SOCIETIES' PROCEEDINGS

ROYAL SOCIETY OF MEDICINE—SECTION OF OTOLOGY

February 5, 1932.

President—Mr. NORMAN PATTERSON, F.R.C.S.

Aural Vertigo—W. S. THACKER NEVILLE.—The paper is published in the *Journal of Laryngology and Otology*, Vol. xlvii., August 1932, p. 533.

DISCUSSION.

Mr. F. W. WATKYN-THOMAS: "The most important advances in the treatment of Ménière's syndrome since it was first described have been the work of Mr. Sydney Scott on the effects of Eustachian obstruction, that of Portmann on the vascular factors and on the saccus endolymphaticus, and that of Mygind and Dederding on water retention.

In the first place, if we use the term 'Ménière's syndrome' at all, we must use it in its original sense, *i.e.*, vertigo associated with changes of hearing coming on as a sudden attack, a sense fully covered by de Kleyn's definition—'a sudden alteration of the activity of the auditory nerve in its cochlear and vestibular portions.' For practical purposes we are entitled to make two reservations: (1) We may exclude all those cases in which the symptoms are due to labyrinthine suppuration, or to any localised intracranial lesion. (2) In the majority of cases we are concerned with recurrent attacks of these symptoms.

If we attempt to make our definition more precise, for instance, by specifying the changes of hearing, we limit ourselves to a group of Ménière cases, and we are entitled to speak of observations on these cases only as observations on a strictly limited group, not as observations on Ménière's syndrome as a whole. I emphasise this particularly as I do not think any one of the investigators whom I have mentioned claims that his results apply to all cases of Ménière's syndrome. The results of treatment are, in fact, to some extent mutually exclusive. Thus we know that many cases are cured by Eustachian inflation alone, a method based on the assumption that the labyrinthine tension has been raised by the in-driven stapes, whereas Mygind and Dederding have cured many other cases by a method based on the assumption that there is labyrinthine hypertension, which must force the stapes outwards.

One point is of interest here. I do not think water-retention cases are nearly so common in this country as they are abroad. Whenever I have visited Dr. Mygind's clinic I have seen several indisputable cases; I have seen very few here, either in private practice or in hospital. It may be to some extent a question of diet; for one thing, I do not think we consume as much salted food as they do in the more northern countries.

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There is another point. All the researches to which I have referred show that the most frequent cause of a Ménière attack is an intermittent, unilateral increase of labyrinthine pressure, either by in-driving of the stapes (Scott), excess of endolymph by failure of excretion (Portmann), intracellular labyrinthine œdema (Mygind), or alteration of blood-volume (Portmann). It is probable that the vertigo associated with accessory sinus infection is really secondary to relapsing Eustachian catarrh kept up by that infection.

There must be another group of cases, a small group certainly, but one which undoubtedly exists. I refer to those cases which defy all Eustachian therapy and are cured by small doses of luminal or bulbocapnine. Here we must admit some cause other than raised intra-labyrinthine pressure.

We do not consider here the so-called Bárány syndrome, for that is a posterior fossa lesion and can operate, as several of us have shown, in the presence of an inactive auditory nerve.

In conclusion, I must repeat that in no way do I attempt to depreciate this most important work. The researches of Mygind and Dederding, for example, have far wider implications than Ménière's syndrome; I only wish to reaffirm a belief that Ménière's syndrome is a syndrome, not a pathological entity."

Mr. EDWARD D. D. DAVIS: "For the purpose of the discussion on aural vertigo at the British Medical Association Meeting at Eastbourne, I went through the notes of 76 of my cases of aural vertigo with the object of ascertaining the causes from a clinical point of view. I did not recognise any cases of water-logging, and though I saw a few cases in which depletion therapy had been carried out and bulbocapnine administered, the results were indifferent.

The following is a list of the clinical causes of the vertigo in the 76 cases:—Traumatism, 3; acute otitis media, 3; acute suppuration or exacerbation of a chronic suppuration, 6; chronic suppuration, 12; secondary sclerosis or healed suppuration, 14; Eustachian obstruction (?), 2; otosclerosis, 14; cerebellar abscess, 2; tabes, 2; disseminated sclerosis, 3; general (intestinal and circulatory), 3; cause unknown, 12. Total, 76.

The twelve cases of unknown cause were in middle-aged or elderly patients, thin, worried and overworked, who complained of severe rotary vertigo of sudden onset, and of tinnitus. The range of hearing in one ear was much diminished, especially for high notes. These cases would be labelled Ménière's disease. The labyrinth was active to the irrigation test, but in a few cases the reaction was sluggish. Vomiting he interpreted to be only an indication of the severity of the vertigo, and the same with regard to diarrhœa. In the later and milder attacks of vertigo there was no vomiting. The Eustachian tubes were clear, and the blood-pressure normal. The vertigo was very variable, and the pathology of these cases is definitely obscure.

