morning, she thought she had contracted a slight cold, as she was somewhat hoarse. She had no sore throat, nor was she aware of having any fever. Her indisposition did not interfere with her attending to her domestic duties until at the end of three weeks, when, her voice becoming stridulous, she consulted her physician, who prescribed some cough-mixtures. These seemed to have no effect, and her voice and cough annoyed her by their shrill sound. Gradually she found she was getting worse, and that her breathing was interfered with by the condition of her throat. Her family noticed that her breathing was more difficult when she was asleep—not being able to exert her will-power, the abductors of her larynx were not as efficient as when awake. Her voice became more and more stridulous, and the shortness of breath increased to such an extent that her family became alarmed and she was sent to me as an intractable case of emphysema of the lungs. This was on October 20, 1887. As she walked from the street into the office it was painful to witness her dyspnoea. Her voice was very stridulous and her cough brazen and croupal. These symptoms betrayed the larynx as the seat of disease. The laryngoscope, with the aid of the oxyhydric light, demonstrated the cause of the difficulty to be a well-defined, clear, smooth membrane, like a diaphragm, with a small hole in the centre, extending across the larynx from one-fifth to one-fourth of an inch below the glottis. At its insertion into the sides of the larynx there was a bevelled edge thicker than the rest of the membrane. The epiglottis, the epiglottidean folds, the vocal cords, the ventricles, and, indeed, all other portions of the larynx were normal in their appearance. It was

evident that the oppression of breathing was augmented by the exact position of the membrane, which was at that point of the cricoid cartilage to which O'Dwyer called attention—where, in the infraglottic division of the larynx, the diameter is smaller than in the trachea.

He found that the inserted tubes would slip down below the vocal cords and be arrested at this place before reaching the trachea. It is, in fact, comparatively easy to get the tubes through the glottis but difficult to force them past the cricoid cartilage into the trachea. This is the dangerous place of lessened diameter where the croup-membranes close up the calibre of the breathing canal.

O'Dwyer quotes two fatal cases of subglottic stenosis existing at this point, while there was abundant breathing-room between the cords.

We have all had deaths in membranous croup where, in children, no membrane could be seen in the glottis or in any part of the larynx ordinarily visible in a laryngeal image. It has been said that seventy per cent. of the deaths, notwithstanding radical operations in membranous stenosis, result from the extension of membrane into the bronchial tubes. Does it not seem probable that some, at least, of these have been from this small diameter of the cricoid cartilages?

Pathology.—The nature of this adventitious membrane was the first question to be settled. Knowing syphilis gets the credit, among other destructive work in the organism, of the formation of pathological bands abnormally uniting different parts of the larynx, we carefully examined the appearance of the membrane and the surrounding textures, and we could detect nothing of a suspicious constitutional appearance. The woman herself was above suspicion. Her husband assured me that he had never had any disease of that kind. I was told that the parents on both sides had lived to old age and had never shown any tendency of syphilis. As far as we could penetrate into the mysteries of their lives there had never been any grounds for considering that the condition resulted from syphilis: unless we believe in Ricord's filthy views that all are thus contaminated to a greater or less degree, we must acquit this woman. There had been no external pressure or swelling, she had swallowed no corrosive substance, had had no violent acute inflammation of the parts, she had had no tubercular disease. There was no reason to suspect perichondritis. The most probable explanation was that the attack in July

was diphtheria in the larynx, and that that had started a chronic stenosing inflammation with membranous bands.

Treatment.—The symptoms were so urgent that we decided to use at once systematic mechanical dilatation. After a consultation with Dr. H. Clinton McSherry, having considered the advantages and disadvantages of the various instruments suggested for that purpose, including O'Dwyer's tubes, we decided to try Schroetter's long hard-rubber perforated tubes. It was considered unnecessary in this case to insert a cannula into the trachea, or to allow bougies to remain in the larynx; owing to its thinness we thought the membrane could easily be broken up.

Remembering that there was more space in the air-tubes than is required for easy respiration we used a tube that only approximated in size to that of the trachea. Dr. O'Dwyer used with comfort for several days, upon a woman of forty years of age, a tube of the same calibre as that intended for children from eight to twelve years of age. We commenced by the introduction of No. 1, which is 8 mm. thick from before backward and 6 mm. transversely. We gradually got up to No. 5, the tubes increasing in thickness, with each number, 1 mm. antero-posteriorly and not quite one millimetre transversely; in length they varied from twenty-three to twenty-five centimetres with the laryngeal curve. Before inserting them we touched the larynx with a fifteen per cent. solution of cocaine, after which, by the aid of the laryngoscope, there was no difficulty in inserting them and keeping them in the constricted portion for some minutes, the patient breathing easier while the instrument was in the larynx. There were a few drops of blood from the rupture of the membrane, gradually the membrane disappeared, and in two months there was visible in the larynx only a very narrow rim which did not interfere with respiration. The patient appeared to be perfectly cured and went home breathing as well, she said, as she had ever done. Since her departure she has always written that she was doing well until one month ago, when she wrote that she was fearful the obstruction had returned and that she would be obliged to come again under treatment. I have, however, a letter, dated the tenth of this month, in which she states that the tight breathing she experienced some weeks since, from a catarrhal attack, had passed off and that she felt now so comfortable that it was not necessary for her to come north.

I fear there may be some return of the obstructing membrane.

This case confirms Dr. Asch's statement that the greatest patience and perseverance in the treatment of chronic laryngeal stenosis must be exercised by both patient and operator.

Paper.

A CASE OF COMPLETE STENOSIS OF THE LARYNX AND PARTIAL STENOSIS OF THE TRACHEA.

By CARL SEILER, M.D.

THE case the main features of which I report below, and which I presented to the Philadelphia German Medical Society last fall (see Philadelphia "Medical Times," January 1, 1888), was of very great interest to me, owing not only to its rarity but also to the fact that it enabled me to study the mechanism of articulation without vocalization. It is for this reason that I bring this report before the Association, and also in the hope that some of the members may express their opinion in regard to some of the points which need further elucidation. In 1881 Mrs. K., of Philadelphia, brought her boy Daniel, aged three years, to my office for examination. She stated that when the child had been about two years old he had had a severe cold, and after that his voice had remained hoarse until the present time. Before this time the child's voice had been good, and, being a remarkably bright boy, he had begun to talk when he was eighteen months old. She had never observed any difficulty in the child's breathing, and had been sent by her family physician, Dr. Troutman, for the purpose of discovering the cause of the hoarseness. The little patient appeared well nourished and in excellent health, and, being intelligent beyond his years, I after a little trouble obtained a fairly good view of the larynx. The mucous membrane appeared normal and the only pathological condition seen was a small neoplasm, pedunculated, of the usual raspberry surface, denoting it to be a papilloma and apparently springing from the left vocal cord near the anterior angle of the glottis.

In consideration of the fact that pedunculated laryngeal papillomata become occasionally detached and are expectorated spontaneously, and also because of the extreme youth of the little patient (a little over three years), which would have made a removal of the growth by the intralaryngeal method extremely

difficult, if not impossible, I thought best to advise the mother to do nothing at present, but to have an external operation done for the removal of the neoplasm as soon as dyspnoea made its appearance. I saw nothing more of the patient until the early summer of 1885, when the mother of the child requested me to come to the house and take charge of the case. On inquiry I found that about a year before, that is, nearly four years after I had made the first examination, dyspnoea had set in, and at the instance of some friends the parents had called one of our specialists, who performed a low tracheotomy, but did not attempt to remove the growth from the larynx either by an external operation or by the intralaryngeal method. For some reason the tracheotomy-wound did not heal kindly; abscesses formed around it and in the tube-channel, followed by ulceration which had not healed, in spite of all efforts on the part of the mother. The physician who had performed the operation had not been to see the case for several months, and had then been requested by the parents of the child to cease his visits altogether, as he seemed to have lost interest in the case. Under the circumstances I did not hesitate to see the patient. When I called I found the little boy pale and badly nourished, extremely nervous, and fearful of being hurt, so that I experienced some difficulty in making an examination of his condition. After considerable trouble and persuasion I succeeded at last, and found his larynx completely filled with a papillomatous growth covering the vocal cords completely and the ventricular bands partially. The skin around the trachea-tube was ulcerated and the canal leading to the tracheal opening filled with granulations, which bled at the slightest touch and made the removal of the tube and its reinsertion a painful and bloody operation. The tube had thus been cleaned but very seldom, and was, when I first saw it, in a very filthy condition. On placing my finger over the opening of the tube apparently no air passed through the larynx and symptoms of suffocation very soon set in, showing that the larynx was completely stenosed. In order to satisfy myself that the stenosis was complete I tried a number of experiments—with a feather, the flame of a candle, and the cold surface of a mirror held before the mouth of the little patient, who was directed to blow—but no sign of any air coming from the lungs could be detected; neither the feather nor the flame moved in the slightest degree, nor was there any film of moisture apparent on the surface of the mirror. In spite of this absence of laryngeal respiration the boy was able to

articulate in a peculiar manner, but loud enough to be heard across a good-sized room.

The tracheal opening being but a short distance above the sternal notch and the canal slanting downward, infraglottic laryngoscopy was not possible.

I substituted a rubber cannula, of a slightly different curve, for the silver one, after having cauterized the granulations in the canal with nitrate of silver, and by strict cleanliness and antiseptic washes succeeded in healing the ulcerations and producing a healthy cicatrix in the course of a few weeks. Having gained the boy's confidence in the meantime and his general condition having undergone a marked improvement, I proceeded to remove the papillomatous growth by the intralaryngeal method, chiefly because the parents of the patient declined any external operation for the removal of the growth, giving as their reason that he had suffered enough already from the tracheotomy, and succeeded, in the course of a few months, in clearing the upper laryngeal cavity from all traces of neoplasm but was unable to reach that portion situated in the subglottic cavity. During this time every opportunity was afforded me for studying the peculiar method of articulation which the child had adopted, and he, being very intelligent and pleased at the notice taken of his accomplishments, aided me not a little.

To give a description of what this articulation sounded like is impossible, as it could not be compared to any known combination of noises, and yet it was in the main perfectly intelligible to an attentive listener. If you imagine the grunting noises made by a small pig, the purring of a cat, and the low clucking of a dreaming hen combined into a semblance of syllables and words you will get a faint idea of this boy's speech. And yet even strangers, after the first astonishment at the strange sounds had passed, could understand him, and he found no difficulty in communicating with his friends and the shopkeepers in the neighborhood to whose stores his mother was in the habit of sending him on errands, which he always executed satisfactorily.

I found it no easy task to unravel the mystery of the production of these strange sounds without the aid of an air-current from the lungs, but I finally succeeded, and the following is the result of my observations.

Having directed my attention, first, to the production of the consonants, I found that the boy filled his oral and pharyngeal

cavities with air by opening the mouth ; he then forcibly contracted the pharyngeal constrictors and raised the back of the tongue quickly and simultaneously and forced the air into the anterior portion of the oral cavity, whence it escaped past the obstacle presented to the easy outflow of the breath in ordinary articulation, thus producing the characteristic noise of the consonants. This process of expulsion of the air was executed with great force and rapidity, so that the self-sounding consonants,* as *s, f, t, r*, and so forth, were pronounced almost as loud and pure as in ordinary articulation. The *k, g*, and hard *c*, as well as the *j*, sounds had more of a guttural purring sound, owing to the fact that the obstruction to the outflow of the air occurs farther back in the oral cavity. They were also not nearly as loud and distinct as the first named, because, the volume of air behind the obstruction being much smaller, the necessary amount of compression could not be obtained to produce a loud explosive noise. The simple and compound tone-borrowing consonants, such as *m, n, h, ng*, and so forth, were of course absent, because, there being in their formation no great obstacle to be overcome, he could not compress the air sufficiently to make them audible in connection with the vowel-sounds.

The vowel-sounds in connection with the self-sounding consonants in those syllables in which the consonant comes before the vowel he made by simply tuning the oral cavity to the required pitch for the vowel-sound, and utilized the noise of the consonant to make this pitch appreciated by the ear. This I tested by means of tuning-forks held before his mouth.

In those syllables, however, in which the self-sounding consonants came after the vowel-sound, and also in those in which the vowel was associated with tone-borrowing consonants, he again tuned the oral cavity to the required pitch for the vowel, and by squeezing the air between the edge of the tongue and the anterior pillars of the velum produced a grunting noise which caused the vowel-sound to become appreciable to the ear of the listener.

Former experiments and observations convinced me that vowels and consonants are distinct and separate from each other in written language only, and that in articulate speech they are

* I found the classification of consonants proposed by Wolff, of Frankfort, and described in my chapter on "Physiology of the Voice" in the "Cyclopædia of Dentistry," the most satisfactory for this investigation, as it is based exclusively upon acoustics.

combined so as to form but one sound, more or less modified in the pronunciation of syllables. The observations made in this case furnished an indisputable proof of this theory, for how could this boy otherwise utilize the explosive noise of the consonant to make the vowel audible if the consonant was not a mere modifier of the vowel-sound.

I do not remember having seen a report of a case of complete laryngeal stenosis in which articulation was possible, but I remember having seen a similar case in Vienna in 1871, under the care of Professor Carl Stoerk, in which the stenosis was due to agglutination of the vocal cords throughout their entire length, caused by an attempt at suicide by cutting the throat with a razor, and in which, as in the present case, the patient was able to articulate audibly.

The upper laryngeal cavity being cleared of the papilloma, I introduced a fenestrated cannula through the tracheal opening in place of the tube which the boy had borne heretofore, but not sufficient air passed through the larynx to sustain life, and any attempt to force respiration through the natural channel by closing the opening of the cannula resulted in a short time in extreme dyspnoea.

I then proposed laryngotomy as a radical operation for the removal of the obstruction, and after considerable waste of time and trouble obtained the consent of the parents to open the larynx by an external operation. With the assistance of Drs. Reeves, Milbank, and Gibb, the latter two personal friends of the family, I proceeded to open the larynx in the fall of 1886.

The little boy took the ether badly, and after I had made the external incision and cleared the trachea and cricoid cartilage, he began to vomit incessantly, his pulse became weak and intermittent, so that I deemed it prudent to proceed no further for the time being. The wound was dressed with antiseptic cotton and gauze, and the patient put to bed. On inquiry I found that the boy had eaten an apple and several pieces of ginger-cake shortly before the ether was administered, and this no doubt was the cause of the trouble. He rallied quickly from the effects of the ether and seemed none the worse in the evening, so that I concluded to finish the operation on the next day.

On the following noon I opened the trachea above the old wound, which, as I have said, was very low down in the neck, and cut through the cricoid cartilage without, however, carrying the

incision into the crico-thyroid membrane. By introducing a small rhinoscopic mirror into the distended opening and reflecting the light upward, I could see that the whole subglottic cavity was filled with papillomatous growth.

Bearing in mind the remarks made by Professor Leidy at a meeting of the American Laryngological Association in Philadelphia, that the vocal bands were continuous with the crico-thyroid membrane, and that owing to this fact any rupture of continuity of this membrane would necessarily interfere with the action of the bands, I endeavored to remove the neoplasm with forceps and curette through the tracheal opening without carrying the incision into the larynx proper.

This I found at first difficult, owing to the fact that there was not room enough for both the forceps and the mirror. But by introducing the index-finger of the left hand into the larynx through the mouth, and thus pushing the growth down, I very soon had every trace of the neoplasm cleared away. After all hemorrhage, which was very slight, had stopped, I investigated that portion of the trachea between the old tracheal opening and the lower end of the new wound and found, to my surprise, a stricture of the trachea which had reduced its lumen to about one-third of an inch. Hoping to obtain absorption of the cicatricial tissue at this point by pressure and permanent dilatation, I removed the cannula from the old opening and inserted it in the lower end of the wound just made through the stricture, which was accomplished after some difficulty. All obstructions to respiration being thus removed, the wound was sewed up with catgut sutures and dressed with antiseptic precautions, and I had the satisfaction to find that the little patient was able to breathe freely through the larynx. He made a rapid recovery from the operation, and greeted me on the third day with a fairly good vocal sound. I left the trachea-tube in place for four months, when it was removed, and the patient experienced no further trouble. He gradually learned to use his vocal bands for phonation, and at the present time can sing and speak with as good a voice as any child of his age. This result could hardly have been obtained if the crico-thyroid membrane had been cut, and it seems to me to be an indication to avoid cutting it in laryngotomy whenever it is important to preserve the voice.

*Paper.*STRICTURE OF THE LARYNX, WITH EXTENSIVE CICATRIZATION
FROM ULCERATIVE TUBERCULOSIS.

By J. SOLIS-COHEN, M.D.

MR. X., aged forty-five, of spare habit, scrofulous complexion, and nervo-sanguine temperament, brought up as a farmer, but for more than twenty years a machinist in charge of one of the most extensive foundries in the United States, applied to me in September, 1887, for treatment of difficulty in breathing, difficulty in swallowing, painful deglutition, and weakness of voice.

As received from the patient, his clinical history was briefly as follows: Without any recollection of previous illnesses, during the winter of 1871-72 he acquired a very sore throat, more severe on the left side, which hurt him extremely in swallowing. A swelling developed on the left side of the neck, just below the ear, to the size of an ordinary peach-kernel, and softened into an abscess which was opened, and which remained open for about six weeks. As this swelling had increased in the neck the sore throat had improved, so that it had gotten well before the abscess was opened. The voice had not been in any way affected. In the winter of 1883-84 he had an attack of bronchitis following an acute coryza, but recovered thoroughly. In February, 1886, while perfectly well, exposure to cold brought on acute inflammation of the throat, with dysphonia and dysphagia. This subsided under constitutional and topical medication in about six weeks, the voice becoming entirely normal.

One year later, February, 1887, after exposure to cold, a much severer attack of sore throat ensued, the dysphagia being much greater than before. By May the inflammation had subsided very much, and the voice had almost resumed its natural character. In the middle of May the soreness began to increase, and the voice failed. This condition, with some improvement in strength of voice, but never complete freedom from huskiness, prevailed until the date of application to me. On close questioning, I learned that the patient had never been able as a boy to take part in games that required running. His wife assured me that, though strong in every other way, he had been a little short of breath on

exertion, and had a weak voice ever since she had known him; that in December, 1877, he had had a severe sore throat for two weeks with chokings at each meal, after recovery from which he had no trouble until February, 1886; that he began to breathe with difficulty in May, 1887, and in June began to cough and choke in swallowing liquids. The patient had lost twenty-four pounds in weight within six months, despite a summer sojourn in the Adirondacks which had so improved his general strength that, from having been hardly able to walk on his arrival, he had become able to walk three or four miles at a stretch without fatigue and without dyspnœa.

On examination of the throat, I found a condition that I had not met before. At the root of the uvula, extending half an inch along each side the soft palate, was a pale, bilateral, symmetric cicatrix, broad at the raphé and gradually acuminate toward each extremity, of the same physical appearance as the cicatrices of syphilis. The epiglottis was gone; the cicatrized stump presented the same pale, glistening aspect as the cicatrix in the palate, and it was continuous into similar-looking tissue on either side, which represented thickened pharyngo-epiglottic folds. The top of the larynx looked as though overlaid by a thick, tense, uniform diaphragmatic membrane, which, without evidence of cicatrices at any point, left a small pear-shaped orifice in the centre: the butt in front and the apex in junction posteriorly (Fig. 1). The largest horizontal diameter was about three millimetres at the butt, whence it tapered to a point at a distance posteriorly of about six millimetres. Through this membranous-looking structure the exterior outline of the aryteno-epiglottic folds could just be made out.

The parts were pale. Their appearance was quite similar to the picture of lupus of the larynx figured in the last edition of Lennox Browne's volume ("The Throat and its Diseases," London, 1887, p. 398, pl. xiv., Fig. 119). There was no history of syphilis, nor had I any reason to suspect infection.

The picture was the picture of lupus; the cachexia, the cachexia of tuberculosis; the diathesis, that of scrofulosis.

There was evidence of disorganization going on in much of the left lung and in the upper portion of the right one. The sputa, which were ejected with difficulty accompanied by a sort of sneeze of the glottis, if I may so describe it, were decidedly tuberculous.

The conclusion I arrived at was that this was a case of congenital syphilis which had become cured with slight defect in the

soft palate, loss of the epiglottis, and adhesions between the upper surfaces of the ventricular bands, which, with the aryteno-epiglottic folds, had become stretched into a sort of diaphragm. The closest scrutiny with the oxyhydrogen light and with magnifying mirrors did not disclose any trace of a cicatrix in this diaphragmatic tissue. Hence there was some suspicion that this formation might have been congenital, and that contraction had taken place of late years in consequence of recent inflammations or of irritation set up by the tuberculous process.

The difficulty in swallowing liquids was readily overcome by adopting Wolfenden's suggestion of swallowing in the prone position from a tube in a tumbler. My patient, who was a machinist, explained the mechanism by a sort of siphonage, making one continuous conduit of the rubber tube, the back of the throat, and the œsophagus, without impingement of the liquids on the superior

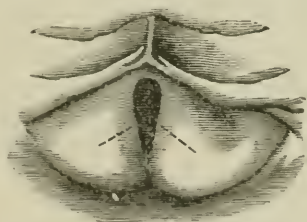


FIG. 1.—Stricture of the superior orifice of the larynx.

surface of the larynx, the efforts at swallowing keeping the liquids in line.

As to relief for dyspnœa, the choice wavered between tracheotomy and section of the constricting tissues. It was determined to try the latter first, as tracheotomy could always be resorted to in an emergency. I began by dilating with the Schroetter's tubes. At first there was difficulty in introducing the smallest, No. 1; but at the end of about three weeks I was able to introduce No. 10, although the orifice closed up a little after its withdrawal. It did not contract, however, beyond the calibre of No. 5, and this passage gave me ample room, under oxyhydrogen illumination, to see that the vocal bands were free to move in efforts at phonation. In the belief that the diaphragm was composed of the tissues normally represented by the aryteno-epiglottic folds and ventricular bands, I had a special pair of scissors made to cut the fold; but on trying them found, to my surprise, that the tissue was so thick

that I could not get a purchase. I then resorted to the naked knives presenting in the cardinal directions, which for more than twenty years I have been using to divide strictures of the larynx ; and by sawing through fully half an inch of solid tissue, almost cartilaginous to the touch, beginning in the direction represented in the dotted lines in Fig. 1, I succeeded, in the course of several days, in modelling a very fair representation of what I thought the normal aryteno-epiglottic folds ought to be. Several pieces

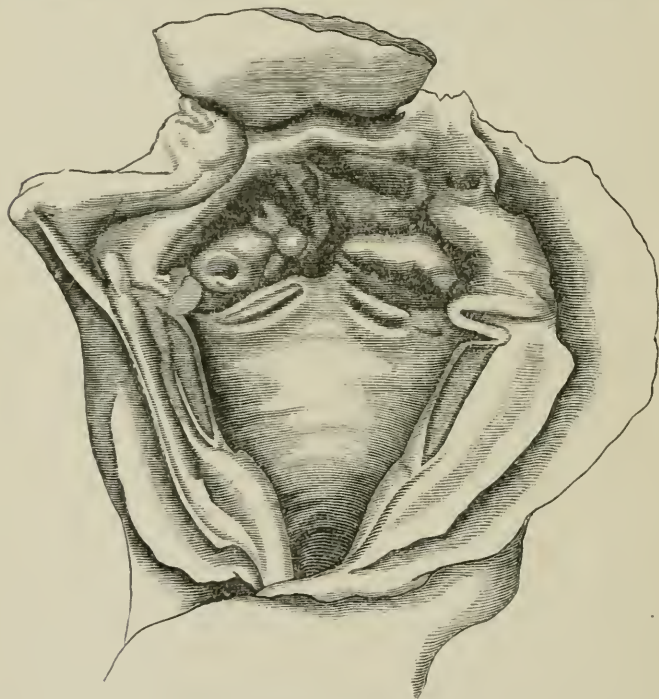


FIG. 2.—The larynx exposed posteriorly.

were thus sawed out solidly. Some were examined microscopically in Philadelphia, others in Washington by Dr. W. M. Gray, of the United States Army Medical Museum. Dr. Gray wrote me that he cut the largest piece only, not thinking it worth while to examine the little pieces unless specially requested. The specimen contained many bacilli, some of them in large giant-cells. Dr. G. de Schweinitz, of Philadelphia, found in the sections he examined a somewhat thickened epithelium, beneath which was a granulation-like tissue, with occasional giant-cells and numerous tubercle bacilli.

After the posterior adhesions had been divided and the resection of the lateral parts had been effected, the picture assumed the ordinary aspect of tuberculosis of the larynx.

There was no disposition to retraction, and the operative wounds in a great measure cicatrized, although the wedges of tissue excised had contained numerous tubercle bacilli. This cicatrization was spontaneous.

The subsequent clinical history was the usual one of tuberculous laryngitis, and the patient died with pulmonary œdema in the latter part of February, 1888.

Examination twenty-five hours after death showed both lungs tuberculous, the apex of the left one being riddled with small cavities, and the base of the right lung being healthy. The larynx showed very great thickening of the aryteno-epiglottic folds and ventricular bands, with detachment of the fibrinous portion of the vocal bands from the muscular portion, the intervening tissue having cicatrized. Both arytenoid cartilages were carious and exposed. The raw surfaces of the cuts made in resection were in great measure cicatrized (Fig. 2).

The specimen has been preserved for future references in the United States Army Medical Museum, Washington.

Discussion.

Dr. RICE said that he had had a case like that reported by the preceding speaker, in which O'Dwyer's tubes were used, but with rather better success than in his case. The patient had been under treatment for syphilis for several years. He had treated the stenosis at first with the galvano-cantery unsuccessfully, and subsequently used the laryngeal knife.

Dr. DELAVAN alluded to a case recently seen by him in which a very serious condition of laryngeal stenosis had occurred in a patient in whom the diagnosis of syphilis was established with the greatest difficulty, and in whom persistent dilatation, by means of O'Dwyer's tubes, had given unsatisfactory results.

Dr. J. SOLIS-COMEN said that his limited experience with the O'Dwyer tubes so far indicated that, as at present used, simply as permanent dilators they will be of no use whatever in treating cicatricial stricture of the larynx. Incision of a portion of the cicatrix, and forcible division every few days, is required in addition to overcome the great tendency to recontraction. The case referred to by Dr. Delavan had been kindly sent to him for examination by Dr. O'Dwyer, and he had found that there was adhesion between the arytenoid cartilages. Such a case might be dilated, but the larynx would not remain dilated, as the

laryngeal orifice was much constricted; he therefore advised Dr. O'Dwyer to reintroduce the tracheotomy-tube as soon as possible. His own observation had been that where the patient had cicatricial stricture of the larynx he would have to resort to periodic dilatation during the rest of his life, as is so often necessary in stricture of the urethra. He recalled the case of a boy with a large papilloma which caused great obstruction of the larynx. Tracheotomy had been performed and respiration relieved. He removed the growths by external access through the divided wings of the thyroid; and a year or two later was compelled to repeat this operation for recurrent growths. He had never been able to relieve this lad of his cannula, or cure a stricture at the upper level of the glottis. At one time dilatation had been so effective that he had taken out the tracheal cannula. It had been left out for two weeks, when the mother brought the boy back to him suddenly on account of difficulty in breathing. The patient was black in the face, and it was necessary to plunge a trocar through the cicatrices, and introduce the tube again. During the past summer he had endeavored to dilate this boy's larynx with O'Dwyer's tubes, and left one in place for nineteen days, but the boy became emaciated and lost strength because of trachitis and cough. He had long overcome the difficulty in swallowing caused by the tube. The tube was removed to examine his larynx, and the opening was found smaller than before. The tube was reinserted, and at the end of two weeks the larynx was again examined and found even more contracted, so that he felt obliged to replace the tracheotomy-cannula. In this case there existed a peculiar method of talking, which the speaker had likewise seen in other cases. The lad had acquired the habit of speaking with the anterior palatine folds as a substitute for the vocal bands; his voice being like a moderately loud, hoarse whisper.

Paper.

A POSSIBLE SUBSTITUTE FOR TRACHEOTOMY AND INTUBATION IN CERTAIN CASES.

BY EDGAR HOLDEN, M.D., PH.D.

THE case of gummatous stenosis of the larynx presented to this Association two years ago, in which, after the employment of all the modern devices for relief, I performed thyroid laryngotomy, led me seriously to consider the possibility of some as yet undiscovered method of relief. A recent case of croupous stenosis, in which neither intubation was permitted because of resistance to the gag, nor tracheotomy because of preconceived notions, suggested a device for divulsion. This was to be inserted by punct-

ure through the superior angle made by the thyroid alæ. It consisted of two narrow strips of gold lying flat together, an inch and a half long, an eighth of an inch wide, and a thirty-second of an inch thick, which bent after introduction to any desired extent by the approximation of their protruding ends. The trivial incision was, of course, through the base of the epiglottis, but no larger than that made by a small tenotomy knife. This was abandoned through fear of necrosis and because it dilated only the supraglottic larynx, and could be used only on the well-developed patient.

A better method suggested itself, which is the occasion of this essay. Before presenting this, will you kindly grant me your indulgence for a few remarks upon the improvement in the mortality of the present methods and the toleration of the larynx under manipulation, whether for dilatation or for temporary relief?

It is the custom for writers to make exhaustive research into the bibliography of their subject, and to go back at least to Hippocrates or Paracelsus, but this has been so well done by members of this Association and others since the relative merits of tracheotomy and intubation have engrossed our attention, that it would take too much of your valuable time to repeat it.

The title of this paper may be paraphrased as "a new proposition for the relief of stenosis," and it appropriately follows the interesting essays that have preceded it.

It may appear strange at this day to attack as inartistic and unmechanical so time-honored a procedure as tracheotomy, but probably every man, when he attempts to force the round tube through a straight cut in the trachea, feels that it is, after all, a somewhat barbarous expedient. One may get a better idea of the mechanical character of the operation by trying it on a rubber tube, or, better still, upon the trachea removed from the body of some animal.

The availability of the operation, its antiquity, and, above all, the necessity for an immediate supply of air to a dying patient, have, however, stamped it as correct, while, notwithstanding this, effort has been unceasing to devise a substitute. Perhaps if the mortality afterward were more favorable, this would be less energetic; but, as it is, we owe it not only to ourselves but to the public to leave no means untried to find a safer if not a better means of relief. This feeling has long actuated our profession, and is the

basis of efforts innumerable in the way of catheterism, intubation, and the various methods of dilatation of the occluded larynx.

Now, how far has the mortality been improved? It would aid us greatly to answer this question if we could always distinguish in our statistics between death from operation and death notwithstanding operation. As this is impracticable, for obvious reasons, we must approximate by drawing deductions only from large numbers of cases.

The 1,698 cases of Duchek (von Ziemssen), the records of the hospital at Prague (von Ziemssen), and the 5,000 cases of Professor Cohn (Ashhurst's "Surgery") agree with the deductions of Trousseau that tracheotomy in croup and diphtheria gives about 25 per cent. of recoveries.

The 21,853 cases recently collated by Lovett and Monroe ("Am. Jour. of the Med. Sci.") show a much better result—viz., 28 per cent. of recoveries.

Before the recent German Surgical Congress, Herr Rehn, who had performed tracheotomy 1,926 times, professed even better results—viz., 28.4 per cent. This is tracheotomy as it is; what it may become under the modern views as to antiseptics may be inferred from the experience of the Marburg Hospital, in which, during the last three years and a half, 53 per cent. have recovered ("Deutsch. med. Wochenschrift," 1888). Dr. Karl Roser, of that institution, covers the tube with gauze dipped in sublimate solution and rubbed with iodoform, changed on the second day, continued till the fifth, and then changed to the ordinary tube. This difference, if hereafter confirmed, indicates clearly the influence of the purely surgical part of the procedure upon the mortality.

It would be unfair to bring into contrast the results of intubation, even with the large number of published experiences before us, yet we may say that the detailed statements of Dr. O'Dwyer ("Med. Record," October, 1887), of Dr. Francis Huber, Dr. W. P. Northrup, Dr. A. Caillé, Dr. Dillon Brown ("Med. Record," July 23d), and last year that of Dr. Fletcher Ingals before this Association, giving about 1,000 cases ("N. Y. Med. Jour.," July 2, 9, 1887), show a mortality of, in round numbers, 27 per cent. Larger experience will undoubtedly improve this, but the small difference is surprising in view of the greater apparent danger of tracheotomy. There is so little difference indeed that, while the former is less barbarous, the inference as to the cutting operation is either that it is less dangerous than it appears, or that its

danger is counterbalanced by others of a different character in intubation.

As the matter of danger from either is to be weighed in suggesting a possible substitute, may I take the risk of annoying you with what you already know, and hastily enumerate the principal sources of this? For tracheotomy: Hemorrhage, erysipelas, gangrene, necrosis of cartilage, sepsis through the wound, ulceration of the trachea, inflammation from inspiration of air unmodified by the normal passages. For intubation: Apnœa and laceration



FIG. 1.



FIG. 2.

of tissue from prolonged efforts at introduction, interference with deglutition and nourishment when most essential to improvement, occlusion of the tube or of the trachea by pushing down the membrane, ulceration of the trachea by pressure of the tube and consequent sepsis or necrosis, aspiration of retained secretions, inflammation from the passage of food into the respiratory tract, expulsion of the tube by cough when no one is near to replace it, coughing up and swallowing the tube, forcing the tube downward in efforts at removal, or injury from forcible attempts to seize the tube with the extractor.

I think it self-evident that the size and character of the open wound of tracheotomy greatly enhance the mortality (for, however carefully made, it is practically a contused and lacerated wound). This, of course, is especially true in pseudo-membranous disease. In occlusion by neoplasms, in hypertrophic or hyperplastic changes, paralysis of the abductors, spasm, œdema, etc., the danger from sepsis is far less, and the question becomes one of tolerance of a foreign body.

With reference to this, the catheterism of Desault (1793), the

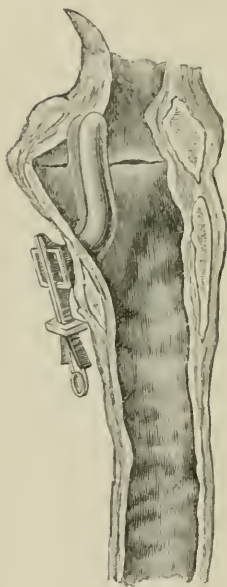


FIG. 3.

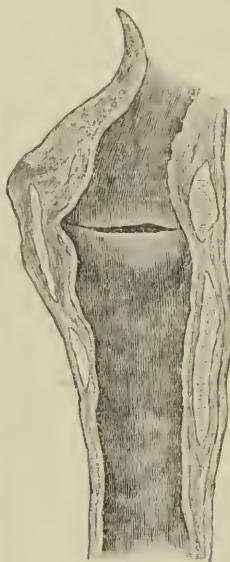


FIG. 4.

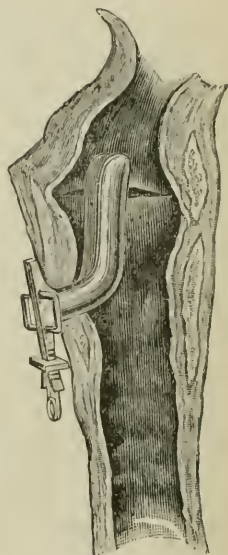


FIG. 5.

tube of Bouchut (1801), Fig. 10, the experience of Loiseau, Weinlechner, Green, Reese, and a host of others with which you are familiar, and the tubes of Dr. O'Dwyer, in these forms of stenosis, have established the fact that the larynx will bear indefinitely the presence of a smooth metallic body.

As to the tolerance of the larynx under dilatation, the experiences you have already heard to-day, and those of Mackenzie, Stoerk, Schroetter, Liston, Trendelenburg; the dilators of various types and patterns—Navratil's, Whistler's, McSherry's; the flexible metal bougies of Dr. Asch; and the many ingenious expedi-

ents given in medical literature—combine to testify, without columns of figures, as to the possibilities in this direction.

Now, so far as I have been able to learn, all attempts at dilatation, catheterism, tubage, or intubation have been made either through the mouth or from below through the tracheal cannula, and these methods all commend themselves for cases to which they are individually applicable. The method I would submit differs radically from any of these. It is divulsion through the crico-thyroid space. There is nothing new under the sun, and it is

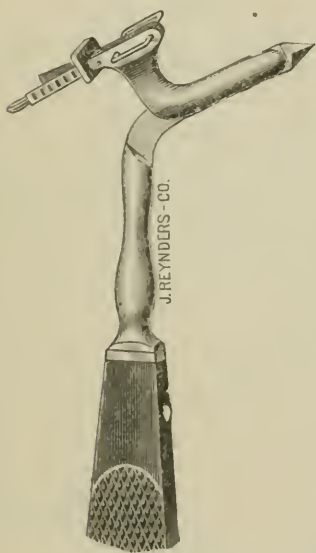


FIG. 6.

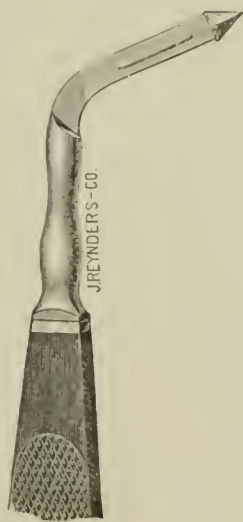


FIG. 7.

quite possible that someone has before entertained the same idea, although I have not been able to find a record of it. The divulsor is quite small, and consists of two blades hinged at the base. They may vary from three-quarters of an inch to an inch and a quarter in length, from an eighth of an inch to a fourth of an inch in width, and from a sixteenth of an inch to an eighth of an inch in thickness. It is curved to the shape of the larynx, so as not to impinge upon the base of the epiglottis. A handle, with a blade for perforation, accompanies it, detachable instantly after introduction, different-sized divulsors being adapted to the same blade. This handle, however, is not essential, as the perforation can be

made with a tenotomy-knife. The two blades flare at the lower end, which is to remain outside, the smaller ends, when introduced, clasping the perforating knife and curving upward, while the knife-handle curves downward. Once in, the flanges are pressed slightly together, the blade is withdrawn, and the divulsor is closed, passed upward into place, separated, and held by a small sliding plate. The trivial wound is thus closed by the instrument, a small portion of which alone remains in sight. The crico-thyroid space, readily detected by the finger, can be perforated instantly; the

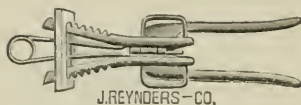


FIG. 8.

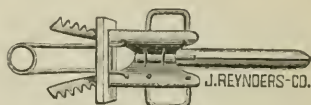


FIG. 9.

perforation is easy, almost bloodless, and as harmless as any incised wound of the respiratory tract can be. The instrument can be withdrawn and reintroduced very quickly.

It is almost impossible to give a clear idea of this device without drawings, and these are submitted, together with two of the instruments.

Colored drawings of the larynx, made by me from dissections on the recent subject, are submitted to show the normal lateral constriction of the larynx, with its supraglottic and subglottic

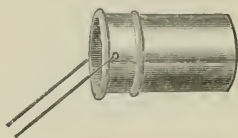


FIG. 10.

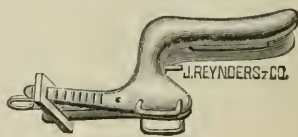


FIG. 11.

portions (Fig. 1), the appearance upon antero-posterior section (Fig. 4), the instrument introduced through the crico-thyroid space (Fig. 5), and the same in a larynx contracted by a preservative fluid (Fig. 3). Figs. 6, 7, 8, 9, 11, and 13 show the instrument, with the handle and blade for perforation and introduction, and also the various appearances of the divulsor when detached. These are of the actual size adapted to the adult larynx; those for children and infants are of the same shape, but shorter, to be used with the same blade and handle. A short forceps (Fig. 12) accompanies the divulsor to aid in manipulation.

Fig. 13 shows the position of the hand in introduction necessary to prevent a too deep perforation and consequent wounding of the posterior laryngeal wall. As the drawings sufficiently ex-

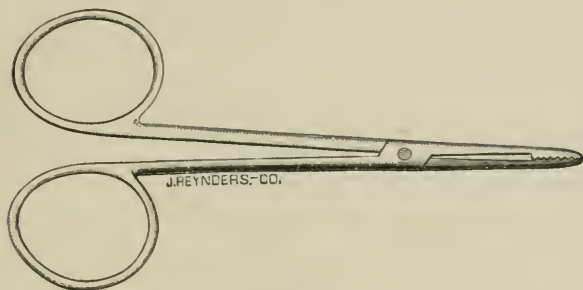


FIG. 12.

plain the device, and the instrument itself is before you, it will perhaps be unnecessary to give a more detailed description.

It is quite possible that in great tumefaction of the larynx it will be desirable to use wider blades, and this would not be diffi-



FIG. 13.

cult, nor would harm result from a slight transverse section of the dense fascia over the crico-thyroid space, as is done in Boze's operation, sometimes called bloodless tracheotomy.

This suggestion would not preclude a subsequent tracheotomy, nor a preliminary attempt at intubation. Whether or not the

procedure is applicable to children under four years of age experience alone will show. It may perhaps occupy a place between the two familiar operations. It can be done by a tyro in the profession. It permits of breathing through the natural channels. It can be done with greater celerity than either tracheotomy or intubation. It will usually be bloodless, since the only artery likely to be wounded, the median branch of the superior thyroid, very rarely rises so high as the crico-thyroid space, and, if present, would be pushed aside by the spade-shaped blade. The instrument can be quickly withdrawn and replaced.

Permit me, in conclusion, to again refer to some of the dangers of tracheotomy and intubation, and to see if any of them would be likely to be met by the procedure suggested. Some are of necessity common to all operations, but the danger of hemorrhage, erysipelas, ulceration, and sepsis would be lessened; apnoea during introduction, interference with deglutition and so with nourishment, occlusion by membrane or by its being pushed downward, tracheal ulceration, aspiration of retained secretions, and inflammation from passage of food into the trachea, would be avoided; and expulsion by coughing, swallowing the instrument, or forcing it downward into the trachea, would be impossible.

The "certain cases" alluded to in the title of this paper would at least be any where immediate and rapid operation for relief is demanded.

Discussion.

Dr. DALY regarded the proposed operation with Dr. Holden's instrument as a real advance in laryngeal surgery. He had known of a case where the son of a physician lost his life, although an experienced surgeon had attempted tracheotomy; but, after death, it was found that the tube had not been introduced into the trachea. Such an accident served to show that tracheotomy is not always an easy or a safe operation.

Dr. SEILER confirmed the remark of the last speaker with regard to the extreme difficulty of tracheotomy in some cases. The mistake is sometimes made of inserting the tube between the trachea and an enlarged middle lobe of the thyroid gland. He asked Dr. Holden if he had observed any impairment of the voice after using his instrument. He asked this because Dr. Leidy, in a paper read before this Association two years ago, had said that tearing the crico-thyroid membrane would be likely to have this effect.

Dr. J. SOLIS-COHEN thought that any substitute for tracheotomy should be welcomed; although he believed that tracheotomy was an operation

which every physician, surgeon, or accoucheur should qualify himself to perform. The general practitioner need not be deterred from operating in an emergency. He, also, had witnessed an operation performed by a prominent surgeon in which the tube was left outside of the trachea, but he had been fortunate enough to discover the mistake shortly afterward and had completed the operation and introduced the tube into the trachea. He mentioned another case to which his attention had been called, in which the patient could breathe when the tube was in but could not speak, while he could speak but could not breathe when the tube was out. In this case the surgeon had opened the thyro-hyoid membrane and had passed the tube over the epiglottis into the natural channel of the larynx. In a third and fatal instance, the surgeon had actually gone above the hyoid bone and had lacerated (button-holed) the base of the tongue.

Dr. LANGMAID thought that too much stress had been laid upon the danger of wounding the crico-thyroid membrane. In an emergency we should not hesitate to open this membrane, although for a permanent opening it is better to go lower down; the lowest possible operation should be preferred. He thought that the instrument might prove of great service where a foreign body is inhaled into the glottis, as a substitute for the operation of tracheotomy, and where the surgeon hesitates about performing the graver operation.

Dr. COHEN thought that Dr. Holden's operation might save life where there is no time to perform tracheotomy. Even at the risk of some impairment of voice, it may be rapidly performed and the child saved where time is of great importance.

Dr. LEFFERTS believed that the actual trial of this instrument would be of more service than any amount of discussion. There are many cases of acute swelling and engorgement of the glottis and surrounding parts in which such an instrument might be useful, provided the blades were made large enough to open a sufficient passage for the air. He thought that the mechanical execution of the instrument could be slightly improved, by enlarging the screws, and that the part outside the patient's neck should be larger. He considered the instrument and the method of operation as well worthy of trial. He could not agree with Dr. Langmaid. If there is a suspicion that a foreign body has been inhaled, and there is interference with the respiratory murmur or other evidence of a foreign body in the chest, it is better to make a free opening in the trachea.

Dr. BOSWORTH thought that there were two conditions of laryngeal disease in which the application of this instrument might be exceedingly happy. One was where there was bilateral paralysis of the adductors, in which there was a certain amount of insensibility of the larynx, so that the presence of an instrument might be well tolerated. The other condition was what was often described as paralysis, but was

really ankylosis of the crico-arytenoid articulation. By means of the instrument the ankylosis might be broken up, and thus a more patent condition of the glottis secured.

Dr. HOLDEN said that he positively made no claims for the instrument and had simply submitted it for the judgment of the Association. He appreciated the criticisms that had been made of its mechanism and could easily apply the modifications which experience proved desirable. He had not used the instrument himself yet, because he did not wish to apply it to any cases except those suited to the operation. He was surprised to hear Dr. Seiler's remark about the danger of opening the crico-thyroid membrane. He had seen several cases in which this membrane had been divided without any injurious effect upon the voice.

Business Meeting.

At the close of the regular proceedings of the morning the Association went into executive session.

The following named gentlemen, having been duly proposed for membership and recommended by the Council, were unanimously elected Active Fellows of the Association :

F. WHITEHILL HINKEL, M.D., Buffalo, N. Y.

JOHN H. LOWMAN, M.D., Cleveland, O.

S. OAKLEY VAN DER POEL, New York, N. Y.

The President appointed the following :

Nominating Committee.—Dr. HOOPER, Dr. HOLDEN, and Dr. SHURLY.

Auditing Committee.—Dr. J. SOLIS-COHEN, Dr. C. H. KNIGHT, and Dr. DALY.

Afternoon Session.

Paper.

RESIDENCE AT CERTAIN HIGH ALTITUDES AS A MEANS OF CURE FOR LARYNGEAL PHTHISIS.

By CLINTON WAGNER, M.D.

IN a paper read before the New York Academy of Medicine last October, entitled "Colorado Springs and Davos-Platz, as Winter Health-resorts, Compared," I stated that "cases of laryngeal phthisis may safely be permitted to remain at high-altitude resorts, provided improvement in the pulmonary trouble and general condition had already taken place." Since then, although I have had no further personal experience in the treatment of these

cases at high altitudes, I have been in communication with several physicians, long resident at Colorado and Switzerland health-resorts, who have kindly furnished me with valuable information on the subject.

It does not come within the scope of this brief paper to dwell upon the etiology and pathology of laryngeal phthisis, but I wish to state that by the term I refer to that condition which is recognized as laryngeal tuberculosis, the appearances of which are quite familiar to you all.

Statistics show that about 33 per cent. of all cases of pulmonary phthisis have the laryngeal complication, an affection which, while much more frequent than cancer of the larynx, is quite as fatal in its results. The knife may offer a chance in cancer, as a *dernier ressort*; in laryngeal phthisis surgery can be of no avail.

