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SOCIETIES' MEETINGS.

BRITISH MEDICAL ASSOCIATION.

Annual Meeting, Edinburgh, 1898.

ABSTRACTS OF PAPERS.

SECTION OF LARYNGOLOGY AND OTOLOGY.

PRESIDENTIAL ADDRESS BY P. MCBRIDE, M.D., F.R.S.E.

The Expansion of Laryngology and Otology.

The time is long past when there was a necessity for defending the existence of laryngology and otology as special branches of study. It used to be said by the opponents of specialism that it tended to a narrowing of the mental horizon on the part of its votaries. The inclination now is rather to complain that the surgical limits of our specialties are being unduly extended. Indeed, I have been told that a well known teacher of surgery in this school is in the habit of demonstrating a very small region in the neighbourhood of the umbilicus, which, in the near future, will represent the region upon which the general surgeon will still continue to exercise his skill. Experience has shown that no charge of mental narrowness can be brought against the best workers in our specialties, but the danger of excessive extension is perhaps more real. Let us consider first how easy it is for the laryngologist gradually to extend his field, both on the medical and surgical side. You are all familiar with the indications of general disease, which are often first detected by the laryngoscope. We discover, it may be, some lesion of

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the chest, nervous system, or even kidneys, which we feel ourselves perfectly able to treat, and so, unless the laryngologist be careful, he may be led to encroach seriously upon the domain of the general physician.

Turning now to the surgical aspect of the same specialty, the old rule used to be to call in a surgeon when external incisions were required. Of course to carry out this absolutely would be impossible, for tracheotomy is an operation we must all be prepared to perform when the indication is urgent. The laryngologist of to-day, however, does not confine himself to this. He performs thyrotomy and excisions, removes goîtres and sometimes cervical glands, so that he thus annexes as it were a considerable portion of the general surgeon's territory. If these operations are to come within our sphere of work, then it almost logically follows that we shall in the near future undertake external operations on the œsophagus and stomach, as well as extensive dissections involving the removal of tumours from the neighbourhood of the large vessels of the neck.

In otology there is the same tendency towards extension on the surgical side. Thus the aurist no longer fears to open the cranial cavity nor does he hesitate to perform such operations as ligature of the internal jugular; he has not, however, the same direct temptation as the laryngologist to enlarge his field at the expense of the physician. The same expanding tendency may be observed, too, in connection with the nose, although here there is not quite the same scope. I am content, gentlemen, to place these facts before you. There is a good deal to be said for and against this growing desire of the younger specialties to annex fresh territory. It is a question for each one of us to decide for himself how far he shall take part in this policy of expansion. Only if it creates against us a certain feeling of antagonism on the part of consulting physicians and surgeons we must not be surprised, and I think much could be done towards mitigating such antagonism by taking care that our position—be it in the van or rear of this movement—is logically unassailable.

Another direction in which our expanding tendencies have manifested themselves is in our immense literary activity. I suppose I shall not be considered far wrong in saying that most of the best that is written sooner or later finds its way into English, French, and German, as being the most widely known languages, although I am well aware that much excellent matter makes its first appearance in Russia, including Poland, Scandinavia, Denmark, Holland, Spain, and Italy. To most of us, however, only those works which appear in the three languages first referred to are accessible. It may not be uninteresting to glance for a moment at the most striking national peculiarities of our literature. The Anglo-Saxon writer (whether European, American, or Colonial) usually aims at brevity, and, on the whole, I am inclined to think that there is a slight tendency to put points of purely scientific and theoretical interest on one side in favour of the more directly practical, and in some cases to dispense with all literary references to the subject treated of. In striking contrast to the Anglo-Saxon is the German author. In his work we find the most elaborate attention to detail, and a very strong

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tendency to discuss the subject from every possible point of view, and even then not always in the fewest possible words. His literary references to the works of his compatriots are generally full and accurate, but this cannot always be said of those to foreign literature, and, withal, he is not over tolerant to the foreigner who overlooks a Teutonic authority. Moreover, there is among Germans a great tendency to polemic writing, and sometimes even to personality. With all these drawbacks, however, we must admit that the best literature in our specialties at the present time emanates from Germany. It may be because of the large number of workers, or due to greater facilities afforded by the Government and circumstances of the country, but the fact remains. As we all know, many excellent works emanate from French pens, and in the absence of polemical writing we have reflected the racial courtesy. It has sometimes appeared to me as if the amount of material did not quite justify the existence of all the journals which are devoted to our specialties in that language, but the frequent appearance of excellent, interesting and original articles in all of them must be fully admitted. In speaking of French journals, however, I cannot refrain from noticing the odious custom of interleaving advertisements with the text—a practice which certainly cannot conduce to the dignity of medical journalism. Let us now turn from national to individual characteristics, for in the study of the individual we come nearer the forces which make for and against expansion.

The first and best type of author is undoubtedly represented by the man who has really something new and valuable to communicate. It may be the result of scientific research, or of clinical observation, while sometimes it takes the form of valuable generalizations from the collected work of others.

There are, however, besides, numerous and less praiseworthy types. We all know that often diseases which are least amenable to treatment are those for which innumerable curative agents have been recommended, and further how each new remedy is said to be followed by numerous successes, often occurring only in the hands of its inventor. When the method employed is harmless little mischief results, but when operative measures are advocated in this way a grave evil arises. A danger of specialism has always been the tendency of some specialists to magnify the importance of the part of the body with which they are familiar, and I do not think that otology, laryngology, and rhinology can plead that their votaries have been altogether guiltless in this respect. Specialism is only good so long as it rests upon a broad basis of anatomical, physiological, and pathological facts, and so long as no attempt is made by writers to juggle with these facts in order to elevate the part at the expense of the whole. It would be ill-judged to give any examples, but no doubt works will occur to some here in which this mistake has been made.

Far be it from me to suggest that there are many writers who indulge in misrepresentation. Absence of the highest critical faculties, and a limited knowledge of general medical and surgical science sometimes associated with an almost morbid desire to magnify the importance of a

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special organ, account for much writing which is ill calculated to bear the clear light of criticism.

Again, what I may call undue therapeutic credulity is responsible for much that is worthless to science. It is but rarely, I trust, that lower motives, such as a desire to establish a temporary notoriety, and to benefit directly therefrom, actuate authors in our specialties. Still, it must be remembered that we are but human, and that there is no more certain way of establishing a reputation of a sort than by originating some new and startling theory, remedy, or operative procedure. Under these circumstances, would it be surprising if some driven by vanity, and others spurred on by hopes of aggrandizement, were to fall before the temptation?

Let us finally turn to another great difficulty which has arisen of late years, and which confronts the serious student not only of laryngology and otology, but of almost all branches of medicine and surgery. It is, of course, necessary for every specialist to follow the literature of his subject, but perhaps the burden falls most heavily upon those who are engaged in lecturing, and upon writers of text books. All of you know how voluminous are the works devoted to our specialties; you are aware of the numerous journals which appear in French, German, and English; there is further a considerable array of monographs, and finally we have an ever increasing number of text books. All this bears very heavily upon the conscientious reader, for it must be remembered that until a work has been read it cannot be classified or criticised. No separation of "wheat from chaff" is therefore possible without an immense amount of wasted time and energy. Among our large current literature there is much that is good, but more that is valueless. This may seem a rather sweeping statement, but if you will throw your mental glance back over recent years and compare the actually valuable additions to our knowledge with the amount written in the same period, I am sure that you will agree with me that they are not proportional, indeed we might be not far wide of the truth in calling them inversely proportional. It may be urged that the system of abstracting papers, now so largely in vogue, is of value in saving time and labour to the over-burdened worker. No doubt this is to some extent true, and certain journals are, by employing a carefully selected staff, enabled to present an epitome of all that is being done in various parts of the world. It is, however, necessary to warn readers that such abstracts are by no means always correct representations of authors' views, and it is perfectly certain that some periodicals which profess to give abstracts of current literature are lamentably defective, in so far that they confine their attention to reviewing only articles which appear in a few of the better known journals of each country. I have thus merely outlined some of the difficulties which every experienced reader can fill in and amplify for himself. The important question I wish to bring forward is: Can this be remedied? It appears to me that it might be by adopting some such method as this:—

1. The establishment of a body composed of men of ripe experience and wide reading in each country, equivalent in position to the collaborateurs of the "Centralblätter" and journals of to-day.

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2. The selection of two or three of those collaborateurs to form a small central committee in each metropolis.

3. The employment of a staff of abstractors composed of young workers.

The advantages of such a scheme would be obvious. The collaborateurs would each have assigned to them certain journals, and it would be their duty to send in a return to the central committee indicating the names of the papers which were considered worthy of a place. The list so accumulated would be again checked by the central committee, and in this form handed over to the abstractors.

It will be seen that the adoption of some such method as this would produce a periodical of reasonable dimensions, because many published works would probably be rejected by those responsible for selection. Of course, we have something similar in the various year books, but it must be remembered that the reading specialist can hardly accept any single author as his guide, while, on the other hand, he might be quite satisfied to have the important works chosen for him by a strong, responsible committee of each country.

In conclusion, I beg to say that I desire in no sense to reflect upon the excellence of works which endeavour to give, and in some cases actually do give, abstracts of nearly all papers which are written on our subjects. In doing so, however, they must give the bad with the good. Although every now and then we find a writer, bolder than the rest, who describes a paper as containing nothing new, yet a desire to avoid discourtesy prevents this being frequently done. If it were once understood that only papers of importance were to be abstracted an immense amount of space would be saved, and a most valuable publication would result, which, if it were published in English, French, and German, ought to be commercially, as well as scientifically, successful.

SIR FELIX SEMON. *The Mutual Relationship and Relative Value of Experimental Research and Clinical Experience in Laryngology.*

In his introduction the speaker described the discrepancies of opinion concerning this question at present existing amongst laryngologists, and humorously depicted the gradual shades of opinion—from the extreme right wing, the "stern, unbending tories," representing those clinical laryngologists who did not believe in the value of experimental research at all, to the radical left, or the "stalwarts" of experiment, who looked upon clinical experience as mere "bag and baggage." He himself confessed to belong to the "centre" party, *i.e.*, those who from experience of their own had arrived at the conclusion that both methods "properly applied are extremely valuable, that neither of them is infallible, and that in each individual question which appears to come under the sway of both of them it must be left to individual judgment to determine the comparative value of each." This thesis the speaker supported by a rapid survey of the achievements, the failures, the applicability, and the sources of error of each method. It was first shown by a series of illustrative examples that the clinical method, whilst usually most successful in determining, not merely the nature of most local affections of the larynx, but also of grave constitutional disease in distant parts, yet

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in not a few instances did not suffice for the establishment of a positive and certain diagnosis, and that in other cases, even when showing the nature of the disease, it did not give an explanation of its causation. It was further pointed out that even the employment of all modern accessory methods of investigation (microscopy, electricity, bacteriology, etc.) did not afford guarantee of an absolutely reliable conclusion in many instances. Hence the desirability of further help in that respect was unreservedly admitted, and the importance of experimental research in view of the progress obtained by its employment in so many other branches of medicine was duly emphasized. At the same time, the question was asked whether its results so far obtained with special regard to laryngology had been of so universally reliable a character as to justify its laying down the law to clinical laryngology. In reply to this, the principal experiments referring to special laryngological subjects were passed in review, and it was shown :—

1. That the applicability of experimental research in laryngology had been so far very limited.

2. That in certain instances its results had undoubtedly been decisive, and of great importance to clinical progress (*e.g.*, in the questions of extirpation of the larynx, of the special representation of the larynx in the cerebral cortex, of the existence of the reflex-tonus of the dilator muscles of the glottis during quiet respiration, etc.).

3. That, on the other hand, its employment had in various questions not only not cleared up previously existing difficulties, but had, on the contrary, increased them.

4. That the experimental method had so far failed in elucidating some of the fundamental laryngological problems (*e.g.*, the question of the ultimate origin of the recurrent laryngeal nerve ; the question whether this nerve contained centripetal fibres, etc.).

In continuation of this argument it was pointed out that in purely *pathological* experiments, *i.e.*, in the imitation of pathological processes by experimental research, the results had been even less satisfactory, inasmuch as in the two most important attempts of that kind which have so far been made—Krause's attempt to experimentally imitate the pressure of a growth upon the recurrent laryngeal nerve, and Klemperer's injection of pathogenic micro-organisms into the laryngeal areas of the cerebral cortex—the results had caused an augmentation rather than a diminution of the discrepancies of clinical observers on these important points. The speaker endeavoured to explain this by enumerating the various and grave sources of error in experimental research with which he had become personally acquainted, and from this drew the conclusion that there were four general principles which ought always to be remembered when experimental research was resorted to for the solution of laryngological problems, viz. :—

1. What was the question to be solved ?

2. What was the method of the experiment undertaken for its solution ?

3. What were its possible or probable sources of error in the individual case ?

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4. Who was the experimenter?

