Richardson *et al.* seem surprised at finding themselves in the unwanted company of creationists. One might have foreseen this. The liberties Haeckel took with some of his figures gained fame only because they were welcome to practising anti-Darwinists, who gladly exploited what they called "fraud" (*1*). To some of them, every sort of vilifying argument was welcome. This seems to still be true today, as is evident from recent claims in the British press that Haeckel had been convicted by his university of alleged fraud. On being asked to disclose their sources, one of the respective authors (*2*) kindly referred us to a book agitating against the origin of man from other primates (which in turn gave no relevant reference), while the other (*3*) did not answer our queries. Because, to our knowledge, no respectable historical source mentions this conviction of Haeckel, we conclude that the claim for it must be based on hearsay, not fact. By way of compensation, the authors (*4*) who inadvertently triggered the recent round of Haeckel-bashing have meanwhile acknowledged that "on a fundamental level, Haeckel was right."

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References
1. R. Bender, *Biol. Uns. Zeit* **28**, 157 (1998).
2. T. J. Hamblin and R. E. M. Moore, *The Times*, 18 August 1997, p. 18.
3. *New Sci.*, Issue 2098, 23 (1997).
4. M. K. Richardson *et al.*, *Anat. Embryol.* **196**, 91 (1997).

Tick Population Trends and Forest Type

In their interesting report "Chain reactions linking acorns to gypsy moth outbreaks and Lyme disease risk" (13 Feb., p. 1023), Clive G. Jones *et al.* found a positive correlation between mast years in oak forests and population size of larval blacklegged ticks. In short, when acorns were abundant, mice and deer (that feed on the acorns) were plentiful, as were ticks (that feed on the blood of these mammals). They conclude (p. 1025) that "acorns determine larval tick densities" by affecting the behavior of deer and the population size of mice.

A co-author of the report, Richard S. Ostfeld, has described this phenomenon elsewhere (*1*), but the highest density of larvae at their study site in the Hudson Valley, New York, was found in a maple, not an oak, forest [figure 7 in (*1*)]. This result raises a question as to whether the relations noted in the report are the major determinant of tick density. Populations of nymphal ticks, the stage responsible for most human cases of Lyme disease (*2*), have followed similar trends (Fig. 1) at three other study sites in the northeast (*3*). Sites on Prudence Island, Rhode Island, and in Westchester County,

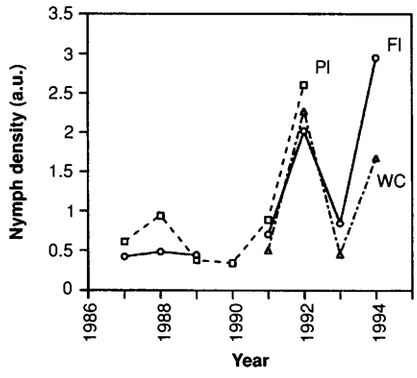

Fig. 1. Trends in densities of nymphal Ixodes scapularis ticks at sample sites (*3, 5*) on Fire Island, New York (FI); Prudence Island, Rhode Island (PI); and in Westchester County, New York (WC). a.u., arbitrary units.

New York, are in areas with extensive oak forests, but a site on Fire Island, New York, is not. The latter is a deciduous forest that includes sassafras, holly, shadbush, and black cherry, but only occasional oaks (*4*). Nymphal population trends are the same at these three sites (Fig. 1), regardless of the sampling technique used (*5*) or the presence or absence of oak forests. Thus, overall tick population trends are regional in scope and are not dependent on any one habitat type.

Oak mast production likely contributes substantially to trends in tick numbers because of the ubiquity of oak forests in the northeast. Nevertheless, the oak mast effect appears to be superimposed on a broader tick population trend that results from some factor (such as weather) operating on a regional scale.

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References and Notes

1. R. S. Ostfeld, *Am. Sci.* **85**, 338 (1997).
2. D. Fish, in *Ecology and Environmental Management of Lyme Disease*, H. S. Ginsberg, Ed. (Rutgers Univ. Press, New Brunswick, NJ, 1993), pp. 25–42.
3. H. S. Ginsberg and C. P. Ewing, *Exp. Appl. Acarol.* **7**, 313 (1989); H. S. Ginsberg and R. A. LeBrun, *Technical Report NPS/NESO-RNR/ NRTR/ 96-02* (National Park Service, Boston, 1996); C. L. Fritz, G. L. Campbell, D. Fish, H. S. Ginsberg, T. Mather, paper presented at the 7th International Congress on Lyme Borreliosis, San Francisco, CA, 17 June 1996; D. Fish, T. J. Daniels, R. C. Falco, paper presented at the 7th International Congress on Lyme Borreliosis, San Francisco, CA, 17 June 1996; H. S. Ginsberg, H. B. Underwood, K. E. Hyland, paper presented at the 46th Annual Meeting of the American Society of Tropical Medicine and Hygiene, Orlando, FL, 10 December 1997.
4. H. W. Art, *Ecological Studies of the Sunken Forest, Fire Island National Seashore, New York* (National Park Service Scientific Monograph Series, No. 7, Washington, DC, 1976); R. Stalter, E. E. Lamont, J. Northup, *Bull. Torrey Bot. Club* **113**, 298 (1986).
5. Fire Island data were measured in number of nymphs per minute in flag-drag samples; Prudence Island data were in number of nymphs per 20 seconds in flagging samples; and Westchester data were in number of nymphs per square meter on the basis of mark-recapture estimates. Differences in tick numbers between sites likely result from differences in sampling techniques and presumably from actual differences in tick densities between sites.