In the treatment of pulmonary phthisis, until, we may say, quite recently, equability and warmth were the essentials sought for in the matter of climate, but the excellent results obtained, of late years, from the cold, dry air of great altitudes have in a measure revolutionized our views in relation to the climatic treatment of chronic pulmonary affections.

The practice which formerly obtained in relation to pulmonary phthisis now holds in the treatment of laryngeal consumption. Equability and warmth are recommended for these cases, whenever sent from home for change of climate. If good results have not followed in the pulmonary form, why should they be looked for in the laryngeal variety? Have the results in the latter been of a sufficiently gratifying character to justify us in persisting in sending cases to such places? Personally, I have had most discouraging results; I have never known a case sent to a warm and equable climate *recover*. On the other hand, if cases of pulmonary phthisis recover at high altitudes, why should not the same good results be achieved in laryngeal phthisis? At the resorts which I visited I learned that the physicians, as a rule, were in the habit of sending cases of laryngeal phthisis to the lowlands; not because experience had taught them to do this, but rather following the teachings laid down in our standard works on diseases of the throat. The objections urged against high-altitude resorts for laryngeal phthisis are the cold, excessive dryness, and over-stimulating qualities of the atmosphere; also the great extremes of temperature which occur daily throughout the entire year. When we consider that the laryngeal, and the most *fatal*

form of pulmonary, cases are dependent upon the same cause, *tuberculosis*, and that the majority of the cases of the pulmonary variety recover when sent to high altitudes, provided the disease has not advanced too far, then the objections above enumerated seem trivial and should not, in my opinion, be seriously entertained.

The direct local effects of inhaling the very cold air, which undoubtedly in some cases is irritating, will not be experienced if the invalid be instructed to breathe through the nose instead of the mouth, by which the air becomes of the body-temperature.

Laryngeal phthisis is a secondary and not a primary affection. As I have already stated, it is estimated that at least 33 per cent. of cases of pulmonary phthisis have the laryngeal complication; that is, this large percentage of cases *follows* the development of the disease in the lungs.

Dr. William R. Huggard, of Davos-Platz, writes me: "Not in a *single instance* has tubercular infiltration *begun* in any patient under my observation at Davos. That such a thing may occur, I see no reason to doubt. But if it does occur it must, at any rate, be rare, in patients otherwise suitable for this climate."

Dr. Tucker Wise, in charge of the Kursaal at Maloja, writes that he has had no experience in the treatment of these cases at Maloja—they are not sent thither; neither do they occur in cases of pulmonary phthisis under treatment. Both of the physicians just referred to have constantly under treatment a large number of cases of pulmonary phthisis, and the evidence furnished by them surely might be accepted as an indication that laryngeal phthisis may be totally arrested, while in the incipient stage, if placed under the influence of the cool, dry, aseptic air of high altitudes.

In response to the query, Do cases of tubercular infiltration of the larynx improve or recover at Davos? Dr. Huggard says the few cases that have come under his care, with infiltration and ulceration, he did not allow to remain at Davos, as they were in other respects unfit for the place. With regard to the influence of climate upon cases in the incipient stage he has had no experience, as such cases have not been sent to him, neither have they, as already stated, developed in cases under his care for pulmonary trouble. That such cases might improve he thinks is not improbable, but from lack of experience he is not prepared to counsel the measure.

Dr. H. H. Howland, of Denver, Col., for five years one of my assistants at the Metropolitan Throat Hospital, and for the past six years engaged actively in special throat practice at Denver, has sent me a report of four cases of laryngeal phthisis which recovered under his care. Thickening from tubercular infiltration was present in all the cases.

Dr. Howland, as the result of his experience, extending over six years, thinks that the climate of Colorado is well suited to this class of cases, and that recovery may reasonably be looked for, provided infiltration has not given way to the ulcerative process.

Dr. B. P. Anderson, who has been for a number of years engaged in general practice at Colorado Springs, reports two cases of recovery; both well-marked typical cases. One of the cases I saw in consultation with Dr. Anderson in October, 1885; there was thickening of the epiglottis and of the arytenoids, and also of the mucous membrane covering the vocal cords, with deposit in the apex and infraclavicular space of the right lung. The man recovered perfectly, and is engaged at present in business at Colorado Springs. The other case, Dr. Anderson writes, presented similar appearances in the larynx; the left lung was involved instead of the right. This case also has recovered, and is living on his ranch near the Springs. Dr. Anderson is of the opinion that incipient cases, before ulceration has begun, may do well at high altitudes. I saw also at Colorado Springs, in consultation with Dr. S. E. Solly, two cases of well-marked tubercular laryngitis; in one, slight ulceration had begun. Under the influence of the dry air of the place, and the local treatment adopted by Dr. Solly, they seemed to be improving. The final result I have not as yet learned. The management of these cases will require greater care than those in which the disease is confined to the lungs. The patient during the cold season, say from October till May, should retire within doors before the setting of the sun. Owing to the great fall in temperature caused by the rapid radiation of heat from the earth's surface, the sudden change is more apt to be felt in the upper than in the lower air-passages. At Colorado Springs the patient will have, during the shortest days, from eight to nine hours daily for outing. During the summer he can safely remain out-doors from the time of rising in the morning until bedtime. The high winds and dust-storms which occasionally take place should be avoided.

In addition, appropriate local treatment should be employed.

In recommending high altitudes, I do not wish to be understood as saying that height is the only requisite.

In addition, there should be an abundance of sunshine, a dry, rarefied air and no fogs, a climate which will permit the invalid to be in the open air the greatest number of days, where the comforts of home may be secured, and the patient remain the entire year round. Colorado Springs on many accounts, perhaps, is to be preferred; but there are numerous other places in the State of Colorado presenting the same climatic characteristics—for instance, Denver, Cañon City, and Pueblo. In New Mexico and Old Mexico there are many excellent resorts, as well as in Idaho and California.

The climate of the Swiss Alps is, in my opinion, unsuited to these cases. The invalid's day, during the winter, lasts from four to five hours only. At times there are fogs, and during the melting of the snow, which always takes place when the *föhn*, or south wind, prevails, the atmosphere becomes very humid. For this reason, early in April the patients are compelled to seek the lowlands.

The result of my inquiries tends to establish the following, although I think further investigation will be necessary:

First: That at high altitudes tubercular infiltration does *not* begin; although it is developed in 33 per cent. of the cases of pulmonary phthisis elsewhere.

Second: That cases of laryngeal phthisis may recover, if sent to certain high altitudes while in the incipient stage.

Discussion.

Dr. GLASGOW had observed that in the laryngeal disease of consumptives residence in the higher altitudes had been injurious. It was a maxim with him in such cases that the patient should go to a lower elevation (say three thousand to four thousand feet) rather than to a high one (five thousand to seven thousand feet). He used the words throat disorder, and not laryngeal phthisis, advisedly, since all throat disorders occurring in consumptives were not necessarily tubercular. Some were simply catarrhal, and these recovered under treatment. His rule was to have all cases with throat complication remain in a lower elevation until the throat symptoms were better, before going to such high altitudes as Las Vegas, N. M., and similar places. He had never seen a case of this kind, with decided throat ulceration, recover in high altitudes. In fact, true tuberculous ulceration of the throat, he believed, did not recover in any climate; but he would state positively

that, in his experience, in all cases of consumption where throat complication existed residence in high altitudes had been injurious.

Dr. SHURLY confirmed the statement that in a great many cases of throat disorder, with phthisis pulmonalis, the larynx is not affected by the tuberculous process at all. Diagnosis was not always easy. The discovery of the tubercle bacillus had seemed to simplify the whole subject, but subsequent study had left the matter as uncertain as before. He had observed as good results from sending some cases to the sea-shore as by sending others to the mountains. The question as to the best climate was still a difficult problem.

The PRESIDENT referred to a case of incipient phthisis, with laryngeal complication, without manifestation of tubercular deposit except upon one vocal band and with moderate deposit in one lung, which remained stationary, at Colorado Springs, but during a subsequent visit to the sea-shore the deposit in the lung increased and the laryngeal trouble also increased.

Dr. LEFFERTS agreed with Dr. Glasgow as to the existence, clinically, of two kinds of laryngeal ulceration in phthisis; and held that when the profession generally comes to recognize these differences the more easily will the present divergent views and teachings be reconciled and questions of climatic cure or improvement be settled. There is one form of laryngeal phthisis due to a lowered vitality with a low grade of catarrhal inflammation tending to ulceration; the second form is that in which the ulcers are characteristic, typical, and never heal—never show a disposition to cicatrize; these are due to a true tuberculous infiltration and degeneration and occur, as a rule, in cases of rapidly progressing pulmonary phthisis. Now, it was reasonable to expect that the first form might improve under better conditions of hygiene and climate, just as the patient's general physical condition improved. In such cases the disease might be arrested, cicatrization might occur, and, occasionally though rarely, the laryngeal lesion might be cured. This was the explanation, perhaps, of the cases of laryngeal phthisis which came to a stand-still under proper conditions of climate, be the altitude high or low. They are not cured, but are arrested in their course. On the other hand, a rapidly progressing, steadily infiltrating disease of the larynx, such as is recognized as the true tubercular laryngeal ulcer, is, practically, incurable. Such ulcers never cicatrize; such patients never improve, or at most but slightly, with quick relapses, whether sent to high altitudes or lower ones. Such patients were far better kept at home, surrounded by home comforts, than sent away to be subjected to various treatments, local applications, etc., which not infrequently hasten the invariably fatal termination of the disease. Such cases climate cannot cure; it is doubtful if it even improves them. The question as to which climate suited the former class of cases the best was, as Dr. Wagner had said, still an open one.

Paper.

INTERNAL ŒSOPHAGOTOMY—THE REPORT OF A CASE.

By JOHN O. ROE, M.D.

IT is not my purpose, at this time, to present a general paper on the subject of internal œsophagotomy.

I will, therefore, simply report to you the details of a case of aggravated fibrous or cicatricial stricture of the œsophagus, the third in which I have performed this operation with complete success. The former two cases were reported to the Medical Society of the State of New York and published in "The Medical Record."

Mrs. M. L. O., forty-eight years of age, was referred to me, June 3, 1887, by Dr. Pardee, of Fulton, N. Y., on account of a serious obstruction to deglutition which she had had for fourteen years.

The onset of the difficulty was very sudden. One afternoon, while eating a chicken sandwich, a piece of the chicken lodged in her throat and caused her to choke quite violently.

The chicken she believed to be entirely free from bone, but such could hardly have been the case, for it would seem barely possible for a piece of chicken, free from bone or cartilage, to injure the œsophagus sufficiently, or to lodge in it long enough, to excite inflammation or ulceration sufficient to cause the membranous or cicatricial formation which I shall presently describe to you.

At all events, such was the result, and one of my other cases had a similar history.

After the choking had subsided the patient found she was unable to swallow any solid substance whatever, and this condition continued until the time I saw her.* She was, however, able to swallow liquids and semi-solids very slowly, but a solid particle as

* Since this paper was read the patient has told me of a fall that she had six months before the choking occurred. She was thrown from a sleigh on to a sharp ridge of ice, striking on the back of her neck.

She believes she came very near dislocating her neck, for it was very painful and lame for several weeks, and for a year afterward she could not turn her head to look behind her or to look up without putting her hand to the back of her head to support it.

This fall might have produced a contusion of the œsophagus and been the cause of the stricture.

large as a tomato-seed would lodge in her throat and cause her much discomfort until it was expelled.

In order to expel it, she would often be obliged to nauseate herself and sometimes to produce vomiting, by running her finger down her throat.

The nutriment she was able to take consisted of milk, soups, broths, and the like. She could also take bread, cake, potatoes, and such substances as could be softened and thoroughly incorporated in the milk or broth. Everything, however, excepting the clear milk she insisted on being strained, lest it might contain some solid particle that would lodge in her throat.

On taking the nourishment she would place the substance in the back part of her mouth, throw her head slightly back, and allow it to run down very slowly. Efforts at swallowing would be of but little assistance.

In this manner she had been able, during these fourteen years, to sustain herself fairly well. The obstruction was, however, slowly increasing, and she was at the same time losing flesh and strength. Swallowing had now become so difficult that it occupied all her time during the day to get down sufficient nutriment to appease her hunger.

She is a tall woman, five feet five and a half inches in height, and has always been rather slender. Her weight, previous to the commencement of this trouble, was 135 pounds, but it was, at the time I first saw her, reduced to 108 pounds.

On attempting to explore her œsophagus with an ordinary small, conical-pointed œsophageal bougie, 4 mm. in diameter, I found it arrested two and a half inches below the entrance to the œsophagus. I then tried to pass a fine whalebone, filiform bougie, 1 mm. in diameter, but also without success. I then employed a small metal-tipped bougie, 2 mm. in diameter, mounted on a small copper stem, covered with the smallest oiled silk bougie through which this copper stem would pass. With this flexible stem, bent in various directions, I finally succeeded in finding the opening. It was located at the extreme left side of the œsophagus, so that the bougie when in the passage was lying close against the left posterior pillar of the fauces.

This success in finding the opening was very gratifying not only to the patient but to myself as well, for the reason that so many attempts to find the passage had been made by different surgeons without success.

Her œsophagus was very sensitive to the introduction of instruments—so much so that much irritation and some pain followed the first exploration. This irritation, however, subsided in a short time with the aid of a little morphine, applied locally; and on the second day afterward the same bougie was introduced, with little or no irritation. This was followed up by slightly larger bougies, until one 6 mm. in diameter could be passed.

For a short time after each dilatation deglutition was improved; but the stricture would soon contract to its former size.

Daily dilatation was, nevertheless, persevered in for three weeks, without any additional gain. I then decided to divide the stricture by internal incision, as the easiest and best way of dealing with it.

With the bulbous bougie, I determined the vertical extent of the stricture to be about three millimetres. Below this point the œsophagus was entirely free.

By means of the half-round or “demi-bulbous” bougie, I determined that the stricture occupied about two-thirds of the circumference of the tube on the right side—the other, the left third, being free and unaffected. This is the form of bougie I used in the cases I have already reported. It was devised by Trélat in 1870. It is of the utmost value in determining the depth of the projecting portion of the stricture, and the point where the incision should be made.

The bulb of this bougie is made flat on one side and half-round on the other, forming half a sphere.

It is readily seen that when the bulb is introduced beyond the stricture and withdrawn, if the bulbous side is turned toward the projecting portion of the stricture, it will meet with resistance proportionate to the size of the bulb and to the distance that the edge of the stricture projects beyond the line of the wall of the œsophagus. If the bulb is turned to the flat or straight side of the œsophageal wall and the flat side of the bulb to the strictured side, no resistance is felt on withdrawing the bulb. If the stricture projects equally on all sides, the same resistance will accordingly be felt when the bulb is turned to either side. After thus carefully determining the location and extent of the stricture, and the depth I wished to make the incision, I introduced the œsophagotome and made an incision 2 mm. deep through the most projecting portion of the stricture on the right side.

The blade met with a little resistance, indicating that the tissue composing the stricture was moderately firm and dense.

The operation caused but little pain, mainly of a stinging sensation, and there was but very little hemorrhage, three or four expectorations only being mixed with blood. During the following twenty-four hours the patient was permitted only to take a small quantity of milk. There was no pronounced pain or inflammation; and on the second day dilatation was begun, to prevent the reunion of the cut surfaces.

A bougie 10 mm. in diameter could now be passed quite easily and deglutition was much improved, although no solids could yet be taken.

In one week (July 2d) I repeated the incision, dilatation having failed to increase the opening beyond the 10 mm. At this operation the incision was made back of the former one, the blade being turned backward about 35°.

The incision was made $1\frac{1}{2}$ mm. in depth. It caused scarcely any pain, and only a few drops of blood were seen. The treatment after it was the same as that before described.

A bougie could now be passed, 12 mm. in diameter, and deglutition was correspondingly improved.

Dilatation was now continued for ten days, with the result of only increasing the opening to admit a bougie 3 mm. in diameter.

On July 12th another incision was made, like the last one, but on exactly the opposite side of the stricture. A bougie 15 mm. in diameter could now be admitted.

Dilatation was continued, and on July 19th, one week later, an incision 2 mm. deep was made in the centre between the first and second incisions; and on July 26th a fifth incision, 2 mm. deep, was made between the first and third incisions.

The last two operations were about the same in every particular as the first one.

After the last incision a bougie 20 mm. in diameter was passed through quite easily, and the patient was able to take all the solid food she desired without difficulty.

The calibre of the œsophagus at the place where the stricture had been was so near its normal size that further operations were deemed unnecessary. Dilatation was, however, continued daily to prevent any recontraction during the process of healing.

At the end of three weeks there was no narrowing of the tube, and the patient went home for four weeks. She was then to return for examination. During this interval she herself con-

tinued daily the dilatation of the stricture with a bougie that I had taught her to introduce. When she returned, I found a very slight contraction had taken place, but only sufficient to cause the bougie to go through very snugly.

This contraction was, however, overcome by increasing the size of the bougie $1\frac{1}{2}$ mm. Some force was required to pass this, at first, but the contraction soon yielded and none has taken place since; or, at least, none had taken place when I saw her last, about six months ago.

I heard from her indirectly, however, just before I left for my summer vacation, and she was at that time quite well.*

The form of bougie which I employed in the case, and which I taught the patient to introduce for herself, was made of hard rubber, two and a half inches long, tapering at both ends alike, the middle portion cylindrical, and mounted on a whalebone stem.

The distal end of this bougie was tipped with a flexible gum-elastic and conical-pointed bougie, to facilitate the passage of the hard-rubber portion through the fauces and to direct it into the œsophagus.

This form of bougie I had devised a year before for the dilatation of a stricture at the lower end of the œsophagus in a patient brought to me by Dr. F. D. Vanderhoof, of Phelps, N. Y.

In this case, however, as the stricture soon manifested a cancerous nature, no operation for internal œsophagotomy was attempted.

The addition of the flexible conical tip to the hard-rubber bougie is of special advantage in many cases of œsophageal stricture.

The small flexible point very readily directs the bougie into the stricture, and the long acute angle which it gives prevents irritation and the necessity of using as much force as would be necessary to carry the dilatation to the same extent with the ordinary short, blunt, olive-shaped bougie.

The advantage of this bougie with a whalebone stem over the long gum-elastic bougie with a conical point is, that the hard rubber is far better for dilating, and the slender whalebone stem readily allows the retention of the bougie for a time sufficient to get the advantage of a longer-continued pressure, which the long

* Since this paper was read Mrs. O. has reported to me that she is very well and growing quite stout—weighing one hundred and forty pounds. She has no trouble whatever in swallowing, although she introduces the bougie occasionally.

gum-elastic bougie will not readily permit. It is also very much superior to the other form for dilating strictures low down in the œsophagus.

This flexible-tipped, hard-rubber bougie, like all other forms of bougie, is made in different sizes, and different lengths according to the size, to meet the requirements of different cases.

Since devising this form of bougie I have employed it in preference to all others.

The œsophagotome employed in this case, and also in the other two cases I have reported, is the form devised by Sir Morell Mackenzie, excepting that I have slightly modified it so that the blade can be more accurately adjusted and the distance to which the blade will be thrown out at each introduction can be more absolutely determined. This instrument has done for me most excellent service and given results which leave nothing more to be desired.

Discussion.

Dr. RICE suggested, with regard to diagnosis of this condition, that he had met with a few cases of supposed stricture of the œsophagus; they generally gave a history of fright, or of some mental shock during eating, which had caused choking and subsequently supposed inability to swallow. In such cases he had made applications of cocaine (eight per cent. solution) after the first examination and before the final examination with satisfactory results. He did not think that the spasm was entirely involuntary, but to some degree voluntary, since the patient would make every effort to obstruct the passage of the probang. Possibly cocaine might assist in demonstrating the diagnosis of these oft-times obscure cases.

Dr. INGALS inquired the depth of the incisions.

Dr. ROE replied, two centimetres.

Dr. INGALS recalled a case of stricture in which he had inserted a bougie which had met with an obstruction; but by using a little force the obstacle had suddenly given way, and the patient had never had any trouble with it again. In this case the obstruction probably consisted of only a thin membrane.

Dr. LANGMAD had seen a number of cases of stricture following accidental swallowing of corrosive fluids. In others he had never been successful in locating a stricture where it was supposed to exist. In some cases there might possibly be partial paralysis of the muscles to give rise to these symptoms. He had seen pneumonia follow forcible dilatation in one case, where the stricture had been caused by swallowing caustic potash, although he used the greatest care in passing the

bougie. The patient was a young and strong workman ; pneumonia followed, and the patient died.

Dr. INGALS inquired if an anæsthetic was necessary, especially in young children.

Dr. ROE said that his first case was that of a boy, aged six years, in which he did not have to resort to an anæsthetic because the child had become accustomed to the passing of bougies. The stricture had been caused in this case by caustic potash.

Dr. SAJOURS feared that the use of cocaine introduced an element of danger, through the fact that the assistance of the patient (who otherwise indicates the position of the bulb) is lost, while on the other hand a soft area in the œsophagus might become penetrated and lead to fatal results.

Dr. DELAVAN agreed with Dr. Sajours as to the danger of using cocaine in this way.

Dr. RICE explained, as to the use of cocaine, that he merely meant to apply it as a means of diagnosis.

Dr. ROE believed that, as to the possibility of spasmodic stricture of the œsophagus, it was strictly analogous to spasmodic stricture of the larynx. As pointed out by the late Dr. Elsberg, there might be a tender spot at the level of the arytenoid cartilage, and when food passed down the œsophagus it might cause spasm of the larynx ; but it might also cause spasm of the œsophagus. The speaker had had two cases of this kind : a lady who nearly strangled to death on account of spasmodic stricture when she attempted to swallow food, but in whom nothing could be detected upon passing the bougie ; the spasm was really a spasm of the larynx, and was cured by proper treatment directed to the larynx. He did not use cocaine when introducing instruments into the œsophagus. He sometimes sprayed the throat with it, but not in a routine way. The resort to force, as suggested by Dr. Langmaid, he considered very objectionable. Where there is rigid cicatricial tissue upon one side of the œsophagus the application of force is much more likely to rupture the opposite healthy side of the œsophagus than the thickened tissue. Of course, where the stricture was symmetrical and affected the entire circumference of the tube, the danger was not so great ; but in the former condition the risk was actual. This explained some cases in which the use of instruments in the œsophagus had been followed by death.

Paper.

ON A HITHERTO UNDESCRIBED NEUROSIS OF THE AURAL APPARATUS, CLOSELY ALLIED TO CORYZA SYMPATHETICA.

By JOHN NOLAND MACKENZIE, M.D.

IN the course of an article on the "Respiratory Vaso-motor Neuroses," read in May, 1886, before this Association, I called attention to a condition of the aural apparatus closely akin to vaso-motor coryza—a sort of "hay fever" of the ear, so to speak—and brought it forward in support of the doctrine which I hold concerning this class of neuro-vascular phenomena. I have seen but one case of the affection I am about to describe, the details of which may be briefly given as follows :

Mrs. B., aged about forty-two, living in a distant city, came to Baltimore a few years ago to consult me concerning a peculiar periodic affection of the ear, which had excited the interest of her physicians but which had never been satisfactorily explained, and which came upon her every summer with such unerring regularity as to make life a burden to her for a definite part of each recurring year.

Accustomed always to the good things of life, she had in later years been greatly reduced in circumstances and had experienced some of the acutest phases of domestic sorrow. She had met the call upon her mental and physical endurance with indomitable courage, but in the progress of time it had begun to tell upon her and manifested itself in a weakened condition of the nervous system. She is not a nervous woman, in the common acceptance of the term, but belongs to that class, so common among our American women, which Beard above all others has so clearly differentiated from the purely hyperexcitable and hysterical.

The affection came on suddenly soon after her marriage, in 1866, after a visit to the White Sulphur and Warm Springs in the mountains of West Virginia. There were no premonitory signs, nor can she ascribe the affection or the suddenness of its onset to any particular cause. She could not say that she was in any remarkable degree affected by the sudden cooling and dampness of the atmosphere which often occurs in those localities after the setting of the sun. The disease commences, without premonitory

symptoms, about the first day of June, with intolerable itching of the auditory canal. This may be preceded by a similar itching in the corresponding side of the throat in the region of the opening of the Eustachian tube ; or both throat and ear may begin to itch at the same time. The itching is soon followed by swelling of the lining membrane along the whole length of the auditory canal. This diffuse swelling or engorgement rapidly increases until the meatus becomes nearly completely occluded. The surface of the swollen membrane is intensely sensitive to all sorts of local applications or irritants, but does not seem to be notably affected by the condition of the external atmosphere. This excessive irritability, which is particularly striking, prevents the employment of topical applications, but is occasionally relieved by the constant use of hot water.

Later on, symptoms of middle-ear inflammation develop and give rise to deafness, varying in degree. The Eustachian tube now becomes involved, as indicated by shooting pains from the ear to the throat in a line precisely corresponding to that taken by the tube in its passage to the pharynx and also by direct rhinoscopic inspection. During the period of swelling of the meatus it is impossible to get a view of the tympanum, but on one occasion, when the opportunity was afforded me of examining that structure, it was found slightly hyperemic. The corresponding side of the nasal pharynx was also in a congested state. The above symptoms last for a short while, when a profuse discharge takes place from the auditory canal, which at the same time gives relief to the preceding symptoms. Some discharge also takes place into the throat, but this is inconspicuous in comparison with the external aural flux. She thinks that sometimes little swellings, "like pimples or boils," are produced in the ear and that some of the discharge may come from them. A number of incisions into the swelling made by her brother, a distinguished surgeon, have failed to detect the presence of pus, and, as they failed to give relief and seemed to aggravate the pain, were finally abandoned.

The affection only makes its appearance during the heated term, and usually either in the month of June or the month of September. On several occasions, however, it has appeared in the months of July and August. It is always limited to one side, one ear being affected one summer and the other the next ; or the same ear may alone suffer for several consecutive summers. Dur-

ing the winter-time she never suffers from her trouble nor do her nose and throat show any signs of disease.

The almost daily paroxysms of the disease last for generally exactly four weeks, when they disappear as suddenly, and without premonition, as they came. One summer they passed away in two weeks.

She can, unfortunately, throw no light on the possible origin of the disorder, nor upon its exciting causes, except that the trouble, when once started, may be provoked or aggravated by various kinds of local irritants. During the paroxysms, she becomes weak and irritable and generally "out of sorts."

Nothing that she has ever taken for the trouble has ever in the slightest degree modified its course; but during last summer, which she spent at a well-known "hay-fever resort," she was entirely free from it for the first time in twenty-two years. The present summer (1888) she has spent on the sea-shore, chiefly at Narragansett Pier, and up to date (September 15th) has not had a return, but is living in daily dread of its approach.

We have, then, a periodic affection coming on suddenly only at a certain time of the year, characterized by a succession of paroxysms lasting a definite number of days and disappearing with the suddenness of its inception—an inflammatory condition of the auditory canal (with possibly an occasional furuncular element), an inflamed or congested state of the cavity of the tympanum, and, finally, an Eustachian salpingitis—appearing with perfect regularity year after year, and rebellious to all forms of seemingly appropriate treatment.

I call your attention to it, in the first place, because it represents a diseased condition of the aural apparatus, as far as I know, hitherto unrecognized and undescribed. In the second place, the phenomena outlined above not only furnish additional evidence in favor of the doctrine which I have maintained concerning the rôle of the sympathetic in the so-called motor and neuro-vascular affections of the upper respiratory tract, but serve as a pregnant illustration of the law that "*the area in which the vaso-motor reflexes occur will depend, other things being equal, on the seat of the local pathological process—on the localization of the area of peripheral excitability.*"

I have on several previous occasions spoken of certain conspicuous aural phenomena in connection with the sympathetic forms of coryza and directly related to them through the nervous

system, prominent among which is the enormously distended and congested condition of the auricles, and other vaso-motor phenomena similar or analogous to those found in the external aural apparatus after section of the sympathetic in the neck.

We have, characteristic of the condition before us, a group of symptoms referable to a distinctly circumscribed region which derives its vaso-motor and trophic nerve-supply, in all probability, directly through the otic ganglion. In sympathetic coryza the territory chiefly involved is the area in which the nerves from the sphenopalatine ganglion are distributed, while in the periodic affection of the conjunctiva, analogous, possibly, to both the aural and naso-pharyngeal affections, the vaso-motor supply is obtained through the ophthalmic.

The observation detailed above is, of course, an isolated one, and more extensive study of other cases must be made before we can arrive at its precise pathological significance. That it presents a striking analogy to certain neuro-vascular disturbances of the upper respiratory and ophthalmic tracts scarcely admits of a doubt. But, even if not directly comparable or related to these latter, it is at least suggestive of a line of thought and method of observation by which our vision of this class of affections may be possibly broadened and which may lead to the establishment of the common kinship of a host of phenomena whose relationship has never been before suspected.

Above all, we should allow no opportunity to go by, however trivial and insignificant, to penetrate the veil which hides in darkness the pathology of the sympathetic nerve, and to approach more nearly the mysterious operations of that wizard force.

Discussion.

Dr. SHURLY agreed as to the importance of the sympathetic system in these affections. He had noticed in several cases observed by him that irritation of the nerves of the ear had given rise to symptoms in remote parts of the body; *e.g.*, ear-cough. With regard to the function of the sphenopalatine ganglion and its participation in the production of the symptoms of hay fever, he could not accept the views of the lecturer; he did not think that irritation of this produced any such effects as had been described. From a number of experiments upon dogs, he had not been able to observe that either electrical or mechanical stimulation produced engorgement or discharge from the nasal mucous membrane.

Dr. SAJOUS reported a case similar to Dr. Mackenzie's, in a hay-fever

patient, in whom the ear-affection began a week after the coryza. This he mentioned in connection with the preceding case in order to show that an affection of the ear might occur in hay fever, although his case was not comparable to Dr. Mackenzie's in other respects.

Dr. HARRISON ALLEN said that on a former occasion, referred to by the lecturer, he had expressed himself as fully upon the subject of vasomotor affections as in his judgment our present knowledge would warrant. He believed that in these affections the process was an inflammatory one such as occurred elsewhere, modified by the anatomical peculiarities of the region : an inflammatory process involving the over-action which is ascribed here to the sympathetic fibres and spinal fibres of the nerve, both being concerned in producing the condition of the blood-vessels referred to. He knew of no reason why the auditory tract should not have the same affections as the nose, but he agreed with the lecturer that the ear was rarely if ever affected with the peculiar condition recognized as hay fever.

Dr. MACKENZIE, in closing the discussion said, with regard to experimentation upon the spheno-palatine ganglion, that he had found it difficult of demonstration, even in large dogs, many of which he had been obliged to sacrifice before he succeeded in finding the ganglion, and, when found, that it was exceedingly small, a mere bulging of the nerve-trunk. The speaker commented upon the results brought about by stimulation of the ganglion and referred briefly to the experiments of Prévost and Aschenbrandt. The speaker believed that ear symptoms were sufficiently common in connection with "hay fever," but that in the case reported by him the phenomena were confined to the aural apparatus alone.

Paper.

CANCER OF THE LARYNX ; TRACHEOTOMY.—BUCCAL PERFORATION OPENING INTO THE MAXILLARY ANTRUM.

BY A. GOUGUENHEIM, M.D.,

PARIS, FRANCE.

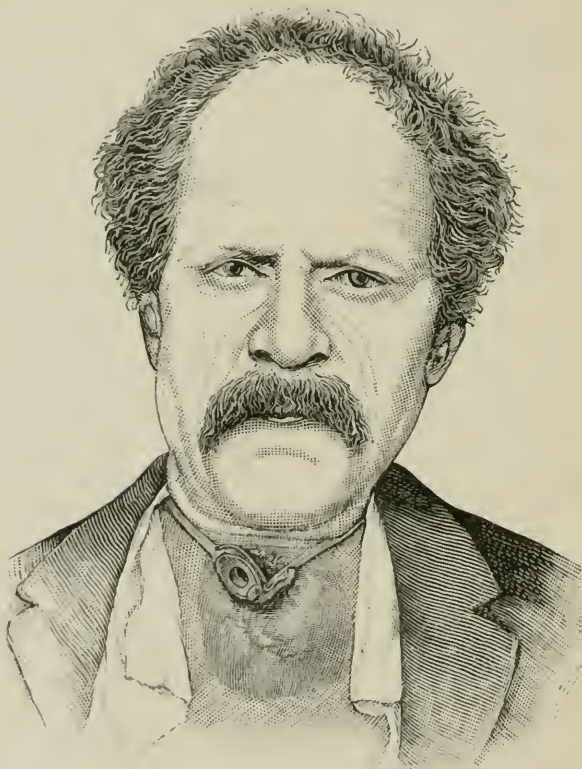
I HAVE the honor to present to you two cases of interest observed in my clinic of laryngology at the Lariboisière Hospital.

The first case is that of cancer of the larynx in a male patient, a workman, fifty-six years of age ; but it is not for the disease itself that I present the case, but for a special point of therapeutical interest.

Tracheotomy was performed under urgent circumstances in November, 1887.

When the patient first came under observation the disease was limited to the left vocal band, but later, after the operation of tracheotomy, the right band also became involved, and for two or three weeks during this period many hemorrhages occurred. Hemorrhages now also occur from time to time.

A thrill is felt in the course of the right carotid artery.



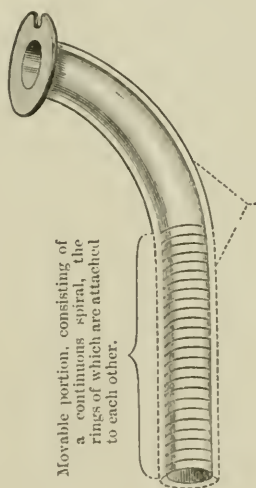
About three months ago there appeared around the wound a tumor, very hard in consistence and red in color. The size of the tumor increased until it became as large as an orange. An ulceration then appeared on its apex, and it presented the characteristic appearances of carcinoma in the ulcerating stage.

The cannula now was insufficiently long, was frequently getting out of place, and the patient suffered from a continual dyspnoea. None of the cannulae available to me were sufficiently long.

I therefore, in consequence of the continuous and distressing dyspnœa, presented the patient to Dr. Berger, the surgeon of the hospital, requesting resection of the tumor to be made; but this operation, however, was declined.

I had now to resort to some expedient to obtain a cannula of sufficient length which could be easily introduced. Such an instrument could not be entirely rigid, as then its introduction would be impossible.

M. Mathieu, of Paris, by my instructions, succeeded, after many attempts, in making for me a cannula the first part of



Tracheal cannula (half-size).

which is rigid, while the lower two thirds are movable. The movable part consists of a continuous spiral, the rings of which are attached to each other. The inner cannula resembles the outer one in this respect.

For introducing the outer cannula I made use of a rubber bougie as a guide, the bougie projecting slightly beyond the end of the cannula. In spite of the irregularities of the passage, the introduction of the cannula was easy.

The inner cannula is extracted with facility for purposes of cleaning.

The patient has been wearing the cannula now for six weeks, and is able to breathe quite freely. A point of great interest

also in this instrument is that it always remains *in situ* when the strings which fasten it around the neck are unloosened, thus differing from the ordinary cannulae. The cannula is made of silver.

I present to you a photograph of the patient and a drawing of the cannula.

Buccal Perforation opening into the Maxillary Antrum.—The other case is that of a workwoman about thirty years of age. This patient came to my clinic in consequence of a large perforation situated at the left side of the hard palate in a position corresponding to several of the molar teeth. Here three or four teeth have disappeared, leaving a large sinus, the borders of which are rounded and smooth, and show no signs of any ulceration. This sinus, into which I can introduce the end of my little finger, opens into the cavity of the maxillary antrum, which is of about the size of a small nut, with irregular walls covered with white mucus. The cavity was easily illuminated by the Drummond light for the purpose of inspection. A probe was easily passed through it into the corresponding side of the nose, and could be seen in the middle meatus. The patient complains of fluid passing into the nose when she is drinking.

This condition, which is very curious, is very probably the consequence of a localized necrosis in this situation, coincident probably with syphilis; but no trace of this disease was found on the first examination.

If indicated, a specific treatment will be given, but the condition above alluded to is certainly irremediable. As a local measure, however, I propose the use of a movable apparatus to prevent the entrance of food into the cavity during meals.

I am very glad to have observed these two very interesting cases. The first one is very remarkable in that it necessitated the construction of a difficult apparatus indispensable for the preservation of life. The second case is a very rare one indeed, and I believe that it is almost unique.

Paper.

PARASITES INHABITING THE HUMAN NARES.

By D. N. RANKIN, A.M., M.D.

INDIVIDUALS of the human species are very liable to have the larvæ or ova of insects introduced into the nose. My subject, I am aware, is not a new one. Its bibliography, so far as I can discover, is summed up thus : Ernst speaks of a worm which was blown from the nostril, its appearance being followed by a great hæmorrhage. Razoux published a case in which a large number of larvæ of flies came from the nose. Martin Slabber, a Dutch writer, tells of a man, fifty-two years old, who had labored under severe headaches from an early period of his life, which ceased immediately on his expelling, in the act of sneezing, a worm eight inches long.

Lange, in the third volume of Blumenbach's "*Medici Bibliothek*," gives the case of a peasant from whose frontal sinus a similar worm came forth ; and Blumenbach, in his treatise on the frontal sinus, speaks of the *scolopendra electrica* and other insects, and worms being found in this part. Sandifort makes mention of a living earwig escaping from the nose. Sengmalm, a Swedish writer, has recorded a very interesting case in which more than two hundred larvæ of the domestic fly were expelled from the nose of an infant eight months old. In the eighth volume of the Edinburgh "*Medical Commentaries*" is a case which occurred in Jamaica, of worms in the nose, which caused very severe symptoms, till they were at length expelled by injecting a decoction of tobacco into the nostrils. In the history of the Academy of Sciences for the year 1708 there is an account of a woman, aged thirty-nine years, who began to suffer a fixed pain in the forehead, on the right side, near the nose. This, by the end of two years, had become very violent, and continued constant, and was accompanied by convulsions and almost perpetual insomnia. At the end of four years, after having tried a great variety of remedies in vain, she began to use snuff in the hope of relieving her sufferings, when, one morning, after a violent fit of sneezing, a worm, or, properly speaking, an insect, gathered up into a lump, came away from the nose. From that moment she was well. The in-

sect, which was alive, measured six inches, but only two when it folded itself into a zigzag form, a habit which it had acquired from its long confinement in the limited space of the frontal sinus, into which it had perhaps been introduced in the state of an ovum. It was two lines broad, and about one and a half thick, in the middle of the body. It was of a clear coffee-color, convex above and flat beneath, and covered with annular scales separated from each other by minute intervals, through which the feet came out, there being fifty-six of them on each side, about a line in length, and thick as a hair. It seems, from the description, to have been a species of centipede. It lived for many hours after its expulsion, and even for two or three hours after having been plunged into brandy.

Other interesting cases of maggots in the nose (*myiasis narium*) have been reported by various authors from 1743 to the present time, most of which occurred in Mexico, Cayenne, Costa Rica, Italy, South America, and British India. In the last-named country the disease has received the name of "peenash."

Notwithstanding it may be considered a disease of the tropics, its occasional appearance has been observed in cooler climates. My object in preparing this paper is to present to this Congress two cases that occurred in my own practice.

CASE I.—J. W., male, colored, aged about twenty years, a prisoner in the Western Penitentiary of Pennsylvania, came under my care immediately after his admission for a very offensive and irritating discharge from both nostrils, from which he suffered intensely. He was otherwise physically impaired with a scrofulous diathesis. Upon examination of the nostrils with reflected light, nothing beyond a congested and ulcerated condition of the Schneiderian membrane could be discovered. I then commenced spraying with a solution of carbolic acid; at the second spraying, followed by inhalations of chloroform, a large number of maggots made their appearance in the basin. I afterward insufflated calomel and iodoform alternately up the nostrils, thinking perhaps there might be some more remaining, and that the iodoform would destroy the terrible stench, and heal the ulcerated surfaces. The man a short time before he was sent to prison, just previous to his arrest, had been in South America, where, it is to be presumed, the larvæ were deposited.

CASE II.—M. S., female, white, aged three years; my attention was called to the child by the mother. While examining the case I noticed something moving at the orifice of one of the child's nostrils; it gradually protruded more and more; at a glance I saw it was a worm; I seized the protruding end with my fingers, and drew a long round worm there-

from. The mother, being an extremely nervous lady, at the sight of the worm almost went into nervous convulsions. I then put the child on calomel and santolin, which caused it to pass five long round worms, after which the patient recovered her usual good health.

Such instances as those above alluded to may be supposed to originate from insects depositing their ova in the olfactory passages, or creeping in unobserved, especially in persons who are fast asleep, or broken down by disease, or not in full possession of their senses, and also in children; sometimes they may be drawn into the nostrils in the act of smelling strongly of flowers: or, in the case of worms, they may be swallowed with fruits, or various other articles of food, or in impure water used for drink, and remain in the stomach, there to grow and to assume such proportions and strength as to work themselves up through the œsophagus, and posterior nares, and appear externally at the orifice of the nostrils, as exemplified in one of the cases reported.

It is highly probable, however, that they can only live in dyspeptic patients, or persons whose digestive powers are impaired; for there are few or no animals capable of resisting the solvent power of the gastric juice when secreted in full health and vigor.

Second Day—Morning Session.

BUSINESS MEETING.

THE meeting was called to order by the President at ten o'clock, and the reports of officers and committees presented as follows:

Secretary's Report.—The minutes of the last regular meeting, together with those of the Council for 1887–88, were read by the Secretary, who presented, as his official report, the Ninth Annual Volume of the "Transactions" of the Association.

The Secretary also presented an Index of the first ten volumes of the "Transactions" of the Association.

The Secretary reported that, owing to the unusual date of the present meeting, it had been impossible to make the customary arrangement for the publication of the "Transactions" of the Association for 1888.

The death was reported of Dr. Woolsey Johnson, of New York, which took place upon the twenty-first day of June, 1887.

It was announced that, by order of the Council, the names of

Drs. R. H. Kealnofer and J. W. Robertson had been dropped from the list of active Fellows of the Association.

Treasurer's Report.—The Treasurer submitted the following report:

THE AMERICAN LARYNGOLOGICAL ASSOCIATION

in account with D. BRYSON DELAVAN, *Treasurer.*

NEW YORK, *September 19, 1888.*

By		To	
Balance, May 27, 1887..	\$270.07	Printing.....	\$71.85
Annual dues.....	220.00	Rent of hall.....	60.00
Rebate on discussions..	20.02	D. Appleton & Co.....	94.37
"Transactions," sale of.	33.75	" ".....	4.97
		Stenographer.....	75.00
		Clerk.....	10.00
		D. Appleton & Co.....	113.31
			<hr/>
			429.50
		Balance on hand.....	114.34
			<hr/>
	<hr/>		<hr/>
	\$543.84		\$543.84

Examined and found correct.

J. SOLIS-COHEN.

CHARLES H. KNIGHT.

Librarian's Report.—The Librarian regrets being obliged to report that the efforts made to awaken interest in the library have not been as successful as could be desired, for during the past year there has been a considerable falling off in the number of contributions. The library was established nine years ago, and it now contains 55 books and 850 pamphlets. During the past year 1 book and 64 pamphlets have been received. The contributions from abroad have outnumbered those from this country. Unless a livelier interest is taken in this department there is but little hope that it will prove of much value.

During the past few years the Fellows of the Association have shown but little more interest in the library than those outside.

It is doubtful if a library of any considerable value can be established without funds with which to purchase published matter which has not been donated. But even if such funds were available they would not, alone, be sufficient.

The success of the library will depend mainly upon the interest taken in it by the members of the Association.

The Librarian bespeaks an increase of your interest in the library during the coming year.

Respectfully submitted,

THOMAS R. FRENCH,

Librarian.

Committee on Congress.—This committee made its final report and was discharged.

Nominating Committee.—The Nominating Committee reported the following nominations for officers for 1880 :

For President.—Dr. Ethelbert Carroll Morgan, Washington.

For First Vice-President.—Dr. William C. Glasgow, St. Louis.

For Second Vice-President.—Dr. Charles E. Sajous, Philadelphia.

For Secretary and Treasurer.—Dr. D. Bryson Delavan, New York.

For Librarian.—Dr. Thomas R. French, Brooklyn.

For Members of Council.—Drs. George M. Lefferts, New York, and Frederick I. Knight, Boston.

For place and time of next meeting :—Washington, D. C., the last Thursday in May, 1880.

[Signed.]

FRANKLIN H. HOOPER,

EDGAR HOLDEN,

ERNEST L. SHURLY,

Committee on Nominations.

Upon the recommendation of the Council, it was moved that for the year 1880 the Association itself publish its "Transactions," and that an assessment of ten dollars be levied upon each Fellow of the Association to meet the expenses thus incurred. Carried.

It was moved that the Treasurer be authorized to subscribe ten dollars toward the publication of the "Index Medicus." Carried.

An amendment to Section III., Clause Second, of the Constitution, offered by Dr. J. Solis-Cohen, and relating to an increase of the limit of active Fellowship of the Association, was lost by a vote of 16 to 4.

Through Dr. John S. Billings, the President of the Congress, an invitation was extended to the Fellows of the American

Laryngological Association, as members of the Congress of American Physicians and Surgeons, by the President and Mrs. Cleveland, to attend a reception given by them to the Congress, at the White House, upon this, Wednesday, afternoon at four o'clock.

It was moved that a vote of thanks be tendered the Secretary for the preparation of the index to the first ten volumes of the "Transactions" of the Association. Carried.

It was also moved that a vote of thanks be tendered Dr. E. Carroll Morgan for his valuable services as member of the local Committee of Arrangements of the First Congress of the Association of American Physicians and Surgeons. This motion was seconded by the Secretary, who called attention to the unusual difficulties which the above committee had encountered, and to the general success which it had achieved, which success, he stated, had been due in an important degree to the sagacity, foresight, and knowledge of affairs of Dr. Morgan, to whom, he believed from his own somewhat intimate acquaintance with the history of the said committee, too great credit could not be given. The motion was carried with applause.

Adjourned.

Paper.

DYSPEPSIA AS REFLECTED IN THE MUCOUS MEMBRANE OF THE UPPER AIR-PASSAGES.

BY BEVERLEY ROBINSON, M.D.