In support of these propositions he pointed out:—1. That not all questions in which the help of experimental research was invoked, were equivalent and equally suitable for experimental investigations. 2. That there were enormous differences between the methods of various experiments. 3. That the sources of error encountered in certain experiments were so manifold and so great as to entirely spoil the application of their results to apparently analogous conditions in man. 4. That a rare combination of qualities was required to make a successful experimenter. The conclusion ultimately arrived at was a re-affirmation of the speaker's conviction expressed eight years ago in the "Virchow-Festschrift," and couched in the following terms:—

"Many years' clinical and experimental investigation leaves no doubt in my mind that in these questions experiment cannot lay down the law to clinical observation, nor clinical observation to experiment. I feel equally certain there is no incompatibility between them, that the one completes the other, and that whenever a contradiction seems to arise the conflict is only *apparent*. With sufficient patience and care it can always be traced to defective clinical or pathological anatomical observation, to faults in the experimental method or to an incorrect way of stating the problem."

IN RHINOLOGY.

(*Read by Title.*)

Dr. GREVILLE MACDONALD: Mr. President and Gentlemen,—For a discussion of the sort which we have before us I cannot help feeling that no region in the body could afford us better grounds for statements of the two sides of the proposition than the nose; and especially for this reason, that, long before any experimental investigation had been made concerning the functions of the nose, it was generally admitted, on theoretical grounds, perhaps rather than from actual observation, that the function of the Schneiderian was to warm, moisten, and filter the inspired current of air.

It is only within the last few years that the nose has been studied, even clinically; and I suspect the immediate consequence of inquiry into the etiology and pathology of nose disease, and more especially into the bearing of the latter upon affections of the throat, immediately indicated the desirability, if not the necessity, of some more accurate information as to precise physiology. We had observed how frequently chronic pharyngitis and laryngitis were associated with nasal stenosis, and had suspected that this was primarily due to the fact that these regions were compelled, from the enforced mouth-breathing, to warm and moisten the inspired air, although all unfitted for such duties, and to capture irritant particles from which they should have been protected. We had, moreover, observed how, in dry conditions of the nasal mucous membrane, we often found a tendency to that partial inspissation of the laryngeal and tracheal secretion, which is one of the most troublesome conditions which we are called upon to treat. So far our surmises were perfectly correct; but until accurate experiment had been made we had not the faintest

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conception of the vast importance which we are now compelled to ascribe to the nasal function. Physiological text-books, for instance, still instruct the unsuspicious student as to the enormous quantity of aqueous vapour exhaled by the lungs; but we now know that the inspired current of air, even when previously artificially dried, is entirely saturated with moisture before reaching even the pharynx. Physiologists also tell us of the difference in temperature in the inspired and expired air, generally without being aware that almost the whole of that heat, not forgetting the enormous amount rendered latent by the vapour absorbed, is yielded by the nasal mucosa.

It is altogether unnecessary to enlarge upon these points before a meeting composed of such distinguished gentlemen as I have the honour to meet on this occasion. We are all informed of the experiments of Aschenbrandt, Keyser, and Bloch. These are familiar to us all. To quote precisely from my own investigations, it was found that:—

At + 0·7° C. the temperature was raised to... ... 28·8° C.
„ + 1·7° C. „ „ „ „ „... ... 35° C.
„ 12° C. „ „ „ „ „... ... 35·6° C.
„ 45 C. „ „ „ reduced to ... 33·6° C.

And that, as far as the humidity of the air is concerned, in every instance, although experimenting with air artificially and absolutely dried, it was shown that, whatever the external temperature, the saturation with aqueous vapour was complete. It was concluded that the amount of moisture taken up by the inspired air varied (a) with the rapidity of the inspiratory act; (b) with the degree of patency of the nasal passages; and (c), let us note most emphatically, with the degree of turgescence of the erectile tissue. I lay stress upon this last point, and consider myself justified in referring to my own small contributions to physiology, partly because of the importance of the fact in relation to pathological conditions of the erectile tissue, and still more by reason of the reckless manner in which the inferior turbinated bodies are condemned by certain rhinologists to the most ruthless eradication.

If we will only remember that when the erectile tissue is collapsed less than one-half the usual amount of aqueous vapour is given off from the nose, it will surely appear that by the operation of turbinectomy the nose is being deprived of one of its most important structures from the functional point of view.

It is a little curious that many who proclaim most loudly the importance of easy nasal respiration should be the first to be willing actually to deprive the nose of the very structure to which it mainly owes its virtue.

So far, I maintain that clinical observation actually forestalled experimental discoveries, the special merit of the laboratory investigations lying in their confirmation of conclusions drawn from the study of morbid conditions. Of course experimental investigation has gone further; has shown, for instance, how a mucous membrane over which air passes shares to a considerable extent in the lung functions themselves: but with this clinical observation has little interest. It has further been shown by StClair Thomson and others to what an extra-

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ordinary degree the filtering functions of the nose are carried, facts which coincide entirely with Lister's observations as to the destructive action of mucous membranes on micro-organisms ; as well as with the clinical fact of the remarkable tolerance the nose exhibits of abuse on the part of septic instruments and atmospheres teeming with biological venom.

We are next inevitably compelled to pass in review many curious physiological phenomena observed as the consequence of, or at any rate in company with, certain forms of nasal disease. I refer, of course, to the so-called reflexes. These reflex phenomena are scarcely susceptible of physiological demonstration or verification, and hence the study of their physiology from a clinical standpoint becomes doubly interesting. So far as I am aware, Shurley, of Detroit, is the only investigator who has sought to establish in the laboratory the relation subsisting between nasal irritation and bronchial spasm ; and perhaps his failure to do so is sufficient to compel our asking the question whether the association of asthma with certain morbid conditions of the nasal mucosa can be justly attributed to reflex action ? My own clinical experience steadily inclines me more surely to the conclusion that the asthma must either be regarded as due to direct attack of hyperæsthetic bronchial tubes by irritant particles gaining access to the lower respiratory passages as a consequence of nasal obstruction; or that both nose and bronchial tubes are equally concerned in an inflammatory process involving the whole of the respiratory tract. To put the point more concretely, my experience is that hypertrophied inferior turbinated bodies, spurs on the septum and adenoids induce asthma in those especially predisposed by exposing the bronchial tubes to direct irritation ; whereas the frequent association of nasal polypus with chronic bronchitis and asthma must be considered, judging from the frequent failure to remedy materially the bronchial symptoms by removal of the polypi, as due to an inflammatory condition common to nose and bronchial tubes. Probably somewhat similar arguments explain some other phenomena, such as laryngismus stridulus disappearing immediately on the removal of adenoids ; while more remote nervous phenomena, such as chorea, epilepsy, etc., can probably be accounted for by the often serious interference with easy respiration. Such considerations should convince us of the risks we run in seeking too zealously for physiological facts as the result of our clinical investigations. Physiological experiment may help us much in our clinical work ; but clinical observation will help us even more, I fancy, in our practical work if we do not allow it to misguide us into physiological conclusions.

IN OTOLOGY.

By W. Milligan.

Mr. President and Gentlemen,—If we study the evolution of Otology from its earliest days we must all, I take it, be struck by the marked advances which have been made in this department of the healing art, especially during recent years.

Not so very long ago the practice of diseases of the ear and the

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practice of charlatanism were almost synonymous terms, but thanks to the painstaking researches of many workers in various parts of the habitable globe, Otology now occupies an important and a prominent place as a branch of the great science and art of medicine.

The reason of this rapid advance is after all not very far to seek, and it is my duty to-day to try to show how our knowledge of diseases of the ear has been gradually evolved as the result of careful experimental research and carefully collated clinical experience.

No subject has, I think, derived more benefit from research work than has Otology, and the practical deductions which have been arrived at have proved, and are proving, of lasting benefit to the human race.

As a striking and withal a simple illustration of what I have just said, let me mention the effects of experimental research work upon the etiology and treatment of auditory furunculosis. Many years ago Löwenberg [1] showed that the exciting factor in the production of a furuncle was the presence of the staphylococcus pyogenes albus, that its penetration under the epidermal cells was a necessary part of thi phenomenon, and that when once so located, it was able to set up such an amount of irritation as to lead to the production of a small focus of suppuration.

He further showed that furunculosis could be experimentally produced in animals by introducing staphylococci under the epidermal cells, and as a deduction he came to the conclusion that the affection was in reality of microbic origin, and that it was auto-infective. What has been the result so far as the treatment of to-day is concerned?

Do we not attack the disease by means of antiseptic agencies; do we not warn the patient of the possibility of one furuncle following in the train of another; and do we not at as early a date as possible lay bare the infected area so as to allow our remedies the chance of acting locally upon the nest of germs, if I may be allowed the expression?

The relation of germ life to diseases of the ear, especially to diseases of the middle ear, is a study of the utmost practical importance and of fascinating interest. Attempts have been made to found a classification of suppurative disease of the middle ear, according to the predominating organism or organisms present in the discharge; and although, perhaps, the time has not yet arrived when this can be done with any degree of accuracy, yet bacteriological researches have afforded much information which is of the greatest practical and clinical importance.

Although organisms are found in great numbers and in considerable varieties in cases of suppurative disease of the middle ear, it must also be noted that they are at times found in cases of exudation into the tympanum without any marked reactionary symptoms. That they are the actual exciting factor in the production of middle ear suppuration cannot at the present time be definitely admitted. Hence any bacteriological classification would be premature.

The cavity of the middle ear affords an almost perfect incubating chamber for germ life, shut off as it is from the access of light, kept at

[1] "Archiv. of Otology," Vol. XI., p. 273.

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an almost uniform temperature, and in direct relation by way of the Eustachian tube with the cavity of the naso-pharynx, whose masses of lymphoid tissue afford an excellent nidus for the harbouring of germs derived from inspired air. No doubt it is possible for germs to reach the cavity of the middle ear by way of the circulatory system, but clinical facts and clinical experience go to show that the Eustachian tube and the external meatus are the more usual portals through which they enter

The germs with which we have most to do in suppurative diseases of the middle ear are the staphylococcus albus et aureus, the streptococcus pyogenes, the pneumococcus of Fraenkel and the pneumobacillus of Friedlander.

Any or all of those germs may be present, and are capable of giving rise to the most varied and serious complications. In cases of acute otitis media pure cultures of the diplococcus pneumoniæ are rarely to be obtained. In chronic cases one organism may succeed another, a suitable soil having been prepared for their development, and such a succession is believed by many to be the main cause of the chronicity of certain cases.

The organism, perhaps, to be specially dreaded is the streptococcus, for it has been proved by careful bacteriological investigation that it is of all the above-named germs the one most frequently met with in cases of septic thrombosis, intracranial abscesses, and septic affections of the pia-arachnoid.

Since the days of the discovery of those pathogenic organisms and their relation to the intracranial complications of middle ear disease, the study and the practice of aural surgery has received an impetus which some years ago was undreamt of. No longer can the scientific physician of to-day ignore the importance of middle ear suppuration. Its existence and its consequences place it upon a platform of importance which cannot now be denied it.

While germ life plays an all-important *rôle* in the production of acute suppurative attacks, clinical experience has long ago proved that the risks of secondary pathogenic infections are much more to be dreaded in cases which have passed from an acute into a chronic condition—a condition in which the muco-periosteum becomes eroded, the venous and lymphatic radicles become opened up, and a pathway thus afforded for the rapid dissemination to more deeply-seated structures of these deadly foes.

Lermoyez[2] regards the invasion of staphylococci from without as the invariable cause of chronic suppurative middle-ear disease. Whether this be so or not there is much to be said for Pes and Gradinego's[3] aseptic method of treatment, which consists in sterilization of the auricle and meatus, the introduction of iodoform gauze into the auditory canal, and the application of a sterilized pad over the external ear, in other words an attempt to prevent the entrance into the middle ear of germ life from without. This method has the additional advantage of keeping the parts fairly dry. The abstraction of fluid is undoubtedly prejudicial to the activity of germ life.

[2] "Annal. des Malad de l'Oreille," Jan., 1895.
[3] "Zeitschrift für Ohrenheilk," Vol. XXXVIII., p. 65.

