

are more concerned about conscientiousness when they have to choose people to work with. Contexts were ignored in this study, even the context of the study itself. Yet the questions were put to students by teachers, who may unconsciously have impressed on them that the results were to be evaluated in America, and would be used to publish to the world the opinions of (say) Koreans or Nigerians.

Finally, there are great problems with what the authors term culture, which is supposed to account for the different responses of students in different societies. Culture in this study turns out to be measured by the sort of statistics available from an almanac. Take, for example, 'Christianity', which the authors use as one of their measures of culture on the grounds that this is "the only religion for which worldwide statistics were available". But is Christianity in Portugal the same as Christianity in Norway? Similarly, is the experience of urbanization of students in Lagos or Hong Kong to be equated with that of a student in Oslo?

There is a more empirically sound and interesting field of cross-cultural psychology, practised by anthropologists. It is not mentioned by the authors, but if this study represents what cross-cultural psychologists are up to, then the anthropologists should soon have the field to themselves. □

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From worms to prawns

Arthropod Relationships

edited by R. A. Fortey and R. H. Thomas
Kluwer Academic: 1998. 382 pp.
 £126.25, \$223

Diethard Tautz

"And now we come to the creepy crawly stuff that Darwin said we are all related to." This remark can be found in a Scottish castle at the entrance to a room displaying an insect collection. Setting our own rather remote relationships to arthropods aside, it is actually the relationships among arthropods that have fascinated biologists for more than a century — the wealth of the material, the richness of the characters and the beauty of the fossil record.

These factors should be a perfect setting for producing a complete phylogeny of the group. But scarcely any other taxonomic group has seen such dramatic revisions. In the 1960s, Sidnie Manton even challenged the monophyly of the arthropods in general, and used arguments from functional morphology to introduce a new group — the uniramia — which united the onycho-



You looking at me?

This photogenic little arthropod is a cone-headed katydid (*Copiphora* sp.) from the Tambopata River region of Peru. It comes from the collection of plants, insects, animals and indigenous peoples photographed in *Rainforests of the World: Water, Fire, Earth and*

Air, with photographs by Art Wolfe and text by Ghilleen T. Prance (Crown Publishers, \$45, £30). Containing more than 200 colour images, the book bears witness to the splendour and fragility of the rainforests, home to more than 50 per cent of the world's living species.

phorans (velvet worms) with the atelocerates (myriapods and insects). Crustaceans (crabs and prawns) and chelicerates (spiders and scorpions), on the other hand, were considered to have arisen independently.

This was in strong contrast to traditional views placing the chelicerates at the base and the crustaceans as a sister group to the atelocerates. The concept of the uniramia has provoked emotional debates, but the Mantonian affair seems almost over now and most practitioners have reverted to the traditional views.

Ironically, with the advent of molecular techniques, the atelocerates, the only grouping that was always agreed on, is now the one most seriously challenged. Molecular data favour the view that insects are derived from an — as yet unidentified — crustacean subgroup, which is effectively a complete reversal of Manton's ideas. Nevertheless, *Arthropod Relationships*, edited by R. A. Fortey and R. H. Thomas, is dedicated to Manton's memory because her descriptive and morphological work remains outstanding.

The book is the outcome of an inter-

national symposium on arthropod phylogeny held in London in 1996. It covers a wide spectrum of issues: from comparative morphology and palaeontology to molecular comparisons and a range of technical approaches, from 'total evidence' to puristic cladism. Most authors put their contributions in a broader context, and the book contains many well-argued and thoughtful passages.

Although the symposium was meant to work towards a consensus, *Arthropod Relationships* is more a display of the disparity of thought that still exists at all levels. Yet by bringing these opinions together, one can see common ground emerging, or at least identify the problems that have led to the debates.

