

Chapter 25

OTHER COUNTRIES IN SOUTHEASTERN ASIA

Countries included in this chapter are Myanmar (Burma), followed by, in alphabetical order, Cambodia, Indonesia, Laos, Malaysia, The Philippines and Vietnam.

Regional Taxonomic Inventory (see Chapter 23)

MYANMAR (Burma)

Ghosh (1924, pp. 403 ff.; vide Bodenheimer 1951, pp. 268-269) reports that many insects have found a place in the diets of the Burmese, Karens, Chins, Kachins, Shans, Talaings and others. The Buddhists have no objection there to eating animals killed by others. Many Burmese kill insects for themselves, as well as for sale. Ghosh considers his list of the insects eaten in Myanmar (discussed below by insect order) to be incomplete.

Frederick Delphin, MD, Ph.D. (pers. comm. 1988), a native of Myanmar and occupant of the chair in zoology at Mandalay University prior to 1978, provided a considerable amount of more recent information on insects used as food in Burma (discussed below by insect order). Mentioning that, in upper Myanmar, even scorpions, killed by immersion in hot water, are considered as food and are sold in the village markets, Dr. Delphin concluded his remarks by saying: "I come from a culture where insects are traditionally eaten because we like the taste of them. If I have written this account with my heart and soul, I have also written it with my stomach, so to speak."

Coleoptera

Cerambycidae (long-horned beetles)

Cerambycid larvae are extracted from logs, dried, preserved in oil, and consumed with Burmese tea (**Ghosh 1924**).

Curculionidae (weevils, snout beetles)

Rhynchophorus ferrugineus Oliv., larva

Ghosh reports that the larva of the curculionid, *Rhynchophorus ferrugineus*, known as *on-po*, or coconut insect, is liked by everyone but is not easily procured. It occurs in *Phoenix acaulis*. Larvae are fattened by being placed inside ripe coconuts from which the water has been drained, then they are sold for 8 annas. They are eaten boiled; the skin, which separates during boiling, is rejected.

Dr. **Delphin** mentions that in the coastal areas of the Irrawaddy Delta, the larva of *Rhynchophorus*, which lives in the soft core of the brackish water palm tree, is as highly prized as is the larva of the dung beetle elsewhere. He relates an amusing incident relative to this species that occurred while he was at Mandalay University:

As in most developing countries, a professor is somebody who is expected to know everything about his subject (that is the connotation of the term professor in the Burmese language, *pah-mouk-kha*). So, when anything zoological was to be identified, the professor would be referred to. It so happened that, one day in 1974 or 1975, none other than the President, General Ne Win, on his return from an excursion to the riverine towns, brought back some larvae of *Rhynchophorus*, and he wanted to know the true identity of the insect. Local superstition had it that the larva changes into a strange-looking creature (obviously the pupa), which then emerges from the palm tree and flies away as a *bird!!!* The larvae were sent to the professor at Rangoon University; he, having been *my* professor, called me at Mandalay to come to Rangoon urgently; in this context, a call meant a *command*. In the meantime, the Rangoon people had told the First Lady that the larva was an 'Ee-koke,' which is the Burmese name for the larva of the dung beetle; but the First Lady said she was familiar with the Ee-koke, having herself eaten it many times before, but that the present larva was from a palm tree and not from a ball of earth. Fortunately for we zoologists, I was already familiar with the

palm weevil, and could come up with the identification right away.

Dytiscidae (predaceous diving beetles)

Eretes stictus Linn. (= *E. sticticus*), larva, adult

Adults of the dytiscid beetle, *Eretes sticticus*, are eaten, although **Ghosh** apparently refers to an earlier record by **Maxwell-Lefroy**. According to the latter author (1971 reprint, pp. 276-277), the insect is known as the "Twinpo"; both larvae and adults are eaten and "considered a delicacy by the Burman."

Delphin says that a very popular insect is the larva of *Eretes sticticus*, which breeds in prodigious numbers in a lake in the crater of an extinct volcano at Twinn-daung in central Myanmar. The larvae come up to the shore and burrow into the soil where they pupate. The larvae are sundried, then fried crisp and eaten as a snack between meals or as a dessert after meals. The larvae are also used as a substitute or in addition to powdered shrimp in the typically Burmese preparation consisting of fermented tea leaves (called *Le-hpet* = tea) (called pickled tea in the British press), toasted sesame seeds, crisp fried slivers of garlic, shrimp (or fish) sauce (in lieu of salt), and chopped hot green peppers, with a dash of fresh lime or lemon juice for tartness. This is eaten at all times of the day or night, and is offered to visitors to homes, and as a *digestive* after the meal at typical Burmese social gatherings. Many foreigners cannot tolerate the taste, but those that like the taste can get quite addicted to it.

Scarabaeidae (scarab beetles)

Helicoprism bucephalus (author?), larva, pupa

Oryctes rhinoceros (Linn.), larva

Xylotrupes gideon (Linn.), larva

According to **Ghosh**, the pupa of the large dung beetle, *Helicoprism bucephalus*, known as *shwe-po*, is in "great demand among the Shans," each pupa costing 1 to 1½ annas. It is "widely exported." It is common from March to May in the Shan hills, where men, women and children dig over large areas in search of the pupae which are found inside round balls of earth one to two feet deep in the soil. As summarized by Bodenheimer (p. 269), "They seem to know as if by instinct where to dig for these balls by finding the opening hole of the gallery." They are dug out during the "season when the cuckoo begins to sing." Another scarabaeid, the larva of *Oryctes rhinoceros*, which breeds in dung heaps and is eaten fried, is "highly esteemed by the Karens." The larva of *Xylotrupes gideon* is also eaten. Other Coleoptera include larvae of various species that are found in cattle droppings and which are "eaten by many"; and various beetles attracted to light and collected with lanterns, then eaten or sold.

Delphin states that:

The larva of the dung beetle (Scarabaeidae: Coprinae) which is enclosed in a globe of earth, is particularly prized. The globe is found some one to three or more feet underground, either singly or in groups of three or more, and entails a lot of hard work to be unearthed. The gooey contents of the larva are squeezed out of the cuticle and cooked with scrambled eggs. (This is one insect I have never had the courage to try because I do not like gooey things except perhaps oat-meal porridge.)

Hemiptera

Belostomatidae (giant water bugs)

Lethocerus indicus Lep. & Serv., adult

Delphin mentioned the giant water bug, *Lethocerus*, which is collected in the Rangoon area as it flies around the bright mercury lanterns that line the streets. The bugs are placed on hot coals, and the cooked insides eaten just as one would the soft parts of the limbs of lobsters and crabs. This practice, however, is not widespread.

Notonectidae (back-swimmers)

Notonecta sp.

Delphin notes that in some parts of central and upper Burma, especially in the Mandalay area, myriads of *Notonecta* are scooped up from the ponds, mashed in a mortar, and used as a shrimp substitute to

give "body" to gravies and soups and other dishes.

