

Chapter 21

SOUTHWEST ASIA

As treated here, this region is bounded on the west by Turkey and Saudi Arabia and on the east by Iran. Because of their relatively small size, proximity to each other, and the nature of the pertinent literature, Iraq, Israel, Syria and the Sinai are grouped together. As can be expected in a generally arid region, the variety of insects used as food is much reduced from that of other regions. Only 16 species, belonging to 13 genera, 8 families and 4 orders are included in the Regional Taxonomic Inventory below. The specific taxonomic identity is known for only 11 of the species, only the generic identity of another 3 species, and only the family identity of one species.

Regional Taxonomic Inventory

Taxa and stages consumed	Countries
Coleoptera	
Curculionidae (weevils, snout beetles)	
<i>Larinus mellificus</i> Jekel, cocoon	Iran, Syria
<i>Larinus onopordi</i> Fabr., cocoon	Iran, Iraq
<i>Larinus rudicollis</i> Petri, cocoon	Israel
<i>Larinus syriacus</i> Gyll., cocoon	Iran, Iraq, Syria
Tenebrionidae (darkling beetles)	
<i>Blaps</i> sp., adult	Turkey
<i>Pimelia</i> sp., adult	Turkey
<i>Tenebrio</i> sp., adult	Turkey
Homoptera	
Aphididae (aphids)	
Aphid species, honeydew	Middle East
Cicadellidae (leafhoppers)	
<i>Euscelis decoratus</i> Hpt., honeydew	Sinai Desert
<i>Opsius jucundus</i> Leth., honeydew	Sinai Desert
Pseudococcidae (soft scale insects)	
<i>Naiacoccus serpentinus</i> Green, honeydew	Iran, Sinai Desert
<i>Trabutina mannipara</i> (Ehrenberg), honeydew	Sinai Desert
<i>Trabutina</i> sp., honeydew	Iran
Psyllidae (psyllids)	
<i>Chermes</i> sp., honeydew	Iran
Hymenoptera	
Cynipidae (gall wasps)	
<i>Aulacidea levantina</i> Hed., galls	Turkey
Orthoptera	
Acrididae (short-horned grasshoppers)	
<i>Cyrtacanthacris septemfasciata</i> (Serville), adult	Kuwait, Saudi Arabia
<i>Schistocerca gregaria</i> (Forsk.) adult	Pan-regional

There are many accounts of the use of locusts as food in this region, especially in the Arabian peninsula, and there are vivid descriptions of their abundance and destructiveness. There is much discourse on the lawfulness of locusts and other insects as food for both Jews and Arabs, and on whether the locusts eaten by

John the Baptist were actually locusts. There is much discussion about the identity of the insect producers of the biblical "manna" and of Middle East mannas in general. One group of insects listed above, the *Larinus* weevil cocoons, while used as food (similarly to tapioca), are used primarily for medicinal purposes, the treatment of respiratory problems.

IRAN

Coleoptera

Curculionidae (weevils, snout beetles)

Larinus mellificus Jekel (= *nidificans* Cap.), cocoons

Larinus onopordi Fabr. (= *maculatus*), cocoons

Larinus syriacus Chevrolat, cocoons

Bodenheimer (1951, pp. 224-225) discusses the trehela cocoons of *Larinus* weevils which are applied by popular medicine and by physicians throughout the Middle East for respiratory ailments. The cocoons are boiled in water until dissolved, then they are drunk. Species used in Iran include *Larinus onopordi* (= *maculatus*) and *L. mellificus* Jekel (= *nidificans* Cap.). *Larinus syriacus* Gyll. belongs to the same group and may also be used. According to Bodenheimer, "The materials for the cocoon are massed in the hind-intestines of the larva before pupation, and are perhaps prepared in the Malpighian tubules. The cocoons are also known as *Trehale* manna. At Teheran they are called *tiqal*, i.e. sugar of nests."

Homoptera

Aphididae (aphids)

Bodenheimer discusses (pp. 22-23) the Kurdish manna produced in Iran (see also the related discussion under Iraq). The sources in Iran are the leaves of several species of oak: *Quercus mannifera* Lindl., *Q. persica* J. and S., and *Q. taurica* Kl. This aphid-produced manna is found widely in the markets in Iraq and Iran.

Pseudococcidae (mealybugs)

Naiacoccus (= *Najacoccus*) *serpentinus* Green, sweet secretion

Trabutina sp., sweet secretion

Bodenheimer (1951, p. 221) identifies Hardwick's location as on "the Irano-Baluchi border," and the insect studied by Hardwick as a psyllid larva. Bodenheimer continues: "In Iran a number of other mannas are popularly known and used officially; these, however, have not yet been properly studied. According to reliable reports, a tamarisk-manna is known from one of the western mountain ranges of Iran which apparently is produced in some quantity by a species of *Trabutina* and by *Najacoccus serpentinus*."

Psyllidae (psyllids)

Chermes sp., sweet secretion from larva

Hardwick (1822 [1980], pp. 182-186) describes the nymph of a species of *Chermes*, to which he attributes secretion of a saccharine substance known as *Gez* or *Manna*, thus confirming a similar earlier conclusion by the French entomologist, Geoffroy. Hardwick states his intention to name the insect "*Chermis-Mannifer*" when the adult becomes known, mentioning also that it appears to resemble *Chermes alni*. Hardwick states that the manna is found "in pieces of various shapes; some flat, as taken off the leaves of the tree; sometimes in cylindrical pieces, impressed with the figure of the stalk or branch on which it has fallen." A letter from a Mr. Hunter is quoted, in part, as follows:

These insects are found on the branches and leaves of trees, on which they swarm in millions, and work and generate this feather like substance, till it gets long, and drops on the leaves, caking on them, and resembling the most beautiful white bees wax; this hardens on the leaf, and takes the complete form of it, which you can strip off, bearing the very impression and imitation of the leaf itself, which no art could exceed.... I have seen a great deal of it about these hills, and much might be collected, I should suppose, were it desirable; there are no inhabitants however about here.

