BOOKS: HISTORY OF SCIENCE

Wallace at Center Stage

Gareth Nelson

Alfred Russel Wallace
A Life
by Peter Raby
Chatto and Windus (Random House), London, and Princeton University Press, Princeton, NJ, 2001. 352 pp. £20. ISBN 0-7011-6838-2. $29.95. ISBN 0-691-00695-4.

1 July 1858 marks the birth of the theory of evolution by means of natural selection. True to the spirit of that time, the theory had no mother, but it did have two English fathers, Charles Darwin (1809–1882) and Alfred Wallace (1823–1913). It was brought forth at Burlington House, Piccadilly, home of the Linnean Society of London, during a special meeting from which both parents were absent. Read to the assembled Fellows were an excerpt from an 1844 manuscript by Darwin; an abstract of an 1857 letter from Darwin to Asa Gray, the botanist, at Harvard; and, unbeknownst to its author (then in the jungles of Irian Jaya, half a world away), a short manuscript by Wallace. The manuscript, posted from the Indonesian island of Ternate in early March, had reached Darwin in England on 18 June. The extracts and manuscript were promptly published in the Society's *Journal of the Proceedings*, under a joint title of which Darwin is the senior author. These events were orchestrated and attended by two of Darwin's friends, the botanist Joseph Hooker and the geologist Charles Lyell, without whose creative foresight and influence a different history would prevail today.

Darwin and Wallace were among the British naturalist-explorers that Peter Raby, research reader in English and drama at Homerton College, Cambridge University, discussed in his earlier book, *Bright Paradise: Victorian Scientific Travellers* (Chatto and Windus, London, 1996). Raby's new book is a biography of Wallace, natural selection's lesser known co-discoverer—"that perennial afterthought in the Darwinian story" (*1*) and, according to the dust jacket, "one of the neglected giants of the history of science and ideas."

Wallace was the author of some 20 books and 700 other publications, the bulk of which were written to earn a living for himself and his extended family. His writings chronicled his long and active life, most notably in volumes on his travels and exploration along the Amazon and Rio Negro (1853) and around the Malay Archipelago (1869) and in an autobiography (1905). His close friend James Marchant, who compiled a posthumous *Letters and Reminiscences* (1916), saw Wallace's life as an open book written in simple candor, unusual for the time and for a culture noted for the reticence of its literate classes.

Naturalist at work.

Raby has worked with these sources over several years and supplemented them with examinations of unpublished notebooks and letters from various archives and visits to locations where Wallace explored or set up his homes. He has produced a congenial 300-page account of Wallace's life, major interests, and activities for the general reader, with 30 additional pages of scholarly notes and bibliography of value to the serious student.

In search of fortune and adventure in his mid-twenties, the impoverished Wallace went to Brazil in 1848 with an even younger friend, Henry Bates. He aimed to investigate "the theory of the origin of species," but also to collect natural history specimens, particularly insects and birds, for their commercial value in the London market. During his return to England four years later, most of these specimens were lost at sea when his ship, three weeks out from Belém, sank after an all-consuming fire. Using the insurance paid on this lost collection and a first-class P&O steamship ticket purchased by the Royal Geographical Society, he journeyed to Singapore and Indonesia in 1854. After eight years, flush with success and nearly 40 years old, he returned to England. In the meantime, his future, if not his fortune, had been determined to a significant degree by the Linnean Society meeting and its aftermath, particularly the rushed publication of Darwin's *On the Origin of Species* (1859). In effect, Wallace had been elevated from obscurity to a position of importance within the British scientific community—yet a position not important enough to gain him a salaried livelihood, to which he aspired but never achieved. Twenty years later his financial anxiety was eventually eased by Darwin's influential prodding, when the British government granted to Wallace an annual pension of 200 pounds.

Convention teaches that Wallace's life is a sequence of two personalities: a youthfully keen and self-taught observer and theorist who "to generations of field naturalists...shines as an inspiration," and an aging and gullible enthusiast of spiritualism, socialism, and psychic research who was simultaneously a cranky antagonist of vaccination, militarism, rape of the environment, and other practices seemingly oppressive or manipulative of the innocent masses. This book, too, portrays the latter Wallace as "totally unshakeable in his beliefs, totally lacking in objectivity."

The author attempts to present Wallace as a whole person, but one who, "full of contradictions," is put back at center stage as an intellectual counterpart, therefore a derivative, of Darwin: "Through the

A Sarawak tree. This painting by Wallace dates from the 15 months he spent on Borneo beginning in November 1854. During this same interval, he set out the first stage of his theory of organic change in "On the Law Which Has Regulated the Introduction of New Species" (*2*).

CREDIT: (TOP TO BOTTOM) ROYAL COLLEGE OF SURGEONS, LONDON; NATURAL HISTORY MUSEUM, LONDON

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wrestling minds of Darwin and Wallace, the joint protagonists, the lines of the animal/human, materialist/spiritualist debate can be followed like the traces of some Promethean struggle." In this mythic framework, Raby finds relevance for today's reader because "even in a world in which the genetic coding of a human being is completely known, the polarization of the two opposing views continues."

The book closes with the two personae again in sequence, as Wallace himself might have preferred:

> There is, finally, something heroic about a man who independently constructs a theory of natural selection, which can be written, in its simplest form, as the accidental survival of the fittest, and spends the rest of his life proclaiming the ideals of co-operation and altruism as the way to hasten the perfecting of the human.

