Chapter 16

CENTRAL AND EASTERN AFRICA: CONGO (Kinshaza) (Formerly Zaire)

Taxonomic Inventory
Taxa and life stages consumed

Coleoptera

Curculionidae (weevils, snout beetles)
Rhynchophorus phoenicis Fabr., larva, adult (occasionally)

Scarabaeidae (scarab beetles)
Gnathocera sp.
Goliathus sp., larva
Oryctes boas Fabr., larva, adult
Oryctes owariensis Beauv., larva, adult
Platygenia (= Platygenis) barbata Afzelius, larva

Miscellaneous Coleoptera
Several spp. apparently

Hemiptera

Nepidae (waterscorpions)
A nepid sp.

Homoptera

Cercopidae (spittlebugs)
A cercopid sp.

Hymenoptera

Apidae (honey bees)
Apis mellifica adansonii Latr., larva
Meliponula bocandei Spin., larva
Trigona braunsi (Kohl), larva
Trigona erythra interposita Darchen, larva
Trigona lendliana Fr., larva
Trigona occidentalis Darchen, larva
Trigona richardsi Darchen, larva

Formicidae (ants)
Carebara vidua F. Smith, winged adult
Oecophylla smaragdina longinoda (author?), larva, adult
Sternotornis sp., winged adult

Sphecidae (sphecoid wasps)
Sceliphron (= Pelopoeus) sp.

Vespidae (wasps, hornets)
Synagris sp.

Isoptera

Termitidae
Bellicositermes spp., winged adults, soldiers

Macrotermes (= Termes) natalensis Haviland, winged adult, soldier
Macrotermes spp, winged adults, soldiers
Pseudacanthotermes (= Acanthotermes) spiniger Sjostedt, winged adult
Termes gabonensis (author?), winged adult, soldier

Lepidoptera

Ceratocampidae
Ceratocampid spp. (2), larvae

Hesperiidae (skippers)
Caliades (= Coliades) libeon Druce, larva

Limacodidae (slug caterpillars)
A limacodid sp., larva

Noctuidae (noctuids)
Nyodes (= Elacodes) prasinodes Prout, larva

Notodontidae (prominants)
Anaphe panda (Boisd.), larva
Anaphe sp., larva
Antheua (= Pheosigna) insignata Gaede, larva
Drapetides (= Loptoperyx) uniformis Swinhoe, larva
Elaphrodes (= Onophalera) lacteal Gaede, larva
Rhenea mediata Walker, larva

Nymphalidae (brush-footed butterflies)
Species identity not known

Psychidae (bagworm moths)
Clania moddermanni (author?), larva
Eumeta cervina Druce, larva
Eumeta rougeoti Bourgogne, larva

Saturniidae (giant silkworm moths)
Athletes gigas Sonthonnax, larva
Athletes semialba Sonthonnax, larva
Bunaea alcinoe Stoll (= *caffraria*), larva
Bunaeopsis aurantiaca Rothschild (= *hersilia*), larva
Cinabra hyperbius Westwood, larva
Cirina forda Westwood, larva
Gonimbrasia hecate Rougeot (= *nictitans*), larva
Gonimbrasia richelmanni Weymer, larva
Gonimbrasia zambesina Walker, larva
Goodia kuntzei Dewitz, larva
Gynanisa maia ata Strand, larva
Imbrasia dione Fabr., larva
Imbrasia epimethea Drury, larva
Imbrasia macrothyris Rothschild (= *lubumbashii*), larva
Imbrasia rubra Bouvier, larva
Imbrasia spp., larvae
Imbrasia truncata (author?), larva
Lobobunaea saturnus Fabr., larva
Melanocera parva Rothschild, larva
Micragone (= Cyrtogone) cana Aurivillius, larva
Microgone herilla Westw., larva
Nudaurelia oyemensis (author?), larva
Pseudanthara discrepans Butler, larva
Tagoropsis flavinata Walker (= *hanningtoni*), larva

Urota sinope Westw., larva

Sphingidae (sphinx or hawk moths)
Sphingid spp. (2), larvae

Family unknown
Several spp., larvae

Miscellaneous Lepidoptera
At least one species, identity unkown

Orthoptera

Acrididae (short-horned grasshoppers)
Cyrtacanthacris (= Nomadacris) septemfasciata) Serville, adult
Homoxyrrhepes punctipennis Walker, nymph, adult
Locusta migratoria migratorioides Reiche & Fairemaire, adult

Miscellaneous Acrididae
Several species apparently

Blattidae (cockroaches)
Identity unknown

Gryllidae (crickets)
Brachytrupes membranaceus Drury

Tettigoniidae (long-horned grasshoppers)
Ruspolia (= Homorocoryphus) nitidula (author?) (= *nitidulus*), adult
Ruspolia sp., adult

Possibly the most comprehensive study anywhere to date on quantitative use of insects as food on a national scale was that of **Gomez et al** (**1961**) who estimated that insects furnished 10% of the animal proteins produced annually in Zaire (now Congo [Kinshasa]), compared to 30% for game, 47% for fishing, and only 1% for fish culture, 10% for grazing animals and 2% for poultry (Congo [Kinshasa] Table l; see Gomez et al, p. 805, Diagram E). This 10% for Congo (Kinshasa) as a whole becomes even more impressive when the data are broken down into the country's 25 districts and 137 territories. In Congo (Kinshasa) Table 2 (drawn from data of Gomez et al), the districts are listed in descending order on the basis of food insect use as a percentage of the total animal proteins produced. For each district, the number of territories is shown in parentheses. For example, in Kwanga district, which is divided into five territories, insects furnished 37% of the animal proteins for the district as a whole, and from 22% to 64% in the different territories. Totally, in the country, insects furnished more than 20% of the animal proteins produced in four of the districts and in 32 of the territories. It is interesting, and revealing, that in projecting the country's future protein needs and how they might be met, Gomez et al considered possible increases in fish culture, grazing animals and poultry, but assumed that the insect contribution, similarly to game and fishing, would remain only at then-current levels. These data are of particular interest, because it is probable that the quantitative use of insects as estimated for Congo (Kinshasa) is not atypical of most other countries in central and southern Africa.

Schebesta (**1936**: 165) reported on the foods of the Bambuti stating that the hunt is by no means the most important source of food. Their staple diet is essentially vegetarian and is provided almost exclusively by the women, although the men also bring in all kinds of roots or fruits on their way home from the hunt. The most favored titbit is honey, which is collected by both men and women. Six different kinds of bees are known to the Bambuti. All of the Bambuti eat ants, caterpillars and grubs. The grubs, mostly the size of one's small finger, are very fat and are found in decayed trees which the Bambuti persistently seek and break into fragments so as to secure all of the larvae. Schebesta states that: "Unfortunately the supply of foodstuffs is very uncertain, and changes with the seasons. There are lean months and full months. The snail season alternates with the ant period, and this in turn gives place to the time when grubs are plentiful and caterpillars in season."

Schebesta (**1938**: 67-71; vide Bodenheimer 1951: 195-196) reiterates in greater detail points made in the earlier paper. Game animals are more scarce in the Ituri than is generally assumed, and smaller animals,

including insects, are of fundamental importance for the existence of the Bambuti. The Ituri as a whole is rich in termite hills, and, according to Schebesta, termites vie with wild honey as the most prized foods of the Bambuti. Caterpillars, grubs from rotting trees, and larvae of all kinds are collected.

Schebasta (*sic*) (**1940**: 31) refers to the use of caterpillars and termites by the Bambuti (translation): "In the forest, one must always keep one's eyes open: this felt that clings to a tree trunk is a colony of caterpillars that will fill a supply basket in minutes. Grilled, it is a great pleasure, but on grinding them up with vegetables, a flavorful seasoning can also be made." Harvesting is the exclusive domain of women. Schebasta says of termites:

> Termites are not found everywhere; but all termite nests find fans. At the time of harvest, the camps are abuzz. The women get ready by weaving baskets. A termite mound has its owner, just as a tree with caterpillars or a tree with honey does. In order to indicate ownership, the discoverer of the find tramples on and breaks the underbrush all around it.

Schebasta continues:

> The propitious moment is that of the swarming; they frequently visit the termite nest for fear of missing it. By scraping off the thin layer of earth that covers the mound, the tunnels that wind through it are exposed. Some little pieces of wood are stuck in the openings; upon removing them, the moment when the termites are close to reaching the surface is recognized. Flight is at night. The family stays, during the waiting period, next to a small screen. Some leaves are held above the termite nest; at the base, a hole is dug and some resinous wood is piled there. The termite mound begins to swarm with a sort of grating. With wings outstretched, the insects rise, bump into the roof of leaves and fall back to the ground. A fire is lit at the edge of the hole, its light draws them, and they fall into the trap.

Chinn (**1945**: 123-131, 137-149) discussed the food use and nutritional value of several beetles, an ant, termites, caterpillars and a grasshopper in the province of Coquilhatville (the city of Coquilhatville is now Mbandaka) (see below under the appropriate taxonomic categories).

Adriaens (**1951**) studied the food and nutrition among five tribes, the Bayaka, the Bapelende, the Basuku, the Bambeko and the Bankano in south-central Congo (Kinshasa) (Kasai and Lower Congo districts). The studies were intentionally limited to regions where the economic activity is weak or nil, the soil barren, and the tribes have little or no income (pp. 228-230). The difficulties in conducting the study are described in part as follows (translation):

> Apart from the instinctive mistrust of the Blacks towards anyone who wants to penetrate their life, it must be remembered that the majority of adults are illiterate. Besides, the interviewees never understand the importance of the study in which they are wanted to take part. Either they carry on with lamentations of their bad luck or, so as not to incur the disfavor of the interviewer, and in the secret hope of getting it over with as fast as possible, they will give the response they deem the most conformable to his wishes.

Help from "native brothers of the teaching congregations, agricultural instructors, and the nurses of the rural dispensaries" was essential in overcoming these obstacles.

