we remember the atheromatous condition of the arterial walls and the consequent irregularities of the blood supply to the brain substance. Among the exciting causes, poisons—e. g., tobacco (smokers' vertigo)—unaccustomed circular rocking movements, such as we feel on board ship, play an important *rôle;* yet it is by no means clear how these causes act, and every attempt to explain, for instance, the nature of sea-sickness, or to prevent and cure it, has thus far been futile (cf. Pampoukis, Étude pathogénique et expérimentale sur le vertige marin, Arch. de Neurol., 1888, xv, xvi). The dizziness experienced on looking down from a height—the "height dizziness"—which has erroneously been attributed to a fear of danger, is probably a reflex movement evoked by a wrong conception of our position in space, the result of a purely optical illusion; for its production not only the cerebrum and cerebellum, but also the action of the retina, is needed.

The prognosis in vertigo depends upon the nature of the primary disease, and Boerhaave's expression, "vertigo est omnium morborum capitis levissimus et facillime curabilis," has to be taken *cum grano salis.* In an organic lesion of the cerebellum—or more especially of the vermis—we can expect no improvement in the vertigo, while if it is attributable to an anæmia of the brain, occurring as a symptom of a general anæmia, the outlook is decidedly favorable.

In the same way the treatment will be different in different cases according to the primary disease, which always has to be taken into consideration. For the symptomatic or prophylactic treatment, the repeated administration of mild laxatives, the frequent use of strong stimuli to the skin, such as cold douches, brushing of the neck and the back, mustard plasters, regular bodily exercise, and well-regulated diet, are to be recommended, while any overloading of the stomach, especially in the evening, should be strenuously avoided. In spite of the much-lauded remedies (cocaine, etc.), we do not possess any reliable medicinal treatment for sea-sickness and height dizziness.

After this digression we will return to the consideration of that form of vertigo which is especially connected with aural disturbances. Notwithstanding the fact that it is by no means settled that the above-mentioned combination of symptoms constituting Ménière's disease can be produced by a pure neurosis of the auditory nerve, we will take it up here, because under all circumstances this nerve plays a prominent part in the pathology of the affection.

Since Ménière in 1861 first described the disease, it has been repeatedly observed and carefully studied by German physicians. All have, however, failed as yet to give us a clear understanding of its pathology. Ménière himself believed that an extravasation of blood or an acute exudation takes place into the labyrinth, which produces the same symptoms as occur in animals after injury to the semicircular canals. This view is in so far incorrect in that cerebral affections, accumulations of cerumen, and diseases of the middle ear, can undoubtedly produce the same symptoms; and then we have to remember that not the hæmorrhage nor the exudation, but its action upon certain parts of the membranous labyrinth is necessary before the symptoms occur (Politzer). It can easily be imagined that, whenever the extravasation stimulates the nerves of the ampullæ, Ménière's symptoms are produced, while they are absent if the hæmorrhage does not directly press upon the nerves of the antrum or the ampullæ (Politzer).

More recently Brunner (cf. lit.) has put forward a supposition which we think is worth considering, namely, that we may be dealing with a vaso-motor neurosis of the vessels of the labyrinth. According to him, the pressure in the labyrinth acts in a similar way as pressure in the cranial cavity, where considerable changes are borne so long as the normal expansion of the subdural and subarachnoid space is not interfered with. He thinks, therefore, that narrowings of the labyrinth could produce a predisposition to Ménière's disease.

This hypothesis is extremely plausible, especially as the symptoms appear paroxysmally, and in the intervals the patient is apparently in perfect health. In this way also the favorable action of quinine can be explained if we suppose that it diminishes the hyperæmia in the semicircular canals, just as Horner has shown to be the case for the retinal vessels. He observed that large doses of quinine constantly produced considerable ischæmia in the latter. The question is, however, by no means settled, especially since cases have been observed where, in spite of the absence of the circular canals (Politzer), or in spite of the fact that they were filled with blood-clots (Lucae), no disturbances of equilibrium were noted during life. Hence it may also be possible that vertigo can be produced by pressure

changes within the cranial cavity (Steiner, Deutsche med. Wochenschr., 1889, 47).

The view expressed by Peugnier and Fournier (cf. lit.) that Ménière's vertigo is a cerebral affection, and is only met with in individuals who are already insane or who will later surely become insane, certainly needs further confirmation and does not at all agree with our experience.

