abscess which extended inwards along the sigmoid groove as far as the jugular bulb. Undue external pressure under these circumstances might have been attended with serious consequences.

Finally, gentlemen, I would venture to enumerate the following points as perhaps worthy of discussion:

1. The question of politzerisation in muco-purulent otorrhœa.
2. The escape of pus into the digastric groove in the absence of caries or necrosis.
3. Œdema and tenderness at the posterior extremity of the digastric groove, simulating phlebitis of the emissary vein.
4. The simulation of infra-auricular adenitis.
5. The necessity of observing the perforation while making Bezold's experiment.
6. The question as to the duration and degree of the external pressure to be exercised.

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SECTION OF OTOLOGY.

Summary of communications translated and abstracted by
ARTHUR J. HUTCHISON, M.B.

On a Universal Notation of Acoumetry. By Dr. F. SCHIFFERS (Liège).

For several years attempts have been made by physicians and physiologists to invent a simple and practical acoumetric notation. The endeavour to invent a method which shall put the measurement of hearing acuity on the same level as the measurement of visual acuity is a legitimate endeavour, but it must be admitted that the problem is much more complex, and its solution is extremely difficult. Apart from the incompleteness of our knowledge of the physiology of hearing, the difficulty of the problem is increased by the fact that sound vibrations reach the perceptive apparatus by two distinct routes, the aerial and the bony. Further, the principal function of the ear is to perceive articulate language. We have, therefore, to deal not only with the special sense, but also with the faculty of appreciation and analysis, the comprehension of the complex sounds of the different words which succeed one another in a phrase. How can we possibly invent a simple and trustworthy notation of these? Daily experience with children demonstrates

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the necessity for recognising this faculty of perception of articulate language. In early infancy, specially, there can be no doubt that the different functions of the nerve of hearing are not in constant rapport with one another. How, then, can we get an exact idea of the functional disturbance from any single method of measurement, even if founded on the use of a perfect acoumeter?

The study of this question has been complicated by the fact that the different methods in use have attempted to determine the position of the lesion or functional disturbance. This mode of regarding the question ought to be given up; any way, it has given rise to numerous errors. In many cases it cannot, of itself, establish a sure diagnosis.

Conclusions.—1. The watch and all kinds of acoumeters without gradation are useless for the desired notation—that is, for a "minimal fundamental notation." Watches are not all alike in their sound; moreover, as the gradation of intensity of the sound depends on distance, it is not possible to use this method for measuring the hearing power "on contact."

2. The tuning-fork is the best instrument for measurement of hearing power. The optical method constitutes a decided step forward, and may be further perfected. It is, we believe, the simplest and most exact existing method of making a minimal acoumetric notation. It is applicable to all cases.

3. The method of noting the time during which a given tuning-fork is heard has many supporters. The tuning-fork used must be named—that is to say, the number of its vibrations per second. The result would be expressed thus: R. A. c_2 256 v. $\frac{9}{24}$; *i.e.*, right ear, by air-conduction, hears a fork of 256 vibrations for nine seconds, whilst a normal ear hears it for twenty-four seconds.

4. Weber's experiment maintains its value.

5. Rinne's experiment, if used at all, must be modified. The foot of the fork ought to be held in front of the otoscopic tube in order to get a proper comparison between aerial and bone conduction.

6. Examination by spoken words is indispensable, specially in the case of children. Here Wolf's experiments must be kept in mind. Vowels and consonants—omitting sibilants—spoken in a whisper, using only residual air, are to be employed. A method of giving a uniform tone to the voice is a desideratum; without it all vocal measurements lack precision. In noting results the words or letters whispered, and the distance at which they are repeated, are to be recorded.

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Proposed Universal Notation of Acoumetry. By Dr. ARTHUR HARTMANN (Berlin).

Tests of hearing-power have two objects: (1) To make a diagnosis possible of the kind of disease of the organ of hearing. (2) To determine the degree of hearing-power and the results of treatment.

For diagnosis it is essential to estimate the power of hearing by air-conduction and by bone-conduction.

