

BOOKS & ARTS

In your own image

Care must be taken when looking for natural selection to explain the evolution of human behaviour.

Before the Dawn: Recovering the Lost History of Our Ancestors

by Nicholas Wade

Penguin: 2006. 320 pp. \$24.95

Kenneth M. Weiss and Anne V. Buchanan

In *Before the Dawn*, journalist Nicholas Wade explores the “lost history of our ancestors” from a genetic viewpoint. He presents a compilation of scenarios that are meant to explain the evolutionary origins of human behaviour and social structure during the past 50,000 years, discussing archaeological findings but mainly focusing on how genes can reveal the ‘hidden’ past that can’t be inferred from fossils or archaeology. He uses examples ranging from the first wearing of clothes and the origin of hairdressing to the evolution of language, race and intelligence.

These inherently interesting and smoothly presented tales of progress towards the human present will doubtless captivate many readers. However, what could have been a tempered and timely treatment of an important subject is, in our view, regularly undermined by Wade’s determination to find simplistic natural selection behind every trait, and by a lack of attention to issues that are known to inhibit a credible understanding of complex traits, never mind their evolution.

Wade’s explanations commit various well-known errors, such as equating correlation with causation and extrapolating from individual traits to group characteristics. Often his arguments and trait choices are laden with Western-oriented value judgements. The following are a few examples of the kinds of problematic scenario that can be found in the book. Wade suggests that until recently racial variation has not been the subject of scholarly pursuit, and confidently asserts that there are five “major” races, identified statistically by neutral markers (from a genome that he assures us is 97% “filler”), yet “the alleles involved in differentiating the human population are likely to be of the selected kind not the neutral kind”. He also states that stressing genetic racial differences as he does is “objective” and scientific, but stressing human similarities is “political”. Wade argues that Europeans resist ‘mad cow disease’ because their ancestors were selected for cannibalism. He also says that Jews were selected for higher intelligence than other peoples because of



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Born to win: does the ability of some Chinese people mean there is a gene for table-tennis?

the calculational demands of money-lending. He suggests that high intellectual skills are a genetic adaptation that occurred only after the origin of settled societies in places such as Europe. And he says that the Chinese as a “race or ethnic group” excel at ping-pong, which should encourage researchers to look for a genetic explanation.

Extraordinary claims demand extraordinary evidence. In *The New York Times* on 15 January 2006, Wade warned against journalists being too ready to accept “overstated or wrong” claims from the science literature, but in too many places where it makes a difference he has ignored his own advice. A journalist doesn’t create facts, but he does select what to repeat and how to colour it, and Wade is long on speculating about what “is reasonable to assume”, and short on circumspection of his own, or anthropologists’, yarn-spinning. Most of the scenarios he reports have not been rigorously tested, nor is it clear how they could be. The book has many internal inconsistencies, and one can easily find contrary evidence or readily construct alternative ‘just so’ stories that invoke the same genetic scenario and the same kind of reasoning.

How could this subject be better treated, without denying the importance of genes in human traits? For a start, evolutionary arguments

should be based on sufficiently credible, consistent and compelling scientific evidence. It is easy to claim that a trait is due to natural selection, but responsible selection-based arguments should have substantial experimental mechanistic support, at least for the fact of selection. That’s not the state of most current evidence. Indeed, after 50 years of investigation, we can’t convincingly demonstrate selection for most of the red-blood-cell diseases, other than sickle-cell anaemia, that are probably coevolving with the strong selective force of malaria. Other best-case scenarios for human genetic adaptation, such as adult lactase persistence and skin colour, are also incomplete. Explaining selection is particularly problematic for behavioural traits because of the powerful role of culture and facultative ability, which is probably what human evolution really favoured. Human phenotypic changes can far outpace genetic ones, making it challenging to know whether such traits are even genetic, much less what they ‘evolved for’ millennia ago.

In addition, assertions of genetic causation should be built on what is already known about the difficulties of explaining complex traits, including behaviour or intelligence. The extensive literature documenting the subtleties of such traits undermines simplistic ‘evolved for’ scenarios, but Wade largely ignores it. The

aetiology of complex traits is influenced by environmental factors as well as variation at multiple genes, greatly attenuating the causal impact of individual genes. We are far from understanding either the genetic architecture or the evolution of complex biological traits, even in the best data from experimental organisms unaffected by the blur of culture. Intensive gene mapping has typically failed to identify more than a fraction of even the genetic variation, much less all the variation, in such traits. The effects of experimental genetic manipulation in laboratory animals routinely vary significantly even among the few strains tested, and the life experiences of litter-mates, twins, inbred animals and clones are far from identical. Despite this sobering knowledge, Wade claims example after example of 'genes for' traits.

