of their success. They include without exception all the patients under my care who have been operated upon in this way since June 23rd, 1893. The results must be regarded as very encouraging, as in every instance the goal aimed at was attained—namely, the removal of a purulent process in the middle ear and temporal bone, which had for years baffled all other methods of treatment carried out personally by well-known specialists.

Dr. MILLIGAN (Manchester) agreed with Dr. Barr as to the advantage of the burr in the mastoid operation. In the treatment of those cases which depend upon suppurative disease of the tympanic attic he thought that the line of procedure to be adopted should depend upon the exact etiological factors which produce the suppuration. He had found distinct advantage in retaining a permanent mastoid fistula, not only on account of the ease with which the parts might be inspected, but also because he had found in several cases an improvement in the hearing.

A DISCUSSION ON CEREBRAL COMPLICATIONS IN RELATION TO MIDDLE-EAR DISEASE.¹

INTRODUCED BY WILLIAM MACEWEN, M.D., F.R.S.,
Regius Professor of Surgery, University of Glasgow.

IN A Section of the British Medical Association so largely consisting of specialists, it is with diffidence that a surgeon, not only addresses them, but ventures to open a discussion. The cordial invitation, however, of the Council of the Otolological Section, so courteously conveyed by your President, Sir William Dalby, caused me to dismiss the hesitancy, and I accede with pleasure to their request to open a discussion on cerebral complications arising from ear disease.

It is evident that the time at our disposal is insufficient to enable us to review even the pathology of the various forms of intracranial complications arising from middle-ear disease. It is necessary, therefore, to select a few points for discussion, without wishing to restrict others who may deem it advisable to introduce subjects which they consider of equal importance.

An opportunity has been afforded me so recently of expressing my views on abscess of the brain, meningitis, and sigmoid sinus thrombosis—the three main forms of pyogenic intracranial invasion arising from otitis media purulenta, that the Section will kindly take as read the observations which I might otherwise have found necessary to have placed before them to-day upon these subjects.

I will therefore direct your attention to three points. First, to a fallacy in differential localising diagnosis; secondly, to tubercle of the middle ear; and, thirdly, to a few points on bacteriology in aural surgery, especially regarding prophylaxis.

A FALLACY IN DIFFERENTIAL LOCALISING DIAGNOSIS.

When in a case of intracranial abscess a difficulty exists in localising the lesion to the cerebrum or cerebellum, it has been averred that the point can easily be decided by testing the function of the nerves to transmission of sound by bone conduction. It is alleged that if bone conduction be still intact the abscess is in the cerebrum, but if bone conduction be absent then the abscess is cerebellar. This statement is evidently based upon *a priori* reasoning, and it is founded upon at least two fallacies.

First, it is assumed that the path by which pyogenic organisms reach the cerebellum and there produce abscess is by way of the internal ear; and, secondly, it takes for granted that a pyogenic infective process spreading along the auditory nerve and its coverings would abolish the possibility of bone conduction. Facts are, however, decidedly against this hypothesis, and do not bear out the assumptions upon which it is founded. First, cerebellar abscess arises, as a rule, from pyogenic extension from the sigmoid sinus, and not by way of the internal ear, so that the seventh and eighth nerves in the internal ear remain unaffected and capable of performing

their function, and if the mechanism of hearing remains intact the auditory will transmit sounds aerial as well as by bone conduction, notwithstanding the presence of cerebellar abscess.

