Miscellaneous

Sir JAMES DUNDAS-GRANT said that if laryngo-fissure were done in this case, it should be carried out in accordance with Chevalier Jackson's latest recommendation, because if one went boldly through the thyroid cartilage, one would cut into the middle of the tumour. Jackson had shown that with a small saw the operator could cut down through the cartilage without opening through the soft parts, and when the cartilage had been separated, the soft parts could be detached, and one could judge as to how much could be removed. He (the speaker) was not sure that this growth was malignant.

Mr J. F. O'MALLEY said that two years ago his view was that the growth was carcinoma, and in this he was supported by some members of the Section. The man's teeth were bad, and he advised their removal. The case then came under Mr Cleminson, who obtained a report on a portion that it was papilloma, but the growth was now considerably larger, and he still suspected it was malignant.

Dr IRWIN MOORE said he did not think the growth was attached to the cord; he believed it emanated from the sacculus laryngis; he took it to be a chronic hyperplasia of a fold of the sacculus, or else a fibroma. He thought thyro-fissure was indicated in this case.

Mr CLEMINSON (in reply) said he considered it was on the border-line between a malignant and a simple papilloma; at present the cord was not infiltrated. If left for a year it might become definitely malignant; therefore it was safer to do thyro-fissure, and he would remember to do it so as not to wound the tumour by the initial incision, as Sir James Dundas-Grant had suggested.

ABSTRACTS

MISCELLANEOUS.

Psicain, an artificial cocain. E. WATSON-WILLIAMS. (Specimens, etc., shown at Royal Soc. of Med., Sect. of Laryngol., 7th Nov. 1924.) (*Brit. Med. Journ.*, 3rd Jan. 1925, p. 11.)

Psicain is the acid tartrate of an artificial isomer of cocain; alkaloid content 67 per cent. It is soluble in water, making an acid solution. This is unharmed by brief boiling, and keeps well with the addition of $\frac{1}{4}$ per cent. Ac. Salicyl. to inhibit moulds.

Used in the nose, 7 per cent. psicain gives the same anæsthesia and ischæmia as 5 per cent. cocain hydrochloride. The new alkaloid has therefore the same anæsthetic value as cocain.

The experimental toxicity of psicain in guinea-pigs is three-fourths that of cocain hydrochloride; the new alkaloid has the same toxicity as cocain.

It is probable that excitement, fainting, etc., will not readily be produced by psicain. It may therefore be useful for persons easily

influenced by cocain; and will probably not be subject to abuse by the addict. It is a "Dangerous Drug." As minor disturbances do not arise to warn the surgeon that the clinical dosage is becoming too large, psicain should only be used by those accustomed to use cocain, and the dosage should be carefully regulated. The price of psicain is not yet published. (AUTHOR'S ABSTRACT.)

The Use of Tutocain in Rhino-Laryngology. G. RIEDEL. (*Münch. Med. Wochenschrift*, Nr. 24, Jahr. 71.)

The exact composition of tutocain is not mentioned, but it is a synthetic preparation made by Bayer & Co., Leverkusen.

The writer states that they have employed this substance in the clinic of Professor Schiebe of Erlangen for the past year for the production of local anæsthesia in the nose and pharynx. It has not proved sufficiently powerful for laryngeal work, at least in the strengths used. It is claimed to be a good anæsthetic and to be cheaper and less toxic than cocain. It is soluble in water and may be readily sterilised by heat. A 5 per cent. solution has been found to be efficient for the various purposes for which it is employed. A suprarenal addition is advisable for hæmostatic purposes.

JAMES B. HORGAN.

Report of a Death from Cocain Poisoning. Dr A. M. ADLER. (*Laryngoscope*, Vol. xxxiii., No. 11, p. 889.)

A male patient, aged 34 years, was prepared for submucous resection of the nasal septum in the usual way. Preliminary to cocainisation he was swabbed with one application of adrenalin, 1-1000. One thorough application of 10 per cent. cocain was made with a cotton-wool applicator. In a short time, before the operation commenced, the patient complained of a pain round the heart, went into a clonic convulsion and respiration ceased. He had so far been seated and was now placed in the prone position. The pulse was rapid and feeble and pupils widely dilated; the respiration did not recommence in spite of every effort. The cocain was analysed and found to contain 8.65 per cent. of cocain. No post-mortem was obtained and the amount of cocain used is not stated. ANDREW CAMPBELL.

Injection of the Gasserian Ganglion with Alcohol. M. TAPTAS, Constantinople. (*Bulletin d'Oto-Rhino-Laryngologie*, Paris, Sept. 1924, pp. 12 and bibliography.)

