

BOOK REVIEWS

Post-Eruption Ecology

Krakatau. The Destruction and Reassembly of an Island Ecosystem. IAN THORNTON. Harvard University Press, Cambridge, MA, 1996. xiv, 346 pp., illus. \$39.95 or £25.50.

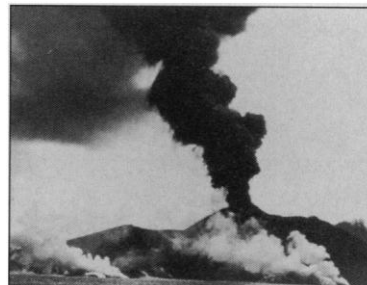
In the recent book *Song of the Dodo*, David Quammen relates the tale of the young Robert MacArthur and Edward Wilson, who in the '60s were putting the finishing touches on their new, and now famous, equilibrium theory of island biogeography. If the number of species on any particular island is indeed kept at an approximate equilibrium number through the countervailing forces of colonization by new species and extinction of existing residents, it should be possible to find some islands that document these dynamics. In particular, and most crucial to the theory, on a newly created island, colonization rates should far exceed extinctions initially, but the imbalance should gradually diminish, until a species number is reached where the two rates are approximately equal. At this point, MacArthur and Wilson rediscovered the rich and remarkable example of the Indonesian volcanic island Krakatau and quickly set about analyzing the historical records to determine whether the plants and birds fit the expected pattern.

As Ian Thornton documents in this uncommonly well-written book, this was not the first time that Krakatau was at the center of development in the growing field of biogeography and ecology. This scholarly and lucid book summarizes nearly all that is known concerning the history, geology,

and natural history of Krakatau, both before and after the cataclysmic eruption of August 1883. For biogeographers interested in colonization and the ecological succession of natural communities, this eruption offered multiple new islands, initially devoid of all life, that were about 44 kilometers from the nearest colonization source.

This "experiment" unfortunately was not ideal, since the pre-eruption flora and fauna were poorly known and described. In some cases, all we know of forest trees is from landscape paintings. Thornton explains that we should view Krakatau as actually an experiment within an experiment, because of the secondary emergence of the new island of Anak Krakatau (literally daughter of Krakatau) beginning in 1927 and culminating after several short-lived emergences in Anak Krakatau IV in 1930. This last experimental island, in turn, could be colonized at a much closer distance and from a source community that now was much better known.

Thornton, who has focused his professional attention on Krakatau for the last 20 years, is both entertaining and informative in synthesizing these events and explaining their biological significance in the context of ongoing conceptual debates in ecology and biogeography. For example, he points



"Lava entering the sea on Anak Krakatau's north coast in December 1992." Rakata, a remnant of Ancient Krakatau, is at the right, in the background. [From *Krakatau*]

out that for no taxa is the evidence strong that an equilibrium has been reached, even though species accumulation curves seem to be decelerating. Moreover, where animal extinctions are observed, they can be ascribed in most cases to directional successional changes in the island's vegetation (from grasslands to forest) rather than the

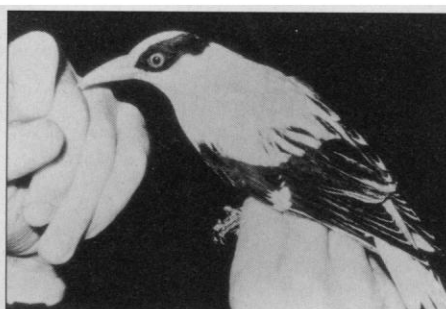
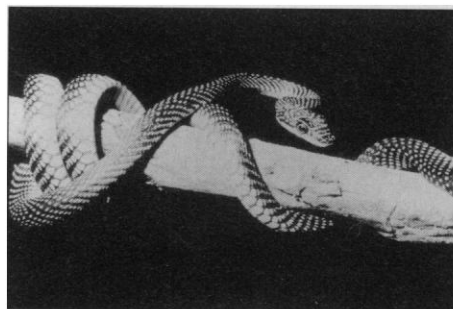
stochastic turnover of particularly small populations. Also, and germane to the notion of alternative stable points in ecological communities, the separate islands of Krakatau seem to have diverged from one another in the composition of the common flora. I would have liked appendixes listing the distribution and status of each species on each island today, so that researchers attracted to this fascinating system down the

road would have a convenient reference compendium.

Finally, there is an important and unique conservation message here. None of the species on Krakatau is unique to the island; the flora and fauna are simply a subset of those in surrounding Indonesia, yet despite a lack of uniqueness "certain parts of the earth should be conserved with minimal human interference because they are essential for the elucidation of important ecological processes." If this can be accomplished for Krakatau, we may learn as much in the next century as we have in the first since its eruption.

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Left, "The paradise tree snake, evidently a fairly late colonist, now occurs on all four islands" in the Krakatau archipelago. Right, "The black-naped oriole, an insectivore-frugivore of high treetops, probably colonized [Krakatau] soon after trees were established." [From *Krakatau*]

Nucleosynthesis and After

Supernovae and Nucleosynthesis. An Investigation of the History of Matter, from the Big Bang to the Present. DAVID ARNETT. Princeton University Press, Princeton, NJ, 1996. xx, 599 pp., illus. \$85 or £66.50; paper, \$39.50 or £27.50. Princeton Series in Astrophysics.

The nuclear astrophysics community has long awaited this comprehensive treatise on the formation and evolution of the elements in stars, supernovae, and the big bang by an author renowned for his pioneering