BOOK REVIEWS

Chemistry and Cooperation

Crusading for Chemistry. The Professional Career of Charles Holmes Herty. GERMAINE M. REED. Forest History Society, Durham, NC, and University of Georgia Press, Athens, 1995. xvi, 474 pp., illus. $45.

Those who promote science could profitably study the life of Charles Holmes Herty. Born in Milledgeville, Georgia, in 1867, Herty translated a chemist's education into an unusual career of entrepreneurship and advocacy. In 1890, seeking an academic's life, he took a doctorate under Ira Remsen at Johns Hopkins. When his star as a professor subsequently failed to rise at his alma mater, the University of Georgia, and a year at European polytechnics didn't help, he turned to applied work, adapting efficient French methods to the naval stores industry in his native state. In 1901, with an aplomb that became a hallmark, Herty parlayed an audience with Gifford Pinchot into a paid consultancy on naval stores for the Bureau of Forestry. One thing led to another until Herty deserted academe entirely to become an "expert" at the bureau. In short order, he patented a new apparatus for tapping southern pine trees, aggressively sold it among progressive turpentine producers, and resigned from the bureau to become a full-time principal in the firm manufacturing his resin cups. That made him financially secure, and the innovation revolutionized the industry. Moreover, the experience established three enduring characteristics of Herty's life: faith that fundamental education and "pure science" undergird industrial prosperity; belief that applied chemistry could develop the South; and a penchant for tireless speechmaking, elite networking, and relentless cultivation of newspapermen.

For a decade thereafter, at the University of North Carolina, Herty tried academe again, but the lure of a lobbyist's life proved irresistible. As the 1915–16 president of the American Chemical Society, Herty hopped on the preparedness bandwagon for the "Chemists' War," an activity that yielded two further career motifs: enthusiasm for "cooperation" in "matters chemical" among academics, industrialists, and politicians; and near-xenophobic endorsement of national chemical "independence." As full-time editor of the *Journal of Industrial and Engineering Chemistry*, then as first president of the Synthetic Organic Chemicals Manufacturers' Association, he lobbied for steep import tariffs on organic chemicals. Herty thereby befriended Francis P. Garvan, the flamboyant but reclusive president of the Chemical Foundation, and by 1926 he had become Garvan's full-time paid ambassador. As such, he figured centrally in the creation of the National Institutes of Health, objected to the intrusions of the I.G. Farben cartel, and preached lay appreciation for the blessings of science. When the Chemical Foundation's funds ran out, Herty returned to Georgia pine, scoring his greatest success. The demonstration experiments conducted at Herty's Savannah Pulp and Paper Laboratory, launched in 1931, proved pivotal in establishing the lucrative southern pulp paper industry; just after his death in 1938, the first plant to make commercial newsprint from southern pine opened in Herty, Texas.

Reed's faithfulness to the extensive Herty Papers at Emory University is both blessing and curse for this readable, albeit occasionally repetitive and overly detailed, biography. Herty's correspondence forms the backbone for her reconstruction of his activities, providing a valuable complement to such related works as Victoria Harden's *Inventing the NIH* (Johns Hopkins University Press, 1986) and David Rhees's "The Chemists' Crusade" (University of Pennsylvania dissertation, 1987). She also includes several new tidbits, such as the revelation that Frederick E. Breithut was Herty's mole inside Herbert Hoover's Commerce Department. In her crusade for the chemist of the southern pine, however, Reed sometimes loses sight of the forest for the trees. Most notably, Herty's progressive obsession with "cooperation" as a panacea repeatedly left him wounded in the crossfire of conflicting interests among competing industrialists, regionalist legislators, and ambitious academics, thereby diminishing his effectiveness relative to more shrewdly political contemporaries like Vannevar Bush. To her credit, Reed clearly identifies cooperation mania as quintessential Herty, but her readers must ponder alone the distinctions between scientific solutions and political settlements.

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Notorious Events

Factories of Death. Japanese Biological Warfare 1932–45 and the American Cover-Up. SHELDON H. HARRIS. Routledge, New York, 1994. xiv, 297 pp., illus. $25; paper, $16.95.