Hardwick mentions that the manna has been found in Persia (Iran) and Armenia. Hunter's location was southwest of Husainabad (India?).

Orthoptera

Acrididae (short-horned grasshoppers)

Bodenheimer (1951: 212) cites Le Chevalier Chardin (in 1711) who reported observing locusts in late March near Bender Abbas in southern Iran. Bodenheimer summarizes his account as follows: "...the sky appeared to be obscured by clouds owing to the locust swarms flying 60 to 70 feet high, and wherever these swarms passed an enormous quantity of locusts fell to the ground; big, red insects, so heavy that they could not rise again. The peasants catch them as they drop. At that season similar clouds passed almost every evening, and the locusts are caught, dried and salted, but also eaten raw. They are sold on the markets of S. Iran as a common food."

IRAQ, ISRAEL, SYRIA, THE SINAI

Forbes (1813 [1834], I, pp. 31-32) states:

I am surprised that commentators on the scriptures have perplexed themselves about the food of John the Baptist in the wilderness; which we are informed consisted of locusts and wild honey; and for which the cassia-fistula, or locust tree, and many other substitutes have been mentioned; but it is well known that locusts are an article of food in Persia and Arabia, at the present day; they are fried until their wings and legs fall off, and in that state are sold in the markets, and eaten with rice and dates, sometimes flavoured with salt and spices: and the wild honey is found in the clefts of the rocks in Judea, as abundantly as in the caves of Hindostan.

Bodenheimer (1951, p. 212), citing the 1813 edition of Forbes, states that his *Acridites lineola*, which is the species commonly sold in the markets of Baghdad, is, in fact, *Schistocerca gregaria*.

Forbes (p. 32) continues:

We often read in Scripture of the butter of kine, the milk of sheep, and the fat of the kidneys of wheat; with the pure blood of the grape, and honey out of the rock: 'He should have fed them also with the finest of the wheat, and with the honey out of the stony rock would I have satisfied thee.' Psalm lxxxix, v. 16. There can be as little doubt what that honey was, as of the wild honey on which the Baptist fed in the wilderness; some of the greatest delicacies in India are now made from the rolong-flour, which is called the heart, or kidney of the wheat: and most probably the brooks of honey and butter, mentioned by Zophar, in the book of Job, were the liquid honey from the wild bees; and the clarified butter, or ghee, used throughout Hindostan, which pours like oil out of the dippers, or immense leather bottles in which it is transported, as an article of commerce; and is every where preferred by the natives to butter not so prepared.

The word kosher, derived from Jewish ritual, though used in many contexts, has retained its original connection to Biblical dietary laws (**Isman and Cohen 1995**). The dietary laws are stated initially in Leviticus XI, with verses 20-23 referring specifically to insects. According to Isman and Cohen, the notion that the rationale for the dietary restrictions is rooted in ancient hygiene and health regulations is a common misconception that has no basis at all in the biblical text. The dietary laws were more spiritually based, part of the Israelites' obsession with discovering the line separating the divine from the profane aspects of things.

The authors summarize the characteristics of land animals and sea creatures that may or may not be eaten, then review, in detail, the various scholarly interpretations of the verses pertaining to insects. Biblical scholars have generally deemed these verses to mean that locusts, grasshoppers, crickets and possibly other closely related orthopterans are fit for consumption, while other insects are excluded. In addition to structural characteristics, ecology may be a factor in the acceptability of orthopterans, especially acridians. The authors note that acceptable mammals are all ungulates, feeding predominantly on grasses. Predatory land animals, including specific birds that are predaceous or feeders on carrion, are excluded. The orthopterans, and especially the acridians, which are primarily graminivorous may have been viewed by the biblical legislators as analogous to the acceptable land animals.

The authors conclude: "The dietary laws pertaining to insects are not merely of historical interest, but are still of concern today. Many observant Jews at present shun broccoli, believing that the tight clusters of florets cannot be cleaned of insects with certainty. Rather than risk impurity, they avoid this vegetable."

Coleoptera

Curculionidae (weevils, snout beetles)

Larinus mellificus (Jekel) (= *nidificans* Guibourt), cocoon

Larinus onopordi Fabr. (= *maculatus* Faldermann), cocoon

Larinus rudicollis Petri, cocoon

Larinus syriacus Chevrolat), cocoon

Guibourt (1858, p. 276; vide Pierce 1915) states that the cocoon of the trehalose-containing weevil, *Larinus nidificans* Guibourt, is used for food in the Orient as commonly as salep and tapioca are used in France. His material probably originated in Syria. **Berthelot (1858, pp. 1276-1279;** vide Pierce 1915) found the chemistry of trehalose to be analogous with cane sugar, with the formula $C_{12}H_{22}O_{11}$.