Secondly, even when the internal ear is the path by which pyogenic intracranial invasion takes place, bone conduction may remain intact. A case illustrating this occurred recently, and came under my care, suffering from purulent leptomeningitis, originating in otitis media purulenta. The patient, whose aerial conduction on the affected side was almost absent, yet retained the function of bone conduction, which seemed almost more acute on the affected ear than on its fellow on the opposite side. At the *post-mortem* examination there was extensive purulent leptomeningitis, chiefly marked in the posterior fossa surrounding the right internal auditory meatus. A marked contrast was presented between the appearances of the seventh and eighth nerves on the right side (the affected side) and the corresponding nerves on the left; while the latter occupied about one-half of the lumen of the internal auditory meatus; the nerves and their pial coverings on the right side were so swollen that they occupied the whole canal, and were even compressed by the enclosing bone, as the portions of the united nerves, previous to entering into the canal, were more swollen than those inside of the canal. A semi-purulent exudation lined the pial sheaths throughout the course of the internal auditory canal, and was seen to pass outward to the cribriform plate on the one hand and into the internal orifice of the aqueductus Fallopii on the other. The pial sheaths of the lesser petrosal nerves were likewise inflamed, though to a less extent. Yet, while this patient lived she still retained the perception of bone conduction equally on both sides. A still further fact against this theory appeared in a case previously published by me,² in which "the hearing was absolutely abolished by aerial and bone conduction, yet there was no abscess in the cerebellum, and there was a superficial one in the cerebrum." Probably in the latter case the abolition of the function of the auditory nerve might have been due to previous chronic processes.

It may therefore be concluded that neither in its presence nor in its absence is bone conduction a reliable sign of localisation between cerebral and cerebellar abscess.

Tubercle of the middle ear in its relation to intracranial lesions has not yet received the attention which it deserves. It is one of the less obtrusive forms of middle-ear disease, spreading slowly, occasioning little pain or uneasiness, and being often accompanied by very slight mucoid discharge. In some cases, also, the disease reaches an advanced stage without occasioning perforation of the membrana tympani, yet its extension to the membranes, especially in children, whose sutures are still open, is always liable to occur. Two such cases have been under my observation. Both died from tuberculous meningitis, and *post-mortem* examination showed that the invasion of the inner membranes was clearly traceable to the tuberculous focus in the middle ear. The invasion was by direct extension through the ununited petro-squamosal suture to the membranes of the middle fossa of the skull. When the inner ear is involved, no doubt the tuberculous invasion proceeds by the pial coverings of the seventh and eighth nerves in the internal auditory canal. The grosser forms of tuberculous otitis media are familiar to every aurist, but they are not so apt to be followed by intracranial tuberculous complications, as in the advanced stages of tuberculous destruction of the middle ear, pyogenic processes are apt to be superimposed, and when this does occur the latter assumes the rôle (to borrow a current phrase) of the "dominant partner." Here, as elsewhere in the body, tuberculous products form excellent cultivation media for pyogenic cocci, which, when they are implanted on them, become vigorous, proliferate rapidly, and disseminate themselves into all the osseous erosions and softened membranes which the tubercle bacilli have been so insidiously and slowly accomplishing. If a breach, however small, can be found in the protective wall of granulation tissue surrounding the softened cerebral membranes, the pyogenic organisms will invade the intracranial cavity. It reminds one of the words which Shakespeare puts into the mouth of Richard II:

¹ In the Section of Otology at the Annual Meeting of the British Medical Association, held in London, July-August, 1895.

² *Pyogenic Diseases of the Brain and Spinal Cord*, p. 285.

For within the hollow crown
That rounds the mortal temple of a king
Keeps Death his court; and there the antic sits.....
Allowing him a breath, a little scene,
.....and, humour'd thus,
Comes at the last, and with a little pin
Bores through his castle-wall, and—farewell, king!

Thus, in at least two ways, tubercle of the middle ear merits our attention in relation to intracranial complications, first, by the fact that tuberculous invasions of the membranes of the brain may occur from the focus in the internal or middle ear; and secondly, tubercle of the middle ear, by its slow disintegrating process, lays bare the intracranial contents, and exposes them to attacks of pyogenic cocci whose potency has been increased by the pabulum which the liquefaction of the tuberculous products afford.

