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OF THE

Thirty-eighth Annual Meeting

OF THE

American Laryngological Association

HELD AT

WASHINGTON, D. C.

MAY 9TH, 10TH AND 11TH, 1916

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REGISTRATION

The Thirty-eighth Annual Congress of the American Laryngological Association was called to order Tuesday, May 9th, 1916, at 10 A. M., by the president, Dr. G. Hudson Makuen, in the Reception Room of the Hotel Raleigh, Washington, D. C. The following Fellows enrolled during the session:

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Packard, Francis R.
Pierce, Norval H.
Renner, W. Scott
Richards, George L.
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Shurly, Burt R.
Sluder, Greenfield
Smith, Harmon
Swain, Henry L.
Theisen, Clement F.
Wilson, J. Gordon
Winslow, John R.

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TRANSACTIONS OF THE THIRTY-EIGHTH ANNUAL MEETING

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HELD AT

WASHINGTON, D. C., MAY 9TH, 10TH AND 11TH, 1916

PRESIDENT'S ADDRESS.

G. HUDSON MAKUEN, M.D.

Fellows of the American Laryngological Association:

The man who coined the phrase "Uneasy lies the head that wears a crown" knew exactly what he was talking about. There is no doubt whatever about that.

The one and only objection that I had to accepting the great honor which you have conferred upon me was the fact that it entailed the preparation and delivery of a so-called President's Address, and I assure you that there have been periods during my tenure in office when the necessity for this task nearly, if not quite, overwhelmed me, and the sense of obligation seemed for the time to throw in shadow the realization of the honor than which there is no higher in the specialty which we all love so much.

When I was in the throes of production and in the deepest despair, I bethought myself of the addresses of my predecessors in office, and I immediately started in to reread them in the hope of receiving inspiration, but to my great discomfiture I was even more overwhelmed with my own inability to do anything like justice to this great occasion, and apropos of my feelings there came to my mind the story of a conversation between two women upon their relative positions in their re-

spective homes. One said: "I think it is far better to let our husbands think they are having their own way"; and the other said: "Oh, no; I think they should be made to feel their inferiority."

The year has been one of unrest and strife across the water, and our professional brethren in most other countries have been called upon to do unusual work. In this labor of love and mercy performed for those who are suffering as a result of hatred and revenge, some of our own members have been occupied and are even now engaged. To them at this time must go our best wishes for a safe and speedy return.

War to many of us seems to be a useless and terrible thing, but according to recent important discoveries made by some of us relating to the tonic effect of the belligerent emotions upon the autonomic nervous system, war or something akin to it appears to be really essential to the highest development of the human organism, and if we can feel that it does serve to keep us from becoming mere "mollycoddles," we can at least look upon it with some degree of allowance and enter upon a campaign of so-called preparedness with a more imperturbable spirit.

We are gathered here in this beautiful capital city to celebrate the thirty-eighth anniversary of our association, and this fact may serve to remind us that we have passed through the age of adolescence and entered upon that of full manhood. The present may be regarded as a somewhat critical period in the history of the association. Many of those who first conceived the notion of the formation of a national organization and who gave their best energies to the realization of their conception have now passed away, but fortunately a few of them still remain and by their presence here to-day continue to show their interest in the organization. It is for us, or perhaps I should say for you, the more recent members, to try to imbibe the spirit of loyalty and enthusiasm which has always characterized the founders of the association, in order that we may adequately appreciate our heritage and do our full duty in maintaining the traditions which have been handed down to us.

During the year, two of our esteemed colleagues have passed away, and although formal reference to this fact will be made by others, I cannot refrain from an expression of my own deep sense of loss in the death of my warm personal friends, Drs. John O. Roe and William L. Ballenger. They are dead, but I cannot help but feel that their influence lives and that it will continue to actuate us to higher resolves and nobler living.

One of the advantages of a formal address on occasions like this is that it gives the presiding officer an opportunity to say some things that he might otherwise scarcely have the courage to say, and thus relieve his own mind, if perchance no other good may come of it.

The chief function of the physician, whether he be a general practitioner or specialist, is to conserve and prolong human life, and yet, notwithstanding our recent much-vaunted progress in what we are pleased to call scientific medicine, it appears that the average duration of human life is scarcely longer to-day than it was in the days of our forebears.

This does not indicate that our progress in medicine, when put to the supreme test, has been altogether fanciful, but it does suggest that something may be wrong and that some of the cogs in our progressive medical machinery may be slipping and in need of adjustment, and if further evidence of a loss of power should be desired, we have but to look to the persistency and even increase in medical quackery. Never was there a time perhaps in the history of the world when pathies and cults in medical practice were so numerous as they are to-day, and the fault, it seems to me, is not in our stars but in ourselves, not that we are underlings but that we are unmindful of certain important facts in connection with our preparation for medical work and our prosecution of it.

Without appearing to be too dogmatic and personalistic, I shall try to point out to you on this occasion wherein we, as specialists in the practice of medicine, are in a measure, failing to live up to our highest opportunities and possibilities, and to suggest ways and means by which we may increase our usefulness.

In this connection, I desire to emphasize two points: First, the importance of a full recognition of the interdependence of specialties in medicine; and second, the broad general principles which should underly all specialism in medicine. While these two propositions are to some extent interrelated, I speak of them separately, in order to give each of them the emphasis which it deserves.

When the practice of medicine began to divide itself into so-called specialties, the question first to arise in the minds of all was, to what extent must general medicine be practiced before the physician should enter upon his chosen specialty? In other words, the necessity for a more or less thorough knowledge of general medicine was recognized from the beginning, but that some knowledge of the various specialties themselves is desirable is a conclusion that has been of slower development.

The throat specialist must be a nose specialist and an ear specialist, and to some extent at least, an eye specialist, if he would be a throat specialist in the highest sense of the term, and that he can be a better throat specialist if he is also a pediatrist and even gynecologist, and if he has had some experience in general surgery is becoming more and more apparent, but the specialties upon which laryngology chiefly depends for its future progress and development are those of psychology and its related branch of medicine, neurology.

I have, therefore, chosen for my subject on this occasion the psychology of diseases of the respiratory tract. First of all, let it be understood that respiratory diseases have a psychology which is peculiarly their own, as witness, for example, the psychical differences between pulmonary tuberculosis and gastrointestinal diseases, the former being characterized by marked optimism and hopefulness, and the latter by extreme pessimism and mental depression.

The peripheral mechanisms of respiration and vocalization are so closely related to their corresponding central mechanisms that it is often quite impossible to tell during their united action where the one begins and the other ends, and it is now generally conceded that the greatest improvement in artistic

and effective respiration, vocalization, and even articulation is accomplished only when their corresponding central mechanisms, coupled with the higher intellectual centers of the brain, are given full rein and are in complete command.

In other words, these psychophysical processes so vital to health as well as to artistic voice and speech production, are rather more mental than physical, and this predominance of the mental activities over the physical or bodily activities is not confined alone to the development of respiratory and laryngeal functions, but it exists also to a marked degree in the various disorders of these functions.

There is no such thing as a purely physical respiratory disease, and I may add that there is no such thing as a purely psychical respiratory disease, but respiratory diseases are both physical and psychical and their treatment should be both physical and psychical.

It has been pointed out that disease always exists and progresses in a kind of vicious circle, and in this vicious circle are involved psychical as well as physical activities. Just as health has been called a self-maintaining circle, so disease may be defined as a self-corroding circle, and we may carry the analogy still further by stating that just as departures from health result from a breaking into the self-maintaining circle at some point, so disease must be cured by breaking into the self-corroding circle at some point, and as someone has said, if the gateway by which the vicious circle of disease may be entered is in the psychical area of the circle, the disease may be regarded as functional, but if it is in the physical area, it is organic.

This, by the way, gives us a new and more practical definition of the terms organic and functional in their relation to disease, and it opens the way also for more rational and scientific therapeutical measures.

According to this distinction, the treatment of the so-called functional diseases of the respiratory tract, or indeed of any other tract, should be largely psychical in character.

It is true that psychotherapy has been practiced after a fashion since the very beginning of the history of medicine,

but that this form of therapy has not kept pace with other forms must be apparent to all, and there are good reasons why this should be so, the chief one of which being the fact that the successful practice of psychotherapy requires on the part of the practitioner the profoundest knowledge of both medicine and man, and especially of man. The fact is that few of us are mentally and temperamentally capable of practicing psychotherapy in the way that it should be practiced, and even the improved curricula of the schools are not offering the rising generation of specialists the kind of assistance they should have.

We all practice psychotherapy incidentally and in a half-hearted way, but this is not enough. The modern physician should be able to differentiate clearly between those diseases which have a purely physical basis and those which are due to psychical conditions. He should know whether the disease is organic or functional according to the definitions which have been given, and when he has decided to which class it belongs he should know how to explain the situation. If the patient's respiratory difficulties chance not to have an organic basis, the physician should be able to persuade him that no amount of operative interference can possibly give him relief.

If, for example, a man's cough is a nervous or habit cough due to fear of some permanent disability or serious pulmonary disease this fact must be fully revealed to him in the clearest possible language and his reason must be appealed to in an educative way in order to enlist his psychical co-operation in his cure.

To remove a man's tonsils for the cure of an irritation in the pharynx having its basis merely in a psychoneurotic habit can only bring discredit upon the surgeon and further disaster to the patient, and to operate merely for the psychical effect of the operation is also exceedingly questionable surgery. Many a tonsil has been sacrificed as well as many a turbinal bone for no other reason than that the patient is suffering from some purely psychical disability, and the sooner this fact is fully realized by the laryngologist and the rhinologist the better it will be for all concerned.

Moreover, when the diagnosis of a functional disability having a psychical basis is established it is not enough to point out to our patients the true nature of their affection, and to tell them what they must do to be saved, nor is it enough to show them how to do the things that are necessary as well for the body as the soul, but we must actually make them do these things or gradually teach them to do them by a systematic course of reasoning and instruction.

The successful practice of psychotherapy requires the whole man, and the whole man at his best. Of all the successful psychotherapists whom I have met, the late Dr. Weir Mitchell was the most successful. Although he rarely used the term psychotherapy, yet he practiced it in a most pronounced and effective manner. It should be said, however, that his was not the purest type of psychotherapy, but that his practice combined in a most skillful manner both physico- and psychotherapy.

Psychotherapy reduced to its final essence depends for its success upon the subtle influence which one personality is able to bring to bear upon another and weaker personality. This influence can be exerted by the physician to its fullest extent only when he is thoroughly familiar with all of the constituent elements of the particular personality which he desires to change or rehabilitate. There must be no secrets between the patient and his physician. The patient must be made to feel reasonably sure that the physician knows all and knowing all can do all that is necessary to bring about a cure in his particular case. In other words, the physician must have made what has been called a psychognosis, as well as a diagnosis before he can hope to influence the personality of his patient.

The method of psychoanalysis as suggested by Freud and his followers has been practiced with varying results. It is based upon the theory that psychical or functional diseases are due to unconscious or rather subconscious conditions of mind which must be brought up out of their hidden depths into the domain of consciousness before a cure can be accomplished.

The methods adopted for this psychical analysis are through

certain complicated association tests and a study of dreams. It is a very ingenious theory and one perhaps more ingenious than practical, but in certain complicated cases and in skilled hands its use may prove to be of great value. In but few instances, however, is it necessary or superior to psychotherapy practiced by the methods known as persuasion, education, and re-education.

The successful practitioner of medicine or of any phase or specialty of medicine must be a psychologist and a teacher. He must be able to differentiate between functional and organic diseases; he must know whether the self-maintaining circle of health has been broken into by the psychical or physical gateway, in order that he may know just what particular therapy is indicated. He must understand that although organic lesions are found, the disease originally may have been wholly psychical, and in such instances it is not enough to cure the organic disease but he must remove its original cause, else a permanent cure will be quite impossible.

All this has a special bearing upon the treatment of diseases of the respiratory tract, for many of them are purely functional, and of psychic origin. It is important, therefore, for us to so understand the psychology of these diseases and the psychology of human nature as to be able to distinguish between those of our patients who are psychopaths and neuropaths and those who are suffering from actual organic diseases which may be relieved and cured by medical and surgical treatment.

It is probably not going too far to say that quite as many of the habitues of our offices and clinics are there because of psychical as of physical disorders, and we must recognize the fact that to treat the purely psychical cases by physical measures is not only useless but in many instances absolutely harmful.

It is well known that to fix the psychism on a particular organ, like the nose or throat, is sufficient in itself to develop the various neuroses of these organs, such as difficult nasal breathing, sensations of intranasal pressure, and even catarrhal states of the nasopharyngeal mucous membrane.

Voice and speech difficulties also arise and are continued as a result of this psychical condition. Laryngeal coughs and the so-called sore throats of clergymen and actors are frequently the results of emotional disturbances arising from fear of the disability to which these conditions may give rise.

To fix the attention strongly upon anything, always interferes with normal respiratory interchange in that it tends to diminish the frequency and rhythm of the respiratory movements, and to fix the attention upon disturbances of respiration, such as we find in certain forms of asthma and in so-called dyspnea, apnea, and polypnea, is doubly injurious because it tends both to aggravate the affection and to establish it as a more or less permanent psychophysical habit.

Whether or not the diseased condition was originally functional and of psychical origin, it must always have in it a psychical element, although it may have become chronic in character and even though it may appear to have an organic basis. For example, faulty respiratory interchange whatever may be its cause, may result in enlarged or even hypertrophied turbinal bodies, especially when the breathing is in large part oral rather than nasal, on the principle that the disuse of an organ tends to render it organically as well as functionally less efficient in its action; and obviously the removal of such turbinal bodies by operative measures will not result in normal breathing unless at the same time we correct the faulty habits of breathing which were in great measure at least the original cause of the apparent organic lesions. It is not enough, therefore, either in acute or chronic cases to do operations for the correction of disturbed functions without at the same time or immediately thereafter doing something in an educational way to correct the faulty habits which accompany either as cause or result the conditions that we are seeking to modify or cure.

Another good example of the psychophysical habits that arise owing to functional disturbances due to organic lesions is found in the cleft palate speech. The individual with a cleft palate acquires a characteristic speech, and this speech is the result of faulty psychical as well as faulty physical conditions. When the cleft palate speech has once developed no amount

of adequacy and efficiency of the palate brought about by operative measures can in itself appreciably change or improve the speech. This is true because the psychism of the individual has come to accept the cleft palate speech as being normal speech, and this psychical condition must be changed before anything like correct speech can be given to him.

This principle obtains in all our operations upon the respiratory tract the object of which is to correct faulty functionation. We have not done our whole duty, therefore, in the removal of tonsils and adenoids until we have by medico-educational methods taught our patient to overcome the faulty psychophysical habit to which the hypertrophied or diseased glands have given rise, nor have we done our wholy duty in a submucous septum operation until we have by medico-educational measures taught our patient to properly use the free nasal channels for respiratory purposes.

Full recognition has been given to the fact that respiratory difficulties, such as certain forms of asthma, have been due to reflex nervous action following intranasal obstruction and pressure, and some uncomplicated cases have undoubtedly been relieved by the correction of the intranasal deformities, but the percentage of cures resulting from intranasal operations for the relief of asthma and other respiratory affections would be far greater if the operative procedures were accompanied and followed by the correction of the faulty respiratory habits engendered by the original abnormal conditions within the nostrils.

Examples of this kind could easily be multiplied, but enough has been said to show that psychotherapy in the form of education and re-education should always be used in addition to the necessary medical and surgical measures for the relief of disturbed respiratory, phonatory, and articulatory functions.

The value of this principle is apparent in the particular so-called specialty within a specialty to which I have given much of my time and energy, namely the disorders of speech, and I may say that the treatment of these disorders differs not from that of other disorders of function found in the respiratory tract.

An historical review of stammering reveals the fact that surgery of the phonatory and articulatory organs was formerly looked upon as the great panacea for the cure of this affection. Distinguished surgeons operated not alone upon diseased conditions and abnormal structures but also upon perfectly normal structures, not hesitating, for example, to remove cross sections of the tongue and portions of the epiglottis in the hope of curing stammering. To us of the present day this practice would appear to be absurd, and yet it was done by some of the best surgeons of the nineteenth century.

We now know that stammering in the great majority of instances is of psychic and not of physical origin, and that to cure stammering psychotherapy is quite as important, and in some instances more important than physicotherapy. We know, in other words, that stammering at least in its chronic forms is essentially a psychoneurosis, whatever may have been the original cause of the affection, and that stammering speech, like the cleft palate speech, can be cured only by a happy combination of psychotherapeutic measures with the necessary medical and surgical procedures.

What is true of stammering is equally true not only of other forms of defects of speech such as pseudolalia or faulty articulation, but of many of the other more or less serious functional disorders of the respiratory tract, and as we of the medical profession have been slow in recognizing that stammering and other defects of speech are largely of psychopathic origin and require for their cure psychotherapeutic measures, so have we been slow in recognizing that many forms of asthma, sore throat, and difficult nasal breathing are of similar origin and require similar treatment.

In no specialty of medicine is the importance of these matters so apparent as in our own, for in no specialty is the psychical element so great a factor in the causation not only of functional but of organic disorders as well. In this connection, it must not be overlooked that faulty methods of breathing, vocalization, and articulation, although at first of psychical origin, frequently result in organic diseases which cannot be differentiated from diseases having purely physical bases.

In our discussion of this subject, however, we should try not to differentiate too closely between the psychical and physical, and we should keep in mind that these phenomena are not only closely related but they are equally demonstrable as objective entities.

A study of the psychobiologic phenomena as they appear in a given individual is merely a study of his reactions to his environment, or in other words a study of what has been called his mentation, behavior, and personality.

The new psychology, therefore, teaches us not merely how to treat diseases of special organs, such as the larynx, the nose, or the ear, but it teaches us how to treat the patient himself or the reactions of the patient to these particular diseases.

Moreover, a knowledge of this psychology will greatly broaden the scope of our work, and it will also tend, as Dr. Adolph Meyer has said, to make a medical education absolutely necessary to those desiring to practice the various forms of the healing art.

The suggestion of the desirability of treating the patient rather than the disease is not a new one, but the principle involved has met with only scant favor, and as long as medical practitioners persist in ignoring it, so long shall we have non-medical practitioners, such as Christian Scientists, osteopaths, hydropaths, and all the others of their kind, actually invading our fields of operations, and so long also shall we fail to live up to our high calling in the practice of medicine.

THE TONSILLOSCOPE, AND THE EXPLORATION OF THE INTERIOR OF THE TONSILS IN SITU.

THOMAS R. FRENCH, M.D.

The faucial tonsils lying undisturbed in their beds in the throat have, to the clinical eye, always been as an unknown, an undiscovered country. There has been no map, chart, or compass to guide us in a survey of that little world, a world which now has opened wide its portals for inspection. It is, therefore, for the purpose of offering a map, a chart, and a compass for the exploration of the interior of the tonsils *in situ* that this communication is presented.

Naturally the first map of a new country, or of an old country seen in a new way, as well as the tools to assist in its exploration, must be of an elementary character and, doubtless, those which are here offered will be considerably refined by future study and more extensive experience.

The tonsilloscope consists of a tonsil microscope, made on the simplest principles, and a diminutive electric lamp with which to transilluminate the tonsil.

Tonsilloscopy is the method of examining the interior of the tonsil by transillumination alone, or with the aid of the tonsil microscope while the gland is being transilluminated. A small lamp hidden in the folds above, behind, or below the tonsil transilluminates that body with a flood of light, and so illuminated, it is examined with the tonsil microscope. To some extent the color and its shade, or value, as well as its character, shown in transillumination, indicate the probable class to which the tonsil belongs; but in the field of the microscope the conditions present in the tonsil are in most cases wholly revealed.

The knowledge thus far obtained of the normal and pathological conditions existing within the tonsil, as seen with the tonsil microscope and transillumination, has been reached after two and a half years of practically continuous observation. A year and a half ago we reported the results of our study of ex-

ploratory sections of the tonsils removed at the beginning of operations, when in a brilliantly lighted field, at the end of a tube containing a powerful magnifying lens, they were subjected to a minute surface examination. From that method it was but a step to place the lamp behind the exploratory section and the section itself over the end of the tube containing the lens and then examine the tissues while the light was shining through them. Studies made in that way enabled us, in the course of a few months, to become familiar with, and to classify the conditions found in the substance of a large number and a great variety of tonsils, and from those studies there was developed what properly may be called a code. When it became apparent that the language of the code was highly significant and constant, again it was but a step to adapt the principles used in examining exploratory sections in the external tonsilloscope to the examination of the tonsils *in situ;* and so the present method was created.

This method is presented as a means to assist the clinical eye; as a means to detect gross changes in the tonsil from histological and pathological points of view; and as a means to determine whether the tonsil is that of health or is definitely diseased. By the word *disease,* as used in this connection, is meant a chronic inflammation or congestion, with its concomitant dilatation of the blood channels in the substance of the tonsil, resulting from past acute inflammatory processes which probably have left in their train collections of detritus or pus in the crypts or in pockets or sacs in the tonsil. While this definition does not cover every phase of tonsillar disorder, it comprises the conditions with which we are most, indeed almost solely, concerned and which, therefore, we most desire to recognize and comprehend.

This method is intended only for the study of clinical pathology, but it permits even more accurate and dependable studies than most of those of clinical pathology elsewhere, for with it we can determine not only whether the tissues under examination are the seats of disease, but, if they are, to what probable extent. The degrees and the varieties of hyperemic displays resulting from inflammatory reactions constitute an almost invariable index of the character and extent of disease present, and the portrayals of collections of necrotic material or pus, when they

can be seen, are, in most cases, as definite and as distinct from all other conditions as are the portrayals of foreign bodies in x-ray pictures.

Although we began our investigation of the tonsil with the modest ambition of helping to conserve the capsule, the continuous revelations made in the study expanded the scope of the work to such an extent that it may now be said that the highest aim and purpose of this method is to assist in resolving the problem of systemic infections produced by pathological conditions in the tonsils. Still, while much of interest might be contributed on that phase of the subject at this time, we must, of necessity, in this short paper, confine ourselves almost entirely to a description of the means and appearances by which definite information is supplied in regard to the actual conditions existing in any given tonsil.

The outcome of our investigations thus far has been the development of two methods which it has been thought proper to name the external and internal methods of tonsilloscopy, but it is quite likely that the word, tonsilloscopy, will, in the future, be applied only to the internal method, as that, of course, will have by far the greater field of usefulness. The external method will then, perhaps, be employed solely for the acquisition of the knowledge needed to interpret the revelations made within the internal tonsil microscope while the tissues are being transilluminated.

The external tonsilloscope. This instrument was originally intended and used for the examination of exploratory sections removed from the tonsil at the beginning of operations, but now it is used for the study of the tonsil, as a whole or in part, after operations. It consists of a simple microscope, on a light screen, and a powerful electric lamp suspended together from a crane (Fig. 1). The object in their suspension is to make it possible to conduct the examination without a break in surgical cleanliness. The lens in the microscope has a magnifying power of six diameters. It is fitted into the proximal end of the tube of the microscope and has an adjustable focus. The microscope tube tapers to a size at the distal end which can be readily covered by a section, or the whole of the tonsil. The specimen is caught

Fig. 1. Shows the external tonsilloscope and the manner of examining tonsil tissues with it.

upon a hook at the distal end and left in position for leisurely study.

The lamp is the Nernst, of 250 candle power. The transillumination produced by it is brilliant and highly effective.

The knowledge which has been acquired of the various conditions in, and disorders of the tonsils was obtained by a long

study of the tissues exposed in the suspended external tonsilloscope, and it is quite certain that such knowledge could not have been acquired in any other way. Whether we shall be able to make the code clear to others without the study of sections within this instrument remains to be seen, but our present belief is that the essential ground work of knowledge will have to be laid with the aid of the external method. The apparatus for the purpose need not, however, be as elaborate as that just described, for a pocket lamp in a small box with one end open and the tonsil microscope employed in the internal method will, if the lamp is pressed firmly against the tonsil, give almost, if not quite as satisfactory results as can be obtained with the suspended external tonsilloscope and its powerful lamp. Such studies may also be made in the inexpensive contrivance which we have fallen into the habit of speaking of as the *tonsil camera lucida,* with the aid of which the group of tonsil classes will presently be demonstrated. The explanation of how a weak light can be made to do the work of a strong one under changed conditions, is the explanation of the finding of the secret of the internal method of tonsilloscopy which is about to be described.

The internal tonsilloscope and tonsilloscopy. The internal tonsilloscope is for direct tonsilloscopy or the examination of the tonsil *in situ.* For many months, while working upon a solution of the tonsil problem with the external method, we supposed that we had reached the limit of usefulness of the instrument employed in it. The large lamp became intensely hot, and yet with it we obtained only the illuminating power which we believed we needed to make the substance of the gland blaze with light. We dreamed of putting the whole of the external tonsilloscope into the throat; for a time, however, it was but a dream, for thought is often curiously slow. But then, later, we did put it into the throat, and its introduction was accomplished in this way: Using the shortest of the Jackson bronchoscopes with a beveled end and a lamp on a light carrier of the next largest tube, packed securely with gauze so that the lamp was held just within the distal opening, the end of the tube was slipped behind the tonsil, and to our surprise and gratification the tonsil lighted up as brilliantly, we thought, as

we were accustomed to see it in the powerful external apparatus. The explanation of the light from the two lamps of vastly different candle powers giving the same illuminating results, lies in the fact that the high power lamp, which because of its heat is not brought into contact with the tissues, is used in the brightly lighted operating room, under which conditions its rays are rapidly dispersed, while the low power lamp is in firm contact with the tissues and is employed in the semidarkness of the back of the mouth where every ray of artificial light becomes effective. In other words, contact, with pressure, with the low power lamp compensates to a large extent the lack of candle power. The main obstacle to the internal method having, in this way, been overcome, it was then only a matter of adapting the tools to the conditions, and this, happily, proved to be an easy task.

The instruments needed for internal tonsilloscopy are a lens tube speculum, or tonsil microscope, and a slender lamp which can be placed behind, below, or above the tonsil and buried within the various spaces between the tissues, so that its light is not directly exposed to the eye. The tonsil microscope (Fig. 2), which is made in two sizes, is a slender tube or speculum about six inches long, inside of which, at the end of a sliding tube, is a lens of from five to eight diopters, according to the visual needs of the examiner. The distal end of the microscope is beveled and beaded and has an aperture the diameter of which is in one instrument one-quarter of an inch and in the other one-eighth by one-quarter of an inch. The instrument with the largest aperture is intended for the examination of the free face of the tonsil and the capsule as well. That with the smaller aperture is intended for the examination of the capsule only.

The lamp (Fig. 3) is of one candle power and is enclosed in a small metal case with a glass window at or near its distal extremity. It is attached at an obtuse angle to an electric light shank which connects by a cable with a Tungsten battery balanced in size and power to the candle power of the lamp. The tonsillar substance can, however, be more effectively transilluminated with a double lamp (Fig. 3), which should be preferred in all examinations in which the tonsil is large enough to hide the glass windows from view.

With the tonsil microscope and lamp, the tonsil can be examined with almost the same freedom and thoroughness as can a small section of a tonsil or an excised tonsil in the external tonsilloscope, with the difference, however, that with the internal method the entire surface of the capsule cannot as yet be ex-

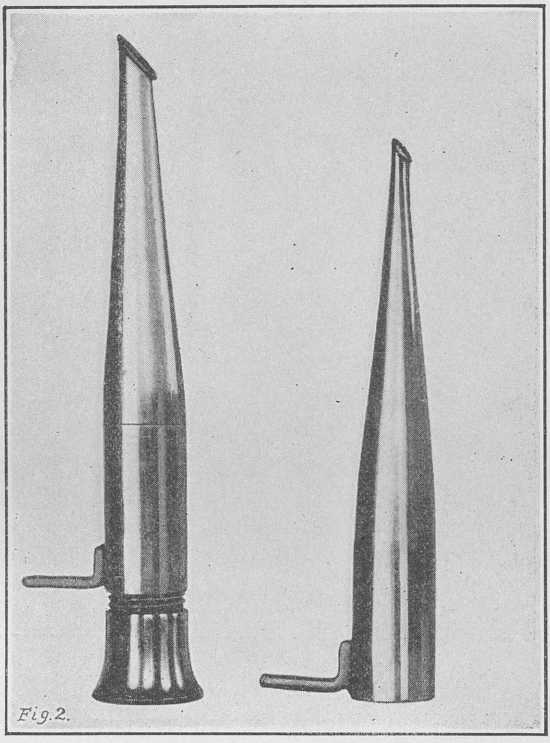

Fig. 2. Tonsil microscopes with large and small apertures.

plored, and also, that with the same method transillumination and the microscopic examination of the tonsil must be made of the gland as a whole, instead of a relatively thin section sometimes exposed in the external tonsilloscope. Allowance must be made, therefore, for a greater depth of color in the whole tonsil than is shown in a small, thin, and somewhat exsanguinated section.

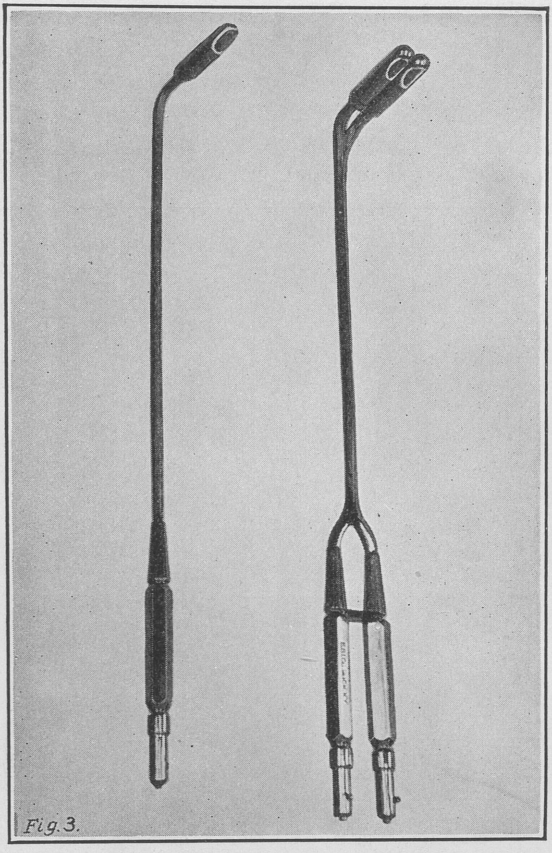

Fig. 3. Single and double tonsil lamps.

The internal method (Fig. 4), which can be used with as little discomfort to the patient as is occasioned by the use of the instruments employed in posterior rhinoscopy, necessitates an even and penetrating illumination of the interior of the tonsil; and that can be instantly accomplished by placing a cool but bright lamp behind, above, or below the gland, making *firm* pressure upon the tissues, when the tonsil lights up in much the same way as does a stained glass window brilliantly transilluminated from the opposite side. The outlet of the tonsil microscope is then applied to any and every surface of the luminous tonsil not oc-

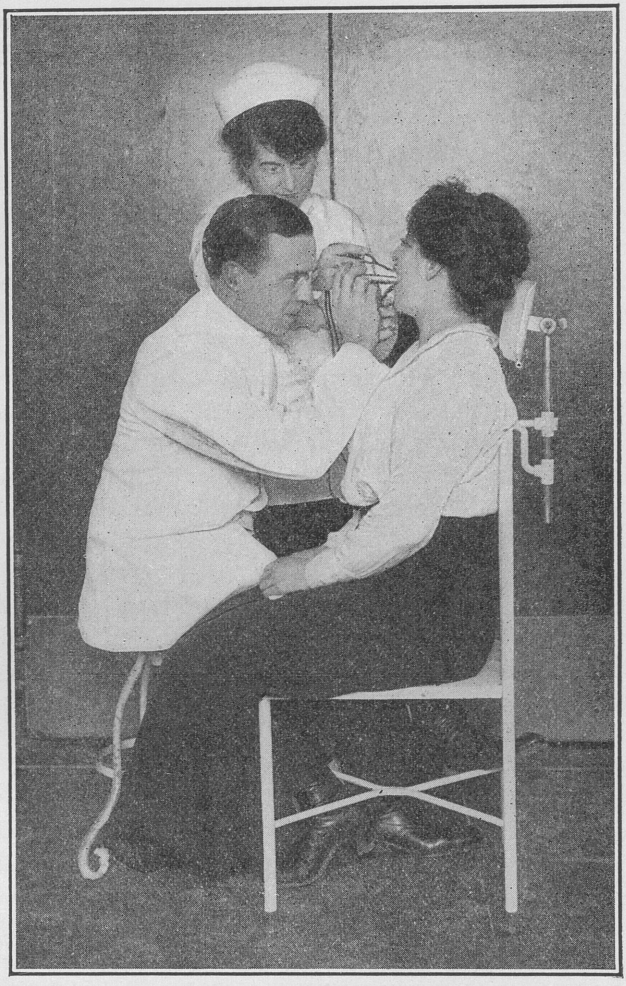

Fig. 4. Illustrates the manner of using the tonsil microscope, while an assistant holds the lamp in position behind the tonsil. When transillumination alone is practiced, the examiner manipulates the lamp as well as the tongue depressor.

cupied by the lamp, including even, if there are no adhesions to the anterior pillar, a large part of the surface of the capsule. Many of the conditions within the tonsil can in this way be seen directly. The meaning of the varieties and shades of coloring

is a matter of interpretation which has been developed from experimental color studies made in association with the anatomical, histological, and pathological findings.

When the tonsil is that of health, or nearly so, it is relatively translucent and permits a considerable insight into its contents. When, however, it is the seat of disease, it is less translucent in proportion, presumably, to the number and virulence of the bacteria in the pathogenic material present and the consequent inflammatory reaction produced by them, so that in extensive disease it is impossible to detect anything beyond collections of detritus and pus lying close to the surface. As will be explained further on, this fact is of no material consequence, for beyond a certain point, as has been demonstrated in the several hundred cases tested, the degree and character of the hyperemia alone proclaim the extent or the irritating nature of the disease within the tonsil. With this method, therefore, we are able to detect, either at the beginning of operations in children, or in patients of any age when examined in the office or at the bedside, the positively normal or the positively diseased tonsils, or to decide whether they should be classed with the doubtful or borderline conditions. That we were not misled in this study by the hyperemias which occur in acute processes is proved by the fact that care was taken to exclude every subject for operation whose chart showed a temperature above 99.2 degrees F.

The pathologists who have assisted in this study, and to whom we are greatly indebted, are Dr. Francis A. Hulst, visiting pathologist to the Brooklyn Hospital, and Dr. Robert F. Barber, assistant pathologist in the Hoagland Laboratory of the Long Island College Hospital. Doctor Hulst did not enter the investigation until four months ago, but since then he has done much excellent work. Doctor Barber made some early tests of our findings, which served admirably as leading strings for the work which followed. While from macroscopic examination of the specimens after they had been removed from the throat and exposed in the external tonsilloscope, conclusive pathological evidence could always be easily secured, if definite disease existed, still it is, of course, largely because of the indorsement of our gross findings by the pathologists that we are able to

speak with confidence in the statements made in describing the code.

The code. The code is a language of signs which are, within certain limits, unvarying and unmistakable, and to one who has learned the language the tonsil becomes, practically, an open book. After the tonsilloscope was perfected it was many months before the, at first, unmeaning revelations began to be understood, and then in the light of the unvarying facts presented in the abundant supply of fresh tissues, the significances of which were ascertained in subsequent pathological findings, the code settled slowly into the form in which we find it today. In the process, however, many world-old beliefs were relentlessly swept aside, for one brutal fact will overwhelm a thousand finely spun theories.

All microscopic work is by transillumination. Irrespective of the lens power, the difference between the method being described and that of the high power microscope is that in one the tissues are seen in bulk and are subjected to examination while still in the living anatomical state, while in the other the tissues, which are seen in thin sections, are necessarily greatly changed by their removal from the body and by the processes needed to prepare them for examination; and those differences produce wonderfully different results.

If to an amber colored fluid is added crimson lake pigment in weak mixture, gradually adding to its strength until a considerable depth of color is obtained, the solution will pass through all the shades of color which are found by transillumination in disordered tonsils, ranging from that caused by functional stimulation, or an infinitesimal quantity of detritus, to that caused by a complete honeycombing of the tonsil with detritus and pus. In its effect upon transillumination irritating pathological material in a tonsil acts, in a sense, like a pigment in a solution; the more intense its quality or the greater its quantity, the deeper will the characteristic coloring be.

While the conditions seen in a section of a tonsil in the external tonsilloscope are more graphically shown because the section is thinner than the tonsil as a whole, still if care is taken to make at least a part of the examination of the tonsil *in situ* close to

one of its edges, the result will be practically the same in both cases. There is, happily, one advantage which the method of examining the tonsil *in situ* has over the method of examining tonsillar tissues in the external tonsilloscope, and to that we wish especially to draw attention before describing the tonsil classification, and that is, that except when the tonsil is the seat of extensive general disease, its color, or shade of color, is never the same as that of the anterior pillar of the fauces transilluminated by the same lamp at the same time. The color of the anterior pillar is the result of the passage of the light through the tonsil and the palatoglossus muscle beneath the mucous membrane, and, unless the mucous membrane is the seat of deep congestion, the shade of color of the pillar is always practically the same as that of the tonsil in extensive general disease. As the shade of the anterior pillar is fixed, that anatomical structure, therefore, serves in a most admirable and a satisfactory way as a guide, or control, to indicate by contrast the degree of hyperemic coloring in the tonsil. In the diseased classes of tonsils, generally speaking, the greater the contrast between the tonsil and the anterior pillar, the less the disease in the tonsil. The figures on the color card illustrating the code, which we now take pleasure in presenting (and which will be reproduced for publication in the *Transactions*) were designed to depict such contrasts as well as to illustrate the appearances of the tonsils in the tonsil microscope. The actual appearances of the various classes of tonsils, as seen in the transilluminated microscopic field, are shown in these boxes—the tonsil camera lucida—each of which contains a lens and a pocket lamp arranged as in the external tonsilloscope and each also contains a tonsil of one of the classes without, of course, the contrasting anterior pillars.

The classification of the conditions found in the tonsils, in health and disease, was, in this study, practically automatic, for the different varieties fell naturally into six groups, viz.: 1, the tonsil of health; 2, the tonsil which was disturbed by functional stimulation or was mildly diseased; 3, the tonsil containing superfical abscesses; 4, the tonsil with apparently active or large foci of detritus and pus occupying restricted areas; 5, the tonsil which was the seat of considerable general disease; and,

6, the tonsil which was the seat of extensive general disease. These groups may, properly, be regarded as classes, and as such will be described in detail.

Class 1. The tonsil of health. The color resulting from the transillumination of the tonsil of health is a warm amber, but the passage of light through a thin edge of a tonsil or through a very small tonsil of health, even in an adult, produces a color more like that of rock candy. In the tonsil microscope small arteries are seen coursing upon the surface and to some extent in the stroma, while here and there in the substance of the gland appear small round red spots like flies in amber. In commenting upon the red spots, Dr. Hulst says: "While I have not seen a sample of Class 1, it seems plausible that the 'flies in amber' might be normal follicles which represent a denser tissue than the rest of the tonsil." The reason why samples of the tonsil of health were not sent to the pathologist is because of the curious, interesting, and as yet unexplained fact that during our investigation the tonsil of health has been found in almost every instance in subjects operated upon in the spring, summer, and early autumn, and none have been seen in the clinic since last November. It would, therefore, seem likely that many of the tonsils which were assigned to Class 2 were in reality the tonsils of health masked during the winter months by conditions of ill health incidental to the cold and wet seasons.

For diagnostic purposes the use of the tonsil microscope in this class is not really essential, for by transillumination the bright amber coloring of the tonsil in sharp contrast to the rosy colored anterior pillar, is conclusive and proclaims the tonsil to be, peradventure, that of health. And yet there is a pitfall in the examination of tonsils which at the first glance appear to be of this class, and which illustrates in an impressive way the inadvisability of reaching a conclusion in haste through transillumination alone. In two other classes, both of disease, bright red areas, more or less sharply defined, appear in the amber field. If the lamp is placed behind the amber colored portion of the field, the transillumination is apt to be in that color only and so give the impression that the tonsil is that of health, while the placing of the lamp in various other positions or its reintroduction will

disclose a distinctly diseased condition. Therefore, so far as the color in transillumination is concerned, it is perfectly safe to trust the first glance if disease is shown, but it is not safe to do so if by that glance the tonsil of health appears to be present.

Of course, a somewhat exsanguinated section of a tonsil when examined in the external tonsilloscope, will appear to be of a lighter shade than that of the transilluminated tonsil *in situ*, but they are both uniform amber in color and that fact is all that is required to disclose the presence of the tonsil of health.

Class 2. Functional stimulation or mild disease; the doubtful class. In this class there is a departure from the normal indicated either by a uniform pink-amber coloring involving the entire tonsil, or by hyperemic blushes covering small areas of the amber field. This class must, for the present, be regarded as the doubtful one; that in which the borderline conditions are found. It is, perhaps, the only class which will afford a platform for debate on the propriety of partial or complete removal of the tonsils, for the revelations made in the other classes are well understood and are definite. The questions which must be answered in dealing with this class are: Do the signs indicate physiological stimulation; or an extension of hyperemia from surrounding catarrhal congestion; or the process of involution after an attack of acute tonsillitis; or the presence of minute permanent collections of detritus locked in after former attacks of acute inflammation; or inflammatory areas without foreign material? Our studies of this class thus far have led us to the belief that if the coloring is uniform pink-amber, that is, not mottled, and is the same in both tonsils, the cause is either a physiological stimulation or an extension of catarrhal pharyngitis. An interval of a week or two between examinations, and in the meantime a search for a possible cause, would tend to clear up the doubt if it was due to stimulation. If, however, the tonsil coloring is mottled and uneven or in discrete areas only, the explanation will be found in the presence of minute collections of foreign material which have not yet been cast off after an attack of acute cryptic tonsillitis, or in minute permanent collections of cheesy material distributed throughout the gland like seeds in a strawberry, or in inflammatory areas without foreign

material within the areas of heightened color. We have, occasionally, been able to outline, in such tonsils *in situ,* small collections of detritus, but in most instances, because of the clouding effect of the hyperemia, it has been impossible to see the collections directly. It is said that cuttle fish seek to hide themselves from their enemies by emitting a substance which forms an opaque cloud about them, thus, perhaps, proclaiming their presence to alert piscatorial hunters. In much the same way more or less discrete hyperemic areas in the tonsils proclaim the presence of collections of detritus, or at least inflammatory processes within them.

In this connection Doctor Hulst says: "In three cases of Class 2, I have found on section through areas giving the small localized deepening of color, a moderate increase of connective tissue just within the epithelial layer lining the crypt. This represents a chronic inflammatory process." Doctor Barber reports similar findings.

When one tonsil is seen to be in this class, then the other should be subjected to examination, for not infrequently one of them is over the border and in the class which is being described, while the other is in the class of health. If such is the case, it would be evident that the disordered tonsil contained either foreign material or was, possibly, the subject of physiological stimulation from some one-sided source, for the presumption is against its being due to an extension of catarrhal pharyngitis or being in a state of involution after an acute cryptic tonsillitis. An examination after the lapse of a week or two would, perhaps, show whether it was due to detritus or stimulation. If both tonsils show moderate disorder, with areas of hyperemic blushes, but one more than the other, the deduction would have to be made that the cause was detritus, for it is highly improbable that any other cause could give rise to an uneven disturbance. This class of tonsils may be found at any age, but we have not met with it in enlarged tonsils in subjects above the age of eight years.

In a masterly disquisition in a letter from Dr. Jonathan Wright, in answer to a question by the writer of this paper whether it was within the bounds of possibility for him to say at what time and to what degree one might expect the im-

mediate histological and pathological changes caused by an acute cryptic tonsillitis to have disappeared, he says in part, that he does not know where the normal leaves off or where the abnormal begins, clinically or anatomically, nor when pericryptic vascularity is physiological; "that after the first attack of cryptic inflammation, clinically it is usually impossible to detect structural change a week or two after the entire disappearance of symptoms. With each succeeding attack clinical observation, with increasing frequency, is able to recognize the traces left behind, consisting in a deepening of the pits and a concomitant increase in pericryptic tissue—hypertrophy—in a vascularity due to permanent dilatation of blood channels in the lymphoid tissue itself, and in the neighboring mucosa."

Still we do not doubt that through the means of making histological observations described in this paper, a better understanding of the borderline conditions will result. If in the future this method is employed in routine examinations of the throat, it will not be long before we shall know whether or not tonsils which give positive signs of being definitely diseased will later, without treatment, be shown to have expelled the offending material and returned to a practically normal condition. From some of our experiences with the tonsilloscope since it was perfected, we are inclined to the belief that, at least in adult life, the crypts are capable of clearing themselves completely after acute cryptic inflammatory processes, even when the attacks have been somewhat frequent. This class constitutes a field which, doubtless, will be studied diligently, for as the other classes are easily recognized, the need of the future, as it applies to systemic infections, as well as to the surgical treatment of the tonsil, will be the determination of the status of the tonsil presenting conditions which are just over the borderline.

Class 3. Superficial abscesses. In this class blind abscesses are seen just under or near the epithelium on the free face of the tonsil which transilluminate as dark or black discs according to their proximity to the surface; the nearer the surface, the darker the shade. In the tonsil microscope abscess formations, when present, may also be found directly under the capsule. They are at times seen to be set in zones of a rosy hue, the depth

of which probably represents the degree of inflammatory reaction. In this class both tonsils should be examined, as one only may be found guilty, the other being entirely innocent. But whether one or both of the tonsils are involved, unless the abscesses can be shown to be confined to the free surface and are unaccompanied by collections of detritus in the crypts, the variety of disordered tonsils found in Class 3 must be regarded as definitely diseased and, therefore, proper subjects for radical treatment.

Class 4. Apparently active or large foci of detritus and pus occupying restricted areas. The characteristic feature found upon examination of this group, with the tonsil microscope and transillumination, is that the hyperemia is in more or less sharply defined areas set in a field which may not be far removed from the coloring of the tonsil of health. The appearance of the plumelike areas of crimson lake is much the same as the appearance of dye stuff the first instant or two after it has been thrown into water, some of the edges of the plumes being shadowy, while others are lined off sharply. The shade of red is usually as deep as that seen in the tonsil which is the seat of extensive disease, but by contrast with the amber or pink-amber field it appears to be even deeper. It will, however, be found to be of practically the same shade as that of the anterior pillar. The pronounced pecularities in the areas of rosy coloring are due to the presence, within the dense cloud of hyperemia, of a considerable quantity of pathological material occupying only certain portions of the tonsil; the crypts in the unaffected parts appearing to be empty and in a seemingly normal condition. In this class, as in the three preceding classes, one tonsil alone may be affected. It is, therefore, essential upon finding in one tonsil the conditions characterizing this class that the other tonsil also should be examined to determine whether it too is involved—as we believe it nearly always is. Tonsils containing the amount and probable pathogenicity of the extraneous material found in this class must be regarded as serious menaces to the health of the host.

Class 5. Considerable general disease. This is classified as *considerable* general disease in contradistinction to *extensive*

general disease. In the operating clinic, in the office, and at the bedside, in tonsils of every size, this class has been met with far more frequently than any of the others. In this class there is uniform though comparatively light hyperemia, indicating that there is quite a number of collections of detritus scattered throughout the tonsil, but probably no pus. While the coloring is of a uniform shade in all parts of the tonsil, it is not always deep enough to prevent a view, either with or without the tonsil microscope, of collections of foreign material, even when they are situated in remote parts of the gland. When, therefore, as the lamp sinks out of sight the tonsil lights up in a uniform color, but of a distinctly lighter shade than that of the anterior pillar, it may with certainty be assumed that there is, scattered throughout the substance of the tonsil, a considerable number of collections of foreign material, even though few of them can be brought definitely into view. In this class both tonsils should be examined, for while in a large percentage of cases, in the extent of disease, both tonsils have been found to be practically alike, occasionally one has been more diseased than the other, that is, one may have been in Class 5 and the other in either Class 2 or 4.

If both tonsils are of the same shade of color, the use of the tonsil microscope, though clarifying, is not essential in making a diagnosis in this class, for the fact that their tissues transilluminate in a uniform rosy color, but several shades lighter than that of the anterior pillars, is sufficient proof that the tonsils are the seat of the milder form of general disease. In this and the more extensively diseased class, collections of detritus entrapped between the anterior pillars and the tonsils are, in this way, often graphically exposed.

Class 6. Extensive general disease. This is classified as extensive and implies the honeycombing of the crypts and the substance of the tonsils with detritus and pus. The coloring in transillumination is uniform and of the deepest shade seen in the tonsils; it always corresponds to that of the anterior pillar. The depth of the color is, doubtless, dependent not so much upon the quantity of foreign material within the tonsil as to the irritating character of its bacterial contents, and while in a few

tonsils, examined in this study, we have found the shade of color to be even deeper than that of the anterior pillar, such cases must be regarded as exceptions, for the rule is that the shade of color of tonsils in this class is the same as that of the anterior pillars. The invariable association of excessive hyperemia, as shown in transillumination, and the subsequent finding of extensive pathological collections within the tonsils of this class, establishes the propriety of making diagnoses by transillumination alone; and as the conditions found in one tonsil are quite certain to be found in the other, an examination of one tonsil is sufficient to make a diagnosis of the conditions existing in both. Because of the opacity of the tissues produced by excessive hyperemia, foci can be seen only when lying near the free surface or close to the capsule, but as the high degree of inflammatory reaction proclaims the presence of many foci in various parts of the gland, the use of the tonsil microscope is not essential in determining the status of this class of tonsils.

Transillumination of a tonsil which is the seat of acute cryptic inflammation reveals, practically, the same depth of coloring as that characterizing Class 6 (the shade of color of the tonsil and the anterior pillar being the same), and in addition there are seen upon or near the surface many sharply defined dark areas which indicate the location of the exudate in and near the openings of the crypts.

The subject of this paper is such a vast one and the variations in the findings are so great that we, of course, do not assume that the foregoing code representations will apply accurately to all cases. They are the cumulative results of the first gleanings in a new field which, while they permit a classification of the varieties of tonsils into somewhat definite and comprehensive groups, cannot be regarded as final studies.

Of the histological and pathological findings in general, Doctor Hulst says, among other things:

"I have studied the material you sent me, giving special attention to the least diseased tonsils. I have supplemented my work with material from other sources, but have used the tonsils so obtained mostly in familiarizing myself with the classification you use in transillumination. I have also used other tissue with the transilluminating lamp and tonsil microscope, to see

what general appearances pathological tissue had over the normal. An interesting example of this was in the study of breast tissue in chronic mastitis, where there were numerous cysts of all sizes and all degrees of thickening. Some of the cysts contained clear fluid and some purulent and cheesy. It was impossible for me to say from transillumination what was the character of the material within the cyst, for all gave about the same appearance. The intensity of color depended upon the amount of inflammatory reaction about the cyst.

"The same thing holds true for the tonsils as for the tissue described, in that the inflammatory reaction in the tissue is what gives the change in color rather than the character of the material accumulated in any pockets, whether abscess cavities in the tissue, or detritus in the crypts. The density of the tissue as well as active hyperemia modifies the color when transilluminated.

"Some of the material has been investigated from the bacteriological standpoint. This has not been done thoroughly, for I knew that this was not your point at this time, and I have deferred it for later material. In making a puncture through a seared surface into an area which shows by transillumination a deeper color, it is difficult to say whether one had opened an abscess in the tissue of the tonsil, or had merely penetrated a crypt, or perhaps passed through a crypt to reach an abscess. In other words, cultures taken from a puncture through a seared surface may represent the bacteria from the tissue proper, but more likely that of a crypt or contaminated by material from a crypt. One of Class 2, so treated revealed a small sac about one mm. in diameter containing cheesy material, cultures from which showed no growth. Another Class 2 showed a similar sac with turbid fluid, cultures negative. Still another Class 2 showed no fluid, but seemed to represent inflammatory infiltration. None of the other classes were studied in this way, for it seemed apparent what their relation was to pockets of pus and debris, and much has been done recently on the bacteriology of this material.

"I think the tissue study is important in relation to the work you are doing, and while the material studied is insufficient to come to any conclusion, I think that it will be found, judging from my work so far, that the deepening of color will depend upon the chronic inflammatory thickening of the stroma and the lining of crypts."

Conclusions from the study with the tonsilloscope to the present time. While our tonsil investigation in all its phases

has now occupied nearly three years, there has been too little time since the present method of examining the gland was perfected, to permit many final conclusions to be drawn in any of the departments of the study. Numerous revelations, which have settled into established facts, have, however, been made, while the deductions from others will, perhaps, endure the test of time and extended observations. We can now tell whether a tonsil is that of health or is definitely diseased, but there still remains a class upon which more light must be thrown before it can with certainty be placed in the group of health or be condemned to that of disease. We refer to the borderline conditions described in Class 2 of the code.

The percentages of normal and of diseased tonsils need not now be a matter of opinion or conjecture and doubtless before long they will be determined with exactitude. By the word, *enlarged,* when used to indicate the size of the tonsil in the statement which follows, is meant a tonsil which fills the tonsillar fossa to such an extent that its free face extends beyond the edges of the pillars, or its anterior face curves the anterior pillars forward. Doubtless a tonsil of smaller size than that indicated by this definition may be regarded as enlarged, but for our present purposes references to enlarged tonsils must be made with such a definition in mind.

Our study of 666 tonsils in and from 333 operations upon children in our hospital clinic and the study of tonsils *in situ* in a large but indefinite number of youths and adults, would seem to indicate that all *enlarged* tonsils in subjects above the age of eight years, whether in late childhood, youth, or adult life, are diseased. Enlarged tonsils in subjects below the age of eight years may or may not be diseased, and whether they are or not can be determined only by examination with the tonsilloscope. Of *enlarged* tonsils below the age of eight years, twenty per cent. were found to be the tonsils of health, twenty-five per cent. were of the doubtful class, or Class 2, and fifty-five per cent. were definitely diseased. Most of the enlarged tonsils of health were found in the second, third, and fourth years. Enlarged tonsils in subjects below the age of eight years, therefore, exist to the extent of at least twenty per cent. as the result of

their functional activity and not because they are diseased. Above the age of eight years all enlarged tonsils probably condemn themselves as diseased by being enlarged. While, therefore, enlarged tonsils in subjects above the age of eight years are probably diseased, diseased tonsils are not necessarily enlarged, for normal sized tonsils at any age may be diseased. In this investigation normal sized, or very small tonsils were found diseased in four per cent. of the subjects below the age of eight years. Whether or not normal sized tonsils are diseased can be determined by examination with the tonsilloscope.

The study of a much larger number of cases may show that the foregoing statement in regard to gross percentages should be subjected to revision, for many cases in our series which were placed in the doubtful class may have been, and probably were, the tonsils of health temporarily congested from stimulation or from various other causes. Therefore, because of the many reasons for the presence of a cloud upon the healthy tonsil a long collective tonsilloscopic study from this point of view, especially in subjects below the age of eight years, will be required before we can reach a knowledge of the real percentage of the enlarged tonsils of health.

Although the study of 333 cases will not permit many definite and final deductions to be made, nevertheless some of the results of this study would seem to indicate that the erstwhile enlarged tonsils of health in childhood may be regarded as permanently diseased if they continue enlarged after the seventh or eighth year, and that the enlarged tonsils of health which undergo a retrograde metamorphosis in late childhood may remain the tonsils of health throughout life. While we have seen many small diseased tonsils in the throats of youths and adults, we have not seen one enlarged tonsil after the age of eight years which was not diseased. If after the study of a much larger number of cases this observation continues to hold true, then the fact that a tonsil is found enlarged in a subject above the age of eight years will be a proof that it is diseased.

The assumption that the tonsil has no special function because it has not yet been discovered, is an unconscious confession of impotence to which few of us can agree, but one con-

clusion reached in this study, and which bears upon the function of the tonsil, seems deserving of at least a passing comment, and that is, that the revelations of this method, to at least a large extent, reduces the function of the tonsil to a negligible feature, for it must be conceded that a tonsil which is extensively diseased cannot perform its function, if it has one, and that a tonsil which is partially but permanently diseased would, probably, be the potential or actual source of too much mischief to be offset by the value of any function which a part of it might possess. When, however, a tonsil is found to be that of health, it should be left, at least in part, to perform whatever function it may have and also, incidentally, to spare the fauces the now common postoperative deformities and the consequent impairment of the speaking and singing voices.

The fact that an enlarged tonsil of health was not found above the age of eight years in any of the 333 subjects of this study, may suggest the thought that every enlarged tonsil of health in children below that age would later be likely to become diseased and should therefore be completely disposed of whenever found in early childhood. This, to us, would not seem to be logical reasoning in view of the fact that nearly all, if not all tonsils are enlarged in some stage of early childhood, and the tonsil of health in all its pristine purity is found in a considerable percentage of adult throats. In the present state of our knowledge regarding this matter we cannot, therefore, believe that an enucleation of a tonsil of health would ever be justifiable, and it is now always possible to determine when a tonsil is that of health. Again, while the tonsil of health should never be destroyed, the hopelessly degenerate tonsil when left, even in part, in the tonsillar fossa, must, of necessity, be a potent cause of future acute infections or of chronic ill health and invalidism—and the hopelessly degenerate tonsil can, in an instantaneous luminous view, be absolutely and finally exploited.

In this connection it may be of interest to observe that while one tonsil may be moderately diseased and the other perfectly healthy, as noted in Class 2, of the code, we have not seen, either in children or in adults, one tonsil extensively diseased and the other normal.

While, as has been said, this research work was originally undertaken principally for the conservation of the capsules of the tonsils in children, we believe that tonsilloscopy will, at least in the near future, most often be employed for the examination of the tonsils of youths and adults; for it has been clearly demonstrated, in a large number of cases, that the tonsils in subjects above the age of childhood are often, and without much doubt oftener than we now know, the seats of foci capable, under certain conditions, of producing local and systemic infections. Indeed the revelations within the tonsils and the degree of active irritation disclosed by this method of diagnosis lead to the conviction that a very large percentage of mankind is suffering in one way or another from this, heretofore, almost completely masked menace. As far as we have gone in the study of the tonsils in subjects above the age of childhood, the tonsilloscope has shown those glands, in the majority of cases, to be hyperemic; but as practically all the throats of adults in this country, and especially those living in large communities, are the seats of a greater or less degree of catarrhal inflammation, it would seem to be a reasonable assumption that a mild degree of hyperemia in the tonsils could be accounted for by an extension of the catarrhal process from the neighboring structures. Curiously enough, however, perfectly healthy tonsils have been found in the fauces of middle aged adults, the mucous membrane of which was in an advanced stage of catarrhal inflammation; thus proving that an extension of catarrhal inflammation from the pharynx to the tonsils does not necessarily follow, and that the tonsils may remain in a condition of health while the surrounding mucosa is diseased.

For the present, in adults, unless there should be an excess of hyperemia in the tonsils, which would in itself indicate the presence of foreign material, we must regard either the actual portrayal of such material or the presence of unevenly distributed thin clouds of hyperemia as the only conclusive proof of its existence, and while with the tonsilloscope it should never be difficult to determine whether or not a collection of foreign material is present, it is not yet possible, by the appearances within the tonsils, to prove that such a collection,

if present, is at the moment, acting as an infection focus. We believe, however, that ultimately even that obstacle may be removed, and that the characteristics of the hyperemic display around a focus will at least suggest its latent nature or its activity. Of course, in the absence of other demonstrable focal origins, an existing infection can be attributed quite positively to active bacteria in tonsils which are seen to be diseased. But there is, happily, one other means by which, in many cases, we may not only decide this highly important question in a very short time but also, if the relationship between the disease in the tonsils and a systemic infection is established, bring about a marked amelioration, or indeed complete relief, of the symptoms before or without resorting to radical measures. It is this: in subjects within the age of reason, to remove by the time worn method a considerable quantity, if not all, of the disease making material in the crypts, pockets, or sacs with a knife or curette, or both, followed by injections of fifty per cent. alcohol into the various openings through which the material was released. We have, in this way, in the few months since the tonsilloscope was perfected, been able to prove, in many cases of infection, that tonsillar foci were solely responsible. The association of facial neuralgia, flat foot, obstinate pains in various parts of the body, rheumatism, arthritis deformans, glandular enlargement, neuritis, regional paralysis, and labyrinthine deafness, with morbid material in the tonsils were definitely determined. In a few of the cases the effects of conservative treatment alone were somewhat startling because, though improvement in the symptoms was hoped for, their disappearance was not expected. The most striking illustration of an unlooked for result of such treatment was in a lady, thirty-five years of age, who for eighteen months had been the subject of complete nerve deafness in one ear. The tonsil on the affected side, though very small, was seen to contain, in the depths of its substance, four or five collections of necrotic material set in a field of moderately translucent hyperemia. The hearing returned suddenly to nearly its normal power at the end of the second week of treatment in which the curette and alcohol injections alone were employed.

This measure cannot, however, always be depended upon, for

in a small percentage of cases, especially in adults, too few of the mouths of the crypts remain patent to permit the removal with the curette of enough detritus to make a definite impression upon the systemic disorder. In a few such cases we have, however, secured locked-in collections of foreign material, which could be seen in the substance of the tonsil, by cutting down to and removing them while the tissues were filled with light from a lamp held behind the gland.

While, therefore, in many subjects with tonsils in Classes 2, 3, and 5, of the code, we have been able, with conservative measures, to prove that they were the sources of systemic infections, and have succeeded, in the course of time, in partly or entirely relieving the symptoms, we have also, of course, in cases in which the relief was definite but only partial, been enabled positively to decide that enucleation held out the only, but well founded hope of complete and permanent relief.

This opens up the subject of systemic infections and, doubtless, this method of detecting tonsillar diseases will make the study of relationships much easier. Through it we may learn much of the harmful potentialities of the tonsils, and with its aid we may be assisted in placing the responsibility for many of the now mysteriously caused diseases of the vital organs.

It may be doubted if tonsils which are the seats of extensive or even considerable disease can ever fail, at some time, to produce local, remote, or general disorders. Certainly, it must be regarded as a reasonable belief that every individual possessing tonsils of such a character, even if there should be no localized expression of remote infections, would, under certain conditions, be the subjects of a bacteriemia or toxemia with the lowering of tissue resistance in the entire body. This belief applies to adults with small tonsils which often contain compressed packings of detritus and pus, as well as to children with larger tonsils, and, therefore, probably, a larger quantity of disease-making contents. The degeneracy of the body to be accounted for in this way and the commanding importance of the tonsils in pathogenesis, has already been demonstrated to a large extent, but we must all agree that by far the largest measure of information needed to solve this pressing question has yet to be supplied.

It is, perhaps, more than likely that a protective envelope, or capsule, is, at times, formed about necrotic tissues in the tonsil analagous to the hypothesis of Professor Theobald Smith in regard to latent foci of tubercle bacilli. In other words, the defensive powers of the body may make even pathogenic collections innocuous, and under those conditions individuals in whose tonsils such collections exist would be immune to injury from them. But however that may be, the fact remains that the human tonsil, with surprising frequency, can be seen to contain locked up material which is either innocuous or is a menace to the health of the host. While, therefore, we are not in a position to determine without doubt, except by the means already pointed out, whether such material may be regarded as actively injurious or only potentially so, we are, we believe, quite safe in saying that until we are capable of distinguishing positively between latent and active foci we shall look upon all such collections of foreign material with at least a considerable degree of suspicion. Given, however, a disorder of the body the cause of which cannot be clearly traced, and given also in the same body tonsils, large or small, in which the presence of foreign material has been positively disclosed, then the removal of such material, in an effort to determine the existence of a possible relationship of cause and effect, must be regarded as a logical sequence.

What has been said in regard to the indications of the presence of collections of detritus and pus will, doubtless, apply to the presence in the tonsils of tuberculous foci, but in what way such foci will affect the circulation, as shown in transillumination, or in what particular way the material itself will appear in the tonsil microscope, must be determined by future experimentation, for we have not yet reached that feature of the study. When, however, it is reached it will, probably, prove to be a fertile field for investigation.

In this study we have submitted many adenoid growths to examination in the external tonsilloscope, and have found that in health and disease the conditions within them correspond closely to those found in the tonsils. One interesting and instructive feature of those examinations was that, as seen in the gross, the

vascularity of the overgrowths of the pharyngeal tonsils was shown to be greater than that of the faucial tonsils. At first the excess of coloring in the adenoid growths was thought to be due to an excess of disease, but investigation soon proved that an excess in the number of the blood channels themselves was the cause of the difference in the shades of coloring. While we have not yet experimented with it, it seems likely that much will be learned of the conditions in adenoid growths by examining them *in situ* with the pharyngoscope, while the mass is made luminous with a lamp carried up behind the velum and buried in the soft tissues.

It may be of interest to note, in passing, two by-products of the study with this method of exploring the interior of the tonsils, the first being that tonsils which are the seat of extreme disease and are, therefore, seen to be excessively hyperemic, bleed freely when cut into, and while we know that they are no more liable to postoperative hemorrhage than are those in the other classes, the demonstrated presence of hyperemia enables us to predict that free immediate bleeding will accompany operative procedures upon them. By determining before operation the degree of turgescence and, therefore, the degree of dilatation of the blood channels, the probable blood loss can, all other things being equal, be fairly well anticipated in operations upon tonsils of either of the classes. From this the postulate can be framed that except for vocal and respiratory obstruction, the greater the need of a tonsil operation, the greater the hemorrhage which will accompany it.

The second by-product is the disclosure of the ease with which the inner wall of a peritonsillar abscess can be located and mapped out, thus enabling us in early cases to release the pus soon after it has formed. In late cases even the novice need never fail to make an accurate puncture in the first attempt.

Because of the amount and variety of clinical work required, it would not have been possible to elaborate the details of this study without the keen interest and loyal co-operation of our two assistants in the Long Island College Hospital, and we gladly embrace this opportunity to express our grateful appreciation of the long-continued display of enthusiasm and of skill of Dr.

Albert J. Keenan and Dr. John A. Quell. Their desire to assist in developing a method which had for its object a high degree of accuracy in tonsil diagnosis is, to a considerable extent, responsible for the attainment of the end which was sought.

While this method of diagnosis, in revealing the fallacy of former methods of detecting tonsillar diseases, has been our undoing, we desire, nevertheless, to place it in your expert hands for a test of its value, for we do not now doubt that it carries within it the brightest promise of future helpful achievements.

Discussion

Dr. D. Bryson Delavan, New York City: I have watched the progress of the work of Dr. French almost from its inception. I have made frequent visits to his clinics and have seen the pains, energy and inspiration with which he carried on this work. Listening to the closing sentences of his paper a moment ago, my neighbor said, "Is this a dream?" Why, yes, in one sense it it. It requires a dreamer, an idealist, one with imagination to preconceive a new discovery. Without the dream there can be no goal towards which to work. In this case the dream has become a very beautiful reality, very real in its simplicity and its practicability, and especially so in the ease with which it can be applied. There is nothing in it which would not come within the technical skill of any ordinary operator. It is all that you may think it to be from this short presentation, and a great deal more besides. But all this is quite unnecessary to be said, as any observer will see it for himself. Of the reality I am sure. It is practical and it works a tremendous advance in our work.

Dr. E. Fletcher Ingals, Chicago, Ill.: I wish to ask Dr. French how large a tonsil must be before he calls it "enlarged." I judge from his paper that he has in mind some standard.

