ABSTRACTS

THE EAR.

The Mechanism of Perception of Intensity of Sound. EDWIN G. BORING. (*American Journal of Psychology*, April 1926.)

The writer is of the opinion that in the long-drawn controversy over the theory of hearing not sufficient attention has been paid to the factor of perception of intensity of sound. He points out that Adrian's "all or nothing" law renders untenable the old assumption that intensity of sensation of tone depends simply on the amplitude of vibration of the basilar membrane. According to the "all or nothing" doctrine, the intensity of a single nerve impulse arising at the point of stimulation of a sense organ is independent of the intensity of the stimulus. The nerve impulses are all of the same intensity. The nerve reacts if the stimulus rises above the "threshold" value, but the current of action set up has the same intensity whatever the intensity of the stimulus above the minimum. How then can we account for the variations in the intensity of the sounds we hear? There are two obvious alternatives, either (1) that more impulses are transmitted in unit time by each nerve fibre with a strong than with a weak stimulus, or (2) that each detectable increment of loudness connotes the spread of the area of stimulation in the sense organ to an additional nerve ending. Boring adopts the second of these alternatives, and suggests a new theory of hearing, starting from this view of intensity perception. He visualises the displacement of the basilar membrane resulting from the impact of a sound impulse on the cochlea as starting at the proximal (*i.e.*, basal) end of the membrane, and travelling forward along the membrane to a distance determined by the intensity of the impulse. The louder sounds would thus affect a larger extent of the membrane, and consequently a greater number of nerve endings in the organ of Corti, than the less intense sounds. As for pitch perception, we are driven back to the old hypothesis of central analysis according to the frequency of the sound impulses. Boring admits that this view postulates the conduction of separate nerve impulses through the nerve tract to the brain at a rate up to 20,000 per second, but he contends that the possibility of such a rate of transmission has not been disproved. G. WILKINSON.

The Place of Perception of Intensity in the Resonance Theory of Hearing. GEORGE WILKINSON. (*American Journal of Psychology*, April 1927.)

The writer enters a protest against Boring's assumption that the question of analysis of tones by resonance, as opposed to central analysis, should still be regarded as an open one. He considers that the possibility of the transmission of stimuli along the auditory nerve at the required rate of at least 20,000 per second has definitely been

disproved by recent work on the nature of nerve impulse. Boring's theory is similar to the "travelling bulge" theories of M. Meyer, Hurst, ter Kuile, and Watt, the difference being that he connotes the linear dimensions of the "bulge" with intensity, and not with the duration of a single sound impulse (*i.e.*, pitch) as do the latter theories. The older "travelling bulge" theories gave a plausible solution of tone perception but failed to explain tone analysis. Similarly Boring's theory might explain intensity perception, but could not explain intensity analysis. However many musical sounds we hear together, we recognise that they have their relative intensities as well as their relative pitches. The conductor of an orchestra immediately detects whether one or other of the instruments is playing too loudly, or not loudly enough. The different sounds are perceived as separate entities, each with its proper character (*i.e.*, pitch distribution) and magnitude (*i.e.*, intensity). This is difficult to explain except on the supposition of a discrete stimulation of the sense organ at different levels, and with different amplitudes of movement at these levels.

The recognition of any difficulty in the interpretation of perception of intensity is only of recent origin, and is due to the formulation of the "all or nothing" doctrine of nerve impulses. Before the work of Adrian and Keith Lucas appeared it was assumed that intensity was related in the simplest manner to degree of stimulation, or, in other words, depended on the amplitude of the displacement of the receptor organs. The "all or nothing" law states that, if a stimulus to a receptor organ rises above a certain minimum (or limen), it will cause a discharge of energy to be propagated along the nerve fibre in connection with the receptor, and that the strength of the discharge is independent of any further intensity the stimulus may have beyond the minimum. The original experimental work on which the theory was based was concerned with motor nerves only. As there is no obvious difference in the structure, the chemical and electrical reactions of motor and sensory nerves, there seemed no reason why the same law should not hold good for sensory as well as for motor nerves. If this were so, how could the perception of intensity be accounted for? There appeared to be two possible explanations: either that for each increment of intensity an additional nerve fibre must be stimulated, or that more stimuli must be transmitted along the nerve fibres implicated in unit time. Boring adopts the first of these alternative views, and makes it the basis of the theory he has tentatively put forward. The second explanation was elaborated on theoretical grounds by Forbes and Gregg in 1916. Recently, Adrian has published experimental work on the current of action in sensory nerve fibres, which demonstrates conclusively that increase of intensity of the stimulus causes increase in the rate of rhythmic discharge of