Hanbury (1859, pp. 178-183) refers to the earlier literature on "trehala" or "tricala," citing the early Persian names for it (Shakir-elma-ascher) and stating that the first reference to the substance was by Ange in his "Pharmacopoea Persica" in 1681. Hanbury (vide Pierce 1915) described the cocoons of *Larinus maculatus* Faldermann, a species occurring widely around the Mediterranean and as far east as Iran as ovoid or globular and about 3/4 of an inch long. Their inner surface is composed of a smooth, hard, dusky layer, external to which is a thick, rough, tuberculated coating of a greyish-white color and earthy appearance. They are found on the stems of *Echinops* and sometimes contain spiny portions of the leaves. The cocoons were imported into Lahore from Hindustan (India) and were abundant in the shops of the Jewish drug-dealers in Constantinople (Istanbul), where Arab and Turkish physicians considered them of value in treating respiratory diseases. Hanbury also notes the production of a saccharine substance resembling dark honey made by the punctures of *L. nidificans* (= *mellificus* Jekel). Apparently, the adult in puncturing *Echinops* causes a flow of honey, and the larva after feeding to maturity constructs a saccharine cocoon.

Gervais and van Beneden (1859, pp. 311-313; vide Pierce 1915) described the uses of trehala and how the decoction is prepared for use against respiratory problems, especially bronchial catarrh. A liter of boiling water is poured over about 15 grams of cocoons, this being then stirred for about 15 minutes, and then boiled. It is drunk by the patient without being filtered. The species they referred to was *Larinus syriacus* Chevrolat, found on *Onopordon* in the desert between Aleppo and Baghdad. The cocoons must be collected before the weevils emerge.

Capiomont and Leprieur (1874, p. 65; vide Pierce 1915) describe the taste of the *L. nidificans* cocoon as sweet, and state that it swells in water but does not completely dissolve even after long boiling. It contains 66% of a substance similar to sago (a tasteless carbohydrate, $C_{24}H_{42}O_{21}$), a small amount of gum and inorganic mineral matter, and 28% of the trehalose sugar. The authors cite the occurrence of this species in Syria and Iran, and state that it is used as a decoction against bronchial catarrh and as a food like tapioca.

Pierce (1915), after reviewing previous literature on *Larinus* and trehalose, states that the genus is confined to feeding on Compositae related to the thistle. The larvae usually feed at the base of the flower head and then construct a cocoon. According to Pierce, the cocoon is made by abdominal excretion, and the larva diminishes considerably in size during its construction.

Bodenheimer (1951, p.225) mentions that cocoons of *Larinus rudicollis* Petri are found in Israel. He also refers to an earlier publication (Bodenheimer 1935, pp. 247, 249) in which he mentioned buying cocoons of *Larinus onopordi* Fabr. in the bazaar in Baghdad. This species is widely distributed "from Turkestan to the Mediterranean shore."

Homoptera

Kaiser (1924, 1930; vide Bodenheimer 1951, p. 221) discovered minor manna secretions on the shrubs of *Haloxylon* and *Artemisia* in the Sinai, but was not able to find the insects responsible for them.

Aphididae (aphids)

Aphid spp. honeydew

Cicadellidae (leafhoppers)

Euscelis decoratus (author?), sweet manna excretion

Opsiis jucundus (author?), sweet manna excretion

Pseudococcidae (mealybugs)

Naiacoccus (= *Najacoccus*) *serpentinus* Green, sweet manna excretion

Trabutina mannipara (Ehrenburg), sweet manna excretion

Manna production by the various insect groups

Bodenheimer (1929) identified two small "cicadas," *Euscelis decoratus* Hpt. and *Opsiurus jucundus* Leth. (Jassidae), as additional manna producers on tamarisk (pp. 75 ff.; vide Bodenheimer 1951, p. 221). Bodenheimer (1929; vide Leibowitz 1943) identified the manna of the Sinai desert as the excretion of the scale insects, *Trabutina mannipara* and *Najacoccus serpentinus*, on the leaves of *Tamarix mannifera*. **Leibowitz (1943)** analyzed scale manna supplied by Prof. Bodenheimer from northern Iraq, noting that, "The Bedouin gather this sweet product from leaves of trees and bushes, and use it as a sugar substitute in coffee." The sugar fraction was found to consist mainly of the rare disaccharide trehalose. Two samples contained 30% and 45% of trehalose, respectively, calculated on the basis of total dry matter, and 70% and 80%, respectively, calculated on the total carbohydrate content. The remaining carbohydrate consisted of sucrose and invert sugar containing an excess of glucose.

Bodenheimer (1947) argues that the manna of Biblical history (Exodus 16 and Numbers 11) was the excretion of two species of scale insects, *Trabutina mannipara* Ehrenberg and *Najacoccus serpentinus* Green. First, he gives strong biological evidence against the widely held view that the lichen, *Lecanora esculenta*, was identical with the manna. Then he says:

The record of the oldest local traditions of Sinai comes from Flavius Josephus and the early monks of the St. Catherine monastery. These reports link the manna with the tamarisk thickets in the wadis of the Central Sinai mountains. Here year after year in June appears a granular type of sweet manna from pinhead to pea size. It appears on the tender twigs of tamarisk bushes for a period of three to six weeks. The quantity of this manna fluctuates according to the winter rainfall. The crop may fail entirely in one wadi and at the same time be plentiful in others. Certain wadis such as Wadi Nasib and the Wadi esh-Sheikh are especially famous for their manna production. Usually the annual crop does not exceed several kilograms, but one steady man may collect over a kilogram a day at the peak of the season. This certainly does not allow for the 'bread' or daily food of the wandering Israelites. However, we must note that *lechem* does not have an original meaning of bread, but of food in general. Otherwise, it could not have come to mean 'meat' in Arabic. All in all, the nutritive value of these few kilograms of manna could not have been important enough to deserve a recording in Israel's history. There must have been a special quality to justify its inclusion in the chronicle. The special quality was its sweetness.