Dr. Henry L. Swain, New Haven, Conn.: I, too, have seen a good deal of Dr. French's work and have been stimulated by his enthusiasm. To me it seems perfectly marvelous that he has been able to develop and perfect the method and bring this practical demonstration here to show to us. When I wrote a paper some time ago in consideration of the much-slaughtered tonsil my whole thought was that we ought to be able to tell whether a tonsil was diseased or not, and not remove them indiscriminately. I want to congratulate Dr.

French, for I think he is able to do this same very wonderful thing.

Dr. Chevalier Jackson, Pittsburgh, Pa.: Some years ago I ceased doing tonsil work. I have, however, distinct recollections of the difficulties, not only of surgical technic, but of determining, in certain cases, whether or not the tonsils should be removed. I recollect also on numerous occasions consulting with members of this Association and we all seemed to have rather indefinite ideas as to what constituted disease apart from mere enlargement. It seems to me that in studying the tonsil this new way, so well worked out and ably presented by Dr. French, one of the most important steps in the study of the living pathology of the tonsil has been made.

Dr. John F. Barnhill, Indianapolis, Ind.: The tonsil question is before us in a new way. The general practitioner brings a tonsil to us for various reasons, but principally because he wants to know whether or not it is diseased. Heretofore, if we said a tonsil was diseased, the patient usually agreed to it and we took it out. Now the home physician as well as the consultant wants to know this, and I have been hard put to it many times whether to answer questions in the affirmative or negative. It seems to me the doctor's paper here is one which may enable us to answer positively, but in his paper he does not mention any definite basis for us to work upon.

On two occasions last year I remember tonsil patients were brought to my observation, and in neither case could I find any trouble. I was frank to say so, and stated I did not think the tonsils should be removed. In each instance the family physician said "there is a general infection present which I am confident has arisen in the tonsil," and upon that statement and his recommendation I was willing to remove the tonsils. In each case I found a cold abscess outside of the capsule.

I am wondering if Dr. French's method would have been able to discover such an abscess. In each instance the abscess had been present for at least a year.

Dr. Hanau W. Loeb, St. Louis, Missouri: There are two points I would like to know: If the instruments can be procured and where; and secondly, whether or not the method will demonstrate the presence of the minute multiple foci of pus at various portions of the tonsil, which is an important matter.

Dr. Greenfield Sluder, St. Louis, Missouri: These are the observations for which Dr. French's friends have been waiting so impatiently. I have known of what he was try-

ing to do and something of how far he was succeeding. It seems to me a vote of thanks from the Association ought to go to him for it would seem as if this will be the means of dispensing with the fantastic definitions of diseased and healthy tonsils.

Dr. Chevalier Jackson, Pittsburgh, Pennsylvania: I move that a vote of thanks and appreciation of the Association be extended to Dr. French for the demonstration of this new procedure.

Dr. Thomas R. French, Brooklyn, New York (in closing): The manner in which this method of tonsil diagnosis has been received is very gratifying. I know, of course, that the friendly expressions were based upon first impressions as it will be necessary for you to test the method thoroughly before you can form a final opinion. I hoped for your approval at the first hearing and now that that has been so freely given I shall go forward with renewed zest to perfect the art still further for new avenues are constantly opening up for its greater refinement.

Dr. Delavan has been my lifelong and constant friend and can perhaps find virtues in the author of the paper which others fail to discover. Still I am deeply appreciative of his gracious and eloquent words and his good opinion of this work.

The answer to Dr. Ingals's question as to the definition of the word "enlarged" was covered in the part of the paper not read. I tried to make it clear that the word referred to tonsils which project beyond the edges of the pillars or are sufficiently large to curve the anterior pillars forward.

I had greatly hoped for Dr. Swain's approval and am therefore highly gratified with his remarks.

That Dr. Jackson should at first glance have seen the reason for accuracy in diagnoses made in studies which form the basis of this method, is the kind of encouragement we need in teaching the art.

Dr. Barnhill said that in this method no basis to work upon was mentioned. Of necessity in the few minutes at my command the subject had to be presented in a sketchy way and I probably did not make every feature sufficiently clear. The basis to work upon is mainly the evidences of inflammatory reaction seen by transillumination in tissues which have not been the seat of recent acute inflammatory processes. The abscesses he speaks of would probably have been directly portrayed but even if they were not their presence would have been proclaimed by the amount and character of the hyperemic displays in the tonsils.

The answer to Dr. Loeb's first question is that the instruments are made by F. A. Hardy & Company, of New York and Chicago. If Dr. Loeb will permit me I will say that the answer

to his second question is the same as that which I have just made to Dr. Barnhill's question about abscesses under the capsule.

Had it not been for Dr. Sluder's brilliant technic of tonsillectomy I doubt if I would have been able to do this thing. In the first stage of the experiments I soon learned that no matter how large the exploratory section removed and, therefore, how small the base left, if the tonsil was found to be diseased we could, with his method, always get the base out easily. That was in the first stage and without a first stage there could not have been a second and final stage.

I am deeply impressed with the belief that we are standing at the edge of new and undiscovered fields and are getting but dim glimpses of vast expanses of diseases to be accounted for, as never before, by heretofore unsuspected infecting processes, and I shall be glad if this method proves to be of sufficient value to assist in the coming revelations.

THROAT OPERATIONS IN DIPHTHERIA CARRIERS.

THOMAS HUBBARD, M.D.

Definition of Diphtheria Carriers.

1. Primary or healthy diphtheria carriers—Those from whose nasal or pharyngeal secretions dipththeria bacilli may be recovered, and who, so far as known have never manifested clinical evidence of diptheria.

2. Secondary diphtheria carriers—Those from whose nasal or pharyngeal secretions diphtheria bacilli may be recovered twenty-one days or longer after an attack of diphtheria. The question of virulency of bacilli found in so-called carriers is very important, but unfortunately it is at present impractical to determine this positively.

Group 2 includes recurrent diphtheria, that is, cases having a second attack of clinical diphtheria after an interval of apparent recovery, and also the "fibrinous rhinitis" type and other subacute or chronic manifestations of diphtheria with mild clinical symptoms and prolonged local diphtheria deposits on the mucosa, often in obscure regions such as posterior septum or naso pharynx, trachea or bronchi.

It is evident that the question of immunity is the dominant factor in this classification. Group 1 exhibit perfect natural immunity while Group 2 give evidence of retarded, incomplete or transient immunity. In other words, according to Parks, the first group have at least 1-30 natural antitoxic units per c.c. of blood serum, while in the second group the natural immunity is low and even if fortified artificially recovery from the clinical symptoms is of transient duration. To this group belongs the case reported.

About 1 per cent. of the population carry diphtheria bacilli, but of these only about 15 per cent. are of virulent type.

These rather alarming statistics seem ample justification for presentation of this subject and especially since clinicians are now disposed to depend on the surgical method of cleaning out the diphtheria breeding foci in throat and naso-pharynx.

It should be mentioned in passing that the treatment of "carriers"—that is, the destruction of virulent bacilli *in situ*—has been very unsatisfactory.

A glance at the list of medicaments employed is of itself an evidence of lack of confidence in any.

Diphtheria antitoxin. Efficacious only in cases having clinical diphtheria, subacute or recurrent, and in whom there is low grade of immunity. Even in these it has no effect on the liability to become carriers of virulent bacilli or in affecting virulency. It is irrational in Group 1 and likewise in Group 2, except in those having a definite second attack. Spraying with staphylococcus emulsion. This method has been abandoned because it is dangerous. Lactic acid bacilli spraying and irrigation. This is not reliable. Swabbing with strong antiseptic solutions, such as nitrate of silver, copper and zinc salts, and iodinized phenol. This method is impractical and in a measure harmful in proportion to the trauma inflicted by destruction of mucosa. Crypts and sulci in throat and naso-pharynx are absolutely inaccessible especially in children.

According to Ruh, Miller and Perkins, J. A. M. A., March 25, 1916, analysis of the case reports of these various treatments are far from convincing. But still there is a group of cases in which chemical antiseptics are indicated and with proper precaution against trauma and unnecessary escharotic effect there is undoubtedly a limited field for local treatments.

Kaolin insufflation, as recommended by Rappaport and others, is comparatively harmless and may be useful in certain cases. For instance, a case may be presented, a secondary diphtheria carrier in whom there is positive contra-indication to surgical cleaning out of throat and naso-pharynx, such as sequellae or retarded convalesence or low vitality. In such a case local treatment may be necessitated, and occasionally it will be successful.

It remains to speak of the vaccine treatment advocated by Petruschy. Clinical data are not yet sufficient to draw conclusions concerning this promising method. But even assuming a hopeful attitude toward any of the above mentioned methods of treatment there is still a large group of "carriers" that will be referred for surgical eradication of the foci of infection and

the laryngologist will be called upon to do this in a thoroughly efficient manner.

This brief resume of local treatments is in order for the obvious reason that once the larygologist is in consultation and even supposing he has done the necessary surgical work, tonsillectomy and adenoidectomy, it may still be advisable to follow it up by thorough local antiseptic applications. In fact it seems rational that immediately following operation such an application as iodoglycerole—see J. A. M. A., August 3, 1912—or other antiseptics should be applied to all accessible parts of throat and naso-pharynx.

When confronted with the surgical proposition the first impression will be that operation is contra-indicated in throat and nasal chambers infested with diphtheria bacilli. The second thought will be, is this patient in condition for tonsillectomy and adenoidectomy?

The first doubt can be quickly settled. The very fact that the patient is a healthy carrier, be the bacilli ever so virulent, is proof positive that perfect immunity is established, and there is no more danger from the diphtheria bacilli than from the ordinary germs present in all cases of candidates for tonsillectomy and adenoidectomy. They recover about the same as ordinary cases—that is, the systemic symptoms are not more severe, even though there be typical diphtheritic pseudo-membranous formation in evidence in tonsillar fossae and naso-pharynx after operation.

The Schick skin reaction test can be relied on in doubtful cases to determine the immunity toward diphtheria at the time of proposed operation. This will be of great service in this particular class of cases. Reports indicate that it is dependable and particularly useful in the study of those cases which have had second attacks of diphtheria and in whom immunity is obviously very unstable.

But the so-called secondary group—those cases that were not primarily immune, and have had clinical diphtheria in more or less severe form—even though they have been artificially immunized by antitoxin, are not as a group ideal surgical subjects. Each case must be studied carefully—the nasal type, the recur-

rent or relapsing type—all presenting peculiar problems to the clinician. For instance, the case that has had typical diphtheria twice with a few months interval. He is undoubtedly a carrier and has a low transient immunity. Furthermore, he may have been sensitized to antitoxin by the first course of treatment. The second course of serum must be administered with due precaution, or there may be a calamity and this warning would likewise apply to serum at time of operation. The general condition must be taken into consideration and it may be necessary to prolong isolation until convalescence is well established before resorting to the radical method of cleaning him up as a menacing carrier of virulent diphtheria bacilli.

Case report: Tonsillectomy and adenoidectomy in a diphtheria carrier following second attack of diphtheria. M., age 15, first attack followed exposure to his sister in August, 1914. Prompt recovery after 10,000 units of antitoxin. One negative throat swab and all negative swabs from family before released from quarantine. In February, 1915, a second attack with extensive false membrane over tonsils which were hypertrophied and cryptic—cultures positive for diphtheria bacilli. He was given atropin 1-75 hypodermically and 1 c.c. of antitoxin given intramuscularly in buttock. Delay of ten minutes and as no symptoms of anaphylaxis appeared the remainder of serum, 10,000 units, was administered. Prompt recovery from symptoms, but throat cultures were positive off and on until May, 1915, when tonsillectomy and adenoidectomy was performed by Dr. Hubbard. Since then cultures negative. (Record of Dr. Willard J. Stone.)

The operation in this case was postponed on account of the slow convalescence from the second attack of diphtheria, the lad showing the effects of prolonged isolation and confinement necessitated by the presence of positive cultures at intervals.

Extra precautions were taken; isolation while in hospital, brief ether anesthesia followed by oxygen inhalations to promote ether elimination, and thorough surgery. Following the operation he developed typical pseudo-membrane in the fossae which showed diphtheria bacilli. The membrane was removed in large plaques and the throat swabbed twice

daily with ½ per cent .phenol in alkaline solution with frequent spraying of nose and throat with the same. Recovery in about one week and a rapid uneventful convalescence followed. Throat and nose culture negative in the second week and thereafter.

Discussion

Dr. Stanton A. Friedberg (by request):

Dr. Hubbard has covered the subject very well and there is not very much left to discuss. I have been doing some work in Chicago, at the Durand Hospital for Infectious Diseases along this line.

The problem of the carrier was called to our attention several years ago by the fact that we had patients who, on account of having positive cultures in their throats, were compelled to remain in the hospital for weeks—sometimes fifty to sixty days. As we only have a limited capacity (about forty beds) this was a serious condition on account of the fact that we had clinically well patients occupying beds which we really needed. We experimented along various medicinal lines without any particular effect in some of the patients and it was then that Dr. Hektoen brought out the use of kaolin. In spite of all local treatment we found that there were a number that would not clear up, and it was then that we took up the question of operation. In all patients I would urge the members to take nasal as well as pharyngeal cultures, for we frequently found that we had positive nasal cultures when those from the pharynx were negative.

A certain number will clear up under medicinal treatment. We have tried out vaccines without any particular effect. We were deterred from using the staphylococcus spray by the report of the complication of meningitis that followed its use in a patient. The feasibility of medical treatment may be illustrated in this way. We know that we find the bacilli in the depths of the crypts where it is impossible to reach them. They have also been found in the epithelium of the crypts and that perhaps explains why it is hard to get any effect from local applications.

As to those cases in which are involved the naso-pharynx and the nasal accessory sinuses, as Dr. Hubbard has mentioned, the accessory sinus cases are the hardest ones to deal with.

We have found that in mixed infections the diphtheria bacilli are apt to persist. In a child between two and three years of age, with marked nasal discharge, the cultures gave staphylococci with diphtheria bacilli constant, on one side only. The house physician examined the nose and found a shoe button which

was keeping up the local infection. Upon removing it, the cultures became negative.

We have had other children where the cultures remained positive in chronic rhinitis. These may possibly have been due to some ethmoid involvement. There are a number of points which might be brought out that are most interesting. One condition which we ought to consider is the occurrence of post diphtheritic paralysis and neuritis. I do not know whether any work has been done in these cases or not. There is a question as to whether or not the constant harboring by the tonsil of bacilli, with toxins thrown out continually is not responsible for these complications.

Before operating we have made it a practice to give medication a thorough trial. The Shick test is made and operation is only done when the reaction is negative. As to the use of applications after operation, after a thorough medicinal trial beforehand, we have not used any. We have taken the nasal and other cultures so that our results would not be influenced by any application made to the throat. It is common in large hospitals for cultures to be taken after an application is made to the throat and in the event of securing three negative results to let the patient go out. We determined to eliminate that factor entirely. The results after operation have not differed in any respect from those seen ordinarily, in so far as the general condition of the patient is concerned. Several months ago I reported six cases in which we had removed the tonsils and adenoids, where the results were startling. The next day after operation, without any application at all, the cultures became negative. We took cultures for five days afterwards and each time they were negative, except in one case in which the nasal cultures remained positive.

The whole question is very important and a simple reference to the literature will show a gradual increase in the curve of the amount of work contributed to the study of carriers in recent years.

Dr. Robert Clyde Lynch, New Orleans, La.:

My experience in this direction covers twelve or fourteen cases and there are a few points I would like to bring to your notice. First of all, there are twenty or more varieties of pseudo diphtheria bacilli in which the microscopist appears almost unable to absolutely and faultlessly tell the difference between the true organism and the pseudo variety. I think this is important for frequently we might be dealing with a pseudo variety.

The second point is in relation to a little matter of technic in the administration of antitoxin in patients who have been pre-

viously sensitized by the administration of horse serum, as developed by Dr. Bass of New Orleans. The patient is given a small dose just above the ankle and there is a constrictor ready for application, above the knee; three or four drops are injected just under the skin above the ankle, and the constrictor ready. Sufficient time is allowed for the development of the anaphylactic symptoms and if they do not develop in one-half to three-quarters of an hour, the injection can be made. If they should develop, why the constrictor is applied, and the serum cut out with scalpel.

I would like to report a case of a medical student, who had rather a virulent attack of diphtheria, which yielded to twenty thousand units of antitoxin. The patient gradually got well and finally had two negative cultures, with a normal temperature four days and was ready for discharge. Suddenly there was a rise of temperature to 99, and the appearance on the surface of the tonsil of acute follicular tonsillitis, which gave a culture of positive diphtheria. This was fourteen days after the first injection of antitoxin. we proceeded again to give him 10,000 units, and he was discharged. Six weeks later he came walking in on crutches, just able to navigate, with paralysis of the soft palate and extensor muscles of the extremities and suffering from constipation, which he had never had before. This man's cultures were taken and shown to be positive from the tonsils. He was treated locally without any result. Tonsillectomy was done and in two weeks after the tonsillectomy, the paralysis entirely disappeared without further medication.

Another case in which tonsillectomy was performed for carriers yielded nice results as far as the operation went. The cultures remained positive, nasal as well as throat cultures. We have taken cultures of both nostrils separately, and in this case we determined the discharge was coming from the antrum. We made a large opening into the inferior meatus and irrigated the antrum with buttermilk. The use of buttermilk has also cleared up some of the diphtheria carriers.

Another striking feature was that in nine out of the fourteen cases in which we could determine the form of organism coming from one or both tonsils, when the tonsils were removed we could not determine any organism in the tonsillar material. Yet all the cases cleared up immediately after tonsillectomy, and in none of the cases was the reformation of membrane in any way different from the usual case of tonsillectomy.

Dr. Robert C. Myles, New York City:

This is a subject which interests me in a practical way, because of the fact that in many of the clinics, as well as private

practice, we find children who have chronic nasal trouble with bacilli, without any other evidence of disease. The subject for decision would then be, what relation would a child having diphtheria carriers, but without any other evidence of diphtheria, bear to the other children in the home? I have had some very difficult propositions to contend with—the home protection by myself, and the public by the board of health.

Dr. Thomas Hubbard, Toledo, Ohio, closing the discussion:

I merely wish to say that I consider the paper rather in the nature of a preliminary report. There is not enough clinical data to formulate any definite conclusions. I wrote the paper to stimulate work along that line. Of course all the study of the "primary" cases, those having at no time clinical evidences of the disease, is largely institutional work, and to some extent this applies to "secondary" cases. This latter group, however, have some symptoms of diphtheria and are still diphtheria carriers. It is going to be put up to laryngologists to help out in this matter, and by another year we will have more cases on record, so that one can arrive at definite conclusions. At present I think that we are warranted in proceeding along the lines suggested in the paper and endorsed by the experience of Drs. Friedberg, Lynch and others. In fact, I think that unawares we have already been doing considerable of this prophylactic work. We can all doubtless recall cases that have had post-operative local diphtheria—somewhat alarming in appearance but usually normal in period of convalescence. Most of these cases were immune "carriers" and the radical operation is the rational procedure.

SORE THROAT CLINICALLY CONSIDERED.

SAMUEL JOHNSTON, M.D.

"The schemes of any of the arts or sciences may be analyzed in a sort of skeleton, and represented upon tables, with the various dependencies of their several parts."—Watts.

Sore throat is defined as a popular term embracing almost every inflammation or morbid condition of the throat (Gould's Illustrated Dictionary of Medicine).

To study the subject clinically, as is my purpose, it is necessary to scrutinize the nasal passages and accessory sinuses as well as the oral cavity and larynx. We should also scan the physiognomy of the patient, mark well any changes in the voice tone, and note the odor of the breath before entering into a more detailed examination of the case.

"In the early ages of medical science the doctrine of physiognomy formed an important part of all systematic teaching, and practically it is no small part of the accomplishment of a skillful physician to be able to recognize readily in any sick person the outward signs which may be characteristic of his malady."—Ord. The staining of the skin and conjunctivae of icterus; the flush of hectic; the cyanosed countenance of the subject of laryngeal or tracheal stenosis; the facies of the habitual mouth-breather; the notched central incisors of hereditary syphilis; "the typical features of myxedema and cretinism," will serve to illustrate what may be gleaned by the close observer.

Changes in the voice are produced by such a variety of causes that it is only possible to name a few examples: Paralysis of the soft palate, defects in the conformation of the palatine arch, swollen tonsils, benign and malignant growths in the nasopharynx, palsies of the vocal bands, laryngeal growths, laryngeal inflammations—all produce voice alterations to a greater or less extent.

The odor of the breath is a valuable aid to diagnosis and may direct our attention to certain morbid conditions which other-

wise are liable to be overlooked. Profound uremic poisoning, now and then, is accompanied by a distinctive odor of the breath; pulmonary gangrene fills the expired air of the patient with an odor fetid beyond compare. Who is not familiar with the scent of the exhalations of the alcoholic, or of that of the victim of quinsy, or of throat syphilis, of ozena, or necrosis of the nasal bones? These are not all the conditions producing foul breath, the list may be indefinitely extended, but decayed teeth and disorders of the digestive apparatus may be also mentioned by way of a supplement.

With a strong light now directed into the widely opened mouth of the patient, we may proceed with the investigation of the case before us.

The lips, gums, teeth, tongue, palate, pharynx, naso-pharynx, and lastly, the lingual tonsil, epiglottis and larynx, in the order named, should be carefully examined.

Search for any reflexes in the nasal passages and in the external auditory canal, for often here may be found the *origo mali.*

Upon the lips mucous patches, cysts, tubercular ulcers, chancre, malignant growths, herpes, and tertiary syphilitic ulcers may be found. The gums and teeth will be more thoroughly looked after by the dentist; but tubercular ulcers, tumors, etc., are not uncommonly located on the alveolar processes.

The bleeding gums of scurvy, and the blue line upon the gums indicative of lead poisoning, may be the first sugestions regarding these affections. Cancrum oris, herpes and thrush, commonly, and rarely pemphigus, may be looked for on the buccal mucous membrane.

Affections of the mouth form a chapter of their own. Books have been written upon diseases of the tongue, but that abscess, cancer, papilloma, gummatous infiltrations, cysts, syphilitic and tubercular ulcers appear on this organ, and that beneath it ranula, or perhaps an imbedded salivary calculus may be found, should be borne in mind.

The uvula may be elongated, causing in some instances distressing cough, or this member may be enormously swollen as in acute uvulitis. It is also the site of specific ulcers. or a

benign, notably papillomata—or occasionally a malignant——growth may be located here.

In the roof of the mouth tumors are rare. It is, however, a favorite location for gummatous deposits, and often we see these followed by necrosis and perforation.

The tonsils may be atrophied or hypertrophied. These glands may also be acutely inflamed, followed by abscesses in the parenchyma of the gland, or in the peri-tonsillar tissue. In the lacunae, calculi are sometimes imbedded, giving rise to the suspicion of a malignant growth. Mycosis tonsillaris, acute and chronic tonsillitis, diphtheria, syphilis in its various manifestations, Vincent's Angina, and tumors, may be thought of in studying the tonsils.

The lips, tongue and palate, singly or collectively, may have their motion impaired or abolished, due to central or peripheral disease.

The examination of the naso-pharynx should not be omitted, for besides the usual inflammatory affections of this region—namely, adenoid growths, polypi, etc.—an ulcer, usually of an infectious nature, is found here when least suspected. Retro-pharyngeal abscess and gumma of the pharynx are revealed as rounded swellings projecting from the surface of the normal pharyngeal wall. In recent years the lingual tonsil has been the subject of much study, but as it is liable pathologically to the same changes as the faucial glands, it will suffice to say that its abnormal growth gives rise to cough, a sense of lump in the throat, etc.

The epiglottis is the seat of acute and chronic inflammations; the former occasionally resulting in edema, though we do also find this a part of general dropsy due to cardiac or renal disease.

The micro-organisms of syphilis and tuberculosis, unfortunately, too often find the epiglottis a suitable soil for their development and destructive work.

Sore throat is to a greater or less extent the accompaniment of measles, scarlet fever, influenza, typhoid fever, etc. It is a good rule to examine the body carefully as a whole in all cases of sore throat, for often the throat symptoms are only a local manifestation of a general infection.

I am aware that this list of affections causing sore throat is far from complete; it is, however, sufficient if my efforts stimulate a further study of the subject.

The diagnosis is not usually difficult if we examine the cases systematically, but should any doubt arise it is best to ask for counsel.

In regard to treatment there is no hard and fast rule. Each case must be managed in accordance with the conditions present, and general medical and surgical, as well as hygienic and dietetic, principles should be the guide.

Recent studies in bacteriology have conclusively proven that many throat affections are due to micro-organisms, consequently antiseptic remedies by preference should be used in the majority of cases, though the galvano-cautery, nitrate of silver, iodine, chloride of zinc, and some of the acids may be required to combat ulcerative and rebellious inflammations. A skilled surgeon should decide the advisability of operative interference.

Sanarelli states: "Numerous species of micro-organisms are constantly present in the buccal secretions and upon the moist surface of the mucous membrane of the mouth. Some of these are only occasionally encountered and may be regarded as accidental; others appear to have their natural habitat in the buccal cavity. The non-pathogenic organisms possess various properties; some curdle milk, others dissolve albumin; others, again, give rise to fermentation in solutions of glucose and lactose, or invert cane-sugar.

"Of the pathogenic series the bacilli of cholera, typhoid, and diphtheria, the coccus of sputum septicemia, and the diplicoccus of pneumonia, are the most important. The saliva of healthy persons has the power of destroying or retarding the growth or the above-mentioned bacilli, but it constitutes an excellent medium for the development of the cocci."

The story told is doubtless an old one, but I have thought that to formulate certain conditions producing sore throat and sore mouth would be of some little advantage, and assist in their intelligent diagnosis and treatment.

If my experience in the treatment of affections of the throat and nose has proved any one thing, it is that diseases of these

regions differ in no way from similar pathological changes in other parts of the body, and should receive the same therapeutic and surgical treatment. Conservatism and mild measures, however, should be the rule for guidance.

Discussion

Dr. G. Hudson Makuen, Philadelphia, Pa.:

Gentlemen, I think we are particularly fortunate in having heard this interesting contribution by Dr. Johnston, who, as you may know, is one of the founders of this Association, and I hope that there will be a free discussion of the paper.

Dr. Lewis A. Coffin, New York City:

I have been much interested in Dr. Johnston's paper and am particularly pleased that a man of his age and experience can stand before us and speak so confidently of the many diseased conditions of the upper air passages that are relieved by other processes than operative and advise more conservative treatment of these parts. As we grow older we all probably come to feel that perhaps as younger men we too frequently and too zealously interfered with the architecture of the upper air passages.

AN EPIDEMIC OF A SEVERE FORM OF ACUTE INFECTION OF THE THROAT WITH ABSCESS FORMATION. REPORT OF 58 OPERATIONS.

CLEMENT F. THEISEN, M.D.

During the past winter, particularly in December, January, and part of February, the writer was fortunate in being able to observe an epidemic of acute infection of the throat occurring in Albany, and to a smaller extent in some of the neighboring cities. Altogether 384 cases came under the writer's personal observation. Nearly all the cases were treated in Albany. A few were seen in consultation in Schenectady, Troy, and Rensselaer. Some of the physicians in those cities stated that they had treated a large number of cases, but the writer was not able to secure any accurate data as to the exact number.

Of the total number of cases observed (384), fifty-eight required surgical measures. Forty-four were cases of peri-tonsillar abscess, and in nearly all these cases diseased tonsils were present; in the majority, the submerged variety, with crypts high up in the upper lobe of the tonsil. Thirty-eight cases were unilateral, and in six, abscesses developed on both sides. Of the remaining fourteen cases requiring operation, in eight, the abscess developed in the lateral columns of the pharynx, in two well up in the naso-pharynx. There were two cases of infection of the epiglottis with great edema and some pus, two cases of abscess of the lingual tonsil, and two of retro-pharyngeal abscess, the last two occurring in children. It is worthy of note, that in this series of fourteen cases, in ten there were no enlarged tonsils, and in the other four, healthy looking tonsils with no deep crypts. In the cases, then, in which the infection did not originate in the tonsils, and in which no diseased tonsil tissue could be demonstrated, the infectious process selected other lymphoid structures like the lateral columns and the lingual tonsil.

We could not determine that the cases in this epidemic

answered the typical description of epidemics of so-called "septic sore throat," nor could the streptococcus of Smith, which is supposed to be the organism responsible for septic sore throat, be isolated.

I suppose all cases of acute infection of the throat, with abscess formation, might properly be called septic, irrespective of the particular variety of streptococcus isolated in the cultures.

The writer has come to the conclusion that Semon's opinion, stated in his paper on the probable pathological identity of the various forms of acute septic inflammation of the throat and neck, and since then in other papers, is the correct one.

Semon believes "that the various forms of acute septic inflammation of the throat and neck, hitherto considered as so many essentially different diseases, are in reality pathologically identical; that they merely represent degrees varying in virulence of one and the same process." It is known, for example, that a certain variety of the pneumococcus will produce localized edema. Welch, in his paper on the micrococcus lanceolatus, has determined by animal experimentation that this particular kind of pneumococcus or diplococcus, when injected subcutaneously, produced extensive local edema. This is a common observation also in cases of peritonsillar abscess, and other forms of streptococcus angina, so that from a clinical and practical point of view, it does not matter much what particular variety of the streptococcus is responsible for epidemic infections of the throat. The pathological changes in the tissues are much the same.

Personally the writer is frank to admit that he has not been able to find the special distinctions and differences in the appearance of the throat, in epidemic sore throat, such as have been described by Smiley, who, working with Smith, investigated epidemics occurring in Boston, in which they isolated the particular variety of streptococcus now known as the Streptococcus of Smith. These epidemics were caused by infected milk.

The epidemic in Albany was at its height during December and January. After the middle of February very few new

cases developed. During December and January the writer was called to see new cases daily. These occurred in all parts of Albany. We did not think that the epidemic was caused by infected milk, as the families afflicted got milk from many different dairies and milkmen. The cases of sore throat were distributed, as above stated, in all parts of the city, no greater number of cases occurring in families supplied by a particular dairy. During the worst of the epidemic, so many new cases developed every day that we did not have time to study them carefully. The cultures that were taken in the beginning, practically all showed the streptococcus as the predominating organism. After that, as the cases in which no abscesses developed, were so similar clinically, no cultures were taken, except in cases in which a distinct membrane was present, or when the diagnosis was in doubt. Patients were all very ill from the very onset of the infection, many of the cases starting with chills. In nearly all there was great prostration, and in the cases occurring in children, very high temperatures were the rule. Joint complications, acute arthritis and polyarthritis occurred in twelve of the cases, acute endocarditis in one case, and in twenty-four, examinations of the urine showed the presence of albumen and casts.

In the cases occurring among children between the ages of six and fourteen, eighteen in number, acute otitis media, requiring incision of the tympanic membrane, developed in eight. These cases were all clinically follicular tonsillitis, and could not be distinguished from the usual sporadic cases.

There were sixty other acute ear complications occurring among the cases during the epidemic. In the majority of the cases the writer was called in time to incise the tympanic membrane very early, and this was undoubtedly the reason that no mastoid complications developed. There was only one mastoid, and that in a child, aged fourteen years. In this case the drum membrane had ruptured ten days before the writer was sent for.

It would make this paper much too long to report cases in detail, so all the cases of peritonsillar abscess will be grouped and considered as a whole.

The forty-four cases of this kind occurred in patients between the ages of ten and seventy-two years, the majority occurring in young adults between twenty and thirty years of age. There were four cases in children, three girls and one boy, aged twelve, ten, thirteen, and fourteen years. In nearly all these cases, as before stated, the tonsils were found to be enlarged and abnormal in other respects. Thirty-eight cases were unilateral and six bilateral. A number of the patients between fifty and seventy years of age had not had any trouble with their throats for years, and came down with quinsy in this epidemic.

The abscess cases started very acutely, in many the usual symptoms being much intensified. Abscesses developed rapidly, with great edema of the surrounding parts, and swelling of the glands of the neck, particularly in the bilateral cases. In two of the bilateral cases there was great difficulty in breathing, due to an extension of the edema to the laryngeal mucosa. The constant use of an iced adrenalin spray afforded the greatest relief, and was continued after the abscesses were opened. Arthritis occurred in eight of the abscess cases, and endocarditis followed one case. There were four other cases of arthritis occurring in cases in which abscesses did not develop. Examinations of the urine were made only in the abscess cases, and in twenty-four albumen and casts were found.

In the management of the cases of peritonsillar abscess, I would like to mention a method that was employed with great success.

We have all experienced the difficulty in operating on these cases after they have been going on for a number of days, the patient at times not being able to separate the teeth far enough to admit even the handle of a teaspoon. If the cases are operated on early, this difficulty is done away with. Pus is present in the majority of the cases and can be reached after forty-eight hours.

For several years I have been following a method suggested by Ballenger, that is a dissection backward toward the capsule until the pus is reached.

In fourteen of the cases operated on during the epidemic last winter, I have gone a step farther, and have removed the upper lobe of the tonsil which had been loosened by the dissection. This leaves a large triangular opening for drainage. I have not found, and I agree with Barnes in this, that operating in this way during the acute stage, that there was an increased chance for a more extensive infection. The entire sinus tonsilaris is usually infected in these cases, and patients so operated upon have done much better, and recovered more quickly than the ones treated by the usual incisions.

Barnes, in his paper on the radical treatment of peritonsillar abscess by tonsillectomy, speaks of the difficulties of locating the pus when it is confined between the body of the tonsil and the superior constrictor muscle, and recommends dissecting out the tonsil in this class of cases. He has reported excellent results in ten cases.

It is unfortunate that we are frequently called to see cases of peritonsillar abscess so late, and when the edema on the affected side is so great that it is difficult and in some cases impossible to find the usual anatomical landmarks. In such cases the operative procedure described above was not attempted.

The abscesses developing in the lateral pharyngeal columns are of particular interest and are easily overlooked. The writer's attention was called to this class of cases particularly by Swain's paper on the subject. In a very instructive paper, Swain reports several cases. In one, where he was able to make a thorough examination of the throat after the rupture of an unsuspected abscess of the lingual tonsil, a subsiding swelling of the epiglottis and aryepiglottic fold could be seen. The abscesses in the cases of this type occurring during the epidemic in Albany, developed slowly, and for a number of days the writer could not determine the cause for the great distress and pain in swallowing that the patients complained of. In six of the cases, the abscess was discovered high up in the lateral pharyngeal wall, the marked localized swelling finally calling my attention to the source of the trouble. In two other cases, the soft palate was pushed forward. Pus was evacuated in all after the first deep incision. In the two

retro-pharyngeal cases the bulging was found almost in the median line of the posterior pharyngeal wall.

Local anesthesia was employed in all cases, except in a few of the peritonsillar abscess cases in children, as the writer is of the opinion that general anesthesia is not entirely safe in this class of cases.

Roe in his very complete paper, "Phlegmons of the Respiratory Tract," reported two fatal cases of abscess of the throat. In the first case, that of a young man, aged twenty years, a retro-pharyngeal abscess developed in the right side of the throat which was opened. In spite of all efforts to save his life, he died of exhaustion in three days. The throat infection was mixed, streptococci predominating. In the second case, a young woman, aged eighteen years, the throat was very much swollen, finally involving the laryngeal mucosa, and requiring tracheotomy. Patient died five days after the onset of the attack. This was also a mixed infection, pneumococcus and streptococcus.

Roe also mentions cases of faucial phlegmon in children, resulting in retro-pharyngeal abscess. The abscesses were opened in all these cases, patients making good recoveries.

The larynx is frequently involved in acute pharyngeal infections, particularly when abscess formation occurs. The great edema of the surrounding tissues that frequently accompanies peritonsillar and abscesses in other parts of the pharynx, may extend to the laryngeal mucous membrane. Some of these cases are fatal.

Goodall has reported thirty-five cases of a very virulent form of ulcerative sore throat, twenty-five of which were fatal. The principle lesions were in the pharynx, but in nine, the larynx was also involved. In these severe septic and ulcerative throat conditions, the streptococcus is the organism most frequently demonstrated. Undoubtedly more virulent forms of streptococci are responsible for the serious complications such as arthritis, endocarditis and nephritis occurring with such throat conditions.

In the epidemic form, which has been reported from many

parts of this country and England, the throat infection appears to be milder than in the sporadic cases.

In an epidemic in Baltimore, Hirschberg found in addition to streptococci, pneumococci in forty-eight cases.

Davis and Rosenow, in the Chicago epidemic, found a peculiar streptococcus causing many serious complications and deaths. Cases had a sudden onset with severe prostration, enlargement of the glands and other complications. The authors isolated an encapsulated hemolytic streptococcus of high virulency which sometimes coagulates milk.

Cases of mastitis were discovered in the suspected herds, and some cows that had not been suspected were discharging pus with the milk. The special streptococcus is thought to be related to the streptococcus pyogenes group which Leutscher has classified. He divides the group as follows: The ordinary streptococcus pyogenes group which does not clot the milk or ferment raffinose. The streptococcus angiosus group, which often clots milk and ferments raffinose. He states that the streptococcus pyogenes group is usually associated with suppurations, erysipelas and septicemia, and that the streptococcus angiosus group is particularly associated with inflamed throats, and with malignant endocarditis and otitis.

A mild epidemic of sore throat occurred in Schenectady in 1912. Van der Bogart observed sixty-three cases of which thirteen occurred in infants and thirteen between the ages of ten and fifteen years. It could be positively determined in this epidemic, that the milk supply was not responsible in any way.

The ordinary run of the cases in the Albany epidemic, excepting the cases where abscesses formed, was characterized clinically by the intensely acute angina, great pain in swallowing, glandular swelling in many cases, extreme prostration and weakness, and unusually long-continued temperature. The onset was usually very sharp, often starting with a chill and sharp temperature elevation. The writer was fortunate in having no deaths among his cases, although a number of the patients were seriously ill, and two just escaped tracheotomies.

In the treatment of the abscess cases after operation, patients received great relief from the use of frequent irrigations of the

throat with normal salt solution, and Seiler's solution. A fountain syringe was used, care being taken to control the flow so that a gentle current of fluid under practically no pressure was carried into the throat.

A study of the reported epidemics of septic and other forms of epidemic sore throat proves fairly conclusively that in the majority the milk supply was largely responsible. It is now generally known and believed that they are caused by a hemolysing type of streptococcus transmitted by the milk.

We can readily understand that milk as well as other body fluids may favor the development of a pathogenic power in the streptococcus.

In an epidemic at Rockville Centre, L. I., milk was collected separately from each quarter of the udder of each cow. One cow showed mastitis, and streptococci isolated were of bovine origin. In one quarter with many streptococci the milk was flocculent. Both hemolysing and non-hemolysing strains were obtained, but few had the fermentative character of the bovine strain. The conclusion was reached in this epidemic that the cows were infected by the milkers.

Mellen, in his paper on the early diagnosis of streptococcic sore throat and the effects of vaccine in its treatment, comes to the following conclusions:

Early examination is valuable as it gives a clue to the virulence of organisms.

It is not necessary to have symptoms for an individual to carry the organism.

The acute cases respond quickly and decisively to a vaccine of proved immunizing power, if it is used early.

The condition should not go untreated even though in most cases it is self-limited, as it has many sequelae.

Even after the symptoms are allayed, the body is still apt to absorb a few remaining organisms with sometimes serious results.

Rosenow and Moon reported an epidemic of sore throat in Elmhurst, Ill., occurring in February, 1914, which could be traced to the milk, isolated virulent streptococci from the milk.

Thirty cases used milk from the same dairy which drew milk from eight farms.

Seven ounce samples of milk were centrifuged at high speed for twenty minutes. Sediment obtained was streaked in blood agar and inoculated into ascitis dextrose broth. Similar streptococci to the ones found in the patients' throats were isolated in nine out of eleven samples. They produced hemolysis on blood agar and of them four were virulent for guinea pigs. On the use of pasteurized milk the epidemic subsided.

Conclusions

1. The epidemic subsided when pasteurized milk was used.
2. Virulent streptococci showed preference for certain structures.
3. Organisms from milk resembled rheumatic strains culturally.
4. Involvement of muscles and joints occurred in patients infected by milk.

North, White, and Avery, in a study of an epidemic of septic sore throat in Cortland and Homer, N. Y., in April, 1913, traced the source to milk. In three days a wide-spread epidemic developed. Mastitis was found among the herd in the dairy supplying most of the milk to both towns. The following results were obtained:

1. Seventy per cent. of the cases in each town occurred among people taking milk from the same dairy.
2. Mastitis was found in two cows of this dairy herd.
3. Streptococci found in patients' throats were identical to those found in the milk from cows with mastitis.
4. The streptococci were similar to the ones found in cases of mastitis in cows of another herd.

At Finckley, England, in 1904, streptococci were demonstrated in throat cultures. In this epidemic 550 cases were reported.

At Guildford, England, in 1903, streptococci were detected in the suspected milk.

At Colchester in 1904, with 600 victims, streptococci were found both in the throats and in the milk.

At Christiania, in 1905, this was also found.

Mastitis in cows was noted in all four of these outbreaks and the organisms were a hemolytic capsulated type. The cases appeared in winter and spring.

Symptoms—Sudden onset, with sore throat, intense hyperemia and grayish exudate. Enlarged cervical glands with some suppuration was common. Extreme prostration was characteristic. The complications were otitis media, peritonsillar abscess, erysipelas, nephritis, endocarditis and myocarditis.

The infection was traced directly to the milk supply.

Streptococci were demonstrated in the mixed milk of the entire herd at a suspected farm.

Mastitis was found in the cows of this herd.

Streptococcic sore throat was diagnosed in the milkers.

Streptococcic sore throat was seen in other employees who handled the milk.

King has recently reported a series of cases of severe infection of the tonsils, followed by arthritis, endocarditis, and other complications, in which the Conellan King diplococcus was found in the crypts of the tonsils.

Seventy-eight cases have been observed by the author, in all of which this diplococcus was found.

In conclusion, I would like to give brief histories of two cases, one of abscess of the so-called lateral column of the pharynx, and the other an abscess of the lingual tonsil. Both occurred in young patients, aged eighteen and twenty-one years.

Case 1—L. F., a young man twenty-one years old. Was called to see him in December, 1915. He stated that for a couple of days he had had an extremely severe sore throat, starting with a chill and sharp temperature elevation. His physician, who called me to see the case, said he had been subject to sore throats. On inspection, the entire pharyngeal mucous membrane proved to be intensely congested and reddened, the tonsils, however, not being particularly involved. Epiglottis and larynx appeared normal. I stated that it was

an ordinary acute angina, and prescribed ice and an astringent gargle. His difficulty in swallowing got steadily worse, and I was again asked to see him, at the end of another forty-eight hours. The throat looked much the same, except that high up on the right side of the lateral wall of the pharynx, above the arch of the soft palate, there was a decided bulging which pushed the soft palate forward. A deep free incision was followed by the escape of a rather thick pus. His recovery from this time on was uneventful.

The second case, that of a young woman, eighteen years of age, started in a similar manner with a chill and temperature elevation. I was not asked to see this case until the throat symptoms had existed for five or six days. She was having some difficulty in breathing and great difficulty in swallowing. The right side of the fauces was very edematous, and examination with a laryngeal mirror disclosed the seat of the trouble at once. The lingual tonsil was enormously swollen and very edematous, so much so, indeed, that the larynx could not be seen. This was of course responsible for her difficult breathing. The first attempt, a deep puncture failed to locate the pus. We then cocainized thoroughly and made a deep incision. This was followed by a very profuse hemorrhage and some pus. The bleeding could be finally controlled by ice in the mouth, and an ice-bag externally.

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Discussion

Dr. Henry L. Swain, New Haven, Conn.:

I feel that we ought to note that Dr. Theisen did not lose a single one of his four hundred cases.

THE DIAGNOSIS AND MANAGEMENT OF VASOMOTOR DISTURBANCES OF THE UPPER AIR PASSAGES.

J. L. GOODALE, M.D.

It has been known for some years that an individual sensitized to a given proteid may exhibit a characteristic reaction if the proteid is brought in a soluble form in sufficient concentration into contact with a scratch or abrasion of the skin. In the present connection it is of importance for us to recognize and interpret correctly the significance of this skin reaction. I shall therefore briefly describe it and its various degrees of intensity.

The proteid to be tested is applied to a scratch on the skin of the arm. After five to fifteen minutes the positive reactions are indicated by varying degrees of local disturbance. These disturbances of the skin may be ranged in order of intensity as follows: In some cases the first perceptible alteration consists in a sharply circumscribed white area, not elevated, bordering the scratch for a distance of 1 to 3 mm. We may find in other individuals the first manifestation to consist of a slightly reddened raised area. In more pronounced disturbances the area of swelling is more extensive, and is more or less white in color, being surrounded by an area of reddening of varying size. When this degree of disturbance appears, it is usually accompanied by itching. It may, in marked cases, attain a considerable size, the edematous area reaching 2 or 3 cm. or more in diameter and surrounded by a centimeter or more of hyperemia.

In the course of thirty minutes, or at the most, one hour, the reaction fades and only the slight trauma occasioned by the scratch is left. In the case of certain proteids there may appear on the following day an alteration at the site of the scratch characterized by appearances of inflammation rather than of angioneurotic disturbances. The skin bordering the scratch becomes reddened, slightly elevated and firm. In the course of another twenty-four hours a trace of suppuration may supervene. These disturbances disappear in two or three days. It was

at first thought that these inflammatory manifestations were the result of a chance infection, but they have occurred so regularly after testing with certain proteids as to suggest a definite relationship to the proteid substance itself. They follow most frequently tests with the staphylococcus p. aureus and albus and the streptococcus pyogenes. Among the foods, cocoa is apt to show it.

While the occurrence of the skin reaction may be regarded as indicative of sensitization to the proteid employed, yet it is premature to say that a direct relationship invariably exists. Certain observations, for instance, made in the course of hay fever immunization, which I have elsewhere recorded, show that there is not always a skin reaction proportionate to the intensity of the nasal and ocular symptoms. These are matters requiring further study.

During the past two years, over four hundred cases showing vasomotor disturbances of the upper air passages were examined by the skin test with different proteids, for the purpose of determining, if possible, the diagnostic value of this reaction, and ascertaining its relationship to the clinical manifestations. For many of these disturbances the special exciting proteid was indicated by the patient's history, as in cases of hay fever, intolerance to fish, horses, eggs, etc., but exclusive of the hay-fever patients, the larger number gave a clinical history in which the causative agent was unknown to the patient.

Cases of vasomotor rhinitis of recognizable reflex origin and asthma from cardiac and renal disease are not included. In many instances, particularly of nasal disturbances, the diagnosis of a reflex cause such as from the genital organs is difficult to establish, but wherever possible a physical examination from an internist or the family physician was obtained.

Classification of Proteids.

Recent studies have established a phylogenetic classification of animals and plants, based upon the serum reactions. As the result of the studies chiefly of Nuttall for animals and of Metz and Gohlke for plants, we are enabled to construct a phylogenetic tree for both kingdoms. The application of these studies

to our subject is considerably simplified by our ability to eliminate many members of the animal and plant kingdoms, which have no direct relation to man. The following phylogenetic trees are based upon the result of the studies above referred to, and only those orders are here represented which are likely to come into contact with the exposed mucous membranes under natural conditions.

Animals. The primitive proteid molecule in the animal kingdom represented by protozoa exhibits a differentiation in the direction of the moluscs or shell-fish, and passing upward gives off the branch of the crustacea. Above this are the vertebrates, with the branches respectively of fishes and birds, the main trunk terminating in the mammals. In the present connection the mammalian orders which concern us are represented by the domestic animals, and by those which serve as foods, or whose skins as articles of clothing.

Plants. The phylogenetic tree of the plant kingdom proceeds from the bacteria upward, and divides into the monocotyledons and dicotyledons, the first being represented chiefly by the large family of grasses and by the orders of iris and lily. The trunk of the dicotyledons terminates in the order Compositae, to which the ragweed belongs, and gives off along its course a large number of orders, which have been shown to be of anaphylactic significance, the most important members of these being the nuts, the legumes and the rose family.

Preparation of Material.

It is of importance to have the test material in the form in which it exists when exciting symptoms. Consequently, we should have it either in the raw or cooked state, respectively, or in both as the case may be.

It should also be in a stable form and as pure and concentrated as possible.

This statement is especially emphasized by the fact that we find different persons to vary widely in their degree of sensitization to a given proteid; consequently one person may react to a proteid dilution of a given strength, while another indi-

vidual sensitized to the same proteid may require a hundred or more times greater strength of the solution to elicit an equivalent skin reaction.

In the case of animals preparations should be made both of those parts capable of entering the respiratory tracts as flying scales or hairs, and also of the serum or of those parts ordinarily ingested such as egg and milk. Extracts from the epidermal structures are easily obtained by placing scrapings from the skin, hairs or feathers, respectively, in 12 per cent. alcohol. Sterilization is accomplished after a few days by the action of the alcohol, and the clear filtrate may then be used. The material may be tested for its sterility, but in no case have I found it contaminated or even after months show signs of decomposition. These extracts appear to keep without deterioration, and I have now two made from horse epidermis, which have been kept at room temperature for over a year, and are apparently as active as when first prepared.

In the case of animal foods, crude but satisfactory material is readily prepared by expressing the juices in a meat press, and subjecting them to rapid dessication by a blower.

The same method may be followed with plants. Oils may be removed by leaching with carbon tetrachloride. Both these animal and plant extracts may then be preserved when thoroughly dry without deterioration.

The proteids of egg and milk can be obtained commercially in the form of a pure powder as egg albumen and casein respectively.

While the refinement and separation of the different proteids present in a given material is desirable and represents a field of important research, yet the above-mentioned relatively crude preparation will suffice to answer our first clinical question as to whether the individual is sensitized to the material in question.

In the present work cases were examined both with preparations made along the above lines by Dr. Turnbull in the Throat Department of the Massachusetts General Hospital, and also by pure refined proteids prepared by Mr. R. P. Wodehouse in the Botanical Laboratories of Harvard University.

In the case of plant pollen I prefer to keep it in a dry form, as it will then keep unchanged for an indefinite period. I have flowering specimens of grasses and of ragweed in my herbarium gathered over thirty years ago, the pollen of which still gives pronounced skin reactions in patients sensitized to these plants.

In the case of ragweed a method was evolved by Mr. Wodehouse for the extraction of pollen from the flower heads, which enables one to obtain it in a purer form than has hitherto been the case. Plants of ragweed are gathered in the flowering stage and the flower heads stripped off. The habit of this plant is to open the flower heads in succession, and consequently at a given time some will be found to have discharged their pollen and others to be as yet unopened. After drying in air the heads of flowers were washed in carbon tetrachloride to remove oils, etc., and it was found that most of the pollen came out in the process. A very little solid matter except the pollen will pass through the muslin used for straining. The pollen grains having passed through are allowed to dry and are seen to be somewhat paler than those obtained in the natural way, the difference in color being probably due to the removal of lecithin.

The same method is applicable to the other anemophilous plants which furnish a large amount of pollen.

We are thus enabled to obtain the pollen in a relatively pure form, and, consequently, can make solutions of known proteid strength. Furthermore, this material has not been subjected to the risk of change by treatment with proteid precipitants and approximates closely to the original proteids in their natural state, as they actually reach the exposed mucous membranes.

Experiments were undertaken in regard to preserving pollen extracts. As I have stated in a previous paper, a dilution of alcohol in water proved most serviceable. The important object to be attained is a solution which will check decomposition, with the minimum loss of strength of the active principle. It was found that pollen extract in 6 per cent. alcohol or less showed after a few days development of bacteria and proteid decomposition. A dilution of 8 to 10 per cent. was sufficient to check putrefaction, and if the bottle was completely filled with the solution it remained free from alteration. If, however,

the bottle was frequently opened or left half full, there was a prompt invasion of the yeast organism with development of vinous odor. This was later followed by the appearance of the Mycoderma vini and general turbidity. Solutions from 12 to 15 per cent. could be left open without alteration and there was no development in them of the Mycoderma. These solutions were found to contain an unstable albumen and a relatively stable proteose. The form is readily coagulated by exposure to air, by treatment with alcohol of above 20 per cent. and by heating to 60 deg. C. The proteose, on the contrary, suffers but little on exposure to air, and will endure boiling without precipitation. This observation is in harmony with the familiar fact in wine making, that at the close of the first fermentation a clear fluid is present containing the albuminoids of the grape in solution. These are in part thrown down at the first racking, and consequent exposure to oxygen rendering the wine turbid, and requiring often the admixture of isinglass to effect a clarification.

For this reason pollen solutions should be kept as far as possible from exposure to air, and if in the older ones a cloudiness occurs, it should not be filtered, as thereby the albumen would be removed, leaving only the proteose in solution.

Preparation of Bacterial Test Material.

Suspensions of bacteria killed by coagulation of their albumen may be injected intradermally and the presence or absence of a reaction noted on the following day as already practised for a number of diagnostic tests; but I have also found it possible to procure the bacterial proteids in a soluble form capable of exciting an immediate skin reaction in the same manner as that obtained from pollen and other plant and animal extracts. At the beginning of the work cultures were grown by Dr. C. G. Page, Instructor in Bacteriology at the Harvard Medical School, on agar slants, when they were exposed to ether vapor, the object sought being to kill the micro-organisms without coagulation of their albuminous constitutents. After remaining in ether vapor four days, the colonies were transferred to a 12 per cent. dilution of alcohol with water, in order to extract, if possible, the

proteids of the bacteria. This alcoholic dilution was chosen as it has been found by the writer to preserve best the anaphylactogenic properites of pollen and keratin extracts. The quantity of bacteria was about one-third by volume that of the alcohol dilution added; so that, on centrifuging, the bacterial bodies occupied one-third and the fluid two-thirds of the tubes. After a week the fluids were tested on the skin of patients in the same manner as that employed for the diagnosis of plant sensitizations.

Since then a variety of methods of preparing the material have been developed by Dr. A. E. Steele, of the Massachusetts General Hospital; Dr. I. C. Walker, of the Peter Bent Brigham Hospital; and Dr. Cleaveland Floyd, Instructor in Bacteriology at the Harvard Medical School, to all of whom I am greatly indebted for the opportunity which they have given me to test preparations made with this object in view.

Method of Entrance of Foreign Proteids into the Body.

Obviously, under natural conditions the mucous membranes of the respiratory and the intestinal tract afford ready means of access for these substances when inhaled or ingested, and we may consequently speak of such forms of allergy as inhalation or ingestion anaphylaxis.

The possible existence of a third form should be considered, namely, where the symptoms may arise from autolysis of bacterial proteids when in contact with the mucous membranes. In a recent paper I have called attention to this possibility, and have shown that in certain cases of perennial vasomotor rhinitis and bronchitis, it is possible to elicit an immediate skin reaction by the application of soluble bacterial proteids to a scratch. Since this paper was written, further observations have tended to confirm these views. Such cases are apparently dependent upon the more or less periodic invasion of the mucous membranes by the bacteria to which the individual is sensitized, and during the intervals of infection, the patient remaining free from vasomotor disturbance.

At least two other possible bacterial causes may exist. In the first instance it is theoretically possible that chronic septic foci

as in chronic tonsillitis, with accumulation of lacunar debris, may be the source of sensitizing proteids; also it is conceivable that the intestinal canal may permit the development of bacteria, which may undergo autolysis, with the consequent liberation of proteid material which is anaphylactogenic for the individual.

The above system of classification is a tentative one, and, while for certain portions we may believe that we have sufficiently confirmatory evidence, we are not as yet in a position to accept it as a whole without further investigation.

In the following paper I have endeavored with this classification as a basis to study a series of vasomotor disturbances occurring in private practice:

I. Inhalation Anaphylaxis.

Under this heading two main types are recognizable, the first being seasonal, the second perennial. In the first instance, we find that the symptoms appear at a definite time of the year, and are represented by the very large class of hay-fever patients, the symptoms coinciding with the flowering of the special plant in question. The second or perennial form occurs at any time of year whenever the exciting proteid enters the system through the respiratory tract, as in sneezing or asthma from the presence of horses and cats.

A. Seasonal Inhalation Anaphylaxis or Hay Fever:

In this affection recognition of the causative agent is considerably simplified by keeping in mind the following facts. In the first place our search should be chiefly directed to the monecious or diecious plants. As I have previously pointed out, it is those plants which distribute a large amount of pollen in the air which excite hay-fever symptoms. Entomophilous plants which accomplish cross fertilization through the agency of insects are able to be much more economical in the production of pollen, and it is consequently not likely that such pollen can come in contact with exposed mucous surfaces under natural conditions. Such pollen, furthermore, is more viscid and sticky, the object evidently being to enable it to cling to the bodies of the insects which visit the plant in question. It is

necessary, on the other hand, for anemophilous plants which depend for their fertilization upon the agency of air currents, to produce a large amount of pollen, and pollen furthermore which is relatively light and easily detached from the anthers.

Recognition of these facts enables us to determine with much more certainty the causes of hay fever in a given locality. We may therefore pass over the entomophilous plants and confine our attention to the anemophilous representatives. Such are, in this vicinity, certain trees, the grass family as a whole and some members of the Compositae. Although the pines and other gymnosperms produce a very large amount of pollen, yet I have not so far found any instance of hay fever being caused by them. It is in the next place necessary to consider the season of hay fever symptoms. If they occur previous to the flowering of the grasses, we shall obviously have to look for the exciting cause in the early flowering shrubs and trees, and among these, birch, maple and willow are chiefly responsible. About the middle or the last of May the oak begins to flower in this region, and tests should therefore be made for this family. The flowering period of these trees is relatively brief, and consequently the hay fever occasioned by them is less likely to disturb seriously the patient's mode of life.

In the case of grasses we have a flowering period extending from the middle of May in this locality until the first week in July, and the attack of hay fever which they may excite is not only more prolonged but more severe.

Examination of the Compositae is very much simplified by recognizing that the proteid or active agent of all its members is essentially the same. While minor differences may exist, yet one active pollen will, for diagnostic purposes, cover the whole order. An interesting example of this is found in two of my patients who spend the winter in Cuba, and who there in February suffer severely from a plant known locally as Escoba amarga, used by the natives to keep fleas from their dwellings, which has been identified for me by Mr. Oakes Ames as *Parthenium hysterophorus* Linn. After the return of these patients to Boston in the early spring, they are free from hay fever until the flowering of the grasses, when a moderately severe amount

of vasomotor irritation appears and lasts until the first of July. They then remain comfortable until the middle of August, when severe hay fever appears and lasts until frost. Examination shows that these patients are sensitized to grasses and to ragweed, and that the Cuban plant excites marked skin reaction. Tests of this plant on numerous other sufferers from ragweed who have never been in Cuba excite marked skin reaction in all cases.

Tests, furthermore, of different members of the Compositae from the earliest flowering ones such as coltsfoot to the late blooming asters show that with sufficiently strong solutions all ragweed cases will develop skin reactions. Under natural conditions, however, throughout the greater part of the United States, the special exciting cause among the Compositae is found in the ragweed, the structure of which will repay examination. It will be seen from the specimens that the plant is characterized by the possession of long spikes containing the male flowers, and by the localization of the female flowers at the base of the spikes. The amount of pollen which this plant distributes is very large, and it is also extremely light. The flowers open in succession beginning with the central spike, a few discharging daily, and the scattering of the pollen being consequently maintained for a long period. Another plant of the Compositae which resembles the ragweed in its method of flowering is the *Baccharis halimifolia,* a favorite plant in shrubberies, although its power of causing hay fever has not hitherto been recorded. The plants are diecious, and the amount of pollen formed is considerable. The more showy members of the Compositae, such as field daisy, golden rod, asters and other garden representatives, possess a relatively small amount of pollen, as well as one of a more generally viscid character. Patients consequently more readily escape unless the plants are brought into the house.

Examination of the present series of cases has led to the conclusion that the number of proteid types concerned in exciting symptoms is much smaller, at least for New England, than has previously been supposed. During the period preceding the flowering of the grasses, nine cases presented symptoms which ter-

minated by the first or the middle of May, according to the seasons. These patients showed no sensitization to grasses, but reacted chiefly to the maple, birch and willow. Fifty-seven cases showed sensitization to grasses, and 183 cases were positive to ragweed and other members of the Compositae. Sensitization to members of the rose family alone was found in but one case, although a number were found in association with grass sensitization, where it was evident that grasses were the predominating factor.

With regard to the July or midseason forms of hay fever, I believe that with exception of the chestnut and possibly some garden flowers, the chief causes are found either in some special distribution or exposure to either late blooming grasses or early blooming Compositae.

It is at this season also that the cases of olfactory vasomotor rhinitis or pseudo hay fever are most commonly found. In this affection the fragrance of certain heavily scented flowers excites vasomotor disturbances, ranging all the way from sneezing to actual asthmatic paroxysms. The action of pollen can be definitely excluded by wetting or removing the anthers without influencing the vasomotor symptoms. Skin tests, furthermore, of the pollen show no reaction. The phenomena are plainly reflex, and the path of transmission appears to be along the olfactory rather than the optic nerve. The flowers most commonly responsible are lilies, hyacinths, sweet peas and peonies. The condition occurs either alone, or in association with true hay fever, and is more common in neurotic or impressionable individuals, although not confined to such, several of my cases occurring in highly intelligent individuals, possessing otherwise no discoverable neurosis.

It may here be noted that during the hay-fever attack a general hypersensitiveness of the patient is apt to appear towards plants for which at other seasons he shows only a minor or no reaction. One must therefore be on his guard at this time to observe carefully the relative preponderance of degree of development of the various skin reactions, and he will probably be safe in confining his therapeutic endeavors to the plant which causes the most marked disturbance.

B. Perennial Inhalation Anaphylaxis:

(a) Of plant origin. Under this heading I have included those cases of vasomotor disturbance in which the inhaled proteid is derived from some other part of the plant than the pollen. Two cases of severe sensitization to flour were found in bakers, who, however, had no hay fever, and who did not react to wheat or grass pollen. These cases, furthermore, could eat bread without disturbance. One case of sensitization to potato was found in a cook. Eight cases of severe sneezing from orris root were encountered in women using face powder containing this as an ingredient. Both the crude root of *Iris Florentina* and the commercially prepared orris powder produced in these cases marked skin reactions and vasomotor disturbances. In several of these patients the cause of the symptoms had not been previously suspected, but in all instances a complete subsidence followed the discontinuance of the face powder.

(b) Of animal origin. Forty-nine cases were found of sensitization to epidermal scales and hairs of animals or feathers of birds. The symptoms varied from vasomotor rhinitis to severe asthma when inhaling fine suspended particles of the special exciting substance in question. In all cases a definite reaction was elicited by the application of a keratin extract to a scratch of the skin. While the majority were aware of their sensitization, yet for a number of individuals the first recognition of the cause was obtained by the test. This was especially found in the case of children.

Of the various animals, the horse was represented by forty-two cases, the dog by eight and the cat by six. The sheep and cow gave in two cases respectively moderate, but apparently definite reaction to keratin extracts from the natural hair, yet it did not appear that the first case was affected by the dust from woolen blankets. In two cases definite vasomotor rhinitis was occasioned by the use of feather pillows and keratin extracts from feathers of the chicken or duck gave well-defined skin reactions. The symptoms disappeared on the discontinuance of the feather pillow.

A distinct difference appears to exist between the proteid of

the serum and that of the epidermal structures in the animals studied. In the case of the horse eleven patients gave marked reactions to the keratin extract, but no reaction to the serum either in pure powder or as antitoxin. That this difference is not due to greater strength of the keratin extract employed is shown both by the fact that the majority of patients gave equally marked reactions to both serum and keratin, and by the observation made in one individual of a pronounced cutaneous reaction to horse serum, without a trace of disturbance from the keratin. This patient had but little to do with horses, but had thirty-eight years previously been bitten by a colt. It is conceivable that in this manner a sensitization to the serum alone may have developed.

While the majority of the dog and cat cases reacted to keratin, both clinically and by the tests, yet two individuals were discovered who reacted to dog serum in a marked degree without sensitization to dog hair. Two similar cases were found reacting to cat serum alone. These four individuals had no discomfort when in the neighborhood of dogs or cats respectively.

Of the two cases of feather sensitization, one showed no reaction to eggs.

These observations indicate the necessity of employing keratin extracts as well as sera, when making diagnostic tests of sensitization. Furthermore, the probability is suggested that certain cases of horse fever or horse asthma may in reality receive antitoxin without anaphylactic shock, if their sensitization is to the hair and not to the serum of the animal. Finally the possibility is conversely suggested that the absence of symptoms from horses does not preclude the possibility of an anaphylactic shock from the administration of antitoxin.

II. Ingestion Anaphylaxis.

Twenty-eight cases were characterized by a more or less well-defined sensitization to various foods. This number does not represent the true relative frequency of such cases since their study has been undertaken only during the past six months, and many of the earlier ones may have escaped recognition.

These cases represent all gradations ranging between sensitizations so slight as to have excited no subjective symptoms on the part of the patient to extreme susceptibility, in which contact of the smallest part of the proteid in question caused profound general disturbance. It was noted that the local sensations were referred to the throat, rather than to the region of the stomach. Such symptoms were described variously as tickling or itching in the throat, or in more severe cases as swelling and smarting. The general constitutional phenomena were in some cases definite asthmatic symptoms, in others urticaria. Eczema was found associated in a number of instances, psoriasis occurred once.

Animal foods were prepared for testing, as already described, and instances were found of sensitization to shell fish, crustacea, fish of various sorts, egg, milk and meat. If the skin reaction was marked, the patients were usually aware of their idiosyncrasy. This applies particularly to intolerance to fish and eggs.

Milk was found in one instance to give severe asthma in a child seven years of age. This patient had had more or less constant asthma since being weaned. Physical examination by Dr. J. L. Morse was negative. The skin tests showed reaction to milk, horse and cat keratin. On discontinuing the milk, and keeping the cat away, the asthma ceased completely. At the end of two weeks, the child was given cow's milk again with a return of the asthmatic symptoms. This was allowed to continue for a week, and the milk discontinued, the asthma simultaneously disappearing. A week later he was allowed to play with the cat, whereupon asthma reappeared. On keeping him away from the cat, and giving milk at the beginning in drop doses, and gradually increasing, it was possible at the end of six months to establish a tolerance for a glass of milk. The child has during this time been free from asthma.

Cases of sensitization to egg have been referred to childrens' specialists for immunization by progressive doses, with successful results.

A case of sensitization to raw animal sera was found in a boy twelve years of age. This individual reacted to dog, cat, hog, sheep and ox serum to a high degree. Horse serum and goat serum excited slight reaction. Guinea pig serum gave

no reaction. Tests with cooked beef and lamb gave no reaction. There was well-defined sensitization to keratin of dog, cat, horse and lamb, but none to that of the ox. Commercial casein and egg gave no reaction. This case indicates the desirability of having the animal foods prepared for testing in the form in which they are usually taken into the system.

In the case of plant foods we have likewise to prepare the material in the raw, boiled or roasted state, as the case may be. A variety of proteid substances exists in plants, the greater part of which is coagulable by heat. While many proteid substances in aqueous solution require a temperature of 100 deg. C. before being coagulated, others coagulate at 65 deg. C. Proteoses withstand boiling, but may be precipitated by treatment with absolute alcohol. Eleven cases were found of sensitization to grains. In certain of these the patients had no subjective sensations. In four, however, it seemed probable that the asthmatic symptoms of which they complained were attributable to the eating of grains in the form of cereals and bread. Two of these cases are reported somewhat in detail.