Response

Ginsberg *et al.* pose two important questions. First, is acorn production the major determinant of tick density? At a local scale, the answer appears to be, yes. Within oak-dominated forests at our study sites in the Hudson Valley of New York, the density of red oak (*Quercus rubra*) and chestnut oak (*Q. prinus*) acorns produced in autumn on our 2.25-hectare plots (*1*) accounted for 67% of the variation among years in the density of larval black-legged ticks the following summer (n = 6 years, P = 0.05; Fig. 1). Our data suggest that, within adjacent maple forests, larval ticks become abundant only in summers after poor acorn production (Fig. 1), probably as a result of heavier use by deer of maple habitats in autumns, when acorns are scarce (*2*).

Thus, the effects of acorn production appear to extend to the local landscape surrounding oak forests (*3*). The second question—How localized is the acorn effect on tick density?—cannot be answered with the available data. Because seed production by forest trees often is well synchronized over hundreds of square kilometers (*4*), we expect that acorn effects may occur over regional scales. We agree with Ginsberg *et al.* that other factors, including

density-independent mortality agents such as weather, may affect patterns of density fluctuations in populations of black-legged ticks, and we hope that such factors will be rigorously examined. Finally, we agree with David E. Blockstein (Letters, 20 Mar., p. 1831) that the extinct passenger pigeon may have altered ecological interactions important today in determining Lyme-disease risk by reducing the tendency of white-footed mice to fluctuate with acorn production. The loss of the American chestnut (*Castanea dentata*) from eastern forests earlier this century, and the consequent increase in dominance by oaks (*5*), may also have had a similar effect. Extinctions may have unanticipated repercussions in ecosystems that affect humans directly and indirectly.

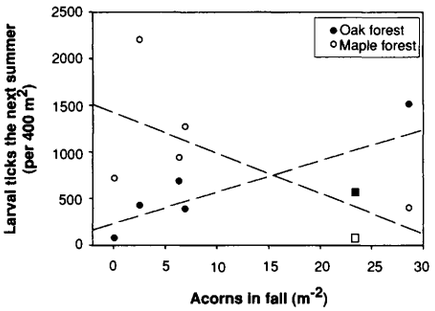

Fig. 1. Association between density of acorns produced in fall and density of larval *Ixodes scapularis* ticks the following summer. Acorn densities from 1991 to 1996 were determined using methods described in note (*1*). Density estimates for larval *Ixodes scapularis* were obtained by sampling four 100-meter transacts with a 1-meter drag cloth on two 2.25-hectare sampling plots each summer from 1992 to 1997. Values are average peak densities of ticks each year. For oak-dominated forests, linear regression $r^2 = 0.67$, df = 5, $P = 0.05$; for adjacent maple-dominated forests, linear regression $r^2 = 0.46$, df = 5, $P = 0.14$.

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References and Notes

1. Data on mast production were obtained in two 2.25-hectare oak-dominated forest plots at the Institute of Ecosystem Studies (IES) in Millbrook, New York, with the use of seed traps placed under the canopies of four species of dominant canopy trees, *Quercus rubra, Q. prinus, Q. alba*, and Carya glabra. One 0.5-meter^2 seed trap was deployed under each of five specimens of each tree species, and total acorn production (acorns per meter^2) was determined each year from 1992 to 1996 (C.D. Canham, unpublished data). Data from 1991 (square symbols in Fig. 1) were obtained by averaging *Q. rubra* acorns in 21 2-meter^2-quadrants placed along each of four 100-meter transepts in a similar oak-dominated forest 35 kilometers from IES (T. N. Coulson, thesis, University of London, 1994, pp. 49–50).
2. R. S. Ostfeld, C. G. Jones, J. O. Wolff, *BioScience* **146**, 323 (1996); R. S. Ostfeld, *Am. Sci.* **85**, 338 (1997).
3. J. Van Buskirk and R. S. Ostfeld, *Ecol. Applic.* **8**, 365 (1998).
4. J. Silvertown, *Biol. J. Linnaean Soc.* **14**, 235 (1980).
5. E. L. Braun, *Deciduous Forests of Eastern North America* (Free Press, New York, 1950).

CORRECTIONS AND CLARIFICATIONS

In the article "NIH urged to involve the public in policy-making" by Eliot Marshall (News of the Week, 10 July, p. 152), the new advisory structure for the National Institutes of Health (NIH) recommended by the Institute of Medicine (IOM) was misconstrued. The IOM report called for a Council of Public Representatives only in the office of the director of NIH (not in each NIH institute). However, the report does call for a new, NIH-staffed public liaison office in each institute and more public representatives on existing institute committees.