afferent nerve impulses. "There is no evidence that an increase in the stimulus causes an increase in the size of the action current in single fibres, but the *frequency of the impulses* in the nerve trunk increases." Thus we owe the extension of the "all or nothing" law to sensory nerves to the original exponent of that law. This is a most notable advance, which will clear the ground of much unfounded speculation.

Adrian demonstrates that a constant stimulus applied *through the receptor organs* to a sensory nerve gives rise to a rhythmic discharge of afferent impulses, and that the frequency of the rhythm varies with the intensity of the stimulus. No doubt we may expect further communications working out these conclusions in greater detail, but the experimental results appear to be quite convincing. They even give us a hint as to the meaning of Fechner's logarithmic law of intensity of sensation. A study of the records reproduced in Adrian's paper shows an approximation of the number of nerve impulses to the log of the intensity of the stimulus. In the case of the current of action in the proprioceptor nerve fibres from the frog's gastrocnemius muscle, excited by stretching of the muscle, a weight of 5 grams. gave a frequency of 120 impulses per sec., and a weight of 50 grams. gave 310. In another observation a weight of 10 grams. gave approximately 180 per sec. and one of 100 grams. gave approximately 360.

An increase in the stimulus causes an increased frequency up to limiting value (corresponding no doubt to the absolute refractory period). The limit in the case of a frog's gastrocnemius-sciatic preparation was found to be 400 per sec. In the case of the cutaneous nerves of a decerebrate cat at a temperature of 25° C. the maximum number was 420, and in the afferent fibres of the vagus from the expanded lung, 450.

It seems to the writer that this "intensity-frequency" law of Adrian's must dispose once and for all of the theory of "central analysis" of pitch, or "pitch-frequency" theory, as Boring calls it. Indeed, this theory had already worn sufficiently thin by reason of the recognition of the latent period of nerve stimuli before the recent work of Adrian shivered it to pieces. It could only be maintained on the basis of a number of arbitrary assumptions for which there was no particle of positive evidence, such as, for instance, that the refractory period in the auditory nerve might be much less (by some 60 times) than that of any of the nerves for which the period had been experimentally determined, and that frequencies up to 20,000 per sec. may not only pass the nerve unchanged, but also through the various cells and synapses that lie in the tract between the receptors and the cortex. The maximum number of nerve impulses found in Adrian's experiments is 450. However, the question of the maximum number

of impulses which can be transmitted by the auditory nerve has lost its significance so far as pitch perception is concerned, for if number of impulses means intensity it cannot at the same time mean pitch. On the "frequency-intensity" basis, the number of impulses travelling to the cortex can bear no constant relation to the *number* of vibrations acting on the receptors. We are left, therefore, with relative position of the particular receptors on the basilar scale as the only possible criterion of pitch. AUTHOR'S ABSTRACT.

Two Cases of Encephalitis Lethargica with so-called Otolith Symptoms. G. WOTZILKA, Aussig. (*Zeitschrift für Hals-, Nasen-, und Ohrenheilkunde*, Bd. xiv., Heft 1 und 2, p. 312.)

In one case, it was only in the sitting posture that nystagmus showed itself, namely to the left during looking to the left and also vertical while looking downwards. In the second case (with normal cochlear function), there was no nystagmus in the recumbent posture except when the head and body were turned to the left.

The vertical direction of the nystagmus, in the one, indicated its central origin. In the same way the normal functioning of the cochlear nerve negatived the possibility of actual disease of the otolith apparatus. In cases presenting "otolith symptoms" with normal labyrinth reactions influenzal encephalitis should be thought of. In disseminated sclerosis and in cerebellar disease spontaneous nystagmus may be present only in some special position of the head. JAMES DUNDAS-GRANT.

THE NOSE AND ACCESSORY SINUSES

Some Observations on "Saddle-Nose" Deformity in Children. J. G. STRACHAN, M.D. (*Journ. Canadian Med. Assoc.*, March 1927, p. 324.)

