Letters

Technology Transfer and Universities

There is at present great ferment in our institutions over something called "technology transfer." It is the "in" thing to be doing, and our great research universities are being asked to show in their grant proposals how they will transfer their technology to U.S. industry. The problem is that in many cases there is little if any technology to transfer. Most of these universities do not do technology: they do science and engineering. Through their faculty and graduates and their research programs they have a great wealth of knowledge and cutting-edge research results to transfer, but not usually technology. Indeed, we need to encourage better means for transfer of this knowledge.

Technology is the application of knowledge, tools, and skills to solve practical problems and extend human capabilities. It is enhanced by the discoveries of science and shaped by the designs of engineering. It has been primarily the responsibility of industry. Unfortunately our changing national values and the associated tyranny of the bottom line have mitigated our incentives to take necessary risks and have weakened our ability to compete. Technology is indeed where we must focus our energies and ideas. We need to develop and transfer it within our industrial system, where it can benefit our nation. But to pretend that it will come from our great research universities is nonsense.

JAMES R. JOHNSON
Route 1, Box 231B,
River Falls, WI 54022

Timekeeping

Eliot Marshall's News & Comment article "A matter of time" (18 Dec., p. 1641) needs several clarifications.

Time balls were devices used well into the 20th century to give ocean navigators a convenient way to rate their chronometers. They were common before the radio: nearly 200 were in use. There were balls, guns, boards, flags, and shutters; not until radio time signals were broadcast widely were such visual signals dismantled. The first time ball, erected in 1829, was at the Royal Navy's Portsmouth base (*1*). Greenwich's time ball—the third in the world—was also erected to provide a signal for navigators; time for the public was a secondary consideration, for the Royal Observatory was an Admiralty function then. The time ball there is one of four still operating; its instant of release is 1 p.m., not noon (*2*). The Times Square, New York, ball—now an "apple"—although reminding us of this important visual time-signal service, is not a relic of the era. The tradition began in 1908; exactly at midnight, the lighted "Times Ball" reached the bottom of its descent, and a huge display of lights was turned on.

"Greenwich Mean Time" did not begin at the end of the 19th century, as the article suggests, but during the 17th, with the founding of the Greenwich Observatory. The concept of mean time—averaging the variations in the solar days over a year to generate a uniform scale and adjusting one's mechanical timekeeper to count the resulting seconds—became important with the invention of accurate (pendulum) clocks; cities switched to mean time from apparent (sundial) time during the 18th century. "Greenwich" simply tells one that the timekeeper has been set to Greenwich's local time, the mean solar time along the observatory's meridian. The designation GMT seems to have been adopted officially for civil purposes in 1880, but was in use decades earlier (*3*).

Astronomers moved from Greenwich to Herstmonceux, Sussex, after World War II, and Britain's time service was placed there in 1957 (*4*). The Royal Observatory—a national treasure designed by Sir Christopher Wren—continues as part of the National Maritime Museum; the Royal Greenwich Observatory's Sussex castle is the one to be transformed to a hotel.

Finally, the public is little affected by "adjustments" made in time reckoning; calendar reform, of course, is a much different matter. Even the worldwide adoption of time zones from 1883 on was driven more by geophysical needs than by civil or astronomical ones (*5*). Governments took scarcely any action on civil time matters until the societal effects of daylight saving time became apparent (*6*).

IAN R. BARTKY
U.S. Army Laboratory Command,
2800 Powder Mill Road,
Adelphi, MD 20783

REFERENCES

1. I. R. Bartky and S. J. Dick, *J. Hist. Astron.* **12**, 155 (1981); *ibid.* **13**, 50 (1982).
2. I. R. Bartky, *Sky Tele.* **73**, 32 (1987).
3. H. M. Smith, *Vistas Astron.* **20**, 219 (1976); H. Raper, *The Practice of Navigation and Nautical Astronomy* (Bate, London, ed. 3, 1849), table 10.
4. D. Howse, *Greenwich Time and Discovery of the Longitude* (Oxford Univ. Press, Oxford, England, 1980), pp. 175 and 202.
5. I. R. Bartky, *Vistas Astron.* **28**, 105 (1985); *ibid.*, *Technol. Culture*, in press.
6. _____ and E. Harrison, *Sci. Am.* **240**, 46 (May 1979).

Protection of Rights

In his 8 January letter (p. 127), M. B. Mittleman expresses concern about a "proposed guideline of the National Conference of Lawyers and Scientists (NCLS) for 'bringing charges anonymously' against those presumed guilty of scientific fraud." The need to protect legitimate "whistleblowers" against possible reprisals was discussed at the NCLS workshop, and anonymity was advocated by some participants as one means of offering such protection. The meeting did not in any sense endorse the concept, however. Indeed, a central issue was the need to protect the rights of *all* parties involved in allegations—the accused as well as the accuser and the larger scientific community.

ALBERT H. TEICH*
Office of Public Sector Programs,
American Association for the
Advancement of Science,
1333 H Street, NW,
Washington, DC 20005

*Staff Officer, National Conference of Lawyers and Scientists

Proposition 65: Implementation

Steven A. Book's letter (18 Dec., p. 1635) replying to Philip H. Abelson's editorial (25 Sept., p. 1553) amply illustrates the major confusion and dislocation that will occur unless California's Proposition 65 is implemented in a clear and sound way.

The facts are that (i) virtually all food contains trace amounts of carcinogens, and (ii) most of these carcinogens are present at such low levels that the Food and Drug Administration and state agencies have not found it necessary to promulgate formal regulations to control them. Federal and state agencies adopt specific enforcement requirements of this kind only when a substance reaches a level that presents a potential safety problem, not when a substance is present at a level that presents an insignificant risk.

Book's letter makes two quite different statements about the intention of California to implement Proposition 65. In the fourth paragraph of his letter, he states that California intends to recognize "regulatory levels for carcinogens and reproductive toxicants that are regulated by state and federal agencies." This would be an inadequate approach, because state and federal agencies have not established specific regulatory levels for trace carcinogenic contaminants in most of the food supply. In his fifth para-