Although there is no direct lineage to prewar and wartime Japanese military activities, the Sarin nerve-gas outrages committed by doomsday cultists at Matsumoto in 1994 and in the Tokyo-Yokohama area in 1995 have rekindled interest in Japan's larger experience in both the chemical and the bacteriological warfare domains. After the Pacific War, sporadic information emerged on horrific biological weapons testing conducted in Manchuria by the clandestine Unit 731 of the Japanese Kwantung Army. In October 1981 John W. Powell published a probe of the matter, "Japan's biological weapons 1930–1945," in the *Bulletin of the Atomic Scientists*. Subsequently the subject was rediscovered by foreign journalists such as Peter Williams and David Wallace, authors of *Unit 731: Japan's Secret Biological Warfare in World War II* (Free Press, 1989), and unvarnished transcripts of interviews with Japanese veterans have appeared in Haruko Taya and Theodore F. Cook's *Japan at War: An Oral History* (New Press, 1992). More recently, Gavan Daws touched briefly on the biological atrocities in *Prisoners of the Japanese* (Morrow, 1994). All this work, however, has suffered from unavailability of records, lack of testimony from senior officials, and the deadening plea-bargain that exempted the Japanese biological weaponry leaders such as Lieutenant General Shiro Ishii from prosecution as war criminals in exchange for the revelation of data to the American Occupation authorities at the outset of the Cold War.

A professional historian, Sheldon H. Harris, professor emeritus at California State University, Northridge, has undertaken the laborious effort of tracking down extant documentation in the countries that were the main targets of Japanese prewar and wartime ground operations, China and the Soviet Union. It is the Chinese nexus that provides the core of Harris's research, and he has often traveled to such distant locales as Changchun, Harbin, and Hailar in search of material. Harris also tenaciously delved into documentation housed in the United States, as at Fort Detrick, Maryland, though his access was inevitably incomplete. Less successful were his efforts in Russia and Japan. Issues of access aside, Harris's account suffers from the fact that, lacking command of the languages involved, he had to rely on interpreters and translators. Some of the published works in

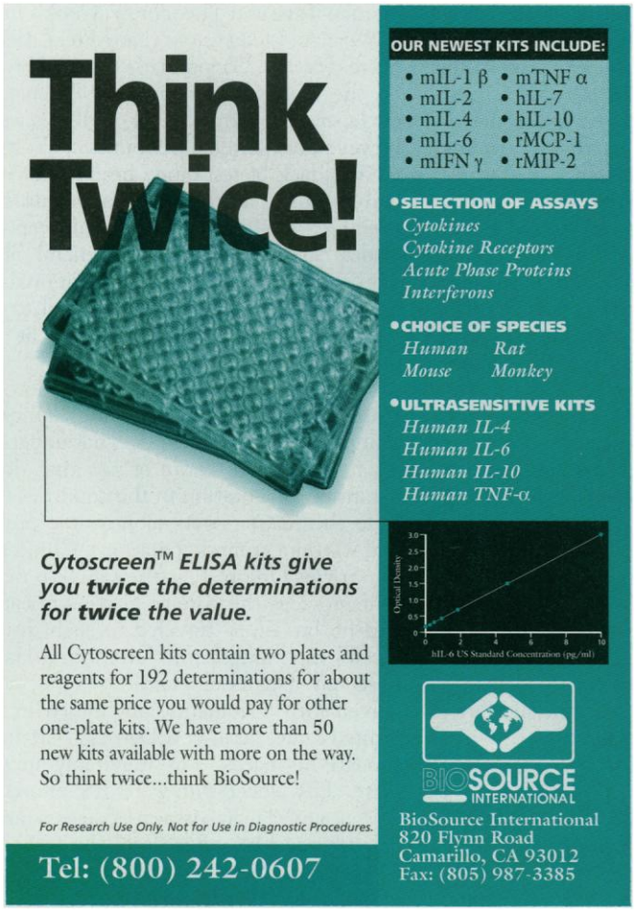
English he draws on are also problematic as sources, such as David Bergamini's sensationalistic *Japan's Imperial Conspiracy* (Morrow, 1971) and Edward Behr's impressionistic *Hirohito: Behind the Myth* (Villard, 1989).

