SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY.

President—J. S. FRASER, F.R.C.S.E.

June 1 and 2, 1928.

The Pathology of Otosclerosis.—OTTO MAYER, M.D., Vienna.

A Working Hypothesis for Research in Otosclerosis.—A. LOWNDES YATES, M.D. The Papers are published in the *Journal of Laryngology and Otology*, vol. xliii., December 1928, pp. 843, 852.

DISCUSSION.

Dr ALBERT A. GRAY said it was interesting that Professor Mayer held the view that absorption of bone in otosclerosis took place by means of osteoclasts, since Manasse was of the opinion that osteoclasts took no part in the absorption; he thought that the absorption of bone was by simple pressure. He (the speaker) agreed with Professor Mayer that osteoclasts played a part in the formation; some of his own specimens showed osteoclasts absorbing the bone.

He agreed with almost everything Professor Mayer had said. For instance, he himself also thought that otosclerosis was not an inflammatory condition. It was, in his view, a degenerative process in the organ of hearing as a whole, and that, for this condition to result, the tendency towards that process must be present in the individual. He did not think the affection was hereditary in every case.

Another important point which this demonstration brought out was that the changes in the bone were not the same in every case. Many thought there was absorption of a certain amount of bone and then a deposition of excess bone in its place, but that was not always so. In some cases no new bone was deposited, there was only absorption. In others, the bone deposited was less than that absorbed. In this respect the difficulty arose in attempting to associate the condition with osteitis deformans. In the latter disease an excessive deposition always followed absorption.

He also agreed with Professor Mayer that otosclerosis was a disease affecting the whole auditory apparatus, as he (the speaker) stated in his book in 1917. Diminished secretion of wax in the external auditory meatus and the striking diminution in the sensitiveness of the tympanic membrane and the skin lining the external auditory meatus could not be accounted for by changes in a minute area of bone in the capsule of the labyrinth. He went further than Professor Mayer and maintained that even the auditory nerve connections into the cortex might be affected. Future research work should include not only the temporal bone, but also the auditory nerve tracts and the brain cortex. He hoped the British National Committee which was working on this subject would ask not only for the

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temporal bones, but also the brains of those who during life had suffered from this condition.

Otosclerosis was confessedly a mystery, and, like all mysteries, it possessed a great fascination.

Mr G. J. JENKINS pointed out that in osteitis deformans there was, in some cases, deafness of the middle-ear type, whereas in others it was of the internal ear type. He had microscopically examined four specimens of osteitis deformans, and in none did he find any of the bone changes characteristic of otosclerosis. He did not think these two bone diseases were identical. He thought osteitis deformans caused the clinical aspects of "otosclerosis" by involving the same structures in a similar manner as did the other bone disease of otosclerosis.

Mr SOMERVILLE HASTINGS said the two papers clearly illustrated the importance of having clearly defined definitions before considering the pathological conditions. Dr Lowndes Yates defined otosclerosis as middle-ear deafness with Bezold's triad of symptoms; Professor Mayer defined it as a pathological condition showing changes in the capsule of the internal ear. That this definition could not correspond with that of Dr Lowndes Yates was shown by his statement that in many cases otosclerosis was associated with deaf-mutism, which could not possibly show Bezold's triad.

From the clinical side he was interested in Dr Lowndes Yates's paper, as he believed he had himself seen such cases, which he would describe as typical middle-ear deafness changing to what must be termed otosclerosis.

There was a tendency to conclude that because in otosclerosis no active changes in the middle-ear and no septic focus were to be found, there had not been any such changes; but an inflammatory process could be caused by trouble in one situation which might disappear, but the process might persist. As Professor Mayer had shown, in these cases there was what closely resembled tumour formation, but it was not justifiable to say that this could not be due to inflammatory changes. Enormous hypertrophies resembling tumour formations occurred in the lower jaw, and dental surgeons said these were originated by pathological changes due to unhealthy teeth. He (the speaker) did not see why a similar process should not take place in the capsule of the internal ear.

Dr JAMES ADAM said he knew of three brothers, the youngest aged 46, the eldest 54. All had blue sclera, all had pronounced arcus senilis and were grey-haired, but none had obvious atheroma of the arteries. In the two younger there was definite otosclerosis, and both had had suppurative disease in the middle-ear. The eldest had not had middle-ear disease and his hearing was normal. He had two daughters, neither of whom had suffered from multiple fractures, though all the brothers had had fractures half a dozen times. None of the brothers was five feet in height. All had scoliosis and kyphosis of the spine. The youngest brother had two children, both of whom had had fractures. The eldest of the three was the only one who had plugs of wax in his ears.

Sir JAMES DUNDAS-GRANT said he hoped a diagnosis of otosclerosis would not be expressed rashly, as many held it to be equivalent to a death warrant. He had seen many cases in which the expected progression to stone-deafness did not happen, the condition became

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stationary, and some even seemed to improve. Some of the cases might not have been pure otosclerosis; the same kind of deafness and most of the symptoms of the condition could be produced by catarrhal changes. In the schedule the Eustachian tube condition was omitted. A condition laid down in otosclerosis was that the tubes should be free. If catarrh was present, the case was not one of pure otosclerosis. A hopeless attitude should not be taken up on first seeing the case, and time should often be allowed for trial treatment to have effect before making a pronouncement. He tested after inflation to see whether there was any improvement, and he often placed in the hands of the patient, for self-use, a Politzerising apparatus in which the addition of chloroform vapour caused better penetration. In some cases he had had to postpone and even abandon the diagnosis of otosclerosis. The otosclerotic patient was liable, like everybody else, to catarrhal conditions, which were apt to be neglected. Thirty years ago he saw a patient who had the typical features of otosclerosis. She had married, and had assured him (the speaker) that the birth of her children had had no detrimental effect. Recently he had seen her again, and found her deafness worse. He put her, however, in possession of the inflating instrument to use for herself, and she had now written to say that her friends had noticed an improvement in her hearing.