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In a recent and valuable paper by Dr. R. H. Woods,[4] a large number of elaborate clinical observations are brought together to show that the effused fluid in cases of acute middle-ear catarrh should not be regarded as purulent *ab initio*. So long as the membrane remains intact, so long are the bacteria restrained from active multiplication. The moment, however, that either the membrane ruptures or is punctured that moment contamination from without is courted, and an enormous impetus given to the rapid multiplication of the various pathogenic organisms existing in the middle ear. Now, sir, what does all this bacteriological and clinical work teach us? Does it not point to the conclusion that so far as is possible an attempt should be made by means of local depletion, mild and sedative applications and suitable hygienic surroundings to favour the absorption of the effused products of inflammation within the tympanic cavity before rupture of the membrane and consequent ærial contamination have taken place; also that if the membrane ruptures or has to be incised the strictest antiseptic precautions should be undertaken, and a vigorous attempt made to arrest the disease before secondary ulcerative changes have taken place in the mucosa and underlying bone, and before these pathogenic germs have a chance of disseminating their baneful influences? Where incision is necessary in cases of acute or subacute otitis media, I cannot too strongly urge the importance of free incision, for it is by securing efficient drainage that we are most likely to prevent extension to the mastoid cells—an ideal situation for an almost limitless manufactory of germ life—and to the interior of the cranium.

The importance of the streptococcus as an active agent in the production of these many and varied intracranial complications naturally makes us ask ourselves the question: Has research work by the discovery of an anti-streptococcic serum given us an agent of real practical value, capable of arresting or retarding the development of this deadly organism? At the outset we are met by the question: Is there one streptococcus, or are there several, which are pathogenic to man and the corollary? Will an anti-streptococcic serum protect against one streptococcus, or against all?

In 1892 Behring[5] reported that time and patient research would doubtless procure a serum which would antagonise human streptococcal infections. Shortly afterwards Marmorek[6] published a series of observations detailing the immunising effects of a serum he had prepared. Other observers, however, notably Petruschky,[7] failed to obtain results which at all tallied with Marmorek's statements, while Aronson[8] found the serum to be practically worthless. Schenk,[9] however, by careful and laborious work, obtained a serum capable of protecting animals against the streptococcus used in the production of the serum.

The question still remains, however: Has this serum the property of

[4] "Dublin Journ. of Med. Science," Jan., 1898.
[5] "Centralblatt für Bakteriologie," &c., Jena, 1892.
[6] "Wiener Medicinische Wochenschrift," 1895.
[7] "Zeitschrift für Hygiene," Band XXII.; "Centralblatt für Bakteriologie," &c., 1896.
[8] "Berliner Klinische Wochenschrift," 1896.
[9] "Wiener Klinische Wochenschrift," 1897.

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protecting against streptococci pathogenic to man? The weight of experimental evidence conclusively goes to show that the anti-streptococcic serum is incapable of doing so. To turn for a moment to the practical side of the question: What are the results when the serum has been used as a remedial agent? Does it or does it not arrest or modify acute streptococcal infections in man?

Cases have been recorded by numerous observers, Low,[10] Pringle,[11] Raw,[12] where good results have been claimed from its employment. Other observers, however, report an exactly opposite state of affairs, having found the serum of practically no use whatever.

My own experience, gleaned certainly from a comparatively small number of cases where I have used it, is, that the serum exerts very slight, if any, influence upon the course of acute human streptococcal infections. It is true that an anti-streptococcic serum has been produced, but not a streptococcic antitoxin, for although the animals used in the production of the serum have been immunised against the streptococcus germ, they have not been immunised against the toxin produced by the streptococcus. I fully believe, however, that a time will come when the labours of the many painstaking scientists who are working at this subject will be crowned with success, and that they will put into the hands of the profession (1) the knowledge as to whether there is one, or whether there are many streptococci pathogenic to man, and (2) a serum, or a series of serums, which will possess an action antagonistic to the development of the one pathogenic streptococcus, or to the many, as the case may be.

Tubercular affections of the middle ear and its adnexa form an important and a not uncommon class of ear disease, and here, again, we have to thank the results of experimental work for much which is of use to us, both in the way of diagnosis and of treatment. Thanks to Koch's brilliant discovery we are now able to determine from the presence or absence of the tubercle bacillus whether a given case is or is not tubercular. Workers in this field will, I think, agree with me when I say that the detection of bacilli in discharge from the ear is a matter of great difficulty, and is frequently not possible. Nor is the difficulty much lessened when we come to make cover-glass preparations of small tufts of granulation tissue removed from the deeper areas of disease. But in properly conducted inoculation experiments we have a test which may, I think, be regarded as infallible. If a small portion of diseased bone from the advancing fringe of disease be taken and introduced with proper precautions under the subcutaneous tissues of a guinea pig's leg, and, if a few weeks' time be allowed, not only will the neighbouring glands be found to be the seat of tuberculosis, but bacilli can be found in sections taken from these glands.[13] I regard this experimental proof as a matter of the first importance, because not only has the treatment to be somewhat different to that followed in a non-tubercular case, but

[10] "Lancet," March 19th, 1898.
[11] "Brit. Med. Journal," Jan. 15th, 1898.
[12] "Lancet," July 9th, 1898.
[13] "Brit. Med. Journ.," Nov. 16th, 1895.

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the prognosis is naturally of much greater gravity. It is true that in the clinical history of such cases we have certain facts which lend colour to the idea that the case is of a tubercular nature, viz., the pale sodden appearance of the membrane, its perforation without the ordinary symptoms of pain, etc., the early occurrence of facial paralysis or pareisis and the early appearance of enlarged cervical glands. At the same time, I hold that for scientific accuracy we are called upon to demonstrate the actual tubercular nature of the affection just as much as the physician in a suspected case of pulmonary tuberculosis is called upon to demonstrate the presence of the bacillus in the expectoration.

I would desire to lay special stress upon this, because experience has taught me that cases of tubercular disease of the middle ear are by no means uncommon, and that in such cases we cannot be too guarded in our prognosis, nor too thorough in our methods of treatment. What is the exact etiology of these tubercular cases, and how does the bacillus find its way to this part of the body? Is it by aerial conduction by way of the Eustachian tube, or is it conveyed by vascular or lymphatic channels?

The importance of masses of naso-pharyngeal adenoid vegetations as an etiological factor in the production of middle ear disease is too well known to require any comment, but is it possible that these masses are more frequently tubercular than is at present generally supposed, and is it also possible that these tubercular vegetations may be the direct means of infecting the middle ear? Of late a considerable amount of time and labour has been spent in investigating the tubercular or non-tubercular nature of these adenoid masses. In 1894, Lermoyez[14] published the history of two cases of adenoid hypertrophy, consisting almost entirely of tubercular tissue and tubercle bacilli. In 1895, Dieulafoy[15] published the results of an investigation upon latent tuberculosis of the three tonsils. His method of research was to inoculate guinea-pigs with portions of adenoid tissue, and in a series of thirty-five cases he found that seven or 20 per cent. of the guinea-pigs became tubercular. In 1896, Brindel[16] found out of sixty-four cases eight, or 12·5 per cent., showing microscopic evidence of latent tubercle. G. Gottstein[17] found also in thirty-three pharyngeal tonsils four or 12 per cent. showing evidence of a tubercular origin.

Pfluder and Fischer[18] examined thirty-two cases of adenoid hypertrophy, and found microscopic evidence of tubercle in five, or 15 per cent.

In a recent and very comprehensive paper upon naso-pharyngeal adenoids by you, Mr. President, and our esteemed Secretary, Dr. Logan Turner,[19] you state, as the result of your experience, that 3 per cent. of the adenoid masses examined were tubercular, but say at the same time that this percentage and the other percentages which I have mentioned are probably all too low, and that with a more complete and more

[14] "Annal. des Malad. de l'Oreille," etc., 1894, p. 979.
[15] "Bull. Acad. de Méd.," April 30th, May 7th and 14th, 1895.
[16] "Annal. des Malad. de l'Oreille," 1894.
[17] "Berlin Klin. Wochenschr.," Heftes 31 and 32, August, 1896.
[18] "Archiv. fur Laryngol.," Bd. IV. Heft 3.
[19] "Edin. Med. Journ.," April, May, June, 1897.

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thorough examination the percentage might be found to be considerably higher. The tubercular nodules are, more or less, isolated; they may occur in outlying lobules, and they may not extend through the whole depth of the tissue, hence a very complete series of serial sections is required in each and every case before the existence of tubercle can be definitely excluded. In a series of experiments, which I have myself carried out—the inoculation of guinea-pigs with portions of adenoid masses—I have found 16·4 per cent. of the vegetations tuberculous. It appears to me, sir, that in the hypertrophied adenoid tissue of the naso-pharynx, we have an excellent nidus for bacilli, and that very probably in the future research will show that many cases of tubercular middle ear disease owe their origin to tubercular disease of adenoid vegetations.

On the other hand, however, negative results have been obtained by other observers. Gourc[20] examined 201 cases microscopically, bacteriologically, and by inoculation, but could not find a single giant cell, or a single bacillus, while all his inoculation experiments proved negative.

Walsham[21] also in a series of microscopic examinations of portions of adenoid vegetations removed from living subjects was unable to find any evidence of tuberculosis.

The preceding remarks will have shewn, to some extent at least, the interdependence between research work and our present knowledge of diseases of the middle ear. While much which is of the greatest practical and clinical value has been accomplished, much still remains to be done. How unsatisfactory our knowledge and our methods of treatment of certain forms of dry middle ear catarrh are is too well appreciated by all aural surgeons to require comment. Is it not possible, however, that careful research, experimental or otherwise, and the results of clinical experience may some day in the near future reveal what are the actual factors which underlie the production of this form of disease, both in its hypertrophic, its atrophic, and its so-called sclerotic varieties? Is sclerosis really an affection of the mucosa at all, or is it, as Politzer[22] has affirmed, a primary affection of the bony capsule of the labyrinth?

Again, do we take sufficient cognizance of the frequent association of deaf-mutism with naso-pharyngeal adenoid vegetations? Its frequency surely suggests something more than a casual relationship. During an examination of a large number of deaf mutes, Frankenberger[23] found adenoids present in 59·49 per cent., Lemke[24] in 58 per cent., Wroblewski[25] in 27 per cent., and Aldrich in 73 per cent.

The great and important advances which have been made in the treatment of suppurative affections in and around the middle ear and its adnexa are due to two main causes. (1) The knowledge of the part played by micro-organisms in the production of these affections, and (2) the knowledge of the value of strict antisepsis in subsequent treatment.

[20] "Annal. des Malad. de l'Oreille," May, 1897.
[21] "Lancet," June," 1898.
[22] "Archiv. of Otolog.," Vol. XXIII., No. 4.
[23] "Monatschrift für Ohrenheilk," 1896, No. 100.
[24] "Die Taubstummkert in Grossherzogthum Mecklenburg Schwerin ihre Ursache und ihre Verhutung. Leipzig. 1892.
[25] "Pszeglast Lekarski," 1891, Nos. 23 and 24.

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In the department of aural surgery, as, in fact, in every other department of surgery, both general and special, we have to acknowledge with an everlasting debt of gratitude our obligations to the brilliant research work carried on within these walls, Mr. President, by one of the most distinguished of the many distinguished alumni of this ancient and renowned university, the present Lord Lister. The principles which he laid down, the combined result of patient research and laborious clinical investigation, have revolutionised the science and art of surgery, and in our department have transformed the mastoid operation from a *noli me tangere* to an everyday proceeding, and have enabled us to follow up the paths along which septic organisms have travelled from foci of suppuration within and around the middle ear to the interior of the cranium with a degree of safety which a few years ago was undreamt of.

Our knowledge of diseases of the internal ear has been somewhat retarded from two causes: (1) the paucity of material for *post-mortem* examination, and (2) the great practical difficulty of examining such material even when it is in our possession. This dearth of pathological material has seriously interfered with an accurate appreciation of the clinical features of many affections of the internal ear. Yet at the same time experimental research has come to the rescue and has helped to fill in the gap.

The functions of the various portions of the internal ear—the semicircular canals and the cochlea—have been largely determined from experimental work. Many years ago, Goltz,[26] Breuer,[27] and Mach[28] decided that the labyrinth contained a special anatomical apparatus, which by reflex action served to maintain the equilibrium of the body, during motion (the canals) the dynamic organs of sense, and during rest (the utricle and sacculus) the static organs of sense.