Adriaens notes that:

> When one comes in contact with the native of central Africa, one clearly gets the feeling that the question of the meal, which he does not require daily nor even periodically, pursues him like an obsession. Having scarcely arrived in Africa, we stopped before a venerable baobab and asked a bystander what the name of this tree was in the local dialect. He answered while shaking his head, 'It is not for eating.'.... Songs, proverbs and legends constantly recall the imperious necessity of alimentation. Among the Bapelende, the children welcome the traveler by singing: 'The rainy season is also that of the caterpillar and the pineapple' [pp. 231-232].... As a member of the clan, the Black knows that everything he owns belongs first to the clan, or at the very least, should be at the disposition of his fellow villagers. Consequently, he will keep in his hut only what he needs for one or two meals. Outside of some small packets of caterpillars or dried mushrooms, sometimes some leftover manioc, there are scarcely any foodstuffs that are not also found in the homes of his neighbors [p. 234].... In Pangala, among the Bankano, we were witness to a collective meal. Four women had each brought a basket of manioc paste of about 2.5 kg, with a

> small native casserole filled with a puree of legumes or squash almond 'soup,' insects cooked in water or, finally, some puree of legumes enhanced with some caterpillars. According to one's fantasy and preference, each of the participants pulls a bit of paste from one of the four baskets and dunks it into one of the four casseroles before swallowing it (p. 235).

Adriaens (p. 246) lists comparative prices of native products in the local market in Kenge (Bayaka and Bapelende) in March, 1948:

Manioc, soaked and dried in carrots	0.40 fr/kg
Maize	0.50 fr/kg
Peanuts in pods	2.00 fr/kg
Native rice, hulled	3.50 fr/kg
Fish, salted and dried	l0.00 fr/kg
Dried caterpillars "Mikwati" (Saturniidae)	12.00 fr/kg

Adriaens (p. 251) states:

> Without a doubt, the native finds carbohydrates in abundance in his natural environment, while protides and lipids, we agree, are in insufficient quantity. It would take some effort to overcome the deficiencies in his diet through the purchase of palm oil and salt, but his income seems inadequate for regularly obtaining imported meat. Salted and dried fish, unwieldy merchandise which is demanded by the higher-priority mining and industrial societies, has a hard time making its way to the interior of the country. More often than not, it is bought by the public services, which have to supply rations to the police and soldiers.

Adriaens makes several remarks relative to insect use in specific tribes. For the Bayaka, the forest is their domain.

> Since agriculture and fishing are the domain of the women, hunting is the main occupation of the men. It is the object of all their worries and the subject of their interminable conversations. When there is no meat or it is scarce, the Blacks fall back on insects: grasshoppers, caterpillars and crickets. In the dry season, at the time of the shrinkage of the waters, the waterfronts of the Kwango yield big aquatic mollusks. These dishes [mollusks], however, are reserved for the women and the 'poor.'

Adriaens states of the Basuku (pp. 262-263):

> When one travels through the country of the Entre-Kwenge-Bakali in June, one sees women and children by the dozen prowling over the recently burned land in search of charred grasshoppers. They have walked a long time to get to the bush of their clan; at dusk, they go back to their village with a fistful of insects, which will be used to flavor the crushed squash almond soup. The harvest of insects, an ancestral activity, is more consistent with the spirit of the Musuku than is big game hunting.

Of the Bankano, a very backward group, Adriaens says (p. 267), "The little currents of water contain few fish and the caterpillars are rather rare."

Adriaens (1951) notes that the tribes of the Kango are carnivorous by inclination, vegetarian by necessity. The introduction of manioc was a "godsend," but according to Adriaens, starchy foods have lost favor (p. 475). Carrots, along with manioc leaves, constitute the basic food, and yams are still found. As the manioc dough is tasteless it is never eaten without the accompaniment of garnishes, the *bissaka* and *makaia*. These garnishes are mainly obtained from the forest and include such things as mushrooms cooked in water and warmed up in palm oil, or squash almond soup which may or may not be flavored with grasshoppers, caterpillars or crickets. Adriaens states (p. 476), "Consumption of animal protides essentially depends on the risks of hunting and fishing, because it is the exception rather than the rule, and only for great events, that the Black will sacrifice a piece of his caprine livestock."

Game and fish are seasonal sources of animal proteins. Adriaens describes the role of insects as follows (a somewhat condensed and edited translation of Adriaen's text, pp. 495-498):

The rainy season also brings caterpillars, larvae and different insects, of which the natives are very fond. The most sought after caterpillars are the 'Mikwati.' 'Mikwati' is also the name given by the natives to the botanical association, *Erythrophleum africanum, Ctenium newtonni, Hyparrhenia pachystachya*, the most typical association of wooded savannahs of the Kwango, and also found in the small valleys. On the other hand, the caterpillars 'Misasi' or 'Mikobeto,' 'Tsiata' or 'Mingolo' show their preference for alighting on the 'Musesi,' Burckea africana.

Throughout the entire area of the Kwango district, situated beneath the 5th parallel south, there is some real breeding going on. A modern Black explained to us that, in his childhood, when he had discovered a caterpillar nest, he placed it precautiously on the 'Mikwati.' They were crammed in there, he told us, and growing larger, and at the time of the first brush fires, they fell from the tree, charred and dried. They were eaten immediately or stockpiled, unless they were cooked in water with salt before being put out to dry in the sun.

Some weeks before the beginning of the dry season, the Blacks burn the savannah, the goal being to force out the game, and also, thanks to the last rains, the bushes may give young sprouts again before the period of great drought. Whereas all the surrounding brush is left bare by the fires, the leaves of the 'Mikwati' constitute an abundant reserve of verdure. It is therefore very easy to harvest caterpillars, to dry and sell them. It is not unusual to see caterpillars called 'Panzi' displayed at the trading posts. At a single store in the commercial center of Kwenge in February 1948, there was a supply of 50 bags, 50 kg apiece; they were sold at 12 francs per kilo. We have been told that the territory of Kasongo-Lunda exports significant quantities of these caterpillars in the direction of [Kinshasa].

The best time to harvest caterpillars is December-January. At this time, the Blacks eat from 50 to 100 grams of dried caterpillars per day, for 4 or 5 persons. When the black housewife uses the dry caterpillars, she is careful to eliminate the contents of the body. When she has fresh caterpillars, she 'purges' them at both ends. It seems, then, that the chitin alone is eaten.

The 'Missati' or 'Mikwati' that we were able to harvest in the Bapelende villages appeared to be *Imbrasia* (Saturnidae). Generally, the caterpillars eaten by the natives belong to diverse families. Among our harvests, there were Sphingidae, Notodontidae, Noctuidae, Nymphalidae, and mainly, Saturnidae. It should also be noted that *Caeliades libeon* Druce (Hesperidae) is quite common and very well-liked by the natives. The Bapelende call it 'Mwanqu' or 'Tunzengededi.'

In the dry season, the natives do not disdain certain crickets, or 'nzenze' ([*Brachytrupes =] Brachytrypes membranaceous*), which are sometimes called 'tubes of fat,' certain grasshoppers, and 'kinzenze.' The 'nzenze' are solitary. At nightfall, they emerge from their tunnel to eat the fresh grass. Near the entrance of their lodging, they blast a long strident shout, running the risk of having to hurry into their tunnel at the slightest alert. With great skill, the black children succeed in capturing them at the moment they begin their cry. In the dry season, when the grass becomes scarce, the 'nzenze' move farther away to look for food. At the end of August 1948, we found tunnels containing debris of fern leaves. The Blacks then try to blind the insect with the light from torched straw. Most of the time it is necessary to dig deeply to capture the 'nzenze,' which are curled up at the bottom of their tunnel.

Among larvae of other insects, the white palm tree worm (*Platygenis barbata*, 'mafulu' in Kimbala, 'mafundu' in Kiaka) is a choice dish. The Basonde and the Basuku from around Feshi exhume 'Makela' larvae from soil close to streams and marshland. When the harvest is abundant, or when money is needed, the natives pierce some larvae onto a small stick, dry and smoke them and sell them in the village. In a native market at Feshi, 1 lot of 15 Makela was sold in 1948 for 1 fr 50. The 'Mafundi' are big Coleoptera larvae that live in hot, humid places, compost holes or places where palm tree leaves and wood debris accumulate. The female natives dig with a hoe to find the 'Mafundi' which are curled up on top of one another.

It is also important to point out the winged ants 'Tswa,' 'Ngangula' *Gnathocira* sp. [a scarabaeid], the 'Nsengi-tringa,' (Bambala) or 'Bitsiki' (Basuku) *Sternotornis* sp. and the different grasshoppers. Brush is burned in order to capture grasshoppers.

Culinary preparation of the insects is very simple. Caterpillars, larvae and grasshoppers are

> normally cooked at the same time as the peanut seeds and the crushed squash almonds. The 'nzenze' are heated in a native saucepan and sprinkled with water during cooking.
>
> Thus, each season brings protides of animal origin: during the dry season, big game, 'nzenze' and grasshoppers; during the rainy season, caterpillars; and throughout the year, fish, rodents, reptiles, and diverse larvae. Provision of these protides is essentially dependent on the nature of the fauna, on abundance of the species, and on the season, too. Hunting is the men's job, reptiles and rodents are captured by the children, and the harvest of different insects and fishing fall especially on the women's shoulders.

Adriaens reports that geophagy or the custom of eating earth is very common throughout much of the Kwango. Clay is preferred, with women the main consumers, especially those who are pregnant. The custom apparently has to do with a concern for providing lime to the fetus. Among the sources used are fragments of "fly nests," called "maconnes" (or animal which builds home with dirt). The genera used are *Synagris* sp. and/or *Pelopaeus* sp.

Adriaens discusses native cuisine as preparations based on vegetable products (pp. 518-520) and those based on products of animal origin (pp. 520-521). Vegetable preparations include: a) "Saka-saka," or puree of manioc leaves and young buds; b) Purees from leaves of other plants; c) Mushrooms, and; d) Foods of vegetable origin, like brans and voandzou, which are not indigenous (often they are introductions of the European) and make their way into the native dishes only with difficulty. Most foods, whether of vegetable or animal origin, are cooked for a long time in water. In the case of manioc leaves, chopping into small pieces and the long cooking should result in the hydrolysis of cyanogenetic heteroside and release of cyanhydric acid. Insects, small fish, crabs or shrimp are frequently added to the purees, but they represent only a small amount in relation to the total mass; "at the maximum, l0 caterpillars or grasshoppers, 50 grams of dried fish in a plate destined for 2 people." Relative to mushrooms, Adriaens states:

> During the rainy season, the natives gather and eat an abundance of mushrooms. One hundred grams of dried mushrooms dipped in tepid water before culinary use, then warmed up with a trace of oil, constitute a meal for 3 people. When the harvest is abundant, the housewives cut them up into pieces and dry them on the roof of the hut. They are, along with caterpillars, pili-pili and tobacco leaves, the only provisions that are found hanging inside the huts.

