

INSECT POTPOURRI:

Adventures in Entomology

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Insects — An Overlooked Food Resource

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As the first 100 years of entomology drew to a close, there is new interest in one dimension of the science that has remained virtually unexplored. Americans and Europeans are learning that throughout human history, insects have played an important direct role in human nutrition. In many cultures, especially in tropical regions, they have served as an important source of animal proteins and fats and of a variety of needed vitamins and minerals.

The traditional and regular dietary use of insects has become less widespread as urbanization and "westernization" have spread. The traditional insects are still important, however, in rural areas where many of the people can but rarely afford to put chicken, goat, fish, or beef on the table. In rural Mexico, for example, Dr. Julieta Ramos-Elorduy of the National Autonomous University in Mexico City finds that insects of more than 100 species are still a regular part of the diet in various parts of the country. As in other countries where insects are used, the most common methods of preparation are roasting or frying; and they may be eaten as a separate dish or mixed with other foods.

These traditional insect foods in Mexico are for sale in the village marketplaces right alongside the same kinds of food products that Westerners are accustomed to buying and eating at home. While the important nutritional contribution of insects is among the low-income population, it should not go unnoticed that some insects are special favorites throughout the country and are eaten by Mexicans of all income levels. They are found on the menus of some of the best restaurants in Mexico City and the other urban centers. One called "gusano blanco de maguey" is the larva of the giant skipper butterfly (*Aegiale hesperiaris*) that develops in the agave, or maguey, plant. Another, "escamol," the immature stages of the ant, *Liomotopum apiculatum*, is often sold in tacos. They are served fried with black butter or fried with onions and garlic. A third known as "ahuahutle" or Mexican caviar consists of the eggs of several species of aquatic bugs. The availability of Mexican caviar is now reduced, however, because of contamination of the saline lakes in which the bugs (species of several genera) formerly bred in tremendous numbers.

Mexico is not atypical of many other countries in Africa, Asia, and Latin America where the use of insects as food has been traditional. Insects of 20 or more species are used in many countries and literally hundreds of species on a worldwide basis. The insects are of nutritional importance in the countryside, and some continue to be regarded as "delicacies" in modern urban centers despite Western influence thus providing an additional source of income for rural inhabitants.

In Africa, caterpillars of the giant silk moths (Family Saturniidae) and winged sexuals of the large fungus-gardening termites of the genus *Macrotermes* are particularly popular and their use is widespread. In Zimbabwe (and probably elsewhere), Europeans eat the termites although not in the quantities that are eaten by the local people. In the countries of southern Africa, the "mopanie worm" (caterpillar of the giant silk moth, *Gonimbrasia belina*) is an article of international commerce. The South Africa Bureau of Standards estimated that in 1981, 1600 metric tons were marketed through agricultural cooperatives. This is probably only a fraction of the volume harvested by rural inhabitants. There is a mopanie cannery in the Transvaal, South Africa. In addition, mopanie are eaten by the tons in Zimbabwe and Botswana and exported by the tons from Botswana to Zambia.

Insects are also still widely eaten in Asia, especially in Southeast Asia; and, again, some of the favorites are sold in the markets of the largest cities. One, found in the markets of Bangkok and other urban centers in Thailand, is the giant water bug (*Lethocerus indicus*). W.S. Bristowe wrote in 1932: "It is a great delicacy which is shared by Laos and Siamese alike; it reaches the tables of princes in Bangkok." In the market, the bugs are sold live or steamed; the latter sometimes beautifully arranged in rows. They are prepared for consumption in several ways, one being to fry them in oil; but more commonly they are used as one of the seasonings in a sauce which is served with fried fish. This insect is now exported to the United States where it can be bought in Thai food shops in California. Purchased as whole bugs (known as "mangda"), as bug paste ("nam prik mangda"), or as an alcohol extract ("Mangdana essence"), they are used in the preparation of condiments.

Another insect that is a popular food item in southeastern Asia and could probably find a market in Asian communities in the U.S.A. is the large brown cricket, *Brachytrupes portentosus*. After the wings and legs are removed, the crickets are mixed with ground garlic and salt and then deep-fried until crisp. It is particularly popular in Burma. A former Burmese national now living near Chicago told the author that these crickets are the thing she misses most since coming to the United States. Silkworm pupae (*Bombyx mori*) are another

insect item that is widely consumed in Asia and now exported to the United States. In Madison, Wisconsin, they are especially popular in the Korean community.

