health, and had no tendency to fever, although the temperature was remarkably high for the month of June.

I have not seen a similar accident during my fifteen years' residence in France, but I presume they are not unfrequent here, or there would be no reason for the vulgar French expression "*Mauvaise comme une chenille*." A. GILLANDER
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The Glacial Period

PROF. TYNDALL has several times called attention to a point in regard to the height of the snow-line, which seems to be steadily overlooked by those who speculate on the causes of the great prevalence of snow during the glacial epoch. It is of course well known that the height of the snow-line at any place is determined mainly by two things, viz., the depth of annual snow-fall, and the temperature of the place. If the amount of snow falling over the whole earth is to be increased, the evaporation must also be increased. ("*Heat as a Mode of Motion*," pp. 206-7. New York, 1866.) This would also raise the temperature, but the snow-line might nevertheless descend. We have a case of exactly this kind in the Himalayas. On the warm southern side of these mountains the snow-line is, nevertheless, 3,000 ft. lower than on the northern side, where the temperature is very much colder. This is evidently due to a difference in the amount of annual precipitation. Assume that the sun was at one time much warmer than now, and that since then it has been steadily cooling; and I believe you have the key to the solution of the questions asked by J. H. Rohrs, as well as to such questions as the widespread occurrence of tropical vegetation during the past ages.

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FRANK E. NIPHER

RECENT RESEARCHES ON THE LOCALISATION OF THE CEREBRAL FUNCTIONS

THE fifth part of Dr. Brown-Séquard's new "*Archives of Scientific and Practical Medicine*" contains an excellent report by Dr. Nefstel, "on some of the recent researches in neuropathology" embracing a digest of several important modern methods, recently introduced, for the purpose of analysing the functions of the different parts of the cerebral hemispheres, together with a succinct account of the results arrived at by their employment. An abstract of this report forms the substance of the present notice.

The researches of Longet, Magendie, Matteucci, and others have led to the assumption by most physiologists, that the cerebral hemispheres, especially their cortical substance, are destitute of sensibility, being the seats of origin of higher mental phenomena only. The experiments from which these conclusions were arrived at, consisted in the irritation of the hemispheres in living animals by mechanical, chemical, and electrical means; and in none were they succeeded by muscular contractions. As if to put the question beyond a doubt, Flourens removed the entire hemispheres without disturbing the muscular mechanism.

But the tendency of modern observation is in a different direction; the new researches have been made independently by several investigators, with entirely different methods, nevertheless the results are the same, contrary to that of the earlier workers; the evidence going to prove that the cortical substance of the cerebral hemispheres is in close relation with certain muscular groups, forming the "psychomotor centres" of Gudden.

Fritsch and Hitzig commenced these researches, the latter having observed that galvanic excitation of the hemispheres in the living man produced contraction of the eye-muscles. This aberrant result suggested further experiments. They irritated the cerebral hemispheres in a dog with an extremely weak current, and found that movements of certain groups of muscles followed the excitation of definite spots on the anterior convex portion of the brain, always upon the side opposite to that which was acted on; whilst the same excitation of portions of the

hemispheres situated more posteriorly, produced no effect. Thus they found the centre for the extensor and adductor muscles of the anterior extremity at the external end of the pre-frontal convolution; and somewhat behind it the centre for the flexor and rotating muscles of the same extremity. The irritation of these centres by metallic closing of a very weak galvanic current produces a single contraction, whilst the interrupted current produces tonic and gradually disappearing contractions of these muscles, followed by epileptiform movements. The anode has much more influence in producing these results than the cathode, so much so, that with a current of minimal intensity contractions can only be produced by the anode.

When Fritz and Hitzig removed in dogs the centre for the anterior extremity, this latter did not become entirely paralysed, the animal could use it, but imperfectly, and seemed quite unconscious of the condition of the limb, which could be placed into any position without attracting its attention.

Nothnagel employs a new method for the determination of the functions of the brain. His observations are made mostly on rabbits. An incision is made in the scalp, the skull is perforated with a needle. Through the canal thus formed in the bone a very small drop of a concentrated solution of chromic acid is injected by means of a hypodermic syringe with a very slender nozzle. The scalp wound is then united by suture, and the animal does not seem to be affected, except with regard to the functional derangement incidental to the lesion. Generally they survive the operation two or three weeks, and die from causes which Nothnagel cannot explain, no constitutional symptoms being developed. However, when the chromic acid is injected into the lateral cerebral ventricles death is the immediate result. On post-mortem examination, where the chromic acid was injected a minute circumscribed place appears, of a green colour, resistant and hard.

In methods employed previous to this, many causes acted to impair the value of the results arrived at; there was considerable hæmorrhage, refrigeration of the brain surface, and modification of the intra-cranial pressure, in addition to which the animal died very shortly. These are obviated by the new means just described; many fresh facts have therefore been brought to light. In one of his experiments Nothnagel made a chromic acid lesion on the surface of the cerebral cortex, which penetrated very slightly into its substance, in a spot corresponding exactly to the outer end of the post-frontal convolution. The animal appeared healthy, but it was found on careful observation that it had lost the muscular sense in the anterior extremity, on the opposite side to the cerebral lesion, it being possible to put, and retain for some time, the affected paw in strained positions. This condition passed off before death, which seems to indicate that the terminal station or the real centre for the muscular sense exists elsewhere, and that after a time other ways to it become developed.

Nothnagel found, further, a circumscribed locality in the cerebral cortex, the lesion of which produces a partial and transient hemiplegia of the opposite extremity. This spot is in front of that for the muscular sense, and deeper than it. In no other portions of the cerebral cortex, except those above mentioned, have the chromic acid lesions been followed by paralytic symptoms.

Gudden has introduced another method by which the function of the different parts of the cerebrum may be studied. He finds that newly-born animals, as rabbits, will undergo a very great amount of mutilation without interfering seriously with the nutritive functions, so that portions of the brain may be removed, and the animal will grow to full size, with no peculiarities excepting those resulting from the absence of the parts removed. The slight sensibility, rapid coagulation of the blood, and the