Preparations based on products of animal origin include: a) Game meat, occasionally bred meat, and larger fish; b) Rats, and; c) Insects, although the latter two are not considered meat. Caterpillars are cooked in saltwater after having been purged if they are fresh or winnowed if they are dried. They are eaten with "soup" of squashed almonds. The *nzenze*, or crickets, are handled in one of four ways: a) cooked in water with salt and some pili-pili; b) pierced through with a small stick, grilled and eaten immediately, either alone or with squash soup; c) cleaned of intestines, feet and mandibles, dried over the fire or in the sun, and munched upon; d) thrown into a hot saucepan and sprinkled with a little water.

Finally, Adriaens (p. 532) presents data on the nature and frequency of garnishes among 44 Bayaka families at Munene during the morning meal, September 12, 1948, towards the end of the dry season:

l) Purees, whose major ingredient is "Dimbula" (*Gnetum africanum* Welw.)		18 or 44%
Dimbula + grilled winged ants	l	
+ different grasshoppers	l	
+ mushrooms + grilled winged ants	l	
2) Purees with a "Mbondi" base (*Salacia pynaerti* DeWild)		11 or 25%
Mbondi + squash seed or peanut seeds + caterpillars	2	
+ grilled winged ants	1	
3) "Soups" with a squash seed base		10 or 23%
+ caterpillars	2	
+ grilled winged ants	1	
+ grasshoppers	3	
+ caterpillars + grilled winged ants	1	
+ grasshoppers + caterpillars	l	
+ grasshoppers + shrimp	1	
4) Different foods		5 or 11%

Grilled nzenze (*Brachytrupes membranaceus*) l

From the above tabulation, it is seen that, on the particular morning sampled, insects were included in 16 of the 44 family meals or 36%.

Relative to animal proteins, Adriaens (p. 534) says of caterpillars, "The usual amount of dried caterpillars cooked in water and added to peanut seeds or crushed squash almonds is 100 grams for 2 adults."

Finally, in stressing the quantitative importance of garnishes, Adriaens mentions (p. 546) several of them that included insects that were observed in the mission schools: at Kingunji, caterpillars + ground peanuts + pili-pili; at Kimbongo, worms of the palm tree (*Platygenis barbata*) + some squash almonds; and at Ndinga, salted and dried fish cooked in water with caterpillars (Saturniidae) + palm oil + pili-pili.

Adriaens, as have others doing similar studies, stressed the difficulty of getting reliable specific insect identifications, even when expert taxonomic input is available. He states (p. 495): "We would really like to stress how laborious the identification of the insects was. The specimens gathered in the villages are frequently in different stages of development. Moreover, they are already in a dry state the majority of the time, unless they have been treated or grilled by the natives. Insects and grasshoppers have almost always had their feet and wings removed."

Heymans and Evrard (1970) analyzed several kinds of insects purchased in a public market in the village of Lubumbashi, and, in addition, several lots from captures in the vicinity of the village (Congo (Kinshasa) Table 3; see below, data drawn from Heymans and Evrard, pp.334-337). The lots collected for analysis were as follows (translation):

#1) Soldier termites of the genera *Bellicositermes* and *Macrotermes* (Family Termitidae); vernacular names, *macaro*, (Swahili), *mankenene* (Tshiluba-Kasai), *bamambay* (Tshibemba); purchased alive 9 January 1970; price 20 K (Makuta) for 206.2 grams. The soldiers are eaten grilled or smoked and constitute a food much-liked by the Baluba (Kasai and Katanga), the Tshokwe and the Lunda.

#2) Winged termites of the genera *Bellicositermes* and *Macrotermes*; vernacular names, *inswa* (Swahili), *nswa* (Tshiluba - Kasai), *fibengele* (Tshibemba); captured November 1969, bought January 1970, smoked material; price 10 K (Makuta) for 137.4 g. The authors state that the winged termites "are harvested in abundance from the time of the first rains and represent a delectable food for the tribes of Katanga and Kasai. The natives prefer them far and away to the soldier termites which, according to them, have very few lipids and consequently are of very low nutritive value."

#3) Caterpillars; vernacular names, *mansamba* (Tshiluba-Kasai), *bamukoso* (Tshibemba); captured October 1969, bought 9 January 1970; price 20 K (Makuta) for 176.3 g.

#4) Caterpillars; vernacular names, *nukoso* (Tshibemba), *binkubala* (Swahili); captured 11 January 1970; boiled material + salt. The authors state that caterpillars are frequently encountered at mealtime and constitute, along with winged termites, a secondary food that is very well-liked by the Katanga and Kasai populations. They often accompany the main dish obtained from manioc flour or corn mashed in boiling water. They can be prepared by simple cooking in saltwater, by frying in boiling oil after previous cooking in non-saltwater, by grilling on metallic plates heated over a fire, or by smoking by a wood fire.

#5) Nymphal stage female grasshoppers without wings, *Homoxyrrhepes punctipennis* (Walker) (Family Acrididae); vernacular names, *pandjo* (Swahili term for grasshoppers in general), *muluba* (Tshiluba-Kasai), *tete* (Tshibemba); living material captured 12 January 1970.

#6) Same data as Lot #5 except these grasshoppers were in the sixth nymphal stage with wings half-developed.

#7) Adult male grasshoppers, otherwise same data as Lots #5 and 6.

Grasshoppers are prepared by several methods, but mainly by grilling or smoking. They are used as a sidedish and are well-liked by the local people. *Homoxyrrhepes punctipennis* is collected in qreat numbers in the same season as another edible species, *Ruspolia (= Homorocoryphus) nitidula*, but whereas the former is collected in tall graminees bordering roads and fields, the latter is collected mainly in the evenings around public streetliqhts.

According to Heymans and Evrard, the edible insects utilized in the province of Katanga are mainly the termites, caterpillars and grasshoppers, and these are all prized by the local populations. They are rich in proteins and fats (a very much sought-after constituent), furnish some calcium and make not a negligible contribution to nutrition. The authors state that: "The winged termites are especially rich in lipids. In the eastern province, this fat is kept in a jar and is currently used by the local people. It constitutes a solution to all lipidic problems." They also state: "The various cooking methods, as well as the modes of modern transportation, permit their acquisition almost year-round. Their low price does not pose an obstacle to the majority of the people, who can likewise find proteins and fats at a cheap price."

Tango Muyay (**1981**) (as translated by Dan Turk) identifies by vernacular name and discusses more than 50 species of insects eaten by the Yansi, a group of people living in an area of central Zaire extending

approximately 200 km southeastward from the city of Bandundu. That the Yansi recognize the nutritional value of insects is apparent from an old Yansi saying, "caterpillars and meat play the same role in the human body" (p. 9). The author emphasizes that unlike large game animals, insects are easy to catch and readily available throughout the year. Hence the saying, "As food, caterpillars are regulars in the village but meat is a stranger" (p. 10). A table (p. 28) lists many of the species available each month, the main season being December-January.

Tango Muyay describes several methods for conserving insects (p. 11). Some species are preserved alive for weeks or even months. "Mimpoo" caterpillars are placed in the thatch roofs of houses where they make their "nests" and can be kept alive for up to 6 months. Beetle larvae are sometimes kept in pots where they fatten on manioc flour for 3 or 4 weeks. "Nseol" palm grubs can be kept alive in oil where they grow fatter until ready to be eaten several weeks later. Three species of caterpillars ("misa", "nkukab", and "mindan") are sometimes taken from the forest at a young age to be raised to maturity on trees in the village. Beetle larvae, grasshoppers, black crickets, termites and many caterpillars are dried in the sun, then over a fire for long-term preservation. Drying in this manner appears to be the preferred method for preparing insects for sale to commercial vendors. Muyay warns that poorly preserved caterpillars are subject to attack by maggots (p. 12). In preserving insects or preparing them for direct consumption, the intestines of species with a lot of excrement are first purged. Species without excrement are highly esteemed (p. 21).

Tango Muyay emphasizes the increasing importance of insects in commerce, particularly of certain caterpillar species. One of the species for sale in the Bandundu market in January 1981, "mingwel," was purchased from merchants in Kikwit, more than 250 km to the southeast (pp. 12-13). Some species now used were relatively recently adopted into Yansi cuisine due to the influence of their neighbors, the Mbala (p. 13). Among these are "makul" larvae, "kebamwe" beetles, and a number of grasshoppers (p. 147). Muyay devotes separate chapters of his book to caterpillars, larvae, adult beetles, crickets, grasshoppers, aquatic insects, and termites, providing information on each species' use as food and by whom it is collected, cooked and consumed, and information on food plants, behavior, abundance and seasonal availability of the insects (see below under the appropriate taxonomic categories). Muyay also records songs (a total of 70), stories and sayings which illustrate the importance of each species within Yansi culture.

Susan Kirinich, Peace Corps Volunteer in Zaire (now Congo [Kinshasa]) from 1981 to 1983, reported (pers. comm. **1987**) that grubs, caterpillars, termites, grasshoppers, and an unidentified larva are used as food by the Pende tribe (the people are known as the Bapende) in the Bandundy Region (capital: Kikwit). Specific observations were mainly in the vicinity of the village of Kilembe and town of Mukedi. Caterpillars and grubs were available during the dry season (June-September), grasshoppers throughout the year. Kirinich summarized her observations as follows:

> Caterpillars were a very important source of protein at a time of the year when there were few green vegetables available. They were usually fried in palm oil and were tasty! Termites were eaten only in the winged stage. People simply stood over a termite mound and caught them as they flew out. They were eaten both raw (still alive) and cooked in palm oil. Grubs were sold in the market on sticks, but I never saw how they were gathered. They weren't very popular in my area. The unidentified larvae were thin and whitish and sold in the market alive in baskets. Their appearance was not inviting. The grasshoppers were difficult to catch and they were mainly sought after by children who had the patience to stalk them.

Pamela J. Boyle, PCV in Zaire (now Congo [Kinshasa]) from 1983 to 1985, reported (pers. comm. **1987**) the use of palm grubs, large crickets, red ants, termites (both winged and unwinged), black and white striped caterpillars, and cockroaches. Tribes observed included the Bakuba and Bakete (Bantu tribes that migrated from south of the Angola border), and the Baluba (Bantu tribe from central Zaire which has a lot of mixing with Arab traders). Geographically, observations were primarily around Mweka, Kasai Occidental, 150 km north of Katanga on the main road through Ilebo and Kikwit to Kinshasa. Termites were collected during the season when they were flying, crickets in the wet spring, caterpillars at the end of the rainy season (May-June), ants when they came out to search for food (influenced by the moon?), and palm grubs whenever a palm tree was harvested. It was usually the children that captured the insects. The only "rearing" observed involved palm grubs; when found in the base of the trees, they were allowed to remain until they were large. The grubs were fried or ground up to make a sauce. Crickets and cockroaches were eaten fried, with their legs removed. Caterpillars were fried. Winged termites and ants were eaten alive or dried, while the soft white termites were pounded to a pulp or a sauce.