Case 1. G.—Aged 40. Asthma since childhood of unknown origin, more or less persistent throughout the year. No reactions were found to animal foods or to the pollen of grasses, and the patient had no hay fever. Raw and boiled proteids of wheat, barley, oat, corn and rice gave marked skin reactions. Proteids extracted from the inside of bread gave reactions much less pronounced than the raw or the boiled material. Extracts prepared from well-browned toast and roasted grains of wheat, corn and rice gave no reaction whatever. Various breakfast foods were tested, shredded wheat, triscuit, corn flakes, force, Kellogg's wheat biscuit and puffed rice giving no skin reaction. Grape nuts gave a pronounced reaction. The patient was negative for other plant foods with the exception of beans and peas. Bread and cereals were omitted from his diet for a period of two weeks, during which time his asthma became much less, giving him at the close of this time practically no discomfort except on exertion. On eating again freely of bread, after two days the asthma returned in its original intensity, diminishing later when bread was omitted. When the roasted and

other cereal foods above mentioned, which gave negative reactions, were introduced into the diet, there was no return of the asthmatic symptoms, and the patient is now in greatly improved general health.

Case 2. S.—Aged 35. Asthma many years more or less constant. Hay fever in spring, moderate. Marked reaction to wheat, raw and boiled, and to bread proteid. Marked reactions to raw and boiled proteids of oat, barley, rice and corn. Positive reactions were obtained also for cocoa and buckwheat. Squash, pea, almond and Brazil nut gave pronounced reactions. There was no reaction to beet, turnip, cabbage, parsnip, potato, eggs, fish or meat. This case was relieved very much of his asthma on omitting bread and grains, and the other plant foods to which he was sensitized. The proteid extract of wheat on being treated with pancreatin for three days caused at the end of this time marked skin reactions. Wheat, rice and corn heated to a temperature of 115 deg. C. gave no reaction, and their proteids on treatment with pancreatin for three days gave no reaction.

These two cases indicate that proteid present in the grains is heat stable up to 100 deg. C., but at 115 deg. C. the anaphylactogenic property of the proteids is destroyed, and is not reintroduced by pancreatic digestion.

Four cases of sensitization to potato both raw and boiled were observed. In one of these only was there any systemic disturbance, this consisting in an urticarial eruption. Proteids from baked potatoes gave no skin reaction.

Cases were also encountered of sensitization to nuts, both walnuts, chestnuts and Brazil nuts, some reacting also to almond, although this is derived from the rose family, and stands far removed in a botanical classification from the others. These cases did not react to the pollen of chestnut or the rose family respectively. A few cases were found of sensitization to strawberries, bananas, oranges and apples in the raw state. Cooking, however, of the strawberries and apples made it possible for the patients to eat the fruits without discomfort. The inference here to be drawn is that the sensitizing proteid was coagulated or destroyed on boiling. The cases of sensitization to

grains as a rule had no hay fever, and did not react to the pollen of grasses. It was, however, observed that cases of marked sensitization to grass pollen gave without exception a definite skin reaction to proteids both boiled and raw of grains. This observation suggests the probability that the pollen represents the specific plant proteid found throughout all its parts as Metz and Gohlke have apparently shown, but that in the development of the ovule during the summer other proteids are formed with anaphylactogenic properties differing from those of the specific plant proteid, and that these seed and fruit proteids represent a high degree of differentiation among closely related species. This clinical observation receives confirmation from the works of Wells & Osborne.

These observers have isolated from the seeds of closely allied plants substances resembling proteoses, which are distinguishable from each other. They reach the conclusion that resemblances and differences of these substances are dependent upon the chemical constitution of proteid molecule, rather than upon biological differences. They, for instance, found that zein, the alcohol soluble protein of corn did not cause the anaphylactic reaction in animals sensitized with gliadin, the alcohol soluble proteid of wheat, nor with hordein, the alcohol soluble protein of barley. At that time hordein and gliadin had not been tested against one another, but it had been observed that preparations of gliadin from either wheat or rye interacted against one another, as if they were one and the same protein. On testing hordein from barley against gliadin from either wheat or rye, they have since found that these two proteins of different origin also react with one another. Furthermore, they have found that while preparations of gliadin from wheat reacted anaphylactically with glutenin from the same seed, hordein from barley fails to cause reactions in guinea pigs sensitized with glutenin.

It has seemed to me possible that these relationships between the specific plant proteid found in the pollen, and those of the seeds and fruits, may be represented graphically as follows: Taking for instance the Rosaceae, we may let A represent the specific proteid of the family found in the pollen and

throughout all the parts of the plant. B, C and D may be taken to denote the fruit proteids of the apple, strawberry and almond elaborated by the activity of the respective plants during the summer's growth. The proteids present in the fruits will therefore be AB, AC and AD. An individual sensitized to the pollen of the rose will react positively to the pollen of all the members of that order, and will also react to extracts from the fruits or seeds of all. If, however, he is sensitized to proteid B of the apple, he will neither react to the pollen of any of the rose family nor to proteid C of the strawberry or to proteid D of the almond.

This hypothesis has apparently received confirmation from my observations on the Rosaceae and Gramineae as already mentioned.

III. Autolysis of Bacterial Proteids.

While the influence of proteids from animals and from flowering plants in the causation of anaphylactic symptoms is sufficiently recognized, yet the part which possibly bacterial proteids may play in these conditions is not yet clear. Clinically we find a large number of patients in which the influence of bacteria seems probable. We may divide these conditions provisionally into acute recurrent and chronic forms. In the first instance we find that the individual goes for considerable periods of time with little or no vasomotor disturbance, and that with the advent of an acute infection of the nasal or bronchial mucous membrane, he exhibits symptoms of vasomotor rhinitis or of asthma. The mucous membranes in these conditions do not show reddening or pus formation which are characteristic of acute rhinitis and acute bronchitis, but present rather the typical picture of hay fever. After the cessation of the acute symptoms, the individual is free from asthma until the occurrence of another infection. The existence of chronic forms of bacterial infection has been recognized by clinicians as being represented on the one hand by chronic sinusitis and on the other by intestinal stasis, and we have probably all had cases where treatment or cure of these conditions has resulted in relieving the vasomotor symptoms. I believe that chronic lacunar ton-

sillitis with accumulation of detritus must be regarded also as a possible cause of proteid absorption.

In a recent paper I have called attention to the possible explanation of such types of vasomotor disturbance, referring them to the solution or autolysis of bacterial proteids, to which the patient is sensitized. On this hypothesis both these acute and chronic forms of vasomotor rhinitis and asthma are dependent upon the occasional or constant anaphylactogenic action of autolyzed bacteria. Experiments which were then reported for the purpose of determining whether bacterial proteids in solution could elicit skin reaction, showed that out of fifty cases positive reactions were obtained from the staphylococcus p. albus, aureus and citreus; also from a bacillus of the Friedlander type, and the micrococcus tetragenius. Since then further study has confirmed these observations and reactions have been obtained in a number of cases from the bacillus of influenza, streptococcus pyogenes and viridans and pneumococcus, Type I and II. It was also observed that after an attack of asthma the skin reaction could not be elicited, but returned again after a few weeks. Much still remains to be done before conclusions can be drawn as to the relation of these organisms to the vasomotor disturbance in question. If it should be confirmed that definite sensitizations to micro-organisms exist on the part of these anaphylactic cases, our therapeutic work should receive a highly important assistance. We should, for instance, in the case of acute recurrent infections be guided in the choice and administration of vaccines. The cases of chronic proteid absorption would be more intelligently approached in that we should be led to examine the patient with especial care for the purpose of removing, if possible, the foci of infection, or at least of draining and cleansing the regions in which prolonged contact of bacterial proteids may occur.

Association of Factors and the Occurrence of Clinical Symptoms.

A review of the cases has shown that for the majority a variety of sensitizations is present. We find for instance often hay fever disturbances from the pollen of different orders, while here and

there hay fever patients occur with sensitization also to bacterial proteids, certain classes of foods, or keratin desquamations.

In such cases our task is first to determine the factor which is responsible for the symptoms, and to place in proper perspective the relative influence of the other sensitizations to which the patient is subject. The line of inquiry is usually as follows. First, are the symptoms strictly seasonal? In this case we shall obviously be able to disregard all factors except the various pollens. If the symptoms are perennial, inquiry is next made as to their relation to the occurrence of colds and acute infections. If the answer is confirmative and the patient states he is entirely free from discomfort except when suffering from a cold or acute bronchitis, we may feel justified in disregarding the influence of both inhaled and ingested proteids, and devote our attention to an examination of his reactions to the various bacteria concerned in acute infections of the upper air passages.

If the symptoms are more or less constant throughout the year, the possible influence of domestic animals should be sought for, especially dogs and cats in the case of children. Nor must the possibility of orris root in toilet or sachet powder be forgotten. Inquiry is next made as to disturbance from different articles of foods, and here the tests should be first made for such substances as enter habitually into the diet, thus, in order of importance, we place eggs, milk, meat, grains, legumes and potatoes. If the patient is not sensitized to any of these, it is unlikely that more occasional articles of diet, such as shell-fish, fish, root vegetables, greens and fruits are responsible.

If the above tests have resulted negatively, our attention should be directed to the possible existence of chronic absorption of bacterial proteids, and we may then proceed with the examination of the patient, as to his sinuses, tonsils and gastro-intestinal tract.

The Management of Patients Showing Hypersusceptibility.

In symptoms arising from inhalation of sensitizing substances, if the exposure is likely to continue throughout the year, it is probably wiser to avoid the irritation than to seek to immunize

the patient against it. We have, at least as yet, no record of successful immunization. A case which I reported last year of attempted immunization against horse asthma by the injection of horse serum and keratin extract showed a gain in tolerance to the presence of horses, but on the discontinuance of the treatment, the immunity was gradually lost, and the patient has now regained her original sensitiveness. Since for the successful preservation of the required resistance, continuation of proteid administration is necessary, and inasmuch as we have as yet developed no successful method which the patients would be willing to carry out for an indefinite period, it would seem preferable for the patient to accept his disability and make the best of it.

Immunization against hay fever by the injection of plant proteids has been described by other writers, and by myself in a previous paper, so that I shall not consider it here in detail. Before, however, we undertake the treatment, we should first decide whether the patient's discomfort is sufficient to justify us in starting him upon a course of procedure which may prove time-consuming and not wholly devoid of risk. The treatment is by no means to be compared to typhoid inoculation, but may require numerous visits with careful tests of the degree of progress in order to determine the correct dose for each occasion. I cannot too strongly emphasize the importance of this matter of dosage. We are dealing with agents capable in moderate overdose of causing unpleasant shock, and in sufficient amount of leading promptly to a fatal result. The best advice that I can give one starting in this work is to test continually the patient's resistance, and to increase the doses gradually in conformity with the skin or conjunctival tests.

In reviewing the results thus far obtained in three years treatment of hay fever by hypodermic injection, one must in the first place be guarded in accepting the statements of the patients themselves. As I have previously pointed out, seasons vary, and the physical condition of the patient may likewise differ from year to year. Patients are all too ready to attribute a greater freedom from hay fever symptoms to the treatment employed. It is only where the patient's statements are controlled by clini-

cal tests that they may be accepted as possessing value. With this preliminary statement, I will say that the majority of patients who received treatment in the past two summers expressed themselves as satisfied with the results accomplished. From those who felt themselves improved, however, a considerable number should be eliminated, as careful examination of their surroundings, the seasons and their physical condition might permit other explanations of the diminution in symptoms. The typical individual who presented himself for treatment two or three months before the expected season showed a progressive diminution in the intensity of the skin reactions, and a greater tolerance to the solution employed. In most instances, however, the patients did not escape entirely the hay fever symptoms when the season came around. The typical behavior was as follows: Hay fever appeared at the usual time or somewhat later, the latter possibly attributable to the season, and reached within a few days nearly its accustomed degree of intensity. This was, however, followed by a striking diminution in the symptoms, so that after the acme of discomfort had been reached, a very considerable degree of relief supervened, and most of these cases remained relatively or entirely free from trouble through the balance of the season. The impression was given in such cases that the amount of treatment which it had been possible to administer in the few weeks before the season was insufficient to effect a complete immunity, but that with the arrival of the season enough pollen was absorbed through the mucous membrane to push the patient, so to speak, over the line. The same results were apparently obtained when treatment was instituted at the beginning of the hay fever season, and in the majority of such instances it was possible to bring about a relief of hay fever symptoms several weeks before relief would ordinarily have been due.

I have received the impression consequently that we are not likely, in the majority of cases with the present methods, to do away completely with hay fever symptoms in the course of a single season, but that nevertheless sufficient relief may be obtained to make it worth while to continue this method.

Where, however, treatment has been carried on during one

season with more or less success, it has been evident that a second course of treatment the following season is more distinctly efficacious.

The usual course of events here is as follows:

At the close of the first hay fever season, one finds that the patient has attained a relatively high degree of immunity which in the course of the winter progressively diminishes. Beginning again next season several weeks before the expected date for hay fever one injects a small dose carefully determined in the usual way, and follows this by larger doses. In practically all such cases a rapid striking diminution in the intensity of the skin reaction was observed, much more speedy than was the case during the first season. Such cases when the hay fever season arrived were distinctly more benefitted than during the previous year, more than half showing no or exceedingly trifling symptoms. The work is yet too young to enable us to say with certainty what the future will bring forth, but with our present information, I should advise considerable caution in the statements to be made to the patients, and especially to explain to them that they may observe little or no benefit during the first season, but that the results obtained lead us to advise a following out of treatment for two years, with the reasonable expectation that the second season's treatment will be more helpful than the first.

Although feeding experiments in the past with extracts of the ragweed do not appear to have been sufficiently successful to justify their general adoption, yet the work which Schloss, Talbot and other internists have done with the treatment of egg sensitizations, has suggested the possibility that we may accompish similar results by administering foods in a natural state derived from the order which produced the symptoms. Experiments were consequently undertaken during the past summer to determine whether the patients sensitized to ragweed pollen would present symptoms from the ingestion of proteid foods derived from the same family.

It was thought that if such internal administration was followed by the development of vasomotor symptoms either of

the skin or of the mucous membranes, an immunization might possibly be accomplished along the recognized lines of treating egg and other food sensitizations.

For this purpose sunflower and lettuce were taken, both being plants of the Compositae, to which the ragweed also belongs. The pollen of both was found to excite marked skin reaction in cases of autumnal hay fever.

Extracts were made from the seeds of the Russian sunflower which gave positive skin reactions, but inferior in intensity than those excited by the pollen. The seeds were given to ten hay fever patients with the direction that they should chew them thoroughly and swallow shortly before their regular meals, with the idea that a certain amount of the proteid might pass into the system directly without digestive alteration. In nine adult cases, however, no gastric discomfort was noted or any influence upon the hay fever symptoms. Oil-free meal from sunflower seeds was prepared which on the skin excited a moderate or marked skin reaction, depending upon the sensitization of the individual. This was administered internally in doses of one to two grams, without exciting symptoms of any kind whatever. One patient, a boy, said that his hay fever was made worse after eating the sunflower seeds.

In the case of lettuce a strong extract was made from the seeds in a 5 per cent. sodium chloride solution, which gave a weak reaction. A strong solution of lettuce leaves in a 10 per cent. sodium choride solution (proteins shown to be present by preliminary tests) gave a negative reaction.

The amount of proteid present in the lettuce is evidently too small to excite any disturbance, and with one doubtful exception no patients had noted any influence upon their hay fever from eating it in abundance.

It would appear consequently probable that we have no foods of the Compositae, the ingestion of which is likely to influence the course of ragweed hay fever.

In the course of this work it has become evident that many individuals exist who show definite anaphylactic skin reactions to various classes of foods, and the problem which here confronts us is to determine to what extent the clinical vasomotor

symptoms are dependent upon such a hypersusceptibility. It has in some instances seemed indicated that certain individuals possess food sensitizations, either partially developed or measurably overcome through the acquisition of progressively increasing tolerance, in whom the actual vasomotor explosion is in reality dependent upon some other proteid cause. The following case illustrates this possibility.

D.—Male, aged 40. Asthma severe nearly constant for many years. Marked polypoid degeneration of middle turbinates with involvement of antra. Skin tests were positive for staphylococcus p. albus and a diphtheroid bacillus; negative for pneumococcus, the influenza bacillus, micrococcus catharrhalis and staphylococcus p. aureus. Positive reactions were obtained from proteid extracts of wheat, barley, corn, rice, pea, orange and cocoa. Negative or slight reactions were obtained from egg, milk, beef, mutton, fish, potato, carrot, beet, parsnip, squash and cabbage. Keratin extracts of domestic animals and birds were negative. The patient was put upon a diet containing only those foods to which he was negative, but without perceptible influence upon the asthma. No operation has as yet been done upon his sinuses, but in view of the above observations this seems the measure most reasonable to undertake.

Conditions of highly developed sensitization to foods have been studied by numerous observers, especially Schloss, Talbot and Chappell. It has been evident that children are much more prone to exhibit anaphylactic phenomena from foods than is the case in adults, a fact possibly due to the greater absorptive power of the gastric mucous membrane in children, or to the acquisition of partial immunity in adults.

If the proteid enters into the accepted articles of diet, experiments have shown that immunity can be obtained in the majority of cases by administering it in small and progressively increasing amount. The details of treatment may be found sufficiently described by the authors mentioned.

The management of cases in which the vasomotor symptoms either demonstrably or by exclusion are attributable to the absorption through the mucous membrane of bacterial proteids is to be undertaken along lines already indicated. Acute recur-

rent infections may perhaps be checked by the administration of vaccines. The sensitized individual presents here an advantage in that it may be found possible to select for him with accuracy the special organism required.

Foci of chronic inflammation or sepsis should be drained or removed. In three of my cases of long standing asthma, the excision of septic tonsils was followed by entire relief.

Cases of intestinal stasis should be treated by the internist or the orthopedic surgeon as circumstances may require. Two cases of asthma with ptosis of the viscera were relieved by the application of a proper support.

Conclusions.

In a large proportion of vasomotor diseases of the upper air passages the disturbances are dependent upon the entrance of a foreign proteid into the system. The method of entrance may be through contact of the proteid in question with the mucous membranes of the respiratory or of the gastro-intestinal tract by inhalation or ingestion respectively. Foreign proteids may perhaps also develop in or upon these mucous membranes through autolysis of pathogenic or saprophytic bacteria. The application of the skin test to these conditions is of diagnostic value when employed with a recognition of the phylogenetic relationships of animals and plants as determined by studies in serobiology.

Proteid material for testing should be prepared both from the keratin and sera of domestic animals, from the pollen of the chief causes of hay fever, and from the various articles of food, which enter commonly into the diet. Bacterial proteids derived from the various invaders of the respiratory tract should be available either in solution or in soluble form.

When the skin reactions to the various classes of proteids have been determined, the management of cases will depend largely upon the relative preponderance of the local reactions in relation to the clinical history. If the cause is found to be seasonal as in hay fever, immunizing treatment by injection of pollen extracts is likely to prove of service. The sensitization returns during the following winter, and treatment must prob-

ably be repeated annually. If the cause is perennial and is due to inhalation of foreign proteids, it is wiser to avoid the cause rather than to seek to effect a cure by immunization. If the disturbing proteid enters into the ordinary articles of diet, a tolerance may be gradually established by feeding the substance in progressively increasing doses. Disturbances of bacterial origin have not yet been sufficiently studied to enable the formulation of a definite plan of treatment, but the results of these investigations confirm our present methods of treatment, and emphasize the importance of draining regions which can retain the products of bacterial activity. Septic foci should be removed. Vaccine therapy is likely in such anaphylactic cases to be more accurately guided than in the ordinary individual.

The results already accomplished in the course of this clinical investigation has led me to the conclusion that we possess in the intelligent application of the skin test a very definite aid in the diagnosis and consequent management of our cases of vasomotor disturbances of the upper air passages. We are as yet at the entrance of this field, and its exploration must be carried out by the co-operation of laboratory workers in chemistry and serobiology.

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DISCUSSION

Dr. John F. Barnhill, Indianapolis, Indiana: I would just like to ask one question in regard to whether the subject has been brought down to a working basis. For instance, if a patient comes to Dr. Goodale, what plan does he adopt for determining what the sensitization may be. Has he come to any conclusion? I have a little boy now under my care who undoubtedly is the victim of some one of these things, yet which one I cannot determine. He has these nasal sensitive storms over and over again.

Dr. Robert Levy, Denver, Colorado.: We were very much stimulated by Dr. Goodale's work last year. I should like to ask him two questions. First, what is his mode of procedure when there are a multiplicity of sensitizations? I would like to have that more at length. And secondly, having determined for a certain individual his sensitizations to a variety of proteids or inhalations (I have particular reference to inhalations), what method does he proceed with in the treatment of such individual?

On motion duly made and seconded, it was ordered that Dr. Goodale be given an extension of time for the full reading of his paper.

Dr. G. Hudson Makuen, Philadelphia, Pennsylvania, Chairman.: Gentlemen, the time allotted to this paper and to its discussion has been nearly all taken up, and if you feel about it as I do, you will be willing to take Dr. Goodale's word for a great deal of it, rather than to enter into any critical discussion of it with him. However, a few minutes will now be given for any remarks or questions upon the subject.

Dr. Hanau W. Loeb, St. Louis, Missouri.: I would like to ask Dr. Goodale to tell us if lactate of calcium and calcium chlorid salts have, in his experience, had the effect of reducing the sensitization.

PATHOGENESIS OF THE NASAL NEUROSES.

CHARLES PREVOST GRAYSON, M.D.

If any excuse were necessary for the reintroduction of this almost exhaustively discussed subject, I would offer the fact that during the past few years some very important additions have been made to our knowledge of the causes and consequences of certain disturbances of metabolism, the effects which should particularly arouse our interest because of their bearing upon the genesis of the nasal neuroses, being those that are exerted upon the cerebro-spinal and sympathetic nervous systems. It is only of the vaso and secretomotor neuroses of the nose that I intend speaking, not of the functional disorders of the olfactory nerve nor of the neuralgias of intranasal or accessory sinus origin. Hay fever, paroxysmal sneezing, nasal hydrorrhea and a passive serous infiltration of the nasal mucosa unassociated with hyperesthesia or any material degree of secretory disturbance are the affections that I have now in mind. It has seemed to me that since the pioneer work of Dunbar in the really scientific search for a specific remedy for hay fever, there has been a gradual reawakening of interest as to the causation and rational treatment of these vasomotor disorders. If I may speak for a moment of their treatment, however brilliant at times may have seemed the beneficial results of operative measures or of the cauterization of hyperesthetic areas, I fancy that no one will claim that this is rational treatment, rational, that is to say, in the sense that it is directed against the cause of the disease rather than against merely its effect. And it is because so much of our treatment of these affections has been of an almost exclusively local nature and has had for its purpose no more than symptomatic relief, and because, therefore, the relief obtained has so frequently been but partial and transient, that I am emboldened to turn back a few pages of rhinological history and to recall some facts of pathogenic interest the therapeutic significance of which seems to have been for a time more or less obscured. Of course,

it has never been possible to arrange with any accuracy the sequence of events that terminate in enfeeblement of vasomotor control. In many cases we can only conjecture as to where the first step is taken as well as as to the nature of it. The records of my own experience show that almost two-thirds of those whom I have studied have given a clear, or fairly clear, history of inherited neurotic tendency, and in almost all the others there have been perfectly evident and sufficient reasons of an emotional, mental or physical nature to fully account for that general nervous exhaustion of which the loss of vasomotor equilibrium was but a symptom and sequel. In addition to these two classes of neurasthenics—those who have inherited and those who have acquired their neurosis—there is another group of cases the pathogenic explanation of which may be based upon the theory of anaphylactic reaction. In such cases, however, the recurring attacks, although perhaps frequent and violent, are usually of brief duration and associated with them we are apt to find hyperemic and urticarial lesions of the skin and not infrequently other areas of angioneurotic edema besides that in the nose. Assuming that there is among us a general agreement as to the fundamentally neurasthenic state of practically all of these people and that the nasal neurosis is but a localized manifestation of it, it becomes incidentally a question of some ethical interest whether, as patients, they more properly belong to us or to the neurologist. And, indeed, I am not sure that, in many of them, the internist would not be the most appropriate man of the three. I am inclined to this opinion because I thoroughly believe that in a very large percentage of cases the neurasthenia primarily, and the nasal neurosis secondarily are the products of a long continued violation, through ignorance or deliberate disregard, of the implacable laws of personal hygiene, and particularly those concerning diet, exercise, work and play. I instance these because it is through their infraction that the intricate processes of metabolism are most constantly and seriously disturbed, and I do not think that I am taking too much for granted in regarding as well established the pathogenic relationship of abnormal metabolism to the

vasomotor neuroses of the nose. It is in this connection that the field opened by Abderhalden, Fauser, Kafka, Wegener and others through their studies of the physics and chemistry of the colloids and of their interactions, and also of the effects of ferments, toxins and hormones upon the sympathetic nervous system is most impressive, not only in its extent, but in the promise it gives of the elucidation of many problems of pathogenesis that have been for a long time awaiting solution. It was Langley, the physiologist, who suggested substituting the name autonomic for what we have hitherto known as the sympathetic nervous system. His suggestion, which has been widely accepted by neurologists, was based upon the hypothesis that structures supplied by the nerves of the sympathetic system were not controlled, or even influenced, by the will, or, to put it differently, that all efferent nerve fibers of the sympathetic system terminate either in smooth muscle fiber or in glandular tissue. This latter is, of course, an anatomical fact, but there is another such fact that militates against the supposition that the sympathetic system is absolutely independent and autonomic, and this is that the first or proximal neuron of this system is located in the gray matter of the cerebrospinal axis and that the axon coming from this terminates in an arborization about the distal neuron situated in the sympathetic ganglion. The primary root therefore of the sympathetic system is embedded in the cerebrospinal apparatus and neither anatomically nor physiologically can the two systems be regarded as distinct and independent of one another. Fauser, Lampa and others have shown, so conclusively as to place it beyond the reach of scepticism, that dementia praecox and perhaps also paresis are due to the double action of the "defensive ferments" of Abderhalden. It is unfortunate that, coupled with the defensive action of certain of these autogenous ferments, there may be an offensive action upon one or more of the constituent body tissues. In dementia praecox, for instance, the ferment that is furnished to destroy the unchanged sex gland protein present in the blood has also a destructive action upon the cortex. I am far from contending that there is any strict pathogenic analogy between dementia

praecox and the angioneuroses of the nose, but I do not think it requires any great stretch of the imagination to discern a possible or even probable relationship between the metabolic processes or perversions concerned in each. The exact nature of the perversion may vary in different cases, involving at times some glandular dysfunction, at others toxemias of intestinal origin, and at still others the presence in the blood plasma of certain ferments or hormones, but in all cases the symptomatic result is due to the same intermediate cause—a toxic action which expresses itself through the sympathetic or autonomic nervous system. Although you may have found but little interest in this very brief abstract of the serologic studies of the men I have mentioned, yet they may serve as the forerunners of further research that may remove much of our present uncertainty regarding both the pathogenesis of the nasal neuroses and their rational treatment. Until now, their treatment, both medical and surgical, has been almost purely empirical. We have attacked the nasal mucous membrane by the direct application of an extraordinary number and variety of remedies, we have cauterized and even removed it more or less extensively, but seldom with any better result than the incomplete and temporary relief of which I have spoken. Whatever general treatment may have been employed has usually been based more upon pharmacologic than pathogenic knowledge. The treatment of hay fever with pollen extracts is obviously addressed only to the elimination of the idiosyncratic element. The underlying neuropathy that probably strongly influences the violence and duration of the pollen storm, is unaffected. To me, therefore, it seems self-evident that if we are ever to be successful in suppressing the neurotic type of nasal disorder we must apply ourselves to the hygienic instruction of our patients and to the development of an internal treatment that will be founded upon a recognition of the essential nature of their disease. And if we would lay our axe to its very root, we must do it through a prophylaxis that will be the more certain of success the earlier in life it is begun. The man who said that the treatment of insanity should be begun a half century or more before birth, might have ex-

tended the observation to the vaso- and secreto-motor neuroses of the nose, for in many, if not in the majority, of these cases, it is only by thus discounting the future that it can be safeguarded from these evils.

This was the end of my paper as it was finished some two weeks ago, but within the past four days at the annual meeting of the Laryngological, Rhinological and Otological Society a paper was read by Dr. Albert P. Brubaker, of Philadelphia, entitled: "The Vaso-Motor and Secreto-Motor Nerve Mechanism of the Nasal Chambers," in which he gave so brilliantly clear and masterly a description of the innervation of the nasal fossae that I cannot resist the temptation to supplement and greatly increase the slight value of my paper by the addition of a few of the vital facts from his.

In the first place, he made it evident that the sphenopalatine or Meckel's ganglion was no more than a sort of clearing-house for nerve impulses received from the central system by means of preganglionic fibers and transmitted to the glandular epithelial cells and the muscle cells of the nasal blood-vessels by means of postganglionic fibers. The nerve cells of this ganglion possess no spontaneity of action of their own, but are wholly dependent for their excitation upon nerve impulses discharged by cells of the central system. The central mechanism for the innervation of the nasal fossae was shown to consist of groups of nerve cells having secreto-motor, vaso-dilator or inhibitor and vaso-constrictor or augmentor functions. Dr. Brubaker took up the question as to the manner in which these different groups are excited and co-ordinated in action. It has been, he said, as nearly as I can quote him, experimentally demonstrated that as a primary condition for their activity they must possess a certain degree of tonicity or tonus, this degree of excitability being due to a reaction between the constituents of the cells and the constituents of the lymph and blood by which they are surrounded. Given this tonus they may be excited to activity or inhibited by (1) the arrival of nerve impulses transmitted from the surface of the nasal mucosa by the nasal and other branches of the trigeminal nerve, and from the skin by the cutaneous

nerves. (2) The arrival of nerve impulses descending from the cerebrum in consequence of psychic states of an affective or emotional character. In the first instance the excitation is said to be reflex or peripheral in origin; in the second, direct or cerebral. In either instance the resulting change in secretion and vascularity will be proportional to the intensity of the peripheral or the cerebral excitation and the degree of tonus possessed by the central cells themselves, for whatever the conditions for the normal tonus may be, it is evident from a study of pathologic conditions that the tonus of one or more of these centers may be abnormally increased or decreased by changes in their nutrition; changes due to alterations in the composition of the blood and lymph, *the result of increased production or diminished elimination of the more or less toxic products of metabolism.* It is a common observation that the perverted functions and pathological changes of the nasal fossae are closely associated with alcoholic or dietetic excesses in conjunction with an insufficient amount of physical exercise and fresh air. With the establishment of an impaired tonus of the central mechanism, either peripheral or psychic causes which at one time would produce little if any disturbance, may now occasion the most pronounced and distressing effects.

Discussion

Dr. Greenfield Sluder, St. Louis, Mo.: The entire text of Dr. Grayson's paper is so at variance with the work I have done beginning in 1909, that I feel impelled to recall some of the things that are within this discussion. I realized then, and I do now, that there are many elements, all of which Dr. Grayson has stated, which must be considered. The patients are sometimes highly neurotic and neurasthenic, and all of the various features he has mentioned are there, but if you can trace these patients back to the beginning, you will find that up to a certain time they were in good health and supposed to be normal; that they began with a violent coryza, with a terrific headache, and in the wake of that, followed the pain in their neck, shoulders, etc., conceived by the neurologist as pathognomonic of neurasthenia. Watching these cases from time to time it has been my opportunity to make out, that preceding these symptoms was a sphenoidal post-ethmoidal empyema, and in the wake of that

remained a subacute inflammation, sometimes localized sharply to the spheno palatine foramen—the membrane which overlies the nasal ganglion—that the membrane overlying the nasal ganglion is a sharply inflamed patch of redness, clear as one of the lamps on the wall, and an application of cocaine to that particular point will relieve all the symptoms—the pain in the neck will vanish, the eyes become normal, etc.

It seems very difficult to work out that such a case in an able-bodied normal man, hard worked and responsible in life in every way should point out that that individual had suddenly become neurotic. In other words, this is a long story. I have inflicted it upon the Association since 1909, and the transactions are full of it.

I shall not say anything more about it other than that my observations are in direct variance with those of Dr. Grayson.

Dr. Burt R. Shurly, Detroit, Mich.: Dr. Grayson's very beautiful paper on the vasomotor system certainly is a complete demonstration of the very wonderful inter-relationship of the problem of neurology and internal medicine, which the president has given us under the psychology of our specialty and localized conditions that we find in the nose and throat. It seems to me that we all err in taking care of this class of cases because of the fact that we do not classify them where they properly belong. In my opinion these cases should at least come under three large classifications: (1) Those cases which are sensitized to some particular condition, a microbe or food sensitization perhaps; (2) a so-called pollen sensitization; (3) a sensitization to some other chemical phenomenon.

We are just beginning to understand a few of the phenomena which may give rise to these various motor disturbances. When we carry this subject deeper and farther I think that these three classifications will include those cases which Dr. Sluder has mentioned where we have termination in a purely localized condition; again, where we have a sensitization; and still again where we have what has been so beautifully demonstrated in the laboratory with the carrier pigeon—a condition of early nerve fatigue in the granules in the giant cells of the spinal cord. You can take a carrier pigeon that has been on a long flight and examine histologically the giant cells of the spinal cord and find it completely changed from the picture of another resting pigeon's cells histologically. The granules in the first pigeon are absolutely used up, and the whole problem of nerve fatigue following that long flight of the carrier pigeon can be absolutely seen under the microscope. It is very remarkable—the change which the nerve cell adopts.

It would therefore seem very easy for that class of neurasthenics whose vasomotor function is less under hereditary disability, to have nerve fatigue develop under the slightest exercise. It seems to me that we must be very much broader in our consideration of this subject.

Dr. George A. Leland, Boston, Mass.: This subject of nasal neuroses is so extensive and so complicated and we have heard so much about it during the last few years, especially as to local excitants, that I hesitate very much to enter the discussion at this time. First, I would like to say that I have the greatest admiration and the highest commendation for the very valuable scientific work of our Boston colleague, a most learned and skilled botanist, with reference to irritation caused by pollen and other substances implanted on the facial mucosa, the word "facial" being used to include that of the nose, fauces and conjunctiva. I am glad also to hear Dr. Grayson's most valuable paper which I think is exceedingly timely and shows that there is much more to this subject than local irritation. If this latter hypothesis is exclusively true, then I am at a loss to explain the rather exceptional success with which I have been treating vasomotor neuroses, including rose cold, hay fever, asthma, etc., for upwards of twenty-five years: *i. e.* how I am to reconcile my working hypothesis with the modern idea of pollen poisoning, which Dr. Morrill Wyman, however, showed up something like forty years ago. I believe it is admitted that the rupture of the pollen envelope on the moist mucous membrane sets free a nascent proteid, that is, a nitrogenous toxin, if you like, in its most active state. The question is why it does not produce the same distressing symptoms in everyone. I think the explanation can be found in this idea of auto-intoxication. If a patient is hypersensitized to all proteids, then an inhaled proteid, extremely potent because of its nascent state, has the property of starting the conflagration.

In my experience it has always been found that those who suffer from these neuroses are overfed or they are deficient in elimination of their nitrogenous waste. They may be or they may not be neurasthenics, but they are almost always indulgent feeders, usually of proteids with or without sweets. It is always my custom to examine the urine in these cases and often it is found, and I think I can say without exception, that the kidneys are either overworked and trying to eliminate a too concentrated secretion, or they are sluggish and unable to eliminate enough. Several typical cases come to mind.

A few years ago a Boston physician sent me a case of very marked asthma. The lady was stout, took almost no active exer-

cise, was unable to walk up the steps into her house from her automobile without assistance because of asthmatic breathing. I found the urine dilute, of diminished quantity, pale, with a specific gravity of about 1008. Thinking there might be some renal disease as well as inefficiency I sent her back to him for investigation in this respect. As soon as he had produced a more normal secretion, a little treatment of contact in the nose almost entirely eliminated the asthma. Afterwards she was troubled only in consequence of indiscretions of diet, or more or less sluggish elimination. This was about seven years ago. I have heard from her frequently since and she has been, as a rule, entirely free from asthma.

In 1891 a Boston physician was sent to me who had had hay fever and hay asthma for about fourteen years so that it was impossible for him to spend his summers on our sea coast or even to go into a horse barn. He said he had had his nose burned for four years without benefit. I found that his nasal sensitive areas were in the lower posterior part of the nose, which at that time was unusual in my experience. One side was cauterized immediately and the other after about five days, as I remember. Caution was given as to his indulgence in alcoholics, sour fruits and nitrogenous foods. He was spending the summer at an inland hotel, his family being at the beach as usual. After about ten days he said he was very comfortable and I asked him to go into the barn connected with the hotel. This he refused to do saying he was well aware what kind of an experience he would have after such an indiscretion: but providentially for me a man broke his leg in that barn and our doctor was the only one available. He went into that barn and splinted up the leg, and on coming out was surprised to find that he was not affected as usual. Several days later, he was asked to go on a coaching party, and rode behind four horses without any of his usual trouble. The next fall, (November, '92) I met him on the street and he said he had been able to go to the beach with his family that year for the first time in fourteen years. For several summers he would come around perhaps in May or June and say that he was sneezing a little more than he should, I found that he was apt to indulge in lemonade, having a full pitcher in the house for the family, which the maid kept replenished. I also met him at the club occasionally where gin fizzes, horses necks and beer might be indulged in. He told me a short time ago that he had had no more trouble since he had followed advice and eliminated from his diet beef, mutton and excessive indulgence in other meats and had stopped ingestion of sour fruits and drinks. He also wrote me a few months ago that he had been cautioned against

"acidosis" by me in the early nineties, but not the kind which is so very fatal to children. It seems to me that the explanation of the relief in this case, which extends until the present time more than twenty years, seems to be that he has not hypersensitized himself to proteids, has not kept up a high blood tension by too many acidions in the blood, and in fact because he has not overindulged himself by ingesting more than he can eliminate.

A third case rather strikingly illustrative of these points comes to mind; that of a rather large, stout lady, perhaps five feet six, one hundred eighty pounds, about thirty to thirty-five years of age, who came to my office about twelve years ago in December, saying that she had hay fever all the year 'round off and on, that she had been burned for it more or less for two years and that finally her physician confessed, while pacing up and down the floor, that he did not understand her case. I found on inquiry that she was living at one of the most fashionable hotels and that she had made a great change in her social state, something like four years before. Having been a stenographer, living in a boarding house, she had married her employer, and since that happy event had indulged in hotel fancy foods and in frequent cocktails with her fashionable husband, with occasionally a bottle at dinner; that she always used the elevator in going to and from her room, and carriages or trolleys in going down town; that she was of a rheumatic diathesis on her mother's side and had little twinges of rheumatic pain here and there herself; that she also had occasional patches of eczema. Her nose had been sufficiently cauterized, the anterior ends of the three turbinates having been shrunken down to the bone; and the rest of the interior swollen and somewhat macerated so that it needed little more except to lightly touch here and there the sensitive areas which came in contact. She was therefore advised to return to her simple life, as far as her diet and exercise were concerned, forbidden to ride to and fro or up and down, forbidden to remain so much in the house, forbidden to indulge in strong meats, made dishes, sours and sweets, also forbidden indulgence in alcoholic appetite exciters or so-called dry wines, which are really vinegars and abominations to the stomach, in fact forbidden alcoholics altogether; encouraged to eat lightly and raise her quota of water from four to ten glasses per day and to take all the exercise possible out of doors, always breathing through the nose. The urine was found to be overacid and somewhat concentrated. She was put on diluents with the phosphate of soda, and in the course of two or three months she was so well that her husband said she did not need any further treatment. Since

that time I have seen her but a few times, and then because of her lithemic diathesis, but not at all for the last ten years for her nasal neurosis, only for occasional manifestations of rheumatism in her throat.

I do not mean to mention these cases except as types. Many similar examples might be cited, some where noses are so small and narrow that it is impossible to treat them locally with safety where the whole question has been solved and immunity produced by strict attention to ingestion and elimination; and where full payment follows immediately on indiscretions and errors in these respects.

Dr. Lewis A. Coffin, New York City: I wish heartily to endorse this paper by Dr. Grayson. In these conditions my greatest satisfaction has been through the direct general treatment of the patient, particularly in regard to diet and elimination with special attention to the cleaning up of the intestinal tract. Gentlemen, these cases practically all have tender glands in the cervical region and suffer from occipital headache. These symptoms all disappear when proper attention has been paid to diet and the elimination processes of the body.

Dr. J. Solis Cohen, Philadelphia, Pa.: It has given me great pleasure to hear the paper under discussion, because it confirms the opinion I expressed more than a generation ago that the predisposing cause of hay fever and allied afflictions could be summed up in one word—"coddling."

Dr. G. Hudson-Makuen, Philadelphia, Pa.: It would seem that Dr. Brubaker was right in his conclusions. There is undoubtedly a psychical factor operative in some of these cases. We know that hay fever attacks frequently occur on exactly the same date every year, notwithstanding the seasonal variations. This would seem to be due to a kind of psychical expectancy. The man who went into a barn to set the broken leg of a friend was mentally preoccupied; his psychism was fixed upon another matter, and therefore he did not have his usual attack of hay fever.

Dr. Greenfield Sluder, St. Louis, Mo.: I am familiar with all that has passed in the discussion. These points were probably not emphasized sufficiently in my primary statement, and I now affirm all of that. But, despite this, the fact still remains that there is a giant category which comes into the classification of the material I have described.

Dr. Charles P. Grayson, Philadelphia, Pa., closing the discussion. I did not intend to teach anything new in this paper. My only intention was to refer to and emphasize certain facts

of comparatively recent discovery or elaboration. I think Dr. Shurley's classification of these different cases is a thing we ought to be particularly cognizant of in every new case we examine.

There is no question of the occurrence and existence of cases such as those referred to by Dr. Sluder, but they are in a class by themselves. If he means to imply that it is a very large and extensive class, I have my doubts. Of course, there are a great many in the aggregate, but the proportion to all others is, I think, comparatively small.

I have nothing to add to my paper. I am only glad it brought forth this very interesting discussion.

FURTHER PROGRESS IN THE USE OF RADIUM IN THE FIELD OF LARYNGOLOGY.

D. BRYSON DELAVAN, M.D.

At the last meeting of the Association, I presented a short paper, calling attention to the use of radium in the treatment of naso-pharyngeal fibroma; and in the discussion of the admirable paper of Dr. Levy upon Leukoplakia Buccalis, suggested the value of radium in that disease. In the year that has just passed great advances in our knowledge of the use of radium have been made, in no department with more interesting results than in ours. To-day many observers are studying its effect upon an ever-increasing variety of conditions, some of which are far beyond the limits of previous conjecture. Additions are being rapidly made to the number of conditions in which the treatment is effective, and ever-increasing encouragement has been given to the hope that there has been found in radium a truly valuable therapeutic agent. Several of our institutions, notably the Memorial Hospital of New York, have been fortunate enough to acquire amounts of radium large enough to meet all probable demands, while those engaged in administering it are gaining experience in its application and learning how it may best be utilized and controlled.

Some additions have been made to the literature of the subject in general, but in the department of laryngology few contributions have appeared. This is not surprising. The study of radium is in its infancy. Few investigators at present are ready to issue formal reports of their work, wisely refraining from announcing results until their deductions can be placed upon a stable basis of well-proved fact. Any attempt to drag it before the medical public at the present time would be premature. What is needed now is not publicity, but rather the development of scientifically proved data upon which, and only which, reliable reports of progress are possible. The securing of such data requires *the long-continued and painstaking study of the action of radium, under conditions favorable for accurate observation, in the hands of men scientifically qualified for the*

work. When these conditions have been fulfilled, and not till then, we may hope for the beginning of a literature at once valuable and instructive. Meanwhile, however, even the most conservative observers are willing to admit that encouraging progress is being made. Were the actual experiences of several institutions of high standing devoted to the study of radium to be quoted the truth of the above statement would be plain.

A few fragmentary contributions and reports have appeared, some of which are worthy of notice. From these it is again evident that the progress being made in the knowledge of radium efficiency in non-malignant surgical conditions and in certain non-surgical affections of the upper air passages, continues to be gratifying. This is shown by the experience of various observers in the United States, particularly by that of Dr. Robert Abbe of New York,[2] and by the reports of the two leading British Institutions, the Radium Institute of London[1] and the Royal Infirmary of Edinburgh.[1]

Thus, the London Institute reports excellent results in the treatment of "vernal catarrh," patients treated for it by radium having in a large proportion of cases been cured without recurrence, although under observation for a series of years.

In the treatment of naevus [2] by radium excellent results are being obtained. The most brilliant of these are seen in young children, where conditions of unusual severity in the vicinity of the lips and nose, far beyond the limits of surgical relief, are being successfully reduced. Rhinoscleroma, according to Kahler,[3] has been treated with good results.

Good results have been claimed [4] from the application of radium in goitre and in tubercular glands. For the latter condition Bissell,[5] of New York, is particularly impressed with its value. Under his observation proper radium treatment has often and completely restored such glands to their normal functions.

Abbe [2] believes that leucoplakia of the tongue is not unlike a keratosis of the skin, often precancerous and tending to extend down and become cancerous. He considers it as capable of cure by radium as is the skin keratosis. Delavan [6] has called attention to the same thing. Serra [7] reports a successful case.

Much attention is also being given to the study of radium as

applied to new growths in general, and many highly interesting and important facts are being obtained. This is especially true of growths of a non-malignant character. In the treatment of naso-pharyngeal fibroma the use of radium has proved encouraging, particularly so in view of its success in the treatment of fibromata in other parts of the body.[8] In the treatment of non-malignant intra-laryngeal growths many tumors of various histological structures have disappeared, in a number of cases with complete restoration of the singing voice. The treatment of papilloma of the larynx by radium is particularly promising, in view of the success already attained with this form of growth, as with warty growths in general in other parts of the body. In this highly specialized department radium promises to occupy a wide and important field.

Abbe [2] has shown a case of myeloid tumor of the lower jaw, completely cured. Weil [9] reports a parotid tumor (adenoid-cystic-epithelioma) of seven years' standing, which was treated for six weeks by the insertion of radium into the tumor. The growth disappeared, and at the end of two years has not recurred. Freudenthal [10] reports a case of fibro-sarcoma of the right antrum cured. He also reports a case of sarcoma of the tonsil, in which the growth disappeared and remained in abeyance for six years. Then it recurred and the patient died. In another similar case the growth disappeared for six months.

While, as has been shown, the treatment of these various lesions has been attended with brilliant results, the final value of radium in certain of the more serious affections has yet to be proved. Especially is this true of its use in carcinoma, for while a number of cases have been placed under treatment, it has been claimed by some that the effect of the radium has in certain instances been unsatisfactory; and even in those in which its influence has been apparently beneficial the improvement has not always been lasting or else too little time has yet elapsed to prove the final result. In a few cases it is said that not even temporary benefit has resulted, while in some of these the advance of the disease seems to have been actually hastened. Again, while parts of the region exposed have improved, other parts have retrogressed. Admitting that these several objections may

contain more or less of truth, it is nevertheless encouraging to know that the causes of more than one of them are known and that earnest effort is being made to discover the means of their prevention. In this connection recent British experience is interesting. The report of the Radium Institute of London states that "epithelioma of the buccal, lingual, and pharyngeal mucous membranes usually proves refractory and disappointing in its response to radium, but," it is significantly added, "under new methods of application better results may be expected. Thus far, the treatment does not seem to have much effect in arresting the disease."

The report of the Royal Infirmary gives a more sanguine outlook. Thus: "While in advanced malignant cases a cure may not have been effected, yet in practically all treated more or less benefit was produced, through the relief of pain, the cessation of discharges, the healing of ulcerative surfaces, the removal of local growths, and the prolongation of life.

"Malignant diseases of the posterior nares, buccal cavity, pharynx, and larynx seem less amenable to radium, but this may be from the difficulty of administering a sufficient dose in such positions."

This has not been true of all. Several cases have come under my own observation, two of which have shown effects so extraordinary as to make them well worthy of notice. Both were cases of epithelial carcinoma, originating in the left side of the throat close to the wall of the larynx, and as far as could be ascertained, were extra-laryngeal. Both patients were men in the early fifties, hitherto in perfect health, active, vigorous, and of excellent antecedents. When first seen the disease in both had invaded the interior of the larynx, the left lateral wall of the pharynx, the tonsil, and the base of the tongue, to such a degree that operation was impossible. Both were subjected to the radium treatment at the same institution, and in both the results have been materially the same.

The first effect of the radium locally was an almost immediate control of the secretions of the throat; from having been abundant and fetid they promptly ceased. Folowing this, the areas of ulceration rapidly diminished in extent, and in the

less severe of the two cases they disappeared; while in the other case they seemed to do so, although it has not been possible to prove this owing to the difficulty of examining them. The swellings which had appeared over extensive areas of the affected parts decreased markedly, the infiltrated tissues were reduced in size and became soft to the touch and more natural in appearance. Accompanying these changes extraordinary improvement took place in the various functions of the throat; thus, the voice became clearer and deglutition, which had before been almost impossible, showed such improvement that both patients were able to swallow without pain and to largely increase the variety of their food.

Together with these local changes, the improvement in general was most remarkable. Digestion became normal and sleep greatly improved, while with the improved nutrition a steady increase of strength was apparent, and a rapid return to an almost normal condition of good spirits. All who have seen them, as well as the patients themselves, admit that even if from now on the progress of the disease should be entirely unfavorable, the benefit already gained in the relief of suffering and the added comfort which the radium has afforded would well repay them for any inconvenience the radium had caused.

This is an important concession, for the superficial burn sometimes resulting from radium is an unpleasant feature. Compared, however, with the results of any serious surgical operation, it is but a slight annoyance. And yet how gladly will the patient submit himself to the knife and to weeks and perhaps months of disability and suffering following its use for the sake of cure, quickly forgetting all the harrowing details of his surgical experience and even its resulting mutilations in the joy of being restored to life and health. Any method which will cure carcinoma, leaving the normal parts intact with no worse penalty than a slight superficial burn should surely be welcomed with acclaim.

The present is no time for adverse criticism. The study of the radium treatment of carcinoma is but just begun. Some, at the very threshold, are already discouraged and are announcing themselves as unwilling to believe in its efficacy. To these

we may repeat that the knowledge of the use of radium in general is still in embryo. The failure to gain uniformly reliable results in carcinoma is probably due to our imperfect knowledge of the methods by which the radiations can be controlled, of the amounts of radium which should be used, and of the correct duration of the exposures. The all-important, basic principle has certainly been proved that, under proper application, *radium will destroy a superficially located cancer cell.* Granting this, it is by no means impossible that with increased knowledge of its action, and skill in its application, deeply seated cells may be successfully reached and destroyed, while at the same time the surrounding tissues are effectively protected.

Already, results worthy of earnest consideration have been obtained. Far from being discouraged, there is every reason why persistent and continued effort should be made to finally solve the existing problems and give to the world a cure for one of its most grievous scourges. Fortunately, there are some who, in the face of repeated disappointment, are earnestly and hopefully striving to obtain this end. Let such gain inspiration from Trudeau, that noblest of humanitarians: "Optimism is a mixture of faith and imagination, and from it springs the vision which leads one from the beaten paths, urges him to effort when obstacles block the way, and carries him finally to achievement when pessimism can only see failure ahead. Optimism may, and often does, point to a road that is hard to travel, or to one that leads nowhere; but pessimism leads to no road at all. . . .

"Let us not therefore quench the faith nor turn from the vision which, whether we own it or not, we carry . . . and thus inspired many will reach the goal."

What shall be said of those who, regarding the study of radium without inspiration themselves, seek to belittle and even to hinder the earnest and honest efforts now being made to do away with that melancholy admission of defeat, the knife, and to substitute for it a veritable cure. Or, still worse, those who without skill or knowledge of the use of radium advertised impossible results through motives of purely mercenary self-interest.

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Discussion

Dr. Cornelius G. Coakley, New York City:

I am much interested in this paper because I have done a little work along this line. The great trouble with the use of radium is that one can find little or nothing to be used as a guide in the dosage of the material. Dr. Delavan mentions in his paper "the application of a tube of strong radium for fifteen minutes." Now that does not mean anything to those working with it. I would like to know the actual amount, so as to be a guide to other men.

Another great difficulty with the use of radium is the enormous expense of the material. At the present time we are having placed at our disposal by the Crocker Institute about 100 grammes of radium, the cost of which is about $10,000. We are using it in various pathological conditions. We are using this now in a dosage varying from 17 to 83 milligrams, unscreened, the applications varying from 45 minutes to two hours, depending upon how deep the pathological process is from the point of application of the radium.

Our greatest difficulty is that it burns and burns very severely. We have not yet been able to properly screen this material when placed in the mouth, or in the nose, or nasopharynx, or on the exterior of the body so as to reach the object of the pathological process without getting more or less burning. If we use too little radium we do not get enough action; if too much we get terrific burns which occur not at the time, but some weeks or months later, as happened in one case treated by radium at Johns Hopkins. The patient had an application of radium a year ago last March, and the appearance

of the burn did not manifest itself until August of last year. In one of my own cases in which we applied it, the ala of the nose had been burned off as a result of the action, the burn coming on six months after the application. The radium destroyed the growth in the nose, but also almost all of the nose as well.

There is one other point in relation to malignancy. If used it will unquestionably stimulate the action of the malignant process in the same way as it would if the growth were curetted or cauterized. If you are going to use radium successfully, you have got to put it into the mass and use an amount which the ordinary practitioner cannot afford to invest in, otherwise you are in danger of stimulating the growth to increased activity.

I would like to ask with reference to Dr. Hartman's case whether the growth of the larynx was ulcerated, and what was the strength of radium used.

Seventy-five milligrams of radium, when put into the growth and left there, will do an enormous amount of destruction. Seventy-five milligrams, when applied to the outside of the neck for involvement within the larynx or tonsil or pharyngeal mucous membrane, will not do very much. You must use an enormous amount, from four hundred to one thousand milligrams, if you wish to get results from external application through healthy tissue to malignant tissue. This must be left on about three or four hours. I think the best results are obtained by strong doses applied for a short time, and then reapplied at short intervals of about two or three days.

Dr. Jacob H. Hartman, Baltimore, Md.:

This subject has great interest for me, as I have had some little experience in the use of radium. As you perhaps know, the Kelly Sanitarium has been well equipped with radium for treating all sorts of conditions. There is a case I would like to report in this connection, a most unusual experience.

In August, 1913, there was a patient, a gentleman sent to me by his family physician, with an intralaryngeal growth, of a red, angry color, filling up a large part of the larynx and interfering greatly with his respiration. I gave him an unfavorable prognosis and advised him to have another opinion. He was taken to Dr. Winslow for consultation, who agreed with me that the growth was undoubtedly malignant in character, an inoperable case. On September 4th, two small portions were removed very carefully for pathological examination. The microscopic examination was made and the specimen reported as carcinoma. On September 14th a preliminary tracheotomy was performed. As this was one of the very first cases of intra-

laryngeal trouble, Dr. Burnham was a little uncertain as to the application of the radium. On September 21st the radium was applied externally for three hours; I do not know which rays, though I believe the gamma rays—at any rate, the most penetrating. On September 24th the radium was again applied for nine hours, and was followed by most extensive burns all over the neck, and the patient suffered intensely. On October 6th, there was almost complete obliteration of the growth, and on October 23d the patient was again examined and there was no vestige of the growth at all, only a slight thickening of the mucous membrane over the arythnoid space. I believe Dr. Winslow saw the patient again frequently since that date. The larynx is absolutely normal. The last time I saw him, April 12, 1916, the larynx was thoroughly clean, and there was no evidence of growth noted at all. The patient had gained thirty to forty pounds and was remarkably well and absolutely free from any trouble of this kind.

Dr. Harmon Smith, New York City:

I want to say one word about fibroma and similar tumors representing cellular growths, running riot and getting beyond control. About three years ago a young boy, with a diagnosis of post-nasal sarcoma was sent to the General Memorial Hospital in New York City. At that time radium was applied without benefit over a period of several months. He was then referred to me at the Manhattan Eye, Ear and Throat Hospital for diagnosis and treatment. A diagnosis of fibroma was made and the tumor removed, with considerable hemorrhage. Monochloracetic acid failed to hold it in check. The condition progressed gradually over a period of two years, the boy became anemic and the growth extended out into the jaw and filled up the cheek. Some weeks ago he was sent back to the General Memorial Hospital, where they applied radium several times and once for a period of three hours. Following that he had a hemorrhage, and a few days after the hemorrhage set up an edema of the larynx, which necessitated tracheotomy. Death shortly ensued.

I recall a case of similar character where surgical removal had not effected the permanent disappearance of the growth, and this boy, about nineteen years of age, was also sent to have radium applied at the same place and time as the other. He had an application of strong radium which set up such an inflammation in the cheek and the tissues adjacent to the growth, that for a space of at least a week he was unable to swallow at all. We had to feed him by rectum and it became a very serious proposition. So that, in my opinion, we should know

more about the action of radium before applying it indiscriminately. Yet this radium was in the hands of an expert and applied at a hospital where radium is being used experimentally as well as practically and is one of the strongest possessions in the United States.

I also had three cases of cancer of the larynx which required tracheotomy, and a tube of radium was inserted in each, to be left as long as was seen fit. Those cases went on without any apparent benefit to death.

I merely cite these instances in conjunction with what has been already said regarding it, to aid possibly in coming to a more definite comprehension of the subject.

Dr. John R. Winslow, Baltimore, Md.:

It was my privilege to see the case mentioned by Dr. Hartman from the beginning until the end. The growth in the larynx was of a size which I would describe as that of an English walnut, in addition to which there was a tongue-shaped projection which extended posteriorly beyond the larynx into the hypopharynx without any attachment—in other words, an intrinsic growth. It so completely filled the larynx that I could hardly conceive of the possibility of the patient's being able to breathe at all. Still he did, without any great discomfort. I saw the patient some six months after the application of the radium and saw him again a year after that, and Dr. Hartman has seen the patient since. The last time I examined him there was no evidence of the growth, nor any indication of the site of attachment of the growth. One who had not seen the case previously would have been unable to determine that there had ever been any pathological condition in the larynx. This case is an absolute cure of a condition which, as far as my experience and judgment go, would have been an absolutely incurable and inoperable one by any other method.

An interesting thought occurs to me as to what happens to these growths? I took particular pains to inquire of this patient whether he had had any increased expectoration or secretion in any way, pointing to a breaking down by ulceration, or similar process, and he admitted no such condition. The growth simply apparently disappears. What the nature of this occurrence is, I don't know. It was really almost marvelous in this particular case—the result of the use of radium.

We are, however, greatly handicapped, for while we have one of the largest collections of radium in the country, it belongs to an incorporated, private institution which is conducted largely on a commercial basis. The cost of each application of radium is somewhere in the neighborhood of $100, if not more.

That, in itself, is almost prohibitive in many cases, so that it can only be used exceptionally. There is no one from whom we can obtain a loan of radium. It seems to me it is a field in which the national government should take a hand and incorporate a national radium institution for the benefit of the public.

Just before I came away from home I saw a case of epithelioma of the nose, completely filling the nose and invading the ethmoid as well, causing protuberance of the eyeball, in which I expect if possible to have the radium applied. It is a case which is absolutely inoperable. The patient is 79 years of age, and the tumor myxomatous in appearance, bleeding on touch. While there has been no opportunity of removing a specimen for examination, I have no doubt but that it is an epitheliomatous growth.

Answering Dr. Coakley's question as to whether the growth in the larynx was ulcerated and the strength of radium used in Dr. Hartman's case, there was no ulceration and no involvement of the glands. I do not know in what strength the radium was used, but I know it was very strong.

Dr. Robert Clyde Lynch, New Orleans, La.:

I have had two or three experiences with the use of radium. The first case was that of a patient with sarcoma of the nose treated two years ago. I did the first stage of the Caldwell-Luc operation, and put in the radium, unscreened, simply the little capsule with the glass container which holds the radium into the nose and antral cavity. This was a fifty-five mm. tube. The diagnosis of sarcoma had been made by microscopic examination, and the nose had been blocked up completely. In the course of four weeks there was free nasal respiration, and an examination with the Holmes pharyngoscope did not reveal any evidence of the growth at all.

The second case was one of an intrinsic laryngeal growth in which an accident occurred necessitating something else being done. Seventy-five milligrams of radium were applied externally, fifty on the diseased side and twenty-five on the opposite side, the radium being screened with brass, then four rows of sheet lead, one mm. thick, then the same thickness of aluminum, then gauze and finally a rubber cot. This roll was applied to the outside of the larynx and left for twelve hours. Two days following the application there appeared the most beautiful sunburn, surface only; the larynx was extremely red, and the patient complained a little. The growth became pale, white and dry; it gave the appearance through the mirror of being dry. There was a rest of

five days and then a reapplication for eight hours, accompanied by a recurrence of this burn, though not quite so much. Then there was a rest of one week and a reapplication for twelve hours. After this there was an apparent retraction of the growth. The surfaces remained dry and gave one the impression as if the deeper tissues of the growth, that is, the deeper invasion of the growth towards the cartilage, was becoming less. I will show later an intubation tube devised for the intralaryngeal application of radium; it was one just devised for the application in this case. In reporting an application of radium, I think we ought to lay special stress upon the size of the dose and the length of application and screening.

I should like also to relate an experience with a case of cauliflower growth of the cervix of the uterus in which radium was applied into the uterus and left for a period of fourteen hours, both tubes, seventy-five milligrams. The growth subsided and the pain was relieved and the patient improved in every way. After a period of treatment of this kind the growth melted away and the uterus became about one-fifth in size. A panhysterectomy was done at that time by Dr. Miller of New Orleans and the outlying glands removed at the same time. This tissue was subjected to microscopic examination, and the pathologist was able to determine the practical death of the cancer cells in the substance of the uterus and one of the glands removed. I think that is an important observation, the fact that in one of the lymphatic glands leading off from the uterus there appeared the death of what was at least taken to be cancer cells, and cancer cells in the uterus itself showed death disorganization.

Dr. Henry L. Swain, New Haven, Conn.:

In a case exactly similar to the one cited by Dr. Winslow, in which he is expecting to use radium, we used the capsule as mentioned by Dr. Lynch. In this case we merely put the capsule into the substance of the growth, and it bled profusely for a little while. The capsule was allowed to remain in overnight and the patient went home in the morning. An external burn resulted from the application, and marked recession of the growth. Dr. Winslow said he was interested to know what became of these growths. This was one of those pale, flaccid growths. It became rosy hued, and all of this rose-hued area eventually disappeared by mild ulceration. The whole growth was not exposed to this application of radium, so a second application was given about six weeks after the original application, at this time the radium remaining for only five hours.

It is now only three months since the second application and the growth has practically disappeared. I think it is extremely valuable for us to recite our experiences in this way, and discuss them from all angles.

Dr. Chevalier Jackson, Pittsburgh, Pa.:

My rather limited experience with radium corroborates the point made by Dr. Delavan. The patient that is here for your examination to-day came to me for a squamous-celled epithelioma which gradually closed up his larynx so completely that tracheotomy was required. I made three applications, each of six hours' duration of the equivalent of forty-eight milligrams of radium element. The infiltrations diminished, the lumen of the larynx opened, his voice came back so that he now talks well over the telephone. He goes about all day and sleeps all night with the cannula corked; but I have not removed the cannula because on general principles I do not think it wise for a man to throw away his crutches until he is sure that he will not need them again. From my limited experience, which is much less than that of Dr. Delavan, I quite agree that we are not ready yet to report end results, but the palliative results in some cases are so remarkable as to make it well worth while, even though the absolute cures be few. Bearing in mind the relatively mild degree of malignancy in some cases I do not see why we should not get a certain percentage of relative or even permanent cures. As Dr. Delavan has well indicated, we do not know enough about the dosage and technic of applications to be certain in any given case that the patient has had the benefit of all that radium could do for him. As to technic in my own cases, as you will see by this radiograph, we anchor the capsule containing the radium to the tracheotomy cannula, the capsule extending up into the larynx a greater or less distance according to the lesion and the location of the tracheotomic wound. The capsule is composed of gold onto which a coating of hard rubber is vulcanized. The process of vulcanizing the rubber onto the gold prevents any possibility of detachment. A glass capsule containing the salt of radium is inserted inside of the gold capsule before the latter is introduced. The tracheotomic cannula is then reinserted and the threads from the radium capsule are tied to the shield of the cannula. In cases that do not require tracheotomy for dyspnea, the radium can be inserted from above by the direct method and can be held in position with a wire, but only in cases where there is little or no stenosis. I am told that Hill anchors the radium in the pharynx and lower pharynx with fish hooks.

Dr. D. Bryson Delavan, New York City, closing the discussion:

As I have already emphasized in my paper, there are some types of investigation which belong distinctly to the laboratory. The study of radium is one of them. In the very nature of the case it cannot be expected at present that the practitioner with limited experience and small amounts of radium will handle it with the prospect of success. Even those few who were the earliest to study it are still laboring earnestly to develop its possibilities. Meanwhile the number of scientific investigators has steadily grown and in several institutions at least the work has been placed upon a highly satisfactory basis. As the investigations are still in embryo there is of course no literature. To announce authoritative directions for treatment, before such treatment has been tested and proved would be obviously impossible. At the General Memorial Hospital, New York City, we shall soon have two grammes of radium, a larger amount than any institution in this country or in Europe. Results are being obtained with it sufficiently encouraging to effectually quiet any adverse criticism which might be raised. Those having its use in charge are men of highly scientific and courageous minds, not foolishly overhopeful, but willing to investigate with clear, unbiased vision. Not pessimistic as some, but exercising that quality of optimism which brought success to Columbus and Washington, to Pasteur, to Lister and to Trudeau. Optimism has been the basis of the success of every great achievement the world has ever seen. Without it failure is inevitable.

The instance quoted by Dr. Coakley well illustrates the necessity for care in the use of radium. An exposure of twenty-four hours' duration was obviously far too long continued for such a case.

Radium has not yet proved to be a cure for cancer, but beyond question it possesses posibilities worthy of most serious attention. Radium may cause burns. Well, it hurts to be operated upon in any way. It is not pleasant to take ether and be laid up for a month, or two months, or five months after a painful and perhaps permanently destructive surgery; but it is a very beautiful thing when it is over to find oneself well and strong and out among his friends again. And so it is with the successful use of radium.

I have written this paper to stimulate that hope that radium may be found a useful curative agent. If it should be proved that there is nothing in it we will then have tried and have done our best; if it can be proved valuable a great prize is in store.

CASE OF EPITHELIOMA OF THE POSTERIOR PHARYNGEAL WALL CURED BY USE OF ELECTRO-CAUTERY.

DUNBAR ROY.

Mrs. R. B. B., age 27, consulted me on July 29, 1913, on account of an ulcer on the posterior wall of the pharynx. Family history was absolutely negative. Personal history: Had always enjoyed good health. No signs of cachexia or physical weakness. Syphilitic history was entirely negative and this was true of the husband who was closely questioned. Never suffered with her throat previous to the present attack except an occasional tonsillitis. No history of traumatism of the throat by caustics or otherwise.

For the last three months she had suffered with a throbbing soreness in her throat that was present almost continually. Had been treated during this time by another laryngologist who used various remedies without success. Finally told her there was an ulcer which failed to heal and in fact was getting larger all the time.

