modern palaeobiology, or whether, like the dinosaurs, it has had its day.

The list of contributors is impressive — some 200 research scientists from many countries, although mostly from North America. Some of these authors offer classic nuggets: Stefan Bengtson on the evolution of skeletons, Euan Clarkson on fossilized eyes of invertebrates, Philippe Janvier on craniates, Conrad Labandeira on fossil insects, Michael Ruse on various nineteenth-century palaeontologists, Dolf Seilacher on the Ediacaran biota, and Ian Tattersall on primates. Other articles are more workaday, and the editor clearly had difficulty plugging many of the gaps. Among historical figures, for example, we have William Buckland and Richard Owen, but not Gideon Mantell; Marcellin Boule and Eugène Dubois, but not Arthur Keith; Otto Schindewolf and Friedrich von Huene, but not Karl Zittel.

The biggest gap is in the area of systematics and analytical approaches in evolutionary theory. There is one article on systematics, and a series on evolution, variation, selection, extinction, and the like. But where is the fulsome representation of current palaeobiological research on mass extinctions, rates of evolution, diversification, morphometry, fossil-record quality, and cladistic methods? The only articles on 'events' are on the origin of life and terrestrialization. What about the five big mass extinctions, major changes in tectonics in the sea and on land, multiple origins of flight, the Mesozoic marine revolution, the spread of grasslands?

The accounts of specific groups of plants and animals are generally useful. You can look up a brief, up-to-date account of aardvarks, acanthodians, algae or annelids. Admittedly, though, such accounts are also available in current textbooks on invertebrate or vertebrate palaeontology, and on palaeobotany. The accounts of topics in palaeobiological theory and method are useful too, but, again, such information is also available in textbooks and review journals. Derek Briggs' and Peter Crowther's *Palaeobiology: A Synthesis* (Blackwell Scientific, 1990; new edition due 2000) offers much better coverage in the form of mini-essays designed both for professionals and for students. The inclusion of historical personages in Singer's *Encyclopedia of Paleontology* is a mixed blessing: many are excellent, pithy accounts, and provide key references, but many are missing, and some of the people included are perhaps not sufficiently important in the history of the subject to warrant a mention.

But the book is better than many encyclopaedias, and it contains some excellent nuggets. It will be a useful addition to university and museum libraries. ■

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Science in culture

French fusions

The newly renovated Musée des Arts et Métiers in Paris.

Martin Kemp

There is no other collection quite like the Musée des Arts et Métiers in Paris. It looks, at first sight, like a museum of technology, yet it encompasses much more than this English term implies. It relies upon that special French fusion of arts, crafts, manufacturing, technology, engineering and science, laced with *philosophie* and backed by social reform.

Founded in 1794 by the revolutionary priest Abbé Henri Grégoire, the Conservatoire des Arts et Métiers was to serve as a repository for "tools and newly invented and perfected machines" in order to provide a source of didactic inspiration for French craftsmen. In particular, those inventive and visionary individuals "who can see further will make new connections, for all the arts have points of contact". The accumulated collection, housed since 1798 in the abbey of Saint-Martin-des-Champs (itself a wonder of medieval structural technology), had declined to a state of benign neglect when, some ten years ago, the current director, Dominique Ferriot, embarked on a heroic campaign of renovation.

Re-opened to the public this month, the old penumbral labyrinth inhabited by mysterious fossils of bygone technologies has been superseded in Andrea Bruno's bold design by bright airy spaces, enclosed by white walls, complemented by the gleam of exposed pipe-work and the shiny interplay of metal and glass. The wondrous machines, including such visionary marvels as Blaise Pascal's seventeenth-century calculator and Louis Blériot's precarious flying-machines, are literally shown in a new light, and elucidated by touch-screen animations. Grouped in seven domains — the scientific instrument, materials, construction, communication, energy, mechanics and transport — the exhibits range from early astrolabes to pioneer television receivers, and from Georges Buffon's compound mirror to sumptuous art nouveau glass by Emile Gallé.

The ingenious device that I have chosen to embody Grégoire's aspirations is an engraving

machine invented by Nicolas-Jacques Conté, whose name is immortalized in the art world by the types of pencil and crayon that still bear his name. Conté, trained as a painter, entered the technological world via ballooning, working on the large-scale production of hydrogen to fuel balloons from the breakdown of water. As a fertile inventor and committed pedagogue, he was an obvious candidate to be enlisted by the Abbé as one of the three original demonstrators in the Conservatoire.

In the great age of illustrated encyclopaedias and didactic publications aimed at the new bourgeoisie, any mechanical device that could short-cut the laborious business of reproductive engraving would meet a conspicuous need. Conté's beautiful machine, shown here in the version constructed by Gallet in 1803, was originally conceived to facilitate the production of the 900 plates for his 23-volume *La Description de l'Egypte*.

Precision-designed to cut lines regularly into copper engraving plates, his machine could be set up to produce wide varieties of straight and curved incisions, not least the laborious sets of parallel, curved and cross-hatched gouges needed to print areas of modulated tone in a meticulously controllable way. As a draftsman skilled of hand, Conté took pains to ensure that the engraving tool could incise the plate at varied pressures in order to emulate some aspects of the subtle 'touch' that gave such grace to the work of master engravers and etchers.

His engraving machine is a perfect manifestation of the eighteenth-century passion for automated devices, ranging from the restrictedly practical to the unashamedly entertaining (such as the recreational automatons of which the museum holds a supreme collection). Such marvels of artifice finally and decisively confirmed the triumph of the 'moderns' over the 'ancients'. In the Revolutionary era of Grégoire, Conté and his fellow inventors also played their role in constructing a new era in the social and economic machinery of society itself. ■

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