**The AAAS Board of Directors has established a search committee to identify recommended prospects to succeed Floyd Bloom as editor-in-chief of *Science*. The Board asked the search committee to respond by the end of this year if possible.**

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The search committee would be pleased to receive names of potential candidates for the editor-in-chief position but asks that the names be accompanied by a short justification for the nomination. Suggestions can be sent to the committee's attention via Gretchen Seiler, Executive Secretary to the Search Committee, at AAAS, 1200 New York Avenue, NW, Washington, DC 20005 or via internet at gseiler@aaas.org or via fax at 202-371-9526.

All material will be treated confidentially.

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## Paleolithic Population Growth

The report "Paleolithic population growth pulses evidenced by small animal exploitation" by Mary C. Stiner *et al.* (8 Jan., p. 190) offers an original and compelling argument for inferring paleodemographic conditions among Middle Paleolithic hunter-gatherer populations in the Mediterranean Basin. The analysis based on "slow" and "quick" prey types in the three main archaeological assemblages makes a strong case for a shift from Middle Paleolithic procurement of high-ranked (slow) prey to an early Upper Paleolithic pattern of greater dietary breadth with increased hunting of low-ranked (quick) game types. The posited relationship between dependence upon slow prey and low densities of highly mobile hunter-gatherers during the Middle Paleolithic also seems reasonable. Mobility was probably a key factor in obtaining slow prey, and the archaeological evidence presented is congruent with studies in human ecology that support such a uniformitarian relationship (*1*).

What may not be consistent, however, is the further conclusion that "[l]ow human population densities during most of the Middle Paleolithic imply that group sizes and social networks were small, which certainly limited the numeric scope of individual interactions." Group sizes may have been small, and meetings between groups and individuals may have been infrequent, but this does not mean that social networks were limited or undeveloped. Scholars studying traditional Australian aborigines, particularly those in desert regions where population densities were the lowest and where mobility was extreme (*2*), have long been aware that in these cases social networking was highly developed over wide geographical areas. These networks were supported by marriage rules, kinship behavior, and ritual mechanisms. Often these social relationships were flexible, resulting in "kin cliques," as found among the Kalahari G/wi (*3*). This aspect of hunter-gatherer social life under conditions of high mobility and relatively low population densities (with plenty of "slow" game types present in the diet) is echoed in findings by Lee (*4*) among the !Kung of the Kalahari desert, in which he points out, "If one has good relations with in-laws at different waterholes, one will never go hungry."

These and other historic and ethnographic cases suggest that low population densities and high mobility can sometimes be expected to produce well-developed so-

cial networks for mutual support over wide geographical areas among hunter-gatherers. This does not preclude further developments in social networking among hunters of "quick" prey. But social networks were sometimes important for mobile hunter gatherers, especially for overcoming perturbations in key resources.

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**References**

1. A. A. Yengoyan, in *Social Exchange and Interaction*, E.N. Wilmsen, Ed. (University of Michigan Museum of Anthropology Papers, Ann Arbor, MI, 1972), vol. 46, pp. 5–9.
2. R. A. Gould, *Oceania* **62**, 12 (1991).
3. G. B. Silberbauer, *Hunter and Habitat in the Central Kalahari Desert* (Cambridge Univ. Press, Cambridge, 1981), pp. 178–190.
4. R. B. Lee, *The Doby !Kung* (Holt, Rinehart & Winston, New York, 1984), p. 82.

Stiner *et al.* make the important point that, under conditions of low population density, with reduced mobility, and with the least-cost selection assumption in effect (*1*), foragers will tend to respond to population-resource imbalances by tracking on differences in the defense mechanisms of a few, key, secondary resources (slow-moving and reproducing, easily caught tortoises and shellfish; agile, rapidly reproducing, hard-to-capture lagomorphs and birds). They show clearly that, in the Mediterranean archaeofaunal data analyzed, the breadth of the human diet increased during the Upper and Epipaleolithic (circa 30,000 to 10,000 years ago) as a consequence of increased predation on birds and lagomorphs, and that this pattern was independent of climatic changes (*2*). They conclude, however, that, of the two components of dietary diversity, evenness (the proportional contribution of a species to the diet measured in terms of some currency, for example, calories) is a better indicator of dietary stress than richness (the number of species in a sample or collection). Although this conclusion is supported empirically, it might be problematic as a universal generalization, especially if pattern searches on the archaeofaunas are extended into and through the Neolithic, and later (*3*).