As all combinations of sound-waves are the resultant of simple vibrations, the latter form the true basis on which an exact estimate of auditory acuity is to be formed for diagnostic purposes.

The only instrument we possess for conveying simple sonorous vibrations to the ear, through the air and by the bone, is the tuning-fork.

Therefore, for diagnostic purposes, hearing must be tested by tuning-forks, and the duration of perception by air and by bone must be determined.

The letters L (Luft), K (Knochen), A (Aer), O (Os), A (Air), B (Bone), may be used to indicate which route is referred to.

In noting the results of tuning-fork tests, we must state the number of vibrations of the fork, as well as the name of the fork, because physicists and musicians of different countries have not yet adopted a uniform standard. Further, note should be made of the time during which the given tuning-fork is heard by the normal ear.

The simplest method will be to note the duration of hearing by the diseased ear, s (sinister) or d (dexter), in the form of a fraction, of which the denominator is the duration of hearing in the normal ear, the numerator that in the diseased ear. Thus: s. c^2 512 $\frac{18}{48}$ L. (A), *i.e.*, a tuning-fork (named c^2) of 512 vibrations is heard by the healthy ear forty-eight seconds, by the diseased left (s) ear only eighteen seconds, by air conduction.

But as the chief use of the human ear is to understand speech, this power must also be tested. The whispered voice is used, and in noting results the words used and the distances at which they are repeated are to be noted.

Acoustic Exercises for Deaf-Mutes. By Dr. V. URBANTSCHITSCH (Vienna).

The paper deals first with the importance of acoustic exercises in all cases for developing the sense of hearing, then treats of methodical acoustic exercises for deaf-mutes. In a short historical review of the subject the excellent work of French authors is referred to, but the general neglect of the subject is lamented. In conse-

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quence of some remarkable results obtained by the author with methodical acoustic exercises in 1888, trials of the method were undertaken in Viennese schools for deaf-mutes. The author next describes the method of carrying out these exercises with very young children, then with children who are being taught to speak and to read.

Examination of the hearing-power of deaf-mutes shows that often considerable remnants of hearing-power (Hörreste) are present, so that complete bilateral deafness is a rarity. On the other hand, comprehension of the sounds perceived is frequently absent; moreover, deaf-mutes show a remarkable lack of attention to sound-impressions. The object of methodical acoustic exercises is, therefore, (1) To awaken attention to acoustic impressions; (2) to build up "differential hearing"; (3) to increase acoustic excitability.

The author describes the application of the exercises to cases of very weak hearing-power and to the apparently totally deaf. Experience shows that even apparently totally deaf people ought to be tried. These exercises are not suitable for school-children, on account of the great pains that must be taken and the time required.

The author then proceeds to answer several important questions.

1. What cases are suitable for methodical acoustic exercises? The exercises are always at first experimental, because the result cannot be foretold in any individual case. Success has been achieved even in deafness due to cerebro-spinal meningitis. The author is quite opposed to Bezold's view that all who cannot hear tuning-forks a^1 to b^2 should be passed over, for even in such cases he has had good results.

2. How long should the exercises be continued? The more difficulty there is in arousing perception of sound, the more are special exercises required, whereas these may be limited or omitted whenever ordinary sounds are perceived or the deaf-mute can hear his own voice.

3. What are the results of acoustic exercises? The result of the exercises will vary with the nature and duration of the daily practice; with the amount of hearing-power already present, and with its capacity for development; with the intellectual condition of the patient, and with his interest in the exercises. In some cases in which hearing-power is apparently absolutely wanting, a trace of hearing may be awakened which is capable of further development. As a general rule acoustic exercises raise the hearing-power, thus a mere trace of hearing becomes a hearing of tones, this again a hearing of vowels, words and sentences. The capacity

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for development of each individual case cannot, however, be estimated; it varies even in a right and a left ear which at the start were functionally equal.

4. What is the practical worth of acoustic exercises? These exercises have a favourable influence on speech, on its hardness and its modulation, and also on the possibility of learning a dialect. As his hearing-power improves social intercourse becomes easier for the deaf-mute, and at the same time the difficulty of earning his living diminishes.