Examination showed a healthy looking woman with no signs of enlarged lymphatic glands in the neck. On looking into the pharynx there was seen some enlargement of the faucial tonsils but otherwise healthy in appearance. At the center of the posterior pharyngeal wall with the upper half hidden by the soft palate there was seen a perfectly round ulcer almost ½ inch in diameter with a clean-cut border separating it from the surrounding healthy tissue. The whole ulcer was yellowish gray granular looking in appearance and apparently 2 or 3 mm. deep. By palpation the edges were rather firm and elevated, giving the ulcer a somewhat crater shape. It seemed to dip into the pharyngeal aponeurosis. There was some pain on deglutition, but mostly a throbbing sensation. A syphilitic ulcer was the first impression made with a possibility of its being tubercular in origin. Questioning elicited the fact that she had already been taking mercury and the iodides. A piece of the ulcer was removed with Hartman's punch forceps and submitted to a com-

petent pathologist for immediate report. Frozen sections were made and his report was as follows: "The specimen submitted to me shows it to be a typical epithelioma of the mucous membrane."

Two days later, under cocain anesthesia, the writer undertook to destroy the ulcerative growth by the use of a sharp point of the electro-cautery. A deep burning incision was made entirely around the ulceration, about 3 mm. to the outside of the rim. All tissue within this ring was then cauterized as deeply and as thoroughly as possible. Sufficient time was taken to see that every point in this area had been touched by the cautery point. There was considerable pain for the first thirty-six hours, after which all discomfort began to subside.

An emulsion of orthoform was given as a local analgesic. There was very little reaction. The cauterized area began to heal and contract so that in two months there was nothing remaining but an area of white scar tissue. This gave no inconvenience and the patient has remained thoroughly comfortable. Only one application of the cautery was made, and at no time did the patient complain of pain during the operation. She was examined about the middle of April, nearly three years after the operation, and there are absolutely no signs of a recurrence.

Unfortunately clinical observers and writers have been too prone to classify all malignant growths of the pharynx under that general term without distinguishing between the different forms of carcinomas and sarcomas. For clinical purposes such may be sufficient, but as an aid to their treatment and probable prognosis it is very necessary for the laryngologist to distinguish between these malignant growths whenever this is at all feasible. In the large majority of cases the word "cancer" is supposed to embrace all malignant growths and unfortunately this term is too often accepted in our clinical reports. This statement is made because in looking up the literature on the subject of this paper the writer found it almost impossible to correlate all the cases recorded, in that many of them were reported in the most unexpected places and not under any of the headings where one would expect to find them. Furthermore as Morrell

Mackenzie and others have pointed out, the disease is often so extensive when first examined that it is impossible to tell its point of origin. Since the tendency whenever found in the pharynx is to upward extension, malignant growths are apt to be reported under the naso-pharynx, tonsils, tongue, esophagus, etc. It is surprising how very superficially this subject is treated in the various text-books on laryngology. All of the authors seem to be of the opinion that since malignant growths are rarely seen in their early stage, but usually after they have involved the various portions of the pharynx, larynx, and hypopharynx, it is unnecessary to ascertain their true pathology because so little can be accomplished for the patient. In fact, Dr. D. B. Kyle, who has discussed this subject more thoroughly than any other author of a text-book, has this to say: "The treatment is largely palliative, as no radical operation can be successfully performed." Of course, he means those carcinomatous and sarcomatous growths where the surrounding tissue is infiltrated together with the lymphatics and where it would be utterly impossible to eradicate the growth. But simple epitheliomatous ulcers may occur in the pharyngeal cavity which can be successfully destroyed by the electro-cautery and where the prognosis is not quite so grave as in other forms of malignant growths.

The writer has been unable to find a case similar to the one here reported. As was stated above, all writers speak of malignant growths meaning carcinoma as well as sarcoma. The only case found in the literature which is at all parallel is the one reported by Henri Aboulker[1] from the hospital in Algiers. This was a case of epithelioma in a man 60 years of age which had invaded the left half of the velum, extending to the tonsillar region, to the lateral part of the base of the tongue, and to the lateral wall of the pharynx, who was operated upon by pharyngectomy and who remained cured three and one-half years after the operation. This writer says that in 7 out of 11 cases of bucco pharyngeal epithelioma his results had been successful. He also makes the interesting statement that Kronleim's statistics give 39 per cent. of deaths from operation; Czerny, 39 per cent.; Vallas, 37 per cent. Aboulker states that these are

practically the only series of such operations which have been published. He believes in brief that out of 100 patients operated upon, 60 survive at the end of six or three months, or even granting that they all die, then they have lived as long as the patients who were not operated upon. Their end is not as horrible as that of patients left to themselves. It is not the intention of the writer to discuss the prognosis and treatment of malignant affections of the pharynx, nor to give any statistical presentation. This has been very thoroughly accomplished in articles by Prof. G. Ferreri of Rome [2] and Chevalier Jackson.[3] The article by Ferreri is very complete and well worth reading because of his eminently conservative radical treatment of this subject. Under the surgical treatment this author cites Trelat as declaring that it is useless to intervene in the case of epithelioma of the pharynx. He believes that electrolysis offers the best chances for the patient.

Jackson in reviewing the subject has this to say: "Primary carcinoma of the nasal fossae is rare, yet most rhinologists of considerable experience have seen them. Primary carcinoma of the naso-pharynx is so rare, judging from the fewness of reports, that but few rhinologists have even had one case. A careful search of the various indexes of the medical journals published in French, German, English, and Italian during the last twenty years had failed to unearth more than 14 cases. It is probable, however, that some reports have not been found; others have doubtless escaped because buried under misleading titles. Cases primary in the tonsil, nasal fossae, antrum and brain, probably have been reported, if at all, as of those regions. Politzer mentions 5 cases where the eustachian tube was involved by cancerous extension from the tongue and the superior maxilla, but none of these seems to have been primary in the naso-pharynx. It scarcely seems possible that all medical records should contain so few as 14 cases of carcinoma of the naso-pharynx, yet Moritz Schmidt, in a total of 32,997 nose and throat patients, did not meet with one case, though 75 of laryngeal carcinoma were seen. Reports of 5 cases were collected by Bosworth, in 1889, to which he added 1 of his own observation. To these I have added 8, including 1 of my own, making 14 in all,

tabulating them as well as the incomplete report would permit. The table is incomplete, because 5 of the cases were evidently not under observation to their termination, and consequently only record symptoms to a certain stage. All of the cases were primary in the naso-pharynx, with the possible exception of Latzbeck's, in which the naso-pharyngeal portion was discovered at the autopsy."

The treatment is considered under: (1) radical (operative), and (2) palliative (cold snare; cutting forceps; curette; electrolysis; galvano-cautery; lactic and nitric acid; "some other caustics"; soothing applications; chian turpentine). In only one of the 14 cases collected was galvani igni puncture employed. Death.

Pathologists place carcinomata or so-called cancers under the head of epithelial tumors because in their structure they are made up of cells of the epithelial type.

They are usually divided into two groups:

1. Acinous cancer with scirrhus or chronic cancer and encephaloid or acute cancer as subdivisions.

2. Epithelial cancer including squamous or columnar epithelioma.

It is unfortunate that reports of cancer of the throat are not more definite as to the specific nature of the growth. For instance the encephaloid variety is more malignant and more speedily fatal than the scirrhus. Colloid degeneration of these growths seems to diminish their malignancy. Every now and then an encapsulated tumor is met with, especially in the soft palate (Green), showing no signs of malignancy and yet having the structure of acinous cancer. Then again in the variety known as atrophic scirrhus the disease is not uncommonly from ten to twenty years and the extension only local and glandular.

Epithelioma pathologically, is much the least malignant of the cancers, and consequently more amenable to treatment such as by the use of the electro-cautery.

Green in his text-book says epithelioma extends locally, breaks down early and often infects the neighboring lymphatics, but rarely reproduces itself in internal organs. This is probably

owing to the size and character of its epithelial elements which renders them much less liable to transmission by the blood and lymph streams than the cells of the other varieties of cancer.

Its malignancy varies curiously with its seat: thus on the skin of the face it has generally a very chronic course and rarely affects even the glands; on the lip early excision gives a fair chance of cure; on the tongue its course is often so rapid, affection of the glands so early and cachexia and death so speedy that it must be ranked as one of the most malignant tumors.

In the case here reported the large ulcer on the posterior wall of the pharynx had some of the characteristics of the so-called rodent ulcer sometimes seen on the nose and cheek and which pathologists place under the head of epithelioma. This case was the type known as "columnar celled epithelioma," or "adenoid cancer," showing also some squamous cells just as transformation of these growths takes place inside of the uterus. These terms are applied to forms of epithelial cancer which grow from mucous membranes of the columnar or cylindrical epithelium variety. They have a great tendency to undergo colloid degeneration. For this reason writers in reporting cases of malignant growths in the throat, should certainly try to state exactly the pathologic character of the same in order that any statistical presentation in the future might be more accurate. Furthermore we would be in a better position to pass judgment on the final result accomplished by the treatment if we knew the character of the malignancy.

It has now been three years since the case here reported was healed and there has been absolutely no signs of a return. The results obtained in one case especially of a cancerous type certainly does not justify any positive deduction, but the writer believes that the thorough and judicious use of the electrocautery offers the best chance for a good result. In cases where the growth is limited to those portions of the pharynx which are easily accessible and where they are of the flat ulcerative type as in the case here reported, it certainly seems to me that such a method would be able to eradicate the growth far better than any cutting operation, especially if the glands and lymphatics were not also involved.

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Discussion

Dr. J. Solis Cohen, Philadelphia, Pa.:

I have been very glad to hear the paper by Dr. Roy because it exemplifies the opinion that epithelioma taken early, before there is any glandular involvement, can be cured. The method which he adopted is an excellent one. In the first place he limited the growth, and a certain portion of healthy tissue around it, with the cautery. The heat of that cautery extended and cooked some of the area around that growth, and getting rid of the growth entirely, he of course had a normal return of tissue. He got rid of the entire growth except as far as the scar tissue was concerned.

Some time previous to the twenty years' investigation which he spoke of, I very well remember a case in the clinic of the Jefferson College Hospital. I do not know, Dr. Roy, whether this was in your time or not. It was a case in which there was a spontaneous cure of a growth similar to the one mentioned, about the size of the end of the thumb. A portion was removed with forceps for examination, and in the interval waiting for the report, the patient was allowed to go home. I powdered the area with lactopeptin powder and let him go. He was a carpenter, sixty years of age. The man was instructed to return at the next clinic, and when he did so he looked better and nothing else was done. The specimen was reported as epithelioma. Eventually, that growth was entirely resolved. I do not, however, attribute the result to the powder, but have always looked upon it as a case (such rare cases have occasionally been re-

ported) of spontaneous retrogression of a pharyngeal epithelioma.

DR. CORNELIUS G. COAKLEY, New York City:

I think the case of Dr. Roy is exceedingly interesting. It presents one phase, however, to my mind, which is a little doubtful and that is that I understood the tissue was examined only in frozen section. I think most pathologists will feel a little in doubt as to their examination of a frozen section.

The next point is the unusual absence of glandular involvement in this area. I have never seen a malignant process, even fairly early, on the posterior pharyngeal wall, that did not have the glands involved. It may have been some particular type of cancer, some peculiar form different from the average type which we ordinarily see.

The next point is one which I think we ought to take up seriously, and that is the absence in the literature of records of cases of involvement of the nose, throat, accessory sinuses, pharynx and larynx. Within the last year I personally ran across at least one dozen cases of malignant disease of rather unusual type—ethmoidal, maxillary, etc. I had one case recently involving the sphenoid and naso-pharynx, whether primary or secondary I could not tell. Those cases are unrecorded in the literature and I have no doubt that those of us who are working in large clinics have numbers of these cases. I think we should report all cases of malignancy seen during the year and have them tabulated in some form for reference. It is really surprising to note the relative frequency of these cases as compared with the actual records.

DR. D. BRYSON DELAVAN, New York City:

There is nothing so uncertain as the prognosis in a case of so-called epithelioma. I say "so-called" because we cannot get further information histologically than the microscope is able to give us. When the microscopic examination is made and the findings reported, there our information ends. There are in the recollection of most of us isolated cases which differ entirely in their result from the average. For example, the solitary case upon which Dr. Elsburg operated at different times for a dozen years and upon which Dr. Solis Cohen operated twenty years after its inception, in which the patient lived fifty years after the first operation, a long while for a patient to survive epithelioma.

In contrast to such a case as the above, which represents a type rarely seen, are thousands of others which give the ordinary history. I had a case of epithelioma of the epiglottis which was discovered so early that the growth was only about

half the size of a split pea, say one-quarter of an inch in diameter. It was located upon the extreme margin of the epiglottis. One-third of the epiglottis was thoroughly removed, as far as seemed necessary, and the disease was apparently completely extirpated. After four or five years, the throat apparently having been in a perfectly normal condition, the patient redeveloped the disease and after a comparatively short course died.

This case is instructive because it shows that although we may operate as we suppose, far and wide of the lesion itself, nevertheless structures in that neighborhood may have already become involved, and with the lapse of time recurrence will take place and the disease destroy the patient.

The speaker's reference to the poverty and the misleading nature of the statistics of this subject is very timely. I called your attention yesterday to the work of the American Society for the Control of Cancer. I wish now to bring it before you again and to urge as forcefully as I can the desirability of carrying out the suggestion of the last speaker. As Chairman of your Committee, representing that Association, I can say that the Association stands ready to give all possible aid to any institution which may interest itself in the matter of statistics. Apparently this is now the thing most needed. I hope our Society will bear that in mind. Each Fellow of the American Laryngological Association is a central influence of great importance in the region where he lives. It is to be hoped that each one of us will do his best to forward this work for the study of cancer.

Dr. Dunbar Roy, Atlanta, closing the discussion:

In reply to Dr. Coakley, there was a frozen section made for diagnosis, and later on this was confirmed. The case was operated upon, however, under the diagnosis of the frozen section.

I have nothing further to add except the fact that anyone who has had any of these cases and tried to look up the literature will know what an awful burden it is. It is almost impossible to get anything whatever. With the majority of writers, "cancer" seems to be a general term used to cover everything; one gets into a labyrinth of cases from which nothing can be made out. The words of Dr. Delavan are very timely indeed. We certainly ought to be a little more scientific and get every case recorded as far as possible from its point of origin.

A CASE OF VAGOTONIA, APPARENTLY ORIGINATING IN THE NASAL ACCESSORY SINUSES.

GEORGE FETTEROLF, M.D., SC.D.

Vagotonia can be defined briefly as a condition of excitement or hypertonus of a group of nerves called the "extended vagus." The phrase "extended vagus" is applied to a nerve series which includes not only the pneumogastric, but also a group of nerves which functionate similarly to it. Antagonistic to the vagus group is the sympathetic and there exists a condition of it called sympatheticotonia, which can be defined as a state of excitement or hypertonus of the sympathetic system. In order to locate accurately these two systems, the "extended vagus" and sympathetic, a brief review of a few points in the anatomy of the nervous system might be in order.

Connected with the brain and spinal cord is a long series of paired nerves, beginning above with the first cranial and ending below with the last coccygeal. The fibers of these are divided into two groups, the animal and the vegetative. The *animal* group consists of sensory and motor fibers, which supply the organs of sensation and the voluntary muscles.

The *vegetative* system supplies all those glands which have ducts and all involuntary muscle tissue, including that of the muscular organs.

It has been found that this vegetative system consists of two distinct parts, called the autonomic system and the sympathetic system. These two cannot be separated by dissection, but through various tests, especially drug tests, their individuality has been established beyond question.

The place of origin of the vegetative fibers is the brain and the spinal cord. The sympathetic portion arises from the cord alone, beginning above at the second thoracic nerve and continuing down to and including the second lumbar. The autonomic portion arises in part from the brain-stem and in part from the sacral region of the cord.

The distribution of these fibers is widespread, but only that

of the autonomic system will be given, as it is the one with which this contribution mainly is concerned. On account of its direct clinical bearing this distribution will be described in some detail.

The fibers which arise from the brain are contained in the third, seventh, ninth, tenth, and eleventh cranial nerves.

Those of the third nerve go to the ciliary ganglion, whence other neurones take up the impulse and carry them to the ciliary muscle and the sphincter of the iris. It is probable, too, that the elevator of the upper eyelid receives autonomic fibers.

The fibers of the seventh nerve are those added to it by the pars intermedia of Wrisberg, and, with those from the ninth, tenth, and eleventh, go to sundry ganglia, whence secondary or post-ganglionic fibers emerge. These "innervate the blood-vessels of the mucous membrane of the mouth, throat, nose, and paranasal sinuses, the salivary glands, the heart muscle, the glands and musculature of the trachea and bronchi, the glands and musculature of the digestive tube from the esophagus to the colon (gullet, stomach, intestine, liver and biliary passages, pancreas, and ducts), as well as the blood-vessels and tubules of the kidney."[1]

The sacral part of the autonomic system derives its fibers from the first, second, and third sacral nerves and is distributed through the pelvic plexus. It supplies fibers to the "musculature and glands of the lower colon, sigmoid, rectum, anus, urinary bladder, and genital organs, and to the arteries of the rectum, anus, and internal and external genitals."[1]

In action the two groups, the autonomic and the sympathetic, are antagonistic, and it is generally conceded that all glands which possess ducts and all involuntary muscles receive a supply from both. Upon the maintenance of a proper balance between the two depends the normal functionating of the structures to which they go. If the autonomic supply is irritated, the organ will overfunctionate in one direction, and if the sympathetic is irritated, the excess of action will be in the other. As glands and muscles are the organs to which these impulses go, the result will be manifested by hyper- or hyposecretion on the one hand and by spasm or relaxation on the other.

The control of the entire vegetative system, both autonomic and sympathetic, is believed to lie in the cerebro-spinal axis, where possibly a regulating center exists, and in the glands of internal secretion, the so-called endocrinous glands. This latter is quite well established for the sympathetic system, adrenin having been shown to act as a consistent stimulator to the entire distribution of this group. For the autonomic system no substance has been found which acts uniformly upon *all* parts of it. The nearest approach to such a drug is atropin, which is a sedative to practically the entire autonomic system, dilating the pupil, checking the flow of saliva and sweat, and relaxing contracted involuntary muscle. Eppinger and Hess[2] state that its action is selective, in that the sacral part of the autonomic system is practically unaffected by it. In a recent paper Block[3] takes an opposite view, as the result of having used atropin in what he calls the "vagotonic type" of dysmenorrhea, substituting this term for the older one of "essential or uterine dysmenorrhea." In this form of the disease he has used atropin in a limited number of cases with "most satisfactory results." Even more selective is pilocarpin, which has a powerful effect upon the salivary and sweat glands, producing over-secretion, and hence clearly to be regarded as a stimulator of *part* of this system.

Pilocarpin is known to be so reliable and constant a stimulator of the autonomic system that it is used in testing for the presence of vagotonia. 1-20 to 1-6 gr. is given hypodermically, and if the test is positive there will be noted salivation, lachrymation, sweating, cardio-respiratory arhythmia and hyperperistalsis, all these out of proportion to the size of the dose. Writers on vagotonia believe the drug tests to be quite important. The definition of vagotonia given by Eppinger and Hess is as follows: "A functional, autonomic system disease, regarded so for the reason that all its symptoms may be identified with those of a state of stimulation of the extended vagus or autonomic nervous system."[2] But they do not consider this definition to be complete unless there is added to it "a hypersensitiveness to pilocarpin"[1] and "a relative decrease of reactivity to sympathetic stimuli."[2]

The symptoms of vagotonia in general are such as would be expected when the autonomic system is stimulated, and they represent activity of function at the terminal distribution of the nerves concerned. There are many of these symptoms, but just a few will be mentioned in order to indicate their general nature.

Cramp of the ciliary muscle, spasm of accommodation and widening of the palpebral fissure are examples of what would result from hypertonus of the fibres from the ciliary ganglion.

Congestion of and hypersecretion from the nose and nasopharynx, likewise salivation, would follow irritation transmitted through the otic, sphenopalatine and submaxillary ganglia.

To the vagus itself can be ascribed many phenomena, such as bronchial asthma, bronchial hypersecretion, laryngeal crises, bradycardia, gastric crises, hyperperistalsis and excessive gastric and intestinal secretion.

Through the sacral part of the autonomic system could pass impulses which would give rise to such conditions as spasm of the anal sphincter, hypersecretion from the intestine, dysmenorrhea, etc.

The blood picture shows an excess of eosinophiles. Hopkins[4] says "Eosinophilia occurs especially where the skin, lung or intestinal element is present, and is increased after pilocarpin, often markedly."

An interesting observation by Eppinger and Hess[2] is that in vagotonics there is likely to be a marked anesthesia of the entrance to the pharnyx, a condition usually ascribed to hysteria These authors say that "we wish to state that, on the basis of our observations, we regard this phenomenon as entirely unrelated to hysteria."

The treatment of the condition is the same as that of any other secondary disease, viz., find if possible and eliminate a cause or focus, build up the health and give proper medication. The last factor, the medicinal treatment, can be managed on one of two principles, either administering a sedative for the autonomic system, or overcoming the tonus of the latter by giving a stimulator to its antagonist, the sympathetic system. This principle is illustrated notably by the successful treat-

ment of spasmodic bronchial asthma, success being possible either by quieting the autonomic system with atropin or by stimulating the sympathetic by the local or hypodermic use of adrenin.

The case I wish to report in this connection was referred to me by Dr. Alfred Stengel, who had given it long and careful study. The patient was a lad of about 12 who for five years had gradually failed in health, with an intermission or two of slight improvement. He presented many symptoms of autonomic hypertonus and, in addition, had evident disease of his paranasal sinuses.

His impaired health dated back to an attack of measles at the age of 7, which left him with marked nasal discharge and expectoration, which had persisted ever since. There was at times a loose cough which was productive of a thin, mucoid sputum, which never became yellow nor blood-tinged. For a year there was profuse sweating at night and his sleep was much disturbed by sneezing, coughing and expectorating. His adenoids were removed during this time, but the result was unfortunate, as immediately afterward his nasal discharge increased and he developed abscesses in both ears.

Three years after the appearance of the first symptoms, Dr. Stengel saw him. No cause for his symptoms was found, physical examination being negative. He was tested with pilocarpin for vagotonia by Dr. A. H. Hopkins and the result was positive. He was put upon guaiacol carbonate and extract of belladonna and some slight improvement resulted.

Two years later he returned to Dr. Stengel, a very sick little boy, having lost 9 pounds in four weeks. At this time he was vomiting all his meals, a condition which soon changed to a weekly attack of severe abdominal pain, nausea and vomiting, which would last about two days. The vomitus was profuse and consisted almost entirely of mucus. With this there was profuse salivation, of a clear, watery character. Soon was added to these conditions frequent watery bowel movements. Medication was of little value and the boy's condition was becoming a desperate one.

It was at this time I was requested to examine him, and

aided by an X-ray examination by Dr. Henry K. Pancoast, a diagnosis of chronic suppuration in the posterior ethmoidal and sphenoidal cells of the left side readily was made. The surgical indications were clear, and I removed the posterior end of the middle turbinated and opened widely the offending cells.

Improvement was immediate and very striking, as almost at once his symptoms disappeared. In two months he gained 10 pounds and was a perfectly well boy except for some discharge from his nose. Later, Dr. Herbert Fox administered autogenous vaccines and this was followed by almost total disappearance of the nasal mucus.

Our interpretation of the case is this: The boy was one with a very unstable vegetative nervous system and it has been observed that in such a state small stimuli can produce large reactions. The irritation which would cause such a condition of autonomic tonus may, (quoting Hopkins[4]) "arise from noxa in the form of bacterial toxins, as during or after acute infections, from drugs or from the products of deranged metabolism, mechanical irritation and so forth." There was present in this case a primary acute infection, measles, followed by prolonged chronic suppurative sinus disease, and we believe that the consequent toxemia and irritation were the exciting factors. For, when this was relieved, the wide-spread vagotonic symptoms disappeared so promptly as practically to bar accidental coincidence.

As far as I have been able to discover, the case is the first to go on record in which such a distinct entity as chronic sinus disease was presumably the exciting cause of such wide-spread vagotonic manifestations and in which prompt disappearance of these symptoms followed relief of the local condition. By the free drainage of suppurating sinuses this patient was almost instantaneously relieved of salivation, cough, expectoration, severe abdominal pain, vomiting and diarrhea, for none of which symptoms a physical cause could be found.

As a sinus case *per se* there is nothing notable about it, as the diagnosis was easy and the treatment simple. The big feature is the field of observation and deduction such a case opens

up. It does seem that many other conditions which are but vaguely understood, may possibly become clarified when viewed as vagotonic or sympatheticotonic phenomena. For example: the treatment of bronchial asthma with adrenin or with atropin has been successful in many instances.

Noteworthy has been the nasal treatment by our colleague, Emil Mayer,[5] Brettauer,[6] and others of selected cases of dysmenorrhea.

Another fellow member, Greenfield Sluder[7], after painstaking study has succeeded in relieving certain symptoms by treating the sphenopalatine ganglion.

These are but a few of the conditions upon which some additional light may be shed. Undoubtedly many others will suggest themselves as being based upon a derangement of the vegetative nervous system. Should such prove to be the case, they will constitute a new group whose pathology can be described in definite terms.

In conclusion. An obvious criticism which may be and has been made of this entire subject is that there is much of the speculative in it. In answer to this comment Barker[1] says: "We find out new facts by forming hypotheses. No man works without an hypothesis. So long as we use hypotheses only to stimulate work, to clarify our views, or to hold even temporarily widely separated facts together, I think they may be most helpful."

Eppinger and Hess[2], with the same thought in mind say that "we know full well that many of the things, which we have stated, stand but on unsteady ground, but, in spite of this, we hope to have given the impetus to further investigations, which may be of great significance for special pathology and therapy."

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Discussion

J. Gordon Wilson, Chicago:

We are indebted to Dr. Fetterolf for having introduced in so lucid a manner the obscure and difficult subject of vagotonia. We regret the absence of Dr. Stengel, who from his experience could have added so much to this discussion. It must be obvious to all of us not only from the reference made to this theory by our President in his address, but also from the contents of some of the papers read at this meeting that vagotonia has attracted considerable attention. Dr. Fetterolf is therefore justified in presenting to us so full a consideration of this subject.

The advantages offered by the supporters of the vagotonic hypothesis are that it offers a plausible interpretation and suggests a rational treatment of certain types of neurosis. As it deals so largely with the vagus nerve, the nerve which innervates so many of the parts we specialize in, it is incumbent on us to learn on what basis this hypothesis rests.

With your permission I would like first to read one or two quotations which the supporters of the vagotonic theory offer in explanation of what Vagotonia professes to be. Eppinger and Hess (Vagotonia, Eppinger and Hess, Nervous and Mental Diseases, Monograph Series, No. 20, New York, 1915), whose work on Vagotonia may be regarded as authoritative, state that "Vagotonia is a functional increase of tone in the autonomic system, which permits stimuli to act more readily on it." "Vagotonia is to be regarded as a state of stimulation of the vagus."

"The vagotonic disposition is abnormal irritability." "The cause of vagotonia is to be sought in disturbances of internal secretion." "Vagotonia is present if we have increased sensitivity to pilocarpin."

If Vagotonia is an increase of tonus in the autonomic system it will be well here to inquire what is the conception of tonus that is usually accepted. Tonus is a difficult thing to define—it seems at times so intangible. There are three sets of phenomena to which physiologists usually apply this term (Bayliss, Principles of General Physiology, London, 1915, p. 533):

(1) A prolonged contraction of smooth muscle which is automatic—independent of impulses from nerve centers.

(2) A state of tension shown by skeletal muscles under certain conditions which in some way is dependent on nerve stimuli for it disappears if the nerves be cut.

(3) A state of some nerve centers which appear to give off constantly nerve impulses apart from the receipt of messages from other nerves, e. g., the respiratory nerve center.

It is with the last of these that we are chiefly concerned.

Dr. Fetterolf has sufficiently referred to the anatomy of the sympathetic nervous system ("vegetative system") and its two divisions, the autonomic nervous system (vagus group) and sympathetic nervous system proper. This division has been long recognized and acknowledged chiefly through the work of the English physiologist, Langley.

I do not intend to discuss whether or not the supporters of this theory have sufficiently differentiated between stimulation of a nerve and nerve tonus. I wish rather to call your attention to what is one of the fundamental propositions on which this vagotonic hypothesis is built. Eppinger and Hess (loc. cit., p. 8) say that tonus in the vegetative system is due to the equilibrium of two impulses, one from the autonomic and one from the sympathetic system, caused by two hormones antagonistic to each other. Hormones, as you are aware, are chemical messengers by means of which the activity of certain organs is co-ordinated with that of others; produced in one organ they are carried to another which they affect, even when present in very small amount. The supporters of the vagotonic theory assume as a fundamental fact that sympathetic tonus is produced by adrenalin, and to get a corresponding hormone for the autonomic system they further assume, without any evidence, the existence of an unknown hormone akin to pilocarpin. According to them these two hormones, the real and the hypothetical, acting in antagonism to each other produce normally a state of equilibrium.

A departure from this state of equilibrium constitutes in the autonomic system Vagotonia.

The first point I would make is that in their attempt to establish the equilibrium essential to their hypothesis they assume as proved beyond doubt that adrenalin acts to produce tonus. So far as I can gather this assumption is not in accord with the teaching of many of our physiologists. In fact, most recent investigations appear to show that adrenalin does not produce tonus in the sympathetic system (Hoskins, The Journal of Laboratory and Clinical Medicine, Vol. I, No. 7, 1916).

To get over the difficulty of the assumption of an unknown hormone to act on the autonomic system they assume that this hypothetical hormone will act like pilocarpin. Pilocarpin is a chemical body which acts directly on the cell membrane and produces morphological changes in the cell. It seems to me that there are serious objections to a hypothesis which demands that we grant to it for a basis an unknown hormone comparable in action to a chemical body. It would therefore appear that the fundamental basis on which this hypothesis is built is not generally accepted and is open to very serious objections.

Again it is assumed that the glands of internal secretion, the endocrine glands, control the sympathetic system and that they produce and stimulate the tonus of the vegetative system. This appears to me to be an assumption beyond the point we are justified in going. Experiments with these glands such as feeding with these glands and removal of these glands (e. g., pituitary and thyroid) show that their action is not so restricted and affects the growth of many of the body cells. It would be more correct to say that it is generally accepted that the endocrine glands act on tissue metabolism and so indirectly affect the condition of the nerve cell.

There might be quoted other examples of the unreliability or doubtfulness of the assumptions demanded by this hypothesis. Equally unreliable appear to be some of the applications of the hypothesis. It is stated (Eppinger and Hess, loc. cit., p. 31) that "the stomach dilates actively in proportion to the degree of filling thus causing the muscular elements to cover the contents closely. Tonus is, therefore, a resistance to filling." The meaning here is not quite clear. These two consecutive sentences do not fit in unless one lays emphasis on the "resistance to filling." The meaning appears to be that as the filling increases so does the tonus. (One might remark in passing that it would seem curious that the body mechanism should resist the entrance of food into its receptacle.) We find that experimental evidence does not bear out the statement that tonus varies in proportion

to the degree of filling. Tonus can only be measured by the tension of the muscle and Sherrington (Sherrington, Brain, 1915, Vol. XXXVIII, p. 219) has shown that the muscle wall of the living stomach can increase from a 100 c.c. posture to a 500 c.c. posture without change of tension. Also the reverse of this holds for there may be loss of 300 c.c. without fall of pressure.

Vagotonia is a difficult subject to discuss because it is based on the physiology of the sympathetic system and of the endocrine glands, much of which is unknown and much of which is speculative. The subject of the action of the sympathetic system in health and disease is a very important one, and if "vagotonia" has directed the attention of the clinician to this very important subject it has served an excellent purpose. When from experience we find that atropin or pilocarpin is of use in diseases associated with the sympathetic or internal secretive system we are justified in using them, but to build a system of medicine on so slim a basis as the clinical use of drugs is to court disaster.

In concluding let me quote the words of Elliott, one of the leading investigators of the glands of internal secretion: "Medicine owes no debt of gratitude to those who teach to her theories without proof."

Dr. Thomas Hubbard, Toledo, Ohio:

I would include also the globus hystericus and the various types of esophagismus and cardiospasm as manifestations of vagotonia. In fact, this type would seem to be the most practical field for study of the physiologic disturbance of the vagus and sympathetic systems.

Dr. Emil Mayer, New York City:

It seems to me that we have with all this entirely wandered from the question of vagotonia pure and simple. This may explain some of the things we have not understood, as, for instance, the effect in treating for dysmenorrhea, as mentioned by the speaker. Above all, the immensely practical value in that is always to remember that when we have done anything surgical for our patients, we must not be surprised if the patient does not get well, and we must not put them down as being nasal hypochondriacs.

I have a case in mind of a gentleman who came to consult me recently. He had been having an ethmoiditis. The operation on his nose had been very properly and carefully done, but he was still having terrific headaches. He was one of those men who was determined to ascertain what the trouble was, and he was sent to me. I told him that so far as the nose was concerned, there was nothing to do for him surgically. He said that he was

still having the discharge and still having the headaches. An examination of the secretion had been made and he had received injections of vaccine, but nothing had helped him. I noticed his tongue was very much furrowed, and inquired very carefully into the question as to whether he had syphilis. He said "No"; he had absolutely no knowledge of it. A Wassermann test was made which proved negative. He even brought his sister to me and she submitted to a most careful examination and there was nothing there. I sent him to a dermatologist and he said it was probably a case of hereditary syphilis and he advised Salvarsan and mercurial injections. The patient has now become entirely well, and as soon as he has any symptoms a mercurial injection always makes him well.

I quote this case because it seems to have a marked connection with the subject at hand, and to show that we must remember that a patient has something else besides nose and ears.

Dr. Joseph L. Goodale, Boston, Mass.:

I hardly feel competent to discuss the paper, but it impressed me with the realization that there are several gates which give us entrance upon this large field. In view of the eosinophilia which takes place in a child who is being weened and that which occurs in conditions of asthma and in other anaphylactic conditions, there may be possibly an indication of the underlying identity of these various conditions.

Dr. G. Hudson Makuen, Philadelphia, Pa.:

This paper is exceedingly interesting to me because it expresses very well and emphasizes again the close relationship which exists between our own specialty and that of neurology and general medicine.

I am particularly pleased that Dr. Fetterolf should have brought this subject before the meeting because I have long been of the opinion that we as laryngologists and otologists have been giving rather too much attention to the surgical side of our specialty to the exclusion, or perhaps neglect, of the neurological and medical side of it. I therefore think that this discussion is timely and important, and I am of the opinion that in the near future our work will deal less with surgery and more with the general phase of the subject.

Dr. George Fetterolf, Philadelphia, Pa.:

In answer to Dr. Wilson I can do no better than quote the reply of Dr. Barker to a criticism made by Dr. Meltzer to the effect that this subject is five per cent. fact and ninety-five per cent. theory. Barker's reply was that a working hypothesis is better than none.

In answer to Dr. Hubbard I would say that I have been busy during the last two months cutting a sixty-page paper down to thirteen pages. In consequence there are a great many phases that I have not been able to touch upon, and a great many symptoms and signs lack of time prevented my taking up.

Anyone here who is interested in this subject can find much of value in a brochure entitled "Vagotonia," by Eppinger and Hess, translated by Jelliffe and Kraus, and an exceedingly able article by Barker and Sladen which appeared in the Transactions of the Association of American Physicians for 1912.

A RESUME OF MY YEAR'S WORK WITH SUSPENSION LARYNGOSCOPY.

R. CLYDE LYNCH, M.D.

Last year you conferred on me the signal honor of permitting me to demonstrate to you suspension laryngoscopy as I practice it, and to detail for you the various reasons for the modifications which seemed to me improvements over the instrument as used by Killian.

In my contributions upon this subject, up to this time, I have dealt with the technique of acquiring an unobstructed view of the larynx, including the anterior commissure, and in most instances a small area just superior to it. This field being sufficiently broad enables one to practice the new type of intralaryngeal surgery.

I will now devote the time you have so generously allowed me to reviewing my work in this new two-handed surgery of the larynx, the term while not thoroughly scientific is descriptive and at once differentiates it from all preceding methods.

It may be in keeping here for me to say that I have not found it necessary to change the model of the instrument in any way since its presentation last year and have added to it in only three ways; two of these because of two accidents which must be made known to you now that you may provide against such occurrences in your work.

In a case being suspended for malignancy, a man of 63, well preserved and weighing about 175 lbs., who appeared to have very good and solidly fixed teeth. The view seemed a little difficult to acquire, a little more lifting and a little jacking of the epiglottis brought the tumor well into view. A section of tissue was removed for rush pathologic diagnosis, when suddenly the instrument slipped from his mouth, the cause being a fracture of the alveolus carrying his five front teeth of the upper jaw, the mass hanging from the mucous membrane on the labial aspect.

The spatula was quickly removed, the teeth wired in place

with silver wire, and I am glad to report that they are now firmly rooted, healthy and apparently as good as ever. To counteract this accident I now place this strap under the occiput of all of the cases and clamp it into the angles of the pear-shaped ring. By tightening it sufficiently, one relieves almost completely the pressure of the tooth plates against the teeth, and it will be impossible for this accident to happen again. The other resulted from the tognue spatula breaking at its angle. As this spatula was the first made by the instrument maker, its construction was not so perfect as it now is. The danger lay here in the sudden dropping of the patient's head from the spatula and a possible fracture of the cervical vertebra. To counteract this, I have incorporated in my new suspension table this feature of having the head piece drop at various angles so that should the patient drop for any reason the support would be in place to receive the head.

While reviewing my cases operated on from one to two years ago, I noticed in two or three of the adult cases the loss of the enamel of the teeth from contact with the tooth plate or plates. This I found after further observation to be due to the fact that there was a lateral fracture of the teeth due to the pressure downward and outward of the tooth plates of the mouth gag. In a few instances, I have observed the loss of the enamel of the teeth on the biting edge. It has also happened that in patients whose teeth were very irregular and in some instances where carious tooth roots happened to be present or where the only teeth available to fix the tooth plates were loose, decayed or painful, that it became quite a problem to find a means of adjusting the tooth plates so as to do the least harm.

I have now surmounted these difficulties most satisfactorily by using a dental impression spoon filled with moulding compound, and make an impression of the entire upper jaw, including the hard palate. When cold this impression must naturally fit accurately the entire upper jaw and if a tooth is loose or the gum painful on any particular spot, the compound can be cut away so as to ease the pressure on this particular locality. In order that the tooth plates will now hold firmly against this smooth surface of the spoon, I have found it necessary to fill

the cavity in such a way as to give a square surface of sufficient depth for the tooth plates to gain firm hold. This has necessitated lengthening the tooth plates considerably and changing their shape in order to preserve the base of the fixing triangle.

Now that I have used this device for a few times, I find it far superior to the tooth plates in every way. It offers now complete protection to the teeth, absolutely equalizing the pressure upon the oral surface of the upper jaw. It will protect sensitive areas, loose teeth, and I have no fear for the irregularity of the teeth or their condition. No more fractures of the enamel occur, and the localized pain that was complained of previously is now no longer felt. It markedly facilitates the introduction of the spatula and makes it easier to keep the spatula in the middle line. Since the tooth plates have such a firm grip on the metal surface and such a broad area from pressure downward, there is much less danger of losing the view after once obtained.

This to me is one of the best additions I have made for some time, and I recommend it to you most heartily. Two sizes, one for adults and one for children, seem so far all that is necessary and are designed to fit one set of tooth plates.

The table I am using is one constructed for me by the McDermott Instrument Company from an old high-low dental base which will permit the table to be raised or lowered twenty inches. This, you see, permits the patient in suspension being raised to the proper height for the comfort of the operator and thus facilitates his work. The table has various other features which may be of interest. The top is of solid maple, one and one-half inches thick because it forms a very firm support for the travelling crane and is itself thick enough to permit of perfect rigidity. The top can be tilted at various angles, raising or lowering the head at an angle of forty-five degrees; the top can be moved in a circle to take advantage of any light, and lastly one can if he chooses perform the turning test for the labyrinth with the patient lying on the table.

Foot and shoulder braces are so arranged as to fix the patient both comfortable and rigidly. The shoulder braces act effec-

tually in preventing the patient slipping on the table, while under heavy extension and while it is primarily designed for suspension work it is a most serviceable ear, nose and throat operating table. In my work I have discarded all the unnecessary illuminating appliances, except the deep tracheal searcher and confine myself to an ordinary head mirror and a nitrogen lamp. This latter is always ready, always works, and is after all under the best control of the operator.

Epithelioma of Larynx Intrinsic.

Let it be distinctly understood now that I do not propose the removal of intrinsic malignant growths of the larynx under suspension as a substitute or advise it as better than thyrotomy, for the special reason that my own experience covers too few cases and my work is too young to be of deciding value at this time. I propose, however, to state to you my experience that you may discuss my views and that we may establish a careful foundation upon which to work.

Mr. B. was operated on May 1, 1913. He has remained perfectly well up to this time and seems now to be in good shape. In the early part of 1914, he seemed to have a small round mass at the anterior commissure which was removed and found to be only scar tissue. In him the tumor was removed completely and a rush section made at the time and since from the removed tumor showed the characteristics of malignancy.

H. W. was operated in July, 1914. He is still well and has resumed his occupation of vaudeville singer, with the exception that his voice has changed from a good baritone to a fair tenor. In him malignancy microscopically and clinically was unmistakable.

Four cases were operated in 1915. Three of these are well and without evidence of recurrence. The fourth is a bit interesting. Mr. H. was referred because of papilloma. Clinically, the diagnosis was suspicious of malignancy. Fixation of the arytenoid was present, radiating pains to the ear for the same side, continual hoarseness for one year, age 38. At operation under suspension a specimen was removed for microscopic rush diagnosis, reported papilloma and no malignancy, as I have

a most profound confidence in our pathologist, I accordingly began a dissection of the mass and while it seemed at the time as though the larynx was clear, there still remained an indurated base which felt to me different from the preceding papilloma cases. In six weeks from the date of suspension there was marked recurrence requiring tracheotomy and a few days later thyrotomy. At this time it was seen that the mass was infiltrating the posterior half of the larynx and there was suspicion of it having crossed the anterior commissure. As we had no permission to remove the larynx completely, we proceeded as completely as possible with the thyrotomy, though I was not entirely satisfied with the result. In three months he submitted to a laryngectomy and is now in most excellent health, weighing more than ever, working hard and apparently enjoying life in this altered state.

May I here repeat my advice that where one has malignancy of the larynx involving its posterior half with fixation of the joints and slight thickening or edema over the arytenoid, such a case, even though intrinsic, is unfit for operation by suspension. Under suspension one can make such an examination of the larynx as to determine an extension downward to the crico thyroid membrane. In one case not included in this list, by the indirect method we determined the mass to be entirely intrinsic, no cervical glands were enlarged and we could not palpate anything to be construed as extension downward. Under suspension we could see distinctly the extension downward to the crico thyroid membrane, and in order to be certain of the position of this area, I put a fine hypodermic needle through the crico thyroid membrane externally and used this as a land mark. It was a revelation to see the mass beyond the needle, dipping or dimpling into the crico-thyroid space. This patient is now a laryngectomy and has resumed his occupation of fishing and is working in comfort.

Four cases have been done so far this year, they are all well. I mean by this healed and returned home to report again at intervals of three months. The fourth lost his front teeth as before mentioned, and is now under radium, to be suspended again if the latter does not bring about the desired result.

I may mention again that the dissection under suspension is not difficult and can be done without permitting an instrument to touch the tumor mass, can include the perichondrium, does not require much time, there is no excessive bleeding, does not require the opening of the cartilaginous box, is not in consequence followed by stenosis. None of my cases have had any post operative disturbance and they are usually up and out as soon as the ether is exhaled. There has been no shock and so far a most surprising lack of reaction .

Non-Malignant Tumors.

Papilloma. I have removed by dissection multiple papilloma from the larynx in cases ranging from 18 months to 16 years, with no recurrence in a single case so far. The shortest time since operation is 5 months, the longest 3 years. In the case reported to you last year during the discussion of Dr. Hubbard's paper, the recurrence was beneath the cord, an entirely new site from that originally operated on and followed an attack of whooping cough one year after the operation.

Single pedunculated papilloma and those growing from broad bases have been operated on with no recurrence to date, the cases numbering 19 in all.

Pick the mass up and dissect it well from the base from which it grows, curet this base to be more certain, paint the area with pure alcohol and dress the wound with tincture of benzoin compound.

Pedunculated Fibroma.

Growing from the loose tissue beneath the cord by a fairly large pedicle was removed by dissection and the wound sutured, healed by first intention, no recurrence.

Vocal Nodules.

Only those are selected for operation that cannot be removed by medical or contributory surgical procedures. Three cases, one congenital, two school teachers, all symtomatically well. The school teachers have been referred to singing teachers for instruction in voice use and have remained well.

Cyst Aryteno Epiglottic Fold.

About the size of a marble ¾ of an inch in diameter was dissected without rupture of the sack and the wound stitched with good union and complete recovery. To remove the sack entirely is the classical surgery of cysts. It cannot be done with one hand.

Pachydermic Laryngitis.

Two cases, both males between 30 and 40. Farmer and preacher. In the former a hypertrophic mass at vocal process and extending along free border of right arytenoid cartilage, mass removed by wedge incision and the free edge stitched with two sutures, healing rapidly, result perfect. The latter much thickened, inter-arytenoid space was much improved by three horizontal deep cauterizations with actual cautery. It was very simple and accurate to apply the cautery in this case and an easy matter to protect surrounding structures from burning. Such procedures would be impossible without suspension.

Perichondrites of Thyroid.

Patient, C. D., 20 years, cook. Followed by abscess formation. Patient suffered intense pain upon swallowing, due to the inflammatory process and dyspnea from swelling and edema of the glottis, it seemed that tracheotomy would be immediately necessary. Patient was suspended and by palpating over the swollen surface with a cotton tipped applicator, a soft fluctuating area was discovered, an aspirating needle was introduced and pus obtained. Free incision was made and dilated with artery forceps after the method of Hilton. Catgut strands were placed in the incision to maintain the opening. A rapid subsidence of swelling followed, patient was able to take nourishment freely and made a good recovery with a much disorganized larynx. At the time of final visit, one could not recognize any cords false or true and what was a larynx was now a tube lined with scar tissue through which the patient breathed.

Fracture of Thyroid Cartilage.

Master C. G., age 11 years. While at school received a blow on left side of lateral cervical region and suffered at once from

dyspnea, loss of voice, pain in region of larynx, aggravated on swallowing. On admission it was impossible to see the larynx and X-ray showed transverse fracture of thyroid cartilage about its middle. Under anesthesia crepitus could be determined, and with the aid of suspension we could see swelling on left lateral half of larynx with marked tumefaction about region of true cord. By manipulation we were able to reduce the fracture which re-established the larynx to its normal lumen. A large intubation tube was then introduced as a splint to maintain the fragments. This remained about two weeks, when it was coughed out and the larynx was seen to maintain its usual shape. About four weeks later patient returned with marked dyspnea, this time due to granulation growing into larynx presumably from the line of fracture. There was also quite an area of redundant tissue over upper surface of arytenoids which was drawn into larynx with each inspiration. Under suspension the granulation tissue was removed and its base cauterized with trichloracetic acid. The redundant tissue was carefully removed by dissection and the raw surface stitched, requiring three sutures on each side. Healing was entirely satisfactory, but the patient maintained an aphonic voice for some time after this procedure, though under anesthesia he cried out with good tone. He has since regained his voice. The successful termination of this case was due in a very great measure to the suspension apparatus.

Tubercular Laryngitis Ulcerative.

Six cases have been cauterized. In two, over three-fourths of the area of the larynx. There was very marked relief from pain and healing followed in all of the cases. This, however, was only temporary, for all of the cases were third stage with progressive pulmonary destruction.

Abscess of Epiglottis. Its lingual face was the seat of accumulation; incision and drainage was very easy under suspension.

Pedunculated Epithelioma.

The mouth of the esophagus was the seat of lesion in my two cases. A negro man aged 80 was suspended; cocain anesthesia; the mass resected the five stitches placed, healing completely

by primary union. Recurrence in ten months at site of removal; this time recurrence was by rather broad flat ulcer about the size of a quarter, on post hypo pharyngeal wall. Mass was cauterized after technique of Percy, using heavy electro cautery point; much swelling and discomfort followed. The patient has remained well with no recurrence up to this time.

Second case. White male. Mass springing from posterio-lateral aspect of cricoid cartilage and lateral wall of esophagus. Mass was removed and base completely cauterized. Patient's life was prolonged ten months.

This technique requires two free hands and is only possible under suspension and it may hold for us some hope in the fight against these lesions in this locality.

Foreign Bodies in Trachea Esophagus

In babies the suspension apparatus permits the careful passage of the tube beyond the vocal cords and subglottic space which it is so necessary not to traumatize. I have removed water-melon seeds from the trachea of children without the use of a tube, and a peanut impacted in the right main bronchus was removed under suspension, with the section tube and no forceps. It was very easy to see the foreign body and to apply the tube. Safety pin with point up, jackstone, and quarter in children from 11 months to 3 years were removed very nicely from the upper end of the esophagus. While this is quite possible by the usual methods, one does the work more carefully with less traumatism and with more exactness than by the usual methods. With two hands free, a part can be lifted, points protected, bodies rotated, the cricoid lifted and moved from side to side in order to permit dislodgment and extraction, without tearing the mucous membrane or otherwise injuring the parts. It also facilitates the introduction of the esophagoscope in certain cases.

I prefer, however, when working with an esophagus or a bronchoscope to introduce the tubes unaided, if suspension is necessary for their introduction the patient should be relieved from the suspension apparatus after the tube has been passed so that subsequent manipulation will not be interfered with.

Discussion

Dr. Emil Mayer, New York City:

There is one phase of suspension that has not been mentioned by the writer of the paper which has worked splendidly in my hands, and that is in the treatment of stenosis of the larynx and trachea. In one instance, that of a little boy who was on my service at the Mt. Sinai Hospital and who had tracheal stenosis, post-operative, it became necessary to intubate this boy, and the only way possible was under general anesthesia. It was my hope that we could keep the trachea widely open with the wearing of the intubation tube. With the capable assistance of my associate, Dr. Yankauer, this boy has been anesthetized and extubated and reintubated a number of times. He has been wearing the intubation tube for a matter of two years now, and we are in hopes that he will be able to do away with it eventually by the interesting method of transplanting fascia in the cicatricial tissue. In this case I do not know what I would have done without being able to put the child under general anesthesia and use the suspension apparatus, first of all to distend the web of cicatricial tissue and then to intubate.

The second case was that of a man with syphilitic stenosis of the larynx, perhaps one of the most unique and remarkable conditions I have ever seen. It became necessary to do a tracheotomy on account of the stenosis. He then received regularly, about three times a week, a distension of his larynx by means of a Schrotter tube, first from the size of twenty French up to a large size, so that by the time he was ready for the intubation tube, his larynx was fairly well distended. He also received some Salvarsan injections. I felt that we were able to do something for him in a good deal quicker time than ever before in my experience. The man was given a hypodermic of cocaine and told what we wanted to do, and without any anesthesia whatever we distended and put in the intubation tube. This remained in situ and about ten days afterwards he coughed out the tube. The amount of breathing room was so much greater directly after this that we were quite able to do without the intubation tube. In this exceedingly short space of time by this means and the treatment of Salvarsan and mercurial injections he has been quite cured. The suspension apparatus helped us materially in this case.

Dr. John F. Barnhill, Indianapolis, Ind.:

I would be glad if Dr. Lynch would tell us about his present views of anesthesia in the use of his apparatus.

Dr. Robert Levy, Denver, Colo.:

Dr. Lynch's unusually large experience and great skill makes one hesitate to place upon record anything that he may do. I have used suspension for some time and have been gratified with its application in a number of unique experiences.

In the treatment of tuberculosis of the larynx I have been particularly pleased with its value in removal of the epiglottis; the special feature in its favor here is that one has perfect control of the hemorrhage following the excision of the epiglottis. Before the advent of the suspension apparatus, in an attempt to remove the epiglottis, I had rather serious arterial hemorrhage upon two occasions. In several cases of epiglottidectomy since the suspension method has been in vogue hemorrhage has had no terrors whatever for me. I have seen an artery spurt from both sides of the stump, the vessel being so large that its spurting could be seen by a class of students at some distance from the operation. The artery spurts into the mouth and one controls the hemorrhage with the greatest ease by means of artery forceps.

In curettage or cauterization of the larynx for tuberculosis the apparatus is of great value because one can do so much more in one sitting than by the indirect method.

With these cases it has been my practice to use scopolamin and morphine, although in one case I had a death on the table.

Tumors of the larynx have been exceptionally easy of removal with this method. A large-sized malignant tumor herewith shown was removed under suspension. It sprang from the posterior wall of the larynx and came over by its attachment to the external surface, so that it was partially extrinsic. It was placed in such a position that when the patient sat erect it dropped into the larynx and produced dyspnea. On two occasions the patient was picked up on the street and sent to the hospital, so that any prolonged operation in the erect position would have been impossible; under suspension it was removed with the greatest ease.

In the dissection of a venous cyst with large veins that bled freely in the hypopharynx the method was particularly valuable, because I could make a very wide dissection. This case was one in which removal had been attempted on several occasions without success. I made two attempts, one by galvanic cautery and one by injection with iodine. It recurred each time until we were able to make a wide excision under suspension.

Dr. Harris P. Mosher, Boston, Mass.:

I do not think I am the only member of this Society who was startled about two years ago by Dr. Lynch's extension of the

use of the suspension laryngoscope. I was not only startled but very much pleased and have followed his work with great interest. I have been much interested in his paper and in the instrument as he has developed it, and am very much pleased to see that a child of mine has come unto its own in Dr. Lynch's hands, namely, the impression tray for protecting the teeth.

When Dr. Lynch began his work, especially the work of removing malignant disease of the larynx, I withheld my judgment for a time, waiting to see what his results would be. In the paper read this morning I was very pleased to see that he had gone on carefully, and with a great deal of judgment, and that he had come to the conclusion which many of us felt that he would come to—that is, that the removal of malignant disease by suspension was not a final success, but that thyrotomy was better. For myself, I feel that I much prefer thyrotomy to suspension removal of malignant disease.

Dr. Robert Clyde Lynch, New Orleans, La.:

The chief essential of the suspension apparatus is to obtain relaxation of the parts. This can be done by local anesthesia whatever kind you use, namely, cocaine, or any other varieties which may be used. I have done a number of suspensions under local anesthesia. Ten per cent. cocaine by means of a syringe will give some individuals with suitable necks, and if suitable otherwise temperamentally, sufficient anesthesia to allow one to do a successful suspension. Whether the anesthetic be morphine and scopolamin or another is left to the individual judgment of the case. I have used only cocaine anesthesia and prefer it. I give one or two doses of morphine, one-fourth grain one or one and a half hours before the operation and one-eighth grain one-half hour before the operation is to be done. For surgical work I much prefer general anesthesia in those cases where it is not definitely contraindicated. Under general anesthesia we get the proper amount of relaxation of the parts and are able then to suspend the patient until we get the proper view. You must understand suspension is not an easy proposition so far as the patient is concerned. It is not painless, and for that reason patients must be put in such shape that they will not interfere with the work after it has been once started.

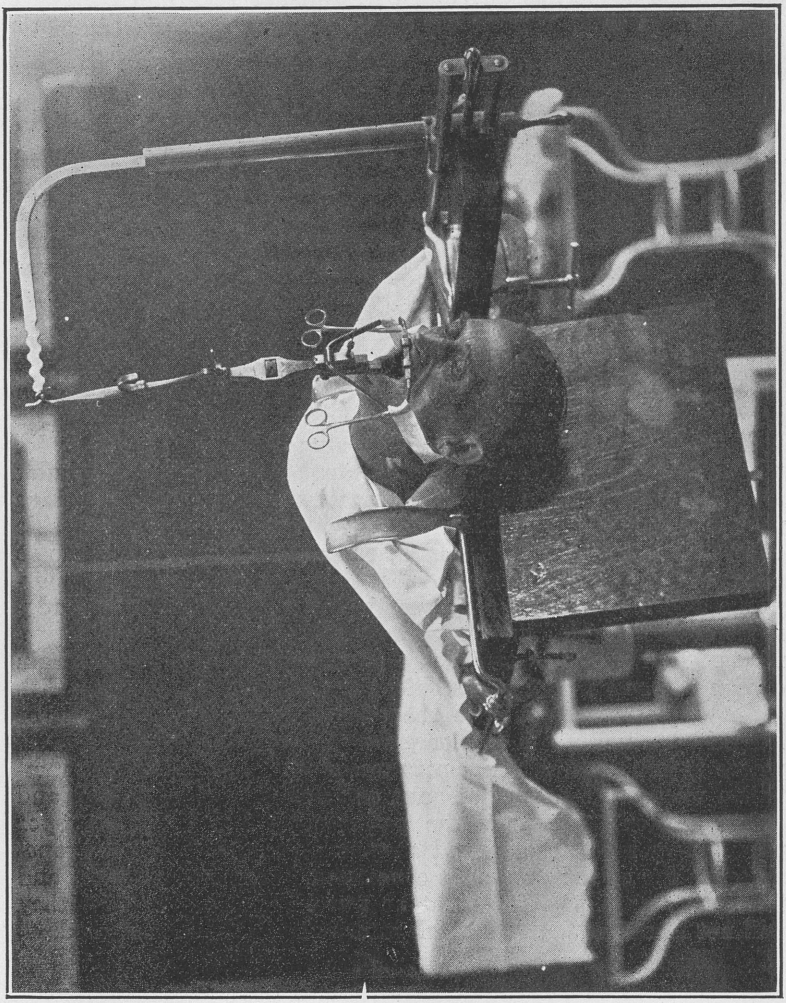


Fig. 1. Shows strap under occiput to prevent slipping of spatula and pressure upon teeth.

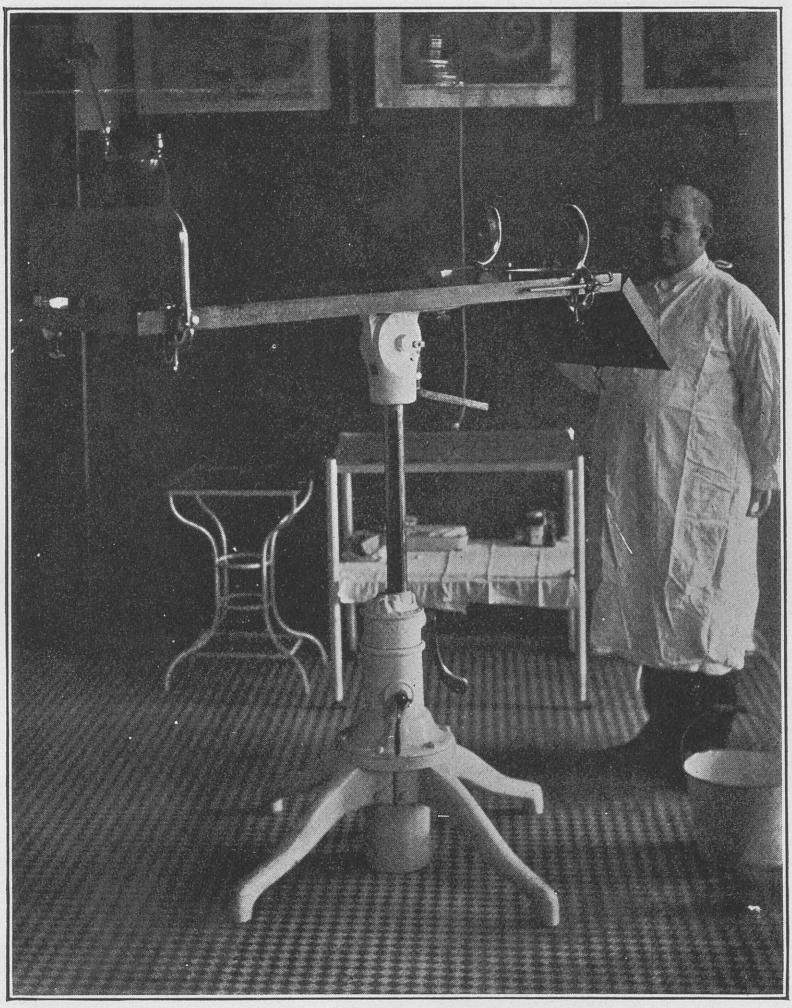


Fig. 2. Table elevated 55 inches with head rest to prevent dropping of head for crane.

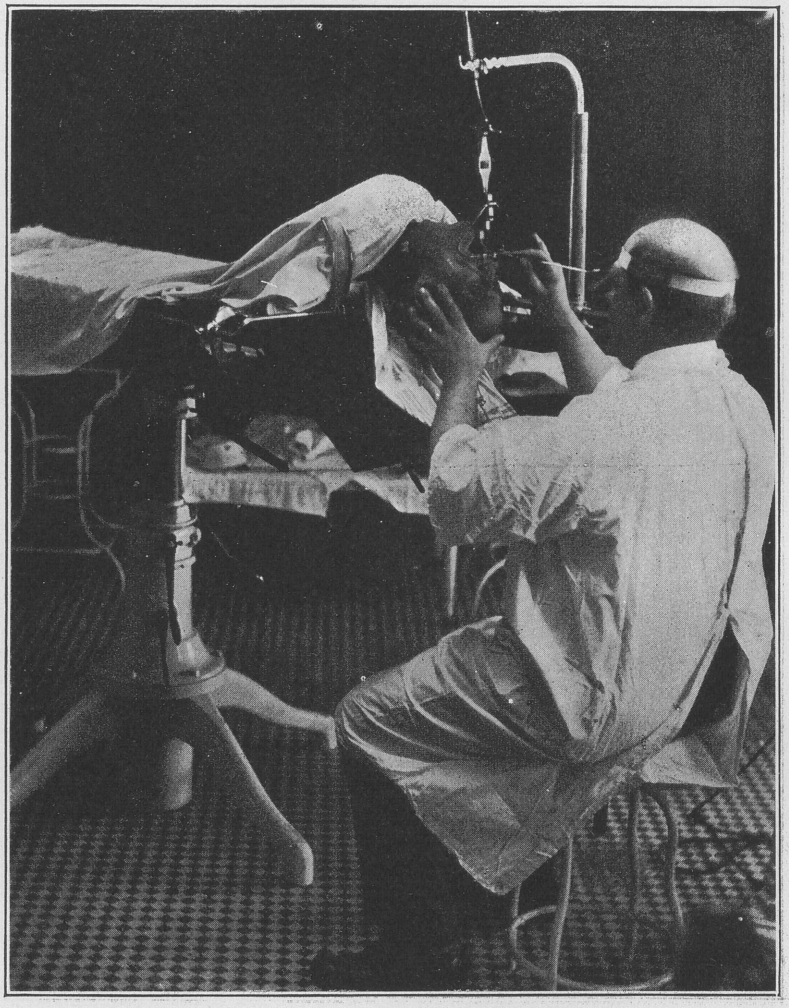


Fig. 3. Table elevated to comfortable height for operating in sitting position.

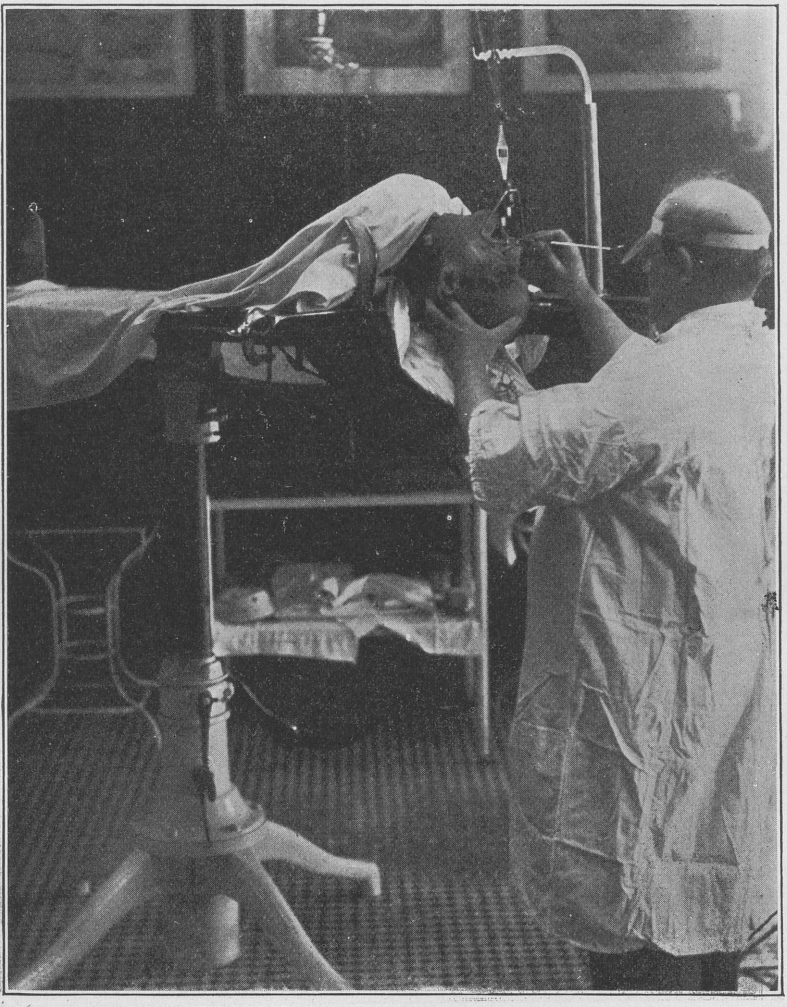


Fig. 4. Table elevated to operate standing.

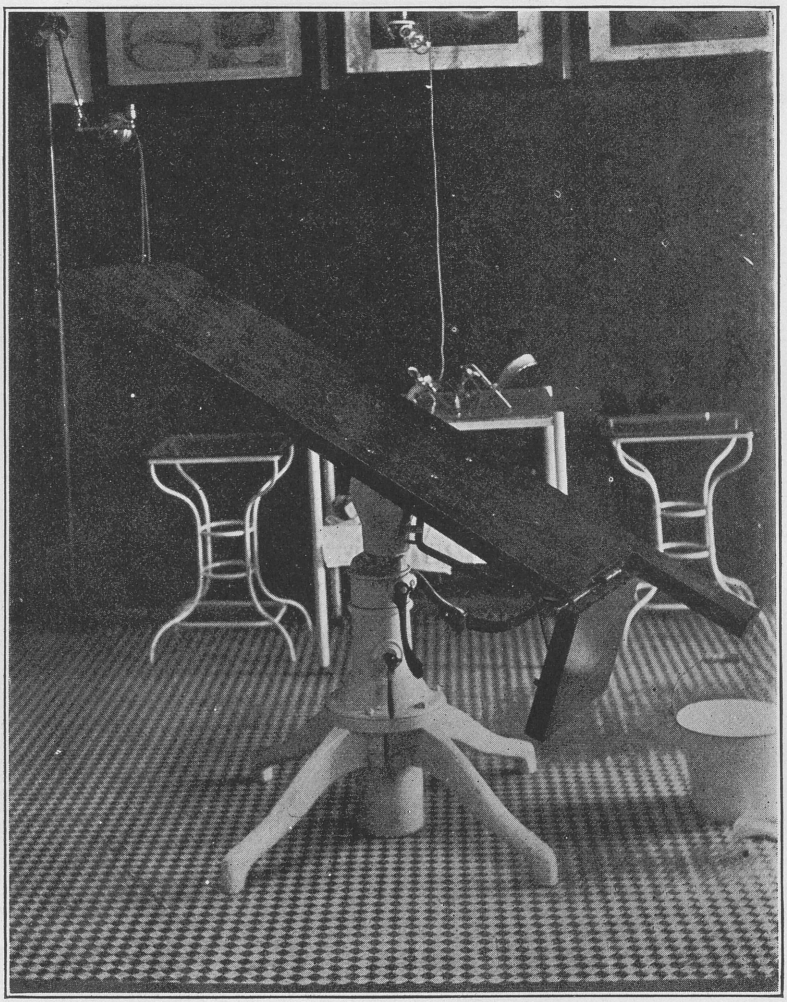


Fig. 5. Head lowered to 45 degrees.