The author recalls his publication in the *Presse Médicale*, of 7/10/11, wherein he first described his method. For alcohol injection of the Gasserian ganglion as a method of treating *tic douloureux* he claims

certain advantages. The relief is as certain as by open operation, the comparative risk is trivial. A patient may be treated at the "office" at the time of his first consultation. Results endure seven or eight years or more; the procedure can be repeated if necessary. Although not especially dangerous, certain complications may follow destruction of the ganglion, and only cases which resist milder measures should be hus treated. The most severe types are amenable to treatment.

Two routes are available for injecting the ganglion. The author's is as follows: Under anæsthesia by novocain and adrenalin, a 6 cm. needle is entered at right angles to the sagittal plane, below the zygoma midway between the angle of the orbit and the margin of the tragus. It is directed slightly upwards and forwards, along the great wing of the sphenoid, until at a depth of 3.5 cm. it strikes the pterygoid process. Thence directed slightly backwards, the point enters the foramen ovale. An injection is then made of some drops of 80 per cent. alcohol containing novocain and adrenalin: a sharp pain is felt in the lower jaw and temple, which become forthwith anæsthetic. Should the needle pass too far in, the injection enters the naso-pharynx; if it has been directed too far back, the alcohol passes by the Eustachian tube into the middle ear, where it causes severe pain. Having ascertained from the results of the first injection that the point is really in the foramen ovale, the operator passes the needle 1 cm. further, directing it upwards as much as possible, and injects a further 1 c.c. of the solution. If this is successful, complete and permanent anæsthesia of one-half of the face and head results.

Dr Taptas next describes the method of Härtel, by passing the needle behind the tuberosity of the maxilla. He compares the advantages of the two methods. By his own, though it is not always so easy to enter the foramen, the injection of the ganglion from this point is simple and certain, and there is much less risk of injecting the meninges. Sometimes one method succeeds, sometimes the other; ossification of the pterygospinous ligament is a bar to either. [An illustration would much assist this part of a rather complex description.—E.W.-W.]

Passing to the results seen in the 32 cases treated, the author describes certain accidents. Contrary to expectation, deep hæmorrhage is not of serious import. Injection of the meninges causes vertigo, vomiting, etc.; these symptoms disappear in the space of a few hours. Corneal ulceration led to destruction of the eye in one case. Three cases had facial paralysis; of these two had corneal trouble, but following blepharorrhaphy this subsided. Corneal ulceration is thus less common in this series than in certain others reported. Satisfactory relief of pain followed in the 32 cases treated, of which one had a bilateral injection. As to late results, 15 cases were traced. Of these, 7 had died without return of pain: the average duration of survival was

six years: 5 are still alive, without further pain: the earliest case has lived eighteen years, the average time being seven years: two cases required a second injection, and one a third, and are alive and well.

E. WATSON-WILLIAMS.

The Treatment of Erysipelas, especially of the Head. Dr med. BIRKHOLZ, Annaberg i. Erzgeb. (*Archiv. für Ohren-, Nasen-, und Kehlkopfheilkunde*, 111 Bd., 3/4 Heft.)

Birkholz speaks in the highest terms of the value in erysipelas of intramuscular injections of caseosan, a 5 per cent. sterile solution of casein, in doses of 0.5 c.c. in children to 1.0 c.c. in adults. Notes of 12 cases thus treated demonstrate a striking diminution of the fever and subsidence of the local inflammation after the injections. The question of active immunity and its production by non-specific agents is discussed from the historical and theoretical point of view, and a bibliography is appended. WM. OLIVER LODGE.

Chlorine as a Therapeutic Agent in Certain Respiratory Diseases. EDWARD B. VEDDER, M.D., Lieut.-Col. Medical Corps, U.S. Army, and HAROLD P. SAWYER, M.D., Captain Medical Corps, U.S. Army, Edgewood Arsenal, Md. (*Journ. Amer. Med. Assoc.*, 8th March 1924, Vol. lxxxii., No. 10.)

The writers have investigated the action of chlorine gas on infections of the respiratory tract and have found it of distinct value in curing or improving various acute and chronic inflammations. They use chlorine in concentrations sufficient to kill the organisms, but not strong enough to irritate the mucous membrane. They claim that inhalations of chlorine of a concentratiton of 0.015 mg. per litre for one or more hours have a distinctly curative value on infections which are superficially situated on the mucous membrane. They also describe an apparatus for practical use in generating the chlorine in the proper concentration. PERRY GOLDSMITH.

A New Method for removing Hair from Skin Flaps in the Plastic Surgery of the Face. Dr AUREL RÉTHI, Budapest. (*Zeitschrift für Laryngologie und Rhinologie*, February 1924.)

