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The Race for the “Gold” in Research

It is the conviction of scientists that more basic research will profit not only the globe, but also the specific countries in which it is carried out. The former is essentially obvious. Although one nation may at the beginning have an edge in producing television sets, hybrid corn, or new solid-state materials, the technology rapidly spreads to all countries in the world, and everyone lives better than they did before. The latter, the competitiveness argument for research funding, is blurred, however, by the internationality of science. A scientist’s lab is open to any scientist, regardless of international borders, and scientists like to publish in journals that are read all over the world.

Is it contradictory, therefore, to make an argument for governments to increase support for basic research to increase national competitiveness and at the same time maintain the international community of science? At first glance, it would seem that the two are incompatible. Indeed, there are even some shortsighted proposals to exclude foreigners from meetings and from laboratories. Yet, the easiest and most feasible solution is a world patent system. If the countries of the world agreed to recognize a world patent, then countries trying to increase the global standard of living and, incidentally, their own by supporting basic research would have the protection of a patent system. Such a system would give governments an incentive to increase basic research funds, and a country that proceeded to get patents would give itself and its workers a short-term advantage. Ultimately, the entire world would benefit because those short-term advantages would be converted into globally useful new products and processes. Such a system would also help maintain the internationalization of the scientific community without endangering either the flow of knowledge among scientists or the recognition of the value of their work in their own country.

The idea is so simple and so straightforward that one wonders why it has not been put into operation already. Here one comes face to face with harsh reality. There are groups working on patent harmonization, a term that means that patent provisions in all countries would have similar approaches and mutual respect. Today the United States gives priority rights to those who are “first to invent,” whereas most of Europe and Japan have a “first to file” system. Among the objectors to a change in U.S. law are universities, which want a period of grace between the time the invention is made in the laboratory and the time publication occurs in a scientific journal. It is possible to see how international compromises could be effected by some combination of first to file and grace periods for publication. But technicalities become stumbling blocks in treaties when individual countries see benefits or threats to their economic well-being. These involve genuine disputes about the internationalization of property rights and protection for developing countries and are not to be taken lightly.

The United States should make a major concession in shifting to a first-to-file system because so much of the rest of the world has adopted the first-to-file approach. Other countries should compromise on a grace period because there are features of the U.S. law protecting the lone inventor and the university researcher that are desirable. A compromise including both first to file and a grace period would allow the harmonization of patent law, which would be a service to the entire world. A world patent is probably a concept for the future, but reciprocal treaties with countries that see the benefits are already being discussed. The scientific community must realize that the world has changed and that some of the informality that formerly permitted great strides in international science is going to have to be replaced by more formal arrangements, and these may provide a basis for a fairer and more productive international system of research. When flags are raised and anthems sung for the gold medal in a downhill slalom race, one can at least imagine that eventually countries would experience as much excitement and as much pride for winning the gold in the race for the cystic fibrosis gene or the giant slalom down the Josephson junction. Perhaps there should be a supermedal for the nation contributing the most funds to basic research, since the citizens of the world would recognize that they were the ultimate beneficiaries of such an investment, no matter where it occurred. A national competitiveness in the coordination and flexing of intellectual muscles would be a competition in which all would benefit.—DANIEL E. KOSHLAND, JR.
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pCi/liter. In a major study, it was found that the relatively few miners who died of lung cancer after low exposures to radon were cigarette smokers (3). Most of the nonsmoking miners of the Colorado Plateau who died of lung cancer experienced levels of radon orders of magnitude greater than 4 pCi/liter. The miners' exposure was poorly controlled and measured during the crucial early 1950s and has probably been understated.

In view of the difference in exposure levels between mines and homes and the pathologic effects of heavy exposures to mineral dusts and diesel fumes, extrapolation from mines to homes is questionable. Nevertheless, EPA has been emphasizing for the past 5 years that radon in homes is the second leading cause of lung cancer. The total annual number from all causes, including smoking, is about 140,000. Various numbers quoted by EPA of the deaths resulting from radon have ranged as high as 43,200. This was a statistical limit, but how many members of the public are versed in statistics? If radon is such a potent cause of lung cancer in the general public, the pathology should be highly obvious. In recent times, levels of radon in millions of homes have been measured. High levels of radon have not correlated with high rates of lung cancer (4). In the three states with the highest mean radon levels in home living areas (Colorado, North Dakota, and Iowa: 3.9, 3.5, and 3.3 pCi/liter, respectively), the death rate from lung cancer averages 41 per 100,000. In the three states with the lowest radon levels (Delaware, Louisiana, and California: 0.75, 0.96, and 0.97 pCi/liter, respectively), the rate averages 66 per 100,000.

Before 1930, lung cancer was a rare disease. At that time radon exposures were comparable to those of today. Lung cancer became important only after the advent of smoking on a large scale (4).

In spite of the flimsiness of the evidence to support its radon program, EPA has engaged in a campaign designed to frighten all of us, and especially mothers. This has gone on for years and has been fostered by the media. The most egregious tactic has been a 30-second spot TV film that has been repeatedly shown. I have a VCR copy of it.

In the TV spot a family is seen in front of their television set. A voice says that high radon in one's home is like having hundreds of chest x-rays a year. Flashes occur that appear to cause the entire skeleton of a child seated on his mother's lap to be revealed. It isn't only the child's chest that is exposed to x-rays; it's his entire skeleton—conveying an impression of death.