It is probable that the "large crickets" observed by Boyle were *Brachytrupes membranaceus*, considered a delicacy in East Africa from Uganda to Zimbabwe.

Ann DeLong, PCV from 1983 to 1985, observed the use of palm grubs, caterpillars, flying and

unwinged termites, and grasshoppers (pers. comm. **1987**). Palm grubs and caterpillars were sold in Kinshasa. Winged termites, used by the Lulua tribe near the city of Kananga in the Kasai Occidental region, were caught when they were attracted to the light of a lantern placed outside. The wings were removed and they were eaten raw. Unwinged termites were collected by inserting a piece of straw into one of the holes in the termite hill. They were eaten raw or fried in palm oil. Grasshoppers, swarms of which invaded the fields once a year, were collected by the Hutu tribe (observations near the city of Goma in the Kivu region). Wings, tails and legs were removed and the bodies were then fried in palm oil.

Chris Allen, PCV from 1984 to 1986, commented as follows (pers. comm. **1987**):

> What interested me most about insect consumption in Zaire was that while insects played a major role in the diets of people all over the country, certain ethnic groups near the Rwandan border considered eating insects disgusting. These groups - Bashi, Batutsi, Balumde and a few others - lived next to other groups that did consume insects (e.g., Balega), but for the most part individuals had never *heard* of the practice and were shocked when told about it. People did eat grasshoppers, roasted in a fire, but never dreamed of eating the termites, caterpillars or palm grubs that were 'haute cuisine' elsewhere in the country.

Professor **G. Parent**, in Rwanda, has mentioned (pers. comm. **1988**) that there is no use of insects as food among Rwandans, although Dr. **Florence Dunkel** mentioned (pers. comm. **1988**) that grasshoppers are eaten there.

Katya Kitsa (**1989**) (as translated and reviewed by Dan Turk) conducted a survey of household expenditures on edible insects over the course of 9 months (September 1986 through May 1987) in Kananga, a city of over 200,000 people in Western Kasai Region, Zaire (now Congo (Kinshasa)). Based on the prices of insects in city markets, he calculated the quantities of insects purchased. In the 237 households surveyed, 564 of the 2006 people represented purchased an average of 1331 kg of insects per month. This amounts to 2360 g of insects per person per month for the people who ate insects, or 663 g insects per person per month for all people surveyed. If accurate and representative, this represents at least 12,000 tons of insects consumed in Kananga per year. The relative quantities (weight basis) of various insects consumed were termites 35%, caterpillars 30%, larvae [other] 23%, and grasshoppers 12%. The author noted that people in outlying areas purchased more insects than those living nearer the city center. On a weight basis, the price of smoked caterpillars was only 26% of the price of beef.

Over the same nine month period a survey of insects sold in the six major rural markets that supply Kananga with edible insects yielded information on the types and seasonality of insects available in Kananga. The people selling insects provided information covering the summer months. Sixteen types of insects, identified by local names, are described briefly: 9 caterpillars, 4 termites, 2 beetle larvae, and a grasshopper. Three of these, soldier termites, beetle larvae from oil palms, and beetle larvae from raphia palms, were sold live throughout the year. All others were seasonal though preservation permitted some to remain in the markets for extended periods. More types of insects were available from December to April than the rest of the year.

The author calculated the dietary importance of insects in Kananga based on protein content and quality compared with FAO/OMS dietary recommendations. According to his calculations, insects satisfied all of the daily animal protein requirements of the people who ate insects. Similarly, using regional animal production statistics, he calculated that cattle, sheep, goats, pigs, poultry and fish (apparently the only animals for which data were available) satisfied only 37.5% of dietary animal protein requirements in the region as a whole. Because of their potential to satisfy protein needs, he concluded that insects "merit the attention of all people responsible for promoting the improvement of our people's health: health workers, merchants, and researchers." His recommendations for increasing insect consumption in Kananga included nutritional education to extirpate sociological and psychological constraints to insect consumption, and examination of possibilities for the development of an insect flour for feeding to children. (Turk states that "Although the accuracy of Katya Kitsa's survey data is open to question, it is clear that insects continue to contribute substantially to protein nutrition in this part of Africa. Local publication of this article is evidence that Zairians consider edible insects a resource worth developing.")

Caputo (**1991**) presents a colored photograph showing "caterpillars and palm grubs fresh off the riverboat" covering a table in Kinshasa's central market. According to a newspaper article by **Neil Henry** (*Washington Post*, May 10, **1991**), these and other edible insects are very much a part of Kinshasa's night life:

> The hot band known as Masanka looked like some kind of single-celled organism as it jammed at an outdoor pub here the other night, expanding in size whenever anybody from the crowd felt the spirit to join in. . . . This infectiously buoyant Zairian beat can be savored in the cite section of Kinshasa on any night of the week - often starting as late as 2 a.m. - in clubs that range in

style from the bright-colored lights and well-dressed crowds in the O.K. Jazz Club to down-home outdoor pubs featuring neighborhood youths honing their skills on guitars, trumpets and bootle drums. Beer, fried goat innards and insect delicacies such as termites, caterpillars and palm grubs sauteed in spicy garlic sauce are the most popular items on the menu.

Amy Roda, a Peace Corps volunteer, reported (**1991**) that the extent of edible insect use in the Zairian diet varies between the different regions and even within the same region. There was relatively little use where she was posted, in Bas Zaire in an area known as the Mayombe. Insects such as caterpillars and palm grubs were served to her only on rare occasions. One insect served was *Biphatu*, a kind of caterpillar which during the dry season congregates inside orange silk packets. Roda mentions that, "By many, insects are not considered food for people. . . It is difficult to say whether insects are being reintroduced because other meat sources are decreasing as the population grows and the forest diminishes, or if the strong western influence will continue to hold sway." She mentions that although *Biphatu* are not readily eaten in her area, they are collected and sold to merchants who transport them to large cities such as Boma and Matadi. There, market women sell them, dry, by the bar glass or tomato can.

Roda found when visiting the Cateral, the area between Matadi and Kinshasa, and two other regions in Zaire (now Congo (Kinshasa)), Bandundu and Kaisi occidental, that insects were more frequently included in the diets. She states: "In the local market one has a variety of textures and flavors to choose from. Live palm grubs can be had pretty much any time, though I prefer the seasonal grasshoppers and termites. They are best when fried in palm oil with a bit of hot pepper and salt. They are a better complement to a cold beer than any 'Frito-Lay' product." In the Bandundu region insects are eaten raw. When a mound of emerging termites is encountered, "all other planned work is stopped, much to the frustration of the Volunteer." She was told that "a mouthful of live termites tastes much like bacon." The largest selection of insects can be found at the Grand Marche in Kinshasa. They are brought in from all the regions, both live and preserved. They are also regularly sold as a bar snack in Kinshasa's fashionable night hot spot, the Matonge. Finally, relative to fish culture, Roda mentions that nests of ants are usually used to attract fingerlings to be "lift-netted" and transferred to other ponds. She states that, "Often after a couple of years, the ant population is depleted making it difficult to harvest fingerlings." Plankton currently serves as the major food source for pond fish, but Roda notes that a simple and low-cost cultivation of insects "would enhance production as well as aid in the collection of fingerlings."

Tango Muyay (**1994**) discusses the use of insects representing a number of orders and families as remedies in Zairian folk medicine.

Coleoptera

Curculionidae (weevils, snout beetles)
Rhynchophorus phoenicis Fabr., larva, adult (occasionally)

Ghesquiere (1947) states that: "Natives of [Zaire] are very fond of Rhynchophoridae and hunt them in a rather interesting manner: sticking their ear against the palm tree, they recognize the right moment for harvesting by the noise that the larvae make while nibbling away at the inner tissues of their plant-host." According to **Bodenheimer (1951:** 186), *Rhynchophorus phoenicis* is the palmworm of tropical Africa and the species about which Ghesquiere was writing.

According to **Chinn** (**1945**), to track down the ivory-colored larvae (known as "Mpose" in Kundu) in fallen palms the natives strike the trunk a sharp blow, then whistle softly. If larvae are in the tree, the natives claim to hear a fine stridulation in response. Practically the whole fallen palm is eventually invaded by the *R. phoenicis* larvae, and this occurs more or less regularly the year round. The succulent larvae and to a lesser extent the adults ("Linkoo" in Kundu) are eaten throughout the province. The larvae may be eaten raw with a little bit of salt and pepper after washing and decapitation, or steamed in Nkongo leaves, or cooked in a minimum of water. They are always eaten alone, as a delicacy. "They have a taste like light wine," according to Chinn. The Bakela are great consumers of the larvae, because the harvest and selling of the malafu was, in times past, their principal source of revenue, and, as they did not climb palm trees, they were obliged to cut them down for the wine harvest. Larvae were found to contain 78% water, and with dry matter content of 47.4% protein and 52.4% fat (p. 129; a small error in calculation seems apparent inasmuch as dry matter constituents totalled 101.13%). According to Chinn, the natives eat 250 g of the larvae at a time. They also eat the adult beetles after first removing the head, legs, elytra and wings, then smoking them.

Grubs or palm grubs are mentioned (see Introduction) by Schebesta (1936, 1938), Adriaens (1951), Allen (1987), Boyle (1987), DeLong (1987) and Kirinich (1987), Kitsa (1989), Caputo (1991), Henry (1991), and Roda (1991). One vernacular name is *mafundi* (**Adriaens 1951**). Also see Muyay (1981) under

Miscellaneous Coleoptera.

Scarabaeidae (scarab beetles)
Gnathocera sp.
Goliathus sp., larva
Oryctes boas Fabr., larva, adult
Oryctes owariensis Beauv., larva, adult
Platygenia (= Platygenis) barbata Afzelius, larva

The huge grubs of *Goliathus* sp. (goliath beetle), which live in the swelling near the roots of banana trees, are considered a gastronomic treat **(Bequaert 1921).** The grubs frequently measure 13-14 cm in length. *Platygenia barbata* larvae (*mafulu, mafundu*) and those of *Gnathocera* sp. are mentioned by **Adriaens** (**1951**) (see Introduction).