His own observations agreed with those of Mr Jenkins that the changes seen in osteitis deformans were different from those in otosclerosis. In his (Sir James's) cases there was narrowing of the Eustachian tubes, in one also immobility of the malleus.

Dr J. S. FRASER (Chairman) said he did not think that inflammation was the "be-all and end-all" of otosclerosis, but it could not be entirely left out of account. Mr Richard Muir, of Edinburgh, an expert pathologist, when he examined specimens from his (the speaker's) cases of otosclerosis, had concluded that otosclerosis was a chronic inflammatory affection. In all the cases from which his slides were taken, the patients had suffered from middle-ear disease, and all had demonstrated conditions which, if not otosclerosis, were certainly closely allied to it.

As Professor Mayer had said, otosclerosis was very common. If it were admitted that the six cases of which he showed specimens were suffering from otosclerosis, it was only right to state that he (the President) had examined two hundred cases histologically. He did not think, however, that 3 per cent. of the population had otosclerosis. Dr Albert Gray had put the frequency at 0·5 per cent. of the population. It therefore required a little more than the normal incidence of the disease to explain changes analogous to otosclerosis in six out of two hundred cases examined.

Dr LOWNDES YATES (in reply) said it was important to attack the problem of the etiology of otosclerosis by a study of cases in which the signs fulfilled the accepted clinical definition of the disease, because it was clear that what clinicians called ostosclerosis was a condition not yet sufficiently defined. It seemed to him that cases which fulfilled the present clinical and pathological definition were not necessarily examples of the same disease. He had discussed in his paper cases which fell within the clinical definition.

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Societies' Proceedings

The Use of Temporal Muscle Grafts in Mastoid Operations —HAROLD KISCH, F.R.C.S.—The Paper is published in the *Journal of Laryngology and Otology*, vol. xliii., December 1928, p. 856.

Fat Grafting in Mastoid Surgery—DOUGLAS GUTHRIE, M.D. —An autogenous graft of muscle or fat is frequently used by the general surgeon to fill up a cavity in bone created by excising a diseased area. Apparently this principle has not been adopted to any extent by the aural surgeon in dealing with mastoid cavities. A brief record of personal experience of the method in ten cases (all of children under 8 years) may be of interest. The cases fall under three headings: (1) Mastoid fistula, (2) chronic middle-ear suppuration, (3) acute mastoiditis.

(1) *Two Cases of Mastoid Fistula.*—As the result of a mastoid operation there may be a deep depression behind the ear, or even a small fistula leading to a dry, lined cavity. It is unsightly, difficult to keep clean, and liable to reinfection. The ideal treatment is to excise the fistula by an elliptical incision, dissect up the edges, remove the lining of the cavity, and implant a piece of fat, from the thigh or buttock, just large enough to raise the skin to the desired level.

(2) *Four Cases of Chronic Middle-Ear Suppuration.*—In children the treatment of cases of chronic middle-ear suppuration which do not respond to conservative measures is a difficult problem. The results of zinc ionisation in small children have not been encouraging. As regards the radical mastoid operation, most otologists will agree that this operation should seldom be performed on children under the age of ten, and never on account of chronic discharge alone, apart from cholesteatoma, polypi, etc. The modified radical operation requires long and careful after-treatment and does not always save the hearing. In a series of eight cases (reported in 1925), discharge was arrested in five cases, but deafness followed or persisted in seven cases.

Post-auricular drainage — that is, the performance of a simple (Schwartze) operation and the retention of a drainage track from the aditus to the surface—is tedious, and the aditus and track become readily occluded by granulations.

Probably the best treatment is to leave the tympanum to nature, save for a free enlargement of the perforation, and to deal with the anterior and posterior sources of infection; the anterior by removal of adenoids and applications of argyrol, etc., the posterior by excision (not merely drainage) of antrum and cells, followed by immediate closure of the wound. This method I adopted in ten cases last year. In each case the wound healed by first intention and in six cases the discharge ceased.

In four of the cases obliteration of the cavity was secured by a free

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graft of fat rather than by blood-clot. In three of these cases the discharge ceased.

(3) *Four Cases of Acute Mastoiditis.*—A fat graft was introduced into the bone cavity after operation for acute mastoiditis, in four cases. In two of these there was slight redness and œdema of the wound on the third or fourth day, and the graft was removed. In the other two cases the wound healed by first intention, aural discharge ceased, and the patient returned home in a week. Despite these successes, one hardly felt inclined to continue the use of fat grafting in acute mastoiditis, as the use of bismuth, iodoform and paraffin and closure method gives such excellent results. In twenty-eight operations for acute mastoiditis last year, healing by first intention was secured in twenty-three cases.

Fat grafting in mastoid surgery is an excellent means of reconstruction in cases of mastoid fistula, and a further trial in cases of chronic suppurative otitis in children appears to be justified, but the procedure has no place in the treatment of acute mastoiditis.

DISCUSSION.

Mr HERBERT TILLEY said he was glad to find that Dr Guthrie had had twenty-three out of twenty-eight cases in which there was primary union after immediate closure of the wound in acute mastoid inflammation, a satisfactory result in hospital practice where there was always a great demand on the beds. The method demanded a much shorter time than when one had to wait for the wound to granulate up from the bottom. He had a case last year in which he cleared out the whole of a suppurating mastoid, thoroughly cleansed it, anointed it with bismuth, iodoform and paraffin, and sewed up the wound; this was done on a Thursday afternoon, and he did not touch the wound until the following Tuesday morning. When the dressing was then removed, the wound was dry, and the patient left two days later with almost perfect hearing. He wished the method were tried more frequently. He knew there were theoretical objections to it, but so far he had never seen a fatal case following the procedure. He had had no experience of placing fat in the wound, or of Mr Kisch's operation.

Dr W. S. SYME said he did not see why fat should not be implanted after acute mastoid conditions if the whole of the disease had been removed, and that was the whole crux of the question of immediate closure.