The author advises a correction of "saddle-nose" deformity in children at the age of twelve years. He contends that little growth takes place in the bones of the face after that age and that the graft of cartilage lives, grows, and tends towards better development of the nose.

A series of sixteen cases are reported.

E. HAMILTON WHITE.

Two Cases of Foreign Body removed from the Nose after Ten Years. E. H. R. ALTOUNYAU. (*Lancet*, 1927, ii., 119.)

The author describes these cases, the second one of which was a coin in the nose in a man, aged 20. Unilateral nasal discharge and right-sided headache were the chief symptoms. Transillumination

showed the right antrum to be opaque, but puncture gave clear washings. A radiogram revealed an opaque body in the right inferior meatus. On removal it proved to be a small silver one-piastre coin, 1.5 cm. in diameter. The patient had no recollection of any coin being introduced, but recalled that, as a small boy, he had sometimes entertained friends by producing coins from his mouth previously introduced through his nose. MACLEOD YEARSLEY.

On the Treatment of Ozæna with Quillaia Bark on the ground of its Pharmacological Action on the Nasal Mucosa and Ozæna Secretion. R. PERWITZSCHKY, Jena. (*Archiv. für Nasen-, und Ohrenheilkunde*, March 1927, Band 116, Heft 3, S. 185.)

In 1926 an article in the *Zeitschrift für Nasen-, und Ohrenheilkunde* (Bd, 14, S. 256) Soyka advocated the local application in ozæna of preparations of *quillaia saponaria mollina*. The bark as obtained contains as active principles (1) quillaia acid $C_{19}H_{30}O_{10}$ (strongly poisonous), (2) sapotoxin $C_{17}H_{26}O_{10}$ (also poisonous), and (3) the carbohydrate laktanin.

Perwitzschky discusses its pharmacology and effect upon the nasal mucosa and secretions, and tabulates the results of the treatment in twenty-five cases, at all stages of the disease. The conclusion at which Perwitzschky arrives is that the saponine content has a certain affinity for the cells and secretions in question, becoming fixed by them, so as to be liberated only by alkalies. Clinically, he finds the alleged remedy useless, if not positively harmful. W. O. LODGE.

Asthma, with Maxillary Sinusitis and a Healthy Supernumerary Paranasal Sinus. W. S. THACKER NEVILLE, M.D., F.R.C.S.E. (*Brit. Med. Journ.*, 12th February 1927.)

In this case, in which the asthma had originated less than a year before the writer saw the patient, examination of the nose was negative but transillumination showed both antra dark. Proof puncture yielded mucoid material from the right antrum and some stringy mucus from the left. The next lavage yielded mucoid material from both, while on a third occasion the left antrum was negative. Operation on both antra by the Caldwell-Luc procedure revealed division of the antra by a thin bony partition into an antero-median and postero-lateral compartment on each side. In each case the former compartment was healthy, while the other was the seat of polypoid degeneration of the mucosa. Improvement resulted from the operation, but lavage had to be maintained as the patient was apparently sensitised to his own protein. The writer points out that had transillumination been neglected in this case a correct diagnosis would not have been reached.

T. RITCHIE RODGER.

Abstracts

THE TRACHEA.

The Permanent Wearing of a Tracheotomy Tube: the few drawbacks and many advantages in necessary cases, in Adults. Sir ST CLAIR THOMSON. (*Medical Press and Circular*, 8th June 1927.)

Although tracheotomy has been an established operation for over 2000 years, it is often undertaken with reluctance and after undue delay. Moreover, many surgeons display an unwarrantable haste in attempting to dispense with the cannula. It is alleged that air inspired directly into the trachea without the warming, moistening, and filtering action of the nose, may cause bronchial and pulmonary troubles. But although nasal respiration provides the physiological and most desirable route for inspired air and is of great importance to the growing child, there is no evidence that nasal stenosis and mouth breathing are of serious consequence to the adult. The symptoms of nasal stenosis in adult life are frequently the result of the accompanying sepsis.

The disadvantages of tracheotomy, therefore, are few. Social disability hardly exists, and the patient may participate in all games with the obvious exception of swimming. In the writer's experience, tubes had been worn, during a healthy useful life, for fifty and for seventy years. The latter patient was an old lady of 81 who never had bronchitis. Permanent tracheotomies should all be the low operation. The cannula is then easily concealed and controlled and does not irritate or damage the larynx.

