

ART. V.—THE ARCHITECTURE AND MECHANISM  
OF THE BRAIN.

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## CHAPTER II.

## THE HIGHER GANGLIA OF THE MID- AND HIND-BRAIN.

*Treating of the optic and post-optic lobes, and the cerebellum.*

IN the preceding chapter I have discussed the morphology of the, physiologically speaking, lowest cerebral centres. Not one of the grey masses described thus far, if imagined dissected out by itself, could constitute a sufficient basis for any act which would merit the designation of cerebration. Nay, all of them in the aggregate and in their combination through the associating tracts uniting them in functional union, would constitute but a very simple nervous mechanism, whose highest aspiration might be the production of co-ordinated reflex acts, such as the respiratory and deglutitory movements.<sup>(1)</sup>

If we imagined the cranial nerve nuclei and their uniting strands, as well as the peripheral nerves, separated from all connections with the higher centres, and in the light of what experimentation has taught us, analyze the phenomena resulting from their isolated functional activity, we will be struck by the uniformity of the latter. The same peripheral irritation will provoke the same reaction<sup>(2)</sup> with such regularity that this feature has given to the word automatic one of its collaterally acquired significations.

If the simplicity of function manifested by the cranial nerve nuclei was in perfect harmony with their simplicity in structure, those, physiologically speaking, higher centres which are developed in the same two lower oncephalic segments, whose ventricular grey constitutes the aforesaid nerve nuclei, may be expected to show a higher structure; and so we find it.

(8) To Forel (*Unters. über die Haubenregion*) belongs the credit of having first clearly differentiated these different constituents.

(9) In no animal have I seen the grey color of the anterior pair so well marked, and the extent of the ganglionic expanse superficially so neatly demarcated as in the hippopotamus. In the dog, which in cerebral development reaches nearer to that of the Simians than does that of the rabbit, the grey color is less distinct; in man Forel states that a slight yellowish tinge is noticeable in the anterior pair, as an indication of the atrophic cortex.

(10) The possibility that some of the fibres of this fasciculi pass directly into the lateral column, though to my mind a remote one, is not to be entirely excluded. As far as I can judge from the obscure description of Flechsig, which labors under the additional disadvantage of being ambiguous, his results derived from the embryo, agree with those I obtained from a study of the adult brain. Such a connection accepted, it would perhaps tend to explain the participation of the retina in many spinal disorders. How often is not a chronic or acute myelitis, or posterior spinal sclerosis, ushered in or accompanied by temporary diplopia, amblyopia, or by optic nerve atrophy? How frequent it is for the symptoms of spinal irritation to be accompanied by visual disturbances. It is now generally accepted that some of the most severe prodromal symptoms of organic spinal disease are not accompanied by palpable structural change, and, perhaps the diplopic and amblyopic disturbances may be due to the distant transmission of an irritative influence through the lemniscus (a most probably centripetal tract), from the seat of disease, the posterior spinal columns.

Temporary diplopia is the most constant of all the symptoms ushering in the spinal affections mentioned, particularly posterior spinal sclerosis. And in every case observed by myself, and in almost every case which has made any impression on myself in perusing the literature of the latter disease, I have found that diplopia preceded amblyopia where the latter occurred. This would harmonize with the fact that any irritative influence traveling up the lemniscus tract would first encounter the coördinating centre of the eyeball movements (deep grey of optic lobes), and only by extension further on, the superficial or visual grey and through the opto-thalamic tract, perhaps higher visual centres.

(11) Whence anatomists have erroneously confounded it with the emientia teres of mammals. The reason why it is so palpable at the ventricular floor in reptiles is that the motor nuclei are feebly prominent and fail to mask it, therefore, as they do in the mammalia.

(12) I would however note its relative reduction in size as compared with the anterior pair in the fruit-bat (*Pteropus fuliginosus*). Is this perhaps related to the relative reduction of the visceral masses and cavities in this animal?

(13) Notably by the experiments of Ott, published in the *JOURNAL OF NERVOUS AND MENTAL DISEASE*, and by the histological correspondence between the post-optic ganglia and the nucleus vagi.

(14) Probably the post-optic ganglia had a similar relation originally, in obedience to the law of segmental harmony. Even in the adult, Forel considers a relation with the fifth nerve as not impossible.