Bodenheimer says that sweetness is the highest "culinaric dream" of the nomad in the desert, and, therefore, "the sudden discovery of a source of pure and attractive sweetness would have been an exciting event."

According to Bodenheimer, all of the statements about manna in the early formations of Scripture agree with the biological observations; it was the later commentaries that produced divergences. He says:

We begin with the criteria of space and time. The location of the manna excretion which is given in the older codes as beginning at Elim (near Wadi Gharandel) and ending at Rephidim (the oasis Feiran), agrees well with the northern limits of the manna excretion in our day. Manna was first discovered on the 15th day of the second month after the Exodus from Egypt. This would be the middle or end of Siwan, which is late May or early June. This date agrees with the natural season of manna production. The description of manna in the Bible, which likens it to small, light brown cummin seeds and to the stickiness of bdellion resin, is a remarkably suitable description of the tamarisk manna. In the Bible its taste is described as like that of *sappihith bidhvas*, which easily may refer to the crystalized grains so often found on the surface of honey. Exodus 16:14 and Numbers 11:9 state that the manna fell from heaven during the night. Actually, most of the dropping of manna, or at least its accumulation on the soil, occurs at night when the ants are not collecting it.... All those manna grains which drop from late afternoon to early morning remain until the beginning of ant activity in the morning. Then, however, they are speedily collected and carried away.

According to Bodenheimer, *T. mannipara* is the manna producer in the mountains, *N. serpentinus* in the

lowlands. The manna, of course, is the well-known "honeydew" excretion of many aphids and scale insects, and the drops, which are excreted mainly by the larvae and immature females, evaporate quickly to sticky solids in the dry air of the desert. "Man" is the common Arabic name for aphids, and "man es-simma" (the manna of heaven) for honeydew. A number of small cicadas found in Sinai, southern Iraq, and Iran are locally called "man," and they produce small quantities of a product similar to manna which is used as a delicacy and as an ingredient in popular medicines. Bodenheimer states that: "The most famous manna product of the Middle East is the Kurdish manna which is collected by the thousands of kilograms every year in June and July. It is used for the preparation of special confections which are sold in the streets of Baghdad and elsewhere under the name of 'man.' This manna is also produced all over the general Kurdistan region in the extensive oak forest by a still undetermined aphid."

Bodenheimer (1951, pp. 217-225) discusses Middle East mannas in general, incorporating information from his earlier works. Of the Kurdish manna from northern Iraq, a sample of which was analyzed by Leibowitz (see above), Bodenheimer gives the following information (p. 222): "In October, 1942, Gelal Bey, then Qaimakam of Shuarta, treated us to some manna in the same condition as above [from Turkey] and also with a purified morsel, which had been boiled and pressed through cloth. It is collected in the surrounding oak forests and is consumed by the peasants as a sweet for breakfast in the form of sherbet drinks, or as a popular medicament. Mixed with flour the manna is turned into delightful cakes." In Iraqi Kurdistan, the oak, *Quercus infectoria* is the source of the manna. Other oak species are the source in Iranian Kurdistan. Bodenheimer states that, without a doubt, the producer of this manna is an aphid (species unknown). The main season is June, with a second minor peak in September.

Bodenheimer (p. 223) cites a report by Jafar al Khayat in 1937, in the files of the Directorate General of Agriculture, that the Iraqi manna is regarded as a secretion of oak leaves believed to be caused by the feeding of a small green aphid. Bodenheimer's account, from Khayat's report, is as follows:

The manna first appears on the under surface of the leaves as a gummy liquid, which drops on the upper surface of the lower leaves, on branches and on the soil. It is collected in a great many places of the Liwa Sulaimaniya and also in the Halebje district. It is entirely restricted to the forests of *Quercus infectoria* in the higher altitudes. Its normal season is from the middle of June to the second half of July, and it is collected in the coldest hours of the early morning. The peasants believe that it drops from the sky on the leaves and soil. When rains are heavy in spring and in June, the manna and the insects which produce it are washed off the oaks, and the manna production is small. Cold winds increase, hot winds and warm, cloudy weather decrease its quantity. When the weather has been favourable and much manna has formed on the trees, the collectors begin their work. They cut large numbers of the branches on which manna has been formed in any substantial quantity. The branches are then beaten until the manna has dropped off. It is gathered into skin bags and brought to the market as lumps of crystallized manna mixed with pieces of oak leaves and dirt. Very rarely pure, white manna is found. The confectioners who buy it there, beat it into pieces until it becomes soft. Then it is filled into jars, mixed with water and left for 24 hours. The liquid is poured into bags (al shal), which are suspended above vessels. The bags are pressed and the liquid which passes out is collected in the vessels. This liquid is then mixed with eggs, 50 eggs for each 400 gr. of manna, with almonds or nuts and with some essences. The whole is boiled, cooled and cut into pieces, which are covered with fine sugar powder. This is the manna which is sold in the markets and streets of Baghdad. The Iraqi authorities estimate that annually about 30,000 kg. of manna are sold on the markets throughout the country, two thirds of which come from the Iranian side of Kurdistan.

Kosztarab (1987) makes brief reference to *Trabutina mannipara* (Ehrenburg) and *Naiacoccus serpentinus* Green (Pseudococcidae), the manna producers on *Tamarix* trees in the Sinai Desert. **Brown (1975;** vide Kosztarab 1987) reported on the chemistry of aphids and scale insects.