If the auditory nerve could be seen with the ophthalmoscope or similar instrument, we should probably know more about vertigo and nerve deafness. The analogy with the eye may be carried still further, and cases of increased intra-labyrinthine pressure may be compared to glaucoma. The ophthalmologist has the advantage of being able to measure the intra-ocular pressure with a delicate gauge known as the tonometer, and so verify the effect of any treatment for the reduction of pressure. Depletion therapy

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for glaucoma was tried in 1915, when these patients had been given an intravenous injection of saline, as in cases of cerebral compression. This treatment has been given up as unsatisfactory, but it was found that there was a decrease in the intra-ocular pressure for twelve hours only. Perhaps one reason for giving up depletion therapy in glaucoma was the need for mental relaxation and quiet. The same applies to vertigo. If a patient is given such a potent diuretic as salyrgan he is in and out of bed every five minutes with considerable disturbance of sleep.

With regard to lumbar puncture, Babinski in 1903 performed lumbar puncture for vertigo of functional origin, and claimed good results, particularly when no lesion of the ear was apparent. I have tried lumbar puncture in some of the above patients; the cerebrospinal fluid was normal, and the condition was not improved.

Portmann's operation for drainage of the saccus endolymphaticus has been performed with success by Mr. Musgrave Woodman. Patients with vertigo do not readily consent to operations, and seem to prefer the vertigo to anything but simple treatment. The evidence of increased intra-labyrinthine pressure or of water-logging in the above cases was absent.

In the fourteen cases of otosclerosis there was severe vertigo, but it was temporary, and disappeared with rest and the administration of bromides. These patients were usually sea-sick, train-sick, anxious women, with normal patent Eustachian tubes. In most cases of otosclerosis the blood-pressure is normal; in a few it is depressed and low. In these latter I have tried Mr. Richard Lake's treatment with ergotin without much success. The low blood-pressure is probably partly due to the vertigo, but the question of blood-pressure needs more careful investigation.

The secondary sclerosis cases are those for which one might perform labyrinthotomy, especially when a previous radical mastoid operation has been performed. Such operations are justified:—(1) if it is certain that the vertigo is due to the ear; (2) when all other remedies have failed; and (3) if the patient is incapacitated by the vertigo. The cases which fulfilled these three conditions are few; Richard Lake records only 14.

The cases of acute suppuration or exacerbation of a chronic suppuration are the most satisfactory, and the vertigo usually disappears when a mastoid operation is performed.

Mr. Thacker Neville has mentioned some cases of acute otitis media with vertigo. I have seen three patients of this type; when the otitis cleared up the vertigo disappeared and did not return.

In the three traumatic cases the vertigo was probably due to cerebral disturbance, and not caused by the ear."

Mr. A. W. McCay: "In 1926, at the request of Mr. J. S. Fraser, I made an investigation of the cases of Ménière's symptom complex, dating from the year 1908 to 1926.

One of the greatest difficulties was the classification of the cases. In all, there were 199 cases of Ménière's symptom complex, and of this number I have chosen 28, which I consider are cases of true Ménière's disease (excluding all cases with suppurative conditions, such as labyrinthitis, etc.).

To-day I intend to confine my remarks chiefly to these 28, except for a brief classification of the remaining 171. In these 28 cases, which I consider to be true cases of Ménière's disease, the membrana tympani were normal

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in appearance, the Eustachian tubes were patent, and there was a history of sudden onset of severe giddiness and tinnitus, accompanied by deafness in the affected ear and vomiting during the attack. In each case, the hearing tests showed inner-ear deafness, with raising of the lower tone limit in all and slight lowering of the upper tone limit in most cases. The cold caloric test in each was more or less normal, that is, the reaction was present within thirty seconds. The deafness was unilateral in 19 cases and bilateral in 9, but in these latter cases one ear was always more affected. There were 17 males and 11 females. The greatest age-incidence was over 40 years of age, there being only 10 cases under this age. In many of the cases there had been a history of tinnitus and symptoms of deafness for some considerable time prior to the onset of the giddiness and vomiting, and in the cases in which observation had been made over a period, it was clear that the deafness was progressive.

The remaining 171 cases showing Ménière's symptom complex, that is, severe attacks of giddiness accompanied by deafness and noises in the ear, no sickness, but of apoplectic origin, were classified as follows:—Traumatic in origin, 33; toxic neuritis or chronic progressive labyrinthine deafness, 32; syphilitic neuritis of the eighth nerve and labyrinthitis, 71; tumours of the eighth nerve, cerebello-pontine angle and cerebellum, 20; vascular and anæmic, 15. Total, 171.

It is important to define clearly the type of case with which we are dealing. As we know, Ménière's syndrome can be caused by a plug of hard wax in the external auditory meatus, by an acute otitis media, labyrinthitis, tumour of the auditory nerve, etc., but when the pathology of the condition is known, I do not think it ought to be termed Ménière's disease; otherwise, we are dealing with symptoms of a known condition, whereas Ménière's disease seems to me to be in the same category as migraine, asthma, and epilepsy, and thus until we know the definite pathology of these cases, the treatment will always be difficult.

As regards treatment, I find that in severe cases complete rest in bed for two or three weeks, a strictly limited diet, and small doses of calomel, together with luminal and bromides, give definite relief."

