discouraged or be discouraged by teachers or parents who misunderstand the difference between speculation and fact.

Those who argue for the biological basis of differences seem to be saying that it is important to make people aware of sex differences in mathematical test performance so that "unrealistic expectations" will not be set for girls. While I understand the concern about quotas being set for colleges or industry, surely there is harm in the misconception that sex differences between groups mean all men are better than all women. In the not so distant past women have been discouraged from attempting careers in fields dominated by men. If more men than women possess the necessary combination of abilities to succeed in some endeavors, let this be demonstrated fairly in an open arena of competition in the classroom and on the job. We should not erect psychological barriers to thwart the achievement of those women who do have the talent. Instead we should work to create a society in which individuals are valued and evaluated for their achievements independent of their race, creed, or sex. More research is needed to learn how biological factors relate to intellectual performance, but more research is also needed to study the social factors that influence the development of the intellectual abilities. Surely today's world is so complex that modelers of human behavior must look at both biological and social factors.

LYNN H. FOX
*School of Continuing Studies,
Johns Hopkins University,
Baltimore, Maryland 21218*

References

1. L. Fox, L. Brody, D. Tobin, *The Study of Social Processes That Inhibit or Enhance the Development of Competence and Interest in Mathematics Among Highly Able Young Women* (National Institute of Education, Washington, D.C., 1982).

Biological Diversity

David Jablonski *et al.* (9 Dec., p. 1123) report fossil evidence suggesting that unstable, nearshore habitats serve as the source of species with major evolutionary innovations rather than more stable, offshore habitats. This finding was considered sufficiently newsworthy to rate commentary by Roger Lewin (Research News, 9 Dec., p. 1112). However, it is interesting to note that a similar phenomenon has been previously described by neontologists and is referred to in the ecological literature as the "taxon cycle" (*1*).

For example, it has been shown that geographically widespread species of ants in Melanesia (*1*) and birds in the West Indies (*2*) are generally confined to ecologically marginal habitats, while older, more specialized species in these taxa inhabit stable, mature ones. The species occupying marginal habitats are good colonizers, however, and are able to expand their ranges to offshore islands with smaller endemic faunas. There the colonizing species are able to increase their ecological amplitude and invade the more stable habitats. The penetration of these habitats by colonizing species is aided both by the large population reservoirs that are maintained in marginal habitats and by new adaptations that allow the colonizers to usurp niche space already occupied by endemic species. Once the more stable habitats have been penetrated, differentiation in morphology and ecology is rapid; populations become more specialized; and speciation often occurs. By this process, species evolving in ecologically marginal environments not only contribute directly to species diversity in mature habitats, but they also play a major role in the fragmentation and further speciation of older taxa.

Now that this phenomenon appears to be more general and has been documented as occurring in ancient as well as recent communities, I hope further work on this interesting aspect of the genesis of biological diversity will be undertaken by both paleontologists and neontologists.

PETER F. BRUSSARD
*Section of Ecology and Systematics,
Corson Hall, Cornell University,
Ithaca, New York 14853-0239*

References

1. E. O. Wilson, *Amer. Nat.* **95**, 169 (1961).
2. R. E. Ricklefs and G. W. Cox, *ibid.* **106**, 195 (1972).

We were aware that one possible mechanism for the large-scale patterns we observed in the evolution of marine benthic communities might be analogous to the "taxon cycle" proposed to explain present-day distributions of Melanesian ants and West Indian birds. However, not all ecologists accept the validity of the taxon cycle (*1*), and there are a number of important differences between the hypothesized taxon cycle and the paleontologic results discussed in our paper.

1) Different hierarchical levels and time scales. Individual species are the units that pass through taxon cycles seemingly on time scales of thousands of years, whereas our paleontological patterns were detected at the ordinal level over tens of millions of years. A variety of origination, extinction, and interaction processes could underlie this larger-scale pattern.

2) Different phylogenetic structure. The taxon cycle is proposed to occur phyletically, within individual species. The major faunas of the Phanerozoic that spread successively across the continental shelf are ecologic and higher taxonomic groupings that exhibit net statistical trends; they certainly are not monophyletic groups.

3) Different proposed driving mechanisms. Ricklefs and Cox (*2*, p. 196) assert that "the progress of a species through the taxon cycle reflects effects of progressively reduced competitive ability caused by 'counterevolution' of an island biota to that species, coupled with strong competitive pressure from subsequent immigrants." There is little reason to infer that the Paleozoic fauna dominated by suspension-feeding brachiopods competitively drove the trilobite-rich Cambrian fauna from nearshore habitats; net changes in tolerance to physical environmental extremes over the history of a clade is one of several more plausible explanations that do not require continuous phyletic evolution in response to rampant competitive exclusion (*3*).

Although the analogies can be intriguing and a stimulus to interdisciplinary research, the simple extrapolation of short-term intraspecific processes to more sweeping time scales and taxonomic levels can also be highly misleading.

DAVID JABLONSKI
*Department of Ecology and
Evolutionary Biology, University of
Arizona, Tucson 85721*
J. JOHN SEPKOSKI, JR.
*Department of Geophysical Sciences,
University of Chicago,
Chicago, Illinois 60637*
DAVID J. BOTTJER
*Department of Geological Sciences,
University of Southern California,
Los Angeles 90007*
PETER M. SHEEHAN
*Department of Geology,
Milwaukee Public Museum,
Milwaukee, Wisconsin 53233*

References

1. G. K. Pregill and S. L. Olson, *Ann. Rev. Ecol. Syst.* **12**, 75 (1981); S. L. Olson and W. B. Hilgartner, *Smithsonian Contrib. Paleobiol.* **48**, 22 (1982).
2. R. E. Ricklefs and G. W. Cox, *Am. Nat.* **106**, 195 (1972).
3. D. Jablonski and D. J. Bottjer, in *Biotic Interactions in Recent and Fossil Benthic Communities*, M. J. Tevesz and P. L. McCall, Eds. (Plenum, New York, 1983), pp. 747–812; J. J. Sepkoski, Jr., and P. M. Sheehan, *ibid.*, pp. 673–717.