LETTERS

AIDS Repository

The National Institute of Allergy and Infectious Diseases and the National Cancer Institute have developed a repository of biological specimens from homosexual men. The specimens were collected through contracts with five major U.S. universities for studies of the natural history of acquired immune deficiency syndrome (AIDS). Information about applying for collaborative use of these specimens and pertinent epidemiological data is now available from the Project Officer, AIDS Repository, Epidemiology and Biometry Section, National Institute of Allergy and Infectious Diseases, Westwood Building, Room 739, National Institutes of Health, Bethesda, Maryland 20205.

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Biogeographic Methods

Lawrence G. Abele's review of *Biogeography and Ecology of the Seychelles Islands* (11 Jan., p. 160) concludes with an important (but disturbing) paragraph. Abele notes that in this volume, "[t]here is a conspicuous (and pleasant) absence of controversy on biogeographic methods—Croizat is not cited, and I was unable to locate the word "vicariance" anywhere in the 654 pages of text. This fact plus the excellent natural history and the thousand-plus references make it a worthwhile volume."

Abele may find it pleasing to have a book that does not discuss current controversy in biogeographic methods, but the fact that "Croizat" and "vicariance" are not even mentioned suggests that the contributors to this volume do not recognize vicariance (as a biogeographic pattern or process) or any elements of Croizat's panbiogeographic method. In reading this review I am left with the suspicion that the contributing biogeographers avoided comparing their methods with those of competing research programs in contemporary biogeography (*1*).

More important, Croizat (*2*) has published hundreds of pages on the biogeography of the Seychelles and has certainly progressed beyond the "narrative approach" that Abele implies is the only approach appropriate to the available data. In his major works (which contain many index references to the Seychelles and East African Islands in general), Croizat analyzes the biogeography of a wide variety of plants and animals of the Seychelles, such as *Nepenthes* (pitcher plants) and *Testudo* (giant land tortoises). Croizat also places the Seychelles in a global context, for example, in accounting for the biogeographic connection with the Galapagos Islands and in concluding that the biota of the Seychelles is "not primarily insular."

Other biogeographers may criticize Croizat's method or dispute his evidence and conclusions, but a volume that completely ignores this contribution cannot be considered "worthwhile" as a summary of the biogeography of the Seychelles.

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References

1. R. C. Craw and P. Weston, *Syst. Zool.* **33**, 1 (1984).
2. L. Croizat, *Manual of Phytogeography* (Junk, The Hague, 1952); *Panbiogeography* (L. Croizat, Caracas, 1958); *Space, Time, Form: The Biological Synthesis* (L. Croizat, Caracas, 1964); *Atti Ist. Bot. Univ. Lab. Crittogam. Pavia Ser. 6* **4**, 1 (1968); M. Heads and R. C. Craw, *Tuatara* **27**, 67 (1984).

The works of Leon Croizat are well known to most biogeographers, including the reviewer of the volume (*1*), as well as the editor of the volume (*2*).

Why wasn't vicariance cited, and why was this fact pleasant? Perhaps the editor and all 27 contributors considered the vicariance method and found it wanting. In this regard they would be in agreement with Croizat himself (*3*).

Or perhaps, unlike many of Croizat's followers, the reviewer has a sense of humor.

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References

1. L. G. Abele, *Paleobiology* **8**, 79 (1982).
2. D. R. Stoddart, *Progr. Phys. Geogr.* **2**, 514 (1978).
3. L. Croizat, *Syst. Zool.* **31**, 291 (1982).

Molecular Evolutionary Clocks

Proteins and nucleic acids are widely assumed to evolve at regular rates, and structural differences between homologous molecules in different plants and animals are assumed to reflect, clock-like, any time that has elapsed since their evolutionary divergence. Discussing molecular clocks, Roger Lewin (Research News, 3 May, p. 571) repeats a common misconception concerning the relative rate test as a test of metronomic change in molecular evolution. Molecular differences, however measured, must pass three tests to satisfy the Zuckerkandl-Pauling metronomic clock hypothesis. In simplest form these are: (i) the reciprocity test [RCP]—difference measured as molecular distance from any species *A* to another species *B* is the same as that from *B* to *A*; (ii) the relative rate test [RRT]—species *A* differs from an outgroup species *C* by the same amount as species *B* differs from *C*; and (iii) the temporal scaling test [TST]—molecular differences and independent historically or paleontologically determined times of divergence for species pairs *A* and *A* (zero point), *A* and *B*, and *A* and *C* are mutually colinear (*1*).

A relative rate test is necessary but not sufficient to demonstrate metronomic clock-like evolution on a molecular scale. If one assumes that molecular comparisons satisfy RCP and RRT, relative rates are still not real rates unless molecular change over evolutionary time can be shown to be constant, satisfying TST—a matter to be investigated, not assumed implicitly. Straight-line theories of morphological evolution were abandoned decades ago. Now temporal scaling of protein and nucleic acid differences (*2*) indicates that molecular orthogenesis is also simplistic and unrealistic. Molecular clocks need not be linear and metronomic to be interesting and informative: characterization and analysis of secular trends and other patterns of variation in rates of molecular change promise to contribute a better understanding of molecular function and evolution.

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References

1. L. Radinsky, *Science* **200**, 1182 (1978).
2. P. D. Gingerich, *Yearb. Phys. Anthropol.* **27**, 67 (1984); in *Past, Present, and Future of Hominid Evolutionary Studies*, P. Tobias, Ed. (Liss, New York, in press).

Erratum: In the article "Spotlight falls on science policy" (News and Comment, 10 May, p. 691) by Mark H. Crawford, the findings of a General Accounting Office report on the operating costs of the Continuous Electron Beam Accelerator Facility (CEBAF) were overstated. The report found that the Department of Energy's operating costs would rise by $80 million if both CEBAF *and* the Relativistic Heavy Ion Collider are constructed. CEBAF's operating cost is estimated to be $30 million. The report also found problems in accommodating the operating costs of the proposed Superconducting Super Collider in the department's budget.