Hymenoptera

Apidae (honey bees)

Bodenheimer (1951, pp. 225-231) discusses honey and honey-hunting in the Middle East. **Springer (1954)** discusses the history of beekeeping and honey in relation to the Talmud.

Orthoptera

Acrididae (short-horned grasshoppers)*Schistocerca gregaria* (Forsk.) (= *Acridites lineola*), adult*Schistocerca peregrina* (author?) (= *Acridium peregrinum*), adult

Hope (1842, p. 135) rendered his opinion on the scholarly dispute concerning whether John the Baptist ate actual locusts or whether the term referred to the pods of a species of cassia:

The hypercritic argues that locusts are an unnatural food, forgetting that they were allowed to be eaten by Moses, the Jewish lawgiver. Now, if they were eaten in early days, and are eaten at present by people frequenting the very same desert which John the Baptist inhabited, what reason have we to think that they were ever abandoned in his time? None whatever! Locusts will still continue to be eaten, and critics still endeavor to refine, but all their acumen and learning will never convert an insect to a fruit.

H.B. Tristram (1873) (cited by **Bodenheimer (1951: 215)**) described locusts as very good to eat when stewed after the Arab fashion with butter. They tasted somewhat like shrimps, but had less flavor.

Burr (1939: 212) cites Ealand (in 1915) as expressing surprise that Bible students of yore strained so hard over the thought of locusts, and would go to the trouble to suggest that what John really ate was the carob which is also known as the locust bean.

Whiting (1915), in his article, "Jerusalem's Locust Plague," gives such a vivid description that it should be read in its entirety in order to fully grasp the magnitude of destruction caused by the invasion and human futility in trying to combat it. According to Whiting, students of Joel assert that the first two chapters of that Old Testament book, up to the 28th verse, picture an actual invasion of locusts and not Judah's human enemies. The 1915 influx, by the winged adults of *Schistocerca peregrina* (= *Acridium peregrinum*) covered all of Palestine and Syria. At Jerusalem, "before they were seen, a loud noise, produced by the flapping of myriads of locust wings, was heard, described as resembling the distant rumble of waves, or, as St. John has it, 'the sound of their wings was as the sound of chariots of many horses running into battle' (Rev. 9:9)." And, Whiting says, "Attention was drawn to them by the sudden darkening of the bright sunshine, and then by a veritable shower of their excretions, which fell thick and fast and resembled those of mice especially noticeable on the white macadam roads."

At Bethlehem, where the locusts were brought to earth by heavy showers (Whiting, p. 513):

Quantities were now gathered by the poorer Bethlehemites. A few ate them roasted, describing the taste as delicious, especially the females full of eggs. Still, the main reason for collecting them was in order to secure the small bonus offered by the local government of Bethlehem. Thus tons were destroyed, being buried alive till several ancient abandoned cisterns were filled, while in surrounding villages each family was required to produce a stipulated weight. Likewise in Jaffa they were destroyed by being thrown into the Mediterranean and, when washed ashore, dead and dried on the beach, were collected and used as fuel in the public 'Turkish baths' and ovens.

Whiting describes oviposition by the hordes of locusts, noting that as many as 60,000 young nymphs, or "creepers," can emerge from one square meter of soil. "Once the alarming extent to which these eggs were laid was realized, the authorities issued a proclamation, dated April 19, requiring each male person from 16 years to 60 to gather eleven pounds of the eggs." The young bands advanced at the rate of 400 to 600 feet per day, "clearing the ground of any vegetation before them.... None but those who have seen them can begin to imagine their countless multitudes and the destruction to follow." Whiting notes that older nymphs walk or leap like ordinary insects, but the younger nymphs "seemed to hop like fleas, so that when anything neared their thickened masses it seemed as if the entire surface of the ground moved, producing a most curious effect upon one's vision and causing dizziness, which in some was so severe as to produce a sensation not unlike seasickness. The same was also true when watching them undisturbed on tree or field."

There are not many accounts of locusts in urban situations, but Whiting described their entry into Jerusalem (pp. 525-526):

Countless numbers of the young locusts [wingless nymphs] poured into the broad, walled road leading into the city from the west, past the United States Consulate to the Jaffa Gate. For three or four days an incessant and unending stream filled the road from side to side, like numberless troops marching on parade, and in spite of the traffic at this junction, which to this city is like lower Broadway to New York, their ranks, although thinned, entered the ancient gateway and the New Breach. 'Though in among the weapons they fall they shall not stop' (Joel 2:2).

Thus the moat around 'David's Tower' was so filled that the dry earth seemed to be a living mass. Up and up the city walls and the castle they climbed to their very heights.

Whiting provides graphic photographs and again recalls Joel (p. 526): "Did not Joel then see the already ancient walls of Jerusalem in his day, as we now do, form so slender an obstacle to tiny soldiers composing immense armies, causing him to so graphically exclaim: 'They shall run like mighty men; they shall climb the wall like men of war; and they shall march every one on his ways, and they shall not break their ranks'?' (Joel 2:7)." In describing the obnoxious invasion of homes and clothing, Whiting again quotes Joel (2:9) (p. 533): "They shall run to and fro in the city; they shall run upon the wall; and they shall climb up upon the houses; they shall enter in at the windows like a thief."

