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Cover: For more than a decade, scientists have struggled to pin down the purported health effects of electromagnetic fields emitted by power lines and other sources. New epidemiologic studies strengthen the controversial link between electromagnetic field exposures and cancer risks, although the findings are sometimes difficult to replicate. Biologists and physicists are probing such effects in laboratory studies in an attempt to explain how electromagnetic fields might trigger cancer-promoting changes at the cellular level. (Photo: Grant Heilman/Grant Heilman Photography Inc.)



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To Ted Sherburne: Farewell and many thanks

You are reading the 1,319th issue of SCIENCE NEWS for which E. G. Sherburne Jr. has served as publisher, his last. Ted — as we on the magazine and thousands of people involved in publishing or high school science education know him — will retire on Sept. 30 after a quarter century as president of Science Service, our parent organization.

These have proved eventful years, for science and for Science Service. The moon landings, the theory of plate tectonics, the biotechnology revolution, the introduction of submicrometer miniaturization to computer chips, and remarkable work in genetics, immunology, neuroscience, botany, high-energy physics, lasers, chemistry, materials science and a host of other disciplines have all occurred since Ted began his tenure here.

Under his direction, SCIENCE NEWS has reported extensively on these developments and has surged from a circulation of 90,000 to nearly 230,000 subscribers. The prestigious Science Talent Search (STS), which Science Service administers for the Westinghouse Electric Corp., has garnered even greater luster and fame, celebrating its 50th anniversary this year (SN: 2/23/91, p.120). And the International Science and Engineering Fair (ISEF), which for 42 years has brought together the winners from many local high school science fairs, counted 748 participating students from 46 states, the District of Columbia, American Samoa, Guam, Puerto Rico, and seven foreign countries last May in Orlando, Fla.

I'm a relative newcomer to the organization, having arrived only 3½ years ago.



Photo: Richard Monastersky

I'd heard some lore of Ted's early days, and with his departure imminent, I asked him what he regarded as his greatest accomplishment at Science Service.

"The organization's survival," he re-

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Letters

Forays into fusion

Those who wish to understand the current state of cold fusion research ("Cold ConFu-sion," SN: 6/22/91, p.392) might benefit from a careful study of the history and philosophy of science. In his history of the discovery of the Wasserman test for syphilis (*Genesis and Development of an Idea*, University of Chicago Press, 1981), Ludwig Fleck, a bacteriologist and philosopher of science, noted that "Wasserman's basic assumptions were untenable, and his initial experiments irreproducible, yet both were of enormous heuristic value. This is the case with all really valuable experiments."

The initial forays into unexplored regions of nature are invariably fraught with error and misconception. But we must not confuse the ambiguity of the data, and the failure of scientists to immediately perceive the "truth" within this ambiguity, with failure of the scientific method or inadequacy of the scientists performing the research.

The more we know, the more there is to discover. Indeed, more than half a century after it was invented, we still do not understand the immunological basis for the Wasserman test. Such unknowns represent outstanding problems that should evoke excitement, not knowledge-quenching skepticism.

*Robert S. Root-Bernstein
Associate Professor of Physiology
Michigan State University
East Lansing, Mich.*

Since the earliest publication of "cold fusion" results, I have constantly recalled the

first method used to prepare deuterium in pure form. This was the electrolytic method of concentration, discovered by E.W. Washburn and implemented by G.N. Lewis. When water (approximately 0.015 percent deuterium) is electrolyzed, the hydrogen gas produced contains a smaller fraction of deuterium than the remaining water. Thus, deuterium is concentrated in the residual water, and continued electrolysis yields a very nearly pure solution of deuterium.

An analog may exist in the cold fusion experiments. If tritium oxide is present in the deuterium oxide being electrolyzed, even in very small percentages, the tritium would be concentrated in the residual deuterium oxide solution. The radioactive decomposition of that tritium could be the source of the observed energy surplus. The decomposition products of tritium are an energetic electron (beta minus) and a helium-3 nucleus. Both of these decay products seem to adequately account for observed phenomena.

The most striking correlations between the observations of the Pons-Fleischmann experiments and those of B.F. Bush *et al.* are those related to the helium-3 nucleus. This could emerge from the electrolyte as either a light alpha particle or a helium atom, depending on the availability of electrons. Thus, a light alpha particle would emerge if measurements were made with the current *off*, and a helium atom would emerge with the current *on*. It seems possible that an alpha particle could have been mistaken for a neutron, thus explaining the Pons-Fleischmann results.