IT has long been a view to which I have clung with great tenacity, that affections of the upper air-passages cannot be cured unless attention be directed to adjacent or remote organs, so that they be made to exercise their functions properly. No amount of mere local treatment, whether it be medical or surgical, will produce this desired result unless the heart, lungs, liver, and kidneys are all doing their share toward helping the general weal. While all these organs are important to the preservation of a healthy upper air-tract, they all sink into relative littleness as compared with the immediate influence of the stomach. Let this organ perform its work well, and the nose, pharynx, and larynx are not apt to be great sufferers from catarrhal inflammation. Let the stomach be disturbed acutely or in a chronic manner by

an attack of acute dyspepsia or habitual indigestion, and immediately there is evident morbid response on the part of the pituitary, pharyngeal, or laryngeal mucous membrane. I have seen children repeatedly who, whenever their stomach became upset by errors of diet or indiscretions of cake, candy, or soda-water, had febrile excitement accompanied by more or less marked pharyngeal inflammation. This pharyngeal inflammation is ordinarily one of two distinct types. Either there is a markedly red, swollen aspect, with sensations of dryness, soreness, and pain in deglutition, or there is less of these symptoms, while the tonsils on either side show a considerable number already of white exudations, situated over or near the mouths of the follicles, and which, so far as I have been able to observe, differ in no respect from similar deposits that indicate a contagious disorder with which we are all familiar. In many children, each time they are attacked with acute dyspepsia, gastric catarrh, or "biliousness," they also have within twenty-four or forty-eight hours subsequently an attack of this membranous amygdalitis. It shows itself sometimes, indeed, concomitantly with the evidences of disordered digestion, and again, as I have said, we may be obliged to wait a day or longer before the throat deposits are visible. Seemingly in the latter cases there can be no doubt that the disturbance of the stomachal digestion was the original factor in the development of the throat ailment. Now, this affection of the tonsils would not come under the heading, properly speaking, of the subject of our discussion were it not accompanied almost invariably with an extension of inflammation to the upper air-tract in one or other or both directions. Frequently the nasal passages become more or less occluded from swelling and infiltration of the turbinated bodies and the mucous membrane lining the naso-pharynx. Accompanying this condition there is a nasal intonation of voice, and when the tongue is depressed to look at the throat a mass of thick white or yellowish mucus fills up the interval between the pharyngeal wall and the margin of the soft palate. Immediately an effort of hawking takes place, so that the patient is enabled to expectorate the mass and afford himself relief. At times the pharyngeal wall is for a day or more covered with a continuous coating of viscid, sticky, adherent mucus. As this mucus drops down the pharyngeal wall some of it is prone to enter the larynx and produce a slight momentary sensation of suffocation or frequent harsh cough, until it is expelled by an effort of expectoration. Whenever, as will also oc-

cur, these attacks are accompanied by considerable hoarseness, it is the generally received impression that the child has in some unexplained manner taken cold. Now, although I believe that a not dissimilar state may occasionally occur from "catching cold," yet I am of the opinion that the digestive organs, and particularly the stomach, are, as a rule, directly responsible for these effects, always admitting that a check of perspiration, or sitting in a draught, or getting a wetting, may in a sensitive child produce acute indigestion, even though there has been no evident error in diet. To strengthen my interpretation of the cases referred to, I would lay emphasis on the fact that the best medication of a similar condition is active purgation and low diet for several days. Local medication of the nose, fauces, pharynx, or larynx is of far less importance.

Having considered the effects of acute dyspepsia in children, I would direct your attention to chronic digestive disturbances. To locate precisely in small children the seat of their suffering is frequently difficult. This statement is nowhere truer than of the stomach and bowels. There are some children, frequently sons or daughters of poor parents, not rarely of well-to-do people, who have coated, flabby, indented tongues; habitual foul breath; yellowish conjunctivæ; thick, sallow-looking skin of face; small or capricious appetite; distended abdomen; confined or loose bowels. These same children are constantly having vomiting attacks, stomachal or abdominal pains, and are ordinarily listless, peevish, fretful, and ill disposed to play or be amused. Here, then, is a clear picture of dyspepsia, which might, of course, readily be enlarged or elaborated. How frequently in just such cases do we hear parents state that their child is unable to rest at night because it cannot breathe through its nose; that, even when it goes finally to sleep, it is restless and uncomfortable, and awakens with a start, frightened and crying out! Such children are liable to croupy attacks, in which hoarseness and spasmodic dyspnoea are very pronounced. Now, if we examine the nose and throat, we are apt to find some of the following conditions: In the nose the turbinated bodies are swollen and pale-looking, and frequently on one or both sides almost touch the nasal septum in more or less extensive areas; often, indeed, there is no interval between these organs. The retro-nasal space habitually contains a quantity of thick mucus, which the child cannot detach by its own effort, but which spontaneously dislodges itself from time to time, and which,

when it reaches the lower pharynx, is usually swallowed, thus helping much to increase the dyspepsia which already exists. The pharynx, fauces, palate, tonsils, and larynx are all more or less pale-looking and relaxed. The uvula is apt to be elongated and somewhat infiltrated. The tonsils are sometimes considerably enlarged, but not in the majority of instances. Cough is a very frequent symptom. Occasionally it is a distressing, paroxysmal cough caused by local irritation of the larynx from the presence of mucus, or by nerve-irritation, or as a reflex from the elongated uvula tickling the base of the tongue or epiglottis. When we inquire into the efficient causation of such a condition, we are obliged to confess that great ignorance of or inattention to the most ordinary dietary requirements is the source from which so much trouble arises. It is interesting to observe in this connection how absolutely regardless many people are as to whether a child's bowels are moved every day regularly, as to the amount of sugar, or butter, or rich sauce a child may get at separate meals or at odd intervals during the twenty-four hours. And yet the great importance of proper care in these respects cannot be a matter of reasonable doubt to anyone who has closely observed the effects of the simplest remedial measures in restoring perfect equilibrium to the system. The remedial measure may not consist necessarily in doing something actively; it may merely be essential to eliminate or get rid of that which causes the outbreak of trouble.

Taking away an undue amount of sugar from the dietary of some children will enable them to pass restful nights when, previous to this exercise of care, they would have attacks of stridulous cough which would alarm a household. The free use of lime-water, in one instance I recall, broke up very rapidly spasmodic attacks of cough and hoarseness very distressing in character, accompanied by an eruption of urticaria on the face and neck. These attacks occurred in a little girl who for two years was unable to drink a glass of simple milk without causing such an attack. If she ate a small slice of bread with the milk, the attacks referred to did not occur.

I can only explain such an occurrence by supposing that the small amount of bread helped to divide the milk-curd in such a way as to prevent stomachal dyspepsia.

In adults we are able to get, of course, clear descriptions in regard to digestive ailments if manifestly present, and to trace the connection more accurately between them and affections of

the mucous membrane of the upper air-tract. In many cases it is difficult accurately to determine, however, which is the occasion of most distress—the dyspepsia on the one hand, or the catarrhal inflammation of the upper air-passages on the other. Not only is the statement true, so closely correlated are the two conditions, that when one is better the other improves, and if one grows worse the other immediately follows the same march, but it is also often evident that dyspepsia preceded for a long while, in a more or less pronounced manner, the advent of disordered function of the upper air-tract. This is not, however, always the case. No matter how closely we interrogate our patients at times, we can form no definite opinion as to which disease manifested itself first. What I have said in regard to the effect of acute dyspepsia in children is only in part true, as a rule, of adults. Men and women are far less exposed to have the *follicular* form of amygdalitis accompanying the blocking up of the nose from pituitary thickening and catarrh of the naso-pharynx. Still, such cases do occasionally occur. Among dyspeptic adults there are several familiar types of reflected inflammatory or other disturbances of the mucous membrane of the upper air-passages. These depend much upon the character or underlying causes of the dyspepsia. In women, especially those who are pale, careworn victims of nervousness, palpitations, leucorrhœa, and menstrual derangements, we shall, in my experience, often discover atrophic conditions present in the nose and throat. I am inclined to believe at present, mainly from analogy, that just as the glandular apparatus seems insufficient in the stomach to furnish a healthy and adequate amount of digestive fluids, so the pale, contracted, improperly nourished pituitary membrane, which is only an accompaniment here of gland atrophy, explains in some degree the presence of those hard, scaly, adherent, bad-smelling deposits which, under these circumstances, we are apt to notice in the nasal passages, upon the septum or turbinated bodies, or lodged high up in the naso-pharynx.

This analogy is apparently strengthened by the curative effects obtained by Shurly, Delavan, and others from the prolonged use of galvanism in those parts which can be readily reached. Occasionally in such women, just as the flatulent dyspepsia is accompanied by gastralgia more or less intense in its manifestations, so the atrophic rhinitis, or the pharyngitis sicca, may be accompanied by sharp neuralgic pains radiating in different directions to the

eye, ear, temple, vertex, larynx, etc., or that continued burning or throbbing which, when it exists, is so distressing. In some of these women the atrophic rhinitis and pharyngitis, though quite evident if we consider the obviously thin, transparent-looking mucous membrane, are not accompanied by any increased or abnormal formation of inspissated mucus. What we notice in addition to the moderate or considerable atrophy is a marked augmentation in the number and size of the follicles in the naso-pharynx and extending downward over the lower and median pharyngeal wall. Between these various follicles the veins are oftentimes enlarged, tortuous, and filled with blood. The digestive disturbance of the nature of flatulent dyspepsia, accompanied by more or less pain and distress, usually after food and sometimes before or between meals, is frequently relieved most by an appropriate cardiac tonic like *strophanthus* or *strychnine*. Not infrequently this same cardiac tonic will be the means of neutralizing to a considerable degree the distressed feelings in the throat, and the glistening, irritated aspect which previously existed will notably improve, the enlarged veins become less prominent, and all the various abnormal painful sensations become very much less, or disappear entirely. What I have described as being true in many instances in which the heart shows only that degree of weakness which is distinctly evident to the ear of the expert auscultator when he discovers a distant, muffled, irregular first sound, may be more easily allowed when the systole of the heart is accompanied by a blowing murmur which is heard more or less intensely over the entire precordial area.

The dyspeptic student, the overworked, somewhat "bilious" professional man who has no time for physical exercise or out-door pastimes, those persons closely confined in all sedentary pursuits, know full well, when their attention is directed in that way by their well-wisher and professional adviser, that they suffer at the same time and almost invariably from *slow*, difficult digestion, and from *catarrhal secretions* in excess from the upper air-passages. As an absolute antithesis to the class of individuals just referred to we should place the corpulent, plethoric individual with much adipose tissue everywhere, and who becomes easily congested. His face shows it by the flushed, engorged appearance; his liver shows it by transcending its normal limits, especially in the downward direction; his kidneys are not backward in demonstrating it by the high specific gravity, the intense acidity, the considerable

deposit of urates, which are revealed in his urine. He is short-winded, has palpitations when he goes upstairs, and his heart-action is often labored after slight exertion, although beating, as a rule, when he is in repose, forcibly and regularly. There may be some enlargement of this organ, but none which of itself appears serious as regards the outlook for the patient. Such an individual is often a dyspeptic; he eats heartily, but his satisfaction is marred afterward by feelings of weight and distention in the epigastric region, which the full use of Vichy water temporarily relieves.

If we inspect this man's nasal passages they are occluded, very red, and often the turbinated bodies fill up the choanæ so much that free nasal respiration is absolutely impossible. The mucous membranes of the naso-pharynx, pharynx, fauces, palate, and larynx all show more or less the same thickened, engorged appearance. Now, all means at our command, locally applied, are in such a case of little real utility until the portal circulation is thoroughly relieved. These are the instances in which Carlsbad water at home or abroad is of great service. Together with the water, the regimen instituted at the Carlsbad Springs is of much advantage, and helps largely to complete the cure of the dyspepsia (result of the general and local plethora) and the intercurrent catarrhal congestion of the mucous membrane of the upper air-passages. After this treatment has been faithfully carried out, unless the morbid condition had previously been allowed to continue much too long without interference, there is usually no need for the use of the knife, the saw, or the drill to open up the nasal passages and establish satisfactory drainage. Another category of patient is one who, without very pronounced dyspeptic symptoms, yet has a constantly coated tongue and is always somewhat torpid after too abundant and varied meals. The urine of such a patient may or may not show an excess of urates, a few hyaline casts, and a trace of albumin. He is possibly a club man, who takes at least several drinks of whiskey or beer each day, and has a slight muco-purulent discharge from the naso-pharyngeal space, with a subjective unpleasant odor and taste, which is a source of considerable annoyance. Such persons are perfectly willing to have local applications made to their nasal passages, under the form of sprays, pulverizations, douches, etc., during successive weeks and months. If these fail to afford relief, they are willing to submit to repeated cauterizations of the moderately hypertrophied tur-

binated bodies, in the hope of obtaining a more or less permanent cure.

All is vain, however, until, by strict dieting and the continued use during some time of a pill of podophyllin, or other pill appropriate to their condition, they are enabled to affect the hepatic function favorably. In order that the torpid state of the liver (due to its obstructed circulation and brought on by excesses of the table) may rapidly improve, certain hygienic rules must be enforced. Alcohol should be given up for a time, the amount of food should be diminished, and tobacco proscribed. In their place should be substituted much out-door exercise and early hours for retiring. If these rules be carried out effectively, improvement in health will soon be manifest. The tongue is less coated in the morning, bad taste and smell disappear, and these patients feel better in every way, readier to go about and attend to their affairs, and the catarrhal secretions from the nose diminish to such an extent that they are almost unnoticed. Such patients are really dyspeptics without being aware of it until sensible treatment makes them conscious of the fact by relieving all unpleasant symptoms. Why does dyspepsia act thus to produce various morbid conditions of the mucous membrane of the upper air-passages? The reply in many instances seems very simple; in others, difficult. In certain cases of dyspepsia there is developed a fermentation or putrefaction of the ingesta which gives rise to the formation of certain organic acids in excess, such as butyric, acetic, or lactic acid, or, again, to the formation of irritating gases, such as sulphuretted hydrogen, hydrogen, or carbonic acid. The acids are brought up into the throat by involuntary efforts of regurgitation, and thus cause pronounced and manifest local irritation. Gases may rise up in the same way and produce analogous effects. Occasionally, however, one is not conscious of acid eructations into the throat, or the rise of malodorous gases. Despite this fact, it is fair to assume that the latter, at least, *do* come up from the stomach, and, by contact with the mucous membrane of the upper air-passages, occasion the unpleasant effects to which we have previously referred. In some instances, doubtless, we shall be obliged to regard malassimilation, general depression of nervous force, reflex irritation from a chronically disturbed organ or system as explanations, either of which will be partly or wholly true. Once the catarrhal inflammation of the upper air-passages has taken place, it is certain that it frequently aggravates very much the pre-existing

dyspepsia. Indeed, it is no uncommon thing to hear a patient say that it is the violent hawking and constant spitting from which he suffers every morning on rising that unsettles his stomach at that time, and may continue to cause inappetence or disgust for food during several hours of the day.

If this is true, we must get the nasal passages and pharynx in better shape if we can reasonably hope really to improve the condition of our patient. I would also state as an observed fact, not very infrequent, that patients who have never previously suffered in the smallest degree from any evidence whatever of one of the recognized forms of dyspepsia have developed this condition in a distinct form subsequent to the appearance of a catarrhal inflammation of the nose, naso-pharynx, or the pharynx and larynx. It is probable in such cases that some of the secreted mucus from these organs works its way down the back of the throat and is swallowed, thus starting gastric disturbance. It is also clear that the current of inspired air, or, rather, the air which is swallowed, after passing over masses of mucus or muco-pus, more or less in a state of putrefaction, must be very injurious to the healthy functions of the stomach, or stomach and bowels. In these latter cases, again, there should be little hope of favorably modifying the patient's condition unless the catarrhal disease of the upper air-passages be efficiently treated. I do not consider it as within my province at this time to consider the possibility of dyspepsia acting as an efficient or remote cause in the production of various neoplasms in the upper air-passages. Seemingly this study is one that future observation can alone settle on anything like a satisfactory basis. In conclusion, I would remark that in speaking of dyspepsia I have simply used the term as applied to difficult or disturbed digestion, dependent mainly upon functional trouble, with, no doubt in many cases, an intercurrent state of gastric inflammation, more or less intense and extensive. It is obvious that in all cases in which these conditions are present to any degree whatever a suitable and judicious dietary is equally important for a return to a normal state of the nose, throat, and stomach.

Discussion.

Dr. SHURLY indorsed many of the views expressed in Dr. Robinson's paper. The tendency was to ignore too much the constitutional condition. He had had a large number of cases of so-called nasal catarrh

which had recovered by change of hygiene and diet. This had been curative in many cases. As he had before remarked, many so-called nasal hypertrophies were not real hypertrophies but only apparently so; they were most marked at certain times in the day. In such cases local treatment was unnecessary, as the cause was a general one; either dyspepsia, as the lecturer had mentioned, or some other constitutional difficulty. Too much importance could not be laid upon this as a cause of naso-pharyngeal catarrh. He could not agree with Dr. Robinson that naso-pharyngeal disease produces dyspepsia. He had met with a number of cases of naso-pharyngeal disease in which there was no evidence of gastric or dyspeptic disturbance whatever; but he did believe very thoroughly that so-called dyspeptic conditions of the stomach, plethoric conditions of the system, and sedentary habits of living were frequent causes of naso-pharyngeal disease.

Dr. DALY could not plead guilty to neglecting the patient's general habits of life in treating disease of the upper air-passages. He believed that the state of the naso-pharyngeal passages and gastric disorders were, so to speak, intercommunicative. He had seen many cases in which both the local morbid states were due to a common cause. He had been in the habit for several years of using strychnine, and a good dose of calomel, say one-quarter of a grain twice a week, combined with a moderate dose of fluid extract of senna sufficient to cause one or two movements on the following day. Since adopting this plan he had observed that his local treatment had been much more efficacious. He was not willing, however, to rely altogether upon general treatment, but believed that local treatment was still necessary to complete success.

Dr. ROBINSON said that in bringing up this subject for discussion he was influenced by the thought that it was very important for every association of specialists to have in their number one or two men who were identified with the general practice of medicine. There was a tendency to too much medication. He was not a great believer in drugs, but considered them far preferable to too much surgical interference. In conclusion, he deprecated an attempt to bring the nasal chambers into conformity with some hypothetical standard; as he thought that there was no absolutely normal condition or symmetrical shape that could be taken as a standard.

Paper.

THE ANATOMY OF THE NASAL CHAMBERS.

BY HARRISON ALLEN, M.D.

THE anatomy of the nasal chambers bears a close relation to their clinical states, and must always repay the physician who makes them the subject of study.

The descriptions which form this essay will be confined, in the main, to the structures which can be seen in the living subject.

I shall consider the shape of the anterior portion of the middle turbinated bone and associated parts, the shape of the posterior part of the same, the difference in diameter of the chambers, and the boundaries of the naso-pharynx directly back of the chambers.

The Shape of the Anterior Part of the Middle Turbinal.—The middle turbinal, when examined by anterior rhinoscopy, presents a stout anterior border which extends vertically, and an inferior border seen foreshortened, extending horizontally for a variable distance.

The vertical border varies both in position and shape. It may, as a rule, lie in the plane of the posterior border of the ascending process of the maxilla, or be advanced well into the external nose so as to be placed between the process last named and the septum. The border is, in the majority of instances, thin and compressed, and retains a diameter not over 2 or 3 mm., but it may be much wider, and attain in rare instances estimated diameters of 6 to 10 mm.* Examination of the ethmoid bone in the skeleton shows the increase of width to be due to the inflation of the bone by two or more interspaces occurring between the vertical walls. The anterior portion of the middle turbinated bone may be said to be separated from the posterior portion at a vertical plane which passes through the anterior ethmoidal foramen and the line of the suture between the malar and sphenoid bones. The part of the nasal chamber which lies between this plane and the ascending process of the maxilla is wider than elsewhere. It is bounded laterally by the uncinate process of the ethmoid bone and the lacrymal bone, inferiorly by the suture between the horizontal

* Greater diameters have been observed by Zuckerkandl ("Anat. der Nasenhöhle").

plates of the maxilla and the palatal bones, anteriorly by the plane of the posterior borders of the ascending process of the maxilla, and posteriorly by the plane of the anterior ethmoidal foramen. Hanging directly within this space is the anterior portion of the middle turbinated bone.

The following structures lying within the anterior part of the nasal chamber may become inflated—viz., the anterior portion of the middle turbinal, the anterior ethmoid cells,* and the points of junction of the middle and superior turbinal with the ethmoid bone proper. No inflated part occurs in the posterior portion. The anterior portion is never scrolled.

The inferior free border of the anterior portion of the middle turbinated bone may be abruptly bent and be free from surrounding parts or be pressed against them. The anterior portion is distinguished clinically from the posterior by the disposition shown for the bone to be covered with spicules or the whole region to be hyperostosed. The membrane is often abnormally thickened at this place alone. The bone, when denuded of its membrane, is found to be separated from the rest of the turbinal by a groove.

The septum being in no instance perfectly straight, but presenting wavy surfaces (even when not grossly deviating from a vertical plane), it is possible for the inflated anterior portion of the middle turbinated bone to be concealed at the sides while freely exposed in front.

Numbers of instances have been seen in which the anterior border was not inflected, but of wafer-like thickness, yet the bone was found to be greatly inflated a short distance back.

The importance of this knowledge in making clinical examinations is so evident as to call for no comment.

The anterior ethmoid cells often form a distinct structure. A rounded mass which resembles the larger end of a distended peapod may be seen occasionally projecting into the nasal chamber at the widened anterior part. It usually lies back of the uncinate process, which may be widened and placed nearly transverse to the chamber, and thus be held between it and the nasal septum (as in skull No. 1,432, Peruvian, in the Academy of Natural

* The term cyst used by Bayer (*Centralbl. f. Laryng.*, ii., 237) and Glassmacher (*Berl. k. Wochensch.*, 1884, No. 30) is probably the same as the inflated part as above denoted. Since they are not morbid, but may simply become the seat of disease, it was thought best to avoid a term of pathology.

Sciences of Philadelphia), or projects more directly forward than in the instances given, when it occupies the space between the uncinate process and the lachrymal bone, and can be seen only after this bone has been removed (see skull, Peruvian, McCracken series, in the Academy of Natural Sciences of Philadelphia). The entire anterior portion of the ethmoid mass may be distended, but without a distinctly projecting mass being formed (No. 1,032, Peruvian, in the Academy of Natural Sciences of Philadelphia, will serve as an illustration).

I have seen cases where intense pain of an inflammatory type was located directly over this anterior inflated part of the ethmoid bone, which was relieved by drilling into the parts from in front.

The inflated parts at the places of junction of the turbinals with the main portion of the ethmoid are never of large proportions, but may exert injurious pressure against the septum, especially in the instance of the superior turbinal.

A question may here be answered as to the connection between the forms of the middle turbinated bone and disease of the bone and its membranes. I have found, both in children and adults suffering from atrophic catarrh, a simple and compressed anterior portion.

The lower free border anteriorly may be also inflated. An S-shaped anterior portion has been observed in adults only. The inflated form is, however, absent in all ages. In chronic nasal catarrh I have met with all the above varieties.

The Shape of the Posterior Part of the Middle Turbinal.—The hinder part of the middle turbinal as seen by posterior rhinoscopy either entirely occupies the upper part of the choana or inclines obliquely downward and inward. In the latter instance, a space is formed through which a small portion of the interior of the chamber can be seen. The superior turbinal is less commonly seen in the choana than is shown in the figures of the clinical text-books. I have commonly found the right middle turbinal less inclined than the left, and it may be horizontal at the upper part, a condition very rarely seen on the left side. The left turbinal is often nearly vertical and held in a narrowed choana. A deflected septum will be apt to compress the middle turbinal on the side toward which the septum inclines. But, apart from this condition, the left middle turbinal may incline posteriorly to the vertical line.

In posterior rhinoscopy the parts are seen as they lie in various relations to the plane of the posterior naris, as this opening is defined in the skull. Observers commonly speak of the image as though it were framed in this plane. In truth, what is seen is a foreshortened view of the posterior portion of the nasal chamber seen through the naris. If care be not taken, a septal deviation which is within the chamber may be confounded with a thickening of the septum at the plane of the nares. In studying the skull, of course, this difficulty disappears. If a careful inspection satisfies the observer of the living subject that an irregular or triangular swelling exists on the septal side of the smaller of the two images of the nares, and that this swelling is associated with a middle turbinated bone which inclines to the vertical, a diagnosis of posterior deviation of the septum can be made, although the septum may be normal as seen from in front.

The Diameters of the Chambers.—That the two chambers may vary in size without deviation of the nasal septum was shown by me in a skull exhibited before the Association in 1883.* Since that time I have seen a number of crania which yield a similar appearance, and it would not be necessary to recall the observation if a statement had not been made by Sir Morell Mackenzie † to the effect that he had examined 3,102 skulls in the collections of London and not found a single example of such asymmetry. ‡ I was led by this statement to go over the ground as it was presented in the museums at Philadelphia.

In the Academy of Natural Sciences are collected 1,750 skulls of many nationalities; eighteen examples of left choanal asymmetry were met with. Of this number only two showed septal deviation, and three only presented angularity of the left contour-line of the septum. In all the above the left choana was distinctly smaller than the right, and the general disposition was the same throughout the left nasal chamber.

The following crania make up the total as given above: Eight Peruvian (Nos. 892, 1,273, 1,489, 1,518, 1,376, San Maleo, 1,026, 1,691), one aged six months; two Hindoo (Nos. 1,554, 4), one aged eight years; two Narragansett North American Indians (Nos. 952, 951); and one each of the ensuing tribes: Otaheitan (No. 1,681),

* "Trans. Am. Laryngolog. Assoc.," 1883, p. 84.

† "Diseases of the Throat and Nose," 1884, ii., 467.

‡ In the figure of the choanae in Quain's "Anatomy" (vol. i., Fig. 52, 9th edition) the left is the smaller.

Carib (No. 692). Araucanian (No. 652), Fiji (No. —), Columbia River Indians (No. 575), and one skull was unnamed (No. 1,489).

In nine examples it was observed that the right nasal chamber was the smaller. They were distributed as follows: Four Peruvians (Nos. 403, 1,366, 1,432, 67); and one of a Columbia River Indian (No. 574), and of the ensuing numbers (Nos. 1,489, 32, negro, 964, 959).

In the skull last named (No. 959) the nasal septum was deviated to the right.

The following include some measurements in centimetres and millimetres of the asymmetrical nares in Peruvian crania:

No. of specimen.	Height.	Middle width.	Top width.	Width of turbinals.
892..... { R ...	2.0	1.1		
{ L	2.0	1.0		
1,442..... { R....	2.3	1.3		
{ L ...	2.3	1.1		
1,489..... { R ...	2.5	1.2		
{ L....	2.4	1.0		
1,366..... { R....	2.5	1.5	0.7	
{ L....	2.4	1.5	0.8	
1,518..... { R....	2.1	1.5	0.7	
{ L ...	2.4	1.4	0.4	
1,691..... { R....	2.3	1.3		
{ L....	2.3	1.5		
67 { R....	2.3		1.1
{ L....	2.4		0.9
1,273..... { R....	2.8	1.5		
{ L....	2.7	1.2		
1,033..... { R....	2.6	1.4		
{ L....	2.4	1.6		
1,026 (Young)..... { R....	1.8	1.0		
{ L....	1.6	0.9		

In the collection of 156 crania in the College of Physicians of Philadelphia—most of the specimens being from European localities—the asymmetry was noted in twenty-four.

Of this number, eleven exhibited the left choana as the smaller. The specimens were distributed as follows: Gypsy (No. 31), Magyar (No. 13), Cossack (No. 101), Roumanian (No. 96), Dalmatian (No. 132) "Gaming Steverin" (No. 138), Krain (No. 86), Anglo-American (No. 5), Japanese (No. 50), Pole (No. 26), and one without locality.

The septum was straight in two examples only of the series—viz., in Nos. 86 and 138. It was nearly straight in No. 96.

The remaining thirteen skulls yielded a larger right choana, as

follows : Wende (No. 85), Carniola (No. 87), Kumanéa (No. 71), Schlesien (No. 68), Austrian (No. 63), Calabria (No. 48), Ceragora (No. 29), Gypsy (No. 18), Italian (No. 107), Servian (No. 90), Gorale (No. 83), Genua (No. 113), Anglo-American (No. 28) ; five showed straight or nearly straight septa.

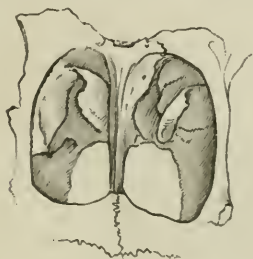


FIG. 1.



FIG. 2.

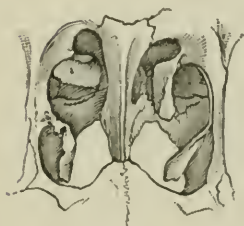


FIG. 3.

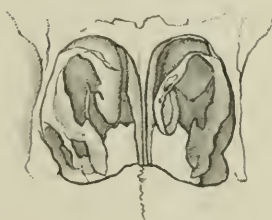


FIG. 4.



FIG. 5.

The above examples of asymmetry of the nasal chambers at the choanæ (the septum being straight or nearly so) are from the collection of the Academy of Natural Sciences of Philadelphia. The artist, in order to better illuminate the parts, inverted the specimens, thus sacrificing some of the details at the region of the inferior turbinals.

It is seen that the number of instances among recent European skulls (three only of the skulls in the College of Physicians were from ancient graves, and these were symmetrical) of contrasts in measurements of the choanæ is much greater than in the skulls of other races, and that within the group thus limited deflection of the septum is of more common occurrence.

It would appear that the best guide to nasal asymmetry as seen in crania is a comparison between the choanae. The septum may be straight, be inclined to the smaller choana, or to the opposite side. The asymmetry appears to be determined by causes which exist independently of the deviation of the septum—always assuming that the posterior free border of the septum does not deviate from the vertical.

The study of crania is not the best standard for clinical study. From my experience, the number of instances of asymmetry of

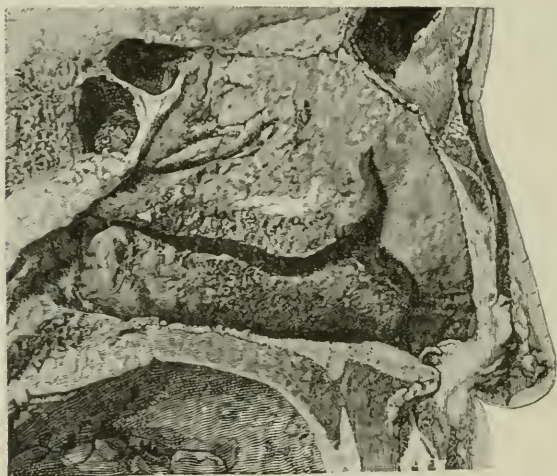


FIG. 6.—View of the left nasal chamber, from a specimen prepared by the alinjection method of Professor Wilder. The subject was believed to be free from disease of the nasal mucous surfaces. Since the saw used in making the section fractured the horizontal plate of the palatal bone, it is possible the measurements given in the text are approximately correct only. In any event it will be seen that the ends of the middle and inferior turbinal lie beyond the plane of the choana.

the choanae is vastly greater than can be gleaned from ethnological cabinets.* The entire number has not been recorded, but it can be stated in general terms that a difference exists in the diameters of the choanae, and that the left is the smaller, as a rule. Even when the contrast is slight, the left middle turbinal is commonly more vertically inclined than is the right.

The Boundaries of the Naso-pharynx directly back of the Choanae.—The space directly back of the choanae receives the turgescient ends of the turbinals when they can be no longer con-

* "Trans. Am. Laryngolog. Assn."

tained within the chambers. Above, the space is defined by the alæ of the vomer ; below, by the velum in advance of the salpingo-palatal folds ; and at the sides, by the internal pterygoid plates and the orifices of the Eustachian tubes. As opposed to the vestibule, which lies in advance of the true nasal chamber, the above space may logically constitute the *posterula*, if it be found convenient to employ a distinctive term.

In a specimen of the human head which has been carefully injected by Professor Burt G. Wilder, of Cornell University, it is shown that, in a normal condition of the membranes, the mucosa and submucosa became infiltrated and distended in such wise as to cause projections of the lower and middle turbinals into the naso-pharynx.* The measurements in this specimen are as follows : Inferior turbinal, beyond the end of horizontal plane of palatal bone, 5 mm. ; middle turbinal, beyond the end of horizontal plane of palatal bone, 7 mm. ; from the end of vomerine alæ to the plane of the choanae, 15 mm.

During life the presence of the posterior ends of the turbinals in the naso-pharynx is not unphysiological. I have frequently observed that perfect comfort is compatible with the existence of such masses. If, however, nasal breathing is arrested, if the turbinals are pressed against each other in the same chamber, if the Eustachian tubes are pressed upon, if the salpingo-palatal folds are impinged—and it must be said that one or more of the above conditions are apt to be present—the reduction of the swellings is demanded.

Discussion.

Dr. DELAVAN expressed great interest in the work done by Dr. Allen, and hoped that it and similar investigations would have at least the effect of inciting those who operate upon the nasal region to the acquirement of a knowledge of the anatomy, normal and pathological, of the parts more accurate than was often possessed.

He instanced the danger of some of the work at present done in the surgical treatment of nasal deformities and insisted that surgical operations performed upon this important organ should be done by those well versed in the general principles of surgery, that they should be done in strict accordance with these principles, and that the after-care of the patient should be carried out upon the rules governing the care of any other surgical case.

* I desire to return acknowledgments to Professor Wilder for an opportunity of exhibiting this interesting specimen.

The paper just read added much to our knowledge of the anatomical relations of the parts. As regarded frequency of occurrence of abnormalities of the skull, the speaker mentioned the fact that he had examined a number of specimens of ancient crania, in the Peabody Museum at Harvard, and had found that in twenty-four skulls, taken from Roman mounds, there were eight in which deformity of the nasal chambers was present to an exaggerated degree.

Dr. FRANK BAKER, of Washington, remarked that it was possible that the facts noted by Dr. Allen as to the occurrence of irregularities and deviations within the region anterior to a vertical plane passing through the anterior ethmoidal foramina might have a morphological significance. That region is formed by the orbito-nasal process of the embryonic cranium and is at first a cartilaginous capsule of considerable relative size, the different sinuses—maxillary, frontal, ethmoidal—being formed by vesiculation and absorption. It is a region of peculiar physiological action in this respect. It would seem probable that on further examination it would not be limited by a plane as arbitrarily drawn as the one indicated by Dr. Allen.

Paper.

SOME RESULTS IN THE TREATMENT OF ATROPHIC RHINITIS WITH THE GALVANIC CURRENT.

By J. H. HARTMAN, M.D.

AT the last Congress of this Association the attention of the Fellows was called to some recent investigations, by Dr. Delavan, of the treatment of rhinitis of the atrophic variety by the application of the galvanic current.

At the same time reference was made to some conclusive results which Dr. Shurly had arrived at several years ago.

Since then it has been my pleasure and profit to investigate and carry out the suggestions of Drs. Delavan and Shurly, and I beg to bring before you the results for your consideration.

In an article in the "Medical Record," September 16, 1882, Dr. Bosworth speaks of the application of the faradic current in the treatment of turgescence of the nasal mucous membrane, which he regarded as due to lack of tone in the muscular coat of the venous sinuses. His experience was a favorable one, being confined, though, entirely to the use of the faradic current, but he suggested that the galvanic current might be equally valuable and probably less painful.

Dr. J. D. Lente, in an article on the "Treatment of Nasal Diseases by Electricity," in the "Medical Gazette," vol. ix., p. 471, 1882, also refers to this method of treating nasal turgescence and engorgement, and considers its action prompt and decided. He further says that it may and has been used by him for other abnormal conditions. Dr. Lente, however, used the galvanic current. He advises not to have the current too strong, using from two to three cells.

His method of application is very similar to that advised by Dr. Delavan, but he does not say whether he uses the positive or negative pole of the battery in the nostrils. He claims no originality in this method of treatment, stating that he was not aware that there was anything novel about it, having used it for some years, and he refers also to Dr. Bosworth's article in his remarks.

So far, these are the only references that I have been able to trace upon the application of either the mild faradic or galvanic current in the treatment of nasal diseases.

The action of the galvanic current upon mucous membranes has not up to the present time been satisfactorily explained. In my own view, I have no doubt that a stimulating action is set up, causing a molecular change and altering the secreting functions of the tissues. This, of course, only applies to mild currents; for, should a strong current be used, we then get destruction of tissue and death to cell-forming structures.

During the past fifteen months twenty-one cases of atrophic rhinitis have been treated by me with the mild galvanic current. Fourteen of them have been discharged cured; five are still under treatment, being greatly benefited, and two gave up the treatment after a short time. No definite period can be given to obtain positive relief. Each case seems to vary. Some improve from the beginning and seem to make rapid progress. Others improve less rapidly, but nevertheless improve, and eventually are relieved.

The form of battery used is of no special importance—my own preference being for the chloride of silver batteries, which are readily managed, cleanly, not likely to get out of order, and give a mild, regular current.

The method of application followed has been similar to that advised by Dr. Delavan, the positive pole being applied to the nape of the neck by a sponge electrode and the negative to the nasal mucous membrane by means of pledgets of absorbent cotton,

wrapped on insulated copper wire and well moistened before being applied. The strength of the current should be exceedingly mild at first, but can be gradually increased after several applications.

The duration of the applications should vary in different patients. I have found that some cases will admit of a lengthy sitting—from ten to fifteen minutes—while others complain after four or five minutes. The nasal membrane should be thoroughly cleansed before each application.

A flow of a watery secretion invariably follows after the use of the current, but ceases in a short time. In a number of cases I have noticed paroxysms of sneezing to occur during or following the treatment. Should they persist, it is evidence of either the strength of the current being too great or the sitting too long. As regards the frequency of the applications, it is impossible to lay down any rule. Daily sittings are seldom necessary. Generally three to four applications a week will suffice in most cases. As Ranney so well says: "Our present ignorance of the molecular and nutritive changes in tissues (as the cause or result of disease) renders it impossible to do more than speculate upon the theory of the therapeutical action of electricity in many cases; but, on the other hand, our empirical knowledge of these effects is none the less valuable although we may be unable to explain them." The same criticisms would otherwise hold good in reference to many of the drugs employed in medicine; none of us know exactly *how* they produce their specific effects. So it may be regarded in the action of the mild galvanic current upon the mucous membrane of the nasal passages. As the view I expressed regarding its action as a stimulant is only a theory, nevertheless certain results are obtained, and such as warrant me in esteeming this method of treatment superior to any which has heretofore been suggested, and one which, if faithfully and patiently carried out, will, I am sure, gratify the operator in the end.

Paper.

NOTES ON A CASE OF NASAL CARIES, COMPLICATED WITH MENINGITIS, SUCCESSFULLY TREATED BY MEANS OF THE SURGICAL DRILL.

By WILLIAM CHAPMAN JARVIS, M.D.

OF the several reasons which have prompted the preparation of this paper I shall only notice the most important, namely, the extreme rarity of the meningeal complication, announced in my title, as a result of syphilitic disease of the nose, the absolute uniqueness of my own case in regard to its course and termination as proved by medical literature, and, finally, the opportunity afforded to construct a precise and systematic plan for the successful treatment of similar cases and their numerous modifications.

In regard to my statement concerning the rarity of the meningeal complication, it may be well to explain that a diligent search into the literature of the subject resulted in the discovery of but a single case, namely, the one reported by Trousseau, also referred to by Sir Morell Mackenzie in his work on the "Nose and Throat." This instance, cited by Trousseau, was that of an English officer "who had a sudden, terrible, suffocative attack, caused by the presence in the posterior nares of a foreign body, which had subsequently fallen into the throat. In the midst of his suffocative convulsion he seized with his fingers, and finally drew forth, a large, irregularly shaped and rough-edged piece of the ethmoid bone. On the same day cerebral symptoms supervened, under which he died within twenty-four hours" (A. Trousseau, "Lectures on Clinical Medicine," vol. iii., p. 66).

The following is the history of my own case, extracted from my note-book, a number of unimportant details being omitted in the text.

Mr. M., an intelligent, well-born gentleman, aged thirty-one, after consulting a number of physicians for relief from a severe nasal disease, and obtaining no satisfaction, finally sought the advice of Dr. Hubbard, of New York; who promptly referred him to me for treatment. The nasal disease for which the patient consulted us had, through neglect and maltreatment, so completely

undermined his health and shattered his nerves that it was found necessary to resort to the liberal use of morphine to enable him to traverse the distance (about thirty miles) intervening between his home and the city. The symptom most complained of was a severe headache, which had harassed him almost continuously for about five months, and, despite the assiduous use of opiates, he had been able to procure but little rest. The pain in the head was for the most part referred to the temporal region, and associated with it there was marked tenderness of the scalp, evinced when slight pressure was exercised. A minor, though at times exceedingly annoying symptom, tinnitus aurium, was also present. Much discomfort was caused by the constant accumulation in the nares, and gravitation into the throat, of masses of green crusts, the removal of which provoked an offensive stench, causing much distress to the patient and those in his immediate neighborhood. In addition to the discharges of putrefactive matter from the anterior and posterior nares, the patient noticed that upon forcibly blowing the nostril some fetid fluid issued through a small perforation in the palate near the sockets of the central incisors. The loss of flesh occasioned by the nasal putrefactive changes, and the destructive process permitted to go untreated for so many months, had reduced the unfortunate man to a state of extreme emaciation. Much valuable time, it was learned, had been lost by the sufferer's worse than useless effort to procure relief from the so-called "compound oxygen treatment." Inquiries, naturally directed to the discovery of syphilis as affording a possible clew to the peculiar morbid manifestations, elicited the fact that the patient had been treated for a venereal affection several years since; he, however, claimed that the physician had pronounced the trouble of a mild type, presumably a chancroid. The statement that catarrh had existed as far back as the memory of the patient could reach merits mention, inasmuch as it throws some light upon the etiology of the nasal lesion.

External Inspection.—Inspection of the external nose afforded no evidence of the character or extent of the morbid process within the nostril. Beyond the existence of a marked deflection of the cartilaginous septum, always demonstrable when present by the practice of palpation, there were no external signs of intranasal disease.

Internal Inspection.—An anterior rhinoscopic examination revealed the triangular cartilage of the septum impacted against the

left lateral nasal wall. Its contour, furthermore, had been almost obliterated by reason of two large vertical apertures, the intermediate remnant of cartilage corresponding to the middle of the most prominent point of the deflected structure. The edges of these pathological openings were encrusted with a sanguineous muco-purulent matter which, when removed, showed the margin of the lower or larger orifice to be in a state of advanced ulceration. The turbinated tissues proper had evidently long since vanished. The location of the left inferior erectile structure was marked by the presence of a spongy mass of carious bone corresponding to the inferior crescentia. The base of this blackened mass of the necrotic bone was dotted with islands of granulation-tissue, which afforded excellent evidence of a natural tendency toward recovery or repair. The same morbid peculiarities, slightly modified by the difference in location, were visible within what once formed the space of the right anterior nares, converted now, however, by reason of the destruction of the party wall between it and the neighboring nasal fossa, into a single capacious cavern. As far as vision and the probe could reach, evidences of destruction and local death were discoverable. The occasional presence of reddish discolorations indicated the recent involvement of blood-vessels. With particular vehemence did the disease appear to exert itself upon the floor of the nose. Such an idea was encouraged, perhaps, by reason of this point being particularly favorable for the practice of intranasal inspection.

Completely denuded of its mucous membrane, the carious bone was distinctly visible in the form of an excavation, most marked along the median line of the nasal floor. At a point about two or three millimetres distant from and directly behind the columna, this depression appeared deepest, and probing demonstrated it to be the point of communication between the mouth and the nasal chambers through the perforation I have already alluded to, found in the hard palate near the upper alveolus.

Etiology and Diagnosis.—In view of the evidence, historical and symptomatic, re-enforced by the pathological findings I have just enumerated, not to mention minor points of a similar character, I decided that the destructive process within the nasal chambers was the result of a long-standing ulcerative and necrotic process due to syphilis, and that the head symptoms were the manifestations of an attack of meningitis, set up by the extension of the nasal disease into the brain through the cribriform plate of the

ethmoid, or at some equally vulnerable point in the roof of the nose. It is highly probable that this tertiary process selected as a starting-point the cartilaginous septum as a point of minor resistance, it being, as actually indicated by the deviation of this structure,* the centre of an already existing catarrhal disease. The appearance, consistency, and inclination of the septum, likewise the formation of the structures in its immediate neighborhood, convinced me that the abnormal position of what then remained of this support could not be entirely attributed to depression from weakening of the nasal partition, for, as I have already indicated, despite the wide-spread ravages occasioned by the ulcerative process, no depression of the external nose was visible, the nasal bone, fortunately, having escaped destruction.

Treatment.—The most important therapeutic indications which, in my judgment, appeared immediately necessary, were anti-syphilitic medication, anodynes for the painful head-symptoms, and appropriate local treatment of the nasal cavities; these measures were rendered all the more urgent by reason of the lamentable state of neglect into which the patient had fallen in regard to the care of the nostril. Aside from the usual spasmodic efforts practised to expel the masses of inspissated matter which rapidly and persistently formed in the nostrils, strange to relate, no systematic effort had been employed to remove the intranasal accumulations, or to mitigate the intolerable stench. I at once had recourse to the postnasal syringe, and by the liberal use of antiseptic washes, combined with the assiduous employment of the cotton probe, I succeeded in placing and keeping the nasal chambers in a state of comparative cleanliness. Large, offensive crusts, composed of particles of necrotic bone and tissue, mingled with decomposing purulent matter, were effectually removed from the nostril, their reformation being prevented by persistent treatment.

The ulcerated, carious, and necrosed surfaces laid bare by the employment of these measures were carefully covered with a film of finely pulverized iodoform, the even distribution of this impalpable powder being insured by the use of an insufflator, constructed in accordance with the principle of Dr. Ely. By employing iodoform in this way the mechanical irritation consequent

* "The Etiology and Treatment of Nasal Catarrh, with Special Reference to the Deviated Septum," by W. C. Jarvis, M.D., "Medical Record," March 14, 1885.

upon the application of the powder in bulk was avoided, and I believe, from clinical observation, that a beneficial healing and quieting influence was exercised by the drug, and am convinced, from experimental experience, that the iodoform acted as a valuable antiseptic.

Despite the local benefit derived from this plan of treatment, combined with the adoption of careful constitutional and anodyne measures, the cerebral symptoms increased alarmingly in their severity. Convinced now that the meningitis had assumed an acute and exceedingly serious type, I mentioned my fears to members of the family, and favored the plan of holding a consultation with Dr. Alfred L. Loomis. Dr. Loomis expressed even graver views concerning the severity of the meningeal disease, believing it to be probable that the patient would not survive more than twelve days. This highly unfavorable prognosis, given by such an eminent authority, obviously lends an additional interesting feature to the case, successfully treated under such adverse circumstances.

In accordance with Dr. Loomis's suggestion, the dose of the potassium iodide was increased from twenty to sixty grains three times a day. Thanks, I believe, to the patient's ability to tolerate this free dosage of the iodide, combined with the most careful nursing, the serious menace to his life was, to our supreme satisfaction, happily averted.

After a gradual convalescence, extending over several weeks, the patient rallied completely from the attack, and was able once more to leave his home and return to my office for local treatment.

Inasmuch as the nasal cavities had been kept in a state of comparative cleanliness, it was now possible to satisfactorily detect and reach the dead and carious bone. An examination of the teeth, near the perforation in the palate, revealed the fact that the sockets had been involved to such an extent as to render them loose and almost useless. Recourse was therefore had to a dentist, and I availed myself of the services of Dr. Rhein, who skillfully extracted two teeth with portions of the alveolus involved, making in all three removed. I then commenced an active surgical course of treatment, having for its object the total eradication of all the necrosed bone. A surgical engine of special design was employed by me for this purpose, which enabled me to effectively employ bone drills of various forms and sizes.

Contrary to the teachings of the advocates of the *tactus eruli-*

tus, my rule was to direct the burrs exclusively by the sense of sight, and I adopted as a precaution the maxim: *Never lose sight of the drill*. Furthermore, my rule was to freely remove the carious and necrotic masses, and not to desist until a bleeding surface was clearly exposed to view. By the careful practice of this method of operating I soon succeeded in eradicating every vestige of the dead tissues, and, favored partly, no doubt, by the improvement in the patient's general health, the thorough system of nasal irrigation, and prompt response to internal and general alterative medication and the effective applications of iodoform, the wounded surfaces healed without accident.

