# SCIENCE.—SUPPLEMENT.

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## *PHYSIOLOGY OF THE BRAIN.*

THE recently published memoir of Dr. J. Steiner[1] is an especially important contribution to this very difficult field of research, and one which is likely to have influence not only from its intrinsic merit as an investigation, but also from the unusual literary excellence characterizing the author's presentation of his subject. The frog was chosen for the experiments on account of the comparative simplicity of its brain. The experiments consisted in a series of systematic removals of portions of the brain; and to the thoroughness and patience with which this system of study was executed the success must be attributed. Steiner removed first the hemispheres, and records in his memoir the observed results; next both the hemispheres and optic thalami; then the mid-brain; then the cerebellum; finally the upper part of the medulla. Then follow experiments with asymmetrical removals. Together with the description of each operation is given the account of the physiological phenomena which ensue from it. The discussion of the interpretation of the observations is kept separate, — an essential advantage to the reader.

The most important conclusion reached is, that in the anterior portion of the medulla oblongata there is a common centre for the co-ordinated movements of the head, rump, and limbs; or, in other words, that we cannot separate the three centres topographically, and can establish the fact of their organic connection. This central office Steiner names the brain-centre (*hirncentrum*). By ingenious experiments and reasoning he renders it probable that the upper parts of the brain (*bigemnia*, etc.) contain no general co-ordinating motor-centres, but only sensory centres and pathways; that is to say, they act to the brain-centre the *rôle* of centrifugal nerves, and the brain-centre is the only locomotion centre of the body.

The relation of the brain-centre to the reflex centres of the spinal cord is very remarkable, and is demonstrated by the reactions of a frog deprived of its hemispheres to irritations produced by varying strengths of sulphuric acid placed on the skin. The strength is gradually increased until a reaction occurs. The first reaction is a locomotion; a little stronger, and there is first a locomotion, and then the well-known reflex wiping motion to remove the irritant; the wiping motion causes the stoppage of the locomotion — the interpretation of this fact is that the brain (locomotion) centre is more readily excited than the reflex centre in the cord, and that the reflex centre inhibits the action of the brain-centre. This is another of the increasing number of instances of the reaction consequent upon stimulation of a given part varying with the strength of the stimulus. This discovery already appears to us of very far-reaching significance for the future of nervous physiology.

In a second chapter the author establishes asymmetrical injury of the brain as the cause of compulsory curvilinear motions (*mouvements de manège, rollbewegungen*, clock finger movements, etc.). For further details we must refer to the interesting original.

Dr. Josef Paneth brings a new contribution[1] to the solution of the vexed question whether the cortex cerebri of new-born animals is irritable. He attributes Toltmann's negative results, which are accepted in most text-books, to the use of narcotics by that experimenter, and reports thirteen experiments made by himself on dogs, of which eight gave a positive, four a probably positive, and one a negative result. It may be added that animals which are born more advanced in development (as, for instance, guinea-pigs) have been already shown to have an irritable cortex at birth. The only irritable area was half a square centimetre in the region of the sulcus cruciatus. Microscopical examination showed the absence of medullated fibres in this region, so that Toltmann's view that their presence is essential to irritability is not sustained. Paneth's results agree with those previously reached by Lemoine.[2]

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## *GEOLOGICAL SURVEY OF CANADA.*

THE Dominion of Canada embraces nearly half the continent; but the greater part of this vast area is still a trackless wilderness; and the labors of the geological survey, in its earlier decades, were wisely concentrated upon those districts in the eastern provinces and the valley of the St. Law-

[1] *Untersuchungen über die physiologie des froschhirns.* Von Dr. J. STEINER. Braunschweig, *Vieweg*, 1885. 8°.

[1] *Ueber die erregbarkeit der hirnrinde neugeborener hunde.* Von J. PANETH. *Pflüg. archiv f. physiol.*, xxxvii. 202.

[2] Lemoine, *Contribution à la détermination et à l'étude expérimentale des localisations fonctionelles encéphaliques.* Paris, 1880.