Remarkable Biologists: From Ray to Hamilton

Author: Harman, Oren

Source: BioScience, 61(1) : 79-81

Published By: American Institute of Biological Sciences

URL: https://doi.org/10.1525/bio.2011.61.1.16

not the, key to their success: silk. This book is aimed at anyone with an interest in natural history, and provides a fundamental course on arachnology, evolution, and genetics. It therefore serves as an ideal introduction to spiders and a tempting peek at the field of silk research that I hope will leave the reader forever fascinated and enthused by these wonderful web weavers.

Leslie Brunetta is a freelance writer whose articles have appeared in the *New York Times*, *Technology Review,* and the *Princeton Alumni Weekly*, as well as on National Public Radio and elsewhere. Catherine L. Craig, a research associate of Harvard University and author of the monograph *Spiderwebs and Silk*, is an internationally recognized evolutionary biologist, arachnologist, and authority on silk.

A silk researcher myself, I can appreciate how, much like an orb-weaving spider's web, the authors attempt to combine several different threads, each with a specific function, into a structure carefully designed to ensnare the mind of the reader. They begin with one of the strongest, the scaffolding or dragline silk; a discussion about the genesis of the arachnids based on fossil records and a detailed history of evolutionary theory. From this scaffolding they then spin the underlying framework through their description of how minor changes in the structure of silk molecules have endowed the spiders with new silks to use and thus conquer their environment. This is then replaced by a captivating spiral of stories over the second half that delves into how silk plays an integral role in a spider's life from dispersal as young to capturing the next meal and mating.

This book is the result of a dialogue between a scientist (Craig) and nonscientist (Brunetta), and is essentially a more accessible version of Craig's excellent academic text *Spiderwebs and Silk*. The authors achieve the difficult task of conveying many high-level yet fundamental biological concepts while preventing the reader from becoming entangled in specialized language and theories. On occasion, however, this conversation becomes tangential, and the flow of the narrative is sometimes lost as the authors revisit concepts that would have been better introduced much earlier (specifically, the chapter on evolutionary-developmental biology). Yet these digressions are rarely laborious, and to the uninitiated, they serve as a good source of background knowledge that enhances the appreciation of the subject matter.

I particularly enjoyed the wide range of examples drawn from across the world of arachnids that build upon each other subtly, yet convincingly, into a cohesive and logical hypothesis for the evolution of web structures and how they represent evolutionary trade-offs between a range of competing ecological and genetic factors. This was all explained in a well-conceived manner and endows the reader with unique insights into the mindset and approaches taken by an evolutionary biologist.

Those who read *Spider Silk* in the hope that the mysteries of silk's superior mechanical properties will be revealed may be surprised to learn that we don't really know (yet). I was relieved by this truly refreshing admission, as I work in a field where most would have you believe that this mystery is solved with every new paper. I do feel, however, that the authors lacked conviction with respect to our current understanding of structure–function relationships in silk. Their explanation tends to focus too much on the protein sequence and, in my opinion, not enough on the other, equally important aspects of silk production: the coevolution of the glands (morphology) and how silk is spun (behavior). For example, the same silk protein pulled through the same silk duct at different speeds produces fibers with very different mechanical properties, something eminently more phenotypically plastic than chancing upon a new beneficial mutation. However, I think this merely highlights why we are so fascinated by this material; its elusive qualities are just out of our reach, and only through continued research and inspiring the next generation of scientists from all disciplines to tackle this important and interesting issue will we be able to "unravel" the web.

In summary, Craig and Brunetta successfully walk the thin line between education and entertainment, providing a solid foundation from which the reader can balloon into the world of the arachnids.

CHRIS HOLLAND
Chris Holland (christopher.holland@zoo.ox.ac.uk) is a fellow by examination at Magdalen College and a member of the Oxford Silk Group in the Department of Zoology at the University of Oxford, United Kingdom.

WHY SCIENTIFIC LIVES?

Remarkable Biologists: From Ray to Hamilton. Ioan James. Cambridge University Press, 2009. 196 pp., illus. $46.99 (ISBN 9780521699181 paper).

Ioan James is emeritus professor of mathematics at Oxford University, and in recent years he has become interested in scientific lives. As with his earlier *Remarkable Mathematicians* and *Remarkable Physicists*, here too, in *Remarkable Biologists*, he fancies himself neither a professional historian nor philosopher of science but rather more like an ice-cream vendor, providing stylized tastes on small

doi:10.1525/bio.2011.61.1.16

spoons to interested passersby, inviting curiosity, perhaps hoping to fall upon a veritable sweet tooth. "This book is intended for those who would like to read something, but not too much," he writes in the preface, "about the life stories of some of the most remarkable biologists born in the last four hundred years." James has handpicked 38 of them, not necessarily on the basis of their eminence or scientific legacies, but rather in the interest of providing variety. Candidly, James admits that a main criterion for inclusion was that a full-scale biography of the figure already exists. So, what kind of glimpses does he provide?