Mr ALEX. R. TWEEDIE said that he was sorry to appear in opposition to the suggestion of filling and closing any septic wound. On one occasion on the removal of a keloid over a mastoid operation wound performed by another surgeon two years previously, he had found the cavity occupied merely with blood-clot, the marks of the gouge still unaltered, and the lateral sinus still exposed with no attempt whatever towards formation of granulation tissue. [Mr Kisch: I do not graft for acute cases, only for chronic.] He asked what advantage was claimed,

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as without grafts and with mere cleansing of the cavity with normal saline solution he expected such mastoid operations to be healed in about two months. He was much interested in Mr Kisch's method of closing the tube by pushing in mucous membrane, and asked if this was invariably successful. As regards Dr Guthrie's suggestion of fat grafting, he gathered that at present this was only suggested, and not urged as a routine treatment.

Mr C. A. S. RIDOUT said that with regard to acute cases, he was closing about two-thirds of the wound; but he shared Mr Tweedie's apprehension with regard to immediate closure of a septic cavity.

Mr T. B. JOBSON said that in these cases the time element was very important; when operation had to be done within from twenty-four to forty-eight hours, one had to leave the wound more open than if one had the case at a later stage. In a case in which mastoiditis had been present for ten or fourteen days, and in which there was a true abscess underlying the incision, closure by first intention was much more likely than in a very recent case. He had tried Mr Tilley's method in late cases in which there was true pus, and there had been excellent healing, and some had been completely dry; but in nearly every recent case the wound had had to be reopened. He regarded it as a question of the development of immunity. When the diseased area was cleared out, the patient overcame the residual sepsis if his blood had developed sufficient immunity.

Mr J. S. FRASER (Chairman) said that most of the remarks in discussion had been dealing with the after-treatment of acute middle-ear suppuration and mastoiditis, but with that the papers read were not concerned; they dealt with the technique (1) of finishing the radical mastoid operation, and (2) the simple or Schwartze operation.

Mr G. J. JENKINS said that he very rarely found it necessary to use a muscle-graft in connection with the radical mastoid operation. When it was necessary he had used the upper part of the sterno-mastoid. Recently, however, he had used temporal muscle in a case in which there had occurred leakage of cerebrospinal fluid after an abscess of the temporal lobe had been opened.

Mr THACKER NEVILLE said he had been using Kahn's skin-flap, which filled the cavity, and plugged the Eustachian tube. After the operation, an incision was made parallel to the posterior incision in the skin, the incision including skin and fat. The flap was then cut at the lower end of the wound. The distal part of the skin which went into the middle ear was pared very thin, so as not to include fat, and this filled up the small cavity if one did not remove the apex of the mastoid, which it was not often necessary to do in chronic mastoid cases. The wound was sutured, and a week later the base of the pedicle-flap was cut; usually a suture was not needed.

Dr JAMES ADAM said he did what Mr Kisch recommended in one case, and in ten days the patient had been sent to a convalescent home. He closed the Eustachian tube by putting in a needle-shaped cautery point at the upper end. He was pleased with the operation and intended to try it again.

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Mr KISCH (in reply) said he wished specially to emphasise the fact that he did not advocate putting a graft into an acute mastoid cavity; to do so would break an important rule of surgery. Free drainage must be provided for acute inflammation. It was not necessary to discuss Mr Tilley's method, as it did not come into his paper.

In answer to Mr Tweedie, he did not always succeed in closing the Eustachian tube, but the method described was, on the whole, very successful, and in most cases he was unable afterwards to blow air through the Eustachian tube into the middle ear. He thought anyone who did many mastoid operations would be able to show some cases which had healed within two months without grafts, but he could himself show twelve consecutive cases operated on by the graft method, which were healed in that time. He was certain healing was much more rapid by using this method than by the granulation or skin graft methods.

Dr GUTHRIE (in reply) said that he would not recommend fat grafting as a routine procedure. In acute mastoiditis he would not recommend it at all, in spite of his two successes. The use of bismuth, iodoform and paraffin, and closure of the wound in acute mastoiditis, gave results which could hardly be surpassed.

He regretted that no one had discussed the difficult cases of chronic middle-ear suppuration in children which resisted conservative treatment. He had secured good results from the ordinary Schwartze operation, with thorough disinfection of the bone cavity. Instead of packing and re-packing until the cavity closed, and instead of permitting the cavity to fill with blood-clot, which might become organised or might not, he introduced sufficient fat to fill the cavity, and he stitched the wound. This experiment had produced a good result in three out of four cases, and after further trial it might prove suitable for regular use in selected cases.

Vasomotor Affections of the Internal Ear—Professor GEORGES PORTMANN, Bordeaux.—The Paper is published in the *Journal of Laryngology and Otology*, vol. xliii., December 1928, p. 860.

Mr G. J. JENKINS said that, in 1914, he had read a paper on vertigo (non-infective), suggesting that some of the symptoms might be due to raised intralabyrinthine pressure, and proposing that an operation should be done to relieve the pressure. He had not practised the operation since then. Later, there was a conjoint discussion at the Society on vertigo, in which he drew attention to the low blood-pressure in certain people as probably being causative of this syndrome. He had never met with labyrinthine symptoms resulting from too high blood-pressure, but these symptoms were often associated with too low blood-pressure for the condition of the blood-vessels of the patient. A colleague suffered from attacks of vertigo, and could produce an attack by having a hot bath. He (Mr Jenkins) saw him once after a hot bath; he was vomiting and had severe vertigo, with occipital headache, tinnitus and some deafness in one ear. While lying flat he appeared to be normal, but the symptoms returned when he sat up. It seemed to him (the speaker) that in this case there was a variation of pressure in a person whose labyrinths were

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not equal. Deafness was greater in one ear than in the other. He knew of a practitioner with blood-pressure, normal to him, of 210 mm. Hg. When his pressure dropped to 180 mm. Hg. he had to go to bed because of nausea, giddiness, headache and tinnitus. That man also had unequal ears. The explanation offered by Professor Portmann was most valuable. Would he also explain how it was that in some of these cases of vertigo, after the attack, the patient heard much better for some time afterwards? His colleague, who had attacks of giddiness regularly, always felt better for a week or two after the attack, and also heard better.

