

The 'new synthesis' vindicated

Sociobiology is here to stay and the debate now needs to move on.

The Triumph of Sociobiology
by John Alcock
Oxford University Press: 2001. 257 pp.
£16.95, \$27.50

Laurent Keller

Sociobiology has a peculiar history. Most people acknowledge that natural selection has been important in shaping the evolution of organisms and their genomes. Few would also deny that reproductive success, which determines which genes are transmitted from one generation to the next, is influenced by how organisms behave. One would think, therefore, that studies of social behaviour from an evolutionary perspective should be uncontroversial. So why is there such a fuss about sociobiology?

The controversy started soon after the publication of Edward O. Wilson's classic book *Sociobiology: The New Synthesis* (Harvard University Press, 1975). Most of the book was devoted to the evolutionary relationship between an animal's behaviour and its environment, in particular the social environment. This approach was far from new, beginning with the publication in 1859 of *On the Origin of Species* by Charles Darwin. Following the work of other evolutionary ethologists, Wilson tried to explain apparently peculiar behaviours, such as how insect colonies with sterile workers evolved or why some female spiders eat their mates

after mating. Sociobiology is based on the principle that, over evolutionary time, natural selection has favoured genes that increase the survival and reproduction of organisms. As a result, extant organisms should generally behave so as to maximize their reproductive success. So far so good. But Wilson went one step further in asserting, in the final chapter of his book, that the same approach can be used to study human behaviour. And this ignited controversy.

In his excellent book, John Alcock analyses the history of this controversy. The most vehement critics of sociobiology were some of Wilson's colleagues at Harvard. They were highly unreceptive to the notion that an evolved human nature exists, fearing that this might be interpreted to mean that human behaviour cannot be changed and that sociobiology could be used to justify unpleasant features of human behaviour. But, as clearly explained by Alcock, sociobiology by no means provides an ideological foundation for endorsing unwanted behaviour such as racism, fascism and sexism. Yet it is true that some of Wilson's statements, in particular those pertaining to the existence of a human nature, did not take into account history and how various definitions of man's 'natural state' had been used in the past to justify non-egalitarian political and social systems. Fortunately, Wilson and most other sociobiologists have now become more



Inexplicable behaviour: a female mantis neatly decapitates her partner after mating.

careful about the possible implications of their writing, as exemplified by Wilson's more recent book *Consilience: The Unity of Knowledge* (Random House, 1999).

Alcock addresses numerous misconceptions about sociobiology. Some were deliberately introduced by critics. For example, sociobiologists are frequently portrayed as believing in a 'biological determinism' or 'genetic determinism' of behaviour. No sensible sociobiologist believes such a thing. There is no doubt that human behaviour is the product of complex interactions between numerous genes and the social environment. The straw man of a simple genetic determinism was raised by critics such as Stephen Jay Gould because it is easy to chastise sociobiologists for getting their genetics wrong.

Behavioural differences between men and women provide a good example of the combined effect of genes and social environment. It is quite possible that men and women might have maximized their fitness by behaving differently in the past. As a result, genetic, hormonal and other physiological differences might have evolved, inducing, for example, a higher tendency to promiscuity or more attempts to attain a high social status in men than in women. But

YANN ARTHUS-BERTRAND/CORBIS



Rutting season: seeing off a younger rival.

PASCAL GOETHEL/UCKA/ARDEA LONDON

even if men and women have inclinations to behave differently, there are no fixed and irreversible differences, and, as Alcock points out, sensible sociobiologists do not believe there are. All human behaviour is influenced by culture and can be modified by education.

It is not certain, however, that the best course for the well-being of men and women is to refute possible intrinsic differences and implement educational rules aimed at making men adopt a more 'woman-like' behaviour, or vice versa. Rather, it might be more helpful to acknowledge any differences and to formulate a policy that prevents social discrimination of one sex over the other.

Alcock also addresses the criticism that sociobiologists tell 'just-so stories'. He correctly points out that evolutionary theory makes predictions that can be tested. For that reason, he argues, sociobiology is just as rigorous as any other scientific field. Here I would add a note of caution. It is very difficult to test whether human behaviour is adaptive (or was in the past), not all studies are solid and there are publication biases.

Take the example of facial and body symmetry. There is evidence that greater asymmetry reflects higher stress during development as the result of a less favourable environment and/or 'bad' genes. Some sociobiologists thus predicted that females should be more attracted by more symmetrical males because they would potentially be better fathers. These predictions are supported by some studies, primarily in birds and humans, but Richard Palmer showed that this is a good example of selective reporting. Studies that found a negative association between male asymmetry and reproductive success were more likely to be published in scientific journals (not to mention the general media) than those that did not. Sociobiology, and evolutionary biology as a whole, would greatly benefit if selective reporting could be prevented. The risk of just-so stories would also be much lower if formal replicative studies were performed more often.

I was surprised by the book's title, as many readers probably will be. But it soon becomes clear that Alcock is not implying that sociobiologists are all correct and their critics all wrong. Rather, his point is that a large body of work now shows that animal behaviour, and to some extent human behaviour, has been shaped by natural selection. Thus, the debate should no longer focus on the merit of sociobiology *per se*, but should move on to more interesting issues such as the study of interactions between genes, social environment and culture. An even more challenging task, in my view, will be to acknowledge that we are not all identical, free of the influence of our genes, culture and education, while ensuring that this does

not lead to social discrimination between ethnic groups, genders and individuals. ■
Laurent Keller is at the Institut d'Ecologie, Bâtiment de Biologie, Université de Lausanne, CH-1015 Lausanne, Switzerland.

Shedding light on a golden age

Nearest Star: The Surprising Science of Our Sun

by Leon Golub & Jay M. Pasachoff
Harvard University Press: 2001. 267 pp.
\$29.95, £20.50

John H. Thomas

Solar physics is in something of a golden age. Recent observational results from highly successful space missions have significantly altered our understanding of the Sun's outer atmosphere, its magnetic-activity cycle and its influence on the Earth and the near-space

environment. The new technique of helioseismology — the probing of the solar interior using observations of oscillations at the solar surface — has given us a much more complete and accurate picture of the Sun's internal structure and dynamics. Measurements of the flux of neutrinos from the Sun are forcing changes in our understanding of fundamental particle physics.

Nearest Star beautifully presents these and other recent advances for the general reader, while also giving a good historical perspective on our study of the Sun. The authors are especially well qualified to write a popular book on this topic. Leon Golub is an astrophysicist at the Harvard-Smithsonian Center for Astrophysics. He has carried out observations of the Sun using rockets and satellites in space for more than 30 years, most recently as an investigator for NASA's Transition Region and Coronal Explorer (TRACE) spacecraft. Jay Pasachoff is professor of astronomy at Williams College in Massachusetts and an experienced writer of astronomy textbooks, who has observed 31 solar eclipses.



Explosive secrets of the Sun

Images of coronal mass ejections such as this one, obtained using the Soft X-ray Telescope aboard the *Yohkoh* spacecraft, are helping to explain how such sudden explosions occur. These events, which come about when plasma and magnetic fields are transiently ejected from the Sun's corona — the outermost region of the solar atmosphere — produce intense shock waves, accelerating vast quantities of energetic

particles. When directed at the Earth, coronal mass ejections can cause strong geomagnetic storms, disrupting communications. Magnetic changes that occur before this energy release may act as a warning of imminent ejections. More on this and many other aspects of the Sun can be found in *The Cambridge Encyclopedia of the Sun* by Kenneth R. Lang (Cambridge University Press, £29.95, \$49.95).