Prolonged exposure to high levels of radon in miners undoubtedly is a cause of cancer in both smokers and nonsmokers. The failure of EPA to produce rigorous data on effects of low levels of radon on nonsmokers in homes detracts from its credibility.—PHILIP H. ABELSON

REFERENCES
4. R. Yalow, personal communication.

Structure of RNA Polymerase II–Associated Protein: Correction

A recent paper by M. Horikoshi et al. (1) pointing out an error in the complementary DNA sequence encoding the RNA polymerase II–associated protein, RAP30, has prompted us to write a correction of our recent report "Related RNA polymerase―binding regions in human RAP30/74 and Escherichia coli e70" (23 Aug., p. 900) (2). Because the inferred amino acid sequence of RAP30 is changed by the correction of Horikoshi et al., the COOH-terminal fragment is now predicted to be 7.5 kD rather than 5.5 kD, and it might be expected to have a lower electrophoretic mobility than the internal 7.3-kD fragment, which contains the α homology region. The schematic representation of RAP30 ([2], figure 1C) should be altered to reflect this change. We have performed amino acid sequence analysis of the 7.3- and the 7.5-kD cyanogen bromide fragments, obtained from bacterially expressed RAP30, that were purified by urea SDS–gel electrophoresis and have confirmed that our earlier identification of the 7.3-kD fragment was correct. Therefore, the conclusions stated in our report are not affected by this change.

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REFERENCES

Erratum: In the report "Cloning and expression of a cocaine-sensitive dopamine transporter complementary DNA" by S. Shimada et al. (25 Oct., p. 576), three amino acids were inadvertently omitted in figure 1. A tyrosine (Y) should have been at position 156 so that phenylalanine (F) and asparagine (N) were at 155 and 157, respectively; a cystine (C) should have been at position 242 so that alanine (A) and leucine (L) were at 241 and 243, respectively; and a proline (P) should have been at position 272 so that methionine (M) and Y were at 271 and 273, respectively.
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REFERENCES AND NOTES
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13 January 1992; accepted 10 February 1992

"Take two of these and call me a century from now."
tion age structure at water hole and hunting death sites. From these actualistic studies, Haynes develops models for interpreting patterns of mastodont and mammoth mortality. However, these actualistic studies only provide useful models if mastodonts and mammoths had behaviors and social structures similar to modern elephants, a contention for which Haynes presents little strong evidence. Though a case can be made for similarity between mammoths and living elephants, due to their close phylogenetic relationship, mastodonts are more distantly related to living elephants, and they might have had very different behaviors and social structures. Ultimately, mastodont and mammoth behavior must be reconstructed not by mere analogy to modern elephants but through rigorous study of evidence from the fossils themselves, including biochemical, geochemical, and structural attributes.

With data in hand from modern elephants, Haynes turns to the fossil record, broadly surveying global patterns in elephant, mastodont, and mammoth sites. This review is iconoclastic and, I believe, overly biased by the author's experiences with butchery practices at the Hwange mass kill sites. Yet the survey highlights the fact that unambiguous, well-studied butcher sites are very rare. It also offers an important English-language overview of the many spectacular Eurasian mammoth sites excavated over the past century.

The book closes with a discussion of climatic and hunting hypotheses for the late Pleistocene extinction in North America. Given the uncertainties about mastodont behavior and the lack of butcher sites with multiple individuals, mastodonts do not figure into Haynes's discussion. The dozen or so Clovis sites with multiple butchered mammoths present a paradox. Most sites are located near water sources and have age structures similar to those of African elephant die-offs during droughts. And though these mammoths were clearly butchered, they show no evidence of thorough carcass utilization, as is seen in African butcher sites. Haynes proposes that at the end of the Pleistocene, mammoths were clustering around water holes during a period of extreme environmental stress caused by the shift to a post-glacial climate. They were in poor physical condition and thus were easy targets for opportunistic human hunters. However, because of their poor condition and their abundance, humans did not carefully extract all available resources from each carcass. Environmental stress set mammoths up for extinction, but it was human predation that ultimately pushed them over the brink.

The book is well written, with illustrations and tables provided to support important conclusions. The bibliography alone is an excellent resource, and many researchers will use the information on growth patterns and age determination provided in the appendix. This book does not purport to solve the mystery of late Pleistocene extinction. It does offer a reasonable scenario for mammoth extinction that is consistent with the wealth of new information provided concerning modern elephant behavior and mortality.

Paul L. Koch
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Books Received


Vignettes: Our Universities

One of the things that concerns me is the persistent tendency to emphasize too heavily . . . the importance of relationships between universities and industry as a means of getting ahead competitively. The validity of this linkage is far from clear. If universities are really the key . . ., why did we grow faster than other countries during the late nineteenth and early twentieth centuries when our universities were mediocre, and why is our productivity lagging behind other nations now that our universities and their scientific achievements lead the world?


The university . . . like most other organizations, . . . wants first of all to survive. The university has become adept at survival, to the point that it is not always clear whether the great range of activities in which many universities are engaged today represents a deep ideological commitment or simply a manifestation of the need to survive.

—George Bugliarello, in The Changing University

Structures and guidelines have been built by universities; but more importantly, the visceral fears that outside commercial interests would distort the search for truth, would taint academic freedom, have all but disappeared. It is not that those fears and conflicts do not exist; but in a world where there is constant interchange of manpower and money between academia and commerce, no one much protests publicly anymore.


**Bioluminescence of Illuminating Protists.** Frank Halbach. xii, 451 pp., illus. $95. Wadsworth and Brooks/Cole Mathematics Series.


**Biophysical Methods in Health and Disease.** vol. 53.


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