DOUGLAS GUTHRIE.

The Intratracheal Pressure under Normal and Pathological Conditions. F. HASLINGER, Vienna. (*Zeitschrift für Hals-, Nasen-, und Ohrenheilkunde*, Bd. xvi., Heft 2, p. 302.)

During quiet respiration in the tracheotomised but otherwise normal person, the pressure in expiration was from +5 to +9 mm. water and in inspiration −6 to −9 mm. With greater rapidity of respiration the numbers were respectively +34 to +38 and −36 to −38. In a case of considerable stenosis of the larynx the pressure in expiration reached +298 mm. water and in inspiration −326. The pressure was at its maximum in the act of sneezing, reaching as high as 502 mm. of mercury (*sic*), while in coughing it varied from 256 to 384. The pressure required to produce emphysema of the tissues round a fresh tracheotomy wound or round the trachea down the mediastinum was only from 26 to 28 mm. of mercury. In softening (malakia) of the trachea the Röntgen examination may reveal extreme dilatation of the tube under increased intratracheal pressure and narrowing under negative pressure.

JAMES DUNDAS-GRANT.

The Œsophagus

THE ŒSOPHAGUS.

Congenital Stenosis and Dilatation of the Œsophagus in Children. Dr A. SARGNON. (*Revue de Laryngologie*, 15th December 1925.)

The writer reports in detail two cases of congenital fibrous stricture of the œsophagus, and one of idiopathic megaœsophagia.

Case 1.—A boy, aged 10½ years, had regurgitation of food since three months old, and constant difficulty in swallowing causing insufficient nutrition. By œsophagoscopy a stricture was found at 28 cm. from the incisor teeth, apparently thick, reddish-grey in colour, with a smooth lined circular hole in the middle, which allowed a No. 19 bougie to pass. The stricture was at the extreme lower end of the œsophagus. It yielded to gradual dilatation by bougies.

Case 2.—A boy aged 14, was much wasted. He had difficulty in swallowing since infancy. Only fluids could be taken, and these with difficulty. Radioscopy showed a stricture 6 to 7 cm. above the level of the diaphragm. This was confirmed by œsophagoscopy. The lumen admitted a No. 14 bougie. There was slight dilatation of the lumen of the œsophagus above the stricture. The case was treated successfully by dilatation with bougies.

Case 3.—A boy aged 12, with symptoms first noticed when he was 1 year old: he had great difficulty in swallowing solids from the first. By radioscopy the shadow of the œsophagus, when filled with bismuth emulsion, was three fingers breadth wide above the level of the diaphragm. Œsophagoscopy showed a flask-shaped dilatation occupying the lower half of the thoracic œsophagus 5 to 6 cm. in diameter, lined by pale, smooth mucous membrane. No. 24 bougie passed readily into the stomach. Symptoms were relieved by dilatation with bougies.

A number of cases are quoted from literature showing that idiopathic dilatation of the œsophagus not infrequently begins in early life, and is associated with spasmodic closing of the lower end of the œsophagus, not with organic stricture. G. WILKINSON.

Œsophagospasm in Infancy. Prof. JACQUES. (*Revue de Laryngologie*, May 1926.)

This article is based upon the record of two cases in which symptoms began in early life.

Case 1.—A boy aged 7, had shown signs of difficulty in swallowing since the first months of life, and who suffered in consequence from insufficient nourishment. Skiagraphy showed a supradiaphragmatic cylindrical dilatation of the œsophagus, with sacculation above the diaphragmatic sphincter. The œsophagoscope showed an opening 8 mm. by 5 mm. in diameter at the level of the diaphragmatic opening, the edges of which were normal in appearance. The stricture was dilated with bougies. Later, a gastrostomy was done, and subsequently swallowing spontaneously became normal.

Case 2.—A girl aged 2½ years, very wasted and undeveloped, had suffered all her life from crises of absolute dysphagia, accompanied by regurgitation and paroxysms of suffocative cough if attempts to give food were persisted in. The crises occurred without assignable cause, the obstruction persisting from eight to fifteen days, during which time the child wasted perceptibly. The crises were accompanied by painful cramps, and regurgitation of mucus, mixed with food debris, and occasionally slight convulsions occurred with turning of the eyes.

