The cauliflorous nangka, or jackfruit, *Artocarpus heterophyllus* (Moraceae), growing in a farmyard in Jambi, Sumatra. "Cauliflory, or the bearing of flowers and fruits on the trunk of a tree rather than at the ends of branches, is a rain forest phenomenon [the advantage of which] seems to be that the plant can produce larger, heavier fruits on such stout supports and that the larger, heavier animals can more easily reach them." The genus *Artocarpus* comprises "47 species . . . indigenous to Asia, though some species have been found to be so useful to mankind that they are now found pantropically." As the fruit of *A. heterophyllus* approaches maturity "the human owners of the tree protect [it] by wrapping it in jute or plastic bags to ward off the attentions of [the giant bat] *Pteropus vampyrus*." [From *The Tropical Rain Forest*]

that a drawing illustrates rain forest better than can any photograph (the book, however, is full of good photographs).

Jacobs believes that logging virgin rain forest is a horrendously wasteful way to use it. Rain forest timber is a nonrenewable resource (at least given current knowledge and the present incapacity of tropical countries to enforce sound practice). Jacobs shows how the complex interdependences of rain forest utterly defeat the common sense of forestry practice. Removing "uneconomic" trees eliminates the alternate food sources needed by dispersers; removing lianas removes crawlways on which small seed-dispersing mammals move from tree to tree; removing rotten trees destroys homes for seed-dispersing hornbills. Moreover, customary logging practice profits businessmen and central governments at the expense of the future welfare of the poor, who are left with a tenacious, barren grassland. Even if the grasslands were useful farms, extinction of rain forest organisms destroys an irreplaceable storehouse of plants and animals, some of which might in future be essential for human welfare. Far better to keep the rainforest as a storehouse of "minor forest products."

Here Jacobs faces a dilemma that pierces many lovers of rain forest, a dilemma that is a primary source of tension in his book. Rain forest is overwhelmingly magnificent. It seems frivolous to defend it simply as pleasing to (some) humans. As Jacobs shows, harvesting the world's rain forests would be a reckless act whose consequences we cannot forecast with precision but which may entail not only economic inconvenience on a grand scale but also enormous human suffering. Nevertheless, it seems dishonest to defend rain forest in terms of economic advantage, as if we would consent to its destruction were the destruction shown to benefit mankind. Conserving rain forests is an ethical issue. Jacobs implies it is *wrong* to destroy the rain forests, which he sees as, like mankind, one of the "summits of creation." Who are we to destroy it for our profit? Yet scientific publications are poor vehicles for appeals to God. In this dilemma, Jacobs casts about for "objective" arguments to defend his beloved rain forest, some of which are remarkably unattractive. Ethics without God is so very dicey a business. How much simpler to say that human beings were created (never mind by what means) lords of creation and that if we rule creation as shepherds, not as plunderers, the other good things we seek shall be given us. Sadly, the memory of countless persecutions, inquisitions, imperialism, and holocausts and the prevailing mechanistic worldview make such arguments seem folly. To resolve this dilemma, must biologists with no belief in supernature teach "creationists" a proper admiration for nature, to receive in return a true foundation for conservation ethics? Such a rapprochement seems more likely in India, where religious traditions are more respectful of nature.

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Some Other Books of Interest

Cantor's Dilemma. CARL DJERASSI. Doubleday, New York, 1989. viii, 230 pp. $18.95.

This is a novel about science in the spirit of the times—its action centers on a question of misconduct in the Nobel leagues. The cancer biologist I. C. Cantor intuits (in a hotel bathroom) a general theory of carcinogenesis. The theory is recognized as brilliant at the highest echelon in his field but is (as the author didactically explains) dependent on experimental confirmation. That assignment falls to Cantor's much-vaunted post-doc Jerry Stafford, who gets the results. But they aren't replicated elsewhere, and Stafford's notebook is sketchy and his hours have been odd. Reputable ways around this are found—Cantor devises and himself conducts in his private lab another experimental test of the theory—and the prize is won by the one-time collaborators. There follow a confrontation in which Stafford attempts to square things and an idyllic trip to Stockholm with a little tension of its own—what will Stafford say in his lecture? In the event Stafford quotes T. S. Eliot's observation that "The Nobel is a ticket to one's funeral. No one has ever done anything after he got it" and announces his intention to redirect his career by applying to medical school.