Besides invading the cranial contents, tubercle originating in the middle ear and mastoid antrum and cells may enter the circulation, and when it does it occasionally induces miliary tuberculosis of the lungs or other organ. The possibility of doing so may be judged by the fact that the tuberculous invasion readily passes backward to the sigmoid sinus or inwards to the recesses of the petrous bone, and even occasionally penetrates the jugular fossa. Then, by the softening of the walls of the smaller, and sometimes also of the larger, vessels, the ensuing tuberculous infiltration finds its way into the blood stream. Tubercle surrounding the sigmoid sinus is in my experience of frequent occurrence, and in the *post-mortem* examination of a patient who died from miliary tuberculosis of the lungs, the sigmoid sinus was imbedded in tuberculous granulations, and its anterior wall was softened and infiltrated with tuberculous foci, one of them caseating.

Those invasions of other parts of the body are secondary to the primary focus in the ear, and if tubercle of the mastoid antrum and cells is to be treated, it must be on the same footing as one deals with a localised tuberculous lesion elsewhere. Except by way of improving the hearing in such cases, little good would be done by removing a small portion of granulation tissue from the middle ear. The mastoid process must be freely opened, and the whole of the recesses of the temporal bone exposed, and tubercle fully eradicated.

In contemplating the small area occupied by the middle ear and its annexes, one cannot avoid being struck by the potency of the forces which may be generated within, and which, under suitable conditions, may not only invade the intracranial contents, but within a few days may destroy the function of the whole cerebro-spinal system, or, entering the circulation, induce general toxæmia, pulmonary infarctions, or infective gangrenous pneumonia. The middle ear, and especially the mastoid antrum and cells, while in a state of suppuration, acts as an incubating chamber beautifully arranged for bacteriological work such as the cultivation of the various pyogenic cocci. In it the organisms are supplied with moisture, kept in darkness, afforded abundant pabulum, and are maintained under carefully regulated thermic conditions. The access to some of these chambers is difficult by way of the external auditory meatus, while injections by that route will hardly reach them, and may even do harm by disseminating the elements which one wishes to remove. Some of these cells are filled with cholesteatomatous material, in which cocci are protected and preserved quite proof against the small quantities of antiseptic fluids which may reach it, as these merely play over the surface of the unctuous material without affecting the organisms within.

Besides the organisms contained in this store of solid culture medium others may introduce themselves, or, more probably, be introduced from without. One knows the ease by which organisms may be transferred from one liquid medium to another by merely allowing the point of a slender platinum wire to come in contact for a minute portion of a second with an affected liquid, and then transferring the wire to a sterile medium. So, if it were possible at the present day to find a surgeon who was not scrupulously careful about his examination probe or other instrument, one might expect that the hastily but imperfectly cleansed instrument might convey fresh infection from one diseased ear to another. The probe in this case would be like the bee passing from flower to flower, while its limbs coming accidentally into contact with pollen of one flower, conveys it to and deposits

it upon others. The probe and the bee's limbs are accidental fertilising agents; but while the latter is a beneficent provision for the fertilisation and the possible evolution of varieties in plant form, the action of the former, whatever happiness it may afford the cocci, is apt to destroy the host in which they flourish.

AUTO-INOCULATION.

Besides these sources of infection one can reinfect the tissues of the middle ear by performing in the midst of swarms of pyogenic organisms operations involving a breach of surface in the layer of protective granulations, and thus expose fresh surfaces to the action of pyogenic cocci. Serious intracranial invasion has followed such septic operations. I hope, Sir, I have demonstrated that one who treats ear disease can no longer be looked upon as one whose whole duty is confined to the function of hearing. He has to act upon that small area of the temporal bone so as to prevent destruction of the whole organism. Every aurist therefore must be a bacteriologist, and his operations are each of them, whether he wills it or no, bacteriological experiments.

I will conclude with the following propositions: (a) Infectious diseases extending to the brain and its membranes, or to the organs of the body from the middle ear and its annexes, are preventable. (b) When once these diseases are established in the middle ear, it is necessary to adopt means which will ensure their thorough eradication, and this must be regarded as a prophylactic measure against cerebral invasion. (c) When these diseases have once penetrated into the brain, not only does one require to remove the focus in the brain and that in the ear, but likewise the path between the two, by which infection has travelled.