The writer quotes a similar case described by Frey of Montreux. In his case there was a history of congenital syphilis, and there was also hyperacidity of the gastric secretion. The part played by inherited syphilis is not clear. Apparently the stricture of the œsophagus was spasmodic, and not organic in nature. G. WILKINSON.

OTO-LARYNGOLOGY IN BORDEAUX, 1927.

(*Communicated*)

Early in April the Visiting Association of Throat and Ear Surgeons of Great Britain paid a visit to Bordeaux. The members of the Association were greatly indebted to Professor Georges Portmann for the time and attention which he devoted to them during their stay in the city.

OPERATION CASES:—Professor Portmann, both in his Clinic at the Hôpital du Tondu and at the Clinic St Augustin, performed a number of operations. Local anæsthesia was employed in the majority of them, the preparation of the operation area being very skilfully carried out by Dr Leduc, one of the anæsthetists to the hospital.

Complete Laryngectomy.—This operation for carcinoma was done under local anæsthesia; 5 per cent. novocain being used with one minim of adrenalin to 100 c.c. Particular attention was directed to the region of the superior laryngeal nerve, and the period spent in making the injections extended over twenty minutes. As a rule, Professor Portmann performs a one-stage operation, but in this case tracheotomy had been found necessary two months previously owing to the onset of urgent dyspnœa. The incision was made so as to construct a rhomboidal flap, the skin and fascia being included in it. A partial separation of the muscles from the thyroid cartilage up to the hyoid bone was effected, so as to expose very freely the superior laryngeal artery and nerve as they lie on the outer surface of the thyrohyoid membrane. The lateral muscles on the thyroid cartilage were stripped downwards, while the larynx itself was dissected upwards from the tracheal opening. Bleeding was negligible except from one branch of the inferior thyroid artery which appeared to give trouble. Ligation of bleeding points was done mainly by under-running them. After the larynx had been dissected upwards—and this included the greater cornua of the thyroid cartilage—the pharynx was cut into posteriorly. The suture of the pharynx was carried out first transversely and then horizontally, the patient being asked to swallow so that the surgeon was certain that there was no leak and the suture line was watertight. A nasal feeding tube was inserted. There was no reinforcement of the suture line by muscles, in fact some of the redundant

infrahyoid musculature was removed, the pharyngeal wall thus forming a gutter running to the tracheal opening. Iodoform gauze plugs were packed in laterally and the skin-flap sewn across, the plugs lying under the edge of the sternomastoid and projecting above and below on each side. The trachea was next sutured to the skin with strong silk stitches. The posterior wall of the trachea, however, was not separated from the œsophagus.

In the after-treatment the gauze plugs were pulled out a little each day, so that all the plugs were removed in four or five days ; rubber drains were then inserted. The deep dressing was changed once a day, but the superficial one, three or four times. The nasal tube was left in for about twenty days.

Professor Portmann confines the operation of laryngectomy to those cases in which the disease is purely intrinsic. When the pyriform sinus or the base of the tongue is involved, or when the glands are enlarged, no operation is performed.

Two cases of laryngectomy were shown, six years after operation. Both patients were well and there had been no recurrence of the growth. One was wearing a tracheotomy tube, and the other a long rubber tube passing down the trachea. One of the men had a very good pharyngeal voice ; in the other the voice was weaker and softer.

Laryngofissure.—Recurrent papilloma of the larynx in a young adult was treated by laryngofissure ; local anæsthesia was employed. A vertical incision exposed the hyoid bone and the thyroid and cricoid cartilages. Through a small incision in the cricothyroid membrane a pledget of gauze soaked in 10 per cent. cocaine was introduced into the interior of the larynx. A considerable amount of coughing was produced, necessitating an injection into the lumen of the larynx of more 10 per cent. cocaine. The thyroid cartilage was split with a knife instead of with shears, so as to avoid damaging the papilloma. Bleeding was very free and coughing incessant. After the main portion of the papilloma had been removed with the knife, the rest of the affected region was cauterised with the diathermy point.

