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Man and members of the genus Rattus have lived in close association for many centuries. The similarity of food habits and the great adaptability of these commensal rodents have made the relationship a rather durable one. Even as rats exploded into Europe during the Middle Ages, they also spread eastward across the Pacific.

Micronesians and Polynesians in their many criss-crossings of the tropical Pacific by outrigger canoes transported the Polynesian rat (Rattus exulans) to most of the inhabited areas. Some think that this rat was important in early mythology and that its rate of spread was thus enhanced. The larger roof rat (R. rattus) was less widely distributed prior to World War II. Its introductions were related to early explorations from the West and perhaps some commercial vessels from Japan and the Philippines. During the last war vast quantities of western shipping invaded the Pacific, and roof rats were introduced to many island groups for the first time. Where resources are limited, the roof rat may push the smaller Polynesian rat to extinction. The better known Norway rat (R. norvegicus) does poorly in most tropical areas and generally is found only in small colonies restricted to warehouse, dock, or residential areas; its introduction probably parallels that of the roof rat. In areas close to the Asian mainland--such as Melanesia and the Philippines—many other species of rats also are found.

Rats cause severe economic losses in many areas; generally the roof rat is most involved. In addition to the well known zoonoses usually associated with the rats (Beck, 1959), a new parasitic disease recently has been detailed across the Pacific. Bosinophilic meningitis is caused by a round worm, normally found in the pulmonary arteries of a rat, accidentally getting into the central nervous system of man; severe cases may end in death. Man probably acquires the nematode by eating raw or poorly cooked crustaceans or molluscs (Wallace and Rosen, 1965).

In addition to their being involved in the transmission of debilitating or even fatal diseases, rats cause an immense amount of crop damage. Especially on islands where some agricultural practices are used (producing relatively large areas of uniform habitat), significant harvests are not possible without some means of rat control.

The roof rat lives in or frequently invades the crowns of coconut trees, gnawing holes into young nuts for the coconut milk and in some cases the meat. Cacao production, considered by some administrators to be an important means of economic revitalization for the islands, is impossible without rat control. Rice production is similarly affected. Sugar cane, especially certain varieties, may suffer heavy damage. Even when employing rat control measures, plantation managers in Hawaii figure that up to one ton out of ten of sugar may go to the rats directly or is lost because of cane damage, and without control the loss can run to 40% of the crop. Truck crops, such as melons or beans, cannot be grown without rat control, for just as the crops mature the rats move in to make their harvest. Tree fruits likewise may be involved.

While some of the Pacific people have tried to catch rats with ingenious traps and snares, for the most part presence of rodents in and about habitations has been accepted as a way of life. In recent years the banding of coconut trees with metal bands has effectively kept rats out of the trees; harvests have increased 40%. In some cases clearing the undergrowth or providing a barrier strip around a crop has been helpful, but vegetation regrows so quickly that this kind of environmental control usually breaks down.

Poisons have been sparingly used, in part because of their cost. Anticoagulants have reached to every island group and often have been an effective tool. Except for such areas as the Philippines and Hawaii, more toxic rodenticides like 1080, thallium, and strychnine have not been widely used. An acute, specific, rodenticide is needed here—as elsewhere. Chemosterilants currently are being investigated as a possible tool in Hawaii.

Rat populations in our urban complexes are often characterized by rapid growth, high reproductive rates, and high mortality that are related to the changing environmental conditions. Populations I have studied in Micronesia are quite the opposite (Storer, et al., 1962). Reproductive and mortality rates are lower, and longevity is higher. The relatively uniform, largely unchanging environment probably plays a major influencing role, for when a typhoon disrupts the quiet balance, reproductive rates soar.

Rats on these islands are largely vegetarians, feeding on a variety of leaves, fruits, and seeds for more than 90% of the diet. Invertebrates are eaten as available. At Eniwetok we found some roof rats that fed on ghost crabs on the beach, but this seemed to be an exceptional source of food.

On most Pacific islands, the rats have few or no effective predators. Dogs and cats, even when feral, are ineffective in limiting populations; owls are present on only a few islands. The mongoose usually turns from the rat to more easily captured prey; the monitor lizard likewise finds chickens easier targets. Population limitation probably occurs largely from internal endocrine mechanisms which reinforce the environmental stability.

At Eniwetok Atoll in the Marshall Islands, rats have been involved in an intriguing story. Polynesian rats were probably the only rodents present until after World War 11 when roof rats were brought in along with supplies and equipment for the atomic test program in the late 40's or early 50's.

Some islets of the atoll, originally covered with coconut plantations, were denuded by heat, shock, and tidal waves following the detonation of devices. Initially radiation levels were high, but radioactive decay and dilution reduced the radiation hazard, and today the background radiation is well within the safe range.

Many of the studies of rodents at Eniwetok have been centered on an island 2 3/4 miles from the site of several of the larger explosions. Probably the Polynesian rat population was exterminated by the blast which denuded this island. Sometime during the early days of the test program, the roof rat was accidentally introduced with supplies or equipment and quickly populated the island. Some survived the tests, probably by being in protected cable tunnels or under concrete structures, being able to scavenge enough food, and existing through the initial period of heavy radiation.

Today, more than a decade after the tests, the islands have recovered remarkably; dense vegetation grows to 20 feet in places. No genetic damage is apparent in either the plant or animal populations. The rats are healthy, normal appearing animals. Any mutations which may have resulted from radiation exposure have either been lost from the population or are not readily apparent when examining the animal grossly. All over the atoll the scars left from the testing program are being covered with remarkable speed. The resiliency of the biologic community surprised some observers.

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