

ating in bronze, and their rudimentary writing), while it also absorbed certain elements from the primitive Neolithic civilisation of the original "Ligurians" of the Tiber valley. Finally (*tantae molis erat Romanam condere gentem*), there came the Etruscans, at about the same date as the Umbro-Sabellians. The Etruscans, according to Prof. Modestov, who accepts, and fortifies by archæological evidence, the testimony of Herodotus, were a people from Asia Minor, who came by sea to Tuscany, bringing, *inter alia*, Eastern methods of divination which they had borrowed through the Hittites from Chaldæa. To corroborate this view, Prof. Modestov alleges the conclusions of a Danish scholar, who seeks to connect the mysterious Etruscan language with the dialects of the southern Caucasus. Here Prof. Modestov seems somewhat inconsistent, for while he compares the archæological relics of the Etruscans with those of south-western Asia Minor, he compares their language with the dialects of the north-east.

We should be ungrateful if we did not mention the many illustrations, for the most part original, with which the author has ornamented his book and sought to aid his readers. The Etruscan illustrations are particularly interesting.

ERNEST BARKER.

THE FUNCTIONS OF THE BRAIN AND SPINAL CORD.

The Integrative Action of the Nervous System. By Dr. C. S. Sherrington, F.R.S. Pp. xvi+411. (London: Archibald Constable and Co., Ltd., 1906.) Price 16s. net.

THE unravelling of the arrangement and complications of the nervous system has always been of great interest, not only to physiologists, but also to mankind in general. The specially human attributes which distinguish our species from the rest of the Mammalia have at least an intimate connection with the superior development of the central nervous system, and we have therefore a peculiar interest in tracing the methods by which this complexity is of advantage to the individual.

The central idea of the book under review is the action of the nervous system in connecting the various cells composing the body into one individual, as distinguished from a mere collection of separate items. While there are other agencies that work to this end, mechanical as well as chemical, still the nervous system is preeminently effective in this respect from the delicacy and speed with which the intercommunication is effected. The unit reaction, to which all the complex phenomena of nervous activity are referable, is recognised to be the "simple reflex action."

The recognition of this definite unit, in place of the vague generalities too often quoted, marks the first important step in the study of the subject.

Prof. Sherrington then goes on to show that the anatomical basis underlying this simple reflex consists of three parts:—(1) the *receptor*, the sensitive organ which receives the impression; (2) the *con-*

ductor; (3) the *effector*, the organ which effects the reflex act.

The various details of the apparatus are then considered. By an arrangement of this kind the threshold is lowered for one kind of stimulus and heightened for others, so that the reflex becomes selective. The phenomena called out by these stimuli are then considered, namely, the irreversibility of the direction of the impulse, the long latent period, and the rhythm of the action. By the method of "successive degeneration" it is possible to examine the conductor apparatus, and the conclusion is arrived at that the simple reflex arc is at least *disynaptic*, that is, composed of three separate neurones as a minimum, that the "effector" part of the arc is a "final common path" for all the reflexes using the particular end organ attached to it, and that somewhere in the "conductor" (the part of the arc connecting receptor and effector) there is some mechanism which gives a refractory phase. The importance of this is seen when such a phenomenon as the scratch reflex is examined, as this consists of a rhythmic series of movements the rate of which is governed by the purpose for which the reflex acts, and not by the rapidity of the successive stimuli. Further, as such a reflex is a coordinated action, there must be rhythmic *inhibition* of a series of muscles as well as rhythmic *contraction* of the opposing set, and by a series of well-devised experiments and careful consideration of the results the author again makes an important advance. This becomes more evident when the next chapter of the story is considered, namely, the compounding of reflexes, and the method by which one reflex becomes prepotent over another which would use antagonistic muscles.

The limited space at a reviewer's disposal will not permit the further description of Prof. Sherrington's account of the functions of the cerebral cortex and the very ingenious experiments on sensual fusion, but it will be found that the later chapters of the book possess the same wealth of information and lucid reasoning as the earlier. The only criticism that might be gently urged is that occasionally the language in which the reasoning is conveyed becomes nearly as complicated and abstruse as the subject-matter of the discourse. Sometimes, however, this recondite phrasing hides gems of humour as well as knowledge, as in the sentence on p. 317:—

"Into that sequestered nook the organism by appropriate reactions gathers morsels of environmental material whence by chemical action and by absorption it draws nutriment,"

which by careful examination of the context appears to mean "Tommy ate a piece of cake!!!"

But, jesting apart, we have in this book the most valuable contribution to the comprehension of the functions of the nervous system that has appeared up to the present time, not only from the records of the experiments quoted, but also from the logical and orderly way in which the due inferences from the experiments are put forward, and the volume stands out as a landmark in our knowledge of the subject.