The awkward gap occasioned by the removal of the teeth, and the necessarily free excursions of the drill along the floor of the nose and roof of the mouth, became contracted, in the healing process, until it assumed the size of an insignificant orifice, connecting the mouth with the nasal cavities. The ragged alveolar border, the former sockets of the disrupted teeth, became smooth and regular. It was deemed advisable not to permanently close this orifice, for the reason that it formed the base of a funnel-shaped depression in the floor of the nose, occasioned by the extensive implication of the bone in this region, which favored the gravitation and retention of the intranasal secretions. This artificial canal could be efficiently opened and closed at will by means of a closely fitting obturator, which formed part of the plate supporting the artificial teeth, so that the patient could eat without the slightest inconvenience, and when syringing the nostril was enabled, at will, to effectually flush the nasal gutters by allowing a portion of the fluid to flow into the mouth. This, in brief, formed the treatment adopted by me to meet the several requirements. The subsequent behavior of this singular case, and the character and permanency of the results obtained, can be better explained by quoting a short extract from a letter addressed to me by the patient, July 30, 1888, more than two years after he had received final treatment. He writes: "My general health was better after the healing of the diseased bone than for many years. I have not had a headache since June, 1886. Increased in weight from one hundred and ten to about one hundred and fifty pounds."

A few weeks since, July, 1888, the grateful patient called to place a friend under my care, and I found it difficult to recognize in the ruddy face of this active, vigorous, genial gentleman, the

once loathsome, ostracised, and almost resurrected human wreck of two years before.

Conclusions and Remarks.—In concluding, I shall briefly carry out the text announced in my introductory sentence, by directing attention to certain deductions drawn from the history and behavior of this remarkable case. In the first place, I believe it may be viewed as an example of the deplorable consequences likely to result from neglect or maltreatment, as found by the preliminary examination and the patient's history. While it is possible that nasal caries or syphilitic disease of the nose, as a rule, does not exhibit the same degree of destruction as in the case just cited, it is nevertheless often true that the severity and extent of the nasal disease are often proportionate to its chronicity or neglect. Aside from the meningeal complication, a feature, possibly, less rare (judging from the history of certain headaches), at least in its milder form, than we really suspect, there is always present a sequestrum of dead bone, and the prominent symptom ozaena, with its baneful effects, which must claim a large share of the surgeon's attention. The excellent results attained by active surgical interference in this case should, it seems to me, serve as a warning against the prevalent practice of temporizing with this class of patients, which usually assumes the shape of an effort—and, as far as it goes, a truly laudable one—to place the patient and his nostril in the best hygienic condition, a result usually accomplished by means of the free use of antiseptic nasal washes and appropriate general medication. While this course—under the plea of favoring or awaiting the safe and easy, though extremely slow, exfoliation of the central local cause of the disease, the sequestrum—may be in order, it obviously fulfils only part of the requirement. In its literal acceptation, this doctrine is little less than a delusion. Cases constantly occur where many years are required to develop this Utopian result; indeed, the carious condition of the nasal skeleton sometimes exhibits a decided disposition to persist during the remainder of the individual's life. These and other reasons should urge us to actively interfere in such cases; no time being lost in inaugurating an efficient system of antiseptic cleansing, having for its object the thorough renovation of the nasal gutters and the mitigation of the offensive effluvia. This sanitary requirement once satisfactorily accomplished, the efforts of the operator will be greatly expedited by the freedom of the field of operation from crusts and the general purification of the nasal

atmosphere. As is well known, the advance of the local necrotic process is usually painless, and the behavior of the case just reviewed demonstrated that cocaine and care render the cutting procedure almost, if not entirely, painless.

In regard to the mechanical therapeutics, I now would favor the employment of the electric motor in place of the surgical engine just described. The former device enables one to dispense with the services of a skilled assistant, a consideration with the infrequent operator, and, a matter of greater importance, it offers, in many respects, a more convenient and reliable means for propelling nasal drills.

It would be foreign to my subject to enter into a description of the electric-motor operative system perfected by me for the correction and cure of the various forms of deflected septa in a finished and satisfactory manner.*

I shall, however, briefly remind you that this motor, introduced by me, known as the C and C, already enjoys an excellent reputation in regard to its utility for the purpose I have named, and that, too, in the hands of specialists who had previously employed entirely different instruments of this kind. My electromotive force is now exclusively derived from the Gibson storage-cell, which a somewhat extended experience has induced me to view as the most powerful, reliable, and, in the long run, the cheapest device obtainable for combined cautery, illuminating, and motor purposes.

The antiseptic tubular nasal drills devised by me to cut away osseous septal spurs and distortions of the vomer will be found serviceable for the enucleation of the necrotic or carious centres in tertiary disease, and particularly the antiseptic siphon-drill, which, by washing away the detritus resulting from the cutting, insures a perfectly clear field before the advancing drill.

Finally, thanking you for your kind attention, I shall close, expressing the hope that you will give this radical method a careful trial, in which event I am confident that you will become convinced of its unquestionable applicability for all forms of syphilitic disease of the osseous structures of the nose.

* "A Novel System of Operating for the Correction of the Deflected Septum," "Medical Record," April 9, 1887.

Paper.

A PHOTOGRAPHIC STUDY OF THE LARYNGEAL IMAGE DURING
THE FORMATION OF THE REGISTERS IN THE SINGING VOICE.

By THOMAS R. FRENCH, M.D.

TWO years ago I had the honor of presenting a paper to this Association, in which I made an effort to explain, to some extent, the reasons for the diversity of opinion existing among writers on voice production, regarding the appearance of the larynx during the formation of tones in the singing voice. The photographic demonstration made at that time served to show, at least, that nature has many ways of accomplishing the same result, and that different larynges do not always act exactly alike while producing the same tones, even in the same class of voice. To-day I propose to present more facts, gleaned from the study of a very large number of photographs taken since then.

There are many movements which take place in the larynx which may be seen by the eye but which cannot be shown in photographs, and again there are many changes which the eye cannot see or the mind grasp which are caught and held upon the sensitive plate. The value of photography in the study of the physiology of the larynx lies in the fact that with its aid the exact conditions occurring at any given time are caught and held, and we are thus able to compare two or more conditions at the same time and at leisure.

The size of an object photographed upon a sensitive plate depends upon its distance from the lens. The shorter the distance between the object and lens the larger will the image appear in the negative, and the longer the distance the smaller the image. In laryngeal photography the size of the image of the larynx depends mainly upon the position of the lens—in other words, upon the focus used; but it does not depend entirely upon this, for the larynx occupies different positions in the neck while singing notes in different parts of the scale. The difference, however, is so slight that a change of focus is rarely needed in order to obtain perfectly sharp photographs in any part of the gamut.

If the larynx rose as the voice ascended the scale, and occupied the highest position in the neck while the highest note was

being emitted and the lowest while the lowest note was being sung, then with the same focus the image would appear largest in the highest note and smallest in the lowest note. This, however, does not appear to be the case. As will be shown in this demonstration, physiological variations in the size of the cavity of the larynx occur at different points in the scale. If the epiglottis or any of the other structures of the larynx should appear larger in one photograph than in any of the others of the same subject, it would, of course, be apparent that the image as a whole was increased in size. In this investigation, when two or more photographs were taken of one larynx, the same focus was always employed. The relative sizes of the photographs will be seen upon the screen, for, though enlarged positives were made from them, the degree of enlargement was always exactly the same.

It would, no doubt, be more instructive and comprehensive if I should compare the results of this investigation with the most generally accepted theories of the action of the larynx as seen in the mirror, but this would be impossible in the short time at my disposal to-day.

The study of the singing voice has such a broad range that it will be impossible for me to deal with more than one of its divisions at this time. The limited time in which I must speak will suffice only for the consideration and demonstration of the appearance of the larynx in the formation of the *registers* of the voice.

First of all, let us understand what is meant by the term register. Garcia defines it as a "series of consecutive homogeneous sounds, going from low to high, produced by the action of a certain mechanism." Behnke says that "a register consists of a series of tones which are produced by the same mechanism," and Sir Morell Mackenzie's definition is "the series of tones of like quality producible by a particular adjustment of the vocal cords." These definitions imply that different mechanisms are necessary for the production of the voice in different portions of the scale, and that each series of tones produced by the same mechanism represents what is known as a register.

Writers are generally agreed as to what is meant by a register, but there is a great lack of uniformity in their belief as to their number as well as to the appearance of the larynx in their formation. Some believe that there are but two registers. Others are of the opinion that there are three, and others again insist that there are five. My own opinion is that the female voice has three

registers and the male voice two. Having stated my belief, I will now proceed to demonstrate by means of photographs, to be shown upon the screen, the changes which occur in the larynx at the breaks from one register to another, and the points at which these breaks occur. I will consider first the action of the female larynx. [Several hundred photographs were taken during this investigation, twenty-five of which, showing the larynges of thirteen subjects, were thrown upon the screen during the reading of the paper. They showed the changes which occurred in the mechanism of the larynx at the points of transition from one register to another.]

While most of the photographs which will be exhibited to-day were being taken, the tongue of the subject was held out, for when it remained in the mouth the anterior insertions of the vocal bands could rarely be exposed. I am unable to detect any difference in the relative positions of the various structures of the larynx whether the tongue is protruded or remains in the mouth.

The two photographs now seen upon the screen were taken of the larynx of a contralto while singing F sharp, treble clef, top line. The first of the pair was taken while the tongue was in the mouth, and the second while it was protruded. The only differences to be seen are those caused by the shadows, the slight difference in the position of the epiglottis—it being a trifle more elevated in the second than the first—and that caused by the difference in the force of the air-blast. The blast was greater when the tongue was in the mouth, and therefore the space between the vocal bands is a little wider in the first of the pair. It is easier to sing a loud tone when the tongue is in than when it is held out, and when it is held out the epiglottis is raised higher than when the tongue is not protruded.

A number of the subjects used in this investigation were not aware of any sudden change in quality in any part of their singing voices, nor could I detect it while listening to their voices as they sang up the scale, or see sudden changes in the mechanism while looking sharply for them in the mirror; but, nevertheless, such changes were invariably disclosed in the photographs taken of four or five notes below and above the points at which they are supposed to occur. Others, again, were not conscious of a change in sensation, though a change in the quality of the voice could be heard and a slight change in the appearance of the glottis seen in the mirror, but the character of the change could not always be

positively ascertained until it was disclosed in the photographs. When the notes at which the changes occurred were determined by the photographs and the changes themselves were displayed, they could easily be distinguished by the eye with the aid of the laryngoscope, but the contrast between the mechanism of the vocal bands before and after the break was never as clearly shown in the laryngoscope as in the photographs.

In the series of photographs which I took a number of years ago I failed to find evidences of sudden changes in the mechanism of the vocal bands, and in the paper already referred to, which I read before this Association two years ago, I made use of these words: "That certain changes do occur in many larynges while singing up the scale can be easily demonstrated; . . . but these changes are, I believe, almost always gradual, not sudden." In another part of the paper, when referring to a portfolio of photographs, I said: "The portfolio contains a soprano, contralto, tenor, and bass series, all of which bear me out in the statement that sudden changes in the positions of the vocal bands, as the trained voice mounts the scale, are rarely apparent." An examination of the series of photographs of female larynges contained in the portfolio referred to reveals the existence of sudden changes in every instance. I am therefore forced to the conclusion that, as I was ignorant of the nature of these changes, I did not recognize them when I saw them.

A slight change in the shape of the glottic chink may easily escape notice unless one is familiar with the exact conditions to be looked for and the neighborhood in which they may be found. Judging from the slight difference in the appearance of some of the larynges which have just been shown, it is scarcely to be wondered at that changes in the mechanism of the vocal bands are frequently overlooked in the mirror. One of the main motives for the preparation of the paper was to supply positive information concerning these changes by demonstrating their occurrence.

A very careful search for changes in the mechanism of the vocal bands in the larynges of fifty or more female singers has failed to reveal more than two—namely, at or near F sharp, treble clef, first space, and at or near F sharp, treble clef, fourth line. That these changes occur and are apparent to the eye is conclusively proved by the photographs.

It is believed by many writers that when the voice breaks from

one register to another the epiglottis is suddenly raised. I am of the opinion that, instead of its being suddenly raised, it is suddenly depressed. My reason for this belief is that, in almost every instance, I have found it lower in the photographs showing the change than in those representing the note immediately preceding it. In a number of instances I found it impossible to expose the entire length of the vocal bands at the note on which the change occurred, though the anterior insertions could be easily seen during the production of the note before the break. In such cases the photographs showed that when the epiglottis was well raised the change had not occurred, but the mechanism of the lower register was continued upward. When, however, the change in the mechanism was displayed, the epiglottis was depressed enough to cut off a view of the anterior commissure.

During the production of the lower notes of any voice the vibrations of the vocal bands can usually be seen, but in the middle and upper notes they cannot be detected. As to what portions of the vocal bands vibrate in the middle and upper notes neither the photographs nor inspection with the laryngoscope give any positive information. From what has already been demonstrated to-day, and from the demonstration of two years ago, we must conclude that there are no positively characteristic appearances of the glottis in the different registers or different portions of the scale. In the lowest notes of the male voice the chink may be elliptical or open widest behind. In the middle and upper notes the chink may be linear or open widest behind. In the falsetto register the chink may be open in its whole length, or stop-closure may occur in front, or behind, or both. In the lower register of the female voice there is something like uniformity, for the chink is almost invariably open widest behind. In the middle register it may be linear or elliptical, or the edges of the vocal bands may be curved inward. In the upper register, as we have seen to-day, the chink may be open in its entire length, or stop-closure may occur, but of that more will be said while dealing with another portion of the subject which it was my original intention to consider to-day—namely, the appearances of the larynx in the production of variations in the pitch of the voice. Time will not permit it to be properly presented this afternoon.

The conclusions which may be drawn from this study are :

1. That protrusion of the tongue does not alter the laryngoscopic appearances.

2. That in the female voice there are three registers. This renders two changes necessary in the mechanism of the vocal bands. These changes are always accompanied by changes in the quality of the voice. The lower break occurs at or near F sharp, treble clef, first space; and the upper break at or near F sharp, treble clef, top line. The change of mechanism consists of a shortening of the vocal bands, an appearance of an increase in their tension, and a change in the shape of the chink of the glottis. The change in the mechanism is usually accompanied by a backward movement of the epiglottis.

The change in the shape of the chink at the lower break consists usually of a wider opening of the ligamentous portion of the glottis and partial or complete closure of the cartilaginous portion of the glottis. At the upper break the chink may simply be reduced in length and width, or a part of the ligamentous and all of the cartilaginous portion of the glottis may be closed.

3. That in male voices possessing the falsetto range there are two registers. The transition from the chest to the falsetto usually occurs somewhere between C sharp, bass clef, first line above staff, and the F sharp above.

The change in the mechanism consists usually of a sudden shortening of the vocal bands—though occasionally they are increased in length—an appearance of increased tension, and an alteration in the shape of the glottic chink. The edges of the vocal bands may be brought into apposition in front or behind, or both in front and behind, or the chink of the glottis may be open in its entire length, in which case the shape is altered, but the area of the space between the vocal bands is about the same as is necessary for the production of the note before the break.

The falsetto tones are therefore produced by stop-closure and change in the length and tension of the vocal bands, or by change in the length and tension without stop-closure.

Discussion.

Dr. INGALS called attention to the position of the supra-arytenoid cartilages. He observed in some of the photographs that they were as usually seen, while in others they were not. There seemed to be a change which had not yet been mentioned—a change in the position of the supra-glottic portion of the larynx for the formation of tones. This was particularly marked in one of the figures last shown, the upper portion of the larynx being distorted by a drawing inward of the superior

portion of the arytenoid cartilages, contracting the upper part of the larynx.

Dr. J. SOLIS-COHEN said that in the male subject with great command of the voice we often find the cartilages of Wrisberg very well developed and penetrating deeply into the soft tissues. It seemed that the Wrisberg cartilage kept the part tense. In some cases he had seen it become very prominent in the production of singing notes.

Dr. LANGMAID said that, with regard to this very remarkable exhibition which Dr. French had just given, it must be recollected that we were enjoying almost the only series of photographic representations of the human glottis during the production of the singing voice ever presented. It was a great privilege. The speaker highly appreciated these reproductions of the actual appearances in the larynx by photography, without any changes or torturing of the images in accordance with any foregone conclusions. This gave the exhibition especial interest, for very little was definitely known with regard to the action of the larynx in the production of tone. The proof that these were actual conditions of the glottis was made evident by the fact that they did not confirm some prevailing opinions with regard to the formation of the singing voice. From the speaker's own observations there were certain conditions which were constant, subject only to the variations in different kinds of voices, which Dr. French had also shown. He had demonstrated to us certain changes in the glottis between E and F sharp (chest to medium) and also between E and F sharp (medium to head) in the contralto voice, and in the baritone voice between C sharp and D (chest to falsetto).

Now he had given these changes at points which the speaker considered too high for low voices. He could not help thinking that there had been in Dr. French's cases some very extraordinary conditions, or that the patients possessed exceptional power of continuing the lower registers too high. That is to say that if the singer, either naturally or as the result of education, made the break at these points all the harmonic requirements would be satisfied. It was admitted, however, that by effort the register might be made to extend to higher notes, but the voice became less pleasant to the trained ear, and this could not be continued without vocal strain. Attention was merely called to this, and more light upon the subject desired.

The differences in laryngeal form were well shown by the photographs, and prove that all singers could not be trained alike. There were some points which the photographs shown did not make clear.

Now, with regard to the epiglottis. With a change in the register the lecturer had called attention to a change in the epiglottis. It would seem as if some muscular adjustment took place at these points, that the muscles really placed the larynx in a new position at this point. This was shown by examination with the laryngoscope and was felt by the singer himself. *Something* took place, whether it was the minimum

action of the muscles, or only that a portion of the laryngeal muscles were brought into use or not, remained to be proved.

The speaker inquired if, in the ordinary soprano, the stop-action did not generally take place in the head register?

Dr. WESTBROOK asked if the drawing forward of the tongue had appeared to affect the position of the epiglottis at the break of the voice.

Dr. FRENCH, in closing the discussion, said that the assertion was frequently made that the changes in the larynx, in passing from one register to another, were so slight that they could not be seen. He frequently failed to see changes with the eye, but had never yet failed to detect them with the camera. In reply to Dr. Ingals, he said that the supra-arytenoid cartilages were not usually sharply defined in the mucous membrane covering them. In the majority of instances marked contraction of the upper portion of the larynx was not apparent. When it occurred it was most noticeable in the production of the highest notes of a register. In reply to Dr. Langmaid's question if, in soprano voices, stop-closure did not generally occur in the head register, he said that he believed it usually occurred at one of the first five notes in the register. He had taken photographs of each note in the head range of singers, while they were undoubtedly singing head tones, without finding evidence of stop-closure.

In answer to another question by Dr. Langmaid, Dr. French said that if the larynx rose as the voice ascended the scale it would be brought nearer to the sensitive plate, and therefore, in accordance with a well-known law in photography, it would give a larger image. This was not shown in the photographs, though the mirror occupied the same position in the fauces during the formation of the different tones.

In reply to Dr. Westbrook, he said that the position of the tongue did not affect the epiglottis at the break in the voice. According to his observation, the epiglottis was depressed at the instant the change occurred, whether the tongue was protruded or whether it remained in the mouth.

Paper.

CONGENITAL BONY OCCLUSION OF THE POSTERIOR NARES.

By CHARLES H. KNIGHT, M.D.

UNTIL recently but little attention has been paid to bony abnormality or outgrowth, as a cause of nasal stenosis. Aside from what may be called acute stenosis, from traumatism or fractures involving the skeleton of the nose, bony occlusion is rare. This statement is especially true of the anterior nasal canal, the case described by Jarvis,* at last year's meeting of this

* "Trans. Amer. Laryngological Association," 1887, p. 222.

Association, who referred also to one observed by Delstanche, and one recently reported by Dr. F. H. Potter,* of Buffalo, being the only cases which have been noted.

The opinion of Mackenzie,† of Baltimore, that "occlusion of the posterior nares is the most common of congenital nasopharyngeal anomalies," is probably correct, but the proportion of cases in which the obstruction consists of bone is extremely small. The number of cases of congenital postnasal occlusion, from this cause, found by Dr. Alvin A. Hubbell, and cited in his paper read two years ago before the New York State Medical Association, was then limited to thirteen, including one of his own. Six of these were bilateral (Emmert,‡ 1851; Luschka,§ 1859; Bitot,|| 1876; Wilkerson,¶ 1882; Schrötter,** 1884; Hubbell,†† 1886). In the remaining cases the obstruction was confined to the right side in three (Wolff,‡‡ quoted by Fränkel, 1876; Zaufal,§§ 1876; Pomeroy,||| 1881); to the left in three (Brandeis,¶¶ 1881; Sommer,*** 1883; Zaufal,††† 1883); and in one case the side affected was not mentioned (Gosselin,†††† 1876).

Congenital bony occlusion of the posterior nares may occur as a result of: (1) Exostosis, or simple hypertrophy of the osseous structure of the turbinated body, middle or inferior; (2) a ridge, or exostosis, springing from the vomer; (3) an adventitious plate of bone developed from the floor, or the outer wall, of the nasal cavity. The bony impediment may vary in extent from a thin lamella or band, jutting into or bridging over the nasal passage, to a complete impervious wall. The former may occasion little or no manifest trouble, until, in after-life, it becomes the exciting cause of various local and reflex derangements. The latter is far

* "Buffalo Med. and Surg. Journal," September, 1888, p. 74.

† "Arch. of Laryngology," New York, July, 1883, p. 161.

‡ "Lehrbuch der Chirurgie," Stuttgart, 1853, B. ii., p. 535.

§ "Arch. für path. Anat.," xviii., 1859.

|| "Gaz. méd. de Paris," 1876, No. 36, p. 430.

¶ "North Carolina Medical Journal," June, 1882, p. 305.

** "Monatsschr. für Ohrenheilk.," April, 1885, p. 97.

†† "Buffalo Med. and Surg. Journal," December, 1886.

‡‡ "Ziemssen's Cyclopædia," vol. iv., p. 113.

§§ "Präger med. Wochenschr.," 1876, No. 45, p. 837.

||| "Diseases of the Ear," 1883, p. 201.

¶¶ "Medical Record," New York, November 12, 1881, p. 552.

*** "Wiener med. Presse," April, 1883, p. 476.

††† "Wiener med. Presse," April, 1885.

†††† "Gaz. méd. de Paris," 1876, No. 36, p. 430.

more serious ; and, when it exists on both sides, is almost of necessity fatal to the nursing infant.

The first variety (turbinated) is probably the most common, although true exostoses of the turbinated bone are rare, and may be congenital, or a result of disease. It is illustrated by several cases reported, more recently by a case operated on by Weir,* at the New York Hospital, who informs me that he has met with another similar case. Each of these was, in a measure, relieved by operation.

The dictum of certain authorities, that congenital deflections of the bony septum are unknown, may be true if restricted to its thicker posterior portion. While, therefore, it may not be proper to enumerate deflection of the septum among the causes of congenital postnasal occlusion, thickening or exostosis of the vomer may exist to a degree sufficient to produce the second variety (septal) of nasal stenosis, especially if associated with abnormality of the turbinated bodies. In his work on "Postnasal Catarrh," p. 180, Woakes mentions exostosis and deviation of the septum as causing postnasal obstruction, and refers to several cases, but does not speak of having met with congenital occlusion from these causes.

This condition, usually pathological, may be congenital. An instance of the former may be found in Case III., and of the latter in Case V., in Zuckerkandl's † classical work. In the former the septum presented a bony prominence, which had formed an adhesion with a similar outgrowth from the middle turbinated body, evidently due to a morbid process. In the latter case, a very complicated one, there were several synechiæ, partly membranous and partly osseous, due no doubt to faulty development, and not to a pathological process.

The third variety (palatal) of bony occlusion of the nares is of particular interest in connection with the case forming the basis of this paper. In the classification of the last-mentioned authority no reference is made to it, and I have been able to find only two cases (Luschka and Bitot) in which its existence was proved by post-mortem examination. Yet careful anterior and posterior rhinoscopy, as well as palpation, and the shape, situation, and character of the bony obstacle seem to establish the presence of this anomaly in several cases reported, as well as in my own case.

* "New York Medical Journal," March 12, 1887.

† "Normale und path. Anatomie der Nasenhöhle," etc., 1882, p. 95.

The precise origin of the bony wall is more or less a matter of speculation. It is quite probably a continuation of the free border of the horizontal plate of the palate-bone, as described by Luschka, or an extension of its vertical plate, as maintained by Kundrat. In an interesting paper on "chronic nasal catarrh" based on the study of a large number of skulls, Harrison Allen* refers to one cranium in which the palatal bones sent up a delicate process "nearly half way on either side of the vomer at the posterior nares." He speaks of it as "strengthening the septum," but does not say to what extent it obstructed the choanæ. Possibly this may have been a modified or incipient form of Luschka's plate. In examining more than two thousand skulls, Sir Morell Mackenzie met with four instances of bony synechiæ, which he describes, but it does not appear whether the deformity in any case was congenital or acquired, or that this special form of bony abnormality was present.

The etiology of this condition is obscure. Spencer Watson † says that "it is probable that the late development of the bones in this region occasionally favors the formation of tumors and outgrowths in the nasal and orbital cavities, and that some of the malformations of the face are due to arrest of development of these parts during foetal life." It is not difficult to understand the occurrence of asymmetry of the nasal chambers resulting from want of harmony in the development of the lateral half arches and the median structures, which enter into the formation of the face, as suggested by Allen. It is easy to conceive that this error of formation might proceed to even complete occlusion of the nares. But the deformity under consideration is not *necessarily* accompanied by obvious malformation or lack of development in other respects. It would seem to be rather an excess of development, an overgrowth of bone, resulting from hypernutrition.

A fourth case of bony occlusion, though not strictly within the scope of this paper, deserves passing notice, namely, osteoma, either intranasal or, much more commonly, projecting into the nasal passage from adjacent structures or cavities. This rare lesion has been described by Watson, Bornhaupt,‡ Tillmans,§ and others,

* "The American Journal of the Medical Sciences," 1880, p. 72.

† "Diseases of the Nose," 1875, p. 23.

‡ "Arch. für klin. Chirurg.," 1881, B. xxvi., p. 589.

§ "Arch. für klin. Chirurg.," 1885, B. xxxii., p. 677.

and recently a case of orbital osteoma, invading and blocking up the posterior nares, has been reported by Fenger.*

Several cases should be added to those already mentioned. Schütz† reports a case of a girl, sixteen years old, whose posterior nares were obstructed by diaphragms, probably bony, in consequence of which she had never been able to smell, or breathe freely through the nose. He expected to restore both the olfactory and the respiratory function by an operation. He mentions having found records of eight similar cases of double occlusion. Woltering‡ describes a case of right-sided bony occlusion, in a girl eighteen years old, which he treated with especially devised bone-cutting forceps, but with only partial success.

At the sixtieth meeting of German naturalists and physicians, Hopmann§ described two original cases of complete bony occlusion of the right posterior naris. The first occurred in a patient eleven years old. An anæsthetic having been given, a passage was cleared by means of a chisel. In so doing the septum was broken, and fracture of the hard palate, with laceration of its mucous membrane, was produced. In consequence, the patient had considerable constitutional disturbance. Rubber tubes, increasing in size, were worn for about two months, and then discontinued. In three weeks the stenosis recurred, and a system of dilatation with Schrötter's laryngeal dilators was begun. Later, ivory plugs were used for nearly three months, being removed twice daily for cleansing. Nine months afterward there had been no narrowing of the passage.

In the second case the author describes the obstruction as being caused by a bony lamina from the free border of the septum, and by an osteoma springing from the floor of the nose. The patient was nineteen years old, and, as in the preceding case, the right choana only was affected. A similar operation was resorted to, and, as before, the vomer and hard palate were fractured. In this instance the cure seems to have been less tardy. A case observed by Schaeffer|| is referred to, and notes of several cases of incomplete occlusion, partly membranous and partly osseous, are added.

* "Journ. Amer. Med. Association," August 11, 1888.

† "Deutsche med. Zeitung," March 3, 1887, No. 18.

‡ "Monatsschr. für Ohrenheilkunde," 1886, No. 20, p. 318.

§ "Archiv für klin. Chirurg.," B. xxxvii., 2, p. 235; also, "Rev. mens. de laryngologie," etc., January, 1888, p. 28.

|| "Chirurg. Erfahrungen in der Rhinologie." Wiesbaden, 1885.

In the discussion on Hopmann's paper, a case of total osseous occlusion *without symptoms* was referred to by Abertüschen. Keenir reported a case in which he operated with a chisel. He then inserted a gum catheter, and afterward a silver tube. Gottstein stated that he had operated in a similar case with a dental drill, which failed to give him satisfaction.

In reporting Bitot's case to the French Academy of Medicine, Depaul* referred to an analogous case in his own experience. No doubt farther search would discover additional examples of this interesting malformation.

Two cases of congenital bony occlusion of the posterior nares have come under my observation, in either case the right side only being affected. One was seen but a few times, and no operation was undertaken; the other submitted to operation, and gave the following history:

G. S., female, aged eighteen, single, consulted me in May, 1887, for enlarged tonsils, which were removed with the galvano-cautery. In the course of examination, she drew my attention to the fact that she could not breathe through her right nostril. This condition had existed as long as she could remember, but had given her no special discomfort. There was a moderate grade of chronic catarrhal rhino-pharyngitis. There was no impairment of smell, although it cannot be supposed that the right nostril shared in this function. There was no trouble in breathing through the left side of the nose, under ordinary circumstances. When the patient caught cold a discharge of watery fluid occurred from the right nostril, which at other times was entirely free from secretion. For two or three years impairment of hearing in the right ear had been observed, but it is by no means certain that hearing on that side has ever been perfect. Vision was good. The patient's mind was so occupied with her tonsils that her nose would have given her little or no uneasiness, but for the fact that she was aware of being different from other people. She was somewhat subject to headaches, which were usually explained by gastric disorder. She had no cough, and had never had any serious illness. Her general condition was not good. Her complexion was sallow, her cervical glands were enlarged, her flesh lacked firmness, and altogether she had the appearance of being poorly nourished. Her family history was good, except that a younger brother has hypertrophied tonsils.

The external contour of the nose was manifestly unsymmetrical, the right side being more prominent and "thicker," as the patient expressed it. Anterior rhinoscopy showed a very much contracted right nasal

* "Gaz. méd. de Paris," 1876, No. 36, p. 430. Mackenzie, Schrötter, and others refer to a case reported by "Betts." The name should be Bitot.

fossa, the septum being slightly deviated to the right, and presenting a ridge along the floor of the nose. The turbinated bodies seemed atrophied and their covering of mucous membrane appeared thin and dry. They were notably paler than those of the other side. A probe could be passed along the inferior meatus for two and a half inches. It traversed the middle meatus with great difficulty, on account of the deflected septum, to a similar depth, when it met with firm resistance. The left nasal cavity was unusually roomy, and the turbinated bodies, especially the lower, were large.

Posterior rhinoscopy was not easy, but after considerable training of the patient the right choana was seen to be completely occluded by a partition, which seemed to be on a plane with the free margin of the vomer. The septum did not appear to be deflected. There was a small amount of adenoid tissue in the vault of the pharynx. The palatal arch was of average height, and nothing abnormal was seen in the oral cavity. On palpation, however, the left palate bone could be distinctly felt to extend farther back by fully one-fourth of an inch than the right. By firm pressure it was possible to determine that the posterior margin of the latter was much thicker than that of its fellow. The impression given to the finger was as if the right palate bone had been bent at an obtuse angle. Pressure forward from the naso-pharynx proved the barrier to be unyielding. On pressing firmly with a large blunt probe, passed from the front along the inferior meatus, the patient complained of pain in the roof of the mouth, and during subsequent manipulations sensations were always referred to this region.

With the idea that it might be a membranous wall, an attempt was made to puncture with the galvano-cautery, but it soon became evident that I had to deal with osseous tissue. No difficulty was found in perforating the obstruction with the nasal trephine attached to the electric motor. The opening thus made, about one-quarter of an inch in diameter, was subsequently enlarged by means of a revolving burr. There was not much bleeding and pain was not excessive, cocaine, in a twenty per cent. solution, having been applied anteriorly and to the naso-pharynx.

The piece of bone removed in the crown of the trephine was found to be very dense. On one side only the mucous membrane was preserved, it having been burned away anteriorly. The segment of bone measured antero-posteriorly about one-quarter of an inch at its lower, and one-eighth of an inch at its upper margin.

The after-treatment was directed to keeping the parts clean by means of a spray of Dobell's solution, and to preventing closure of the wound by daily passage of nasal bougies.

It is now more than a year since the operation, and the patient is able to breathe through her right nostril, though not always with perfect freedom. Her hearing has not improved, but her sense of smell is somewhat more acute than formerly. The question arises, Whether any other advantage has been gained? Aside from the benefit to her general

health from tonic treatment, and to her pharynx following the removal of the tonsils, it must be admitted that nothing has been gained by boring a hole through her nostril. On the contrary, she is rather uncomfortable much of the time from the fact that secretions accumulate and dry in her right nostril, whereas formerly she was not annoyed in that way.

It must be confessed therefore that, except in the points mentioned, this patient was more comfortable with her nose as Nature made it than she has been since she fell a victim to science. Possibly, too, it may be said that the operation is not yet complete, since the right posterior naris is still much narrower than the left. The patient, however, is satisfied with being enabled to breathe through both nostrils, and cannot be persuaded to undergo any more drilling.

The great difficulty in these cases, namely, to keep open the newly made nasal tract, may arise from the fact that sufficient tissue has not been removed, as well as from neglect in the after-treatment. By far the best method of operating, as regards rapidity, accuracy, and thoroughness, is that with the electric trephine or drill.

Should another case of this kind offer itself to me for treatment my plan would be, unless quite sure of the fortitude of my patient, to give an anæsthetic, and thus be allowed time enough to restore the malformed naris more nearly to its normal dimensions. Various devices have been used to obviate failure of the operation, such as the retention of flexible and of metallic tubes, and the passage of nasal bougies and dilators. In spite of all, in several cases recorded the operation has had to be many times repeated, in consequence of recurrence of obstruction.

In studying this case, two points impressed me with peculiar force. The first was the remarkable tolerance on the part of the patient of a condition involving serious interference with three important functions. In this respect the case seems to be exceptional, since the literature of the subject shows that nearly all similar cases on record had symptoms of more or less consequence, being naturally most severe in case of bilateral atresia. The amount of disturbance which would be likely to ensue from a similar *acquired* condition is in striking contrast.

The second point, a practical one, relates to the testimony gained by examination of the parts with the finger. I would not detract from the importance of rhinoscopy, but certainly, in this case at least, information was obtained by the finger which could not have been given by the mirror.

Paper.

ANTISEPTIC NASAL SURGERY.

By CLARENCE C. RICE, M.D.

THE only reason why antiseptic methods have been employed so little in nasal surgery is because surgical operations in the nose have become frequent only within the last few years. It requires a few years for any line of surgery to develop antiseptic methods. In a very short time, it is safe to predict that the rhinologist will be as particular in his methods of operating as is the abdominal surgeon of to-day. It would seem that either the general surgeon is over-careful in his attempts to secure perfect cleanliness and in the employment of aseptic and antiseptic solutions, or nasal surgeons, so far as my knowledge extends, have paid far too little attention to this matter of antisepsis in their operative work. Either the germ theory of infection or of putrefactive fermentation of Pasteur, Koch, Lister, and Watson Cheyne—a theory which is firmly believed in by nine-tenths of the leading American surgeons to-day—either this germ theory is still unproved or the nasal surgeons have not apparently kept abreast of the times. There are obvious reasons, however, why we have heard so little of antiseptic methods in nasal surgery; and, first, because nasal surgery is comparatively a new field. When I first thought of preparing a paper on the use of antiseptics in nasal surgery I was so unfamiliar with the surgical methods employed by the members of this Association, and their opinion as to the necessity and value of antiseptics in nasal surgery, that I wrote to a number of them, asking for their views on this subject, and I take this opportunity of thanking them for their prompt and valuable suggestions. Several of the gentlemen said they did but little nasal surgery, because, in their opinion, there were but few cases that required surgical interference. A small number employed only the galvano-cautery in removing tissue, and were not favorably disposed toward cutting and drilling operations upon the bony and cartilaginous structure of the nose, so that, aside from the observance of strict cleanliness in treating nasal disease, they had had but little occasion to employ antiseptic solutions. I would like to add, in parenthesis, here a point which I shall refer to

again—that the application of the galvano- (that is, the actual) cautery to open wounds affords one of the most effective means of preventing the absorption of septic material. Gerster* says : “The actual cautery is the most effective sterilizer.” It may be true, therefore, that the gentlemen of this Association who employ only the galvano-cautery in removing nasal obstructions have little need to use other antiseptic precautions. Strict cleanliness before operations and application of the actual cautery to the wound would perhaps satisfy most antiseptic operators. While it is true, however, that the majority of rhinologists do make use of the saw, drill, knife, and trephine, these instruments have been perfected so short a time that nasal surgery, as we employ the term to-day, is, if not a new field, one which has assumed large proportions only during the last few years.

A second reason for the lack of attention paid to the use of antiseptics in nasal surgery is that the wounds inflicted by operations are very small as compared with those which the general surgeon has to treat ; but the advantage the nasal operator possesses in the loss of a smaller extent of surface tissue is fully neutralized by the peculiar conditions and surroundings of nasal wounds, and these conditions furnish the *third* reason why antiseptics have been held at so low a value by nasal surgeons. It is far more difficult to employ antiseptic methods effectively in the nasal cavities than upon the surface of the body, or in the joints or in the abdominal or pelvic cavities. Not only is it wellnigh impossible to obtain an aseptic surface in the nasal cavities before operations, as can be done on the surface of the body, by shaving, thoroughly scrubbing with soap and water, and finally sponging with a solution of carbolic acid or bichloride of mercury, but the nasal wound is subjected to all the exact conditions which are deemed most favorable to the generation and propagation of micro-organisms ; viz., heat and an abundance of moisture and oxygen.

Watson Cheyne† says : “The ideal result of wound treatment is seen in the repair of subcutaneous injuries.” He might have cited nasal wounds as the most unfavorable illustration of wound healing. The decomposing nasal secretions add to the fertility of the soil which is most favorable to the development of pathogenic microbes. The swelling of the soft tissues within the bony

* Gerster : “Aseptic and Antiseptic Surgery,” p. 3.

† Cheyne : “Antiseptic Treatment of Wounds,” p. 7.

nasal walls prevents effective drainage, one of the safeguards against septic absorption, and the pent-up secretions furnish ample septic material until the absorbents are satisfied. We find, therefore, in nasal wounds caused by operation, both varieties of the "obstacles to repair" which are recognized by writers—the mechanical and the chemical. The mechanical are present in the particles of bone, cartilage, or soft tissue, or in the atoms of dirt which remain in the nasal cavities unless great care is taken to wash them out, while all the usual conditions of nasal wounds favor putrefactive fermentation, which is the basis of the chemical obstacle to healing.

In endeavoring to mention all the difficulties lying in the way of the practice of antiseptic nasal surgery, we must not forget that the peculiar anatomical structure of the nasal tissue and the peculiar physiological function it performs furnish hinderances to the proper treatment of wounds. If an attempt is made to exclude air from an ulceration on the septum by covering it with a protective and sealing the nasal orifice with antiseptic gauze, we have the evil results which are caused by the irritation of these packings in the nostril. The erectile tissues will not bear the contact of a foreign body with impunity and the dressings quickly disturb the vaso-motor reflexes, and the nostrils are flooded with a constant outpouring of serum, which wets the dressings and makes them useless.

In view of these difficulties, this question naturally presents itself: Is there the same necessity for antiseptic methods in the treatment of nasal wounds that there is in the treatment of wounds in other portions of the body? Are we depriving our patients of any degree of safety or comfort by treating nasal wounds as the general surgeons treated all wounds twenty years ago? To make the question still more tangible: Do we see symptoms of septic poisoning follow operations in the nose where no antiseptic precautions are employed? I shall not at this time discuss the point which some of the gentlemen made prominent in their discussion of this matter; viz., that there was more surgical work performed in the nose than was requisite or judicious. I believe it is safe to say that the amount of nasal surgery will be larger in the future rather than less, and whether it *should* be performed will always be a fair matter for discussion; but there should be no debatable ground as to *how* it should be performed.

Do patients after operations upon the nasal septum or tur-

binated tissues exhibit symptoms which may be properly attributed to absorption of septic material? In looking over the replies from the gentlemen of this Association, I find that it is almost the universal testimony of those who use the galvano-cautery, the knife, the saw, and the trephine, that certain constitutional symptoms, more or less marked in character according to the amount of tissue removed or the extent of surface denuded, follow a certain percentage of these operations. These symptoms may be stated as commencing with slight chilly feelings, occasionally with a chill, and followed in twelve or forty-eight hours by a rise of temperature ranging from 99.5° F. in mild cases to 103° in severe ones, headache, pains through the eyes, nose, and forehead, and in the back and limbs. The patient feels generally too ill to engage in any business. Men of nervous temperament remain at home for two days, and women may stay in bed. These patients seem to be extremely nervous and irritable, and they do not thoroughly regain their equilibrium for a week or more. Some of the above symptoms occur in a mild degree after perhaps 50 per cent. of the cutting, sawing, or drilling operations of the nose. Of the severe cases I have seen but one in my practice, and that was not in any sense grave. I may describe it :

In the spring of 1887 a young man came to me with the left nostril almost entirely stopped with cartilaginous deflection. I remember him as one of the most nervous patients I ever saw. I used the trephine, driven by the electric motor. The operation lasted but a few moments, causing a slight pain and no shock. Hemorrhage was not severe, but it was persistent, and I was compelled to do what I then felt to be bad surgical practice, and which I never do at present—place an ordinary cotton tampon against the wound. The patient came to the office the next day. I removed the plug, washed out the nostril with a carbolized solution, but, as the bleeding continued, I put in a second tampon. I saw the patient at his house the next day. The tissues over the left nostril and cheek were swollen and somewhat reddened; the left eye was almost closed—more, however by oedema of the lids than by inflammatory swelling. The patient had had chilly feelings the night before, and I found his temperature 102.5° F. He exhibited the nervous irritability spoken of. I removed the plug and washed the nasal cavities with carbolized solutions. He began to improve the next day, and was about in four days. In another case, operated on two years ago, after using the galvano-cautery on the septum, the patient suffered from constitutional symptoms; temperature, 101.5°; and on the second day after the operation an erysipelatous blush showed itself on the nose and

for a short distance on the cheeks. This lasted only twenty-four hours, and the patient quickly recovered.

I have seen a large number of cases where the patient felt uncomfortable the second day after an operation on the septum. There is probably some slight rise of temperature in all these cases. It is common enough in dispensary practice to have patients return a few days after a cautery or drilling operation on the nasal septum, and say that they felt quite sick for some time after the operation. It is difficult to keep any record of such constitutional disturbance, as the patient is not seen for some days after the operation. My attention was most forcibly called to the serious results which may follow nasal operations by the uncomfortable experience of a friend of mine, a surgeon of New York.

He was operated on by a physician of large experience in nasal work. A cartilaginous and bony convexity was removed by a revolving drill. The work was done skilfully under chloroform. I believe that ordinary care was used in cleansing the nostrils. I examined the nose some weeks later, but did not discover that much tissue had been removed. Tampons were used for styptic purposes. The second day after the operation the nostril was closed by inflammatory swelling. Patient had a chill on the evening of the second day, and for seven days afterward the temperature ranged from 103° to 104° F.; slight chills were frequent, perspiration abundant, albumin in urine. The nose, eyes, and face were considerably swollen. The patient lost flesh so rapidly and was so depressed mentally that fears were entertained at one time that he would not recover. He convalesced slowly, and was unfit for work for six weeks. In conversation with me about his case, he criticised in strong language the lack of antiseptic methods employed by some surgeons. He himself, a strong advocate of all antiseptic precautions and most particular in his practice, as a general surgeon styled the old-time methods by the more expressive than elegant term of "rotten surgery." There was no doubt that he had suffered from a severe attack of blood-poisoning—the "septic intoxication" of Cheyne, the "traumatic infectious" disease of Koch. Absorption of putrid matter had taken place through the denuded cartilage and bone of the nose, and, as a consequence, he had almost lost his life.

Could this absorption of septic material have been prevented? I have heard of other serious cases, but have no authentic history of them.

The constitutional symptoms which follow the majority of operations in the nasal cavities, even where no antiseptic precautions are resorted to, are neither severe nor long continued. The

patient's life is rarely endangered, but his comfort may be seriously interfered with. There are a number of rhinologists who do not perform cutting or drilling operations upon the nose because they fear the constitutional disturbance that follows. As one physician expresses himself in regard to these operations, he "prefers to be on the safe side." Is it not possible to operate freely in any nasal case where good judgment advises, and, by employing strict antiseptic precautions, always be on the safe side? General surgeons do not hesitate to do many operations to-day which they feared to perform ten years ago. This same feeling may get abroad in regard to nasal surgery when it is done as scientifically as abdominal sections.

General symptoms which appear during the first twenty-four hours after a nasal operation may properly be attributed to shock and the reaction after shock. The amount of shock will depend upon the temperament and general health of the patient. Sex seems to have little significance. Shock will be in proportion to the amount of tissue removed, the extent of surface laid bare, the amount of pain inflicted, the quantity of blood lost. The degree of shock is also in direct ratio to the length of time consumed in operating. Shock seems to be greater when the nasal septum is wounded than when the soft tissues are injured, but this perhaps is because knives, saws, and drills are rarely used on soft tissues. All the symptoms which may be fairly attributable to shock following the small operations upon the nose should be over in twenty-four hours. For example, the nasal trephine is used upon the septum, and in a few hours the patient feels generally shaken up—headache, neuralgic pains about the eyes, nose, ears, and teeth; he feels weak and perhaps faint; reaction declares itself in a slight rise of remperature, not more than 99.5° F., which subsides in twenty-four hours. We should not confound such constitutional disturbance with symptoms which begin later, last longer, and are more pronounced—symptoms which surgical writers formerly grouped under the names of traumatic fever or surgical fever.

The transitory disturbance which is called shock is undoubtedly due to direct and reflex periphero-central nervous causes; but it subsides as soon as the nervous system has had time to recover its equilibrium. But neither shock to the nervous reflexes nor mechanical disturbance to the nasal circulation is considered any longer to be competent to explain the systemic disturbance which

was called "surgical fever" by the operators twenty years ago. The pathology and etiology of this disease rest upon a different and more satisfactory basis to-day than they did then. Thanks to the investigations of Pasteur and Koch and to the surgical procedures elaborated by Lister, traumatic fever is no longer a legitimate disease which follows all surgical operations. The presence of marked constitutional disturbance, chills, and high temperature after the severest operation now rather reflects upon the methods employed by the operator, and the old "laudable" pus, teeming with germs of suppuration, has been proved to act as a foreign body, and its presence to be an evidence of wound infection.

Were we ever so indifferent as to the importance of treating nasal wounds antiseptically, we cannot ignore the greatly improved results which surgeons have been able to obtain since they have employed antiseptic methods. The largest operations are so scientifically performed in our hospitals to-day that we have ceased to wonder when we observe that there is less constitutional disturbance after an exsection of the knee, an amputation of the thigh, or an abdominal section, than formerly followed the loss of a finger or toe. It cannot be argued that operations in the nasal cavities are subject to any different laws. A most interesting paper was read at the New York Academy last winter which brought out an earnest discussion. The writer advocated external operation for deep urethral stricture on the ground that in performing internal urethrotomy proper drainage was obtained with great difficulty, and that urethral fever, the great bugbear of operators, was due to sepsis and not to nervous causes. The discussion was as to the causation of urethral fever. I believe only one surgeon who discussed the paper indorsed the older theory, that urethral fever was due to reflex nervous causes. In extirpation of the tongue, it is found that there is much less danger of septicæmia where preliminary tracheotomy is done, and it is thus rendered more feasible to employ antiseptic solutions by excluding air from the mouth. Such arguments in favor of antiseptics could be cited indefinitely did this method require any bolstering up.