Ogston-Luc Operation.—A modified Ogston-Luc operation was performed on a case of chronic frontal sinus disease. The anterior wall was partially removed by chisel and forceps, a severe curettage of all the ramifications of the sinus was carried out and all the mucous membrane was removed. The cavity was then swabbed with 10 per cent. zinc chloride. An opening into the nasal cavity was made rather far back ; it appeared to be behind the normal frontonasal duct. Iodoform gauze was pushed down through this opening into the nostril, the upper end projecting through the external incision just above the inner canthus. The gauze is partially removed on the third day and a small piece pulled out daily until the whole plug is finally removed at the end of a week. One of the essential points in the operation is the preliminary removal of ethmoidal cells by the intranasal method with a large Moure's curette.

Caldwell-Luc Operation.—The Caldwell-Luc operation was performed on a case of chronic maxillary sinus suppuration. Anæsthesia was obtained by injecting the superior maxillary nerve in the infra-orbital canal and the sublabial region with 5 per cent. novocain. The nasal cavity was packed with 10 per cent. cocaine. Through the canine fossa opening the entire mucous membrane of the antrum was removed and the interior of the

cavity swabbed with 10 per cent. chloride of zinc. The opening in the canine fossa was made larger than usual and extended upwards towards the ethmoid to expose more efficiently the roof of the antrum and the naso-antral wall. A curette in the inferior meatus of the nose fractured the naso-antral wall laterally into the antrum, the debris being removed with Luc's forceps; an opening was made above the inferior turbinate as well as below it. The naso-antral opening was packed with iodoform gauze in the following manner. The plug was passed through the nasal opening and then folded so that it lay in the hole below and lateral to the inferior turbinate, leaving the antral cavity free. The incision in the mouth was sutured with catgut.

In the after-treatment the gauze is pulled out gradually from the third to the seventh day; then after two days' rest, lavage is used until the discharge ceases.

Operation on the Saccus Endolymphaticus.—Portmann also demonstrated his operation on the saccus endolymphaticus in a case of vertigo. Chloroform anæsthesia was used in this case. The usual mastoid incision was made and the tissues retracted to expose the chief landmark, namely the spine of Henle. The mastoid, however, was entered below and posteriorly to this in order to expose the lateral sinus. The exposure was prolonged forwards and then a small portion of bone covering the dura mater in this situation was removed. The dura mater which is here adherent is the wall of the saccus endolymphaticus. The lateral sinus was then pressed down and the saccus opened with a long fine tenotome. A gauze strip was inserted as far as the saccus and brought out externally. It is removed in twenty-four hours. The mastoid wound was closed with interrupted sutures.

Prior to the operation Professor Portmann gave a very interesting account of his investigations into the comparative anatomy and physiology of the saccus endolymphaticus, tracing its development through certain members of the animal kingdom up to man. He was unable to support the view of some investigators who regarded the sac as a glandular organ secreting the endolymphatic fluid. Histologically he had found no elements to substantiate this conclusion. Like the rest of the membranous labyrinth the saccus belonged to a closed system.

He had resorted to experiment to ascertain its function and had found that in the cartilaginous fishes (Selaciens) this form of research could be most efficiently carried out. The endolymphatic canal terminated subcutaneously on the dorsocephalic aspect mesially just behind and between the eyes. By means of the cautery point it was possible to obliterate the endolymphatic canal without damaging the neighbouring parts, the subjacent membranous labyrinth being uninjured. This was proved by microscopic examination.

The results of his experiments on *Leiobatis postinaca* were very instructive. The animal operated on showed disturbance in equilibration in both the vertical and horizontal planes. By means of a cinematograph film the movements were carefully studied. The fish was unable to maintain itself in the water tank in the normal horizontal plane. Some of those operated upon were unable to swim in a straight line, others, again, turned round on themselves, while some presented such complex gyratory movements, it was impossible to give them an accurate description.

Oto-Laryngology in Bordeaux

Post-Graduate Instruction.—The organisation of the teaching of the specialty in Professor Portmann's Department in the Clinique St Raphael is very complete. There is an abundance of material to illustrate the anatomy of the different regions and to permit of operations on the cadaver. By means of casts and dissections preserved in the museum, the different steps of the principal operations are illustrated. Diagrams, stereoscopic photographs, skiagrams and pathological specimens are used to demonstrate many of the commoner diseases.

