## 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-

vocating and utilizing new, and often incongruous, teaching methods, he creates animosity and distrust in his home-educated colleagues who consider him a threat to their positions and status. He may find himself ostracized by his peers and by the students and even may be obliged to quit his teaching position. I knew three U.S.-trained chemists who left a university because of pressure from the faculty and sought funds to return to the United States.

There is no easy solution to this second source of discontent, unless a U.S.-trained foreigner is willing to forget much of what is theoretically valuable experience and return to often antiquated, yet deeply entrenched, systems of education. Perhaps if he is able to continue progressive modern research, he will decide to remain in his own country, where he is sorely needed. All Peace Corps volunteers going to developing countries as teachers are told to be "flexible." A similar precaution should be observed by U.S.-trained foreigners.

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. . . I should like to refute the statement and conclusion advanced by Labbauf in his letter (3 Feb.) in regard to Iran. U.S. aid to Iran has been spent reasonably well in recent years and much progress in the health and education of Iranians (partly due to that aid) has been achieved. Labbauf is apparently unaware of the work now carried out by the Health Corps and the Education Corps, which were initiated a few years ago by the Shah. Great improvements in the health of the population and substantial reduction in the illiteracy rate have been achieved throughout the country by these two well-functioning organizations.

Also Labbauf's statement that "public authorities in Iran refuse to recognize the needs and aspirations of the educated segment" is completely false. Presently almost all members of the Iranian cabinet are foreign-trained and about half of them are American-trained. An increasing number of American-trained Iranians are going home to occupy important positions in the government and at various universities. Those who are still remaining in this country after completion of their training are mainly highly specialized scientists for whom research facilities

are, as yet, either unavailable or limited in Iran. Iran is now a vigorously developing country and I have no doubt that facilities for such specialized fields will become available in due time. I can assure Labbauf that eventually the great majority of American-trained Iranians will go home to take part in the development of the land of such "World Greats" as Darius, Avicenna, and Khayyam.

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Much could be done to help to stem the brain drain from the poorer to the wealthier countries, but the main effort will have to come from the latter. Permission to go to the West should be more difficult for students to obtain, as should permission to stay on indefinitely once they are there. Visas should be limited to the specific courses for which the student travels to Western Europe or America. Much of the training received abroad not only fails to fit a student for work in his own country but creates a profound dissatisfaction with anything but the superlative. Increased support of universities in the developing countries for all but the highest level of training (the Ph.D.) would dam the brain drain at its source and would improve the quality and increase the prestige of educational institutions in these countries.

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### Publishing in Valid Media

Van Bavel would not have cause for concern about "unedited publication media" (Letters, 6 Jan.) if the lesser institutions would follow their leaders. The better universities consider as valid publications only those articles on current research which have survived an adequate review process. Trade journals, educational journals, technical reports, and letters columns simply do not count for "brownie points." If all institutions were to follow this policy, the media which bother him would begin to wither.

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