Mr. HUGH CAIRNS asked whether Mr. Thacker Neville had seen Ménière's syndrome in severe water retention, such as the œdema accompanying various forms of nephritis. If the pathology of the condition was really water-retention, one would expect to get it also in kidney cases. He had been interested in Ménière's syndrome recently because cases had been sent to him for division of the eighth nerve. Dandy introduced that operation and had reported successes. His (Mr. Cairns') own cases were too recent for him to say anything about the late results, but the immediate results of the operation were satisfactory, and the operation was fairly easy to perform. It should be limited to cases in which there was gross loss of hearing in one ear.

Mr. H. V. FORSTER said that having observed, in his student days, that his ability to hear clearly through the stethoscope during auscultation of the heart and chest, varied with regard to lower tones, he found that he could test his own ear for low tones in a simple manner by firmly closing the external meatus with the index finger upon the tragus, when under

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normal conditions the muscle note or muscle tone set up by the contracting muscle of the hand or forearm could be heard. When this failed to be appreciated, which was found to be the case in his right ear, he concluded that the lower tone limit had been raised.

On one occasion he experienced a slight but very disagreeable attack of vertigo referred to the right ear, and discovered on another occasion that the temporary loss of hearing for low tones completely disappeared after an attack of vomiting of a copious amount of fluid.

It was not until he had seen some of the writings of Dederding and Mygind, and also those of Mr. Thacker Neville, that he felt satisfied that his own personal experiences could be explained by the hypotheses of those writers.

It should also be mentioned with regard to hearing tests in which the method of closing the tragus was used, that Federici,* of Genoa, had recently described a test in which, after the 128 d.v. fork had ceased to be heard on the mastoid by bone conduction, it could be heard for a considerable period with its base applied to the closed tragus, but in cases believed to have stapes fixation, *e.g.* in otosclerosis, this period was remarkably shortened.

Dr. KERR LOVE said that the cases described in the paper bore a superficial resemblance to cases of hypothyroidism and he would therefore ask whether Mr. Thacker Neville had tried administering thyroid tablets for the relief of the swelling and the kidney condition.

Mr. E. WATSON-WILLIAMS said that since he had not himself observed the condition described by Mr. Thacker Neville, he must confine his remarks to theoretical considerations. The treatment outlined seemed very drastic, even for a month, and as a régime for a lifetime, hardly compatible with existence. It was important, therefore, to be certain that the attack on the faulty water metabolism was the only or the best line of treatment. Surely there must be some aural lesion in addition, for, if both ears were normal, it was difficult to understand how a symmetrical plethora should cause vertigo. Was Mr. Neville not himself giving bulbocapnine for its effect on the vestibular nerve-endings or possibly on the cortex? He (the speaker) was accustomed to rely on small doses of quinine for controlling vertigo of this type. Another drug that he had found effective, especially when there was also tinnitus, was mercury; from ten to twenty minims of liquor hydrargyri perchloridi twice a day were sufficient, and caused no alimentary disturbance.

Mr. W. STUART-LOW said that one of the cardinal principles to observe in cases was rest in bed and quiet. Bromides with drachm doses of dilute hydrobromic acid in the case of middle-aged and elderly patients, particularly women, were beneficial and soothing, but for younger women and girls, luminal in half-grain doses, increasing the dose to one grain every three hours, often proved useful. Quinine in half-grain doses acted as a tonic to the vestibular branches of the auditory nerve and so helped to steady the patient.

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* *Acta Oto-Laryngologica*, xvi., Fasc. 1, "A New Test mainly for determining the presence of Ankylosis of the Stapes at the Oval Window."

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Dry-cupping by placing medium-sized cups over the region of the mastoid and round to the middle line at the back on the affected side greatly helped by drawing blood more or less directly from the congested area of the labyrinth. The application could be maintained by making use of a suction pump for five minutes at a time and repeated at intervals of ten minutes for a few times.

He had found small repeated doses of liquor hydrargyri perchloridi in mixture, and calomel in pill form, most effective in lowering the blood-pressure by acting freely on the liver and bowels.

He considered too great restriction of the intake of fluids undesirable, as the cause of the vertigo might be toxins circulating in the blood, and their elimination, being essential, was best accomplished by giving water freely, especially in the early morning, while restricting fluids only throughout the day.

Mr. ALEX. R. TWEEDIE said he ventured to suggest that Mr. Neville had emphasised the factor of water metabolism unduly ; in support of this suggestion he would quote some extracts from the actual summary by Dr. Dederding, of the reports just mentioned, as follows :—

"By morb. Ménièri we understand a disease which, as far as the ear is concerned, is characterised by changing acoustic and vestibular abnormalities, and which has no specific ætiology. The acoustic function is generally affected on both sides. The great majority exhibit abnormalities of the tympanic membrane. Tubal stenoses are frequent. The elevated lower limit indicates an affection of the sound-transmitting apparatus. The generally well preserved upper limit speaks against a presumption of an affection of the sound-perceiving apparatus."

He (the speaker) objected to the term "morb. Ménièri," but these statements by Dr. Dederding accorded well with his own small experience of cases of vertigo which he had examined.