Flourens[29] in a series of experiments upon pigeons and rabbits, found, after division of the semicircular canals, such marked motor disturbances as to convince him that these canals were the central organs for co-ordinated movements. In 1875, Crum Brown advanced the kinetic theory, in which he assumes that the canals are paired organs, and that each pair has a function to perform in connection with rotation or movements of the head in particular directions. On the other hand, Böttcher and Baginsky[30] affirm that all motor disturbances which ensue as the result of injury to the semicircular canals proceed from a simultaneous injury to the cerebellum, and this view is supported by Steiner's[31] experiments upon the dog-fish, where after removal of all semi-circular canals no motor disturbances were observed, and also by Politzer's[32] observations in cases of ossification of the canals, when again no motor disturbances were noted.

[26] "Pflüjer's Archiv.," III.
[27] "Pflüjer's Archiv.," 1888.
[28] "Sitzungsbericht der K. K. Akademie der Wissenschaften," 1870.
[29] "Recherch Exper.," etc. 1842.
[30] "Archiv. für Physiologie," 1881.
[31] "Deutsche Med. Woch.," 1889.
[32] "Diseases of the Ear," 1894.

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Ménière [33] was the first to adduce clinical proof that disturbances of equilibrium might be due to disease of the labyrinth, and we are all familiar with what has been designated Ménière's disease, in which sudden loss of hearing—partial or complete—is associated with vertigo, incoordinate movements, sickness and tinnitus, while clinical facts and *post-mortem* observations have taught us that affections of the utricle and sacculus are associated with static disturbances, affections of the ampullary system with dynamic disturbances.

Our ideas upon the functions of the cochlea are more or less hypothetical. Experimentally it has been shown by Corradi [34] that complete deafness follows destruction of the cochlea in dogs. Helmholtz's theory that only certain cords of the membrana basilaris vibrate for certain tones is supported by Baginsky's [35] experiments upon dogs. By destroying the lower coils of the cochlea he produced deafness for high tones, and deafness for low tones by destroying the upper coils.

Stepanow's [36] experiments upon animals are not in harmony with those just mentioned. After destruction of the upper portions of the cochlea he found no interference with audition ; and again in a case of a patient who suffered from chronic suppurative otitis media with subsequent exfoliation of the upper turn and a half of the left cochlea, no defect in hearing for either high or low tones could be detected. These observations have been severely criticised by Moos and Steinbrügge.

Facts gleaned from numerous pathological observations support experimental research in assigning to the left superior temporo-sphenoidal convolution the important *rôle* of being the cortical centre for audition, whilst clinical observations point to the existence of a definite connection between the cortical centre of the one side and the auditory organ of the other. Ferrier,[37] whose experimental work upon the nervous system is so well known, found in two cases in which the temporal lobe was destroyed upon one side only impairment or total abolition of reaction to sound when the ear upon the same side was plugged, and in two cases where the destruction was bi-lateral no sign of hearing could be elicited, although the animals in all other respects were fully on the alert. As a converse to this he found that when every part of the temporo-sphenoidal lobe was destroyed, except the superior lobe, no sign of any impairment in hearing could be detected. Clinical evidence also supports these facts, derived as they have been from experimental research, as is shown by the well-known case recorded by Shaw,[38] where a female, aged thirty-four, after an apoplectic seizure, lost the power of speech and became deaf, and who about a year afterwards died of pneumonia. Upon *post-mortem* examination complete atrophy of the angular gyrus and superior temporo-sphenoidal convolutions of both sides was found. Similar cases have

[33] "Gaz. Med. de Paris," 1861.
[34] "Archiv. fur Ohrenheilk." Bd. XXXII.
[35] "Sitzungsbericht d. Acad. d. Wissenschaften, Berlin, 1883.
[36] "Monats. fur Ohrenheilk," 1888.
[37] "Cerebral Localization," 1890.
[38] "Archives of Medicine," Feb., 1882.

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also been described by Wernicke and Friedlander,[39] Balzer,[40] Amidon,[41] Alt,[42] etc.

Disease of this convolution upon one side interferes with the functional activity of the opposite auditory nerve, but not permanently, as perfect compensation is possible apparently by means of the corresponding centre of the opposite side. From various observations, Gowers[43] infers that ordinarily only the opposite cortical centre is functionally in active operation, but that under certain exceptional circumstances the cortical centre of the same side takes on a compensatory action, and does double duty. If the disease, however, be left-sided, persistent inability to understand the meaning of words usually remains, although they are still heard as sounds. Numerous instances of this condition of sensory aphasia have been noted in cases of temporo-sphenoidal abscess secondary to suppurative otitis media, tumours, etc. Localization is also aided by the co-existence of agraphia, alexia and paraphasia.

On the other hand it is only fair to state that the cortical centre for audition has been referred to other areas in the brain. Thus, Ling in a case of bi-lateral suppurative otitis media, in which the auditory nerves were greatly atrophied, found a simultaneous and marked atrophy of the cuneus and the adjoining occipital convolutions of both sides, and of the precuneus of the right side, and locates the centre accordingly.

Strumpel also, on the strength of a *post-mortem*, places the centre in the parietal lobe.

The actual paths of communication between the cortical centres and the roots of the auditory nerves are imperfectly understood. According to Gowers the path is by way of the posterior part of the internal capsule and through the most superficial part of the tegmentum of the crus. That the fibres decussate in their course to the cerebrum has been established both by anatomical and by clinical research.

The many serious and dangerous intracranial complications which may ensue as the result of old-standing suppurative middle ear disease, necessitate an accurate knowledge on the part of the clinician of all that has been gleaned from experimental work upon cerebral localization. In this field many able scientists—Ferrier, Horsley, Goltz, Gowers, Hughlings Jackson, Bennett, and others—have been at work, and by mapping out topographically the functions of various portions of the cortex have put into our hands a key by means of which we can read the clinical course of a given case with a very fair degree of accuracy. In this connection I need only mention the occurrence of sensory aphasia as a symptom in cases in which a pathological lesion is situated in the superior temporo-sphenoidal convolution, of motor aphasia when the lesion is in the third left frontal convolution, or when pressure, say from an adjoining temporo-sphenoidal abscess, is exerted upon this centre (Kuhn's case[44]) of twitching, pareisis or paralysis of various muscles or

[39] "Fortschritte d. Med.," No. 6, 1883.
[40] "Gaz. Med. de Paris," 1884, IX., 1897
[41] "New York Med. Journ.," Jan. 31st, 1885.
[42] "Monats. für Ohrenheilk," Jan., 1898.
[43] "Diseases of the Nervous System," 1893.
[44] "Archiv. of Otology," Jan., 1897.

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groups of muscles, when the cortical centre which controls these muscles is interfered with, either as the result of an irritative and spreading meningitis, or as the result of the pressure of a gradually increasing focus of suppuration.

Unfortunately in cases of intracranial abscess, definite focal symptoms are frequently wanting, for the reason that those parts in which abscesses are usually found (temporo-sphenoidal lobe, cerebellar lobes, and frontal lobes) do not, as a rule, give rise to any definite focal symptoms for any form of lesion. Occasionally hemiplegia may be found if the abscess be very large, or if it encroaches upon the internal capsule. (Ballance,[45] Emmett Holt,[46] etc.) In 6 per cent. of the cases tabulated by Körner hemiplegia or hemiparesis existed. Implication of various cranial nerves has valuable diagnostic significance. Thus in temporo-sphenoidal abscess the third nerve is at times involved, in other cases the sixth, again in cerebellar abscesses optic neuritis followed by atrophy is at times observed.

Even if clinical evidence points to the probability of a localized intracranial collection of pus existing, it is frequently exceedingly difficult to say whether it exists in the cerebrum or the cerebellum.

The compilation, however, of the main symptoms of a large number of cases of intracranial lesions secondary to suppurative middle ear disease has enabled the clinician to associate with a given group of symptoms a definite lesion and sequence of pathological events.

Thus the clinical picture of an uncomplicated case of meningitis, of sinus thrombosis, or of intracranial abscess is fairly well understood. It is when one lesion is complicated or masked by another that we encounter our greatest difficulties in accurate diagnosis. For example, a meningitis may complicate a case of sinus thrombosis, a sinus thrombosis may complicate an intracranial abscess, and so on. From the prognostic point of view an accurate diagnosis is of the utmost importance, as will be readily appreciated. Should extensive meningitis co-exist with thrombosis, the chances of recovery, even were the sinus successfully opened and cleared out, would necessarily be diminished. In like manner, should meningitis co-exist with abscess, the most exact localizing of the purulent collection, and the most brilliant tapping and drainage, would almost certainly end in disappointment.

MacEwen[47] has pointed out that the symptoms of extra dural abscess or sigmoid sinus thrombosis always dominate and mask those of brain abscess when they occur together, and that it is not until the condition has been relieved that reliable evidence of the presence of an abscess can be obtained.

The question thus naturally arises—Have we any means at our command of diagnosing the exact nature of cases of mixed intracranial complications? Can we say of one case that it is complicated with meningitis, and of another that it is not? Some years ago Ziemssen and Quincke[48] urged the value of paracentesis of the spinal theca, not only as

[45] "Brit. Med. Journ.," May 22, 1897.
[46] "Archiv. of Pediatrics," March, 1898.
[47] "Pyogenic Infective Diseases of the Brain and Spinal Cord, 1893.
[48] "Neurologisches Centralblatt," May, 1893.

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a therapeutic measure in cases of hydrocephalus, cerebral tumour, and spinal meningitis, but also as an aid to the differential diagnosis of certain intracranial lesions and of certain effusions, serous, purulent, tubercular, etc.

Whatever may be said of the therapeutic value of the procedure there can be no question as to its diagnostic utility. Normal cerebro-spinal fluid is perfectly clear, colourless, faintly alkaline, of a specific gravity of 1010 or less, free from histological elements, containing either no albumen or only mere traces, but containing a substance, pyrocatechin, which although not a sugar, is capable of reducing Fehling's solution. Any departure from this normal standard may have very considerable diagnostic value. Thus in cases of cerebral abscess or tumour the quantity of albumen is slightly increased, in meningitis it is markedly so, so much so that more than one per cent. of albumen indicates the existence of meningitis. Pus, if found, will naturally indicate the presence of purulent meningitis, whilst the presence of tubercle bacilli would indicate the existence of tubercular meningitis.

Grunert[49] speaks very highly of the value of lumbar puncture in the diagnosis of the intracranial complications of middle ear disease, especially as regards the determination of the existence of a lepto-meningitis in connection with purulent otitis media, whilst Körner[50] remarks that in cases of otitic brain abscess, in which a complicating lepto-meningitis is suspected, absence of polynuclear leucocytes would indicate absence of any inflammatory condition of the lepto-meninges.

Stadelmann,[51] in seven cases of meningitis purulenta, found the escaping fluid to be cloudy, and to contain pus and many bacteria (meningococci, streptococci, pneumococci, etc.), whilst the amount of albumen in the fluid was always increased.

The observation is, however, of value only when the nature of the meningitis can be determined by ascertaining the microbe setting it up.

The actual value of lumbar puncture in the diagnosis of brain abscess is doubtful. In one case Stadelmann found the fluid to be under high pressure, in another the fluid was cloudy and purulent, and in a third it was at first purulent and then clear. So far also by means of lumbar puncture it is not possible to make a differential diagnosis between brain abscess and sinus thrombosis.

We have, then, at our command, in addition to various well-known clinical signs and symptoms, a means of diagnosing with a very fair degree of accuracy the all important question as to the existence or non-existence of an accompanying meningitis in these cases of mixed intracranial infections by an accurate chemical, microscopical and bacteriological examination of the spinal fluid, remembering always that positive results are alone of value.

In these somewhat discursive remarks, Mr. President, I have endeavoured to show how wrapped up our clinical knowledge is with facts gleaned from experimental research. That much has been done

[49] "Munchener. Med. Wochenschrift," Dec. 14, 1897.
[50] "Centralblatt für die Grenzgebiete der Med. and Chirurg.," Dec., 1897.
[51] "Deutsche Med. Wochenschrift," No, 18, 1897.

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in the past by means of experimental investigation to advance our knowledge of the etiology and treatment of diseases of the ear, will, I think, be granted by all students of the subject; that much still remains to be worked out will probably be just as readily admitted.

Our knowledge of the central acoustic tract, although much advanced of late years by the methods of research associated with the names of Golgi, Weigart and Pal, by examination in the developmental stages as suggested by Bechterew and by Gudden's method, is still far from perfect, as also is our knowledge of the central course of the vestibular nerve.

