

EAR.

Bárány, Robert.—Temporary Depression of the Function of the Cerebellar Cortex after the Method of Trendelenburg, evidenced by the Pointing Test; Localisation in the Cerebellar Cortex. (Preliminary communication.) "Monats. f. Ohrenh.," Year 45, No. 3.

At the Physiological Congress in Vienna, 1910, Trendelenburg had demonstrated his method of non-injurious inhibition of the cerebral cortex by the agency of cold, normal saline solution at -7° being used. By this means the temperature of the dura was reduced to $+12^{\circ}$, the solution being allowed to flow through a rubber bag applied over the desired area. Dr. Kollmer had suggested that this method should be adopted in experimental research on the cerebellum of animals. It had thus occurred to Bárány that, as it was impossible to carry out his pointing tests on animals, and as the temperature of the dura could be lowered to $+12^{\circ}$ with impunity, this method might be used on man without danger, especially if the temperature were not reduced so low but were applied longer, and he had carried out investigations on these lines on patients in whom a large area of the cerebellar dura had been exposed, as often occurred after labyrinth and sinus operations. As regards the result of these tests on cases which had been subjected to the labyrinth operation, he could state theoretically what would be the direction of the pointing, if, indeed, any response at all occurred. The patient with a healed, right-sided cerebellar abscess whom he had shown at the Austrian Otological Society, whilst in the acute stages of the disease, had pointed to the right with the right arm; later on a deviation to the left with the same arm was observed. Also the other patients, in whom severe degrees of deafness existed in combination with symptoms of cerebellar disease, had all shown spontaneous deviation outwards when their pointing reaction was stimulated, whilst after rotation or syringing the deviation to the left was absent. From this Bárány had concluded that the centre for the inward movement must lie in the surface of the cerebellum immediately behind the labyrinth, and thus if one were able to inhibit this centre by cold-water irrigation then deviation outwards must be the result. Repeated investigations carried out by him on two cases, in which the labyrinth operation had been performed, resulted in the deviation of the arm and leg outwards on the operated side if the meatus on the same side were irrigated, whilst no effect took place on the opposite side. In addition the sound ear was next irrigated with cold water, which gave rise to a nystagmus directed towards the operated side and deviation of both upper extremities towards the sound side. Afterwards the ear on which the labyrinth operation had been performed was similarly treated, when, as he had expected, the arm of the sound side and of the opposite side deviated outwards. Although these tests confirmed his theoretical expectations yet he could not unreservedly accept their accuracy. The deviation did not follow with the mechanical promptness one saw in the labyrinth tests and the degree of the deviation was only slight, so that further investigations must be carried out in order to establish their true value. He had attempted to adduce further corroborative evidence by endeavouring to produce other deviation effects through action on other areas of the cerebellum. To this end he had applied water at 10° to two patients in whom, after operations on the lateral sinus, the posterior fossa had been exposed and in whom already healthy skin had covered the underlying dura. No constant results, however, were obtained. Deviation inwards

of the arm and leg on the operated side was, indeed, repeatedly noted—that is, in an opposite direction to that which was observed during the earlier tests on those patients in whom the labyrinth operation had been performed—but the reaction was not constant and was only of a slight degree. This may have been due to the intervention of the comparatively thick scar-tissue. The object of the test was to determine the localisation of the various centres in the cerebellar cortex for the various directions of deviation by means of localised application of cold. It would be most important to investigate on these lines those cases in which a growth was to be removed, and thereby to test the function of the area thus exposed when the bone had been resected just before the second portion of the operation on the cerebellum itself.

He would reserve any further remarks until he had extended his research in this direction.

[It is very unfortunate that some most important data have apparently been omitted, as this is an almost verbatim report of the paper, and the account of continued research in this direction will be awaited with great interest. As regards my own very limited experience of such tests, the main feature of the results of cold irrigation of the meatus, carried out on cases in which the cerebellum was presumably healthy, has been an outward deviation of the upper extremity on the side under observation, that is, in a direction opposite to that of the nystagmus so induced. The normal physiological reaction must be first determined and *post-mortem* evidence obtained before inference of any value can be deduced from the results of these tests in cases where disease is present.]

Alex. R. Tweedie.

v. Stein (Moscow).—Giddiness: Autokinesis Externa et Interna; New Function of the Cochlea.

[The following is chiefly a translation of Goerke's notice of v. Stein's book in the "Zentralbl. f. O.," February, 1911.]

The substance of the book is a *resumé* of v. Stein's numerous and elaborate researches, physiological and clinical, during ten years, into the functions of the labyrinth; in addition it includes an exhaustive bibliography and general review of the literature of the subject. The author begins with a historical account of the various definitions of "giddiness," and divides the various abnormal states of sensation of movement into two classes: (1) The sensation of the movement of external objects about the percipient (autokinesis externa); (2) the sensation of movement of the percipient's body, which is in reality stationary (autokinesis interna).

Both forms need to be analysed as regards their plane and direction of movement, and the nature of the movement, whether vibratory, pendulum, circular, etc., as well as their duration, speed, and relation to alterations of position. For the determination of these points v. Stein has invented a number of special tests (autokinometer, photokinometer, colour experiment), in addition to the application of better-known methods, and especially the investigation of objective disturbances of equilibrium ("Statik" and "Dynamik"). Throughout the book great emphasis is laid on the last method.