Other Hemiptera

Bristowe (1932, p. 397) cites Kingdon Ward's book, *In Farthest Burma*, as saying that Ward's Nung porters searched in the "shingle" of a river bed for a species of bug (Hemiptera?), "which when captured was decapitated between the fingernails and dropped into a bamboo tube. These bugs are fried in oil and eaten as a delicacy, despite their horrible odour."

Homoptera

Cicadidae (cicadas)

Platypleura insignis Distant, nymph

Distant (1892; vide Bodenheimer 1951, pp. 269-270) reported that the larva of the cicadid, *Platypleura insignis*, is collected by the dexterous use of a long thorny branch inserted into a shaft sunk 60-90 cm into the ground. It is considered a great luxury by the Karens. **Delphin** states: "In the northern and southern Shan states, the cicada (Hemiptera: Cicadidae) is highly esteemed. I have tried them, and must say they are tasty, but to all Burmese, the tastiest insect is the large brown cricket."

Hymenoptera

Apidae (honey bees)

Among the Sema Negas, the nests of wild rock bees become the private property of the finder (**Hutton 1921, p. 72**). Both honey and grubs are harvested. The collector must observe certain restrictions (described by Hutton) in taking the nest. A "much-relished soup" is made from the eggs, larvae and pupae of honey bees which are boiled with the comb (**Ghosh 1924**), and **Delphin** also notes that the larvae and pupae of honey bees are eaten.

Formicidae (ants)

Formica ?, adult

Oecophylla smaragdina (Fabr.), larva, adult

Bingham (1903, p. 311) noted that in Myanmar, as well as in Thailand and parts of India, a paste is made by pounding the ant, *Oecophylla smaragdina* Fabr., which is eaten as a condiment with curry. **Maxwell-Lefroy (1971 reprint, p. 276)** mentioned the red ant as a delicacy in Myanmar. According to **Ghosh**, nests of the weaver ant, *O. smaragdina*, are collected and the adults and larvae killed by smoke. They are then made into a paste which turns sour and is called *Khagyin*. It is consumed especially by the women, who believe it to be good for menstruation. **Delphin** states that the large red ant, *Formica* [or *O. smaragdina*?], which lives in paper nests on trees, particularly mango trees, is used as an ingredient in a cough expectorant called locally *Yet-hsar*, "a salt to lick." This "salt" is widely eaten not only to loosen phlegm in the throat, but also to leave a pleasant taste in the mouth.

Vespidae (wasps, hornets)

Vespa auraria (author?), larva, pupa

The wasp, *Vespa auraria*, is collected by the Shans by smoking the nests at night. The larvae and pupae are eaten. Wasps nesting underground are also caught and eaten (**Ghosh 1924**).

Isoptera

Winged termites "are eaten in many places, boiled or fried" (**Ghosh 1924**). According to **Delphin**, termites are eaten raw as they emerge from underground in the extreme northern parts of Myanmar. The queen termites are a particularly great delicacy.

Lepidoptera

Bombycidae (silkworm moths)

Bombyx mori (Linn.), pupa

Ghosh (1924) reports that silkworms, *Po-gaung-gyaw* (presumably *Bombyx mori*), are eaten fried or are stored for future use, then boiled before being eaten. They sell for 1½ rupees per 3½ lbs. The silkworm pupa is ready to be eaten as it comes from the reeling pan in boiled condition. According to Ghosh, "It was delightful to see the little children come begging for such pupae from the Indian reelers...in the Prome district among the Yabeins." Also, the boiled pupae made a ready dish to be carried home by the girls being trained, after the day's work was done.

Orthoptera

Gryllidae (crickets)

Brachytrupes portentosus Licht., (= *Brachytrupes achitinus*)

The big brown cricket, *Brachytrupes portentosus* (= *Brachytrupes achitinus*), called *payit*, "is widely eaten and sold, fried, on the market at Mandalay" (**Ghosh 1924**). Collectors in the villages sell 10 large crickets for 2 annas. In Mandalay, 100 are sold for 1 rupee and 4 annas. Fried crickets are sometimes eaten by the basketsfull during festivals of the "rich."

According to **Delphin**, the most popular food insect in Burma is the large cricket, *Brachytrupes portentosus*, which breeds underground and emerges during the end of the rainy season, around September-October. It is particularly plentiful in the upper regions of the country, less so in the Rangoon area. It is gathered by the thousands at sundown and is considered to be more delicious when dug up from the loamy earth or when just emerging from underground rather than after it has flown around and maybe fallen into muddy fields or drains. The spiny tarsi, mouthparts and wings are clipped, the gut pulled out, and then the crickets are mixed with ground garlic and salt and deep fried until crisp. Females laden with eggs are more prized than the males. Live as well as fried crickets may be bought in the local markets.

Another former Burmese national, now living near Chicago, mentioned to the author (pers. comm. 1988) that the "large brown crickets" which she ate as a child (*B. portentosus*, obviously) is the food which she misses the most since coming to the United States.

CAMBODIA
(Kampuchea)

Reports of insect consumption in Cambodia are almost non-existent, but it must occur fairly widely there as it is widespread in Viet Nam to the east and in Thailand to the west. **Bréhion (1913;** vide Bodenheimer 1951, pp. 264-265) mentions that among the forest-dwelling Mois in Khas and Pnons (Cambodia), many big beetles, all larvae, and "every living thing" is eaten when hunger prevails.

Onnucha Hutasingh (1996) reports that "Cambodian farmers usually catch locusts, high in protein, from Ban Komokrown near Bantey Meanchey's Sisaphon district and sell them to Thai traders at Rong Klua market [Thailand] where they fetch 40 baht a kilogramme. Fried locusts are a popular snack among Cambodians and Thais." Hutasingh interviewed a Cambodian villager at the Rong Klua market who removes wings from locusts for four baht a kg. According to Hutasingh, many Cambodian villagers have abandoned their land to work as laborers along the Thai border for a daily wage of 50-80 baht.

INDONESIA

Van der Burg (1904, pp. 37, 90 f.; vide Bodenheimer, pp. 235-236) reported many species of insects that are used as food in Indonesia, mentioning also taboos which include among the Muslims, ants, bees, flies, worms and water animals. Species discussed by Van der Burg are listed below under the appropriate orders and families. Citing earlier work by Greshoff, Van der Burg mentions that the cicada or *gareng*, caterpillars of *Hyblea puera* known as *entong* or *oengker*, and grubs of the palm weevils, *Rhynchophorus palmarum* and *R. ferrugineus* known as *oelar ratan*, *gendon*, *sabeta*, *oelar sagoe*, or *olakna mandjalin*, are all eaten. The latter are very fat and are eagerly eaten when roasted with *ketan*. According to Greshoff, the caterpillars of *Euproctes* (?) *mulleri* are reportedly poisonous as are the following orthopterans: *Poecilocerus punctatus* (*walang peloes*), *Acanthoderus bifoliatius* (*onggas*), and *Bactarina nematodes* (*walang kandel*).