Whiting describes, as the result of all of the more succulent vegetation having been devoured by the nymphs, the special havoc caused by the new generation of young winged adults (p. 541):

Up to this time the olive orchards had suffered comparatively little. The creeping locusts had not seemed to care for the tough, bitter leaves while better things were at hand, and as a rule only severely damaged individual trees where other food was scarce. But now that these ravenously hungry, freshly moulted fliers appeared, food had already become scarcer, obliging the creepers to seek the heretofore despised olive, crawling up the trunks layers deep. Between the two they stripped every leaf, berry, and even the tender bark, leaving only, where such existed, the green tufts of the poisonous mistletoe.

Likewise every variety of tree was attacked and stripped, with the sole exception of the Persian lilac (*Melia azedarach* L.) and oleander bushes (*Nerium oleander* L.). The succulent cactus (*Opuntia Ficus-indica* L.) they seemed very fond of, but instead of commencing on the edge of the large leaves, they ate away layer after layer over the whole surface, giving the leaves the effect of having been jack-planed. Even on the scarce and prized palms they had no pity, gnawing off the tenderer ends of the sword-like branches, and, diving deep into the heart, they tunneled after the juicy pith.

Concerning the use of the locusts as food, Whiting says (p. 547):

Since in Palestine and Syria locust visitations are very rare, the eating of them is practically unknown by the Arabs, while in Arabia, where the locusts make their appearances frequently, locust flesh is even found among the articles of trade.

The natives dismember the insects, pulling off legs and wings, but not the head, and while still alive roast them in a pan over a hot fire; and after being thoroughly dried in the sun, they can be stored away in sacks. The taste is said by them to be akin to that of fish.

Whiting describes attempts to reduce locust numbers (the wingless nymphs) by herding them into traps (pp. 535-536). The first design was a "bottomless box" lined with shining tin, up which the locusts cannot crawl. This was sunk in the ground at a site toward which the locusts were moving. Smooth-faced metal barriers were extended from either side forming a V-shaped area which opened above the trap, and into which the locusts could be driven. The locusts were unaffected by loud noise made in an effort to force them between the barriers and into the trap, but waving a large, dark-colored cloth to cast a shadow on the ground was effective. When the metal-lined box was full, it could either be emptied and refilled or pulled out of the hole, leaving the locusts to be buried. To avoid the labor of sinking the trap it was found that the locusts readily ascended a ramp ending over the trap. This still left the problem of disposing of the captured insects, but led to a further improvement, attaching the inclined plane to a tin hopper, below which a bag was attached. The bagged locusts were then easily carried away and destroyed.

There appears to be no reason why this method of herding locust nymphs to their destruction could not be used for their harvest as food or feed. Similar methods were used to destroy Mormon crickets in the early days of the American West. According to Whiting, the nymphs became more wary when they were large, and they were more difficult to herd into the traps.

Bodenheimer (1951: 212) cites Hedin (1918) who reported that along the shores of the Tigris and Euphrates [Iraq], the Arabs tear off the wings and legs of the locusts and roast their bodies over the fire.

Steyn (1962) cites Samsonoff's (1919) description of an outbreak of disease among cattle, sheep and goats in Palestine which followed an invasion by dense swarms of migratory locusts. As summarized by Steyn:

"Circumstantial evidence pointed to the probability that the water from wells, some of which were filled with the dead bodies of larval locusts, poisoned the animals. The symptoms, which appeared about half-an-hour after the animals had drunk water from the polluted wells, were mainly of cerebral origin -- after signs of vertigo, the animals became comatose and died." Steyn's summary continues: "Similar symptoms appeared in cattle, buffaloes and sheep after having eaten sorghum leaves which had previously been attacked by locusts. Samsonoff concluded that the greenish-yellow secretions of the locusts poisoned the animals. However, he also stated that it is well known that animals can consume dead locusts without suffering any harmful effects."

Steyn (1962) also cited G. Curasson (1934) who described cases of locust poisoning in cattle, sheep and buffaloes in Palestine and North Africa similar to those described by Samsonoff. As summarized by Steyn:

Curasson succeeded in killing guinea-pigs and rats within a few minutes with subcutaneous injections of 0.125 ml of the greenish-brown fluid which consisted of secretions of the salivary glands, the stomach glands and other glands associated with the digestive tract. Two to 4.0 ml of this fluid injected subcutaneously, or 8.0 to 15.0 ml given by mouth to sheep and goats, induced salivation, excitement, muscular spasms, accelerated respiration, vertigo, coma and death. . . . Curasson used the secretions from the mouth of *Locusta migratoria*, var. *migratorioides*, *Scistocerca gregaria* and *Cyrtacanthacris ruficornis*.

Bodkin (1929) describes the anti-locust (*Schistocerca gregaria*) campaign in Palestine in 1928. It is noted that invasions occurred in 1865, 1878, 1890, 1902, and 1915, or regularly at 12 to 13 year intervals with 1915 being the worst plague. Bodkin states (p. 134) that: "An accurate prediction of a locust year and the existence of an organization having at its back a plentiful supply of materials and equipment, the good will and confidence of the population and adequate legislative measures, are *sine qua non* for the successful prosecution of a locust campaign."

The main piece of equipment used was a standard compressed air spraying machine to which was fitted a special adaptor for flame projection (described in detail by Bodkin on pages 135-139). A total of 150 flame-throwers were purchased and distributed for use by Department of Agriculture personnel who were formed into Field Companies. Other equipment and materials included 2,000 hand nets for collecting locusts during the early morning hours before they warmed sufficiently to become airborne; portable "Lux" lamps which were attractive to locusts and, when placed in the center of swarms at night, facilitated concentrating the insects (which could be driven toward the center) for more efficient use of flame-throwers; bait and spray mixtures of molasses and sodium arsenite; and zinc sheeting (enough to stretch nine miles) for herding the young hoppers into trenches and pits. Training and public education efforts are described. Legislative measures included penalties for noncompliance.

