Letters

Punctuated Equilibrium

Roger Lewin's recent article "Punctuated equilibrium is now old hat" (Research News, 14 Feb., p. 672) sounds almost like a conciliatory gesture to population geneticists to offset the attention he has given in the past to the theory and its proponents Niles Eldredge and Stephen Jay Gould. Several models have already been published (*1–2*) that demonstrate how easy it is for a population genetic model to mimic punctuative change. One, in particular, uses Wrightian landscapes quite well to illustrate the expectation of alternations of slow and rapid change (*1*). The model of random deviation from an adaptive peak (*3*) is certainly a possible mechanism of sudden change, but only part of a spectrum of models. Indeed, the earlier work of Lande on reduction of digits (*4*) shows how Wright's original model of digit regulation mimics punctuation, simply because many traits are regulated by threshold effects. This model explains why so many characters show no phenotypic change, then a geologically instantaneous transition, in the face of continuous environmental change. In other words, the notion of sudden change alternating with stasis is so context-dependent, both in terms of trait determination and the selective regime, that the claims and counterclaims of the "punctuationists" about the presence of stasis fall safely within an effectively infinite range of possibilities.

What Lewin does not mention is that punctuated equilibrium is as much about species and speciation as it is about stasis. A major part of all of the objections have addressed the part concerning speciation. As the geophysicist George Kennedy used to say about other such theories, this concept "extrapolates into the face of known data!" It is disingenuous to trivialize the concerns about speciation by arguing that stasis is the real issue. There would have been no problem in the first place if the straw man of phyletic gradualism had not been invented. I dare say that Gould's earlier works on developmental constraints would have generated the same interest in stasis, without subjecting us all to a decade of hype. Let us just say that a maladaptive intermediate phase, the punctuated equilibrium theory, may have forestalled an adaptive phase in evolutionary biology.

The theory of punctuated equilibrium as first stated by Eldredge and Gould appears now to be as dead as a doornail. It has become an emblem for a confusing array of valid and invalid claims. In a defense of punctuated equilibrium (*5*), Gould has recently wondered how so many critics could think a theory to be so trivial or incorrect while passionately bashing it. By the same logic, I suppose one could think that scientific creationism and sociobiology—of which Gould has been a strident critic—are intellectually potent. Theories that are vague or untestable are usually far more difficult to criticize than elegant and simple theories. They become transmuted into catchy slogans and acquire a life of their own. Like sociobiology and (the oxymoron) scientific creationism, punctuated equilibrium has become so diffuse that it is impossible to refute or even discuss it without in effect perpetuating the slogan. Any advertising executive would be envious! As DeBeer (*6*) once wrote: "It is characteristic of a slogan that it tends to be accepted uncritically and die hard."

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The Future of U.S. Agriculture

In his article "U.S. farm dilemma: The global bad news is wrong" (25 Oct., p. 408), Dennis Avery presents a classically unrealistic solution to the problem of declining American agricultural exports. Avery appears to be arguing that, since food production is increasing in developing as well as industrial countries, U.S. farmers will have to continually implement "cost lowering" new technologies, and adopt free market agriculture at home and abroad, to remain competitive in world markets.

If one puts aside the complexities involved in the application of new technologies in agriculture, Avery's thesis on behalf of free trade in agricultural commodities is idealistic to the point of being irrelevant. Two important facts subvert Avery's position: We cannot compete "freely" in international agricultural markets when our major competitors subsidize their exports; and, in any case, new markets will soon be needed to absorb surplus commodities. While the greatest potential market for these commodities is Africa, governments there do not have the foreign exchange to import commodities at anything resembling a market rate.

Perhaps Avery avoids this issue precisely because of the dismal prospects for market development in Africa and other "fourth world" nations. Most poor (the poorest 50) nations depend on cash crop exports for foreign exchange. Unfortunately, these growers compete directly for markets with producers from both developing and developed countries. Faced with subsidized competition from developed nations in many export crops (sugar, cotton, beef, peanuts, and tobacco) or surpluses and elastic demand for others (cacao, rubber, coffee, and fruits), poorer nations are literally losing billions in foreign exchange earnings to American and European exporters (*1*). The balance of trade and foreign exchange earning capacity of most non–oil-producing African countries are declining, and the unfortunate fact is that debtor nations will never be able to import our agricultural products at prices that guarantee American farmers a profit in the absence of large U.S. government subsidies.

To make things worse, in 45 countries, most of them in Africa, food production is lagging far behind population growth rates with no realistic hope of catching up for the rest of the century. Per capita food production in Africa has fallen every year since 1970. While most of these nations will have to import foodstuffs, this will continue to take the form of subsidized exports, as is the case with the European Economic Community (EEC), where 40 percent of the total EEC budget ($5.8 billion in 1981) goes to export surplus commodities.

To guarantee future markets for U.S. agricultural commodities, it makes much more sense for the United States to allow and actively encourage developing nations (India, China, Indonesia, Thailand) to feed themselves, regardless of the theoretical comparative advantage that they may have in certain commodity exports. These countries will then use a well-fed population to develop a more diversified economy, which in the long run will import far more from American farmers and other industries than an economy that perpetually exports cash crops at the expense of domestic agriculture.

While domestic food distribution inequities persist, Brazil, Korea, and Taiwan illustrate this point; having developed their own agricultural capability, they now import more agricultural products from the United States than ever before. Unfortunately for the American farmer, this is precisely the result that is squelched when U.S. and European agricultural surpluses are continually dumped on poor countries, distorting their agricultural systems and rural economies.