## Chapter 35

### Evolutionary Aside 35.2--Island Dwarfism: miniature elephants and tiny hippos

The discovery of the diminutive *Homo floresiensis* has rekindled interest in a long-established phenomenon, the tendency for mammal species on islands to evolve differences in body size. These differences are predictable: large species (those approximately the size of a rabbit or above) tend to get smaller (island dwarfism), whereas smaller species tend to get larger (island gigantism).

The dwarves are more dramatic. For example, elephant species around the world—on islands off the coast of California and in the Mediterannean—evolved to a smaller size, some so small that adults were only 1 m tall at the shoulder, about the size of a Saint Bernard. Many of these species occurred in the recent past. Indeed, the oxymoronic dwarf woolly mammoth occurred on Wrangel Island near Siberia as recently 4000 years ago, while the Egyptians were building pyramids. Many other types of dwarf mammals are known, including dwarf hippos and deer. Island gigantism is less impressive, but many species of small mammals, such as a variety of rodents (e.g., the giant rat of Flores) and shrews, became larger on islands.

Changes in body size of island forms are not restricted to mammals; many species of reptiles, birds, and insects also change greatly in size. However, in contrast to mammals, the pattern of change is less consistent.

Why changes in body size occur is still not well-understood. Two leading theories concern the availability of resources and predators. One theory argues that resource distributions differ on islands and that these differences affect the optimal body size favored by natural selection. For example, not enough food may be available to support large individuals, thus favoring the evolution of smaller size. The predation theory hinges on the general reduction or absence of predator species on islands, especially those that arose by volcanic action out of the sea (as opposed to those islands which formerly were connected to a continent and thus were populated by the same species—including predators—found on that continent). This theory argues that the body size of species on continents is partly a response to predation threat—small species evolve to be smaller to be able to hide and duck into small refuges, whereas large species evolve to be larger to make themselves more resistant to attack by predators. Thus, the theory goes, in the absence of predators, these selection pressures are relaxed, resulting in small species evolving to be larger, and vice versa.

Of course, these theories are not mutually exclusive, and some combination may be correct. In addition, other theories are being debated, and this has become an active area of research.

**References:**


1. Lomolino, M.V. 2005. Body size evolution in insular vertebrates: Generality of the island rule. *Journal of Biogeography* 32: 1683–1699.
2. Meiri, S., T. Dayan, and D. Simberloff. 2005. Body The generality of the island rule reexamined. *Journal of Biogeography* 33: 1571–1577.