

Chapter 20

NORTH AND WEST AFRICA

Overview

The region as treated here includes all countries in the bulge of West Africa (on the southern coast from Nigeria westward) and to the east Chad, Sudan, Ethiopia, Somalia and countries north. Insects of at least 25 species are eaten, belonging to at least 21 genera, 13 families and 7 orders (see the Regional Taxonomic Inventory below). Of this group, the specific identity is known for only 21 species, the generic identity for another 4, only the family identity for one and the order identity for one. Nigeria is the best-studied country in the region insofar as its food insect use is concerned, and it is presented first with others following alphabetically. Other countries on the southern coast of West Africa probably have edible insect use similar in variety to that of Nigeria, but less information is available. North of the coastal countries, the variety is greatly reduced, limited mainly to locusts, and primarily the desert locust, *Schistocerca gregaria*.

Regional Taxonomic Inventory

Taxa and stages consumed	Countries
Coleoptera	
Beetles/beetle larvae	Ivory Coast, Liberia, Nigeria, Sierra Leone
Cerambycidae (long-horned beetles)	
<i>Ancylonotus tribulus</i> (Fabr.), larva	Senegal
<i>Dorysthenes forficatus</i> Fabr., larva	Morocco
<i>Omacantha gigas</i> Fabr., larva	Senegal
Curculionidae (weevils, snout beetles)	
<i>Rhynchophorus phoenicis</i> (Fabr.), larva	Southern coastal countries
Scarabaeidae (scarab beetles)	
<i>Ateuches sacar</i> Linn.	Egypt
<i>Oryctes boas</i> Fabr., larva	Nigeria
<i>Oryctes owariensis</i> Beauvois, larva, adult?	Fernando Po, Ghana, Sierra Leone
Scarabaeid larvae, pupae, adults	Southern coastal countries
Tenebrionidae (darkling beetles)	
<i>Blaps</i> sp., adult	Tunisia
<i>Pimelia</i> sp., adult	North Africa
<i>Tenebrio</i> sp., adult	North Africa
Hemiptera	
Corixidae (water boatmen)	
<i>Corixa esculenta</i> (author?), egg	Egypt
Hymenoptera	
Apidae (honey bees)	
Bee larvae	Sierra Leone
Isoptera	
Winged termites	Burkina Faso, Mali, Sudan, southern coastal countries
Termitidae	
<i>Bellicositermes</i> sp., winged adult	Ivory Coast

<i>Macrotermes bellicosus</i> (Smeathman), winged adult, queen	Guinea, Nigeria
<i>Macrotermes natalensis</i> (Haviland), winged adult, queen	Nigeria

Lepidoptera

Caterpillars	Ivory Coast, Mali
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Notodontidae (prominents)

<i>Anaphe infracta</i> Walsingham, larva	Nigeria
<i>Anaphe reticulata</i> Walker, larva	Nigeria
<i>Anaphe venata</i> Butler, larva	Nigeria

Saturniidae (giant silkworm moths)

<i>Cirina butyrospermi</i> Vuillet, larva	Mali
<i>Cirina forda</i> (Westwood), larva	Burkina Faso, Nigeria

Odonata

Dragonflies	Nigeria
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Orthoptera

Acrididae (short-horned grasshoppers)

<i>Acridium perigrinum</i> (author?), adult	Morocco
<i>Cyrtacanthacris aeruginosa unicolor</i> Uvarov, adult	Nigeria
<i>Schistocerca gregaria</i> (Forsk.) adult	Pan-regional in north
Locusts/grasshoppers	Nearly pan-regional

Gryllidae (crickets)

<i>Brachytrupes membranaceus</i> Drury	Nigeria
Crickets	Burkina Faso

Pyrgomorphidae

<i>Zonocerus variegatus</i> Linn.	Nigeria
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Studies in Nigeria show that most Nigerians have had direct or indirect experience with entomophagy although it is more prevalent in rural than in urbanized areas. As in other parts of Africa, the more educated persons are more reluctant to admit that indigenous customs still exist, including the eating of insects. Modern researchers, however, such as Fasoranti and Ajiboye (1993), believe that entomophagy should be promoted through education because edible insects can help significantly in reducing protein deficiency in the country. They also stress the need for development of mass-rearing methods, rather than continued reliance on harvesting natural populations. Development of mass-rearing is particularly important in the case of *Anaphe venata*, as pointed out by Ashiru (1988), because of the loss of its host tree, *Triplochiton scleroxylon*, to logging.

The saturniid caterpillar, *Cirina forda*, is the most widely marketed edible insect in Nigeria and sells for about twice the price of beef. Others widely marketed are palm grubs (*Rhynchophorus phoenicis*), termites, *Anaphe* larvae, and dried dragonflies. Studies by Ashiru show *Anaphe* larvae among the insects that are an unusually good source of fat, having a calorific value of 6.113 kcal/g. Unfortunately, these larvae have recently come under a shadow for possible involvement as the cause of a seasonal ataxic syndrome. Although insects are eaten by all age groups, some, such as *Oryctes* beetle grubs and termites are collected mainly by women and children, and according to Akingbohunge (1988), grasshoppers and crickets are eaten mainly by the children.

Much information on insect use in the southern countries of West Africa has been furnished by former Peace Corps Volunteers and others on a personal communication basis. In general, the patterns of insect consumption observed (and probably the species involved) appear to be similar to those in Nigeria.

The infamous desert locust, *Schistocerca gregaria gregaria* (Forsk.) is widely distributed, from northern Burma, Nepal and Afganistan across southwestern Asia, North and West Africa, except for a narrow band along the southern coast of West Africa, and thence to northeastern Congo (Kinshaza) (Zaire) and southern Tanzania (Dirsh 1974). It has been reported as food across Africa and the Middle East, and before the coming of international locust control programs was widely marketed across North and West Africa. Typically, the desert locust can breed in any desert-type area when there is sufficient rain. As a pest species, it shows some

preference for cereals but is very polyphagous and virtually all crops are at risk (Hill 1983: 167). Swarm damage usually results in complete defoliation of the crop and can be devastating over wide areas. Baits, ground and aerial sprays as well as dusts of various insecticides are used to control the hoppers. Barrier spraying with residual insecticides such as dieldrin (dieldrin no longer recommended) can be very effective. Sprays are used against the aerial swarms.

No outbreak areas, in the sense discussed in Chapter 13 for other migratory locust species, have been found for *S. gregaria* (Gunn 1960). In fact, up to that year, at least one swarm had been reported from somewhere in the vast plague area in every year since 1887. Gunn cites an estimate that 500 sq. miles of swarms invaded Kenya in January 1954 and that there were probably between 10^{10} and 5×10^{10} locusts in the swarms. Also, the number of desert locusts in Somalia in August 1957 was estimated at 1.6×10^{10} ; at one-third of a million to the ton, the weight of locusts was 50,000 tons. Or, as described by Stern (1973), young hoppers frequently congregate in bands at densities of 18,000 m² and adults normally at about 300 m² or about 1.2 million per acre. Stern states that an average large swarm covers 5 to 130 km² while a very large swarm may cover 50 to 1,300 km² or about 500 sq. miles. At 2 g per locust, 1.2 million locusts per acre represents 2.4 metric tons per acre.

