Evolutionists red in tooth and claw

The Darwin Wars: How Stupid Genes Became Selfish Gods
by Andrew Brown
Simon & Schuster: 1999. 241 pp. £12.99, $20

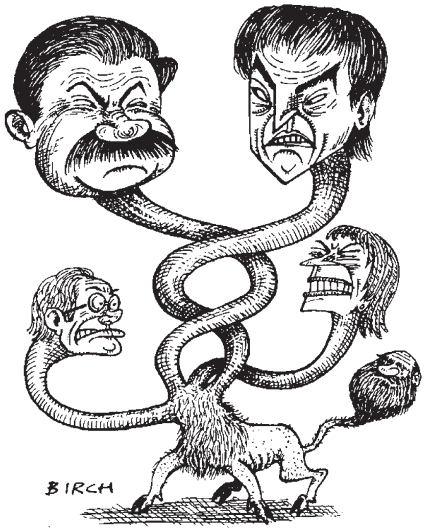
David L. Hull

Dust-jackets are frequently adorned by quotations from famous people praising the book. At first glance, Andrew Brown's *The Darwin Wars* is no exception. Pithy quotations from Steve Jones, Richard Dawkins, John Maynard Smith, Stephen Jay Gould and Daniel Dennett. Who could ask for more? However, on closer inspection these quotations turn out not to be about Brown's book at all, but quotations that Brown uses in his book. Only Dennett's blurb refers to one of Brown's own publications: "What a sleazy bit of trash journalism."

The Darwin Wars chronicles the battles over the past 25 years among warring factions in evolutionary biology — the Dawkinsians versus the Gouldians, as Brown dichotomizes the conflict. In his narrative, Brown interweaves interpersonal relationships with issues of substance. For example, E. O. Wilson was especially hurt when colleagues whom he considered long-time friends viciously attacked his book on sociobiology, generating years of nasty exchanges in *The New York Review of Books*, the form of fisticuffs preferred by American academics.

Brown also details the issues that separated the combatants. For example, he discusses at length David Haig's work on the warfare between a mother and her fetus, Elaine Morgan's aquatic ape theory, Napoleon Chagnon's warring Yanomamö, Margo Wilson's explanation of why children are more often murdered by their mother's new boyfriend than by their biological father, and John Tooby and Leda Cosmides's arguments against the mind being a general-purpose tool. He devotes an entire chapter to the adaptive advantages of religious beliefs. In each case, Brown reiterates the familiar message that adaptationist claims are extremely difficult to check. If we accept evolutionary theory, as everyone in this book does, then some adaptationist claims must be true. The problem is deciding which ones.

Brown is a freelance journalist, a precarious way of making a living. As a journalist he must write well, at least well enough to keep his readers turning the pages of his books. From my perspective, Brown's first chapter contains his most successful prose. He relates a tragic story of the intellectual and personal relationships between three highly original evolutionary biologists, two well known and one obscure. In the late 1950s, William Hamilton studied with John Maynard Smith at University College London. Maynard



Smith hardly noticed Hamilton. A decade later, both men independently came to realize how original the ideas of an amateur biologist named George Price were. Price had worked out a mathematical argument showing that altruistic behaviour is possible but that it is not in the least bit noble. According to Brown, this proof sent Price into a deep depression that was lifted only by a religious revelation that was visited upon him just north of the BBC Broadcasting House. Thereafter, Price tried to combine his work on the evolutionary process with ministering to the down-and-outs in London's back streets. It was not long before he had joined his charges as he descended into near madness. In the winter of 1974 Price killed himself in a squat near Euston Station, driven to suicide, as Brown sees it, by his work on the evolution of altruism and selfishness.

In many respects, *The Darwin Wars* is a remake of the tired old nature–nurture scenario. Back in the 1930s the environment was in the driver's seat — no matter how horrific the crime, the response among the literate public tended to be reform and counselling. It was not his fault: his environment made him do it. More recently, genes have caught the imaginations of journalists and popularizers. It was not his fault: his genes made him do it. Today all sides agree that both nature and nurture are important in making us what we are, but the Dawkinsians emphasize the role of genes while the Gouldians emphasize culture. Hence, on the surface, the issue in *The Darwin Wars* is the relative mix of genes and environment.