The course of bronchoscopy and œsophagoscopy is a practical one. Opportunities are given of practising on dogs, the animals being first anæsthetised by an intravenous injection of chloralose.

Oto-Rhino-Laryngology and Thermal Treatment in France was dealt with by Dr R. Pierret under the following heads.

I. **The Scientific Basis of Action of Medical Treatment in Oto-Rhino-Laryngology.**—To Pasteur and Lister we are indebted for the great progress made in the surgical part of the specialty, but the medical aspect of the question is much the same to-day as it was fifty years ago, except in what concerns the thermal treatment. Spas deal only with chronic affections. Thermal applications act not only on the local symptoms, but also on the general condition of the organism, on what is even now called the temperament. The inherited basic temperament is the capability of reaction of the organism to any agent; it is individual, whereas its sensitivity to external agents is general; on the other hand, acquired secondary subtemperaments are numerous, but their sensitivity is specific for a single antigen. Sensitisation (subtemperament) requires two pathogenic treatments (to say nothing of the symptomatic one). They are directed against (1) sensitisation itself; (2) the original temperament, responsible for the facility with which subtemperaments are acquired. Thermal specialised spas act in both ways.

II. **Modes of action.**—Spa specialised treatment acts on (*a*) general nutrition; (*b*) hydremia; (*c*) cellular development; (*d*) electrostatic index; (*e*) resistance to poison and toxins; (*f*) vagosympathetic regulation and anti-anaphylaxis or desensitisation; (*g*) pH point or acidobasic equilibrium.

Many experiments on animals and clinical results prove these actions, too long to explain in an abstract. It is necessary, however, to say something about pH. The pH point of the nasal mucous secretion varies for each individual, but is, normally, constant for each person; it ranges from 6·6 to 7·3. Experimentally pollens of weeds have an optimum pH point for germination, which is very sensitive to changes in the acidity of the medium; experimentally, La Bourboule and Mont Dore waters, spas where hay-fever is precisely treated, are the only thermal waters of which the pH point is unfavourable to pollen germination.

III. **Methods of Treatment.**—Apart from the question of climate, altitude and rest, there is a basic treatment common to all spas, namely, drinking the waters, taking baths, douches, massage, and so on, but these procedures act only indirectly on nose and throat diseases.

The real oto-rhino-laryngological procedures are general or local.

(1) *General*:—These aim at the dissemination of the thermal waters, or their gases, in the atmosphere of the room where the patients inhale

the mixture; this procedure is called inhalation. Inhalations are cold or warm. The cold are used in Allevard, Ax-les-Thermes, Challes, Luchon, Saint Honoré; the warm only in La Bourboule and Mont Dore. This general procedure acts only on laryngeal, bronchial and pulmonary ailments.

(2) *Local*:—They carry thermal waters or gases directly into contact with the mucous membrane of the nose, ear and pharynx. Three chief methods are employed; (*a*) humage; this is a direct inhalation by means of a special apparatus, the patient sitting in a room at ordinary temperature; (*b*) pulverisation of various kinds; (*c*) gaseous douches to the pharynx and nose, or insufflations consisting of sulphydric gas in Luchon, nebulised water in Cauterets, carbonic acid in Mont Dore, and the same gas with radium emanation in La Bourboule.

In addition to these three main methods of treatment, retronasal douches, nasal baths and gargling are used.