Considering its tremendous numbers and aggregation, it is not surprising that, since olden times, the desert locust has served as a major food resource throughout the barren reaches of North Africa. Also since olden times, an occasional enterprising visionary considered its potential as a candidate for other commercial-sized food production endeavors. The following excerpt is from A.S. Packard, U.S. Department of Agriculture (1878):

It is stated in the *Bulletin Mensuel de la Société d'Acclimation* (August 1875) that Dr. Morran, a physician at Douarnenez, in Finistere, has thought of utilizing the African locust as bait for the sardine-fishery in the maritime districts of the coast of Mancha and the Atlantic Ocean. The doctor hopes to substitute this new bait for that employed until now under the name of roe (rogue), and the price of which, always increasing, is injurious to the interests of French fishermen. The locusts cooked in salt water are dried in the sun, and ground. The powder obtained seems to make as good bait as roe. It has a dark color like that of the pickled roe of Norway. It preserves all of the nutritive qualities of the locust. It reabsorbs the pickle, and is fatty, unctuous, and soft to the touch. Besides, it falls to the bottom of the water, resembling the flesh of craw-fish, comminuted and dried fish, of which the sardines are very fond. The insect can be put up in different ways, as made into biscuit, pickled, salted, pressed, or dried in the sun. Different methods of preparation have been tried; cooked and salted, the insects can be piled up in cakes, so as to be easily packed and transported. They can also be thrown alive, pell-mell, into brine and pressed. The first of these methods is employed by the Arabs. The Society of Agriculture of Algeria recommends smothering the locusts in sacks, then drying in the sun. The bait prepared in these different modes has been tried at Douarnenez with good results. The sardines bit at them eagerly. It appears that in the bodies of a great number of sardines there have been found on examination the remains of locusts which the fish had swallowd. This last fact, stated officially, has well satisfied the maritime population of Douarnenez.

One drawback in considering the potential of the desert locust as a food resource is that there are relatively long recession periods between major outbreaks. The most recent plague years were 1986-1989. The last major plague period prior to that was 1950-1962. Nevertheless, there are good reasons for trying to take advantage of the locust's qualities as food, and changes in locust control tactics are in the offing which would appear to make this more tenable.

The international control program conducted against the 1986-1989 plague which afflicted 23 countries from western North Africa to India came under criticism in a report issued by the U.S. Office of Technology Assessment (OTA) (Gibbons 1990). The report concluded that massive insecticide spraying is costly, inefficient and ineffective, and questioned whether the \$275 million invested by international aid agencies and the \$59 million U.S. investment was worth it. Criticisms included steeping the continent in pesticides, some of which are banned in the United States, exposure of workers and domestic animals to toxic doses of pesticides and other adverse environmental effects. The report concluded that locusts are less damaging than generally portrayed (for example, accounting for less than 1% of the crop loss in the nine countries most affected in 1986), and, further, that weather, not chemical assault brought the plague to an end. In place of "crisis management," the report advocated a long-term preventive strategy which would include integrated pest management (IPM), training of local workers for control of indigenous pests, and targeting early spraying at locust breeding areas, thus controlling the locust population before it explodes.

Showler and Potter (1991) embrace some of the OTA recommendations in discussing the *crop protection* concept which was used during the 1986-1989 plague and aims to destroy locusts near croplands versus the

newer concept of *strategic control* which would halt or prevent plagues by managing sexually immature locusts in major breeding areas. Showler and Potter state:

Nymphal bands are less costly to kill than swarms because less pesticide per locust is required, bands occupy smaller areas than swarms, and bait formulations, which are not effective against flying swarms, can be used . . . The preventive approach involves continuous surveys in recession breeding areas and control when populations reach treatment threshold levels. . . annual crop protection costs during a plague will equal the cost of 15-20 yr of strategic control.

The United Nations General Assembly has endorsed the strategic concept of using a preventive control strike force.

Showler and Potter discuss a number of factors relevant to desert locust control including basic problems such as remoteness of breeding areas, the training, placing and coordination of preventive control teams, and research needs such as refining remote sensing technology. They note that in the last outbreak, trained "farmer brigades" were especially useful in countries where government crop protection resources were very limited (Niger, for example, had 10,000 five-person brigades). Unfortunately, they make no mention among research needs of developing mass-harvest methods for the desert locust as food.

NIGERIA

Ene (1963) noted that "many educated and urbanized West Africans are either ignorant of, or reluctant to admit, the existence of certain indigenous customs such as the eating of insects; customs which might be regarded as derogatory, and are in any case fast disappearing with the rapid improvement in education and living standards." Nevertheless, a questionnaire survey conducted by Dr. Ene (Nigeria Table 1; see Ene's Table 1) showed that a high percentage of West Africans have some knowledge or experience with entomophagy. The bulk of responses to the questionnaire were from Nigerian, Ghanaian and Cameroonian undergraduate students of Agriculture, Medicine and Zoology, and a few Nigerian university lecturers and their wives. According to Ene, "Most people interviewed personally claimed their experiences were confined to a few occasions before adulthood, when the insects were eaten out of curiosity, or were offered by relatives or companions."

Ene opines that insects have come to be regarded by educated people as too dirty or disgusting to be contemplated as human food because of the many discoveries of association with disease organisms. He states:

In fact, insects could directly or indirectly provide man with good quality food.... Queen and alate termites for instance live in underground brood chambers which are kept 'spic and span' by the worker-termites, and are fed throughout on 'processed' food. They must therefore be reasonably clean and uncontaminated....Besides, it probably would be much easier to manufacture processed proteins from insect tissues than from grass or sawdust or any of the other plant tissues as is being attempted by scientists in various countries. Suitably processed and marketed, therefore, insects could add to the world's meagre supply of proteins and fats.

Ene mentions that the insects used as food are mostly those which can be collected in large numbers. After rainfall, winged termites are "trapped in basins of water around which lights are placed, or in pits dug in front of the holes through which they are emerging. After cleaning and salting, they are usually roasted or tied in parcels and boiled." Crickets are dug up individually or flushed out of their holes with water at night. "Edible beetles are picked up around fruit trees and where palm wine is being tapped. Their larvae are found in the fluff around the leaf bases of palm trees, and inside decaying tree trunks in the forests."

In the *Nigerian Cookbook*, **Antonio and Isoun (1982)** state that: "A variety of insects and larvae are seasonally popular in some areas. They are fried in their own oil and salted for snacks either alone or with a boiled carbohydrate food. Residents in your locality should be consulted about such local delicacies."

Portia L. Gage, who served from 1967 to 1969 as a Peace Corps Volunteer in Shagamu, Western State, about 40 miles north of Lagos, and in Ife, also Western State, about 40 miles east of Ibadan, furnished information (pers. comm. **1987**) on two kinds of edible insects (see below).

Professor **A.E. Akingbohunbe** of Obafemi Awolowo University in Ile-Ife furnished information on several species of insects consumed in Nigeria (pers. comm. **1988**); they are discussed below under the appropriate families.

Ivbijaro (1990) expresses delight that "information is now being gathered on food insects which, in Nigeria, are important sources of high food protein to rural dwellers and a growing delicacy to many city dwellers."

According to **Fasoranti and Ajiboye (1993)**, taboos -- religious and other -- are important among factors

influencing entomophagy in West Africa. The taboos are believed to run generally along ethnic lines, and the authors set out therefore to investigate beliefs militating against entomophagy among the four major tribes in Kwara State, the Yoruba, Ibara, Nupe and Baruba. Seven species of insects are generally acceptable within these four dominant tribes. A questionnaire was sent to all local government areas of Kwara State and followed up by personal interviews to clarify questions that arose from responses to these questionnaires. The authors conclude that entomophagy should be promoted through education and that edible insects can help substantially in reducing the protein deficiency problem that exists in Kwara State. They stress that only the development of artificial breeding methods, rather than relying on harvesting from natural populations, would ensure an abundant and continuous supply. Food species discussed by the authors are included below under the appropriate orders and families.