It was important, primarily, not to regard vertigo as a mystery. Everyone experienced these symptoms more or less, and their recognition varied largely according to the psychic conditions. Vertigo could be induced easily, as all knew, by rotation, but if a child were vigorously rotated, he would get up and run away laughing, whilst one or two slow turns could induce extreme discomfort in an elderly person.

He urged that, as indeed Dr. Dederding's summary stated, there was always some demonstrable underlying middle-ear lesion, and as far as his own examinations were concerned, there was also a demonstrable asymmetry of both the vestibular and the auditory functions. Such functions, however, on each side might still be within the physiological limits, but the essential point was asymmetry. Such underlying conditions may well have been present for many years, but it was not until some other influence occurred, such as the effects of constipation, an over-loaded stomach, unaccustomed stooping, or the menopause, that this asymmetry became recognised by the patient.

The symptoms, he admitted, might be most alarming ; more than one case had been referred to him as possibly due to cerebellar tumour.

With regard to treatment: the right line was encouragement, with the assurance to the patient that the symptoms really only represented recognition of an old-standing trouble to which they would soon become

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accustomed. He would also urge general tonic treatment and avoidance of sedatives; in his experience, with this form of therapy, recovery was not long delayed.

Sir JAMES DUNDAS-GRANT said that Dida Dederding's definition of Ménière's disease was somewhat vague. The rationale of small doses of quinine in aural vertigo was that it had an anodyne effect on the vestibular nerve. The effect was not to produce any weakening of the affected side, but a lowering of the hyperactivity of the sound side, because, as Mr. Tweedie had remarked, there was an asymmetry between the two labyrinths, an important element in the production of Ménière's symptoms.

In otosclerosis the reason of the vertigo was probably that, one of the windows being quite closed as, for example, in fixation of the stapes, there was not the safety-valve action which the movement of the stapes would allow and vascular or other changes in pressure were not compensated.

Nothing had been said to-day about the post-suppurative adhesive changes which were so frequent in the cases of aural vertigo sent to him. He (the speaker) had, for instance, found a severe attack to have been due to the "indrawing" of a small loose cicatrix. When this was sucked out and fixed with collodion the patient was quite comfortable.

He hoped that Mr. Thacker Neville was making use of his (the speaker's) cold-air apparatus. Monrad-Krohn, in his book on the examination of the nervous system, stated that he had given up cold-water tests and was now using this cold-air apparatus.

With regard to the discomfort of a no-salt diet he, Sir James, after adopting such a diet, had been able to detect new flavours in his food, and he held out this fact as a grain of comfort to those who found the absence of salt a great deprivation.

Mr. THACKER NEVILLE, in reply to Mr. Davis, said he had treated one case of vertigo with acute otitis media and had cured the otitis by ionization. The hearing was not fully recovered nor was the vertigo cured until the source of the toxæmia, namely, septic tonsils, was removed. Most cases of water-logged patients in Copenhagen were also treated with the Eustachian catheter in order to rectify the position of the stapes which was displaced by the negative pressure due to the water-logging of the Eustachian tube. He himself did not use it in this investigation, in order to show the effect of limited fluid intake.

In reply to Mr. McCay: with this treatment rest was not necessary as the patient could be depleted of fluid quickly and therefore exercise was demanded in order to make the skin active.

Mr. Hugh Cairns asked why people with nephritis did not have aural vertigo. The reason was that nephritis was intercellular, but this water-logging was an intracellular accumulation of fluid and there was no pitting. Dandy had reported eleven cases of division of the eighth nerve, nine of which were claimed as cured. For him (the speaker), this would be a dangerous operation, but destruction of the labyrinth was not dangerous. Furthermore, the destruction of the vestibular branch was not sufficient, as tinnitus was an annoying symptom which could be rectified only by destroying the cochlear branch of the eighth nerve or the cochlea itself. If a patient was water-logged such radical operations were not necessary.

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Dr. Kerr Love had mentioned the treatment with thyroid. The patient, who was deaf and had been drinking ten pints of beer a day, found it impossible to limit fluid intake to one pint, therefore he took tablets of elityran which was ten times more effective than thyroxin and said he had received great benefit from it. All other patients placed on elityran were made worse.

Mr. Watson-Williams had asked whether there was no other method besides the unpleasant one of limitation to one pint of fluid daily. Anything which caused loss of fluid—such as dancing—was useful. Mr. Watson-Williams mentioned the difficulty of understanding why one labyrinth only was water-logged; he (the speaker) believed that both labyrinths were actually water-logged, but as the vertigo was always preceded by deafness, the increased pressure in the labyrinth would displace the stapes in the deaf ear, whilst in the healthy ear there would not be such a displacement.

The action of bulbocapnine on the labyrinth was shown by its power of arresting vomiting in a case of acute labyrinthitis.

Mr. Stuart Low had referred to the usefulness of leeches. He (Mr. Thacker Neville) had found their application successful in one water-logged patient who, although the giddiness was cured, yet at times had a sensation of a weight on her head and a feeling of being compelled to walk to the side of the affected ear. A leech on the mastoid removed this sensation for three weeks at a time.