There are hardly two cases in which the symptoms are exactly the same, and the course is so far from being uniform that we can not be surprised if often great uncertainty about the diagnosis prevails. The onset even is very variable. Now it is sudden, with loss of consciousness and apoplectiform symptoms, etc.; again it is gradual, first, subjective noises in the ears being noticed, sometimes comparable to the whistle of a locomotive, sometimes to the rustling of the leaves in the forest. Next comes a feeling of dizziness, at times only moderate, at times so pronounced that the patient in spite of all his efforts falls to the ground. Vomiting may be present or absent. Finally, a decrease in the power of hearing, first in one, then in the other ear, becomes noticeable. Some cases show a decided progressive tendency. After short remissions the symptoms always reappear with increased severity, the vertigo gains so much in intensity that now the patient repeatedly falls with great violence, vomiting becomes more and more frequent, and the patient becomes at first incapable of following his calling, and finally is reduced to the state of a useless member of society. In rare instances periods of marked improvement, which may indeed last for years, occur. In these even the difficulty in hearing may be gradually diminished, and the prognosis becomes relatively favorable. Finally, it is at times observed that with the full development of the deafness all the other symptoms, buzzing in the ears, vertigo, and vomiting, disappear. In other words, we have what we call a relative recovery or recovery with defect. In any given case we are never in a position to predict the outcome, and have always to be very guarded in our prognosis.

Of considerable diagnostic importance is the fact that usually the examination of the drum and the Eustachian tube does not reveal any changes, and that neither cranial nor spinal nerves present any disturbances of function. Rinne's test gives variable results in Ménière's disease. This test consists, as is well known, in applying a vibrating tuning-fork with moderate pressure first over the mastoid process, leaving it there until the patient no longer hears the sound, and then as quickly as possible bringing it immediately in front of the external meatus, avoiding all contact with the head or ear. If the patient then is able to hear the sound of the tuning-fork once more, this is a sign that, as is normally the case, the conduction through the air is better than through the bone. If, on the other hand, he does not hear it, the conduction through the air must in some way be interfered with. In the diagnosis these are points to be considered.

In the treatment, above all, the action of large doses of quinine—0.7–1.0 (gr. x–xv) *pro die*—must be tried, a procedure warmly recommended by Charcot, and later used with gratifying results by Féré, Moos, and others. In many cases, as we have said, the effect is very marked, and there is no need to seek further for other medication. At times, however, this will fail, and then we are forced to resort to a two-per-cent solution of pilocarpine (nine to ten drops subcutaneously). The result is often surprising. I have seen grave symptoms completely subside after three or four days' use of this medicine. The injections are to be continued every second day for three or four weeks, and, as a rule, after the fifteenth dose the treatment can be discontinued, at any rate for a time. We need not add that on administering this drug the general condition of the patient must be carefully looked after, and any symptoms of collapse guarded against by the timely exhibition of stimulants, wine, and the like. Whether the view of Field (British Med. Journal, 1890, xvii, 5) that the action of pilocarpine is to be attributed to an increased secretion of cerumen is correct or not is as yet uncertain, although it must be acknowledged that in all cases of labyrinthian deafness the cerumen is absent.

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CHAPTER VII.

DISEASES OF THE GLOSSO-PHARYNGEAL NERVE.

The glosso-pharyngeal nerve leaves the brain between the root fibres of the auditory and those of the vagus, at the side of the medulla oblongata, by five or six filaments; these soon unite to form an anterior (small) and a posterior (larger) bundle; they both pass outward, under and in front of the flocculus, to the anterior division of the jugular foramen, through which the nerve leaves the skull. Whether the so-called jugular ganglion which the nerve presents while still inside the skull has to be looked upon as a special ganglion or only as a group of nerve-cells which have separated themselves from the petrous ganglion, which is seen on the nerve immediately after its exit from the skull, remains to be decided.

The glosso-pharyngeal has no nucleus of its own, but originates in a large collection of nerve cells, which are regarded as the nucleus common to this nerve, the vagus, and the accessorius. This nucleus is situated midway between the anterior and posterior spinal roots. In the manner in which its root fibres originate it corresponds partly to the motor, partly to the sensory type (Wernicke). It is therefore designated as the mixed lateral system (Deiters), and it is supposed that the glosso-pharyngeal originates in the upper, the vagus in the middle, and the accessory in the inferior portion of the nucleus (cf. Fig. 17, p. 96). The manner in which this common nucleus is composed is not yet understood, nor do we know how many modes of origin for root fibres of this "lateral mixed system" we have to assume. Exact data may be found in Wernicke's text-book, i, p. 155 *et seq.*

The glosso-pharyngeal, which, according to our present ideas, has to be regarded as the only genuine nerve of taste, is the third one which is to be taken into consideration in the examination of the functions of taste. The trigeminus (the third branch (lingual), possibly also the second branch) and the facial (chorda tympani) we have treated of, and it remains, therefore, to determine whether and if so under what condi-