Fasoranti and Ajiboye discussed several specific taboos, but relative to termite queens they state:

Children are forbidden to eat the queens for several reasons, not all of which have to do directly with safety to health. Children form a large proportion of the farm hands, and the elders believe that if the young ones are allowed to eat the queens they will cherish the insects and spend so much of their time searching for them, that productivity in the fields will be reduced.

From similar reasoning, children are discouraged from eating palm weevil larvae: "As the larvae taste so good, the young ones are likely to become preoccupied with felling palm trees to provide more breeding sites and a bumper harvest of larvae. Indiscriminate felling of trees would deprive the community of primary palm products such as palm oil, palm kernels, and palm wine."

Coleoptera

Curculionidae (weevils, snout beetles)

Rhynchophorus phoenicis Fabr., larva

"Grubs of the palm weevil, *Rhynchophorus phoenicis* Fabr., are fried and eaten in several parts of Western Nigeria and in Bendel State (old Mid-Western Nigeria) where active marketing of the fried grubs takes place. The grub is called Itun by the Yorubas" (Akingbohunge 1988).

Palm trees under stress for any reason and fallen palms serve as breeding sites for *R. phoenicis* and can support hundreds of larvae (Fasoranti and Ajiboye 1993). The mature larvae are huge, measuring about 10.5 cm long and 5.5 cm wide. Collected larvae are washed and fried; condiments added include onion, pepper and a little salt. "Most people who were interviewed believe that this insect is very delicious."

Scarabaeidae (scarab beetles)

Oryctes boas Fabr., larva

Scarabaeid larvae and pupae were mentioned by Ene (1963). According to Fasoranti and Ajiboye (1993), breeding sites of *O. boas* such as dunghills and refuse of various kinds are searched for by all age groups, but more frequently by the women and children in the course of their other duties. The larvae are even larger than palm weevil larvae. After preparation they are washed thoroughly and fried. Acceptability of this insect is decreased because of the "dirty" nature of the breeding sites, but it is still popular among most insect eaters.

Family uncertain

Gage reported seeing some very large larva-like insects [possibly *Rhynchophorus?*] being sold in an area about 100 miles east of Lagos, south of Okitipupa, and near the town of Aiyetoro near the coast. These people may have been Yoruba or a more eastern tribe such as the Urhobo, Itsekiri or Western Ibo.

Hymenoptera

Apidae (honey bees)

Ene discusses apiculture and honey production in Nigeria, noting, however, that "the honey bee is rarely domesticated and the bulk of the honey offered for sale in the markets is harvested from hollow trees and rock crevices in the wild." Note is made of efforts being made to develop large-scale bee-keeping in northern Nigeria, and Ene suggests that "Beekeeping could quickly lead to a considerable increase in the earning capacity of peasants in the savannah and borderline forest areas of West Africa, as it has done for the peasants of Ethiopia

and Portuguese African territories." He mentions the ready markets for beeswax in Europe and the United States, noting that, "Large quantities of honeycomb are thrown away each year in West Africa because the peasant bee-keepers do not know its value."

Isoptera

Termitidae

Macrotermes bellicosus Smeathman, winged adults, queens

Macrotermes natalensis (Haviland), winged adults, queens

Akingbohunge (1988) reported:

Termites (*Macrotermes bellicosus* Smeathman) are eaten in several parts of Western Nigeria. The winged adults are usually caught while on their nuptial flight or collected from the ground after they have shed their wings, and then roasted for eating. The queen termite is also eaten but rather infrequently largely because of the difficulty in procuring it from its protected custody. The winged termites are called Esunsun in Yoruba.

Fasoranti and Ajiboye (1993) state that the winged reproductives of *M. natalensis*, which are strongly attracted to light sources, are eaten by all age groups but are collected mainly by the women and children. Termites are sold in the markets when catches are large, while small collections are consumed at home. They are fried or roasted. The queen termite is considered a delicacy for adults only, but can be obtained only when a termitarium is destroyed.

Family uncertain

At Kukawa, large termites known as *kanam galgalma* or *tsutsu*, when winged and airborne, are fried and used as food (**Barth 1857**, III: 4; vide Bodenheimer 1951: 159).

Gage (1987) didn't personally see termites being eaten, but relates that, "In the mornings as I was sweeping up the wings on my front stoop people would tell me that these insects are good to eat." They are apparently used in this area by the Yoruba people who roast and eat them as a snack food - like peanuts. The termites swarm in the evening of rainy days during the early part of the rainy season. They are attracted to lights in the dwellings, where they lose their wings, drop to the ground, and are easily swept up.

Lepidoptera

Notodontidae (prominants)

Anaphe infracta Walsingham, larva

Anaphe reticulata Walker (= *ambrozia* Butler; = *imbrasia*), larva

Anaphe spp., larvae

Anaphe venata Butler, larva

Ene discussed the economic possibilities of silk from the *Anaphe* caterpillars. Now the basis of a cottage industry, Ene believes that it might be expanded to provide a valuable export or even a new modern industry. The two major species are *Anaphe infracta* (brown silk) and *A. imbrasia* (white silk) which feed mainly on the leaves of *Bridelia micrantha* and *Albizia zygia*, respectively. Their communal cocoons may be more than a foot long and weigh up to 24 ounces when fresh. The fibers are deposited in from six to twelve sheets and can be separated from each other. In 1931, a German firm was granted a license by the Nigerian Government and went so far as to plant more than 100,000 stands of *Bridelia micrantha*. Several British firms were also interested, but efforts to exploit the silk were halted by the trade depression that followed World War I. One drawback to exploiting the silk is that the two *Anaphe* species are popular as food among the Yorubas, and the caterpillars are offered for sale in the markets.

According to **Akingbohunge (1988)**: "Caterpillars of African silk moths, *Anaphe* spp. are fried dry and eaten as such or used in preparing soup just like dried lobsters are used. This is especially common in several parts of Ondo State."

Ashiru (1988), in interviews with 35 people in widely separated localities in Nigeria, found that 80% of them were aware that the larvae of *Anaphe venata* Butler are edible and 69% had either eaten the larvae or had household members who had eaten them. The larvae are prepared by roasting them in hot dry white sand.

Forty-six percent of the people interviewed attributed the reduced availability of the larvae in recent years to the logging of the host tree, *Triplochiton scleroxylon*. Ashiru considers it noteworthy that more than 20 years after the 1963 survey by Ene, there is no appreciable reduction in people's awareness and actual involvement in entomophagy, although he cautions that this finding might be somewhat biased by the lower average educational level of those interviewed in the present survey. Insect larvae are eaten mainly by the peasants in the rural areas rather than by the educated and urbanized population.

Ashiru presents the results of proximate, amino acid and mineral analyses in a series of data tables. Proximate analysis of dried, seventh-instar field-collected larvae from which the long setae had been removed by passing the larvae over a flame was as follows: moisture 6.61%, crude protein (N x 6.25) 60%, fat 23.22%, ash 3.21%. Calorific value, determined by a ballistic bomb calorimeter, was 6.113 kcal/g. The author notes that more sophisticated studies of the protein quality are needed (protein efficiency ratio, true digestibility, etc.), and concludes that because *A. venata* is univoltine and its host plant (an important timber species) is fast disappearing, mass-rearing would be necessary to enhance its value as a supplementary protein source in rural areas.