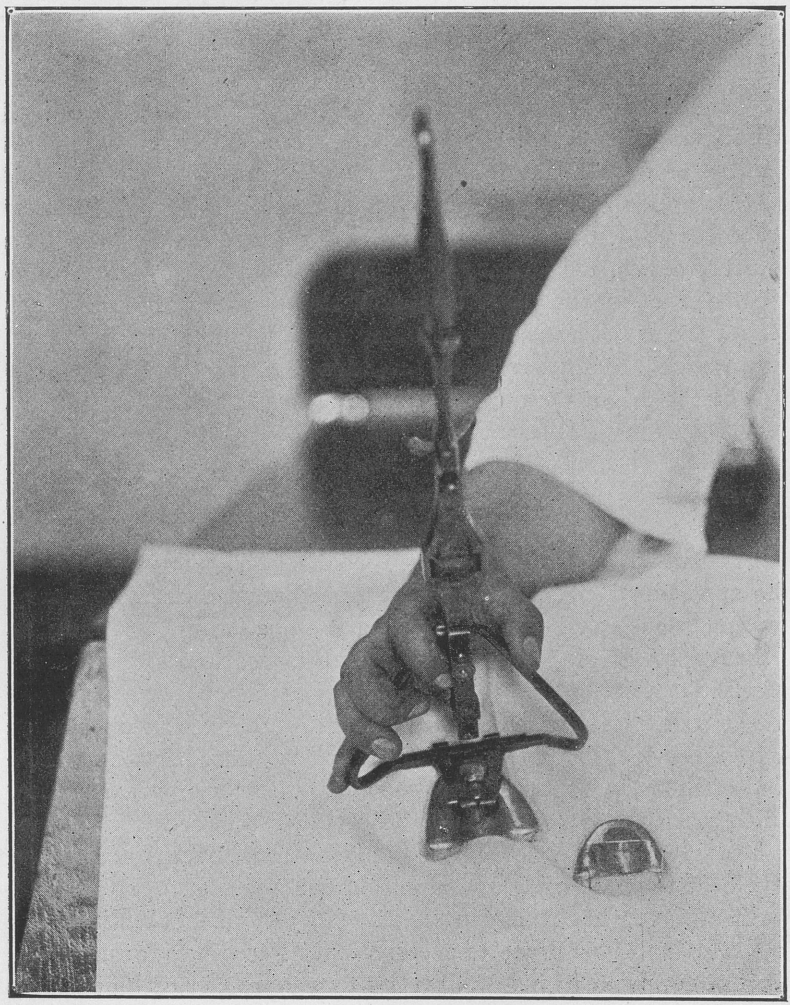


Fig. 6. Dental spoons, with tooth plates to protect teeth and distribute pressure over upper jaw.

ENDOTHELIOMA OF THE RIGHT BRONCHUS REMOVED BY PERORAL BRONCHOSCOPY.

CHEVALIER JACKSON, M.D.

The patient was referred to the author by Dr. J. P. Harley, of Williamsport, Pa., who stated that there were signs of a localized pathology in the right bronchus and right lower lobe which in his opinion was not tuberculous and was otherwise so unusual as to demand a diagnostic bronchoscopy. The patient's statement (to Dr. Harley) that he had "a sensation as of a 'ball-valve' in the right bronchus shutting off his breath, at times when breathing in, at other times when breathing out" impressed the author with the idea that the patient was a neurasthenic, in view of which a diagnostic bronchoscopy did not seem justifiable. The outcome showed this opinion erroneous. The following is the history:

Mr. F.—Aged 35 years, occupied as a clerk at a desk and around a factory, had had good health until five years ago. Ill health started with a "heavy cold" lasting one year; then he spat blood. Symptoms were less during summer. Every winter's end, and spring, symptoms were worse, starting as "heavy cold" and ending in ill health. Patient refers sensations (restriction, swelling, compression, wheezing) to his right side. Wheezing audible with mouth open, worse after expectoration. Breathing never seems normal. Has sensation of secretion in bronchi, also sensation of "flapping" at times. Also a sensation as of a ball valve suddenly shutting off sometimes inspiration, at other times expiration. Twice yearly has cycle of the following symptoms in the order given: (1) Cold in head. (2) Tightness in chest. (3) Cough. (4) Slight expectoration. (5) Free expectoration. Bleeding, formerly ¼ cupful followed in a few days by expectoration of blood clot. Recently only blood streaks in expectoration.

He spent two years in a sanitarium for the tuberculous. Discharged because no bacilli could be found in sputum, but cough, wheezing, persisted. Roentgen-ray examination and sputum examinations, guinea pig inoculation, Wassermann and

therapeutic luetic tests at a large eastern hospital, were all negative. Diagnosis then made: Enlarged bronchial gland. No treatment was beneficial. No sputum test had been made during last twelve months. Bronchoscopy by someone negative. Septum deflected by "foul tip" at baseball some years previously. Septal operation by Dr. Ritter cured persistent headaches.

Diagnoses of various clinicians prior to coming under observation of Dr. Harley: Tuberculosis. Chronic right sided bronchitis. Monolateral (right) asthma. Compression stenosis of right bronchus, probably caused by adenopathy.

Report of sputum examination by Dr. Ernest W. Willetts: "Very careful repeated examinations for tubercle bacilli both by direct smears and also by antiformin method failed to show them. The sputum contains some small whitish masses of solid matter which, on examination, showed many large cells of varying shape; some oval, some spindle shaped and others polygonal. They are unlike any of the cells ordinarly seen in sputum and are so like cells from a new growth that a diagnosis of tumor is, I believe, justifiable."

Report of Dr. George C. Johnson: "*First fluoroscopy.* Fibrosis of right lower lobe bronchus. Patient presented symptoms of unilateral asthma on fluoroscopic examination. Left lung and diaphragm normal, parts were normal in size, shape and position. Right upper lobe normal but beginning about one inch below bifurcation, a trefoil-shaped shadow extending downward was seen. The diaphragm on the right side could not be distinguished. The lower lobe of the lung was replaced by a shadow having exactly the opacity of the liver. It was impossible to state where the liver ended and the lung began. The appearance was that of an unresolved pneumonia. This portion of the lung could not be made to light up on deep respiration or coughing. No motion of the right portion of the diaphragm could be seen nor could its position be located.

"*Second fluoroscopy.* At a second examination two days later a considerable change had occurred. Some portions of the dense shadow were clear showing that the lower lobe was occasionally receiving small quantities of air. The diagnosis of

atelectasis due to right bronchial obstruction was made, and diagnostic bronchoscopy was strongly urged.

"*Radiographic examination.* Fig. 1 showed an opacity of the lower lobe continuous with the hepatic opacity, the dome of the diaphragm on the right side being indistinguishable."

Physical examination and consideration of symptoms by Dr. John W. Boyce: "At date of first examination there was some contraction of right side and a slight impairment of percussion note—both of them corresponding to extreme expiration as though the air could not get in. Vesicular sound was suppressed and replaced by large wheezing rales. There was evidently obstruction in the right main bronchus affecting inspiration more than expiration at this particular time. There was some impairment of supracardiac resonance and also an increased area of conduction of whispered voice at the back; but both of these signs (suggestive of bronchial adenopathy) extended rather to the left than to the right.

"Aneurism or other mediastinal tumor having been excluded, we have to consider the possibility of a single lymphatic gland making pressure on the bronchus. This diagnosis had been suggested by an expert clinician. Against it was the fact that there was no evidence of bronchial adenopathy. Nor could we conceive how pressure from without could exert a valve effect, occasionally reversing the direction of the valve action. The same considerations apply to organic stricture almost hermetically tight; large calibre strictures being latent as regards dyspnea. The long duration of attacks seemed to exclude spasmodic stricture.

"It remained then for us to consider transparent foreign body and pedunculated intrabronchial growth. Dr. Jackson theoretically excluded the former on the ground that a movable foreign body in the open bronchus would certainly produce purulent sputum and foul breath in less than five years time. This narrowed down the diagnosis to a movable intrabronchial tumor. The only objection to this diagnosis is, as Dr. George C. Johnson expressed it, that it 'Explained every item of the history and physical examination too nicely.' Clinical diagnosis and pathological conditions rarely fit so precisely."

"*Bronchoscopy.* Under local anesthesia, I passed a 9 mm. bronchoscope. A moderate amount of secretion was encountered coming upward from the right bronchus. When this was cleared away and the bronchoscope was inserted into the right bronchus to the point where the image shown at B, in Fig. 2, should normally appear, the tumor (A) came into view. The tumor filled a dilatation of the right stem bronchus and sprang from the right bronchial wall, just above the orifice of the middle-lobe bronchus.

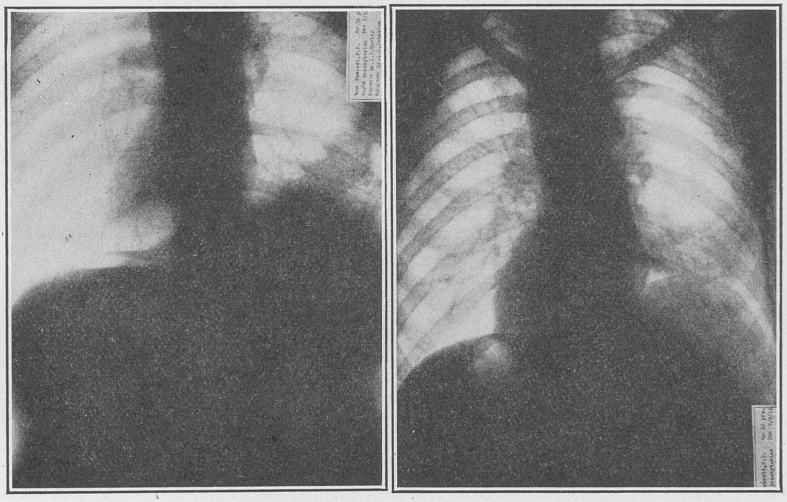


Fig. 1. Radiograph showing (on left) opacity of lower lobe of right lung, due to obstruction of right bronchus by tumor shown in Fig. 2. The right-hand side of illustration shows radiograph taken after peroral bronchoscopic removal of tumor.

The history of five years duration, the smooth shining surface, slightly nodular shape, and the fact of the tumor having made for itself a dilatation of the bronchus lead the author in consultation with Dr. Ellen J. Patterson, to conclude that the growth was benign, probably fibromatous and to advise immediate removal without withdrawal of the bronchoscope. The patient gave his consent by a slight nod, and the growth was extirpated in a few minutes by successive nips of the bron-

choscopic tissue forceps. The bleeding was not severe; possibly as much as two ounces was expectorated. The temperature rose to 102.2 deg. F., the pulse to 98 and the respirations to 30. All came to normal in about one week. Expectoration of blood-stained pus gradually diminished until it disappeared at the end of about four weeks. The patient has had uninterrupted good health until the present time—nine months.* The present condition of the patient is thus reported by Dr. Harley:

March 29, 1916.

Dr. Chevalier Jackson,
Pittsburgh, Pa.

Dear Doctor: In replying to you regarding Mr. Fawcett's condition wish to say the word "fine" doesn't half express his good condition. He has gained 26 lbs. in weight; has enjoyed the best health this winter for six years, not having the slightest bronchial affection all winter—just feeling at the "top of heap" ever since his operation and I feel sure he is grateful to you every day of his life for this most remarkable cure.

Very cordially,

(Signed) J. P. Harley.

Report of histologic examination of tumor by Dr. Ernest W. Willetts: "Frozen sections show a very cellular structure which presents the general appearances of an endothelial growth, although in some areas there are appearances that indicate epithelial origin. Nuclear changes are not marked but the growth is so cellular and infiltrates the supporting tissues in such a way as to suggest malignancy. Later examination of paraffin sections only confirms original opinion."

Remarks: In discussing the paper of Dr. J. M. Ingersol at the meeting of this Association in 1914, I spoke against the attempt at bronchoscopic removal of endotracheal malignancy; and such being my conviction I would not have removed the endobronchial growth in the present case had I not felt at the time that it was benign. The present condition of the patient, however, indicates

* At the time of reading proof of this paper, a full year has elapsed. The patient continues in perfect health.

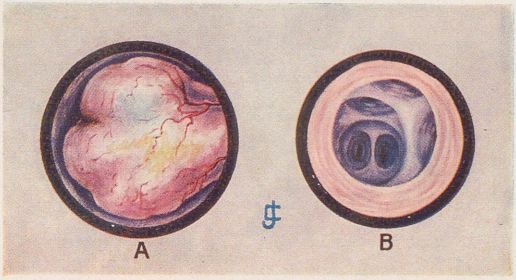


FIGURE 2.

Endobronchial obstructing endothelial tumor in a man aged 35, who complained of coughing, wheezing and "a sensation as of a ball-valve shutting off his breath, sometimes on inspiration and at other times on expiration." B, bronchoscopic view down right main bronchus. A, tumor presenting itself in its self-made bronchial enlargement, when the bronchoscopic tube-mouth reached the location at which the view, B, should appear. Tumor removed with forceps through a bronchoscope passed through the mouth. Patient free from symptoms at end of three weeks and remained perfectly well nine months later.

that Dr. Ingersol's position as to the possibilities of bronchoscopic removal may be nearer right than my own, though he referred only to tracheal growths, while my case was bronchial. It would not be right, however, on the basis of this unique case, to sanction the indiscriminate bronchoscopic attack of pulmonary malignancy. It scarcely seems possible bronchoscopically to remove malignancy completely in many instances; and we all know only too well the results of partial removal elsewhere. So far as the present case is to be taken for guidance, it can apply only to a sharply circumscribed non-ulcerated tumor of very slow growth. Moreover, it may be that the tumor was one of those that is histologically malignant and clinically benign. Or, it may be that it was of a very low degree of malignancy, for we know that there are degrees of malignancy or of individual vulnerability; and, as stated by Wright, it is not possible to make a prognosis from the histologic examination of a growth. Finally, we know that recurrence is yet possible. In view, however, of the very great rarity of the case and the necessity for us all to be alert to the possibilities of diagnostic bronchoscopy longer delay in making this report seemed inadvisable, especially in view of the fact that the present condition of the patient and his months of perfect health fully justified the relatively minor operation under local anesthesia, even if the growth ultimately recur.

Conclusions.

1. Diagnostic bronchoscopy is indicated in cases of monolateral "asthma," bronchitis, bronchial obstruction, and in cases of tuberculosis where persistent search fails to show tubercle bacilli.

2. Peroral bronchoscopic removal of an endobronchial tumor is feasible under local anesthesia.

3. General anesthesia might have permitted clotting of blood in the lower bronchi before bechic expulsion, involving septic risk.

4. Peroral bronchoscopic removal may be justifiable in a malignant endobronchial growth if small, circumscribed and not ulcerated.

5. As this is the only recorded case of apparent cure of an endothelial endobronchial tumor by peroral bronchoscopy, and only the second endoscopic removal of any form of malignant growth from a bronchus, it would be unwise to make too many or too sweeping deductions.

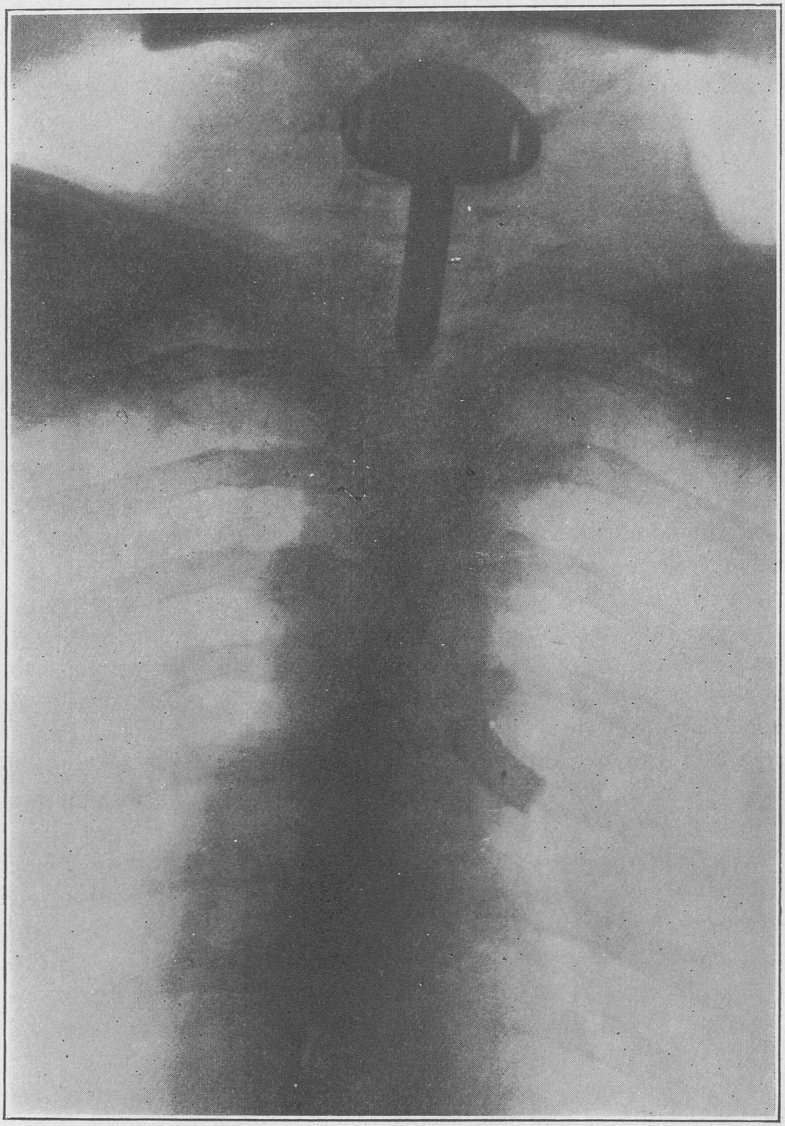
REPORT OF THE REMOVAL OF A FRAGMENT OF A TRACHEOTOMY TUBE FROM THE LUNG, SIX YEARS AFTER ITS INSPIRATION.

FRANCIS R. PACKARD, M.D.

The patient whose case I report was an Italian, 33 years old. Twelve years previous to the time at which I saw him, he had suffered from typhoid fever, having been a patient at the Pennsylvania Hospital, Philadelphia, for three months. During this illness he had an abductor paralysis of the vocal cords, necessitating intubation. The tube remained in the larynx for two months, when it was removed and the patient discharged from the hospital as cured.

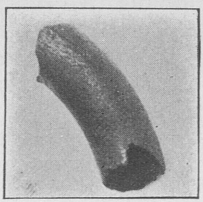
One month after leaving the Pennsylvania Hospital, he had an attack of dyspnea and spat up large quantities of blood. He was admitted to the Philadelphia Hospital, where a tracheotomy was performed. The patient remained in the Philadelphia Hospital for six months, when he was discharged still wearing the tracheotomy tube. This was twelve years ago, and he remained in a fairly comfortable condition subsequent to that time for six years, when he said that one day during a coughing spell he coughed up the tracheotomy tube which he was still wearing and found that the lower end was broken off and missing. He stated that he had not had the tube out for cleansing or any other purpose for three years up to that time. Since that time, six years ago, he had suffered from violent attacks of coughing, accompanied at times by the expectoration of blood and considerable pain in the chest. He stated that one of these attacks was so severe that three years ago he was in the Bryn Mawr Hospital for eleven days with fever and pain in the right chest. There is no record in the hospital, however, of his having been a patient there at any time.

For the past six months he has had great exaggeration of all of his symptoms and has been obliged to give up his work because of shortness of breath, cough, pain in his right chest and quite a profuse spitting of blood.



Tracheotomy tube in situ in neck. Fragment of inner tube in right bronchus, opposite fifth intercostal space.

I first saw him in April, 1915, when he came to the Pennsylvania Hospital. No very definite history at that time was attainable, as he was unable to talk English and he had no interpreter. He was wearing a tracheotomy tube and complained of the symptoms above reported. I had an X-ray examination made of his chest which resulted in the discovery of a foreign body lodged in his right bronchus opposite the fifth intercostal space. He left the hospital the day after his admission, refusing to have anything done for his relief. Three months later, on July 14, 1915, he appeared at the Bryn Mawr Hospital, at which institution I was on duty, and another X-ray was taken showing the foreign body in the right bronchus, the same location as that revealed by the previous X-ray three months before at the Pennsylvania Hospital. I had the patient etherized, and, on removing the tracheotomy tube, which we had been unable to disturb before because of the patient's resistance and unruly behavior, I found, to my surprise, that it contained an obturator. I passed a Jackson bronchoscope through the tracheotomy wound and without difficulty succeeded in extracting with forceps the fragment of tracheotomy tube which I show herewith. The



Fragment of tracheotomy tube, actual size.

patient was returned to the ward in good condition. He reacted from the anesthetic and left the hospital in excellent condition three days later. He had absolutely refused to have anything done towards closing the wound in his neck and trachea.

The points of particular interest in the case seem to me that he had retained a foreign body of this nature for six years in his chest, producing such marked symptoms, without arousing the suspicion of its presence either in the mind of the patient

or the number of physicians who had examined him from time to time. It was only after the fragment of the tracheotomy tube was removed from his chest that we succeeded, by means of a clever interpreter, in eliciting the history that he had six years before noticed that the tube was broken when he took it out. Secondly, I think it was curious to reflect that for some unknown reason he had worn an obturator in the tube, a fact which was only ascertained after the removal of the tube on the operating table.

Discussion

Dr. J. Solis Cohen, Philadelphia, Pa.:

I have seen quite a number of these cases, especially in the early days of my practice. The ordinary tracheotomy tube is made in several pieces which are held together by solder. You then have two metals and you have the fluid of the mucous membrane constantly washing the metals and so electrolytic action takes place which dissolves the softer metal, and finally the tube becomes removed from its plate. Now a great many of the tracheotomy patients keep their tubes in position without taking them out for cleansing, and in the course of time they become more or less detached. I have tried to prevent this by having my tubes made in one piece without the solder. I then adopted the plan which I have recorded in my reports of always insisting upon a patient having two sets of tubes, and changing them on alternating days. In that way you will avoid any accident of this kind. The patients can take the tube out and cleanse it after putting the fresh tube in. I tried tubes of all metals but this electrolytic action will always take place. Consequently, I advise every tracheotomist to see that his patients have two sets of tubes, and teach them how to take them out and cleanse them.

A FOREIGN BODY IN THE LARYNX AND ONE IN THE PYRIFORM SINUS OF AN INSANE PATIENT. REPORT OF CASE

CHEVALIER JACKSON, M.D.

A male negro, 40 years of age, confined in the Western Pennsylvania Hospital for the Insane for dementia praecox, died of a complication of diseases including chronic nephritis, pericarditis, endocarditis with valvular disease, with an acute gastritis during the last three days preceding death which seemed to be due to exhaustion. A post-mortem was made by Dr. T. T. McS. Barrett, who has given me the following report:

"A brass key, two inches long, was found in the larynx, the ring end resting on the cords. In the right pyriform sinus was a screw-eye, one and one-half inches long, its screw end extending upward above the glosso-epiglottic fold. There were no signs of local inflammation except on the epiglottis, which showed a slight excoriation of its under surface where it had been subjected to pressure of the upper end of the kek during swallowing. Both articles were wrapped in cloth which was very putrid. Although evidence is lacking to fix the exact time of the lodgment of these foreign bodies, the nature of the circumstances as well as of the presence of the articles at necropsy seems to justify the assumption that they had been in the throat for at least three weeks. With the exception of the comparatively mild vomiting which occurred only after eating, there were no violent symptoms of coughing, gagging or choking such as would be likely to accompany the presence of foreign bodies in the throat. The supposition is that this man, having found these articles while working outside, and recognizing their utility for a special purpose that he had in view and fearing to be deprived of them during the search to which all patients submit at bedtime, sought to conceal them in his throat intending when necessary to recover them by regurgitation."

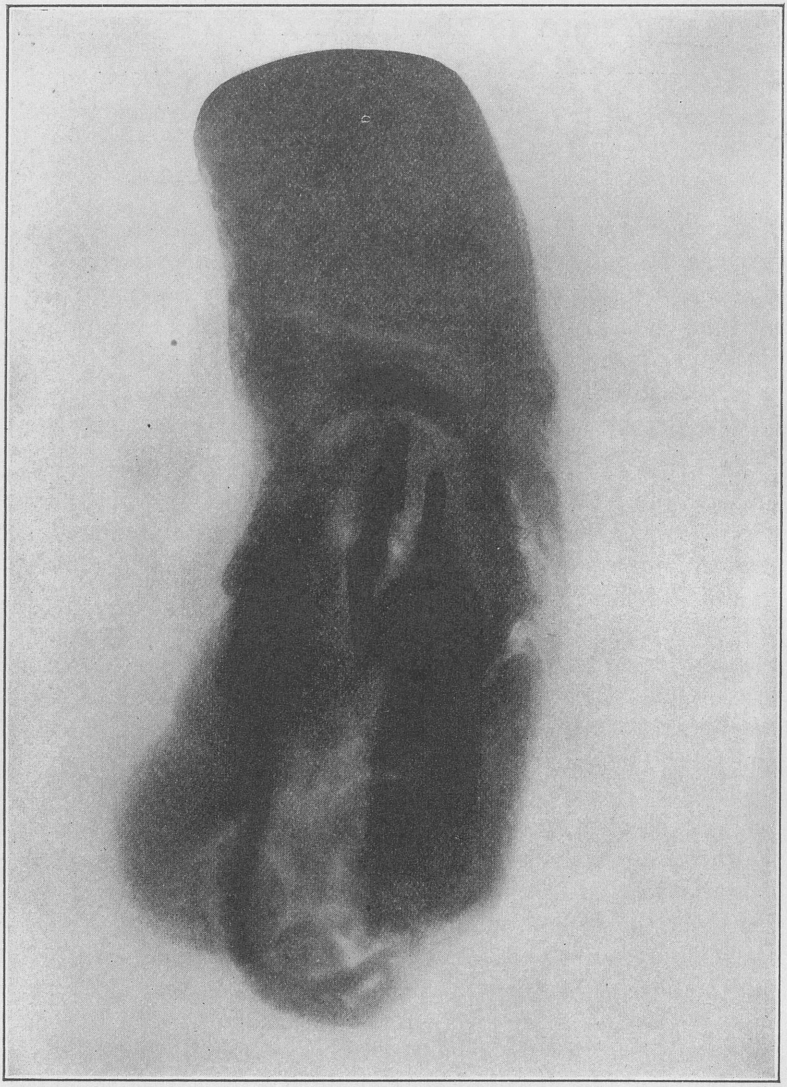


Fig. 1. Radiograph of post-mortem specimen of tongue, larynx and pharynx of an insane patient, showing key and screw-eye as they were found post-mortem.

Both of the objects projecting upward into the pharynx would have been very readily visible on indirect laryngoscopy, and indeed could easily have been removed by the indirect method by such skillful indirect laryngoscopists as constitute the older membership of this society; but there was never any examination made of the throat because the man had a delusion that he was a deaf mute. It was known that he could both hear and speak. It seemed quite certain that the presence of the foreign bodies had absolutely nothing whatever to do with the patient's death.

ANGIOMA OF THE LARYNX.

EMIL MAYER, M.D.

Angioma of the larynx is of rare occurrence. The importance of its recognition becomes at once apparent when we consider the danger that may follow upon an attempt at the removal of a portion of the angiomatous induration for diagnostic purposes.

In the case here recorded there was good reason to suspect the condition to be due to a malignant growth, and an attempt at removal of specimen for confirmation of that diagnosis might have led to fatal consequences.

Mrs. S. R., aged 52 years, was first seen by myself in consultation with her physician at my office September 20, 1915. She had been hoarse for a year. This was her second attack. Six months previous to the beginning of this attack, she had been hoarse for a time, had a profuse hemorrhage from the mouth, and her hoarseness left her to return some months later. There was some cough, no pain, but attacks of dyspnea occurred on the slightest exertion. Patient well nourished and there was no loss of weight.

An examination showed a growth involving the left side of the larynx, extending from the lower surface of the left false cord downward, diminishing the lumen of the larynx appreciably. The left vocal cord was not visible.

The diagnosis of cancer of the larynx had been previously made, and the likelihood of this was not deemed impossible. The patient was advised to enter the hospital for observation and operation, if indicated.

On October 4, 1915, she entered Mount Sinai Hospital in the service of Dr. Charles A. Elsberg, and I was requested to examine her and report as to the diagnosis.

Upon examination I found a dark, bluish-gray mass, yielding to the probe, generally rounded and extending downward, on the left side, from the under surface of the false vocal cord, and completely hiding the true cord, without having the external

appearance of a cancerous growth. My diagnosis was angioma of the larynx. In view of the history of a previous hemorrhage, and the danger of uncontrollable hemorrage following, I declined to remove a portion of the growth, but advised laryngofissure and extirpation of the mass.

The operation of laryngotomy and excision of the angioma of the larynx was done by Dr. Elsberg. Local anesthesia: Under infiltration anesthesia, incision five centimeters long made over thyroid cartilage. Cartilage split in median line and edges retracted. Mucous membrane of larynx thoroughly cocainized with ten per cent. cocain. The posterior half of the left true vocal cord was occupied by a bluish tumor which extended into the ventricle on that side and over the greater part of the false vocal cord. The tumor was 2 cm. in its greatest length and 1½ cm. in its greatest width (Fig. 1). After incision of the

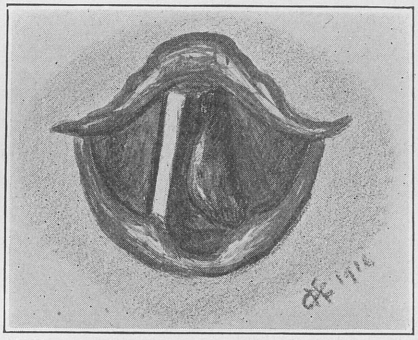


Fig. 1.—Growth in situ.

mucous membrane above the tumor down to the cartilage, the entire mass was peeled out of its bed. Part of the thyroid cartilage, the entire false vocal cord, part of the wall of the ventricle and the posterior half of the true vocal cord being excised. The base was touched with the thermo-cautery. Bleeding very slight. The mucous membrane was then raised up to the epiglottis and into the saccule until it was possible to unite its edge with the mucous membrane below the vocal cord. The edges were united by inter-

rupted sutures of fine catgut and the continuity of the mucous membrane thus restored. Edges of the thyroid cartilage were then approximated by sutures of catgut and the skin wound closed with drainage.

At the time of operation a frozen section of the tumor was made by Dr. F. S. Mandlebaum, pathologist to the hospital, who reported it to be non-malignant. Subsequent sections showed it to be a hemangioma.

The patient made an uneventful recovery and was discharged cured on November 6th, with a reasonably good voice.

An examination made January 27, 1916, showed no evidence of former growth, the left vocal cord is much thinner than normal, the voice is strong but husky, and the patient has had no discomfort.

The greatest point of interest in this case lies in the diagnosis. She had been seen by a number of laryngologists who all concurred in the diagnosis of tumor of the larynx, cancerous in nature. In fact, at first it seemed so to me, but the color of the growth, its yielding to the probe, and finally the history of an unaccounted for hemorrhage, made me confident that it was an angioma.

I then decided not to attempt the removal of the whole or a part endolaryngeally, and I am confident that had I done otherwise, there would have been a severe hemorrhage requiring a hasty tracheotomy, and perhaps a fatal ending. This opinion is held by others who have encountered this affection in this most unusual situation.

The number of cases found in the world's literature is very small. John Phillips and H. O. Ruh [1] have recorded an interesting case of this affection in a young child. It has been carefully studied and is very interesting: "A boy aged nine months was hoarse, had gradually increasing difficulty in breathing, cough and inspiratory stridor dating back to an attack of measles four months previous. The dyspnea was especially severe at night. The child was brought to the hospital with pneumonia and was moribund. The larynx could not be examined. The child died the next day.

"At the autopsy, stenosis of the larynx, chronic catarrhal

laryngitis, hemangioma-simplex of the larynx, early lobar pneumonia of the lower lobe of the left lung, were the main features found."

Of special interest is the detailed description of the condition of the larynx and trachea:

"On removing the larynx and on external inspection it appears quite normal. On looking down between the vocal cords, how-

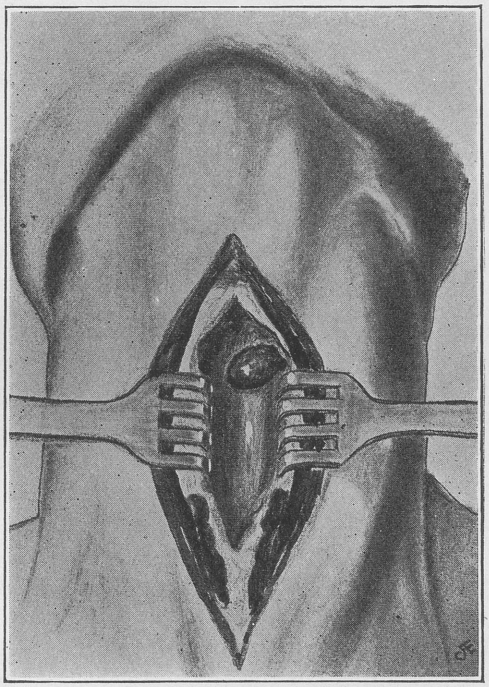


Fig. 2.—Appearance after laryngo-fissure.

ever, marked changes are found. Instead of the characteristically shaped chink between the true vocal cords, there is only a very small slit-like aperture with granular edges. On opening the larynx over the anterolateral portion of the wall and extending from the true vocal cord down to the third ring of the

trachea, there is a reddish gray growth with quite an irregular and granular surface. Opposite the lower border of the thyroid cartilage, there is a slightly larger growth of a deeper red color, with a more irregular surface. The lumen of the larynx and upper part of the trachea is greatly narrowed by this growth. The greatest narrowing is at the true vocal cords, where the opening measures 1-5 x 3 mm.; the point of the greatest thickening is at the lower border of the thyroid cartilage where the mucous membrane measures 4 mm., while at the latter it is only 3 mm. at the widest point.''

The pathologic changes in the larynx are confined to the mucosa, and show marked differences in the various regions.

''Just below the vocal cords there is a great thickening of the mucosa. This depends on an increase of all the elements, but more especially in the fibrous connective tissues. Towards the lumen, the tissue is infiltrated with mononuclear leucocytes and plasma cells. Thin-walled engorged vessels are quite numerous and the mucous glands, which normally in this region are rather small, are quite large and show evidences of an active hyperplasia. In places they are considerably distorted by the overgrowth of the surrounding connective tissue. The lumina of the glands and their ducts are filled with a faintly basic-staining homogeneous material in which a few mononuclear cells are found.

''The gland cells stain deeply, and the nuclei are very large. The epithelium of the larynx is absent in not a few regions, and here the tissue is densely infiltrated with round cells and the surface is covered by a small amount of cellular exudate. The tissue in this region is quite edematous.

''Near the lower border of the thyroid cartilage in the region which microscopically appeared of a deeper red than elsewhere, very interesting changes are found. Here, as in other portions of the laryngeal mucosa, the glandular elements are hyperplastic, but instead of being imbedded in an edematous, infiltrated, fibrous, connective tissue, they are compressed and distorted by what appears to be a true hemangioma-simplex.

''The main portions of the tissue are composed of numerous

small tortuous vessels, with thin walls and quite prominent endothelium, which in places seems to be more than one layer in thickness. The vessels lie very near each other, the interstitial tissue being composed of numerous spindle-shaped cells. All the vessels are filled with blood.''

The same writers found but twenty-six cases of this affection in a critical review of the literature, their own case being the twenty-seventh, and they present a brief reference to each of these twenty-six cases.

The earliest recorded case is by Fauvel in 1876. Others were presented by Coupard, Heinze, Louis Elsberg, Kidd, Seiler, Wolfenden, Schwarz, Desvernine, Brown, Loomis, M. Mackenzie, Beau, Brady, Glasgow, Ferreri, Matzen and Thurber.

These cases, however, are not all the recorded ones, for I have found twelve more cases omitted by them, and one more published since theirs. These with my own case bring the total number of cases found in the literature up to forty-one. They are here presented in brief:

Edmund Meyer[2] at a meeting of the Berlin Laryngological Society, January 22, 1904, showed a specimen of cavernous angioma of the larynx removed from a thirteen-year-old boy by means of laryngo-fissure and galvano-cautery snare. The growth was subglottic on the right vocal process, and so filled the larynx as to occasion great dyspnea. Microscopically it was composed of cavernous tissue and newly formed vessels.

Biaggi[3] (Eighth Congress of the Italian Society for Laryngology) records a case of cavernous angioma of the larynx in a hemophiliac forty-two years old. Hoarse for two years and occasional attacks of dyspnea. Tumor of the larynx, size and color of a raspberry. Spontaneous expectoration of the tumor with much hemorrhage checked by enemas of gelatine. Another growth remained in the larynx still larger than the first, which was removed by forceps eight days later and again the hemorrhage controlled by gelatine enemata.

Blevgad[4] (Proceeding Danish Oto-Laryngological Society, 1908) reports a case of pedunculated angioma on the left processus vocalis. Male, hoarse a few months, slight improvement,

later becoming worse. Fourteen days before examination sudden expectoration of blood, without any cause, after which the voice was better.

Examination showed a tumor of the size of a millet seed, white and irregular surface between the anterior and middle third of the left processus vocalis. This tumor was removed with the cold wire snare. There was little bleeding. The microscope showed it to be angioma. The writer believed that there was an attempt at healing after the spontaneous bleeding.

D. von Navratil[5] (Rhino-laryngeal section of Royal Hungarian Medical Society of Budapest, January 30, 1908) presented a case of angioma laryngis. Woman of thirty-one, with a tumor of soft consistency, reaching beyond the left vocal cord.

If there should be any increase of stridor the speaker contemplated removal of the tumor by laryngo-fissure. In the discussion von Lenart (loc. cit.) would proceed endolaryngeally, while Donogamy (loc. cit.) asked for histologic examination. Von Navratil, in closing, said he had observed the case for nine months and noticed its increase. He would not consider endolaryngeal procedure or removal of a portion, because of his experience of a severe hemorrhage from an endolaryngeal interference in a similar case, which caused suffocation and required hasty tracheotomy.

J. Safranek[6] (Tumors of Blood Vessels in the Upper Air Passages) reports two cases of angioma, one in a woman of twenty-seven. A small angioma with pedicle extending from the vocal process, and the other with a broad base on the right arytenoid.

E. Pistre[7] (Contributions to the History of Bloody Tumors of the Larynx; Cavernous Angioma of the Right Vocal Cord) records a case with histologic report.

Loubert[8] (French Congress of Oto-Rhino Laryngology, Paris, May, 1912) reports a case of subglottic angioma.

F. Roux[9] (on angioma of the larynx) reports three cases occurring on the vocal cords and a fourth one at the tip of the left arytenoid.

G. S. Ryerson[10] angioma of the larynx. Female, aged fifty-five. Difficult and oppressive breathing without pain, hoarseness or cough. Had lingual varix which was cauterized. "On

the left side on the anterior surface of the arytenoid, on the ventricular hand, and along the external margin of the vocal cord, is a bluish-purple mass, lobulated and presenting the appearance of a small raspberry. Another similar smaller body, on the anterior surface of the right arytenoid, extended beyond it. Because of disastrous effect of operative interference, radium was preferred and tried successfully.''

Martuscelli and Porfidia[11]. The writers lay special stress on the size of the growth and upon the fact that the tumor had undergone hyaline and amyloid changes. They state that Massei (International Congress of Laryngology, Vienna, 1908) declared that of eight hundred cases he had seen, only ten were large enough to be called ''giant tumors.'' Massei was the first to call attention to the association of hemo-angio-endothelioma of the larynx and general sarcomatosis cutis, and the similarity in the histological structure of the two kinds of tumors. Such growths may attain a large size in the larynx, and have been found not only in the isthmus and under the vocal cords, but also on the uvula, soft palate, and walls of the pharynx. The authors give only a short history of their patient—a man, thirty-two years of age, addicted to excesses (tobacco and alcohol) was brought to them with the history that he had been having atacks of painful asthma for a long time. Breathing had been much interfered with at times, he had the feeling as if there was a foreign body in his throat. Occasionally he felt as if he was suffocating, and one night had an attack in which he had great trouble in getting air. Examination: A large growth filling the aperture of the larynx almost completely, very soft and changing its shape and volume with respiration, so that it caused a varying amount of obstruction to breathing.

After the thorough application of cocain and adrenalin, the base of the growth below the vocal cords could be seen. The growth was the size of a chestnut and presented the appearance of an angioma. (The authors do not describe the appearance of the growth, they do not say what was its color, and fail to state exactly where the growth started.) With a Mackenzie forceps modified by Martuscelli, an attempt was made to get

around the growth. This failed on account of the deep situation under the cords. At a second attempt the growth with its pedicle was removed. Lively bleeding followed, and though the hemorrhage was never an alarming one, it required all the skill and close attention of an experienced laryngologist to control it. Frequent applications of cocain and adrenalin finally controlled the bleeding.

The growth was the size of a chestnut, it consisted of a mass of dilated and new formed capillaries, lying in an amorphous and homogeneous stroma, which gave with eosin the typical staining reaction of hyalo-amyloid degeneration.

After remarks on amyloid degeneration of laryngeal tumors, the authors conclusions are:

1. Report of a rare "giant" growth of larynx.

2. It was a rare form both as an angioma and because of the amyloid degeneration.

In a discussion on a case of angioma of the larynx presented by Thurber[12] before the Laryngological Section of the New York Academy of Medicine, Simpson advised evulsion, while I called attention to the dangers of this method and advised laryngo-fissure.

As a rule angiomata of the larynx lie at the entrance, and my own case is the only one, as far as I can ascertain whose position was in the favorite site of malignant disease and was suspected of malignancy.

A study of this and of the recorded cases enables us to reach the following conclusions:

1. Angioma of the larynx is a rare disease, occurring mostly in adults and the proportion of males to females is approximately four to one.

2. It may be mistaken for cancer.

3. Endolaryngeal removal of a portion of the growth for diagnosis, or its complete removal in this manner, is fraught with danger and may have serious results.

4. Laryngo-fissure, removal and suturing the mucosa are entirely safe and feasible procedures.

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DISCUSSION

DR. HENRY L. SWAIN, New Haven, Conn.:

If Dr. Mayer wants another case simply to bear out what he said about the danger in operating upon these patients, I might mention one in which I attempted to remove a growth of this kind. We got hemorrhage and plenty of it! If anything further was needed to substantiate the diagnosis the microscope did. I have a slide at home showing it to be true angioma of that type. The patient was a man fifty years of age.

I am interested to hear what Dr. Lynch thinks he could do with such a case by suspension.

DR. ROBERT CLYDE LYNCH, New Orleans, La.:

I have never had an opportunity of seeing one of these cases and have therefore had no personal experience with them. I think, however, that if it were possible to get underneath the place of attachment, and if the surface was not too broad and the position properly localized, it might be possible to remove it under suspension. However, that could be decided at the time the case presented itself.

DR. EMIL MAYER, New York City, closing the discussion:

I have nothing further to add except to present the illustration of this angioma of the larynx and pass it around.

A SURGICAL CONSIDERATION OF THE UPPER PARA-NASAL CELLS.

GREENFIELD SLUDER, M.D.

I propose a surgical procedure for treatment of the upper paranasal cells which cuts always downward and forward. All other procedures so far as I know cut more or less upward and backward.

Anatomically the paranasal cells are designated according to which meatus of the nose they enter. This is more or less an anterior and posterior subdivision, and for the purposes of diagnosis this must remain unchanged. For surgical purposes, however, it seems to me that they may advantageously be thought of as upper and lower, the latter being the antrum of Highmore, the former being the remaining cells. This subdivision establishes a horizontal dividing line on the lateral wall at about its middle. Successful surgery of the antrum must leave a drain at the level of the nasal floor. The lowermost part of the upper cells is along the line separating them from the antrum, i. e., the horizontal midline. Successful surgery of the upper sinuses, however, is not achieved by a drain along this line, for the reason that there are usually cells which are limited to a part far above the midline. Successful surgery of the upper sinuses must lay open for drain the upper cells in their entirety beginning at or very close to the cribriform plate of the ethmoid—the roof of the nose—opening at the same time the lowermost of these cells, that is, removing the lateral wall with the middle and upper turbinates above the midline.

This procedure may be conservative or radical. The former consists of the removal of the turbinate and the very superficial layer of the capsule of the ethmoid. The radical operation consists in removing the capsule "part and parcel" including the orbital plate when desirable for drainage of the orbit into the nose, at any or all points from its anterior limit to its apex.

One comprehensive surgical procedure has been offered for this district. To this therapeutical end particularly was directed

the understanding mind of Dr. H. P. Mosher[1] when he proposed the "Surgery of the Ethmoidal Labyrinth." That procedure must of necessity be a radical one, although he does not recommend it for the extreme of radical, opening the orbit.

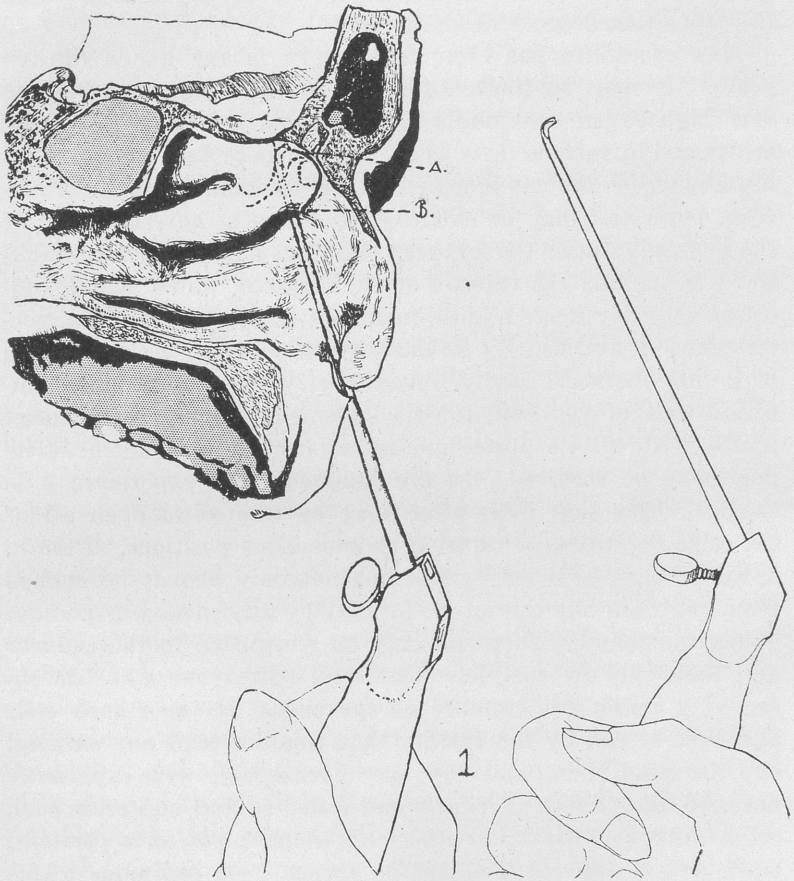

Fig. 1. On the right the angle knife is shown in the sagittal plane ready for insertion under the middle turbinate. On the left it is shown in position for the forward and downward cut. It has been introduced into the infundibulum and rotated 30 degrees inwards, i. e., toward the septum nasi. The heavy line a-b shows diagrammatically the line of this first cut which may be accomplished in one stroke or two, according to the surgeon's election (I prefer two strokes usually).

It seems to me that the procedure that I now submit has some advantages that are not otherwise offered. Mosher's operation cannot (as I understand it) be made conservative. By this I mean the simple freeing of the outlets of the cells leaving their walls otherwise intact. And the more completely it is executed the more risk it must needs involve.

This procedure has been satisfactory in my hands for ten years. It may be limited for the frontal sinus, providing a very high cut of the middle turbinate which I have frequently mentioned in various texts as a "cribriform or infundibular turbinectomy." The cut is actually 2 or 2.5 mm. from the cribriform plate and may be extended to the most anterior limit of the infundibulum. Or this very high cut may be carried backward to include the capsule of the ethmoid, under which condition not only is the middle turbinate removed, but the uppermost line of, and usually all the other ethmoidal cells are opened wide into the nasal cavity. And when desirable the entire anterior wall of the body of the sphenoid from its uppermost limits, with all its postethmoidal association and much of its floor may be removed. In my judgment and experience it is the technique that most often may be trusted to open all of the cells, regardless of unusual or anomalous positions. I know, however, that cells may exist that not only cannot be opened from the nose but cannot be located by any means at present at our command. They can only be recognized in the cadaver and then only by complete dissection. Everyone who has observed a reasonable number of specimens has seen such cells and been struck by the futility that would attend any surgical effort to reach them; and everyone of reasonably wide experience has met cases where all efforts had failed to find and treat such cells. *But there are many other cells that are placed in positions more or less unusual that will be opened by a technique which has for its primary plan an incision which will skirt the cribriform plate and remove the middle turbinate at its most anterior as well as its most upper limits and extend into the sphenoid body at its uppermost part regardless of the natural opening, and then be extended downward until it has cut through its floor* or found it to be impenetrable. I have here avoided the

designation of sphenoid sinus because such a term does not always comprehend the full body of the sphenoid. It (the body) may be subdivided, and shared by a postethmoidal cell. And it is this variation which I believe to be the most pernicious from the clinical side (for headache and optic nerve lesions), as well as anatomically far more frequent than is at present recognized clinically. This variation will (it seems to me) be satisfactorily dealt with by this proposed technique—practically every time it is met. Also pre-frontal ethmoidal cells will be opened into the nose as a rule, if not uniformly.

The Operation. In 1907 [2] I published an elementary text in which I described a surgical method which was at that time novel. It consisted in approaching the turbinate from above on its inner side. Prior to that all surgical approach was from below laterally upward, removing it by scissors or snare or a combination of these or such working instruments. I describe a knife consisting of a handle, a shaft and a cutting end turned at a right angle to the shaft and sharpened so as to cut on the inside of the right angle, i. e., on the pull. It was also sharpened on a face parallel to the shaft which at the same time gave it far more strength than a hook could have were it sharpened on its concavity. I selected this shape in preference to a hook for those reasons, and the fact that great strength is necessary for the tasks to which this knife is put. The knife although possessing great strength is so small that it may readily enter spaces which larger instruments could not. I believe it to be the smallest nasal instrument possessing great strength.

Surgical Procedure. A glance at the lateral wall shows that the higher and the more forward the infundibulum is opened the wider and freer will be the inlet to the frontal sinus usually. At the same time pre-frontal ethmoidal cells will usually be opened by such an incision. For these reasons it has been advantageous in my hands to introduce the knife sagital under the anterior third of the middle turbinate as far back as the uncinate process, as high as the cribriform plate with its cutting edges facing forward. It is then rotated somewhat inward and drawn forward and downward, fig. 1. Considerable forward pressure is kept on it while it is being drawn downward.

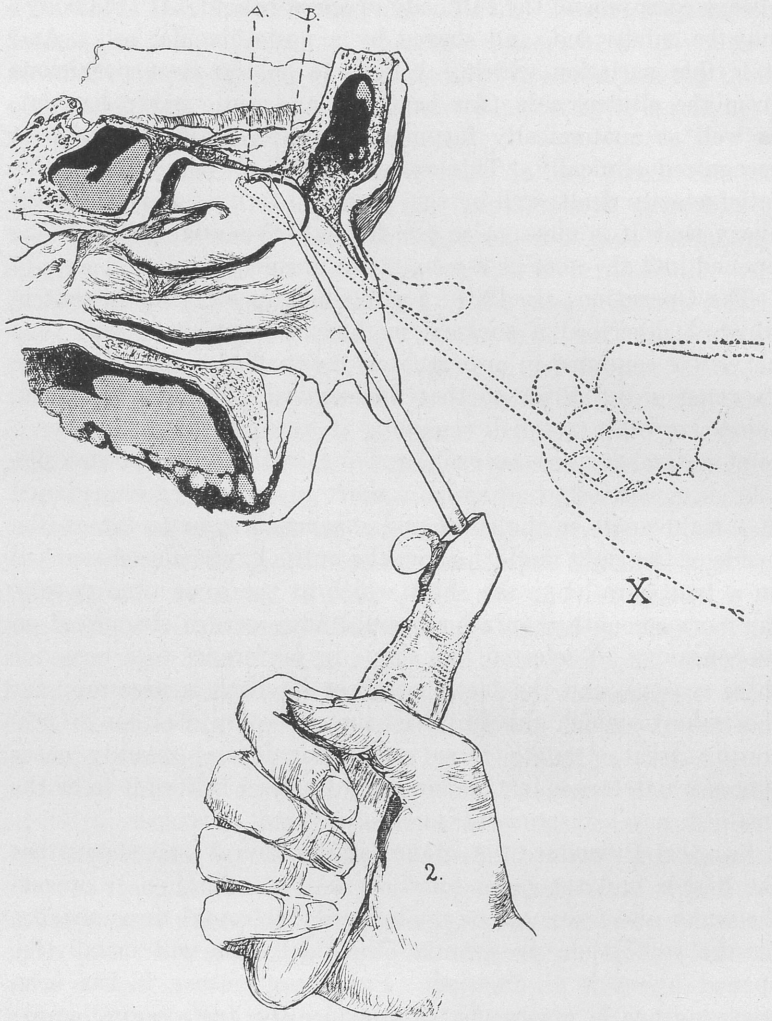

Fig. 2. Shows the angle knife introduced between the septum and middle turbinate. It has passed 1 cm. back of the first cut along the cribriform plate. The dotted line X shows it to have been rotated outward until its cutting edges point 30 degrees above the horizontal. The tip of the nose has, at the same time, been forcibly elevated. The heavy dotted line a-b shows the line of cut.

In this way the foremost and uppermost nasal wall of the capsule of the ethmoid (with the atachment of the middle turbinate) is cut open and the pre-frontal cells of the ethmoid are thereby thrown open, as the nasal wall of these cells is usually constituted by that part of the capsule with the attachment of the turbinate. This must be considered the conservative technique. By these means, however, are put an outlet to the usual frontal sinus that comprehends the dimensions of the usual infundibulum, i. e., 1 cm. anteroposteriorly and 0.50 cm. laterally. Should this size be reduced to such a degree as to require some procedure more radical the knife is then engaged in the hiatus semilunaris with its cutting edges facing forward or downward—usually in the uppermost limit. By a downward pull, the uncinate process will be removed, and the knife may finally be engaged in the floor of the anterior part of the frontal sinus. (Fig. 12.) This may be so thick and hard that it is with difficulty or impossibly handled by this knife. A large enough opening, however, is usually secured to admit a Good rasp or a burr. The burr is then introduced into the sinus and put in motion with a forward and downward pull. In this way I have slightly modified Ingal's ideal frontal sinus technique. This stroke of the right angle knife, it will be seen, is safe, as it cuts away from danger, or the knife in position, cutting edges facing upward and forward is likewise safe with a downward pull as it also cuts away from danger. It will cut into the buttress of the lower anterior part of the floor of the sinus.

For the ethmoidal district the knife is reintroduced along the cribriform plate—its smooth elbow with a gentle touch, recognizing the smooth uppermost limit of the nose—to a distance 1 cm. In this position its two cutting edges face downward. It is now rotated till its cutting edges point outward and slightly upward. The upward turn is added to the outward for the reason that the outward and upward position permits of a horizontal straight line pull. This is away from the cribriform plate. The slight upward turn keeps the line of incision much more nearly the horizontal despite the fact that the pull must needs be downward and forward or forward and downward. The

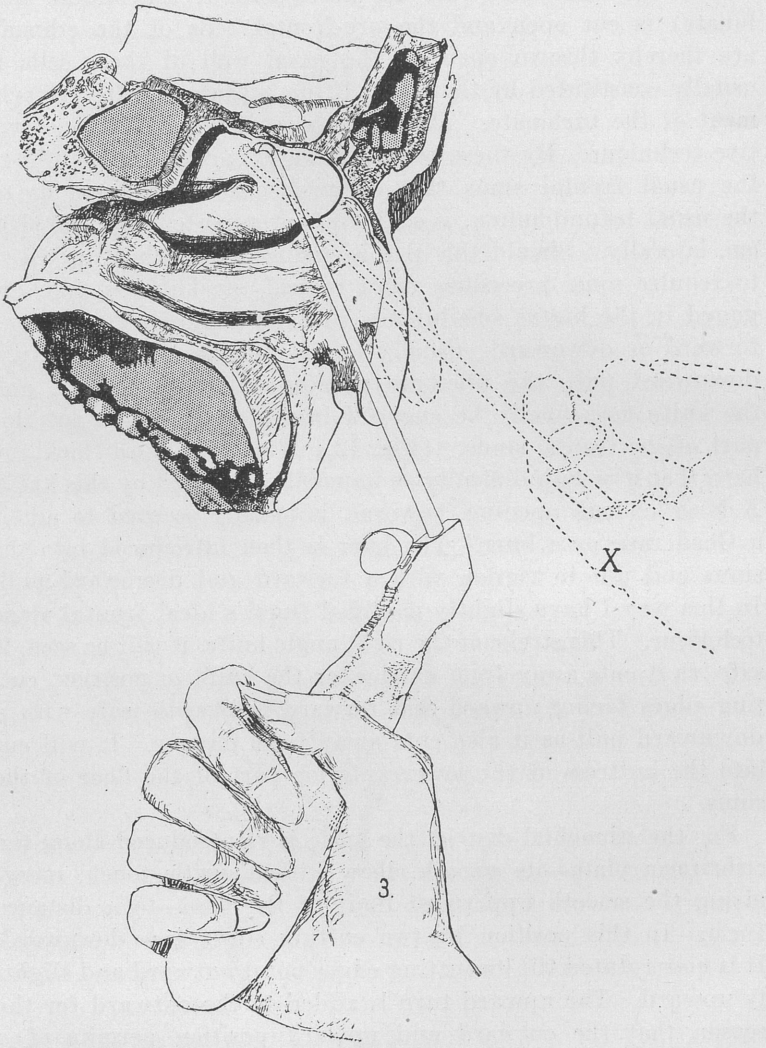

Fig. 3. Is the same as Fig. 2, with the difference that the knife has been passed the second time along the cribriform plate to a distance 1 cm. back of the first cut.

safety of this cut is provided by two factors, i. e., the cells of the ethmoid in their extension into the roof of the orbit rise at once above the cribriform plate; and the length of the cutting arm of the knife which should be 2 mm. is too short to cut through the thickness of the nasal orbital thickness of the ethmoid capsule under any circumstances. This incision is the first of two or three similar ones. (Figs. 2 and 3.) I prefer to divide it into two or three because I can keep my bearing upon the cribriform plate more satisfactory by these shorter cuts than in one longer one.

Now the operative procedure is to be directed by the judgment of the surgeon. In my judgment the only turbinectomy should be a cribriform or infundibular turbinectomy, i. e., one that opens the infundibulum to its widest possibilities, for the reason that a lower cut leaves a stump that is physiologically worthless and surgically difficult of later manipulation. This is not in reality a stump although in former years I considered it such. It is that part of the ethmoidal capsule which makes the inner portion of the final entrance of the frontal sinus into the nose—the anterior part being the uncinate process, the posterior part being the bulla ethmoidalis, the external and internal parts being ethmoid capsule. The removal of this inner part as high as possible usually gives an inlet to the frontal sinus 6 mm. anteroposteriorly by 3 mm. laterally. Some frontals enter the nose by a devious[3] channel and cannot be considered as usual. If this upper internal part of the frontal inlet be not removed at the primary operation it seems to me to be unfortunate, as a secondary operation will almost surely wound the epithelial surfaces of the frontal inlet and then be followed by connective tissue development which will block the inlet. The primary high cut is usually accomplished without that result, leaving the hiatus semilunaris and infundibulum free of scar tissue. The secondary operation is usually of necessity done with more trauma to the hiatus regardless of whatever technique be employed. For this reason I emphasize the advisability of doing the foremost cribriform cut primarily if the anterior half of the turbinate is touched at all, regardless of whatever else is to be done surgically.

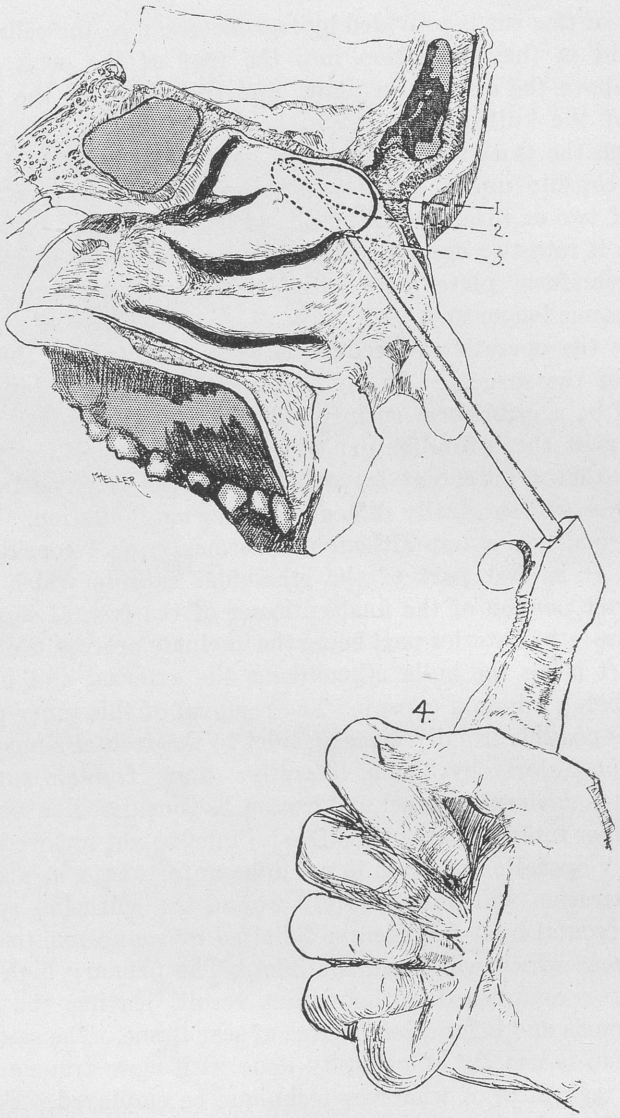

Fig. 4. Shows the knife introduced sagitally under (lateral to) the middle turbinate for the purpose of cutting into the capsule of the ethmoid. The dotted line 1-2-3 shows the successive cuts from above downward. These cuts may be readily made to enter the orbit by inclining the cutting edges 30 degrees outward. In the conservative employment of this technic, this employment of the knife may be omitted.

The cutting edges of the knife (reintroduced) are now turned downward or downward and slightly outward (Fig. 4), and the incision is placed superficial (internally) or may be placed as deep(externally)in the capsule of the ethmoid as the judgment

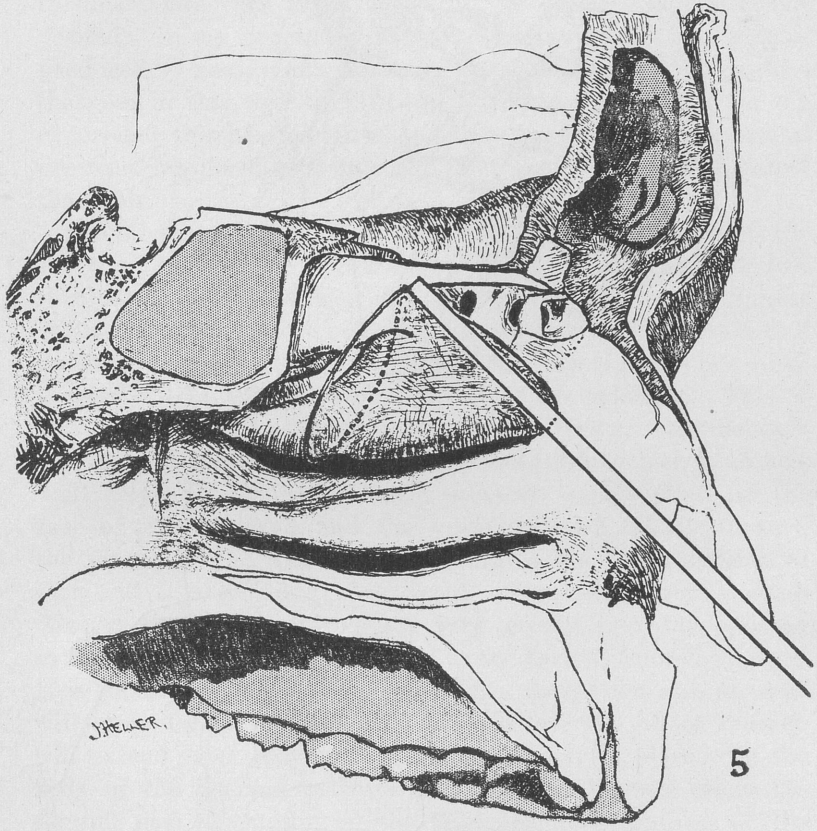

Fig. 5. Shows the snare loop placed around part detached.

of the surgeon directs. For the simplest subacute suppurative cases, the superficial incision suffices. For most radical, e. g., an orbital phlegmon back of the transverse meridian of the eye, the incision goes through the capsule into the orbit in its posterior

Fig. 6. Shows knife 1 passed backward along cribriform plate penetrating anterior face of sphenoid at its top. The dotted lines 2 and 3 show knife passed back to posterior wall of cell and to have been rotated 20 degrees inward cutting downward to hug the septum nasi.

half. This is readily and quickly done. The detached mass is then by means of the same knife, which may be turned somewhat transverse, pushed downward into the nose where a snare may be put around it and cut it from its attachments (Fig. 5).

The procedure may be varied by a superficial removal of the turbinate and then the excision of the capsule to any extent desired. In my practice I have had twenty orbital phlegmons, produced by nasal sinus ruptures, twelve of which I opened into the nose in this way back of the transverse meridian. In my experience this has far surpassed the results of external orbital drainage inasmuch as it drains by the same route that infected the orbit.