The Cantor-Stafford story is played against the story of Jerry's lover, Celestine (Celly), and her more personal and egalitarian relationship with her P.I., Jean Ardley. Their field, pheromones, is also seen by its protagonists as fast-moving and with high stakes (perhaps in reflection of the author's sympathies as a biological chemist), but the maneuverings are more straightforward, though Celly's career has included a sexual initiation not paralleled in Jerry's. An incredulous deconstructionist graduate student in literature serves as a foil for the explication of such issues of modern science as the relative merits of alphabetical order of authorship and putting one's name last on one's students' papers. (Though she changed her name from Yardley in anticipation of the former, Jean explains, she has found a different role model and now does the latter.)

Another subplot of the book concerns Cantor's rather covert extrascientific life, which includes independent wealth due to a settlement from an admiring ex-father-in-law, connoisseurship of erotic art and antique furniture, and chamber-music playing as well as a discreetly presented romance with (as it happens) Celly's aunt. The story ends well for all the lovers, rather in the manner of *A Midsummer Night's Dream*, but professionally Cantor is left with a Machiavellian dénouement more reminiscent of *La Ronde*.

The book is peppered with the names of real scientists and anecdotes from the history of science and includes an afterword in which the author, whom readers of *Science* are most likely to know for his work on oral contraceptives, explains his intentions.

—K.L.

Reprints of Books Previously Reviewed

Leviathan and the Air-Pump. Hobbes, Boyle, and the Experimental Life. Steven Shapin and Simon Schaffer. Princeton University Press, Princeton, NJ, 1989. Paper, $16.95. *Reviewed* **232**, 1040 (1986).

Three Hundred Years of Gravitation. S. W. Hawking and W. Israel, Eds. Cambridge University Press, New York, 1989. Paper, $34.50. *Reviewed* **240**, 1069 (1988).

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Acid Toxicity and Aquatic Animals. R. Morris *et al.*, Eds. Cambridge University Press, New York, 1989. xii, 282 pp., illus. $59.50. Society for Experimental Biology Seminar Series, vol. 34. Based on a symposium, Nottingham, UK, March 1986.

Aggression and War. Their Biological and Social Bases. Jo Groebel and Robert A. Hinde, Eds. Cambridge University Press, New York, 1989. xvi, 237 pp. $49.50; paper, $14.95.

Before It's Too Late. The Child Guidance Movement in the United States, 1922–1945. Margo Horn. Temple University Press, Philadelphia, 1989. xii, 224 pp. $34.95. American Civilization.

Behaviorism, Neobehaviorism, and Cognitivism in Learning Theory. Historical and Contemporary Perspectives. Abram Amsel. Erlbaum, Hillsdale, NJ, 1989. xiv, 105 pp. $19.95. MacEachran Memorial Lecture Series.

Biology of Seagrasses. A Treatise on the Biology of Region. A. W. D., Larkum, A. J. McComb, and S. A. Shepherd, Eds. Elsevier, New York, 1989. xxiv, 841 pp., illus. $152.75. Aquatic Plant Studies, vol. 2.

Biotechnology in Growth Regulation. R. B. Heap, C. G. 1989. x, 286 p., illus. $39.95. From a symposium, Cambridge, UK, Sept. 1988.

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Dynamical Chaos. M. V. Berry, I. C. Percival, and N. O. Weiss, Eds. Princeton University Press, Princeton, NJ, 1989. vi, 199 pp., illus. Paper, $19.50. Reprint, 1987 ed.

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The Ecology of Intercropping. John Vandermeer. Cambridge University Press, New York, 1989, xii, 237 pp., illus. $59.50.

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Endocrine, Metabolic and Immunologic Functions of Keratinocytes. Leonard M. Milstone and Richard L. Edelson, Eds. New York Academy of Science, New York, 1988. x, 366 pp., illus. Paper, $92. Annals of the New York Academy of Sciences, vol. 548. From a conference, New York, Feb. 1988.

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Human Mast Cells. Ann M. Dvorak. Springer-Verlag, New York, 1989. viii, 107 pp., illus. Paper, $83.30. Advances in Anatomy, Embryology, and Cell Biology, vol. 114.

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