In concluding my paper, I would say that I believe it to be desirable when operating upon the nasal cavities to follow some *routine method* in our attempts to secure an antiseptic or aseptic condition of the nostrils and wound. *The success of all antiseptic methods depends upon methodical and perhaps tedious detail; but let it be believed that of far more importance than the opera-*

tion itself are the preparations for the operation, and the methodical employment of all means to secure cleanliness, and asepsis will be willingly undertaken. Thoroughly cleansing the nostrils is of major importance, the method of operating of minor importance. It is doubtful whether it will ever be possible to render the nostrils strictly aseptic, so difficult is it to cleanse the upper nasal passages and the accessory sinuses; but the conscientious employment of antiseptic solutions will place nasal surgery on as scientific a basis as general surgery rests upon to-day. The methods which I have endeavored to follow before operating upon the nasal septum are in no sense new, but I state them because, as I have said, it is well to have a detailed routine. Something may be accomplished in the right direction if the patient is instructed to wash out his nostrils twice daily for some days before the operation—a saline or alkaline tepid douche first, to be followed with an antiseptic solution applied with atomizer. I like a prescription of peroxide of hydrogen containing two per cent. of cocaine hydrochlorate in solution. The peroxide of hydrogen cleanses to better advantage after the swellings have been partially effaced by the cocaine. There are many antiseptic solutions. Even a solution of salt and water, generously and carefully used, does more than cleanse—it acts as an antiseptic. A solution of mercuric chloride, however, is considered preferable to all others. In strong solution (1 to 4,000) it can be sprayed into the nostrils both anteriorly and posteriorly; but it is irritating and, if used in considerable quantity, there is danger of salivation by absorption through the nasal tissues, or from the small quantity which may be swallowed. As it is necessary to use cleansing solutions in large quantities—one or two quarts—to thoroughly wash the nostrils, a quart of a saline solution may first be used from a fountain-syringe and then followed by a small quantity of a solution of bichloride (1 to 4,000), to be used with atomizer. A better plan still is to employ so weak a solution of bichloride (1 to 10,000) that it can be used in large quantities—a quart. It is best to introduce it posteriorly, so that it will not run down into the pharynx and be swallowed, and also to lessen any chance of causing middle-ear inflammation. I employ a postnasal irrigating tube which I have had constructed for the purpose. To prevent the solution running backward, a small piece of antiseptic sponge is placed near the tip of the tube, which is held in place by a hard-rubber shoulder. The size of the sponge must be adapted to

the size of each posterior nasal orifice. The hole in the sponge is quickly made with a circular punch ; a number of these sponges may be prepared in advance and be kept in a carbolyzed solution (1 to 30). Before operating, the sponges can be squeezed out and placed in a solution of bichloride (1 to 3,000). Before introducing the irrigating tube a four per cent. solution of cocaine should be thrown up behind the palate to allay irritability and to open the nostrils. After the quart of 1 to 10,000 bichloride has been passed through the nostrils they should be thoroughly dried with absorbent bichloride-of-mercury cotton. I think it is more convenient to sterilize the small instruments we employ in nasal operations by boiling them in a small dish over a Bunsen burner conveniently placed on the operating table, the instruments to be removed as they are to be used and replaced in the hot water after use, than to employ the usual solution of 1 to 30 carbolic acid. I need not say that the hands must be thoroughly scrubbed with soap and brush and then placed in a bichloride solution before the operation is commenced, and as often afterward as anything is touched which has not been rendered antiseptic. The dental hand-piece which is used with the trephine or drill may be wound with bichloride gauze where it is grasped by the hand. In many of the cases where severe constitutional disturbance has followed operations upon the septum we find that the nostrils have been temporarily plugged to prevent hemorrhage, and these tampons have been allowed to remain twelve to forty-eight hours. This is, I believe, an unsafe practice, even though antiseptic cotton is used. The cases are rare where it is necessary to place the tampon upon the wounded surface. It can be introduced just inside the orifice, and if the patient is instructed to keep the head inclined forward the blood-coagulum will be dammed back upon the wound and the bleeding stopped. The patient can remove the tampon in a few hours (four to six), and need not replace it unless the bleeding recommences. I usually prefer not to introduce any plug, for it is my experience that bleeding will cease of itself in a few moments in the vast majority of cases. The galvano-cautery is so good a sterilizer that it may be applied not only to stop hemorrhage, but to sear over the denuded surface which has been made by knife or trephine. After the operation, I much prefer to have the patient use a solution of peroxide of hydrogen or of boric and salicylic acids for cleansing purposes, than to attempt to keep the wound covered with any of the powders, iodoform, boracic acid, etc.

Not do I believe that antiseptic measures can be successfully employed after the operation with a view to extending the life. They are irritating, they produce drainage, and soon lose their antiseptic qualities. It is better to keep the patient warm, and to keep it as nearly antiseptic as possible by cleansing and antiseptic washing.

Discussion.

Dr. HARRISON ARNOLD referred a case sent him by Dr. Knight's of congenital bony excrescence of the posterior nares, very much like that, whose excrescence was symmetrical. He was glad that Dr. Knight had investigated the literature of the subject. His own patient was a woman aged twenty-three, but owing to the acquiescence of her parents, who feared an operation, nothing had ever been done for her relief. She was dull of hearing at both ears, and had no sense of smell. The same excrescence was made as the doctor had referred to, by passing a finger in the nostril over the tumor; and he could do this what Dr. Knight had said about the superiority of this method. The time of demonstration would be distinctly marked between the two excrescences, which were symmetrical. With the aid of Dr. Conrad Bickerton, who brought the case to him, the bony excrescence was removed by a large lancet. The operation was successful, and it was interesting to watch the development of the sense of smell. The opening, however, was not permanent, but the tumor again closed; this time with a considerable tumor, which was removed by the galvanic-treatment. At the end of six weeks the nostril again reopened. The tumor had increased since the operation; indeed, it was difficult to see how much of the inflammatory reaction would have been avoided, as the place of the growth was so near to that of the centre of the Fossæ nasales. The case was sufficiently interesting to be worthy of mention, although still under treatment.

With regard to Dr. Ross's paper, he said that he had been in the habit of observing the fullest antiseptic precautions possible in his intracranial operations, not because he had seen any bad results when he had failed to use them, but merely as a precaution. He doubted the possibility of thoroughly sterilizing the nasal chambers. It was misleading to say that we have destroyed all the germs in the nasal chambers at any time; but the method had the advantage of preventing the landing of the germ by various attachments, and in encouraging cleanliness.

Dr. SARGENT referred to the use of nasal tubes of tin by Dr. Abrie A. Haldell, of Buffalo,* for the purpose of maintaining the apertures open in a case of necrosis, after operation. With regard to antiseptics, he recalled the case of an old gentleman from whom the operation had brought out an eruption resembling scabies or measles. From the

* See p. 263, vol. III., "Annals of the New York Acad. Med. Sci.," 1888.

time that the operation was performed there was a gradual rise in temperature; when it reached 102.5° F. the eruption took place. He recovered under tonic treatment and quinine. It was quite evident that there had been blood-poisoning, from other symptoms that were present. Another case was one where the topical use of chromic acid was followed by symptoms of blood-poisoning. The eruption was vesicular, and the patient came back with the statement that he had had chicken-pox, and still showed some papules upon the face.

Dr. DELAVAN said that he had recently seen a case of congenital bony occlusion of the nares, in a young woman aged twenty-eight. The patient suffered with nasal catarrh, marked deafness, and loss of smell. She had been referred to him by Dr. Albert H. Buck, of New York, on account of the loss of hearing. The lesion consisted in the projection downward of the arches which extended over the posterior choanæ. With regard to the after-treatment of cases operated upon, he was in the habit of packing against the wounded surface a pledget of antiseptic cotton, which, with occasional renewals, was continued for forty-eight hours, after which the nasal cavity was left open and was kept cleansed by repeated applications of an antiseptic solution.

Dr. ROBINSON felt obliged to Dr. Rice for what he had said, because certain results which he had seen follow the use of the saw and gouge had led him to abandon them for the use of the galvanocautery. He had not had personal experience with the drill, but after the saw and gouge he had observed ulcerations which had refused to heal under all sorts of applications. He believed that it was important in these cases to use a mild solution of carbolic acid. This prevented the formation of pus-cells, while, on the other hand, the ordinary dressings did not penetrate deep enough to influence cell-formation. In the treatment of wounds left by operations he considered it better to use mild dressings than to resort to bichloride, iodoform, and the so-called antiseptic applications.

Dr. INGALS urged that if antiseptic methods could be applied satisfactorily to the nose they should be used. Some methods he considered of very little advantage. The flow of the secretions usually kept the nasal chambers in a clean condition; if not, the indication was to spray them with Dobell's solution, or a solution of two grains each of sulphate of zinc and of carbolic acid to the ounce of water. For disinfection a four per cent. solution of carbolic acid could be used before the operation. After the operation there was always blood in the nose which could not be entirely removed. He was in the habit of blowing in a solution of iodoform and boric acid. His experience did not agree with that of Dr. Rice. Bleeding might come on several hours after operation, requiring plugging the nose. For this purpose cotton was far inferior to gauze, for the reason that cotton was very difficult to remove. He had used bichloride gauze soaked in a mixture of tannic acid, gallic acid, water, and carbolic acid, making a sirupy mixture, allowing the gauze

to take up all it would retain; he then insufflated iodoform and boric acid freely and packed the gauze into the cavity until it was full, and was sure then that there would be no more hemorrhage. He removed it after twelve or fourteen hours, although no danger would result from leaving it in longer. After removing the plug he used a spray of salicylic acid, or of common salt and water, several times a day. From this he had never seen any serious results, such as elevation of temperature, follow the operation. One case had an attack of erysipelas, but he doubted if the operation had anything to do with it. He thought it well to render the nasal chambers aseptic, if possible, but thought that powders would be of more service than solutions.

He mentioned a case in which he had resorted to the galvano-cautery to check excessive bleeding, but had had no severe hemorrhages in his own practice. It had been said that the galvano-cautery favored the healing of a wound. He did not believe that anything could be done to cause the healing of a wound in the nasal septum in less time than four or five weeks.

Dr. RICE agreed with the statement that it was extremely difficult, if not impossible, to render the nose entirely aseptic. The purpose of his paper was to advocate the use of such measures as would render the nose sufficiently aseptic to prevent those symptoms which were recognized as being due to blood-poisoning. He had tried the method of plugging with bichloride gauze and bichloride cotton, and found them irritating and liable to cause an abundant flow of serum, and the cases did not do so well as when the passages were kept open and cleansed by antiseptic solutions. He agreed with the last speaker that it required four or five weeks for any large ulcerating wound in the nose to heal. He now always observed the precaution of keeping a patient under observation for half an hour after an operation. He thought that patients could use sprays more easily than powders.

Paper.

TREATMENT OF CHRONIC LARYNGITIS BY CHROMIC ACID.

By CHARLES E. SAJOUS, M.D.

IN the "Archives of Laryngology," volume of 1880, appeared an abstract of a monograph from the pen of Dr. Carlo Labus, of Milan, upon the treatment of laryngitis in singers by flaying (tearing off the hyperplastic tissue) the vocal bands. The procedure detailed minutely by its author and supported by a number of recoveries, bade fair to give us a satisfactory means for the cure of this stubborn affection and of the accompanying hoarseness, its all-important symptom in professionals. But it seems that the

harshness of the measure must have deterred other operators from resorting to it, for with the exception of Masini's * recent papers extolling the method, I have not been able to find, in the literature of the subject, other cases of chronic laryngitis treated by flaying, aside from those treated by the distinguished inventor of the operation himself. I confess that to deliberately strip the vocal bands of their overlying membrane, especially in the state of marked vascularization in which they appear during marked laryngitis is, apparently at least, rather a formidable operation.

The ordinary methods of treatment, especially in professional singers who cannot take prolonged periods of rest, are at best unsatisfactory as regards permanent results. An exacerbation, induced by slight exposure, an indiscretion in diet, etc., soon forces them to return, to be again patched up for a short time. As the subacute inflammatory processes are renewed, the case progresses from bad to worse until the loss of voice is complete, as far as its use in singing is concerned. To the amateur this loss of voice is comparatively unimportant; to the professional singer it means the loss of his livelihood.

In demonstrating the curability of chronic laryngitis by flaying of the bands, Labus showed, indirectly:

- 1, That, in a certain proportion of cases at least, the inflammatory process inducing the hoarseness was mainly located in the mucous layer covering the bands;

- 2, That in those cases the surrounding portions of the vocal apparatus were but slightly involved; and,

- 3, That with a careful differential diagnosis we could reasonably expect to thoroughly eradicate the hoarseness. Much is therefore due him for the information thus furnished, and if the operation proposed is one the formidableness of which narrows its employment to a small limit—it could but suggest easier and less vigorous means to attain the same end.

In certain cases of chronic laryngitis, especially those in which excesses in diet, hepatic engorgement, and excessive smoking cannot be considered as inductive causes, the vocal bands will present, during an exacerbation of the catarrhal process, the greatest amount of congestion as compared with other parts of the laryngeal cavity, due regard being paid to their comparative hues in the normal state, longitudinal streaks of dark red showing be-

* "Italian Archives of Laryngology," Nos. 1 and 2, 1888; "Gazetta degli Ospitali," No. 56.

tween them. Patches of a lighter color are often seen, while in other cases, although the redness is not quite so great, the tortuous and irregularly engorged capillaries at once suggest the expressive term—arborescent congestion. In all, the congestion is deepest at the vocal processes, involving but slightly the intra- and inter-arytenoid space, the general congestion, in fact, being limited to the lower portion of the larynx, to gradually decrease as the upper portion of the cavity is reached. In all, during an exacerbation the edges of the bands are somewhat irregular, den- tated in some, bosselated in others, and when a high note is sounded a whitish fluid appears between the vocal processes—and sometimes beyond—that seems to hold them in apposition for a moment after the sound is emitted. The voice is naturally coarse, the first notes usually beginning with a puff of wasted breath. The high notes, if at all within reach, are either screechy or veiled.

It is in this class of cases that vigorous treatment is required to obtain permanent relief. In these, astringents but induce momentary depletion of the engorged capillaries, the mechanical impediments to the formation of the voice. It is evident, after the results reported by Labus, that that mechanical impediment demands destruction if we are to expect a cure.

Flaying being a measure inspiring sufficient timidity, especially through the magnitude of its immediate effects, to prevent its general use even by specialists, can less energetic means be used that will cause sufficient destructive action to bring about the same results? We have in the varied forms of treatment for laryngeal neoplasms an ample field wherein to find this means, not forgetting, however, that we have a much larger surface to deal with, much more hemorrhage to fear, and the formation of much more cicatricial tissue to apprehend. Instrumental interference is not warranted, on account of the danger of hemorrhage, although to cut off a very small portion of the engorged membrane, previously pinched up by means of square-tipped and sharp-edged forceps, might be a practicable operation, a small piece of membrane being thus snipped, now and then, until complete eradication of the offending tissues is effected. The tediousness of this means would hardly commend it, however.

The reflex spasm caused by nitrate of silver, applicable here in the fused state, and the danger of hard, cicatricial nodules of the surface and edge of the bands, following its use, especially when the large area to be cauterized is considered, make this chemical

undesirable. Galvano-cautery presents the last-mentioned of the undesirable features of the solid stick, to a great degree, while it would not have the quality of penetration possessed by soluble chemicals, unless the application be made quite deep, a matter of importance when we consider that a large surface is to be cauterized. Glacial acetic acid and nitric acid are hardly to be thought of, for many reasons; the irritating fumes of both, and the too great diffusibility of the latter, being the main drawbacks militating against their use.

In chromic acid, unweakened as much as possible by the local secretion, we have not only an effective agent, but one possessing none of the detrimental peculiarities characterizing the others. It is sufficiently penetrating to completely destroy the exaggerated superficial vascular supply and that without causing plastic inflammation of the underlying tissues, while little, if any, cicatricial tissue follows its use in this location. In order to obtain a satisfactory result, however, I will repeat that the acid must not be weakened by the secretions of the part. Bearing this point in mind, it is necessary to limit as much as possible local secretion by preparatory treatment and to use the anæsthetic in the manner explained below.

As to preparatory treatment, the local application, every two hours on the day the chromic acid is to be applied, of a ten grains to the ounce solution of resorcin by means of the atomizer, has been found to be the best local measure, while the effect can be enhanced by a couple of seven-drop doses, four hours apart, of the tincture of belladonna in persons in whom this remedy can be used with safety. Or, if the patient can call an hour or so before the cauterization, a powder of one-quarter grain of morphia and two grains of acacia will prepare the larynx very satisfactorily.

As to the local anæsthetic—cocaine, of course—its effect must be induced rapidly in order to avoid profuse secretion. In a paper read before the Pennsylvania State Medical Society in May,* 1886, I had occasion to point out that prolonged application of cocaine caused profuse secretion of lubricating fluid from the laryngeal ventricles, having observed this fact particularly in one case in which a large papilloma rendered prolonged anæsthetization necessary. A perfect stream of comparatively thin mucus was observed to emerge from both ventricles after a twenty per cent. solution of cocaine had kept the larynx completely anæsthe-

* See Transactions of the Pennsylvania State Medical Society.

tized for a few minutes. For our object, therefore, it is necessary to induce rapid anæsthesia, and to take advantage of it promptly. Having tested the patient the day before the operation as to his susceptibility to the effects of the drug, by applying solutions of increasing strength to his pharynx and larynx, I use, if warranted in doing so, a twenty-five per cent. solution, first applying it to the pharynx and the back of the tongue, then repeatedly to the larynx by means of a good-sized cotton pledget until complete anæsthesia is procured. The chromic acid, fused by heat to the end of a covered probe such as MacCoy's, immediately before using the anæsthetic, is then applied to one of the vocal bands, while the patient, in his effort to make a sound, brings both bands into apposition, thus enabling the operator to avoid cauterization of their edges, an important point in the preservation of the voice, especially in the female. When the operation is thus conducted, the dampness of the surface of the bands is sufficient to dissolve the acid, and a spot the size of a small pea is observed at the point of application. But little, if any, local disturbance follows, and after a few days hardly a trace of the cauterization is left, except a spot presenting less redness than the surrounding parts. The applications are renewed every few days, touching each band alternately, until all the arborescent vessels or areas of superficial congestion have been destroyed. A month or so after the completion of the treatment the bands will have their normal color, a pinkish tinge perhaps remaining.

Among the cases treated in this manner were two female professionals in whom inflammatory neoplasms were present as complications. In the one, the pendant soft growth did not interfere with the voice, being forced out during the emission of sound. In the other, the neoplasm absolutely prevented the use of the voice in singing, on account of hoarseness. The superficial vessels nourishing the growth were alone destroyed in the latter case, causing disappearance of the tumor, and return of the singing voice.

Discussion.

Dr. F. I. KNIGHT confirmed the statement as to the free secretion following the application of cocaine; it seemed to throw off the cocaine so as to make the application of no use whatever.

Dr. INGALS said that the occurrence of free secretion after the prolonged use of cocaine was new to him, but he had seen it immediately after the first application, just as Dr. Knight had stated. It had not

seemed to him that the prolonged application made any difference as to the amount of the secretion.

Dr. MacCox had had some experience with the treatment advocated in the paper, and mentioned a case where the voice had been entirely restored. With regard to the prolonged application of cocaine, he had not observed the result to which Dr. Sajous alluded. He had used a two per cent. solution of resorcin and had found it to give great relief in the case.

Dr. SAJOURS said that he had referred to increased secretion in the ventricles of the larynx and not to general salivation; it required prolonged use of cocaine to produce it in the ventricles. In using chromic acid it was important to make the application before this excessive secretion occurred.

Paper.

SUBGLOTTIC LARYNGEAL ENCHONDROMA.

By E. FLETCHER INGALS, M.D.

CARTILAGINOUS tumors of the larynx are so rare that I believe this Association will be interested in the report of a case which, although at present incomplete, seems in a fair way to be cured by endolaryngeal treatment.

When I promised a paper on this subject I had under treatment a case that was improving so rapidly that I fully expected complete recovery long before this meeting, but, unfortunately for the report, the gentleman, who is a commercial traveller, is seldom in the city, and he has had so little inconvenience since the treatment given about six months ago that he did not call again until the early part of August.

At the New York meeting, in 1884, Dr. Morris J. Asch* presented to this Association the history of a case of laryngeal ecchondrosis, together with a *résumé* of the literature of the subject. He cites eight cases besides his own, only two of which were accurately diagnosticated and treated during the patients' lifetime, and only one of these had been treated by endolaryngeal methods.

By consulting the library of the Surgeon-General's Office at Washington, I have been unable to find records of any other cases, excepting one of immense fibro-enchondroma of the hyoid bone

* "Trans. Am. Laryngological Association," 1884, p. 66.

and larynx, which was skilfully removed by Dr. Azzio-Caselli * twenty-four hours before the patient's death. This, however, should hardly be included with laryngeal growths, although at first it seemed to spring from the outer surface of the thyroid cartilage. Dr. Asch's case, in which the tumor grew from the upper part of the thyroid cartilage, and Stoerk's case, in which it occupied a site at the base of the left arytenoid and vocal process, are the only ones that have been successfully treated by endolaryngeal means. Virchow † says that from the thickness and hardness of these tumors "they cannot be removed *per vias naturales*." In the case which I have to report the tumor was seated below the glottis, and although a cure has not been effected, four applications, made at intervals of from four to six weeks or more, caused a diminution from its largest dimensions (about the size of a split cherry) to one-tenth of that size, and I feel confident that from two or three more applications it would have been entirely destroyed; therefore I feel justified in recommending a careful trial of the treatment in similar cases. The history is as follows :

Mr. X., aged twenty-four, commercial traveller, came to me, July 24, 1886, complaining of almost constant hoarseness, which dated from exposure in a tornado about a year previously. His general health was perfect, and there was positive evidence of *no* specific taint. The vocal bands were slightly congested, and at about the middle of the left band there was a small conical outgrowth about 3 mm. in diameter. In the subglottic region, just below the anterior commissure, I found a small yellowish, somewhat conical tumor, measuring, as nearly as I could estimate, 4 mm. in thickness at its highest part and 6 or 7 mm. across its base. Its surface was smooth but slightly nodular, and its base occupied partly the inner surface of the thyroid cartilage and partly the inner surface of the crico-thyroid membrane. Other portions of the larynx were normal. A solution of sulphate of zinc was applied by spray to the larynx, and an astringent spray was ordered for daily use by the patient. This was continued for about four weeks, when I again saw the patient. There had been little or no improvement. At that time, as a forlorn hope I directed iodide of potassium to be taken in doses of from five to fifteen grains three times a day. I saw the patient only twice during the next month, and made no further local applications. He continued to take the iodide of potassium in doses ranging from ten to twenty grains, *t. i. d.*, for eight months, but during the last six weeks previous to his

* "An. univ. di Med. e Chir.," 1880, oct. iii., pp. 504-516.

† Virchow: "Path. des Tumeurs," vol. i., p. 442.

fifth visit to my office, on July 15, 1887, he had taken no medicine and had not used the spray. The cartilaginous tumor had increased in size so that, as nearly as I could estimate, it was 6 mm. in thickness and fully a centimetre in diameter at its base. The outgrowth had disappeared from the vocal cords and the congestion had subsided. At this visit, now fourteen months ago, I decided to suspend all other treatment and try the effects of cauterization with chromic acid. I anesthetized the larynx with a ten per cent. spray of cocaine, and then applied the caustic accurately to the whole surface of the tumor until it appeared of a uniform brownish-yellow color. This I succeeded in doing without touching surrounding parts, though shortly afterward I found that the diffusion of the acid had tinged the anterior half of the vocal cords of a yellowish color.

Six days later I found the larynx highly congested, and I then applied a spray of a thirty-grain solution of sulphate of zinc. I did not see the patient again until the end of a month, when I found the tumor materially reduced in size. I again applied the caustic in the same manner. He returned again at the end of two months, when I find from my notes that his voice was perfect, and as a result of two applications of chromic acid the growth had diminished to two-fifths of its former size. Owing to the patient's business engagements the tumor was not cauterized at this time, but two months later, December 22, 1887, I cauterized it again; and again, two months later, I repeated the treatment. One month later, March 15, 1888, I found the tumor diminished to about one-tenth of its former size. On this date I made the sixth cauterization. I did not see the patient again until August 7th, about five months, when the tumor appeared to me somewhat larger than at the last treatment, or about one-fifth of its largest size. I again cauterized it with chromic acid. I saw the patient once more at the end of a month, and found that the growth had been reduced about one-half by the last application. He was usually hoarse for three or four days after each treatment; therefore, because of his business engagements, further treatment was postponed until my return from this meeting.

Dr. J. E. Rhodes, who has seen this case with me two or three times, concurs in my belief that the treatment would speedily eradicate the growth if two or three applications could be made at intervals of three or four weeks. I expect to follow this course the present fall, and hope to be able to report a perfect cure at our next meeting.

In making the applications of chromic acid, I used an aluminium wire, on the end of which a small amount of the acid was fused. Over this wire I slipped a section of small rubber tubing which had been cut away at its lower end to expose the acid in front. The section of tubing was made secure by tying it with a

silk thread, which was extended along the wire to the handle so that there could be no possible chance of its dropping off. This I have found the simplest and most convenient instrument for applying caustics to the larynx. The rubber tubing protects the surrounding parts better than any other device I have seen. The instrument is simple, it may be bent in any direction, it is easily cleaned, and it does not get out of order.

Paper.

SARCOMA OF THE TONSIL.

BY ALEXANDER W. MACCOY, M.D.

PRIMARY sarcoma of the tonsil—so far as cases have been put on record—appears to be a rare disease, and the meagre literature on the subject, as given in the “*Index Medicus*,” verifies this statement. This especially applies to past observations. Current literature offers a far greater proportion of cases, the years 1886 and 1887 being particularly rich. This can probably be explained by the greater zeal manifested throughout the world in the study of laryngology; in the increased number of observers now at work; together with the exact methods of study now in vogue.

The object of this paper is not so much to give a complete bibliography of the subject (although I have appended to the history of my own case an epitome of cases recorded so far as they were accessible to me), but with the hope of bringing out in discussion the comparative frequency of sarcoma of the tonsil, as shown in the wide experiences of members of this Society.

The history of my own case is as follows.:

Mary A. W., mulatto, aged forty-five, native of New Jersey, married, no children, first came under my care in May, 1886. The short family history is as follows: Her father died of paralysis at seventy years of age; her mother is still living and in good health, aged about seventy; a maternal aunt died at an advanced age of a tumor of the breast, said to be cancerous; an older sister of the subject of these notes also died of a tumor of the breast of a malignant character, at the age of fifty; the other children are healthy, and are still living; a niece and nephew had died of consumption of the lungs one or two years before she came under my observation. The history of her father's family was good.

Her general health had been moderately good, but her menstruation had always been very irregular. She suffered from a menstrual flow which often lasted for several months, and after ceasing would not again appear for as long as six months. This state of affairs continued during her married life. No history of abortions or miscarriages could be made out.

On May 15, 1886, the patient presented herself for treatment, complaining of a soreness on the right side of her throat which rendered deglutition somewhat painful. She stated that this soreness had only been present for a few days, and she thought was not different from what she had often had before. Her general condition was good; flesh and strength maintained perfectly. Examination revealed on the *right* side a redness with but little swelling of the tonsil, accompanied by the slightest flushing of the anterior palatine fold in its lower half. The tonsil gave all the appearances of a tonsillitis of a mild type. Appropriate treatment was advised, and, with the injunction to let me see her again the following day if not improved, she was dismissed.

At least three weeks intervened between the first and second visits. At the second visit the previous symptoms and appearances were accentuated. The tonsil was a trifle larger, and showed a cleavage through its substance irregular in direction. A probe pressed into this fissure for about one-third inch with a little force could separate the two lips for a considerable distance. In this fissure, and hanging from it, was a grayish, pultaceous, irregular mass of tissue, which was quite movable, but adherent to the bottom of the fissure; this mass gave off a fetid odor, and led me to believe that a small abscess in the tonsil had become gangrenous and the outer wall had sloughed away, causing this appearance and retaining some of the decomposed contents. There was nothing in the appearance in color or form of the tonsil to warrant an opinion of other than a simple inflammatory condition. The cleavage was peculiar, it is true, and yet *could* be explained as above stated. The sloughing fissure was washed out and a solution of carbolic acid, iodine, and glycerine applied. In a few days the fissure was perfectly clean and the odor gone; the redness had abated considerably. The adjacent tissues appeared healthy. The general health of the patient had not suffered nor had she lost flesh. There was no lymphatic glandular involvement whatever present, neither was there any until very late in the progress of the case.

After several weeks' absence the patient again reported for treatment, having during the interval enjoyed freedom from any unpleasant symptoms until a few days previous, when some uneasiness and pain in swallowing occurred. The local appearances were strikingly changed, the tonsil remained comparatively small and with little appreciable change in color (indeed, the tonsil itself never increased much in size, but remained throughout the disease in about the same condition), but the

anterior palatine fold had become infiltrated, thickened, shiny, and grayish-red, having a zone of deeper redness as a limiting margin, shading off quickly into sound tissue.

This involvement embraced all the ascending portion of the anterior palatine fold; the appearance of grayish-redness resembled that of a gumma in a striking degree. Upon pressure the swelling felt somewhat like that of an erysipelatous inflammation of the face—possibly less brawny. This appearance remained for a few days with a slow involvement of the half-arch and palate, when suddenly a small whitish spot appeared in about the centre of this right half-arch, which rapidly increased in extent and soon showed a loss of tissue in the fold—very material and threatening complete destruction of it.

There appeared to be considerable œdema bounding the destructive process; the color was darkish red. The destruction of tissue embraced a large portion of the fold, and when it had ceased the appearance of the fold and arch was ragged, thickened, and red; the uvula was well over to the opposite side. The process of involvement never completely destroyed the uvula, but for a long time did not appear to cross the median line, and at no time was there any involvement of the opposite side, although late in the disease the left side was greatly encroached upon by new developments.

A stage of quiescence intervened, with a general improvement of all the symptoms, and a faint hope of arrest. Her strength and spirits were still unimpaired.

After this stage of quiescence had continued for some weeks, upon rhinoscopic and laryngoscopic examination an irregular mass of red, velvety tissue was noticed behind the posterior palatine fold. Its long diameter was vertical, and extended from a line a little below the lower line of the tonsil and continued well up behind the palate to the margin of the Eustachian tube. This mass grew rapidly at first and pushed out prolongations laterally which were about one-half inch in thickness and appeared to spread out *over* the posterior pharyngeal wall and to be *movable* upon it, so that a probe could be passed underneath its free edge for some little distance until it came in contact with its hardened base springing from the lateral wall. This mass continued to push out and spread over until that half of the pharynx was materially encroached upon. Again there was a destructive process set up and sloughing, followed by relief of encroachment and a stage of abeyance of all activities.

This stage continued for an interval, followed by redevelopment in this region as well as in that of the palate. From the free and ragged edge which had made efforts for a time to heal there sprang out a soft velvety fringe, red and glistening, which was accompanied by increased infiltration of the palate, followed by sloughing. This process was repeated again and again during her illness until the border of the hard palate was reached on the right side where the destructive changes

ceased, and toward the end of the disease the edge of the hard palate appeared to act as a breakwater to the further progress of the disease in that direction.

After the lateral and posterior wall had been subjected to repeated involvements and the space fully occupied by the growth in the region before mentioned, the *lower* portion of the mass began to interfere with the base of the tongue and somewhat with the play of the epiglottis, rendering the swallowing of fluids somewhat hazardous. This condition was, however, for the most part confined to the latter end of the disease, and for many months respiration and deglutition were accomplished with comparative comfort.

After some eight months the upper end of the growth began to make respiration through the right nostril difficult; and toward the end it became impossible. After about six or seven months the base and sides of the tongue showed implication. The tongue appeared to become involved through the medium of the lateral ligament, and from there extended over the right side of the tongue and then downward toward the base.

The disease also crept along from the angle of the jaws to the gums; from there to the mucous membrane of the cheek, and gave rise to some swelling of the cheek externally, and inability to close the mouth. As soon as the tongue, gum, and cheek became involved the submaxillary gland began to swell and attained the size of a small walnut; the lymphatic glands, which appeared to be so long in showing involvement, at about eight months began to become indurated in the side of the neck and were slightly tender; they never increased much in size.

For some weeks prior to her death deglutition became very difficult and painful; respiration was impeded so much that tracheotomy seemed at times almost imperative. As soon as deglutition began to be *very* difficult, at about nine or ten months, the patient rapidly began to fail in strength and lose flesh; the emaciation was accelerated toward the end, as difficult respiration and pain were added to lack of sustenance caused by difficult deglutition.

A day before her death an attempt was made by her relatives, against my advice, to remove her to her former home, and although warned that she would certainly die in the attempt, they carried out their wishes, and the patient died suddenly in the carriage on removal from the train.

Much to my regret, no *post-mortem* was obtainable, being out of jurisdiction.

The treatment was non-surgical, and to many it will doubtless appear strange that some active surgical measures were not instituted.

There were several factors present which prevented a prompt decision for an operation:

1. The rarity of the case and want of a clear diagnosis.

2. The want of distinctive features while the tonsil alone was involved, having all the appearance of a tonsillar inflammation, and the absence of the patient during the critical period of the few weeks when surgical interference would have been most effective.

3. A necessarily unsatisfactory report from the microscopist to whom I gave a portion of the growth too small for examination.*

After the involvement of the lateral and posterior wall several consultations were held, and the opinions being adverse to a radical operation, it was abandoned.

The medical treatment consisted of the administration of Donovan's solution, beginning with the usual dose, and gradually increasing until fourteen drops were taken, three times a day. It was remarkable how large a dose could be taken for so many months without the slightest gastric derangement or constitutional injury.

The local treatment consisted of galvano-cantery, lactic acid, and, finally, for many months the application every few days of a solution of crystallized iodine and crystallized carbolic acid, 1 to 4. This appeared to control or *retard* the development better than any other remedy used, and destroyed the fetor most effectually during the stages of sloughing.

The duration of this case was one year.

In an analysis† of 10,100 cases of tumors occurring in four of the London hospitals, extending over periods varying from nine to seventeen years, only nine cases of *primary* tumors of the tonsil appear, and of these only *one case* of sarcoma is recorded.

Mr. Butlin, in his lectures on tumors, records only nine cases of sarcoma of the tonsil. In the "Transactions of the Pathological Society of London," 1882, p. 331, Samuel West, M.B., narrates an interesting case of sarcoma of the *right* tonsil. The subject was a woman, aged seventy-four years. There was marked glandular involvement. The duration was five and a half months.

Mr. Lennox Browne,‡ of London, at a meeting of the Medical Society of London, March, 1887, showed a patient suffering from lympho-sarcoma of the *left* tonsil, extending down the pharynx and involving the larynx.

* Later investigation proved it a round-celled sarcoma.

† "Sex and Tumor Formations," by W. R. Williams, F.R.C.S. Eng., London "Lancet," May, 1884, p. 934.

‡ "British Medical Journal," April, 1887, p. 724.

At the Academy of Medicine,* in Ireland (Surgical Section), April, 1887, Mr. Henry Gray Croly read a paper on primary sarcoma of the tonsil. He detailed the history of two very interesting cases. One was that of a lad, aged seventeen years, admitted into the City of Dublin Hospital, April, 1886. The history of the beginning of this attack is remarkably like that of my own case. It began like an ordinary tonsillitis in the left tonsil (also involving the soft palate);

“and so much did the swelling resemble tonsillar abscess that an exploratory incision was made by the medical gentleman who first saw the case. No pus escaped. Glandular infiltration in the digastric space showed itself. All the usual symptoms were present—painful deglutition, dyspnoea, etc. An operation was performed. A rapid reappearance necessitated another operation. A cauterization followed this second operation. The disease returned very rapidly and the lad soon died. The duration of the disease was six months.”

The second case of Mr. Croly's occurred in a man over fifty years of age. The growth was confined to the tonsil (left or right not stated), and, like the other case, so much resembled tonsillar abscess that an incision was made into the tumor. Mr. Croly declined to operate, owing to glandular infiltration. The patient subsequently died from repeated hemorrhages. Duration of disease not stated.

Professor Weinlechner† reports a case of sarcoma of the left tonsil in a man fifty years of age: Infiltration of the glands at angle of the jaw and subsequent involvement of the side of the pharynx; hemorrhages requiring ligation of the common carotid. The claim is made of “arrest and disappearance of the growths” from injections of a solution of ether and iodoform, 1 to 10. No microscopic examination having been made, there remains an element of doubt as to the true nature of the growth.

Zeigmondy's case‡ was of the left tonsil: Operation by the galvano-cautery. Microscopical examination showed it to be a spindle-celled sarcoma.

Dr. M. H. Richardson§ reports a case of round-celled sarcoma

* “British Medical Journal,” June, 1887.

† “Allgemeine wiener medizinische Zeitung,” October, 1882.

‡ “Aerzt. bei. d. k. k. allg. Krankenh. zu Wien,” 1878, pp. 151–153.

§ “Boston Med. and Surg. Journal,” and the “International Journal of Surgery and Antiseptics,” July, 1888.

of the left tonsil in a woman : Externally, induration ; internally, the tonsil was pushed with the pharynx to the median line. April, 1887, the tumor was successfully removed by external incision. The upper portion of the growth extended to the base of the skull and was difficult of removal. The patient made a rapid recovery. Seven months after the operation there had been no recurrence of the growth. Dr. W. M. Gray,* Microscopist to the Army Medical Museum, Washington, D. C., has some beautiful microscopic sections of a sarcoma of the tonsil occurring in a child. The sarcoma is alveolar.

This completes the list of cases of primary sarcoma of the tonsils accessible to me, and makes in all nineteen cases,† including my own.

Discussion.

Dr. J. SOLIS-COHEN said that this paper presented the most detailed clinical history of a case of sarcoma of the tonsil of which he had any recollection at the moment. The speaker had an opportunity of seeing this patient on two occasions : first, when the growth was limited to the tonsil ; and second, six months later, when it had involved the soft and hard palate, and the tissues around the lower jaw. It was impossible to say what the effect of an early operation might have been, before the glands became involved ; but in such a case he would be disposed to give the patient the chance. Formerly the general opinion of surgeons was against operating, but lately his own opinion had changed, and he was in favor of operating, not through the mouth but by external incision. A few years ago he had seen a case of sarcoma, and had seen the patient in this hall yesterday. It was a case of sarcoma of the tonsil in which the palate was involved. The speaker had declined to operate through the mouth, and had advised immediate operation externally. The patient then went to New York, and Dr. Bosworth removed the growth with snare and forceps, though with a good deal of trouble and some risk but had succeeded in getting the growth entirely away. The patient reports that he is entirely well. This was an exceptional case. As a rule, he would prefer the more radical operation, and remove the growth from without.

Dr. DELAVAN stated that the question of operation in these cases was very important, and the remarks of Dr. Cohen were very pertinent. At

* Since published in the " American Journal of the Medical Sciences," February, 1889.

† Possibly twenty, if the following be a case of *primary* sarcoma, which I am unable to verify. " Sarkom der beiden Tonsillen. Jahrs. u d. Chir. Atch. d. Spits. zu Basel " (1883), 1884, pp. 29-31.

the same time they were not in accord with the views advanced in the latest works upon the subject. The statistics lately published showed that the results of the external operation were bad.

In Mr. Henry Butlin's recent work, valuable statistical records of the subject were given, with the result of proving that the prognosis in external operation was exceedingly unfavorable. The operation by the mouth was much more favorable in its results. The speaker had seen several cases in which removal through the mouth had given great relief—cases in which an external operation would have seriously threatened life. He believed that the internal method was the best.

Dr. MacCox stated that in another similar case, in which the diagnosis was promptly made and where the tonsil alone was involved, he would perform the operation, and probably with considerable prospect of success. There had been several cases reported of early removal followed by entire cure. It was, of course, understood that such an operation could be successful only in cases without glandular involvement.

With regard to the duration of his case, it was considerably longer than that of several cases previously reported, and upon which operations had been performed. This case lasted for a year, while most of the recorded cases operated upon survived a much less time. He attributed the retardation of the disease to the effect of the comparatively large doses of the three active alteratives combined in Donovan's solution, continued for months without any ill effects.

Paper.

ACUTE ŒDEMA OF THE SUBEPIGLOTTIC REGION AND LOWER PHARYNX IN A DIABETIC PATIENT.

By E. J. MOURE, M.D.,

BORDEAUX, FRANCE.

I SHALL not refer here to the history of acute and primary œdema of the mucous membrane of the larynx, the existence of which is proved to-day by numerous and perfectly established facts.

The influence of cold and traumatism in the production of serous infiltration is equally clear, and the question has been treated learnedly and at length by my former *chef de clinique*, Dr. Charazac, of Toulouse, in his important monograph on "Œdema of the Larynx," published in Paris in 1885.

On the contrary, observations of dyscrasic œdema are less numerous, although Lefevre (quoted by Lestier in his well-known

work) has reported facts relating to œdematous infiltration in the case of overworked convicts. Granting that the malarial cachexia also gives rise to this lesion, we must acknowledge that cases of this class are far less numerous than those first mentioned. As much must be said of scorbutic œdema. The infiltration of albuminuria, on the other hand, is rather better known, and it would be even easier to report several examples of this complication in Bright's disease. Its appearance in an affection essentially œdematous, characterized by anasarca of the eyelids, extremities, etc., is likewise readily understood. Facts relating to laryngeal œdema developing in the course of diabetes are, however, much rarer, and it is especially to this subject that I take the liberty of calling your attention, a case of this kind having recently been under my observation :

Mr. X., fifty-three years of age, consulted me on the 14th of June, 1888, concerning a difficulty which he experienced in swallowing saliva. He was apparently robust and had always enjoyed good health, but has been subject to trouble with his throat, which, however, has been usually of short duration, yielding to anodyne medication, gargles and mild saline purgatives. This time the attack appeared to be worse than usual. He experienced something akin to pain on the right side when swallowing his saliva and food ; wine produced a disagreeable burning sensation ; the pain seemed to extend to the ear on the same side ; respiration was not embarrassed. He was able to attend to his usual occupations. Appetite fairly good. When questioned as to a probable cause for his sore throat, he thought he might have caught cold three days before, while out on the water. Upon examination I found the tongue coated and dirty ; the mucous membrane of the posterior wall of the pharynx was somewhat redder than normal, and the pillars of the fauces seemed thickened and glazed ; the pharynx was rather dry, without abnormal secretion.

Laryngoscopic Examination.—Near the base of the tongue on the right side and on a level with the lateral insertion of the epiglottis was a tumefaction, red at its borders and almost transparent in the centre, which, gaining the outside of the aryteno-epiglottidean fold, projected considerably into the sinus pyriformis, partially obliterating it. The edge of the epiglottis was infiltrated and red. In a word, the œdema had invaded the whole right subepiglottic region and the external part of the aryteno-epiglottidean fold of that side, reaching to the orifice of the œsophagus. The painful symptoms complained of were now quite easily explained, and having been assured that the first manifestations were of but three days' standing, and, moreover, having examined the heart and lungs by way of caution, I prescribed a saline draught (sul-

plate of sodium), a gargle, and emollient fumigations, as well as a hot poultice to the right side of the neck. Three days afterward, June 18th, all trace of œdema had disappeared, likewise the dysphagia and pain complained of. The patient noticed, however, a slight pricking sensation near the base of the tongue. Antiphlogistic medication was discontinued and a gargle of iodo-phenol and laudanum substituted. I could not, however, understand how such a trivial influence could produce this œdema in a vigorous, healthy subject, and therefore asked the patient to have his urine analyzed.

June 29th.—The patient returned to me very much frightened at the result of the examination, the chemist having found sixty grammes of sugar to the litre; he also reported that the urine was largely increased in amount. Specific gravity, 1.039. In order to be perfectly certain, another analysis was made by a different chemist a week later, and this time were found *seventy-seven grammes to the litre*. No trace of albumin or other pathological residue. In the presence of such a considerable quantity of glucose I did not hesitate to attribute the production of the laryngeal œdema to this morbid condition, and I advised the patient to treat the diabetes. This he has scrupulously done.

As I have remarked above, sugar was present in such quantity that I had no fear in attributing the laryngeal œdema to the existence of this product. Had the cold been the etiological factor and recognized as capable of producing the acute œdema, it surely would have been one of those cases in which its influence would have been very manifest and its action promptly felt. Here, on the contrary, the patient was obliged to make an effort of memory in order to connect his excursion upon the water with his subsequent condition. On the other hand, as neither the ingestion of hot liquids nor the presence of a foreign body could be regarded as causal, apparently our only resource was to attribute the observed phenomena to the cause mentioned. I was thus led to order an examination of the urine of my patient, and therefore do not hesitate to regard the diabetes as the primary cause of the œdematous infiltration. Hence, I think, in the so-called acute cases of laryngeal œdema, with but few exceptions where the cause of the trouble is evident (burns, traumatism, foreign bodies, etc.), it would be wise to have the urine examined, and thereby we would perhaps find, in the majority of cases, the primary cause of a lesion which, at first sight, is often inexplicable. With the view of calling attention to this point, I have taken the liberty of offering this communication for the consideration of your learned body.

Paper.

THE CURE OF THE FALSETTO VOICE.

By J. C. MULHALL, A.M., M.D.

AT puberty, voice in the man, as everyone knows, undergoes a remarkable change. Its timbre or intensity may remain the same, but its pitch becomes much lowered; the puerile becomes masculine. In some this change occurs quite suddenly, in more it is gradual, but in a very few, though puberty be fully established, the voice remains unaltered, or, more usually, its pitch becomes higher—reaches the falsetto; physically, the boy is man in everything but voice.

Frequently this condition cures itself at a period of uncertain length after puberty, it may be a few months, it may be a few years; the lad, in some vocal effort hitherto untried, finds that the voice of a man issues from his chest. He repeats the experiment, and the heretofore unused or misused muscles which control the lower register, having once felt the stimulus of action, automatically respond to future exigencies.

More rarely—indeed, the condition is quite a rare one—this falsetto voice persists beyond the second into the third decade, when social and business interests begin to cluster about the man and his condition is made a very humiliating one.

Until recently I was under the impression that every laryngologist was familiar with this anomaly and its cure, but the history related to me by my last patient of the various attempts made in this direction convinced me that I need not apologize for the introduction of the subject at this meeting, further fortified by the fact that, within my knowledge, the theme has as yet been untouched by writer's pen; I mean, the instantaneous cure of the condition.

Mr. S. G. Fowler, banker's clerk, aged twenty-five, a native, and until within sixteen months a resident, of Washington, D. C., but for the period mentioned an inhabitant of St. Louis, consulted me with regard to an infirmity of the voice in November, 1887. His statement, made in quite a high falsetto key, revealed the fact that he had never yet talked in any other manner, with the following exception; namely, that he occasionally rendered monosyllabic imitations of an elder brother's voice, a deep basso. He had, however, on such occasions been warned

to avoid this, for fear of injury to the vocal apparatus. He had never yet uttered a complete sentence in other than his present squeaking, puerile voice. He felt quite sure that his voice at the age of puberty, instead of becoming lower, had become of higher pitch. There existed a partial, not a literal, exception to this rule. Direct questioning elicited the important and instructive fact that in laughing the voice was of low pitch, like that of other men. He had quite given up hope of relief, inasmuch as a physician of much prominence at his home, having unsuccessfully treated him for several months, had then called to his aid the services of a distinguished and veteran laryngologist, who could, however, suggest no other therapeutic measure than the one already chiefly employed—electricity. He was told that the trouble was of a paralytic nature and given an unfavorable prognosis.