Fewer insect food items are found in the urban centers of South America. Roasted abdomens of leafcutter ants (*Atta cephalotes* and *A. sexdens*) are sold in Bogota and other Colombian cities, however, and used similarly to popcorn. *Atta* and a wide variety of other insects are used in the South American countryside, and some of them were formerly used in the Caribbean islands. The grubs of two species of beetles, *Rhynchophorus palmarum* (the palm weevil) and *Stenodontes damicornis* are particularly notable for their delicious flavor. Of the former, Sir Robert Schomburgk wrote in 1848 in his *History of Barbados*: "The larva roasted is considered by some of the creoles a great delicacy; it resembles in taste the marrow of beef-bones." Of the latter, Harvard University entomologist, J. C. Bequaert, noted (in 1921) that in earlier times some planters in the West Indies kept blacks whose sole duty it was to go into the woods in search of the larvae. And F. S. Bodenheffer, in his classic, *Insects as Human Food*, stated (1951) that the larva of *S. damicornis* was considered by epicures as "one of the greatest delicacies of the New World." It can be mentioned that the grubs of various species of *Rhynchophorus* are appreciated by indigenous populations in Africa, Asia, and Polynesia, as well as in the Western Hemisphere.

Any general discussion of insects as food would be incomplete without mention of grasshoppers. Grasshoppers and locusts are among the insects used in every country for which entomophagy (eating insects) has been recorded. The plagues that have periodically devastated Africa were greeted with joy by those who had no crops to protect. George W. Stowe wrote in 1905 in his book, *The Native Races of South Africa*, "The arrival of [a swarm of locusts] was hailed by the Bushmen as a glorious time of harvest, as they were esteemed excellent and nourishing food ... The nutritious properties of this food were proved by the fact that during the locust season, the Bushmen increased in flesh, and became rotund and well-conditioned."

Grasshoppers were also the insect food most widely used by native cultures in western North America. They were harvested in abundance and, sun-dried, provided winter provisions. One of the early giants of American entomology, C. V. Riley, was dedicated to the proposition of using the Rocky Mountain locust *Melanoplus spretus*, now considered a migratory form of *Melanoplus sanguinipes*, as food and animal feed during the devastating outbreaks of this species. Riley wrote:

"It had long been a desire with me to test the value of this species (*spretus*) as food, and I did not lose the opportunity to gratify that

desire which the recent locust invasions into some of the Mississippi Valley States afforded. I knew well enough that the attempt would provoke to ridicule and mirth, or even disgust, the vast majority of our people, unaccustomed to anything of the sort, and associating with the word insect or 'bug' everything horrid and repulsive. Yet, I was governed by weightier reasons than mere curiosity; for many a family in Kansas and Nebraska was, in 1874, brought to the brink of the grave by sheer lack of food, while the Saint Louis papers reported cases of actual death from starvation in some sections of Missouri, where the insects abounded and ate up every green thing, in the spring of 1875."

Riley was not the first, nor the last, scientist to suggest and in fact urge, that Western cultural biases should be set aside to allow full investigation of the potential of insects as a food resource. In his own time, such other pioneer American entomologists as L. O. Howard and A. S. Packard of the U.S. Department of Agriculture were supportive of his efforts. In more recent times, almost every scientist who has studied the use of insects as food by cultures that have made traditional dietary use of them has called for greater recognition and awareness of their nutritional importance and potential.

In his studies of the Pedi people of South Africa, published by the Witwatersrand University Press in 1959, P. J. Quin concluded that "the recognition and encouragement of their traditional foods and feeding habits could be the means of alleviating, and perhaps even solving, the great problem of malnutrition and disease among these people."

After studying Melanesian food habits in Papua New Guinea, V. B. Myer-Rochow of the University of Waikato in New Zealand concluded in 1973: "If the new Papua and New Guinea government can be persuaded not to accept the European attitude toward insects as human food, it would act to the benefit of vast numbers of natives. Instead of wasting resources in destroying certain insects often regarded as crop pests, the insects themselves should be used. Quite often they represent a higher nutritional value than the vegetable that they have been eating..."

Two researchers at Manipur University in northeastern India, B. Gope and B. Prasad, in 1983 concluded that insects represent the cheapest source of animal protein in the State of Manipur, and recommended that their consumption should be encouraged because many of the people cannot afford fish or animal flesh.

And University of Colorado anthropologist, Darna Dufour, who studied the dietary habits of Tukanoan Indians in southeastern Colombia, states (in 1987) that "the widespread practice of entomo-

phagy warrants further attention in any evaluation of the availability of protein resources' in the Amazonian ecosystem.

Entomologists now believe that insects may come to be regarded as one of the resources with which to meet the nutritional needs of populations that are economically and agriculturally hard pressed. The concept is harmonious with the tenets of low-input, sustainable agriculture. Their persistence in urban markets of the developing world, despite Western acculturation as discussed above, attests to their palatability; and, with a little "push" by appropriate government agencies toward reinstatement of their "respectability," greater use could help yield increased incomes for marginal rural economies. Their traditional and continuing widespread use in the developing world provides a base upon which to rebuild.

Suggested Further Reading

- Bodenheimer, F.S. 1951. *Insects as Human Food*. W. Junk, The Hague, The Netherlands.
- Defoliart, G.R. 1989. The human use of insects as food and as animal feed.. *Bull. Entomol. Soc. Amer.* 35: 22-25.