Dr. LUC (Paris) said: I think the relation of the following case which recently came under my care is likely to prove interesting after Dr. Macewen's communication, as it confirms many of the views expressed in his excellent book with regard to the mode of infection of the cerebellum in the course of chronic suppurations of the ear, and to the possibility of recognising the formation of pus in the cerebellar substance, and treating it surgically. The patient, a mechanic, about 30 years of age, came to consult me at the end of last April, complaining of a scanty discharge from the right ear, and of a dull pain which he localised in the right half of the skull, and especially in the occipital region. The external meatus was so narrow that an otoscopic examination could not possibly give the slightest hint with regard to the condition of the tympanic membrane and of the ossicles, but making use of a Hartmann's cannula, which was pushed deeply through the canal and directed upwards and backwards, I succeeded, by injecting a boric solution through it, in expelling numberless caseous and cholesteatomatous offensive fragments. This induced me to suspect the presence of a considerable mass of the same substance impacted in the cavities of the middle ear, and I proceeded on the following day to the opening of the latter, following exactly Zaufal's method. I found the mastoid antrum transformed into a large cavity extending downwards to the insertion of the sterno-mastoid muscle, and backwards to the lateral sinus, which was exposed to the length of more than 1 centimetre. The ossicles and the oblique part of the upper wall of the auditory canal were completely destroyed. A bony projection of the superior wall of the antrum prevented me from seeing a large perforation of the tegmen, which an exploration by means of a fine probe had enabled me to suspect before the operation. My opening into the bone was a very large one, as you can easily judge from the petrous bone presented to you. I further dissected two cutaneous flaps, which were applied to the edge of the opening in the bone, with a view of creating a permanent fistula behind the ear. As I had detected no extradural abscess, and as the symptoms presented by the patient were not such as to suggest the presence of any intracranial complication, I considered my operation a sufficient one. The wound was dressed with iodoform gauze, and as there was neither fever nor headache, the dressing was only renewed after a lapse of a week. The patient then declared himself ready to resume his work. He came two days later in order to have his dressing changed, but after the lapse of two

days, I heard he was complaining of giddiness and vomiting, and could hardly stand. I found him without fever but still suffering from the above-mentioned symptoms, there being only slight headache. I referred his vertigo and vomiting to an auricular origin, having previously had several opportunities of observing similar symptoms after aural operations. He was admitted into hospital, and two days later, on May 16th, I found him without fever, and with a marked relief of his painful symptoms. I had every hope of a satisfactory result, but four days later, on May 20th, I was informed by my colleague that the patient had died on the night of the 18th. On the morning of the same day he had complained of a severe pain in the right occipital region, and had died after a very short coma without presenting the least thermic elevation. Before making the *post-mortem* examination I stated that, in view of the conditions observed during the operation on the mastoid, the patient had most probably died from an abscess in the right cerebellar region. The necropsy gave the following results: (1) A large perforation of the tegmen tympani; (2) a large perforation of the posterior wall of the antrum in front and internal to the lateral sinus; (3) no thrombosis of the lateral sinus, no extradural abscess; (4) no lesions of the temporo-sphenoidal lobe; (5) right hemisphere of the cerebellum occupied in its anterior third by a very foetid abscess, the middle third filled with green offensive pus, and only apparently normal in its posterior third. Although the presence of a double bony perforation in the case, the one on the tegmen pointing to an abscess in the temporo-sphenoidal lobe, the other close to the lateral sinus, suggesting a cerebellar abscess, might render a diagnosis for a moment doubtful, every symptom noted pointed so unmistakably to the latter, that had I been called in time to express an opinion with regard to a surgical intervention, I should not have hesitated to state my conviction that an abscess existed in the cerebellum. I am indebted to Dr. Bodin for the following bacteriological examination of the pus collected from the cerebellar abscess forty-eight hours after death. First, the microscopic examination showed a few chains of streptococci, cocci, and ordinary bacteria. Secondly, the bacteriological examination by means of cultures gave the following results: (a) Colonies of typical pneumococci (Talamon-Fraenkel) in great number; (b) a few scanty colonies of streptococci; (c) numerous colonies of ordinary bacteria of putrefaction.

