school course, they are to be *tried over* at Greek for just the most precious years educationally, and our modern world is to have the broken fragments. This claim is pressed even more impudently by Mr. Livingstone in his recent "Defense of Classical Education." He insists that all our sons are to be muddled about with by the teachers of Greek up to at least the opening of the university stage, entirely in the interests of Greek scholarship. Professor Keeble's dream of "sweet reasonableness" is a mere dream. These classical people are absolutely ignorant of their own limitations; they can imagine no compromise; they mean to ram compulsory Greek down the throat of every able English boy they can catch, and they mean to load the scales in favor of Greek at any cost to science, philosophy and national well-being.—H. G. Wells in *Nature*.

SCIENTIFIC BOOKS

Human Physiology. By Percy G. Stiles. Philadelphia, W. B. Saunders Company, 1916. Pp. 405.

The announcement in the preface, the "purpose is to present concisely the accepted facts with only a limited description of the experiments by which these facts have been established," gives an idea of the scope and nature of the book. There is the further qualification that books of this sort are at fault if they do not make it plain that "unsettled questions confront the investigator at every turn."

Little of historical importance is mentioned, the omission being purposeful. It is an open question in the mind of the reviewer whether the student should not have some knowledge of the history of science as well as of wars and "low ambition and the pride of kings." If necessary, low ambition could be found in the history of science.

While strongly inclined to view with great charity the author's confession of a feeling akin to guilt because he has not acknowledged all the illuminating ideas and happy teaching devices which he owes to his contemporaries, the reviewer can not wholly suppress the wish that such a feeling might become highly contagious and assume a grave form among authors of text-books and the writers of papers generally. The full acknowledgment of such obligations might dim individual brilliance at times, but science would not be the loser thereby. The author's "atonement" might have been more complete if he had included the works of Ott, Stewart and Tigerstedt (English translation) in the list of collateral readings at the end of the book.

In the brief statements of a historical nature on pages 15 and 16, one finds but little mention of the influence of French investigators in physiology. A statement of Professor Howell is so pertinent in this connection that I venture to quote it.

> The establishment of physiology as an experimental science is usually attributed to Johannes Müller and his pupils or their contemporaries who fell under his influence. But as I read its history, its modern characteristics, whether for good or for evil, owe their origin as much to the French as to the German school. Johannes Müller himself was not preeminent as an experimenter—he made use of anatomical rather than physiological methods; but his contemporary Magendie was a typical modern physiologist, and whatever may have been the extent of his personal influence during life, there can be no question that his methods of work and his points of view are the ones that were subsequently adopted in physiology.

On this point, the reviewer is in full agreement with Howell. In the present world conflict of ideals and ideas, even such minor considerations as these should not be wholly lost sight of.

One departure from the usual method of treatment is found on page 95. In the legend of Fig. 22 the author states that the coordinating center for the reflex, a part of whose path is shown, is left undetermined. Evidence is accumulating that the location of the coordinating center for a reflex varies for different reflexes in the same animal, and for a reflex of essentially the same nature in different species of animals.

One might take exception to the statement on page 116 that "We are not usually aware of the nerve currents that arrive in the cen-

tral nervous system from the labyrinth." Crum Brown's statement of the function of the semicircular canals was "the perception of the change of aspect of the head in space." This statement has stood the test of criticism and one usually is aware of the change of aspect of the head in space.

The easy-going husband and the nagging wife find their counterpart in the ventricles and the auricles of the heart, p. 257. A declaration of independence on the part of either husband or ventricle leads to domestic infelicity.

On the whole, the book fulfills its particular purpose better than any other with which I am familiar. Writing such a book is a particularly difficult task, and the author has succeeded better than most. There are many new diagrams of unusual clearness.

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GOODALE'S EXPERIMENTS ON GONADECTOMY OF FOWLS

IT has long been known that the removal of the testes of the male fowl does not affect materially the complete development of the secondary sexual characters of the cock, although a critical examination of the results has been much needed. The change of the hen's plumage into that of the cock, a change that occasionally takes place in old age, or when the ovary has become diseased, is also a matter of record, but the evidence for this has been rather anecdotal than detailed. Both changes have now been carefully studied by Goodale in a series of carefully planned experiments carried out through a series of years, mainly at the Station for Experimental Evolution of the Carnegie Institution. The results[1] have been published recently by the Carnegie Institution. The excellent colored drawings that illustrate the results greatly enhance their value.

[1] "Gonadectomy in Relation to Secondary Sexual Characters of Some Domestic Birds," H. D. Goodale, Carnegie Institution of Washington, 1916, No. 243.

The operation was made on Rouen ducks as well as on fowls (Brown Leghorns) and the results are in agreement in all essential respects. Complete removal of the testes either from very young, or even from older birds, does not cause any lessening of secondary sexual plumage, although in a few points the capon differs in plumage slightly from the normal cock and in a few minor points also other than plumage. The complete removal of the ovary of the birds is an extremely difficult operation and is rarely entirely successful. Failure to remove all of the tissue gives an opportunity for regeneration of the gland, which completely nullifies the attempted experiment. When removal of the ovary was complete (as shown by subsequent dissection) the duck and hen assumed the male plumage. When the very great differences in the plumage of the Brown Leghorn hen and cock and of the Rouen duck and drake are recalled, the change is startling; for it involves not only the transformation of the brown plumage of the hen into the brilliant red and black of the cock, but involves likewise a change in the shape of many of the feathers, notably those of the hackle, back, saddle and shoulder as well as minute details in the barbules. Goodale exhibited such a cock-feathered hen at the Christmas meeting of the Naturalists, as well as one case in which the testes had been removed from a young cock and an ovary engrafted in their place. The presence of the latter had prevented the cock, when adult, from developing the characteristic male plumage. He resembled a hen in essentially all plumage characters.

Into the details of the work it is not possible to enter here—details that involve the effect of incomplete gonadectomy, the possible influence of other organs in the neighborhood of the gonad, the relation between the juvenile plumage and that of the adult female, and in the case of the ducks the effect of gonadectomy on the nuptial and eclipse plumage. Several results here obtained are entirely new and a number of problems raised heretofore unsuspected.