Pfeiffer, Geh. Med.-Rat. in Weimar, with 250 Original-Abbildungen. Jena, Verlag von Gustav Fischer. 1912.

Dr. Pfeiffer has produced an important work on the stone art in which he has not only detailed his own extensive researches on the subject, but has brought together the results found in the scattered and often inaccessible publications which have appeared from time to time. It is encouraging to workers that his enthusiasm has not been dampened by the difficulty of encompassing so vast a subject, the most part of whose materials are buried (archeological) and the rest only fragmentarily studied (ethnological culture history). If we regret that the historians of the past have not recorded for us the methods of ancient arts, so do we also mourn that there were not more of the thorough workers like Holmes, Mason, McGuire, Cushing, Roth and others, to undertake the study of present man before he lost his inherited art.

Dr. Pfeiffer remarks in his preface that organized labor goes farther back than has been supposed and that in the immensely long period before metals, man had manufactured implements and discovered processes for a definite purpose and in so doing developed industries and the tools necessary to carry them on. The work concerns the stone age up to the time of the beginning of the technical age when bronze, hard bronze and iron took the place of stone, the latter age small compared with the million years that flint dominated. He believes that the tools that have survived to us show a progressive modification as a result of their transmittal from earlier to later social units, the changes marking the phases of culture which in European archeology are practically established. The most important material covered by the monograph is naturally flint, but Dr. Pfeiffer does not lose sight of the industries connected with wood, skin and other softer materials.

The subject is so fascinating that excursions into it are almost irresistible and with some slight knowledge of the complexity of the study and the liability to error we must honor the efforts of those who are the pioneers. The problems are not simple, it is not enough to know how the American Indian made an arrowhead—there are 20 ways, or to set it on its shaft—there are many ways. A study of the mute point in a museum is good, but a study of the mind of primitive man correlated with its environment is necessary before we can loose the scientific imagination on its quest. We must manipulate the substances ourselves; we must unravel and weave again until the possibilities are exhausted so far as our limits are concerned, going again and again to the man in the hinterland of civilization and hoping, also, that some survival can be wrested from bog or cave to give us light.

The chapters are seven, as follows: (1) The History of Technic in the Stone Age, Treating of the Time Element; (2) The Physical Basis of Stone Technic; (3) The Products; (4) The Stone Age Bone Work; (5) The Stone Age Wood Work; (6) Animal Industry; (7) The Extinction of the Stone Art.

The subheadings of subjects treated under the chapters number 59 and form an interesting synopsis. Walter Hough

Psychology and Industrial Efficiency. By Hugo Münsterberg. Boston and New York, Houghton Mifflin Company. 1913. Pp. 321. $1.50 net.

There are three varieties of books on applied psychology. To the first variety belongs the intensive monograph in which is reported some attempt to utilize the methods of experimental psychology in the detailed investigation of some limited problem of general and practical importance. This variety is represented by Thorndike's studies in the quantitative measurement of school progress. A second variety attempts directly to apply the generalizations of psychology to some particular field of daily life, and is represented by Scott's books on psychology and business. Books of the third variety are designed primarily to stimulate general interest in the possible serviceableness of the science and to suggest various directions which this service may

take at some future time. Of these three types the first is the most rare, the second the most familiar and the third the most popular. Professor Münsterberg's book belongs to the third type, and its popularity is indicated by the fact that during the month of April it was reported among the six best selling non-fiction books in the largest cities of Maryland, Massachusetts, Illinois, Michigan, Florida, Minnesota and New York, along with "The New Freedom," "The Promised Land," the Montessori books, "Zone Policeman 88" and "Auction Bridge of To-day."

The book contemplates the ultimate development of a science of "psychotechnics" which shall handle the problems of industry and economics by the application of the technique of experimental psychology. The various chapters give a series of interestingly presented illustrations of the psychotechnic point of view, the selection of examples being confined to those fields of industry which have not yet been systematically explored by applied psychology.

Tests for vocational guidance; methods of scientific management; elimination of unfit individuals from railway, ship and telephone service; economy of movement; fatigue and monotony; types of attention; the influence of weather, drugs, entertainment, rhythm, and other physical and social factors; the effectiveness of advertisements; illegal imitation; buying and selling;—all these topics, and similar ones, are discussed from the point of view of the three problems—"How to find the best possible man, how to produce the best possible work and how to secure the best possible results." Preliminary experiments are described and the work of other workers briefly summarized. The author frequently remarks that most of the experiments represent only the beginnings of investigations, which, it is hoped, will in time yield significant and useful results.

Of particular interest is the author's recognition of the importance of interests, inclinations and emotional attitudes, and of the desirability of devising tests which will measure an individual's ability to grasp a general situation. Tests of this sort will doubtless prove to be of much greater diagnostic value than the simple sensori-motor measurements. More complete data are promised in forthcoming reports of detailed investigations now being carried on in the author's laboratory. These reports will presumably belong to the rare first variety of monographs, and will be looked forward to with interest by professional psychologists to whom the present book constitutes not so much a contribution as a challenge to fulfil the prophecies of a fellow worker. Perhaps the most immediate value of the book comes from the ingenuity with which its problems are conceived and the preliminary tests devised. Professor Münsterberg's hopefulness for the future possibilities of "psychotechnics" does not keep him from placing a commendably conservative value on the actual results and correlations of his own preliminary studies.

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SPECIAL ARTICLES

THE EMISSION OF ELECTRONS FROM TUNGSTEN AT HIGH TEMPERATURES: AN EXPERIMENTAL PROOF THAT THE ELECTRIC CURRENT IN METALS IS CARRIED BY ELECTRONS

THAT the carriers of the negative thermionic current from incandescent solids are negative electrons was first established by J. J. Thomson.[1] In 1901[2] the writer developed the view that this emission of negative electrons occurred by virtue of the kinetic energy of thermal agitation of some of the electrons in the solid exceeding the work which was necessary to overcome the forces which tend to retain them in the body and which prevent them from escaping at lower temperatures. This conception has proved a very fruitful one and its consequences have been verified in a number of ways. It has provided a quantitative explanation of the variation of the number of electrons emitted with the temperature of the body. It led to the prediction of a cooling

[1] *Phil. Mag.*, Vol. 48, p. 547 (1899).

[2] *Camb. Phil. Proc.*, Vol. 11, p. 286 (1901); *Phil. Trans., A,* Vol. 201, p. 497 (1903).