as exact and positive as any broad and classifying law ever laid down by science."

The copious foot-note references to the literature constitute a useful feature of the volume. The author has evidently expended care on these, though he has not escaped falling into numerous minor inaccuracies. HAVELOCK ELLIS.

Part III.—Epitome of Current Literature.

1. Physiological Psychology.

The Laws of Relative Fatigue. (*Psychol. Rev., March*, 1917.) *Dodge, R.*

The problems of fatigue have recently, for well-known reasons, attracted unusual attention. They are, however, ancient problems around which a bewildering and contradictory mass of work and literature has accumulated. The author, who has for many years been working on the subject, here deals (in a Presidential Address to the American Psychological Association last year) with one limited aspect of these problems: the relativity of fatigue. He is more concerned with the scientific than with the practical aspects of the subject, for he considers that the extreme practical importance of fatigue has injured its proper scientific investigation. For this we must know what mental fatigue is, if it exists at all, and how it is conditioned.

If the word fatigue has any scientific propriety in connection with mental life it refers, the author believes, to the metabolic conditions of mental action, and not to any predetermined characteristic of its consequences. He regards it as improbable that any of the mental work decrements commonly treated as mental fatigue are ever simply conditioned by true fatigue processes in nervous tissue, while, conversely, real fatigue may not appear as decrement at all. He invokes the physiological fact that nervous tissue has been found quite resistant to fatigue, while, on the contrary, hyper-excitability is an almost regular phenomenon of extreme mental fatigue. The complete cessation of mental processes cannot mean a correspondingly complete fatigue of nervous tissue. Again, the traditional differentiæ of fatigue fail to exclude normal psycho-physical rhythms, of which the most significant is sleep. There is no physiological justification for the belief that sleep is the daily climax of fatigue, and for some people evening is the best time for work. The conditions for sleep are not, however, simple, and include habit, the absence of stimuli, probably wide-spread inhibitions, and possibly gland-products and vasomotor changes. Restriction of activity is more potent than over-exertion. "Lecturers never go to sleep, the audience may." A third argument against the true fatigue character of so-called mental fatigue lies in the means used to induce it. To produce nerve-muscle fatigue the same tissue is successively stimulated in the same manner. In mental fatigue the greater the complexity of the task, the more pronounced the decrement. This is probably due to confusion between paths of discharge and not to fatigue of any one path. It is not

really fatigue, but merely associative rivalry. A fourth reason may be found in the operation of incidental inhibitions, which, when attention is concentrated in one field, produces a pseudo-fatigue effect in other fields.

Putting aside irrelevant conceptions of fatigue, is there in mental life a real fatigue effect? Dodge believes there is. But it differs from nerve-muscle fatigue in two respects: inconstancy of the stimuli, and interaction of competing paths. In nerve-muscle fatigue experiments the stimulus (usually the faradic current) is more or less simple, constant, and regular. In mental fatigue experiments it is necessarily unknown and variable, and, still more important, the ever changing inner factors, such as personal interest, are unknown. Perhaps true mental fatigue is really fatigue of the inner stimuli rather than of the capacity to re-act. Sometimes there are successive changes in the inner stimuli resulting from fatigue, though the work is continued. Dodge holds that the first law of relative fatigue may be formulated thus: "Within physiological limits, all fatigue decrement in the results of work is relative to the intensity of the stimulus." The adequate adjustment of stimuli is a very real problem in practical life, and in the training of both normal and abnormal children. Continuous activity under the reinforcement of emotion, or even in the educational use of play, may be a source of serious fatigue, as Kraepelin holds. Another conspicuous reinforcement is worry. It would seem to be no accident that this is so closely connected with exhaustive psychoses.

There is, further, the complication of what Sherrington calls competition. Any afferent impulse in the higher nervous system may theoretically activate any efferent path. We thus reach a second law of relative fatigue: "In any complex of competing tendencies the relatively greater fatigue of one tendency will tend to eliminate it from the competition in favour of the less fatigued tendencies."

The longest mental process ends at last. But the causes are many, and fatigue is only a single contributory factor, less important than intercurrent competing tendencies. That is why in pathogenic nervous exhaustion it is a therapeutic measure to strengthen some competing interest—to develop some fad, play, interest, or what not. But most normal lives are too full of competing interests. Any monotonous work leads to an insistent demand for change, just as when, after lying awake sometimes, we turn over, not from fatigue, but because in the complex of competing tendencies, a little relative fatigue may lead to the entirely disproportionate result of a change of the whole body mass. Social changes are caused similarly by relative fatigue, a desire to shift the pressure. All the phenomena of restlessness are similar. "They operate in work and play, in social and economic activities, in politics and in religion. Without this interference in our lives, unwelcome as it often is, we must have continued indefinitely in the direction of our first activity, with the consequent loss of that vital equilibrium on which the organism as a unit of different parts depends for its continued existence. "Relative fatigue, then," the author concludes, "is not a mere limitation of human efficiency. It is not exhaustion, but prevents it. It is a conservation of organic equilibrium, as well as a condition of organic development."

HAVELOCK ELLIS.