Home is the hunter

Fairweather Eden

by Michael Pitts and Mark Roberts
Century: 1997. Pp. 356. £17.99

Asako Saegusa

Boxgrove in West Sussex, England, has over the years turned up many flint tools and fossil animal bones, supplying intriguing evidence that our 'primitive' ancestors hunted, killed and butchered large animals rather than scavenging for food. Although these findings themselves were compelling enough to spark heated debate among prehistorians, it was not until the discovery three years ago of a hominid fossil shin-bone that this Palaeolithic

site gained worldwide recognition (see *Nature* 369, 311–313; 1994).

The tibia belonged to a hominid from the Middle Pleistocene who stood six feet tall and weighed 13 stone (182 pounds or 83 kg). He was later identified by the archaeologists as *Homo heidelbergensis*, an ancestor of modern Europeans. The fossil was originally estimated to be 200,000 years old, but biostratigraphic evidence from the excavation site dated it to 500,000 years ago — the oldest hominid bone then to have been found in Europe.

Boxgrove man's status as the oldest European has since been challenged by discoveries at Dmanisi, Georgia, and at Atapuerca in northern Spain. Finds at Boxgrove have nevertheless provided us with a better understanding of Archeulian industry in Britain and the

behaviour of our ancestors. *Fairweather Eden* is a colourful insider's account of the 10-year excavation at Boxgrove, which started as a small-scale project when Mark Roberts, the site director, was an undergraduate at the Institute of Archaeology in London.

The book describes the progress of projects at Boxgrove, provides an historical perspective of European archaeological excavation, advances theories of hominid tool use and cognitive development and presents a snapshot of life in Britain half a million years ago.

So what do we know about the flint tools? Archeulian hand axes were previously described by some archaeologists as a by-product of tool manufacture. But bones of large animals such as extinct rhinos found at Boxgrove reveal cut marks made by flint tools, and some show filleting marks matching those of modern butchery; in fact, when a local butcher was asked to dismember a roe with reconstructed flint tools, he found them surprisingly effective. Also, the edges of the hand axes show wear that is reckoned could have been caused only by butchering meat.

In addition, circular perforations in an excavated horse shoulder are believed to have been caused by blows from a spear. This evidence, together with the recent discovery of 400,000-year-old wooden throwing-spears in Schöningen, Germany (see *Nature* 385, 807–810; 1997), indicates that Boxgrove hominids were robust in build and were big-game hunters.

Fairweather Eden is a well-documented account of recent discoveries that pieces together compelling and intelligent ideas about the evolution of early humans. □

Asako Saegusa has been appointed Tokyo correspondent of *Nature*.

In-flight meals

A frog who would a-wooing go attracts unwelcome attention. The fringe-lipped bat *Trachops cirrhosus* (below) fastens on to the mating call of frogs to find its daily diet. The yellow epauletted bat *Sturnira lilium* (left) prefers fruit, while other bats eat insects, fish and even scorpions. But only three out of more than 900 species of bat are vampires, and their record of biting humans is stronger in fiction than in fact. In *Bats in Question* (Smithsonian Institution Press, \$49 (hbk), \$24.95 (pbk)), mammal specialist Don E. Wilson attempts to rehabilitate a maligned group of animals, aided by stunning photography by Merlin D. Tuttle, giving a comprehensive guide to the different species and a host of bat facts.

Messages in melody

Musical Languages

by Joseph P. Swain

Norton: 1997. Pp. 384. \$32.50, £25. To be published in the UK in November

Christopher Longuet-Higgins

"How is music like language and so what if it is?" is Joseph Swain's truculent summary of his book. He sees himself as taking up where Deryck Cooke and Leonard Bernstein left off in their famous attempts to invigorate the analogy between music and language — attempts that were fiercely scorned at a time when the concept of structure was sweeping aside the ancient problems of expression and communication.

The topics that Swain selects for his comparative study include syntax, semantics, phonology, language acquisition, language evolution, artificial languages and language-using communities. Their musical counter-

parts have all come under fire in times of revolutionary change such as the early decades of the twentieth century.

Syntax, semantics and phonology deal, respectively, with the forms of utterances, their meanings and their realization in speech or writing. In traditional music, note order is as crucial as word order is in English. When we listen to a tune, our expectations and their satisfaction are governed by syntactic considerations, although we may not know what they are.

The psychological reality of musical syntax is demonstrated by our ability to identify wrong notes in music we have never heard before. Its value to the listener lies in establishing the tensions and resolutions that could never arise if the unfolding of the music were totally unpredictable — or totally predictable.