Bodkin (p. 131) relates a humorous incident from the 1915 anti-locust campaign:

Government control measures consisted in paying one bishlick (15 mils = 4d.) per rotol (slightly more than six pounds) for the winged locusts and, later, a decree that every male person must collect 18 kilograms (about 40 lb.) of eggs and all proprietors must plough up their arable land. . . . In Jerusalem the eggs collected were placed in a large store and, if a number of very reliable witnesses are to be believed, as soon as this store was in receipt of a fair number of eggs, it was possible to apply at the *back* entrance and there *purchase* from the engaging individual in charge the correct amount of eggs decreed for collection by each male member of the population. A visit, later, to the *front* door for delivery of these eggs would then be made and a receipt obtained to the effect that one's duty by the government - so far as the collection of locust eggs was concerned - had been fulfilled. Thus all parties were satisfied - particularly the storekeeper. Many parcels of eggs must have embarked, and continued, on a passage from back door to front door and back again to the rear entrance of the store. This store gradually got filled, however, as many impecunious people were forced to go out and collect the requisite number of eggs. The eggs in the store eventually hatched and the unpleasing spectacle was presented of all available exits therefrom literally vomiting young locusts in millions and millions.

Relative to use of the locusts as food, Bodkin states (p. 134):

The well known Biblical quotation of a diet of 'locusts and wild honey,' so far as locusts are concerned, still holds good. The inhabitants and Beduin tribes of the Jordan Valley greatly appreciated the arrival of the winged swarms this year, and it was no uncommon spectacle to see numbers of these people returning from the early morning campaign laden with sacks of locusts which they kept with them in their houses, each day drying a small number in the sun, afterwards

frying them in oil and consuming them. In Transjordan the locusts fetched a fair price for food.

Bodkin continues (p. 134): "The avian and mammalian fauna of Palestine enjoyed a rich diet in places where the winged swarms appeared. Birds such as sparrows, bee-eaters, and especially storks, assisted the efforts of the Government and population in the work of destruction."

Probably one of the earliest extant references to insects as food is in the Book of Leviticus in the Christian Bible (Lev. 11: 20-23, as translated in the Good News Bible, 1976): "[20] All winged insects are unclean, [21] except those that hop. [22] You may eat locusts, crickets, or grasshoppers. [23] But all other small things that have wings and also crawl must be considered unclean." In the Book of Matthew, which may have been written as early as the First Century AD, we read of John the Baptist (Matt. 3:4, Good News Bible 1976): "John's clothes were made of camel's hair; he wore a leather belt around his waist, and his food was locusts and wild honey." In the Mishna, which is the first part of the Talmud, completed in about 220 AD, there is extensive reference to locusts, which are considered "clean" or okay to eat (translation by Danby 1933; vide Bodenheimer 1951, p. 41). The traditions set down in the Mishna were held by the Pharisees to be of equal authority with the written law of Moses.

See also Forbes (1813) and Bodenheimer (1951) in the Introduction).

SAUDI ARABIA AND KUWAIT

Orthoptera

Acrididae (long-horned grasshoppers)

Cyrtacanthacris (= *Nomadacris*) *septemfasciata* (Serville), adult

Schistocerca gregaria (Forsk.) adult

Hasselquist (1766, pp. 230-233), attempting to establish that John the Baptist did indeed eat locusts, confirmed to his satisfaction that locusts were still eaten by Arabs in Egypt, the Arabian Peninsula, and elsewhere (see discussion under Egypt).

J.L. Burckhardt (1831) is cited by **Bodenheimer (1951: 214)**, saying that,

all of the Bedouins of Arabia as well as the town people of Nedjd and Hejaz are accustomed to eat locusts. At Medina and Tayf he saw locust-shops, where these insects were sold by measure. In Egypt and Nubia they are eaten by the poorest beggars only. The Arabs, in preparing them for food, throw them alive into boiling salty water. After a few minutes they are taken out and dried in the sun. The hard legs and wings are then torn off, the bodies are cleaned of the salt and completely dried, after which process whole sacks are filled with them by the Bedouins. They are sometimes consumed broiled in butter, and they often form part of the breakfast, when they are spread over unleavened bread mixed with butter.

Of all the Bedouins encountered by Burckhardt, those of the Sinai alone did not use locusts as food.

Palgrave (1865, pp. 345-347) describes an encounter with a vast swarm of locusts, just settling down for the night on the Hasa plain. He says that:

. . . our dromedaries capered and started as though struck with sudden insanity.... it would be hard to say which of the two were the most frightened, they or the locusts. It was truly laughable to see so huge a beast lose his wits for fear at the flight of a harmless, stingless insect; of all timid creatures none equal the 'ship of the desert' for cowardice.

But if the beasts were frightened, not so their masters; I really thought they would have gone mad with joy. Locusts are here an article of food, nay, a dainty, and a good swarm of them is begged of heaven no less fervently than it would be deprecated in India or in Syria.... When boiled or fried they are said to be delicious, and boiled and fried accordingly they are to an incredible extent. However, I could never persuade myself to taste them, whatever invitations the inhabitants of the land, smacking their lips over large dishes of entomological 'delicatesses' could make me to join them. Barakat ventured on one, and one only, for a trial; he pronounced it oily and disgusting; it is caviare to unaccustomed palates.

