2. F. Reif, *Science* **184**, 537 (1974).
3. M. Crawford, *ibid.* **247**, 405 (1990).
4. S. A. Cain, *Bull. Atom. Sci.* **46** (3), 7 (1990).

Atkinson and Robert Pool (News & Comment, 27 Apr., p. 433) present some projections of Ph.D. supply and demand for the coming decade and beyond. Both authors focus on the production of new Ph.D.'s, basing their projections on demographic predictions. No mention is made of some other groups who may be expected to fill academic and industrial vacancies as these become available—Ph.D.'s who hold marginal positions or are not currently employed in academics or industry, people with some science training who may enter Ph.D. programs if job prospects improve, and students who may finish their training early.

Possible recruits to science positions are people older than average graduate students. If job prospects are good, and funding is available, it may become economically sensible for a 40-year-old to enter a 5-year training program and work for 20 years before retirement.

Students and junior scientists who are prolonging their Ph.D. programs and postdoctoral appointments until job prospects improve may be moving into the workforce sooner than expected. There seems to be an inverse relationship between the job prospects in a specialty area and the length of time required to complete a Ph.D. in that area.

Many questions remain regarding these groups, but better information on their size and composition would allow more accurate predictions of future supply and demand for scientists and engineers.

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Endangered Species Biology

"Endangered species are in trouble mainly because their numbers are declining, right?" (Briefings, 6 July, p. 20) *Right!* Unfortunately, the contrary assertion offered in the briefing, that "the greatest threat to many endangered species is posed by genetic homogeneity," is one of the overly simplistic views of endangerment that can lead to distracting debates among conservation biologists and a poor track record in endangered species recovery. Genetic homogeneity through inbreeding *can* imperil a species, but such inbreeding occurs as a consequence of population decline and fragmentation. It is just one of several interacting factors that come into play when a population becomes so small that its fate is determined more by randomness than by fitness.

In most cases of species endangerment, the initial decline in numbers and geographic range is due to factors external to the biology of the species, and generally these are consequences of human activity. The prime factor, of course, is habitat destruction, but other factors include the introduction of competitors or predators and overharvesting by humans. Small and fragmented populations are the result, particularly for large vertebrates such as tigers, which have naturally extensive home ranges. Once populations are reduced in size and isolated, deleterious genetic and demographic processes ensue that serve to weaken further the survival potential of the species. The smaller populations also become progressively more vulnerable to environmental catastrophes. Even with amelioration of environmental circumstances, for example, provision of security in protected areas or zoological parks, a species may go too far down the so-called "extinction vortex" of multiple causes to be recoverable.

Zoos have had to face small population biology problems head on in trying to manage the long-term survival of species in captivity. The population viability analysis techniques developed for these situations are now being applied to similar problems in wild populations of species in the United States, Puerto Rico, Brazil, Indonesia, and Australia. Whether captive breeding or propagation is needed relates to the severity of the problem, but the policy of the World Conservation Union (IUCN), recommended by its Captive Breeding Specialist Group, states that such management intervention is best pursued while the wild population still numbers in the thousands. In other words, give the rescue workers a chance before a species is in the critical ward.

Prospectively, as intimated in the briefings, some techniques developed for the critical cases, such as in vitro fertilization in captive cats, may be valuable in the management of the genetic and demographic health of small, isolated wild populations. For example, needed genetic variability could be introduced by in vitro fertilization of a wild female tiger without the disruption that a new male tiger could produce in the local population.

The need for more support for the science and application of conservation biology has become very obvious, thanks to the media. We hope that *Science* will continue to publish articles about this need, but with the correct information, as it can have a great effect on decision-makers and on the general public.

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AI: Thousands of Ants?

The features of artificial intelligence by swarms of miniature robots described in M. Mitchell Waldrop's article "Fast, cheap, and out of control" (Research News, 25 May, p. 959) reminded me of the following passage from *The Lives of a Cell* by Lewis Thomas (Viking, New York, 1974).

> A solitary ant, afield, cannot be considered to have much of anything on his mind; indeed, with only a few neurons strung together by fibers, he can't be imagined to have a mind at all, much less a thought. He is more like a ganglion on legs. Four ants together, or ten, encircling a dead moth on a path, begin to look more like an idea. They fumble and shove, gradually moving the food toward the Hill, but as though by blind chance. It is only when you watch the dense mass of thousands of ants, crowded together around the Hill, blackening the ground, that you begin to see the whole beast, and now you observe it thinking, planning, calculating. It is an intelligence, a kind of live computer, with crawling bits for its wits.

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"Shoehorning" Men into Studies?

Regarding the controversy about including women in National Institutes of Health–funded studies (News & Comment, 29 June, p. 1601), I can certainly understand the position of a researcher such as Charles H. Hennekens. Since he had chosen physicians as his study population, and there weren't enough female physicians for his group to draw sound conclusions, it made sense to leave them out.

The real problem seems to lie in the unconscious assumption that the average, typical human being is male. Females are seen as a variation on this norm. How would male researchers react to the statement that "shoehorning *men* into studies for political rather than scientific reasons would be disastrous"?

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