Acoustic Exercises in the Education of Deaf-Mutes. By Dr. SCHWENDT (Bâle).

1. Remains of hearing-power must be taken advantage of when they are present in sufficient quantity. The patient should be able to hear vowels and a certain number of consonants. This corresponds to a hearing-power for la^3 to la^4.

2. Education of the ear must not interfere with lip-reading.

3. To judge of the results of the method the semi-deaf ought to be separated—at least as an experiment—from the deaf-mutes.

Surgical Treatment of Aural Sclerosis. By F. SIEBENMANN (Bâle).

The question whether aural sclerosis can be treated surgically must, at the present time, be answered in the negative. Almost all aurists who have undertaken operative treatment are agreed that good results are obtained only in dealing with conditions resulting from old suppurations and from hypertrophic catarrh, and even in these the indications for operation and the results are quite uncertain.

The pathologico-anatomical conditions found in sclerosis are in themselves enough to warn us against surgical interference. In this connection it is to be noted that v. Troeltsch's sclerosis must be sharply distinguished from (1) all forms of closure of the tubæ, (2) results of previous middle-ear suppurations, (3) diseases of the nervous system implicating the acousticus. To the latter belongs presbyacousis, which begins generally between the ages of forty and fifty, seldom earlier, and in which the middle ear remains free from any changes.

The juvenile form of progressive hardness of hearing generally begins in the second or third decennium of life (seldom later). This is the true (v. Troeltsch) sclerosis, and it is due to the formation of one or more centres of spongy bone in the dense bone of the labyrinthine capsule.

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(*a*) The part most frequently and earliest affected is the wall of the labyrinth, especially the antero-superior part of the pelvis ovalis, which in the end leads to fixation of the stapes. This (fixation of stapes) is due partly to the narrowing of the recessus and fenestra ovalis by the spongy change in the bone, partly to an ossification of the ligamentum annulare. A mass of spongy bone extends, in almost all cases, forwards and inwards to the endosteum of the lumen of the cochlea. When not too far developed this disease presents Bezold's triad of symptoms.

(*b*) It is well known that isolated foci occur in all or in individual turns of the cochlea, producing the symptoms of nerve deafness. This is probably more frequently due to chemical or physical alterations of the lymph than to pressure on the nervus cochlearis. Combinations of nerve deafness and stapes anchylosis are frequent, especially in the later stages (dysacousis of Bezold).

(*c*) The point from which these foci start and spread out is the intermediate zone between actual labyrinthine capsule and the bone derived from the periosteum.

(*d*) Surgical treatment of the labyrinthine capsule in this disease would have to remove so much bone—even in the earliest stages at which diagnosis is possible—that a great part of the membranous labyrinth (at least in the cochlea) would be torn, opened and destroyed.

Surgical Treatment of Aural Sclerosis. By Dr. Ricardo Botey (Barcelona).

1. In dry otitis surgical treatment is permissible (though even then it seldom does any good) only when the watch is heard by bone-conduction, when Rinne's experiment is negative on the diseased side, and when hearing-power is increased, even if only very slightly, by perforation of the membrane.

2. A permanent perforation of the membrane can be made, even when the meatus is narrow. But although slight improvement of hearing is sometimes obtained, yet at the end of two years the patient is as deaf as before the operation, in spite of all adhesions and membranes having been broken down.

3. Mobilization of the stapes in otitis sicca is an absolutely useless operation, because the improvement obtained, when there is any, is quite transitory. It is only justifiable in dealing with results of inflammation. But the improvement, due to the breaking down of adhesions between stapes, on the one hand, and recessus and fenestra ovalis, on the other, is not always great or decided.

4. Extraction of the malleus, incus and membrane can be

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carried out perfectly through the meatus when this is wide. The results are usually only medium or insignificant in dry otitis. They have disappeared by the end of a year, and may have given place to an increase of deafness.

5. Complete mobilization of the stapes can be done without a preliminary Stacke's operation. A piece of the outer wall of the attic can be removed through the meatus. In otitis sicca the results of this operation are not good, and are rarely permanent.