Dr SALISBURY SHARPE said he saw many patients with high blood-pressure who suffered no discomfort and had no symptoms while the pressure was even pathologically high, but suffered from vertigo if the pressure was rapidly or greatly lowered or raised—but especially if it was lowered.

Dr N. H. PIKE asked whether, when hypertension was supposed to be present, it could be relieved by injections of hypertonic saline and if that had been tried. It was valuable in increased intracranial pressure and in cases of tension in the eyeball, and he wondered whether it would be useful in vestibular cases. Because pressure was high in the radial artery, it did not follow that it was increased in small terminal arteries. It was not so in the eye. He had seen cases with high blood-pressure in the radial, but the pressure in the terminal retinal arteries was lower than normal, and it might be so also in the internal ear. Rectal injection of magnesium sulphate might be used.

Sir JAMES DUNDAS-GRANT referred to experiments on rabbits in which both vertebral arteries were plugged and one common carotid artery tied, and therefore only one common carotid was left. The experiments were made in connection with the sympathetic. Stimulation caused contraction, and it was concluded that there was then diminished vascularity of the vestibule. This produced hyposensitiveness of the labyrinth, as shown by lengthening of the time required to induce the caloric reflex (Demetriades and Spiegel, *Journal of Laryngology and Otology*, xxxix., 1924, p. 231). Professor Portmann had said that there was a hypersensitiveness, which was contrary to what the other investigators found. He (the speaker) had performed a similar experiment; instead of blocking up the hole through which the vertebral artery passed, he compressed the vertebral arteries in the suboccipital triangles in the depressions behind the mastoid processes. He could compress one common carotid and compress the two vertebral arteries, and found that these produced the same effect. But even when he only compressed the two vertebral arteries, it took longer to produce the caloric reaction than when the pressure was removed. This procedure, he considered, was of considerable use and easy to carry out.

With regard to hypertension and hypotension there were cases in which the blood-pressure was low, and on giving iodide of potassium the patient was made worse. Lake was the first to suggest ergot or ernutin, which in such cases afforded considerable relief. By testing with bromide and iodide of potassium one could know in which direction to look for relief. In labyrinthine vertigo, *i.e.* from unilateral disease in the internal ear, great relief followed small doses of quinine; it could only be ascribed

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to a direct sedative effect on the vestibular nerve. In unilateral cases the effect was to diminish the excitability on the *sound* side. Often the vertigo was due to there being inequality between the labyrinths of the two sides, as Mr Jenkins had remarked.

Mr A. D. SHARP (Leeds) said there was another type of case in which vertigo and tinnitus were associated with increased blood-pressure, and when means were taken to reduce the blood-pressure there was a relief of the tinnitus.

Mr THACKER NEVILLE said the improvement in tinnitus by the application of atropine to the tympanum had been demonstrated in the previous year, and was interesting in the light of Professor Portmann's work. Was Professor Portmann willing to do double sympathectomy? How did he know which was the hyper- and which the hypo-sensitive ear? Did he rely on the Babinski-Weil test? If both caloric reactions were weak and the turning test did not give a reaction, how would one decide? He (the speaker) had a deaf patient whose caloric reaction was weak, and the turning tests gave no reaction. On undergoing the Babinski-Weil test sometimes he walked to the right, sometimes to the left. How did Professor Portmann account for this variation, and did he recommend double sympathectomy in that case?

Professor PORTMANN (in reply) said he had not always found, in his experiments, a direct relation between the general blood-pressure and the ear-trouble. The accounts of the different experiments made could be seen in the respective papers. Vertigo might be present either with high blood-pressure or low blood-pressure, as for instance after a severe hæmorrhage. He always saw hyper-excitability of the vestibular apparatus during a warm bath, and yet the blood-pressure was going down.

He had read Sir James Dundas-Grant's accounts of the results of compression of the carotid and vertebral arteries; sometimes there was hypo- and sometimes hyper-tension, and one could not judge which it would be. It was not a sure method. One must always remember the anatomical variation in different individuals. Quinine, he considered, acted as a vasomotor drug. He had injected atropin and adrenalin into rabbits and into human beings, and in many cases they produced a modification of the general circulation, but there were numerous sources of error. A modification of the condition of equilibrium in the sympathetic system could produce opposite syndromes in a few minutes.

The Influenzal Ear—W. SALISBURY SHARPE, M.D.—The Paper is published in the *Journal of Laryngology and Otology*, vol. xliii., December 1928, p. 867.

DISCUSSION.

Mr G. J. JENKINS said that at the discussion on otitis externa hæmorrhagica the conclusion was that after influenza there were seen some of the mildest affections of the ear, and also some of the most disastrous. The otitis externa hæmorrhagica often seen during influenza was sometimes confined to the external auditory meatus; the tympanic membrane might be perfect; hearing normal and no signs of middle-ear affection. The

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patient might suffer from labyrinthine symptoms without obvious middle-ear symptoms. It was not necessary that there should be actual hæmorrhages present. In some cases of influenzal ear there might be much pain, giddiness, and headache, persisting over some weeks, without any sign of hæmorrhage or of accumulation of fluid in the middle-ear. Therefore the condition had a very broad symptomatology, and Dr Salisbury Sharpe had done good service by calling attention to it.