Instrumental examination revealed a condition, crudely speaking, of perfect health of the upper air-passages. He was in all other respects a normal individual, including his genital organs. I make this latter statement as a matter of information to the laity. It is a matter of common knowledge that boys who have been castrated, the eunuchs of the East, maintain their puerile voices after the age of puberty, and it has been written that as late as the last century choir-boys with fine voices suffered castration that their high tenor or falsetto voices might remain unchanged after puberty to serve in the choirs of cloistered orders of monks. The general public, acquainted with these facts, is prone to consider that a full-grown man with a falsetto voice must be lacking in genital development. One of my patients insisted on proving to me that he was not lacking in this respect. I need not say that the public is entirely wrong in the suspicion.

Observation with the laryngoscope proved in the patient in question that, far from there being any parietic condition present, the true and false cords during phonation approximated more closely than they should have done, an observation proved by comparison in the same individual a few moments later when his falsetto voice had given way to a normal baritone. It could readily be seen that the vocal chink was now much larger in both diameters, that the whole larynx was lacking in the element of muscular tenseness which seemed to characterize the vocal attitude of the falsetto voice.

The patient was told, with an air of confident authority, after careful and prolonged laryngoscopic examination, that his vocal apparatus was in a condition of perfect health, that the error was

purely physiological and consisted merely in the faulty use of his voice, and that he would leave the consulting room cured of his falsetto tones. This information was given in such a manner that it might carry conviction—that it might stimulate to a correct performance of function the nerve-element involved.

The chin of the patient was now depressed on the sternum—this being done for its mental effect rather than to depress the larynx or relax tension—and while in this position I uttered a low guttural and asked the patient to imitate me, which he at once did. His attention was then drawn to the fact that he *could* utter low tones. His head being again depressed, he at once readily imitated my low tones in counting—a conversation ensued, his confidence was established, and the cure almost accomplished. In a word, the remedy consists in the revelation to the patient that he *has* a normal voice, and by some device proving it to him.

The patient must, however, be assured that his newly acquired voice is proper to him, for at first he can scarcely believe that the unfamiliar tones form his normal register. For the first few days, unless the patient fixes his attention on each vocal effort, he is apt to commence a sentence in his former falsetto key. My patient was therefore requested to remain at his lodgings for two days, to escape business diversions and, concentrating his attention on his voice, to practise speaking and reading aloud. At the end of this time he found that, even when his mind was diverted from his voice, he spoke quite naturally. At the end of three months, on being requested to speak at his former falsetto pitch he found himself utterly unable to do so. I have thus far had three cases, their history and cure being alike. In my first case, occurring fourteen years ago, I noticed that the individual spoke in falsetto tones, but laughed in quite natural ones. It occurred to me that laughing was a natural act, articulate speech an artificial one, the product of imitation and training. It suggested itself that the artificial tone of speech could be trained to imitate the natural one of laughter. My expectations were realized far more quickly than I expected, for this patient acquired his normal pitch and retained it after the first lesson. The muscles at physiological fault, from misdirected afferent-nerve impulses, are undoubtedly the thyro-arytenoids, from the physiological fact that they are the internal tensors and from the clinical one that in my cases the ellipse between the cords during vocalization was much larger after restoration of the normal voice.

This belief is further strengthened by laryngoscopic observations in a totally opposite class of cases, to which, indeed, also, little if any attention has been paid by authors ; namely, *paralysis of the thyro-arytenoids in adults caused by excessive use of the high register before puberty.*

I have been consulted by two gentlemen for voice trouble, whose clinical history was identical. In both, direct questioning drew forth the history that there had habitually been excessive use of the high register for two or three years before puberty, in the one case in singing, in the other in elocution ; at puberty both found that their voices became husky, very deep, incapable of maintaining as long a sentence without inspiration as before puberty, so aptly termed phonatory waste of breath, and both unable, with any effort, to reach a note higher than the middle register of a baritone. Their ages at the time of observation were respectively twenty-seven and thirty-two, their voices having exhibited no change whatsoever since the age of puberty.

In both the vocal ellipse was very large, the sickle-shape of the cords during phonation being well marked ; there existed the well-known picture of paralysis of the thyro-arytenoidei.

My purpose in mentioning this class of cases is to offer the conclusion that, if in the one the subjective and objective signs collectively be the exact antithesis of those in the other, and it be admitted that in the one paralysis of the thyro-arytenoidei is the correct diagnosis, hypertension of the same muscles must be chiefly concerned in the emission of the falsetto voice.

Discussion.

Dr. J. SOLIS-COHEN said that these cases are not unfamiliar to laryngologists. The difficulty consisted in an improper use of the muscles of phonation, and chiefly in the habit of speaking with the abdomen retracted. This restrained all of the muscles of the chest, neck, throat, and larynx and rendered them tense ; and hence the pitch of the voice was raised. Distend the abdomen, on the contrary, let the diaphragm descend, and then in speaking a large column of air would strike the vocal bands in an unconstrained position and the voice would become deeper. He was in the habit, therefore, of telling the patient to distend his abdomen and to speak while it was in this position. The pitch of the voice would then fall. It being demonstrated that the deep voice can be made, he then transferred the patient for vocal gymnastic exercises to an elocutionist who understood the proper method of voice-culture, with injunctions to practise speaking by the abdominal meth-

od. In occasional instances he had found all means fail to overcome the habit of using the falsetto voice, chiefly, he believed, because the patient would not submit to the discipline.

Dr. GLASGOW had seen two cases, and could not agree with the last speaker that it was simply due to want of proper use of the voice; but agreed with Dr. Mulhall that it was a spasmodic affection of the arytenoid muscles. He recalled a case of a man who had had a falsetto voice for six months, and he relieved him in a single visit. The method adopted was similar to that of the lecturer—bringing the patient's head down upon his chest and then instructing him to use the chest-voice with the head held firmly down upon the sternum. He was then told to read aloud with his head in this position, and to repeat this practice for ten minutes every day, gradually increasing the time. He entirely recovered. The second case was a boy, eighteen years of age, who had not such a high falsetto as the other, but his voice was immediately restored by this expedient.

Dr. JARVIS mentioned the case of a young man, aged twenty-two, in whom the falsetto was simply a head-tone which had been retained from puberty, owing to a bad habit of voice. Acting upon this view, he instructed the patient to use a lower tone, and with immediate success. A note was struck upon the piano and the patient told to keep it in memory, and to use it the rest of his life. In a second case which he had seen, a young man, aged twenty-one, it was not so easy to impart the use of a proper tone, owing to the difficulty of finding the proper register of his voice. This patient was brought to the piano and made to run up and down the scale until the proper note for his voice was found. It had been retained ever since. The proper way was to run down the scale, note by note, until the proper tone was found. All persons do not use the same note in speaking. There are some comedians who use the falsetto voice by preference, and when they have laryngitis are alarmed because they may lose their falsetto and ruin their vocation. In such cases there is a constant strain on the laryngeal muscles, and sooner or later the voice becomes cracked and spoiled.

Dr. LANGMAID said that whether the cases were common or uncommon it was important to know how to treat these patients. He had seen a great many of them. The cause had been well stated by the lecturer. There are several methods of correcting the condition; one which he had successfully used had already been mentioned. He had not always cured a case in one visit, but he could not recall a case in which the patient did not recover his chest-voice. It is very interesting to watch the patient as you prove to him that there is another voice, and teach him to use it. It is also curious to note that it is the baritone voice which is likely to have this affection; most male altos are made of baritones. In this very fact lay the secret of the cure. Dr. Jarvis accomplished this by finding the proper note and having the patient retain it.

Now, in the baritone voices the chest-vibration is much more marked than it is in the tenor voice. This once shown the patients and the sensation imparted to them by placing their hands upon their chests, they could easily repeat it for themselves. It might aid to depress the chin in order to get a deep throat-voice. One point mentioned had proved true in the speaker's experience—that the patient seemed afraid to use his voice properly. This fear must be overcome, the chest-voice demonstrated to them to be the natural voice, and the other must be avoided. With regard to choir-boys, at the time when the voice began to break, if the boys were placed under proper teachers they could be utilized as alto-singers in choral societies, or could use their chest-voices for the deeper parts. Now, applying this to the speaking voice, a lower note would be produced. The speaker was not aware that more had not been written upon this subject. It was certainly worthy the attention Dr. Mulhall had given it. While the method used by him was one of the ways of overcoming the difficulty; others might prefer different methods and still get good results.

Dr. F. I. KNIGHT agreed with what had been said concerning the frequency of the condition. With regard to the cure, sometimes the case yielded at the first visit, sometimes later, but always resulted in cure. He was struck with the remark of the lecturer about the abnormal condition of the organs of voice. He had himself always found intense congestion, which disappeared when the voice returned. It seemed less like a spasm than a voluntary effort on the part of the patient, begun at the age of puberty in an attempt to keep the chest-voice from being heard and afterward continued from habit. It seemed in these cases as if the male voice had never been established. He inquired if choir-boys were likely to have better voices in after-life than if they had not used their voices before puberty?

Dr. LANGMAID said that from what he had heard and had observed they become better singers from having sung, provided that the boy did not make a mistake in his register. The mistake might be made through the boy being accustomed to singing high music and not wishing to lose this power until the voice finally failed; but with good qualification and instruction he would be the better for the musical training received.

Dr. DELAVAN quoted Lennox Browne to the effect that singing before puberty exercised no harmful effect upon the voice in after-life. When loss of singing voice occurred, the matter might be summed up in two causes: (1) The neglect of pathological conditions occurring about the period of puberty, and (2) the improper use of the voice. He agreed with Dr. Cohen that the help of a good teacher of vocalization was of great importance, not only in this class of cases but also in others. This was so true that he believed the armament of a laryngologist not complete unless he possessed a piano and could command

the services of a good instructor in vocal music. With regard to faulty vocal action, he quite agreed with Fournier that much of this could be avoided by watching the voice at the time of puberty and correcting any faults discovered at that time.

Dr. COHEN alluded to the case of an adult in whom a falsetto voice had followed an attack of acute laryngitis contracted at the sea-shore.

Dr. LINCOLN said that his first case of falsetto voice had been in a young man who was a college student of nineteen. He was unusually bright and had performed in private theatricals, taking female parts. Afterwards he could not get rid of his falsetto voice. Examination revealed a large amount of adenoid tissue at the vault of the pharynx. This was removed. The patient soon afterward acquired the lower notes, and now used the chest-voice in speaking.

Dr. MULHALL said that Dr. Cohen had evidently mistaken his remark that there was nothing in print with regard to the rapid cure of the falsetto voice. So far as he knew, this paper was the first which had appeared upon the subject. Dr. Cohen sent his patient to an elocutionist, but the remarks of Drs. Glasgow, Knight, and Jarvis seemed to show that this was unnecessary. Why send them to a teacher of elocution when they could be cured by the physician in a single visit? The depression of the chin upon the sternum was not absolutely necessary, but the speaker resorted to it rather as a psychical aid than for any effect upon the larynx. In reply to Dr. Knight, who was surprised that no lesion was detected in the larynx, the lecturer had said "crudely speaking," by which he meant that there was no marked organic change, but, of course, the overstrain of the voice would cause congestion. It was stated by Dr. Delavan that a neglect of pathological conditions at the time of puberty might lead to the formation of the falsetto voice. The speaker asserted that the cure of such pathological condition had no effect upon the falsetto voice, or in restoring the proper baritone. In conclusion, he would like to have substantiated his view of the existence of a class of cases, exactly opposite in character, in adults, namely, impossibility to reach the falsetto, or even high baritone, dating from puberty and caused by excessive or faulty use of the high register before puberty.

Paper.

CAVERNOUS ANGIOMA OF THE LARYNX: REMOVAL.

BY W. C. GLASGOW, M.D.

WITH DRAWINGS AND DESCRIPTIONS OF THE MICROSCOPICAL SECTIONS, PREPARED BY DR. LUDWIG BREMER.

ANGIOMATA of the larynx are exceedingly rare growths. The text-books on laryngology mention them, but few writers claim to have seen them in their own practice. A search of the literature at my command has given reports of only six cases, viz.: Fauvel ("Mal. du Larynx," pp. 545-606) reports two cases; Heinze ("Archives of Laryngology," June, 1880) reports one case; Elsberg ("Archives of Medicine," February, 1884) reports two cases; Kidd ("British Medical Journal," March, 1888) reports a case with description of the microscopic section; Mackenzie ("Diseases of the Throat and Nose," p. 307) mentions one case of angioma of the larynx, situated on the false cord, and again (in "Essays on Growths," p. 88) he reports a vascular tumor situated in the hyoid fossa. Of the former I can find no account, save the simple statement. The latter cannot strictly be classed as a laryngeal growth.

The case reported by Johnson, 1865, as a vascular cyst situated at the anterior angle of the vocal bands, and the case of Fournie, of a melanotic growth on the epiglottis, cannot in the absence of a definite description be classed among the angiomata.

With the exception of the case mentioned by Mackenzie, all the angiomata hitherto reported have been of soft consistency, and situated at or near the anterior commissure of the larynx.

During the latter part of August, of this year, I was consulted by J. K., a man aged thirty years, a maltster, on account of a persistent hoarseness. He stated that during March of the present year he had first noticed a hoarseness, but, as it was ascribed simply to a cold, it gave him no concern. About July he began to notice an impediment in his speech; the voice would break suddenly at times, and a short cough or the act of swallowing would be necessary to clear it. He had no other symptoms, and his general health was perfect.

When I first saw him, his voice was hoarse and slightly marked by the broken tremor recognized as tumor voice. There was no dysphagia, dyspnœa, or cough. On laryngoscopic examination a grayish-brown

mass, the size of a large pea, was seen attached to the anterior part of the left vocal cord—the tumor was lobulated; a portion reached the commissure and another portion was attached by a pedicle to the surface and edge of the cord; this permitted it at times to fall below the cord and to be partly hidden from view on phonation; a short cough would always bring it between and above the cords. The glistening œdematous appearance of the cord about the growth corresponded in a striking manner with that so well described by Kidd in the report of his case.

After the application of a twenty per cent. solution of cocaine to the larynx, the greater part of the growth was removed in a mass with the Schroetter tube-forceps; it proved to be very soft, and the hæmorrhage was no more than that following the removal of an ordinary blood-cyst, scarcely a small teaspoonful altogether. The base was cauterized, and the patient soon regained the control and tone of his voice. After a lapse of four months, there has been no sign of recurrence.

The portion removed was submitted to Professor Ludwig Bremer, of St. Louis, and the accompanying drawings, microscopic sections, with a full microscopic description of the tumor, were prepared by him.

I feel fully assured that these microscopic specimens are unique in their beauty, and the description of the microscopic appearance of the tumor is the most complete in its details of any yet placed on record. The slide with the microscopic section is now in the National Museum at Washington.

The tumor is about the size and form of a large pea; its base is somewhat flattened. Its color is bluish-gray, flecked with small bright-red spots at the apex. The surface of the latter is glistening and polished, whereas that of the sides of the tumor is slightly roughened and velvety. This difference in appearance is explained by the microscopical examination as follows:

At the apex the epithelial covering is very much reduced in thickness, owing, no doubt, to friction and pressure from an opposite surface; in places it has entirely disappeared, being replaced by dense fibrous tissue. The red spots are small hæmorrhages.

Sections made vertically to the base, through the whole thickness of the tumor, reveal the following facts:

In the unstained specimen a number of reddish-brown spots are visible, embedded in a transparent tissue. The spots give, on coarse inspection, the impression of being hæmorrhages into the mass of the tumor. Examined with a moderately high power ($250\times$ — $300\times$), it is seen that in reality they are made up of blood and a net-work of trabeculae varying in thickness, the whole being surrounded by a more or less circular ring of connective tissue.

Sections stained in fuchsine, dehydrated in alcohol, and preserved in Canada balsam, show the following under a low power (Bausch & Lomb, A 1 in.): About one-half of the whole tumor-mass appears in the field; its periphery is undulating. The uppermost layer of the epithelial covering is stained deep red, the rest pale violet. The thickness of this cover is variable; in some places it is hypertrophied. In one spot it is undergoing mucoid degeneration, the cells being very much swollen, their contours only visible, of oval shape, the nuclei gone. The color of the bulk of the tumor appears, on the whole, reddish-blue,



FIG. 1.—Three contiguous alveoli. *a*, Centre of greatest activity: formation of net-work by large spindle- and star-shaped cells; *b*, formation of mature connective tissue; *c*, *c*, *c*, blood-corpuscles; *d*, accumulation of leucocytes: possibly an inflammatory focus. $\times 300$ reduced.

excepting the blood, which is stained yellow, and a number of spots in the centre of the tumor, which look intensely red. Here, as will be seen further on, is the centre of nutritive activity.

Examined with a higher power ($300\times$), the sections present a variety of structures in different parts, alveolar reticular, myxomatous, and fibrous. What appear macroscopically as hæmorrhagic foci look now like organized thrombi, in which trabeculæ of variable thickness, dividing and subdividing, are seen to form a net-work the meshes of which are, on the whole, elongated in form. These meshes are filled with red blood-corpuscles; occasionally a white one is visible. The septa, espe-

cially the more voluminous ones, are beset with what appear like endothelial cells.

The stroma surrounding the blood-containing net-work is made up of dense fibrous tissue, from which the trabeculae are seen to emerge and branch out; in other places, however, the fibrous rings are not so well defined, the net-work becoming more and more narrow-meshed at the periphery, and passing gradually into the dense stroma.

A very peculiar appearance is presented under a high power (about $350\times$ — $400\times$) by the intensely colored central portions referred to above. In fuchsine preparations which have been bleached by the prolonged action of alcohol, very large spindle- and star-shaped cells are seen to arrange themselves into a net-work containing red blood-corpus-

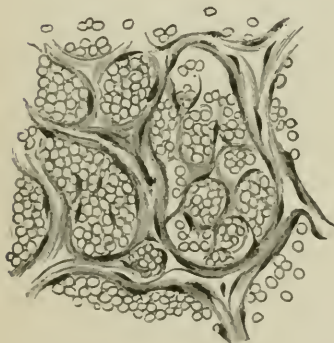


FIG. 2.

FIG. 2.—Portion of the tumor showing voluminous connective tissue, trabeculae, and comparatively small alveoli. The larger alveoli are subdivided into smaller ones and lined with endothelia. $\times 300$.



FIG. 3.

FIG. 3.—Giant spindle-cells. *b*, A spindle cut across; *c*, *c*, large nuclei with invisible protoplasm: probably the juvenile stage of the spindles. $\times 300$, Leltz 1-12th immers. Oc. 1.

cles. A part of these *giant-spindles* are in a state of transition into connective tissue, after the fashion of fibroblasts, their voluminous protoplasmic branches passing gradually into the mass of the neighboring fibrous stroma (Fig. 3 and Fig. 1, *a*).

Wherever the alveolar arrangement predominates, the trabeculae forming the blood-spaces are lined with distinct cells, serving as endothelia. The meshes are of all sizes, some of them so minute that, on a plane, they contain only three or four red-blood corpuscles (Fig. 2).

In some few parts of the tumor the myxomatous character predominates in structure; always, however, with a tendency to pass into the fibrous state. It is at the periphery of the myxomatous patches where the transition stage can be easily seen. (The myxomatous formation may, however, be interpreted as a degenerative process, especially since the large granular cells in the meshes are missing. This point I leave undecided.)

On the whole, a tendency prevails throughout the tumor to form firm fibrous tissue, which points to a benign nature. The histogenetic features are clearly indicated in the deeply stained central parts. Here the large branching cells develop, uniting with each other by their protoplasmic offshoots, thus resembling myxomatous tissue. A connection with the previously existing blood-channels is established, and now one of two things may happen. Either the branching cells are excessively nourished, passing into fibroblasts, and in this case the meshes are small, containing very little blood, the tendency being toward their complete obliteration and the formation of mature connective tissue; or the pressure of the blood may be so considerable that the trabecule formed by the protoplasmic connections of the branching cells remain comparatively thin, the blood predominating over the stroma. The tumor in general resembles a sponge; it is a cavernous growth. Nowhere are there true blood-vessels to be seen; nowhere smooth muscle-fibres indicating the presence of true blood-vessels. The diagnosis is "cavernous angioma."

Paper.

PRESENTATION OF A SPECIMEN OF PAPILLOMA OF THE LARYNX.

By SAMUEL W. LANGMAID, M.D.

THIS specimen of papilloma is interesting from the fact that it has never been interfered with in any way. The following very brief notes of the case were furnished by the attending physician. The patient, a male, had his first attack of difficult respiration in 1885, when he was one and a half year old. The principal symptoms which were observed were hoarseness and noisy breathing. In May, 1886, complete loss of voice ensued. From this time no change was noticed until 1887, when he could say "papa" and "mamma;" death occurred rather suddenly. He was then three years and four months old, the affection having existed for a period of two years less two months. He died asphyxiated. Tracheotomy was not performed.

Cases of papilloma of the larynx are sufficiently common ; the interest of this specimen resides in the fact that it caused death. How early in life these growths may occur I do not know ; no doubt they may be congenital. This tumor is seen occupying the ventricles of the larynx, and extends into the trachea. It is almost an exact reproduction of a case reported by Causit in 1867.

Its appearance is well shown in the illustration accompanying his case, which I now exhibit as an excellent representation of the appearance of the intralaryngeal papilloma in the case I have just reported.



Discussion.

Dr. SOLIS-COHEN said that he had seen several cases of angioma of the larynx, some of which he believed he had referred to in Ashhurst's Surgery, in the article on tumors of the larynx. Most of these occurred in the anterior portion of the vocal bands. One of these was the case of a clergyman from Washington. The growth was upon the anterior portion of the vocal band, of a deep Modena color, and became almost black when he would phonate. He was much incommoded by it. It was very easily removed, and the patient soon recovered his voice. Another case occurred in an engineer. Another case he had reported to the Pathological Society. In a fourth case there were several of these tumors in the larynx and they were sessile. The patient was a member of our own profession, with attacks of spasmodic dyspnoea and falsetto voice. On submitting to laryngoscopic inspection these tumors were discovered, and the impression was that the altered voice was caused by them. The opinion of the speaker was that there was no connection between them—that the tumors had existed from birth, and that they were not responsible for the neurotic condition of the individual. No interference was deemed advisable ; the more so that an attempt to remove one had been attended with serious hæmorrhage, as reported by the patient. Without a microscopical examination he could not say that they were exactly the same as the specimen exhibited to-day. In reply to a question from Dr. Mulhall, he stated that he could not remember whether microscopic examination had been made in any of the four cases he had mentioned. [Since the meeting Dr. Cohen finds that at least one of his cases had been examined microscopically, and pronounced cavernous angioma ; the sections and drawings having been made by an histologist of repute.]

Dr. MULHALL said that without the aid of the microscope it was impossible to make a diagnosis of angioma of the larynx. Different

growths might take on inflammatory action from traumatism, or from cold, and present very much the appearance of an angioma. The specimen presented by Dr. Glasgow had been examined by an expert microscopist and its character as an angioma had been established. The speaker had examined the patient after part of the growth had been removed, and confirmed one of the clinical features, namely, the intense scarlet hue of the infiltration, and its remarkable translucency, the white vocal band underneath being clearly seen through it.

Dr. COHEN inquired if the lecturer had seen cases in which there was something like a thin red band along the edge of the vocal cord.

Dr. GLASGOW answered in the affirmative.

Dr. INGALS asked, with regard to the case reported by Dr. Langmaid, What treatment should be adopted in such cases in young children? Before there was much dyspnoea, was it advisable to do anything? He had seen two cases, and his own plan had been to temporize as long as respiration was easy. In one case the laryngeal symptoms passed away entirely in six or eight months; in the other he had performed laryngotomy and removed the growth.

Dr. LANGMAID said that he would answer by reporting an actual case. The patient had spasmodic dyspnoea, and there was a suspicion upon the nurse's part that something had gotten down and been inhaled into the lung. Although there was no dyspnoea at the time, the recollection of another case that the speaker had seen led him to advise tracheotomy, although there was no real evidence of a foreign body having passed into the trachea. The trachea was opened, and the foreign body escaped through the opening. He believed that if there was reasonable suspicion that dyspnoea was being caused by a foreign body tracheotomy should be done at once. With regard to a growth in the larynx in a young child, he would not interfere as long as there was no dyspnoea; if the child were larger and dyspnoea appeared he would operate. During the operation the growth could be removed by the finger or curette, introduced through the mouth.

Dr. GLASGOW expressed great interest in the subject of papilloma of the larynx in children and recalled the case of a young negro child, whose symptoms were aphonia and increasing dyspnoea, continuing until it was six months old. It died at the end of one year, having presented the signs of laryngeal tumor. The youngest case upon which he had operated was a boy of nine; the papilloma was removed by a sponge, as recommended by Voltolini.

With regard to angioma, Dr. Mulhall had referred to the peculiar appearance of the growth in the case reported. It was a very interesting and singular condition; the vocal cord looked as if covered, at one portion, with a translucent jelly. This condition, however, only lasted for a few days and then passed away.

Paper.

THE SURGICAL PATHOLOGY, ETIOLOGY, AND TREATMENT OF
HÆMORRHAGE AFTER TONSILLOTOMY.

By D. BRYSON DELAVAN, M.D.

OF the many methods hitherto proposed for the removal of enlarged tonsils, none can compare in general popularity, effectiveness, and, on the whole, humanity with tonsillotomy. As time has gone by the value of this procedure has become more and more completely established, and the relative merits of the various methods for its performance better understood and appreciated. While, under special conditions, or in the hands of a few operators, other means may be preferred, by an overwhelming majority of physicians, including the most distinguished specialists and writers of the day, it is the accepted practice to remove an hypertrophied tonsil by means of some modification of the instrument known as the tonsillotome. Of the latter, those made upon the principle adopted many years ago by the late Dr. Physick, of Philadelphia, are perhaps the best. The operation itself is a simple one, and its results, immediate and remote, eminently satisfactory. Following the performance of the operation there is, generally, a certain amount of bleeding.

According to most authorities, however, hæmorrhage after the operation is usually slight and soon ceases spontaneously. If not, it may be readily checked, and, as a rule, by simple means. Of the latter the most effective in common use is the direct application to the cut surfaces of a mixture consisting of one part gallic acid and three parts tannic acid, reduced to the consistency of cream by the addition, drop by drop, of a small quantity of water. This or the sucking of cracked ice will usually produce the desired result.

The question of hæmorrhage after tonsillotomy, however, is by no means so easily settled as would appear from the above general statement, which, although in the main correct, is nevertheless subject to so many exceptions as to have given rise to much spirited discussion. The view taken by most specialists is, that the operation is attended with little or no real danger. On the other hand, there are some practitioners who look upon it with dread.

In studying the literature of the day, the fact becomes apparent that considerable looseness of expression prevails with regard to this matter. Thus, one writer says that there are several records of more than a thousand operations at the hands of the same surgeon without the occurrence of any serious hæmorrhage. Another believes that profuse hæmorrhage occurs perhaps once in five hundred times, while an alarming hæmorrhage does not happen once in a thousand times. Sir Morell Mackenzie, whose experience in this direction undoubtedly exceeds that of any living operator, has only once met with a case in which bleeding actually appeared to endanger life. Elsberg, who claimed to have operated upon several thousand cases, stated that in only two of them had bleeding of an alarming character taken place.

On the other hand, the statement is commonly met with that there are quite a number of cases of tonsillotomy recorded in which the hæmorrhage has proved fatal. Upon investigating the truth of this remark, we find that there are a few instances recorded by the older surgeons in which death from hæmorrhage has followed operation upon the tonsils. It should be explained, however, that in most instances these operations were not performed for simple hypertrophy of the gland, but for some diseased condition which required more or less deep dissection. Again, at the time when these cases are said to have occurred, tonsillotomy was generally performed with the knife, the tonsillotome of Phylsick being unknown.

In an admirable paper upon the subject, by Dr. George M. Lefferts ("Transactions American Laryngological Association," vol. iii.), the author thus summarizes his views: 1, A fatal hæmorrhage after tonsillotomy is very rare; 2, a dangerous hæmorrhage may occasionally occur; 3, a serious one, as regards possible immediate and remote results, is not very unusual; and, 4, a moderate one, requiring direct pressure or strong astringents to check it, is often met with. While fully agreeing with the last three propositions, the writer is inclined to go further than Dr. Lefferts in regard to the first. For many years he has made diligent search, both by reading and by inquiry among the leading authorities of the day, in order to find, if possible, an authentic case of death from hæmorrhage after tonsillotomy performed according to modern methods. His efforts have not been rewarded by the discovery of a single instance! And yet the operation must have been performed many thousands of times.

The fatal cases alluded to are, therefore, traditional, and not fairly to be included in modern statistics.

While the above is believed to be strictly within the bounds of reality, cases are not wanting in which hæmorrhage of an alarming character has taken place, the literature for 1887-88 in particular including several of them.

Investigation of the subject shows that in hæmorrhage after tonsillotomy several varieties of bleeding may occur. These are :

1. Arterial—from the division of one or two comparatively large arterial branches.
2. Arterial—from the division of a large number of small arterial twigs.
3. Venous—from the division of the small plexus of veins which lies below and outside of the tonsil.
4. Capillary, or general—from the presence of the hæmorrhagic diathesis.

Of the above varieties, the first two seem to be decidedly the most common.

Of eight such cases which have come to the knowledge of the writer, all were in men, all were upwards of twenty-four years of age, the youngest being twenty-four and the oldest thirty-four, and the average age was twenty-eight years. Age, therefore, plays an important part, and for the reason that, the older a tonsil is and the longer it has been the subject of hyperplastic disease, the greater will be the amount of fibrous tissue in it and the larger and more dilated will be its vessels. Thus, in a typical case observed by the writer, the patient was aged thirty-four. The tonsil was small in size, firm in texture, and of a grayish color. Marked resistance was encountered in forcing the blade of the tonsillotome through it. Not more than two or three drachms of blood were lost immediately after the operation. Within an hour bleeding returned, and it continued, increasing in severity until the patient was nearly exsanguinated, and that in spite of every possible effort to stop it. The patient recovered. Microscopical examination of a section of the tonsil, made through its base, revealed an unusually large amount of fibrous tissue surrounding and running through the substance of the tonsil in broad bands. In this fibrous tissue were seen large numbers of blood-vessels, many of which were of considerable size. By reason of their situation in the midst of the fibrous tissue, evidently, they had

been unable to retract and close, and thus the bleeding had been allowed to continue.

The sources from which tonsillar hæmorrhage may arise are obscure, since the blood-supply of the gland is derived from a considerable number of different arterial branches which, together ramifying through it, render it almost impossible in the living subject to trace the connection of any one twig with its parent branch. Moreover, anomalies are common, and while the ascending pharyngeal is probably in most cases the largest contributor, it is sometimes small, and precedence is then taken by the ascending palatine.

It is safe to say that in all modern instances in which bleeding has taken place, it has been from some of these smaller arteries. There is nothing to prove that the internal carotid itself has ever been wounded, since the introduction of the tonsillotome, by the use of that instrument; nor does it seem possible that it could be, when the relation of that trunk with the tonsil is considered. In several cases in which the common carotid has been ligated for dangerous tonsillar hæmorrhage the bleeding has continued, and in the case seen by the writer, already referred to, firm and persistent holding of the common carotid seemed absolutely without effect. As stated by Lefferts, the generally received views are in favor of ligation of the internal carotid. Later authorities have expressed a preference for ligating the common carotid, and in a few cases reported this has proved successful. On the other hand, it has in other instances totally failed, while efforts at holding the artery have seemed equally ineffective.

It would seem that a careful study of the circulation of the neck would set at rest any question as to what should be done. In the first place, the objection sometimes made to tying the common carotid, that it may unduly cut off the supply of blood to the brain, is not to be considered for a moment.

Again, the internal carotid lies so far from the tonsil that to injure it directly, in tonsillotomy done with the modern tonsillotome, is, theoretically and anatomically, impossible. Moreover, the wounding of a vessel of such great size as the internal carotid would almost necessarily produce a hæmorrhage of overwhelming severity, while in every case of severe bleeding which has been reported the hæmorrhage has been distinctly of a different character, and plainly referable to the division of a smaller class of vessels. Not even these vessels can come from the internal carotid,

unless they be branches of the ascending pharyngeal when that vessel, as sometimes happens, is given off anomalously from the internal and not from the external carotid. In point of fact, "the cervical portion of the internal carotid gives off *no* branches" (Gray). No branches, therefore, can be distributed to the tonsil, and in case of tonsillar hæmorrhage the bleeding cannot possibly come from that trunk.

On the other hand, in normal cases the branches which do supply the tonsil are, without exception, derived primarily from the external carotid, and although some of them anastomose with their fellows of the opposite side, as, for instance, the dorsalis linguæ, they practically depend entirely upon the carotid.

To ligate the internal carotid, therefore, would be uncalled for. To tie the common carotid would certainly result in shutting off the circulation in that artery and its branches, including the external carotid, from below.

Why, then, should not compression or ligation of the common carotid result in absolutely checking tonsillar hæmorrhage, instead of being followed, as has often happened, by complete failure? And why is it that in nearly every modern instance of severe bleeding, where the hæmorrhage was not arrested by the occlusion of one or two spirting twigs by torsion or otherwise, all means have proved ineffectual, and the flow has only ceased when at last syncope has occurred?

The answer to these questions must be apparent when we consider the connections of the internal carotid with other important arteries, for, through the circle of Willis, it has direct communication with all of the great vessels of both sides which enter the cranium. Ligation of the common carotid, of course, cannot cut off the communication between the external carotid and the internal. Moreover, with its circulation stopped from below, there is no reason why a very considerable supply should not be received from the arteries at the base of the brain, carried downward to the bifurcation of the common carotid, and thence into the external carotid and its branches. Hence it is, apparently, that the results of tying the common carotid have not been more successful.

The answer to the second question will depend somewhat upon the anatomical condition just described.

Hæmorrhage in general, it is unnecessary to say, is likely to cease during syncope. In bleeding after tonsillotomy, the excitement of the patient and the consequent stimulation of the heart and ac-

tivity of the brain result in great increase in the general circulatory force and in the amount of blood actually carried to the brain. As long as this condition lasts, bleeding will continue, the tendency being for it to grow more, rather than less, severe, even although the common carotid may have been tied. When, however, the heart's action becomes weak and the brain anæmic through syncope, the circulation in the common carotid being now, as before, cut off, bleeding from the tonsil will cease. This circumstance would, it seems, tend to confirm the view already expressed and to prove the futility of ligating the common carotid at all. Plainly, then, no dependence can be placed upon the ligation of either the internal or the common carotid. It has been suggested by Leferts to ligate both the common trunk and the internal carotid, and this, in case of an anomalous origin of the ascending pharyngeal, would probably prove effective.

In order to operate with the maximum certainty of success and the least possible surgical interference, it is to the external carotid that the ligature must be applied. And, since the supply sent to the tonsil by the ascending pharyngeal is usually considerable, pains should be taken to tie the carotid behind that vessel and between it and the bifurcation of the common carotid. True, Druitt objects to the tying of the external carotid, "because of the uncertainty of origin of the vessels which supply the tonsil," while Gray states that the operation is rarely performed on account of the number of vessels given off from it, ligation of the common carotid being preferred. It does not seem as if these objections were valid, in view of the general necessities present in the cases which we have had under consideration.

Fortunately, however, the occasions upon which such procedures will be called for are extremely rare, and in the less severe cases reliance may be placed upon simpler means. In general, it may be said that the operation of tonsillotomy should not be performed unless ample means are at hand for controlling any ordinary amount of hæmorrhage which may occur, and although the chances of bleeding are infinitely slight, no surgeon is justified in incurring them unprepared. Since the amount of bleeding present may vary from the loss of a few drachms up to a hæmorrhage of considerable importance, it follows that the means selected for its arrest must vary with the nature and severity of the case.

In the vast majority of instances the bleeding, even though sharp at first, will subside spontaneously within a few minutes

after the operation. In these cases the patient should be directed to keep the head upright, as far as possible ; to refrain from making efforts at clearing the throat ; to gargle the throat quickly, and several times in succession, with ice-water ; or, upon the removal of the tonsils and, if possible, before bleeding has begun, the surgeon should apply at once to the wounded surfaces the tanno-gallic mixture already mentioned, the solution having been prepared and the brush with which the application is to be made having been saturated with it before the operation, so that there shall be no loss of time. By this means it is often possible to escape with almost no loss of blood at all. The use of the perchloride of iron as an astringent in these cases is most disagreeable and inconvenient, and in every respect far inferior to the above. Should the bleeding continue, excellent results may be obtained by grasping a smooth, rounded piece of ice in a pair of long forceps and holding it firmly against the bleeding surface. Or the surgeon may wrap, somewhat tightly, a pledget of absorbent cotton around the end of a suitable rod, saturate it with the tanno-gallic mixture, and then press it against the wound. Should these means not succeed, the pharynx of the patient should be illuminated by the best attainable light, the neighborhood of the tonsil diligently cleared of clots, the cut surface thoroughly exposed to view, and careful search made for the exact source of the hæmorrhage. Sometimes this precaution will be rewarded by the discovery of one or two spirting points. These will generally be found low down in the pharynx, corresponding with the inferior part of the tonsil, in which the larger arterial branches seem to be received. Such points, having been discovered and precisely located, should be seized with a long slender forceps, and thoroughly twisted ; or they may be touched with a small galvano-caustic point ; or the tip of a probe upon which nitrate of silver has been fused may be pressed into them, the spot having been well cleared of blood.

Such hæmorrhage is apt to occur in cases where the incision has been carried low down in the pharynx, and may usually be arrested by the above means. Upon inspecting the thoroughly cleansed wound, however, there may appear not one or two bleeding points, but innumerable little vessels, none of which is large enough to be seized, but all vigorously engaged in the work of pouring out arterial blood. These are the cases in which the tonsil has been subject to hyperplastic enlargement, where the fibrous stroma containing the nutrient vessels is markedly increased and indn-

rated, and the vessels themselves large and abundant. Increased as they are in fibrous tissue, it is difficult for them to contract; hence the bleeding, abundant, persistent, and exceedingly difficult to control.

In these cases torsion is impossible. If the means first mentioned have been tried without effect, good may sometimes be accomplished by the application of pressure, either through the medium of the fingers of one hand of the operator introduced into the pharynx and pressed against the wound, while counter-pressure is made from the outside with the other hand, or by means of a forceps-like instrument made for the purpose, and furnished at its distal ends with two pads of suitable size. Anyone who has tried to apply pressure in a case of lively tonsillar hæmorrhage, with the patient gagging from the pharyngeal reflex and, from time to time, throwing off the blood which has found its way to the stomach—not to mention the other symptoms of distress and alarm usually present—will agree with the writer that it is by no means an easy resource, although at times it may prove effective and may not be attended with the difficulties described. Failing in this, one of two devices may be resorted to. If the removal of the tonsil has been thorough the surface of the wound may be seared with a large flat galvano-caustic point, or with the Paquelin cautery. If, on the other hand, enough tissue has been left to make such a proceeding possible, the stump of the tonsil may be drawn inward by the vulsellum, or hook, or else pierced at its base with two transfixion needles, and a strong ligature passed firmly around it. This method has been employed by Dr. E. W. Clark with success upon a case at the New York Hospital. Pressure of the common carotid may be maintained, although in the personal experience of the writer and of others it has proved useless. Meanwhile, several general measures of great value may be employed.

Since the object desired is to quiet the circulation and allay nervous excitement, the administration of opium is decidedly indicated.

Again, arterial tension may be relieved by shutting off a part of the supply of blood. This may be accomplished by constricting the patient's thighs or arms, as is sometimes done in hæmoptysis.

Causing the patient to breathe through the mouth and thus forcing a current of air directly across the bleeding surface will assist in the formation of the desired clot.

Finally, in nearly every instance of tonsillar hæmorrhage of

the class above described, known to the writer, the bleeding has continued in spite of all efforts to stop it until, at last, the patient has fainted. Upon the occurrence of syncope the flow has promptly ceased, nor has it, with the return of consciousness, recurred. While, therefore, the means which seem best adapted to the case in hand are being applied, any tendency to fainting should be encouraged rather than repressed. Should the above means all prove ineffective, and the question of ligating one of the great vessels be entertained, it should be remembered, as has already been shown, that ligation of the internal carotid is useless ; that ligation of the common carotid has sometimes succeeded, but has often failed ; and that the choice of a successful operation lies between tying the external carotid near the bifurcation of the common carotid, or the ligation of both the common and the internal carotid arteries.

The occurrence of a venous hæmorrhage is unusual. The writer has seen one such case, following the use of the Fahnestock guillotine, in which the instrument, not being properly regulated, dragged the tonsil from its bed and, cutting completely outside of it, passed through the plexus of veins lying near its lower aspect. A profuse and distinctly venous hæmorrhage followed, which was checked without great difficulty by means of cold and pressure.

Capillary hæmorrhage may be stopped by the tanno-gallic mixture, by pressure, by cold, or, finally, by the gargling of water taken as hot as can be borne.

Of a very large number of cases of tonsillotomy known to the writer, in only one has severe hæmorrhage occurred in a child. This patient, a girl of seven, had hæmophilia, and the Fahnestock instrument was used. Profuse bleeding followed, which was controlled by styptics, but it recurred twice within thirty-six hours, leaving the child almost exsanguinated. Recurrence was evidently caused by the swallowing of food. All food by the mouth was interdicted, and the patient was nourished by rectal alimentation for three days, with complete success.

Finally, annoying and persistent bleeding may occur from the accidental wounding of the anterior pillar of the velum palati in the course of tonsillotomy. The adhesions which often exist between the anterior pillar and the tonsil should be broken up before the removal of the gland is attempted.

From what has been said the following deductions seem justifiable :

I. While an alarming hæmorrhage may follow tonsillotomy serious accidents from this cause are decidedly rare.

II. Tonsillotomy, in children and young persons under eighteen years of age, is, practically, an absolutely safe operation, and it should invariably be preferred to removal by caustic or other applications unless distinctly contraindicated.

III. In the adult discretion must be observed as to the choice of means for removal, particularly in cases where there has been an evident hyperplasia of fibrous tissue.

IV. Tonsillotomy should be done by an experienced operator, and with the means for relief, in case of accident, near at hand.

Discussion.

Dr. ROE said that he quite agreed with the reader of the paper that no fatal case, as far as his observation and reading extended, had ever occurred from hæmorrhage after simple excision of the tonsil for hypertrophy. He had seen three or four instances of severe hæmorrhage in cases of adults or persons over eighteen years of age. He had never met with a case in which he could not arrest the hæmorrhage at once, as soon as it became alarming, by simple pressure with the index-fingers. Two cases he recalled had bled quite freely, but the hæmorrhage was controlled by compression between the fingers on the inside and the thumb on the outside, the patient leaning forward so that the blood would run out of his mouth. There is no danger of wounding large vessels in tonsillotomy; least of all, the internal carotid.

Dr. MACKENZIE thought that the lecturer should be commended for correcting some sensational popular views concerning hæmorrhage after tonsillotomy.

Dr. DALY reported the case of a boy in whom tonsillotomy, done with Physick's tonsillotome, was followed by alarming hæmorrhage. Compression was applied as described by Dr. Roe, and had to be continued for several hours. He did not entirely agree with the tenor of Dr. Mackenzie's remark, since the fear of hæmorrhage was not entirely unfounded; cases occasionally happened which gave rise to considerable well founded alarm.

Dr. SAJOU had formerly believed that there was no danger from hæmorrhage after tonsillotomy, and believed that Dr. Lefferts and others had been unduly alarmed by exaggerating a small amount of bleeding. Finally, a case had come to him upon whom he operated for hypertrophied tonsils, and who had successive hæmorrhages until he thought that the man would die. The bleeding finally was controlled by compression by the patient's fingers; it had recurred at intervals for about two weeks. He had another case where he had only removed a small portion of the tonsil; the bleeding was very great, and several

times it was serious. He had had in all three such cases to report, and now adopted the precaution of pricking the tonsil first before operating; if there is much bleeding through this simple procedure he would not excise. He had concluded some time ago that the use of cocaine increased the tendency to hæmorrhage after tonsillotomy by inducing secondary dilatation of the blood-vessels. He believed that there had been, until the past year, a danger from the fact that the operation of tonsillotomy had been performed too frequently, as hæmorrhage would sometimes occur and it was an accident more grave than was generally supposed.

Dr. DELAVAN said that he had not the slightest desire to underrate the danger, which he fully realized and which statistics proved, of the occurrence of hæmorrhage after tonsillotomy. He only wished to correct the idea that tonsillar hæmorrhage was ever fatal. He had not been able to find a single fatal case on record, or in the experience of himself or others.

Paper.

EFFECTS OF VARYING RATES OF STIMULATION ON THE ACTION
OF THE RECURRENT LARYNGEAL NERVES.

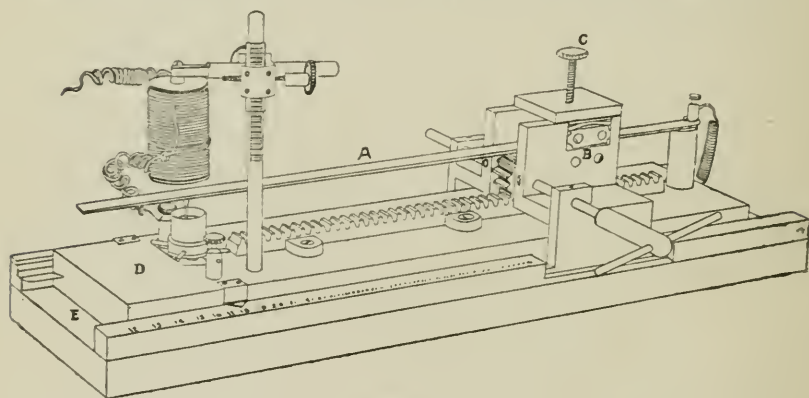
FROM THE PHYSIOLOGICAL LABORATORY OF THE HARVARD MEDICAL
SCHOOL.

By FRANKLIN H. HOOPER, M.D.

IN a preliminary communication on this subject,* Professor Henry P. Bowditch and I recorded the fact that the rate of stimulation of the recurrent laryngeal nerves was an important factor in producing an opening or a closing of the glottis. We stated that slow rates of stimulation (18 to 28 induction shocks in a second) with weak currents produced in dogs an opening of the glottis, while with more rapid rates (30 to 40 a second), the same feeble current being used, closing was the result. We also surmised that the reason that other observers had obtained an opening of the glottis with weak currents might be sought in the slow rate of vibration of the interrupters they had employed. We submit the following experiments to substantiate the statements set forth in our former communication. These experiments have been performed in conjunction with Professor Bowditch, and

* "New York Medical Journal," November 26, 1887.

witnessed by many others besides ourselves. Eleven dogs and four cats have been devoted to the investigation. One dog out of this number, under the influence of chloral, failed to exhibit the phenomenon so constant in all the other animals. In this exceptional dog we obtained only closings of the glottis with all rates and all intensities applied to the recurrent nerves. We have recorded in previous papers* that in dogs sulphuric ether reverses the normal action of the recurrent nerves; the glottis, under the influence of this drug, dilates instead of closing on stimulation of the recurrents. In order, therefore, not to be embarrassed by the "ether effect" in our present research upon the effect of varying rates of stimulation, we used chloralized dogs, inasmuch as we had never been able to produce by the methods previously em-



[FIG. 1.]

ployed a dilatation of the glottis in dogs under the influence of this narcotic. We propose now to describe in detail the apparatus and methods employed in this investigation, and to give a few tables of typical experiments.