But the deeper issue is not nature–nurture at all, but free will. Can our environment and genes gang up on us so that we are forced to follow their dictates? All sides answer that they can't, but exactly how such resistance is possible is not easy to say. Brown reveals himself as a closet Gouldian when he explains Price's madness in terms of his environment, not his genes. Although Brown acknowledges that "one cannot say exactly what drove Price mad", he attributes his mental disintegration and suicide to his failure to come to terms with Hamilton's equations. The primary cause might just as well have been genes.

Brown makes a mistake or two. For example, he identifies "being a woman" with "possessing a Y chromosome". In relating the early history of Mormonism in the United States, he mentions how Joseph Smith founded Nauvoo in Illinois on the banks of the Missouri river. Make that the Mississippi river — I know, because I was born only a few miles from Nauvoo, and some of my ancestors were part of the "lynch mob" that shot Smith.

One of the strengths of Brown's exposition is that he does not pretend to be a disembodied intellect hovering above the fray. In similar circumstances he is likely to behave in similar ways. One thing that does come through is that the scientists Brown discusses really care about their science. The combatants "write from conviction, not for hire". That is why their disputes become so acerbic. If you attack mine, you attack me. Is Brown's book one more "sleazy bit of trash journalism"? I don't think so, but my judgement might be coloured by the fact that Brown treats my work very gently and relates no painful stories about me and my professional friends. □

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On from Babylon

The History and Practice of Ancient Astronomy
by James Evans
Oxford University Press: 1998. 478 pp. $65, £49.50

J. D. North

James Evans is a historian of astronomy who teaches both physics and the history of science at the University of Puget Sound in Washington state. Such biographical details offer a clue to his chosen genre, which is not only unusual but, sadly, unfashionable. Evans approaches the history of ancient astronomy determined to enter the minds of those whose work he discusses, and in this, within his chosen limits, he is highly successful. His is a hands-on approach eminently fitted to the needs of students who want to know not only what historians have said

A Greek heaven: the ancient Greeks believed that the heavens were spherical, and that the Earth lay at its centre. Atlas's hand supports this oldest known celestial sphere, the Farnese globe.

about ancient astronomy, but also how astronomy was actually done in the past.

The book is copiously illustrated with helpful geometrical figures, and supplemented here and there with a generous touch of simple mathematics, but it will be accessible only to readers above a certain level of numeracy. Evans deals with material ranging from the Babylonian arithmetical analyses of planetary motion to Greek epicycles, and ultimately to Keplerian ellipses, presenting the reader with material from the very core of the exact sciences over the past three millennia.

Most of his story is not new, but what is new is his way of telling it. Whether this book can be described as history is a concern to which I imagine its author is fairly indifferent. There is history running quietly through its pages, but it takes second place and is regularly interrupted with problems and exercises for the reader that are designed to give a feeling for the practical art of astronomers from the past. However, Evans' attention to past practice does not mean that he avoids either the literary or the philosophical traditions, for both have a foot in popular, home-spun, practical astronomy, and so earn a small place here.

The earliest activity meriting the name astronomy needed no instrumental aid. The classic case of heliacal risings and settings is a good example. Yet instruments naturally enter the story at an early stage, and the book's greatest strength is in the clarity with which Evans explains how they work. Much can be learned of solar motions even from the humble gnomon, which is first on the list. The usefulness of the illustrations, line drawings, tables and reproductions of old prints cannot be exaggerated. You won't find every history of ancient astronomy illustrating the principles of an astrolabe plate with an example for Mexico City.