Should the sphenoidal and post-ethmoidal cells also need the surgeon's care, I then (after the snare amputation of the middle turbinate) pass the angular knife very gently backward along the cribriform plate with its cutting edges downward. In this way its smooth, round elbow glides along the cribriform plate until it meets the anterior face of the body of the sphenoid. This, it will be seen, is the uppermost point of the face and is independent of the natural opening of the sphenoid sinus which is usually well below this point.[4] Gentle pressure is now made on the face of the sphenoid and the knife inclined slightly toward the septum. The first stroke perforates the usual sphenoidal face and cuts somewhat downward. The knife, cutting edges downward, is then introduced very gently into the opening so made and very gently extended as far back as the cell permits. It is rotated 15 deg. inward, and drawn downward and forward with any degree of force that may be needed. This incision will extend from the junction of the cribriform plate with the body of the phenoid downward, a varying distance along the septum nasi depending on the thickness and hardness of the bone. Should this incision not have reached the floor of the sphenoid, another similar one usually does (Fig. 6). Then the knife, edges down, is again passed along the cribriform plate and very carefully introduced back into the uppermost limit of the opening already made. It is then rotated 30 deg. outward and brought out forward and downward (Fig. 7). This incision includes a considerable part of the wall separating the post-eth-

moidal from the sphenoidal cell, and it has the *advantage* of beginning at the uppermost limit of the sphenoidal face. It has a distinct advantage over all methods which begin their procedure in or from the natural opening of the sphenoid, for the reason

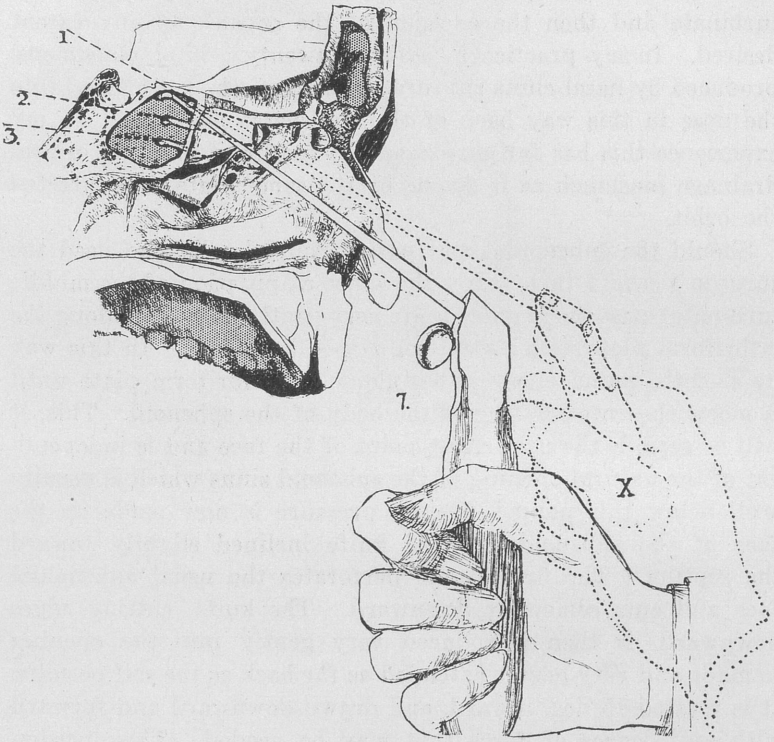

Fig. 7. Shows knife to have been reintroduced through uppermost part of sphenoidal cut as shown in Fig. 6 to posterior wall of cell. It is then rotated 30 degrees outward (X) and carefully drawn forward and (necessarily) downward. The introduction of the knife to the posterior wall of the cell at its uppermost part insures the opening of many of the post-ethmoid cells that are developed into the sphenoid body. I believe this to be very important and one of the advantages to be secured by this technic.

that often a post-ethmoidal cell occupies a part of the body of the sphenoid and is placed above the sphenoidal cell. Figure 13 shows such a cell which would be opened by this technique and would probably not be opened by any other technique now

known. Such cells are exceedingly hard to deal with surgically and sometimes equally hard or impossible to find. Fig. 14B shows such a cell placed all above the line of the cribriform plate. This cell would not be opened by this technique and I do not believe it could be recognized in life by the present means of investigation. Some such cells, however, have a lateral and downward extension which is opened by the second stroke of the knife which is again introduced along the cribriform plate and inserted into the cavity in the body of the sphenoid, turned 30 deg. outward and drawn forward and downward. This second cut usually takes the post-ethmoidal nasal wall as well as most of lateral part of the sphenoidal face and often the mass

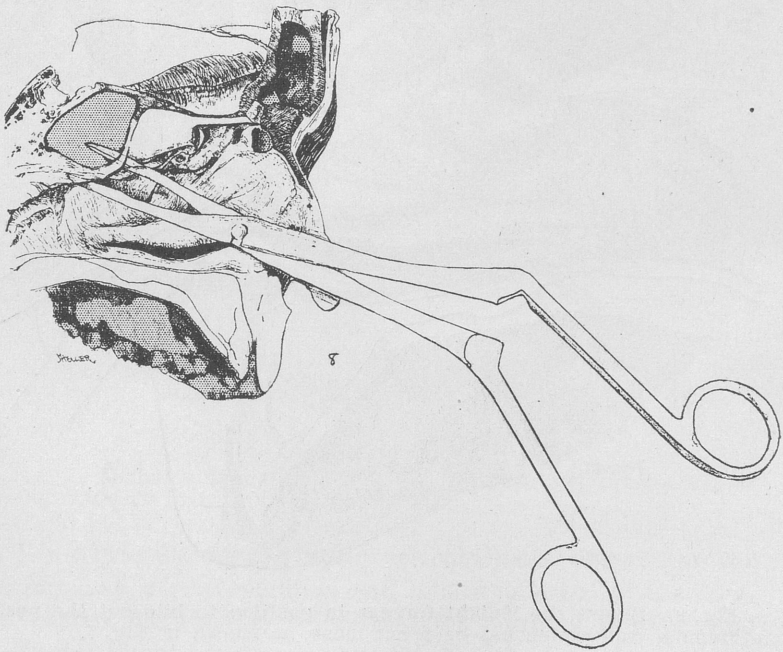

Fig. 8. Shows the Knight forceps (made especially for this purpose 3 cm. longer than the original model because this added length is often required) introduced into the opening in the anterior face of the sphenoid body ready to bite out the anterior half of the *floor* of the body. This is oftentimes easily done, but at other times the floor is too thick to be removed this way. It is removed by a rotatory movement.

may be removed in one piece. For this purpose I use the Knight forceps (Fig. 9 and 10), made, however, for this particular purpose, being 2.5 cm. longer than the original model. These forceps are then introduced into the cavity of the sphenoid (Fig. 8), and

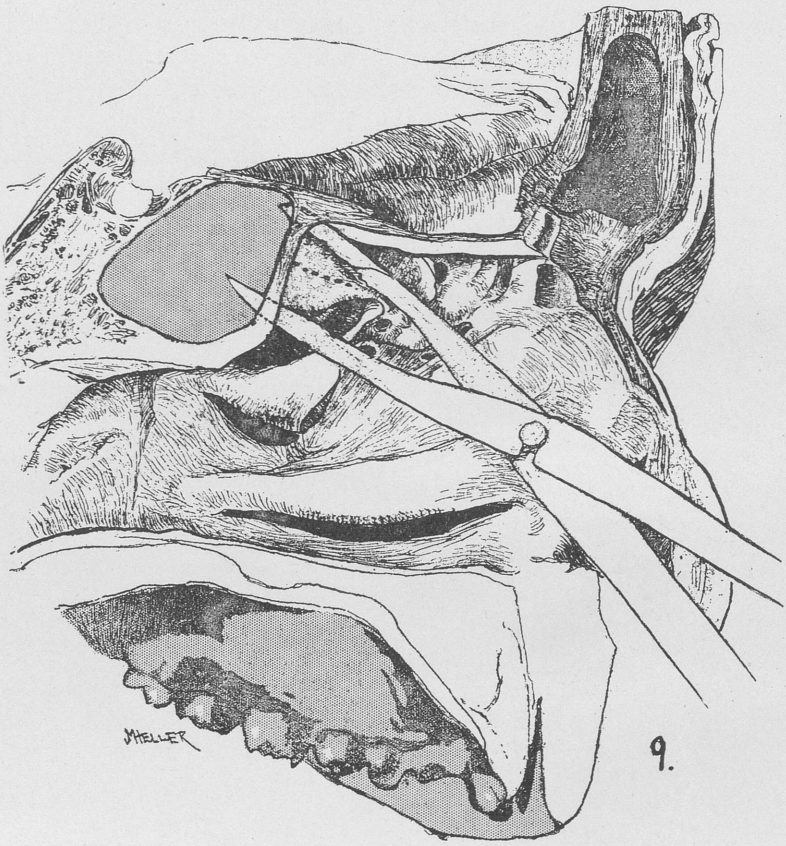

Fig. 9. Shows the Knight forceps in position to bite out the post-ethmoidal wall which has been cut loose, as shown in Fig. 7.

so the floor of the sphenoid is removed in part. Everyone knows, however, that the floor often is so thick and hard that it cannot be removed by forceps. A drill which will do such service may be advantageous.

In the performance of the post-ethmoidal sphenoidal portion of the technique I prefer a knife smaller and slightly different from that used in the anterior portion, for the reasons, first, that it is thereby rendered much stronger; it cannot be broken in any of the service it may be put into; and secondly, a knife 1.5 mm. inside cutting edge cannot inadvertently cut into orbit

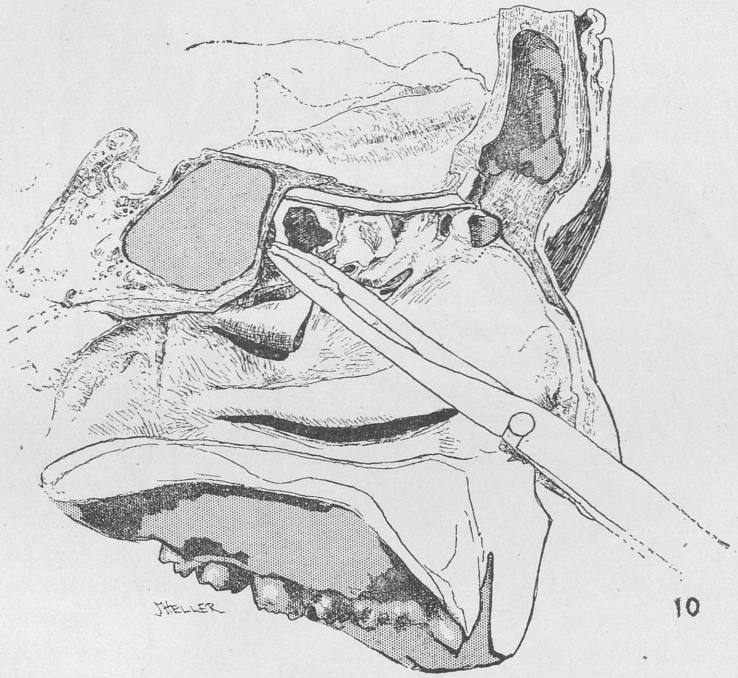

Fig. 10 Shows post-ethmoidal wall in grasp of forceps. It is finally detached by a rotatory movement.

in this service unless wielded by someone neglecting the proper performance of the operation and totally ignorant of the anatomy here; and thirdly, I feel that the angle of the sphenoid knife should not have turned the full 90 deg. from the shaft because such a knife could not be engaged in the face of the sphenoid. An angle of 68 deg. off the shaft which will make the cutting edge on the inside of the angle 112 deg. will bite readily into the face; and fourthly, a small knife 2.5 mm. in its entire

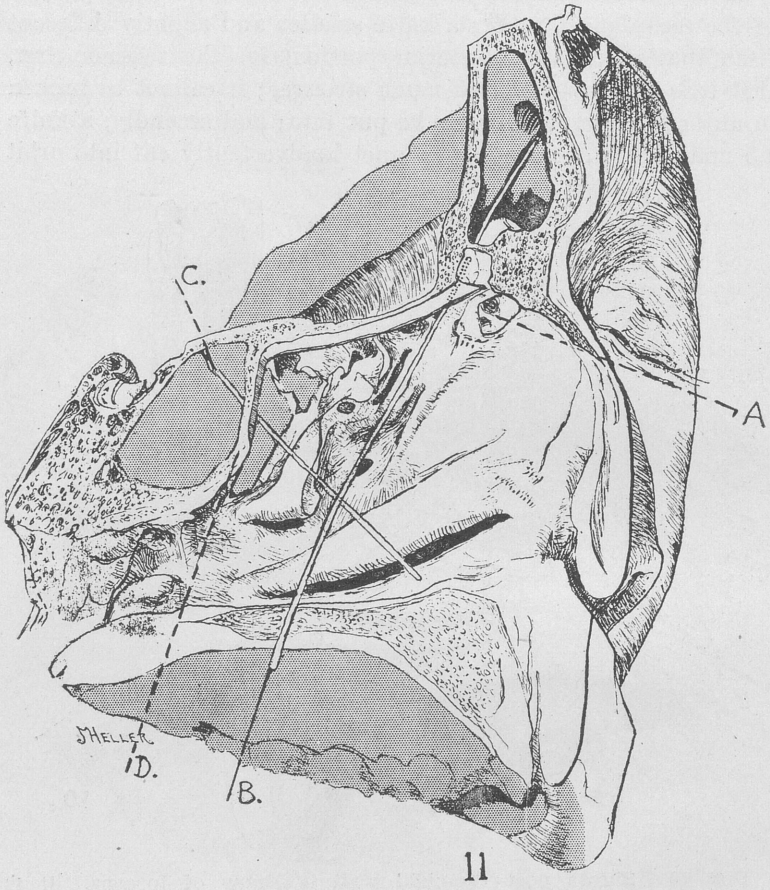

Fig. 11. Shows a three-quarter view of specimen with operation completed. The anterior half has been left "conservative," i. e., the wall is intact with all the openings free as far as 1.5 mm. of the cribriform plate. An infundibular cell, A, has been opened as shown first in Fig. 5. The posterior half is "radical," i. e., the anterior wall of the sphenoid cell has been removed with its entire post-ethmoidal part (lateral part, which is one-half or two-thirds of its extent). The post-ethmoidal cells have of necessity been dealt with radically to accomplish this, i. e., their entire nasal side has been removed. Bristle, B, is shown passing from the nose into the frontal sinus. Bristle, C, is shown passing through the post-ethmoidal-sphenoidal opening. A strip of bone, D, has been left to indicate the position of the sphenoidal-vomer junction.

cross measurement permits a much closer approach to the top of the sphenoid face. One 6 mm. could not get so close by 3.5 mm. In this service a hook sharpened on its concavity would be much less advantageous because, if bent to a right angle, it would not bite into the face and if in 68 deg. to 112 deg. shape it would not execute the work so well and its point would break easily, when it would take the shape of the knife now proposed without being sharpened.

I feel that special emphasis should be laid upon the necessity of the surgeon knowing what are the correct models of these knives. For this reason I submit dimensions and drawings (Fig. 16A and B). Too large a knife has the disadvantage (1) of taking up space unnecessarily, and of (2) biting more bone than it can cut, and (3) of possibly cutting inadvertently into the orbit, and (4) of being much more apt to have its angle cutting portion broken off in the operation. In this connection it must be emphasized that it is absolutely necessary that the knife be *tempered not too hard*. Should it be too hard it will always break with the work put on it in this operation. The instrument maker must specially understand this. It is far better to have it too soft. As such its cutting edges may not be as lasting, but it will not break.

Summary. The intranasal surgery of the upper cells may be performed by this method in *any part* or the *whole* as *conservatively* or as *radically* as desired. The ability to place the incision safely 2 mm. below the cribriform plate in any part of or in the whole length of its extent seems to me to be most advantageous, and not a small part of this advantage is the power to extend this incision to the foremost limit of the infundibulum, thereby opening the inlet of the frontal to its widest natural possibilities. It is most desirable to preserve the *natural* inlet here, and this is done by a cribriform turbinectomy which leaves undisturbed the histologic epithelial covering of the normal inlet, i. e., the uncinate process, the bulla ethmoidalis, the hiatus semilunaris and infundibulum, regardless of the anatomical variations of the frontal inlet. Should these parts be wounded, as in a curettement, the resultant scar tissue blocks the inlet. The angle knife removes by cutting any desired tis-

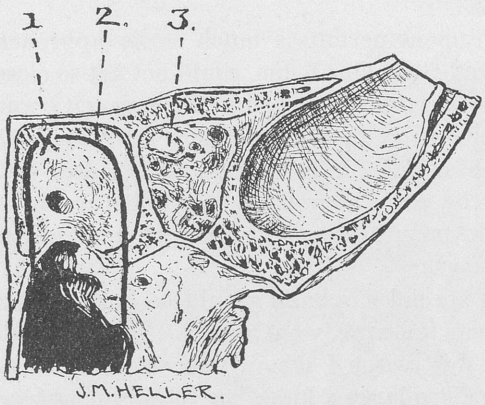

Fig. 11A. Shows diagramatic representation of post-ethmoidal-sphenoidal cut shown in Fig. 11. Transverse vertical section showing anterior sphenoidal wall viewed from behind. 1 the point X shows the entrance through the wall. The line 1-2 shows the extent of the incision. 3 the optic nerve.

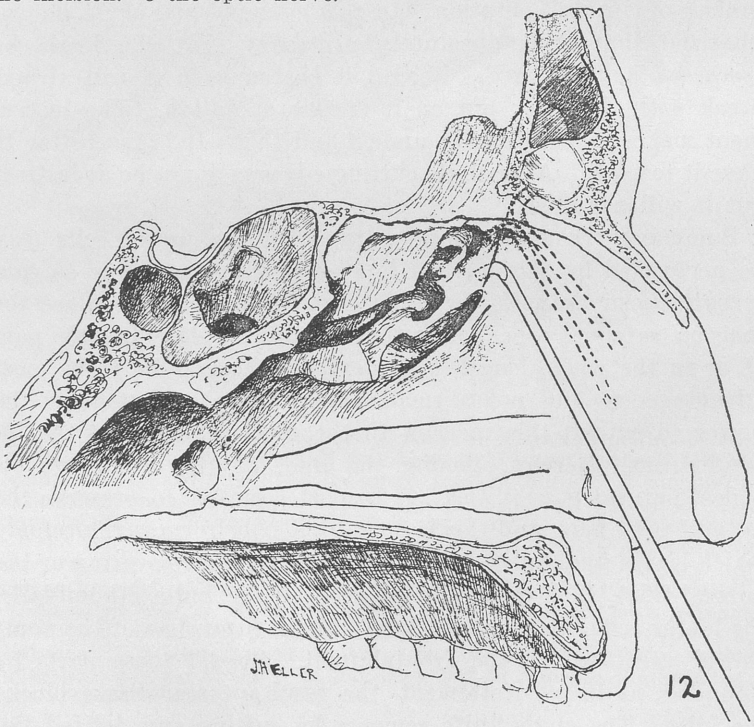

Fig. 12. Shows the knife in position for cutting away the uncinate process preparatory to Ingall's removal of the frontal sinus floor. Oftentimes the entire frontal floor may be cut away by the knife.

sue with the least possible trauma to the surroundings. In the sphenoidal district it opens the *uppermost* and *lowermost* possible parts of the face which has the advantage sometimes of opening also a *post-ethmoidal* cell which may occupy part of the body of the sphenoid. (Such a cell is often the cause of the

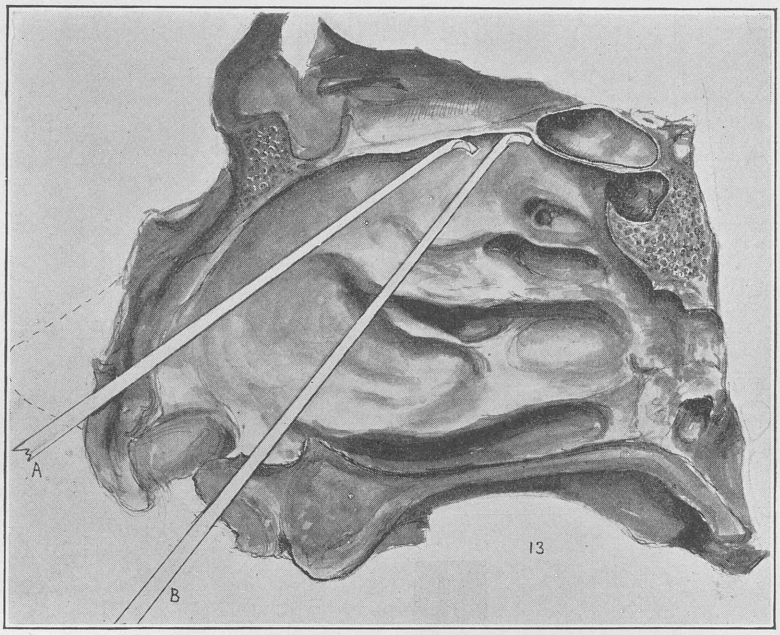

Fig. 13. Shows knife approaching a post-ethmoidal cell which lies on the top of the sphenoidal sinus and occupies about one-half of the body of the sphenoid. The line, A, shows position of approach. B shows the position for cutting. From considerable clinical experience I believe this cell would be opened by this technic.

entire clinical picture.) The angle knife is so small that it takes up the minimum room and so leaves the small field open to the best vision possible. Its execution is *always* in the direction *away* from the danger zone. I have so far not seen such satisfactory post-ethmoidal surgery by other methods. (This district seems to me the most dangerous of all, for on the outer upper aspect runs the optic nerve and above is the optic chiasm

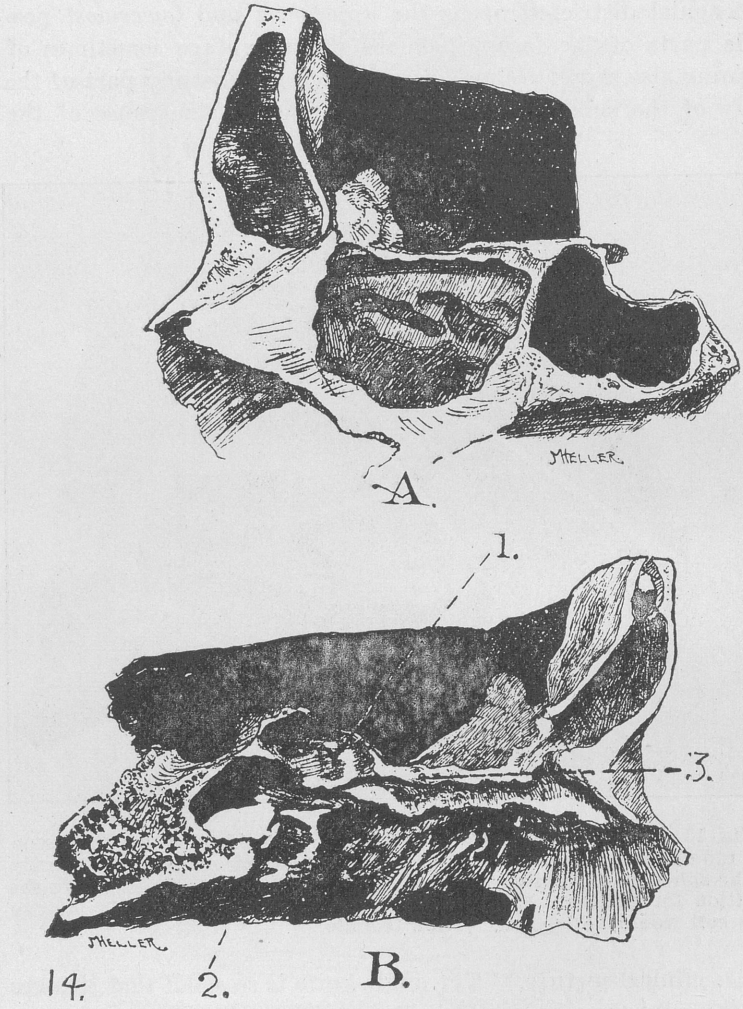

Fig. 14. A shows the usual sphenoidal sinus and the usual cribriform plate with their usual relations. B shows post-ethmoidal cell 1 placed altogether on top of sphenoidal sinus 2. Its lowermost limit is almost on the horizontal of the cribiform plate 3. This cell could not have been opened by this technic, nor, in my judgment, by any other extant.

and cranial cavity.) Satisfactory execution is necessary, particularly in eye lesions.

This entire performance may be accomplished within a short time. I have often finished the high frontal ethmoidal and sphenoidal combined operation in two minutes (including the postorbital opening on one occasion).

A septum nasi deflected into the affected side may add troubles for the surgeon. I have in such cases where the middle turbinate was not visible from in front in any part used a bi-valve speculum specially constructed for the purpose. Just as Killian elongated the blades of the primary bi-valve for his needs in septum resection, I have elongated them still more and widened them for my needs here (Fig. 17). The speculum should be made of tempered steel blades, knife like thin, with handles long enough to give leverage to dislocate the entire septum into the opposite nostril. It should have a set screw, for the pressure required is much and the hand gets tired holding it. Its blades should be 9 mm. wide, for narrower ones such as are supplied with Killian's often do not give sufficient view. They should be 88 cm. long, for shorter ones (Killian's) sometimes fail to reach the posterior field of operation. Killian's short blades are advantageous for the anterior district.

The knives are also made right and left (Fig. 16C-D). Some of my associates prefer these. My own preference is for the single, straight, original model. I recommend an extra (2.5 cm.) long shaft for use with the long blade sphenoidal speculum. A strong, large handle ought always be supplied for the knife.

A right-hand surgeon makes his turbinate cuts for the left side, cutting edges in the plane of the handle. For the right side the cutting edges are turned one quarter (90 deg.) into right nostril. This makes them horizontal or transverse when the handle is on the middle line.

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[2] Sluder, Greenfield. A Method for the Removal of the

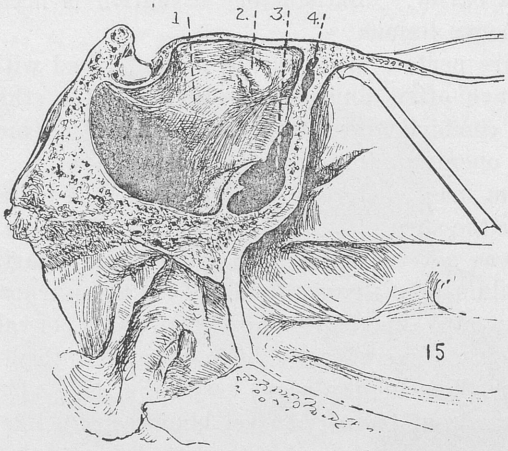

Fig. 15. Shows the left half of specimen. 1 right sphenoidal sinus extending into left side to border left optic canal 2. Left sphenoidal sinus 3 also borders left optic canal. A post-ethmoidal cell 4 also borders left optic canal. All three of these cells would probably have been opened by this technic operating on the left side.

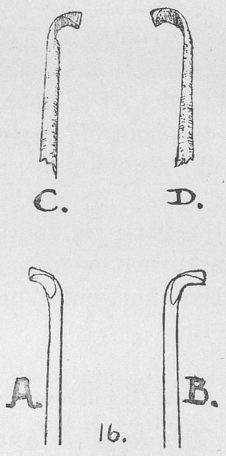

Fig. 16. A, sphenoid knife. B, turbinate knife. C and D, turbinate knives made right and left. Some of my confreres prefer right and left knives. I prefer the straight knife.

Whole or a Part of the Middle Turbinate. Jour. Am. Med. Assn., June 29, 1907. Vol. LXVIII.

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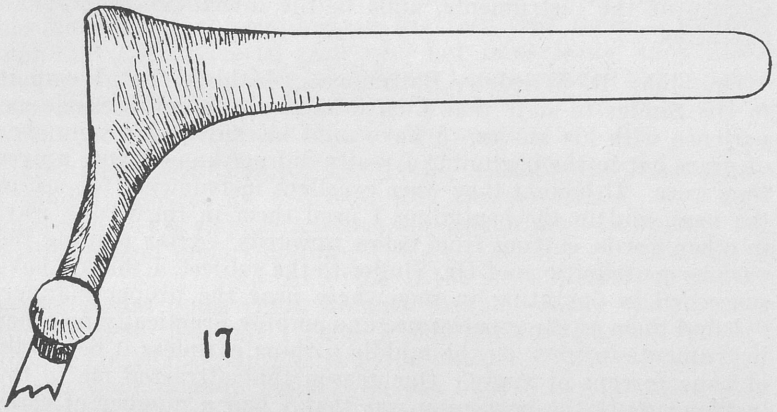


Fig. 17. Sphenoidal speculum. It is the primary bivalve nasal speculum made of tempered steel blades 88 mm. long, 9 mm. wide, knife edge thin near tip. It should have a set screw. It is a simple enlargement of the primary bivalve for this purpose as Killian's enlargement is for the purposes of septum resection. It is 13 mm. longer and 4 mm. wider than the usual model of Killian's. The sphenoidal knife used with this speculum is 25 mm. longer than the regular knife. By means of this speculum the route to the sphenoid may be forcibly widened when it is too narrow.

Discussion

Dr. Harris P. Mosher, Boston: I take great pleasure in recommending this operation of Dr. Sluder's as one with which the greatest success is possible. He has mentioned my name and I naturally feel I ought to get on my feet in the discussion of the operation. I feel that in working on the ethmoid the questions of time and an accurate knowledge of the anatomy, with a simplification of instruments are the essentials. If you can come down to two minutes, it is about as simple as you can make any procedure on the ethmoid. The fewer instruments you can get along with, the better you are off. I have never done much with Dr. Sluder's knife, but I have spoken to a number of men who have used it and liked it. I believe that for work on the ethmoid we ought to use as few special instruments as possible—instru-

ments which are large enough to see and easy to follow from the beginning of their use. For instance, I rely upon a simple straight curette and small round tonsil punch.

My feeling is that simplification of the procedure, simple instruments, and an accurate knowledge of the anatomy are essentials in dealing with the ethmoid. Anything which helps along those requisites are welcome; anything which adds to the complexity of the instruments, adds to the difficulties of ethmoid operating.

Dr. John R. Winslow, Baltimore: I think that I owe it to Dr. Sluder to state that I have had quite a considerable experience with his knives. I have used his knives for a number of years but in the beginning I really did not know whose knives they were. I thought they were excellent instruments for use in the nose, and in the beginning I used them in the wrong way, in other words, cutting from below upwards. After reading the various contributions of Dr. Sluder to the subject, I think I have succeeded in operating in somewhere near the proper manner.

I find them of the greatest use and employ practically no other instruments in work on the middle turbinate, unless it be a pair of bone forceps or snare. One reason that attracted me to the instruments in the beginning was that I had a number of cases of frontal sinus suppuration and deviation of the septum, and it was extremely desirable that there should be good drainage. At that time I did not consider it proper to perform the deviated septum operation in the presence of pus and required some instrument small enough to be used in the narrowed naris. These knives served the purpose admirably.

I have reported quite a number of cases of operation on the various accessory sinuses. I think you will find Dr. Sluder's knife mentioned as the instrument used in every one of the middle turbinal and ethmoidal operative procedures.

Dr. Christian R. Holmes, Cincinnati: I want to congratulate Dr. Sluder upon his most excellent paper. It is a splendid contribution. I think, however, that it is well enough for us to bear in mind that we are in a most dangerous region, and what can be done by Dr. Sluder, an expert, cannot be done safely by inexperienced hands. We operate in a region where there is always infection.

I have in mind a case of ozena, where I wanted to perform a radical Killian, and removed the middle turbinate before proceeding with the general operation, for the purpose of ascertaining whether there was a tendency to great reaction. The removal was very carefully done, with the curried scissors, but

in spite of that the patient developed meningitis and died before the radical operation was performed.

I am not in any way decrying the method advocated, but am simply calling attention to the fact that if we print such a paper without a word of warning to the inexperienced men who buy and use these instruments without ever having had an opportunity of seeing them used by experts, there is great danger of serious complication resulting. It seems to me that Dr. Sluder has not sufficiently emphasized the fact that there is danger, and that inexperienced men who but imperfectly know their anatomy and bacteriology, should not be encouraged to buy these instruments without being instructed how to use them before working in the region of the cribriform plate.

Dr. Greenfield Sluder, St. Louis, closing the discussion: Had I adhered to my text, Dr. Holmes would have been answered. It is emphasized that the district must be approached with care and understanding.

I fancy that Dr. Mosher's idea of the multiplication of instruments is not quite right, because of the number that I have turned in to the chair. There is one knife which may be used for the entire procedure if you stop to turn it this way and that. It you want to work faster, you can have three knives turning in various directions. Others are unnecessary except for more or less refinement in technic.

The only reason I have for appearing before you today with this technic is that it affords a method which cuts everything downward and forward. If there is any method which can make surgery at or approximating the cribriform plate safe, it is one which will cut always downward and forward. In this one the surgeon very greatly feels his position on the cribriform plate and then begins his cut downward and forward. If his knife be too large he can of course cut into the orbit. That is the reason I have emphasized the necessity of the surgeon knowing his model.

I am glad Dr. Holmes emphasized the necessity of care being taken and emphasis being laid upon who shall or shall not work in this region. I am perfectly aware that there are many surgeons who buy instruments from the instrument-maker and do not familiarize themselves either with the method which requires the instrument or even the directions accompanying the instrument. There is no help for that; we cannot appeal to such a man nor emphasize the necessity of his knowing just what he is doing. He ought to know his anatomy, first, last and forever; and secondly he should have an instrument which will make his procedure as safe as the procedure may be made.

ON THE RELATION OF DISEASES OF THE ACCESSORY SINUSES TO DISEASES OF THE EYE, ESPECIALLY IN CHILDREN, WITH A REPORT OF TWO CASES.

Report of a Case of Thrombosis of the Cavernous Sinuses.

J. H. BRYAN, M.D.

The relation of diseases of the accessory sinuses to diseases of the eye is now well established. In the past I have presented several communications on this subject, and reported cases showing the influence of the various affections of the accessory sinuses on the orbit and its contents. Most if not all of these cases occurred in adults. But diseases of the sinuses occurring in children have been only slightly considered, for the reason that these cavities in the very young are supposed to be so small they could not be the seat of an inflammation sufficiently severe to cause any serious disturbance with the eye.

These cavities vary in size in children as in adults, and in many subjects are quite well developed, and when severely inflamed that they have a serious influence on the eye is a well-established fact, as will be demonstrated in the report of the following interesting cases:

Case One.

Suppurating ethmoiditis causing an orbital abscess in a child eighteen months old. W. M.—aged 18 months, was admitted to the Episcopal Eye, Ear and Throat Hospital in March, 1914, on the service of Dr. John Burke, with a very marked exophthalmos on the left side.

His mother stated that during the recent epidemic of influenza all the members of her family had been more or less seriously affected by the disease. About a week after this child had been infected, his left eye commenced to protrude from the orbit,

and there was a severe swelling of both lids, especially the upper. The family physician applied lead and opium wash to the parts, but no relief being obtained he brought the child to the hospital.

On admission, his temperature was 104. There was some secretion flowing from the left nostril, and there was a very marked bulging of the left eye downward and outward. The lids and conjunctiva were edematous, and the periauricular glands were enlarged. As the child could not be controlled, it was not possible to make a satisfactory intra-ocular examination.

The following day, I was asked by Dr. Burke to see the case, and we decided it was a case of orbital abscess resulting from an infection through the ethmoid cells. The radical operation was then done, the incision commencing at the junction of the middle and outer third of the supra-orbital ridge, and was carried inward and downward along the inner border of the nose below its middle. The periosteum along the inner wall and the corresponding parts of the roof of the orbit was stripped from the bone, and in doing so a large quantity of pus was evacuated. The whole of the inner wall of the orbit was removed back as far as the sphenoid. The ethmoid cells were found to be badly diseased, especially the middle and posterior portion, and from the condition I found it was apparent the orbital abscess resulted from a direct infection from the middle and posterior ethmoid cells. The amount of pus evacuated was enormous, when we take into consideration the age of the child and the stage of development of these parts at this age. The abscess having been thoroughly evacuated, a strip of iodoform gauze was placed in the orbit back of the eye and brought out through the nose, and a small gauze drain was placed just inside of the inner canthus, and the external wound closed by interrupted sutures.

This child made an uninterrupted and quick recovery, the eye, gradually receding, soon assumed its normal position. This is the first case of such a marked abscess of the orbit resulting from sinus disease in one so young that I have met with, and in the light of my past experience with these conditions I believe it is most unusual.

Case Two.

Chronic abscess of the posterior ethmoid cells and sphenoidal sinus causing a marked exophthalmos in a child 11 years of age. Robert C.—aged 11, negro, was referred to me from Dr. Henning's clinic on the eye service of the Episcopal Eye, Ear and Throat Hospital, November 2, 1915. Giving a history of

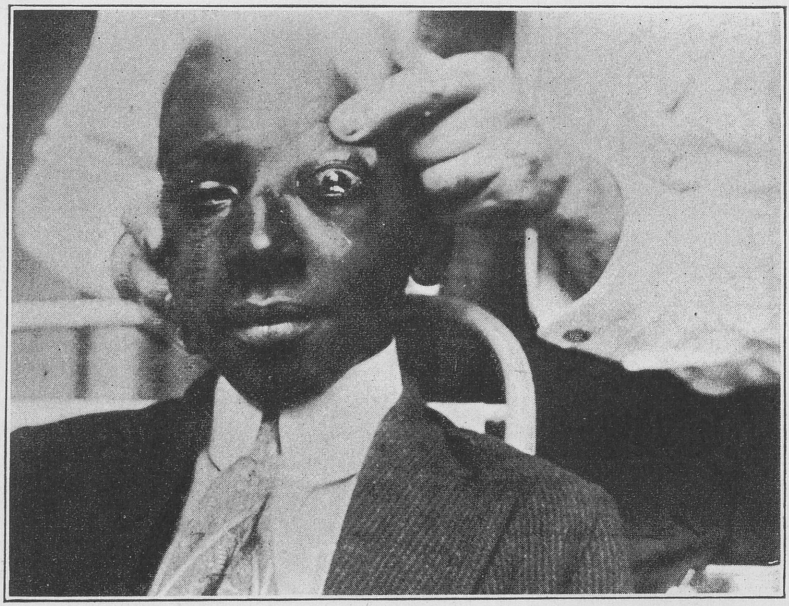


Fig. 1 illustrates fairly well the amount of exophthalmos when I first saw the patient. This case is interesting because of the deceptive character of the X-ray findings, the absence of nasal symptoms and the unusual size of the sphenoidal sinus in a subject so young.

the present condition having existed about six weeks. On examination the left eye was found bulging to a marked degree downward and outward. The bulging was so great that the lids did not completely cover the ball. There was no secretion from

the nose or naso-pharynx. Rhinoscopic examination showed only a moderate swelling of the middle turbinal on the left side. Probing in the anterior and middle ethmoid region failed to reveal any caries or necrosis of the bone, and no secretion followed irrigation of the nose.

The following are the findings after an X-ray examination. Stereo plates in the lateral and posterior-anterior positions showed the frontals to be normal; the ethmoids clear on both sides; the maxillary sinuses clear on both sides. The left orbital cavity is apparently filled with a dense mass which seems to be confined to the orbit.

In the light of the X-ray findings, and in the absence of any catarrhal condition present, and the negative history of any previous catarrhal state, it was thought we had to do with a growth in the orbit back of the eye. I therefore decided to explore the orbit. An incision along the orbital ridge was made, commencing at its outer third and extending down on the inner side of the nose to its lower third; the orbit was exposed and the periosteum covering its inner wall was elevated. At the junction of the middle and posterior portion there was a decided bulging of the ethmoid toward the orbit. With a probe the cells were perforated, and a large quantity of pus was evacuated. The whole of the inner wall of the orbit, including the ethmoid cells, were removed as far back as the sphenoid, and in doing so I found a large abscess involving the posterior ethmoid cells and the sphenoidal sinus. The sphenoidal cavity was unusually developed and filled with thick, creamy pus. All diseased bone and purulent secretion having been thoroughly removed, an iodoform gauze packing was placed in the sphenoid and ethmoid regions, one end being brought out through the nose and the external wound closed by interrupted sutures. At the end of the second day the gauze drain was removed and the nose gently irrigated with a saturated solution of boracic acid.

The patient made a quick recovery, the eye gradually receding within the orbit, and at the end of the ninth day he was discharged from the hospital. About ten days later, I saw the patient again in the eye clinic, then his eye had assumed its normal position and the vision was perfectly normal.

Case Three.

Thrombosis of the cavernous sinuses. This patient, a man of 36 years of age, was first seen by Dr. Henning about six o'clock in the evening of November 3, 1915.

The history Dr. Henning received from the family physician was that the patient in June had an infected hand which was slow in healing, and this was followed by a series of furuncles in both external auditory canals, all of which finally healed under appropriate treatment. During the latter part of October, a pustule appeared on the nose and was opened by the patient. The following day he was seized with severe pain over the left eye, followed soon afterward by exophthalmos on the same side.

When Dr. Henning first saw the patient there was a marked bulging of the left eye with commencing conjunctival edema and diplopia. The optic nerve head showed a blurring of its edges, and the veins of the retina were a trifle larger than those of the right eye. At this time, the right eye was normal in every respect. The temperature was 104 deg. Examination of the nose showed a moderately swollen middle turbinate on the left side. Irrigation of the nose brought away some thick blood-stained muco-pus. As the patient was in a very serious condition and growing rapidly worse, he was removed to the Episcopal Eye, Ear and Throat Hospital. At nine o'clock the following morning, the exopthalmos was more marked in the left eye, the conjunctiva was so edematous that it overlapped the cornea and protruded between the lids. There was also a commencing exophthalmos on the right side. The temperature was 104.6 deg. Although quite dull, the patient was able to comprehend the questions put to him, and stated that he was free from pain. At noon I saw the patient in consultation with Dr. Henning and found the exopthalmos on both sides very marked, conjuctiva protruding between the lids and exuding a bloody secretion. Examination of the nose showed the turbinals on both sides swollen and intensely congested. I probed into both sphenoidal sinuses, and on irrigation brought away a large quantity of thick yellow muco-pus.

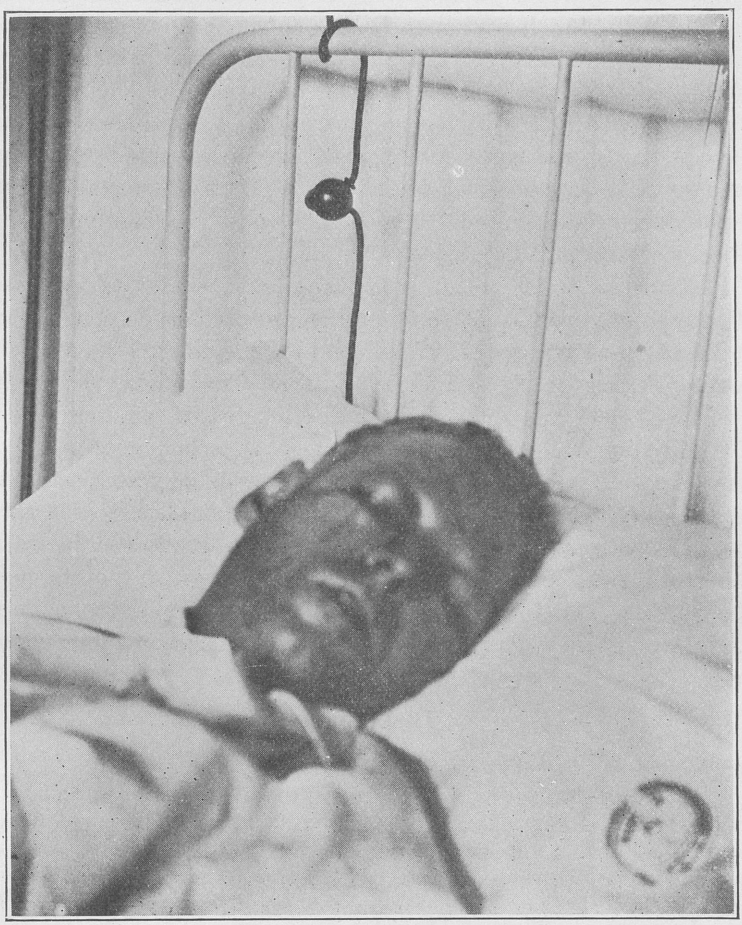


Fig. 2 shows a typical picture of the conditions found in thrombosis of the cavernous sinuses. This case is not only rare but interesting, and was characterized by a sudden onset in which the initial symptoms were ophthalmic and then meningeal, and death within forty-eight hours. When we take into consideration the free anastomosis of the veins of the nose, pharynx, mouth and face, with the veins of the orbit and the cavernous sinuses, and the absence of valves in the veins, we can appreciate the readiness with which the infection was carried from an insignificant pustule on the face to the cavernous sinuses and then to all the sinuses of the brain.

Later in the afternoon, under ether anesthesia, I removed the middle turbinals and opened both sphenoidal sinuses, finding some muco-purulent secretion in both cavities. Examination of the secretion taken from the sphenoidal sinuses showed both streptococci and staphylococci present. A lumbar puncture showed the spinal fluid under great pressure, filled with pus cells roughly estimated at 40,000 per mm. Polymorphonuclear leucocytes predominated. The condition of the patient grew rapidly worse, and he died at 10 p. m.

Postmortem examination—the head only examined—showed all the sinuses contained dark and semi-fluid blood; small hemorrhages on the right half of the cribriform plate of the ethmoid bone. Vessels of the pia-mater generally engorged, the basila surface of the brain showed fibrin and a purulent exudate under the pia, especially on the insula and adjacent opercula. A microscopic examination showed the vessels of the brain engorged. Beneath the membrane was a thin layer of brown material intimately adherent to the brain substance beneath. On section the brain substance showed brownish points near the surface, the brown exudate under the membrane showed fibrin, red blood cells and mono- and poly-morphonuclear round cells.

Discussion

Dr. Lewis A. Coffin, New York City:

As some of you know, I have been much interested in this particular subject for a long time. About three or four years ago papers of this kind were so frequent that they were sort of taboo by program committees. This should not be, because we have only scratched the surface of the subject and it might be discussed at every meeting of this kind with profit—Dr. Bryan's experience is unique, I think, in the extreme youth of his first patient—eighteen months, although in no way outside of what might be expected. The chances are that more cases of this kind would be reported if all were recognized. In 1904 at Chicago I read a paper on Disease of the Accessory Sinuses in children and showed pictures illustrating such effects on the eye as have been described by Dr. Bryan. At that time my youngest patient was six years old. I have since seen them younger, but none so young as 18 months. The eye effects of accessory sinus should be classified. There is the class in which we see an orbital cellu-

litis from either a direct leakage of pus into the orbit from either a dehiscence in its walls, a necrotic opening or as a result of the indirect infection of the cellular tissue. This condition gives rise to swollen lids—exophmthalmus, proptosis, chemosis, etc. Then there is a class in which the eye symptoms are due to affections of the optic nerve due as a rule to the disease of the more posterior cells, e. g., the post ethmoid and the sphenoid—giving rise to optic neuritis, papillitis, choked disc, etc.—and again the choroid may be affected due to exudation onto the surface or into the stroma of that coat and closely associated with the above conditions are the eye symptoms due to covernous sinus thrombosis.

The nerve affection has been explained in two ways. First, it is claimed by some that the affection is due to local toxemia. That is, the results are due to the direct passage of the toxic principle from the diseased cell to the nerve some fibres of which are therby poisoned and a general optic neuritis results. Second, others are of the opinion that the disease is due to a circulatory disturbance. Now we all know that the ethmoidal veins open into the ophthalmic veins. I can conceive of no condition in the body more calculated to set up a phlebitis than that existing in the diseased ethmoidal tract; if this be so there is explained not only the nerve affection, the exudation into the choroid and the thrombosis of the cavernous sinus. The affection in any particular case depending upon the direction and extent of the thrombo phlebitis. I wish that some of our younger members might work out the circulatory relationships of the parts under discussion. Aside from this *a priori* reasoning there are numerous findings which lead one to the same conclusion. Among which are the following: Some years ago, in a study of the color fields accompanying sinus disease Dr. Frank Parker, who was associated with me as oculist in the work, reported in the majority of cases showing much change in the fields "enlarged and tortuous veins" and for the most part these cases when operated through the ethmoidal region bleed most profusely, something the same as would a leg were one operating below a constricting band impeding circulation. Third, remedies like citrate of soda having no other effect than the lessening of the coagulability of the blood seem frequently to markedly ameliorate symptoms.

Dr. Cornelius G. Coakley, New York City:

I am very much interested in the subject of orbital infection. If all the cases were reported, their number would be considerable. Recently I saw a case in consultation with Dr. Robert Lewis and Dr. H. B. Wilcox that was more instructive to me than any case I have seen in years. The patient was a robust child, two years of age, with a swelling around the left orbit,

exophthalmos, ectropion with a swelling of the face over the superior maxilla, and a serosanguinous discharge from the left nostril. Bacteriological examination of the nasal discharge showed streptococci; the variety was not determined. The child had an acute toxic nephritis with a marked amount of albumen and casts, hyalin, granular and epithelial, in the urine. There was also beginning endocarditis; the abdomen was also swollen and tense. Dr. Wilcox had been in attendance upon the child since its birth. It looked very much as though it was only a question of time before the child would die, and we all thought it best to open up the abscess in the cheek, which was done by Dr. Lewis. A blood culture was taken and the following morning it was reported upon as being very markedly positive, with staphylococci. Dr. Wilcox then did a blood transfusion from the father to the child. I expected to hear of the death of the child within a couple of days, and ten days later I heard the child was perfectly well.

Dr. Wilcox recently informed me that after apparently making a complete recovery, swelling of face, orbit, abdomen, kidneys and heart returning to normal, the child died suddenly with what appeared to be a thrombosis of the brain.

Some time previous to that, I saw a child of five in consultation with Dr. Lee M. Hurd. This condition followed one of the exanthemata; I do not know which. The child was operated upon by Dr. Hurd and made a complete recovery.

I also saw a case last winter of cavernous sinus thrombosis, one most interesting as to the source of infection. The patient was a man who had not been feeling particularly well, and a diagnosis of carious teeth and abscess of a tooth was made by a surgeon dentist. Fortunately the dentist who made the diagnosis had taken radiographs of the teeth and sinuses, and I was much surprised at the good radiograph he obtained of the sinuses. This was a week before I saw him. The frontal sinuses, ethmoids, sphenoids and antra appeared perfectly normal. He showed me what he called an abscess of a tooth, but which seemed doubtful to me. The tooth was extracted and a trephine opening made into the left antrum. He had a chill a few hours later, headache and high temperature. Forty-eight hours after the tooth was extracted there began a swelling of the right eye. There was no evidence of pus in the left antrum. The patient died comatose three days later.

I saw the patient of whom Dr. Coffin spoke. I think we have two types of cavernous sinus thrombosis—the type that is infected, and the type that is inflammatory. If we are dealing with a badly infected cavernous sinus thrombosis, it is bound to

end fatally, but if we have one in which the organism is very mild, there is a possibility of recovery.

Dr. Hanau W. Loeb, St. Louis, Mo.:

I would like to make a suggestion with regard to the statement made by Dr. Coffin as to our lack of knowledge of the venous relationship. We might of course learn the names of each trunk, but I think we would find that we would not be any better off. But we do know there is a very abundant venous distribution in this region, and having that abundant venous distribution we naturally must look for infection in the neighborhood, and that undoubtedly accounts for the majority of infective conditions in the orbit coming from the nose. However, there is such a thing as a condition resulting from mere nearness to an acute inflammatory condition. For instance, we know that acute edema results in the larynx from inflammation in the neighborhood. A year ago I put a case before this Society in which blindness had resulted from an acute ethmoiditis, and the blindness disappeared within a week after operation upon the ethmoid. At that time, too, I called attention to an observation which I had made from studies in the neighborhood of this region, that where the posterior ethmoidal cells replace the sphenoid, the optic nerve instead of being at a considerable distance from the ethmoid runs along the lateral wall of the last posterior ethmoid cells. This so happened in two out of thirty cases I had examined. On account of the commonness of suppurative inflammation of the ethmoid and comparative infrequency of such inflammation of the sphenoid, I think that the anatomic finding explains why involvement of the optic nerve is no more common than it is.

BRAIN ABSCESS FROM CHRONIC SUPPURATION IN THE FRONTAL SINUS. CASE REPORT.

T. PASSMORE BERENS, M.D.

In 1913 before the American Otological Society, I reported a case of abscess in the frontal lobe of the brain of otitic origin (published in the Annals of Otology, Rhinology and Laryngology, June 1913). At that time a somewhat close study of the literature showed but 49 other cases of abscess of the frontal lobe. Since then the following cases have been published:

Lubbers, Karl. Hirnabszess, Osteomyelitis des Stirnbeines, Stirnhohlenempyem. Archiv fur Ohrenheilkunde, vol. XC, 1912-13, p. 172. W. W.—Female, 32 years. Chronic frontal sinusitis. Fistula in right eye-brow, leading into frontal sinus. Osteomyelitis of frontal bone. Abscess in frontal lobe of brain. Cure.

Hirschberg, Otto. Beitrag zur Lehre der Hirnabszesse. Deutsches Archiv fur Klinische Medizin, 1912-13, vol. CIX, p. 314. J. K.—Male, 34 years. Broken-down bronchial glands. Fistula from broken-down glands into esophagus. Slight tubercular lesions in lungs. Purulent meningitis. Abscess in right frontal lobe which perforated on to surface of brain. Several smaller abscesses in other parts of the brain. This was a case of metastases in the brain from abscess in the bronchial glands. Symptoms were those of meningitis.

Zemann, W. Beitrag zur Kenntnis der Endokraniellen Komplikationen nach chronischen Nebenhohleneiterung. Zeitschrift fur Laryngologie, Rhinologie und ihre Grenzgebiete, 1913-14, vol. VI, p. 545. G. B.—Male, 37 years. Chronic frontal sinusitis. Fistula through left eye-brow. Killian operation was done on both sides. Necrosis of posterior wall of right frontal sinus. Facial paralysis left. Paralysis of left hypoglossal nerve. Left hemiplegia. Clonic spasms of upper extremities. Sopor. Cheyne-Stokes breathing. Exitus. Post Mortem—Leptomeningitis. Frontal lobe adherent to posterior surface of frontal sinus. Cortical abscess in frontal lobe.

From here there is a fistula leading to two deeper abscesses in frontal lobe.

Elschnig, A. Der otogene Hirnabszess und seine Operation. Prager Medizinische Wochenschrift, 1914, vol. XXXIX, p. 37. Case 1—Boy, 12 years. Phlegmon of left upper eyelid. Incision. Apathy. Paresis of right side of body. Roof of orbit

Figure 1

removed. Incision of frontal lobe abscess. Cure. Case 2—Male, 45 years. Chronic frontal sinusitis. Killian operation. Aphasia. Orbit contains granulations. Removed orbital roof and incised abscess in frontal lobe. Exitus. Purulent meningitis.

Piffl, Otto. Zur Kasuistik der rhinogenen Stirnabszesse. Prager Medizinische Wochenschrift, 1914, vol. XXXIX, p. 39. Male, 36 years. Chronic frontal sinusitis left. Exophthalmos. Intranasal treatment. Cerebro-spinal fluid cloudy. Diplopia. Vomiting. Ptosis. Killian operation. Optic neuritis. Five weeks later, pain and rise of temperature. Vomiting. Orbital roof removed. Frontal lobe incised. No pus. Exitus. Post

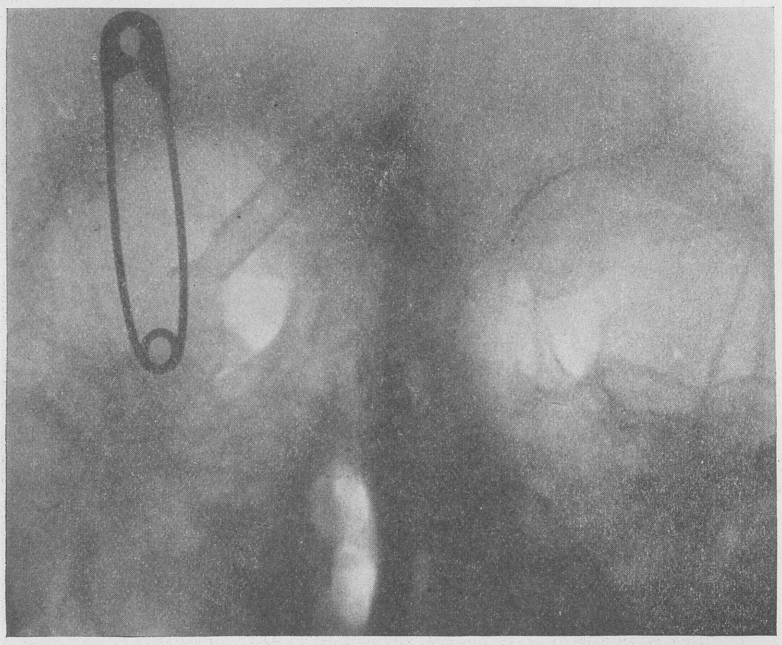


Figure 2

Mortem—Left frontal lobe adherent to orbital roof. Abscess in frontal lobe.

Casamajor, L. Brain with double frontal abscesses. Medical Record, 1915, vol LXXXVII, page 412. Male, 50 years. Frontal headache. Tongue coated. Breath offensive. Temperature normal. Pulse 60. On the fifth day, involuntary defecation. Temperature rose to 101 deg. F. Pupils contracted and sluggish. Nose and ears normal. On the seventh day, chill, tem-

perature 106 deg. F. Coma and death. Post Mortem—Abscess in both frontal lobes. Pus contained bacillus pyocyaneus Meninges normal. The brain infection was probably hematogenous.

It is now my pleasure to report the following case:

January 8, 1913: W—Male, age 30, consulted me on account of a severe pain in and over the right eye, which had persisted for several weeks. He complained also of a profuse discharge of pus from the right nostril. This purulent discharge had persisted for many years. Excepting these two conditions, he had always been well.

Family history: Mother had had a successful operation for one-sided pansinusitis ten years before. Father had had an operation for a surface epithelioma in the temporal region many years previous.

Examination of the nose: Superior and middle meati filled with myxomatous material. Septum deflected to the left.

Transillumination showed the right antrum, ethmoidal and frontal sinuses dark.

At this sitting, several large polypi were removed without affording relief from the pain.

Pathological report: Myxoma. Wasserman negative.

A few days later, an X-ray examination by Dr. F. M. Law, of the Manhattan Eye, Ear and Throat Hospital, showed pansinusitis right side (see plates 1 and 2).

On January 16th under gas and ether anesthesia a radical external frontal, ethmoidal and sphenoidal operation was performed, and the Antrum of Highmore opened through the naso-antral wall beneath the inferior turbinal. The frontal sinus was filled with pus and myxomatous material. There was a small oval sequestrum ¼-in. long by ⅛-in. broad of the internal table, beneath which the dura was reddened but apparently not otherwise diseased. The antrum contained only pus. The external wound was stitched. The patient made a rather slow convalescence.

On the 9th of May the nose presented a fairly normal appearance and his general condition was good. I saw him again in December, 1913, when he complained of much pus

coming from the nose. The naso-antral wound had healed, and pus was exuding from the osteum of the antrum. The old wound was reopened and washed out.

He made a complete recovery after a few weeks and was well until the 24th of July of the following year (1914), when he had a return of the discharge of pus from the antrum.

At this time I opened the antrum freely through the canine

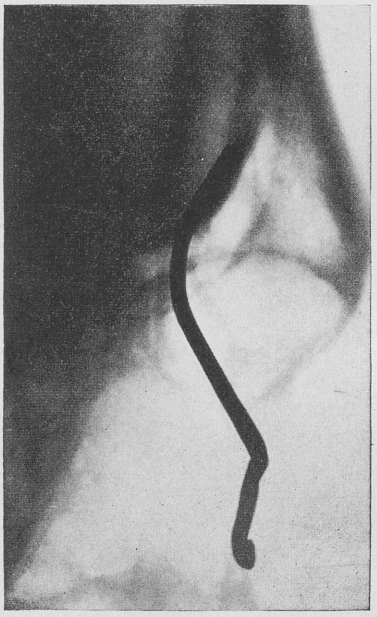


Figure 3

fossa. It contained much thick, creamy pus, but no distinct growth of granulation tissue.

On December 30, 1915, he had an exacerbation of the discharge.

On January 3, 1916, he complained of considerable frontal headache. There was slight puffiness of the cicatrix over the right frontal sinus. I irrigated the frontal region, which was discharging much pus.

Two days later (January 5th), the frontal headache was decidedly worse, and there was a large swelling of the cicatrix in the right frontal region. Pressure applied to the scar caused a considerable discharge of pus into the nostril.

Much against his will, for he "did not feel ill" and he was very busy, the patient was sent to the Manhattan Eye, Ear and Throat Hospital at once.

Under gas ether anesthesia, I incised through the old frontal wound and entered a small pyogenic sac about the size of a cherry. The incision released pus, under slight pressure, and caused considerable bleeding. While the bleeding was being controlled by adrenalin packing, I took down the lower anterior third of the naso-antral wall and opened through the track of the old wound above the first molar. There was much pus but no granulomata. The wound in the frontal sinus was then examined. About 4 dr. of pus oozed from a small mass of granulations in the roof of the sinus at the location of the sequestrum. The granulations were hiding a perforation through which a probe dropped inward and upward toward the vertex for a distance of 2⅛-in. from the roof of the sinus. I very gently enlarged this opening by inserting a closed bayonnet forceps and allowing the blades to open slowly. Because of the firm adhesions between the bone brain and the soft parts, it was considered unwise to disturb the existing conditions, and therefore the only further procedure resorted to was the insertion of a horse-hair drain into the stem of the abscess. The nose was closed off by rubber tissue packing and a wet gauze dressing was applied.

During the afternoon and night, the external dressing were soaked with pus. These dressings consisted of as much loose gauze as is usually used in a large mastoid dressing.

From the day following the operation more strands of horsehair were added daily for a week, when the stem of the abscess had become as large as a lead pencil. A soft rubber drainage tube was then inserted, and for a week longer, i.e., for two weeks, it was necessary to change the dressings every six hours. The discharge gradually lessened and practically ceased at the end of five weeks, but the wound was not allowed

to heal until April 18th. The flow of pus affected the conjunctiva, but argyrol controlled this condition successfully.

General symptoms after the operation: Heart action regular; much frontal headache; restlessness and irritability; slight photophobia; very slight redness of the optic nerve; pupils contracted (Dr. E. S. Thomson). No other nervous manifestations. Temperature ranged from 100 to 101 deg. for ten days, gradually becoming normal.

Culture from brain: Streptococcus hemolyticus in pure culture (J. G. Dwyer, M.D.).

Blood culture day after operation: Streptococcus hemolyticus in small numbers.

Blood culture a week later showed no growth.

On February 2nd, a severe infection (streptococcus) of the left side of his nose and accessory sinuses. This caused persistent and increasing pain in the left eye. Because of this on February 8th, I was compelled to do a middle turbinectomy, which, together with the usual after-treatment, afforded the desired relief from the pain.

The patient had frequent treatment by autogenous vaccine.

Remarks: For the past two weeks, the right nostril has been free from pus, excepting for small crusts that persistently form on the posterior wall of the pharynx. There is still considerable discharge of pus at times from the left nostril, and I propose at an early date to correct the deflection of the septum and possibly to operate on the ethmoidal cells.

My study of the case convinces me that the patient carried a large collection of pus in the frontal lobe for many weeks, if not for months, and that this abscess was the source of the pus in the right side of his nose. The occupation of the patient requires great alertness and very active concentration. He continued at his work until January 3rd. For the past six weeks he has carried on his work daily with perfect satisfaction to himself and to his employers.

X-ray plate No. 1 was made January, 1913. Plate No. 2 was made January 24, 1916. Plate No. 3 was made February 22nd of this year.

Discussion

Dr. J. Solis Cohen, Philadelphia, Pa.:

I think Dr. Berens is to be very much congratulated upon the fortunate outcome of this case.

Dr. T. Passmore Berens, New York City:

I have nothing further to add excepting the fact that we limited our surgery, and I suppose it is to that we can attribute the good result.

REMOVAL OF A LARGE RHINOLITH, WITH EXHIBITION OF SPECIMEN.

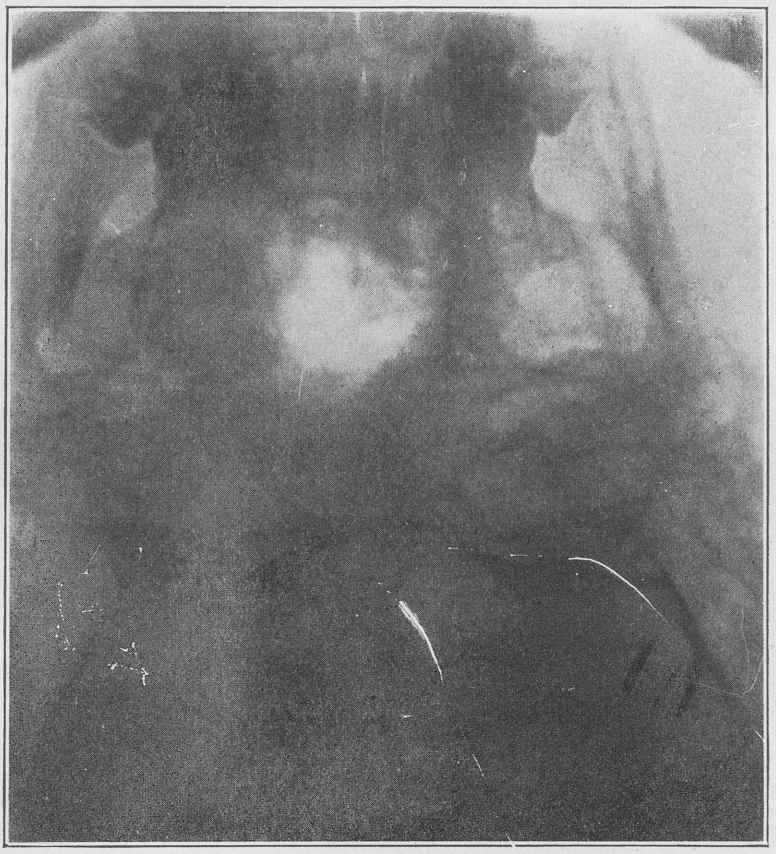
D. BRADEN KYLE, M.D.

L. L. (Luther Landis), aged 17, white, helper in iron works, came to the Nose and Throat Department of Jefferson Hospital, September 29, 1914, giving a history of nasal obstruction which first became noticeable following a fall twelve years ago. About a year later the patient was operated upon in Altoona, and a growth (?) was removed, but following this operation the nasal obstruction became more pronounced and portions of the face became somewhat edematous. Later on, another operation was performed by Dr. Robrecht at the Lancaster General Hospital, and a growth (?) removed from the nose. The patient experienced relief from the symptoms for some time after the operation. During the past three years the face has shown remissions and exacerbations of edema. A moderate amount was present on admission to Jefferson Hospital. During the summer of 1914 the lachrymal duct and sac of the left side was drained and pus evacuated.

For the past year or more the patient has complained of severe headache, usually frontal. His appetite was good, but the bowels showed a marked tendency to constipation. His best weight in 1914 was 156 pounds. His weight on admission to the hospital was 133 pounds.

Examination showed the nose extremely broad and flattened. The right nostril was markedly obstructed by the septum, which was deflected and perforated by pressure from the body in the left nostril. This obstruction in the left nostril was found to be extremely hard, almost black in color, and covered by a great quantity of mucopurulent secretion of bad odor. This object was large enough to fill the entire naris; it forced the septum to the extreme right, extending into the antrum, and could be felt projecting backward into the nasopharynx. It was freely movable and not attached at any point, pocketed, as it were.