Mr. Tweedie had mentioned the necessity of performing labyrinth tests. Labyrinth tests had been carried out in most of the cases which he had reported. The reason why he had said they were inadvisable was that the patients found them unpleasant. Those he met with had suffered from severe giddiness; one had broken her wrist and another had been thrown out of his chair and was unable to drive a car. The abnormality in the rotation tests could be accounted for by a latent nystagmus. The caloric test showed a greater difference between both ears, whilst the response to the galvanic test was normal.

He thanked Sir James Dundas-Grant for his recommendation of his cold-air apparatus, which was essential, as it would prevent acute otitis following the caloric test in the case of a patient with a perforated tympanic membrane.

Towards the Prevention of Deaf-Mutism: A Review of Forty Years' Progress.—J. KERR LOVE, M.D., LL.D.

It is not often that an observer is privileged to compare the figures attached to his own work after so long a period as forty years. It is over forty years since I began work at the Glasgow Institution for the Deaf and Dumb, now known as the Langside School for the Deaf, and it is the figures collected at that school, and from other Scottish schools, that I have chiefly to deal with in the first place. For the most part I shall avoid census returns, because these are not given in the necessary detail, nor are they reliable enough for the purpose of this meeting. The earlier figures were gathered as the result of a circular letter which I addressed to all British schools in 1895 after

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four years' work at the Institution. The later figures were collected for me by Mr. Haycock in response to a similar appeal in 1931.

In 1891 the population of Scotland was about . .	4,000,000
In 1931 „ „ „ . .	4,800,000
In 1895 the deaf in Scottish Schools were . .	524
In 1931 „ „ „ . .	534

This is nearly 17 per cent. of increase of population with a practically stationary number of deaf children in schools, and this in spite of an increasingly severe combing of the population by school-attendance officers for cases of deaf-mutism. Corrected for the increase of population, there should have been one hundred more deaf-mutes in 1931 over the number in 1895. The ratio of acquired congenital cases was, in 1895, as nearly as could be ascertained, 50 per cent. I cannot go into the details of this calculation here, but the basis of it is fully given in my book on *Deaf-Mutism*, published in 1895 (MacLehose, Glasgow).

The ratio in 1931 was: congenital, 72.2; acquired, 27·8.

Population of Scotland, 1891	4,025,647
„ „ 1931	4,800,000
Deaf in Scottish Schools, 1895	524
„ „ 1931	534
Ratio of acquired cases, 1895	50%
„ congenital „ 1895	50%
Percentage of acquired cases, 1931 . . .	27·8
„ congenital „ 1931 . . .	72·2
Average family in deaf „ 1895 . . .	5·5
„ „ „ 1931 . . .	4·0

Ratio of deaf born in congenital families = 3·30, which is as near the Mendelian ratio as one could expect in such small numbers.

The average family in congenital cases was in 1895, 5·5 children; in 1931, four children. This decrease can hardly be accidental. It is perhaps due to a deliberate effort to reduce families by birth control, an effort which we can hardly condemn in families with hereditary deafness. The decrease has occurred, too, in spite of the greatly lowered infantile mortality rate since 1895. The ratio of deaf born to hearing in congenital families is 1 to 3·3, which is as near the Mendelian ratio as one could expect in dealing with such small numbers. Parents are loath to ascribe deafness in a child to heredity. Were the truth known, I believe the Mendelian ratio would be more nearly correct. The returns are made from schedules filled up by medical officers, but even there the medical officer has seldom been the observer of the illness causing deafness.

Comment on these figures might be made to spread over the whole field. I shall content myself with one or two features. The most

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striking feature is the diminution of the ratio of adventitious or acquired cases, a fall of nearly 26 per cent.—from 50 to 27·8 per cent. And this has taken place in the face of an increasingly severe combing of the schools for backward cases of all kinds. What has caused this good result? The answer is, chiefly medical inspection and treatment. Teachers are instructed to refer backward cases to medical officers. Treatment is at once instituted and is continued by skilled nurses over a longer period (a period of at least ten years) than in any other institution.

I can hardly avoid mentioning in this connection the operation for the removal of tonsils and post-nasal adenoids. It may surprise some of you, too—even those of you who are busy with this operation—that 25 per cent. of the youth of this country are without tonsils and post-nasal adenoids.

We admit to the schools in Glasgow, 22,500 children annually, and in school hospitals, general and special hospitals, we remove in at least 6000 children tonsils and post-nasal adenoids.

The better housing, better feeding, and better clothing of school children are all contributing to the diminution of acquired deafness, as also is the greater cleanliness, especially of the hair and head of children at school; lastly, the treatment of the ear complications of scarlet fever and measles to a finish in the infectious diseases hospitals of the ears in children affected by these diseases. This movement has been under way for too short a time for its full effect to be estimated, but I am sure it will show its effect later in the lessening of acquired deaf-mutism. But a link is still wanting in the chain of treatment. It is not always possible to arrest the suppuration in these cases before the patient is dismissed. The result is gradually increasing deafness, danger to the life of the child—for it is nearly always a school child—and sometimes the carrying of infection from the hospital to children outside, because the discharge from scarlet fever ears remains infectious occasionally for months. What is the wanting link? In conversation on this subject, I presented the difficulty to Dr. Arbuckle Brown of the Glasgow Education Authority, and he made the following suggestion: That all children taken into hospital suffering from any disease (infectious or other) wherever any indication of ear complication has been discovered during the illness, should be kept under observation for as long as may be necessary and, if need be, attended to at one of our school clinics for observation or treatment. Cases which have developed otorrhœa, even when the case has been "cured" and the child discharged with a dry ear, whether in hospital for the usual period or for an extended period, are to be dealt with in a similar manner, namely, by attending an observation clinic for an extended period to ensure that there is no return of the discharge. If treatment is necessary then the child will attend a treatment clinic. The chronic