Whenever large skin flaps are used in remedying defects of nose, lips, or pharynx, the problem of the growth of hair on the flaps occasionally presents itself to the surgeon. The writer cites several examples of cases where tufts of hair in the interior of the newly formed nose interfered very considerably with nasal breathing, although in other respects the operation was successful. When cutting a flap by the Indian method of nasal plastic, it is not always possible to stop

short at the hair limit. Dr Réthi also quotes an instance of a troublesome growth of hair in the pharynx after hemilaryngectomy and repair by flaps. A brief review of the various methods of depilation follows. The writer is not in favour of electrolysis, which is too elaborate, and also troublesome for the patient. X-rays are very uncertain and may lead to excessive scarring. On the other hand, Dr Réthi claims that his method is simple, absolutely reliable, and original. He shaves off the hair follicles from the *under* surface of the epidermis. These follicles, which project well into the subcutaneous tissues, are easily recognised, and the operation can be done without damaging the vitality of the flap. J. KEEN.

Tuberculous Cervical Glands. R. DAVIES-COLLEY, F.R.C.S. (*Brit. Med. Journ.*, 16th August 1924.)

Tubercular adenitis is probably always secondary to infection of the glands by pyogenic organisms, the latter reaching the glands by the lymphatics from the mucous or skin surface, while the tubercle bacilli are most likely carried by the blood stream; otherwise tubercular infection of the deep cervical glands draining the tonsillar area would be more frequently associated with actual tubercular lesions in the tonsils. The writer thinks there is a tendency to sacrifice tonsils too readily and that this should not be done unless the glandular enlargement continues between attacks of tonsillitis, and when less radical measures of treatment have been given a thorough trial. In cases where softening glands are associated with tonsils which obviously require extirpation, both operations should be done at the same time, as there is a risk that the tonsil operation may precipitate a state of suppuration in the neck.

By careful attention to the group of glands involved it is quite easy to determine the area from which the infection has originated.

In the writer's experience the order of frequency in a hospital out-patient department is (1) Tonsils; (2) Scalp and External Ear; (3) Teeth. T. RITCHIE RODGER.

The Rôle of Mycotic Infection in Oto-Laryngology. L. BAR (Nice.) (*Comptes Rendus*, Xth International Otological Conference.)

This useful paper draws attention to a class of infections which receive scant consideration in text-books, or indeed in the more accessible periodic medical literature. The writer points out that the various mycoses are more common than is generally supposed, and that many of them are capable of giving rise to very serious or even fatal results under special conditions in which their virulence is enhanced.

He divides the infective agents into moulds and yeasts. The first belong to the group Schizomycetes, and the second to Blastomycetes.

Moulds.—The common *aspergilli* infections of the auditory meatus are of course well known. Chloride of lime in 1-3000 solution is recommended as the best application. It is not so generally recognised that the same organisms cause nasal sinus infections, though a fair number of such cases have been recorded (see 5 cases reported by Mr H. Tilley in this *Journal* in 1915, which were investigated pathologically by the late Mr Shattock).

Öosporoses.—The streptothrix gives rise to three kinds of lesions (1) white plaques in the mouth and throat resembling thrush (2) intratonsilar abscesses; (3) gangrenous areas. The association of *öospora lingualis* with Cryptococcus linguæ pilosæ (a yeast) is believed to be the cause of melanoglossia. With regard to *actinomycosis* the tonsils and the tongue are frequently sites of primary inoculation. The disease may also start in the external or middle ear. Early diagnosis is important and the confusion with tertiary syphilis or tubercle should be avoided. Early treatment with large doses of iodides give good results in most cases, but there is great danger of the spread of the disease to vital areas, failing early diagnosis and prompt treatment.

Yeasts.—The *saccharomyces* have been occasionally found in disseminated white, thrush-like patches on the throat. *Zymonema* rare in Europe, but frequent in the United States, gives rise to papillomatous or granulomatous dermatites, and by extension, to internal pyæmic abscesses. They have also been found in the mucous membrane of the pharynx. The *Oidium albicans* is the familiar organism of thrush. It is not always confined to the surface epithelium, but can disseminate itself in the deeper tissues, and set up a general septicæmic infection. *Sporothrices* give rise to serious lesions in the mouth and throat resembling gummata, which may break down to form deep ulcerations, or even cause widely spread metastases. *Leptothrices* are really filament forming bacteria, so do not strictly come under review. Bar regards them as the causative agent of Keratosis pharyngis (though this has been much disputed). The leptothrix seems also to play a part in association with the fusiform bacillus and spirillum in giving rise to varieties in the clinical picture characteristic of Vincent's angina and stomatitis.

There can be little doubt that the true nature of these various mycoses is often overlooked, as the organisms causing them require special methods and special media for their isolation and cultivation. Possibly further investigation of this class of infections will help to solve a number of clinical puzzles for the laryngologist.