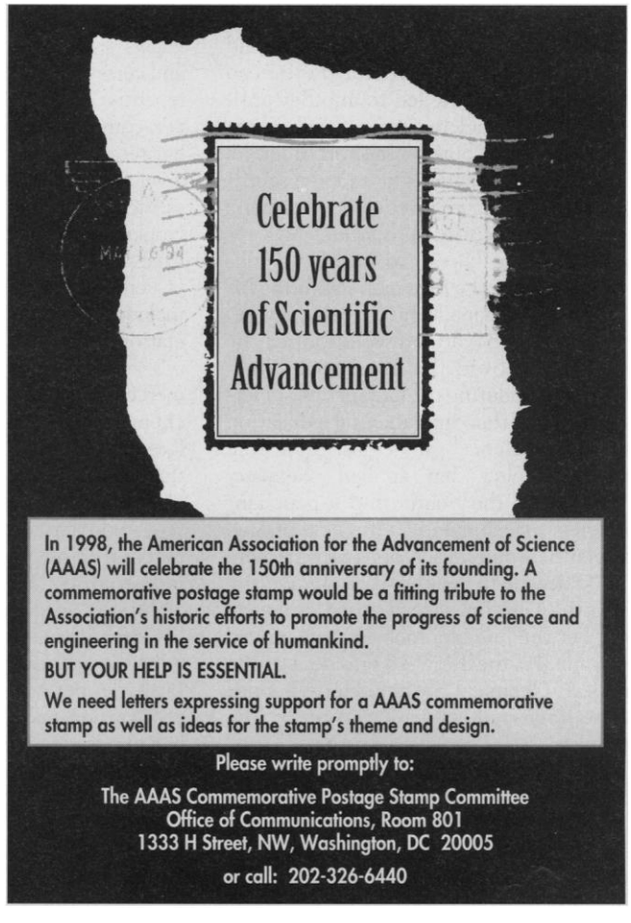
For the Russian dimension, Harris draws on the readily available translated postwar Khabarovsk trial record. This transcript, however, does not shed much light on the single most direct combat confrontation between the Japanese and the Soviet Union, the small war waged at Nomonhan (Khalkhin Gol) between the Kwantung Army and the Red Army two years before Pearl Harbor. For this case history, Harris has consulted this reviewer's massive study, *Nomonhan: Japan Against Russia 1939* (Stanford University Press, 1986). There was a definite potential for the use of biological or chemical weapons at Nomonhan, but in the course of this reviewer's decades of research and interviews with 400 Japanese respondents, the unanimous testimony was that Ishii's unit only handled water-purification and epidemic-prevention measures at the front. Harris is acquainted with these missions (p. 74), but he is convinced that "Ishii viewed the outbreak of fighting at Nomonhan as a golden opportunity to test the possibilities of BW on a large scale" and that the Kwantung Army Commander finally gave him permission to do so by July 1939 (pp. 74–75). Harris also asserts that this reviewer "appears to believe that the fuss about BW use in the [Nomonhan] war was based on 'pseudonymous sources'" (p. 253).

A peripatetic scholar as tenacious as Harris might have exploited the proximity of Northridge to San Diego to ascertain the basis for such contentions at first hand. He would have learned that once-classified Japanese archives reveal very real Japanese suspicions that it was the Russians who were contaminating the river at Nomonhan. As for Japanese culpability, Ishii later told the Kwantung Army chief of staff, in utmost secrecy, that the Japanese central authorities had authorized use of biological weapons but that he had declined to do so because countermeasures were not ready. As for the unconvincing pseudonymous leftist accusers, this reviewer expended much effort to trace them in Japan but could not determine their identities.

The first 10 chapters of Harris's book are devoted to Ishii (reputedly "a womanizer, a night owl, and a heavy drinker," as well as a big spender at places of amusement; p. 15) and to the various death factories in Manchuria and China. The last six chapters address the postwar cover-up involving American scientists and soldiers. An important appendix provides detailed data from the Chinese side concerning chemical weapons discovered abandoned in China by "a certain foreign state" (pp. 235–238).

Though his special anguish for the Chinese "martyrs" is apparent throughout, Harris has sifted through the evidence available to him with care and restraint. He has broken new ground with his exploration of the grisly subject of Japanese testing and field use of anthrax, typhus, and dysentery germs. He has provided biographical and chronological information and a "road map" for studying the cruel Japanese facilities and the resort to human guinea pigs—the so-called *maruta*, or "logs"—at Beiyinhe, Ping Fan, Changchun, and Nanking. Perhaps such publicity underlies the Japanese government's belated decision in 1995 to send military and chemical experts to





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China to seal 30 decaying poison gas shells and three vats of mustard gas located by the Chinese authorities. The Japanese had already dispatched teams to China to check on possible soil contamination, but this is the first effort to neutralize some of the 2 million Japanese gas shells that reportedly remain buried in northeast China.

