observer of the ways of the British, as shown in a letter he wrote in 1844 to Michael Faraday: "What struck me most in England was the perception that only those works of a practical tendency awake attention and command respect; while the purely scientific, which possess far greater merit, are almost unknown." Liebig could not have expressed better the difference in style and approach between British scientists and those on the continent.

There have been many excellent articles on various aspects of Liebig, especially the research school he created at Giessen. Brock's excellent biography is, however, the first published in English since 1901. It includes the translation of the report to the Prussian government on the chemical laboratory at Giessen by C. W. Bergemann, a professor of pharmacy at the University of Bonn, as well as a valuable list of Liebig's British and American students.

By using the gatekeeper metaphor, Brock has satisfied a pressing need for a work that would systematically present Liebig's multifarious activities. It is worth noting Brock's succinct expression of Liebig's own perception of himself as a gatekeeper: "He was the voice that was in position to draw attention to the inexhaustible supplies of neglected wealth that the commercial and industrialized nations of the world could mine by following the chemical road... and how chemists themselves saw their roles intellectually as possessing civic worth in a modern society." □

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Diamonds in spades

Some three billion years ago, in the Earth's mantle, the hardest natural substance in the world was formed and stored. Kimberlite and lamproite magmas later brought it to the surface. Now researchers use it for creating high-pressure cells to investigate planetary interiors and dense matter, mimic the Earth's core or produce solid hydrogen.

The scientific story of the diamond is one facet of a new exhibition at the American Museum of Natural History in New York, "The Nature of Diamonds," which runs until 26 April 1998. The exhibition is accompanied by a book of the same name written by the museum's curator of gems and minerals, George E. Harlow (Cambridge University Press, $75, £55 (hbk); $29.95, £19.95 (pbk)).

Transliterated from the Greek 'adamao' meaning 'I tame' or 'I subdue', the stone's name has become connected with power and strength, and these associations are explored in cultural and historical facets of the exhibition. These sections lead on to a stunning array of jewels from the Middle Ages to the twentieth century, including the Incomparable (pictured), weighing 407.48 carats — the third-largest cut diamond in the world.

But the exhibition offers plenty for interested scientists to get their teeth into. Interactive displays illustrate the main properties of diamond, such as its hardness, refractive index, conductivity and colour — the blue diamond, for example, gets its colour from minute amounts of boron.

The way diamonds are formed is explained in detail, with displays taking the observer through their history.

The use of diamond in research is also highlighted. As well as the diamond anvil cell, whereby two stones are squeezed together to create pressures of up to 4.5 million atmospheres, diamond is also a universal cutting tool and, because of its apparent iciness — heat-conducting ability — is used in electronics to manage heat.

For both science and spectacle, this exhibition is a real gem.

Alison Mitchell *is an assistant editor of* Nature.

Signs of the times

Comets, Popular Culture, and the Birth of Modern Cosmology
by Sara Schechner Genuth
Princeton University Press: 1997. Pp. 365. $49.50, £32.50

Donald Yeomans

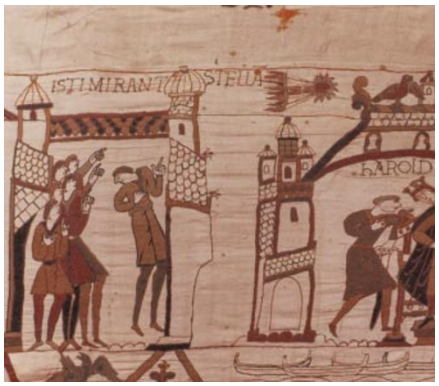
My personal collection of comet memorabilia contains broadsheets, or flyers, issued for the appearances of comets Kohoutek and Halley around Christmas 1973 and in March 1986 respectively, and comet Shoemaker–Levy 9's impact with Jupiter in July 1994. The Kohoutek broadsheet asks "What will the Christmas monster bring?" The Halley flyer screams out "Behold! Halley's comet is coming! The end of mankind is near!" The broadsheet for Shoemaker–Levy warns that the comet's impact with Jupiter is surely an ultimatum from Almighty God: we must ban all crime, indecency and violence, or face global extinction from an Earth-hitting asteroid.

I am struck by the similarities in superstition between these recent broadsheets and those issued two or three centuries ago. The ancient fear of comets as signs or agents of terrestrial disaster has at least partly survived to the present day.

One of Sara Schechner Genuth's main points is that comets have been considered as such signs, or agents, of change throughout most of recorded history. Before the mid-seventeenth century, they were often viewed as atmospheric signs sent to warn sinful humanity that God was not at all pleased with its conduct. Even the demonstration, by Isaac Newton and Edmond Halley in the late seventeenth century, that comets were celestial objects orbiting the Sun did not sweep away the superstitious fear of comets. For Halley had noted that comets travel around the Sun in elongated orbits, so they could, from time to time, collide with Earth.

Thereafter comets were feared not as signs from an angry God but as agents of God's wrath. Their terrestrial effects were no longer seen as localized but rather as global, and Newtonian mechanics could be used to predict which comets might pose a threat. In the late seventeenth century, Newton invoked comets as vehicles for replenishing the planetary fluids consumed by the process of vegetation and putrefaction and for re-supplying the Sun and other stars with fuel so that these celestial fires could continue. For his part, Halley invoked cometary close approaches or collisions to explain the biblical flood, the periodic extinction and renewal of Earth's life forms, and even the origin of the world and its eventual demise.