Chinn (**1945**) listed, in addition to the two *Oryctes* above, *Oryctes rhinoceros*, but this is in error as the species does not occur in Africa. Both larvae and adults of *Oryctes* are eaten according to Chinn.

See also Tango Muyay (1981) under Miscellaneous Coleoptera.

Miscellaneous Coleoptera

Tango Muyay (**1981**) describes five types of edible larvae used by the Yansi (pp. 114-119), four of which are beetle larvae. Two of these ("makul ba" and "nseol") are associated with palm trees, one ("makul makul") with dead trees and the other ("bengweri") with swamp plants. "Makul ba" develop into "kebamwe" beetles which appear to be *Rhynchophorus* (drawing p. 109). Makul makul are eaten in large quantities and reportedly liked by everybody as are bengweri larvae. As with caterpillars and adult beetles, when larvae are found in small quantities, they are generally given to children. Bengweri develop into "bensim," adult beetles which are also eaten, mostly by children. According to Muyay, adult beetles are very important to the Yansi. Four types are used, "kial", "kwer", "kebamwe", and "besim" (pp. 120-135). Kial appear to be (according to Turk) *Augosoma* sp. (drawing p. 109) and are well-liked. They appear in the dry season and can be collected around street lights or by cutting down a vine to which they are attracted. Regarding kebamwe, a palm wine collector is quoted as saying, "Kebamwe and their larvae are our preferred food. We also like to give them to our children because they contain a lot of protein" (p. 126).

Hemiptera

Nepidae (waterscorpions)

Tango Muyay (**1981**) reports (pp. 151-158) that the Yansi eat four types of aquatic insects, one of which (according to Turk) is a waterscorpion (drawing p. 144). Aquatic insects are eaten almost exclusively by women, who catch them mostly in small quantities while fishing or soaking manioc in streams.

Homoptera

Cercopidae (spittlebugs)

Yansi children eat "bentiey," which (according to Turk) appear to be spittlebugs (**Tango Muyay 1981**, p. 117, drawings on pp. 103, 105).

Hymenoptera

Apidae (honey bees)
Apis mellifica adansonii Latr., larva
Meliponula bocandei Spin., larva
Trigona braunsi (Kohl), larva
Trigona erythra interposita Darchen, larva
Trigona lendliana Fr., larva
Trigona occidentalis Darchen, larva
Trigona richardsi Darchen, larva

Parent et al (1978) defined the habitat of seven species of bees that produce honey in the clear forest of

southern Shaba and described the physical and chemical characteristics of the honey produced. Although apiculture is not practiced in southern Shaba, the average annual consumption of honey per adult living in the clear forest is estimated at 15 liters. The calorific values of the honey produced by the different species ranged from 231 to 283 per l00 g, except for a lower value, 176 calories, in one species. In addition to *Apis mellifica adansonii* Latr., which is already domesticated in other territories of Congo (Kinshasa), the authors call attention to *Meliponula bocandei* Spin. as a candidate for possible domestication and local apiculture.

Despite the fact that the practice has been much criticized, honey is still harvested by cutting down the tree, causing serious damage to the forest because of the number of trees felled. Parent et al describe the harvest of honey and the use of the larvae as follows (translation):

> At the time of activities in the forest, the villagers marked with a reference marker the swarms where they are frequently brought by the indicator bird: *Indicator indicator* (Sparmann). This bird guides man toward the swarm with its cries, receiving as retribution of its services some cells tossed aside, some bee larvae or some gulps of honey to swallow. The association of this bird with man had already been cited. . . . The harvest of honey was performed in a cloud of smoke in order to reduce the combativeness of the insects; to this end, a fire is lit at the foot of the tree where the swarm is lodged, some armfuls of greens are thrown on it and in no time a dense column of smoke begins to rise. The tree is then cut down and the insects are again smoked out with the aid of a torch. Access to the honeycombs is enlarged with an axe and then they are harvested. The empty cells, of a dark brown color, are thrown out; those containing nymphs or larvae are set aside and those of a light color (practically white) filled with honey are gathered together in a vessel. The harvester, of course, has the right to dispose of his booty as he pleases, but it really seems that the destination and utilization of the different parts is traditionally established. The villagers are very fond of larvae, thus they generally cannot resist the pleasure of tasting some by chewing the operculated cell, the wax then being spit out again. The remainder of the honeycombs containing the larvae is brought to the village, then heated up in a vessel where the wax melts, thus allowing the larvae to become isolated. These larvae are at last grilled, then salted and eaten as a sidedish. The combs of white wax containing the honey are broken up with a pestle and the honey is harvested by pressure or decantation. The use of different categories of honey depends on its properties and the quantity capable of being harvested.

Species discussed by Parent et al, in addition to *Apis m. adansonii* (vernacular name, *shimu)* and *M. bocandei (kibonge*), include *Trigona braunsi* (Kohl) (*solwe*), *T. erythra interposita* Darchen (*kipashi*), *T. lendliana* Fr. (*kanyanta*), *T. occidentalis* Darchen (*mwande*) and *T. richardsi* Darchen (*bungulwe*). The vernacular term applied to the bee in each case is also applied to its honey.

Bequaert (**1921**) stated that, in the region of Garamba, the nests of wild bees are sought, not only for their honey but for their larvae and pupae which are roasted before being consumed. In the Ituri Forest, **Christy** (**1924**: 40) reported that grubs, honey and pollen were eaten fresh from pieces of honeycomb pulled from bees' nests. The empty nest was then discarded.

Formicidae (ants)
Carebara vidua F. Smith, winged adult
Oecophylla smaragdina longinoda (author?), larva, adult
Sternotornis sp., winged adult

Bequaert (1913: 429; **1922**: 329) noted that the large, winged queens of *Carebara vidua* F. Smith which emerge in great numbers at certain seasons from termite mounds are highly prized as delicacies in Congo (Kinshasa), as they are in other parts of tropical Africa. Only the abdomen is eaten, sometimes raw, sometimes fried, sometimes roasted.

Ants are mentioned by Schebesta (1936) and by Boyle (1987) (see Introduction). The winged adults of *Sternotornis* sp. are mentioned by Adriaens (1951) (see Introduction).

Adults and larvae of the weaver ant, *O. smaragdina longinoda* (known as "Moomba" in Kundu) are eaten by natives from throughout the province of Coquilhatville (**Chinn 1945**). The ants are abundant on fruit trees. The larvae are soft and white and their taste is sweet. The nest is smoked out, then stripped of its silk and the adult ants and larvae are wiped off, washed and dried in the sun. A paste is made from the mixture and then steamed. Analysis of a mixture of adult and larval ants revealed a water content of 73.5% and dry matter content of 48.3% protein and 12.0% fat.

Sphecidae (sphecoid wasps)
Sceliphron (= Pelopoeus) sp.

See Adriaens (1951) in Introduction.

Vespidae (wasps, hornets)
Synagris sp.

The nests of certain social wasps are sought for the same purpose as are those of wild bees, collection of their larvae and pupae as well as their honey **(Bequaert 1921).** *Synagris* sp. (subfamily Eumeninae) is mentioned by Adriaens (1951) (see Introduction).

Isoptera

Tihon (1946b) conducted proximate and mineral analyses (Congo [Kinshasa] Table 4; see Tihon pp. 867-868) on lightly grilled termites as sold in the market at Kinshasa (0 fr 50 per small handful). They are known as *donge* and "constitute a food that the majority of natives consume voraciously." Tihon says (translation): "They draw from it, moreover, a colorless oil, of good quality, which would be excellent for use in frying; it would have even been good enough for a European." Tihon notes that the termites analyzed had a calorific value of 561 kcal/100 g, placing them "among the richest foods, superior to the animal products that we have studied and approximating the peanut." Tihon suggests that the use of termites, along with caterpillars and adult and larval Coleoptera should be encouraged in meeting the dietary needs of the inhabitants. It is noted that the emerging swarms of alate individuals also furnish food for other animals, amphibians, reptiles, insects, birds and farm animals. The termite nests are, in certain areas, the property of the villages, showing the importance that is attached to them. Some of the termites are eaten raw. Tihon says, "Who has not observed at times some young individuals lying flat on their bellies in front of the exit of small nests waiting for the arrival of these winged insects in order to swallow them immediately."

Hegh (**1922**) described methods of harvesting termites and their preparation as food in the various districts of the country. Hegh attests that the taste of roasted termites is suitable to the European palate. [This paper awaits translation; Bodenheimer 1951: 147-151 summarizes it.]

"Twe" is the Yansi word for termite; it means "let's go" (**Muyay 1981**). They were given this name by Yansi ancestors in recognition of the need for fast action in catching the winged adults as they precipitously leave their mounds. The Yansi recognize several categories based on species and castes. "Twe musiem" are collected from the large mounds and, according to Muyay, their protein and delicious taste make them a good meal for children. Also, according to Muyay, 20-60 kg may be collected from a single mound, although sometimes a mound will contain less than 5 kg. When dried, termites can be kept for several months. Some people sell dried twe musiem in the cities. Several other types of termites are collected, including two kinds of soldiers, a black type found in the forest and a brown type found in the savanna. Soldiers are often cooked with mushrooms or manioc leaves and make them taste delicious, according to the author. Queens collected by the women are usually presented to one of their husbands who in turn gives it to the little children. If there is a nursing child in the family, the queen is usually reserved for him/her.

Consumption of termites (various forms) is mentioned (see Introduction) by Schebesta (1938), Schebasta 1940), Allan (1987), Boyle (1987), DeLong (1987) and Kirinich (1987), Katya Kitsa (1989), Henry (1991) and Roda (1991).