In the investigation of disease of the labyrinth it has to be determined whether there is complete destruction of the whole organ, complete destruction of a single part, ampullary crest or macula, partial interference with function in the labyrinth, disease of the eighth nerve and ganglia, or finally of the central nuclei. We have at our disposal, in

addition to the determination of hearing, objective and subjective disturbances of equilibrium. In the former category we have disturbances of co-ordination in single muscles, muscle-groups, and especially in the muscles of the lower extremities, which the author considers to be of fundamental importance. The eye-muscles afford significant evidence in the diagnosis of labyrinth disease by the occurrence of nystagmus. Among the large variety of causes of nystagmus special importance attaches to the rotatory tests, less in the author's opinion to the thermal tests, while electrical stimuli afford no sure grounds for conclusions. In v. Stein's view the muscles of the body at large are almost as intimately influenced by the labyrinth as those of the eyes, each group having its special organ in the labyrinth: the presence or absence of function with regard to the ocular muscles is apparently in his opinion quite inadequate evidence of the functional condition of the vestibular apparatus.

Subjective disturbances of equilibrium (autokinesis) require the application of a force of given magnitude (movement in straight or curved path) to bring about their occurrence in the normal: they include sensations of motion of the subject and of objects about the subject.

The physiology of autokinesis, its causation, and the locality in which the sensations arise is next discussed. All experimental and clinical observation agrees that the labyrinth is the locality of origin, not the brain. Within the labyrinth v. Stein is strongly of opinion that the sensations arise in the cochlea and not in the vestibular section. This opinion seems to be largely based on the absence of known paths of connection between the vestibular nerve and the cerebrum, while those of the cochlear nerve are well known. The reflex muscular movements and inco-ordinations are derived from the vestibular part, the sensory disturbances from the cochlea. He finds a physiology for this by the streaming of endo-lymph during rotation through the canalis reuniens into the ductus cochlearis, producing a bulging of the flexible Reissner's membrane. Centrifugal force at the same time produces a pressure on Corti's membrane and the hair-cells. v. Stein elaborates a theory for the origin of the various labyrinthine sensations by this means, and in this way localises the origin of giddiness in the cochlea.

The disturbances which follow injury or destruction of the labyrinth are ingeniously ascribed by the author to the withdrawal of those constant effects on the labyrinthine nerve-endings which are due to gravity and the centrifugal force of the earth's motion, to which the organism is adjusted, the reflex effects originating in the vestibular parts, the sensory in the cochlea. He regards the majority of the "traumatic neuroses" as the expression of a traumatic damage or concussion of the labyrinth.

Besides the function of hearing, v. Stein thus ascribes to the cochlea a long and varied list of sensory functions, which include, of course, those usually accepted as labyrinthine, and also such varied activities as the recognition of barometric changes, influence on cutaneous sensibility, influence on a number of spatial sensations, influence on nutrition and colour-fields in the eyes, etc.

At first sight much in these conclusions has the appearance of being the product of a fanciful imagination. The whole matter is, however, worked out with method and on an experimental basis, and whatever conclusion is arrived at, the author's views demand serious and attentive consideration. The main object of the work is stated by the author to be to protest against the disuse of those general investigations of the muscular system which he has always advocated in the past as essential in disease of the labyrinth, and to warn the younger generation that the

hasty diagnosis of affections of the labyrinth is often rendered impossible by the complexity of the labyrinthine functions. *C. E. West.*

Clayton, M. Brown (Vienna).—The Influence of the Radical Mastoid Operation upon the Functional Activity of the Labyrinth and the Acuteness of Hearing. "Arch. f. Ohrenheilk.," B1. lxxx, Heft 1 and 2, p. 106.

Twenty-nine cases were examined according to the accepted methods before and after operation. The following are some of the results obtained:

(1) Of the cases in which before operation the hearing (? for whisper) was from 0 to 5 metres, 30 per cent. showed improvement after healing of the wound; 10 per cent. remained as before, and 60 per cent. became worse.

(2) Of the cases in which the hearing before operation was from 6 to 9 metres, 50 per cent. improved and 50 per cent. became worse.

(3) Of the cases in which the hearing before operation was 10 metres or more, 14 per cent. improved, 14 per cent. remained unaltered, and 72 per cent. became worse.

These results bear out the opinion, generally held, that post-operative improvement occurs more often when the hearing is considerably reduced than when it is only slightly reduced. It should be noted, however, as the results here reported show, that if we take the cases as a whole the hearing oftener becomes worse after operation than it was before.

With regard to the question as to whether it is possible to foretell from the hearing and vestibular tests what the prospects are likely to be after operation, the following results were obtained:

(1) Cases in which the *hearing remained unchanged* after operation: In all there were few or no signs of intra-labyrinthine impairment or degeneration, cochlear or vestibular, prior to the operation.

(2) Cases in which the *hearing improved after operation*: The results of testing suggest that improvement may be anticipated if the upper tone limit is little or not all lowered; if the vestibular reactions are normal or nearly so; if the aerial conduction of tuning-fork *a* is normal or only slightly reduced.

(3) Cases in which the *hearing became worse after operation*. Deterioration is to be looked for when, before operation, the hearing for tuning-fork *a* is moderately lessened; when there is some lowering of the upper tone limit; when concomitant disease of the semicircular canals exists.

(4) Cases in which *severe deafness followed operation*: Severe deafness after operation is most likely to occur when the hearing for the lower tones is seriously affected and when before operation the hearing for higher tones is degraded; when the perception of tuning-fork *a* is much impaired; when the vestibular symptoms and reactions betoken grave interference with this part of the labyrinth. Curiously enough it was found that in these cases the severity of the cochlear affection after operation was not accompanied by a corresponding loss of the already impaired vestibular excitability, a finding which seemed to show that the vestibular nerve is more resistant to post-operative degenerations than the cochlear nerve.

The reliance to be placed upon these conclusions is shaken when we learn that it was found that the amount of deterioration of hearing after operation may be quite independent of the state of the function before operation. *Dan McKenzie.*