6. Extraction of the stapes is a bad operation. In sclerosis the results obtained are almost always nil.

7. In following up operative treatment of otitis sicca, modern otology has wandered into a false passage, because the lesions are probably tropho-neuroses and not otitic. Therefore none of the means adopted to modify the organs of transmission has any influence on the progressive affection of the labyrinth.

8. The author's experiments on animals are not applicable to men, because in the former the labyrinth is always intact, whilst in the latter it is always more or less affected, although with our imperfect means of diagnosis we may be unable to prove the fact.

9. The author further considers that his experiments on animals (1890) proved the uselessness of surgical treatment of sclerosis, for he found that, in spite of all his care to avoid disturbing the region of the fenestra ovalis, the plate of the stapes became thoroughly ossified and united to the fenestra ovalis, and the fenestra gradually receded owing to a thickening and calcification of the recessus which followed the propagation of an interstitial inflammation of the mucous membrane.

10. Aural sclerosis being almost certainly a tropho-neurosis, with new formation of connective and osseous tissue chiefly in the labyrinthine capsule, around the fenestra ovalis, in the cochlear canal and even in the whorls of the cochlea, the terminations of the acoustic nerve being more or less affected, it is evident that surgical treatment is of no use at all, or is at least very doubtful, in almost all cases.

The Causes and the Treatment of Ménière's Disease. By Dr. Moll (Arnheim).

Ménière's disease, or the collection of symptoms called Ménière's symptoms, consists of vertigo associated with tinnitus, deafness, or hardness of hearing, and nausea, or vomiting. Before 1861, when Ménière drew attention to this disease or group of symptoms, such cases were considered cerebral affections, because vertigo, the cardinal symptom, was supposed to be always due to intracranial

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lesions. In spite of the celebrated experiments of Flourens, the part played by the labyrinth in equilibration was not recognised.

Vertigo *ab aure læsa*, now universally recognised, arises from a temporary or a permanent affection of the labyrinth; *it is primary* if there is an intralabyrinthine lesion (hæmorrhage, syphilis, etc.); *it is secondary* if there is only an increased intralabyrinthine tension, due to lesions of the middle ear (retained intratympanic exudation, anchylosis of the ossicles, fixation of stapes, tubal obstruction) or external ear (impacted cerumen).

Vertigo, due to affections of cerebrum, cerebellum or acoustic nerve, is accompanied by so many other symptoms that the symptomatic tableau is completely changed. Reflex vertigo has given rise to much confusion. Vertigo *a stomacho læso* has withdrawn the attention of physicians from the labyrinth, whereas vertigo arising from morbid changes in nose and naso-pharynx has drawn too much attention to the labyrinth, and led to the neglect of the principal causes—a pardonable error, when we consider the intimate relations between affections of the nose and affections of the ear.

These different affections, though forming a clinical group, are far from constituting a pathological entity. It is a mistake to take apoplexy of the semicircular canals as the type of Ménière's disease, because (1) too few pathological observations have been made; (2) the etiology differs in different cases even of the apoplectic type: (3) there is too great a difference between the onset, course and termination of the apoplectic form and the other forms; (4) apoplectic cases constitute only a small minority when compared with cases arising from chronic ear disease. Seeing that Ménière's disease is found in different forms, arising from different causes, and that the symptoms are exactly the same when other parts of the ear are affected, it seems useless to restrict the name to one type of the disease. Ménière's symptoms being identical with labyrinthine symptoms, we might speak of such or such a disease, adding the qualification "with labyrinthine symptoms." But this would not be precise, because there are cases of affection of brain, cerebellum and acoustic nerve with labyrinthine symptoms, in which it is impossible to prove the existence of any labyrinthine affection. I am, therefore, inclined to follow Brunner, v. Frankl-Hochwart and others in giving up the term "Ménière's disease," and adopting instead the term "Ménière's symptoms" for all cases, but with this reservation, that a classification be made depending on the position of the affection. Thus:

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Ménière's Symptoms in—

(*a*) Disease of external ear.