The semantics of music is something of a disaster area (but so, for that matter, is natural language semantics). Although a pastoral theme may well suggest the countryside, it cannot possibly assert that you are about to tread in a cowpat. But a ray of hope illuminates the attempt to assign meanings to vocal compositions, where the words and the music may be expected to tell the same story.

Swain invokes this principle to explain the dramatic effect of the chorus "For unto us a Son is born" in Handel's *Messiah*; but he could have done without it in discussing the music of the preceding aria, "The people that walked in darkness", where a lonely melodic line wanders about unpredictably in a minor key.

The phonology of a musical language is properly concerned with the conceptual (phonemic) relations between the notes rather than their acoustic (phonetic) realization. The tonal relations of Western classical music, so economically represented by stave notation, remained basically unchanged during the seventeenth, eighteenth and nineteenth centuries.

The real revolution wrought by the serialists at the beginning of the twentieth century was not to declare all the notes of the keyboard equal, but to throw out the conceptual distinction between homophonic intervals such as the major third and the diminished fourth, along with the bath water of decadent romanticism. But not for long: experiments by Jamshed Barucha have shown that the tonal baby has a way of crawling back into the musical reflexes of even quite fluent modernistic composers.

To illustrate his ideas, Swain discusses in detail such landmark compositions as Palestrina's "Sicut Cervis" and Beethoven's "Violin Concerto". But of more consequence for general musicology are his observations on musical evolution, artificial languages and the supporting role of musical communities. If he is right, the artistic health of languages such as jazz and rock seems assured; the music of small minorities, such as soli-

tary composers of electronic music, faces bleaker prospects.

The least convincing chapter is that on musical metaphor. Perhaps the next edition will replace it by one on prosody, a common concern of poets and songwriters.

Musical Languages is an untidy, enthusiastic, perceptive book, to be heartily recommended to all thoughtful musicians. □

Christopher Longuet-Higgins is in the Department of Experimental Psychology, University of Sussex, Brighton BN1 9QG, UK.

Born to science

Words, Thoughts and Theories

by Alison Gopnik and Andrew N. Meltzoff
MIT Press: 1997. Pp. 268. \$30, £25.50

Peter Bryant

Anyone who has had any prolonged contact with children knows that their intellectual effectiveness changes remarkably as they grow older. This was first systematically demonstrated by Binet's intelligence test which showed ordinary children fumbling hopelessly with elementary verbal or spatial problems one year and solving them unhesitatingly the next. Later, many developmental psychologists, most notably Piaget, charted the details, many still controversial, of the kinds of problems young children can and cannot solve and how children get better at finding solutions as they grow older.

Intelligence testers, Piaget and most other developmental psychologists demonstrated that these changes tend to tail off around late adolescence (although they agreed that there is room for slight improvement during early adulthood) and they assumed that this endpoint in intellectual development is an intellectual summit. Until a child gets there, he or she is intellectually incomplete: after reaching the sum-

Early learning: scientific reasoning starts young, say Gopnik and Meltzoff.

mit, there will be no further improvements in intellectual machinery.

Psychologists vary greatly in how they characterize this endpoint, but Piaget's view probably remains the most influential. He claimed that the climax of intellectual change was scientific thinking: when children can form hypotheses, and test them systematically by looking at the effects of one variable at a time while holding the rest constant, they have reached the endpoint.

In their stimulating and well-written book, Alison Gopnik and Andrew N. Meltzoff attempt to overturn these usually unquestioned assumptions about the developmental endpoint and the late arrival of scientific reasoning.

Their main idea is that scientific reasoning is the cause, not the product, of chil-

New in paperback

Emotional Intelligence: Why It Can Matter More Than IQ

by Daniel Goleman

Bantam, \$13.95

"Goleman has written an interesting if somewhat naive book. ... Some will find the journalistic tone repugnant, but anyone interested in emotion is likely to discover challenging new ideas in this book: it should be read by social workers and agony aunts everywhere." Stuart Sutherland, *Nature* 379, 34 (1996).

The Power to Harm: Mind, Medicine and Murder on Trial

by John Cornwell

Penguin, £7.99

In 1989, Joseph Wesbecker shot 20 of his former

colleagues and then himself. He had been on Prozac, and his victims and their families sued its makers, Eli Lilly, for compensation. Cornwell uses the trial to warn of the potential apocalypse created by "the growing crisis over reductionist solutions to individual suffering and social disorder". Reviewed by Keri K. Gould in *Nature* 383, 783 (1996).

Reality Rules: Picturing the World in Mathematics. Vol. 1 — The Fundamentals. Vol. 2 — The Frontier

by John L. Casti

Wiley, each \$32.50, £19.99

"Casti Tours offers the most spectacular vistas of modern applied mathematics." Karl Sigmund, *Nature* 362, 669 (1993).