For example, the chapter by Geoffrey Fryer in defence of the polyphyly of arthropods may be the last written on this issue, since the credible arguments for polyphyly are quickly disappearing. Also, the strong disagreements among comparative morphologists often appear to be due to poor accessibility to the primary data, which should change with increasing use of the Internet. In fact, the editors have already taken a step in this direction and have prepared a website (now available via the Systematics Association at <http://www.earthsci.gla.ac.uk/palaeo/systass/arthro.html>) at which the data for some chapters are available. Finally, the almost unanimous opinion on the "... unreliability of molecular phylogenies ..." that is voiced by most contributors seems already to be a thing of the

past, because statistical problems are being identified and solved.

Although this book is part of a long series of treatises on arthropod phylogeny, it may mark a historical transition. It could be the last volume in which a disparity of opinions abounds and the first step towards a reunification of concepts. For practitioners in the field this will be an important book and should find its way onto their bookshelves, in spite of its daunting price. □

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Remembering Big Blue and his kin

A History Of Modern Computing

by Paul E. Ceruzzi

MIT Press: 1998. 338 pp. \$53.95, £24.95

Rupert Goodwins

The computer as we know it is barely 50 years old, but it already has a rich and varied history. In writing *A History of Modern Computing*, Paul Ceruzzi, curator of the US National Air and Space Museum, is one of the first professional historians to look back past the feeding frenzy of the present decade and describe how we got here.

A better title would have been "A History of Big Old American Computers", and as a

sourcebook of the years between 1945 and 1980 it is a useful collation of who did what, how much it cost and what happened in consequence.

In the beginning, as Ceruzzi states, the computer was a mathematical marvel and not much more. Its use in defence and research dominated the very early days, and continued to be important until the 1970s by stimulating research into semiconductors. Ceruzzi is strongest in his description of how the commercial world first came to computing. It's easy these days to forget how the omnipresence of IBM's Big Blue once had all the significance of ancient Rome's imperial purple, but this book charts the growth and the consequences of IBM's overweening inertia in some detail.

The coverage of the current state of computing is brief and not always accurate — to correct a few errors, it is worth stating that IBM did not integrate the display system into the motherboard of the original PC; Intel's processors were not particularly ill-suited to networking; and to say that the World Wide Web got off to a slow start is to completely miss the nature of the exponential graph that consistently describes so many aspects of modern computing. Also, there is no mention of the Intel 386 architecture (let alone the Pentium), a breathtaking oversight.

Perhaps these criticisms are not entirely fair: this is a history book and, as Ceruzzi himself says, it is still too early to write the history of the past ten years. He covers the complex interaction between software and hardware development — and, of course, Bill Gates's role in changing that balance for good. But those seeking technological insights will find the book best used as a gloss, a guide to where to look next.

For those whose life and work have involved computing before the microprocessor, *A History of Modern Computing* will be a readable and fascinating memento. It brings together much of importance, and much that would otherwise be forgotten. Yet it fails to demonstrate how the history of computing has set the context for our current experience, surely a prime curatorial concern. I am glad the book has been written, but much remains to be said. □

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Them bones

La Sierra de Atapuerca is Europe's most important archaeological site for human prehistory, with almost a million years of life represented in the various remains found there (see above). One of the world's most complete and best-preserved hominid skulls was found in Atapuerca's 'Pit of Bones'. Other hominid fossils from the site date from over 780,000 years ago — pushing back the date of the earliest

Europeans by 300,000 years. In addition, it is claimed that these remains provide the first evidence of human cannibalism. *Atapuerca: Un millón de años de historia* (Editorial Complutense, 3,990 ptas) by José Cervera, Juan Luis Arsuaga, José María Bermúdez de Castro and Eudald Carbonell, describes the site, its history and the methods used to discover its secrets.

More on computing

Introduction to Quantum Computers

by Gennady P. Berman, Gary D. Doolen, Ronnie Mannieri and Vladimir I. Tsifrinovich

World Scientific: 1998. \$32, £23

The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places

by Byron Reeves and Clifford Nass

Cambridge University Press: 1998. 323 pp.

£10.95. Now available in paperback.