Although our methods of diagnosing the existence or otherwise of the presence of an intracranial abscess have advanced by leaps and bounds, we have yet to learn a means of exact differential diagnosis between a cerebral and a cerebellar abscess. The question as to the advisability or otherwise of ligation of the jugular vein in sinus-thrombosis is still a disputed point, and one worthy of serious consideration. Again, the exact *rôle* played by the ossicles in the transmission of sound has naturally an important bearing upon such operative measures as ossiculectomy in cases of suppurative and non-suppurative middle ear disease. While clinical experience will naturally materially assist in the elucidation of many of these problems the value of experimental research must not be lost sight of.

Knowledge which is built up upon accurate experimental, clinical, and pathological data is sure and lasting. The brilliant work which has been done in the department of aural surgery during the past few years should stimulate us all to greater achievements in the future, recognizing as we must that every fresh fact, and every accurate deduction, contributes in the long run to our knowledge of how to relieve the pangs of human suffering.

Dr. CECIL E. SHAW. *Case of Epithelioma of the Pharynx.*

Mrs. P. was sent to me by Dr. J. St. Clair Boyd, on May 19th, 1897, on account of difficulty in swallowing, and a feeling of a lump in the throat.

The patient was a fairly healthy-looking and well-nourished woman; she did not know her exact age, but said it was about thirty-six or thirty-eight, and certainly she did not look more. Her family history was good, and presented no points of interest. She had been married four years, and had had two children, one of whom had died when teething of "congestion of the lungs." She had had no miscarriages. She was now more than six months pregnant.

About March 1st the throat began to feel sore, but as she had had sore throat in her previous pregnancies she thought little of it. At the end of April her voice had got hoarse, and she began to experience difficulty in swallowing. At no time was there any pain, merely an uncomfortable feeling of something in the throat. She had not lost flesh.

On examination the pharynx was seen to be dry and dirty, and with the laryngeal mirror a swelling, about the size of a nut, was seen in the posterior wall of the pharynx, directly behind the epiglottis, which it touched, and where it touched the top of the swelling was ulcerated. Thick strings of yellow muco-pus partly hid details. I could find no

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enlarged glands, nor could I detect any swelling from the outside, though the patient said her throat felt larger than it used to do.

I ordered a spray of menthol in paroleine, and saw her again in five days, when the parts were cleaner and better seen. After brushing with cocaine solution, I nipped off a small piece of the edge of the ulcer with Schrotter's forceps, and examined it at the Pathological Laboratory at Queen's College.

At this time we had some suspicions of specific disease, and Dr. Boyd had put the patient on specific treatment, for she had lately had some disease of the bone in her hand, and ulcers on her legs. About a year ago her hair and eyebrows fell out, but no history of any rash or eruption in her or her children could be got.

A week later I saw the patient again, when she was confined to bed after several free hæmorrhages from the throat, the first of which came on five days after I had removed the piece of tissue for examination. Subsequently she saw another medical man, and had a severe attack of hæmorrhage while he was examining the growth. She then went to the country, and I did not see her again. I have been told that she gradually became weaker, though no new symptoms presented themselves. On July 2nd she was delivered of a child, which lived three days, and on July 9th she became comatose, and died in a few hours.

Malignant growths in the pharynx are rare, the least rare form being sarcoma of the tonsils, and I have not been able to find any record of a malignant tumour on the posterior wall. McBride (1) records a case of epithelioma of the posterior pillar of the fauces in a woman of sixty-three, and Hill (2) records a similar growth on the right glosso-epiglottic fold in a man of forty-four. In the latter case pain shooting up to the ear is mentioned as a prominent symptom. Tilly (3) has recorded a tumour of the posterior wall of the pharynx, just opposite the epiglottis, as in my case, but there was a clear syphilitic history, and the tumour disappeared in a fortnight under specific treatment.

In the case I have brought before you the absence of pain is an interesting point of which I can offer no explanation, and the patient was young for malignant disease.

Operative interference was from the first entirely out of the question owing to the size and position of the growth.

Mr. THOMAS BARR. *Notes on Extra-dural Suppuration in the Sigmoid Fossa due to Ear Disease.*

The following notes are based upon three cases which have come under my care, possessing some points of practical interest. These belong to that form of extra-dural suppuration in which a firm wall of bone intervenes between the middle ear cavities and the abscess cavity, presenting symptoms in many respects different, as we shall see afterwards, from another form, in which we find on penetrating a thin cortex of bone behind the external meatus cavity, occupied by pus, carionecrotic *débris* and granulation tissue, on the removal of which the sinus wall and the neighbouring dura mater already denuded of their bony covering. While I must not trouble you with too many details, it is

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desirable that I should indicate the leading features of these cases, forming as they do the basis of my remarks.

The first patient was a young man (A.E., 1), nineteen years of age, who had had a purulent discharge from the left ear since early childhood, and as a result there was stenosis of the osseous external meatus and eburnation of the mastoid. Owing to the stenosis in the canal, and the development of severe pain over the corresponding side of the head, along with sickness snd vomiting, the antrum of the mastoid was opened and curetted and the posterior wall of the external meatus was removed.

The painful symptoms continued in spite of the operation, and repeated rigors now ensued, each one accompanied by very high temperature and followed by marked remission. No intraocular changes were found, neither was there any swelling nor tenderness over the internal jugular vein, nor any metastatic phenomena. In view of the repeated rigors and other symptoms the sigmoid sinus and neighbouring dura mater were freely exposed by working back from the cavity of the antrum through sclerosed bone, and a considerable quantity of fœtid pus and abundant granulation tissue were found between the dura mater and the sclerosed bone, especially over the sigmoid sinus. These were thoroughly removed. The sigmoid sinus and a considerable area of the neighbouring dura mater was grey and covered with plastic exudation, but being soft and elastic the sinus was not opened. Although rigors recurred on three occasions within a week after the operation, the patient ultimately made a good recovery. A canal of considerable width opening behind the auricle and leading into the antral cavity remained behind perfectly dry and sweet.

The second patient was a healthy looking boy (c.c.), eight years of age, a deaf mute, who had suffered from purulent disease of both middle ears for five years. Total loss of hearing had ensued, gradually followed by loss of speech, until in a few months the power of speech had been entirely lost.

He had previously been able to hear perfectly and spoke well for his age.

About the beginning of this year he complained of pain in the right ear, and also on the top and side of his head, while the discharge from the ear became more profuse. During four nights previous to his admission to the Ear Hospital he had been unable to sleep owing to the severity of the pain.

There was likewise nausea, and he had vomited constantly for an entire day. He had also become emaciated and pale. *Neither tenderness nor swelling existed over the internal jugular vein on the affected side.*

On the morning after admission he had a severe rigor with a temperature of 103°. On the afternoon of that day I performed Stacke's operation. Much cario-necrotic *débris* and granulation tissue were found and removed by curetting. A few hours after the operation he had a second severe rigor, with a temperature of 105°, falling in a few hours to 97·8°. Within the next thirty-six hours he had other three severe rigors, each followed by very high temperature. The patient was again anæsthetized; and from the back part of the previous operation cavity

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the bone was removed with bur and gouge until the sigmoid groove was opened, when fœtid pus welled out. For a considerable distance above and behind the sinus the bone was still further removed, and a large quantity of granulation tissue was found between the bone and the dura mater. When this was removed by curetting, the dura mater, especially that forming the outer wall of the sinus, was found to be white and even necrotic looking. On the same evening the temperature fell to 97·6°, after which its oscillations were almost entirely within normal limits, and no further rigor occurred. After this the dura mater gradually granulated over, and now the cavity is reduced to a comparatively small one, representing the antrum and upper tympanic cavity. There is practically no secretion, and the boy is in perfect health.

The third case is especially interesting as belonging to the pre-operation period, coming under my care eighteen years ago. The condition found *post-mortem* showed a state of matters almost identical with the two previous cases, and a similarly happy result would, no doubt, have followed had the patient lived in more fortunate surgical times. He was a boy (d.d.), twelve years of age, whose left ear had discharged offensive matter for six years.

On Sunday, the 28th December, 1879, he was seized with great pain behind the ear over the mastoid region and in the back of the head. There was persistent vomiting for the first three or four days, with great heat of the skin, the face being flushed and pale by turns.

At the end of the first week severe rigors began, lasting about twenty minutes. They were followed by heat and then by sweating. The rigors continued three or four times a day, and he became at times unconscious, with stertorous breathing. After sinking into a completely unconscious state, with eyes open and fixed, and pupils dilated, he died three weeks from the onset of the illness. The late Dr. Foulis made the *post-mortem*. No meningitis nor cerebritis was detected, but a circumscribed collection of fœtid pus was found in contact with the inner surface of the mastoid process and posterior surface of the petrous bone on the left side, just at the groove for the lateral sinus. The walls of the lateral sinus were thickened, and along with the neighbouring dura mater were separated from the bone by the collection of pus. There was no pus in the lateral sinus. The brain itself was healthy, with the exception of a slight discolouration of the surface immediately over the abscess. The antrum was dilated, but the bone between it and the sigmoid groove was intact and free from caries.

In regard to these cases I wish especially to direct your attention to the significance of *rigors and high temperature*. In simple extra-dural abscess rigors and high temperature are said to be comparatively rare, probably, according to Grunert, of Halle, in not more than one in five. This contrasts markedly with what is found in ordinary sigmoid sinus thrombosis, when rigors and high temperature are the predominant phenomena. Yet in these cases, notwithstanding the presence of marked rigors and high temperature, there was an absence of other well-known symptoms of sigmoid sinus thrombosis. There was neither pain, swelling, nor cording of the internal jugular vein; neither was there, on exposure

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of the sinus, so far as inspection and palpation went, any evidence of plugging, nor, in the third case, was there any purulent formation in the sinus after death ; neither were there pulmonary nor other symptoms pointing to metastic processes ; while finally, and very important, complete recovery in the first two cases has taken place without interfering with the sinus or internal jugular vein. In the third case the condition found was very favourable for operation, which makes one sorry that the boy did not live ten years afterwards. The death in this case seemed to be from prolonged brain pressure, as there was neither lepto-meningitis nor brain abscess. *One of the most important lessons to be obtained from the study of the two first cases is that rigors and high temperature may exist along with notable inflammatory changes in the outer wall of the sinus, and yet complete recovery take place without opening the sinus or ligaturing the internal jugular.* Apparently, by removing the purulent matter covering the sinus and dura mater, and thus averting further septic absorption from without, there is a fair chance that the infective elements already in the circulation may be got rid of by the phagacytic action of the leucocytes before other important organs become involved. This phagacytic action required some time to achieve its beneficent purpose, as shown by the three rigers, although in gradually diminishing severity, which occurred in Ewing's case after the second operation. This may be considered comparable to what takes place in certain cases of post parturient septic absorption, when the thorough clearing away of the infective matter from the inner surface of the interus may almost immediately bring about the disappearance of high temperature and other alarming symptoms of septicæmia. We are therefore justified in the presence of shiverings and high temperature to delay the opening of the sinus and internal jugular until we first see the effect of simply removing the extra-dural collection and antiseptically treating the dura mater and outer wall of the sinus. We must not, however, delay the exposure of the sinus and dura mater when rigors and pyemic temperature exist in these chronic purulent cases : we saw how delay eventuated in the third case. Delay may mean the formation of multiple metastatic abscesses, the production of deeper intra-dural changes, such as lepto-meningitis or brain abscess, or death from mere pressure, as in the third case.

In future I would not be disposed to wait long after opening the cavities of the middle ear before exposing the dura mater in the presence of symptoms such as were manifested by these two patients. In the light of these and other experiences I would be disposed in future, especially where there are rigors and high temperature, either to complete the exposure of the dura in one operation, or at least to perform the second part of the operation very soon after the first if no decided improvement meanwhile takes place. This no doubt means a long operation when we have to deal with sclerosed bone. I do not believe we can have such rigors and high temperature with an affection confined to the middle ear. What is the goal to be aimed at in these cases? In such cases we should aim not only at removing the extra-dural collection of pus, but at the entire removal of the old septic disease from the middle ear. One

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occasionally finds on examining an ear from the neighbourhood of which an intracranial collection of pus has been previously removed by a surgeon that fœtid purulent matter still exists in the ear. This is most undesirable, as exposing the patient to future intracranial mischief. While in cases of acute ear disease the cure of the middle ear disease is effected without much difficulty, it must be confessed that in chronic purulent middle ear disease it is not unfrequently very difficult to bring about a perfectly dry non-purulent condition of the ear. The preliminary operation of thoroughly laying open the cavities of the middle ear will, of course, contribute materially to the cure of the purulent ear disease, but, notwithstanding, it may be necessary to effect further treatment at a subsequent stage in order to reach the desired result, and I would suggest that a specialist should in such cases carefully examine and report upon the interior of the ear before the patient is allowed to pass finally out of the surgeon's hands. A permanent non-purulent dry condition of the ear is in such cases a consummation devoutly to be wished.