Scheltema (1930, p. 379; vide Bodenheimer, pp. 236-237) (awaiting re-translation) states that the Batakkers in Tapanoeli (Sumatra) consume as animal food the meat of buffaloes and pigs, chicken, cats, mice,

rats, frogs, the larvae of crickets, wasps and an insect pupa. **Bodenheimer (1951, p. 236)** relates original observations in Indonesia by Prof. S. Leefmans of Amsterdam: these are given below under the appropriate orders and families.

Coleoptera

Cerambycidae (long-horned beetles)

Batocera rubus (Linn.) (= *B. albofasciata*), larva

The longicorn beetles, *Batocera albofasciata* Deg. and *B. rubus* Linn., are eaten in Indonesia (**Netolitzky 1920**; vide Bodenheimer, p. 209) (awaiting re-translation).

Curculionidae (weevils, snout beetles)

Rhynchophorus ferrugineus Oliv., larva

In the Moluccas, the palmworm is regularly found in the market (**Burr 1939**). **Ghesquière (1947)**, citing earlier references, states that the large palm larvae "are preferably given to weak and tubercular persons because they are an easily digestible and nutritious food. Better yet, some mulattos who have settled in Europe have these highly nutritious foods sent to them from Java for their own consumption."

Bodenheimer (1951) cites observations by Leefmans: "The larvae of big beetles, such as of *Rhynchophorus*, *Psodocerus*, etc., which develop in palm stems are prized as food on the Moluccan Islands."

The major food of the Asmat people in West Irian is the starch of the sago palm, which is eaten roasted (**Kirk 1972**, pp. 391, 394, 403):

From the sago palm comes also the great Asmat delicacy, the sago grub, which is the soft white larva of the capricorn beetle. The people actually raise these. They fell a tree and cut holes in the trunk to let the beetles in. The beetles lay their eggs, the eggs hatch into grubs....The villagers return about six weeks later and harvest dozens of grubs from each trunk. A prized delicacy, the larvae are skewered and roasted.

Bishop Alphonse A. Sowada OSG (pers. comm. **1988**) narrates a 1986 film describing the *Pir-Jimi* feast of the Asmat people. The *Pir-Jimi* honors and "sacralizes" close friendships within the framework of ritual, and in daily parlance is known as the sago larvae feast because the primary focus is upon the larvae. During dancing, first by the women and then by the men, two cylindrical tubes formed from sago leaf fronds become filled with larvae, as one by one the dancers approach the container and pour their larvae into it. Only the adult men and old women are allowed to eat the "sacralized" larvae; enough larvae are saved which are not used in the ritual, however, so that everyone gets some larvae to eat. The film is available from the Crosier Fathers and Brothers Province, 3204 East 43rd Street, Minneapolis, MN 55406. This material is also used in a book by Ligabue.

Cahill (1992) described his experiences far upriver in the Asmat region (Indonesian half) of New Guinea:

. . . we traded a length of fishing line and a dozen hooks for what William assured us was the local culinary treat: two pounds of fat sago beetle larvae wrapped in sago leaves and secured with a thin strip of rattan. . . . Stef [an Asmat] cooked a dinner of fried catfish along with a healthy portion of sago beetle. The larvae were fried brown in the pan. They were crisp and sort of fishy tasting on the outside, probably because they had been sauteed in fish oil. Inside, they were the color and consistency of custard. They were unlike anything I'd ever eaten before; the closest I can come to describing the taste is 'creamy snail.'

Dresner (1993) discussed the economic potential of palm weevil culture in Indonesia, noting that with most of the coconut plantations now overage, 80 years plus, such a program would provide an incentive to cut down the old, less productive trees and replace them with genetically selected high yielding plants. Dresner's personal assessment as to flavor was enthusiastic.

See also Van der Burg (1904) in the Introduction.

Scarabaeidae (scarab beetles)

Lepidiota hypoleuca (Wied.), adult

Leucopholis rorida (Fabr.), adult

Cockchafers, or *legi*, are roasted and are cooked in the native shops in portions of 10 beetles each (**Van der Burg 1904**). **Bodenheimer (1951)** cites observations by Leefmans: "The males of the common beetles, *Leucopholis rorida* Fabr., which swarm in the evening, are attracted in numbers to stones which are dyed red by the fruit of *Capsicum*. There they are collected, roasted and eaten in Java...Other beetles commonly eaten in Java are the swarming *Lepidiota hypoleuca* Wied. on *naron*-trees."

Family uncertain

Psodocerus sp., larva

Cowan (1865, p. 70) says the Javanese *moutouke* is the grub of a large beetle. It lives in wood. "It is as big as a silk-worm and very white, . . . a mere lump of fat. Thirty are roasted together threaded on a little stick and are delicate eating."

For mention of *Psodocerus*, see Bodenheimer (1951) under Curculionidae.

Hemiptera

Corixidae (water boatmen)

Leptocorisa acuta (author?), adult

Sternocoris varicornis (author?), adult

Van Eek (cited by **Van der Burg 1904, p. 91**) conducted proximate analyses on the waterbugs, *Leptocorisa acuta* and *Stenocoris varicornis*, which are prepared as *sambal*: water 23.4%, protein 38.1%, fat 29.2%, ashes 3.0%. Caloric value is stated as 276, but sample size is not given.

Homoptera

Cicadidae (cicadas)

See Van der Burg (1904) in the Introduction.

Hymenoptera

Apidae (honey bees)

Melipona minuta (author?), larva, pupa

Melipona vidua (author?), larva, pupa

The honey of the stingless bees, *Melopona minuta* and *M. vidua*, called *tawon* or *leba*, together with the bee larvae and pupae (*tawon moeda*, *gono*, *tawon nom*) are eagerly eaten by the native women (**Van der Burg 1904**). The brood (larvae and pupae) are wrapped with the comb into a piece of leaf and roasted (*pipit*) (although it is also stated that the pupae are unhealthful and cause pains in the throat). **Bodenheimer** cites Brygoo (1946) that bee larvae are highly esteemed in Timor.

Formicidae (ants)

Oecophylla smaragdina (Fabr.)

The red ant, *O. smaragdina* is mixed with rice as a condiment by the Dayaks of Borneo (**Beccari 1904, p. 161**).

Vespidae (wasps, hornets)

See Bodenheimer (1951) in the Introduction.

Isoptera

Termitidae

Macrotermes sp., flying sexuals

Termes atrox (author?), winged sexuals, queens

Termes destructor (author?), winged sexuals, queens

Termes fatale (author?), winged sexuals, queens

Termes mordax (author?), winged sexuals, queens

Termes sumatranum (author?), winged sexuals, queens

Giesenhagan (1902, p. 78) observed a termite swarm in Java (translation):

Soon, men, women and children from the worker's village collected in front of the exit hole of the underground structure and began to catch the insects and collect the bodies in pots after having pulled off the frail, long wings. Even a dog had come from the village and was catching insects which got away from the people. Upon asking, I found out that these insects, once prepared, were considered a treat among the Malaysians.