Picton and Mack (1989: 28-29) discuss *Anaphe* silk and say that although the moths are not domesticated, in parts of northern Nigeria their breeding is encouraged by the cultivation of the tamarind tree upon which they feed. Collection of the silk, however, depends upon chance. They state: "If a hunter or a farmer happens to find a cocoon he will take it to the nearest market and sell it. If the cocoon still contains caterpillars he will be able to get a little more for it than if pupation has occurred (in which case the pupae rattle if the cocoon is shaken), because when the cocoon is opened, the caterpillars can be roasted and eaten.

Adamolekun (1993) notes that, because of the high cost of conventional protein foods, protein energy malnutrition is widespread in rural Nigeria. He further notes that consumption of the larvae of *A. venata* is particularly common in southwestern Nigeria, that the nutritional value of the larvae has been shown similar to that of chicken egg, and that mass-rearing of the larvae as an alternative protein source has been advocated. He then reports:

However, *A. venata* entomophagy may be implicated in the actiopathogenesis in southwest Nigeria of an ataxic syndrome that occurs annually in the rainy season (July-September). The syndrome is characterized by sudden onset of severe intention tremors and truncal and gait ataxia after a (usually evening) meal. Up to now the cause remained unknown. The preceding meal consumption led to the suspicion that a food toxin may be responsible, but no food item was common to all patients presenting with the disease.

Dietary recall data are given on patients seen at the Ife State Hospital with the ataxic syndrome. All patients had consumed the roasted larvae of *A. venata* in their last meals before onset, and market surveys indicated that the period of wide availability of larvae coincided with the occurrence of the seasonal ataxia.

Adamolekun concluded:

This seasonal ataxia may occur in poorly nourished subjects who are marginally thiamine-deficient because of a monotonous diet of carbohydrates containing thiamine-binding cyanogenetic glycosides, and who have a seasonal exacerbation of their thiamine deficiency from thiaminases in seasonal foods. The dietary recall in my patients supports this view. Thiaminases are present in many insects, and the invariable finding of *A. venata* entomophagy in all patients with the seasonal coincidence of the ataxic syndrome and the wide availability of the larvae in the markets implicates the larvae. It is ironic that poorly nourished people who desperately need protein supplementation appear to be at greatest risk for developing this ataxic syndrome.

Adamolekun (1993b) provides additional medical detail on the syndrome. **Akingbohunge (pers. comm. 1995)** noted that it is very baffling that the larvae have been used for ages, while the ataxia reported is a recent development.

Saturniidae (giant silkworm moths)

Cirina forda (Westwood), larva

Popularly known as Kanni, the larva of *C. forda* is perhaps the most important and widely marketed edible insect in Kwara State (**Fasoranti and Ajiboye 1993**). The larvae are starved for a day or two to eliminate the gut contents, then boiled for two hours, then sun-dried on mats. Most tribes in Kwara State do not eat dried larvae of other insects, but Kanni is an essential ingredient in a vegetable soup, considered a delicacy, which also

includes onion, melon, tomatoes, pepper oil, and salt to taste. In the market, the dried larvae sold for N19.50/kg (N1.00 = US 30 cents) compared with the 1986 price of N9.00/kg for beef.

Odonata

Family uncertain

Barth (date?); vide Brygoo 1946; vide Bodenheimer 1951: 193-194) observed plates full of roasted dragonflies, *fara*, in the market. These insects, which measure about 5 cm, form an important part of the food in times of famine, and, as quoted by Bodenheimer from the earlier reports, "make a rather appetizing meal."

Orthoptera

"Grasshoppers and crickets are eaten though rather infrequently and largely by young children" (**Akingbohunge 1988**).

Acrididae (short-horned grasshoppers)

Cyrtacanthacris aeruginosus unicolor (author?), adult

According to **Fasoranti and Ajiboye**, these grasshoppers are roasted and consumed by all age groups. Grasshoppers are plentiful only periodically and were not observed being sold in the markets. **Eno (1963)** mentioned locusts among the edible insects in Nigeria.

Gryllidae (crickets)

Brachytrupes membranaceus Drury

According to **Akingbohunge**, the cricket eaten by young folks who can take the trouble of digging it out of its abode in the soil is *Brachytrupes membranaceus* Drury. The cricket is termed *Ire*. **Fasoranti and Ajiboye** note that these insects live in tunnels that are easily detected. They turn a golden color when roasted. Members of the *Ire* clan of the Yoruba tribe do not eat crickets for reasons which the authors discuss.

Pyrgomorphidae

Zonocerus variegatus Linn.

"The variegated grasshopper, *Zonocerus variegatus* Linn., which has a large dry season population in southern Nigeria (i.e. from November to April) is reportedly roasted and eaten in Akoko area of Ondo State" (**Akingbohunge 1988**). The grasshopper is termed *Tata* by the Yorubas. **Fasoranti and Ajiboye** mention that these grasshoppers are prepared in a manner similar to that for crickets and are consumed by all age groups of all tribes. They were not observed being sold in the markets.

ALGERIA

Orthoptera

Acrididae (short-horned grasshoppers)

The following is quoted from **Künckel d'Herculais (1891)**; vide Bodenheimer 1951, pp. 205-206):

The natives are well disposed to carry out orders for the destruction of the locusts, since they use them for food. Around Tougourt every tent and house has prepared its store of locusts, on the average about 200 kilo to each tent. Sixty camel loads (9000) kilo are the quantities of locusts accumulated daily in the Ksours of the Oued-Souf. They are a valuable resource for the poor population. To preserve them, they are first cooked in salt water, then dried in the sun. The natives collect and prepare such considerable stocks that apart from their own needs, they have some for trading on the markets of Tougourt, Temacin, etc. I have in my hands now two boxes of freshly prepared locusts and I convinced myself that they are quite an acceptable food. The taste of shrimps is very pronounced; with time they lose their quality.

BURKINA FASO

Most of the available information has been supplied by two African nationals and a Peace Corps Volunteer. **Zida Bertrand** reported (pers. comm. **1988**) that the Bobo in the vicinity of Dioulasso (Province of Houet) harvest a caterpillar that feeds on the leaves of *Vittellaria* (Sapoleaceae). The caterpillars are collected during the dry season (April and May) and are fried before being eaten. The Mossi in the Provinces of Kadiogo, Bulkiemde, Outoritenga, Passou, Bazega, Sanmatenga, Yatenga, Bam, Zoundueogo, and Boulgou collect winged termites and grasshoppers during the wet season (June, July and August). The termites are captured at night by means of a fire near their nest. They are fried without oil and served.

Prosper Sawadogo reported similar insect use (pers. comm. **1988**). The Bobo around Dioulasso, Banfora, and Orodaro harvest caterpillars (from trees) during May, June and July. They are prepared by frying. Winged termites and crickets are eaten by the Mossi around Koudougou, Ouahigouya, Kaya, Iuagadougou, Tenkodogo, and Fada. The termites are collected in July and August, the crickets from October to December. Termites are fried after burning off the wings. The crickets are collected individually and are eaten mainly by the children.

Isoptera

The following is quoted from **Sarah Shoemaker** (pers. comm. **1987**) who served as a Peace Corps Volunteer:

Certain tribes in Burkina Faso eat roasted (fricasseed) termites. Lured by lamplight at night, they drown in buckets of water placed near lanterns. They are scooped out of the water the next day and marinated in a salty dark soysauce-like mixture, then fricasseed over flames or coals. Their insect-shape is not altered by this process, which was the only reason I found them hard to eat! Because in fact they are quite tasty - crunchy and salty. They are eaten before meals, like appetizers.

