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## Biomass: Renewable Energy

In commenting on Philip H. Abelson's 30 March editorial, "Uncertainties about global warming" (p. 1529), William M. Kaula asks (Letters, 15 June, p. 1281), "How do biomass techniques help reduce carbon dioxide increase? Today vigorous burning of biomass has put three lesser developed countries (Brazil, Indonesia, and Colombia) in the top ten of atmospheric carbon dioxide contributors."

It is a common misconception that techniques that use biomass as an energy source add to carbon dioxide loading of the atmosphere. It would be ecological and economic folly not to replenish the plant life at the same rate as it is being depleted by burning, hence the name "renewable energy." The net release of the gas to the atmosphere is indeed zero. If the biomass were instead left to die and decay, it would also release the carbon dioxide it had absorbed during its lifetime, but in this case no usable energy

would be made available.

The irreversible depletion of forest land by Brazil, Indonesia, and Colombia, and to a comparable extent by the United States in Hawaii and Puerto Rico (1), is hardly analogous.

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## REFERENCES

1. *New York Times*, 24 July 1990, p. A20.

## Balancing American Linguists

Merritt Ruhlen (Letters, 27 July, p. 345) chastises Virginia Morell for inaccuracy and lack of balance in her article "Confusion in earliest America" (Research News, 27 April, p. 439). In particular, he writes that Morell does not cite "the recent discovery by L. L. Cavalli-Sforza and colleagues that, on the basis of human genetics, the populations of the New World fall into the same three groups that [Joseph] Greenberg had previously defined on strictly linguistic grounds." Ruhlen then asserts that Greenberg's ambitious linguistic classification (1) "is fully and independently corroborated by [Cavalli-Sforza *et al.*'s] study of human genetics" (2).

Ruhlen does not state that Cavalli-Sforza *et al.* (2) used his summary of Greenberg's linguistic classification (3) rather than the original work (1). He also ignores the numerous criticisms of Cavalli-Sforza *et al.*'s study that have been detailed in recent publications (4) and previously outlined in *Science* (Letters, 31 March 1989, p. 1651). Instead, Ruhlen implies that Cavalli-Sforza *et al.*'s study provides independent empirical support for Greenberg's theory of three successive waves of linguistic (and thereby genetic) migration from Asia into North America, respectively Amerind, Na-Dene, and Eskimo-Aleut (1, 5).

Cavalli-Sforza *et al.*'s phenetically constructed tree, ostensibly depicting the historical-genetic relationships of human populations, analyzed Eskimo-Aleut peoples and Na-Dene-speaking Amerindians (6) only as single entities, thereby precluding detection of possible multiple origins for these groups. All other Amerindians were assigned to only three geographically delimited groups that unsurprisingly tended to cluster together in subsequent analyses (2, 4). Thus, a priori reductionism of individual humans into undefined "populations" was too severe to offer a genuine test of the Greenberg hypothesis. Moreover, Cavalli-Sforza *et al.*'s tree purports to reveal the true

sequence of historical divergences of genetic-linguistic groups, yet Eskimo-Aleut is shown to diverge before Na-Dene and Amerind—the converse of the Greenberg hypothesis. In fact, the phenetic tree does not distinguish valuable shared derived characters from historically uninformative shared primitive characters (4).

By terming Cavalli-Sforza *et al.*'s "phylogeny" of human populations a "discovery" and asserting that it has "fully ... corroborated" Greenberg's linguistic classification, Ruhlen awards an aura of proof and certainty to what is actually a set of hypotheses subject to the same degree of criticism (4, 5) as the controversial linguistic groupings that he and Greenberg have constructed (1, 3).

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1. J. H. Greenberg, *Language in the Americas* (Stanford Univ. Press, Stanford, CA, 1987).
2. L. L. Cavalli-Sforza, A. Piazza, P. Menozzi, J. Mountain, *Proc. Natl. Acad. Sci. U.S.A.* **85**, 6002 (1988).
3. M. Ruhlen, *A Guide to the World's Languages* (Stanford Univ. Press, Stanford CA, 1987), vol. 1.
4. R. M. Bateman *et al.*, *Curr. Anthropol.* **31**, 1, 177, 313 (1990).
5. B. Bower, *Sci. News* **137**, 360 (1990).
6. Cavalli-Sforza *et al.* tautologically delimited the Na-Dene-speaking Northwest Amerindians as a genetic population on the basis of their possession of Na-Dene languages.

## Marx Misstated

In the heat and humidity of the summer, there are more important things to do than correct mistakes in *Science*, but because Daniel E. Koshland, Jr., bats over .300 with me in his editorials, I will go ahead. Koshland's editorial about the three universal laws of sociodynamics (27 July, p. 341) misquotes Marxist philosophy in his second law. Marx said, "From each [not "for" each] according to his abilities, to each according to his needs." As an economist and a registered Republican, I can say that Marx is bad enough. To misstate his philosophy is even worse.

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*Response:* Fulmer is correct. As a proof-reader, I hang my head in shame.

—DANIEL E. KOSHLAND, JR.