pologists not committed to the racist dogma hold exactly the opposite. There is no evidence to prove that the physical traits which mark off the races of man are correlated with psychological characters, whether this be of the order of intelligence or aptitude; on the other hand, there is good reason to believe that the gamut of human potentiality is run by every sizable group of men.

Professor Dice's use of the phrase "many races" is confusing, since one of the most difficult anthropological problems is to delimit the races of man. Even the three- or four-fold grouping most generally accepted is not broad enough to encompass all cases—as, for instance, the "hairy Ainu" of the island of Sakhalin, variously classified as Caucasoid or Mongoloid; or the peoples of Polynesia. One wonders, indeed, why the word "race" was introduced at all, since Professor Dice seems to be concerned with genetic studies of a restricted group of families. Many anthropologists to-day, as a matter of fact, tend to define a race as an aggregate of genetic lines rather than in the simple taxonomic terms of an earlier fashion which seems to be implicit in Professor Dice's usage. Or is Professor Dice using the word "race" as a synonym for "local group"?

The employment of the term "environment" perhaps reveals the principal source of Professor Dice's confusion. Does he mean the natural environment? Or does he mean culture? At one point he writes that "hereditary trends within families give a basis for studies of the variations in morphology, physiology and psychology that are produced by environmental influences." Later he considers the difficulty of "untangling in human affairs the complex interrelations of heredity and environment." But he also speaks of "physical environment" and of "social environment." These are two quite different things, holding different implications for the study of human biology. It is perfectly possible that high altitude imposes certain conditions on the developing human organism that cause it to have a distinctive character. But this is not a phenomenon of the same order as the food habits of a people, since these comprise a cultural fact and vary widely within the range of possibility presented by any given natural environment.

There is little question that a concerted attack on the problems of human biology, conceived and executed along the widest lines, is desirable. But such a study, made without a conceptual setting of the greatest clarity, and drawn in terms of the findings of all the various disciplines involved, will run the gravest danger of defeating its own ends and repeating errors of earlier days.

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ENZYMATIC SYNTHESIS OF CRYSTALLINE SUCROSE

THE bacterium *Pseudomonas saccharophila* Doudoroff was recently shown[1, 2] to contain a sucrose phosphorylase catalyzing the reaction

sucrose + inorganic phosphate → glucose-1-phosphate + fructose.

The reaction appeared to be reversible since when glucose-1-phosphate and fructose were added to a partially purified enzyme preparation inorganic phosphate and a carbohydrate having certain properties of sucrose were formed. The evidence, however, was not sufficient to establish the identity of the synthetic carbohydrate.

Additional experiments which we have recently completed justify the conclusion that the synthetic product is identical with natural sucrose. By the use of an invertase-free sucrose phosphorylase preparation, 2.5 g of the carbohydrate were obtained in crystalline form. The empirical formula, specific rotation, refractive indices and other optical properties, x-ray pattern, rate of acid hydrolysis and the reducing values before and after invertase or acid hydrolysis of the crystalline compound were all found to be the same as those of sucrose. In addition, the octaacetate derivative of the synthetic carbohydrate was shown to be identical with the corresponding sucrose derivative.

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PENICILLIN PRODUCTION

DURING a study of the growth of *Penicillium notatum* on sulfite waste liquor for penicillin production it was found that whereas lactose may or may not act as a nutrient for mold growth, it definitely serves as a preservative for penicillin. Assuming the same action for the large amounts of lactose added in the commercial production of penicillin on corn steep liquor, a more plentiful substitute preservative was sought.

We have found in preliminary parallel experiments using corn steep liquor that starch dextrin can be substituted for lactose to give equally high quantities of penicillin. The substitution of lactose by dextrin in the commercial production of penicillin might make possible a desirable increase in such production.

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[1] M. Doudoroff, N. Kaplan and W. Z. Hassid, *Jour. Biol. Chem.*, 148: 67–75, 1943.
[2] M. Doudoroff, *Jour. Biol. Chem.*, 151: 351–361, 1943.