See also Bertrand and Sawadogo above.

Lepidoptera

Saturniidae (giant silkworm moths)

Cirina forda (Westwood), larva

The caterpillar reported feeding on *Vittellaria* by Bertrand above and by Cynthia Bertelsen (pers. comm. to the author, 1993) is almost certainly *C. forda* (**DeFoliart 1994**). According to Bertelsen, it is called *guerba* in Moore and is eaten by the Mossi tribe.

Orthoptera

Acrididae (short-horned grasshoppers) (see Bertrand in the Introduction)

Gryllidae (crickets) (see Sawadogo in the Introduction)

EGYPT

According to **Darby et al (1977, p. 422)**, evidence for locust consumption in Ancient Egypt is lacking, and this may reflect a conjectural abhorrence or taboo. "A point upon which there is agreement among certain authors is that the Mosaic dietetic laws were meant clearly to distinguish between the Children of Israel and their former masters. So viewed, Biblical permission [for locust consumption] may be construed as a means of accentuating a cultural difference between the two. . . ." The authors describe (pp. 430-439) the high status and many uses of honey (byty). According to these authors, statements in the literature that larvae and grubs were part of the diet of the earliest Nilots is pure speculation.

Coleoptera

Scarabaeidae (scarab beetles)*Ateuches sacer* Linn.

According to **Bodenheimer** (p. 206), the scarab beetle, *Ateuches sacer* Linn., was reportedly eaten as a protection against sterility.

Hemiptera**Corixidae (water boatmen)***Corixa esculenta* (author?), eggs

There is an unconfirmed report by **Motschoulsky** (1856, p. 77; vide Bodenheimer 1951, p. 206) that the eggs of the aquatic *Corixa esculenta* serve as food in Egypt.

Orthoptera**Acrididae (short-horned grasshoppers)**

Frederick Hasselquist (1766, pp. 230-233), an MD, was intent upon proving that St. John did indeed eat locusts, and not some kind of fruit or bird as some scholars were claiming. Hasselquist says,

The first has been the opinion of all interpreters of the scriptures, who attended only to the contents of them; others, who have translated the New Testament, were for shewing their refined genius; asserting, that St. John never eat Locusts, as they are an unnatural food, never used by any body, and not adapted for sustenance. This is the strongest argument, by which they endeavoured to destroy the true meaning; and this feigned unnaturalness, has, as I imagine, occasioned an alteration, where there needs none, and induced some to crack their brains in finding for St. John other food, than what he really eat, during the rigorous course of life which he led in the desert. If it can be demonstrated, that Locusts are to this day eaten in the neighbourhood of the place where St. John dwelt, the impossibility and unnaturalness of this diet can no longer be asserted, and the weakest person will form the following conclusion: [that St. John ate locusts].

Hasselquist proved to his satisfaction, by questioning numerous people in the Middle East, that the Arabs did indeed eat locusts in Egypt, the Arabian Peninsula, and elsewhere.

In Mecca in times of famine, according to Hasselquist's information, locusts were ground to flour in hand mills or stone mortars, mixed with water to make a dough, then formed into cakes and baked like bread. At other times, the locusts were boiled for some time in water, then stewed with butter and sort of fricasseed. Also see Darby et al (1977) in the Introduction.

ETHIOPIA**Hymenoptera****Apidae (honey bees)**

Bodenheimer (1951, pp. 165-186) notes that honey hunting and husbandry is important in Ethiopia as it is throughout almost all of Africa.

Orthoptera**Acrididae (short-horned grasshoppers)**

Diodorus (2nd Cent. B.C.) of Sicily was among the early historians who referred to a people called *Acridophagi* or locusteaters. **Bodenheimer** summarizes as follows (p. 41):

Diodorus of Sicily talks about the *Acridophagi* of Ethiopia as small, lean and spare, and extremely black men. When in their country in spring the south winds rise high, they drive out of the desert

an infinite number of locusts, of an extraordinary size, with dirty wings of an unpleasant colour. These provide plentiful food and provisions for them all their days. They are caught as follows: in their country there is a large and deep vale, extending for many miles; all over this they lay heaps of wood and other combustible material. When the swarms of locusts are driven thither by the winds, some of the inhabitants go to one part of the valley, some to another and set the grass and other combustible matter on fire. Thereupon arises a great and suffocating smoke, which so stifles the locusts as they fly over the vale, that they soon fall down dead to the ground. This destruction of the locusts is continued for many days together, so that they lie in great heaps. As their country is full of salt, they gather these heaps together and season them sufficiently with salt, which gives them an excellent flavour and preserves them a long time sweet, so that they have food from these insects all the year round. This people dies early as a result of this food. They are very short-lived, never exceeding an age of forty. . ."

Salt (1814, p. ?) states that among the nomads, Dankali as well as Yemenite Arabs, locusts are a common food.

FERNANDO PO

Coleoptera

Curculionidae (weevils, snout beetles)

Rhynchophorus phoenicis (Fabr.), larva

Bodenheimer (1951: 186) followed **Ghesquière (1947)** in saying that *Rhynchophorus* larvae have long been sought as food in Fernando Po. Ghesquiere based his statement on **Hope (1842: 132)**. Although *Rhynchophorus* and *Oryctes* larvae may well have been eaten, and probably were, in Fernando Po, Hope made no such statement insofar as this author can find (see discussion under Sierra Leone).

Scarabaeidae (scarab beetles)

Oryctes spp.?, larvae

See discussion under Sierra Leone.

GAMBIA

Orthoptera

Acrididae (short-horned grasshoppers)

Adanson (1757: 88-89) stated that several tribes in the country make use of locusts as food. The locusts are prepared in several different ways.

GHANA

Coleoptera

Curculionidae (weevils, snout beetles)

Rhynchophorus phoenicis (Fabr.), larva

See discussion under Sierra Leone.

Scarabaeidae (scarab beetles)

Oryctes owariensis Beauvois, larva, (?) adult

Hope (1842) states that *Oryctes owariensis* "is eaten by the nations inhabiting Cape Coast."

GUINEA

Isoptera

Termitidae

Macrotermes bellicosus (Smeathman), winged sexuals

Smeathman (1781: 167-169) writes of *Macrotermes* (= *Termes*) *bellicosus* (Linn.):

I have not found the Africans so ingenious in procuring them or dressing them. They are content with a very small part of those which, at the time of swarming, or rather of emigration, fall into the neighbouring waters, which they skim off with calabashes, bring large kettles full of them to their habitations and parch them in iron pots over a gentle fire, stirring them about as is usually done in roasting coffee. In that state, without sauce or any other addition, they serve them as delicious food; and they put them by hands-full into their mouths, as we do comfits. I have eat them dressed this way several times, and think them both delicate, nourishing, and wholesome; they are something sweeter, but not so fat and cloying as the caterpillar or maggot of the *Palm-tree Snout-beetle*, *Curculio Palmarum*, which is served up at all the luxurious tables of West Indian epicures, particularly of the French, as the greatest dainty of the Western world.

Smeathman continues: "I have discoursed with several gentlemen upon the taste of the white Ants; and on comparing notes we have always agreed, that they are most delicious and delicate eating. One gentleman compared them to sugared marrow, another to sugared cream and a paste of sweet almonds."

IVORY COAST

Eve Beeler (1993), a PCV and director of a workshop for the physically handicapped, stated, ". . . through the urgings of my Ivoirienne husband (who is a great cook), I have sampled many traditional dishes featuring insects. Smoked caterpillars, grilled termites and giant wood grubs are superb in sauces."