Termitidae
Bellicositermes spp., winged adults, soldiers
Macrotermes (= Termes) natalensis Haviland, winged adult, soldier
Macrotermes spp., winged adults, soldiers
Pseudacanthotermes (= Acanthotermes) spiniger Sjostedt, winged adult
Termes gabonensis (author?), winged adult, soldier

Termites are prized in Congo (Kinshasa) as they are throughout tropical Africa. **Bequaert (1921)** recounts that, "So anxious are the Azende and Mangbetu of the Uele district to secure these so-called ants that termite hills are considered private property, and during the harvest of the insects, fights, often resulting fatally, occur between rival claiments." *Pseudacanthotermes (= Acanthotermes) spiniger* and *Macrotermes (= Termes) natalensis* (Haviland) are two of the important species. Bequaert (p. 196) describes an ingenious method of harvesting the winged sexual forms:

> They tightly enfold the termite mound in several layers of the broad leaves of a marantaceous wood reed, the interstices soon being closed with earth by the termites, which usually join the inner leaves to the nest. A projecting pocket, built on one side of the leaf cover, serves as a trap, for when the winged termites begin to swarm, they find no egress and finally drop in masses into the pocket from which they are scooped out. . . . In other instances the nests themselves are dug up to obtain the workers, soldiers, and huge, fat queens, which form a dainty titbit when broiled over the fire. At Banalia along the Aruwimi River in December, 1913, I was rather surprised to find, among many strange articles of food offered for sale by the natives at the weekly market, baskets of dried soldier termites.

Among the inhabitants of the Ubangi, winged adults of *M. natalensis* and *T. gabonensis* are known as "Ndonge," the soldiers as "Kalo" (**Chinn 1945**). *M. natalensis* is very common, they build huge nests, and the winged forms swarm during March-April at nightfall, often after a hard rain. The soldier termites are collected the year round. Chinn describes methods of collecting both the winged forms and the soldiers. The winged forms have large fatty reserves, and, according to Chinn, "the natives are wild about them." The termites are washed and put out to dry in the sun for 3-4 days. The winged forms are slightly grilled to remove their wings. They are eaten with bananas or chikwangues, either grilled and whole, or reduced to paste in a mortar. Or they are sometimes added to meat or fish as part of an ordinary meal. Chinn says the Ndonges "are a good food that tastes like hazelnuts." The soldier forms are low in fat, and the natives find them easy to digest. Proximate analysis of winged *M. natalensis* revealed a dry matter content of 33.06% protein and 54.68% fat. *T. gabonensis* soldiers were 72.90% water, and, on a dry matter basis, 37.05% protein and 3.00% fat.

Winged adults and soldiers of *Bellicositermes* spp. and *Macrotermes* spp. are eaten (see Heymans & Evrard 1970 in Introduction).

Lepidoptera

Some 40 km northeast of Lubumbashi in southern Congo (Kinshasa), **Malaisse and Parent (1980)** found that, among the many insects consumed, caterpillars are the most important both in quantity and diversity. At least 35 species are consumed, 26 of which could be specifically identified after rearing (see Congo [Kinshasa] Table 5; Malaisse & Parent Table 1). Most of these species are univoltine and show strong "seasonality" (**Malaisse 1974**). Malaisse and Parent constructed taxonomic keys for identification of the caterpillars and supplied data on foodplants and season of harvest (see Congo [Kinshasa] Table 6; data drawn from Malaisse & Parent Tables 1 and 2). Congo (Kinshasa) Table 7 (data from Malaisse & Parent Table 1) reveals that 20 of the species are available only during March and April and that a total of 29 and 32 species are harvestable during those two months, respectively, which corresponds with the "late rains" in southern Congo (Kinshasa). Fewer species are available for harvest in other months, and none from November through January, which, however is the period of heavy harvest in neighboring Zambia. Other studies indicate that the season of maximum caterpillar harvest varies considerably from region to region.

According to Malaisse and Parent, certain villagers are very knowledgeable about hosts for the edible species and the season when each is ready for harvest. Not infrequently, a branch containing many young caterpillars of an edible species will be cut off, transported to the vicinity of the village and attached to a tree of the same species. Malaisse and Parent provide detailed information on how the various caterpillars are prepared prior to being either roasted on heated sheet metal, cooked in boiling water, or fried in oil. Salt or, possibly, red peppers may be added. When part of a harvest is to be preserved, the caterpillars are either smoked or cooked by boiling in salt water, followed by draining and drying.

Malaisse and Parent analyzed caterpillars that were prepared in a manner identical to that which precedes their culinary preparation, then dehydrated. As shown in Congo (Kinshasa) Table 8 (Malaisse & Parent Table 4), kcal/100 g dry weight averaged 457, ranging from 397 to 543. Crude protein content averaged 63.5%, ranging from 45.6 to 79.6%. Most species proved a good source of phosphorus and an excellent source of iron, 100 g averaging for 21 species 335% of the daily requirement for the latter. One species of unidentified Limacodidae was, for an insect, unusually high in calcium, containing 1.6 g/l00 g of insect. The samples analyzed included 17 species of Saturniidae, five of Notodontidae, and one of Limacodidae. Professor Malaisse (pers. comm. 1987) noted that caterpillars are always in demand in southern Shaba.

Bequaert (**1921**) reported that at least six species of lepidopterous larvae are used by the Medje, including the saturniid, *Micragone herilla,* and two undetermined species of ceratocampids. The Medje also use the larvae of the psychid, *Clannia moddermanni,* which live within large silken bags that they spin, and the larvae of *Anaphe,* which become gregarious (a dozen or more) when full-grown and spin a communal silk nest in which they spin cocoons and pupate. These larvae are much-liked but adversely affect some individuals, producing "prostration" for as long as two or three days. The Medje also diligently seek a caterpillar (species

unknown) called *ebbo* which, when dried and smoked, can be preserved for months.

Masseguin and Antonini (1938) discuss caterpillars (vide Malaisse and Parent 1980) [copy not yet available, and awaiting translation].

Chinn (**1945**) reported that there are more than 40 species of edible caterpillars ("Beto" in Kundu, "Mbinzu" in Ngombe), the majority of them Saturniidae, in the province of Coquilhatville, and the natives throughout the province eat them. The scientific and vernacular names of 31 host plants and vernacular names of the caterpillars feeding on them are given in a table (pp. 123-124). The main caterpillar season is the "big dry season," with the majority of species reaching harvest size in July and August, although certain species are harvested during the "short dry season" and others in September and December. Reserve supplies are smoked, extending the caterpillar season by two months. Caterpillars are found in great abundance on trees in the forest, and Chinn provides extensive data on how they replace meat or fish in the indigenous menu. In fact, the fishing tribes that rarely have occasion to harvest caterpillars themselves go to their neighbors, inhabitants of the forested regions, to obtain them.

According to Chinn, the natives are very fond of caterpillars, especially when they are fresh. To prepare them, they eviscerate the caterpillar to eliminate intestinal contents, then scrape it against the cutting edge of a knife to remove spines, hairs and the chitinous outer covering. They may then be steamed in leaves of Nkongo, or prepared with bosaka or mafuta, along with legumes. According to Chinn, a native eats 400 g of fresh caterpillars per meal, and they are eaten very frequently, especially in season. Tests on a *Nudaurelia* species found 62.1% protein and 16.1% lipids on a dry weight basis, but reduced digestibility, only 50%, thus lessening their dietary value. The small caterpillars are the least indigestible and the natives eat them in great quantities. Fresh, caterpillars average about 75% water.

Finally, Chinn describes four types of diets among tribes in the province: fish diet, meat diet, mixed fish and meat, and caterpillar and mushroom diet. The caterpillar-mushroom diet is the diet of the Bolenda, who live 50 km from the nearest river. They neither hunt nor fish, and they eat meat or fish only one or two times per week, one or the other. Caterpillars are their main source of animal protein during the fresh caterpillar season, that is, for three months, extended an additional two months using smoked caterpillars. The rest of the year, i.e., for seven months, they eat mushrooms, legumes, oil and starchy foods. The caloric value of a meal of caterpillars is 2200 calories; a meal of mushrooms is 1752 calories, the average for the year reaching only 1939 calories per day. Of the four diets, the caterpillar-mushroom diet is the least adequate nutritionally, both in animal protein intake and energy production. Actually, caterpillars are included in the other diets. For example, with the fish diet, during the fresh caterpillar season, July-August, caterpillars very often replace fish.

Tihon (**1946a**) analyzed caterpillars [this paper awaits translation].

Data by **Adriaens** (**1953**) on *Cirina forda, Elaphrodes lactea,* and two species of *Nudaurelia* revealed crude protein content ranging from 52.3% to 68.3% (dry weight) and fat content from 1.7% to 13.7%. (Note: this paper has not yet been seen.)

Lambrechts et al (**1956**) presented analytical data on a species of caterpillar. (This paper has not yet been seen.)

Lambrechts and Bernier (1961) deal with caterpillars. (Note: This paper has not yet been seen.)

In the midst of national economic decline, **Anon.** (**1991**) reported that, "Much of the country was cut out of basic commerce: visitors to one town recently found only fried caterpillars on the hotel menu."

Tango Muyay (**1981**) describes 33 species of caterpillars used by the Yansi. Most species feed on trees and shrubs, but a few feed on grasses and one each on a fern and two kinds of palm trees. In contrast to other peoples of Africa who base the names of their edible caterpillars on the names of their specific host plants, the Yansi refer to trees by the names of the caterpillars that feed on them. Caterpillars are mainly collected by women and children, but men are beginning to harvest them for sale in the cities. Muyay emphasizes the importance of caterpillars in the diets of children, noting for at least eight species that most of the caterpillars are reserved for children or eaten mostly by them. Caterpillars that are not abundant are preferentially given to children (p. 56). That children enjoy eating caterpillars is apparent from several children's songs. For example: "Father you have to give me some 'milee' caterpillars. . . . Look at all the other children with milee caterpillars that their fathers gave them. . . . I'm going to bother you until you give me some" (p. 57).

To ensure an abundant supply of edible caterpillars, the onset of harvest is regulated through the use of a fetish called "kehal" (pp. 24, 76). When the chief notices young caterpillars of important species beginning to develop, he places the kehal in the forest where they are found. No one is allowed to harvest the caterpillars until they have reached near-maximum size and the kehal is removed. In cases where the kehal was violated, the chief levied heavy fines. In some cases Yansi laws have been enacted that prohibit the cutting of tree branches as a means of harvesting caterpillars from certain species of trees (p. 73). Many caterpillar species are described as well-liked or tasting delicious (e.g., "minsweyi" p. 44, "mimen" p. 50, "mitoon" p. 113). Yansi women sometimes set fires in the savanna to promote fresh regrowth that will serve to promote an abundance of the minsweyi caterpillars. Some edible caterpillars are not esteemed by all Yansi. Some people eat "mibam,"

which taste sour, only because they are abundant and appear at a time of year when other foods are scarce (p. 73). Species with dangerous hairs ("misweswe" p. 29, "mimpoo" p. 29, and "nkool nzil" p. 111) are not given to children. The hairs of these species must be singed off prior to cooking. Failure to do so can provoke swelling of the throat, possibly leading to death (p. 32). One caterpillar species is reported to cause headaches (p. 22).

