

the interests of the individual and the group coincide. But it is doubtful whether people commit suicide or give up reproduction to promote a societal superorganism. Human tendencies towards suicide and celibacy could have some ancient basis in promoting one's immediate relatives, if by these actions the relatives are substantially better off. The conditions for this are probably rare and so it should not be surprising that suicide, notwithstanding Jim Jones's obedient followers and the fabled Japanese warriors of the Second World War, is also rare. So is celibacy: America's Shakers — a sect of religious celibates — are on the verge of extinction.

The human capacity for warfare does, on the other hand, deserve some consideration, if only because it is so common and because so many participate in it. Warfare among human tribal societies may have made good genetic sense to individuals if the members of one's own group tended to be closely related. Vast numbers of Crusaders went into battle with little protection beyond the crosses on their chests, and vast numbers died. These men were not necessarily related. But most lived the abject life of a serf, and so promises of salvation and riches may have made crusading seem an even bet. In a contemporary setting, atavistic and utterly repugnant tendencies such as football hooliganism may not so much constitute surrendering of our selfish needs to those of the group, but rather the distasteful expression of them writ large in possibly inappropriate circumstances. But how do we explain contemporary grown-up warfare in which lots of people regularly die? Here it may again pay to examine the influences of poverty, coercion and punishment as much as any role of the superorganism. Few soldiers with other options willingly go to their deaths.

Not many evolutionary biologists would feel qualified to write a book that touches on most things from apoptosis to neural nets to Erasmus Darwin's *Zoonomia*. Fewer still would see a common thread — the Lucifer Principle — linking all these topics to a dark side of human nature. Even fewer would have the courage, as does Bloom, to hold the view that this insight could prevent the decline of the United States in the closing years of the twentieth century. In Nietzsche's *Thus Spake Zarathustra*, the "last man" discovers happiness through rationality. But Nietzsche found this happiness contemptible because it was based on a naive optimism that celebrated rationality (science) as the technique for the mastery of life and the discovery of human values. □

Mark Pagel is in the BBSRC-NERC Ecology and Behaviour Group, Department of Zoology, University of Oxford, South Parks Road, Oxford OX1 3PS, UK.

## Sailing the ship of Down

Phillip R. Sloan

**Charles Darwin: Voyaging, Volume 1 of a Biography.** By Janet Browne. Knopf/Cape: 1995. Pp. 606. \$35, £25.

THE historian of science I. Bernard Cohen once described the "three revelations" of Isaac Newton, as researchers first digested his printed works, then his correspondence and some of his unpublished manuscripts and finally the more recently available archive of unpublished

Peter Brent (1981), Peter Bowler (1990), John Bowlby (1990) and most recently the highly praised study by Adrian Desmond and James Moore (1991), surely alters some basic assumptions about Darwin and his revolution that had prevailed since the Victorian *Life and Letters* and the *Autobiography*. Yet the basic plot of Darwin's life and the cast of characters has remained surprisingly constant. There have been strikingly few truly astounding revelations and no closet manuscripts have come to light to reveal a very different mind at work than one would have expected from the *Origin, Descent* or the rest of the printed corpus. Nor have we yet found evidence of secret lovers or other titillating details of Darwin's

## IMAGE UNAVAILABLE FOR COPYRIGHT REASONS

The traditional ceremony of 'crossing the line', drawn by Augustus Earle, the *Beagle's* artist. From Captain Robert R. FitzRoy's *Narrative*, 1839.

material. Through these layers of scholarly inquiry, the image of Newton as the archetypal rationalist of the *Principia* was replaced by the Newton of the prophecies of the Book of Daniel and the "Queries" to the *Opticks*, and ultimately by the esoteric alchemist in search of the "Greene Lyon".

The potential for a similar transformation in our understanding of Charles Darwin has existed since 1959 when the full archive of his manuscripts and letters became available. The heroic efforts of the notebooks and correspondence projects have drawn together a remarkable body of information. Darwin promises to become the most completely documented scientist in recorded history. But who is the Darwin of this third revelation?

The run of biographies and partial biographies that has accompanied this new archival scholarship, beginning with Gertrude Himmelfarb's *Darwin and the Darwinian Revolution* of 1959 through to the studies of Edward Manier (1978),

private life.

The mysteries and gaps in our understanding of his scientific thought still need clear explanations. When and why did he first think of transformism? What were the reasons for his refusing to publish details of his theory in 1844? Why were barnacles worth so much of his time and effort? Something more modest has instead been attained: the assemblage of a vast amount of material for describing in remarkable detail the intimate picture of the life and times of a largely conventional Victorian intellectual living through a period of dramatic social and scientific change.

Yet we still do not really have a true 'scientific' biography of the genre represented by the classic works of Richard Westfall on Newton, Thomas Hankins on Jean D'Alembert and William Rowan Hamilton, and Pearce Williams on Faraday, in which the science is brought to life by the use of personal biography. The problem may have been made more diffi-

cult by the extensive work of the Darwin scholars themselves. The mass of archival material, correspondence and commentary now accumulated around the man has become so immense that it is almost impossible to condense.