(*b*) ,, ,, middle ear — (*α* acute. *β* chronic.)

(*c*) ,, ,, internal ear — (*α* hæmorrhagic. *β* traumatic. *γ* acute. *δ* chronic. *ε* toxic.)

(*d*) ,, ,, nervus acousticus — (*α* tabes. *β* neoplasms. *γ* neuroses (angio-neuroses).)

I have not mentioned cerebral affections separately, because if the hearing is intact we are not dealing with a vertigo auralis; if it is not intact, but if an aural affection accompanies the cerebral affection, we are interested in the latter only in so far as the acoustic nerve is concerned. A group of pseudo-Ménière symptoms, including the vertigo of hysteria, of epilepsy, etc., is not necessary, because careful diagnosis will exclude these forms.

The treatment of Ménière's symptoms is the treatment of the different aural lesions in which the ampullary nerves are irritated (1) by a lesion in the labyrinth, (2) by a secondary pressure, (3) by reflex action. In the first—and rarest—form general treatment is most important, whilst in the other forms the whole therapeutics of otology come into action. In the crisis repose and antiphlogistics are indicated, complete rest of body and ear, suppression of all psychic emotions and all excitement. Loud noises are to be avoided; the diet should be limited and dry, and no alcohol allowed.

To calm the labyrinthine hyperæsthesia sulphate of quinine in small doses is the best medicament, then hypodermic injections of pilocarpine (Politzer, Lucæ); ergot (Lucæ) has proved disappointing. Iodides are of value as absorbents, and also in view of the etiology (syphilis). Again, bromides are indicated for the neurasthenic condition.

For all other cases, along with general treatment local treatment is most important. Every operation that can reduce the labyrinthine pressure is indicated, from the simplest operation (such as the removal of impacted cerumen, air douche, paracentesis of the membrana tympani) up to the most serious (perforation of the fenestra rotunda, Botey and Cozzolino). Throat, nose and naso-pharynx must receive attention, not only from the etiological point of view, but also considered as starting-points for reflexes. A ridge on the septum, a hypertrophied middle turbinal, adenoid vegetations, closely connected as they are with aural affections, can at the same

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time produce reflex vertigo, and so produce a condition simulating Ménière's symptoms, though not deserving the name. I have never seen any good obtained from electric treatment. Politzer, however, has had successful results from galvanizing the sympathetic in angio-neurotic (Brunner) cases.

Section of Laryngology and Rhinology.

Summary of communications translated and abstracted by
Arthur J. Hutchison, M.B.

(*Continued from* p. 508.)

On Singers' Nodes (Nodules vocaux). By Professor Hermann Krause (Berlin).

Professor Krause describes singers' nodes as small globular structures, varying in size from a pin-point to a millet-seed, and situated in the border of the purely elastic part of the vocal cord. He goes on to say they are generally due to misuse of the voice in singing, not in speaking.

Anatomically they are fibrous structures, with cystic contents and pachydermatous covering. They displace and cause absorption of the elastic tissue.

The disturbances due to singers' nodes are the following: The production of the singing voice is difficult in certain parts of the scale, because the vocal cords cannot be brought evenly in contact with one another, and the loss of elastic tissue interferes with the singing of piano and medium notes. Further, all singing quickly causes exhaustion. Consequently the singer is compelled to find a substitute for his lost register—this he can accomplish in one way only: by increasing the tension of the cords. The tone suffers in various respects. It becomes "throaty"; that is to say, it is produced too much in the larynx, without proper assistance from the resonance chambers, or else the voice is limited entirely to the chest register. In the latter case the voice loses some of its power of expression: in the former case it loses its purity and beauty, because these depend on the combined working of vocal cords and resonance chambers, the latter adding over-tones to the fundamental note given out by the former. Further, the increased tension of the cords gives rise to pachydermia. This attacks first the small nodes themselves, then the processus vocales and the pars interarytænoidea.

Treatment.—One must attempt first to cause atrophy of the nodes by complete rest of the voice. If this fails, and if the

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