Others who have mentioned consumption of "caterpillars" include (see Introduction) Schebesta (1936, 1938), Schebasta (1940), Adriaens (1951), Heymans and Evrard (1970), Allan (1987), Boyle (1987), DeLong (1987), Kirinich (1987), Katya Kitsa (1989), Caputo (1991), Henry (1991) and Roda (1991).

Ceratocampidae

Two species of ceratocampid larvae (see Bequaert 1921 in Introduction).

Hesperiidae (skippers)
Caliades (= Coliades) libeon Druce, larva

Dartevelle (**1951**) discussed *C. libeon* [the paper awaits translation]. See also Adriaens (1951) in Introduction.

Limacodidae (slug caterpillars)

A limacodid larva (see Malaisse and Parent 1980 in Introduction and Congo (Kinshasa) Tables 5 and 6).

Noctuidae (noctuids)
Nyodes (= Elacodes) prasinodes Prout, larva

See Malaisse and Parent (1980) in Introduction and Congo (Kinshasa) Tables 5 and 6. Adriaens (1951) also mentioned noctuid larvae (see Introduction).

Notodontidae (prominants)
Anaphe panda (Boisd.), larva
Anaphe sp., larva
Antheua (= Pheosigna) insignata Gaede, larva
Drapetides (= Loptoperyx) uniformis Swinhoe, larva
Elaphrodes (= Onophalera) lactea Gaede, larva
Rhenea mediata Walker, larva

Malaisse et al (1969) analyzed caterpillars of *Elaphrodes (= Onophalera) lactea* Gaede, known as the *tunkubiu*, and compared their data with those from previous studies on Congo (Kinshasa) caterpillars (Congo [Kinshasa] Table 9; see their Table 1, pp. 34-35). In addition to the high protein content of caterpillars in general, the authors note in particular the high lipid content of *E. lactea*, 29.6% of dry weight, or more than twice as high as values reported for most other species. Although the harvest of *E. lactea* is seasonal, they constitute a significant addition to the protein supply of the rural people, and, in the opinion of the authors this should be considered in determining forest protection policies regarding this species which is an important forest defoliator.

Malaisse and Parent (1980) (see Introduction and Congo [Kinshasa] Tables 5 and 6) mention larvae of *Anaphe panda, Antheua (= Pheosigna) insignata* Gaede), *Drapetides (= Loptoperyx) uniformis* (Swinhoe), *E. lactea, Rhenea mediata* (Walker) and three unidentified species of notodontids. Adriaens (1951) also mentioned notodontid larvae {see Introduction). Bequaert (1921) reported consumption of an *Anaphe* sp. larva (see above under Lepidoptera)

Nymphalidae (brush-footed butterflies)

Adriaens (1951) mentions nymphalid larvae (see Introduction).

Psychidae (bagworm moths)
Clania moddermanni (author?), larva
Eumeta cervina Druce, larva
Eumeta rougeoti Bourgogne, larva

Peigler (**1994**) notes that, in the Denver Museum of Natural History, there is a cocoon of either *Eumeta cervina* or *E. rougeoti* from Congo (Kinshasa), that was part of an assortment of fetishes used by a witch doctor. The cocoon is 5 cm long. According to J. Bourgogne (personal communication to Peigler), the larvae of *Eumeta* are eaten by natives in several African countries. Also see Bequaert (1921) under Lepidoptera above.

Saturniidae (giant silkworm moths)
Athletes gigas Sonthonnax, larva
Athletes semialba Sonthonnax, larva
Bunaea alcinoe Stoll (= *caffraria*), larva
Bunaeopsis aurantiaca Rothschild (= *hersilia*), larva
Cinabra hyperbius Westwood, larva
Cirina forda Westwood, larva
Gonimbrasia hecate Rougeot (= *nictitans*), larva
Gonimbrasia richelmanni Weymer, larva
Gonimbrasia zambesina Walker, larva
Goodia kuntzei Dewitz, larva
Gynanisa maia ata Strand, larva
Imbrasia dione Fabr., larva
Imbrasia epimethea Drury, larva
Imbrasia macrothyris Rothschild (= *lubumbashii*), larva
Imbrasia rubra Bouvier, larva
Imbrasia spp., larvae
Imbrasia truncata (author?), larva
Lobobunaea saturnus Fabr., larva
Melanocera parva Rothschild, larva
Micragone (= Cyrtogone) cana Aurivillius, larva
Micragone herilla Westw., larva
Nudaurelia oyemensis (author?), larva
Pseudanthara discrepans Butler, larva
Tagoropsis flavinata Walker (= *hanningtoni*), larva
Urota sinope Westw., larva

Malaisse and Parent (**1980**) report the consumption of numerous species of saturniid larvae (see above and Congo (Kinshasa) Tables 5 and 6). Bequaert (1921) mentioned *Micragone herilla* (Westw.) larvae (see above under Lepidoptera). **Chinn** (**1945**) analyzed (proximate analysis) a *Nudaurelia* species and found 62.1% protein and 16.1% lipids on a dry weight basis (see above under Lepidoptera). Adriaens (1951) mentioned *Imbrasia* spp. larvae (see Introduction). Adriaens (1953) mentioned two species of saturniid larvae (see above under Lepidoptera).

LeLeup and Daems (**1969**) published a very valuable paper on the edible caterpillars of the Kwango, considered to be one of the poorest regions of the country from the standpoint of protein resources. The authors say (translation, p. 1):

> Large game having become very scarce, it is fish, and especially caterpillars, of which certain species abound, that constitute the most important sources of protein for local consumption. . . . Caterpillars are not only an important source of protein for local consumption, but they also bring in a substantial income to these disadvantaged regions. In particular, we mention the biological value of protein from preserved Mingola caterpillars that is on the order of 70%, thus entirely comparable to that of fresh meat.

Commercialized dried caterpillars in the Kwango district averaged 185 tons per year for the five-year period, 1954-1958. To this must be added tonnage sold privately to Bapende retailers, as well as local consumption, bringing the dried caterpillar production to an estimated 280-300 tons per year. The study described was commissioned by the territorial administration to investigate whether recent fluctuations and reduced annual tonnage of the most economically important species might be due to badly timed brush-burning.

The authors state that the number of species of caterpillars eaten by the indigenees of the districts of Kwango and Kwilu certainly exceeds 30, almost all of which belong to the family Saturniidae. Eight species are of preponderant importance, for only three of which the scientific names are specified. Many of the other species are either very localized or make only irregular appearances, thus playing a secondary role in the local

diet and in commerce.

Cirina forda larvae, called "Makoso" by both the Kipende and the Kitshok, are found in wooded savannah where they feed on the tree, "Mikoso" (Kipende) or "Mikwatshi" (Kitshok) (*Erythrophleum africanum*?). The larvae are abundant and are harvested in September. Pupation is underground. This species, together with the next-listed, "Masese," are collectively known by the natives as "Mangola." These two species account for most of the exports, about 40% of the annual harvest of Mangola consisting of Makosa (*C. forda*) and 60% consisting of Masese. Masese larvae feed on the "Misese" tree (*Burkea afrikana*?) in wooded savannah and are harvested in February. They are very abundant and, as stated above, an important export item. Pupation is underground.

The third most important species for export is *Bunaeopsis aurantiaca* Rothschild. The larvae are known as "Mambula" (Kipende) or "Makunga" (Kitshok) and feed on a low perennial woody plant known as "Mikia" (Kipende) or "Mitongo" (Kitshok) which occurs in the steppes biotope (open high plateau). Harvest is in October. Pupation is underground. The brush-burning recommendations of LeLeup and Daems are aimed primarily at protecting the three preceding species. The only other important edible species which they identify by scientific name is *Pseudanthera discrepans* Butler, the larvae of which are found in gallery forest and feed on a tree called "Mumbula" (Kipende) or "Mulengo" (Kitshok). It is relatively rare but capable of massive, if fleeting, appearances. Harvest is in January-February. Pupation is aerial. In discussing the biology and ecology of the edible caterpillars, the investigators note that in a given region where the caterpillars swarm in abundance in a given year, they are usually much reduced the following year by the intense proliferation of parasites.

LeLeup and Daems state that setting brush fires at the wrong time can be disastrous to edible caterpillar populations and they cite some past examples. Fires can be set only in the dry season which, in the region studied, extends from the beginning of May to the end of August (Congo [Kinshasa] Fig. 1; see *The Food Insects Newsletter* 4(2): 2, Fig. 1, 1991, adapted from LeLeup & Daems). The authors conclude that, in wooded savannah, the optimum dates for setting brush fires are June 5 in areas where "Makoso" predominates, and June 10 where "Masese" predominates. Fire setting should be banned after June 15. The underground pupae, about 5 cm deep, are somewhat protected from fire if 1) the ground surface is relatively denuded , which is usually the case at the base of the trees where the pupae are located, and 2) if the heat is not too great. This is why, according to the authors, in the wooded savannah where fires have much stronger intensity than on the high plains, fires in July-August when the undergrowth is very dry must be outlawed. This is all the more urgent because this is the time when the Makoso are in the egg or young caterpillar stage (Zaire Fig. 1) and they are subject to destruction in masse. As the adults appear in the second half of June, this justifies the ban on setting fires in the wooded savannah after June 15.

The situation is different in the high plains where the vegetation is lower, the fire moves more rapidly, and the ground does not heat up as much. The optimum date for setting fires in the steppes, relative to "Makunga," is July 10 with a leeway of 10 days earlier or later. Brush fires in the steppes must be banned (1) from July 20 to August 31 in order not to destroy the freshly emerged adults or their eggs, and (2) from May 1 to June 30, so that foliation after the fire is not too advanced (host leaves too tough) when the young caterpillars emerge.

Leaf toughness is also a factor relative to the "Makoso." To burn in the month of May would make the reconstituted foliage of the "Mikoso" too tough by the time the young caterpillars emerge during the second half of July. The "Masese" are much less sensitive to fire because they spend the entire dry season in the pupal stage. They would suffer from fires in July and August, however, because of the high heat intensity of fire in wooded savannah during those driest months.

