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*THE VERTEBRATE NERVOUS SYSTEM.*

*The Nervous System of Vertebrates.* By Prof. J. B. Johnston. Pp. 370. (London: J. Murray, 1907.) Price 15s. net.

THE author's aim has been "to produce a text-book of comparative neurology, giving an account of the nervous system as a whole, to trace its phylogenetic history, and to show the factors which have determined the course of evolution." He states (in the preface) that the functional point of view is the chief characteristic of the present work, but that (p. 10), as an introduction to the study of the nervous system, it deals chiefly with structure.

The work starts with a brief, though clear, summary of the various methods used in the investigation of the nervous system, and then proceeds to a very useful description of the general morphology of the same, more particularly as found in the Cyclostoma, Selachians, and Amphibia. Then follows a lucid account of the main features and processes in the development of the nervous system, especially as seen in the lower vertebrates, and valuable light is thrown on the evolution of those parts of the nervous system associated more directly with the visceral arches, spiracular and branchial clefts, and of the lateral line structures. We note the author, without hesitation, ascribes taste, or gustatory, functions to structures distributed more or less widely on the outside of the head, and in extreme cases, as in some bony fishes, on the fins and over almost the entire body, yet the true and specific function of these organs remains still to be determined.

In a brief description of the nerve elements and their functions the formulation of the neurone theory is ascribed (p. 10) to Waldeyer, in 1891, whereas this distinguished savant did little more than suggest the term "neurone" for structures the conceptions of which in this connection had been gathering strength since the days of Schleiden and Schwann, some fifty years earlier.

In discussing nerve degeneration and regeneration the author *inter alia* states (p. 90) that the proximal portion of a divided peripheral nerve remains in a healthy condition. This may be true for some of the lower vertebrates, but is incorrect for many of the higher forms, as v. Gehuchten and others have proved.

In chapters v. to xii. the author discusses with much originality and lucidity the four kinds of nervous activity, viz., the somatic afferent, somatic efferent, visceral afferent, and visceral efferent, and these chapters, together with that on the evolution of the cerebral hemispheres, may be accounted some of the most valuable in the book. The description of the neuromasts is especially useful, and though on debatable and obscure ground the whole matter is suggestively and clearly treated. However, the author not infrequently falls into the common error of confusing or using indiscriminately the term "afferent" and "sensory," and throughout the work seems more at

home with the subject as it concerns the lower than with that of the higher vertebrates, especially in connection with recent work.

Perhaps, too, reference may be made to the following assertions:—On p. 110 it is stated that "sensory cutaneous fibres emit collaterals which cross directly to the opposite side of the spinal cord." These crossing fibres have never yet been shown degenerated in a mammal, and the statement is incorrect for at least the majority of the higher vertebrates. Again, on p. 115 it is stated that "a part of the secondary neurones of the V. nerve ascend on the same side of the body," whereas recent work tends to show the contrary, at least in mammals.

In the description of the cerebellum several statements call for modification. Thus it is stated, p. 240, that "all three peduncles of the cerebellum carry both incoming and outgoing fibres," whereas many recent workers on higher vertebrates have shown the inferior cerebellar peduncle to contain only afferent fibres. Again, on p. 243, it is stated that "primary somatic sensory fibres from spinal roots enter the cerebellum directly." On p. 245 that "the direct cerebellar tract from Clarke's column ends, according to most observers, in the deep grey nuclei of the cerebellum" (instead of in the cortex of the vermis); and on the same page that "the axones of the Purkinje cells pass to the spinal cord and inferior olive," and that "the fibres passing to the Nucleus Dentatus seem to include fibres from the posterior column nuclei." With all of these statements we are in disagreement, and naturally, therefore, with deductions drawn therefrom. Moreover, we regret in the account of the cerebellum the absence of reference to the views of Hughlings Jackson, or to the recent work by Sherrington, whilst the general conception that the cerebellar cortex is a large recipient surface for afferent impulses from all parts of the body; that this gives off its efferent impulses along the fibres to the cerebellar nuclei, and these gain efferent impulses to the bodily structures as advocated more particularly by Clarke and Horsley, Déjerine, Thomas, Klimoff, &c., seems insufficiently emphasised.

The last chapter offers briefly a review of the more important facts concerning the neopallium, and would have been more useful had it in the discussion of the sensori-motor areas treated of such sub-divisions as the audito-sensory, audito-psychic, visuo-sensory, and visuo-psychic, which are not mentioned; and had the motor area not been depicted as involving the post-central gyrus which Grünbaum and Sherrington disproved for Anthropoids, and many surgeons have disproved in man.

On the whole, the book gives the impression of having been written by an able zoologist interested in neurology, rather than by a pure neurologist, and therein lies a good deal of its value. No more abstruse problem has ever been presented to man than that of the vertebrate nervous system, and in the present work the author presents a very readable and succinct account of his subject, which forms a valuable and welcome addition to the literature relating to it.

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