Abiogenic Synthesis

The excellent review by Curtis A. Williams (20 Jan., p. 308) of Thomas Jukes's book *Molecules and Evolution* did not comment on any specific points in that author's evolutionary treatment of the genetic code. While a number of points might be argued, one citation, admittedly an obscure source, is herewith mentioned inasmuch as it antedates the author's preparation of the book and yet clarifies his argument.

Jukes refers (p. 68) to 15 amino acids that belong to a more primitive group of amino acids. He bases this classification, in part, on the fact that these ampholytes have been synthesized abiogenically from simpler chemicals. Cysteine, however, is included uncertainly in this group because it (as far as the author knew) had not been synthesized abiogenically.

The late Eric Ellenbogen of the University of Pittsburgh had indeed made sulfur-containing amino acids under simulated primitive-earth conditions. No less than 17 methods are described by his U.S. patent 2,765,554—20 Dec. 1960 (obtainable from the U.S. Patent Office). Many of these methods result in the formation of both cysteine (as cystine) and methionine.

On the basis of Jukes's criteria, this information should eliminate any partial ambiguity in the placement of cysteine in the primitive group of amino acids.

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Brain Drain: Further Solutions

With respect to Grubel's article ("The brain drain: a U.S. dilemma," 16 Dec., p. 1420) and to some of the succeeding correspondence (Letters, 3 Feb.), I fail to see the predicament. Unless we live in a police state with its restrictions on personal freedoms, there should be no question of requiring a scientist to work here or there. He should be as free to choose his country of work as is a mechanic, a businessman, or a common laborer. If, as seems likely, many find that their scientific work is best carried out in the United States, then here they will come if they are wanted. It is simply inefficient to attempt some scientific activities in backward countries, as is amply demonstrated in the letters of Rudin and Saini.

Let us do something constructive about the lack of trained people in the countries from which we immigrants come. I, for one, help support a student overseas while he studies the basic science or management training that is essential for the development of his country's economy. Students may be supported for $40 to $70 a month in countries with less fortunate living standards. Also, many of us could even afford to support a foreign graduate student studying in the United States. . . .

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In his editorial, "Brain drain" (25 Nov., p. 965), Wolfle perceptively pointed out that "In educating foreign students, we give some of them better preparation for work here than for work at home." As a Peace Corps volunteer teaching biological sciences in a provincial university in Latin America during 1963–65, I observed the effects of two factors that support Wolfle's statement.

The first is the lack of research facilities that the returning scientist had grown accustomed to using in the United States. There are few provincial universities in Latin America with the relatively expensive, but necessary, instruments needed for modern research in the natural and biological sciences. If he is research-oriented, the returning professional becomes frustrated. A few might find positions in the major universities with modern equipment, but most go to the smaller universities which usually educate the majority of the country's students. If we are to help these U.S.-trained foreigners, why not supply more tangible research apparatus instead of monetary grants which are often spent in ways not beneficial to the university. Such a realistic approach would require U.S. technicians and scientists to become personally involved in the development and modernization of the small universities where most of these educated specialists work.

The second problem is certainly more complicated. Having studied in an educational system quite different from that of his own country, the returned scientist often tries to employ his new approach to teaching. By ad-