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cases in which disease of the mastoid cells has occurred will be dealt with by admission to a hospital for operation. That, I think, is a necessary step in the treatment of the school child, and this system is now in operation in the City of Glasgow.

Syphilis is a cause of both congenital and acquired deaf-mutism. My complaint against this disease is not only that it causes deafness—and this it does, both in children and adults—but also that it ruins families. In a series of family trees which I collected and published in 1912 the following figures came out: In 21 families there were 172 children involved, there were 30 stillborn children; including these, there were 75 deaths of children, nearly all in the first and second years, and in addition there were 31 deaf or deaf and blind children. Of the remaining 66 children few survived until adult life.

Are we dealing successfully in preventing this disease? We are not, and the reasons are that we have no compulsory notification and we cannot compel treatment. Here is the state of matters in the City of Glasgow (Medical Officer's Report, 1929):—

"Even with all the facilities for treatment the individuals suffering from venereal disease do not take advantage of the treatment to a cure. The voluntary system does not seem to be a success." In Dr. MacGregor's latest report just quoted the percentage of defaulters before completion of treatment is stated to have been 55·3 per cent. in 1923 and 77·1 per cent. in 1929. The average percentage in default during the past five years was 70·5 per cent.

There seems nothing for this disease but compulsory notification and compulsory treatment to a finish in every case. Only thus will the hearing and the lives of such deaf children be saved. The objection to compulsory notification of all cases of primary disease is that this would induce the sufferer to conceal the condition. I do not think this objection could be urged against the compulsory notification of the disease in children—a step which I urged on the Royal Commission on venereal diseases many years ago. No parent would see his child die or become deaf because he preferred to hide the condition from which the child suffered. And the power to compel treatment to a finish should be given by Parliament now. The waste of time and money incurred by incomplete treatment is a sufficient reason for compelling the continuance of treatment to a finish. I here make a public appeal for the notification of venereal diseases in children, and I do so not only in the interests of the deaf child but of the families of syphilitic parents. Lastly, let me say a word on hereditary deafness. Whilst a great deal has been done for the prevention of acquired deafness, nothing has been done or is being done for the prevention of hereditary deafness, except by voluntary birth control by the deaf themselves. Were this effort confined to the deaf one would say: "Just let it go on." But it is being carried out

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to an even greater degree by the hearing, and particularly by the better classes amongst the hearing. One cannot look at the thousands of small bungalows growing up all over this country without misgiving. I call these birth-control houses. They are built to accommodate only one child, or, if there is a second baby, it is an Austin. But the average family in hereditary deaf cases is four.

Why should we not educate the deaf children in our schools—say during their leaving year, which is the sixteenth of their lives—on the principles of Mendelism and its bearing on the unions most of them are bound to make? Most of the hereditary deafness we have would diminish rapidly were this instruction given and followed. But would it be followed, you ask? Well, till the instruction is given we have no need to give an answer. Ours is to tell the deaf the truth.

Conclusions regarding the further Prevention of Deaf-Mutism.—So much has been done for the prevention of acquired deafness during the forty years of my review that my chief feeling is one of profound thankfulness. In addition to the continuance of present preventive measures I suggest the following:—

(*a*) The linking up of the school authority with the infectious diseases hospitals for the control and cure of all the ear complications of the infectious diseases.

(*b*) The compulsory notification of all cases of venereal disease as soon as possible, and the immediate notification of all cases of deafness or of any other defect or condition due to venereal disease when such appears in a child.

(*c*) The teaching of sex physiology by way of lessons in Mendelism to all deaf children and their parents or other relatives during the last year of the school life of the child.

(*d*) The encouragement of birth control in families in which hereditary deafness exists.

Mr. F. Brayshaw Gilhespy (Birmingham): "Excepting those who are consultants at institutions for the deaf, otologists have little chance of contact with those responsible for the education of our deaf population. Probably in the past we might have given the teachers of the deaf more help, but have failed to do so owing to lack of knowledge of their requirements. It is important on receiving a deaf-mute for instruction to know what remains of hearing, if any, are present. Ewing, of Manchester, a notable teacher of the deaf, had certain deaf-mutes referred to him who, when they made any attempts at speech or sound, did so with normal intonation—not in the lifeless intonation of the totally deaf. Owing to the different diagnoses expressed as to the auditory acuity by various otologists, Ewing was forced to rely on his own investigations to get at a satisfactory measure of their deafness. It was my duty to review his book *Aphasia in Children*, which contained these investigations, and, briefly, I would like

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to bring this work to your notice in order to draw your attention to the work going on in these institutions for the deaf.