Wallace would have rejected any heroic implications of what he experienced as an ordinary and natural development of his life, experience, and understanding.

References and Notes

1. This phrase from Adrian Desmond and James Moore [*Darwin*, (Michael Joseph, London, 1991)], which Raby quotes, refers to Wallace's service as the rear pallbearer for Darwin's coffin.
2. A. R. Wallace, *Ann. Mag. Nat. Hist.*, **16** (2nd. ser.), 184 (September 1855).

BOOKS: BIOMEDICINE

Controversial Crusader Against Cancer

Ilana Löwy

During the mid-1960s, Judah Folkman, a gifted young surgeon, became increasingly preoccupied with the role of angiogenesis in cancer. His research led him to the unexpected conclusion that a substance secreted by malignant tumors promotes the development of blood vessels that deliver their nutrition. Therefore, he suggested, inhibiting the activity of this substance could put an end to the uncontrolled growth of cancer cells. Initially, Folkman's ideas were met with skepticism. At the time and into the 1970s, research in oncology was focused on viruses and genes, not on putative "growth factors." However, during the 1980s and 1990s angiogenesis-controlling factors were isolated in several laboratories, including Folkman's own. These factors were shown to have anti-cancer effects in mice and were successfully used in the treatment of several rare disorders in humans. Folkman's biographer, science reporter Robert Cooke, honestly admits that it is not yet clear how smoothly the approach of controlling angiogenesis will flow from the bench to the bedside. Nevertheless, molecules that control the development of blood vessels have already become important research tools, and it is reasonable to suppose that some of these compounds will find therapeutic or diagnostic applications. The improved status of angiogenesis is reflected in Folkman's recent rise to real stardom: his talks at professional meetings draw large crowds, he has gained numerous prestigious awards from around the world, and this biography, released by a major publishing house, has been met with praise by figures ranging from James Watson to Arnold Palmer.

Dr. Folkman's War
Angiogenesis and the Struggle to Defeat Cancer
by Robert Cooke
Random House, New York, 2001. 383 pp. $25.95, C$37.95. ISBN 0-375-50244-0.

Dr. Folkman's War is an informative and pleasant book. Cooke succeeds in making the scientific issues accessible and engaging, keeping the reader's attention, and telling the story well. But what kind of story are we told? The book follows a traditional epic model: the hero rises rapidly, then faces numerous obstacles and setbacks, and finally triumphs at the end. Epic narratives are usually focused exclusively on the main protagonist's deeds and tend to exaggerate the hero's difficulties and achievements. However, one can imagine a different story, one in which the "hero" would have been angiogenesis and not Folkman.

Such an account could have started between 1900 and 1910, when the "vascularization hypothesis," which proposed that the growth of blood vessels is the central issue in carcinogenesis, dominated cancer research. It might have given equal time to Bert Vallee's biochemical research and provided more details on the studies by other scientists (Gaspodarowicz, Ferrara, Dvorak) who isolated factors investigated in Folkman's laboratory. The alternative account might have ended with the industrial production of molecules that regulate the growth of blood vessels. Folkman's long-standing efforts undoubtedly contributed a great deal to the development of angiogenesis research, but one might also argue that the rapid growth of this field from the mid-1980s onward mainly reflected the development of methods for the isolation, cloning, and mass-production of biologically active substances.

Folkman, one should remember, was not only a pioneer of angiogenesis studies. He was also a pioneer of university-industry collaboration. He and Vallee were the initiators of the Harvard-Monsanto agreement (1974). At first strongly criticized as "selling out" nonprofit medical research, this agreement rapidly became the model for similar endeavors. The alliance with industry deeply modified the nature of biomedical research. Cooke discusses difficulties Folkman faced after *Science* published a critical news article in 1979, including grant proposals rejected because of Folkman support from industry, people refusing to attend his talks at professional meetings, and prospective postdocs lost because of their professors' biases. The complicated relations among industry, research, and the media were again highlighted in 1998 and 1999, after criticism of Folkman's studies appeared not in the professional literature but in the *Wall Street Journal*.

The book begins with Folkman's father, a rabbi, instructing him to become a "rabbi-like doctor." It ends with stories of patients (often children) cured due to a better understanding of angiogenesis, as well as a description of Folkman's exceptional qualities as a doctor. There is no reason to doubt Folkman's deep commitment to his patients. However, Cooke's choice to frame Folkman's story by presenting him above all as a healer conveys the message that *Dr. Folkman's War* is about one doctor's efforts to alleviate human suffering. The war in the title is not among scientists who seek recognition, or institutions that aspire to enhance their status, or companies that try to conquer markets. It is the "war against cancer." This war, Watson explains on the book's cover, "at last has found its general."

The struggle to "defeat cancer" may implicitly legitimate the aggressive attitude of all the actors. The "war against cancer" metaphor, however, also has a different use. It justifies the administration of high doses of radiation and of the highest tolerated doses of toxic drugs to cancer patients. For nearly 40 years, Folkman has promoted a more physiological understanding of malignancies and a more subtle approach to cancer therapy. He might have been entitled to a biography that does not rely on stereotyped images but stresses complexity instead: complexity of the biology of cancer, of biomedical research, of production of new drugs, and perhaps even of the man Judah Folkman. But would such a book find readers?

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