Van der Burg (1904) states that termites (*rajap, aniani*), including *Termes atrox*, *T. destructor*, *T. fatale*, *T. mordax*, and *T. sumatranum* are much sought after; the wings of the flying sexuals (*laron, raron, reraron*) are removed and the termites are roasted with flour and baked into a kind of cake. The roasted queen (*ratoe rajap*) is a "special delicacy," tasting like almonds.

Bodenheimer (1951) cites observations by Leefmans: "In Java the flying sexuals of termites (*larum*, mainly *Macrotermes* sp.) are caught on small candles attached to pieces of bamboo. The insects burn their wings on the light to which they are attracted and are then avidly eaten."

Anon (1992) stated that about twice a year, termites emerge in tremendous numbers all over Java. In the cities, many houses having wood roof framing or wood window frames also produce termites, releasing thousands of them into a living room on a given night. Lights are turned off and a candle is placed over a container of water; the termites are attracted to the flame where their wings are singed and they fall into the water. Thus, food is collected and the house is temporarily rid of termites without the use of insecticide. Following such an emergence, Anon was offered at breakfast "a huge omelette, loaded not with mushrooms or ham, but filled with the visitors of the night before. Not bad either!"

Lepidoptera

Regarding a toxic caterpillar, see Van der Burg (1904) in the Introduction.

Hyblaeidae

Hyblea puera Cramer, larva

See Van der Burg (1904) in the Introduction.

Odonata

Aeschnidae (darners)

Anax spp., nymphs, adults

Libellulidae (common skimmers)

Crocothemis spp., nymphs, adults

Neurothemis spp., nymphs, adults

Burr (1939, pp. 213-214) credits A.R. Wallace with the information that the natives of Lombok catch dragon flies on twigs smeared with birdlime: "The bodies are torn off and fried with onions and preserved shrimps. It sound a queer blend, but is considered a great delicacy."

On Bali during the rice harvest, women and children catch adult dragonflies on long slender reed wands that are smeared with a sticky gum (**Moore 1951, pp. 18-19**). The dragonflies are enticed to alight on the wand or are caught in mid-air by a deft cast. Later, they are fried and eaten.

Dragonflies (called "chapung") are still widely eaten in Bali, although their abundance apparently has been reduced by pesticides (**Pemberton 1995**). Adults of all species of both dragonflies and damselflies are sought, but larger species are most desired. The most common large species around Balinese rice fields belong to the genera *Anax* (Aeschnidae) and *Crocothemis* and *Neurothemis* (Libellulidae). Unfortunately, the dragonflies caught by Pemberton were not identified to species because they were all eaten, including the intended voucher specimens!

As Pemberton notes, dragonflies are notoriously quick and difficult to catch. Several techniques are used to capture them, some of which utilize the sticky latex of the jackfruit tree, *Artocarpus heterophyllus*,

or, less often, the latex of frangipani, *Plumeria* sp. The most spectacular method, though not the most productive, uses the "ngoneng" which is a stick about half a meter long with a stiff wire or reed attached to one end and a spherical globule of latex molded on the free tip of the wire or reed. To use the ngoneng, one whirls the latex sphere around in a circular motion. Dragonflies dart at the sphere, as if it were prey, and become stuck to it. Latex-tipped sticks may be used to capture dragonflies resting on low vegetation, or they may be captured by hand.

Several methods of preparation and cooking are described by Pemberton, the simplest of which is to grill them, without seasoning. The grilled dragonflies "had a carbonized crispy quality with a subtle, fat flavor." Other methods are more elaborate, a wet method involving the addition of ginger, garlic, shallots and chili pepper boiled for 5-10 minutes in coconut milk, or a dry-cooking method combining the same ingredients with fresh coconut meat wrapped in a banana leaf that is then steamed or roasted on charcoal. Nymphs are sometimes captured and are cooked with the same methods as used for adults. They are "supposed to taste better because they are softer."

According to Pemberton, dragonflies do not seem an important food in Bali or elsewhere in Asia, and he states that, "Given the ingenuity and fun involved in the capture of dragonflies, the customs seem to relate as much to sport as to food." He also states that, "The many Asian customs relating to dragonflies and other insects reflect a more positive attitude toward insects than generally occurs in the West."

Orthoptera

Regarding several toxic species of Orthoptera, see Van der Burg (1904) in the Introduction.

Acrididae (short-horned grasshoppers)

Acridium aerigonosum (author?) [Is this a misspelling of *Acrydium*?]

Grasshoppers and locusts, including *Acridium aerigonosum*, are eaten in West Java; vernacular names include *walang*, *belalang*, *djankirk*, *gansir*, *walang gapoek* and *belalang gambar* (Van der Burg 1904). Brygoo (1946) is cited by Bodenheimer (p. 237) that the natives of Timor prepare wholesome cakes from pounded locusts.

Gryllidae (crickets)

Brachytrupes portentosus Licht.

Bodenheimer (1951) cites observations by Leefmans: "Crickets, mainly the large *Brachytrupes portentosus* Licht. (= *B. achatinus*), are caught by boys in Java and Sumatra by digging in their galleries in the ground. The boys put a number of them on a stick cut from the midrib of palm leaves, and so roast them, eating them with delight." Also see Bodenheimer in the Introduction.

Gryllotalpidae (mole crickets)

Gryllotalpa sp.

A *Gryllotalpa* species is used in West Java (Van der Burg 1904).

LAOS

Laos residing in Thailand, mostly concentrated in the northern and eastern regions, eat a wide variety of insects (see the report by Bristowe 1932 under Thailand). Thus, although reports of insect consumption in Laos itself are almost non-existent, it must be widespread there.

Homoptera

Cicadidae (cicadas, etc.)

Dandubia intermerata Walk., adult

Daguin (1900) (cited by Bodenheimer 1951, p. 259) refers to the cicada, *D. intermerata*, which, along the Mekong River in Laos, is caught with bird-lime and sold in the market or fried for home use.

Odonata

Dragonflies are captured and used as food in Laos (**Pemberton 1995**).

MALAYSIA

Martin (1905, pp. 720 ff.; vide Bodenheimer 1951, p. 270) mentions that the southern groups of the Senoi and the Semang devour everything edible although vegetable food prevails. His statement that some insects are not eaten suggests that some insects are eaten. The Senoi are very fond of the honey of wild bees.

Coleoptera

Cerambycidae (long-horned beetles)

Hoplocerambyx spinicornis, larva

This species, commonly eaten in Sarawak, is a borer in dipterocarp trees and logs (**Mercer 1993**). It is often eaten raw but is more commonly roasted over a fire. It can be a bit "fiddly" unless given time to expel the wood particles from its gut.

Curculionidae (weevils, snout beetles)

Rhynchophorus ferrugineus, larva

The sago grub, known as *Ulat Sagu* in Malay, is commonly eaten in Sarawak, often raw but more commonly after roasting over a fire (**Mercer 1993**).