Janet Browne's splendid book is the first volume of a patient analysis of Darwin's entire life in the light of all these sources. Her qualifications as a trained biologist, historian of science and skilled editor of the correspondence project put her in an ideal position to do this challenging work. To those aware of contemporary Darwin studies, the events, characters, work and basic plot of Darwin's life up to 1856 remain generally unaltered in her study. The novelty is in its emphasis on issues and individuals ignored by others and on the scientific dimensions of Darwin's life. Browne's account is strictly chronological, beginning with the young gentleman at the Mount in Shrewsbury in the world of Jane Austen. We follow him from his chemistry experiments with his elder brother Erasmus to his medical (and natural history) studies at Edinburgh, Cambridge, the *Beagle* voyage, London and finally to Down House where the book ends with Darwin's return in May 1856 to the "species question".

Those looking for history with an agenda will be disappointed. If Browne makes Darwin into a product of his times, a man whose "theory of natural selection could only have emerged out of the competitive context of Victorian England", she does not try to reduce the content of his scientific work to the interplay of Victorian social forces and class conflicts. And she makes little effort to psychoanalyse her subject. Even Darwin's debilitating illness, which has tantalized both parasitologists and professional psychoanalysts, lurks in the background except when it interrupts his scientific work, as with his three-month stay in 1849 at Malvern where he was initiated into the rigours of Dr James Manby Gully's famous water cure.

Browne sensitively reveals the person behind the correspondence and notebooks. She is scrupulously faithful to the texts and the documents in constructing her narrative. Where evidence is slight, such as in the case of Darwin's possible liaison with Fanny Owen of the "Housemaid and Postillon" letters, she simply admits that there is little to conclude, and on the whole allows the social proprieties of the Regency world to decide the issues. Her analyses are exact, plausible and eminently judicious.

Browne's most important 'revelation' is perhaps the important role finally given to Charles's elusive elder brother Erasmus, his first scientific mentor. Erasmus's preparation of the way for Charles's initiation into the Cambridge network has previously received little attention. Their

close relationship in the years between Charles's return from the *Beagle* voyage and his marriage to Emma Wedgwood shines through in the correspondence, but it has needed expanding and deepening. Browne has fleshed out Erasmus's character in fine detail, portraying his circle of associates, his scientific and other intellectual interests and his curiously flaccid personality.

Browne's earlier book on the history of biogeography (*The Secular Ark*, 1983) and her training as a biologist equip her well to examine Darwin's years aboard the *Beagle*, the subject of eight central chapters. Her blending of the geological and biological findings is deft and informative. Darwin's anthropological observations are also drawn together into a coherent and engaging narrative, setting the stage for the incorporation of 'man's place in nature' into his transformist theory.

The book is aimed at a general audience. Darwin specialists may wish for more detail about the crucial scientific inquiries during the *Beagle* years. And although the general framework and balance of the discussion is excellent, it would have been strengthened by more judicious use of quotations and illustrations from the unpublished zoology and geology manuscripts and the field notebooks and manuscripts. The *Beagle* years are typically read in historical reverse in most studies, as if the final cause of the voyage were the creation of the transmutation theory. We need to grasp the problems and issues that were then actually at issue for the young Darwin, problems and issues that may have had little direct bearing on transformism but which might explain many other aspects of his later thought. Browne certainly does not engage in such retrospective readings, and her grasp of the historical documents and literature is superb. But she could have introduced the novice a little more to the scientific, as well as the personal, details.

*Voyaging* is above all a wonderful read. Browne ends with the metaphor of Down House in the 1840s and 1850s as a kind of ship, almost a re-creation of the *Beagle*, self-contained, with specimens and bottles in order, and children and servants replacing Wickham and Covington as aids in Darwin's research. Over it all stands the Victorian father as a disciplined and able captain, continuing in his study the work begun on the large table of the *Beagle* wardroom, with all domestic functions subordinated to a scientific mission. The outcome would be one of the more remarkable products of human genius. I look forward to the sequel. □

*Phillip R. Sloan is director of the Program in History and Philosophy of Science, University of Notre Dame, Notre Dame, Indiana 46556, USA.*

## Paperback history

■ **The Path to the Double Helix: The Discovery of DNA** by Robert Olby, with a foreword by Francis Crick. Dover, \$13.95, £13.95.

■ **The Eighth Day of Creation: Makers of the Revolution in Biology** by Horace Freeland Judson. Penguin, £12.

First published in 1974 and 1979 respectively, these classic books provide in-depth accounts of the events leading up to the discovery in 1953 by Watson and Crick of the molecular structure of DNA.

Judson, a renowned popularizer of science, is the better writer; and, unlike Olby, he goes on to look at the dramatic development of the basic concepts of molecular biology in the 1950s.

In his new postscript, however, Olby, a noted historian of science, describes what he perceives to be the different approaches of the two versions: "For him [Judson] Kuhn's 'celebrated fashionable discourses on scientific revolutions' are not well informed on the practices of scientists. Judson prefers to treat scientific development in terms of the 'correspondence principle', in which the inherent conservatism of science is stressed. A new theory has to explain all that was explained by the old one. In this way the cumulative nature of scientific knowledge is preserved. The problem with this view is that it fails to accommodate rejected knowledge. Such knowledge has to be treated as anomalous, ambiguous, mistaken. . . Nor need we exclude tentatively held and vague theories simply because they were advanced with less conviction than were other more successful theories."

■ **The Physicists: The History of a Scientific Community in Modern America** by Daniel J. Kevles. Harvard University Press, \$17.95, £14.25. On its original publication in 1971, this book was heralded as an indispensable introduction to the institutional history of US science. Kevles, a historian of science, traces the social, cultural and political forces behind the growth of physics from the post-Civil War years to the present. The new edition contains a 34-page account of the rise and fall of the Superconducting Super Collider.