The interrupter used was constructed by Professor Bowditch on the principle of Bernstein's acoustic current-breaker. Its construction is shown in Fig. 1. It consists of a vibrating-rod, *A*, the length of which is readily altered by pushing it between steel rollers, *B*, which grasp it firmly. The pressure of the rollers upon the spring is regulated by the screw *C*. The spring, mercury cup, and elec-

* "The Respiratory Function of the Human Larynx," "New York Medical Journal," July 4, 1885; "The Anatomy and Physiology of the Recurrent Laryngeal Nerves," "New York Medical Journal," July 9, 16, 23, and August 6, 1887.

tro-magnet are supported upon a board, *D*, which is made to slide by a rack and pinion movement upon a second board, *E*, which supports the rollers. A scale graduated empirically upon the board *E* indicates, by the position of a pointer, the number of vibrations from 12 to 80 made by the spring in different positions of the apparatus. A second form of interrupter was also employed, which was constructed by Mr. G. W. Fitz, who furnishes the following description of it :

"The interrupter shown in Fig. 2 consists essentially of a steel vibrator (*A*) on which a weight (*B*) slips to regulate the time of vibration. To the weight is attached a cord, which passes over

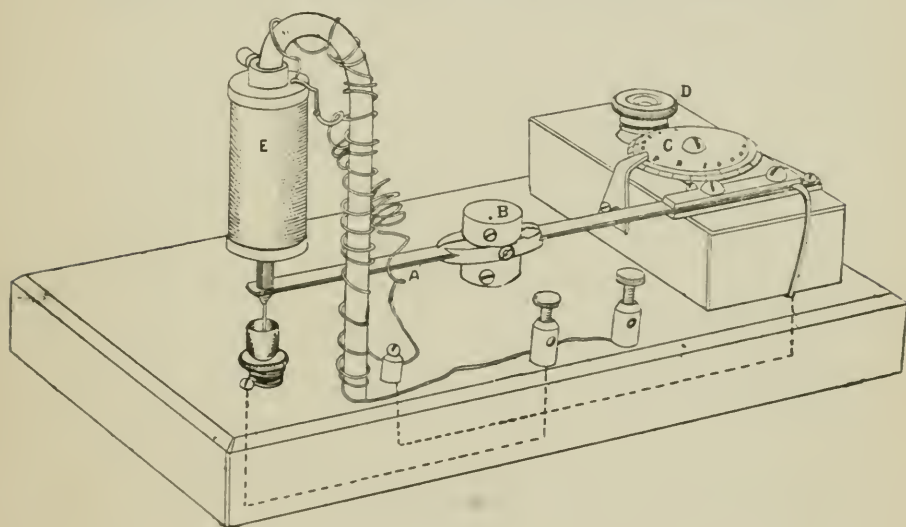


FIG. 2.

the end of the vibrator around the index dial (*C*) and setting head (*D*). By turning *D*, the weight might instantly be changed to any point on the vibrator without stopping its motion—the rate being read on the index dial (*C*). The core of the magnet (*E*) is hollow, and the soft iron process from the vibrator plays within, rendering adjustment unnecessary."

The animals were arranged for observation in the manner hitherto described by us in previous papers. Shielded electrodes were placed on both recurrent laryngeal nerves, which were connected with an induction coil, the latter being in communication with the interrupter. By this arrangement the nerves could be

stimulated at will with any intensity of current* and with any rate of vibration.

In explanation of the letters used in the following tables, we may say that O indicates an opening of the glottis; OC, an opening in the posterior portion of the glottis, and the contraction of the ligamentous portion in front, which gives to the glottis a rhomboidal shape—the appearance, in fact, to which we have alluded in previous communications as the “mixed movement;” C signifies complete closure of the glottis; V, vibrations of the vocal bands.

November 3, 1887.—Mongrel fox-terrier dog; medium-sized; eleven months of age; chloralized.

TABLE I.

Intensities.		Rates of vibration.					
		20	24	28	32	36	40
<i>a</i>	2.....	O	O	O	OC	OC	C
<i>b</i>	3.....	O	O	OC	OC	C	
<i>c</i>	4.....	O	O	OC	OC	C	
<i>d</i>	5.....	O	O	OC	C		
<i>e</i>	6.....	O	O	OC	C		
<i>f</i>	7.....	O	OC	C			
<i>g</i>	8.....	OC	OC	C			
<i>h</i>	10.....	C	C				

It will be seen by the perpendicular column of figures in the above table that the intensity of the stimulation varied from 2 to 10. The horizontal line of figures, indicating the rates of vibration, varied from 20 to 40 in a second. Starting at *a*, with the very feeble irritation of 2, it will be observed that with the rates 20, 24, and 28 opening of the glottis was produced. On increasing the rates to 32 and 36 a contraction of the glottis in front was noticed, the opening behind persisting (mixed movement). With still more rapid rates (40) complete closure took place. In this first trial, then, with a very weak irritation, opening was effected with rates of vibration as rapid as 28; after this there was a

* The intensity of the current is given in arbitrary units, calculated by a method described in a previous paper: “Experimental Researches on the Tension of the Vocal Bands,” “Trans. of the Amer. Laryngological Assoc.,” 1883, p. 121.

tendency to close, and with a rate of 40 complete closure supervened. On increasing the intensity to 3 (*b*) and using the same successive rates of vibration, it will be seen that the tendency to close began with a rate of 28 and complete closure occurred at 36. The third trial (*c*), with an intensity of 4, gave the same results as when an intensity of 3 (*b*) was used. At the fourth trial (*d*), intensity 5, openings took place as with previous rates and intensities, but closing was effected with a rate of 32. It will be observed, therefore, that as the intensity of irritation was increased closing took place with slower rates of vibration; and finally (*h*), with an intensity of 10, closing was effected with a rate of 20, which at the first trial (*a*), when the intensity was 2, gave complete opening, and in which it was necessary to increase the rates to 40 before closing could be elicited.

November 10, 1887.—Scotch terrier dog; old, blind, and feeble; chloralized.

An analysis of the following table shows that the results do not differ in any marked degree from those of Table I. We note in Table II. the vibration of the vocal bands with the weak intensity of 2, and a slow rate of vibration. This vibration of the vocal bands was synchronous with the rate of interruption and was very interesting to watch. On increasing the rate of interruption an opening of the vocal bands was combined with their vibration, yet when a still more rapid rate (22) was used a pronounced opening was obtained, all vibratory movements of the vocal bands having disappeared.

TABLE II.

Intensities.	Rates of vibration.											
	18	20	22	24	26	28	30	32	34	36	38	40
2.....	V	VO	O	O	O	O	OC	OC	OC	OC	OC	C
3.....	O	O	O	O	O	OC	OC	OC	C			
4.....	O	O	OC	OC	OC	OC	C					
5.....	O	O	OC	OC	OC	C						
6.....	O	O	OC	OC	OC	C						
7.....	O	O	OC	OC	OC	C						
8.....	OC	OC	OC	OC	C							
10.....	OC	OC	OC	C								
12.....	C											

May 9, 1888.—Spaniel dog; medium-sized; one year of age; chloralized.

TABLE III.

Intensities.	Rates of vibration.								
	18	20	22	24	26	28	30	34	40
1.....	V	VO	VO	VO	VO	OC	OC	C	C
2.....	VO	VO	O	O	O	OC	C	C	
3.....	VO	O	O	OC	OC	C			
4.....	O	O	OC	OC	OC	C			
5.....	O	OC	OC	OC	C				
6.....	OC	OC	OC	OC	C				
10.....	OC	OC	OC	C					
15.....	OC	C	C						
30.....	OC	C							

The point of the effect of varying rates is well shown in the foregoing table. A very convincing manner of demonstrating the phenomenon is by using two interrupters, the connections with the induction coil being so arranged that by turning a switch the current can be directed through either of the interrupters. In this way stimulations, consisting of induction shocks of any two desired rates, can be alternately sent through the nerve in rapid succession. In the animal which was the subject of the experiments on May 9th, it was determined that with an intensity of 3, rate 40, a very sharp closure of the glottis was produced, while with the same intensity and a rate of 20 an opening of the glottis was effected. Now, by arranging the two interrupters so that the one vibrated 40 times in a second and the other 20, by simply shifting the switch either of these rates could in an instant be passed through the nerves, and an opening or a closing of the glottis followed according to the rate employed.

TABLE IV.

Intensity.	Rate of first interrupter.	Rate of second interrupter.
	20	40
3	O	C

The above-described experiments were performed, as already stated, on chloralized dogs, and seemed to us to be very conclusive. They show that, starting with the slowest rate and the feeblest intensity that could produce any noticeable effect, an open-

ing of the glottis was the phenomenon constantly observed. This opening could be converted into a closing by increasing either the rate or the intensity. But the closing was produced much more readily by increasing the rate than by increasing the intensity. The tables show that doubling the rate was sufficient to call forth a distinct closure, while it was necessary to increase the intensity from three to fourfold. It is evident, therefore, that the cause of the varying results of nerve-stimulation with different rates cannot be sought in the amounts of electricity which were thus applied to the nerves.

In previous communications we have fully detailed the "ether-effect" phenomena, and have recorded that sulphuric ether reverses the normal action of the recurrent nerves; the glottis, under the influence of this drug, dilates instead of closing on stimulation of the recurrents; that the "ether effect" varies according to the susceptibility of the dog, to the amount consumed, and to the intensity of the irritation. Under small doses of ether, stimulation produces closure of the glottis; under large doses, complete dilatation.

The following experiments (Table V.) show very clearly both the "ether effect" and the effects of varying rates of stimulation.

January 19, 1888.—Black-and-tan bitch; about one year of age; tracheotomized. Ether administered through tracheal cannula.*

TABLE V.

Intensities.	Rates of vibration.					
	18	28	34	40	50	80
0.1.....	O	O	O	O	O	O
2.....	O	O	O	O	O	O
3.....	O	O	O	O	O	O
6.....	O	O	O	O	O	O
10.....	O	O	O	O	O	O
15.....	O	O	O	O	O	O
20.....	O	O	O	O	O	O
30.....	O	O	O	O	O	O

It will be seen by the foregoing table that when the animal was profoundly etherized, an opening of the glottis was effected with all intensities and with all rates.

* See cut, "New York Med. Journal," July 23, 1887, p. 100.

The ether was now removed, and, as its effects were passing off, the nerves were stimulated from time to time with different intensities and with varying rates. The results are given in the following table :

TABLE VI.

Hour.	Intensities.	Rates of vibration.			
		18	28	34	40
10.46.	1 to 30	O	O	O	O
10.48.	15	OC	OC	C	
10.49.	2	O	OC	C	
10.50.	2	O	OC	C	
10.50.	30	C			
10.52.	15	C			
10.54.	2	O			
10.54.	13	C			

In our paper last year, already referred to, we stated that our experiments on cats showed that the normal action of the recurrent nerves in that animal was to produce an opening of the glottis instead of a closure, as in the dog. We must now modify that statement, as we have proved that with rapid rates of vibration a closure of the glottis may be called forth in cats. It requires, however, nearly double the rate in the cat that is necessary in the dog. As far as our investigations go, they teach us that, as a rule, in the dog a rate of 40 vibrations in a second is followed by complete closure of the glottis, while in the cat it requires from 70 to 80.

February 16, 1888.—Female cat ; chloralized.

TABLE VII.

Intensities.	Rates of vibration.					
	15	20	30	50	70	80
1.	O	O	O	O	OC	C
3.	O	O	O	O	OC	C
10.	O	O	O	OC	OC	
20.	O	O	OC	OC	C	
50.	O	OC	OC	C		

This table may be taken for the type of our experiments on cats. Experiments with the double interrupters were also made in

the same manner as described for the dogs. One of the interrupters, being set to vibrate at 80, with a feeble current, gave complete closure, while the other, vibrating at 25, produced opening.

TABLE VIH.

Intensity.	Rate of first interrupter.	Rate of second interrupter.
	25	80
2	O	C

We may summarize our conclusions as follows :

1. It requires a more rapid rate of vibration to produce a closing of the glottis in cats than in dogs.
2. In cats the rate of stimulation necessary to effect a closure must be from 70 to 80 a second ; in dogs, from 30 to 40.
3. Rates slower than 70 a second produce in cats an opening of the glottis ; in dogs, rates slower than 30 produce opening.
4. The intensity of the current influences the effect of varying rates of stimulation.
5. Weak currents with slow rates produce opening.
6. By increasing the rates, the intensity remaining the same, closing results.
7. By increasing the intensity, the rate remaining the same, closing results.
8. Closing is produced more readily by increasing the rate than by increasing the intensity.

Discussion.

Mr. VICTOR HORSLEY, of London, having been invited to open the discussion, expressed his admiration and pleasure at hearing the results presented by Dr. Hooper as just described. Dr. Hooper had been the first to call our attention to the effects of certain drugs upon the movements of the larynx ; and now he was the first to demonstrate the effect of different rates of stimulation upon the larynx. The speaker was especially interested in the statement that Dr. Hooper had obtained a repetition of the phenomenon which, in conjunction with Dr. Semon, the speaker had observed in the cat. A few years ago he had performed a series of experiments with Dr. Semon which resulted in the determination of the location of a cortical centre for the larynx in the cat. They found that in the cat, contrary to what usually occurred in the dog,

stimulation of the cortex produced abduction of the vocal bands ; and it was consequently very interesting to him to learn that Dr. Hooper had observed the same thing by stimulating the recurrent nerve that Dr. Semon and he had obtained by stimulating the cortex. It was to be hoped that Dr. Hooper would continue his observations and extend them to the cortex. He would also ask Dr. Hooper to perform these experiments afresh upon monkeys, both upon the recurrent laryngeal nerves and the cortex cerebri, especially since this animal was the nearest to the human being, and because the result obtained would be of the greatest value by independently testing the observations made by other experimenters.

Dr. H. P. BOWDITCH, of Boston, being invited to continue the discussion, said that it might perhaps be of interest to the members of the Association to consider for a moment some theoretical views which naturally ally themselves to the subject. It was evident, from Dr. Hooper's experiments, that a difference in the intensity of the stimulation reverses the action of certain muscles. What explanation could we give of this phenomenon ? One is that the opening muscles are more irritable and at the same time less powerful than the closing muscles, so that slight stimulation causes them to act, whereas a more powerful stimulation brings the more powerful closing muscles into action ; therefore, by continuing and increasing the stimulation, we find that the closing muscles, being stronger, close the larynx in opposition to the opening and weaker ones. Another explanation must be given, however, to the difference shown upon varying the rate of stimulation, to which Dr. Hooper had just directed our attention. A very interesting point in this connection was the way in which these experiments happened to be made. While seeking for an explanation of the varying results of stimulation of the recurrent laryngeal nerve in the hands of different observers, a report of some experiments by Wedensky came to hand. This observer found that with a slow rate of stimulation of the sciatic nerve in frogs, flexion of the leg is produced ; while, with more rapid rates, flexion gives place to extension. An application of this method of investigation to the recurrent laryngeal nerve led to the results which Dr. Hooper had presented ; but, singularly enough, they had been unable to confirm, on Boston frogs, the original experiments of Wedensky which suggested their experiments. The speaker asked Mr. Horsley if he had any theory that would explain the varying action of the muscles under the conditions mentioned by the lecturer ?

Mr. HORSLEY replied that, Dr. Bowditch had raised the point which the speaker had carefully avoided in his previous remarks. It was one upon which he could not speak positively, for the reason that he had not himself arrived at any conclusion with regard to it. He would say, however, that in his own experiments upon the recurrent laryngeal nerve he had observed, in a few instances, that different effects were

produced by applying a very weak stimulus to the different sides of the nerve; thus, when applied to the outer side, the effects were not the same as when the electrode was applied to the inner side. This showed that the ordinary opinions with regard to the easy diffusion of the faradic current through nerves were erroneous; it passes through the nerve-trunk with difficulty. The difference of action, when excitation was made with different rates of current, was quite another, and a very interesting, question.

The PRESIDENT invited Dr. W. W. Keen, of Philadelphia, to speak of the results of some experiments upon the recurrent laryngeal nerve in the human subject which he had made.

Dr. KEEN said that he had made simply one experiment upon an almost living subject—on a criminal who had just been hanged. The injury to the neck was above the point where the nerve was exposed for experiment. The investigation was undertaken at the instance of Dr. S. Weir Mitchell, who had found in his examination of chelonia an anastomosis of the recurrent laryngeal nerves. It was important to ascertain if there was a similar anastomosis in the human subject, because it would be of interest in connection with the differential diagnosis of aneurism of the aorta and of the right subclavian. Paralysis of the vocal band of the affected side would follow if there were no anastomosis, but paralysis of both bands if there were. The stimulation was by an ordinary battery to the exposed nerve, while Dr. Seiler observed the effect upon the larynx with the laryngoscope. It was found that stimulation of one recurrent laryngeal caused abduction of the vocal band on the corresponding side only.

With regard to the subject of the paper, it seemed to him that the explanation given that the closing muscles were more irritable, and at the same time stronger, than their opponents, agreed very well with their function. Closure of the larynx requires stronger muscles than opening it. Just so in the arm, the muscles which have the main work to do, the flexors, are more powerful than the extensors, and probably more irritable.

Dr. S. SOLIS COHEN had witnessed some of the experiments upon the recurrent nerves made by Dr. Donaldson and Dr. Kemp, at the laboratory of the University of Pennsylvania, and he felt convinced, as he had stated four years ago, that so far as the explanation of these experiments was concerned, it was a question of resistance. The effect of ether was simply to heighten the resistance, and hence strong currents acted upon the etherized animal as weak ones did upon the unetherized animal. There is not much difference between the statement that a nerve or muscle "is more irritable" and that "it has less resistance," but he thought the latter the better method of expressing an electrical fact. It is a physiological law that the muscles that are called upon most frequently to perform work offer the least resistance to nervous stimula-

tion, and that the nerve-tracts of most active functions offer the least resistance to the transmission of impulses; it would seem probable *a priori*, therefore, that the abductors of the larynx, and their motor-nerves, being used constantly in the function of respiration, would offer less resistance to the current than the phonatory muscles; although the difference in man might be expected to be less than in the lower animals, because he uses the phonatory muscles so frequently. For similar reasons different results would be obtained with different animals, and, to some extent, with different individuals. A similar explanation might, in a rough way, hold good for the difference in the results from different rates of vibration. The rate of vibration in respiration is slow, in phonation it is rapid. Just as a tuning-fork responds readily to another of the same rate of vibration, we could expect to find the respiratory muscles respond to slow rates of vibration more readily than the phonatory muscles. There are, in the recurrent laryngeal nerve, two sets of nerve-fibres; one set supplying the muscles of phonation that close the glottis, the other set supplying the muscles of respiration that open the glottis. The one function is constantly in action, as a phenomenon of organic life, and its rhythm is slow; the other is manifested less frequently, and its rhythm is rapid, and the nerves and muscles concerned seem, from these experiments, to respond to artificial stimulation accordingly.

Paper.

LARYNGEAL AND PHARYNGEAL PARALYSES.

BY FRANCKE H. BOSWORTH, M.D.

I ASK attention to a consideration of paralysis as affecting the muscular structures of the pharynx and larynx, in order that I may bring forward the question whether we are not, in the large proportion, if not in all cases, to consider true neuropathic paralysis in these regions an evidence of a lesion of the medulla. Of course, we exclude cases of myopathic paralysis such as follow diphtheria, as well as those cases of recurrent laryngeal paralysis dependent on pressure on the nerve-trunk.

That classification of laryngeal paralysis which is based entirely on the anatomy of the organ, such as is given in Mackenzie's* earlier work and followed later by myself,† must be abandoned as failing to make any distinction between true paralysis and myopathic conditions, such as simple muscular weakness.

In this manner our interest in laryngeal paralysis becomes

* "Laryngoscope, Hoarseness, and Loss of Voice." Am. ed., Philadelphia, 1869.

† "Diseases of the Throat and Nose." New York, 1881.

centred really in two conditions, viz., unilateral or bilateral paralysis of the abductor muscles and recurrent laryngeal paralysis. The consideration of pharyngeal paralysis is added as contributing weight to the view that the true clinical significance of either form is in the suggestion that it is due in most instances to some lesion of the medulla.

While the whole motor innervation of the larynx is derived from the recurrent laryngeal nerve, with the exception of the crico-thyroid muscle, which in the present consideration may be discarded, we find this organ endowed with two apparently separate and distinct functions, viz., that of phonation and respiration, the movements by which these functions are accomplished being directed apparently through the same nerve-trunk, yet possessing an action each so entirely independent of the other that they afford a subject of study from a physiological point of view of no little interest; and notwithstanding the many and able contributions which have been made to literature on this subject, it seems to me there are many questions which still remain unsolved, especially those connected with paretic conditions of the respiratory function, namely, unilateral or bilateral paralysis of the abductor muscles. That this disease occurred before the days of laryngoscopy cannot be questioned, yet a diagnosis can only be established by a physical examination; hence our recognition of the affection dates from comparatively recent times, and the disease still is an exceedingly rare one—Mackenzie in his first edition reporting but a single case, while Ziemssen* had collated nine cases. Mackenzie † in his second edition reports having observed sixteen cases, while in a study of the subject made by myself, in 1881, ‡ thirty cases were collated. In the same year Semon § made a valuable contribution to the subject, based on an analysis of twenty-two cases. In addition to these, observations have been made by Krause, || Eisenlohr, ¶ Sokaloff, ** B. Frankel, †† Jean, ‡‡

* "Cyclopedia of Prac. of Med." vol. vii., p. 959. New York, 1876.

† "Diseases of the Throat and Nose," vol. i., p. 442. Amer. ed., 1880.

‡ "N. Y. Med. Jour.," November, 1880.

§ "Arch. of Laryngology," vol. ii., p. 197.

|| "Neurologische Centralblatt," 1885, p. 543; "Berlin. klin. Woch.," 1886, No. 20, p. 651; "Journal of Laryngology," July, 1888.

¶ "Deut. med. Woch.," 1886, No. 21, p. 363; "Arch. f. Psychiatric," vol. ix., pp. 1-45.

** "Deut. Arch. f. klin. Med.," vol. xli., p. 458.

†† "Berlin. klin. Woch.," 1886, No. 40, p. 675.

‡‡ "Progrès médical," 1876, No. 20.

Senator,* Biermer† (as cited by Gottstein), Oppenheim,‡ Ollivier d'Angers§ (as cited by Gottstein), Gerhardt || (as cited by Gottstein), Stephen Mackenzie ¶ (cited by Gottstein); and Saundby.**

There are three views which have been advanced to account for this curious disease.

- I. That it is due to a peripheral lesion ;
- II. That it is due to a morbid lesion in the continuity of the recurrent laryngeal nerve ; and,
- III. That it is due to a central lesion.

I. As regards the peripheral lesion, Mackenzie,†† in his earlier work, states that the cause of the disease is generally cerebral, "but morbid influences which affect both pneumogastric or both recurrent nerves may give rise to it," while in his later work ‡‡ he makes the suggestion that owing to the exposed situation of the abductor muscles on the posterior aspect of the larynx they are especially liable to become the seat of injury, which, added to the fact of their ceaseless activity, renders them vulnerable, and suggests that this fact may act in a causative relation to the disease, apparently abandoning the idea that it may be of cerebral origin. Following the same line of argument, Smith§§ explains the increasing dyspnœa which apparently occurred in his reported case by the suggestion that the progressive weakening of the posticus muscles resulted in a prolapse, as it were, of the posterior wall of the larynx. It may be interesting to note, in this connection, that Smith's case subsequently suffered an attack of cerebral hæmorrhage. Gowers,||| in an ingenious course of reasoning, points out the fact that the abductor muscles are inserted into the arytenoid cartilages at an acute angle, while in the adductors this insertion is at a right angle. Hence pressure affecting the nerve-trunk results in a paralysis, first of the abductors and subsequently of the adductor muscles. Krause, in his admirable series of articles on this subject, seems to have reached the conclusion that the disease is due to a spasm of the adductor muscles, this spasm being due either to a central lesion or it is the result of reflex irrita-

* "Arch. f. Psychiatrie," vol. xi.

† "Die Krankheiten des Kehlkopfes," p. 305. Leipzig und Wien, 1888.

‡ "Berlin. klin. Woch.," 1886, No. 40, p. 675.

§ Op. cit., p. 309.

|| Ibid., 310.

¶ Ibid., 319.

** "Birmingham Med. Review," December, 1886.

†† Op. cit., p. 214.

‡‡ Ibid., 437.

§§ "British Med. Journal," July 13, 1878.

||| "Lancet," June 5, 1886, p. 1077.

tion caused by a lesion of the superior laryngeal nerve. I think it is noticeable that when we attempt to explain the phenomena of bilateral paralysis by a diseased condition of the muscular structures themselves we are dealing largely with pure theory or speculation rather than the direct teaching of clinical observation. A close study of the cases on which this theory is based, it seems to me, hardly justifies the view that a simple local lesion explains all the phenomena of the disease. Thus, in Smith's case the cerebral hæmorrhage which subsequently occurred points very emphatically to a pre-existing cerebral disease which, giving rise in the first instance to paralysis of the abductors, subsequently developed an apoplectic seizure. Furthermore, I recall no well-authenticated case of recovery from bilateral paralysis of the abductors, whereas simple myopathic paresis is not usually regarded as necessarily incurable. Still further, it should be stated that the onset of abductor paralysis is invariably sudden and without warning, whereas a muscular paresis in the nature of the case must be slowly progressive. Krause's curious theory of muscular spasm is open to the same objection, I take it, as that of myopathic paresis, and, furthermore, still leaves us somewhat in the dark. No one has, as yet, demonstrated what constitutes muscular spasm. Certainly, as regards laryngeal spasm, I am strongly of the opinion that this chapter of laryngology is still to be written by a wiser hand than has yet undertaken the subject.

II. As to a morbid condition of the continuity of the nerve as a cause of the disease, pressure on the recurrent laryngeal nerve or other morbid conditions which may interrupt the nerve-current has been a favorite theory by which the phenomena of abductor paralysis is explained. The advocates of this theory are immediately met with what seems to me an insurmountable objection. In a former article on this subject I made this statement: "As to the suggestion that the disease is due to pressure on the recurrent nerve, and that this pressure so far discriminates between the nerve-fibres as to destroy the conductivity of those fibres alone which are distributed to the abductor muscles, it seems to me that the assertion is utterly untenable: that this might happen on one side alone, and that a tumor pressing upon the trunk of the recurrent nerve might so far select its point of pressure as to paralyze the abductor muscles on that side is among the possibilities; that this should happen on both sides and to both recurrent nerve-trunks would be one of the rarest of coincidences;

that it should happen in a large series of cases is simply beyond the pale of possibility." In one of Semon's cases pressure on the recurrent laryngeal nerves seems to have resulted subsequently in bilateral paralysis of the abductors. Here is a clinical observation which, it would seem, is exceedingly difficult to harmonize with the above assertion. The investigations of Exner and Weinzeig,* however, enable us to explain this case of Semon's, which, by the way, I think is quite unique. Both these observers have shown a crossing of the nerves of the larynx, especially of the superior laryngeal, by which the muscles of one side receive innervation from the nerve-trunk entering the opposite side, while Mandlestam† has demonstrated that some of the fibres of the adductor muscles receive innervation from the superior laryngeal nerve. Ziemssen‡ makes the statement that "paralysis of individual branches of the recurrent nerves may arise from incomplete lesions of the trunk as the result of unequal pressure, or when the nerve-fibres are affected in an unequal degree by degenerative changes." Semon,§ completely indorsing Ziemssen's statement, goes further, and asserts that "there is a distinct proclivity of the adductor fibres to become affected in such cases either at an earlier period than the adductor fibres or even exclusively." This proclivity-theory, so ably advocated by Semon, had already been advanced by Rosenbach|| and based on the observation of a single case, and subsequently sustained at the London Congress.¶ I find it difficult to see wherein this idea of Semon's adds to our previous knowledge of the disease. What does he mean by proclivity? What is the essential anatomical or histological condition wherein lies this proclivity or which constitutes a proclivity? It seems not unfair to suggest an analogy between this and that definition of the action of opium which describes it as producing sleep by its hypnotic powers. Moreover, if Semon indorses Ziemssen's teaching that the individual laryngeal muscles may be paralyzed by unequal pressure on the nerve-trunk or differentiated degenerative changes, we need seek no further for an explanation of the fact of the paralysis. The proclivity theory becomes entirely superfluous and uncalled for, if it is possible

* "Monatschrift f. Ohrenheilkunde," December, 1884.

† Ibid.

‡ Op. cit., vol. vii., p. 948.

§ Loc. cit.

|| "Breslau Zeitschrift," 1880, Nos. 2 and 3.

¶ "International Med. Congress—Trans.," vol. iii., p. 222.

that the individual fibre of the nerve-trunk which supplies the posticus muscles has been sought out and destroyed by any morbid process. I have no desire to ignore the teaching of the admirable series of experiments performed by Semon in connection with Victor Horsley,* although I do not think they sustain Semon's proclivity theory. Briefly, these experiments were as follows: The recurrent laryngeal nerve in one of the lower animals was exposed and ligatured. At the end of several days the animal was killed, and an examination showed degeneration of the abductor muscles, with but slight changes in the other muscles supplied by the nerve. In addition to this, another experiment was performed, by which the larynx was removed from the animal and the trunk of the recurrent nerve subjected to an electric current, demonstrating that the contraction ceased in the abductor muscles before the others, or, in other words, the abductors died first. The experiments of F. Donaldson, Jr.,† in connection with Professor Martin, in the laboratory of the Johns Hopkins University, differed from the above in that they were performed upon a living animal, although subsequently verified on the dead subject. The conclusions were virtually the same, in showing that as the result of stimulation of the recurrent laryngeal nerve by the electric current the adductor muscles survived the abductors. The admirable series of experiments made by Hooper,‡ in connection with Professor Bowditch, in the physiological laboratory of Harvard University, in the same line of investigation failed to substantiate the conclusions arrived at by Semon, Horsley, and Donaldson, in that under electrical stimulus the abductor fibres showed an amount of vitality fully equal to the adductors. The fact, however, seems to be established fairly well that under stimulation the adductor fibres show greater vitality than the abductors; or, in other words, that the abductor fibres show a proclivity, if you like, to paralysis, Hooper's experiments alone failing to establish this view. This greater vitality of the adductor muscles is still further illustrated in those cases of bilateral ankylosis of the crico-arytenoid joint improperly regarded as cases of bilateral paralysis of the abductor muscles. Thus, in the two cases reported by Lefferts§ as the result of syphilis there was apparently bilateral

* "Brit. Med. Journal," August 28 and September 4, 1886, pp. 405 and 445.

† "Trans. of the Amer. Laryngological Assoc.," 1886 and 1887.

‡ Ibid., 1885, 1886, and 1887.

§ "N. Y. Med. Journal," December, 1878.

paralysis. It seems to me, however, that a nicer diagnosis would show that the blood-poison had given rise to a local ankylosis of the crico-arytenoid joint and fixation of the cords in the median line, due to the fact that the more powerful structure of the adductor muscles overcame the less resistance on the part of the abductors.

How far these experiments throw light on the causation of the abductor paralysis I think still remains an open question. That they prove a difference in the response to electrical stimulation, on the part of the phonatory and respiratory muscles of the larynx, is conceded, and I think we may naturally anticipate that this would be the case. The two functions differ essentially and in a very marked degree. The respiratory movements of the larynx are unceasing, commencing with the first breath of life and only ending with dissolution. The phonatory movements of the larynx, on the other hand, are intermittent. The respiratory movements are involuntary, the phonatory movements voluntary. These functions, therefore, necessarily involve certain differences in innervation. I think an analogy may be suggested between the posticus muscles and the cardiac muscles, in that their contraction never ceases during life. May we not venture a further analogy in that, under an electric stimulus, the heart is arrested in diastole, or, in other words, it is for the time paralyzed? Under the electric stimulus, if continued, the abductor muscle is paralyzed. The analogy, of course, is not complete, but a certain similarity in the action of these two muscles, the cardiac and the abductor, under the electric stimulus, is suggested.

After all, it is a question as to how far physiological experiment aids us in the elucidation of the finer points in neuropathology. Can the nice differentiation and delicate localization of a morbid process at the ganglionic centres, or in the continuity of a nerve, be in any way imitated, or even approached, by the harsh, coarse, and rude manipulations of the physiologist's scalpel and scissors? In clinical study, then, and analysis of symptoms as they present themselves to us in the cases which come under our observation, I think we must seek for the true cause of these affections; and certainly, if my conclusions shall be correct, we will find a strong confirmation here in the view that abductor paralysis is due not to a peripheral lesion or to disease of the nerve-trunk, but to

III.—Some morbid condition of the nerve-centres.

Mackenzie, in his later work, seems to have abandoned the idea that this disease was due to a central lesion, as suggested in his earlier work. In my article, already quoted, I wrote as follows : "Reasoning from analogy, considering the peculiar character of the respiratory movements of the larynx in that they are purely involuntary and also reflex, that the opening of the glottis constituting the respiratory movement is an independent action separate from all the other movements which take place in the larynx as the result of muscular contractions, it is fair to conclude that this function is presided over by an independent ganglionic nerve-centre, and that the disease in question consists in some degenerative change taking place in this portion of the nerve-centres."

This article was written in 1880, and I think that such light as has been thrown on the subject since that time only serves to substantiate this teaching. Furthermore, as before suggested, our best information must come from the study of cases and analysis of their symptoms. The following cases, hitherto unpublished, are taken from my own note-books.

CASE I.—Bilateral paralysis of the abductors in the early stage of tabes.

H. S. W., aged forty-eight, merchant, was referred to me, June 5, 1883, by Dr. Crumm, of South Otselic, N. Y., with the following history : In October, 1881, as the result of exposure, he contracted a cold, resulting in sore throat and loss of voice. At the end of a week he had a violent attack of dyspnoea, lasting perhaps a minute, characterized with noisy inspiration. The sore throat and loss of voice disappeared, but during the next fifteen months he had almost daily recurrent attacks of inspiratory dyspnoea, lasting a few seconds at a time, with no other symptoms. In addition to this he had occasional attacks of neuralgia, with some impairment of general health, otherwise no change. When he consulted me, a chest examination revealed nothing abnormal ; in the larynx the mucous membrane was fairly healthy, while the vocal cords were nearly motionless and parallel in the median line. I gave an unfavorable opinion on the case, and sent him home. After leaving New York he gradually developed motor and sensory paralysis, beginning in the right lower extremity, then affecting the left, and ultimately the upper extremities. These symptoms began in the winter of 1883-84, a few months before his death, which occurred in the spring of 1885, with marked evidences of paralysis of the facial and lingual muscles.

CASE II.—Unilateral paralysis of the palatal and pharyngeal muscles as the result of bulbar hæmorrhage.

H. L., German, aged sixty-three, merchant, consulted me on the 19th

of August, with the following history: Three months before, he arose in the morning with a feeling of general malaise, weariness on exertion, with a notable difficulty of articulation, and the feeling of an exceedingly thick tongue. On attempting to swallow at breakfast, the bolus lodged in his throat, giving rise to a threatened attack of suffocation until the mass was expelled. Fluids passed to the stomach slowly and with difficulty. The condition improved somewhat until he consulted me, when he was able to take a fair amount of nourishment, although always with exceeding difficulty. An examination of the fauces showed the uvula slightly tilted to one side, while, on protrusion of the tongue, the tip was bent to the same side. His speech was slow and articulation thick. On pricking the pharynx and palate on one side reflex contractions were excited with considerable difficulty, while on the other side the response was prompt. Nothing was noticeable in his movements in walking other than that they were slow and apparently feeble. On directing him to hop on one leg and then on the other, it was ascertained that it was impossible for him to stand or hop on the left leg. Treatment in this case was absolutely of no avail. The disease progressed slowly until the following spring, when he died of inanition. During the last three months of his life the only nourishment he received was administered through an œsophageal tube, deglutition being impossible. My diagnosis in this case was hæmorrhage into the medulla near the nucleus of the glosso-pharyngeal, pneumogastric, and hypoglossal nerves, with subsequent softening, invading the restiform and olivary bodies.

CASE III.—Paresis of the palatal and pharyngeal muscles as the result of obliterating endarteritis in a gouty patient.

H. M., aged sixty-two, was a case similar to Case II., with the exception of the ultimate recovery. He consulted me, November 14, 1886, with the history of rising in the morning a week previously with a feeling of general malaise and weakness of the limbs, which compelled him to lie down again. His speech was slow and thick, and articulation difficult. On his breakfast being brought to him in bed, he found considerable difficulty in swallowing both solids and liquids, although he managed to pass the softer kinds of food into the stomach, while the liquids were regurgitated into the nose. An examination of this patient, when I saw him, revealed the same symptoms as those of Case No. II. The uvula was bent to the left, narrowing the palatal arch to that side, while the right arch was broader than normal. On protrusion of the tongue, the tip was turned to the right side. In attempting to stand or hop on one leg, a notable weakness of the left side was ascertained. This patient always enjoyed fairly good general health, with the exception of occasional attacks of gout, from which he had been a sufferer many years. This patient was under my care for two months, and made a fairly good recovery under the administration of general tonics, strychn-

nia, and lithia, although even up to the present time there is a noticeable impairment in his articulation and lack of vigor in locomotion. The diagnosis in this case was obliterating endarteritis of one of the small vessels distributed in the medulla, undoubtedly the result of the gouty habit.

CASE IV.—Paralysis of the pharyngeal constrictors as the result of endarteritis deformans.

A. S. R., aged fifty-two, merchant, consulted me, May 9, 1888. Up to ten weeks before he consulted me he was perfectly well. On rising in the morning he found that he could not speak. There had been no premonitory symptoms, no giddiness, headaches, etc. On attempting to eat, he found that he could not swallow easily. Solid food seemed to stick in the throat and cause choking. There was slight weakness of the right hand, but no other paralytic symptoms of the extremities. He immediately began to be troubled with salivation, the tongue felt swollen, the lips could not be approximated to whistle or to say "O." After this he went to Washington and Fortress Monroe, and seemed to improve under the warm weather. About a week before he consulted me he took cold, and the hoarseness, which had almost totally disappeared, and his difficulty in swallowing, which during this interval had not troubled him, returned. At the time of examination both symptoms seemed ameliorated, but still present. Since the attack he had lost flesh and strength. There were no cardiac, renal, or pulmonary symptoms. On examination, the larynx was normal, no difference in sensation between the two sides of the palate; pupils sluggish to accommodation, but react perfectly to light. No loss of power in the extremities, tendon reflex normal; no facial paralysis, no deviation of the tongue; no intrathoracic trouble found on physical examination. Retinae normal, field of vision not limited. There was sluggish movement of the palatal and pharyngeal muscles on both sides. This patient was put under the administration of strychnine, and directed to return to Richmond and Washington for two months and abandon any idea of attending to business. At the end of this time I saw him again, and discovered a very satisfactory state of improvement, although there was still evidence of mild faccial paresis. This improvement has slowly continued, and he has resumed charge of his business in Maine. My diagnosis in this case was deforming endarteritis, probably the result of a gouty habit, there being no reason to suspect syphilis. The prognosis given was a guarded one, and made dependent on the careful regulation of his mode of life in the future.

The above cases are reported as containing many points of interest and offering much of suggestion in demonstrating the localized manifestations of the symptoms which arise from organic disease of the medulla. The next case is of special interest as

illustrating how a localized morbid process in the medulla may give rise to both a laryngeal and pharyngeal paralysis.

CASE V.—Mrs. B., aged fifty-three, consulted me, June 1, 1888, with the following history. Several weeks ago she awakened somewhat suddenly in the morning with a violent cough, with difficulty in breathing, the difficulty being of an inspiratory character. In connection with this, there was moderate hoarseness and difficulty in swallowing. The dyspnoëic attacks recurred daily, lasting from a few seconds to a minute, and always characterized by a peculiar crowing, inspiratory sound. These symptoms persisted without much change until I saw her, the dysphagia being of such a character as to seriously impair general nutrition. The hoarseness improved somewhat, but there was a noticeable impairment in phonation; the voice was weak. When I examined her I found the vocal cord of the left side motionless in the median line, indicating complete abductor paralysis; while on the right side there was a very limited amount of motion, abduction being but partially accomplished. An examination of the fauces showed sensation normal, but a very sluggish reflex action on both sides in responding to the impact of the probe, which was more marked on the left side. Speech slow and somewhat difficult, not scanning. No deviation of the tongue. Stands easily with the eyes closed; touches the tip of the nose and ears with the eyes closed. No paresis of the muscles of the extremities. Tendon reflex normal. There was a suspicion of syphilis in this case, which indicated the administration of iodide of potassium. The result of treatment was in every way satisfactory. At the end of a month the cough, dyspnoea, and dysphagia had completely disappeared, although an examination of the larynx showed the left vocal cord still motionless, with an improvement of the movements of the right cord, while the faucial muscles also showed an equal degree of improved action. With the exception of a slight relapse in the following week, the further history of this case was one of improvement, although on the last examination there was still complete left abductor paralysis.

CASE VI.—J. H., aged thirty-three, saloon-keeper, was referred to me by a Dr. Hyland, of Amsterdam, N. Y., on October 3, 1887, with the following history. Fifteen months ago he awakened in the morning with almost complete loss of voice, with no notable symptoms other than some rather obscure neuralgic pains, with difficulty or sluggishness of movement in his left arm. These symptoms persisted for a few weeks and gradually disappeared, involving no notable discomfort or interference with his ordinary occupation. One year later he was suddenly seized with an attack of what he describes as choking, a sudden catching for his breath, followed by loss of consciousness which lasted an hour. On emerging from this state, he was conscious of no new symptoms. His weak voice persisted and was perhaps a little more notice-

able. At the suggestion of Dr. Hyland he consulted me on a casual visit to the city, at which time an examination revealed complete paralysis of the left side of the larynx, the cord remaining motionless in a cadaveric position. A thorough physical examination failed to reveal any discoverable lesion of the thoracic organs, and no impairment in the organs of locomotion or speech.

In this case there was probably an embolic formation in a small blood-vessel in his earlier attack, with a similar formation later, shutting off the blood-supply from a larger tract of the medulla. The interesting feature of this case lies in the fact that we have a bulbar lesion involving only the nuclei of those fibres of the accessory which go to make up the recurrent laryngeal nerve. That the lesion in this case was in the medulla I think can hardly be questioned, in view of the fact of his second apoplectic seizure. This is notably substantiated also by many cases found in the literature of the subject, although I recall none reported in which the bulbar disease gave rise to recurrent laryngeal paralysis alone without involving other parts. Thus, in an interesting case reported by Hughlings-Jackson,* there was paralysis of the right side of the tongue, with wasting paralysis of the right vocal cord; slight weakness of the limbs, especially on the right side. There was no post-mortem. The lesion was located by Dr. Jackson in the bulb. In another case, by the same author,† there was sudden paralysis of the tongue on both sides, difficulty of deglutition, and loss of voice, with apparent paresis of the cords. There was no post-mortem. In this case, Dr. Jackson considered the diagnosis of bulbar disease as established. In another case‡ there was paralysis of the seventh nerve, of the left half of the tongue and palate, and of the left vocal cord. Post-mortem examination showed softening of the medulla in the region of the anterior pyramid and nodes of the cerebral arteries. There was a history of syphilis in this case. In another case of the same author§ there was paralysis of the sixth, seventh, and eighth nerves of one side, the right cord being in the cadaveric position. Post-mortem examination revealed extensive disease in the right side of the medulla and pons. There was also a history of syphilis in this case. In the same connection, a case is reported by Proust,

* "London Hospital Reports," vol. i., 1864, p. 361.

† *Ibid.*, p. 368.

‡ *Ibid.*, vol. iv., 1867, p. 314.

§ *Ibid.*, p. 318.

as cited by Hallopau,* of a female, aged sixty-eight, who suffered from complete paralysis of the vocal cords and dysphagia, intelligence not being affected. The autopsy showed thrombosis of the left vertebral artery, obliteration of the posterior inferior cerebellar artery, and softening of the floor of the fourth ventricle in the region of the nucleus of the hypoglossal, accessory, and facial nerves. In a case reported by Senator † there was difficulty of swallowing, sensory paralysis, impaired voice with nasal intonation. Laryngoscopical examination showed double recurrent paralysis of the vocal cords. The autopsy showed an area of softening involving the olivary body, nucleus of the hypoglossus, and a portion of the fibres of the vagus. In a case reported by Smith ‡ there was inspiratory dyspnoea. Laryngoscopy showed double abductor paralysis, the patient a short time after having an apoplectic attack with loss of consciousness and slight impairment of power in the upper and lower extremities of the left side. Smith attributes the laryngeal symptom to exposure to cold and overexertion; but, from the subsequent history of apoplexy, it seems more probable that the laryngeal symptoms may have been due to a bulbar hæmorrhage. Biermier, as cited by Gottstein,§ reports a patient, aged fifty-six, who suffered from recurrent paralysis of the right side, together with paresis of the right half of the palate and analgesia of the mucous membrane of the right side of the mouth and of the integument about the right eye. The attack came on suddenly and was attended by headache. The diagnosis was thrombosis of the posterior cerebral artery, with a softening of the medulla. There was a history of syphilis. Dumesnil || has written an elaborate article on unilateral paralysis of the soft palate, citing twelve cases in which he observed this symptom.

Case VIII. is worthy of note in that an autopsy was performed which revealed an area of softening in the right testiform body about the size of a pea, the patient dying of cancer of the pylorus. In this case the paralysis was confined to the palate alone. Eisenlohr ¶ refers to three cases which came under his observation, showing a paretic condition of the cords and impaired voice.

* "Des Paralyes bulbaires," Paris, 1875, History 23.

† "Arch. f. Psychiatrie," vol. xi.

‡ Loc. cit.

§ Op. cit., p. 305.

|| "Arch. générales de Médecine," 1875.

¶ "Deut. med. Woch.," 1886, p. 363.

In one case there was thrombosis of the left vertebral artery and degeneration of the left pyramid, and of the right to a certain extent, with sclerosis of the ependyma of the floor of the fourth ventricle. The second case showed atheromatous degeneration of the arteries of the base, narrowing of the vertebral, obliteration of the small vessels running from the basilar arteries to the pons, and degeneration of both pyramids, especially of the left. In the third case, a male patient, aged thirty-three, suffered from complete recurrent paralysis of the left side of the larynx, paralysis of the left side of the palate and left side of the pharynx; voice not affected. There was diminution of sensibility of the skin over the left trigeminus distribution; the facial, motor portion of the fifth, and hypoglossal nerves were intact. The post-mortem showed the left recurrent involved in a thickened pleura and degeneration of the bulb and upper part of the cord. Sokaloff* cites the case of a woman, thirty-five years of age, suffering from weakness of the right arm and leg, defective hearing, face drawn to the left, difficulty in swallowing, deviation of the tongue and uvula to the right, and paralysis of the left vocal cord. Later in the disease there was dyspnoea. The autopsy showed a glioma involving the left side of the pons, medulla, and olivary body. Ollivier d'Angers† cites the case of a male, sixty-eight years of age, suffering from bilateral paralysis of the abductors, dysphagia, spasmodic attacks of coughing, paraplegia, and weakness of the arms. The autopsy revealed an aneurism of the basilar artery, compressing the olivary body and the nuclei of the glosso-pharyngeal, vagus, and hypoglossal nerves. Gerhardt‡ cites a case of left posticus paralysis, with carcinoma compressing the medulla. A similar case is reported by McBride, as cited by Gottstein,§ in which carcinoma at the base of the skull gave rise to paralytic symptoms involving the hypoglossal and the glosso-pharyngeal nerves of the left side, left abductor paralysis, and complete anæsthesia of the left half of the larynx. A somewhat similar case is reported by Nothnagel,|| in which an abscess originating in the petrous portion of the temporal bone gave rise to paralysis and atrophy of the left side of the palate, anæsthesia of the left half of the larynx, abductor paralysis of the left vocal cord, dysphagia, and paresis over the distribution of the left facial, abducens, and trigeminus. Krause¶

* Loc. cit.

