BOOKS: HISTORY OF SCIENCE

# Consequences of the Unresolvable

John Gribbin

**From Certainty to Uncertainty**
**The Story of Science and Ideas in the Twentieth Century**
*by F. David Peat*
Joseph Henry (National Academy Press), Washington, DC, 2002. 248 pp. $24.95. ISBN 0-309-07641-2.

Writing "the story of science and ideas in the twentieth century" would be a challenge indeed, but David Peat's focus in *From Certainty to Uncertainty* is much more aptly indicated by the book's title than its subtitle. Peat, a theoretical physicist and the founder of the Pari Center for New Learning in Italy, is interested in the way the "clockwork" certainty of a universe governed by Newton's laws and Maxwell's equations has been superseded by a world view in which key elements are quantum uncertainty and chaos, albeit deterministic chaos. Although his approach is, loosely speaking, historical, the history highlighted is selectively chosen to provide a framework for his speculations about the way in which our scientific views color, and are colored by, things like language and the way human societies interact. When combined with the brevity of some of the discussion of key scientific topics (the general theory of relativity is dealt with in a single paragraph), this means that the book is of dubious value to anyone who does not have a reasonably clear understanding of the key developments in 20th-century science. But for those who already know something about who did what and when, setting these familiar developments in a more—for want of a better word—philosophical framework is both thought-provoking and worthwhile, whether or not one ultimately agrees with the author's thesis.

The book's strengths lie in the areas where Peat is enthusiastic and working hard to make his case. For example, he explains with gratifying clarity the way in which uncertainty is built into the fabric of quantum reality and is not merely an artifact of our clumsiness at measurement, and he gives a clear presentation of the ideas of David Bohm (as we might expect from the author of a biography of Bohm). But the book is weaker when Peat seems to merely go through the motions of presenting material that he is not very interested in, notably in the area of relativity theory. It is, for example, extremely sloppy to say that "special relativity was conceived by a single mind," when so many of Einstein's contemporaries contributed so much to its development and some even came close to preempting Einstein. If ever a scientific idea was crying out to be discovered at a certain time, that idea was the special theory of relativity.

Recurring weaknesses throughout the book are the lack of detail and the nearly universal absence of diagrams to illustrate the points made by Peat. String theory, for example, is discussed in just two short paragraphs and gets no illustrations. But this is not a fat book, and Peat can explain difficult subjects clearly—as he does with his chapter on chaos theory. Even here, though, he misses a trick. The counterpart to chaos (which implies an unpredictable, disorderly world) is complexity, the way in which order arises naturally in the universe. The study of complexity is likely to be as profound a development in 21st-century science as the ideas Peat describes were to science in the recently completed century. Without any proper discussion of these ideas on complexity, the book already has a dated look.

Adding 50% to the length of the volume would have provided enough room for the author to put the material he is so eager to get across on a solid foundation, thus giving it a more credible context. That material would certainly justify such care in presentation. Among the issues Peat addresses are serious concerns about the way scientific research is carried out and how it is funded, the treatment of mavericks who do not subscribe to the present received wisdom in a particular area of scientific research, how the public (and politicians) perceive and respond to risk, and how the world is likely to develop over the next 100 years. His message is summed up clearly:

> we have been guilty of oversimplifying the world in so many fields of knowledge. We have been looking at nature and ourselves through the convenient lenses of theories that present the cosmos to us in limited ways....[Now] we recognize that nature is complex in its details, unpredictable, and often uncontrollable. What is true for the natural world applies equally to human beings and their societies.

Such an important message indeed merits a more careful presentation in a more thoroughly grounded context, to guard against it being dismissed as the cod-philosophical musing of an old hippie. But by providing a jumping off point for debate, Peat has certainly got at least part of his message across.

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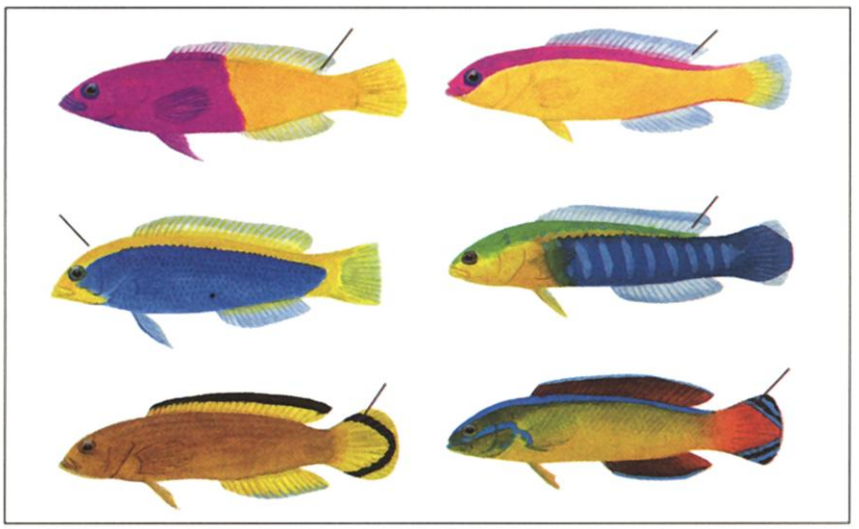
BROWSINGS



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**Coral Reef Fishes.** Indo-Pacific and Caribbean. Revised Edition. *Ewald Lieske and Robert Myers.* Princeton University Press, Princeton, NJ, 2002. 400 pp. Paper, $24.95. ISBN 0-691-08995-7.

Coral reefs, renowned for their biodiversity, support more than 4000 species of fish. This field guide for nonspecialist divers and naturalists covers over 2100 species that are likely to be observed around reefs at depths down to 60 m. (The excluded species are small, under 3 cm, and live within the sand or coral.) The often striking fish—such as these Indo-Pacific *Pseudochromis* species (above)—are depicted in color plates, which are accompanied by brief summaries of habitats, social interactions, and geographic ranges.