Mr RITCHIE RODGER said he had been through several epidemics of influenza and what had struck him was the varying severity of these epidemics in regard to the otitic symptoms. In the winter of 1926 there were, in the north, two distinct epidemics, in December and March, and in these there were different types of cases. He, like Dr Sharpe, made a practice of carrying out early paracentesis in all the middle-ear cases, and in the December epidemic he did this twenty times, and in only two of the cases was the mastoid operation needed. The next epidemic was more generalised and severe, and he did paracentesis thirty-two times, and two out of every three cases required the mastoid operation. That might mean the presence of an organism of different virulence in the two epidemics.

Dr Salisbury Sharpe had been fortunate in the case in which there was a great gush of pus, as one wondered where such a quantity of pus came from; there must have been a collection of pus in the aditus and antrum, as well as in the middle ear, where there was a very small cavity. He had been in the habit of looking upon a large amount of pus as one of the indications of probable mastoid involvement.

Mr HERBERT TILLEY asked whether other members adopted a practice which he employed: viz., after incising the membrane he applied an exhaust speculum until normal blood followed the purulent discharge through the incision. His cases had seemed to do better than when the drum was incised, and the septic contents were left to find their own way through the incision.

Sir JAMES DUNDAS-GRANT said that most alarming appearances were sometimes seen in cases of myringitis hæmorrhagica. One could eliminate the possibility of severe inflammation in the middle ear, when there was still good hearing.

Politzer in his text-book (5th German ed., p. 443) mentioned a type of influenzal mastoiditis in which, when the mastoid was opened, there was a large cavity, and if that was cleared out and drained the discharge from the ear ceased, and there was not even the need for opening the antrum. One would like to ascertain the condition of the antrum. He thought the great flow of pus mentioned by Dr Salisbury Sharpe must have been due to suppuration in the mastoid cells.

Bezold said that mastoid processes having one large cavity were more liable to suppurate than those with many septa, as the latter had a larger area of bacterium-killing mucous membrane.

Mr A. D. SHARP (Leeds) said there was a type of case he saw from time to time which appeared to be a sequel of influenza. Earache and tinnitus were complained of. On examination, one or two bright hæmorrhagic spots the size of a pin-head were present on the tympanic membrane.

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Dr SALISBURY SHARPE (in reply) said that one point he specially stressed had not been dealt with in the comments, namely, the fact that the hæmorrhagic myringitis was pathognomonic of influenza. When cases were brought to him with the petechiæ still present he always attributed the condition to influenza.

He was sorry to hear Mr Ritchie Rodger speak of the large number of mastoid operations he had had to do after free myringotomy. The only explanation of that, he (Dr Sharpe) thought, was not the virulence of the organism, but the fact that the myringotomy was not done early enough.

Sudden Bilateral Destruction of Cochlear and Vestibular Senses of Non-Specific Origin—T. A. CLARKE, M.B. (introduced by Mr CLEMINSON).—Female, aged 36, was well until four months ago, except for occasional slight indefinite attacks of giddiness during preceding six months. Four months ago had an attack, lasting three days, of vomiting, with giddiness and tinnitus. A fortnight later had a similar attack, after which she noticed slight deafness in the left ear.

Three months ago she woke in the night completely deaf, saying in a loud voice: "I am deaf and dumb." No increase in giddiness then occurred.

Since then she has remained completely deaf; giddiness has diminished and strength is returning.

On Examination (2nd May 1928).—Intelligent patient; apparently completely deaf; weak and unsteady. Tympanic membranes normal; no sound heard by air or bone conduction; galvanic tests elicit no response. Very slight spontaneous horizontal nystagmus to both sides; no response to rotational, caloric or galvanic tests. Patient is unsteady, but no definite Rombergism; no alterations in tone; no asynergy; Ocular movements and fundi are normal. Cerebrospinal fluid and blood are normal. Wassermann reaction (blood and cerebrospinal fluid) negative.

Mr J. S. FRASER (Chairman) said that, in spite of negative response to the caloric and galvanic tests, he thought this condition might be due to hysteria, and he believed that the patient would recover her hearing. The members would be interested in a further report.

Mr A. R. TWEEDIE said he agreed with the chairman. He had only been able to examine the patient for a few moments, but the impression he obtained was that hysteria could not be excluded.

Dr LOWNDES YATES said he had found that the patient could hear a tuning-fork placed on the mastoid process. He had then produced another tuning-fork and placed one fork on the mastoid and the other close to the auditory meatus. He had repeated these tests, having previously stopped one of the forks, and the patient said that she heard the tuning-fork when the only fork vibrating was being heard by air. He regarded this as definite evidence that there was a hysterical element in the case.

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Sir JAMES DUNDAS-GRANT said one test of the genuineness of deafness was the acquisition of spontaneous lip-reading. The patient made no attempt at lip-reading.

Mr THACKER NEVILLE said that during the late war a test applied in doubtful cases was to syringe the ear out with ice-cold water until the patient vomited. In such cases the hearing returned if the deafness was functional.

Mr G. J. JENKINS said this was an important case. It was difficult to understand a negative caloric reaction in a case of hysteria, and he was inclined to think that this was not hysteria but that there was something wrong with the caloric test.

Double Acute Mastoiditis, the Post-Operative Symptoms of which Simulated Lateral Sinus Thrombosis—H. NORMAN BARNETT, F.R.C.S.—Schoolboy, aged 8, was admitted to hospital on 5th January 1928, suffering from middle-ear deafness, which had existed since the previous September, and was due to infection from enlarged septic tonsils and adenoids. His father died of consumption contracted in the war, and there was a question as to a brother also having had the same disease. The patient had measles in early childhood.

Tonsillectomy and adenectomy were performed on 14th January, and he was discharged on 16th January. He was readmitted upon the 29th suffering from acute double mastoiditis, and was operated on the same night. Pus was found under pressure on both sides; the bone was extensively diseased and of a cellular type; all cells were removed, including the tip cell; the middle-ear was washed out and a great deal of débris brought away. The wound was then treated with bismuth, iodoform and paraffin, and stitched up. *Both lateral sinuses were abnormally situated and were uncovered in the course of operation. The surface of the sinuses was slightly upbraided and rather grey in colour.*

On the following morning the temperature had fallen from 103.6° F. to 101° F., but it rose again at night and became somewhat oscillating. The boy seemed to be going on favourably for the first twenty-four hours, then gradually became worse. The pulse-rate was irregular and a good deal higher than normal; his general condition did not appear satisfactory; it looked as if lateral sinus thrombosis had developed; the difficulty about this case was that it was bilateral and there was no indication which side, if either, was affected.