G. WILKINSON.

Miscellaneous

Ear, Nose, and Throat Complications of Scarlet Fever. J. GRANT STRACHAN, M.B. (Toronto), L.R.C.P. (London), M.R.C.S. (England). (*Canadian Med. Assoc. Journ.*, November 1924, p. 1089.)

This paper is based on the experience of the author during the previous year when 589 cases of scarlet fever came under his observation in an isolation hospital. He points out that the prompt and efficient treatment of ear, nose, and throat complications is important not only for the immediate welfare and recovery of the patient, but also from the point of view of reducing the danger of the patient continuing to be an infection carrier.

He discusses the question of the acute throat symptoms, and found that in cases where the tonsils had been previously removed the course of the fever appeared to be less severe. He refers to good results claimed to follow early removal of tonsils at the onset of the disease, but has not carried out this method. Tonsils and adenoids have been removed where indicated only after the acute reaction has subsided. This was found of great benefit to the ear and throat complications. He advises special attention to the treatment of the nose with a view to clearing up nasal complications, such as infected sinuses.

E. HAMILTON WHITE.

Clinical Observations on Affections of the Hypophysis. By E. SCHMIEGELOW. (*Annales des Maladies de l'Oreille, etc.*, March 1924.)

Five cases are reported—1. A woman of 48, complained of flushings and headaches. The left zygomatic region was more salient than the right, but there was no localised swelling. Wassermann negative. Ophthalmoscopy showed bilateral retrobulbar neuritis with optic atrophy. X-rays showed a normal sella turcica. Operation was carried out through the gingivo-labial fold, septum and sphenoidal sinuses, the latter proving healthy. The posterior wall of the sinuses was very thick and vascular, and bleeding prevented exploration of the sella. The vision in the right eye improved after the operation, however, though that of the left was unchanged. It was regarded as uncertain that this was a true affection of the hypophysis.

2. A woman of 35 had suffered from acromegaly for seven years, with intense headache. X-rays showed a considerably enlarged sella turcica. Operation as in Case I. revealed a large soft pink tumour with a mulberry surface, which proved to be an adenoma of the hypophysis. The acromegaly retrogressed and the headaches almost disappeared.

3. A man of 49 was found to have a marked bilateral hemianopsia, with very defective vision in the left eye; no headaches. X-rays showed the sella to be much enlarged. Cushing's technique was

followed and a large cyst was evacuated from the sella. The man made a good recovery but the sight did not improve.

Various forms of treatment are mentioned in this paper—X-rays, injection of Pregl's iodine and of calcium lacticum, and the various operative techniques and routes. In the last two cases, Schloffer's method was followed, the nose being split at the bridge, the septum resected through this opening, and the remainder of the operation as before.

4. A woman of 27 suffered from acromegaly, defective vision, and intense headaches. The sphenoidal sinus was thought to be at fault, but operation on that cavity had no good result. X-ray examination showed an enlarged sella which was opened by Schloffer's method, a cyst being evacuated. During the following fortnight, the patient made a good recovery, but at the end of that time she died of œdema of the brain.

5. A man of 62 had failure of vision; he was blind in the right eye, and had hemianopsia in the left. He had also loss of hair and atrophy of the penis and testicles. Operation by Schloffer's method allowed of the removal of a growth which proved to be an adenoma of the hypophysis. The patient made a good recovery.

GAVIN YOUNG.

On Diagnostic Difficulties in Diseases of the Brain. Professor GÜTTICH. (*Zeitschrift für Laryngologie und Rhinologie*, July 1924.)

The most interesting case of a series is one of glioma and meningitis as two separate conditions. The patient, an adult aged 33, was admitted with typical signs of a severe meningitis; he had turbid cerebro-spinal fluid containing diplococci. The examination of the nose showed pus in the left middle meatus, and the floor of the left frontal sinus was very tender on pressure, a sign which could be elicited in spite of the semi-comatose condition. The diagnosis seemed clear and a radical frontal sinus operation was performed, followed by removal of ethmoid cells and opening of the left sphenoidal sinus. No changes in the dura were found. The patient rapidly recovered, and at his own request was discharged on the eleventh day. The cerebro-spinal fluid had become normal, but he still showed *loss of word memory* (*amnestische aphasie*), a sign which had been noticed as soon as he began to recover.

