

tributions of physical science than upon the machinery for their social control. That is, our future depends upon the extent to which in psychology and the social sciences fact is substituted for opinion and the insight of genius or expert. And fact in these fields means statistics. Fortunately the mathematical demands of statistical fundamentals is not so severe as would be inferred from the rather horrendous formulae.

We shall be told, of course, that the time is already taken up with absolute essentials; it always is in every course. But if the foregoing analysis is correct, these "essentials" are less important than some aspects now slighted. One realizes, of course, that the concepts for which we ask more attention are difficult to teach to students without knowledge of rudimentary mathematical operations. Drill in manipulations is essential; but how much? What I am pleading for is a slight shift in orientation. Once the objective is clearly defined, we are ready for a fresh attack on the problem of the irreducible minimum of drill in the manipulation of symbols. We are ready, also, on the side of content, to face the question whether it is more important to teach the student the sort of operations necessary to solve problems in mechanics and thermodynamics, which only a few of them will ever attempt to do, or the sort of operations necessary to solve the problems of citizenship, which ought to be the concern of all.

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SCIENTIFIC BOOKS

The Old Americans. By A. HRDLIČKA. Baltimore, Williams and Wilkins Company, 1925.

THE able curator of physical anthropology of the National Museum has for many years been making measurements and observations on the physical traits of men, women and children who are descendants through a number of generations on both sides of the early immigrants to this country. These early immigrants were less varied than those of the last few decades, being chiefly from the British Isles, with some admixture of Spanish, Dutch and Swedes and later some Germans. The elements were varied enough, however, to comprise, on the one hand, the tall, long-headed, light-pigmented northerners and the stocky, round-headed, deeply-pigmented peoples of the south of Europe. The immigrants were selected for sturdiness and energy. They came to a new country where conditions permitted of rapid spread, and healthy living, including abundant nutrition. The people of different European nationalities

here intermarried and from this blend has gradually arisen a new type which Hrdlička calls the "Old American." To define this type it has been necessary to make extensive measurements for comparison with the natives of the different countries of Europe.

In his study Dr. Hrdlička examined over 900 subjects in detail and 1,000 additional, more superficially as to pigmentation, etc. The material is homogeneous in that old persons and children are not considered and the majority is drawn from the social middle class, excluding laborers or servants. A great many clerks and professional people are included. In the book there is first considered the pigmentation of the old Americans, including the color of the skin, hair and eyes. Under measurements are included tables and distribution curves on stature, weight, sitting height, chest, arms, hand, leg, foot, head and facial features. Physiological observations on pulse, respiration, temperature and muscular strength are considered. Finally the results of the study are given in a series of abstracts and a picture is drawn of the future American type. In the last chapter the reassuring conclusion is drawn that the new American "will in all probability be, in the average, tall, more sanguine, and perhaps less spare than the old. It will remain an intermediary white type in pigmentation, head form and other respects. It will show for a long time a wide range of individual variation in all respects. And it may well be expected to be a wholesome and effective type, for mixtures such as those from which it shall have resulted are, so far as scientific research shows, not harmful but rather beneficial, and conditions of life as well as environment in this country are still propitious."

The method of treatment of the subject matter makes this book more than a study of a group of persons. It is, on the one hand, a sort of text-book of anthropometry; on the other, it gives a comparative view of physical traits throughout the world while it lays especial stress upon the condition of the adult in the United States as a whole and in the separate sections of the country. For example, under "arms" we have a statement concerning the significance of this measurement, a description of the different methods of measuring arm length, a table of frequencies of the different absolute measurements of arm length in males and in females, together with frequency polygons of these results. There is a comparison of the youngest and oldest of the group in respect to arm length, a consideration of arm length in relation to stature and in relation to type of head. There is a table, two pages long, giving relative span in various groups of mankind for both sexes and, finally, there is a summary of the results, as far as old Americans go, with a brief comparison of the

arms of old Americans with those of other peoples. In some other sections as, for example, in that dealing with the head, averages and distributions are afforded not only for the whole data but for different states and comparative frequency polygons for different sections are given. Thus the work becomes a valuable hand-book of comparative anthropology of all races and pedigrees of different sections of the United States.