An operation was performed October 8, 1914, under ether anesthesia. Attempts to remove the obstructing body in its entirety failed, owing to its large size and to the fact that it bore the relation to the surrounding bony structures of a ball



to its socket. It was necessary to use heavy rongeur forceps, by means of which it was possible to break off small fragments from the granitelike mass. About one-third of the body was removed in this manner, when the remaining portion was removed entirely with only a slight tear at the nasolabial angle resulting. The nose was packed with iodoform gauze. The

entire operation occupied about one hour, and considerable blood was lost. The patient was cyanotic and in shock when taken to the ward. He reacted fairly well, however.

The packing was removed from the nose fourteen hours after operation and the nasal passages irrigated twice daily with warm normal salt solution. Twenty-four hours after operation a distinct pneumonic area had developed in the lower left lung, and the patient was removed to the medical ward for treatment of this condition, which cleared up in due time. During the four or five days following the operation, there developed considerable emphysema of the cellular tissue at the root of the neck and below the clavicles. The face was markdly swollen and the eyes puffy. By the 17th of October a distinct abscess had developed at the inner canthus of the left eye. This was incised by Dr. Sweet and found to communicate with the anterior ethmoid cells. This complication being relieved, and the lung having become clear, the patient was returned to the special ward on October 19th, where he made an uneventful recovery, and left the hospital on November 11th, 1914.

X-ray report, October 26, 1914: "Undecided about the frontal and ethmoid sinuses. Would like to make another examination. Do not feel safe to expose again for a week or ten days. Left antrum is occluded." (No subsequent X-ray examination is recorded.)

My object in reporting this was, first, on account of the size of the rhinolith; second, that under the conditions it seemed wise to avoid subjecting the patient to a major operation for two reasons: (1) On account of the infection already present, and (2) the shock from operation, as his condition was decidedly below par. This also shows a possibility of dilatation of the nasal orifices much beyond what is reasonably supposed.

Discussion

Dr. Harris P. Mosher, Boston, Mass.:

I have had a moderate experience in removing exostoses or large foreign bodies which have invaded the nasal cavity as the foreign body in this case, and when the septum was pushed over and the growths had invaded the antrum. The more I see of

these cases, the more I feel that the way to deal with them is the simple way of going through the cheek. The Moure operation appeals to me more and more as time goes on.

The objection brought out by the speaker that the case was septic and he did not feel like making an incision through the cheek, does not seem a valid one. You can get perfect drainage in this way. Had he gone after the tumor by making such an incision, I feel that he could have seen what he was doing and that he would have had a very good chance of getting his tumor out whole, which of course to any surgeon is a certain amount of satisfaction.

Dr. D. Braden Kyle, Philadelphia, Pa., closing the discussion:

My object in reporting this interesting case was twofold. One, the enormous size of the rhinolith, which weighed two hundred and sixty-four (264) grains. The other that I was able to remove it without any extensive operative procedure, which, owing to the fact of the infection and the impossibility of rendering the nasal passage antiseptic, was certainly advantageous to the patient. I do not think we are justified in doing a major operation merely for the satisfaction of having the specimen entire, as the whole object is for the relief of the patient. I do feel that in this case, removing it in the manner described was a much better surgical procedure than to perform any radical operation.

SARCOMA OF THE NOSE. REPORT OF A FATAL CASE, WITH METASTASES IN THE CERVICAL GLANDS AND IN THE BRAIN.

J. PAYSON CLARK, M.D.

The patient, Mrs. X., aged 64, was first seen by me on March 15, 1915, being referred by her physician, Dr. R. L. Toppan, of Newburyport. Three or four months ago she noticed a swelling about the size of a pea on the left side of her nose. It is now (March 15th) about the size of a small marble. It has not been painful at any time. About the middle of February she began to notice a little bleeding on blowing the nose. For the past week this symptom has been more marked and there has been a slight bloody discharge on her pillow in the morning. There is no specific history and the patient has always enjoyed good health. Examination shows a small rounded tumor, over which the skin is freely movable, on the left side of the nose, just below the nasal bone. On the inside of the left nostril can be seen a dark, purplish tumor on the outer wall just above the vestibule and extending anteriorly to the cartilaginous septum, on which it encroaches slightly. The antra and frontal sinuses transilluminate equally and well. A small piece of the rather firm growth was removed for microscopical examination, the patient's consent to an operation having been first obtained, in case the histological examination should show the growth to be malignant. The pathologist's report was as follows:

"March 20, 1915. The specimen consists of a small segment of tissue, arising from which is a round white mass measuring about 3 mm. in diameter. Microscopically, the tissue is composed almost entirely of irregular masses of epithelial cells, which are separated from one another by a connective tissue stroma. Along one border (surface) there is an inflammatory exudate. The cells in themselves, though entirely of the squamous type, vary in size and shape; but more particularly the nucleii in many cases contain mitotic figures. Opinion: The tumor is a squamous-cell cancer.

(Signed) "FRANCIS L. BURNETT, M.D."

March 24th. An operation was performed, under ether anesthesia, with the assistance of Dr. George O. Clark. A longitudinal incision about two and a half cm. long was made through the skin of the nose in the median line. At the lower end the incision was continued to the left cheek in the depression above the ala. The skin flap was elevated and the growth was seen protruding between the lateral cartilage and the nasal bone. The tumor was then removed with a margin of healthy tissue. The nose was packed lightly with gauze and the skin sutured with horse hair. No external dressing. The wound healed uneventfully by first intention. There was some sinking of the left side of the nose, but the deformity was very slight, considering the amount of tissue which had been removed. There was a small perforation of the septum. Professor F. B. Mallory of the Harvard Medical School kindly examined the growth for me and made the following report:

"Microscopic examination of your tumor of the nose shows that it is rapidly growing and infiltrating, as was obvious in gross. The diagnosis is not so positive. There is no sign of differentiation on the part of the cells. It can be classified either as a carcinoma or possibly as a melanosarcoma with little evidence of the formation of pigment. It would require the tissue from the primary operation to make a positive diagnosis. I only mention the possibility because if it were sarcoma, metastases are much more likely to occur. Possibly Dr. Burnett has the sections which he made originally and I am sure he would be perfectly willing for me to see them."

Dr. Mallory saw the sections from the first specimen later, but was, I believe, unable to make a more positive diagnosis.

May 22nd. No local recurrence. A gland, size of a bean, can be felt under the middle of the left side of the jaw. It is freely movable and not tender. On June 4th the gland had fully doubled in size and it was decided to remove it. This was done, under ether anesthesia, on June 14th. The pathological report on the gland was as follows:

"June 25, 1915. The specimen consists of a moderately firm piece of tissue, measuring 2 x 1.5 x 1 cm., and of a pinkish color.

Microscopically, it is composed almost entirely of spindle-shaped fibrous cells, though there is an area of round cells at one border and areolar tissue peripherally. Furthermore, while the spindle-shaped cells do not vary a great deal in size or shape, their nucleii are often found in a state of mitosis. No epithelial whatever are apparent. Opinion. Although the tissue taken from the original tumor was determined as malignant, the metastasis gives a clearer conception of the cells; it is not a cancer, but a spindle (fibro) cell sarcoma. Signed, F. L. Burnett, M.D., confirmed by Prof. Mallory.''

No other glands could be felt at that time. The patient was next seen on July seventh. There was no local recurrence and no glands palpable. On July 30th there was no local recurrence but a gland could be felt under the left sternomastoid muscle.

In view of the diagnosis of sarcoma, it was now determined to try Coley treatment. This was carried out by or under the direction of Dr. Torr W. Harmer, and was continued for two months. The following account of the Coley treatment of this case and general comments are taken from a letter of Dr. Harmer's to me dated March 2, 1916.

''Regarding her (Mrs. X's) treatment under my care: I saw her August 10th and gave her minim ½ of mixed toxins (Coley). Further treatments were as follows: August 12th, m. 1; 16th, m. 2; 18th, m. 4; 20th, m. 4. All injections were in the musculature of the upper back. All produced more or less local irritation; none caused marked reaction, although a few caused some elevation of temperature and chilliness. The treatments were then continued by Dr. Toppan of Newburyport, under my direction. He gave the injections every other day, then twice a week, reaching a maximum of 14 m. I then suggested that injections be given into the growth (meaning the gland under the left sternomastoid, J. P. C.), starting with a marked reduction in dose. The result with an injection of 9 or 10 m. was most distressing: marked fever, chill, and vomiting with temporary increase in size of tumor. A second injection into the tumor resulted in an equally distressing experience, and the toxin treatment was discontinued.''

Dr. Harmer has had a large experience in this treatment of malignant tumors and I shall give, at the end of this paper, a reference to a paper of his on this subject.

I saw the patient again on October 16th. Her general health appeared excellent, but the gland under the sternomastoid muscle was apparently unchanged and there was a small recurrence on the cartilaginous septum just below the perforation. This was a disagreeable surprise to me. I had been afraid of a recurrence on the outer wall of the nose where I had cut rather close to the growth near its lower border, but not at the septal border where a wide margin of healthy tissue had been taken. This recurrence was removed, under local anesthesia, on October 20th. The report on this growth was as follows: "Remarks. The specimen consists of a small piece of mucous membrane bearing a nodule about 3 mm. in diameter, some cartilage and a sliver of bone. In a section of the soft tissue, the cells are of an irregularly shaped spindle variety, with leucocytes and round cells scattered among them; but there also are some epithelial cells forming glands in the tissue and a covering of the tumor. The spindle cells vary in size and shape; some contain large, others small, nucleii, and now and then they are in a state of mitosis. The epithelial cells, on the other hand, are quite regular in size and shape. Opinion: The tumor is evidently a recurrence as it is a spindle-cell sarcoma."

The patient was next seen on November 13th. As the gland under the sternomastoid was apparently unchanged it was decided, after consultation with Dr. George O. Clark and Dr. Harmer to do a complete glandular dissection on the left side of the neck. This operation was performed on November 18th by Dr. George O. Clark. The dissection was done *en bloc,* and every vestige of glandular tissue removed. It is interesting to note that many glands were found involved which could not be palpated before the operation. The patient went home at the end of a week. There was a slight infection at the lower angle of the wound, where the dressing did not fully protect it. With the exception of this small complication the wound healed solidly by first intention. There was a moderate left facial paralysis and some hoarseness (left recurrent paralysis?). I did not

have an opportunity to examine the larynx at this time. The subsequent history of the case is taken from Dr. Toppan's letters. The first signs of mental disturbance appeared on the night of December 5th, with rambling incoherent talk. The next morning she had a convulsive attack with clonic convulsions, general in distribution accompanied by rolling up of eyeballs, loss of consciousness for fifteen to twenty minutes, followed by pallor, a weak, thready pulse and no remembrance of the attack. Subsequently the pulse, temperature, and respiration were practically normal. The urine was normal and there was

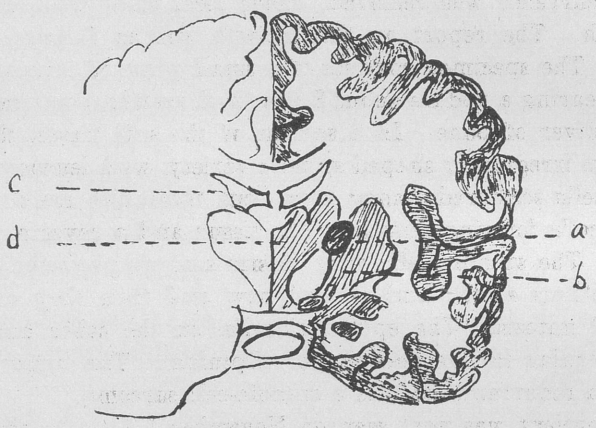


Figure 1. Cross Section of Brain. a—Soft mass, roughly rounded, three-fourths inch in diameter, in the internal capsule. b—Lenticular nucleus. c—Lateral ventricle. d—Thalamus.

no bowel trouble. For two weeks, following this attack, she was very restless, constantly moving hands or feet when awake, talking incoherently and irrationally and sleeping poorly. She would start a sentence but was, apparently, unable to finish it (motor aphasia). Her mind, however, seemed capable of understanding what was said to her during this time. She would answer rationally "yes" or "no," but seemed unable to form words. The blood pressure (systolic) rose gradually from 150 to 180, going down again to 130 three days before death. Dysphagia increased slowly until even liquids were swallowed with

difficulty, but later this symptom was not so marked. She lost weight and color. Reflexes were all apparently normal at first and pupils reacted equally. She was drowsy at times and would sleep for the better part of two or three days, then wake

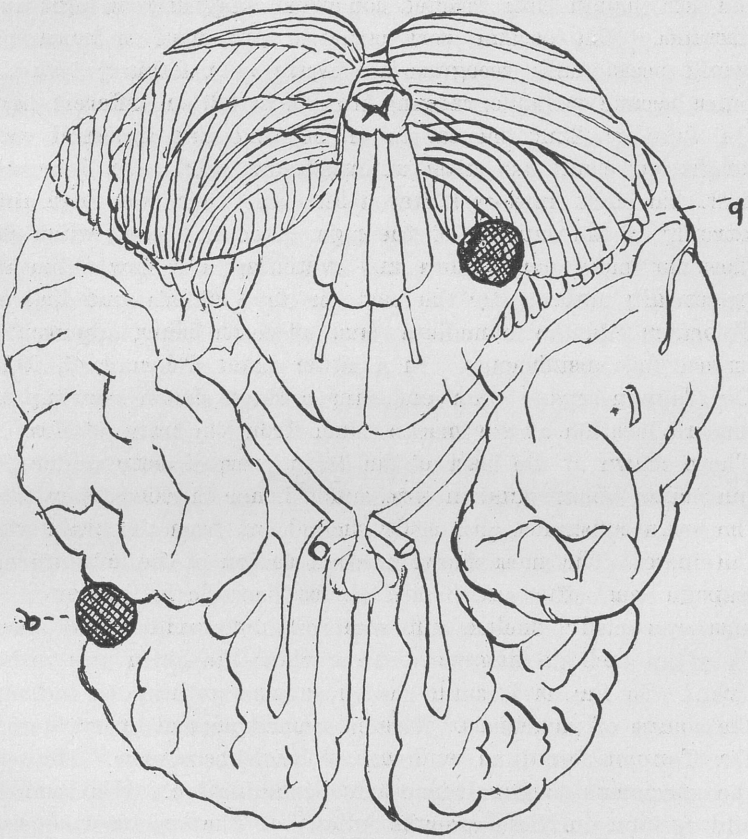


Figure 2. a—Round firm mass, one and one-half inches in diameter, at the anterior border of left temporal lobe at base of brain, just under the pia mater. b—Similar mass under the pia mater, just to right of olive, about where the vagus emerges.

and be very restless and irritable. About January first she practically ceased speaking and was more and more drowsy. It now became very difficult for her to walk and by January 15th

she was practically bed-ridden and had incontinence, worse of the bladder than rectum. There now appeared an exaggerated right knee-jerk with slight ankle clonus and some spasticity of the right arm with twitching of right hand and arm and foot and leg. The right pupil was at this time slightly larger than the left though both reacted somewhat sluggishly to light and distance. She became very comatose and hard to rouse but would occasionally recognize her family. On January 17th the pulse became variable, ranging from 80 to 120 on different days. On January 22nd she sat up in bed and and appeared very bright but could not utter an intelligent word. On February first, the right knee-jerk was absent and there was beginning atrophy of the muscles of the right hand and arm, which she does not move nor is there any twitching in it now. She ate practically nothing for the last ten days of life and died on February 4th, the immediate cause of death being, apparently, myocardial insufficiency. In a letter dated February 6, 1916, Dr. Toppan says: "Am enclosing a rough sketch showing the general location of the masses taken from the brain of Mrs. X. Those shown at the base of the brain were directly under the pia mater, about equal in size, much firmer in consistency than the brain substance, and easily shelled out from the brain with the finger. The mass shown in cross section in the left internal capsule was softer and looked almost necrotic in its center; it also was easily shelled out, was roughly rounded and about ¾ of an inch in diameter. As a whole the brain was rather 'wet.' So far as I could see there was nothing to indicate the course of metastasis. Vessels seemed normal everywhere." Dr. Toppan found no evidence of local recurrence. He sent the specimens to Dr. Burnett for examination. His remarks and opinion on these growths follow: "The specimen consists of three evenly rounded, soft masses in formalin; one measures about 3 x 2.5 x 2.5 cm. and was taken from the anterior portion of the temporal lobe on the left side; another from the internal capsule on the same side measures 2.5 x 2 x 2 cm. and the third from the cerebellum, 2 x 1.5 x 1 cm. In sections the tissue consists almost entirely of spindle-shaped cells, in which a nucleus in a state of mitosis is occasionally apparent. Vessels are not

especially numerous. Opinion. The tumors of the brain are sarcomata, and are evidently secondary growths from the tumor of the nose. Signed, Francis L. Burnett, M.D. Opinions confirmed by Drs. Graham and Mallory.''

The very unusual and interesting features of this case are the metastases in the cervical glands and in the brain. While sarcoma of the nose often recurs again and again locally, metastases seem to be very rare. In the records of the Massachusetts General Hospital I find twenty cases diagnosed sarcoma of the nose. Twelve of these cases were admitted to the wards and eight were treated as out-patients. In none of these is mention made of metastasis. Since 1896 fourteen cases of sarcoma of the nose have been reported in the Transactions of the American Laryngological Association, in none of which metastasis occurred. On looking over the literature I have found but eight cases of nasal or nasopharyngeal sarcoma in which metastases are said to have occurred. In 1911, T. H. Farrell reported a case in which there was a small cervical gland, but this was not examined microscopically. A. Dighton reports a case in a boy eight years old, which he saw first in June, 1913.

There was a hard polyp-like mass protruding from the left nostril, slight exophthalmos of the left eye and prominence of the left cheek. There were small tumors in the roof of the mouth at the junction of the anterior and middle third of the hard palate. The submaxillary, sublingual and deep cervical glands were enlarged and hard. The boy had had tonsils and adenoids removed two years before and about one year later the cervical glands were found enlarged. The nasal condition was not discovered until one month before the patient was seen by Dr. Dighton. On removal both the nasal tumor and the cervical glands were found to be round-cell sarcoma. Dighton is of the opinion that the adenoids and tonsils, removed two years before, may have been sarcomatous as the glands appeared a year after this operation and before the nasal growth gave evidence of its presence.

C. N. Slaney, in October, 1914, reported a case of ''multiple round-cell sarcoma origination in the nares.''

The patient was a man, aged 43 years, with a history of syphi-

lis and gonorrhea. He had had nasal obstruction for three years or more. There was a large pedunculated mass filling the nasopharynx but more on the right side. The tumor, very friable, was removed by snare under local anesthesia. A year later there were pains in both knees and shoulders with edema of the feet and both nostrils were obstructed. Two months later a small painless fluctuating tumor appeared in the frontal bone. Five months later the patient fell owing to spontaneous fracture of the right femur and left tibia and fibula. Other tumors appeared under the scalp and in the fingers. Five months later the patient died from obstruction of the trachea by a tumor. At the autopsy numerous erosions of the skull were found where the fluctuating tumors had been. There is no mention of a syphilitic history, Wasserman test or of any syphilitic treatment in spite of the symptoms. The microscopic report stated that the appearance was characteristic of round-cell sarcoma.

It is well-known that it is often impossible to differentiate a gumma from a round-cell sarcoma by the microscope. The history of the case suggests that the multiple tumors were gummata rather than sarcomata. At all events the diagnosis of sarcoma in this case is open to grave question.

J. A. Watson, in a study of 150 cases published in 1904, found metastases mentioned three times. In two of these cases the cervical glands alone were involved. These two cases have not been identified as Watson does not mention them specifically.

Warthin's case, reported in 1899, the third case referred to by Watson, was a man 39 years old. A year and a half before seen by Warthin, the left nostril became partly occluded and a year later he had had polypi removed from the nose which apparently were not considered malignant. For a month he had noticed numbness of the left side of the face. Diplopia, left sided ptosis and dilatation of the left pupil soon followed. On admission there was weakness, nervousness, insomnia and dull pains in the forehead. Nostrils were entirely occluded. The mind was clear. No operation was attempted. The condition became worse and the patient died in coma six weeks after first seen. At autopsy, a soft growth (size of a cherry) was found on the inner surface of the dura mater near the longi-

tudinal sinus. The pineal body and the hypophysis were replaced by tumor growth. The left third nerve and left Gasserian ganglion were completely surrounded by new growth. The soft tumor mass filling the nose was directly continuous with tumor masses filling the frontal sinus and spheno-maxillary fossa. The heart muscle was infiltrated by nodular tumors and there was a large free tumor in the right ventricle. There were scattered small nodules in the lungs. All the abdominal organs showed metastases. The cervical lymph glands contained large tumor masses. The primary growth was a round-cell sarcoma and the metastases showed a variety of pictures according to the age of the growth and the tissues in which it was located. The primary growth was in the nasal fossa without reasonable doubt, according to Warthin. "The richness of the growth in cellular elements, the scanty stroma, the numerous large thin-walled blood vessels, the smallness and shape of the cells, all contributed to the facility of the rapid dissemination of the tumor."

In 1914, A. Finzi gives an incomplete report entitled. "A case of tumor of the naso-pharynx with metastases in the base of the brain and in the spinal cord." In this case, a man aged 22 years with severe headache and nerve symptoms, there was a malignant process starting in the naso-pharynx. Besides the possible metastases in the brain and spinal cord, the cervical glands were enlarged. No operation was apparently done and, consequently, there is no microscopic report. As the patient was still living at the time of the report, the diagnosis of metastasis in the brain and spinal cord was made solely from the symptoms. The tumor was assumed to be probably sarcoma. Sendziak, in an exhaustive article published in 1913 on malignant tumors of the nasal sinuses and naso-pharynx, does not mention metastases. Ferreri, in the same year, in a paper on the treatment and prognosis of malignant tumors of the nasal fossae and naso-pharynx, says nothing of metastasis.

In a paper on the Coley treatment of inoperable sarcoma, published in 1915, Dr. Torr Wagner Harmer gives the following report.

"Case 25. Multiple small round-cell sarcomata. M. C.,

housewife of 55. Dec. 7, 1912. Six months ago began to have severe frontal headaches. Four months ago small hard swelling on right side of nose near bridge, which had gradually and painlessly increased in size. Three months ago mass discovered in front of right ear, which has gradually and painlessly grown. About the same time, a mass appeared just above the right clavicle and another in the right neck. . . . Behind right sterno-mastoid muscle several pea- to bean-sized glands. In front and behind left sterno-mastoid muscle several small glands also palpable. . . . Excision of several glands for diagnosis. (Description of the toxin treatment is omitted. J. P. C.) Patient died with metastasis in abdominal wall, chest and both breasts, in four months.''

Omitting as doubtful or not proven Farrell's, Dighton's, Slaney's, two of the cases mentioned by Watson and Finzi's cases there remain only two cases besides my own in which the fact of metastases has been established and only one with metastases in the brain. In my case the lymphatic channels through which the cervical glands became involved are quite evident. In describing the lymphatics of the face, Poirier and Charpy say: ''The third group of lymphatics of the nose run with the facial vessels and terminate in the submaxillary glands. This cutaneous network is continuous with the lymphatics of the vestibule and through them with the lymphatics of the mucous membrane. Anterior trunks of lymphatics run . . . between the different cartilages or even in front of them. They thus arrive at the cellulo-adipose subcutaneous tissue, where they unite into two trunks . . . which terminate in the submaxillary glands.'' Sobotta says that the submaxillary nodes empty into the superficial and deep cervical nodes. The natural course of the lymphatic stream thus accounts for the involvement of all the cervical glands in the anterior triangle of the left side.

The channel by which metastases reached the brain is not so clear. Quain's Anatomy says: ''The lymphatics (of the nose) are abundant and large. They form a close plexus in the mucous membrane . . . and a more open plexus of valved vessels nearer the bone. These are in communication with the lymphatic spaces which enclose the branches of the olfactory nerve

and these spaces again communicate with the subdural and subarachnoid spaces of the cranium so that the lymphatics of the nasal mucous membrane can be injected from the cranial cavity.''

In the same connection Poirier and Charpy say: ''In the olfactory region of the mucous membrane of the nasal fossae, there are present, by the side of the lymphatic network, properly so-called, formations which are . . . comparable to them. These are the meningeal sheaths of the first pair of nerves. Now, when these sheaths are injected through the subarachnoid space, it sometimes happens that the lymphatics of the nasal mucous membrane are filled at the same time. Axel Key and Retzius, who first noticed this fact, have never seen direct communications between the periolfactory sheaths and the lymphatics of the mucous membrane. . . . Further study of the lymphatics of this region is important.''

The fact that there were metastases in the meninges and brain in my case would seem to show that there may be a direct communication between the lymphatics of the nose and the interior of the skull. It would seem from the rich lymphatic system of the nose that metastasis in cases of sarcoma would be the rule instead of apparently the rare exception. What may be the reasons for this fact I am at a loss to surmise, nor do there seem to be any facts in the cases so far reported which throw any light on this question.

I desire to take this opportunity of thanking Dr. G. O. Clark for his surgical aid in this case, Dr. Toppan for his valuable contributions to the history, Dr. Harmer for his notes on the Coley treatment, and Drs. Burnett and Mallory for their careful pathological reports.

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Discussion.

Dr. Robert C. Myles, New York City: The question of sarcoma of the nose and accessory sinuses is an interesting one to me because of the optimistic feeling I have with regard to it. A few years ago I had two cases of sarcoma in the frontal sinuses and by a complete operation and removing the bone extensively and all the periosteum I was able to get a good result. One of the cases it had invaded the orbit. It is now more than five years and neither one of them has recurred.

About twelve years ago I reported a case where the whole of the antrum was involved with the pterygoid process and that case continued in business with an artificial jaw for many years. And there was no recurrence when I last heard from him.

Some twelve or fifteen years ago I had a case extending back of the tonsil or soft palate, in which everything was removed very deeply and that has not recurred.

About two years ago I had a case of extensive carcinoma, which first appeared to be sarcoma, involving the external wall and ethmoid in which everything was removed—the naso-antral wall was freely taken away with extensive removal of the adjacent periosteum. That patient to my surprise has no recurrence and since that time has developed physically in every way.

Personally, I believe the good results must be due more to removal of the periosteum than to the bone. If that is thoroughly removed, even if we have to leave the bone, as we do especially when one of the orbito-brain plates is involved, there is still a lot of hope. I think we ought not to let these cases go on without decided surgical procedures. I remember the case of a woman

who had sarcoma of the septum, and for the reasonable factor that we did not remove her septum completely in the region of the cribriform plate, she died of extension to the brain. Death might have occurred after a more extensive operation—for the tumor had existed for many months before I saw her—yet with the faith created by the excellent results in other cases, I should insist on radical surgery in a similar case.

Dr. J. Payson Clark, Boston, Mass.: Closing the discussion. I would just like to say a word in regard to what Dr. Myles has said. Of course, we have all seen cases of sarcoma which have gotten well after thorough removal; but in this case of mine I feel that there is no question but that the glands of the neck and metastases in the brain had already occurred before I operated. I am led to that view from the fact that, apart from the slight recurrence on the septum, there was no other local recurrence, and at the time of the autopsy there was no local recurrence in the nose. There was not a direct extension of the growth to the brain, but the growth was carried through the lymphatics.

EXTENSIVE CHOLESTEATOMA FOLLOWING THE LUC-CALDWELL AND KILLIAN OPERATIONS SIMULATING SARCOMA.

VIRGINIUS DABNEY, M.D.

The phlegmatic temperament and stoicism of the patient whose condition I am about to describe might account for the fact that he sought relief for nothing more serious than a tendency to take cold and an intermittent stoppage of his nasal respiration; whereas, he was suffering from a virulent suppurative disorder of the antrum and ethmoid of not less than a year's duration, perhaps much more. The instant I glanced at his face, that of a well-nourished man 42 years of age, I observed a marked exopthalmos of the left eye, which condition had escaped not only his notice, but also that of an alleged specialist two days before. The apparent sinus infection was impossible of differentiation as the left naris was almost completely blocked in its anterior portion by an angular deviation of the septum, which was a source of much embarrassment to me in all my subsequent intranasal work. However, I was able to elicit with a small probe necrosis and polyp formation in the middle strait, though no pus came away despite the most searching and repeated irrigation. The probing seemed to cause a slight oozing of blood which continued, slight but persistent, for three days, at the end of which I was hurriedly sent for to find him delirious, though the temperature was only 103 F. The exophthalmos was worse, chemosis of the eye was extensive, and the lids were so swollen as to be closed, while a thin stream of pus trickled out of the inner canthus. The probing could hardly have been responsible for this transformation after so long an interval, and it now seems likely that the abscess was on the point of rupture when he was examined three days before.

At operation the instant an opening was made in the canine fossa pus in great quantity and of overpowering fetor escaped under pressure. There were also some shreds of tissue which

floated out at the first gush, but none was found in the free cavity of the antrum. This point is of interest in view of the later developments in this case. While I had intended to proceed to the Killian operation after clearing the antrum, I found that almost the entire nasal wall was so necrotic as to require removal, which procedure allowed me to exenterate most of the ethmoid cells as well. This I was able to do so thoroughly, by keeping a forefinger in the nostril and my curette in the canine fossa wound and through into the middle naris, that I thought the results might obviate the Killian procedure. I was still further moved to this conservative view as the patient's condition was not at all reassuring at the end of the ethmoid operation. The X-ray picture was interpreted for me as showing a pan-sinusitis of the left, though I was not at all convinced by my own examination of it, as such evidence alone has so often proved deceptive and unreliable in my experience. In three days all his symptoms appeared to recede, including the inflammation and position of the eye, and the temperature fell to 100 F. However, the fourth day his fever reached 102.2 F., the eye became much congested and the chemosis again slightly evident. The next day, the fifth since the antrum operation, his condition became so alarming that I did a Killian operation, which exposed an eburnation of bone such as I have never seen in the ethmoid region, parts of which, of course, could not be reached effectively through the antral wound. The frontal sinus was diseased only to the extent of a thickened lining membrane and contained no pus. The nasofrontal canal was normal in size and direction. The great thickness and density of the overlying cortex doubtless caused the shadow which the roentgenologist interpreted as an evidence of frontal sinus abscess, on the existence of which he was most insistent. However, the removal of the deeper lying anterior and posterior ethmoid cells, which had escaped at the previous operation, required a chisel, one of which was broken in the procedure. The diseased bone included a portion of the nasal process of the superior maxilla and its brim of the orbit. While these pieces of bone were themselves of ivory hardness the subjacent bone was friable and plainly ne-

crotic. There was not a trace of anything resembling cholesteatoma in the nares or antrum, which latter was again explored. In ten days the operation seemed a perfect success, and I felt justified in regarding it an ideal cosmetic and functional result, as there had been no discharge after the eighth day after operation, and the wound had healed by first intention without deformity. The only unsatisfactory result was a stubborn headache. On the eleventh day, when I had intended to send the patient home, I noticed a brawny red swelling below the eyelid, which was intensely painful on pressure. An extra dose of autogenous vaccine (pneumococcus) which he had been receiving for ten days, seemed to improve his condition, which began to assume the characteristics of postoperative erysipelas, none of the classical symptoms being lacking, except the very high temperature. This discrepancy I assumed to be due to the vaccine, given him the night before, which I have seen more than once control the temperature of a postoperative erysipelas. However, I now believe it was acute necrosis of bone, which Osler says he has seen several times mistaken for erysipelas. Two days later extensive infiltration and fluctuation led me to incise the swelling, which yielded an ounce and a half of pus of the same nauseating fetor, and due to the same organism as was found in the antrum and other sinuses, a pure growth of pneumococcus. I was still of the opinion that I was dealing with an erysipelas, and the floating particles of cellular tissue which were scattered throughout the pus made me think it a phlegmonous type. That part of the incision which lay over the middle of the malar bone did not heal, and boric irrigations were made through this fistula and through the nose. In two weeks he went home in fair condition, though there was some odor about the wound, and the fistulatous opening exuded a sticky, gelatinous material of a mucoid appearance. For the next two months the dusky redness that had appeared at the beginning of the cheek abscess, extending for an inch below the lower eyelid, gradually spread until it reached the lower border of the inferior maxilla, while the whole side of the face, from the eye to the same point swelled slowly till the sulcus between

the nose and the malar region was obliterated, the bridge of the nose being on a level with the upper margin of the malar bone, and the nose thrust sharply to the opposite side. The whole swelling was board-like in its feeling on palpation. Meanwhile frequent, profuse, spontaneous hemorrhages were occurring five or six times a day, lasting 15 or 20 minutes and unprovoked apparently by any trauma or exertion. In fact, they generally occurred while the patient was sitting quietly talking or reading. The great deformity, hemorrhages, location of the swelling (antrum), wooden feeling to the touch and the X-ray showing of a tumor-like mass in the side of the face all were strong presumptive evidence of sarcoma. Laboratory tests never showed any malignancy, nor did they ever show the presence of tuberculosis or syphilis, despite great care and frequency of examination. Intensive X-ray therapy was tried without success, and finally an exploratory operation was done with the following unusual findings. Heavy pressure on the cheek expressed from the nose and the fistula in the malar bone, a stiff jet of grayish, putty-like material of very foul odor, while exploration with one finger in the nose and another in the cheek showed that the entire floor of the orbit, its entire inner wall, all of the outer wall of the antrum, and all of that part of the nasal wall which had been left at the previous operations, together with the inferior turbinate, and all of the malar bone save its outer one-third had been completely eroded in two months' time. All this osseous tissue had melted away, leaving two small sequestra loose in the cheek as the only remnants. The sensation imparted to the exploring finger was that of an irregularly shaped cavity lined with a smooth velvety membrane, and no roughness was encountered. This common cavity, bounded below by the alveolar process, above by the globe of the eye, in front and internally by the nasal septum, behind by the slender rim of malar remains and palate bone and externally by the cheek muscle, was filled to overflowing with a putty-like mass, which was later determined to be true cholesteatoma. The hemorrhage accompanying its removal was great and somewhat hard to control.

From time to time his eye shows chemosis, and the discharge

increases in amount and in fetor, but increasing the frequency of the irrigations and confinement to bed causes the disappearance of the acute symptoms. His temperature curve has never been of much interest, ranging from 97.5 to 100 F. In view of the lack of positive proof of malignancy, and the absence of any adenitis, his present condition may be termed that of asthenia, as he seems to be growing slowly weaker, though there has been no return of the cholesteatoma in five months. At no time has the sphenoid shown any disease, though it was thoroughly opened and inspected twice, which is rather remarkable in view of the wide-spread degeneration in the sinuses. The treatment has included the routine use of non-irritating irrigations, the internal administration of phosphatic emulsion of cod liver oil, Blaud's pills combined with intramuscular injections of cacodylate of soda, and injection of autogenous vaccine.

The X-ray pictures in this one case crystallize my experience and feeling on such means of diagnosis, as I have come to regard them as highly valuable for anatomic reasons, and believe that they should always be made and studied before every sinus operation. On the other hand, I think that as a guide to the determination of the contents of any of the accessory nasal sinuses, they are often exceedingly deceptive and never to be given preference over our other means of diagnosis. A rhinologist cannot become as gifted in the reading of these plates as the roentgenologist and must trust much to his suggestions, wherein lies the danger, but my own experience has been so unfortunate in this field of differential diagnosis that I have come to accept these pictures as merely confirmatory or suggestive. On two different occasions I have seen X-ray plates of the antrum of Highmore explained as diagnostic of empyema when the true condition was merely inflammatory thickening of the lining membrane following an acute empyema of one and two years before, respectively.

Discussion

Dr. Oscar A. M. McKimmie, Washington, D. C.:

I had the privilege of seeing this case a number of times with Dr. Dabney before operation, and of being present and helping

him with the operation which he has detailed. He has given a very complete report of the condition as it existed and there is very little I can add about the case except to explain that the condition might very readily have given rise to a misleading interpretation of the X-ray plate. The superior process of the bone was the thickest bone I have ever seen in living subject or in dead. One portion of it was at least one-half inch thick, solid and ivorylike in character, and these cells in the ethmoid which Dr. Dabney has referred to, I have never seen in a living or dead subject. They were very hard and extremely thick, and this explains very readily why at the primary operation it was impossible to get away all the cells. At the secondary operation it was shown to be a very dense bone, either an anomaly of development, or the result of chronic inflammation.

The question of the origin of the cholesteatoma is an interesting one. There is no question as to the character of the mass because all its clinical appearances and the laboratory findings proved it to be cholesteatoma. The mass as taken out at the secondary operation I should say was as much as one could hold in the hand. The swelling from the malar bone to the bridge of the nose was a perfect straight line, and the odor was something that I have never experienced in an operating room before. My own impression is that the cholesteatomatous formation started from the skin edges of the unhealed sinus beneath the outer angle of the eye.

I don't know that there is anything further I can add to what has been said, but it has been one of the most interesting cases to me, although the results are not all that could be hoped for.

Dr. Joseph H. Bryan, Washington, D. C.:

I have had no experience with a case such as Dr. Dabney has described. I have seen one or two instances where there was ivory hardness of the bone where we found suppurative conditions of long standing. It probably was an osteitis which eventually produced this cholesteatomatous mass. Some years ago at one of the Boston meetings I described a case in which a condition, which was formerly described as rhinitis caseosa existed. This caseous secretion was the result of a chronic suppurating ethmoiditis. This case represents a condition nearest to that described by Dr. Dabney that I have had.

Dr. Virginius Dabney, Washington, D. C.:

I did not go into details about how I arrived at the nature of the mass, except that it was examined under the microscope by a pathologist. Cholestrin crystals, pus organisms, epithelial

debris and fatty acid crystals were found, and this would confirm the diagnosis. I think Dr. McKimmie's theory is a very tenable one, as there must have been a down growth of epithelium from some source. The hole was right here (pointing to malar bone), and we never made it heal; nothing would make it heal; it is open now. I have helped Dr. Bryan in two frontal sinus cases in which chisels were broken, but not in the ethmoid exenteration.

HEMIPARALYSIS OF THE RIGHT SIDE OF THE TONGUE AND LARYNX, FOLLOWING A LESION OF THE INTERNAL BRANCH OF THE SPINAL AND LARGE HYPOGLOSSAL NERVE BY SHRAPNEL

MARCEL NATIER, M.D.

Naturally my contribution to this year's meeting will be taken from one of the facts, unfortunately too numerous, which the present war is destined to enrich to excess in the medical literature of Old Europe.

History: The patient, a man twenty-four years of age, was of a nervous constitution, a doctor at law by occupation. After two years of military service he got his honorable discharge at the end of the year 1913, as a commissioned officer in the reserve infantry, and mobilized the first day of the war. He participated in the battle of Woevre during the month of August, also in the Belgian retreat, at the battle of Senlis, the Ourcq Canal and the passage of the Aisne. He was wounded at Moulin over Toutvent under the following circumstances: September 23, 1914.—While standing, bandaging his colonel's arm, he received a shrapnel shot in the right cheek and fell to the ground, immediately losing consciousness. He regained the same with the exclamation, "I am not killed," to which a captain, who was present, could not help adding, "Yes, but it is not worth any better." There was a flow of blood from the patient's mouth and thoughts of pulmonary hemorrhage on the patient's part, who believed he was "vomiting his lungs." There was a period of terrible depression, without, however, the fear of immediate death. There was a paralysis of the tongue, with an impossibility of setting up again, because of immobility of the right side. He remained on his back, as if nailed to the ground, but was finally straightened up by two men. After bandages were applied he did not say a word for about five hundred metres. Finding it impossible to walk any further he was carried a distance of two kilometres, when the wound was properly

cleansed and bandaged. He was then taken to a wagon a few kilometres in the rear, having been perfectly conscious of all that took place. Inquiries by writing, about his condition showed his wound to compare with that of General Marguerite, who died several weeks later after having had his tongue cut.

Owing to this fact the patient had to be fed with the aid of a tube. He was told his tongue was not cut, which gave him hope, but he was nevertheless greatly depressed at the thought of remaining dumb for the rest of his life, and therefore having to renounce his chosen career. He passed a bad night in an ambulance and the next day was taken in an autobus to Villers-Cotterets, where he remained during the afternoon, lying on straw in the railroad depot. At four o'clock he was put aboard a train and passed a very bad night. There were abundant bloody secretions and it was impossible for the patient to swallow or expectorate the same. The secretions constantly kept staining his clothes and the floor of the car. He suffered intensely from cold and need of medical attention.

September 25.—At 9 A. M. he arrived in Paris at the La Pitie Hospital and was taken to the surgical ward. He walked up the stairs and after two days of forced silence tried to speak, uttering unintelligible sounds. For about a week he wrote instead of trying to speak and about that time persons who listened attentively were able to understand him.

The patient had cervical pains on the right side, which were worse at night, aggravated by a painful irritation of the pharynx and bronchial tubes. As he had a severe bronchitis with cracking sounds at the base of the right lung, pneumonia was feared. A series of cupping glasses was applied. There was a fever of 40 degrees for two or three days, which after that time subsided slowly. The patient had severe cervical pains and was unable to stand the passing of a comb through his hair. The cervical pains extended to the shoulder and elbow. After two days the cervical and bronchial pains ceased, although the pains occasioned by the hair combing persisted and were felt up to about a few centimetres under the top of the skull, awakening him by night. During his stay at the La Pitie Hospital the wound received daily washings with alcohol and iodine, which were

thorough and very painful. The patient's mouth was washed for a week, but there was no surgical intervention.

Notes taken September 25, 1914.—There was a wound of the right cheek under the malar bone and in front of the masseter, with no exit of the projectile showing. There was suppuration of the wound, a sort of lock-jaw, extinction of voice and a severe bronchitis.

Diagnosis.—Wound of the cheek by shrapnel, the projectile striking on a level with the second cervical vertebra.

Radiological Examination.—Metallic fragments through the flesh of the cheek, inside of the inferior maxillary. The bullet was imbedded in the neck between the transverse apophyses of the atlas and the axis.

Development of Illness.—Normal healing with cervical pains, November 11th, 1914. The projectile not causing great pain it was found advisable not to remove it. Professor Dejerine, asked from the first to examine the patient, has continued to observe the case in his clinic for nervous diseases at Salpetriere. The author himself being here connected was enabled to witness and collect all the elements of this observation up to the present day.

Progress of the Wound in Healing.

(A) Troubles of Deglutition.—It was impossible for the jaws to relax, due to a sort of lockjaw which appeared immediately after the wound was inflicted, attenuated after a few months. The opening was at first only about two or three mm. Six months later the median, on its flat surface, could be inserted into the dental opening, but in the month of May following, the conditions were normal once more.

Alimentation. Milk was given with a nursing bottle for the first two weeks and then up till November mashes were given. Ordinary alimentation was then resumed, as partial mastication was once more possible, but the left side of the mouth could only be used. The patient would bite his tongue, which was deviated in that direction. He found it impossible to shift food from one side to the other on account of the paralysis of the tongue. The solid food given was absorbed normally but the liquids would come out through the nose. During the entire time of the milk

diet the patient had to resort to precautions of all sorts to be able to drink.

(B.) Troubles of Language. There was a slight loss of taste and salivation, with troubles of speech. He was absolutely voiceless at first on the right side. The patient always carried on conversation by writing. He used to grow very weary and tired because of the length of time it took him to express thoughts by that method. The first words spoken were of course unintelligible, for about three or four days, then progressing favorably. A month after being wounded, he had a hoarse voice which same kept so until the month of May. Up to the present daily electrical treatments, of ten minutes' duration, have been given, with a continuous current, an electrode on the back and another on the pharynx and larynx. After ten days of electrical treatment there was a possibility of moving the tongue from the right side to the left, also up and down. There was then no improvement in the patient's condition for a time. Electricity was once more resorted to, twenty minutes of a continuous current being given, plus ten minutes of a sinusoidal current. An electrode was placed on the larynx and another on the back of the head. After ten days of this treatment the volume of voice had doubled and the patient also could whistle, which had been an impossibility since he was first wounded. Of course certain letters like "l" or "r" were only possible by pressing the back of the tongue against the roof of the mouth and therefore were hard to understand.

(C.) Troubles of Respiration.—The patient easily became short of breath, but not while speaking.

(D.) Troubles of Feeling.—A cutaneous hyperesthesia of the chin was represented by a zone, limited above by the edge of the lower lip, below by the chin line, inside by the median line and outside on the right side by a vertical line passing the labial commissure. It was impossible to examine the vocal organs during the first six weeks on account of the lock-jaw.

November 18, 1914.—First specialist's diagnosis. Paralysis of the right recurrent by injury to the spinal nerve as it comes out of the cranium.

January 9, 1915.—Right vocal cord still immobilized. In

February a second specialist thought he observed a slight movement of the cord. In April, May and June a third specialist explained this certain movement by the contraction of the larynx, under the action of the left vocal cord.

Condition on July 29, 1915. The tongue, when drawn out of the mouth is bent to the right side. The anterior extremity of the raphe is placed at one half centimeter outward of the median line, on a level with the right labial commissure. Drawn to the right side, the whole organ has an oblique direction, from the back to the front and left to right. Half of the right side is atrophied and reduced about one-fourth in size. On the same side of the tongue little depressions can be seen, which probably were made at the time of the wound by the teeth of the patient. He himself thought so as soon as he was able to look at it when relieved of his lockjaw. Tactile sensibility was normal. Salt, sugar and vinegar could not be tasted on the right side of the tongue. There was complete deformity of the vocal organ, due to the fact that the whole right half was drawn fixedly inward. The right vocal cord was shortened and immobilized. The arytenoid cartilage was drawn inward and forward. The left half of the larynx was normal. The cord, seemingly in an effort of compensation, passed the median line in phonating, but did not however reach the cord on the opposite side, producing at the emission of sound a hiatus of one mm., between the two cords. The voice consequently was muffled and it was a painful effort to speak with a normal intensity of voice.

September 25, 1915—Electric Examination by Dr. Huet, Chief of Electrotherapy Service at the Clinic of Nervous Diseases at the Salpetriere.

No facial palarysis. The bullet must have passed inside of the inferior maxillary, between the bone and the mucous membrane. The voice was pretty fair, but nasal. A slight anesthesia was present in the region of the chin.

Reactions. The tongue was drawn to the right side, normal at the tip but slightly smaller at the base. No degeneration. Faradization and galvanization equal on the right and left sides.

No RD. Masseter.

Facial reaction slightly diminished on the right side on mouth

and chin. External Spinal Branch, reaction good, no RD. of the sternomastoid and trapezius. There was a persistence of movement of diduction of the jaws.

February 5, 1916.—Voice clearer. Improvement in atrophied condition of the tongue. The patient was able to bring the tongue to the left cheek. A new examination showed that the tongue now moves up and down and on the left side quite easily. The wearing of artificial dental apparatus for one month would have made mastication perfect, were it not for the self-inflicted bites of the tongue.

Voice.—When speaking fast a condition of shortness of breath is produced. Lengthy conversation is possible indoors, when he is careful to catch breath at the right time. There was no modification in the vocal organ. Professor Dejerine, who at first wanted to operate, thought it best after much hesitation, not to do so, for fear of serious complications, such as hemorrhage or embolus during or after operation. As for the surgeon, he was willing to perform the same if it were proved to him that the operation would be useful. The certain peril from which the patient escaped gives one food for thought.

One is astonished that where there was danger of immediate death, the damages are really trifling, caused by the bullet's course through the primordial organs, which are so numerous at this point of the cervical region. Certain of the phenomena observed were transitory, but most of them persisted with more or less marked attenuations. The facial vascularity explains the abundance of hemorrhage at the time of the wound, but the absence of serious gravity and speedy cessation of hemorrhage shows that the important blood vessels were not severed. If the fall on the back and following contusion were the cause, partly of the paralysis of the right shoulder and pains in the same arm, one must not forget that the lesion of the spine through its external branch has contributed to the suffering. The physiological troubles, which were the most serious, have mainly affected two organs, the tongue and the larynx. These, as a matter of fact, were affected immediately after the wound and will most likely never be normal again.

Since I have been following up this case I do not notice much

modification on the parts of the tongue and larynx. Although the degree of improvement may be explained by the fact that the patient has learned to use his damaged organs, but it is very doubtful if he will ever be able to follow his intended profession. It is very evident, after the close analysis of the symptoms and the precision of the anatomic knowledge, that the vulnerable action of the bullet has been bearing upon the spinal and also on the hypoglossal nerve of the tongue or larynx and has brought out the indisputable sign, that the physiology of the dominion of the eleventh and twelfth pairs of nerves makes it easy to explain the secondary troubles, if one is reminded of the numerous anastomoses between them and the cranial nerves. Seemingly the nerve injury was only partial and therefore hope can be entertained for future improvement. It seems that a very wise stand was taken by not resorting to surgical intervention, inasmuch as the urgency of the step was not demonstrated and that on operation the life of the patient would have been risked. After a series of emotions, perfectly natural, the patient seems to have realized matters, without too much regret and has accepted the inevitable. Therefore he will, if not able at any future time to become a barrister, to turn to some other field and choose some other vocation.

THE RELATIONS OF THE SPHENOID SINUS TO THE SEMILUNAR (GASSERIAN) GANGLION AND THEIR POSSIBLE CLINICAL IMPORTANCE.

GREENFIELD SLUDER, M.D.

The semilunar ganglion is at present thought of as so far removed from the sphenoidal sinus that they have not been associated in the minds of the anatomists or clinicians. The internal carotid artery usually rises on the lateral aspect of the body of the sphenoid and the semilunar ganglion is usually lateral and posterior to the ascending artery. This, however, is not always true. The position of the artery seems to have a large part in determining these relations.

I present drawings of two specimens showing an intimate association of the sphenoid sinus to the semilunar ganglion, or parts of it. Fig. 1 shows dissection of the cavernous sinus, semilunar ganglion and sphenoidal fissure viewed from above. The sphenoid sinus lying beneath these structures is shown in dotted line. The thickness of bone separating the cavity of the sphenoid from these structures is eggshell thin. The internal two-thirds of the ganglion are exposed to the uppermost part of the sphenoid cell and the external third is exposed at a little greater depth as the nerve tissues approach the foramen ovale. The mandibular nerve in the foramen ovale is exposed for 10 mm. to an eggshell bone separation from the sphenoid cell.

In the sphenoidal fissure the occulomotor, abducens and ophthalmic are exposed to an eggshell separation from the sphenoid cell. The trochlearis alone is not in this contact because it lies on top of the occulomotor.

Fig. 2 shows a sagittal section through the occulomotor nerve within the cavernous sinus. The specimen is viewed from within outward. In this specimen the ganglion is exposed on its anterior limit for 10 mm. to an eggshell-thin bone separation from the sphenoid sinus at the origins of the ophthalmic and maxillary divisions. The sphenoid cell measured 1.50 cm. sagittal, 4.50 cm. vertical, 5.50 cm. transversely.

In 1912 [1] I proved the permeability of the sphenoid sinus

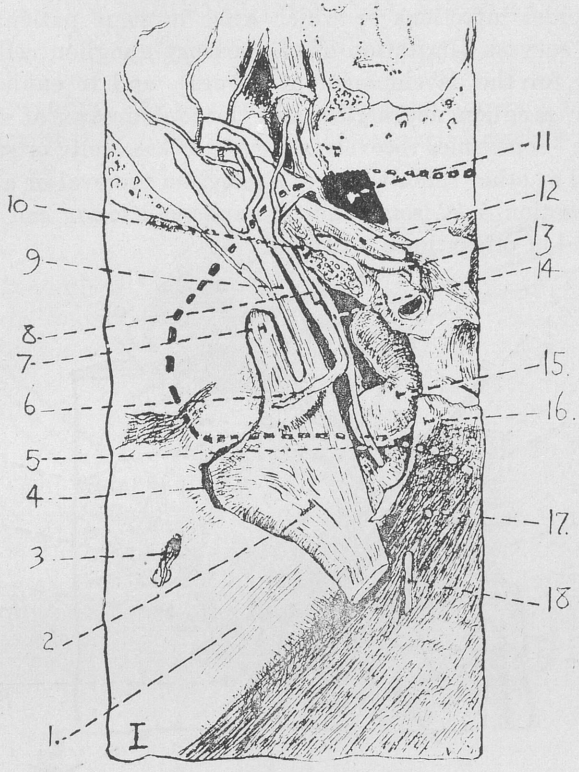

Fig. 1.—Top view of left sphenoidal district, dissected. 1. Petrous part of temporal bone. 2. Semilunar (Gasserian) ganglion. 3. Foramen spinosum. 4. Foramen ovale with mandibular nerve in it. Inside the sphenoid cell the foramen ovale containing the mandibular nerve marked as a canal 5 mm. long, separated in a semicircular exposure from the sphenoid cell by bone 1 mm. thick. 5. Abducent nerve. 6. Oculomotor nerve. 7. Maxillary nerve entering foramen rotundum. 8. Trochlear nerve. 9. Ophthalmic nerve. 10. Inner limit of sphenoidal fissure. 11. Opening dissected into sphenoidal sinus. 12. Optic nerve. 13. Ophthalmic artery. 14. Abducent nerve. 15. Internal carotid artery. 16. Posterior clinoid process. 17. Clivus of Blumenbach. 18. Abducent nerve. Dotted line shows outline of sphenoidal sinus. It is separated from the overlying structures by a wall of bone, egg-shell thin, including those in the sphenoidal fissure. The inner two-thirds of the semilunar ganglion for almost one-half its length are also included in this close association.

wall to small amounts of cocain. Following this observation, with its lesson, into these anatomical associations seems to me to offer an explanation of the herpes which develops in the wake

of sphenoidal infections or which arise in some patients from ordinary coryzas (irritation of the sensory ganglion cells being necessary for the development of herpes), and to explain why semilunar ganglion neuralgias, and tic douloureaux of sphenoidal origin [2] sometimes recover as a more or less acute or subacute lesion and at other times requires a ganglion removal or a posterior root section, i. e., sometimes the sphenoid lesion can be controlled and at other times it cannot.

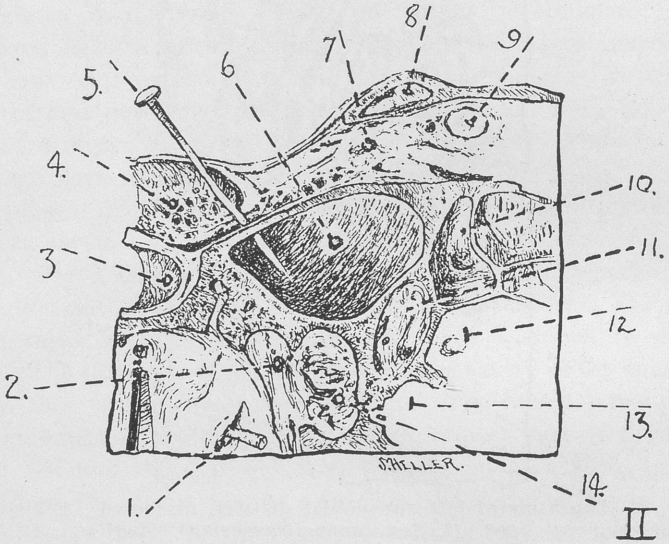

Fig. 2. Shows a sagittal section of left side through the ophthalmic nerve. 1. Eustachian tube with bristle in its lumen. 2. Tensor palati muscle. 3. Part of internal carotid artery. 4. Semilunar ganglion in Meckel's cave. 5. Pin passed through wall of sphenoid. 6. Sphenoidal sinus. 7. Ophthalmic nerve. 8. Lesser wing of sphenoid. 9. Optic nerve. 10. Post-ethmoidal cell. 11. Pterygo-maxillary fossa. 12. Opening dissected into maxillary antrum. 13. Wall of nose. 14. Internal pterygoid muscle.

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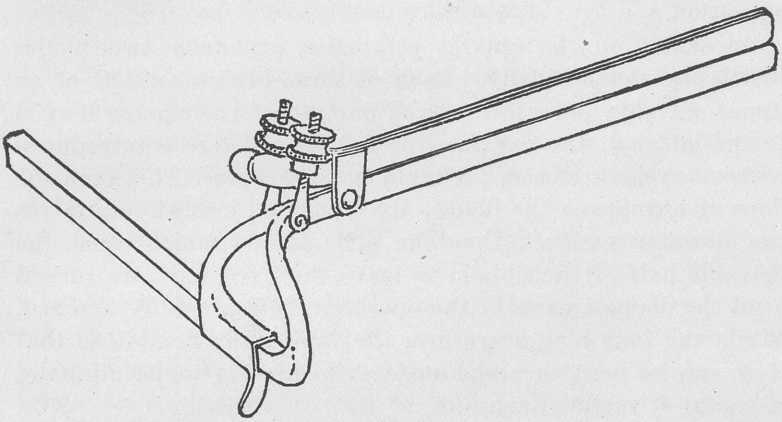
A NEW SUBMUCOUS NASAL SPECULUM

GEORGE FETTEROLF, M.D., SC. D

This speculum was devised to enable the operator to have a clear view of the deeper parts of the operative field in the later



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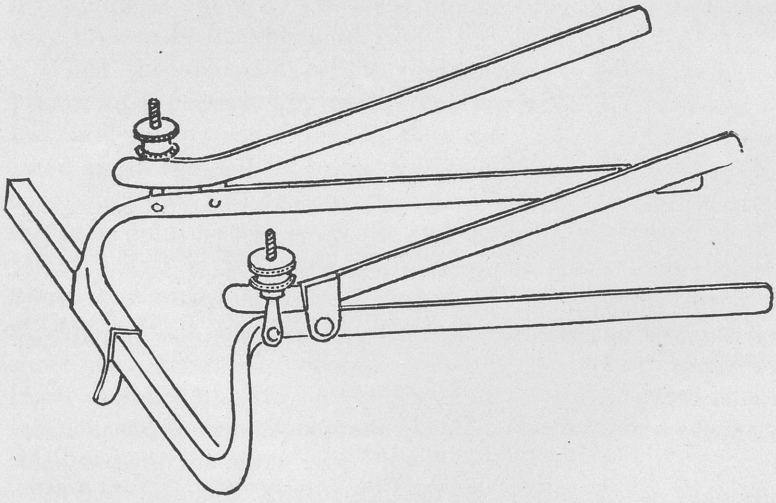

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stages of a submucous resection of the septum. It has been found of value only in inspecting and removing the posterior

and inferior portions of the septum, and it affords such a good view of the region that the operator is enabled to satisfy himself that all necessary tissue has or has not been removed and that all loose pieces of bone and cartilage have or have not been picked out. It is of no use whatever in the early stages of the operation.

As shown in the cuts it comprises primarily two blades which separate laterally. Each of these blades consists of an upper movable and a lower fixed part, the former being hinged to the latter at the proximal or nostril end. It is introduced with everything closed. After it has been placed between the flaps of membrane the blades are separated laterally as far as the operator wishes. Then the little screws which cause the movable half of each blade to leave the fixed half are turned until the deepest parts of the operative field are fully exposed. While the four blades are firm they are made flexible so that they can be bent to accommodate themselves to peculiarities of septal or turbinal contour.

THE RELATIONS OF THE SPHENOID SINUS TO THE EUSTACHIAN TUBE AND THEIR POSSIBLE CLINICAL IMPORTANCE.

GREENFIELD SLUDER, M.D.

So far as I know, the relations of the Eustachian tube to the sphenoidal sinus have not been described.

In the usual skull the tube at all points is far (1.50 cm.) removed from the sphenoidal sinus. Fig. 1 shows a transverse section through a sphenoid which seems to me to represent average large sphenoid cells. The right measures 2.25 cm. transversely, 2 cm. vertically, and 2 cm. sagittal. The left measures 2 cm. transversely, 1 cm. vertically, and 2 cm. sagittal. Fig. 2 shows a sagittal section of same specimen just internal to the foramen rotundum. The Eustachian tube (with bristle in its lumen) is seen to be 15 cm. removed from the nearest approach of the sphenoid cell. Such relations preclude a prejudicial effect be exercised on the tube by an inflammatory process in the sphenoid.

When the sphenoid cell is prolonged downward into the pterygoid process it approaches the Eustachian tube more or less, and it may come to such close association as to be separated by an eggshell thickness of bone (Figs. 3, 4 and 5). This comes through two factors, first the thickness of the bone of the pterygoid process is absent and secondly the origin of the tensor palati is not from the uppermost limit of the plate. Should the tensor palati arise high on the plate the thickness of the muscle will enter in between the tube and the bone of the sinus wall (Fig 6). Should, however, the tensor extend a lesser distance upward on the plate the tube comes into closer relation and in some specimens is in contact with the eggshell-thick wall of the sinus (see Figs. 3, 4 and 5).

Piersol (Human Anatomy, 1907, p. 1503) states that the glands of the membrane lining the tube pierce the depths to perforate the clefts in the cartilage extending into the environing connective tissue.

In 1912 I proved[1] the permeability of the thin sphenoidal wall by an intrasphenoidal application of cocain, paralyzing the entire 5th nerve. Such permeability it seems to me would allow an irritation in the tubes in such a case as Figs. 3, 4 and 5 as long as the sphenoidal inflammation continued. I believe this

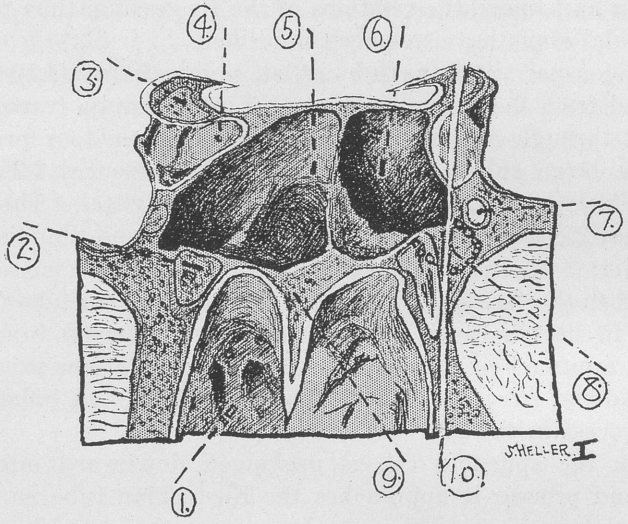

Fig. 1. Cross section of sphenoid body through anterior clinoid processes posterior to optic canals, seen from in front. 1. Remnant of pharyngeal tonsil. 2. Anterior outlet of vidian canal with vidian nerve. 3. Anterior clinoid process. 4. Internal carotid artery in the cavernous sinus making its upturn. 5. Right sphenoidal sinus. 6. Left sphenoidal sinus. 7. Foramen rotundum with maxillary nerve. 8. Dotted line showing the prolongation of sphenoid sinus outward at a place posterior to line of transverse cut showing how it approaches the foramen rotundum. 9. Sphenoid-vomer junction. 10. Line of sagittal cut, the outer portion of which is shown in Fig. 2.

is the explanation of some surprisingly fine results for abandoned cases of low grade tube deafness following post-ethmoidal sphenoidal surgery. I have previously thought these cases to have been crippled Vidian nerves from sphenoid sinus inflammation —the great superficial petrosal nerve from the geniculate ganglion of the 7th (part of the Vidian) being the motor supply to

the tensor and levator palati muscles—it being thereby unable to perform its full functions so that these muscles did not open the tube properly.

I believe both explanations are correct in two types of cases respectively.

It is with much pleasure that I express indebtedness to R. J. Terry, Esq., M.D., Professor of Anatomy in the Washington University Medical School, for consultation in these observations.

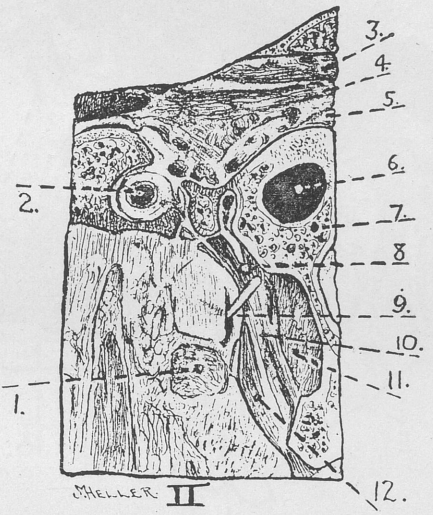

Fig. 2. Lateral part of sagittal section through line 10 of Fig. 1. External pterygoid muscle. 2. Internal carotid artery. 3. Oculomotor nerve. 4. Ophthalmic nerve. 5. Cavernous sinus. 6. Lateral limit of sphenoidal sinus. 7. Bony wall of sphenoidal sinus. 8. Tensor palati muscle. 9. Eustachian tube with bristle in its lumen. 10 Tensor palati. 11. Internal pterygoid muscle. 12. Levator palati muscle.

References.

1. Sluder, Greenfield: Some Anatomical and Clinical Relations of the Sphenoid Sinus to the Cavernous Sinus and the Third, Fourth, Fifth, Sixth and Vidian Nerves. Trans. Am. Laryn. Assn., 1912. Archiv. f. Laryn. u. Rhin., B. 27. Annals of Otol., Rhin. and Laryn., 1913.

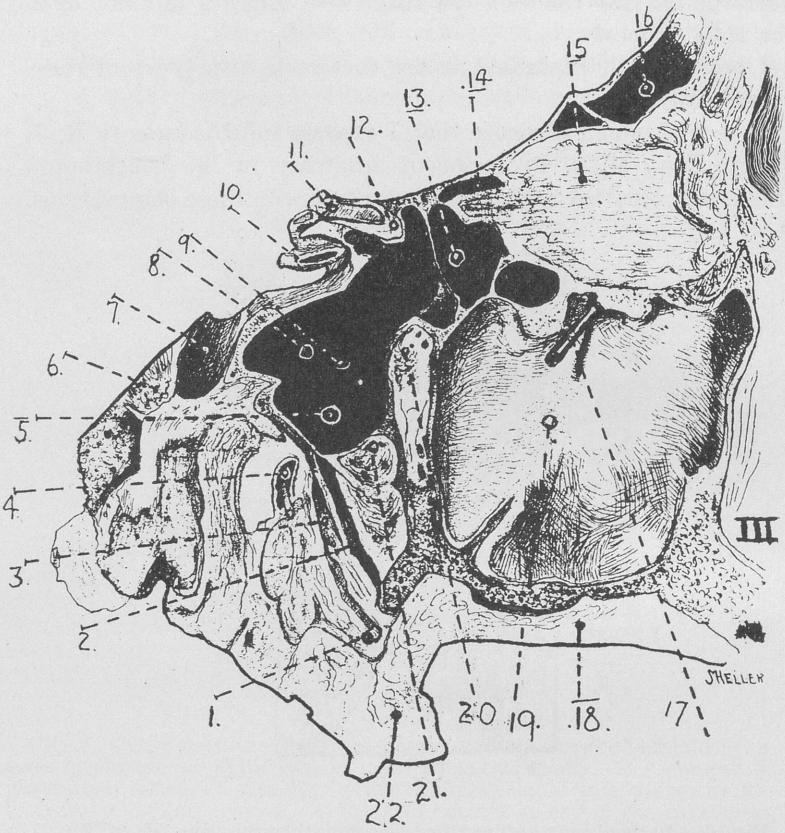

Fig. 3. Sagittal section between the foramen rotundum and vidian canal right side, viewed from without inward. 1. Hammular process. 2. Tensor palati muscle. 3. Levator palati. 4. Eustachian tube with bristle in its lumen. 5. Sphenoidal sinus prolonged downward into pterygoid process to bifurcation of the plates. 6. Clivus of Blumenbach. 7. Groove for carotid artery. 8. Nasal (internal) part of sphenoidal sinus. 9. Vidian canal crossing the sinus. 10. Internal carotid. 11. Optic nerve. 12. Lesser wing of sphenoid. 13. Post-ethmoidal cell. 14. Superior rectus. 15. Orbital fat. 16. Frontal sinus. 17. Bristle passed from maxillary antrum through its outlet into middle meatus of nose. 18. Hard palate. 19. Maxillary antrum (nasal wall). 20. Nasal ganglion. 21. Internal pterygoid muscle. 22. Soft palate.