The man was re-admitted one month later, as the signs of meningitis had returned, this time accompanied by a slight clonic spasm of the right arm and leg. It was thought that a frontal lobe abscess had formed. The wound was reopened and the dura incised with negative result. A large cerebral hernia formed and the patient

gradually sank. The post-mortem examination revealed a glioma in the left temporal lobe. This had suppurated and broken through on the surface of the brain, causing the terminal suppurative meningitis. The amnesia for words had been previously accounted for by an adjacent œdema of the temporal lobe. When this symptom persisted, the writer thinks that the diagnosis should have been revised in favour of a temporal lobe condition. It seems clear that the glioma existed before the first illness, which in Dr Güttich's opinion was an influenzal meningitis and sinusitis, the two independent of each other. From the latter illness alone the patient would probably have recovered; but the same infection caused suppuration and breaking down of the brain tumour and ultimate death. J. KEEN.

"CONTRIBUTIONS TO THE PHYSIOLOGY OF THE HUMAN VESTIBULAR APPARATUS."

I.—SENSATIONS DURING AND SUBSEQUENT TO ROTATION.

By ERNST WODAK and MAX HEINRICH FISCHER.

(*From the Physiological Institute of the German University in Prague.*)

Translated by Alexander R. Tweedie.*

IN contra-distinction to the usually employed methods of observation, our researches concern particularly the nature of the physiological sense. They refer to the "subjective sensations" ("Exakte Subjektivismus") alone, as described by our teacher A. Tschermak. This restriction makes a definite distinction between the *objective* physical stimulus and the accompanying *subjective psycho-physiological sensation* as the physiological effect of the stimulus. It was our object to utilise these methods of observation for the determination of the physiology of the vestibular apparatus.

As a preliminary measure we used exclusively for stimulus, *passive* rotation by means of a chair on ball bearings. Active rotation, as adopted by other observers, is entirely inapplicable to the study of the pure vestibular effects, since it is complicated by muscular actions and reactions. In our experiments the head was continuously fixed in a head-rest, covered with Stent's composition, and adjustable by a toothed clamp. The head-rest was supported on a rod, attached to the rotation chair, by which means we were almost able to completely exclude nausea, and thus make our observations with ease. All the experiments were carried out with the patient's eyes covered and in a dark room. The observer must be specially trained by long experience in order to make this subjective examination. One must first learn to analyse the sensations gradually, and it is most important to note these various points for the correct assessment of effects.

* We desire heartily to thank Dr Alexander R. Tweedie for his kindness in translation.

Physiology of Human Vestibular Apparatus

We differentiate between *objective* space (local stimulus) and *subjective* space (in space sensation). We regard the local stimulus as being in relation to a three-dimensional right-angled co-ordinated system, and the sensation in space as a subjective feeling corresponding to such co-ordinated system. This system is regarded as consisting of a subjective* vertical plane of sensation separating the right from the left side of the body, of a transverse plane of sensation separating the upper from the lower half of the body and of a coronal plane of sensation separating the anterior and the posterior portions. Between the objective and subjective co-ordinated systems are measurable inexactitudes, which we call "discrepancies."

The stimuli employed for testing the vestibular apparatus are movements forwards, backwards, or in a circular direction or, their combinations. Such stimuli give rise to sensations of movement of a particular quality. One must also distinguish between the character of the stimulation (modality) and the character of sensation (quality). It must be specially noted that these two do not stand in one simple relation to each other. In order to emphasise the difference between objective and subjective, it is necessary to coin special words. We use therefore the word "Vektion" to describe the sensation of movement, and subdivide this again into "Vektoriality," meaning the sense of direction of "Vektion," and "Celerity" meaning the speed of the "Vektion," and "Intensity" meaning the distinctness of the "Vektion." Further, we subdivide the sense of rotation, "Circular Vektion" (C.V.) into subjective horizontal (right or left) and subjective vertical (right or left, forwards or backwards) circular vektion. In this connection we understand the sensation of rotation around a subjective vertical axis (either to the right or the left) or around a sagittal or frontal axis.

If one rotates a person in this way ten times, for instance, to the right (ten rotations in about twenty seconds), he experiences during rotation the sensations of a subjective horizontal rotation to the right (horizontal dextro-C.V.). If this movement is suddenly stopped he has the sensation at once of a subjective horizontal sinistro-C.V. of a greater celerity. This latter phase we call *the first negative phase;* its celerity is greater than the C.V. during rotation but quickly decreases, until usually, in a short time, all feeling of rotation ceases. The examinee then feels as if he were at rest. These phenomena have already been observed by many authors (Mach, Aubert-Delage, Abels, Van Rossem, etc.), by whom they have been generally described as the sensations of giddiness after rotation. This description we wish to avoid as it is inexact, and consider that these sensations merit more accurate analysis.