Of the care with which Dr. Hrdlička has worked there can be no doubt, as his technique is known to be excellent. A slight difficulty is introduced in the very nature of his subjects which has made it necessary to take the measurements over clothing, although shoes and outer clothing were dispensed with. Some allowance is made for the increase of measurements due to clothing so that weights, for example, are reduced to nude values. Hrdlička regrets that these are so difficult to compare with extensive series of measurements which have been made, for example, by life insurance companies, because of the varied amount of clothing in which people are measured, amounting in some cases to 8 per cent. of the total weight. Apparently the chest measurements are generally made by Hrdlička over the clothing; but girths are less used by him than breadth and depth, which are less modified by the ever troublesome clothing factor. The presence of clothes results in the measurements not being exactly comparable with those taken on young men at demobilization, the methods of taking which Dr. Hrdlička again criticizes, yet those measurements must remain for a long time the best collection of measurements of young males which has been made in this country, if not in the world, because of the fact that many of the dimensions taken were such as could be satisfactorily secured only from unclothed persons.

The book is illustrated by a large number of satisfactorily reproduced full-page plates of typical old Americans. The numerous frequency polygons are also drawn on a large scale so as to be readily interpreted. It is regrettable, however, that the marginal numbers, indicating the different classes, were drawn with a fine pen and sometimes much reduced in reproduction so that in some cases they are not very legible. In his table the author gives the number of individuals which were used in each class. He relies a great deal upon the average, but fails to give standard deviations or probable errors. In the absence of such standard deviations the tables of averages are less useful for comparison than they would otherwise be. The tables are inferior in this respect to those of Boas and Wissler, in which standard deviations were conscientiously worked out. A series of averages is of relatively little significance for com-

parison unless we have some idea of the relation between differences and probable errors.

The publishers have prepared an attractive book, both in paper, binding and printing. The whole work constitutes an important addition to the series of anthropological works which are appearing from American authors in ever increasing numbers. It is to be hoped that the interesting mixture of races which is occurring on the American continent will be made the object of further studies in the future and all such will find it necessary to refer to the data in the "Old Americans" as a basis for comparison.

CHAS. B. DAVENPORT

The Physics of the Developed Photographic Image: Monograph No. 5 on the Theory of Photography from the Research Laboratory of the Eastman Kodak Company. By F. E. Ross. Pp. 217. D. Van Nostrand Co., 1924.

EITHER a human eye or a photographic surface forms the receiving end of nearly every optical instrument. Each responds in characteristic fashion to the intensity and quality of the light operative. Each possesses its own limitations in sharpness and fineness of detail that may be rendered. Dr. Ross's monograph deals largely with these limitations in the case of the photographic negative. Ultimate causes are considered, carefully planned and very laborious investigations are described and the results analyzed and formulated.

Grain size, form and distribution are carefully considered in two chapters, together with the factors affecting them. The scattered and somewhat conflicting data of the reciprocity law are digested and a modified law formulated. Data and theory bearing on sharpness and resolving power, largely the work of the Eastman Laboratory, are most excellent. The chapter on astronomical photographic photometry will go far toward clearing up the confusion previously existing in that field. The two final chapters on the mutual action of adjacent images and on accuracy of photographic registration of position are models of exposition of exhaustive research by a master hand. An excellent bibliography and index are added.

This monograph is the first of its kind in this field. Along with the solid meat of fact and formulation some readers will wish there had been incorporated more general discussion for the sake of orientation and more speculation as to the ultimate causes as a stimulus to the imagination. The material presented is of the class that will appeal to the technical photographer and investigator rather than to the mere taker