The most interesting portion of this book refers to a study of seven children, who, when brought to the author for speech training, were aphasic on account of deafness, either congenital or acquired soon after birth.

The history of one of these patients is typical of the other six, and illustrates Ewing's thesis. In March 1924, a boy, aged 4½ years, was seen by him. Up to the age of 3 years he had given no signs of being able to hear. Later, when he was examined by otologists, there was thought to be some hearing present, as his pupils dilated when a tuning fork was sounded close to his ear. At the age of 4½ years he behaved, on the whole, like a congenitally deaf child; he could not understand a word said to him and could not speak. He expressed his wants by "cries" which were not words, but at the same time there was normal intonation of the voice in these cries, unusual in any prelinguistic form of deafness. Unlike the born deaf child, he did not drag his feet when walking and he was neat in his movements. Apparently it was found impossible to test him by tuning forks, although I am not entirely convinced of this. Ewing developed a tunnel-test used in conjunction with an audiometer. This is extremely ingenious, as the child depresses the switch when he hears the note of the audiometer, but thinks that it is the noise of the train which is set going through the tunnel at the same moment.

Ewing found, after testing this group of children, that their hearing for 64, 128, 256 d.v. fell definitely within the distribution for children of normal hearing but that there was a severe defect for hearing of the higher frequencies. He called this 'high-frequency deafness.' This term to me now indicates nerve-deafness, but it has a great hold amongst those responsible for teaching the deaf and is bound, sooner or later, to be brought to the notice of otologists. That is one of my reasons for bringing Ewing's work to your notice.

Various workers have shown that vowel sounds have special frequencies, which lie between 375 d.v. to 2400 d.v., while the consonants have frequencies higher up the scale, mostly in the region of 8000 d.v. a second. Therefore, a child with nerve-deafness would not hear consonants but might appreciate vowel sounds. The following table, taken from Harvey Fletcher's *Speech and Hearing*, shows further that the vowels have two

CHARACTERISTIC FREQUENCY OF THE VOWEL SOUNDS.

Speech sound.	Low frequency.	High frequency.
ū (pool)	400	800
u (put)	475	1000
ō (tone)	500	850
a (talk)	600	950
o (ton)	700	1150
āh (father)	825	1200
a (tap)	750	1800
e (ten)	550	1900
er (pert)	500	1500
ā (tape)	550	2100
i (tip)	450	2200
ē (team)	375	2400

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frequencies, sometimes widely apart. Inability to hear a tuning fork above 1000 d.v. would account for the difficulty in distinguishing two vowels, supposing their lower vibration period was the same but that one of the vowels also had a vibration period higher in the scale than 1000.

I have a patient who demonstrates clearly this point of difficulty. He can discriminate $\overline{AH}$ and $\overline{OO}$ with the left ear, up to nine feet, but gives $\overline{OO}$ for $\overline{EE}$ even at one inch, except when a loud voice is used, and then not with certainty. The right ear confuses $\overline{OO}$ for $\overline{EE}$ however close one gets. This is explained by the fact that $\overline{EE}$ has two characteristic frequencies widely apart, one at 375 d.v. and one at 2400 d.v. A normal child would distinguish $\overline{EE}$ from $\overline{OO}$, which have very similar lower frequencies at 375 d.v. and 400 d.v. by the higher frequency at 2400 d.v., characteristic of $\overline{EE}$. If the child cannot hear 2400 d.v. clearly, then he will be unable to distinguish $\overline{EE}$ and $\overline{OO}$ as the lower frequency of $\overline{EE}$ is very near that of $\overline{OO}$.

When it is seen that the vowels go in pairs and that the second of each pair sounds to the deaf child exactly like the first of the pair, it will be realised what confusion may arise in a child's mind on account of the vowels alone. Added to this, he fails to hear the consonants. He has been likened to a person listening to the worst loud speaker ever heard. He *lives in a world of nonsensical sound, for 'I'll be back soon,'* he might hear '$\overline{OO}$ $\overline{BOO}$ $\overline{BAW}$ $\overline{OON}$.'

Being conversant with all the arguments against the use of the Western Electric Audiometer and knowing that Ewing, in his research, had not the opportunity of testing bone-conduction, I have carefully tested my patient with tuning fork and audiometer, and I think that there can be no doubt that his is a case of nerve-deafness, with hearing for the lower part of the scale, and that the explanation for the phenomenon shown, as offered by Ewing, is correct. In testing deaf people I have not found the islands of hearing referred to by Kerr Love in his early work. A chart drawn up by Shambaugh suggests that the loss of hearing in certain parts of the scale is a relative, rather than a total, loss."

[I wish to record here my thanks to Mr. Cockersole, of the Birmingham Institute for the Deaf, who first introduced me to this work.]

Mr. A. D. SHARP said that the incidence of deaf-mutism for Europe was given as 8 in 10,000; in Britain, he thought, the figure was about 2 in 10,000. With regard to the proportion of congenital to acquired deaf-mutes, he found the percentage worked out at 60 per cent. congenital and 40 per cent. acquired. Of the congenital cases, 34 per cent. had no hearing, 66 per cent. had remnants of hearing, 3 per cent. of whom had evidence of fair hearing but were unable to comprehend or make use of it.