Mr. THOMAS BARR. *A Case of Double Acute Mastoid Empyema, with Exposure of Dura Mater. Operation in both.*

The following case illustrates a form of extra-dural suppuration different from what I have just described, namely, where, on opening the mastoid behind the external meatus, the sigmoid sinus and neighbouring dura mater are found already exposed, covered with granulation tissue, and bathed in pus.

J. W. R., a male teacher, aged forty-six, consulted me on the 6th August, 1897. Patient was rather a delicate man, and had defective vision with Reratitis. He remarked that any scratch or wound received by him always had an unfavourable course, and was slow of healing. So far as he knew his ears and his hearing had been perfectly normal until three weeks previously, when he was seized with severe pain, first in the right ear and then in the left. After a few days both tympanic membranes were incised by the medical man in attendance. This was followed on both sides by profuse discharge. When he consulted me the chief features were—very profuse discharge from both ears and extreme deafness, necessitating loud speaking near to the ear. There was constant throbbing in both ears, but no severe pain. He complained, however, of occasional but not severe headache. There was no giddiness. He had been treated for a fortnight by the ordinary methods of antiseptic cleansing with inflation. His temperature was normal, and this continued so throughout, and he never had any rigors. The right ear seemed to be the worse of the two, and, while there was no pain spontaneously complained of, there was tenderness on pressure over the antrum and behind in the region of the masto-occipital suture. There was also swelling at the inner end of the roof of the external meatus, and the discharge, in spite of very frequent and thorough cleansing, continued very profuse ; indeed, no sooner was an ear syringed and dried than pus began again to well out. It was considered desirable to operate first on the right mastoid. The antrum was opened in the usual situation, and there was found a somewhat remarkable condition of matters, consider-

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ing the short duration of the disease. A large cavity was entered, full of pus, with granulation tissue and cario-necrotic *débris*, while the sigmoid sinus and neighbouring dura mater were found exposed on the back wall of the cavity. The pus, granulation tissue, and softened bone were thoroughly cleared away. Boracic acid and iodoform powder were freely applied, and the cavity was stuffed with gauze. After the operation there was practically no further discharge from the meatus. The hearing improved, the perforation soon closed, and the cavity behind granulated, and ultimately was allowed to close.

The left ear, however, still continued to discharge freely, although no pain was complained of unless on severe pressure over the antrum, when only slight pain was elicited. After waiting three weeks longer, the discharge continuing as bad as ever, it was decided to open the left mastoid antrum. This was done when a condition was found similar to that which had existed on the right side with the important exception that the sigmoid sinus was not exposed. The second operation was followed by similarly satisfactory results. Improvement of hearing, almost immediate, and entire cessation of discharge from the ear, with ultimately, although after a considerable time, healing and closure of the wound. Four months elapsed before complete cicatrization took place.

The points in this case which contrast with the other three cases are interesting and instructive.

1. The entire absence of rigors or high temperature with so much local inflammatory mischief. Evidently no systemic infection had taken place, notwithstanding the fact that the sinus had been bathed for some time in septic matter, whose effects, however, must have been limited to its outer wall.

2. In view of the extensive ostitis and destruction of tissue, the comparative absence of pain, unless on pressure, was a somewhat remarkable feature.

3. Instead of sclerosis of the bone, so notable a feature in most of the chronic cases, we had extensive softening and bony destruction in both mastoids rapidly brought about.

4. The almost immediate subsidence of the copious purulent discharge from the ear after the operation is remarkable, as compared with the slow and difficult drying up of the discharge in the other two cases. No doubt this is common in acute empyemas of the mastoid.

5. In view of the early double paracentesis of the tympanic membrane followed by the severe course of the disease, we might recall the opinion of Politzer and others that when the tympanic membrane is incised for acute inflammation of the middle ear, the course of the disease, in certain constitutions, is apt to be more severe and persistent than when the membrane is let alone.

Mr. HUGH EDW. JONES. *Some Unmanageable Complications of Suppurative Middle-Ear Disease.*

The term "unmanageable" is used here in its relative sense only, and is not intended to deny that a successful result might have been obtained in some of the cases recorded in certain contingencies.

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The publication of successful operations to the exclusion of fatal cases, while so encouraging to the special surgeon, blunts the perception of the general body of the profession to the extreme gravity of suppuration in the middle ear. Though no new facts are needed to prove the existence of danger in this affection, the danger cannot be too often insisted upon, nor the means of avoiding and combating it discussed.

These are the reasons which have led me to bring together the notes of seven fatal cases :—

Case 1. A girl, Mary C., aged six years, had otorrhœa for nine months. Fourteen days before admission, had vomiting, rigors, stiffness and swelling of neck and over mastoid. Was admitted into hospital on the day on which she was first seen, and the mastoid antrum and tympanum were thoroughly cleared out. On the third day the lateral sinus was exposed and septic clot removed, and at the same operation the internal jugular vein was tied. Marked improvement, lasting four days, followed, then the symptoms recurred, and the patient died on the seventh day.

Post-mortem.—We found patches of ulceration in the opposite lateral sinus.

This patient would probably have been saved if she had been seen and operated on a week earlier. (The case was reported at the Newcastle meeting.)

Case 2. (June 19th, 1897.) Boy, Jos. T., aged seven years. Otorrhea followed scarlatina a few months and post-auricular abscess formed seven weeks before admission. This abscess had been incised one and a half inches behind the auricle, and a small discharging sinus existed at that point. When admitted our then Senior House Surgeon, Dr. Milroy, at once opened up the abscess freely. Alarming hæmorrhage occurred from the mastoid vein, which could only be stopped by plugging the foramen. The patient had the characteristic oscillating temperature of septic thrombosis, but rigors and vomiting were conspicuous by their absence until the last three days, when vomiting was frequent. Third day in hospital, mastoid and lateral sinus opened up, the latter full of suppurating broken down clot. The bleeding from the sinus and from a bunch of veins over the mastoid was so great that the wound had to be plugged up before the sinus could be thoroughly cleared out.

Fifth day a second attempt was made to clear out the sinus. This time I tried to control the hæmorrhage by trephining over the sinus near the torcular, and pushing in the wall with gauze pledgets. Patient died on tenth day (June 29th, 1897).

Post-mortem.—Both lateral sinuses were full of suppurating broken down clot, through which the fluid blood permeated. About one inch from the torcular on the side away from the original lesion the dura was in a sloughing condition, and in contact with this was one end of a large abscess which extended through the occipital lobe to the anterior end of the tempero-sphenoidal lobe.

It is possible that if this case had been seen five or six weeks earlier, the sinus mischief would not have occurred. When seen the clot had broken down, and allowed blood to pass through it.

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Case 3. (June 14th, 1895.) Robert G., aged seventeen years. Otorrhœa off and on twelve months. Patient was confined to bed at home for two weeks with symptoms of "inflammation of the brain." A slight improvement allowed his medical man, Dr. Parker of Ince, to send him to the hospital to have his ear examined (June 12th, 1895). The symptoms present were slow pulse (64), low temperature (97·6), retracted abdomen, severe pain in ear and forehead, and giddiness without staggering. Right external meatus was full of granulations; no external sign of mastoid disease.

First operation (day of admission), antrum and tympanum laid open. The cavities were full of offensive cheesy material; inner wall rough, tegmen carious and easily broken away, posterior wall and floor smooth and apparently healthy.

During next three days there was no marked change. No localizing symptoms appeared. Intellect clear and quick. Exploration of tempero-sphenoidal lobe through roof of antrum gave a negative result.

On the sixth day in hospital the following symptoms appeared: temperature rose to 102°, pulse 120, left ptosis, conjugate deviation of eyes to one side, nystagmus. While lying on right side on right arm the patient swings his left arm over, constantly striking the bedside and locker with his closed fist; if anything, the grip of the right hand is stronger than the left, but both are good; the pain in the head and shouting has increased day by day.

Third operation (sixth day). The dura was first exposed through the posterior wall of the cavity in the mastoid, and a probe passed between dura and bone in the direction of the internal meatus, but no pus was found there. A disc of bone was then removed from the occipital bone, just behind the posterior border of the mastoid, and on a level with its lower half. A fair-sized hydrocele trocar was used for exploring, and this was introduced four times without pus being found.

Death occurred next day.

Post-mortem.—We found that an abscess, which had embraced the middle peduncle of the cerebellum, had burst on its median aspect, bathing the pons in pus. The inner wall of the cavity towards the pons was not more than one-sixteenth of an inch in thickness. The parts involved were the flocculus, the amygdala, and parts of the quadrate and biventral lobes. The outer half of the affected area was still in a semi-solid condition. Into this solid portion we could follow the track of the trocar.

We were unable to demonstrate any direct connection of the abscess with mastoid or internal ear.

There was no evidence of any other intracranial mischief.

It is not an easy matter in this case to determine the date of the formation of the abscess. Dr. Parker recognized the illness as a cerebral one a fortnight before he was able to transfer the patient to the hospital. On the other hand, the localizing symptoms of cerebellar abscess did not appear until the day before his death. The abscess seems to have started near the median surface, and to have extended backwards and outwards. Did the abscess burst spontaneously, or did the thin inner

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wall give way when the trocar entered the semi-solid outer part of the abscess? With regard to the way of getting at the abscess, I feel sure now that the anterior part of the cerebellum can be best reached through petro-mastoid bone, and not through the occipital. The opening in the former proved to be at least an inch nearer the abscess than the trephine hole in the latter.

Case 4. (Oct., Nov., 1895.) Will. S., aged twenty-three years, had discharge from ears many years ago, but none lately until second week of present illness. He was ill in bed at home three weeks, and in the hospital one week before he came under the writer's care, on November 5th. A large superficial mastoid abscess (right) and some of the outer cells of the mastoid had been opened.

Symptoms.—Double optic neuritis, pupils dilated, vision good, no squint, marked "slowness of cerebration," occasional delirium, severe pain. Pulse rate had gradually risen from 70 to 90 and 100, and temperature from 97° to 100°.

Operation.—After opening the antrum and removing the carious tegmen, the dura over it was found to be sloughing, and a probe passed readily through it into a large abscess in the tempero-sphenoidal lobe. The opening was enlarged, and the cavity gently washed out with boric acid solution. The probe could be passed directly upwards two and a half inches without meeting any resistance.

The patient died ten days after the brain abscess was opened.

Post-mortem.—The abscess cavity was found to be without definite lining, and the brain around it was much softened. The slight relief given by the operation and the comparatively high pulse and temperature had led us to fear that we had to deal with some associated meningitis, or a rapid extension of the inflammation.

The delay of three or four weeks between the onset and opening of the abscess was undoubtedly one cause of failure.

Case 5. Rebecca H., aged twenty-two years. Influenza three months before admission, followed by acute suppurative otitis of left ear; three weeks before admission there was pain and swelling behind the left ear, and a fortnight later a rigor and vomiting.

On Admission.—(May 12th, 1893.) Hard brawny swelling in upper part of post-triangle of neck. Temperature, 100·2°; pulse, 120; pupils dilated; no optic neuritis; membrana tympana hidden by swelling of posterior wall of meatus. Diagnosis: Bezold's disease.

Operation, day of admision; mastoid opened; sinus traced from cells into posterior fossa of skull; extra-dural abscess evacuated; large subperiosteal abscess in posterior triangle of neck opened. These abscesses communicated in some way not discovered at that period. Lotion passed from one to the other.

Case did well from May 13th to 30th, and patient began to get up, then, suddenly, severe facial neuralgia was followed by general symptoms of suppurative meningitis. Trephining and opening the dura in middle and posterior fossæ failed to give relief.

Post-mortem.—(June 3rd, 1893.) Purulent meningitis over parietal and frontal lobes and into sylvian fissure and front part of base. T. S.

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lobes free. T-shaped gutter formed by caries in posterior wall of petrous bone, one end of the cross-piece communicated with the mastoid cells, the other with the internal ear by way of the vestibular vein. The vertical portion passed down through the petro-occipital fissure beneath the sigmoid sinus into the periosteal abscess on the under surface of the occipital bone. From this a sinus burrowed amongst the deep cervical muscles to the front of the spine. Whole of left parietal lobe of brain breaking down.