But why not just enjoy the sport of fanciful speculation, even if the arguments leak like sieves? Because it's not just sport. Positions on genetic determinism often correlate with

social politics, and few of us are neutral or even changeable on the issues. Wade recognizes that his ideas may not be acceptable to everyone but warns that "to falter in scientific inquiry would be a retreat into darkness". He seems to be warning, appropriately enough, against benighted political correctness. But we should never become casual about how comparable 'slopular' science and very similar speculative evolutionary reasoning by leading scientists fed a venomous kind of darkness not too many decades ago. Wade's post-hoc tales often put him in step with a long march of social darwinists who, with comfortable detachment from the (currently) dominant culture, insist that we look starkly at life in the raw and not blink at what we see. But given today's limited understanding of complex traits, too often what one sees is oneself. ■

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intend to make it required reading for my astronomy students (and strongly recommend the same for similar courses), mostly because it provides the right approach to the phenomenology of the Universe. Apart from the elusive gravitational waves, astronomers learn most about our Universe by gathering and analysing electromagnetic radiation from it. The art of astronomy is to extract the maximum information carried to us from the stars by travelling photons: arrival direction, arrival time, energy and state of polarization. And, of course, to gather as many photons as possible.

We've done this for centuries with bigger and bigger telescopes on the ground, but "we live at the bottom of an ocean of air", as Galileo's favourite pupil, Evangelista Torricelli, remarked with astonishing insight. The bulk of the spectrum can only be studied properly from space. For the first time in the history of humankind, astronomy is possible out there, and we've had close encounters with planets and comets in the Solar System. Europe has sent probes to planets and comets (Huygens, Mars Express, Rosetta, Venus Express and so on) through ESA's science programme, and these are discussed in Woltjer's book.

Woltjer has also been a leading figure in space-astronomy planning for Europe, working with Roger Bonnet in crafting the first two long-range ESA science plans. It is a pleasure and an honour to report that this has continued in ESA's 2004 Cosmic Vision plan, based on the science proposed by a community that has trebled in size over the past 20 years.

Europe's Quest for the Universe tells the story of European astronomy with passion, immediacy and candour, and with as much mastery of science as it has personality. ■

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Reaching for the stars

Europe's Quest for the Universe

by Lodewijk Woltjer

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Giovanni Bignami

"The progress of science depends on the technological development of its instrumentation," claims Lodewijk Woltjer in the opening line of *Europe's Quest for the Universe*. From Galileo to Edwin Hubble and Riccardo Giacconi, this has been especially true for astronomy. But, as Europe's former research commissioner Philippe Busquin adds in his preface: "The star-studded sky acts as a source of wonderment and inspiration for our thoughts and dreams." And that's lucky, in these days of obsessive, applications-oriented political pressures on science.

Both from the ground and from space, astronomy has been a success story for Europe, and one that needed to be told. Descriptions of bold endeavours can come from leaders in the field and be accurate yet not impersonal, or they can come from observers without a direct influence on the outcome. Woltjer was director-general of the European Southern Observatory (ESO) for eight years and has been a keen observer of astronomy in Europe and across the world. He writes, then, both as a leader and a commentator. This turns out to be a perfect recipe for the history of the varied and variable discipline of space science, in a continent that has more nations than big telescopes, and where the number of active space astronomy missions is close to the number of member states of the European Space Agency (ESA).

From the ruins of the Second World War, Europe, like Japan, has emerged to become a

world-class power in the peaceful and cultural endeavour to understand our Universe. It all came together at the same time, in those magic years at the end of the 1950s when everything must have seemed possible: we had CERN, the European particle-physics laboratory; the European Space Research Organisation (ESRO); and, of course, the ESO. I wonder whether Europeans today would be capable of pulling off a similar coup in our extremely affluent society?

But a merely historical reading would be a limited and limiting one for Woltjer's book. I



The European Southern Observatory operates the Very Large Telescope array at Paranal in Chile.