In addition to optimum times for burning, LeLeup and Daems made several other recommendations aimed at avoiding the dwindling of the "Mangolo" biologic stock: 1) To enforce the ban on felling trees in order to harvest the caterpillars; 2) To forbid the increasing practice of harvesting pupae; 3) To encourage resowing attempts on a massive scale by collection of eggs prior to burning; and 4) To create "reserves" of some small wooded savannahs, in which all harvest for purposes of consumption would be forbidden.

Three species of saturniid caterpillars (*Nudaurelia oyemensis, Imbrasia truncata, Imbrasia epimethea*) prepared by the traditional techniques (smoking and drying) were analyzed for vitamins by **Kodondi et al (1987)** (Congo (Kinshasa) Table 10; see Kodondi et al Table I). Values for vitamins B2 and pantothenic acid were high, but B1 and B6 were low compared to National Academy of Sciences nutritional recommendations. Feeding trials of 4-weeks' duration using 21-day-old Wistar C.F. rats confirmed that the vitamins supplied by the caterpillars are sufficient to allow proper growth of young rats, except for vitamins B1 and B6 (Congo [Kinshasa] Table 11; see Kodondi et al Table II).

Sphingidae (sphinx or hawk moths)

Under the name "Manzinga," the natives of Kwango include at least two edible species; they are not

congeneric (**LeLeup and Daems 1969**). Each species is probably monophagous, one feeding on "Miseba," the other on "Dundu." These are low, perennial woody plants found in the steppes biotope where they are frequently grouped together. The Miseba has clear sap; the Dundu is a latex plant. The larvae are fairly abundant and there are three harvests per year. Pupation is subterranean.

Adriaens (1951) mentioned consumption of sphingid larvae (see Introduction).

Family unknown

In Kwango, according to **LeLeup and Daems** (**1969**), "Tumbinzu" larvae [probably Saturniidae] sometimes make extraordinarily massive, but usually fleeting, appearances, thus a lack of commercial interest in this species. It feeds preferably on "Makaka," but also on other Graminaceae in the steppes biotope. Months of harvest are February-March and May-June. Pupation is in the ground.

"Makutia" (Kipende) or "Mapatula" (Kitshok) larvae [probably Notodontidae] are found in gallery forest on the tree known as "Mumbunze (Kipende) or "Tshimbunzi" (Kitshok) (LeLeup and Daems 1969). Harvest is in March. These are social caterpillars that pupate aerially in a common cocoon.

Malaisse and Parent (1980) reported consumption of two unidentified species of lepidopterous larvae (see above and Congo [Kinshasa] Tables 5 and 6).

Miscellaneous Lepidoptera

Denis (**1960**) [This paper, pp. 154-155, awaits translation.]

The information by Denis formed the basis for a discussion of caterpillar husbandry by **Miracle** (**1967**, pp. 190-191):

> The Holo practice an interesting form of insect husbandry that partly supports an active commerce with Kinshasa . . . in dried and smoked caterpillars. Early in the dry season a carefully selected parcel of savanna is burned. Female butterflies are attracted to the burned patches in which grass is greener than in the surrounding savanna, and lay their eggs. As the eggs hatch the young caterpillars begin to feed on the pasture created for them. When they start to crawl out of the pasture a band is burned around, and the process is repeated until they are grown . . . They are then killed , dried, smoked, and are ready for market. . . Denis underscores the importance of caterpillars as a cash earner . . . : 'In season , during the month of September, the Portuguese of Leopoldville come and buy them by the truckload in south Kwango and resell them at a large profit on the markets of the capital [Kinshasa]. The consumers who fancy this delicacy do not hesitate to pay five francs for a cup of caterpillars. These Lepidoptera larvae are the delicacies of connoisseurs, the equal of caviar, snails, or truffles among the European gourmets.'

Kimuha Lohande (**1990**) stated regarding reforestation in Kananga (translation): "In short, *Acacia auriculiformis* will constitute the only forest species of our reforested areas. However, we would have preferred finding a local species and especially a species bearing edible caterpillars. It would be in the interest of many more people than *Acacia*.

Orthoptera

Bredo (1945) presented analytical data on a grasshopper [this paper has not yet been seen]. Adriaens (1951), Allan (1987), DeLong (1987), Kirinich (1987), Kitsa (1989) and Roda (1991) all mention qrasshoppers (see Introduction).

Acrididae (short-horned grasshoppers)
Cyrtacanthacris (= Nomadacris) septemfasciata Serville, adult
Homoxyrrhepes punctipennis Walker, nymph, adult
Locusta migratoria migratorioides Reiche & Fairemaire, adult

Bouvier (1945: 43-44) discussed the locusts, *Cyrtacanthacris (= Nomadacris) septemfasciata* and *Locusta migratorioides*, which sometimes occurred in mixed swarms with the former predominating, as follows (translation):

When in 1931 we saw our first cloud of migratory locusts in the province of Lomami, 20 years had passed since the last appearance of these insects. The oldest blacks remembered the last invasion very well, which was for them, as were all the locust migrations, a period of food abundance. It is that the cultivation is very spread out and that the acridiens most often attack the brush, the graminees [cereals, prairie grasses, bamboo, sugar cane, etc.], and different bushes. Hardly any corn planting is destroyed, except if by accident. Manioc, the staple food, is not, or is very slightly, attacked by the locusts, probably because of the (cyanhydrique) acid contained in the manioc's bitter sap.

The cultivation being hardly ruined, the locusts form a very appreciated food supplement for the blacks. The locusts are smoked or cooked in palm oil, whole, especially at the beginning of the invasions. The fact is that the blacks of Lomami are very fond of insects of all kinds: different caterpillars living on a mimosa; termites, which are captured in tons at the time of swarming of the winged males and females; and grasshoppers, which are hunted, in ordinary times, by bow, with special bamboo arrows with four divergent points.

At the time of the locust migration, the quantity of insects is such that it is easy, with very little trouble, to really stock up. The first meal at the time of the locusts' appearance is hard to describe. The amount of insects ingested whole is such that the locusts' feet, with their sharp spines on the tibias, can cause some real blockages with complete intestinal occlusion, which is fatal without surgical intervention. After a certain time, these accidents become rarer, because the blacks take off the feet and wings before cooking the locusts in palm oil.

The black is not the only one to treat himself to the acridian migration bonanza. Monkeys of all types hurry to the bushes invaded by insects that rest, for example, at nightfall. They stock up by stuffing their jowls and by enclosing in their four hands as many insects as possible. For monkeys, too, their gluttony can be fatal to them. We have had the chance to autopsy several monkeys dead of intestinal occlusion, due to masses of acridian feet mixed in.

Birds of prey and 'stilted' birds (e.g. cranes) of all sorts follow the clouds of locusts and likewise make them an object of intense consumption.

A 'cloud' of migratory locusts always has something grandiose and imposing about it. On the great plains of Lomami, in the clear sky, the swarms recognize each other from very great distances, in the form of a violet cloud. This hue is produced by the color of the lower wings of the nomad locusts (*Nomadacris septemfasciata*). Moreover, the clouds are not always exclusively formed by a single species. We have often seen mixed swarms, with a much lower percentage of migratory locusts (*Locusta migratorioides*).

After their massive migrations of 1931, the locusts more or less established themselves in the vast region of Lomami . . . . The masses in migration often rested at night on a small plateau near the station: the ground and bushes were covered to such a degree that all the vegetation had taken on the reddish glints of the nomad locusts. The nights being relatively cold, it was scarcely 9:00 a.m. when the migratory masses restarted their flight . . . .

Chinn (**1945**) reported that *L. migratoria migratorioides* ("Basalankata" in Kundu) are captured from passing swarms by using baskets or nets. The wings and legs are removed before smoking the locusts in Nkongo leaves. They are eaten with bananas and chikwangues. The swarms pass through in July-September and January-March.

Heymans and Evrard (1970) reported consumption of *Homoxyrrhepes punctipennis* adults and nymphs (see Introduction).

Miscellaneous Acrididae

According to **Tango Muyay** (**1981**), grasshoppers (pp. 147-150) are not an important food for the Yansi. They formerly ate only four species but, now, under the influence of their neighbors the Mbala, who eat many more species of grasshoppers, the Yansi eat additional species. The new species are collected dead following savanna fires. The four named species are all migratory. One, "mayaay" is no longer found in the area, while another, "mieyi," has become quite rare. The other two species are mostly eaten by children.

Blattidae (cockroaches)

Consumption of cockroaches was reported by Boyle (1987) (see Introduction).

Gryllidae (crickets)
Brachytrupes membranaceus Drury

Tango Muyay (**1981**) describes two kinds of crickets eaten by the Yansi. One is probably *B. membranaceus* (according to Turk). Muyay reports that they are especially abundant where women have left manioc root peelings on which the crickets feed. Children dig up some young crickets but most are captured after they reach maturity in November and December and again when the second generation matures in May. They are collected by digging them out of their burrows with hoes, by hunting at night with lamps, and by sliding a small noose down their burrows. Reportedly, a woman can catch 50 to 80 crickets per day.

The other edible cricket is called "betel musir," which means black cricket. They are found in large numbers in the forests in February after the main caterpillar harvest is over. A woman may catch 300-400 or more crickets in a single night. When many are caught, some are preserved by smoke-drying. Traders buy them for sale in the large towns.

The use of crickets was reported by Adriaens (1951) and Boyle (1987) (see Introduction).

Tettigoniidae (long-horned grasshoppers)
Ruspolia (= Homorocoryphus) nitidula (author?) (= *nitidulus*), adult
Ruspolia sp., adult

Bequaert (1921) reported that, in the northeastern corner of Congo (Kinshasa), the Logo enjoy a grasshopper belonging to the genus *Ruspolia (= Homorocoryphus)*. Heymans and Evrard (1970) reported consumption of adults of *Ruspolia nitidula (= nitidulus*) (see Introduction).

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Items Needing Attention

P. 18: Hegh (1922) needs translation (pp. 669-678)
P. 21: Masseguin and Antonini (1938) not seen yet; translation of pp. 133-145 needed
P. 21: Tihon (1946a) not yet seen and needs translation
P. 21: Adriaens (1953) not yet seen and needs translation
P. 21: Lambrechts et al (1956) not yet seen and needs translation
P. 21: Lambrechts and Bernier (1961) not yet seen and needs translation
P. 21: Anonymous (1991), volume ?
P. 22: Dartevelle (1951) not yet seen and needs translation
P. 27: Denis (1960, pp. 154-155) awaits translation
P. 28: Bredo (1945) not yet seen and needs translation
P. 30: Bequaert (1913); need title and journal