Mr. MARMADUKE SHEILD referred to the protective influence of granulations, and the danger of lacerating them whilst the middle ear was swarming with organisms. Sir William Savory had pointed out the protective influence of healthy granulation against pyæmia. He (Mr. Sheild) questioned the statement that all these cases were tuberculous, and asked Professor Macewen what test he would regard as a proof of tubercle. So far as his own experience of extensive operations of the mastoid were concerned, they were disappointing in bringing about a perfect cure, although the patients were greatly improved. It was a general principle in surgery that in operations upon carious bone, if a small focus of disease was left, suppurative processes were perpetuated; and in disease of the middle ear, caries was apt to occur about the base of the petrous bone, which was not removable, as well as in the mastoid. He concluded by asking Professor Macewen as to his treatment of the general purulent meningitis, in association with middle-ear disease: such cases were peculiarly fatal, and he (Mr. Sheild) had hitherto been very unsuccessful in dealing with them.

Dr. MILLIGAN (Manchester) remarked that he had derived very great pleasure and profit from the paper which had just been read by Professor Macewen. With regard to the question of the value of the tuning fork as a means of differential diagnosis between cerebral and cerebellar abscess, he had not found it of any particular value. In a case of cerebellar abscess which he had recently seen, bone conduction was found to be remarkably good. He considered that tuberculous disease of the middle ear was a much more frequent condition than was usually supposed to be the case. He could not say that he had found any one symptom which might be regarded as pathognomonic of tuberculous middle-ear disease. He looked upon the painless asthenic onset of a purulent discharge from the middle ear, especially when accom-

panied by early involvement of the auricular glands and of facial paralysis, as highly suggestive of a tuberculous disease. In such cases he advised the employment of subcutaneous inoculation experiments as the only means of discovering the real nature of the process. He advised also very free removal of the bone and thorough packing of the cavity with pure iodoform powder. The utmost care should be taken to eradicate all tuberculous foci, as cases by no means infrequently occur where general tuberculosis is set up as the result of the presence of a tuberculous mastoiditis. In the treatment of all suppurative conditions of the middle ear, especially where granulations exist, he advocated the most rigid antiseptic treatment. Before the removal of granulations he specially insisted upon a preliminary course of treatment with antiseptics. He looked forward to the time when intracranial complications would become less frequent in consequence of earlier and more scientific treatment of purulent processes within the middle ear.

Dr. P. McBRIDE (Edinburgh) begged to join in the general chorus of approbation which had greeted Professor Macewen's valuable contribution. With regard to the value of the tuning-fork test he was not aware of any very dogmatic statements on the matter in literature. In a paper published some years ago by the speaker, in conjunction with Mr. Miller, the suggestion was thrown out, but in the original work it was not insisted upon as by any means pathognomonic, although by some authors the paper has been quoted in this sense. If it be really so dangerous to wound granulations, the logical outcome would be that the aurist ought to give up the common and beneficial operation of removing the so-called aural polypus. Are we to give up this operation which, through many years, has proved itself both useful and beneficial? If the speaker understood Professor Macewen correctly, and if he had not misinterpreted his great work, he advocated operating upon all obstinate cases of middle-ear suppuration through the mastoid. Dr. McBride's own experience with regard both to cases in which he himself had operated, and those which he had seen treated by surgeons, might be shortly stated as follows: (1) In recent cases a rapid and permanent cure often results. (2) In old-standing cases, although an absolute cure occasionally results, more frequently only more or less temporary benefit ensues. The discharge may be reduced to a minimum or even disappear for a time, but very often it gradually returns; therefore Dr. McBride believed that one was not justified at present in holding out definite hopes of cure in this class of cases, and therefore he hesitated to recommend operative interference unless symptoms other than discharge are present as well.