There are both men and women in this collection (33 versus 5), from 10 different countries: naturalists and theoreticians, botanists and geneticists, animal behaviorists, ecologists, evolutionists, and a sexologist (Kinsey). Most have become immortalized—in sculpture, in named chairs and institutions, in literature (Beatrix Potter, author of *The Tale of Peter Rabbit*, is one of the biologists seemingly randomly featured), or in national lore (from Darwin to Rachel Carson to Emperor Hirohito of Japan). In all cases, the emphasis is placed not on the actual science but on biographical sketches, the likes of which begin, "his parents were amongst the semi-impoverished lesser nobility of northern France" (Lamarck), and offer such esoteric descriptions as "his favourite Montbéliard chitterling sausages were never missing from his table," alongside more suggestive illuminations such as "he was a very secretive man and it is not certain that his writings reflected his real opinions" (both of the latter statements referring to George Cuvier). James can be rather opinionated. Here he is on John James Audubon: "His monumental work *Birds of America* is one thing, the slaughter of wildlife, often hundreds of specimens to make one drawing is another…neither honest nor fair…he was only marginally literate and was indifferent to the truth." So too at times can he wax rather embarrassingly hagiographic: "His head was simply magnificent, his forehead large and well developed, and his brilliant, intelligent and searching eyes could best be described by the word fascinating, while his mouth and somewhat voluptuous lips were expressive, and in perfect harmony with an aquiline nose and well-shaped chin." I wonder what Louis Agassiz would have made of such descriptions of his visage.

Some of the nuggets are delightful, such as the fact that Sir Hans Sloane, father of the British Museum, who played a leading role in establishing the practice of inoculation against smallpox, also, having become familiar with chocolate in Jamaica, "found it more digestible when mixed with milk," thereby inventing milk chocolate for posterity (much to the delight and profit of Messrs. Cadbury). Or the rebuff of Carl Linneaus's joyous botanical field trips with his students at the University of Uppsala by a rector who thought that "we Swedes are a serious and slow-witted people; we cannot, like others, unite the pleasurable and fun with the serious and useful." In an essay in which she insisted that biography should be considered a craft as opposed to the art of fiction, Virginia Woolf (1974) wrote: "Biography will enlarge its scope by hanging up looking glasses at odd corners." I am less sure of the hard and fast craft-art divide, but "looking glasses at odd corners"—yes, by all delicious means.

Still, as one advances from sketch to sketch, a nagging contemplation slowly seeps into the neuronal gaps in the mind. Why, after all, scientific lives? What is to be gained from considering childhood mentors; doting or otherwise deranged mothers; motivations; idiosyncratic quirks; or even the larger political, cultural, material, and institutional setting in which science operates? Isn't science ultimately about enduring laws and the uncovering of objective, universal truths? "It is a fine part of history to reconstruct researchers' personal dreams of glory or god," a recent review in *Science* offers. "Scientists may need such dreams to keep them going through the long, hard hours. But after the discovery it is only the outed secret of nature that matters" (Frank 2010). Newton, as John Maynard Keynes noted, regarded the universe as a cryptogram set by the Almighty, but this has little bearing over "the truth of force equals mass times acceleration."

In the history of science, debates have raged for years between "internalists" and "externalists." Despite valiant and meaningful attempts to dishonor the fatuous distinction, it seems as though there will always be minds that lean one way or the other, somewhat similar to the nature versus nurture divide. But whether one professes the social construction of knowledge, or otherwise doubts and discounts the penetration of culture and psychology of the *sanctum sanctorum* of pure rational scientific inquiry, it seems to me that the beauty and profundity of the history of science ultimately stem from bringing both sides to the table. In particular, it is the juxtaposition of the transcendence of nature's laws with the frailty and peculiarity of the human condition—in all its splendor and messiness and unavoidable transience—that truly provides a justification for the study of the history of science, as opposed to the study of science itself.

So despite the fact that this collection suffers in places from hagiography or just plain laziness (the explanation of Fisher's fundamental theorem just falls short and is really under par); despite the fact that the bibliographies provided for each chapter are often out of date and not very helpful; and despite unexplained biases (is the author trying to make a historical redress by oddly providing Alfred Wallace 14 pages of text when all the rest receive a maximum of 5?), there is still something to be gained from this collection of biographical sketches. The visage of John Hunter, the father of the scientific principle of surgery, driving into London in a carriage drawn by buffaloes; the picture of the childless and reclusive Barbara McClintock waiting at the local Cold Spring Harbor bus stop to walk young children home, "describing to them the wonders of nature as they went along"; the anguish Geoffrey Saint

Hillaire must have felt being outdone in public debate by a slicker, sharper Cuvier (a man he himself had pulled out of poverty and into scientific fame, who then turned on him, ridiculing his championing of evolution)—these are integral, priceless slices of the scientific enterprise and its vicissitudes. They inspire, no less than the beautiful truth that force equals mass times acceleration. Science is done and made by people, and this is what provides its majesty, alongside its wonder and intellectual flair. Perhaps then a reader will be found in possession of a veritable sweet tooth and be rewarded by these tiny spoonfuls of history. If so, he should thank the author before diving into deeper, more glorious waters still.