On 2nd February the urine, which had been normal, became dark red in colour and was found to contain blood and casts. On 3rd February temperature rose to 106° F., and the boy became desperately ill.

In consultation with the physicians the case was reviewed; I could

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see no certain indication for operation on the lateral sinuses since we did not know which side to explore, and I felt that it was not a lateral sinus condition but rather general posioning. He was found, then, to have definite acute nephritis. The urine at this time became very scanty—almost suppressed. On 4th February temperature suddenly came down, but again rose, and the left lung became affected. The physicians' report on the condition was that there was a large area of consolidation, and owing to the suddenness of the onset and the area involved they thought that this was a condition of embolism rather than pneumonia.

Gradual improvement set in under careful nursing and treatment about 18th February, and the boy, though very weak, held his own, and very slowly began to improve. He was finally discharged on 12th April, and is present at this meeting entirely recovered from all effects of his illness with both mastoids and middle ears soundly healed and functioning perfectly, and general health good.

He developed pain and limited movement in the left leg about 8th February, and this persisted for some time and was accompanied by wasting. This leg is still slightly wasted.

The case strongly resembled lateral sinus thrombosis, as indicated by the temperature chart, but the course of events rather showed that there was first of all an infection of the kidney producing acute nephritis, carried by the blood stream from the original site of infection in the mastoid, and secondarily an infection of the lung, probably by an infected embolism, though from what site this embolism came is not clear.

Mr HERBERT TILLEY said that eighteen months ago he had referred to this type of case, which was first described by Körner, and afterwards, in his lectures on "Diseases of the Nose and Ear," by the late Professor Luc of Paris, *i.e.*, cases in which there were symptoms of general septicæmia or pyæmia following a primary but fugitive infection of the middle ear. The case to which he (the speaker) had referred was that of a boy who had acute middle-ear infection with mastoid symptoms. As far as could be seen, these cleared up without the mastoid being opened. He saw the boy three weeks after the infection when the tympanic membrane was normal and hearing perfect; there was neither pain nor any other local symptom of mastoid involvement, and it did not seem justifiable to open the mastoid and search for any residue of the primary infection. But the boy had extreme pain over the pubis and under one trochanter (the latter had been mentioned by Luc in two of his cases); there was an evening rise of temperature suggestive of lateral sinus infection, and shortly afterwards he had pulmonary symptoms indicative of pleural effusion. Septic emboli afterwards appeared in various parts of the body, and he (the speaker) advised against operation. The boy died and there was no post-mortem examination. Mr Richard Lake had written an article bearing on this subject and entitled it "aural bacteriæmia." In the speaker's own case the

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primary ear symptoms seem to have cleared up, while the more generalised infection declared itself.

Mr J. S. FRASER (Chairman) asked whether blood-cultures were made in these cases. In aural bacteriæmia the blood-cultures were often positive, more frequently so than in definite septic thrombosis. There was always in these cases the question of thrombosis of the jugular bulb. He would like Mr Donald Watson to relate his recent experience in this matter.

Mr DONALD WATSON said he had had an ordinary mastoid case. The child had recovered from the operation, but ten days afterwards there had been rises of temperature, without rigors, running up to 103° F., and some sweating. He (the speaker) had tried the treatment for puerperal septicæmia with intramuscular quinine and anti-streptococcal serum, but it had not done any good. Six weeks later he had ligated the internal jugular vein. After cutting the vein he looked at the upper end, and there was a little thrombus filling the upper end of the jugular vein, extending from above. The child had no more rises of temperature and is now completely recovered. He believed that nearly all cases of supposed aural bacteriæmia were instances of jugular thrombosis.

Dr JAMES ADAM said that six years ago he had had a pneumococcal epidemic in his wards in the Royal Infirmary, Glasgow, and five deaths had occurred from pneumococcal meningitis. One case had been like Mr Tilley's, and the patient had recovered with impaired power in the leg. A patient with cerebellar abscess, operated on six weeks before the epidemic began and regarded as cured, suddenly became worse and died. A brother of this patient who had been visiting him was admitted with pneumonia. A mastoid case, which was nearly well, was sent home when the wards were cleared, and two days later had a pneumococcal sore throat from which he recovered. The temperatures of every patient in the male and female wards during the epidemic were raised, except that of one child. This child, before the epidemic began, had been several weeks in the ward with pneumococcal pus streaming from eyes, nose and ears. No treatment did any good until pneumococcal phylacogen was given: then all the symptoms cleared up except those in the ears. Mastoid operations were performed. One ear had healed, but the other had not. Several months after the wards had been cleared this child had been readmitted on account of a discharging ear, and within forty-eight hours every temperature in the ward had been raised.

Mr NORMAN BARNETT (in reply) said a blood-culture had not been made. The best results had been achieved by saline injections. He had no fixed rule as to stitching up or draining; a number of cases did exceedingly well with bismuth, iodoform and paraffin and stitching, and healed by first intention; others required draining. He applied the emulsion and stitched in this case, and locally all went satisfactorily, the mastoid healing by first intention, though a sinus subsequently developed for a time on one side. He did not think the absence of drainage was responsible for complications in this case.

He did not think the lateral sinuses or the bulb of the jugular veins were involved, but that the case was a general infection from the

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originating site in the mastoid. The case was made more difficult, as well as more interesting, from the fact that it was bilateral. The organism was the streptococcus.