Students who learn the elements of spherical astronomy from this book will certainly have a firm grasp of what is involved. However, Evans' account will give them a set of conceptual devices — the celestial sphere and associated geometrical elements — that stem from the Greek tradition, and which was not shared by the Babylonians or early Egyptians, for instance. Evans is aware of the danger that, by structuring his material around topics such as the celestial sphere, calendars and solar theory, he might obscure the historical picture. The attentive reader might find his remedy tucked away in a corner near the beginning of the book. Thus, he advises: "The reader is invited to return to this survey to see how a particular writer or topic fits into the broader picture." Whether this rings true to the real world of student psychology is a moot point, for this bumper book is not for the faint-hearted. A student who works steadfastly through it from beginning to end will have read something over a quarter of a million words. The extra stamina required to superimpose the "broader picture" will seem a small investment to the dedicated reader who has covered this ground — always supposing a historical dimension is wanted. But I know from experience that many science students want no more than Evans offers them here. Should they be force-fed?

And what of other potential readers, the intelligent dabbler, for instance? One of the beauties of the book is that it can be browsed non-consecutively. In fact, some sections could easily be used as self-contained course material — the chapter on the calendar, for instance, would provide a better survey for budding historians with chronological tendencies than much of the recent semi-popular literature on that subject.

There is a broadly historical pattern within each chapter that tends to begin with Babylon, or occasionally ancient Egypt, pays most attention to ancient Greece, and then moves quickly through mediaeval Islam and Christian Europe, with some emphasis on the period immediately before and after Copernicus. In a sense, this book is the story of Copernicanism as a recasting of ancient, and in particular Ptolemaic, astronomy.

There is a distinct undertone of scientific progressionism throughout, despite the occasional sceptical remark about the obsessive search for precursors. The question of Copernicus' reliance on his predecessors is sensitively handled, and lacks the hyperbole so often associated with it in recent decades. Evans touches lightly on this and on various other modern controversies over priority, notably that concerning Ptolemy's putative plagiarism of Hipparchus, an idea vigorously promoted by the late Robert R. Newton in the 1970s. In this last case, Evans adds his own extended analysis, which is both simple and convincing, tacitly defending Ptolemy by revealing flaws in his critics' arguments. This is an excellent example of Evans' talent for dispassionately evaluating the evidence, which pervades his text. He offers a no-nonsense account that breathes life into the astronomical past while remaining true to his subject.

His is not the whole truth, and one might occasionally question his choice of emphasis, but it would be hard to find an

elementary account of the subject that is as accurate or as comprehensive as his. I suspect that most students who emerge victorious from this tough assignment will tacitly conclude that they share a common scientific psychology, even motivation, with those whose methods they can now so well understand. In this they are likely to be mistaken, but the fact that the inference is partly right is what makes Evans' book so educationally important. □

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The laying on of genes

The Development of Human Gene Therapy: Monograph 36
edited by Theodore Friedmann
Cold Spring Harbor Laboratory Press: 1999. 729 pp. $134

Karol Sikora

The transfer of specific genetic material to treat disease has been one of the most exciting potential applications of modern genetics. Given the complexity of the task, it is perhaps not surprising that progress has been slow in terms of clinical gain. The main stumbling block right from the start has been in getting DNA to the right place in a form that permits its expression at the right time in enough cells. The problem of effective *in vivo* gene targeting still bedevils the field a decade after the first trials began.

The collection of reviews in *The Development of Human Gene Therapy* begins with a historical overview going back to Archibald Garrod, the senior physician at St Bartholomew's Hospital, London, who, around the turn of the century, discovered what he termed the "inborn errors in metabolism". It covers the abortive and potentially unethical beginnings of human globin-gene transfer for thalassaemia in the early 1970s, when globin genes were introduced into the bone marrow cells of two patients. Gene expression was unlikely, and no ethical approval had been obtained. The first successes came with cystic fibrosis, adenosine-deaminase deficiency and cancer. Success, of course, is only relative. Real success equates with clinical benefit in terms of improved quality of life or increased survival, and this has so far proved elusive.