Scarabaeidae (scarab beetles)

Megasoma actaeon Linn., adult

The beetle, *Megasoma actaeon* Linn., is consumed in Malaysia **Netolitzky (1920;** vide Bodenheimer, p. 209) (awaiting re-translation). **Bodenheimer (1951, p. 209)** states that many melolonthid beetles are eaten in Malaysia.

Family uncertain

Bristowe (1932, p. 388) was told by the Semang that they ate queen termites and the larvae of a greenish coconut beetle.

Hemiptera

Belostomatidae (giant water bugs)

Lethocerus indicus Lep. & Serv., adult

Hoffmann (1947) reports that in Singapore a specially flavored salt is sold with the giant waterbug, *Lethocerus indicus*. The salt, known as *Kwai Fa Shim Im*, is fragrant and has probably had henna flowers added to it.

Homoptera

Cicadidae (cicadas)

Pomponia imperatoria (Westwood), adult

The giant cicada, *Pomponia imperatoria* (Westwood), 3 inches long and with an 8 in. wing span, is used as food (**Essig 1942, p. 315**).

Hymenoptera

Apidae (honey bees)

Favre (1865, p. 61) states of the Jakuns: "One of their most prized dishes is a honey comb. The time

when the honey is in the comb is not considered the proper moment to take the hive. They wait until the small bees are well formed in the cells, and a few days before they are ready to fly away the honey-comb is taken with great care and wrapped in a plantain leaf, is put upon the fire for a few minutes, and then wax and insects are devoured together and considered as an uncommon treat." **Irvine (1957, p. 124)** also says that bee brood is commonly eaten in the comb.

Isoptera

In a Reuters dispatch, **Anon. (1996)** reports that Singaporeans have been flocking to a nearby Malaysian town "to feast on a fashionable but expensive snack: termites." The termites have been selling for up to 17 Malaysian ringgit, or about US \$7.00, for a prime queen termite, which can be up to two inches long. Those who eat them believe they improve health. They are eaten three ways: live, dipped in alcohol and preserved in rice wine, and are sold in local coffee shops. See also Bristowe (1932) above under Coleoptera.

Phasmatodea

Eurycnema versifasciata (Audinet-Serville), excreta
Haaniella grayi grayi (Westwood), egg
Platycrana viridana Olivier, adult

Bragg (1990: 157; vide Kevan 1991) mentioned that in Sarawak the eggs of the walkingstick, *Haaniella grayi grayi*, are eaten as a delicacy by the local people.

Kevan (1991) cites earlier literature that Malaysians ate a certain large species of stick-insect after removing legs and wings. Kevan believes the identity of the species to be, despite previous taxonomic confusion, *Platycrana viridana* Olivier. Regarding *E. versifasciata*, **Nadchattram (1963: 35-36)** states that Malayan Chinese believe in the healing powers of the droppings of this insect and for this reason they rear them. "They claim that dried excreta mixed with herbs will cure a number of ailments, such as asthma, stomach upsets, muscular pains. A brew is also made from the droppings and drunk like tea. This they claim will cleanse the body."

Miscellaneous

Chu et al (1977) and **Sullivan et al (1977)** discussed the public health implications of beetle-eating involving the dermestid, *Palembus* (= *Martianus* ?) *dermestoides*, among Chinese and Malays in Malaysia. These beetles are not used as food but as an aphrodisiac or as a medicinal treatment for a variety of ailments. Both the swallowing of live beetles and of detritus consisting of the insect's feces and chewed herb fragments have been reported. The main public health hazard is that the beetles can serve as a host for the human-infecting tapeworm, *Hymenolepis diminuta*. The practice is apparently not common, but neither is it extremely rare.

THE PHILIPPINES

Gibbs et al (1912, pp. 383-385, 396) acknowledge W. Schultze of the Bureau of Science for information on numerous insects consumed in the Philippines. The authors state: "In various parts of the Islands locusts, beetles and their larvae, bees, crickets, snails, snakes (principally the python), lizards (principally the iguana), and other animals are eaten, and some of these are highly regarded as delicacies." Gibbs et al listed the most commonly eaten insects and their native names (of the Tagalog people unless specified otherwise); they are listed below under the appropriate orders and families.

Bender (1975, p. 78) notes that "The Ifugao of the Philippines eat three species of dragon fly and locusts. These are boiled, dried, and powdered. They also relish red ants, water bugs, and beetles, as well as flying ants, which are usually fried in lard."

In a Manila newspaper article datelined La Trinidad, Benguet, **Domoguen (1980?)** reported in part as follows:

Certain edible insects are helping a growing number of folk in the Cordillera uplands [in northern Luzon] come by simple but protein-laden daily meals during these harsh economic times. Mountain rice spiked, laced or mixed with insect viands is becoming more common everyday fare for highland families whose poverty prevents them from even thinking of buying

exorbitantly priced meat and fish. A survey conducted by entomologists at the Mountain State Agriculture College (MSAC) in this town found that the insect-eating provides the upland folk with their daily protein and other nutrient needs. . . . Eating insects is an old custom among the various minority tribes in the highlands of North Luzon. The habit is due to food needs and a way of reducing the pests which attack food crops, according to the entomologists. The MSAC study, which is still going on, also discovered that a growing market for edible insects has sprang up in a number of towns in the Cordillera provinces of Benguet, Mt. Province, Ifugao and Kalinga-Apayao.

As reported by Domoguen, the MSAC study identified the more popular edible insects as the June beetle, grasshopper, ant, mole cricket, water beetle, katydid, locust and larva of the dragonfly. They are cooked in various ways, being fried in fat, broiled, sauteed with vegetables, or turned into "adobo" or "paksiw." The common measure for folk who sell insects in the market is by the tin can-full, with prices ranging from P1 to P2 per can (25 pisos = US \$1).

Tom Mester (pers. comm. **1987**), who served in the Peace Corps in the Philippines from 1974 to 1976 and in Sierra Leone from 1976 to 1978, observed insect consumption in the latter but not in the Philippines.

Starr (1991) described food insect use which he observed during a six-year stay in the Philippines. He did not find any insect to be a regular part of the diet among the Christianized lowlanders who dominate most of the country, and he rarely saw insects for sale in the market. Several species are, however, at least episodically treated as "serious food." Those observed by Starr are included under the appropriate taxonomic groups below.

Coleoptera

Cerambycidae (long-horned beetles)

Batocera numitor Newm., larva

Known as *u-ok* and eaten only as larvae (**Gibbs et al 1912**).

Curculionidae (weevils, snout beetles)

Rhynchophorus ferrugineus Oliv., larva

Known as *u-ang* and eaten only as larvae (**Gibbs et al 1912**).

Hydrophilidae (water scavenger beetles)

Hydrous picicornis Chev., adult

Known as *obus* in Visayan and as *alukap* in Ilocano; eaten only in the adult stage, either boiled or roasted after the wings and legs have been removed (**Gibbs et al 1912**). Also see Domoguen (1980?) in the Introduction.