Observe close association of Eustachian tube and sphenoidal sinus. The optic canal in this specimen is surrounded two-thirds of its circumference by sphenoidal sinus for 10 mm. of its length.

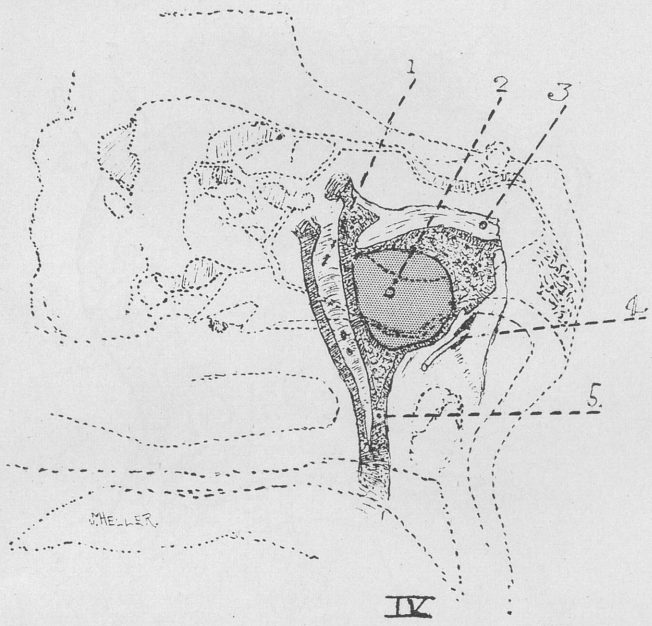

Fig. 4. Sagittal section of specimen shown in Fig. 5 through the maxillary nerve. 1. Pterygomaxillary fossae. 2. Sphenoidal sinus prolonged into pterygoid process to the bifurcation of the plates. 3. Maxillary nerve. 4. Eustachian tube with bristle in its lumen. 5. Pterygoid process. The dotted line of Fig. 5 is shown as superimposed. Observe the very close association of Eustachian tube 4 in Fig. 4 with the sphenoidal sinus 2.

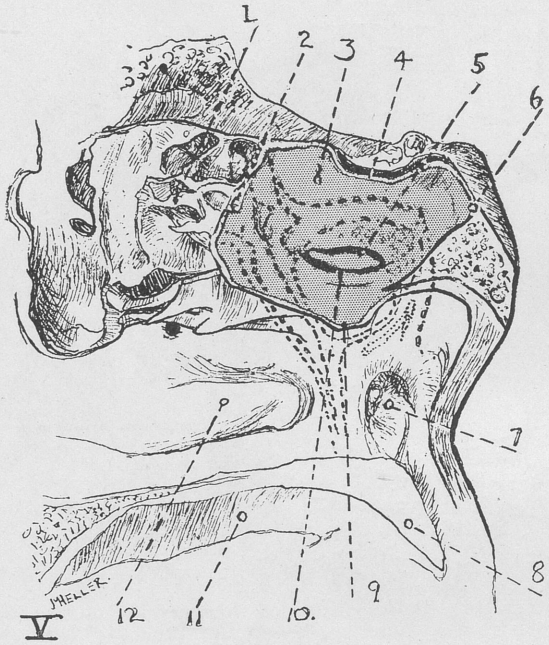

Fig. 5 shows the nasal (internal) surface of specimen. 1. Post-ethmoidal cells. 2. Anterior limit of sphenoidal sinus. 3. Sphenoid sinus. 4. Upper limit of sphenoidal sinus. 5. Looking into lateral part of sinus. 6. Posterior limit of sphenoidal sinus. 7. Eustachian tube mouth. 8. Soft palate. 9. Lower limit of sphenoidal sinus. 10. Vidian canal. 11. Hard palate. 12. Lower turbinate. The dotted line of Fig. 4 is shown in the depths.

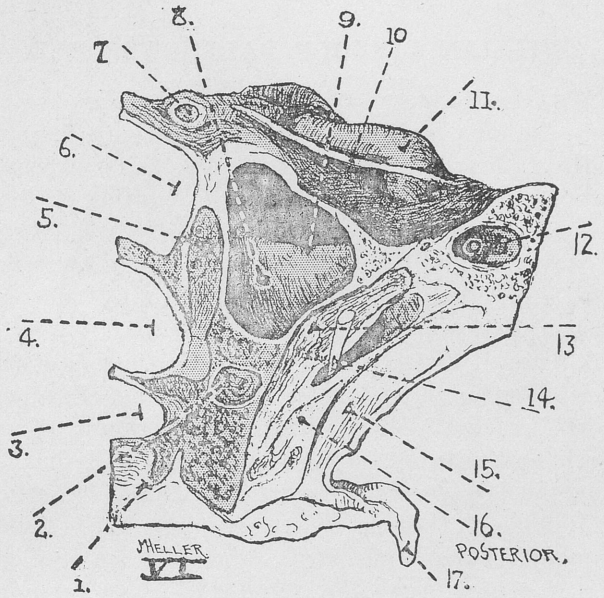

Fig. 6. Sagittal section between foramen rotundum and vidian canal, viewed from without. 1. Hammular process. 2. Internal pterygoid muscle. 3. Lower meatus. 4. Middle meatus. 5. Nasal ganglion. 6. Upper meatus. 7. Optic nerve. 8. Sphenoidal sinus. 9. Vidian canal. 10. Abducent nerve. 11. Internal carotid artery. 12. Internal carotid. 13. Tensor palati muscle. 14. Eustachian tube with bristle in its lumen. 15. Palato-pharyngeus muscle. 16. Levator palati. 17. Soft palate.

Observe 12 mm. separation of Eustachian tube 14 from sphenoidal sinus 8 despite the prolongation of the latter into the pterygoid process to the bifurcation of the plates. In this case the tensor palati arises high and separaes them.

Obituary

WILLIAM LINCOLN BALLENGER, M.D.

Dr. William Lincoln Ballenger died December 22nd at Economy, Indiana, at which place he was born December 26, 1861. His father, William B. Ballenger, a farmer, was born in Virginia and was of German ancestry, although the family had been in this country for two hundred years. His mother, Lydia Starbreck Ballenger, was born in Nantucket Island and was descended from an English family who came to America in 1659.

Dr. Ballenger was educated at the Common and the High School of Economy, and later had the benefit of a short course at Earlham College, Richmond, Indiana. Coming to New York, he studied at the Bellevue Hospital Medical College, receiving the Doctorate of Medicine in 1886. He returned at once to Richmond, Indiana, where he married Miss Ada Poarch of Richmond, Indiana, and at the same time entered upon the practice of general medicine. In 1893, he removed to Evanston, Ill., and practiced general medicine there for two years. In 1895 he abandoned general practice, removed to Chicago, and devoted himself to oto-laryngology. He was appointed to the Chicago Eye and Ear Hospital in 1895, and from 1905 to 1913 held the position of Professor of Otology and Laryngology in the Medical Department of the University of Illinois. He also held positions in the Illinois Charitable Eye and Ear Infirmary and in the West Side Free Dispensary. He served as Secretary of the American Academy of Ophthalmology and Oto-Laryngology, 1897-1902, was its president in 1902-1903, and since then councillor. He was a member of the American College of Surgeons, American Medical Association, the Illinois State Medical Society, and the Chicago Medical Society, and was Fellow of the American Laryngological Association, the American Laryngological, Rhinological,

and Otological Society, and of the Chicago Laryngological and Otological Society. He was also a member of the International Congress of Otology.

Dr. Ballenger was the author of two textbooks, the first appearing in 1900, and the second and larger work on "Diseases of the Nose, Throat, and Ear," several years later. Upon scientific and clinical subjects connected with oto-laryngology he contributed many articles. The inventor of several instruments, he perfected the swivel knife for the submucous resection of the cartilaginous part of the nasal septum. He was among the first in this country to reintroduce the radical extirpation of the tonsil and to appreciate the method of Sluder for its accomplishment.

For many years Dr. Ballenger suffered from diabetes, but nevertheless persevered in active practice until December, 1913, when his condition became so serious that he left Chicago and retired to his farm at Economy, where after two years of suffering he passed away. His widow survives.

JOHN ORLANDO ROE, M.D.

Dr. John Orlando Roe died at his home in Rochester, N. Y., December 24, 1915. The son of Stephen Smith Roe and Hannah Saphronia Randall, his wife, Dr. Roe was descended on both sides from English ancestors who were among the earliest settlers of Providence, Rhode Island, men prominent in the affairs of their communities, and especially so in the activities of the Revolutionary War. Dr. Roe was born at Patchogue, L. I., February 3, 1848. His early education was gained at the schools of his native town, at the Hudson River Institute, at the Wilbraham Academy of Massachusetts, and at the University of Michigan, Ann Arbor. Entering upon the study of medicine at the medical department of the last-named institution, he received the degree of M. D. in 1870. Coming to New York he matriculated at the College of Physicians and Surgeons, receiving his diploma in the class of 1871, and securing a prize for his graduating thesis. He remained in New York for a year, taking graduate courses, and returned to

Rochester in 1872, where he at once entered upon the special practice of diseases of the upper air passages. He soon recognized the necessity for a more thorough course of training, and to secure this he went abroad where he devoted two years of particularly earnest work in the clinics of Vienna, London, and Berlin. His unusual ability was everywhere recognized, particularly by Sir Morell Mackenzie, with whom he spent much time and by whom he was accorded many desirable privileges, among them an active membership in the British Medical Association, an honor rarely conferred upon one of foreign birth.

Returning to Rochester, Dr. Roe quickly made a position for himself which was not long in being generally recognized. He acquired a large practice and was for many years laryngologist to the Rochester Hospital. He was elected a Fellow of the American Laryngological Association at its first meeting, held in New York City, June 10, 11, 12, 1879, on which occasion he offered a paper entitled: "Aphonia, Resulting from Inflammatory Thickening and Induration of the Ventricular Bands." He was elected president of the Association in 1898. He had also been at different times president of the Medical Society of the State of New York, of the Central New York Medical Association, the Monroe County Medical Association, the Rochester Academy of Medicine, and the Rochester Pathological Society. He was one of the founders of the Rochester Academy of Medicine, and was deeply interested in its work of building up a medical library for the use of the members.

He was a member of the Seventh International Medical Congress in London, England; the Eighth International Medical Congress in Copenhagen, Denmark; the Ninth International Medical Congress in Washington, D. C., on which occasion he was secretary of the section in Laryngology; the Tenth International Medical Congress in Berlin, Germany; the Pan-American Medical Congress in Washington, D. C. He was a corresponding member of Societe Francaise D'Otologie de Laryngologie et de Rhinologie, a member of the British Medical Association, American Medical Association, American Climato-

logical Association, American Laryngological, Rhinological, and Otological Society, the New York Academy of Medicine, and the Medical Congress of American Physicians and Surgeons. He was also a fellow of the American College of Surgeons.

But of all the honors which he received, none touched him more deeply nor gave him greater satisfaction than the degree of LL.D., bestowed upon him by his Alma Mater, the University of Michigan, in 1913.

Dr. Roe's original contributions to the science of medicine in his department were many and highly valuable. This could hardly be otherwise in view of his temperament, and his mental ability. Possessed of unusual modesty—indeed, of diffidence—his energy, perseverance, and hopefulness enabled him to surmount obstacles which in the way of others had proved impassable, for to the attainment of the highest success he brought all of the necessary qualifications, each one of these traits developed in him in an equal degree. It can be said of few men that they stand paramount in literary ability, in inventive genius, in technical skill, and in sound judgment. The productions of his pen show admirable literary ability combined with ripe scholarship. His early contributions, especially in the department of the neuroses of the upper air passages, are classic. Through him and a few other members of our Association the vaso-motor disturbances of the nasal region were carefully studied long before the subject had attracted serious attention abroad.

In the operative treatment of the nose, Roe stands preeminent, and it might be well at the present day if his methods and those of his contemporaries were more carefully studied, and better understood. In the repair of nasal deformities he stood alone. Indeed, many of the most popular of the present-day methods were originated by him. This is especially true of the submucous method, as applied to the septum and to the nasal bones. It seems unfair that he should not receive the credit due him in this important department. Long before Killian's name appeared Roe had been teaching the very same principles which govern the septum operation. Indeed, there

are few recesses of our art which were not illuminated by the light of his genius.

In 1895 Dr. Roe was married to Miss Jane Pomeroy, of Troy, Pa., who survives him.

Since our last annual meeting in Washington, May 9th, 10th and 11th, 1916, we have sustained the loss of three of our distinguished fellows, Dr. Jacob H. Hartman of Baltimore, Dr. William E. Casselberry of Chicago, and Dr. D. Braden Kyle of Philadelphia.

The obituaries of these gentlemen will appear in the 1917 issue of the Transactions, after having been read before the next annual meeting of the Association.

Dr. Casselberry has still further perpetuated his memory in the Association by leaving in his will an appropriation for the promotion of laryngological science.

The following is an extract from the will of Dr. Casselberry.

"In respect to Item II: The said five thousand dollars ($5,000), made up by two sets of bonds, viz.: three thousand dollars ($3,000) in South Side Elevated Railway Co. first mortgage 4½ per cent. bonds, and two thousand dollars ($2,000) in Peninsular Power Co. first mortgage 6 per cent. bonds, or the replacement securities of either or both said sets of bonds, shall be paid to the American Laryngological Association, a New York State corporation of which Dr. Harmon Smith is now secretary, with office at 44 West 49th Street, New York, is to be held in trust by said American Laryngological Association or its legal successor and administered as a memorial to the testator, to wit: whenever the net interest only shall have accrued to not less than five hundred dollars ($500), therefore at intervals of two years or more and under any conditions deemed appropriate for said purpose by the executive committee of said association said interest shall be used either in whole or in part, and either alone or in conjunction with any similar fund, for a prize award, decoration or expense to encourage advancement in the art and science of Laryngology and Rhinology."

EXECUTIVE SESSION

Tuesday, May 9, 1916

There were no Active, Emeritus, or Corresponding Fellows presented. The council, through the Secretary, presented the names of Dr. Francke H. Bosworth and Dr. Arthur W. de Roaldes for election as Honorary Fellows of the Association, who were elected by ballot in accordance with the constitution.

Dr. Clement F. Theisen and Dr. John M. Ingersoll were appointed an auditing committee of two.

Dr. Henry L. Swain, Dr. Thomas Hubbard, Dr. D. Bryson Delavan, Dr. Harris P. Mosher, and Dr. E. Fletcher Ingals were unanimously elected by ballot a nominating committee to present the names of ten Fellows to serve as the Board of Directors for the ensuing year.

SECRETARY'S REPORT

The Secretary begs leave to report the deaths of two Active Fellows, Drs. William L. Ballenger and John O. Roe. This leaves an Active Fellowship of 82, with the possibility of 18 new elections to complete the full membership of 100.

So far as the Secretary is acquainted, there have been no deaths among the Honorary, Corresponding, or Emeritus Fellows.

In accordance with the constitution the minutes of the council must be presented to the Association for ratification, but are not to appear in full in the Transactions of the Association.

The first meeting of the Council of the American Laryngological Association was called to order Saturday evening, January 15, 1916, at the residence of the Secretary, Dr. Harmon Smith, 44 West 49th Street, New York City, Dr. Makuen in the chair. The others present were Drs. Leland, Bryan, Clark, and Smith. Regrets were received from Drs. Holmes, Hubbard, MacCoy, and Wilson.

Washington, D. C., was selected as the place for the next An-

nual Meeting of the Association, in conformity with the rules of the Congress of American Physicians and Surgeons. The Hotel Raleigh was designated as the assembly place for the meetings on the mornings of May 9th, 10th, and 11th.

The council presents the names of Dr. Francke H. Bosworth and Dr. Arthur W. de Roaldes to the Association for election to the position of Honorary Fellowship. There are no suggestions for Corresponding or Emeritus Fellows.

In taking action upon the applicants for Active Fellowship, it was voted that all candidates be renominated for consideration of the council in 1917.

The council recommends to the Association for Abstract Editor for the ensuing year the name of Dr. Emil Mayer. It further recommends that the abstracted proceedings of the annual meeting be withheld from publication until the Transactions of the Association are ready for distribution in book form. (This last recommenation voted out by amendment.)

It was moved and carried that the number of Transactions be increased from 250 to 300 copies, owing to the increased demand for extra copies of these volumes.

It was recommended by the council that $300 be appropriated yearly for the expense of the Secretary's office.

The council accepted unanimously the invitation of Dr. Richardson to entertain the Association at luncheon on May 10, 1916, at his residence, 1317 Connecticut Avenue, likewise the invitation of Dr. Joseph H. Bryan to luncheon on May 9, at his home, 1644 Connecticut Avenue, Washington, D. C.

It was decided by the council to omit the symposium at the annual meeting, owing to the fact that only three mornings could be devoted to the scientific and business affairs of the Association.

There being no further business before the council, the meeting adjourned.

The second meeting of the council of the American Laryngological Association was held at the Hotel Raleigh, Washington, D. C., May 9th at 9 a. m., Dr. Makuen in the chair. There were also present Doctors Wilson, Holmes, Bryan, Clark, Leland, Hubbard, MacCoy, and Smith.

It was moved and carried that Dr. Bryan be authorized to secure proper musicians for the banquet, the remuneration for the same to come out of the treasury, not to exceed the sum of fifteen dollars.

It was moved and carried that the Secretary notify Mr. S. W. Stratton that the American Laryngological Association approved of his action relative to the adoption of the centigrade thermometer instead of the Fahrenheit.

It was moved and carried that the incoming president of the Association select, as formerly, three gentlemen to serve on the Board of Governors of the American College of Surgeons for the year ending 1917.

It was moved and carried that a committee be appointed with power to act, to investigate the report of the United States Indian Medical Service and reply to the same. Drs. J. H. Bryan and Harmon Smith were appointed as the committee.

The Secretary was authorized to investigate the status of the El Paso Medical Society Library and the Kansas City Medical Library Club, to determine if they were upon the proper plane to warrant exchanges of the Transactions.

There being no further business the meeting adjourned.

DR. G. HUDSON MAKUEN, *President.*
DR. HARMON SMITH, *Secretary.*

Discussion of Secretary's Report

DR. EMIL MAYER, New York City:

Mr. Chairman, I want to ask whether the publication of the report means that it receives the endorsement of the Association, because I wish to inquire why the abstracting of the proceedings should be postponed until so late a day. It would seem to me that it is a reported abstract to the scientific proceedings, and from inquiry, it would appear that the earlier it gets into the hands of medical journals the better it is for publication. If we wait until a late day I feel it would not be taken at all.

DR. HARMON SMITH, New York City:

The explanation of this is that in sending out the abstracted proceedings of the Association, it detracts from the printed form of the Transactions, and in getting the material in such

abstracted form, a great many readers of the book would not wade through the original article after perusing the abstract, and purchasers would not buy after seeing the abstracts in so many journals.

Dr. Joseph H. Bryan, Washington, D. C.

When this question came up before the council it did not make much impression upon me as to the importance of the early abstraction of the articles; but I can see now that it would be an advantage, as far as the abstract is concerned, and as far as the general profession is concerned, that the abstract should be out as early as possible. Of course there is no great difficulty in getting the manuscripts from the members, but it is a very difficult thing to get the Transactions out early. I don't see how it can detract very much from the Transactions as a whole, and I think myself that the abstracts ought to be in the hands of the abstractor early and published. It is only a resume and it does not give the whole gist of the article, so I can hardly see how it can take much away from the Transactions.

Dr. Ingals, Chicago:

Mr. Chairman, while we are on the subject, it seems to me that the abstracts coming out early, instead of detracting, would add to the value of the Transactions. Many people, seeing the abstracts, would want to get the whole article. I should think it would be beneficial. Certainly, from my standpoint, it is very important that the abstracts should come out early. The Transactions come out the latter part of the year, and if we do not have the abstracts we do not possibly have time to read the papers promptly.

Dr. John F. Barnhill, Indianapolis:

There is every reason for publishing the abstracts early. This association, like every other scientific association, has a duty to the public. I do not mean to the laity, but to physicians in general, and the earlier that is in their hands the better it is for them and the better it is for us. I never understood that it was our desire to sell a large number of these books, but even though this be true I cannot see how that would hinder the sale of it. I should be very much in favor of this as it has been done.

Dr. Harmon Smith, New York City:

I might say in regard to the Transactions that they can be in the hands of the Fellows in September or October (at least if those who contribute to it would send in their discussion and their papers promptly) even if it necessitates the Secretary's remaining in the city all summer.

I move, however, that that section of the council's action relative to the postponement of the publication of the Abstracted Proceedings be stricken from the report of the Secretary.

Motion seconded and so ordered.

On motion duly made and seconded it was ordered that Report of Secretary be adopted as amended.

TREASURER'S STATEMENT TO MAY 1, 1916

Receipts

Balance from old account	$1,029.83
Dues collected	1,305.30
Sale of Transactions	47.29
Interest on deposits	17.80
	$2,400.22

Expenses

Stenographer, 1915 meeting	$105.00
International Hotel, etc.	20.00
Clerical work, Secretary	128.10
Printing, postage, etc., Secretary	97.63
Transactions, mailing, etc	798.42
The Laryngoscope Co., half-tones, etc.	23.40
Letterheads and envelopes, President	4.00
Expenses, Abstract Editor	2.25
Treasurer's expenses	7.63
Collecting checks	1.90
	$1,188.33
By balance in bank	1,211.89
	$2,400.22

ASSETS OF ASSOCIATION

Invested

DeRoaldes Prize Fund	$500.00	
Accrued interest to Feb. 1, 1916	189.69	
		$689.69

Current

Unpaid dues	$45.00	
Bank balance	1,211.89	
		1,256.89
Total assets		$1,946.58

Liabilities, none.

Respectfully submitted,

J. PAYSON CLARK, *Treasurer.*

Audited and approved:

C. F. THEISEN,
J. M. INGERSOLL,
Auditing Committee.

REPORT OF LIBRARIAN

The Librarian has to report that no additions have been made to the library during the past year.

Respectfully submitted,

J. H. BRYAN, *Librarian.*

The Auditing Committee reported that they had examined the books of the Treasurer and found them correct as read.

On motion duly made and seconded, it was ordered that the Report of the Treasurer be adopted as read.

The Nominating Committee presented the names of Dr. Joseph L. Goodale, Dr. Thomas H. Halsted, Dr. Greenfield Sluder, Dr. Harmon Smith, Dr. J. Payson Clark, Dr. Joseph H. Bryan, Dr. George A. Leland, Dr. Thomas Hubbard, Dr. Alexander W. MacCoy, and Dr. G. Hudson Makuen, as Directors for the ensuing year, who were duly elected by ballot.

REPORT OF COMMITTEE ON CONTROL OF CANCER

At the ninth meeting of the Congress of American Physicians and Surgeons held in Washington in May, 1913, the American Gynecological Society presented to the other branches of the Congress an identical resolution requesting the appointment of two or more delegates to co-operate in forming a national organization to conduct educational propaganda regarding the prevention and cure of cancer. The Gynecological Society had just adopted the report of its committee which had been at work on this problem for a year or more previously, and had recommended that a special society should be established with the purpose of conducting this much-needed campaign of education and the collection of data on a nation-wide basis and on a general plan similar to that of the national Association for the Study and Prevention of Tuberculosis. In preparing its report and recommendation the committee of the Gynecological Society had secured the interest and promised support of a group of lay citizens of New York, five of whom had guaranteed $5,000 toward the first year's expenses of the proposed organization, but solely on condition that the project be approved not only by the Gynecological Society but the profession generally.

A majority of the constituent societies of the Congress promptly responded to the suggestion of the Gynecological Society and appointed delegates.

These societies were the American Dermatological, Surgical, Laryngological, Otological, Genito-Urinary, Pathological and

Bacteriological, Orthopedic, Ophthalmological and Neurological Associations.

The delegates from these associations convened at a meeting held in New York City May 2, 1913, when the American Society for the Control of Cancer was duly organized and the following declaration of its design and scope embodied in the constitution:

> "To disseminate knowledge concerning the symptoms, diagnosis, treatment, and prevention of cancer, to investigate the conditions under which cancer is found, and to compile statistics in regard thereto."

It is but fitting that a movement which traces its origin and so large a part of its prestige with the profession and public to the Congress of 1913 should present to the Congress of 1916 an acknowledgment of indebtedness to all the co-operating organizations and make some account of methods of work and progress during the last three years.

Plan and Scope

The purpose of the Society as just stated prescribes two main lines of activity: (1) a campaign of public and professional instruction, and (2) the collection of statistical data. Experimental research, the support of hospitals or clinics, and the care and treatment of individual patients are not contemplated. In extending its influence and carrying on its work the Society necessarily devotes a large share of its direct efforts to securing the interest of other organizations and forces which are in a position to render assistance in local fields.

Professional Endorsement

In the months immediately following the formation of the Society under the auspices of this Congress, other prominent professional bodies successively recorded their approval and support of the project. Resolutions of endorsement have been adopted by the American Medical Association, the Clinical Congress of Surgeons, the Western Surgical Association, the Southern Surgical and Gynecological Association, and many state and local medical societies.

Executive Control

The government of the Society is vested in a board of directors which numbers 66 members, including practitioners of recognized standing and prominent and interested laymen and women from many parts of the country. The direction of the work in detail is delegated to an executive committee of thirteen directors, including the chairmen of standing committees on organization, membership, finance, publication, and statistics. The professional members of the board act in conjunction with the executive committee as an advisory council which formulates the general policies of the Society.

Membership and Finance

In so far as paid service is necessary to supplement the volunteer work which is the chief source of the Society's vitality, a modest budget is raised entirely from dues of members at five dollars per annum and from special contributions in larger amounts. The Society has no endowment and no fixed income from any philanthropic foundation. At present there are 577 members and contributors of all classes, approximately half of whom are physicians, the list including some of the leading American practitioners. The interest and support of these doctors is a chief asset of the Society and this opportunity is taken to urge every member of the Congress of Physicians and Surgeons to contribute his influence by becoming an annual member.

State and Local Committees

Branch committees of the Society are formed in the several states and cities, not as independent local organizations, but as integral parts of the single National Society. The chairmen of state committees are usually members of the National Board of Directors and are vested with full power to appoint the other members of their committees and supervise their work. State committees in turn may organize local committees in the principal centers of population wherever the interest and needs warrant. At the present time state committees have been authorized

in sixteen states and several others are in the process of formation.

Organization and Co-operation

The Society has considered it a matter of first importance to develop its National Executive Office as a central bureau and clearing house through which to seek the co-operation of all appropriate general and local agencies, and to receive and transmit impulses tending to further the propaganda of public instruction in all parts of the country. Standing in close relation, on the one hand, to the leading experimental and statistical students of the disease who represent sources of new and old knowledge of the subject, the Society is, on the other hand, in helpful contact with the various social forces which can be called upon to transmit the essential facts to the public.

Boards of Health

Widespread and increasingly effective work is being done by state and city boards of health in the direction of instructing the public regarding the prevention of disease. The Society therefore endeavors to have the more progressive health officers devote a proportionate share of attention to cancer in this connection, and the national office undertakes to furnish data, statistics, and special articles produced under the supervision of the appropriate committees, for local use in the name of the board of health. Many health boards, including particularly those of Michigan, Virginia, North Carolina, New York, Massachusetts, Kansas, New York City, and Toronto, are now taking an active part in this campaign while a number of other departments have made a beginning.

Medical Societies and Education of the Profession

The design of the Society is taken to include efforts to keep the general practitioner in touch with the latest developments in the knowledge of cancer and cognizant of his duty to the patient. In this field, however, it is felt that the regular professional organizations should take the lead. The Society therefore

offers all possible co-operation and assistance to state and county medical societies in providing literature and speakers, and to the various medical journals in publishing appropriate articles. Many state societies have appointed special cancer committees, some of these, as in the case of Pennsylvania, antedating the formation of the national organization and representing notable pioneer work in this field in America. In several instances the committee of the National Society and that of the state medical society have been made identical. The existing state committees on health and public instruction have also been approached with reference to the inclusion of cancer in their programs.

Nurses

Systematic effort is made to promote the instruction of nurses regarding the earlier phases of malignant disease and predisposing conditions, in order that they may be adequately prepared to advise people, especially women with whom they come in contact in the course of their duties, to seek professional attention in time. A series of special articles for nurses has been published, meetings for nurses have been arranged, all the leading schools of nursing in the country have been urged to include in their courses lectures on the early signs and symptoms of cancer, and opportunities are sought to present the subject at the annual meetings of state and national organizations of nurses, a number of which have recorded their endorsement of the purpose and methods of the Society.

Social Workers

The field workers of charity organization societies have similar opportunities to advise people who do not ordinarily read newspapers and educational books and pamphlets. The National Office has therefore circularized several hundred of the larger charity organization societies in the various states, seeking their interest and co-operation in holding public meetings and in arranging for the special instruction of the members of their working forces.

Women's Clubs

Women's organizations have proved one of the most effective single agencies in disseminating knowledge of early cancer and the conditions leading to the disease. The work of the Society has been brought to the attention of the national and state federations of women's clubs, and the appropriate committee officials have been circularized in order to secure their co-operation in suggesting this topic to local clubs. As a result women's clubs in many states and cities have frequently taken the lead in arranging public meetings and in providing lectures in their regular study programs.

Insurance Companies

The co-operation of the leading insurance companies is sought not only in respect to statistical investigations but for the distribution of educational literature. One of the largest companies has reprinted at the suggestion of the Society a cancer leaflet which it is prepared to distribute to the number of two million copies. At the recent meeting of the American Life Convention a resolution was adopted providing for the distribution by insurance companies generally of a brief uniform circular approved by the Society to be sent out in premium notice envelopes, thereby reaching many thousands of intelligent people. The Life Extension Institute, which grew out of the educational work of insurance companies has advised its subscribers regarding the early recognition of cancer and is indirectly furthering the campaign by its propaganda for periodical physical examinations.

Industrial and Welfare Organizations

Many of the larger industrial, commercial, and transportation companies have undertaken extensive welfare work and health instruction for the benefit of their employees. The Society has offered to the appropriate officials of these companies any desired assistance in providing speakers and circulars, or suggestions for the preparation of special literature to be distributed by the

companies themselves. In this connection the co-operation of such organizations as the National Civic Federation, the National Safety Council, and the American Museum of Safety has been invited.

Newspaper Publicity

By direct effort and through its local committees and various other agencies already referred to, the Society stimulates the publication of carefully considered newspaper articles. So far as possible the character of this matter is controlled by the national organization, which sends out in its own press service short articles prepared under the close scrutiny of a committee on publication made up of professional men of recognized standing. From the beginning the Society has also had the benefit of the constant advice and co-operation of the Council on Health and Public Instruction of the American Medical Association, and by special arrangement a cancer article has been supplied for each issue of A. M. A. press service which reaches a selected list of several thousand newspapers. Valuable newspaper publicity has also been secured through the work of some of the leading state and city boards of health, whose statements to the editors on this topic are frequently given better attention and more space than articles sent out by a distant national bureau.

Circulars and Bulletins

The Society has published for general distribution to the public a number of leaflets giving in simple language the elementary facts about the disease. These circulars are distributed directly on request to the central office or indirectly through local committees. Arrangement has been made to provide these or other approved circulars at small cost to boards of health and other local organizations in a position to purchase and distribute such material.

A series of special bulletins is also published for more limited distribution among members of the Society and those who are directly concerned in organizing local educational campaigns.

Public Meetings and Lectures

To inaugurate work in each of the more important cities, the co-operation of professional, civic, and religious forces is secured in arranging a general public meeting at which recognized experts may discuss the various phases of the cancer problem. Perhaps even more effective in reaching the public with the facts are lectures given under various auspices, particularly women's clubs, to small audiences under conditions such that a single speaker can present the subject in a more direct and convincing manner. It is a particular function of local committees to arrange for such lectures. The Society, through its national and branch offices, undertakes to act as a lecture bureau and to provide qualified speakers for meetings in any part of the country.

Statistical Research

The second principal object of the Society is to organize statistical research on a broader basis than has hitherto been possible. While numerous individuals, clinics, research laboratories, insurance companies, and public health departments have been interested in this field and have done valuable independent work, the Society has now undertaken to co-ordinate all these agencies for the conduct of special investigations on a larger scale. To this end a Statistical Advisory Board has been formed which includes thirty representatives of the leading American organizations in the several classes referred to.

National Mortality Statistics

At the suggestion of the Society the Director of the United States Census has ordered the publication of a special report on the cancer mortality of 1914 which is now in press and will constitute one of the most important statistical studies of this disease so far made under the auspices of any government. An important advance undertaken in this connection at the suggestion of a prominent American surgeon is the distinction made between the figures of deaths in which the diagnosis was reached after autopsy, surgical intervention, or microscopical examination, and those in which the diagnosis was based merely on clin-

ical observations. In addition, the forthcoming report will give the figures in far greater detail than hitherto and according to twenty-nine separate organs and parts of the body affected instead of under the seven group titles of the International List of Causes of Death as used in the annual reports of the Census Bureau. Much of the improvement with respect to greater detail and accuracy which characterizes this special report will doubtless become a permanent feature of the American national statistics of cancer.

Operative Statistics

The Society has also undertaken the collection and study of records of operations for cancer in numbers approximately as great as those represented in the national mortality statistics. A blank has been prepared by a sub-committee of the Statistical Advisory Board and leading surgeons throughout the country are asked to co-operate in this study by reporting thereon a few essential facts regarding each case of the disease on which they operate, either in private practice or in hospital service. The records thus obtained will be followed up at intervals of one year by inquiry addressed to the surgeon and the data will be tabulated and analyzed by expert statistical methods. And new and definite evidence as to the curability of cancer which may result will be laid before the public in the course of the educational campaign, but any such announcement will be in the name of the Society and no comparison or publication of the work of individual surgeons will be authorized.

Hospital Records

The committee on statistics has also prepared a series of more detailed blanks, one for each principal type of malignant disease, on which to record the full history of cases as a basis for careful study of etiological factors. These forms have been put into experimental use and when perfected will be offered for use in a number of the larger hospitals in the endeavor to bring out important factors surrounding the occurrence of cancer in the individual, in the family, and in the community.

(Signed) D. Bryson Delavan, M.D.,
Chairman.

REPORT OF COMMITTEE ON TONSIL INVESTIGATION

The Committee has no formal report to make because we feel that the subject is still an open one. When the subject was first approached, it seemed something reportorial, but the work was of such large volume and moment that we feel the report will have to be something of authority coming from the Society. We have followed the literature for the past 2 or 3 years and we find that we are still far from having reached any position with regard to the tonsil; even the question as to how to remove the tonsil is an open one. There are now operations and new instruments appearing every year, and we do not know the end results. In order to talk satisfactorily of tonsillectomy we must know the results of a number of years of work. For the time being I believe it would be better for the Committee to be continued, that they be allowed to study the literature, and that they take up their serious work perhaps a few years from now. We have not drawn upon the Society's funds, and therefore ask the Society that our Committee be continued; it may be several years before we ask you to publish or print anything from the Society as a whole. We feel the subject is an important one and that we have probably gone too far in removal. I hope Dr. French and others may be the means of bringing us to definite conclusions. We therefore suggest that each member give enough attention to the matter and that the Committee be continued for the time being, that in a few years hence we may hope to bring something before you that will be worth while.

Dr. George L. Richards,
Fall River, Massachusetts.

Upon motion duly made and seconded it was ordered that the Report of the Chairman of the Committee on Tonsil Investigation be accepted and that the committee be continued.

REPORT OF THE DE ROALDES PRIZE COMMITTEE

Announcement was duly made in the leading medical journals of the country that the de Roaldes prize was this year open to competition.

Two theses have been received.

Moved that the Chair appoint three judges.

D. BRYSON DELAVAN.

It was ordered that Dr. Joseph L. Goodale, Dr. Cornelius G. Coakley and Dr. Henry L. Swain be appointed to act as a committee of three judges to act upon these two papers.

REPORT OF THE ABSTRACT EDITOR

I have the honor to report that with the cordial and prompt co-operation of the individual members in sending me abstracts of their papers, as also the typewritten discussions from the Secretary, I have been enabled to send an abstract of the proceedings of the Thirty-seventh Annual Congress at Niagara Falls for publication in the medical journals by the tenth of September, 1915.

The thanks of the Association are due to our fellow member, Dr. H. W. Loeb, for the prompt printing and sending to me of a sufficient number of copies of the galley proofs for distribution. The number of the galley-proof sheets sent to each medical journal this year was twenty as against twenty-two the year previous.

There has been an expense to the Association on the part of the Abstract Editor of $2.25 for envelopes.

Respectfully submitted,

EMIL MAYER,
Abstract Editor.

DR. EMIL MAYER, New York City:

I should like to say in connection with this that the question of abstracting the proceedings seems to be a very popular one as just now I have in my possession a promise to receive within twenty-four hours seventeen of the nineteen papers abstracted.

Upon motion duly made and seconded it was ordered that the Report of the Abstract Editor be accepted as read.

REPORT OF THE COMMITTEE ON TEACHING OTO-LARYNGOLOGY

At the meeting of the several committees representing the various national societies, on the teaching of oto-laryngology, held in Philadelphia last January, it was unanimously agreed that the following report be adopted and that it be presented by the chairman of the respective sub-committees to the constituent bodies at their next annual meeting for consideration and approval:

1. That each student of medicine be entitled to receive sufficient instruction in oto-laryngology to enable him to deal with the parts concerned as intelligently as with the rest of the human body.

2. That for this purpose he should be familiar with the anatomy of the parts, possess a practical working knowledge of the simpler instruments of examination, be able to recognize familiarly the normal appearance of the structures, be practically acquainted with the pictures presented by the acute inflammations, and the commoner diseases of the organs involved and know how to treat the same. He should further be instructed to recognize the symptoms of serious complications, the wisdom of early associating the greater knowledge of the specialist in the care of his patient, and the dangers associated with all operations upon the parts involved, except in the hands of the competently trained specialist.

3. That the said "course of instruction" should embrace both clinical and didactic teaching, preferably intermingled, the clinical to be greatly in excess of the didactic, at least in the proportion of three to one.

4. That clinical instruction be given to groups of students in classes of not more than six, each receiving individual instruction, and this together with the didactic work should extend over a period of not less than 60 credits or 100 full hours, in the time of each student.

5. That operations should not form any part of the above course, except that in so far as may be possible each student should be permitted to assist at the performance of the simpler

varieties, that he may have some knowledge of the methods of procedure and the objects sought.

6. That a special separate examination in oto-laryngology, preferably clinical, conducted by the professors of otology and laryngology, form a part of the final examination in medicine of every university and college.

7. That a copy of these resolutions be forwarded to the medical faculty of every university and college of medicine, as well as to every state or provincial examining board, in the United States and Canada.

It was further moved, seconded, and carried that the committee proceed to formulate some fundamental scheme for post-graduate teaching, to be referred back to the constituent Societies for adoption, and that as a primary essential to this, the Committee be made a continuing committee by each of the constituent Societies.

Discussion

Dr. E. Fletcher Ingals, Chicago:

I might state that some work has been done on graduate teaching, but I have no accurate report of that. I think that it should hardly come up at this meeting.

Dr. Cornelius G. Coakley, New York City:

I move that this report be printed and mailed to each Fellow. I think the recommendations there are not always possible of being carried out. We have been teaching the subject for twenty years, and it seems to me that the matter of assistants and operations is not feasible. For example with tonsil operations. If these are done by the method we think ought to be used, it is not practical to have undergraduate men, students, assist in operations on our patients. Complications arise and they go to court, and if you have an undergraduate with no license (and in my own college this work comes in the third year) assisting you, and it was proved that you had third-year medical students assist at operations, the college would fare badly at the hands of the court.

Before this report is adopted by the Society we should have a chance to look over these things.

Then there is the recommendation that the work be divided into sections of six students each. That is absolutely impossible in Columbia University. The number of men next year would

be twenty; the section last year was seventeen, but we assign one assistant to four men. If we are going to endorse this as an Association I think the whole report should be gotten up in a more practical way.

Therefore I move that this report be printed and sent to each member of the Society and that the report be considered again by special order at its next annual meeting.

DR. E. FLETCHER INGALS, Chicago:

I would like to say with reference to this criticism that it does not seem to me advisable to have the students assist. It is not the design that these men should do the operation, but merely that they shall see it. It certainly would not do to have an undergraduate do the operation. In our college we allowed undergraduates to do operations at times, and they are only too glad to do them, but only recently a prohibitory rule has been adopted.

DR. HANAU W. LOEB, St. Louis:

There is another feature of this report to which some study should be given and that is the sixty credit hours. In most medical colleges there are about one thousand hours given to the whole subject and this would not signify nearly one-tenth of the work. It seems to me that this Committee has done lots of good work, but has gone on the basis that medical students were educated to become doctors. That day is gone. They are educated to become internes. In the better schools, ninety-five per cent. of the men become internes. This is the kind of work they must learn during their interne years and it seems to me that that particular part of the report of the sixty hours of credit should be studied very carefully before it is carried out.

DR. G. HUDSON MAKUEN, Philadelphia:

It would seem to the Chair that this report is merely a recommendation and that the various institutions are not compelled to live up to the strict letter of the ruling. However, you have heard Dr. Coakley's motion.

Motion was duly seconded and ordered.

REPORT OF THE BIOGRAPHER AND HISTORIAN

It would be a good plan for each man to prepare a complete account of himself and give it to the historian as something that can be depended upon as authoritative and really descriptive of his work.

I would call attention to the fact that this is the 38th annual meeting and in two years we will have our fortieth anniversary, and it seems fitting that we should celebrate that in some becoming way. I will not take the matter up further now except to say that steps should be taken for the Council to meet the occasions in some way.

D. Bryson Delavan,

Upon motion duly made and seconded, it was ordered that the report of the Biographer and Historian be accepted and that Dr. Delavan be appointed a Committee of one to act with the Council in considering the celebration of the fortieth anniversary, and that Dr. Delavan be continued in his present position.

Discussion

Dr. Emil Mayer, New York City:

I just want to call attention to the fact that we have been laboring under the same conditions to-day as many years ago, and those conditions each time become more and more intolerable than the year preceding. In a desire to get through with all of the work and reading all of the papers, subjects are presented in the briefest kind of a way, and it does seem to me high time that we should make a change. Such changes have worked so well in other associations that I would present this resolution: That a printed copy of each paper to be read at the annual meeting be sent to each member a fortnight in advance of the meeting.

This is a feasible and inexpensive plan, and I am quite sure it would save some work for the Secretary and will bring the Transactions out any time desired.

Upon motion duly made and seconded, it was ordered that this resolution be presented to the Council for their consideration.

REPORT OF THE COMMITTEE OF JUDGES FOR THE DE ROALDES PRIZE

Dr. Cornelius G. Coakley, New York City:

Mr. Chairman, I would say that these papers were given to the Committee last evening and the Committee is not yet ready to report. It seems to me it is hardly fair to the authors of the

papers for the judges to be given so short a time. May I ask what the sense of the Chair is in regard to the time which should be given to the Committee for this matter.

DR. G. HUDSON MAKUEN, Philadelphia:

The Chairman is in some doubt as to the function of the Committee. Does it have power to act with regard to the final award of the prize, or must part of that come before the Association?

DR. D. BRYSON DELAVAN, New York City:

It seems to me that the present situation of the de Roaldes prize is chaotic, and I would like to make a motion with reference to an effort to reduce that chaos and to bring matters down to a businesslike basis. I would like to move that a Committee of three judges be appointed in any way the Society may choose, either by the Chair or by election, and that that Committee be appointed at a time sufficiently long before the meeting at which the announcement of the award of the prize is to be made, that it may have ample time in which to judge the thesis presented. It is very easy to judge some theses and not very easy to judge others. No Committee of three can very easily be appointed which will embrace in its own experience all of the facts of the theses presented. A man may present a very highly valuable thesis but a very technical one and that thesis may make it desirable for the Committee to seek the opinion of some special outside expert as to the value of the work, and the Committee should be authorized and privileged to seek such help when they see fit to do so. I think the Committee should be appointed at least one year ahead. The prize is awarded only every third year, and it seems to me that at every Washington meeting the Committee be appointed which shall be the prize Committee for the succeeding three years, and that announcement be made of the prize to the medical journals at a sufficiently early date to place the matter before the medical profession, and to so call in the largest number of applications for the prize. To cease rambling—I move that a Committee of three judges be appointed triannually and in advance of the judging of the de Roaldes prize thesis, and that they report to the Council, and that the Council award the prize, rather than have it come before the general meeting.

Motion seconded and so ordered.

CHAIRMAN: Now, where are we at with the present situation?

DR. J. GORDON WILSON, Chicago:

I move that the present decision be left in the hands of the Committee appointed. It is most important that they should

have time to look over the papers carefully so that no error may be made; I therefore move that they be given as much time as may be required to judge the papers well, and that they report to the Council at its next meeting.

CHAIRMAN: Is it the feeling of the Association that the Committee should be given power to award the prize?

Motion amended to the effect that the Committee turn it over to Dr. Delavan, who shall award the prize.

Motion seconded and ordered as amended.

Next order of business—

The committee, consisting of Drs. Coakley, Goodale and Swain subsequently reported that three theses had been submitted, two of which were considered unworthy and the third, while good in itself, contained nothing sufficiently original or new to warrant the award. The committee recommended therefore that the prize be not awarded this year.

ELECTION OF OFFICERS

Dr. Richardson presented a resolution (given to the Secretary) with regard to an infringement upon the present Department System of Washington, D. C., by an effort of the government to erect a power plant in the mall. The resolution asks that we ask the President and Congress to maintain the system in its present policy.

The resolution was adopted, seconded, and unanimously carried.

CHAIRMAN: In view of the usual hospitality of Drs. Bryan and Richardson and their respective families in extending the courtesies that they have to us, as they always do, it seems that we should make some recognition to them as well as to the efficient attention extended by the management of this hotel. This seems to me to have been most unusual, and I think it largely due to the intervention of Dr. Bryan that the management of this hotel has been so courteous in the arrangements, not only for the scientific business, but for the social affairs which have been connected with it, including the banquet.

Dr. Coakley: I move that the Secretary be instructed to write a note of appreciation to Dr. Bryan and his sister and to Dr. and Mrs. Richardson, thanking them for their hospitality, and that he also write to the manager of this hotel expressing our appreciation.

Motion seconded and unanimously carried.

Chairman: The Secretary will please announce the result of the election.

Secretary: Mr. President, there have been twenty positive votes cast for the following gentlemen as directors. These directors will meet after the adjournment and elect officers who will act as President, Vice-President, Secretary, Treasurer, and Librarian, and the remainder as councillors.

The following were elected officers of the Board of Directors:

President, Dr. Joseph L. Goodale.

First Vice-President, Dr. Thomas H. Halsted.

Second Vice-President, Dr. Greenfield Sluder.

Secretary, Dr. Harmon Smith.

Treasurer, Dr. J. Payson Clark.

Librarian, Dr. Joseph H. Bryan.

Members of Board of Directors, Drs. George A. Leland, Thomas Hubbard, Alexander W. MacCoy, G. Hudson Makuen.

Drs. Jackson and French were appointed to escort the newly elected President to the Chair.

Dr. Joseph L. Goodale: Gentlemen, I am overwhelmed. I can only say that I thank you most warmly for the distinguished honor which you have conferred upon me. I shall ask your forbearance during the next year and with your co-operation I shall endeavor to the best of my ability to adhere to traditions and maintain the high standing which has been set by my predecessors. If there is no further business, I now declare the Thirty-eighth Annual Congress of the American Laryngological Association adjourned.

No. 3 Canadian General Hospital—McGill.
Army Post Office No. 3.
British Expeditionary Force,
France, 15th June, 1916.

Dr. Harmon Smith, Secretary,
American Laryngological Association.

My Dear Doctor Harmon Smith:—

I beg to acknowledge receipt of your letter of the 29th of May, in which is expressed by my brother colleagues of the American Laryngological Association the regret of my absence at your last meeting. Will you kindly convey to all the Fellows my warmest appreciation of their so beautifully expressed feelings towards me in this matter of my absence and its cause, and that I sincerely trust that ere our next meeting this dreadful war will be over and we will be permitted to return and renew these friendships now extending over so many years.

With kindest regards,

Believe me,

Yours very sincerely,

H. S. BIRKETT.

O.C., No. 3 Canadian General Hospital—McGill, Colonel.

LIST OF FELLOWS, 1916

Active Fellows

1915. Barnes, Harry Aldrich, 305 Beacon Street, Boston, Massachusetts.
1908. Barnhill, John F., 408 Penway Building, Indianapolis, Indiana.
1904. Berens, T. Passmore, 35 Park Avenue, New York.
1893. Birkett, Herbert S., 252 Mountain Street, Montreal.
1891. Bryan, Joseph H., 818 17th Street, Washington, D. C.
1913. Butler, Ralph, 1926 Chestnut Street, Philadelphia, Pa.
1915. Canfield, R. Bishop, Ann Arbor, Mich.
1896. Chappell, Walter F., 7 East 55th Street, New York.
1897. Clark, J. Payson, 71 Marlborough Street, Boston, Mass.
1902. Coakley, Cornelius G., 53 West 56th St., New York.
1899. Cobb, Frederic C., 11 Marlborough Street, Boston, Mass.
1905. Coffin, Lewis A., 616 Madison Avenue, New York.
1913. Coffin, Rockwell A., 234 Clarendon Street, Boston, Massachusetts.
1893. Coolidge, Algernon, Jr., 613 Beacon Street, Boston. Massachusetts.
1913. Dabney, Virginius, 1633 Connecticut Avenue, Washington, D. C.
1881. Delavan, D. Bryson, 40 East 41st Street, New York.
1892. Farlow, John W., 127 Bay State Road, Boston, Mass.
1901. Freeman, Walter J., 1832 Spruce Street, Philadelphia, Pa.
1914. Fetterolf, George, 134 South 20th Street, Philadelphia, Pa.
1905. Freer, Otto T., 34 Washington Street, Chicago, Ill.
1879. French, Thomas R., 150 Joralemon Street, Brooklyn, New York.
1897. Frothingham, Richard, 616 Madison Avenue, New York.
1909. Getchell, Albert C., 6 Linden Street, Worcester, Mass.
1913. Goldstein, Max A., 3858 Westminster Place, St. Louis, Missouri.
1898. Goodale, Joseph L., 258 Beacon Street, Boston, Mass.
1905. Grayson, Charles P., 262 South 16th Street, Philadelphia, Pa.
1906. Greene, D. Crosby, Jr., 483 Beacon Street, Boston, Mass.
1905. Halsted, Thomas H., 831 University Block, Syracuse, New York.
1896. Hardie, T. Melville, 34 Washington Street, Chicago, Ill.
1903. Harris, Thomas J., 104 East 40th Street, New York.

1915. Hastings, Hill, 924 Trust & Savings Bldg., Los Angeles, California.
1888. Hinkel, F. Whitehill, 581 Delaware Avenue, Buffalo, New York.
1907. Holmes, Christian R., 8 East 8th Street, Cincinnati, O.
1893. Hope, George B., 159 West 72d Street, New York.
1895. Hopkins, Frederick E., 25 Harrison Avenue, Springfield, Mass.
1895. Hubbard, Thomas, 541 Nicholas Bldg., Toledo, O.
1878. Ingals, E. Fletcher, 104 S. Michigan Avenue, Chicago, Illinois.
1904. Ingersoll, John M., 1021 Prospect Avenue, Cleveland, Ohio.
1907. Jackson, Chevalier, 1018 Westinghouse Bldg., Pittsburgh, Pa.
1878. Johnston, Samuel, 204 West Monument Street, Baltimore, Md.
1894. Leland, George A., 354 Commonwealth Avenue, Boston, Massachusetts.
1914. Levy, Robert, Metropolitan Bldg., Denver, Col.
1911. Lockard, Lorenzo B., Metropolitan Bldg., Denver, Col.
1913. Loeb, Hanau W., 537 N. Grand Avenue, St. Louis, Mo.
1897. Logan, James E., 1208 Wyandotte Street, Kansas City, Missouri.
1888. Lowman, John H., 1807 Prospect Avenue S.E., Cleveland, O.
1915. Lynch, Robert Clyde, 634 Maison Blanche Bldg., New Orleans, La.
1896. MacCoy, Alexander W., 216 South 15th Street, Philadelphia, Pa.
1914. Mackenty, John E., 43 West 54th Street, New York.
1883. Mackenzie, John N., 605 Washington Place, Baltimore, Maryland.
1898. Makuen, G. Hudson, 1627 Walnut Street, Philadelphia, Pennsylvania.
1896. Mayer, Emil, 40 East 41st Street, New York.
1913. McKimmie, Oscar A. M., 1330 Massachusetts Avenue N.W., Washington, D. C.
1904. Mosher, Harris P., 828 Beacon Street, Boston, Mass.
1914. Munger, Carl E., 81 North Main Street, Waterbury, Connecticut.
1901. Myles, Robert C., 46 West 38th Street, New York.
1903. Packard, Francis R., 304 South 19th Street, Philadelphia, Pa.
1906. Pierce, Norval H., 31 Washington Street, Chicago, Ill.

1908. Randall, B. Alexander, 1717 Locust Street, Philadelphia, Pa.
1903. Renner, W. Scott, 341 Linwood Avenue, Buffalo, N. Y.
1897. Rhodes, John Edwin, People's Gas Building, Chicago, Illinois.
1884. Rice, Clarence C., 123 East 19th Street, New York.
1905. Richards, George L., 84 North Main Street, Fall River, Massachusetts.
1902. Richardson, Charles W., 1317 Connecticut Avenue, Washington, D. C.
1913. Roy, Dunbar, Grand Opera House, Atlanta, Ga.
1907. Shambaugh, George E., 100 State Street, Chicago, Ill.
1909. Shurly, Burt R., 32 Adams Avenue W, Detroit, Mich.
1909. Sluder, Greenfield, 3542 Washington Avenue, St. Louis, Missouri.
1908. Smith, Harmon, 44 West 49th Street, New York.
1911. Stout, George C., 1611 Walnut Street, Philadelphia, Pa.
1889. Swain, Henry L., 232 York Street, New Haven, Conn.
1903. Theisen, Clement F., 172 Washington Avenue, Albany, New York.
1892. Thrasher, Allen B., The Groton, 7th and Race Streets, Cincinnati, O.
1892. Wagner, Henry L., 518 Sutter Street, San Francisco, California.
1892. Watson, Arthur W., 126 South 18th Street, Philadelphia, Pa.
1908. Wilson, J. Gordon, 104 S. Michigan Avenue, Chicago, Ill.
1906. Winslow, John R., The Latrobe, Charles and Reade Streets, Baltimore, Md.
1905. Wood, George B., 129 South 18th Street, Philadelphia, Pennsylvania.
1890. Wright, Jonathan, Windy Rock, Pleasantville, N. Y.

Honorary Fellows

1916. Bosworth, Francke H., 41 Park Avenue, New York.
1910. Chiari, Ottokar, Bellariastrasse, 12, Vienna, Austria.
1914. Cohen, J. Solis, 1824 Chestnut Street, Philadelphia, Pa.
1914. Lastra, de la Sota Y., 7 Calle de Torqueros, Seville, Spain.
1914. Lefferts, George M., Katonah, N. Y.
1910. Massei, F., 4 Piazza Municipio, Naples, Italy.
1910. Moure, E. J., 25 Cours du Jardin Public, Bordeaux, France.
1914. Navratil, Emerich von, iv Rigyoten, Buda-Pest, Hungary.

1915. Roaldes, Arthur W. de, 634 Maison Blanche Bldg., New Orleans, La.
1909. Semon, Sir Felix, Rignalls, Great Missenden, Bucks, England.
1914. Thompson, Sir St. Clair, 64 Wimpole Street, London W., England.

Corresponding Fellows

1880. Bruns, Paul von, Tubingen, Wurtemberg, Germany.
1901. Collier, Mayo, 145 Harley Street, Cavendish Square, London W., England.
1913. Denker, Alfred, Martinsberg 11, Halle, Germany.
1893. Desvernine, C. M., Cuba 52, Havana, Cuba.
1913. Eicken, Carl von, Friedrichstrasse 14, Giessen, Germany.
1901. Grant, Dundas, 18 Cavendish Square, London W., England.
1902. Heymann, Paul, 60 Lutzowstrasse, Berlin W., Germany.
1908. Killian, Gustav, Lutzow Ufer 3, Berlin W. 10, Germany.
1892. Krause, H., San Remo, Italy.
1902. Lermoyez, Marcel, 20 Rue de la Boetie, Paris, France.
1897. Luc, H., 54 Rue de Varenne, Paris, France.
1903. McBride, P., 20 South Drive, Harrogate, England.
1896. Macdonald, Greville, 85 Harley Street, Cavendish Square, London W., England.
1894. MacIntyre, John, 179 Bath Street, Glasgow, Scotland.
1896. Mygind, Holger, 31 Havnegade, Copenhagen, Denmark.
1901. Natier, Marcel, 10 Rue de Ballechasse, Paris 7e., France.
1903. Onodi, A., o'Uctza, 12, Buda-Pest, Hungary.
1910. Rethi, Leopold, IX Garnisongasse 7, Vienna, Austria.
1894. Sajous, C. E., 2043 Walnut St., Philadelphia, Pa.
1896. Schmiegelow, Ernest, 18 Norregade, Copenhagen, Denmark.
1903. Tilley, Herbert, 72 Harley Street, Cavendish Square, London W., England.
1913. Turner, Logan, 27 Walker Street, Edinburgh, Scotland.
1901. Wingrave, Wyatt, 11 Devonshire Street, Portland Place, London W., England.
1894. Wolfenden, R. Norris, The Grange, Kent, England.

Emeritus Fellows

1914. Brown, J. Price, 28 College Street, Toronto, Can.
1914. De Blois, Thomas Amory, 48 Gloucester Street, Boston, Mass.
1912. Lincoln, William, 210 Lennox Bldg., Cleveland, O.
1914. Porter, William, 3886 Washington Ave., St. Louis, Missouri.
1914. Robinson, Beverly, 42 West 37th Street, New York.

PAST OFFICERS

Presidents

(Year of Election)

1879.	Louis Elsberg	1898.	W. E. Casselberry
1880.	J. Solis Cohen	1899.	Samuel Johnston
1881.	F. I. Knight.	1900.	H. L. Swain
1882.	G. M. Lefferts.	1901.	J. W. Farlow
1883.	F. H. Bosworth	1902.	J. H. Bryan
1884.	E. L. Shurly	1903.	J. H. Hartman
1885.	Harrison Allen	1904.	C. C. Rice
1886.	E. Fletcher Ingals	1905.	J. W. Gleitsmann
1887.	R. P. Lincoln	1906.	A. W. de Roaldes
1888.	E. C. Morgan	1907.	H. S. Birkett
1889.	J. N. Mackenzie	1908.	A. Coolidge, Jr.
1890.	W. C. Glasgow	1909.	J. E. Logan
1891.	S. W. Langmaid	1910.	D. Braden Kyle
1892.	M. J. Asch.	1911.	James E. Newcomb
1893.	D. B. Delavan	1912.	George A. Leland
1894.	J. O. Roe	1913.	Thomas Hubbard
1895.	W. H. Daly	1914.	Alexander W. MacCoy
1896.	C. H. Knight	1915.	G. Hudson Makuen
1897.	T. R. French		

Vice-Presidents

1879.	F. H. Davis	
1880.	W. C. Glasgow	J. O. Roe
1881.	E. L. Shurly	W. Porter
1882.	C. Seiler	E. F. Ingals
1883.	S. W. Langmaid	S. Johnston
1884.	J. H. Hartman	W. H. Daly
1885.	H. A. Johnston	G. W. Major
1886.	E. C. Morgan	J. N. Mackenzie
1887.	J. N. Mackenzie	S. W. Langmaid
1888.	W. C. Glasgow	C. E. Sajous
1889.	E. Holden	C. E. Bean
1890.	J. O. Roe	J. H. Hartman
1891.	M. J. Asch	S. Johnston
1892.	S. Johnston	J. C. Mulhall
1893.	J. C. Mulhall	W. E. Casselberry

1894.	C. C. Rice	S. H. Chapman
1895.	J. Wright	A. W. de Roaldes
1896.	T. M. Murray	D. N. Rankin
1897.	A. W. MacCoy	H. S. Birkett
1898.	J. W. Farlow	F. W. Hinkel
1899.	T. A. De Blois	M. R. Brown
1900.	H. L. Wagner	A. A. Bliss
1901.	J. W. Gleitsmann	D. Braden Kyle
1902.	G. A. Leland	T. Melville Hardie
1903.	J. H. Lowman	W. Peyre Porcher
1904.	Thomas Hubbard	W. J. Freeman
1905.	J. L. Goodale	C. W. Richardson
1906.	G. H. Makuen	A. B. Thrasher
1907.	J. P. Clark	J. E. Rhodes
1908.	E. Mayer	F. R. Packard
1909.	C. G. Coakley	H. P. Mosher
1910.	Robert C. Myles	J. M. Ingersoll
1911.	F. C. Cobb	B. R. Shurly
1912.	A. W. Watson	W. Scott Renner
1913.	F. E. Hopkins	George E. Shambaugh
1914.	Clement F. Theisen	Lewis A. Coffin
1915.	J. Gordon Wilson	Christian R. Holmes

Secretaries and Treasurers

1879.	G. M. Lefferts	1895.	H. L. Swain
1882.	D. B. Delavan	1900.	J. E. Newcomb
1889.	C. H. Knight	1911.	Harmon Smith

Treasurer

1912. J. Payson Clark

Librarians

1879.	F. H. Bosworth	1883.	T. R. French
		1903.	J. H. Bryan

PAST MEMBERS

Honorary Fellows

*1880. Senor Manuel Garcia, London, England
*1883. Sir Morell Mackenzie, London, England
*1907. Leopold von Schroetter, Vienna, Austria
*1904. B. Fraenkel, Berlin, Germany
*1914. Clinton Wagner, New York

Corresponding Fellows

*1892. Lennox Browne, London, England
*1887. A. Gouguenheim, Paris, France
*1894. Edgar Holden, Newark, N. J.
*1881. Carlo Labus, Milan, Italy
*1880. Wilhelm Meyer, Copenhagen, Denmark
*1901. Moritz Schmidt, Frankfort-am-Main, Germany
*1881. Pugin Thornton, London, England
*1881. R. Voltolini, Breslau, Germany
*1880. W. McNeil Whistler, London, England
†1881. Sir Felix Semon, Bucks Co., England
†1887. E. J. Moure, Bordeaux, France
†1892. F. Massei, Naples, Italy
†1896. Ottokar Chiari, Vienna, Austria

Emeritus Fellows

‡1912. Francke H. Bosworth, New York City
*1914. J. Price Brown, Toronto, Canada
*1914. Thomas Amory De Blois, Boston, Mass.
*1914. Joseph W. Gleitsmann, New York City
*1912. Charles H. Knight, New York City
*1914. Samuel W. Langmaid, Boston, Mass.
1912. William Lincoln, Cleveland, Ohio
1914. William Porter, St. Louis, Mo.
‡1913. Arthur W. de Roaldes, New Orleans, La.
1914. Beverly Robinson, New York City

Active Fellows

*1880. Harrison Allen, Philadelphia, Pa.
*1878. Morris J. Asch, New York

1895. J. E. Boylan, Cincinnati, Ohio.
*1883. C. W. Chamberlain, Hartford, Conn.
*1882. S. Hartwell Chapman, New Haven, Conn.
‡1884. J. Solis Cohen, Philadelphia, Pa.
1880. E. W. Cushing, Boston, Mass.
1878. Ephraim Cutter, West Falmouth, Mass.
*1880. W. H. Daly, Pittsburgh, Pa.
*1878. F. H. Davis, Chicago, Ill.
*1901. E. T. Dickerman, Chicago, Ill.
*1878. Frank Donaldson, Baltimore, Md.
*1878. William Carr Glasgow, St. Louis, Mo.
‡1879. Edgar Holden, Newark, N. J.
1882. Franklin H. Hooper, Boston, Mass.
1882. Frank L. Ives, New York Citv
*1878. Hosmer A. Johnson, Chicago, Ill.
*1879. Woolsey Johnson, New York City
1880. William C. Jarvis, New York City
1879. R. H. Kealhofer, St. Louis, Mo.
*1901. Gordon King, New Orleans, La.
*1885. Charles H. Knight, New York City
*1878. Rufus P. Lincoln, New York City
1881. G. W. Major, Montreal, Canada
1879. Charles McBurney, New York City
1885. H. Clinton McSherry, Baltimore, Md.
*1881. E. C. Morgan, Washington, D. C.
*1886. J. C. Mulhall, St. Louis, Mo.
1892. T. Morris Murray, Washington, D. C.
*1881. H. Mynter, Buffalo, N. Y.
*1893. James E. Newcomb, New York City
*1895. J. E. H. Nichols, New York City
1879. H. K. C. Oliver, Boston, Mass.
1894. William H. Park, New York City
1892. W. Peyre Porcher, Charleston, S. C.
*1880. D. N. Rankin, Allegheny, Pa.
1881. J. M. Robertson, Detroit, Mich.
1878. Beverly Robinson, New York City
*1878. T. F. Rumbold, St. Louis, Mo.
‡1880. Charles E. Sajous, Paris, France
*1879. Carl Seiler, Scranton, Pa.
*1893. Charles M. Shields, Richmond, Va.
1879. Andrew H. Smith, Geneva, N. Y.
1879. Bernhard Tauber, Cincinnati, Ohio
*1899. Max Thorner, Cincinnati, Ohio.
1888. S. O. Van der Poel, New York City
*1878. Clinton Wagner, New York City

1896. Marshall R. Ward, Pittsburgh, Pa.
1879. Whitefield Ward, New York City
*1886. Benjamin F. Westbrook, Brooklyn, N. Y.
1896. Green V. Woollen, Indianapolis, Ind.
‡1878. George M. Lefferts, New York City
1901. Frank Hyatt, Washington, D. C.
*1885. Charles H. Knight, New York City
*1880. C. E. Bean, St. Paul, Minn.
*1893. Arthur Ames Bliss, Philadelphia, Pa.
*1878. E. L. Shurly, Detroit, Mich.
*1892. William Kelly Simpson, New York City
*1892. Moreau R. Brown, Chicago, Ill.
*1907. Joseph S. Gibb, Philadelphia, Pa.
*1880. Samuel W. Langmaid, Boston, Mass.
‡1878. Francke H. Bosworth, New York City
‡1893. Arthur W. de Roaldes, New Orleans, La.
*1879. John O. Roe, Rochester, New York
*1878. Jacob H. Hartman, Baltimore, Md.
*1889. William E. Casselberry, Chicago, Ill.
*1898. D. Braden Kyle, Philadelphia, Pa.

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* Deceased † Corresponding Fellow ‡ Honorary Fellow