Cerebellar Abscess — WILLIAM IBBOTSON, F.R.C.S.E. — Male, aged 19, had tympanic and mastoid suppuration for many years on the left side. When first seen was found to be suffering from intense left occipital headache but no vomiting. He lay in bed on his right side, in a flexed position, moaning in pain. Evidence of very chronic suppuration was found in left tympanic cavity; no mastoid tenderness or swelling. No fever, pulse 47, no drowsiness.

Further examination of central nervous system and cerebrospinal fluid and optic disc did not show any conclusive evidence of intracranial abscess. Radical mastoid drainage was performed. Two days later patient showed signs of increasing drowsiness, the headache never having been relieved by the operation, whilst there was now marked increase in tension in the cerebrospinal fluid.

Skull trephined over left cerebellar area and very large abscess, containing extremely foul pus and detritus, evacuated. During this performance respiration entirely ceased for about fifteen minutes, but restarted after injection of several drugs, with artificial respiration, etc., the pulse remaining full and steady all the time.

For some weeks past patient has suffered no inconvenience whatever, there being no symptoms or gross pathological signs and the wounds have completely healed.

Mr N. H. PIKE said that he had recently operated upon a frail woman, who had ceased to breathe during the administration of the anæsthetic. Artificial respiration had failed, and he had carried out a decompression in the temporal region, and the natural respiration slowly came back, forty-five minutes after it had ceased. She was taken back to bed and lived three or four hours. At autopsy a cerebellar abscess was found.

In another case a man was admitted with supposed intracranial tumour and respiration suddenly ceased. A team carried out artificial respiration for fifteen hours before the heart finally gave out. At autopsy no tumour was found, but there was internal hydrocephalus, without apparent reason. A decompression performed during the fifteen hours had given no help.

The Otometer: An Instrument designed to measure accurately Range and Sensitivity of Hearing.—O. POPPER, F.R.C.S.E.—The Paper is published in the *Journal of Laryngology and Otology*, vol. xliii., December 1928, p. 870.

DISCUSSION.

Dr ALBERT A. GRAY said that Mr Popper had remarked that it was difficult to explain why low notes required so much more energy to become audible than high ones. The reason to him (the speaker) was clear. There was much more energy in a rapid vibration than in a slow one.

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The energy depended on the square of the velocity of the movement, whereas it only varied directly with the mass. A low note might mean only twenty vibrations a second, whereas with a high-pitched note it might be thousands of vibrations a second, and as the basilar membrane could only vibrate within the limits of small amplitude, much more amplitude of movement was required for low than for high notes to produce audibility.

Dr LOWNDES YATES said that he agreed that at some future date apparatus which generated sound electrically would be employed for testing hearing. He thought that the practicability of such apparatus was open to considerable question at the moment. He possessed a somewhat similar apparatus and found that the note emitted depended on maintaining constant voltages and on so many other factors that it was difficult to keep the apparatus in order for practical testing, although it was excellent for laboratory work. He believed, however, that even the degree of accuracy obtained by the use of the tuning-fork was greater than that obtainable by the apparatus just demonstrated. For example, the apparatus was obviously difficult to keep in order, and was not in order now, for, in addition to the note which it was claimed was being generated, it emitted a note of about 1000 double vibrations per second and, as a result, a double noise was going on in testing. In addition to this, the loud speaker used could be heard quite differently in different portions of the room; when opposite to it one could hear the note better than if one was at the side of it, and considerable errors thus resulted. Although electrical apparatus similar to this would ultimately replace the tuning-fork as a means of testing hearing, such replacement could not be carried out just now.

Sir JAMES DUNDAS-GRANT said it was necessary to be practical, and the tuning-fork could not yet be discarded, though one must make allowances for what Mr Popper said. He (the speaker) had had tested, with the late Dr Womack, the mode of dying-down of a set of forks, and had read a paper at the Boston International Congress of Otology, giving the results. The duration time could be converted into figures of actual hearing power. Mr Popper was trying to provide something which otologists were anxious to test and employ.

Mr POPPER (in reply) thanked Dr Gray for his explanation. He agreed that the "hum" referred to by Dr Lowndes Yates was present at certain frequencies. It could easily be eliminated. It was due to a hasty reassembly of certain components of the instrument rendered necessary owing to the fact that the electricity supply in the room was direct, whereas in the laboratory where the tests were made it was alternating.

He agreed that the tuning-fork could not be scrapped yet; it was adequate for range, but could never be used as a test for sensitivity, because of the sources of error referred to. The ear during the tests was placed at a distance of 5 feet from the centre of the loud speaker, from which the maximum intensity of sound issued. He did not agree with Dr Lowndes Yates that the instrument was inaccurate. When he began this work he had approached the Staff of the National Physical Laboratory, who measure everything. They referred him for the measurement of sound to the circuit evolved by the Western Electric Company of America,

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and this was demonstrated. The Western Electric Company keep 3000 people employed in research, and in the circumstances the purity of the note must be accepted with few reservations.

Perforation occupying almost the whole of the Tympanic Membrane, closed by Repeated Application of Trichloracetic Acid. Cicatricial Membrane still Complete after Ten Years. — Sir JAMES DUNDAS-GRANT, K.B.E., M.D. — A young woman, when first seen, was suffering from chronic suppuration of the middle ear of several years' duration; it was so rebellious to treatment that a radical mastoid operation had been proposed. In addition to the usual antiseptic and alcoholic drops, injections of a weak solution of chloride of zinc were made through the Eustachian tube by means of the catheter, and the discharge was brought to an end. The perforation occupied considerably more than two-thirds of the membrane. After the ear had remained in a dry condition for a considerable time I decided to try and bring about closure of the perforation by means of applications repeated weekly of trichloracetic acid with, however, no very great hope of success. Ultimately complete closure was effected with great improvement in the hearing power. This has now lasted for at least ten years.