Scarabaeidae (scarab beetles)

Lepidiota punctum Blanch., adult

Leucopholis irrorata Chev., adult

Leucopholis pulverulenta Burm., adult

Oryctes rhinoceros Linn., larva

L. punctum is known as *sibung*, and *L. pulverulenta* as the *salagubang* (**Gibbs et al 1912**). They and *L. irrorata* are all eaten only as adults, either boiled or roasted after the wings and legs have been removed. *O. rhinoceros* (like *R. ferrugineus* above) is known as *u-ang* and eaten only as larvae.

Mindy Kerry (pers. comm. **1987**), Peace Corps Volunteer in the Philippines from 1983 to 1985, provided information on a beetle that is consumed by the Negritos (Sambals) near Cabangan, Zambales, and probably throughout Zambales. The adults (probably a scarabaeid according to Kerry) are captured after emerging from the ground at the beginning of the rainy season and are roasted. They are "munchy" and cherished as a delicacy.

Starr (1991) says that June beetles (Melolonthinae) seem to be the second-most commonly eaten group of insects. In the city of Laoag, at the northern end of Luzon, he had them cooked in vinegar and soya sauce after the appendages, head and prothorax had been removed. This very common form of cooking, known as adobo, is the usual one for June beetles. The beetles are often available in the market at Laoag, and

probably in some other areas as well.

Also see Domoguen (1980?) in the Introduction.

Family uncertain

Douglas Marsden, formerly a research associate in entomology at Eastern Illinois University, related (pers. comm. 1988) that:

While collecting insects on the islands of Occidental Mindoro, I came across a family of natives in loin-cloths (father, mother, two sons and a daughter) camped in the forest. They offered me what later I found out was a python roasted and coleoptera, sans legs boiled in some sort of oil. I ate both the python which rather tasted like chicken and the beetles which in all honesty were not bad at all. I believe the beetles to be a form of *Pachyrrhynchus moniliformis* (Germ.). I collected a few hundred of these beetles during my seven trips to the Philippines.

Hemiptera

Water bugs. See Bender (1975) in the Introduction.

Hymenoptera

Apidae (honey bees)

Apis indica Fabr., larva

Apis (= *Megapis*) *dorsata* Fabr., larva

Apis (= *Megapis*) *zonata* Smith, larva

In addition to the honey, combs containing the larvae of the above species of bees are eaten (**Gibbs et al 1912**). The vernacular name of *A. dorsata* is *pukyutan*. In the Los Banos area, a problem is the frequent theft of combs filled with brood, which are considered by some people to be a delicacy (**Naegel 1992**).

Formicidae (ants)

Oecophylla smaragdina (Fabr.), primarily pupae, prepupae

The weaver ant, *O. smaragdina*, was the only ant which **Starr** observed being used as food, and he describes their use as follows:

. . . during the season when new queens are produced, farmers in the Philippines sometimes slash the silk nests and catch the falling brood. The ideal time is undoubtedly when prepupae and early pupae of queens predominate. Still, one should never expect to get a pure harvest, and when I was served stir-fried weaver ants in a village on the northern coast of Luzon I found quite a heterogeneous mixture. At that time of year we had ants at every meal in that village, to my delight. I never learned how they harvest weaver ants without getting bitten (and formic acid sprayed directly into the bite) by the masses of aggressive workers, and it may be that harvesting is not worthwhile except during the queen-rearing season.

See Bender (1975) and Domoguen (1980?) in the Introduction.

Isoptera

Starr failed to see any indication that termites are commonly eaten in the Philippines, but states that the most likely candidate would be the sexuals of *Macrotermes gilvus* (Termitidae: Macrotermitinae). This is the largest Philippine species, and "colonies are often so massive that they undoubtedly give off large, harvestable masses of sexuals during the pairing season." Also see Bender (1975) in the Introduction.

Odonata

Dragonflies. See Bender (1975) and Domoguen (1980?) in the Introduction.

Orthoptera

Acrididae (short-horned grasshoppers)

Acrydium ranunculium Walker, nymph, adult

Acrydium rubescens Stoll, nymph, adult

Locusta danica Linn., nymph, adult

Locusta migratoria Linn., adult

Dampier (1906: 424), who visited the Batan Islands, later Batanes Province, in 1687, described two dishes of which the natives were fond. The first was a concoction of cooked goat skins and offal and raw fish, the second is described as follows:

They had another Dish made of a sort of locusts....At this time of the Year these creatures came in great Swarms to devour their Potato-leaves, and other Herbs; and the Natives would go out with small Nets, and take a quart at one sweep. When they had enough, they would carry them home, and parch them over the Fire in an earthen Pan; and then their Wings and Legs would fall off, and their Heads and Backs would turn red like boil'd Shrimps, being before brownish....I did once eat of this Dish, and liked it well enough; but their other Dish my Stomach would not take.

Locusts were eaten on a regular basis by the Moros, according to **Pinkerton (1808-1814;** vide Bodenheimer 1951, p. 238), who may have borrowed from Dampier in saying: "The natives catch them in small nets, when they come to devour their potato-vines, and dry them over the fire in an earthen pan. When thus prepared the legs and wings fall off, and the heads and backs, which were previously brownish, turn red like boiled shrimps."

According to **Gibbs (1912)** who reported three of the species listed above, both nymphs and adults of orthopterans are eaten, usually fried. Several related orthopteran species are eaten. The nymphs are called *lukton* and the adults *balang*. Locusts sometimes attain astonishing numbers and leave nothing for the grazing animals which often die of starvation. "Some tribes highly prize these insects as articles of food, while other inhabitants do not eat them at all." In a sample of 300 locusts of the genus *Acrydium*, the average weight per locust was 1.67 g with the edible portion (body and head) comprising 81%. Proximate analysis revealed 59.6% moisture, 24.1% protein (N x 6.25), 7.9% fat, 1.8% ash and 6.6% undetermined.

Showalter (1929) furnishes a photograph of Ifugao women in Luzon preparing locusts by roasting them (p. 39), and another showing an Ifugao locust catcher with his large net.

Starr (1991) reported that locusts (Cyrtacanthacridinae) seem to be the most common insect food of humans throughout the Philippines. During locust outbreaks, they become an important diet supplement for people who would not normally regard themselves as entomophagous.

Litton (1993) reports that grasshoppers are a favorite food in many parts of the Philippines, and therefore they are not destroyed with chemical insecticides. They are also fed to chickens raised on pasture. Pastured chickens in the Philippines are not fed commercial feed. They have a delicious taste and sell for a much higher price than chickens fed with commercial feed.

