

student served incidentally to emphasise the fact, already known, that civilised feet, as a result of tight and badly made shoes, are losing their natural powers. Another series of experiments showed that exercise producing a gain in growth of one arm caused a similar, though smaller, gain in the other arm. "Here it would seem," remarks the author, "is a provision by nature to prevent a one-sided development. If the right side of the body received all the benefit of its excess of exercise over the left, it would tend to outgrow it in much greater proportion than is actually the case." A series of experiments with the dynamometer showed similarly an increase of strength on the opposite side. The general conclusions were that the effects of exercise may be transferred in a greater or less degree from the parts practised to other parts of the body. This transference is greatest to symmetrical and closely related parts. There is thus a close connection between different parts of the muscular system, through nervous channels, the connection being closer between parts related in function or in position. Will-power and attention are educated by physical training, and when developed by any special act they are developed for all other acts. The most important effects of muscular practice are thus more central than peripheral, and the chief central effect is the education of the motor centres, the development of attention and will-power being secondary.

HAVELOCK ELLIS.

A Study of the Relations between certain Organic Processes and Consciousness. (*Psych. Rev.*, January, 1899). *Angell, J. R., and Thompson, Helen B.*

Since Mosso, Lehmann, and Féré first investigated the relationship of organic processes to psychic processes, there has been a tendency to believe that agreeable sensations of emotional tone are connected with dilatation of the peripheral blood-vessels, and disagreeable sensations with constriction. Some of the more recent investigations tend to throw doubt on the conclusion, and reference may be specially made to a series of researches recorded in this paper. The experiments consist of two very complete series of tests carried out on two subjects with Hallion and Comte's air plethysmograph for the capillary pulse tracings, and a modified form of Bert's respirator for recording the breathing curves. Eight plates showing the curves accompany the paper. These curves show no evidence of any marked and constant correspondence of agreeable states with one set of physiological processes and disagreeable states with an antithetical set. None of the various factors involved—vaso-motor level, rate and amplitude of pulse curve, position and emphasis of dicrotic notch, rate and amplitude of breathing,—change uniformly in one direction for agreeable experiences, and in the opposite direction for disagreeable experiences. Almost all the emotional experiences, pleasant or unpleasant, produced vaso-constriction, a result which the writers hold to agree with what the work of Mosso and Binet would lead us to expect. The search for uniformity in regard to the action of sensory stimuli proved as fruitless as in the case of emotional states. The great majority of the sensory stimuli produced vaso-constriction, and the few cases of pronounced vaso-

dilatation do not correspond to distinctly pleasant stimuli. The most pleasurable stimulus, harmony, caused constriction, and unpleasant odours, like camphor and capsicum, sometimes caused dilatation.

Having regard to the very various circumstances in which the organism is called upon to respond to changing stimulation, the authors are inclined to think that it is the *regularity* rather than the presence or absence of one feature in the organic process, which is the most characteristic expression of the total condition. They are led to believe that the changes in circulation and respiration which accompany alterations of consciousness can be formulated in terms of attention, as follows: when the attention process runs smoothly and uninterruptedly the bodily activities (*i. e.* of respiration and circulation) progress with rhythmic regularity. Relatively tense, strained attention is generally characterised by more vigorous bodily movements than in low level, gentle, and relatively relaxed attention, but both agree, so long as their progress is free and unimpeded, in relative regularity of bodily functions. Breaks, shocks, and mal-coördinations of attention are accompanied by sudden spasmodic changes and irregularities in bodily processes, the amount and evidence of such changes being roughly proportional to the intensity of the experience. No reference is made by these writers to the bearing of these researches on the physiological theory of emotion.

HAVELOCK ELLIS.

A Contribution towards an Improvement in Psychological Method.
(*Mind*, 1898.) *McDougall, W.*

In a recent series of articles, Mr. W. McDougall presents an able and noteworthy attempt to formulate the problem of consciousness in accordance with modern scientific conceptions. In doing this he makes considerable use of various recent views concerning the function of neurons, and also Stout's doctrine of apperception translated into terms of neurosis. The nervous system, he argues, in agreement with many previous writers, consists of superposed systems of reflex paths, together with a great mass of new neurons at the top of the system, not yet, or only partially organised into reflex paths. The organisation of these neurons into complex groupings constitutes experience, and is accompanied by consciousness. The young animal has great capacity for experience, and a varied and intense consciousness; in the older animal, more ruled by habit, there is little experience. The essential condition of the occurrence of consciousness is the making of new nerve-paths, the establishment of new functional connections between neurons. It is a logical inference from this, he proceeds, that the adaptation of nervous reaction to environment in the part has been accompanied by consciousness, even to some extent when the instincts of the lower animals were organised, and further, that if an animal becomes perfectly adapted to its environment, all the parts of its nervous system would become mapped into well-organised paths of automatic reaction, with absence of consciousness. He thinks it probable that this state has been reached in the Brachiopod zingula, which has remained unchanged since pre-Cambrian times. Man's environment, however, is so complex that the author does not think he