*Frank C. Wagner
Oklahoma City, Okla.*

In the early '60s, engineering magazines ran a number of articles on exotic systems for automotive propulsion. One system consisted of a canister of palladium pellets that was pressurized to charge it and used engine exhaust heat to drive hydrogen out of solid solution for use as a fuel. The principle—which should also apply to palladium-deuterium—was that the solution process of hydrogen in palladium is pressure- and temperature-dependent and exothermic, with increasing solubility at reduced temperatures.

*Frank J. Kolano
Mechanical Engineer, K-Mech Associates
North Braddock, Pa.*

The "hair" structures associated with successful tests may result from implementation of the first essential condition of cold fusion experiments: that as much deuterium be squeezed into the palladium as possible.

I'm not sure how it happens, but I think the hairs may be an amalgam of palladium and deuterium that forms when we attempt to electroplate deuterium onto palladium. Thirty years ago, I observed a similar phenomenon in a college physics class. I owned a ballpoint pen with a silver-plated brass barrel, which had been knurled before plating to make it easier to grip. The lab experiment involved mercury. I got a little mercury on my pen, and dendritic crystals grew on every corner of the diamond shapes of the knurled surface. These "whiskers" grew so rapidly that I could see them move; I brushed them off and they grew right back.

*George Parrish
Muskegon, Mich.*

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plied without hesitation. "During my first five or six years, we didn't know if we were going to make it."

Ted assumed the leadership of Science Service in 1966, moving over from director of public understanding of science at the American Association for the Advancement of Science. He found that our nonprofit educational foundation—established in 1921 by E.W. Scripps of the Scripps-Howard newspaper chain—had fallen on troubled times. Some weeks the chances of meeting the payroll appeared unlikely, at best.

Ted led a team that reorganized departments, cut costs, improved efforts to attract new subscribers and retain old ones, and obtained a small but vital grant in the early 1970s from the National Science Foundation that kept SCIENCE NEWS alive until it could sustain itself on subscriptions.

The late 1970s and early 1980s brought what Ted calls the "sci boom period"—the proliferation of nonscientist-oriented science magazines. These new magazines, big in budgets, pages and publicity, posed a challenge of another sort: Should SCIENCE NEWS go for the glitter and try to mimic the formats, the big circulations (which cost big dollars to obtain and hold) and the expensive graphics of the newcomers?

Many friends of SCIENCE NEWS urged exactly that, arguing that the magazine must match the competition to remain competitive. But Ted felt we would meet the competition best by retaining the format that had proved so popular with readers. And as some fine but money-losing science magazines folded one by one, Ted proved correct.

"It was a real exercise in self-discipline not to get carried away and imitate everyone else," Ted says.

Ted truly loves books, and he draws great satisfaction from the spectacular success of Science News Books, the buying service that he brought into existence. He likes to emphasize the program's service aspect. Through our weekly book listings and advertisements and our twice-yearly catalogs, Ted says, SCIENCE NEWS alerts people to many volumes they might otherwise never learn about and it provides a convenient way for readers to order books, particularly those difficult to obtain from commercial booksellers.

Apparently our readers agree. I've had several tell me they order regularly from us and gladly pay the extra postage and handling fee. Why? Some don't live close to a store that carries a lot of science books; others hate the hassle of ordering from a local bookstore, if indeed the store will even order for them.

Books and education occupy much of Ted's time. As he reminisces about his

years at Science Service, Ted likes to emphasize a specific educational challenge of the STS and the ISEF: Both require students to conduct real research. "The quality of the research these students do has increased enormously over the years; it is much more sophisticated," he says.

And, he argues, this long-time emphasis on research has contributed to an important trend in secondary school science education. "There is an increasing recognition that research is a motivator for precollege students and a better predictor of adult scientific ability than standardized tests and exams," Ted says. "Even in the last year, there has been a lot more talk about the value of hands-on science, and I think it's going to get more recognition in the future."

Ted plans now to devote his energy to writing ("maybe an analysis of the sci boom period; no one has ever explained why all these magazines suddenly came into being and where their audiences went"), consulting and pursuing his passion for bird watching.

"The two great frustrations I've had at Science Service," he says, "are that the Science Talent Search always took place on my wedding anniversary, so I could never really celebrate with my wife, and that the ISEF always took place at the peak of the warbler migration north."

—Patrick Young