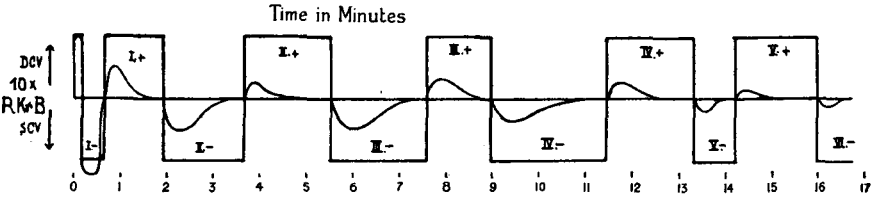
With the passing of the first negative phase, however, the phenomenon is not yet complete. After a certain interval of subjective rest a dextro-C.V. suddenly commences, that is, sensation of rotation in the same direction as that which was experienced during the actual rotation. This condition

* In the English language it is most impossible to differentiate between the two German words "wagrecht, lotrecht" (perpendicular) as physical, objective, and "horizontal, vertical" as physiological for sensation, subjective. Therefore we must, always say "objective horizontal, vertical" (perpendicular) and "subjective horizontal, vertical." If the words "horizontal and vertical" are used with C.V., they mean *always* subjective.

we designate *the first positive phase.* This sensation of rotation (C.V.), which is in no way as intensive as the first "negative phase," disappears after a short time. There again ensues a period of rest until once more a sense of rotation to the left occurs ; *second negative phase.* In its turn this is followed by a sensation of rotation in the original direction, *i.e.*, to the right (C.V.)—*second positive phase.*

*There is thus a rhythmic change of the sensation of rotation in a characteristic manner.** † The whole phenomenon lasts from about fifteen to twenty minutes. The "celerity" of each phase decreases as it becomes more distant in point of time from the original rotation. Towards the end, the examinee no longer experiences the sense of movement through a complete circle, but has the impression that he moves through a small sector of a circle ("Sector Oscillation"). Although there has been a general recognition of the first negative phase, only Bárány would appear to have recognised the existence of the first positive phase.

In order to ensure the truest possible subjective horizontal C.V. the head must be fixed in a definite position during rotation. One of these positions, as already described by one of us, consists in fixing the head-rest



so as to form with the objective horizontal support an angle open backwards of 8°. If one varies this position even in the slightest degree, either upwards or downwards, one then obtains instead of a true C.V. a combination of rotation-sensations. This position we call "The First Head Position." ‡

It is most probable that in the first head position the lateral semicircular canals lie in an objective horizontal plane, that is, they form an angle of 90° with the objective vertical (perpendicular) axis of rotation.

The lateral semicircular canals are thus in their "optimum" position, while, at the same time, the vertical canals (anterior and posterior) are in the "pessimum" position. Other positions of the head can be adopted by which sensations of pure subjective horizontal rotation are induced, and can be brought about by inclining the head on the left shoulder and rotation of the head to the right, when the right anterior semicircular canal and the left posterior semicircular canal are then placed in an angle of 90° to the axis of rotation ("Second Head Position"). In the "Third Head Position" the opposite vertical canals lie in the objective horizontal plane, that is the left anterior semicircular canal and the right posterior semicircular canal.

A definite relationship exists between the positions in which the semicircular canals are placed in these various "head positions" and their

* Naturally there are great individual differences.

† The chart shows one example of duration, sequence, and celerity of the C.V.

‡ This naturally varies in different individuals but is constant in the same person.

physiological effects. In all other positions of the head the sensations of rotation are combined. In such variations of the head position the pairs of semicircular canals must lie at varying angles to the objective horizontal plane (see below).

During the actual rotation and also during the "phases," the idea of the subjective sagittal plane undergoes a variation. We possess, as is well known, an accurate idea of the position of the body and are able with the eyes closed to indicate accurately with the hand the subjective sagittal plane. If, however, a C.V. is induced, this idea of the subjective sagittal plane of the body is affected. It varies with the direction of the C.V. If one asks the examinee in the subjective phase to point, such pointing will vary with the direction of the existing sensation of rotation. This phenomenon has a certain essence of the "pointing test" introduced by Bárány.

There is a special point to be noted as to partial rotations of less than 360°. Short passive rotations limited to under 200° are characterised by the absence of the first negative phase. In these circumstances on cessation of rotation there is a relatively short period of subjective rest, immediately followed by a C.V. sensation of rotation in the original direction. With circular movements of over 200°, we find that the phases run a normal course beginning with the first negative phase. The explanation of this remarkable condition of rotation-sensation with short rotations is as follows :—

There occurs a central algebraic sum of two opposite directed processes; the central after-effect, as the result of the rotation stimulus, together with the opposite effect—which is received by the peripheral vestibular apparatus—as the result of stopping the rotating stool. The latter corresponds to a C.V. in the opposite direction. The two factors are in conflict with each other. If, however, the central after-effect of the rotation stimulus is the greater, then the C.V. in the original direction continues after a short pause. If, however, the other factor has more force, then a sensation of rotation in the opposite direction occurs.