† Loc. cit.

‡ Op. cit.

§ Op. cit., p. 311.

|| "Wien. mediz. Blätter," 1884, No. 9.

¶ "Neurologische Centralblatt," 1885, p. 543.

mentions one case of abductor paralysis necessitating tracheotomy. Death occurred apparently from suffocation. The autopsy showed a clot in the medulla at the nucleus of the vagus and spinal accessory nerves.

Perhaps no chapter in neurology better illustrates the point which we desire to emphasize—namely, that a laryngeal paralysis should always call our attention to the fact of its probable source in the medulla—than the clinical history of locomotor ataxia or tabes dorsalis. Duchenne, Féréol,* and Charcot† lay special emphasis on laryngeal crises, or cough and dyspnoea, as not infrequently accompanying the early stages of the disease, although not defining the specific condition observed on laryngeal examination. This point was still further and very fully elaborated by Cherschevsky,‡ who failed to describe definitely the laryngeal conditions. That the special condition should be so long overlooked is perhaps not remarkable when we consider, as Gottstein§ suggests, that unilateral paralysis of the abductors may give rise to no special symptoms with reference to the voice.

Krause,|| in reporting three cases of tabes, gives a definite description of the laryngeal conditions as revealed by examination. In one of these cases there was anæsthesia of the lining membrane of the larynx and loss of reflex irritability. In the other two, reflex irritability was retained. In all these cases the cords were paralyzed in the median line. Krause explains this condition on the theory of spasm. As before stated, this view I regard as untenable, the condition being one of genuine paralysis of the abductor muscles, as illustrated in the case reported by Ross,¶ in which the characteristic symptoms of tabes were present, and an autopsy revealed degeneration of the medulla in the region of the columns of Goll and in the posterior nuclear zone and in the cerebellar crura. In the case reported by Kehler,** there was difficulty in swallowing, the right vocal cord was in the cadaveric position, the left was normal; there were also attacks of coughing, pharyngeal paralysis, and paralysis of the closers of the epiglottis. The autopsy showed ependymitis of the floor of the fourth ventricle, with sclerosis involving the vagus nucleus, especially the right. Oppenheim ††

* "Gaz. hebdomadaire," 1869, No. 7, p. 108.

† "Progrès médical," 1879, No. 17, p. 319.

‡ "Revue de Méd.," 1881, No. 1.

§ Op. cit., p. 323.

|| "Berlin. klin. Woch.," 1886, No. 20, p. 651.

¶ "Brain," London, 1888.

** "Zeitschr. f. Heilkunde," 1881, p. 440.

†† Loc. cit.

cites a case of paralysis of the right side of the palate, right vocal cord, the ocular muscles, and paræsthesia of the right lower extremities with loss of knee-jerk. Electrical stimulation of the right recurrent nerve in the neck did not cause abduction of the vocal cord, although a similar experiment performed on the left side was successful. This experiment would seem to indicate degeneration in the trunk of the nerve, and yet this would not necessarily contraindicate disease of the medulla. No autopsy was made in this case. Jean* cites a curious case of laryngeal cough with spasm of the pharyngeal muscles, the autopsy showing atrophy of the restiform body and posterior pyramids, and atrophy of the filaments of the left pneumogastric and spinal accessory at their origin. Wegner† is quoted as reporting two cases of his own and making a compilation of other cases of tabes with laryngeal paralysis, in all of which the laryngoscopic lesion was the same, namely, paralysis of the abductor muscles. In a case reported by Semon,‡ of bilateral paralysis of the abductors, the patient developed well-marked symptoms of tabes two years later. Semon takes the ground that there is no necessary connection between the two, and attributes the paralysis to other causes. In the light of later reports this position is hardly tenable, laryngeal paralysis marking more probably the early development of the spinal disease. Thus, in the first of my own cases the tabes did not develop for more than two years after the laryngeal symptoms set in. Saundby§ reports a case of tabes in which there was paralysis of the abductors and paresis of the adductors with abnormal frequency of the heart's action. On autopsy, there was degeneration of the posterior fibres of the cord extending into the medulla, involving the posterior pyramids and restiform bodies. The recurrent nerve was in a condition of chronic interstitial neuritis.

We find thus, in examining the literature of this subject from a purely clinical point, how strong the evidence is that a very large portion of cases of laryngeal paralysis have their origin in the medulla oblongata. Experience teaches us that the physiology of the brain is best studied through an investigation of pathological conditions. Certainly, as far as the question of localization of function is concerned, by far the most valuable part of

* Loc. cit. † "Annual of the Universal Med. Sciences," vol. i., p. 89.

‡ "Clinical Society Trans.," vol. xi., p. 141.

§ "Birmingham Med. Review," December, 1886.

our knowledge of this subject is derived from a study of pathological conditions.

The question suggests itself in this connection, then, as to how far we are justified in looking for a motor centre of the larynx in the cortical substance of the brain. In none of the cases above reported was there discovered any evidence of a cortical lesion, and yet we find the various muscular movements of the larynx, as well as sensation, completely abolished by morbid conditions confined entirely to the medullary tissues.

I think, if one study closely the case reported by Delavan* and compare it with many of the cases above alluded to, the opinion certainly is warranted that Delavan's case was a bulbar clot rather than an effusion into the brain-substance proper. I can hardly justify his conclusion, therefore, that it establishes the existence of a motor centre of the larynx in the third frontal convolution of the brain. Krause,† following the same line of investigation, made a series of experiments on lower animals in which, by irritating the surface of the brain at the base of the præfrontal convolution, he produced phenomena which would seem to lend weight to Delavan's theory, but when he resorted to more vigorous measures, in destroying the brain-tissue, his results were far from satisfactory. Masini‡ indorses this opinion of Krause without, however, substantiating his view by reporting any experimentation on his own part. I think, in estimating the value of Krause's experiments, it is necessary to bear in mind the statement already made of the very great difficulty of imitating the hidden processes of disease by the coarse and bungling methods of physiological investigation.

Paper.

ON SOME MILD MEASURES IN THE TREATMENT OF INTRANASAL HYPERTROPHIES AND INFLAMMATIONS.

By W. H. DALY, M.D.

IN the early part of the present decade, when American laryngology was, in a figurative, general sense, in its first short-clothes, the intranasal structures comprised a region upon which the profession, even those of us who were then freshly budding

* "N. Y. Med. Record," February 14, 1885, p. 178.

† "Arch. f. Anatomie und Physiologie." Phys. Abtheil., 1884.

‡ Twelfth Congress of Italian Physicians and Surgeons.

laryngologists, rarely ventured surgically without a misgiving that we were doing something that was unorthodox. These were the days when the war-cry had not yet been sounded by the pioneers on the outposts to attack the enemy in the nose ; that here some of the chief destroyers of mankind lay hidden ; that in the interior of these curved, irregular, and mysteriously arranged chambers and their more adjacent cavities, the antra, frontal sinuses, and ethmoidal cells, lurked many of the sources of fleshly ills, from the myxomatous polyp to the predisposing cause of hay asthma. In these days, you will remember, our armamentarium did not include so many of the instrumental devices for working in the nose as have since been given to us by the fertility of our collaborators ; and, as my lot was cast in "out of the way" Pittsburg, where instrument-makers were not convenient, much of my work upon the interior structures of the nose was done with serrated edged scissors of my own pattern. And, by the way, I am very fond of using the same instruments yet, whenever I can adapt them to the work in hand. I was upon one occasion, during these earlier times, consulted by a brawny iron-worker who complained of compulsory mouth-breathing. Upon examination I found the difficulty was caused solely by a bagging hypertrophy of the soft tissues over the inferior turbinates, anteriorly, in each nostril. The patient said that he had hunted for my office all over the city, and insisted on having something radical done at once.

In my disposition to oblige his importunate demands I proposed that I should, with the angular serrated scissors, cut off the bagging hypertrophy in one nostril, then plug the cavity with a styptic cotton plug upon a piece of rubber tubing, and asked him if he could stand a little cutting, to which he answered lustily : "Yes! I am no boy. I can stand to have my head cut off." Everything in readiness, I proceeded, when at the first crush of the scissor-blades, and before they had met in the tissues, the patient yelled for me to stop, and, laying hold of my hands, withdrew the scissors from his nose, and then fell to the floor, fainting. As he slowly recovered from this condition, by my elevating his feet, the blood began to flow in the most alarming manner from the wounded tissues, and in this state it was with difficulty I restrained him from running out of my office. He persistently refused to allow me even to look into the cavity again.

I am not sure whether the alarming hæmorrhage finally ceased

from my external compression on the alae nasi, or the exhaustion of the patient, since he would not allow me to plug the nostril. He left as soon as he could get away, with an altered mind concerning radical measures and a faded courage, but a steady determination fully expressed to have nothing more to do with me.

I never saw him again until a year or more afterward, when he fell under my care as a heritage from my colleague who preceded me in service in the medical wards of the Western Pennsylvania Hospital.

The man was then a convalescent from another ailment, and I obtained a history of his case after the operation to which I have in the foregoing lines referred. He told me that he bled from the naris more or less for ten days after the cutting, when gradually good breathing-capacity supervened in that nostril and it continued in this free and open condition, even when he suffered otherwise with cold in the head. An examination was now permitted by the patient, and I found the right naris, upon which I had made the frustrated attempt at abscission, to be in a normal condition, revealing no scar or other evidence that it had ever been other than normal. Its fellow was, however, in its old condition of stenosis.

To me there was a valuable lesson in this case which I determined to turn to an account, and to this end I persuaded the man to allow me to use similar means, of a milder nature, in the other naris. This was at last consented to, and at intervals of a few days small and deep punctures were resorted to, with a knife similar to that used for incising the cornea in the extraction of cataract. I abstracted from one-half to three ounces of blood at a sitting; and in a few weeks we were rewarded with a reduction of the tissues and an entire freedom in nasal breathing, and a cure of a permanent character.

Since then I have practised incisions and punctures in every case in which there was a contraindication to the more radical measures which we ordinarily use. The latter cases are numerous, embracing those in which the galvano-cautery is objected to, and in which the small saw, the scissors or snare are repugnant to the mind of the patient who is suffering from one of the various intranasal deformities resulting from or concomitant with the different stages of inflammation and hyperplasia so commonly seen connected with catarrhal diseases of the naso-pharynx. There is a class of cases, an example of which is seen in the following

taken from my case-books, in which this mild measure is especially appropriate and efficacious.

Miss S. M., of Pittsburg, referred to me by one of our New York colleagues, with catarrhal disease of the naso-pharynx. She was the only remaining child of wealthy parents, who had lost a number of grown children, and were consequently not only nervous and timid about any measure that appeared at all severe, but the lady herself was a very frail person, and subject, under the slightest cause, to serious fainting spells that confined her to bed and left her heart's action weak for days at a time.

The chief but not the only cause of her naso-pharyngo-laryngeal catarrh was an extensively thickened septum, from chondritis. Upon its plane, in the left naris, the adventitious tissue filled the cavity to stenosis. The saw was forbidden even to be mentioned, or any other of the severer measures of like nature, and only the milder incisions with the knife were resorted to surreptitiously, until the sight of blood following my examination became a thing usually looked for, and it was attended with constantly increasing benefit. I finally showed her that the innocent-looking handle, on the end of which was wrapped a piece of cotton, that I used ostensibly to cleanse the surfaces, really concealed the blade of a small knife, with which I made as many punctures deep down into the inflamed tissues as I could at each sitting, without exciting suspicion on the patient's part or producing any mental impression that would bring on fainting. These incisions were at length known to the patient and agreed to, and the gradual but sure result was a reduction of the hyperplasia upon the septum narium, curing the concomitant catarrhal disease in the pharynx and larynx ; but most of all to be noticed was the improvement in the general health of the patient.

This, gentlemen, is a type of case and the style of treatment of which I could give you a very long and somewhat varying list from my case-books ; and now, after several years' experience with this milder form of surgical measure, I bring the simple plan to your notice, believing that, even if many of you have already used it, it will not be altogether amiss for me to attest its value in this brief recital of actual experience

Discussion.

Dr. GLASGOW said that he had not exactly understood the character of the case reported. Was it a case of hypertrophy or a case of congestion?

Dr. DALY answered that it was neither. It was just what was stated: it was a thickening upon the plane of the left side of the septum, which nearly occluded the nostril-cavity. It was mostly soft tissue, but there was a little thickening left upon the cartilage.

Dr. GLASGOW said that he was very happy to hear this paper, as it was a return to more conservative treatment. It reminded him of the plan of treatment that he had advocated some years ago in the management of congestive headache; but in that paper he had stated that hypertrophy would not be relieved by this treatment, but simply the congestion. He had not found that scarifying with the knife produced any result in true hypertrophy, but it produces most marked results in the congestive variety. Where the congestion was marked he could see how this procedure could be of great benefit.

Dr. J. SOLIS-COHEN alluded to the practice of scarifying old ulcers which had resisted every other form of treatment, and under which method they healed rapidly.

Dr. SAJOUS said that in cases presenting very great enlargement the results obtained from the application of the edge of the galvano-cautery knife were remarkable. In the first place, the result was a division of the cavernous tissue; and, secondly, the production of cicatricial tissue, the ultimate end reached being the same as by other means.

Dr. DALY said that in certain cases of hypertrophy, if the patient was willing to take the time, the method of treatment advocated would not be altogether disappointing. This opinion was based upon actual experience during the last seven or eight years. Indeed, it was sometimes a question whether the patient should be treated with mild measures or not treated at all. After all, hypertrophy was the result of increased nutrition. The punctures reduced the amount of blood in the part and destroyed certain of the blood-vessels; they arrested the nutrition in the growth in the first place, and in the second they set the absorbents at work, so that in the course of time there would be a reduction in the hypertrophy.

With regard to the galvano-cautery for these affections, he recalled the fact that some ten years ago he was using the galvano-cautery very freely, and had used it in some three hundred cases; he had used it on ten patients in one day; he had found that it was a dangerous instrument for this purpose. Since then he had used it less frequently, but did not entirely relegate it to the shelf, by any means; it should be reserved for proper cases. In the "Proceedings of the American Medical Association" some seven years ago, he had embodied his experience, up to that time, in a paper on the "Use of the Galvano-cautery in the Treatment of Diseases of the Upper Air-passages" which gave the results of his observations with regard to the use of this valuable but dangerous agent.

Paper.

FURTHER INVESTIGATIONS AS TO THE EXISTENCE OF A CORTICAL MOTOR CENTRE FOR THE HUMAN LARYNX.

By D. BRYSON DELAVAN, M.D.

AT the Eighth International Medical Congress, held in Copenhagen in 1884, the writer presented a paper in which attention was called to the possibility of localizing in the brain the cortical motor centre for the human larynx.

In support of the hypothesis that such a centre existed, the histories of two cases, one of which was original, were related, and through them clinical evidence was for the first time brought to bear upon the question.

The study of these cases seemed to suggest the possibility of the following conclusions :

1. That there is a cortical centre of motion for the human larynx.
2. That this centre is in the course of the third branch of the middle cerebral artery.
3. That it is toward the proximal end of this vessel.
4. That it is in the vicinity of the convolution of Broca.

Although by no means sufficient evidence was furnished to prove the above hypothesis, the subject was one of such unusual scientific interest that, with the intention of calling forth discussion and of inciting others to its more careful investigation, it was thought worthy of presentation. In this respect, at least, the effort has been successful, for since the appearance of the article several others upon the same topic have been published, and results of considerable value attained.

In the recent work of Gottstein (*"Krankheiten des Kehlkopfes,"* Leipzig, 1888) there is given such an excellent synopsis of the literature of the subject that it appears unnecessary to reproduce it here.

In the case reported by the writer in 1884 it was impossible then to verify the diagnosis. The patient having since died and an autopsy having been made, another instance is now added to the small list of those in which a full history has been obtained, and among which that reported by Garel (*"Rev. mens. de Laryn-*

gologic," May, 1886) is the only one in which, corresponding with a paralysis of the larynx, a cortical lesion has been found. In this case, a woman of seventy-two, there was right hemiplegia, facial paralysis of the same side and aphasia. Strange to say, there was paralysis of the left vocal band, which was in the cadaveric position. No local lesion presented itself in the larynx to account for this. The autopsy demonstrated atheroma of the vessels at the base of the brain. The left hemisphere presented four or five spots of red softening, corresponding to which were the paralysees above described. The right hemisphere also showed well-marked lesions at the posterior part of the third frontal convolution, where there was a circumscribed area of softening, affecting only the cortex, and penetrating only to the bottom of the fissure in front of the ascending frontal. The latter was slightly degenerated upon its lower surface. Garel believes that the cortical centre for the larynx should be located in the third frontal convolution, and toward the sulcus which separates it from the ascending frontal.

The complete record of the writer's case is as follows :

CASE I.—Male, aged sixty, retired merchant, family history excellent, except for rheumatic diathesis. Has always been very strong and healthy, of regular habits, and strictly temperate in the use of alcoholics, but an immoderate tobacco smoker. Since middle life has suffered much from rheumatism, and has rapidly accumulated fat, but gives no history of any other diathesis. Has also suffered from naso-pharyngeal catarrh. Is right-handed. In 1876 had a slight attack, attended with vertigo, partial insensibility, and numbness, but without any distinct paralysis. A year later was again attacked, this time with well-marked hemiplegia. Although complete insensibility was at no time present during the attack, there was intense pain in the back of the head and in the nose on the left side, numbness and impairment of motion of the left arm, side, and leg, almost total inability to swallow, and, finally, a remarkable change in the quality of the voice, which, from having been full, deep, and sonorous, was reduced to a cracked, piping, and uncertain tone, which rendered its use almost impossible. Articulation was also impaired, the patient for months afterward being obliged to pronounce each syllable separately, speaking slowly and with difficulty. There was at no time, or to any degree, aphasia.

There was distinct ptosis, with paralysis of the left side of the face and tongue. After continuing two or three days, the general symptoms began to subside, beginning with the leg, then the arm, and, last of all, the face, and slow but steady improvement continued for many months in all the above-mentioned conditions except the voice. In this there was little apparent change for some time, but by degrees it became

more readily controlled and less discordant, although the high-pitched quality has continued up to the present time, together with the loss of power and inability to force it. In 1882 a laryngoscopic examination showed the existence of complete abductor paralysis of the left vocal band, the position of which was in the median line. The larynx was remarkably easy of demonstration, and the diagnosis was afterward confirmed by Dr. Clinton Wagner. Laryngoscopic examinations made at intervals since 1882—one on February 12, 1885, in consultation with Dr. George M. Lefferts, and the last one in January, 1888—have demonstrated no change in the position of the cord. There was, however, a slight attempt at rotation on the part of the left arytenoid, due evidently to the action of the interarytænoidæus muscle. Efforts made to determine the electrical "reaction of degeneration" proved unsuccessful. To summarize, in a case of common left hemiplegia, in which pharyngeal and laryngeal paralysis were especially well marked, all of the symptoms disappeared in regular order, except those relating to one set of muscles—namely, the laryngeal abductors of the left side, and these continued paralyzed for a period of ten years.

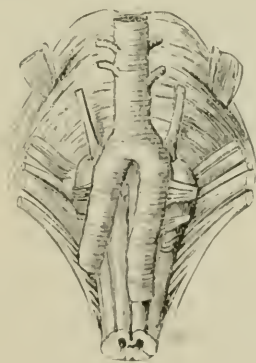


FIG. 1.

Death, due to valvular lesion of the heart and pulmonary œdema, occurred, April 12, 1888.

An autopsy was made, twenty-four hours after death, by my friend Dr. Frank Ferguson, of the New York Hospital. The brain was examined sixty-two hours after death by Dr. M. Allen Starr, with the following result:

Arteries.—Left vertebral artery distended to the diameter of one-fourth of an inch and very tortuous, being deflected forward and outward so as to lie upon the outer side of the medulla oblongata behind the olivary body and upon the ninth, tenth, and eleventh nerves at their exit (Fig. 1).

The right vertebral artery was less distended and thickened but very

atheromatous, and occupied its normal position, being, however, constricted at its entrance to the basilar.

The basilar artery, also much wider than normal and intensely atheromatous, had become elongated so that it pursued a curved course, with the convexity toward the right upon the pons.

In both vertebral and basilar, firm, calcified plates could be felt, producing such a rigid condition of these vessels that they could not be compressed by the fingers. At no point in their course, however, could any embolus or thrombus be discovered. The posterior cerebral arteries were also atheromatous, as were all the smaller branches of these larger trunks. The posterior communicating arteries were unusually small and

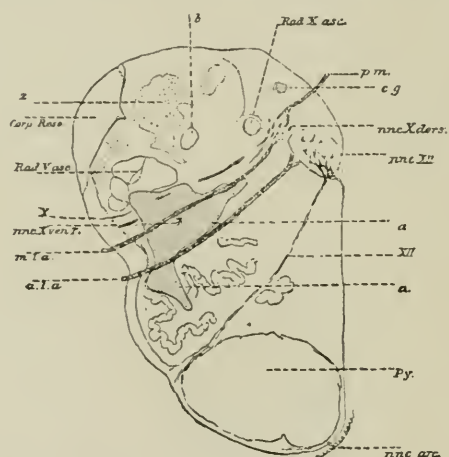


FIG. 2.—Section of the medulla near the lower level of the wedge of softening. *a*, Triangular softened area; *nuc. arc.*, nucleus arciformis; *Py.*, left pyramid; *XII.*, hypoglossal nerve; *nuc. XII.*, hypoglossal nucleus; *c. g.*, column of gelatinous substance of Rolando; *Rad. X. asc.*, ascending root of the vagus (respiratory fasciculus); *Corp. Rest.*, corpus restiforme; *Rad. V. asc.*, ascending trigeminal root; *X.*, vagus strands; *nuc. X. dors.*, sensory vagus nucleus; *nuc. X. vent.*, site of the motor vagus nucleus (nucleus ambiguus) destroyed by the softening; *m. l. a.*, median lateral artery; *a. l. a.*, anterior lateral artery supplying the sensory vagus nucleus in conjunction with the posterior median artery; *p. m.*, entering the ventricular floor; * *z.* analogue of the posterior horn and posterior column nuclei.

apparently unaffected by the atheroma. Both carotids were equally atheromatous with the basilar, calcified plates being easily felt in their walls. The middle cerebral artery and all its branches over the island of Reil were extremely atheromatous, and this atheroma extended to the finer branches throughout the cortex, and was especially marked in some of the smaller arteries of the anterior perforated space.

The anterior cerebral artery of the right side was normal, as was the anterior communicating. On the left side it was very atheromatous.

* The vessels are represented schematically and are copied from the diagram in Ross's "Diseases of the Nervous System," vol. i., p. 761.

Right Hemisphere.—The appearance of the pia mater was that of moderate congestion. It was neither œdematous nor opaque, excepting at one point, about an eighth by a sixteenth of an inch in extent, over the posterior extremity of the second frontal convolution near to its junction with the ascending frontal convolution, and even here the pia was not adherent.

Left Hemisphere.—Pia congested; vessels atheromatous; no opacities; no adhesions. Cortex of the island of Reil and of the convolutions apparently normal in all respects.



FIG. 3.—Section of the medulla near the upper level of the softened wedge. (The floor of the ventricle is from a higher level than the pyramids, and the right half of the section is higher than the left half.) 6, Decussation of the external arciform fibres at the ventral margin of the rhaphé; *Py.*, partially degenerated right pyramid with some of the external arciform fibres running across it to the hilus of the olive; *x.*, vagus strands; *Rad. V. asc.*, ascending trigeminal root; *C. R.*, corpus restiforme; *nuc. Delt.*, direct sensory cerebellar tract of Edinger (fascicular portion of Deiter's nucleus; *Rad. X. asc.*, ascending vagus root; *E.*, common sensory nucleus of ix. and x. nerves; 8, vertical set of association fibres for the cells of the xii. nucleus; *nuc. XII. dor.*, dorsal group of cells of the xii. nucleus; *nuc. XII. vent.*, ventral group of cells of the xii. nucleus; *X. sin.*, vagus filaments of the left side passing through the softened area *a*; *nuc. X. vent.*, site of the motor vagus nucleus; *XII.*, hypoglossal filaments.

Sections made in the frontal direction through the hemispheres from before backward, at intervals of one-quarter of an inch, showed a normal condition of the centrum ovale, corpus callosum, and optic thalamus.

In the left hemisphere, at the summit of the internal capsule, in its anterior half and in the corresponding portion of the caudate nucleus, and extending backward, outward, and downward through the entire middle body of the lenticular nucleus, was a cavity lined with connective tissue and containing a small amount of clear fluid, the remains of

a very old area of softening. Below and a little outside of this cavity was a small space with smooth walls, in which one of the basilar branches of the middle cerebral artery had lain.

In the right hemisphere, at a point in the upper portion of the internal capsule in its middle third opposite to the anterior extremity of the optic thalamus, a small area of softening was found. This involved the upper limit of the internal capsule for about a quarter of an inch from before backward, and the upper portion of the outer body of the lenticular nucleus.

Sections through the crura, pons, medulla, and spinal cord presented nothing abnormal to the naked eye.

In the right choroid plexus a fatty tumor five-eighths by three-eighths by two-eighths of an inch was found in the descending horn of the lateral ventricle. In the right crus cerebri, in its middle third, a slight constriction seemed to indicate a descending degeneration in the motor tract.

The following report of the microscopical appearances was made by Dr. Ira Van Giesen, in the Laboratory of the College of Physicians and Surgeons, New York :

Sections of the lower termination of the two central convolutions and posterior one-third of the third frontal convolution from both hemispheres show no abnormality in the number or arrangement of the nerve-fibres or ganglion-cells. Many of the latter are heavily pigmented. A focus of softening about 7 mm. in diameter, in the posterior arm of the right internal capsule, just behind the knee, involving slightly the optic thalamus, has produced a partial degeneration of the right motor tract.

The left side of a segment of the medulla corresponding to the upper three-quarters of the olivary bodies contains a wedge-shaped mass of softening (3 by 4 by 5 mm. in diameter) situated in the path of the intramedullary-root strands of the vagus nerve. Near its lower level (Fig. 2) the softened mass is triangular in transection. The apex of the triangle (corresponding to the thin edge of the wedge) points toward the dorsal vagus nucleus and is $1\frac{1}{2}$ mm. distant from it. The base (5 mm.) extends from the ascending root of the trigeminus to the olive, and is about $1\frac{1}{2}$ mm. distant from the lateral surface of the medulla. The ventral angle passes through the convolutions of the olive into its hilum. The dorsal angle involves a small portion of the ascending root of the trigeminus.

The wedge of softening gradually tapers at the expense of its base as it passes upward, so that in a section at the entrance of the uppermost vagus-root bundles (Fig. 3) the ventral angle has retreated from the olive. The dorsal angle lies against the ascending trigeminal root, and the apex, pointing toward the sensory vagus nucleus, is 2 mm. from it.

Thus the upper portion of the focus of softening has in section an oval outline instead of the triangular outline which it presents below.

The softened mass is not of recent origin, because it is composed largely of hyperplastic neuroglia. Many of the vagus-root strands, the internal acuate fibres, and some of the vertical fibres of the formatio reticularis pass through the softened region undamaged. A few of the thickened anterior and median lateral arteries* running parallel to the intramedullary vagus strands also pass through the softened mass. The

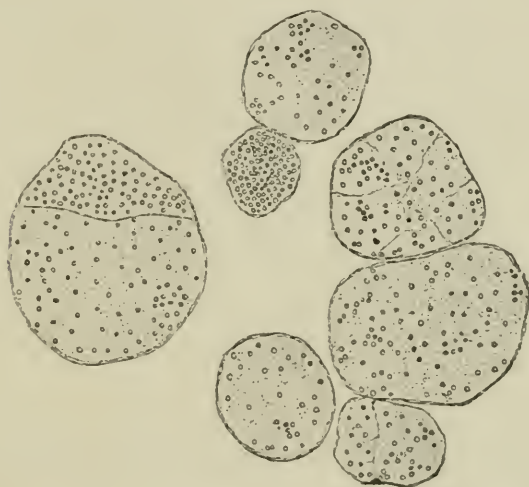


FIG. 4—Transections of left vagus-root bundles, showing the degenerated areas.

ventral vagus nucleus—nucleus ambiguus of Clarke—and the recurrent vagus-root strands are present on the right side, but are absent on the left side.

Many of the extramedullary-root fasciculi of the left vagus are degenerated. In some places the normal nerve-fibres occupy less than one-half of the volume of the fascicle (Fig. 4). The right vagus root and the hypoglossal roots of both sides are normal. The spinal accessory nuclei and the first and second cervical segments of the spinal cord are normal.

The softening was probably produced by an obliterating endarteritis of the median or anterior lateral arteries (see Fig. 2), which are branches of the diseased left vertebral. No area of secondary degeneration was found in the left ascending trigeminus root above the softened region.

The focus of softening in the medulla, occurring simultaneously with

* For a description of the blood-vessels of the medulla, Ross's "Diseases of the Nervous System," vol. i., p. 761, may be consulted.

the lesion in the internal capsule of the opposite side, was probably more instrumental in the production of the permanent laryngeal paralysis, by the complete destruction of the ventral or motor vagus nucleus, than by interference with the root strands. This I infer from the fact that so many of the root strands pass through the old softened focus intact. The degenerated areas in the extramedullary root bundles of the left vagus represent the paths of the motor fibres in them. The left glosso-pharyngeal filaments, although not directly involved by the lesion, seem to have been in such close proximity to the small upper pointed extremity of the softening that a temporary impairment of their functions ensued when the softening occurred. The trunk of the vagus was not preserved for examination. The results of the microscopical examination prove that the laryngeal symptoms were not due to a cortical lesion. The case is interesting in confirming clinically the motor character of the ventral vagus nucleus.

Thus it would appear that the theory maintained by Gottstein—namely, that paralysis of the larynx of central origin is generally due to bulbar lesion and not to disease of the cortex—receives from this case direct confirmation, and that the localization of the cortical motor centre for the human larynx still remains, so far as the above is concerned, an uncertainty.

[Since the presentation of this paper, the attention of the writer has been attracted to a case singularly parallel with the one herein described, reported by C. Eisenlohe, of Hamburg ("Archiv für Psychiatrie," Berlin, vol. xix., 1888, p. 314), in an elaborate article, entitled "Zur Pathologie der centralen Kehlkopffähmungen." The patient was a laborer, aged thirty-three, in whom, attended with severe dysphagia and aphonia, there was found complete left recurrent paralysis, with loss of both motion and sensation. There was also paralysis of the left side of the velum palati. The post-mortem examination showed a condition of acute bulbar myelitis and thrombosis of the medulla, the location of which was apparently identical with that of the lesion described above by Dr. Van Giesen.]

On the other hand, collateral evidence to prove its existence continues to accumulate. Following the excellent experiments of Herman Krause upon the dog, Victor Horsley and Felix Semon, of London, have investigated the question in a series of carefully conducted experiments upon the monkey, with most interesting results. Through the kindness of Mr. Horsley, the writer is permitted to publish the following *résumé* of facts as to "the representation of the vocal cord movements in the cerebral cortex:"

"1. In the monkey there is a small area at the lower and anterior portion of the foot of the ascending frontal gyrus, excitation of which produces complete adduction of the vocal cords (bilateral action). We never, in this animal, observed anything but adduction.

"2. Around this area there is also represented adduction of the vocal cords, but only feebly and in association with other movements—*i.e.*, deglutition, etc.

"3. Unilateral extirpation of the whole region produced no appreciable paralysis of the glottis closers or openers.

"4. Krause's statements respecting the position of the centre in the dog were confirmed by us.

"5. In the cat we found that, when the cortex was excited, adduction was observed very rarely, but abduction almost invariably."

The foregoing conclusions are extremely interesting, not only by reason of the additional proof which they give as to the actual existence of a cortical motor centre for the larynx, but because of their support of, and correspondence with, the recently accepted theories of cortical motor activity for voluntary movement, namely :

1. That unilateral irritation of a given cortical centre excites the corresponding bulbar centre and causes bilateral movement.

2. That unilateral destruction of a given cortical centre gives no result, as the influence of the opposite cortical centre is sufficient to excite the corresponding bulbar centre and thus to cause bilateral movement.

3. That bilateral destruction of a given cortical centre causes paralysis.

These very discoveries, however, increase rather than diminish the difficulties in the way of solving the problem ; for, admitting the foregoing, it is difficult to understand how any unilateral lesion of the cortex could cause a corresponding unilateral paralysis of the larynx. The hypothesis, therefore, upon which all the hitherto reported clinical observations relating to this subject have been made would seem to be wrong. In other words, according to the above supposition, paralysis of the larynx of central origin must, as a rule, depend upon bulbar lesion and not upon cortical injury, and the location of the cortical centre in man remains still to be proved.

In short, combining with the arguments of Gottstein, founded

upon clinical and pathological evidence, the strong testimony of Mr. Horsley's physiological experiments, it cannot be denied that, with the methods hitherto employed in the human subject, the results have been unsatisfactory, and to a certain extent misleading, and that the question is not likely to be settled until more successful means for its solution have been discovered. That in the human brain such a centre does exist becomes more certain with every succeeding group of experiments made upon the lower animals, and, well established in the dog and the monkey, it can be but a matter of time for its location to be unquestionably proved in man.

Case.

LUPUS OF THE NOSE, PHARYNX, AND LARYNX.

By SAMUEL JOHNSTON, M.D.

DR. JOHNSTON presented a patient, a woman aged twenty-six years, who was suffering from marked manifestations of lupus of the nose, pharynx, and larynx.

The integument of the face was slightly involved, and an opportunity for verifying the diagnosis was thus presented. The condition of the larynx was particularly interesting, the epiglottis having been partially destroyed, and the appearances being typical. The disease had existed for about four years.

Presentation of Instruments.

AN IMPROVED "ELECTRIC" NASAL SAW.

By JOHN O. ROE, M.D.

AT the session of this Association, one year ago, I presented before you an electric nasal saw, so called because it was propelled by an electric motor.

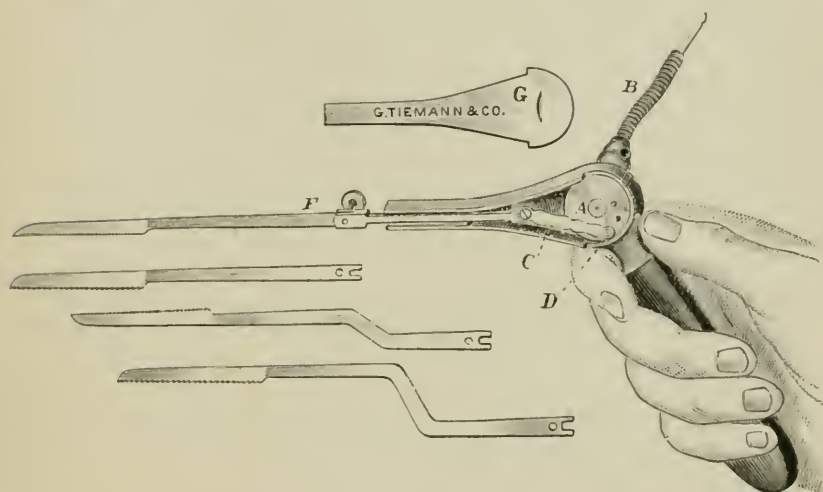
I now have the pleasure of presenting to you an improved and much simplified instrument for doing the same work.

The principle on which the blade of the first saw was operated was that of the "cam" movement, which necessitated a more or less complicated mechanical construction, and the saw was accordingly quite expensive.

In this instrument the saw-blade is propelled by a "crank" movement which permits a very simple construction, and its cost is correspondingly low.

The construction of the instrument is shown by the accompanying cut, which is reduced to exactly one-half the actual size of the instrument.

The shape of the instrument is essentially the same as that of the Bosworth saw. It is also very light, weighing but three ounces.



At the junction of the handle with the body of the instrument there is placed a disk (A) to which is attached a flexible spiral shaft (B), and with the end of this the flexible shaft of the motor is connected.

To the side of the disk A is attached the jointed shaft C, by means of the screw-head D. At the lower end of this shaft (C) is connected, by means of a mill-headed set-screw, the saw-blade F.

In the side of the disk A it will be seen that there are two additional holes for receiving the screw-head D. These holes are placed at different distances from the centre; and the distance through which the saw travels, or its "throw," is regulated by the distance of the hole from the centre of this disk.

The letter G indicates the cover which slides in under the grooved edge of the body of the instrument, and which conceals and protects the mechanism of the instrument.

The saw-blades are so made that they can be reversed, *i.e.*,

turned so as to saw upward or downward as desired. Two of the blades, one for sawing upward and one for sawing downward, have an offset so as to throw the body of the instrument entirely out of the line of vision. The general construction of the instrument is such that it can be grasped by the hand and manipulated with the utmost freedom and precision.

The advantage of this instrument over the one previously shown is also evident from the mode in which the power is applied. In my former instrument the power was applied at the back part of the instrument on a direct line with the movement of the saw. In that case the operator was obliged to pass the flexible shaft over his shoulder, which interfered more or less with the manipulation of the instrument. In the present case the power is applied on the right side of the instrument and at a right angle to the movement of the saw. Thus the cable is entirely out of the way of the operator, and by suspending the motor at the proper height the cable can operate in a direct line from the motor to the instrument.

Although this is called an "electric" saw, because it was constructed with reference to the employment of an electric motor, it can be as readily operated by the dental engine or any other kind of power.

The instrument is made by George Tiemann & Co., of New York, who have left nothing to be desired in either workmanship or finish.

Presentation of Instruments.

THE PHONOGRAPH IN LARYNGOLOGY.

DR. DELAVAN presented a roll from the Edison phonograph-graphophone and called attention to the following purposes for which the instrument might be found useful among laryngologists.

1. *For Comparison.*—In cases where any form of mispronunciation was present ; as, for example, in adenoid hypertrophy at the vault of the pharynx, the patient, by making a phonographic record both before and after operation, could easily demonstrate to himself and others the exact changes which had been wrought in the voice, more particularly in regard to certain difficult consonant-sounds. In this relation the phonographic record would correspond with the method in common use in surgery, by which photo-

graphing a patient before and after operation enables us to demonstrate by truthful comparison the exact extent to which the deformity has been remedied.

2. *For Identification.*—In photographing the larynx during the production of a given singing tone the identification of that tone must depend upon the correctness of judgment of the operator. Hence opportunity for actual or for alleged error may occur. Registration of the note by the phonograph during its production and during the actual moment at which the photographic impression was being received would enable the operator to demonstrate to others not only the name of the note used, but also its exact intensity, quality, and pitch. Thus absolute and uncontrovertible testimony would be easily secured and the experiments reduced to a basis of almost mathematical accuracy.

3. *Instruction.*—In the reproduction of tone by the phonograph there is, to a greater or less degree, a loss of overtone, the sound returned approaching more nearly to the fundamental note. Any defect of tone, therefore, on the part of the person talking into the instrument is apt to be emphasized by the phonograph. In this the phonograph resembles photography, in which, with a loss of color, there is an accentuation of surface-defects. No critic could be so accurate, so emphatic, or so uncompromising as the phonograph. The instrument, therefore, might be of invaluable assistance to students of vocal music and of elocution.

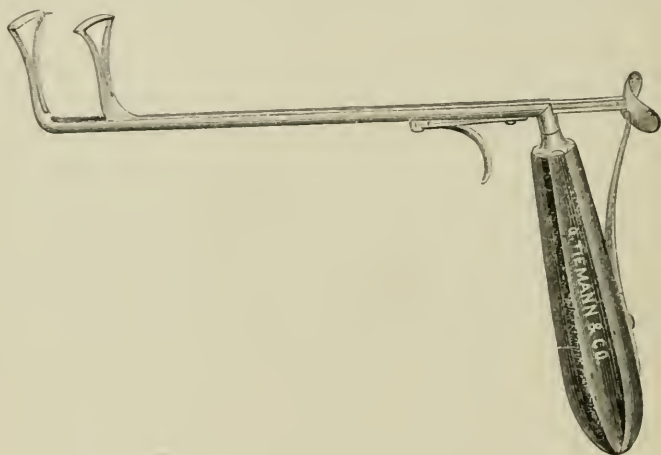
Presentation of Instruments.

AN ADENOMATOME.

By GEORGE W. MAJOR, M.D.

DR. MAJOR presented, through the Secretary, a new adenomatome, an instrument designed for the removal of adenoid growths at the vault of the pharynx, in cases where the latter are confined to the vault and project somewhat from it. The instrument, working essentially upon the principle of the tonsillotome, is intended to accomplish the operation thoroughly, quickly, and with a minimum of pain. The handle, made of hard rubber, is attached to the shank by means of a strong screw, so that, for purposes of convenience in transportation, or for the

attachment of an instrument of larger size, it may easily be removed. The instrument consists essentially of two slightly curved scissors-blades, attached at an angle to two straight steel bars, one of which slides within the other after the manner of the lithotrite. To the end of the movable bar is fastened a thumb-piece, in front of which plays a spring, the opposite end of which is fastened to the posterior aspect of the handle. Anterior to the handle, and attached to the shank, is a small spring-catch; by means of this the instrument may be introduced behind the velum, closed, and locked, and the thumb of the operator thus relieved from the pressure of the posterior spring. The width of the scissors, as well as their distance from the horizontal rod, may be



varied to suit the age and size of the patient to be operated upon, so that, as with the tonsillotome, a series of two or three sizes would be necessary to meet all requirements.

In using the instrument the blades are introduced closed. When the lower margin of the growth is reached the blades are allowed to separate by releasing the upper one, which slides forward, the lower one being held against the posterior wall of the pharynx. The instrument is then urged upward as far as possible, and removal of the growth accomplished by pushing the sliding blade home. Great care must be exercised to get the blades of the instrument well above the eustachian prominence, to avoid any possibility of injury to the latter.

Business Meeting.

AT the close of the scientific proceedings a final business meeting was held. The Committee on the Congress of American Physicians and Surgeons reported that an assessment would be levied upon the Associations forming the Congress, *pro rata* as to the number of the membership of each Association, to pay the cost of the publication of the volume of the "Transactions" of the Congress.

It was moved by Dr. J. Solis-Cohen that the Treasurer assess the American Laryngological Association, *pro rata*, as above. Carried.

It was moved that the Association proceed to the election of officers for the ensuing year. Carried.

It was moved that the Secretary be directed to cast the vote of the Association for the nominees presented by the committee. Carried.

The tellers reported the following officers elected :

President.—ETHELBERT CARROLL MORGAN, M.D., Washington.

1st Vice-President.—WILLIAM C. GLASGOW, M.D., St. Louis.

2d Vice-President.—CHARLES E. SAJOUS, M.D., Philadelphia.

Secretary and Treasurer.—D. BRYSON DELAVAN, M.D., New York.

Librarian.—THOMAS R. FRENCH, M.D., Brooklyn.

Council.—GEORGE M. LEFFERTS, M.D., New York, to fill vacancy, and FREDERICK I. KNIGHT, M.D., Boston.

It was moved that the time and place of the next meeting suggested by the Nominating Committee—namely, the last Thursday in May, 1889, in Washington, D. C.—be adopted. Carried.

Upon leaving the presidential chair Dr. Lincoln extended to the incoming President a cordial and hearty welcome, in his own name and in that of the Association, and expressed the earnest hope that the year might bring the best good fortune to all concerned.

In answer to Dr. Lincoln's remarks, and in taking the chair, Dr. Morgan said :

"In assuming the important office of President of the American Laryngological Association, to which you have chosen to elect me, I am deeply impressed with the nature of the trust and its accompanying responsibilities.

"The office is one I had hoped to merit in the far future, when my scientific work and increasing years might correspond, in a greater degree than at present, with the distinguished attainments of my predecessors in this chair.

"But you have anticipated my fondest desires, and have placed in my custody the sacred standard of an Association dear to you, dear to me, and holding a deservedly prominent position in the scientific medical world.

"In the midst of the all-absorbing work of this Congress and the many emotions resulting from my surprise, I fail in language sufficiently expressive of my heartfelt appreciation of the distinction conferred.

"During the best years of my life I have devotedly pursued our common specialty, and my most profitable and pleasant hours have been passed in the sessions of the American Laryngological Association.

"My warmest friends are among you, and my history is linked with yours.

"In the past I ardently labored to serve the Association; in the future, as your presiding officer, I pledge devotion, energy, and impartial judgment."

Dr. Daly moved that a vote of thanks be extended to the retiring President, and to the Secretary. Carried.

The President then formally declared the Tenth Annual Congress of the Association adjourned.

WITH the close of the Eleventh Annual Congress of the American Laryngological Association, and with the appearance of this the Tenth Volume of its "Transactions," the official duties of the present Secretary, continued now for seven years, will be brought to an end.

In reviewing the history of the past decade, the Association may well be congratulated upon the harmony and mutual good feeling which have prevailed within itself ; upon the value to the world at large of its scientific contributions ; and, finally, upon the discretion of its council in the shaping of its policy and in the highly successful management of its business affairs. For the latter, adherence to the principles established by the first officers of the Association is largely due. To them, aided by the intelligent co-operation of the Association, belongs the credit of having inaugurated an institution which has since become a universal model, and which, conducted in accordance with the design originally laid down by them, has attained ever-increasing success.

In withdrawing from office the Secretary desires to express his high appreciation of the cordial relations which have existed between himself and his fellow-members, both at home and abroad, and to beg their acceptance of the photographic group of the Association, a copy of which will be sent to each Fellow, and of the Frontispiece and the General Index which accompany this volume.

D. B. D.

OBITUARY.

WOOLSEY JOHNSON, M.D.

WOOLSEY JOHNSON, one of the founders of the American Laryngological Association, died in the City of New York, June 21, 1887, aged forty-six. Dr. Johnson was born in Stratford, Conn. His ancestry on both sides was distinguished, and his connections were extensive and influential. He was graduated from the College of Physicians and Surgeons in 1863, and, after spending several years in additional study abroad, he returned to New York and entered upon the regular practice of his profession, paying especial attention to the department of diseases of the throat. Later, in 1869, he was appointed Clinical Lecturer on Laryngology in the College of Physicians and Surgeons, in which position he was afterward succeeded by Dr. George M. Lefferts. Dr. Johnson filled many other important and honorable positions of trust, among which it may be mentioned that he was one of the attending physicians to the New York Hospital, and one of the Commissioners of the Health Department of the City of New York. Possessed of a commanding figure, and of great elegance and dignity of manner, together with wide experience of the world, rare tact, and the utmost geniality of disposition, his social career was one of unusual brilliancy, and no man of his time was more generally known or more popularly esteemed.

He was most happily married, and the loss of his wife was a blow from which he never recovered, and which, about a year later, was followed by his own death.

Although Dr. Johnson's public duties obliged him to depart from the exclusive practice of laryngology, he retained an active interest in the science and in the Association. He will be remembered as a useful and distinguished citizen, a loyal friend, and an accomplished gentleman.

NAMES AND ADDRESSES OF FELLOWS.

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