Mr H. J. BANKS-DAVIS said it was not stated whether the perforation was in the posterior-superior or inferior quadrant, and a point was whether one should leave a perforation alone when an ear was dry. Several times he (the speaker) had tried to close perforations in an ear that was dry, as by applying chromic acid or phenol, but the patients did not hear so well after the closure of the perforation. Trichloracetic acid he regarded as a risky drug to use; it was very corrosive and might erode more of the membrane. This patient said she heard much better, and he was interested to see that on suction the tympanic membrane was translucent-looking, like fine scar tissue. Injections of chloride of zinc through the Eustachian tube were also somewhat risky; he had known acute inflammation of the middle ear to follow.

Mr HAMBLEN THOMAS said the closing of perforations was very useful, since patients were then less likely to have a re-infection during a cold, or to have attacks of giddiness due to obstruction of the Eustachian tube of the sound ear.

Mr NORMAN BARNETT said the hearing of the patient was very good, and asked whether this was a special case, or was it usual to get such a good result.

Sir JAMES DUNDAS-GRANT (in reply) said that he put a moistened plug of cotton-wool over the perforation, and he usually found that hearing improved with closure of the perforation. He had done this in many cases, but never in one of such a large perforation as this. Trichloracetic acid was a very powerful antiseptic, and it was a very useful application after cauterizing the turbinates, for example. It was recommended by an aurist

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in New York, and that gave the speaker greater confidence in using it for perforation of membranes. He applied cocain beforehand, and wiped away any soft crusts adhering to the margin of the perforation, then painted trichloracetic acid round the edges until a white ring resulted. Afterwards he applied bicarbonate of soda to check the further action of the acid, or he might leave it alone. It was important to get the ear dry beforehand. In regard to the present patient, it had been proposed elsewhere that a radical mastoid operation should be done, but he thought it worth while to try and check the discharge by other means. He succeeded by injecting a weak solution of chloride of zinc up the Eustachian tubes. It was interesting to see the arborisation of vessels at the edge of the perforation; a film formed and coalesced, and one day the perforation was found to be completely closed. In the first volume of the *Transactions* of the Otological Society there appeared a description of a case he showed.

Vertigo on Suction in a Patient with Absence of the Stapes (previously shown 17th November 1911)—Sir JAMES DUNDAS-GRANT, K.B.E., M.D. — Male, aged 34, was referred to me in 1911 by Dr Outterson Wood on account of sudden attacks of epileptiform character and dullness of hearing in the left ear. He had been subject to these attacks for about four years and had attacks of vertigo with definite loss of consciousness. I performed ossiculectomy and from that time he was entirely free from the attacks. Either during this or subsequently, the stapes appears to have been dislodged and was seen on the upper part of the promontory, the fenestra ovalis being closed by a small membranous diaphragm. From time to time since then Siegle's speculum has been used and it has been noted that during compression little or no disturbance was induced, but on *rarefaction* most violent disturbance of equilibrium took place, with complicated nystagmus which I was unable to analyse.

In reflection on this case I thought that if such disturbance took place on rarefaction in a person with a complete membrane it would probably be due to there being fixation of the malleo-incudal joint with loss of the action, which only acts on the incus during compression and not on suction. (See next case.)

Vertigo on Suction in a Patient with Adhesive Processes in the Middle Ear, following Scarlet Fever, presumably Malleo-Incudal Ankylosis.—Sir JAMES DUNDAS-GRANT, K.B.E., M.D.—A young woman, with undamaged membrane, was recently referred to me on account of extreme deafness of the left ear; the deafness was attributed to scarlet fever in very early childhood. On suction with Siegle's speculum, giddiness was produced accompanied by nystagmus, which was, however, not at all definite. It is suggested that this had been due to fixation of the malleo-incudal articulation. By means of repeated suction-massage the joint has apparently become looser as the hearing has improved.

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The Ear

Skiagrams of the Petrous Bone used in Diagnosis—DAN MCKENZIE, M.D.—The following case particularly illustrates the value of skiagrams of the petrous in excluding otosclerosis.

The patient, a woman aged 35, suffered from progressive deafness, which began when she was 21. Progress was slow at first, but during the last two years it has been more rapid, especially since she became pregnant three months ago.

The hearing was seriously affected, and the signs were those of nerve-deafness; bone conduction being reduced to minus 15 seconds, and the Rinné was positive in both ears. The highest tone audible was the C. 512 tuning-fork, the monochord not being heard at all. On the other hand, C. 64 was audible by both ears.

Pronounced nerve-deafness in a young person suggested syphilis. But the Wassermann reaction was negative and there was no history of this dyscrasia. As it might be a cochlear otosclerosis the patient was sent to Dr Graham Hodgson to have the petrous bones X-rayed.

The films exhibited Dr Hodgson's reports as showing no evidence of otosclerosis.

The idea of functional or hysterical deafness did not occur to us until the negative X-ray report had been returned.

We then applied the cold caloric test and found the vestibular reactions normal. Not only so, but as often happens, the shock raised the hearing for the voice from one inch to fifteen feet.

The patient has also become aphonic lately.

The value here of the negative X-ray finding is obvious, but the exhibitor would point out that such a finding strengthens reliance upon positive findings in suspected otosclerosis.

ABSTRACTS

THE EAR.

The Superficial Cutaneous Vessels of the Tympanic Membrane, their Topography and Physiology. ERY LUSCHER, Berne. (*Zeitschrift für Hals-, Nasen-, und Ohrenheilkunde*, Band xxii., Part I.)

These points have been greatly elucidated by the use of the capillary microscope. The middle third of the membrana tensa sends its blood towards the umbo and from there along the manubrium to the upper wall of the meatus. The blood from the other two-thirds runs towards the periphery. (Our readers may remember Schirmunski's method of making a lasting perforation by cutting the membrane round the umbo about halfway between it and the periphery, *Journ. of Laryng. and Otol.*, vol. xlii., 1927, p. 779). The membrana flaccida shows great variety in the course of its superficial vessels. The capillary pressure has

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