DeFoliart (1995) summarized Philippine newspaper accounts of a 1994 outbreak of *Locusta migratoria*. As insecticides were not successful in controlling the outbreak, a movement began in some areas, apparently partly farmer-instigated and partly government-instigated, to harvest the insects for sale, both as food for people and as animal and fish feed. Farmers used commercially available nets to catch locusts. Some backyard "tilapia" growers were convinced that grated locusts boosted growth of the fishcrop, and that fish fed dried locusts tastes better than fish fed ordinary commercial feeds. Cooking contests were held in some areas with prizes awarded for best recipes. A popular style of cooking was *locust adobo*, prepared by detaching the wings and legs, boiling the dressed brown locusts in water for a few minutes, and then frying them in oil. The resulting crisp locusts can be served with tomatoes, local red onions (*lasona*) and *bagoong*.

See also Domoguen (1980?) in the Introduction.

Gryllotalpidae (mole crickets)

Gryllotalpa (= *Curtilla*) *africana* Beauv., nymph, adult

The vernacular name of *C. africana* is *sosohong* (**Gibbs 1912**).

According to **Starr**, mole crickets are most commonly eaten in northern Luzon, where they are

sometimes gathered in rice fields in organized hunts. There has been some interest in that region in developing the culture of mole crickets as a regular food.

See also Domoguen (1980?) in the Introduction.

Tettigoniidae (long-horned grasshoppers).

Katydids. See Domoguen (1980?) in the Introduction.

VIETNAM

Bréhion (1913; vide Bodenheimer, pp. 264-265) states that the Annamese and the many forest tribes of the Moïs cook numerous insects as revenge for the damage they cause. The insects reported by Bréhion are discussed below under the appropriate families.

Nguyen-Cong-Tieu (1928) explained "why insects occupy an important place in the diet of the poor Tonkinese":

Everyone who has traveled throughout the Tonkinese countryside easily understands the difficulty that the farmers, especially those of the lower class, face in obtaining food of animal origin. The causes appear to be multiple. First of all, fish on the coast of Tonkin yield less fruitful results than in Annam or Cochinchine. Moreover, streams, lagoons and ponds are relatively devoid of fish. Thus, fresh fish, saltwater fish, shellfish and crustaceans offer no sufficient quantities to respond to the needs of an ever-growing population. On the other hand, because the surface dirt of the delta is almost entirely devoted to the growing of rice and other food plants, there remains little room available for the development of prairies destined for the raising of animals. Buffalo and beef, usually imported from the upper region, are exclusively reserved for field work. They are only killed for the butcher shop when they can no longer work, or on the occasion of a ritualistic festivity. Goats are rare. Many pigs are found, but the flesh of this animal, as well as fowl, constitutes the basis of meat in the diet of only the well-to-do classes.

Nguyen-Cong-Tieu discusses insects from six orders that are used by the Tonkinese (discussed below under the appropriate families). He notes that some of these insect foods, particularly grasshoppers, *Belostoma* and silkworm pupae, are objects of current commerce in the large cities as well as in the village markets.

Esaki (1942; vide Bodenheimer 1951, p. 274) reported that *Cybister* beetles and giant waterbugs are on sale in the markets of Hanoi. **Manocha (1975,** p. 132) mentions that in Indo-China and Thailand, both adult and larval insects are considered delicious and are eaten by the wealthy and poor alike.

Coleoptera

Cerambycidae (long-horned beetles)

Apriona guermari Hope, larva

The larva of the cerambycid, *Apriona guermari* Hope, the *con sau dau* of the Annamites, is found in mulberry tree trunks where its presence is betrayed by a deposit of excrement at the opening of its tunnel (**Nguyen-Cong-Tieu 1928**). It is pulled from its retreat by inserting a wire bent in the shape of a crochet hook, or, lacking wire, a thorny rattan leaf. It is collected more as medicine than as food and is given grilled to children to protect them from sickness.

Curculionidae (weevils, snout beetles)

Rhynchophorus sp.?, larva

In Cochin China and in Annam, the palmworm, known as the *con-duong-ch-la*, is taken from the roots of a certain palm and introduced into the internodes of sugar-cane. **Bréhion** states, as summarized by Bodenheimer: "When sufficiently fattened it is inserted into the nuoc-mam, the national sauce of Annam, fried in pig fat and wrapped in paste. Roasted in butter or rolled in flour this larva is rather succulent and smells like hazel-nut. Europeans like this dish, while in Annam it is reserved for the royal table only. This

palmworm is found only in the maritime districts of Cochin China and its price is always high."

According to **Nguyen-Cong-Tieu**, the palmworm is rare in Tonkin and does not have the same reputation as in Cochinchine.

Dytiscidae (predaceous diving beetles)

Cybister spp., adults

Water beetles, *nieng-nieng bau*, *nieng-nieng kim* (Dytiscidae?), although rather uncommon are eaten grilled or sauteed in grease (**Nguyen-Cong-Tieu 1928**). For the reference to *Cybister*, see Esaki (1942) in the Introduction.

Hydrophilidae (water scavenger beetles)

Hydrous bilineatus MacLeay, adult

Hydrous hastatus Herbst., adult

Hoffmann (1947) states that the hydrophilid beetles, *Hydrous bilineatus* MacLeay and *H. hastatus* Herbst. are used as food in "Indo-China".

Scarabaeidae (scarab beetles)

The *con-ray*, a cockchafer collected by the Annamese in April, and which, after the intestines, elytra, wings, antennae and legs have been removed, is left overnight in the *nuoc-mam* sauce and fried the next day (**Bréhion 1913**). It is reported in Annamese annals that a king of Hue once sent with his triennial tribute to the Emperor in Peking some *con-ray* as a personal gift. The Emperor was so pleased that he asked for more.

Family uncertain.

Bréhion states that other beetles eaten include the larva known as *con-duong-dat* which is collected in May from among the roots of a green plant at Travinh in Cochin China.

Ephemeroptera

Ephemerids (mayflies) are plentiful on certain rivers of Tonkin and, cooked with fat and salt, serve as food for fishermen (**Nguyen-Cong-Tieu 1928**).

Hemiptera

Belostomatidae (giant water bugs)

Lethocerus indicus Lep. & Serv. (= *Belostoma indica* Vitalis), egg, adult

Bréhion reports that the giant waterbug, the *con-bo capunoc*, is roasted and consumed in the *nuoc-mam* sauce, and in Saigon a pair fetches 2 fr. 50.

The hemipteron, *Belostoma indica* Vitalis, the *ca* or *dacuong* of the Annamites is sought not only for its flesh but especially for a liquid that it secretes which is used as a seasoning for many dishes and is considered indispensable for some. **Nguyen-Cong-Tieu** describes in detail how the liquid-producing sacs are harvested. *Belostoma* is also eaten although it is not very fleshy. After the wings, legs and caudal appendages are removed, it is grilled over charcoal or steamed in a special pan (double boiler, the upper part of which has a bottom with a hole through which steam can pass). In either case, only the soft parts within the thorax are eaten. A third procedure involves chopping up the insect and sauteing it in fat, in which case the entire insect is eaten including the chitinous covering. Children collect *Belostoma* eggs from aquatic plants and eat them raw or grilled. The adult bugs are captured using special "fish baskets" and at lights.