The chapters on the major vehicles for gene delivery cover retroviruses, adenoviruses, herpes viruses, lentiviruses, a range of more unusual vectors and, of course, physical delivery systems. Much of the information is dreadfully old and can be found in greater detail elsewhere. Although the major targets for clinical exploitation are discussed, it seems strange to omit the remarkable clinical developments in cystic fibrosis, ischaemic heart disease and the rare single-gene disorders. Some clinical possibilities that are now the focus of much currrent activity, such as arthritis, retinopathies, collagen disorders, asthma, diabetes and obesity, are not even mentioned.

Highlights of this large volume include an excellent chapter on naked DNA injection into various tissues. The fact that this leads to gene expression at all is remarkably encouraging for the future. Another chapter considers targeted gene repair in mammalian cells using chimaeric oligonucleotides. Although a long way from the clinic, this represents the beginnings of genetic surgery. The short review on stem-cell transplantation is concise, yet informative, while the ethics of the subject are well reviewed in a historical context.

There are several excellent short books reviewing gene therapy. Unfortunately, this is not one of them; its content is outdated and the artwork incredibly poor, and, a major criticism, despite the encyclopaedic coverage of the field, the material comes almost exclusively from US-based authors. Human-gene therapy is now an international endeavour, with clinical protocols in place in more than 25 countries. True, the Americans got there first, but please, the rest of the world does exist. □

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Genetics of another animal
The Zebrafish: Biology (*Methods in Cell Biology* Vol. 59)
edited by H. William Detrich III, Monte Westerfield and Leonard I. Zon
Academic:1998. $64.95

An explosive laboratory

Island Biogeography: Ecology, Evolution and Conservation
by Robert J. Whittaker
Oxford University Press: 1998. 285 pp. £19.99, $29.95 (pbk)

Ilkka Hanski

The island of Krakatau in the Sunda strait was reduced to one-third of its size by violent volcanic eruptions on 27 August 1883. Remains of unlucky life were buried under 60–80 metres of ash, but, luckily for science, the biologists of the time were quick to grasp the unique opportunity for observing recovery.

Within a few years, coastal plant communities were well established. The interior was first colonized by ferns and grasses, to be replaced by forest within 40 years. So far, more than 300 plant species have been recorded from Krakatau, although there are fewer species there today — many species recorded in the past have become extinct. Animals present much the same picture. For instance, the cumulative number of bird species is nearly 50, whereas the present bird community has some 30 species.

Robert Whittaker's *Island Biogeography* delivers a sweeping lesson in island ecology enhanced by the author's long-term involvement in the research on Krakatau. Intriguingly, bird colonization of Krakatau also featured as the opening example in the trail-blazing island-ecology book of the century, Robert H. MacArthur and E. O. Wilson's *The Theory of Island Biogeography* (Princeton University Press). Back in 1967, these authors concluded that the number of bird species had reached an equilibrium by the 1930s, although further extinctions and colonizations of individual species were to be expected. In the graph shown by Whittaker, the number of bird species has increased only slightly since the 1930s. Some extinctions and colonizations are attributed to successional changes in the island's vegetation rather than to stochastic factors.

One might think that the latest figures endorse MacArthur and Wilson's prediction, but Whittaker takes the opposite view. In fact, by his judgement the MacArthur–Wilson theory is essentially dead, as islands are ceaselessly bombarded by disturbances — though Krakatau may be an extreme example — and there is therefore no time for an equilibrium to become established. The 'island theory' is replaced by 'disturbed island ecology', without the word 'theory' in the latter label.

Whittaker's conclusion is curious, since it is akin to asserting that density-dependent population regulation is unimportant because population sizes are perturbed by varying environmental conditions. True, an equilibrium in the sense of a constant number of individuals in a population, or of species on an island, is unlikely, but equilibrium in the sense of a characteristic distribution of numbers in the course of time may well occur. What matters are the processes.

Island Biogeography covers the full range of topics, from the geography and geology of islands, their speciation and evolution, population ecology and community assembly, to the application of island theory to conservation. Although islands in the sea account for only 3% of Earth's land area, and individual islands have impoverished communities, the pooled number of species on islands is great. For example, around 15% of all known species of birds and plants occur on islands. Islands are ecological and evolutionary laboratories. Whittaker describes cases of