goes far toward asserting that we have reached the point where we can save biodiversity only by saving the biosphere. Protected areas serve to shelter biodiversity from threats—principally growth in human numbers and human activities that are becoming more threatening with every passing day. Therefore, beyond our need to expand the protected-areas networks, we need many more efforts to resist the overarching threats. Hotspots are only part, not even half, of the overall challenge. Among the many steps required to safeguard the biosphere, we must push back the deserts, replant the forests, preserve water supplies, reduce pollution, restore topsoil, and stabilize climate. Fortunately, these are all measures that we should be taking for all manner of additional good reasons. In short, the agenda Wilson advocates offers a win-win outcome.

When I saw the book's title, I thought Wilson was addressing an emergent new dimension to our current biotic crisis. Not only will the crisis eliminate large numbers of species, but it looks set to deplete the capacity of evolution to generate replacement taxa. This prospect should give pause to conservation planners. The networks of protected areas that are the focus of their efforts reflect present distributions of species, and this approach does not always protect future evolutionary processes. In a long-term perspective extending over the next several million years, we should surely assign equal priority to retaining evolution's capacity to restore the damage of the next few decades. Like all other books that address the preservation of biodiversity, Wilson's account does not broach this fundamental factor.

The Future of Life is vintage Wilson. After his three earlier books on biodiversity, one might wonder if the author has anything fresh to say. The answer is yes. Stacks. Wilson not only tells us how biodiversity is threatened, he shows us how we can relieve many of the threats. It all makes for another tour de force.

BOOKS: CHEMISTRY

The Elements of an Education

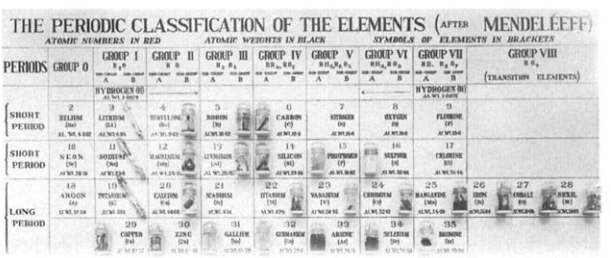
Leo P. Kadanoff

Oliver Sacks is a physician, scientist, and author known for his fascinating stories of people coping with amazing neurological disabilities. In *Uncle Tungsten*, he recounts his scientific boyhood in Britain during the period around World War II. Sacks was born into a large and close-knit family, and he was surrounded by relatives who made science both their work and their hobby. This memoir focuses on the traumas of his separation from family during the war, his fears of insanity, and the redemption he achieved through throwing himself into scientific studies. As Sacks tells his own personal and scientific life story, he also recounts the histories of his family and of the science of chemistry.

Uncle Tungsten
Memories of a Chemical Boyhood
by Oliver Sacks

Knopf, New York, 2001. 350 pp. $25. ISBN 0-375-40448-1. Picador (Macmillan), London. £17.00. ISBN 0-330-39027-9.

The early part of the book describes young Oliver's extensive and foolhardy chemical experiments. In a home basement laboratory, he acquaints himself with the properties of the different chemical elements by the classic processes of mixing and boiling, exploding and burning, and feeling and tasting and smelling. He is aided and abetted by a supportive family, especially his many uncles practicing science and engineering. The "Uncle Tungsten" of the title had created a firm that produced incandescent bulbs with tungsten filaments, and which he ran as businessman, inventor, and scientist. He and his nephew are both particularly taken with the properties of metallic tungsten. This uncle provides not only encouragement for chemical investigations, but also metallic samples, chemical reagents, and scientific instruments. Supportive parents—both are quite thoughtful physicians—provide lab space, a very necessary exhaust hood, and apparently inexhaustible patience. In this way, our young scientist-to-be becomes acquainted with most of the chemical elements and many of their more dramatic chemical properties.



Transforming table. The display of Mendeleev's periodic table at London's Science Museum showed Sacks how science can organize the results of experience and altered his life.

Oliver Sacks badly needs his world of chemistry. He finds much of his boyhood surroundings insupportably oppressive. During the bombing of London, the Sacks children were sent away to country schools where Oliver found sadism, loneliness, and an awful sense of abandonment. So upon returning home, he throws himself into science to escape a world that he has found to be largely intolerable.

The book's climax comes between chapters 15 and 16. At the end of chapter 15, Michael—the author's closest sibling—becomes psychotic and delusional. Oliver believes this illness to be the result of their shared wartime experiences and thinks that he is going the same way himself. But then, at the beginning of chapter 16, he enters the Science Museum in South Kensington, London, which had been closed during the war. There he encounters the museum's giant periodic table, which covers an entire wall at the top of the stairs. He realizes at once that the table enables him to order and organize the knowledge gained in his basement lab and from visits to his uncle's factories. For the first time, Sacks was able to feel not only the richness and diversity of the chemical world, but also science's capacity for giving structure to the results of experience. For a young man at wit's end, this organizing experience hit with all the force of being born again. In the book he recollects, "Seeing the table, 'getting' it, altered my life....it was real, a key to the universe."

Consequently, in 1945 Sacks extends his interest from the practical chemistry of the laboratory to the books of the museum library. He begins to learn about the history of chemistry. From his first point of reference, Mendeleev and the periodic table, he reaches back to older organizing principles in chemistry, particularly to Dalton's atomic theory. This autobiography presents Sacks's memories of learning the chemistry of 1945, but recounts this process with his wisdom and experience as of 2001. For example, he can say of Sir Humphry Davy (1778–1829) that "it was Davy's personality that appealed to me...filled with the exuberance and enthusiasm of a boy, with a wonderful adventurousness and sometime dangerous impulsiveness—he was always at the point of going too far—and it was this which captured my imagination above all." Of course, it is exactly these qualities in Sacks which make this book, and his other writings about science, exciting and unique.

Readers, from practicing scientists to intellectually curious high school students, can expect to appreciate the colorful life story recounted, the interesting person revealed, and the excellent history of chemistry retold. But please, dear parents, don't encourage your children to try the experiments, and don't think that *Uncle Tungsten* provides a primer for raising young scientists.

CREDIT: SCIENCE AND SOCIETY PICTURE LIBRARY/SCIENCE MUSEUM, LONDON

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