Professor URBAN PRITCHARD said that at a meeting of the British Medical Association at Leeds, Professor Macewen gave otologists a kindly scolding for not more emphatically insisting on all patients with otorrhœa being thoroughly treated. He had transferred this scolding from himself to his patients with very good results; that is to say, on first seeing such a patient he gave him a good-tempered scolding; this made him carry out the directions much more faithfully, and hence with better results. Following up the remarks on antiseptics, Dr. Pritchard said he wanted to insist upon the dangerous practice of syringing with plain warm water in otorrhœa. In removing granulations from the middle ear, he always syringed previously with carbolic solution, 1 in 40, then removed antiseptically, and finally treated by again syringing with 1 in 40, and packing with double cyanide gauze. The gauze is changed once a day for four or five days, without syringing. This yielded excellent results, and reduced the danger of the infection of the deeper parts to a minimum. In cases of operating for intracranial disease, he (Dr. Pritchard) would like to express his opinion that the antrum and mastoid process should never be neglected; in fact, he considered we should begin by opening these cavities first.

Dr. DUNDAS GRANT, as a careful student of Professor Macewen's classical work, had endeavoured to make use of the burr but had failed to make any impression with the instrument at his disposal, and had been obliged to resort to gouge and mallet. He determined to procure such burrs as Professor Macewen recommended. The description of Dr. Luc's case was identical with that of one under Dr. Grant's care. The

symptoms suggested an intracranial abscess and the situation of the carious disease pointed to the temporo-sphenoidal lobe as the probable site. The mastoid was then opened, the carious opening in the tegmen enlarged outwards, and some extradural pus removed. Exploration of the temporo-sphenoidal lobe revealed no pus but a large quantity of ventricular fluid escaped and the patient became much less drowsy. Next day he seemed so much better that operation on the cerebellum was considered uncalled for. A few hours later Dr. Grant again visited him with a view to the consideration of the necessity for operation, but was met with the report that the patient had a few minutes before been attacked with difficulty in breathing and had suddenly died. On *post-mortem* examination there was found an abscess in the corresponding lobe of the cerebellum in contact with a minute carious perforation in the posterior surface of the petrous bone, internal to the sigmoid sinus, whereas the very large carious aperture in the tegmen communicated with no disease of the temporo-sphenoidal lobe. He therefore insisted on the danger of delay in operating on suspected cerebellar abscess, and quoted the experience of neurologists that death in cases of cerebellar disease of any kind was very frequently sudden. In cases of chronic suppuration—apart from severe attacks of pain—even when not yielding to other methods of treatment, extraordinarily favourable effects were obtained by an energetic use of the alcohol treatment, a method combining bactericidal and dehydrating effects.

Mr. ROBERT H. WOODS (Dublin) thought an aurist should not merely content himself with the examination and medical treatment of ear diseases, but should be capable of carrying out surgical procedures where indicated, even to the extent of treating intracranial complications. He then showed specimens from two patients on whom he had operated for intracranial abscess. The first case, one of cerebellar abscess, occurred in a girl aged 20, who while suffering from chronic purulent otitis media developed symptoms of right lateral sinus thrombosis. The mastoid process was opened, the middle ear cleared out, the thrombosed lateral sinus laid bare, and a cerebellar abscess evacuated. The internal jugular vein was ligatured in the neck, and the clot removed. She rallied for some days, but finally died of asthenia twelve days after operation. The second specimen was taken from a man aged 33, who had been sent into hospital as a case of fever, and who had symptoms of extradural abscess. He was operated on, and a large extra- and intradural abscess in the middle cranial fossa evacuated, the dura mater having been eroded to the size of a florin. A temporo-sphenoidal abscess was also opened and drained. He never rallied, and died seven days after operation, when it was found that in addition to the conditions diagnosed during life he had diffuse purulent leptomeningitis, and that the ventricles were filled with pus.

Dr. THOMAS BARR (Glasgow) referred to the importance of the middle ear as a source of tubercle, which he pointed out for the first time at the Otological Congress in London, 1881. The subsequent history of events has confirmed the opinion expressed at that time. In regard to granulation tissue and polypi, Dr. Barr had been in the habit of using antiseptic remedies before the instrumental treatment of the growth. This is a precaution of great importance, and likely to avert serious intracranial complications, which have probably at times followed their removal. The treatment of purulent disease of the middle ear by operation on the mastoid, which has resisted all other methods, had been found, in his experience, very satisfactory. Of eight cases operated on, six proved perfectly successful, and the other two showed only the slightest trace of secretion. The use of the dental burr is of the greatest value in securing success, but it is essential that the burr should be good.