The physical apparatus of the factories of death was demolished by the Japanese 50 years ago. Regrettably, the legacy of psychological scars inflicted by the "certain foreign state" can never be eradicated from the pages of Sino-Japanese history.

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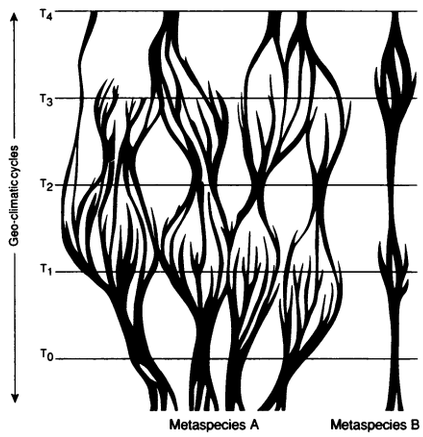
Evolution by Reticulation

Corals in Space and Time. The Biogeography and Evolution of the Scleractinia. J. E. N. VERON. Comstock (Cornell University Press), Ithaca, NY, 1995. xiv 321 pp., illus. Paper, $35 or £27.50.

Corals in Space and Time is a monumental synthesis of the evolution of corals in which the author challenges Charles Darwin head on. Veron argues that, instead of evolving dichotomously along discrete lineages as a result of natural selection as proposed by Darwin, coral species perpetually fuse (by hybridization) or separate (by isolation and genetic drift), giving rise to a reticulate pattern of evolution. Veron's theory of reticulate evolution initially grew out of his observation of the abundance of intergrades between species. He describes his early years of separating and classifying corals, in fact, as "a failure." In the last decade, three discoveries have bolstered Veron's theory with regard to corals. First, it has been established that about three-quarters of all coral species are spawners, releasing their gametes into the water column, where external fertilization takes place. The second discovery is the synchronous mass-spawning events on the Great Barrier Reef of Australia, where many dozens of coral species spawn (within a few days of each other) at the same time of the year, producing a rich soup of reproductive material that can lead to frequent hybridization. The third discovery is an increasing list of species that can produce viable hybrids at least at the F_1 generation. From all this Veron has concluded that coral intergrades are in fact hybrids, some viable but sterile, some viable and reproductive, some fusing back to the parent generation, some diverging, but together forming a species complex of races and subspecies—a large genetic pool of interconnected populations that he calls a syngameon. Such a species is not discrete; its boundaries are fuzzy, and it represents a continuum of variation. At opposite ends of the continuum species may appear different, but all varieties along the continuum are interfertile. The species complex may also include sterile hybrids, which can be ecological dominants, that is, species that may not themselves reproduce but that play a dominant role in the ecosystem and are continually reproduced over time by hybridizing parental populations.



"Concept diagram of evolutionary changes in two metaspecies. Metaspecies A, a syngameon, is caught-up in palaeoclimatic cycles of reticulate evolution. Metaspecies B survives these cycles. Phylogenies have varying patterns of spatial separation. For A, high levels of genetic communication during periods of strong surface circulation (at times T_0, T_2 and T_4) produce small numbers of well-defined species, while low levels of genetic communication during periods of weak circulation (at times T_1 and T_3) produce large numbers of ill-defined species complexes." [From *Corals in Space and Time*]

The syngameon is an interconnected net of populations (races, subspecies, and species) that either converge or diverge in space and time depending on gene flow. Their connectivity in turn depends on the strength and direction of currents. Veron does not deny that natural selection is embedded within the process, but he sees connectivity, or the lack of it, as more important in species evolution. In this regard, this analysis is in agreement with neo-Darwinists Ernst Mayr, Niles Eldredge, and Stephen J. Gould. Veron sees ocean currents, a physical process, as being the dominant control over evolution in corals. He also invokes reticulate evolution to explain why biodiversity in corals in not higher. Hybridization and reproductive connectivity favor fusion and damp separation (speciation). Most coral reefs in the Indo-West-Pacific

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