

## SCIENCE'S COMPASS

given that ultimately it has no option but to operate within the limits of the funds it is able to obtain from all possible sources. Therefore, KWS needs to take a hard look at how much it should spend on each of its activities, including CBC, and what it gets in return. While there is certainly important biodiversity and critical habitat to be conserved outside the parks, park entry fees currently provide about 95% of KWS's revenues. It is a basic principle of business (and common sense) first and foremost to protect your main source of income. Not only the World Bank, but all the international donors supporting KWS, have repeatedly expressed concern over these issues and pressed KWS to come to grips with these realities.

I hope that the recently designed "minimum viable conservation network" cited by Western is a positive step in that direction, although I have not yet seen any discussion of its financial implications. KWS is entrusted with the care of an enormously valuable national and international heritage. While Western claims that its current strategies and activities were developed with a high degree of consultation and participation among stakeholders countrywide, there are many important and knowledgeable stakeholders who feel oth-

erwise and who believe that KWS is going seriously off track.

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### Embryology and Evolution

M. K. Richardson *et al.*, the authors of a study (1) demonstrating fraud (E. Pennisi, Research News, 5 Sept. 1997, p. 1435) by 19th-century embryologist Ernst Haeckel have objected (Letters, 15 May, p. 983) that their work was "used in a nationally televised debate to attack evolutionary theory, and to suggest that evolution cannot explain embryology." As the debate participant who discussed Haeckel, I believe their objections are unwarranted.

Richardson *et al.* write that "[d]ata from embryology are fully consistent with Darwinian evolution." Unfortunately, that is a negligible standard. The distinguished authors of a prominent textbook have strongly argued (2) that the early stages of embryogenesis should be highly conserved, as Haeckel pictured them. That idea, however, has now been shown to be incorrect (1). But if Darwinian theory is

"fully consistent" with either conserved or variable embryogenesis, then it is consistent with virtually any scenario and makes no predictions concerning it. Contrary to Richardson *et al.*'s statement that "Haeckel was right to show increasing difference between species as they develop," the earliest stages of development are actually quite different across vertebrate species, and become increasingly similar toward the phylotypic stage (3). The "hourglass" pattern of development is a conundrum that is not predicted by Darwinism.

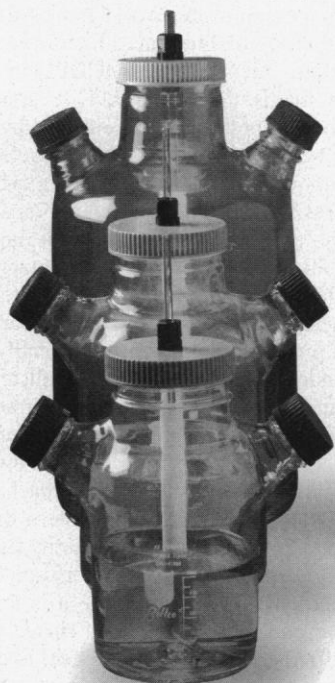
I did not say during the debate, as Richardson *et al.* write, that "evolution cannot explain embryology." Rather, I said, in effect, that for a century, Darwinism easily embraced a false description of a fundamental process and that the problem of development within evolution remains unsolved.

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### References

1. M. K. Richardson *et al.*, *Anat. Embryol.* **196**, 91 (1997).
2. B. Alberts *et al.*, *Molecular Biology of the Cell* (Garland, New York, ed. 3, 1994), pp. 32-33.
3. R. Raff, *The Shape of Life* (Univ. of Chicago Press, Chicago, IL, 1996), pp. 192-197.



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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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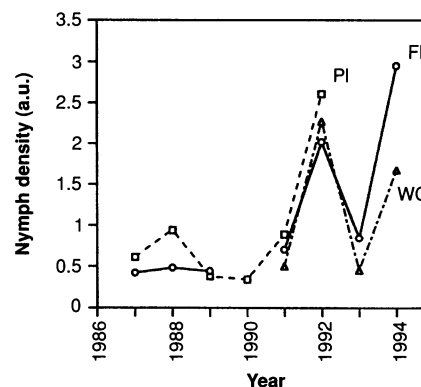
#### References

1. R. Bender, *Biol. Uns. Zeit* **28**, 157 (1998).
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#### 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 black-legged 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.

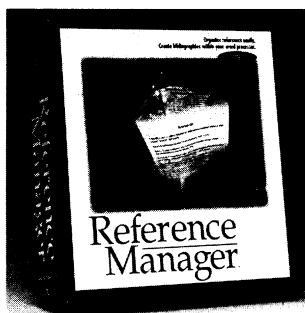
A co-author of the report, Richard S. Ostfeld, has described this phenomenon elsewhere (1), but the highest density of larvae at their study site in the Hudson Valley,



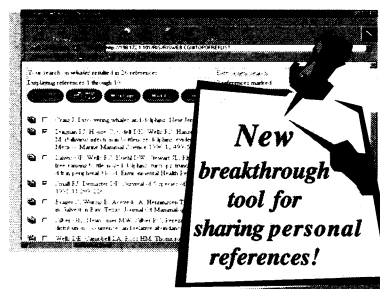
**Fig. 1.** Trends in densities of nymphal *Ixodes scapularis* ticks at sample sites (3, 5) on Fire Island, New York (FI); Prudence Island, Rhode Island (PI); and in Westchester County, New York (WC). a.u., arbitrary units.

New York, 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,

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