At low population densities, foragers tend to be specialized economically, dependent on a few high-yield, low-cost resources, plus whatever they can easily collect in their movements about the landscape. Diversity is, therefore, low, labor efficiency is relatively high, and niche width is comparatively narrow. With a growing population and with constraints on mobility, these "traditional" resources become less efficient to exploit because of extirpation of local populations or, more commonly, increasing scarcity (and consequent increases in location and procurement costs). New resources are added to the diet, and "traditional" resources might be used more intensively, hence the evidence for overexploitation of tortoises and limpets documented by Stiner *et al.* (*4*). In some areas, at least, this general process of diversification and intensification culminates in the appearance of domestication economies. Presumably, these would be areas in which the inhabitants have "run out of options" for further diversification and intensification, so that domestication (perhaps the ultimate form of intensification) remains the only alternative (*3*). With continued population growth, domesticates would tend to make up an increasingly large part of the subsistence economy, so that in those areas characterized by a marked dependence on domesticates, resource diversity, niche width, and labor efficiency would all decline monotonically. In such extreme cases of intensification, both resource diversity and niche width would approach unity. More typically, however, the impact of domesticates would be much attenuated. They would persist along with wild resources, with their contribution to the diet remaining proportionately stable for long periods of time unless (or until) an increase in the rate of population growth shifted the balance in their favor. Under these conditions, resource diversity would remain relatively high, and niche width and labor efficiency would be moderate. Such situations are apparently the norm for most Neolithic economies (*5*).

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**References and Notes**

1. The least-cost selection assumption: in societies directly dependent on human labor for the extraction of energy from the environment, food resources are selected so that energy requirements expended in location, procurement, transportation, processing, and storage are kept to a minimum [see, for example, T. Earle, in *Modeling Change in Prehistoric Subsistence Economics*, T. Earle and A. Christenson, Eds. (Academic Press, New York, 1980), pp. 1–30].
2. See also V. Villaverde, J. E. Aura, C. M. Barton, *J. World Prehist.* **12**, 121 (1998).
3. G. A. Clark, in *The Pleistocene Old World: Regional Perspectives*, O. Soffer, Ed. (Plenum, New York, 1987), pp. 293–316; M. P. Neeley and G. A. Clark, in *Hunting and Animal Exploitation in the Later Paleolithic and Mesolithic of Eurasia*, G. L. Peterkin, H. Bricker, P. Mellars, Eds. (Archeological Papers of the American Anthropological Association, Washington, DC, 1993), vol. 4, pp. 221–240.
4. See also G. A. Clark and L. G. Straus, in *Hunter-Gatherer Economy in Prehistory*, G. Bailey, Ed. (Cambridge Univ. Press, Cambridge, 1983), pp. 131–148.
5. See, for example, I. Köhler-Rollefson, *Paléorient* **14**, 87 (1988); ——— and G. Rollefson, in *Man's Role in the Shaping of the Eastern Mediterranean Landscape*, S. Bottema, G. Entjes-Nieborg, W. Van Zeist, Eds. (Balkema, Rotterdam, 1990), pp. 3–14; A. Simmons, G. Rollefson. I. Köhler-Rollefson, R. Mandel, Z. Kafafi, *Science* **240**, 35 (1988).

***Response***

Gould makes a good point about the difference between rates of individual contact and maintenance of spatially extensive social networks among some modern hunter-gatherer peoples. We should have specified in our discussion that there must have been appreciable limits only on the sizes of Middle Paleolithic residential groups under conditions of low population density. However, it is not at all clear that Middle Paleolithic networks for controlling resource risk were organized in the manner of the modern aboriginal foragers named. One common correlate of modern, spatially extensive hunter-gatherer social networks is the exchange of material goods (shells, pigments, distinctive artifact forms, and so forth) over large areas. The quantities of material transferred may not be great, but they are often sufficient to leave an archaeological signature. In the Middle Paleolithic, there is little evidence for long-distance exchange of goods and, in fact, little evidence that objects or raw materials were regularly moved more than 40 or 50 kilometers. This contrasts sharply with the Upper Paleolithic.

We agree with Clark regarding the decline in dietary breadth associated with the transition from foraging to food-producing economies of the Neolithic and later periods. However, our study is only about what took place before the advent of domestication and agriculture, so these later periods were not covered by our discussion of Paleolithic subsistence change.

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**References and Notes**

1. Data are presented in a much longer, more data-rich paper in press at *Current Anthropology*.
2. Demonstrated, for example, in a recent paper by G. Bar-Oz *et al.*, *J. Archaeol. Sci.*, in press.

## CORRECTIONS AND CLARIFICATIONS

The article "Searching museums from your desktop" (News, 7 May, p. 888) contained an incorrect URL. The correct address is chipotle.nhm.ukans.edu/nabin/

The Perspective "A deadly double life" by Alan M. Weiner and Nancy Maizels (*Science*'s Compass, 2 Apr., p. 63) should have stated (p. 64), that Arc1p binds to glutamyl-tRNA synthetase (GluRS), not to glutaminyl-tRNA synthetase (GlnRS). In the accompanying figure (p. 64), Arc1p of budding yeast should have been shown binding to GluRS, not to GlnRS.