See also Nguyen-Cong-Tieu and Esaki in the Introduction.

Homoptera

Cicadidae (cicadas)

Certain mountain people in the Upper Region eat many different species of cicadas, while in the

Delta, the singing cicada, *ve-sau*, "is especially feasted upon." Completing its metamorphosis, it leaves the ground at night and is collected from tree trunks by lantern light. The young insect is tender, and, sauteed in fat, it is a dish often well-liked (**Nguyen-Cong-Tieu 1928**).

Hymenoptera

Apidae (honey bees)

Apis mellifera Linn., larva, pupa

The pupae of bees in the combs is a popular Annamese dish (**Bréhion 1913**). Larvae and pupae of *Apis mellifera* as well as those of several species of wild bees are eaten (**Nguyen-Cong-Tieu 1928**). Adult honeybees and ant "eggs" are reportedly eaten by the peasants of Tonkin and are made into an omelette by the Mois (Brygoo 1946, as cited by **Bodenheimer**, pp. 233, 267).

Formicidae (ants)

"Eggs" [probably larvae/pupae actually] of certain large ants are eaten, cooked with gummy rice (**Nguyen-Cong-Tieu 1928**).

Vespidae (wasps, hornets)

Larvae and pupae of several species of wasps are eaten (**Nguyen-Cong-Tieu 1928**).

Isoptera

Bréhion (1913), as summarized by Bodenheimer, states:

Termite-queens, the *con duong-cha-la*, are also appreciated. No Annamite will destroy a termite hill close to his house. He will cover its top with a piece of red rag, and he regards it as the dwelling of an ancestor in retirement who has approached his house to answer his prayers. At the foot of the hill he will frequently burn incense sticks. Yet in Cambodia many termite hills are used as lime-kilns.

Lepidoptera

Bombycidae (silkworm moths)

Bombyx mori (Linn.), pupa

The silkworm, *Bombyx mori*, or *con tam* of the Annamites, is eaten in the pupal stage (**Nguyen-Cong-Tieu 1928**). Chemical analysis of pupae three days after transformation revealed 78.8% water, 13.0% nitrogenous matter, 2.8% fat, 1.1% minerals, 0.40% phosphorus expressed as P₂O₅, and 0.05% lime as CaO. When taken out of the cocoons, the pupae are sufficiently cooked to be eaten immediately. But, usually, they are eaten salted or sauteed in grease and flavored with leaves from the lemon tree. Finely ground, they are used to prepare good bouillons with leaves of cabbage phyllanthe and water "liseron." Sometimes they are dried in the sun after cooking, and, dried, they keep for a rather long time. They are sold in all of the markets of Tonkin, one kg (2500 pupae) costing about \$.25. See also Nguyen-Cong-Tieu in the Introduction.

Pyralidae (snout and grass moths)

Bryhaspa (= *Brihaspa*) *atrostigmella* Moore, larva, pupa

The larva and the pupa of the pyralid, *Bryhaspa* (= *Brihaspa*) *atrostigmella* Moore, are eaten either raw or cooked (**Nguyen-Cong-Tieu 1928**). It is a rare food, however, and considered a precious medicine in the Sino-Annamite pharmacopoeia. The larva lives in the terminal bud of the graminee, *Thysanolaena maxima*, which grows spontaneously throughout Southeast Asia.

Orthoptera

Acrididae (short-horned grasshoppers)

Oxya velox Fabr., adult

Among the grasshoppers, *Oxya velox* Fabr., known as the *chau-chau* or *cao-cao*, is abundant and the only species eaten in quantity (**Nguyen-Cong-Tieu 1928**). It is hunted from May to December, primarily during the day which is more productive than hunting at night. Children use a triangular-shaped swatter of woven bamboo to stun and collect the grasshoppers. The main hunting instrument, however, is a large screen-like bamboo basket, 120 cm long x 50 cm wide x 60 cm deep, that is passed through vegetation just above the ground. Grasshoppers that jump or fly into the basket are kept from escaping by the continuous sweeping motions of the hunter. The catch is emptied into a basket that has a drawstring and carried home. The grasshoppers are killed by immersing the basket in cold water for a few hours or in boiling water for a few minutes. The selling price varies according to season, locality and condition of the insects, but is generally about 2-3 sous per 200 g or \$.15 per kg (about 2,000 insects). Gravid females sell for slightly more than others. Analysis of freshly killed *Oxya* revealed 68.9% water, 8.3% nitrogenous matter, 1.0% fat, 1.2% mineral matter, 0.7% phosphorus expressed as P₂O₅, 0.005% lime as CaO, and a trace of carbohydrates.

After removing the wings and sometimes the head, intestines and first two pairs of legs, the grasshoppers are cooked with saltwater or sauteed in pork fat. Allspice and leaves of the lemon tree are good condiments with these preparations. "Served with rice, this food, although not being first rate, constitutes the favorite dish of the agricultural workers."

Gryllidae (crickets)

Brachytrupes portentosus Licht.

Two crickets are edible and are eaten by the poor, but they "cater little to the gourmet's palate" (**Nguyen-Cong-Tieu 1928**). These are *Brachytrupes portentosus* Licht., known as *gie-men*, and the mole cricket, *Gryllotalpa africana* Beauv., the *courtilliere* or *taupe-grillon* or *gie-co*. Nguyen-Cong-Tieu notes that all of the Orthoptera mentioned are harmful to agriculture and should be destroyed so it is "happy coincidence" that the Tonkinese villagers can make use of them as food.

Gryllotalpidae (mole crickets)

Gryllotalpa (= *Grillotalpa*) *africana* Beauv.

According to **Bréhion (1913)**, mole-crickets or *con-de-com* are freed of their wings and legs, cleansed, covered with an *Arachis*-nut and cooked in lard. This famous Annamese dish is served mainly in the wet season, from May to October, when these insects abound. Also see **Nguyen-Cong-Tieu** above under Gryllidae.

Tettigoniidae (long-horned-grasshoppers)

Euconocephalus spp., adults

Nguyen-Cong-Tieu mentions that two species of *Euconocephalus*, one green (*con muom-xanh*), the other brown (*con muom-nau*), are eaten but are too rare to be of great importance. They are caught by hand: "The peasants often give them to the children, who grill them over the fire and eat them like snacks. When the hunters can gather a sufficient quantity, they cook them in water with cabbage leaves, after having dewinged and crushed them. In this way, an excellent broth is obtained."

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Items Needing Attention

Pp. 6, 12, 27. Netolitzky needs retranslation of the pertinent parts.

P. 11. Is *Acridium* a misspelling of *Acrydium*? (Acrididae in Indonesia).

Pp. 13, 14. What are the families of the Phasmatodea genera?

Pp. 6, 25. Van der Burg, 1904; awaiting retranslation of the pertinent parts.

P. 25. Domoguen, is 1980 the correct date of publication?