OREN HARMAN

Oren Harman (oren.harman@gmail.com) is chair of the Graduate Program in Science, Technology, and Society at Bar Ilan University in Ramat-Gan, Israel. He is also a historian of biology and a writer. His books include The Man Who Invented the Chromosome; Rebels, Mavericks and Heretics in Biology (*with Michael Dietrich); and* The Price of Altruism.

References cited

Frank SA. 2010. Belief, reason, and insight. Science 329: 279–280.

Woolf V. 1974. The Art of Biography in The Death of the Moth and Other Essays. Harcourt Brace Jovanovich.

NEW TITLES

Aboveground-belowground Linkages: Biotic Interactions, Ecosystem Processes, and Global Change. Richard D. Bardgett and David A. Wardle. Oxford University Press, 2010. 312 pp., illus. $52.95 (ISBN 9780199546886 paper).

Amazonia: Landscape and Species Evolution—A Look into the Past. Carina Hoorn and Frank Wesselingh, eds. Wiley, 2010. 464 pp., illus. $180.00 (ISBN 9781405181136 cloth).

Biocatalysis and Biomolecular Engineering. Ching T. Hou and Jei-Fu Shaw, eds. Wiley, 2010. 490 pp., illus. $135.00 (ISBN 9780470487594 cloth).

Ecosystem Goods and Services from Plantation Forests. Jürgen Bauhus, Peter J. van der Meer, and Markku Kanninen, eds. Earthscan, 2010. 272 pp., illus. $84.95 (ISBN 9781849711685 cloth).

Elephants on the Edge: What Animals Teach Us about Humanity. G. A. Bradshaw. Yale University Press, 2010. 338 pp., illus. $18.00 (ISBN 9780300167832 paper).

An Epistemology of the Concrete: Twentieth-century Histories of Life. Hans-Jörg Rheinberger. Duke University Press, 2010. 352 pp., illus. $24.95 (ISBN 9780822345756 paper).

Flower and Fruit: Morphology, Ontogeny, Phylogeny, Function, and Ecology. Peter Leins and Claudia Erbar. Schweizerbart Science Publishers, 2010. 440 pp., illus. €69.00 (ISBN 9783510652617 cloth).

Forecasting Forest Futures: A Hybrid Modelling Approach to the Assessment of Sustainability of Forest Ecosystems and Their Values. Hamish Kimmins, Juan A. Blanco, Brad Seely, Clive Welham, and Kim Scoullar. Earthscan, 2010. 296 pp., illus. $99.95 (ISBN 9781844079223 cloth).

Here Is a Human Being: At the Dawn of Personal Genomics. Misha Angrist. HarperCollins, 2010. 352 pp. $26.99 (ISBN 9780061628337 cloth).

Honeybee Democracy. Thomas D. Seeley. Princeton University Press, 2010. 280 pp., illus. $29.95 (ISBN 9780691147215 cloth).

How Intelligence Happens. John Duncan. Yale University Press, 2010. 256 pp., illus. $28.00 (ISBN 9780300154115 cloth).

Humanity's End: Why We Should Reject Radical Enhancement. Nicholas Agar. MIT Press, 2010. 219 pp., illus. $32.00 (ISBN 9780262014625 cloth).

Knowing Global Environments: New Historical Perspectives on the Field Sciences. Jeremy Vetter, ed. Rutgers University Press, 2010. 272 pp., illus. $49.95 (ISBN 9780813548753 cloth).

The Moral Landscape: How Science Can Determine Human Values. Sam Harris. Simon and Schuster (Free Press), 2010. 304 pp., illus. $26.99 (ISBN 9781439171219 cloth).

Parrots of the World. Joseph M. Forshaw (Frank Knight, illus.) Princeton University Press, 2010. 336 pp., illus. $29.95 (ISBN 9781400836208 paper).

Planet Arctic: Life at the Top of the World. Wayne Lynch. Firefly Books, 2010. 240 pp., illus. $40.00 (ISBN 9781554076321 cloth).

Preparing for Climate Change. Michael D. Mastrandrea and Stephen H. Schneider. MIT Press, 2010. 96 pp. $14.95 (ISBN 9780262014885 cloth).

The Species Seekers: Heroes, Fools, and the Mad Pursuit of Life on Earth. Richard Conniff. W. W. Norton, 2010. 464 pp., illus. $26.95 (ISBN 9780393068542 cloth).

Water Resources. Shimon C. Anisfeld. Island Press, 2010. 256 pp., illus. $25.95 (ISBN 9781597264952 paper).

Wired Wilderness: Technologies of Tracking and the Making of Modern Wildlife. Etienne Benson. Johns Hopkins University Press, 2010. 288 pp., illus. $55.00 (ISBN 9780801897108 cloth.)

doi:10.1525/bio.2011.61.1.17