Mr. JAMES BLACK referred to the use of alcoholic instillation as a subsequent treatment to the removal of granulations, and as a means of attaining a partial asepsis.

Mr. BALLANCE pointed out the importance of an early diagnosis of tubercle in aural disease, and the necessity of keeping up thorough and prolonged drainage through the mastoid.

Dr. ROBERTSON agreed as to the great importance of free drainage and asepsis. He advocated the use of a lead stylet to be worn constantly in the mastoid wound; he had also

found the dry treatment, with or without iodoform, more satisfactory than syringing with antiseptic lotions, provided all the necrotic tissue had been removed.

The PRESIDENT (Sir William Dalby) drew attention to the great value of clinical observation in separating cases of general meningitis from cerebral abscess. The defensive operation of opening the mastoid cells, making a free drainage through the tympanic cavity, and removing whatever bone was carious should be employed under the several conditions which were discussed. These included imperfect exit for pus from tympanic cavity due to bone granulation, polypus, exostosis, or hyperostosis. Especially if there were head pain or giddiness this surgical proceeding became imperative.

Professor MACCOWEN, in reply to some of the points raised during the discussion, said that the symptoms of cerebellar abscess would depend upon the level of the pressure. It was the duty of the surgeon to operate even if the case were apparently hopeless, as he himself had seen some cases recover which had appeared very unfavourable. It was useless to attempt to eradicate tubercle by means of the syringe; if the disease was confined to the middle ear and mastoid the case could be cured by operating, but if the internal ear or the petrous portion of the bone were affected, it would be impossible to cure it. It must be recognised that suppuration would continue; it was therefore important to keep open the surface drainage. He considered that there was a certain amount of danger in syringing out cavities; he preferred if possible to keep them dry. Disease of the middle ear should be treated on ordinary surgical lines, all foci being carefully removed, and care being taken to have perfect antiseptics. He believed that the burr was much more effectual than the mallet and chisel for mastoid operation.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, ETC.

UNIFORM INCOMPLETE INFLATION OF BOTH LUNGS.

ON October 17th I was called upon by the coroner for this district to make a *post-mortem* examination of the body of a child, aged 3 days, who had died suddenly. The body proved to be that of a female child, plump, and weighing, I should think, about 10 lbs. The face was decidedly cyanosed, the body not markedly so. The umbilical cord was dried up, but had not begun to separate.

On opening the head I found the larger veins of the meninges engorged with blood, but there was no network of small vessels and capillaries as seen in congestion. The brain and appendages were otherwise normal.

On opening the chest it was seen that the lungs were not fully inflated, the edges only being in view, and the anterior portion of the chest cavity between the vertical nipple lines was occupied by the thymus gland and pericardium only. The lungs were dark red in colour throughout, and very much like liver in consistence and appearance. No crepitation could be elicited anywhere. They were, I should judge, of about one-third the natural bulk, and very nearly of the same specific gravity as water, barely floating; all portions of the lungs behaved in the same way. Both main bronchi contained much frothy mucus. The respiratory passages were otherwise normal.

The greater veins on the surface of the heart were engorged and prominent like the meningeal veins. There were no sub-pericardial petechiæ. The right side of the heart was full of abnormally fluid blood. The ductus arteriosus was patent and not greatly diminished, and the foramen ovale was almost closed. The valves were in their normal condition, and the heart seemed otherwise healthy. The stomach was distended with mucus, evidently from the respiratory passages, in which a few small white flakes of what might have been milk were seen. The mucous membrane was normal, as were the rest of the viscera.

According to the evidence the child was seen alive with its mother at 10.45 A.M.; at 11 A.M. a neighbour came to see the mother, and chatted with her for twenty minutes, then