Isoptera

Termitidae

Bellicositermes sp., winged sexuals

An important food of the Yafobas in the Man region of the Ivory Coast is the common termite, *Bellicositermes* sp. (**Villiers 1947**; vide Bodenheimer 1951: 153). Their high earthen nests sprinkle the countryside, and emergence of huge clouds of the winged sexuals in late September is described as occasionally obscuring the sun. The termites exit the nests slowly and clumsily before taking flight, a behavioral trait that is used by the Yafobas in their harvest technique. The crop is called *glo*. The termites are consumed raw and alive, or fried. When fried, they taste agreeably like "shrimp paste."

Lepidoptera

Caterpillars (see Beeler in the Introduction).

LIBERIA

Available information has been furnished by former Peace Corps volunteers. **Stephen Landry**, a PCV in Liberia from 1977 to 1980, reported (pers. comm. **1988**) that alate termites, queens, palm weevil larvae, and other beetle larvae were consumed. His observations were mainly around Totota about 75 miles east of Monrovia, but use of the insects appeared to be rather pervasive throughout Liberia. Landry says that all Volunteers were aware of "bug-a-bug" (termites) while beetle larvae were not nearly as prominent. The volunteers used to joke that "sitting in front of the radio listening to the BBC with a beer or coke and a bowl of bug-a-bugs was their equivalent to a movie with a coke and popcorn." Termites were sold at the weekly market during the season when they were available. The price was 5¢ to 25¢ for about one cup's worth. Beetle larvae were about 5¢ each, or two for 5¢ if small.

Bug-a-bug were collected at night when they collected in large piles under lights - enough to easily fill a gallon pail. They were dried in the sun in rice baskets or on mats. After drying they were winnowed in the breeze to separate the wings. They were then fried in palm oil and lightly salted; pepper would be added to the oil occasionally. Along with fried plantain chips, they could be purchased in baggies at bars in larger rural cities. Landry was never in the capital (Monrovia) to observe whether they were sold there.

Landry mentions that when a tall termite mound was encountered during walks in the bush, the 10 to 15-year-old boys knew exactly where the queen was located within the mound; they would knock it over and collect her. The queens were usually roasted over a fire.

The beetle larvae occurred in dead or dying palm fronds; the exact location of the larvae could be determined by placing an ear near the frond and listening after the frond had been cut from the tree. The frond was split with a cutlass to remove the larvae. The larvae were prepared by frying, as with bug-a-bugs, or by roasting on a piece of frond over fire. They were considered a treat but were usually eaten by the children.

Roberta M. Saimon, a PCV in 1985 and 1986, observed consumption of termites and rhinoceros beetles (all life stages except the egg)(pers. comm. **1987**). She lived among members of the Gbaepo Grebo tribe in the Gbaepo District in lower Grand Gedeh County, located about 5 miles from Kanweaken, the district seat, which in turn is approximately half-way between Hasper/Cape Palmas and Zwedru, the county capital. She states that:

The termites (or 'bugabugs') were collected at the beginning of the rainy season (April or May) by flooding them out of their underground nests. As the termites escaped the nest, children stood near the exit holes and caught as many as possible. They were then fried and eaten. People have informed me that they taste similar to Bacon-Bits, but I have never tried them.

Saimon said that rhinoceros beetles and grubs were collected at all seasons, depending upon luck in finding them. She states:

Bamboo grubs (rhinoceros beetles) were found in palm trees, although it was not clear whether these were cabbage, nut, or wine palms. After being gathered they were wrapped with some dirt in a large leaf for storage on the way back to town. While watching my neighbors prepare these, I realized that they were the larvae and pupae of the rhinoceros beetle. All three stages of development are consumed and I witnessed all three being prepared together. My neighbors informed me that they were indeed the same insect. The pupae and mature beetles are prepared this way: 1) washed, 2) wings removed, 3) legs removed, 4) pinchers removed (from adult), 5) 'backs' snapped. They are then boiled in palm nut soup till tender and served over rice. The grubs are simply washed and then cooked in palm nut soup and served as mentioned. The adults and pupae resemble shrimp when cooked. All three stages are considered a delicacy. Sometimes the town children would eat the grubs uncooked.

Coleoptera

Curculionidae (weevils, snout beetles)

Palm weevil larvae (see Landry above).

Scarabaeidae (scarab beetles)

Rhinoceros beetle larvae, pupae and adults (see Saimon above).

Isoptera

John and Mary **Gemignani** who served as Peace Corps Volunteers from 1967 to 1969 observed the use of termites by the Gola people (pers. comm. **1987**). Their observations were made mainly in the vicinity of Klay, Bomi Territory, along the road between Monrovia and Bomi Hills, but they mentioned their impression that most of the tribal people of West Africa eat termites. The termites, or "bug-a-bugs" as they are called, were captured at night when they flew toward light; the Gemignani's house had a screen which made a "real easy harvest for the children." The termites were fried in palm oil. "The chubby queen was a real delicacy."

See also Saimon and Landry in the Introduction.

LIBYA

Orthoptera

Acrididae (short-horned grasshoppers)

Cowan (1865, p. 123) refers to many donkeys, laden with locusts for food, being driven into the town of Mesurata.

MALI

Available information was provided mainly by **Moussa Diallo**, a Mali national (pers. comm. **1988**), who states that almost all of the insect consumption is in the southern part of the country. The edible insects and their characteristic times of appearance are well-known by the local people. Caterpillars, termites and grasshoppers are harvested, mainly during the wet season and at the end of the wet season. The Boubara (?) and Senoufo are the dominant ethnic groups but insects are eaten by some other ethnic groups as well. Caterpillars are gathered under the "Shea-wet" (?) tree (*Vitellaria paradoxa*), termites are attracted at night to lights under which containers of water are placed, and grasshoppers are harvested by groups of people (encircled?) or by use of fire.

Isoptera

Bill Grigsby, a former Peace Corps Volunteer in Senegal (1983-1985) mentioned that (pers. comm. **1988**) he was told by Sengalese that it is a common practice in western Mali to harvest winged termites. They are harvested during the rainy season. Also see Diallo in the Introduction.

Lepidoptera

See Diallo in the Introduction.

Saturniidae (giant silkworm moths)

Cirina butyrospermi Vuillet, larva

Bergier (1941; vide Merle 1958) mentions that the Bambara eat the caterpillars of *Cirina butyrospermi*, a species which is very harmful to the "karite," or butter tree. The caterpillars are about 8 cm in length when fully grown. "To prepare them, the people of Koulikoro first boil them in water, then, the tables turned, they saute them in the butter of the karite."

Orthoptera

Acrididae (short-horned grasshoppers)

See Diallo in the Introduction.

MOROCCO

Coleoptera

Cerambycidae (long-horned beetles)

Dorysthenes forficatus Fabr., larva

Ghesquiere (1947) cites Rotrou (1936) that it is rather common to see the Moorish armies using short sticks to dig up grubs of the long-horned beetle, *Dorysthenes forficatus* Fabr. They are fried in oil.

Orthoptera

Acrididae (short-horned grasshoppers)

Acridium perigrinum (author?), adult

Schistocerca gregaria (Forsk.) adult

Locusts, all records except one presumably referring to *Schistocerca gregaria*, have been used extensively as food in Morocco. **Labat (1728, II, p. 177)** states that (translation): "The Moors get revenge on these insects by eating them, and if they eat the food that they had prepared for themselves, they serve them some of it in turn. They gather them carefully, put them in leather sacks, grind them and cook them in milk. They think it is an excellent dish. Different tastes should not be criticized. . . ."