Case 6. (June 16th, 1897.) James R., aged fifty-four years. Pain and deafness, left ear, five weeks, purulent discharge, ten days. Staggering and was giddy eight days ago, rambling in speech four days.

Admission June 16th. Mastoid opened, drachm of pus escaped. Whole mastoid found to be excavated. Symptoms of acute suppurative meningitis. Trephining failed to give relief, and patient died June 23rd.

Post-mortem.—Purulent meningitis of base.

Case 7. (August 22nd, 1897.) Joseph K., aged forty years. Ten days before admission, shivering and tightness in chest. Three days later pain in and behind left ear, which got worse, and continued three days.

On admission, August 21st, pain in left temple, winced when pressure applied over mastoid and below its apex. Pulse 78, respiration 44, temperature 98·4°.

August 22nd. Mastoid opened; full of granulations and small quantities of pus. Considerable relief, August 24th, pulse 63, temperature 97·8°. Optic neuritis. Cerebration perfect. Dura explored, no extra-dural abscess found. August 25th, more dull in intellect, walked without staggering. August 27th, will not speak, but understands what is said. Cerebellum explored; large quantities of pus flowed from beneath dura (meningeal).

August 28th, paralysis of right arm and leg. 30th, died.

Post-mortem.—Purulent meningitis; no brain abscess.

Conclusions.—Causes of failure:—

1. None of these cases had received treatment by a specialist for the ear affection.

2. In most of the cases serious delays occurred before surgical treatment was sought. The first thrombosis case had an unopened mastoid abscess for two weeks before admission. The second had an abscess seven weeks before admission. The temporo-sphenoidal case had been seriously ill for four weeks before he was seen by the writer. The caries of petrous case had swelling over mastoid and in neck three weeks before it was sent for operation. The suppurative meningitis cases were sent in as soon as the complication manifested itself, but evidence of very serious ear mischief had been present for some weeks, and I am bound to say that I think the mastoid complication could have been detected by a specialist.

3. *Extension of the Suppuration beyond the Limit of Successful Operative Treatment.* Whether this was due to the rapidity of the process or to avoid avoidable delays in applying proper treatment, it was the cause of failure in the thrombosis cases, in the tempero-sphenoidal case, and in the cases of purulent meningitis.

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4. *Failure to Expose the Fatal Lesion.* This caused death in the cerebellar case, either by actually bursting the abscess without providing an exit for the pus, or by spontaneous bursting of the abscess after the operation. I venture to affirm that the only way in which the abscess could have been successfully opened was by operating along the posterior wall of the petrous bone. The occurrence of meningitis in the caries of petrous case would possibly have been prevented by a more extensive and thorough exposure of the diseased area. Once a general suppurative meningitis has been set up all operations fail.

The moral seems to me to be that the most important study of all in connection with this subject is the early detection of suppuration in the attic and antrum or internal ear, whether in chronic or *acute* suppurative otitis, and *more especially in the latter*, in which the mischief spreads with much greater rapidity.

Mr. T. MARK HOVELL. *Catheterization of the Eustachian Tubes.*

The Eustachian catheter is not a modern instrument, and there are many cases of ear disease which cannot be treated without it, nevertheless there is not a nomenclature by which any particular instrument can be described in such a manner that its precise dimensions can be known. At the present time Eustachian catheters are described by numbers, such as 1, 2, 3, etc., which indicate a gauge, and in some cases also a length of curve, but even these numbers do not represent any particular standard, for the several surgical instrument makers keep different patterns, and even each set of instruments that bears the name of an aural surgeon differs both in gauge and curve from another set that bears the name of another aural surgeon, and yet all the sets are numbered 1, 2, 3, etc. But not only is there an absence of uniformity with regard to gauge and length of curve as represented by a particular number, but the length of the stem varies also very considerably. An instrument eleven and a half centimètres in length measured by a straight line drawn from its larger extremity along the stem to a transverse line at a right angle with it, which touches the furthest point of the curve of the smaller end, is very convenient to use, for when in position, the anterior portion of this stem does not project more than an inch and an eighth beyond the floor of the nostril, and consequently the nozzle of the air-bag can be easily and firmly held in contact with the catheter by the thumb and forefinger of the left hand whilst air is being injected from the air-bag. For the introduction of this short pattern of catheter the profession is indebted to the late Mr. G. F. Hodgson, of Brighton. Catheters of a foreign pattern more than sixteen centimètres in length are still to be seen in some instrument makers' shops, but when an instrument of this description is in position it projects so far from the nostril that it is impossible, whilst the hand is steadied as it should be on the patient's face, to reach its end with the thumb and forefinger of the left hand, in order to hold the nozzle of the air-bag in contact with it.

As the dimensions of the inferior meatus vary according to the size of the superior maxillary bones, the presence or absence of spurs, deviations of the septum, etc., it is necessary for aural treatment to be provided with catheters which differ respectively in the gauge of their stem and

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in the length of their curve. At the present time, as I have before mentioned, there is not a nomenclature which enables one practitioner to tell another the precise gauge and curve of a catheter required for the treatment of a particular case, and in order to overcome this serious inconvenience, I propose as follows :—

1. That the gauge of Eustachian catheters shall be that of the French catheter gauge, which is well known, and graduated on a definite scale.

2. That the length of curve shall be expressed in millimètres, the number indicating the distance which the curve separates two parallel straight lines. Thus when a catheter is placed so that the outer part of the stem touches the one line, and the tip of its beak the other line, the distance between the lines shall indicate the curve in millimètres.

As the beak of a catheter is usually slightly larger than the stem, the actual gauge of the latter will be a trifle less than the number specified.

The passage of an Eustachian catheter should be almost, if not entirely, painless, and when otherwise the cause is usually the employment of an instrument of too large a gauge, or too long a curve. An Eustachian catheter, No. 9, French catheter gauge, with a curve of eighteen millimètres between parallel lines, is suitable for most adult male cases, but it is sometimes found that this curve is too long to allow the catheter to be turned outwards in the naso-pharynx. When this occurs a curve of sixteen millimètres can usually be passed readily into position. I consider that No. 9 gauge is the largest which need be used. I employ usually either nine or seven gauge with a curve of eighteen or sixteen millimètres. In exceptional cases a curve of fourteen or twenty millimètres is required. Rarely the meatus is so small that a No. 5 gauge is necessary.

A general practitioner, who does not wish to carry a large number of Eustachian catheters, can do good work with the following three :—

No. 9 gauge	...	...	... 18 millimètres curve.
No. 7 gauge	...	...	... 16 millimètres curve.
No. 7 gauge	...	...	... 14 millimètres curve.

As may be inferred, I have found two millimètres sufficient to constitute a size as regards length of curve, and an alternate gauge convenient for the dimensions of the stem. By such a nomenclature as above suggested a standard can be formed which is intelligible to all, and it will enable one practitioner to accurately describe to another practitioner the size of the catheter suitable for the patient under treatment.

Dr. HOLBROOK CURTIS (New York). *The Treatment of Singers' Laryngitis.*

Dr. Curtis said that it was necessary to differentiate between the laryngitis generally found in singers and the ordinary laryngitis due to taking cold, or a coryza or pharyngitis descending in course. He called singers' laryngitis any simple inflammatory condition of the larynx and cords which prevented a singer from temporarily using the voice. These onditions were liable to arise from either constitutional or dynamic causes. Attrition was the most frequent cause of singers' laryngitis. Hæmorrhagic infarction affecting generally one cord, from vomiting,

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coughing, or spasm of the glottis, was another condition to which the same treatment could be applied, and required passing notice. A bad method of attack, especially the *coup de glotte*, or stroke of the glottis, was the initial cause of the soda-water-bottle cords, which condition if neglected went on to a thickening of the membrane, and finally to the formation of nodules. Not only would the employment of tone exercises remove the nodules when present without mechanical or surgical aid, but the practice of these exercises was essential in the beginning of a singer's career to prevent the possibility of attrition. Dr. Curtis showed by diagram on the board the manner of vibration of the vocal cords, which was of a mixed character, having a segmentation in length following the laws of the vibration of strings, and in breadth vibrating like a rod or plate fixed at one end. This had been demonstrated by the laryngo-straboscope, which also showed he opposite bellies of the vibrating segments in contact during bad attacks. From the fact that the trouble which singers experienced was due in great measure to mechanical interference, Dr. Curtis had studied the formation of tones which would not permit the cords to touch during the attack in such a manner that attrition became possible. He showed the methods so fully explained in his book, "Voice Building and Tone Placing" (New York : D. Appleton), and explained the technique. These exercises by bringing into use the resonance, the nasal and buccal cavities in the proper manner, added a different set of overtones, and consequently the cords accepted a new arrangement of segmentation, and the opposite segments would theoretically be in a new position. Carried on as daily exercises the cords would become relieved of the inflammation due to attrition, and of congestions due to bad methods. Several cases were cited in illustration of the efficacy of the method The only drug which Dr. Curtis spoke of as using as an adjunct to treatment was the extract of the suprarenal capsule—*ischænim.*

Dr. EUGENE S. YONGE. *The Treatment of Dysphagia in Laryngeal Tuberculosis.*

The author, in the first place, refers to the principal causes of dysphagia in laryngeal phthisis. He divides the treatment of this symptom into two parts—that by drugs and that by other methods. The relief of dysphagia by drugs hinges largely on the selection of the most suitable local anæsthetic, and a substance to lay claim to this distinction should be strongly anæsthetic, prolonged in action, devoid of marked toxicity, not specially disagreeable to taste, and not costly. The author has carefully tested a series of fifteen local anæsthetics, on the one hand to determine their relative power of relieving pain—five per cent. solution of cocaine being taken as the standard—and on the other hand to ascertain their suitability for the assuagement of the symptom under discussion. He concludes that there is no ideal drug of this class which is applicable to every case, but the following appeared suitable under various circumstances and generally effective :—Cocaine, antipyrin, eucaine, orthoform, carbolic acid, guiacol, ice, morphia (with or without iodoform), and paramonochlorphenol. Holocaine, aneson, aconite, and tropacocaine did

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not prove satisfactory, either from feeble action, toxicity, expensiveness or combinations of these disqualifications. Cocaine-cataphoresis, or the deep diffusion of the drug, by means of the galvanic current, is still *sub judice* as regards its application to laryngeal dysphagia.

In the presence of ulceration any of the above-mentioned remedies may be applied, but when loss of tissue is absent only cocaine, antipyrin, eucaine, carbolic acid, and ice are available. With perichondritis antipyrin has certain advantages, in that it lasts longer than cocaine, and the quantity required to produce analgesia has never, to the author's knowledge, given rise to toxic symptoms. A mixture of cocaine and antipyrin, or cocaine and carbolic acid, may be recommended when the former drug has to be used for considerable periods, the total effect of the cocaine being strengthened without a corresponding increase of that substance. Iced solutions of cocaine (five per cent.) appeared to be at least double the strength of solutions at the ordinary temperature. Morphia and iodoform gave modified relief, in extensive ulceration, for several hours. Orthoform, when applied to a (cleansed) laryngeal ulcer, produced, in the great majority of cases, complete relief, beginning in a few minutes and lasting several hours. No toxic symptoms have been observed. The drug appears to possess decided advantages over cocaine in ulcerations of the upper air-passages owing to its anæsthetic power and prolonged action not being coupled with a perceptible degree of toxicity—an advantage of some moment in regions where a drug becomes quickly absorbed. Guiacol (with or without menthol) has well-known sedative and antiseptic properties in mild degrees of ulceration. Eucaine (A) is weaker and less toxic than cocaine, but, in the author's opinion, its principle indication appears to be when there is an idiosyncracy debarring the employment of cocaine. Solutions of paramonochlorphenol in glycerine produce decided anæsthesia after a preliminary period of rather severe smarting; it has also a curative action, in which it resembles submucous injections of guiacol. The latter is contraindicated when there is any considerable amount of ædema.

Of methods other than drugs, there may be considered the prone position, recommended by Wolfenden, to be adopted in taking nourishment; the imbibition of semi-solids; the œsophageal tube; rectal feeding; and lastly, surgical measures. The author prefers rectal feeding, in exceptionally severe dysphagia, to the œsophageal tube, owing to the distress and disturbance to the parts caused by its passage. He has had no experience of curettement, arytenoidetomy, or epiglotdectomy, for the relief of painful deglutition, because he has not yet encountered a case of dysphagia, uncontrollable by other measures, in advanced phthisis, in which the state of the lungs and the general condition of the patient was such as to permit the consideration that surgical interference would be successful, or even justifiable.