IV. **Indications for specialised Spa Treatment in Oto-Rhino-Laryngology.**—Neither surgical nor acute infectious cases should be sent to a Spa, but only chronic cases. For the sake of brevity, the principal ailment is first mentioned in this description and the name of the Spa required for treatment is then stated. (*a*) Eczema of the concha and auditory canal with external secondary inflammation, La Bourboule; (*b*) hypertrophic spasmodic rhinitis with or without catarrh, La Bourboule, Mont Dore; (*c*) spasmodic mucous or muco-purulent sinusitis, La Bourboule; purulent sinusitis after operation, the sulphurous Spas; (*d*) nasal and pharyngeal catarrh, with thick and constant pus, the sulphurous Spas, Ax-les-Thermes, Cauterets, Luchon, Challes; muco-purulent or accidentally purulent, the arsenical Spa, La Bourboule or milder sulphurous ones, *e.g.*, Allevard, Cauterets, Saint Honoré: mucous rhinorrhœa, hay-fever, asthma, La Bourboule, Mont Dore, and in milder cases, Saint Honoré; (*e*) atrophic rhinitis, in the first place, Challes, then Ax-les-Thermes, Luchon, Cauterets; syphilitic rhinitis, Uriage; (*f*) for disinfection of adenoids and tonsils before operation, or against persistent catarrh after operation, La Bourboule; (*g*) laryngitis, in congestive cases, Mont Dore; in sluggish cases, Cauterets; in asthenic cases, La Bourboule; (*h*) complications; 1, by extension to the bronchi and lungs, where the same indications exist as for nasal and pharyngeal catarrh; 2, by involvement of the lymphatic glandular system; La Bourboule acts simultaneously on the infection and on the lymphoid tissue itself; (*i*) according to age and sex: in the case of children, La Bourboule; for aged people, sulphurous Spas; for women, young anæmic girls with difficult menstruation, La Bourboule; for congestive cases, Mont Dore; for florid, fat women, the warm, sulphurous cures; cases with genital catarrh, La Bourboule; those reacting sluggishly, Cauterets, Luchon.

V. **The Principal Oto-Rhino-Laryngological Spas in France**:—There are four varieties; 1. *Suplhurous*, (*a*) Warm; Cauterets, Luchon, Ax-les-Thermes, all in the Pyrenees; Cauterets has fixed water, Luchon is highly radio-active and the water decomposes itself easily as in Ax-les-Thermes; (*b*) tepid; Uriage, in the Alps, also chlorinated; (*c*) cold; Challes (near Chambéry) the richest known in sulphur, Marlioz (near Aix-les-Bains) a small place, Allevard (near Grenoble) the least exciting sulphurous Spa.

2. *Undetermined or silicated*, Mont Dore alone, with its warm waters, in Auvergne (3150 feet altitude) one of the oldest Spas of France.

3. *Sulpho-arsenical*, St. Honoré, with very slight mineralisation, in the Morvan Hills (750 feet).

4. *Arsenical*, La Bourboule alone, with hot waters and the highest radio-activity, also chlorinated and bicarbonated, in Auvergne (2700 feet), the third and most important Spa of France.

Finally, it must not be forgotten that in some cases it is useful to send rheumatic cases before taking a specialised cure to a strictly metabolic Spa, as Vichy or Aix or others; the patients suffering from urinary diseases to Vittel or Contrexéville; from kidney troubles to Saint Nectaire or Evian; hepatic troubles to Vichy; intestinal to Chatel-Guyon or Plombières; diabetes to Vichy or La Bourboule or Vals; and so on.

It is indeed an absolute law that oto-rhino-laryngological diseases always involve a general reaction of the organism, and treatment in specialised spas is always directed not only against the local symptoms but also against the general disorders: that is one of the most important secrets of their good results.

REVIEWS OF BOOKS

Diatermia en Oto-Rino-Laringologia. Dr LUIS SAMENGO. Pp. 220 with 105 illustrations. Buenos Aires: Andretta & Rey. 1926 $8.00. (Coleccion Medica Argentina.)

In this book Dr Samengo describes the principles on which the high frequency current is applied in the practice of Oto-Rhino-Laryngology, and also in great detail the technique of Diathermy in all the regions concerned. A general account is followed by the technique of local anæsthesia. Then comes a description of the various forms of apparatus for producing the high frequency current, with discussion of their relative merits and much practical information, which would be invaluable before completing the installation of an outfit.

Dr Samengo has exercised remarkable ingenuity in designing electrodes, for he describes and illustrates them of almost every conceivable form, needles, olives, spheres, discs, knives, scissors, saws, and forceps. There is also the diathermy snare. Of this last he says, "The wire remains cold during the application of diathermy, whilst the wire of the electric snare is raised to a red heat by the current which traverses it: when a portion of this wire fails to remain in contact with the tissues, its temperature rises rapidly at this point and the metal fuses." This advantage of the diathermy snare is probably not generally appreciated. The number of different electrodes is enormous and includes the application to such instruments as the forceps of Hartmann, Escat, and Barwell, and also various instruments for intra-laryngeal work. There is also an application of the electric current for