Thomas Shaw (1738, p. 258) notes that locusts are good to eat, when sprinkled with salt and fried, tasting not unlike the river cray-fish. He mentions that the Jews were allowed to eat them, and, involving himself in the argument about St. John's diet in the wilderness, concludes that John did indeed eat these locusts, not birds or fruit.

Chanier (1788; vide Bodenheimer 1951, p. 204) stated that smoked locusts are brought in prodigious quantities to the markets in Morocco, but that they have "an oily and rancid taste which habit only can render agreeable."

Leo Africanus, a converted Mohammedan native of Morocco, writes in the Description of Africa (1805, I, p. 587 f.; vide Bodenheimer 1951, p. 45) of how the nomads of Arabia and Libya greet the appearance of locust swarms with joy; they boil and eat them, dry others in the sun and pound them into flour for future consumption. He also notes that the enormous locust invasions often bring famine, especially in Mauritania.

Jackson (1809, pp. 54-55) states that:

Locusts are esteemed a great delicacy, and during the above periods [when locusts were present] dishes of them were generally served up at the principal repasts; there are various ways of dressing them; that usually adopted, was to boil them in water half an hour; then sprinkle them with salt and pepper, and fry them, adding a little vinegar; the head, wings, and legs are thrown away, the rest of the body is eaten, and resembles the taste of prawns. As the criterion of goodness in all eatables among the Moors, is regulated by the stimulating qualities which they possess, so these locusts are preferred to pigeons, because supposed to be more invigorating. A person may eat a plate full of them, containing two or three hundred, without any ill effects.

Robbins (1831, pp. 170-173, 227-228) mentioned great flights of locusts, and that the insects were collected from the bushes in large quantities at night while they were chilled and wet with dew. Preparation of the collected locusts was described as follows by Robbins:

The manner of cooking is, by digging a deep hole in the ground, building a fire at the bottom... and filling it with wood. After it is heated as hot as possible, the coals and embers are taken out, and they prepare to fill the cavity with the locusts, confined in a large bag. A sufficient number of natives hold the bag perpendicularly over the hole, the mouth of it being near the surface of the ground. A number stand around the hole with sticks. The mouth of the bag is then opened, and it is shaken with great force, the locusts falling into the hot pit, and the surrounding natives throwing sand upon them to prevent them from flying off. The mouth of the hole is then covered with sand, and another fire built upon the top of it. In this manner they cook all they have on hand, and dig a number of holes sufficient to accomplish it, each containing about five bushels. They remain in the hole until they become sufficiently cooled to take out by hand. They are then picked out, and thrown upon tent-cloths, or blankets, and remain in the sun to dry, where they must be watched with the utmost care, to prevent the live locusts from devouring them, if a flight happen to be passing at the time. When they are perfectly dried, which is not done short of two or three days, they are slightly pounded and pressed into bags or skins, ready for transportation. To prepare them to eat, they are pulverized in mortars, and mixed with water sufficient to make a kind of dry pudding. They are, however, sometimes eaten singly without pulverizing, by breaking off the head, wings, and legs, and swallowing the remaining part. In whatever manner they are eaten, they are nourishing food. All the while we remained at this valley, the natives were employed in gathering and cooking locusts.

Steedman (1835, p. 137), speaking of locusts, "It is said that in Morocco they are so highly esteemed, that the price of provisions falls when the locusts have entered the neighbourhood."

Riley (1851, pp. 234-238) dicusses the locust at some length, and gives a vivid description of the approach of a swarm:

In the mean time, the flight was fast approaching, and soon came within a short distance, and

directly towards us. Every labourer's attention was instantly turned from his plough and other employment; the oxen were stopped, and every one stood aghast with apprehension and dismay painted in strong colours on his anxious countenance, fearing his field was to become the prey of this devouring plague. The locusts began to descend and alighted to the northward of us; very few passing where we sat: we soon mounted and rode on, and as we proceeded we found the whole surface of the ground covered with them as thick as they could stand, and all busy in the work of destruction. As it was necessary for them to clear our road to avoid being crushed to death by the trampling of our mules, those in and near the path rose as we passed along, filling the air around us like one continued swarm of bees; whilst thousands came in contact with our faces and bodies. In this situation, fearing my eyes would be injured, I covered my face with a transparent silk handkerchief, and pushed on my mule as fast as I could; we were about two hours in passing this host of destroyers, which when on the wing made a sound, as finely described in Holy Writ, 'like the rushing of horses into battle.' The space covered by this flight extended in length for about eight miles along the road and three miles in breadth. After they had fairly alighted, the Moors, each resuming his labour, left the locusts in the full enjoyment of their repast, assuring us, that when they had filled themselves, which would be in the course of that day and the night, they would move off in a body with the wind, probably one day's march further, where they would again repeat their ravages....

Riley was so impressed by what he had seen that he asks his reader's indulgence for a few moments, "while I undertake to give him a description of that wonderful insect, the destroying locust, that so often lays waste the fertile plains of Asia and the northern regions of Africa."

Relative to locusts as an item of food, Riley says,

Locusts are esteemed very good food by the Moors, Arabs, and Jews, in Barbary, who catch large numbers of them in their season, and throw them, while jumping alive, into a pan of boiling argan oil: here they hiss and fry until their wings are burned off, and their bodies are sufficiently cooked, when they are poured out and eaten. I have seen many thousands cooked in this manner, and have had the curiosity to taste them: they resemble in consistence and flavour, the yolks of hard boiled hen's eggs.

Godard (1860; vide Bodenheimer 1951, p. 204) (awaiting re-translation) mentions that the locusts are placed in bags, salted and either baked or boiled, then dried on the terraced roofs of the houses. He states that, fried in oil, they are not bad.

Simmonds (1885, pp. 359-360) was informed that the locusts, which do some damage almost every year in Morocco,

are used extensively for food whenever they abound, so as to diminish the ordinary food supply, while they are habitually roasted for eating, and brought into Tangier and other towns by the country people, and sold in the market-places and on the streets. The Jews, who form a large proportion of the population, collect the females only for this purpose, having an idea that the male is unclean, but that under the body of the females there are some Hebrew characters which make them lawful food. In reality there are, under the thorax, certain dark markings -- the species used, and which is so injurious to crops, being the *Acridium perigrinum*.

Simmonds states that the Jews in Morocco salt the locusts and keep them for use with the dish called *Dafina*, which forms the Saturday dinner of the Jewish population. "The dish is made by placing meat, fish, eggs, tomatoes -- in fact, almost anything edible -- in a jar which is put in the oven on Friday night, and taken out hot on the Sabbath, so that the people get a hot meal without the sin of lighting a fire on that day."

Lapp and Rohmer (1937) analyzed locusts, *Schistocerca gregaria*, bought in the city square in Marrakech. They note that the females are bigger, much fatter, and therefore more valued and expensive. Before analysis, the locusts were prepared according to the usual procedure which is cooking in saltwater. The authors present their data in three tables and conclude (translation): "The locusts are richer in lipids and protein matter than the majority of our common foods (beef, etc.) that are, however, the source of our fats and albuminoids. They are rich in mineral matter. They are exceptionally rich in cholesterol Their use as an alimentary material is thus plainly justified."