Cosmologists in the eighteenth century expanded on these views. Comets could create, destroy, reform or restore planetary systems. But in the nineteenth century came



BRIDGEMAN ART GALLERY

Woven warning: detail from the Bayeux tapestry showing Harold I being told of comet Halley. The eleventh- or twelfth-century tapestry in Bayeux, France depicts the Norman conquest of England.

Charles Darwin and, perhaps influenced by his views, which favoured slow evolutionary processes for explaining the development of life, the catastrophism of Newton and Halley was all but ignored until fairly recently.

In the past few decades, comet and asteroid collisions have once again been recognized as important processes in rearranging the surfaces of the planets and their satellites and abruptly changing the evolution of life on Earth. There is a growing consensus in the astronomical community that comet collisions with Earth may have laid down much of the thin layer of carbon-based molecules and water that allowed the formation of life 3,500 million years ago.

Subsequent cometary collisions may have caused mass extinctions, allowing only the most adaptable species to evolve further. We mammals may owe our pre-eminent position on Earth to a series of cometary collisions that eliminated our stronger, but less adaptable, competition — including the dinosaurs.

This book is not a general history of comets. Rather than focusing on the development of ideas about their motions or physical characteristics, the author is concerned primarily with the perception of comets throughout history. It is a scholarly, well-illustrated and accurate work. Nearly half the volume is devoted to footnotes and references, however, which leaves the reader with the annoying task of continually having to leaf back and forth between the two halves.

European and English perceptions of comets during the seventeenth and eighteenth centuries are emphasized. Little mention is made of other cultures — that of China, for example — that actively observed and recorded comets. But within the confines of the subject area presented, the author does a fine job. The book should make an important contribution to the history of astronomy. □

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Getting down to business

The Scientist as Consultant: Building New Career Opportunities
by Carl J. Sindermann and Thomas K. Sawyer
Plenum: 1997. Pp. 341. $29.95, £18.15

William Bains

'Consulting' is famously identified with someone who steals your watch to tell you the time and, in this era of 'downsizing', has become almost synonymous with 'unemployed'. An exception to both calumnies is the technical consultant, especially the scientist. These are people who provide their expertise to many clients for a fee. But this book is not aimed at them, but rather at people who wonder whether consultancy is a career for them. Whether the career is right for you or not, the book is an excellent guide to help you decide.

What is a scientific consultant? The authors wrestle with this, and arrive at "a technically trained entrepreneur who makes available for a stated price his expertise, data, data analysis, evaluation and recommendations relevant to a client's needs", a catch-all they admit is unsatisfactory. They also emphasize the need for professional ethics as a consultant, citing a quaintly pre-1980s definition of a professional as one "who maintains a loyalty to a code of ethics that transcends his or her loyalty to the rest of the organisation" or to themselves, a tenet which, if adhered to by major consultancies, would send several of them bankrupt.

But above all the consultant is a business person, and consulting is a business. Consultants must be interested in the processes of both business and science. This means accepting the value of lawyers and accountants as advisers, sending off bills promptly and harassing clients who refuse to pay them, and 'selling'. Most scientists are unused to selling anything except ideas and, if you are not keen to try, then consultancy is not for you. Most consultancies fail, the authors believe, because of lack of aptitude for and interest in business. Squaring this with the Sisyphean task of keeping technically current requires real entrepreneurship. Scientific consulting is not just 'a job'.

The authors describe a rewarding career path from paid hobbyist to professional manager, which you can join or leave at will. They examine what sort of people might flourish in consultancy and why, how to escape from it, what the future is, and how people change, succeed or fail. They also give substantial detail on what consultants actually do. (The section on managing scientists is excellent — a 'must' for department heads as well as industrial managers.) The book is stuffed with useful comments and guidance, including a very honest (if rather short) section on the downside of consulting. Consultants will enjoy putting names to the list of "clients from hell".

My only serious disagreement is with the authors' perception of big consultancy companies. Graduate entry to a large consultancy is not a viable route to a career in scientific consulting. Scientists are the drudges in such organizations, and do not rise to the top without radically altered goals; the leader of the 'science division' in one such consultancy publicly commented early in his post that research and development were a waste of money. Nor can they leave to set up on their own, as the competition clauses in their employment contracts will prevent them from competing as a consultant with their erstwhile employer. The route to scientific consultancy is clearly science first, consultancy later.

The book has a strong US bias, and 'rest of world' seems to mean not Europe but Africa. That said, non-American readers can easily sidestep the few parochial discussions.

This is a business book, because consultancy is a business. But, like science, the book is full of facts and hard detail, and does include the negative controls of business or scientific failure. It is an excellent guide to a fascinating career choice. □

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Corrections

- Some incorrect star ratings were awarded to *The Colours of Life* by Lionel R. Milgrom in the review in *Nature* **389,** 687; 1997. They should have been "excellent" for range and style, "good" for depth, accuracy and accessibility, and "fair" for up-to-dateness. Our apologies for falsely raising expectations.
- In his review of *Molecular Systematics of Fishes* edited by T. D. Kocher and C. A. Stepien (*Nature* **389,** 30; 1997), John Long says that the book "only covers the largest living group of fishes, the teleostean fishes". The editors have asked us to point out that the book in fact contains a chapter on "Interrelationships of Lamniform sharks" – which are not, of course, teleosts.
- *Tropical Medicine and International Health,* reviewed in this year's New Journals supplement (*Nature* **389,** 145; 1997), resulted from the pooling of four previously existing journals, not three. The title not mentioned is the German *Tropical Medicine and International Health*, whose independent history extends back to 1897. *Antiviral Therapy*, reviewed on page 144 in the same supplement, has since its third issue been published by International Medical Press, not MediTech Media.