In 10 per cent. of the absolutely deaf congenital cases, deaf-mutism was present in a near relative. In no case of congenital deaf-mutism were the father and mother related. Syphilis did not account for more than a fraction of the cases. In the acquired cases, deafness was noticed after the following illnesses: pneumonia, meningitis, acute otitis media, measles, scarlet fever, whooping-cough, teething, diphtheria and trauma.

While birth control by those who have a family history of deaf-mutism

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will reduce the number of congenital cases, there is not likely to be any real diminution in the number of acquired.

Sir JAMES DUNDAS-GRANT said that to read about deaf-mutism was depressing, but when the subject was put before one by Dr. Love and Mr. Fraser it became invested with new life.

Reference had been made to "deaf-mutism" without deafness. Professor Giampietro many years ago described a number of cases in which the child could not learn to speak but hearing was still present. Obviously there was in that case some defect in the speech centres and special education of these was required.

Walker Downie had described a post-mortem examination in a case of congenital syphilis in which the disease was originally in the meninges, from which it had extended.

In a paper on the pathology of deafness occurring in tabetic paresis, Krassnig stated that the site of origin seemed to be the internal auditory meatus in the arachnoid sheath where, apparently, there was a constriction behind which the spirochætes could accumulate and from where an extension into the internal ear took place.

Some time ago he saw a case of Schilder's disease with various paralyses attributed to "aplasia." He understood that one of the first symptoms of this disease might be bilateral nerve-deafness, adding another to the difficulties of diagnosis.

The round window was very important for hearing, but only for the high-pitched tones. He, Sir James, had brought forward the case of a woman who had sclerosis of one ear, in which he was able to produce a permanent perforation in the membrane. In her case the round window was plainly visible, and she could hear very high-pitched tones.

Dr. K. B. AIKMAN said the problem of deaf-mutism must be dealt with from a very broad standpoint. The Wood Committee on Mental Defects had shown that the lowest 10 per cent. of the population formed a "Problem Group" in which was concentrated a very great deal of physical and mental weakness.

In tackling this "problem group" we struck at foci of zymotic disease, which contributed so largely to deaf-mutism, as well as to other sequelae, and we also struck at many carriers of congenital deaf-mutism; for carriers were often the subjects of other defects, not always deafness. Opinions as to the legality of sterilisation were conflicting. A Bill to legalise voluntary sterilisation of mental defectives was lately before Parliament and would be re-introduced shortly.

Sterilisation of mental defectives would pave the way for voluntary sterilisation in other conditions. This would be an advantage to the community and to the deaf-mutes themselves.

Dr. KERR LOVE (in reply) said he considered that congenitally deaf children had an island of hearing somewhere. Any defect there might be in a family was emphasised when cousins married. That was the objection to cousin marriages. With regard to sterilisation, the British Medical Association had declared that to be illegal.

The number of cases of acquired deafness had been reduced by 25 per cent. since 1895, and he thought the conditions under which cerebrospinal

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fever was induced would be improved. Forty years hence there would be less congenital deafness, but there were even now more institutions for deaf children in this country than there were deaf children to fill them. The deaf-mute ratio in Scotland and England was diminishing.

Mr. J. S. FRASER (in reply) said that if a child aged 10 years became totally deaf he probably would not become a complete deaf-mute; he would be a "semi-mute."

In regard to the education of deaf children, he did not know whether members of the Section were able to understand the speech of deaf-mutes who had been taught by the oral method; their teachers and mothers could understand them, but he (the speaker) could not.

With regard to congenital cases, he agreed with Dr. Kerr Love that in many of them the patients had some degree of hearing; there were probably little areas of the cochlea which, though malformed, were able to appreciate sound. In acquired cases due to labyrinthitis, however, the whole inner ear was usually destroyed.

He did not enter into the question of brain changes. The French school said that many cases of deaf-mutism were due to changes in the brain. He thought that this was because French otologists had not cut microscopic sections of the inner ear in cases of deaf-mutism; otherwise they would have found it unnecessary to postulate changes in the brain. The celloidin method was laborious, and therefore more suitable to the Teutonic than to the Latin temperament.

From this last case the question arose as to whether the round window or the oval window was the more important for hearing. The stapes was not fixed on either side, though the oval window was filled up with connective tissue, but the round window on both sides was obliterated by new bone. On the left side Corti's organ in the middle and upper coils, at any rate, was fairly well formed. Recently Professor Gustav Alexander of Vienna had said that tones from 16 up to 90 d.v. were heard through the oval window, and that tones from 90 d.v. upwards, *i.e.*, the area concerned in hearing speech, were appreciated through the round window. To some extent at any rate, therefore, this last case tended to support Professor Alexander's view. It was at least doubtful whether complete fixation of the stapes would produce such severe deafness as to result in deaf-mutism, but complete bony obliteration of the round window did so.

Mr. GILHESPY, in reply, said that the deaf child heard such an amount of nonsensical noise that he became confused concerning everything, and that was what teachers had to fight against.

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