

ing suitable material. Hence this note! By suitable material I mean biotite (not muscovite), in flakes of a centimeter in diameter, whose geological provenance is known. I would therefore appeal to geologists and mineralogists to help—not by deluging him with mica, but, in case they find suitable material, by let-

ting him have some. Rock sections can not be used at present.

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SCIENTIFIC BOOKS

THE DYNAMICS OF POPULATION

Dynamics of Population. Social and Biological Significance of Changing Birth Rates in the United States. By FRANK LORIMER and FREDERICK OSBORN. New York (Macmillan), 1934. Pp. xiii + 461. \$4.00.

BECAUSE population is so evidently an important factor in all major social and economic problems its movements have come to the front as a paramount issue in human biology in the period since the world war left all mankind in an uncommonly difficult and troubled situation. In 1918 little that was precise and penetrating was known about population problems. In consequence they became a glittering target for the artillery (or should we say archery) practise of viewers-with-alarm, pseudo-scientific exhorters, God-sakers and other assorted uplifters. Attitudes have changed rapidly in the field. A decade ago the horrid bugaboo was overpopulation; of late it is that mankind is shortly to perish miserably because of its careless inattention to the business of reproduction, or alternatively its reluctance to pursue adequately and diligently so inherently pleasant a duty. But nothing is surer than that earnest exhorters in however noble a cause become bores; quickly, easily and how profoundly. Everybody is getting wearied of sermons about population, as began to be the case a little earlier about its sub-department of eugenics. What is wanted instead is sober, critical appraisal of the pertinent facts, and their extension by further really scientific investigations, unmarred by moral judgments or indignation.

It is in just this direction that Lorimer and Osborn have made a first-rate contribution. At the expense of obviously great and painstaking labor they have brought together, critically digested and assimilated into a reasonably unified whole a large body of factual data. They have done this with a coldly critical eye first to the selection only of material that has some degree at least of quantitative precision, soundness and relevance. In addition they have, wherever possible, extended the usefulness and meaning of the data by working them over, to use the cant phrase of the laboratory, getting out of them in this way all the information they were capable of yielding.

Dynamics of population is divided into four main

parts, each containing several chapters. These parts deal respectively with population trends of American groups; the measurable characteristics of these groups; the influence of differential reproduction on the characteristics of the American people; and, finally, the causes and control of population trends. The discussion of these matters takes up just under 80 per cent. of the volume, the remainder being devoted to detailed appendices, excellent extensive bibliographies and really adequate indices.

The attitude of the authors toward their work is stated in this way:

It has not been the purpose of this book to define a population policy for the United States or propose a program of practical eugenic activity. We shall be satisfied if we have presented a fair picture of the changes which are taking place in our population, of their causes and of their social consequences. But the problems raised are so new as subjects of serious study, that the question is still constantly asked, "Are the forces that determine population change in any way subject to social control?" as though we were dealing with something mysterious or outside the realm of reasonable social concern. It is our belief that the causes of population change are just as capable of being placed under social control as are the forces influencing health, economic processes, or other human activities.

The first part of this platform is maintained throughout the book, with admissible restraint and critical intelligence. And surely it is only fair to allow such conscientious and hard-working authors a little indulgence for the exhibition of their pious beliefs, piety being inherent in man. But one can not help wishing that Mr. Osborn would now turn to and write another book telling us about the "social control" of "economic processes." For the most cursory examination of one's own investment portfolio suggests that the "control" in this sphere has fallen something short of an at least naively conceivable ideal.

The conclusions of the four parts of the book may, in the space of a review, be only briefly and inadequately indicated. In the main they are not novel, as is to be expected from the nature of the book. But they are evaluated with real critical acumen. The United States population as a whole is held to be approaching a stationary condition. Its era of most

rapid growth is past. Its reproductive differentials are, in general, negatively correlated with social, economic and occupational status. But it is to be noted that these three are not independent variables, but on the contrary correlated with each other. Because of these reproductive differentials the future composition of the population, from whatever point viewed, is likely to be divergent from its present one. On this account the authors are rightly cautious about making predictions. No important differences in reproductive performance are found between large racial or national groups in our population. The authors are soundly skeptical about theories of "optimum population" numbers. "The accumulation of surplus population in agriculture areas with limited natural resources" is looked upon as the most serious economic aspect of present population trends. There is found also a trend towards an increase in families with the background of unskilled laborers in a time when the demand for manual labor is plainly contracting rather than expanding, and is likely to continue to do so with the steady progress in the application of science to all processes of industrial production.

The militant eugenist seems likely to derive singularly little warming or cheering sustenance from this book. For it is found that the only point at which anything like convincing evidence of hereditary differences playing an important rôle in large population groups is in relation to the occupational classification. There are three studies in this field regarded by the authors as worthy of some credence, and they indicate "that from one third to one half of the variations usually found among occupational classes in average levels of cultural-intellectual development are due to deviations in hereditary capacities." After some cautionary reservation about this conclusion the authors go on to state that they regard it as conclusively proved that the apparent differences in cultural-intellectual development between major racial groups are due in large part to environmental rather than hereditary influences. They find it even more true that there appear to be no significant differences in hereditary capacities for intellectual development between large social, or urban *versus* rural, groups. They are also extremely skeptical as to the existence of hereditary differences in vitality (health and longevity) between large groups, either regional,

racial or social, admitting at the same time the cogency of the evidence of the importance of hereditary factors in determining inter-individual differences in respect of health and longevity.

The general conclusion of the whole survey seems sound and intelligent.

Our vast educational program may perhaps be sufficient to outweigh the depressing effects of present population trends in their purely environmental aspects. It can never make up for the dying out of any large proportion of people with superior capacities for education. Two mass tendencies are apparently moving in direct opposition: the conscious force of educational endeavor, and the blind influence of present population drift.

Thus many of the present varying rates of reproduction of American groups are bad from the economic, the cultural, or the eugenic point of view. There is, however, an encouraging indication that present differences in reproduction rates are in part the expression of an incomplete social process; some of the most extreme differentials in fertility among American groups are likely to disappear as current changes in attitudes and behavior, already established in a large portion of the population, spread to more isolated, less privileged, and less developed groups.

The book is a little marred by some minor defects. Perhaps the worst of these is a tendency to unnecessary over-elaboration of the discussions, with repetitions and some confusion of the reader as consequences. Conciseness of statement would have enhanced the value and influence of the treatise. The discussion of theoretical genetics in the latter part of Chapter X seems unfortunate for two reasons, first because unnecessary to the argument, and second because it partakes rather more of the nature of Alice in Wonderland than of objective, natural science. There is displayed in an otherwise well and abundantly illustrated book a somewhat distressing fondness for "pie" diagrams, a form of graphic representation now commonly avoided by statisticians other than those attached to the advertising business.

But these and some other offenses to some tastes and judgments that might be mentioned are, after all, minor faults, in a really excellent and valuable book that will be welcomed and treasured in the library of every serious student of human biology.

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SPECIAL ARTICLES

THE ISOLATION OF CRYSTALLINE TRYPSINOGEN AND ITS CONVERSION INTO CRYSTALLINE TRYPSIN

THE isolation of a crystalline protein, chymotrypsinogen, from acid extract of fresh cattle pan-

creas and its conversion into an active proteolytic enzyme, chymo-trypsin, has been previously described.¹ The filtrate from the chymo-trypsinogen

¹ M. Kunitz and J. H. Northrop, *SCIENCE*, 78: 558, 1933.