If one rotates a person at a constant velocity for a certain time all C.V. is gradually abolished (Mach); this fact (adaptation) has been described by different authors (Aubert-Delage, Van Rossem). In addition, the nystagmus disappears as well as the sensation of rotation, yet the vestibular body reflexes (body rotation and body leaning reflex) persist as long as the rotation continues. [A further report on this particular point will be made in a later communication.]

Up to the present we have only dealt with the pure subjective horizontal C.V., with which is associated the placing of the head in a definite position as described; if, however, a person is rotated with the head in other positions the *C.V. then becomes complicated.* Observations of this are best made during the phases. If, for instance, one rotates a person with the head erect ten times to the left (with the head clamp objective horizontal) an almost subjective horizontal C.V. to the left occurs during the rotation. After the rotating stool is stopped a dextro-C.V. suddenly takes place, which, however, is not directed round a subjective vertical axis. The axis on the contrary would appear to be inclined some 30° to 50° to the left from the vertical. After a certain time the axis leans towards the right,

while, at the same time, the right subjective horizontal C.V. is maintained; then the dextro-C.V. changes into a sinistro-C.V. with a like position of the axis. This is continued many times in different ways.

One can understand these results by remembering that the sensation complex described is the result of a combination of both the horizontal and vertical C.V. The two phases, however, run a course completely independent of each other. Certain persons are able to distinguish accurately duration and sensation (Vektoriality) of each C.V. phase. The subjective vertical phases are, generally speaking, shorter and cease earlier. The subjective horizontal C.V. thus, towards the end, persists alone.

In other positions of the head the phenomena are quite similar, and the double phase is always recognisable. However, with extreme inclination of the head forwards or backwards the analysis is often very difficult.

More than a hundred years ago (1820) the physiologist, J. E. Purkinje of Prague, pointed out that the sensation of rotation (C.V.), as the result of circular movement, has a definite relation to each alteration in the position of the head. This statement of Purkinje was confirmed by Mach, Aubert-Delage, and others. If, after ten passive rotations to the left in the first head position, one suddenly stops the rotation, the examinee then has a feeling of an intensive subjective horizontal dextro-C.V. If, however, immediately after cessation of the rotation, the head of the examinee is at once inclined about 90° on to the right shoulder, then the subjective horizontal dextro-C.V. at once is changed into a subjective vertical pro-C.V. (that is a sensation of rotation forwards and downwards around a subjective horizontal frontal axis). The sensation of rotation alone exists for a certain time. This fact was already recognised. After a short time, however, a combined C.V. was recognisable during which the vertical C.V. was again combined with the original horizontal C.V. Similar sensations thus occurred, as described above, after rotation with intermediate positions of the head. These concurrent phases of vertical and horizontal C.V. should be accurately analysed.*

If, in the manner described, one inclines (after cessation of rotation) the head on the left shoulder, then a sensation is obtained of rotation backwards, but otherwise similar results follow.

If one rotates the patient ten times to the left in the second head position (the right anterior and left posterior semicircular canals being objective horizontal in this position) the patient experiences, both during and after the rotation, a horizontal C.V. During the rotation this is directed towards the left, and after the rotation towards the right. If one now moves the head quickly into the erect position after rotation has stopped, then the horizontal dextro-C.V. is transformed again into the sensation of a rotation backwards and downwards, and with this, intense nausea occurs. It thus follows :—

The plane of the sensation of rotation (C.V.) is dependent on the position in space of each pair of semicircular canals, which are stimulated. The plane of the C.V. conforms to the plane of the stimulated pair of semicircular canals, or is parallel to the same. The planes of the C.V. and

* In some sensitive persons this experiment is almost impossible, because alteration of the position of the head causes severe and disturbing nausea.

semicircular canals are intimately related. We are thus able to reduce Purkinje's observation to a simple formula :—

By alteration of position of the head in the first negative phase, the plane of the C.V. varies in conformity with the plane of the semicircular canals concerned.

It is unimportant whether the position of the head is changed, or whether the position of the head and body together is varied. If one changes the position of the head during the first positive phase instead of during the first negative phase, or later still, the existing C.V. *will be in no wise influenced.* The original horizontal C.V. continues unaltered, and the corresponding phases alternate as above described. Purkinje's law is thus only applicable to changes of position of the head during the first negative phase, or, more accurately, only for the first two-thirds of the first negative phase. Thus it can be concluded with certainty that *the first negative phase has a definite peculiarity.* This peculiarity, according to Mach, Breuer, and Crum Brown is referable to a peripheral stimulus, which arises immediately with the cessation of the rotation. The direction of the same must be in an exactly opposite direction to that of the original stimulus during the rotation. The other C.V. phases commencing from the first positive phase are to be regarded as the expression of purely central effects of stimulus running a pendulum-like course. It is impossible to regard a periodicity of such duration and rate as due to a stimulus occurring in the semicircular canal-apparatus, which is the only other possible explanation of this rhythmic C.V. In the first negative phase, however, there exists in addition to the peripheral factor a central component in the same direction.* The two factors are able to be distinguished from one another in the following way :—