NIGER

Ruth and Merlin W. **Van Deraa** (pers. comm. **1987**) didn't see any evidence of insects being used as food during their Peace Corps service in Niger from 1982 to 1984. They were located for one year in the capital, Niamey, and for one year near the town of Simiri (and Oualam) about 75 miles north of Niamey.

SENEGAL

Coleoptera

Cerambycidae (long-horned beetles)

Ancylonotus tribulus Fabr., larva

Omacantha gigas Fabr., larva

Netolitzky (1920; vide Bodenheimer 1951: 186) reported that larvae of *Ancylonotus tribulus* Fabr. and *Omacantha gigas* Fabr. are eaten (awaiting re-translation).

Orthoptera

Acrididae (short-horned grasshoppers)

Adanson (1757: 88-89) makes brief reference to locusts as food (see under Gambia).

SIERRA LEONE

Hope (1842) states that:

Another insect which is eaten at the present day is a species of *Oryctes*, named *owariensis* by Palisot Beauvois. It is eaten by the nations inhabiting Cape Coast [Ghana] . . . My gallant friend, Captain Downes, a resident some years at Fernando Po, who, although unable to specify the insect, mentions that at Sierra Leone the natives roasted and ate a palm-tree worm. He informs me also, that beetles and their larvae are eaten on various parts of the western coast of Africa.

Ghesquière (1947) states: "Later, Hope (1842), after Reamur, uses accounts by ancient voyagers to point out that at Cape, in Sierra Leone, and at Fernando Po, the larvae of Rhynchophoridae and *Oryctes* were very much in demand as food." From this, **Bodenheimer** (1951: 186) constructed the following: "*Rhynchophorus phoenicis* F. This is the palmworm of tropical Africa, about which Ghesquière (1947) wrote. . . . At Mozambique, at the Cape, in Sierra Leone and at Fernando Po these larvae have likewise since olden times been sought for by the natives."

Tom Mester, a Peace Corps Volunteer in Sierra Leone from 1976 to 1978, reported (pers. comm. **1987**) that large thumb-sized white grubs are searched for in fallen oil palm logs. These are deep-fried. Mester worked at a training center in Mange Bureh, but did not state which group or groups brought in the grubs. Although Mange Bureh is in the Temne tribal area, the Limbas were close by and the Mendes were the largest group from outside the area. Totally, there were 8 or 9 language and tribal groups at the Center at any one time.

Terry Ratigan, a PCV from 1980 to 1983, observed consumption of flying termites and "large red grubs" found in the roots of *Raphia* palms growing in swamps (pers. comm. **1987**). Ratigan worked primarily in the vicinity of Kondambia village approximately 15 miles south of Kabala (the Koinadugu District capital) in northeastern Sierra Leone. This is predominantly a Kuranko and Madingo area, but Ratigan states that these two insects are probably collected and eaten by most of the indigenous tribes. Both the termites and the *Raphia* palm grubs are fried and lightly salted. The grubs are highly prized whenever found, which is most often during removal of palms from swamps being developed for rice cultivation. The grubs are also sold as a delicacy in the Mende markets in the south. The termites are popular during the rainy season. They are attracted at night to kerosene lamps and the small children collect them by swatting them into pails of water. Farmers collect them in the same way in the swamps.

Karen King, a PCV from 1982 to 1984, related information (pers. comm. **1987**) on flying termites and bee grubs (although she did not personally witness the latter, it being reported to her by a Mende friend). King was based about half-way between Kenema and Kailahun (northeast of Kenema) and her observations apply to Mende tribesmen in the Eastern District, although "the Temnes and Shebros may also eat termites." The winged

termites emerge twice per year for 2- to 3-day periods at the beginning and end of the rainy season, April and October, respectively. They are caught at night when attracted to lamps or electric lights, placed immediately in water to drown, and then left to soak overnight. The wings usually become detached during this process. The following morning they are fried in palm butter or margarine and salted before being eaten. The harvest of bee larvae follows the harvest of palm wine, a syrupy sweet liquid of very high alcohol content, that is drained from small palms by insertion of a reed emptying into a gourd. The hole is then widened, and bees attracted by the residual syrup build a nest; after a period of time (several weeks?) the bees are smoked out, the hole is widened further and a "feast" of soft white larvae is scooped out. According to King, the bee larvae are considered "a real delicacy, a treat reserved for adults, while termites, although well-liked by all are for the most part reserved for the children."

Coleoptera

Curculionidae (weevils, snout beetles)

Rhynchophorus phoenicis (Fabr.), larva

See Ghesquière and Bodenheimer above.

Scarabaeidae (scarab beetles)

Oryctes owariensis Beauvois, larva

See Hope, Mester, and Ratigan above. The grubs referred to by Mester are possibly *Oryctes monoceros* and/or *O. owariensis*, both of which have been found to breed in dead standing coconut and oil palms in Sierra Leone (Bedford 1980), while the grub reported by Ratigan is almost certainly *O. owariensis* which also breeds in *Raphia* trunks. *Oryctes boas* occurs in Sierra Leone (Bedford 1980) but breeds in manure heaps, not in rotting wood.

Hymenoptera

Apidae (honey bees)

Bee grubs (see King in the Introduction).

Isoptera

See Ratigan and King in the Introduction. The termites, *Macrotermes bellicosus* (Smeathman) and *M. subhyalinus* (Rambur), appear to be the most abundant species of the genus in Sierra Leone (Ruelle 1970) and are probably the major species eaten although *M. ivorensis* Grasse and Noirot also occurs in the country.

SUDAN

Isoptera

Noyes (1937, pp. 226-229; vide Bodenheimer 1951, p. 159) mentions that the natives of the "Equatorial province" have devised various methods of collecting the alate termites from their nests. "The Baganda consider a compost of termites mixed with maize or millet flour to be an appetising dish worthy of any king. Native epicures, however, since the necessary pans were introduced into the country, prefer them fried."

Orthoptera

Acrididae (short-horned grasshoppers)

Barth (1857, I, pp. 443-444) was astonished to see in the market "whole calabashes filled with roasted locusts ('fará'), which occasionally form a considerable part of the food of the natives, particularly if their grain has been destroyed by this plague, as they can then enjoy not only the agreeable flavor of the dish, but also take a pleasant revenge on the ravishers of their fields."

TUNISIA

Coleoptera

Tenebrionidae (darkling beetles)

Blaps sp.

Bodenheimer (1951), pp. 206-207) cites Letourneux in 1875 that a *Blaps* species is used by women in Tunis if they wish to put on weight or beautify themselves.

NORTH AFRICA: GEOGRAPHICALLY UNSPECIFIC

Orthoptera

Acrididae (short-horned grasshoppers)

Browne (1799), p. 266) states, "The locust of Arabia, *Gryllus*, is very common, and is frequently roasted and eaten, particularly by the slaves."

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Items Needing Attention

- P. 11. Barth, under Odonata: date?
- P. 15. Salt (1814), p.?
- P. 22. Godard (1860), awaiting re-translation
- P. 23. Netolitzky (1920), awaiting re-translation

Nigeria Table 1. Entomophagy in West Africe (Ene 1963)¹ .

Insects	Eaten by tribe		Personal experience	Sample size	
	Yes	No Doubtful			
Alate termites	90.6%	6.2%	3.1%	75.0%	32
Crickets	96.9	3.1	0	87.5	32
Locusts	6.7	0	13.3	60.0	30
Caterpillars	84.0	4.0	8.0	60.0	25
Beetles	75.0	4.2	20.8	58.3	24
Beetle larvae	75.0	4.2	16.7	62.5	24

See text for explanation.

Replies incomplete.