Mr. MACLEOD YEARSLEY. *The Thyroid Treatment of Middle Ear Disease.*

After some preliminary remarks upon the sources of error in all clinical investigations of drugs, and the necessity for a large series of

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carefully investigated cases before any conclusions could be drawn, the author reviewed briefly the work that had been published by Brühl, Vulpius, Eitelburg, and Mapurgo. He then gave the results which he had arrived at by the careful treatment, after the manner of Brühl, of twenty-one cases. Of these four were males, seventeen were females. The ages varied from nineteen to sixty-two, the duration of disease from one to twenty-four years. There were fifteen cases of sclerosis, three of middle ear catarrh with ossicular anchylosis, and three of ossicular anchylosis following suppurative disease. Nearly all the cases had already been treated in other ways. In no single case did any benefit result from the thyroid, although several cases benefitted by being treated by other methods. Details were given of several cases, special attention being paid to ossicular anchylosis, since Brühl had suggested that the thyroid gland preparations influence adhesions in the middle ear by the iodine in them, iodine being a "superior resorbent for pathological connective tissue." Two of the cases of ossicular anchylosis from old suppurative otitis media were improved after by ossiculectomy. One case of myxœdema, the subject of chronic middle ear catarrh, who had been taking thyroid for two years, was getting worse until treated by ordinary methods.

In conclusion, Mr. Yearsley stated that he had carried out the treatment with a perfectly unbiassed mind. He thought that in all such investigations of drug action the negative results ought to be published equally with those which were positive. In no single case had any good results been due to the administration of thyroid, and his opinion was distinctly adverse to the treatment.

SECTION OF SURGERY.

Mr. EDMUND OWEN. *The Operative Treatment of Cleft Palate.*

The observations arranged themselves under three headings :—

1. Before the operation.
2. The operation.
3. After the operation.

1. *Before the Operation.*—The operation not being one of immediate urgency, the surgeon can make preparations for it which will add greatly to the prospects of success.

Thus, if the child is liable to diarrhœa, cough, or vomiting, attention must be directed towards obtaining the general improvement in that respect.

If the tongue is coated, a change of air and of diet should be ordered, and the child put upon a course of rhubarb and soda mixture. Every carious tooth should be extracted, or cleaned and filled, and, to diminish to the utmost the risk of local infection from pathogenic micro-organisms, the mouth and gums should be daily washed with boracic lotion.

With regard to the important matter of the presence of pharyngeal adenoids and of enlarged tonsils, it has recently been advised that the operation upon the palate should be done first, but I do not regard such advice as sound.

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The child has hitherto been in the habit of breathing through a wide palatine cleft, and if this is suddenly closed by operation, provision should first have been made for securing a passage for the air as free as possible. It is better that the surgeon should amputate enlarged tonsils at least ten days before dealing with the palate, and if on doing so he cuts across a septic or tuberculous focus, as often happens, he had better wait a little longer still before dealing with the palate.

Just before the operation upon the cleft palate the nurse gives a beef tea enema with a little brandy.

2. *The Operation.*—Some specimens of modified Smith's gags were shown; the modification consisting in substituting for the roughened plates which took their bearings from the teeth, bars studded with two short spikes, which fitted into the crevices between the teeth, or embedded themselves harmlessly in the gum. This modification spared the surgeon the annoyance caused by the slipping of the gag. The gags are made by Messrs. Weiss, of Oxford Street, in three different sizes.

The child being brought up to the end of the table, its head is allowed to hang back, so that the blood may have but slight chance of finding its way into the larynx. Mr. Owen was satisfied that this is the best position for the operation, and he spoke having had ample experience of the old plan of letting the head lie flat or having it slightly raised.

The anæsthetic used is chloroform, but it was never advisable that the child should be too deeply under its influence. It surely must be an anxious time for the anæsthetist when the operator keeps on insisting that the child is not sufficiently comatose. It was far better that the child should now and then show signs of "coming round" than that it should be over-narcotised.

When the anæsthetic is given, a strong suture is passed through the tip of the tongue, to pull it out from beneath the plate of the gag.

As soon as the edges of the cleft have been denuded, an incision is made along the inner side of the alveolar process, and as this is apt to be followed by a good deal of bleeding, it was well to pause here for a few moments and make firm pressure with a sponge, so as to keep the bleeding under control. Then the raspatory is introduced, and the muco-periosteal flaps are raised. But, as a rule, they cannot be sutured until the alveolar incisions have been prolonged into the soft palate. These incisions traverse the attachments of the levator and tensor palati, as well as of the palato-pharyngeus. The attachment of the aponeurosis of the velum to the hard palate is divided with curved scissors. For the sutures silver wire is used, and they are inserted by a modification of Smith's needle.

A point of great practical importance is to have the lateral incisions made very freely, and when the cleft is closed they, together, may seem to be as wide as was the original cleft.

3. *After the Operation.*—Probably the child will vomit when he is "coming round," and if he does this just before he is moved from the table so much the better. The act of vomiting does not interfere with the line of suturing, though, of course, if vomiting persists it may be prejudicial.

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As regards feeding, the best thing is home-made beef jelly ; milk is more likely to cause difficulty in swallowing, or to set up vomiting. Home-made beef jelly slips down easily ; it is of high nutritive value, and it is easily absorbed. Meat extracts and essences should be avoided.

As soon as possible after the operation the child should be daily taken out of the house, for fresh air is an excellent tonic.

Whether a boracic mouth spray is used or not, a case every now and then goes wrong after operation. The child looks ill, his temperature goes up a degree or two, his tongue is coated, his breath is foul, the line of the palatine suture becomes swollen and unhealthy, and a thick, stringy, muco-purulent discharge collects about the roof of the mouth. These appearances indicate that staphylococci have taken possession of the damaged tissues, and that, undergoing luxuriant cultivation, they are spoiling or completely wrecking the surgeon's handiwork. He, poor man, is helpless in the matter. If he is emotional he may sit down and cry.

Mr. Owen had at that time a case of this sort in the Children's Hospital. It was in a girl with a complete cleft of the soft and hard palate. Mr. Templeton took a cultivation from it on the seventh day, and found the gelatine completely liquified in less than thirty-six hours by vigorous staphylococci.

A fortnight after the original operation, when the edges of the cleft had begun to look clean, the child was again put under chloroform, and the marginal granulations having been freshened up, the edges of the flaps were brought together once more, and secured by wire sutures inserted wide of the cleft. The case has done extremely well after this supplemental operation, and it seems to promise as good a result as if the edges had adhered by primary union. This was the chief point in Mr. Owen's paper, and he regarded it as one of great practical importance. There is probably no factor so prejudicial to prompt union after staphylorraphy as septic infection, but after a child has undergone this infection, one would probably be right in concluding that he could not undergo a second attack ; that he has acquired by it a complete immunity. It was strongly advised, therefore, that after complete or partial failure in staphylorraphy a further attempt should be made to close the cleft by adjusting the granulating edges of the flaps.

Mr. LENTHAL CHEATLE. *Specimen of Sarcoma of Middle Ear; Small Spindle Cells.*

In the number of the " British Medical Journal " published on October 16th, 1897, Dr. Barr and Mr. James H. Nicoll reported a case of " malignant tumour of the brain originating in the middle ear." This case, in its history and *post-mortem* appearances, bears a striking resemblance to the following ; in fact, Dr. Barr's account of the character of the tumour's growth will apply equally well to my case.

Female child, aged two and a half years, was admitted into West London Hospital, upon May 4th, 1896. A large, diffuse, fluctuating, red, hot, and painful swelling occupied a position behind the pinna on the left side ; an elliptical, tough, pedunculated polypus filled the external auditory meatus.

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As there was a history of a discharge from the ears for some months past the whole condition appeared to be the result of an infective inflammation, beginning in the middle ear and spreading from there to surrounding parts. Upon opening the post-aural swelling by making the usual curved incision, this view of the case was not altered, for nothing was observed that could not have been caused by an infective inflammatory process, namely, pus, granulation tissue, and ulceration of bone—the last was represented by a communication about the size of a threepenny bit between the abscess cavity and the mastoid antrum. Upon inserting a sharp spoon into this sinus the polypus was forced out of the meatus as if it had been previously separated from its attachments. After enlarging the sinus leading to the antrum the resulting cavity was lightly packed with a strip of cyanide gauze soaked in a mixture of iodoform and 1-2000 solution of perchloride of mercury. I regret to say sections were not made of the polypus.

The local conditions were so much improved by this subsequent treatment that the child left the hospital for the seaside on July 16th.

Dr. Pardoe, who was my house surgeon, saw the case at the hospital again on August 17th, and admitted it as an undoubted sarcoma. When I saw the case the child had facial paralysis of the left side, and behind the auricle a sessile, red, offensive and fungating mass, about the size of a small orange, was pushing it outwards and forwards. The tumour passed subcutaneously downwards into the upper regions of the neck. Optic neuritis was present.

Further operative interference was impossible as the disease was obviously too extensive, so the parts were kept as pure as possible by careful dressing. The external and visible parts of the tumour grew rapidly, and the child died upon October 19th.

At the *post-mortem* examination that was made by myself with the kind permission of Dr. Aldren Turner, the tumour was nearly as big as the child's head, and involved the uppermost of the deep glands of the neck which pushed outwards the overlying structures, and, in parts, actually involving them in the malignant growth. Through an opening in the temporal bone, that involved the mastoid and lower squamous regions and the bony meatus roof of the middle ear, the growth appeared and occupied the middle fossa of the skull as a rounded, lobulated mass, about the size of three chestnuts pressed closely together. Over the intracranial surface of the growth the dura mater was lost, the overlying tempero-sphenoidal lobe was much indented, but did not form any part of the malignant growth.

The lateral sinus and other structures were normal. A microscopical section of the tumour proved it to be a sarcoma, chiefly consisting of small spindle cells.

The references to recorded cases will be found carefully noted at the end of the report of Dr. Barr and Mr. Nicoll, to which allusion has already been made.

The age of the patient precluded the possibility of attaining any data with regard to the hearing or tuning-fork.

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SECTION OF DISEASES OF CHILDREN.

Dr. R. T. HEWLETT. *On Neisser's Diagnostic Stain for the Diphtheria Bacillus.*

A new differential staining method for the diphtheria bacillus was recently published by Neisser.[1] The formula is as follows :—

1. One gramme of methylene blue (Grubler's) is dissolved in twenty cubic centimètres of alcohol (ninety-six per cent.), and mixed with nine hundred and fifty cubic centimètres of distilled water and fifty cubic centimètres of glacial acetic acid.

2. Two grammes of Vesuvin are dissolved in one thousand cubic centimètres of boiling distilled water, and the solution is filtered. Cover-glass specimens prepared from fresh serum cultures are stained in No. 1 for one to three seconds, rinsed in water ; counterstained in No. 2 for three to five seconds, washed in water, dried, and mounted in Canada balsam. So treated the diphtheria bacillus appears as a slender, longish rod, stained brown, and generally containing granules of a deep blue or inky tint. There are usually two granules situated at the poles ; occasionally a third at the middle of the rod.

The method has been tested on about fifty cultures from diphtheritic throats, and the characteristic appearances have been obtained in every case.

A slightly longer treatment than that recommended by Neisser has seemed to yield better results—viz., five seconds in the blue, and ten seconds in the brown. An attempt has been made to extend the method to swabbings or membrane from the throat. With swabbings the results were not very successful, an error of about fourteen per cent. occurring in thirty cases. With fresh membrane, and care being taken to avoid fallacies from the presence of fragments of leptothrix and diplococci, which may simulate the diphtheria bacillus, Neisser's method often affords a rapid means of positive diagnosis. If a negative result be obtained recourse must be had to culture methods.

LARYNGOLOGICAL SOCIETY OF LONDON.

Ordinary Meeting, June 8th, 1898.

HENRY T. BUTLIN, Esq., F.R.C.S., *President, in the Chair.*

Dr. PERMEWEN. *Œsophageal Tumour Removed by Subhyoid Pharyngotomy.*

The author showed a tumour removed from the œsophagus by the above operation. The tumour was of a benign character, and was very easily shelled out and removed. The patient, however, died on the tenth day from septic pneumonia, three days after the removal of the

[1] "Zeitschr. f. Hyg.," XXIV., 1897, p. 448.

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