If, after rotation to the left with the head in the first position (resulting in a horizontal C.V. to the right), the head is then inclined towards the left shoulder, the effect is to produce at first a vertical C.V. backwards and downwards; since the external semicircular canal in which the peripheral stimulus occurred lies now in the objective vertical (perpendicular) plane. Soon, however, the original horizontal C.V. to the right is recognisable unchanged (the central component). It is, so to speak, as if there was burnt into the brain a negative after-image of the C.V., as the result of the now past real rotation. *Central effects are not influenced by changes of head position;* thus a horizontal C.V. remains.

Our theory must thus be formulated as follows :—

The plane of the rotation-sensation (C.V.) is dependent on the position in space of that particular pair of semicircular canals, through whose stimulation the sensation is caused and continues, as long as there is a stimulation of these canals. Of this there is still further proof. One should be able to induce the same phenomena *during rotation* by means of an alteration of the position of the head. This, indeed, is the case. For this purpose continued rotation is the best agent. By this means the examinee at length is usually under the impression that the rotation has ceased, that is to say, he adapts himself to the movement. One can attain

* Thus the great celerity and intensity of the C.V. during the first negative phase is easily understood.

this, for example, after thirty or forty rotations at a speed of 180° per second. If, therefore, for instance from the first head position the head is inclined on one shoulder, then a vertical C.V. as described occurs together with severe nausea; the same also may be provoked in the first negative phase.

One can thus also say conversely: *In the first negative phase (or more accurately at the commencement of the phase) absolutely similar phenomena occur to those which are seen during the real rotation; both can be accurately identified with each other.*

These in short are the chief results of our experiments with sensation of rotation. Further details are set forth in our German literature. In addition to the sensation resulting from rotation many other vestibular phenomena in men become easily intelligible. Therefore, great importance attaches to the more theoretical side of the experiments. In a later communication on the body reflexes vestibular in origin, and on the falling reactions in men, one should easily recognise their relationship. Thus the pointing test of Bárány is intimately connected with our experiments. It will be our duty to report further views on physiological experiments, and many interesting points should appear.

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Review of Book

Tschermak, A., "Der exakte Subjektivismus in der neuerer Sinnesphysiologie," *Pflüger's Arch. f. d. ges. Physiol.*, 1921, clxxxviii., 1-20. Also separately, Springer, Berlin, 1921.

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Wodak, E., u. M. H. Fischer, "Beiträge zur Physiologie des menschlichen Vestibularapparates, III., u. iv., Drehempfindungen und Drehnachempfindnugen," *Monatsschr. f. Ohrenhlk.*, 1924, lviii., 70-96 u. Heft. vi.

REVIEW OF BOOK

Introduction to Operations on the Ear, Tonsils and Nose (Anleitung zu den Operationen am Gehörorgan an den Tonsillen und der Nase). ADOLF PASSOW and HANS KLAUS. Leipzig: Verlag von Ambrosius Barth. 1923.

This work forms part of a large treatise on surgical operations. It is clearly written and well illustrated. The first part of the book deals with operations on the ear and gives an excellent account of the method for obtaining local anæsthesia. One is glad to see that the various operations are preceded by a short account of the anatomy of the region involved. On page 17 will be found an excellent method for preparing the excised temporal bone for operation, by embedding it in plaster of Paris. The authors are against the complete blood-clot method of dealing with the wound cavity after the Schwartze operation. The various labyrinth operations and those for the relief of intracranial complications are well described and illustrated, including the technique for operation on the jugular bulb. It is interesting to note that in the drainage of brain abscesses they do not recommend rubber or glass tubes, but prefer gauze.

Intranasal operations are exhaustively dealt with. Recent work on the methods of correcting deformities of the external nose and intranasal operations on the tear sac are described. Operations for the cure of nasal accessory sinus trouble, and also procedures for narrowing the nose in cases of ozœna are well illustrated.

In the section on the ethmoid labyrinth, Hajek's hook is illustrated but not the instruments or technique of Sluder. Operations in cases of malignant tumours of the nose and hypophyseal tumours are fully dealt with.

One is sorry to see that the section on tonsil operations deals mainly with the old method of tonsillotomy. The modern enucleation is not illustrated at all and is only imperfectly described. A case can be made out for leaving tonsils alone or for enucleating them, but surely not for "snipping a bit off." It is a pity that German writers