

processes, not superficial features. For anyone inclined to the dynamic paradigm of pattern formation, Meinhardt's book, although inadequate as a historical review, is a fine introduction to thinking about dynamics that is, into the bargain, readable and beautiful. It is accompanied by a diskette containing an easily run demonstration program to reproduce all

the computed figures in the book, and full source codes to allow readers to change parameter values and get the feel of dynamic modelling. □

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*Under the Sea* entertainingly plausible.

Ellis's straightforward enquiry successfully relates most 'monster' beliefs to known species. One therefore feels that among a few unexplained reports there may truly lurk an unknown animal. The main sections concern the Loch Ness monster (now at last getting its come-uppance), sea serpents (mainly based on giant squid, oarfish, and large whales and sharks once commoner in populated regions), mermaids (mainly manatees) and a special treatment of sightings of giant squid, including an impressive tabulation of records of this, or these, still poorly known species.

Scientists will feel at ease with the book because it maintains its agnosticism throughout. Some other volumes on the subject, such as Michael Bright's *There Are Giants in the Sea* (1989), although similarly painstaking compilations, are for believers who want to become convinced. To read Bernard Heuvelman's classic *On the Track of Unknown Animals* (1958) one might think that the world were full of undiscovered and spectacular vertebrates; but Ellis's book implies that what actually abounds is human misconception and unjustified belief.

What undiscovered monsters might there yet be? A carnivorous, perhaps deep-sea, shark (*Carcharodon megalodon*), three times the length of the great white shark, is considered to have become extinct shortly before historical times but might conceivably be found alive. After all, runs the irrefutable argument, the huge megamouth shark *Megachasma* was not found until 19 years ago. There are still vast tracts of the world, and especially of the sea, where scientific expertise is sparse. Last year I was able to add several species of jellyfish the size of dinner plates to the faunal list of Australia, some within sight of large towns. Perhaps giant squid with eyes much larger than dinner plates are right now fighting for their lives with enormous sperm whales 3,000 feet below the ocean surface in terrifying struggles that mankind has still to witness — great battle-scars are occasionally seen on sperm whales, which habitually eat squid. Ellis considers the most likely monster we will yet discover is a giant deep-sea octopus with an arm-spread of 200 feet; but, right to the end, he cautiously avoids persuasive speculation.

The sea is indeed a big place and some awesome animals live in it. Ellis's book weeds out the myths, leaving an account of genuine monsters that, because they really exist, are more impressive than their fictional counterparts. Like all good science, it is undeniably fun. □

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## The sea is a very big place

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**Monsters of the Sea: The History, Natural History, and Mythology of the Oceans' Most Fantastic Creatures.** By Richard Ellis. Knopf/Hale: 1994/1995. Pp. 429. \$30, £22.

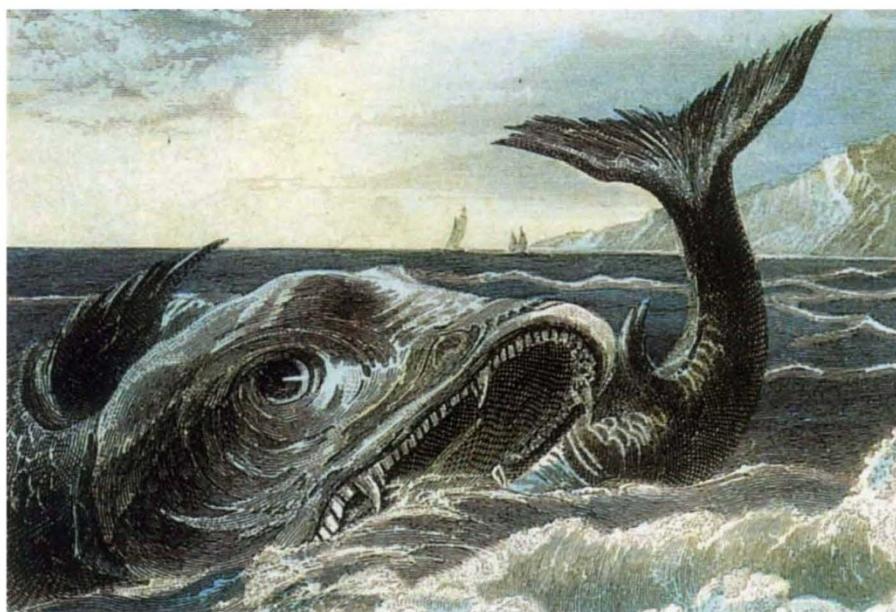
SCIENCE should be fun, or scientists would be fools to do it. But its integrity is never tested more rigorously than in studies in which all the data come from non-scientists. Although scientific method does not allow belief, much reasoning on the scientific shop-floor follows hunch and intuition. 'Healthy' disbelief must often be pragmatically replaced by agnosticism, or progress becomes hampered. Investigation of monster stories requires just this kind of approach.

Richard Ellis brings cold scientific light to bear on numerous monster reports. Thus it is disappointing to learn that, as revealed last year, the main basis of the Scottish 'Loch Ness monster' stories was a hoax started by newspaper reporters. But all is not lost for monster fans. I once heard a non-zoologist ask the late Sir Frederick Russell, one of the sea's shrewdest students, why an enormous jellyfish from the deep Atlantic that he

had described (in *Nature* 184, 1527; 1959) had not been recognized earlier. He replied simply: "The sea is a very big place". Thankfully it still is, and a few of its huge life-forms may be still undiscovered.

Ellis's detailed and interesting account is an impressive compilation. It will satisfy readers from a wide spectrum, from lay people to researchers. Although it is not essential reading, every marine biological library and larger public library should have it. It will be useful also to those interested in the phenomenon of mass human self-deception, including psychologists and media moguls. Some in the last two categories, and sadly a few zoologists, have lined their pockets fuelling belief in monster myths, and they may not welcome this honest book.

Ellis criticizes himself for harshly analysing at length Jules Verne's fictional monsters, even though Verne had artistic licence on his side. Jacqueline Goy of the Muséum National d'Histoire Naturelle in Paris tells me that in fact a nineteenth-century French zoologist, H. Milne Edwards, was largely responsible for some of Verne's fantastic monster creations, making, for example, the giant squid in *Twenty Thousand Leagues*



From *Monsters of the Sea*

Making waves — detail from *Jonah and the Whale* by W. French, after J. Vernet.