Palgrave states that, to his knowledge, locusts are never eaten by the Bedouins or villagers of Syria,

Mesopotamia, and Iraq, and this may be because the locusts of the north are much smaller and more like "ordinary grasshoppers."

Lady Ann Blunt (1881, pp. 94, 96) tells of encountering, on December 30, in an inhospitable-looking range of hills called El Mizmeh, "great numbers of red locusts which, as the sun warmed the ground, began to fly about and were pursued by the men and knocked down with sticks. Enough have been secured to make a dish for dinner.... The locusts fried are fairly good to eat."

Doughty (1923, I, pp. 203-204, 335-336, 472; II, pp. 245-246, 323, 332, 436-437) makes a number of references to locusts, stating (I, pp. 203-204):

The same evening we saw flights of locusts.... The bird-like insects flitting upon their glassy feeble wings in the southern wind, fell about the camp; these locusts were toasted presently at all watch-fires and eaten. The women on the morrow had gathered great heaps, and were busy singeing them in shallow pits, with a weak fire of herbs; they give up a sickly odour of dried fish oil. Thus cured and a little salt cast in, the locust meat is stived in leathern sacks, and will keep a good long while: they mingle this, brayed small, with their often only liquid diet of sour buttermilk. Locust powder is not victual to set before guests; and I have seen poor nomads (more often women) a little out of countenance to confess that (to beguile hunger) they were eating this wretchedness. The best is the fat spring locust, and 'fretting every green thing,' the Aarab [sic] account them medicinal. The later broods, *dubba*, born of these, sexless, or imperfect females, finding only a burned-up herbage, are dry and unwholesome. This early locust, toasted, is reckoned a sweetmeat in town and in desert.

On page 336: "The children bring in gathered locusts, broached upon a twig, and the nomads toast them on the coals; then plucking the scorched members, they break away the head, and the insect body that remains is good meat; but not of these latter swarms, born in time of the dried-up herbage."

In Volume II, Doughty mentions (p. 323) seeing baskets of parched locusts in the market, and also mentions the threat that locusts pose to the date crop (p. 436):

The fruit-stalks hanged already - with full clusters of green berries - in the crowns of the female palms: the promise was of an abundant harvest, which is mostly seen after the scarcity and destruction of a locust-year.... This year there were few hitherto and weak flights; but sometimes with the smooth wind that follows the sun-rising the flickering *jarad* drove in upon us: and then the lads, with palm branches of a spear's length, ran hooting in the orchard and brushed them out of the trees and clover. The fluttering insects rising before them with a *whir-r-r!* were borne forth to the Nefud. The good lads took up the bodies of the slain crying, 'They are good and fat;' and ran to the arbour to toast them.

P.W. Harrison (1924), cited by Bodenheimer (1951: 214), explains that roasted locusts taste better than they look. "We do not have roasted locusts every year in Arabia, but when we have them, we have lots of them. In such years the locusts may come over the country in great clouds which obscure the sun for two or three days." Bodenheimer (p. 215) also cites T. Canaan (1928) who writes of a visit to the Azazima Bedouins of the Negeb: "Locust swarms passed from the South with a heavy grinding noise.... Many Bedouins roasted the adults over a small fire. After a light roasting the insect is gently rubbed between both hands, to break off the wings and legs. Roasted locusts are a highly esteemed dish with the Azazime."

Raswan (1934, p. 59), who spent many years living with the Bedouins, writes that while camping near the oasis al-Jauf, reddish locusts began to "rain" upon the tents. Bodenheimer (1951, pp. 215-216) summarizes as follows:

Immediately, men, women and children hurried to collect them from the ground which they covered with a red carpet. Locusts were roasted on all fires. Children, women and men sat around the fires, and ate them, holding them by their wings, pulling off the legs, and dipping them into salt. Boiled, Raswan did not like them, as they tasted like insipid cabbage. Yet roasted they are crisp, the interior having the taste of spinach. They are clean animals, not at all repugnant, but one soon tires of them, when they are served every day. Women and children continued to collect them, and on the next morning mountains of locusts were spread for drying in the sun. When we left the camp a few days later, we had no empty sacks or bags. The camels were fully loaded with dried locusts. Men, dogs and camels delighted in them, but for a few days only, when they became repugnant. The remainder of the dried locusts was kept for later days of famine, as huge locust swarms always foretell drought and famine Faris told him that tens of thousands of

Bedouins have to subsist often for weeks only upon locusts, and camels and horses have at times to be fed with them. Four days after breaking camp every pasture was destroyed by the locusts.

Hess (1938, p. 110; vide Bodenheimer 1951: 216) gave the following recipe in use with the Arabs of Central Arabia for locusts as a dainty dish. As summarized by Bodenheimer: "The locusts are collected early in the morning, while still drowsy with cold, in bags which are sown up. Then they are thrown into boiling salty water, which later is poured away. The insects are then spread upon old tent cloth to dry in the sun. For eating they are pounded in a mortar and the flour is mixed with salt and fat, and perhaps also with dates. Sometimes the locusts are roasted in a special cooking pit, the *zibweh*."

Guarmani (1938, p. 38), who travelled in northwestern Arabia, says, "For breakfast they gave me camel's milk and baked locusts. The milk was, as usual, excellent, but the locusts very tasteless. I only ate two of them." Bodenheimer (1951, p. 214) quotes additionally from Guarmani: "At Tueie the inhabitants were engaged in gathering up locusts which they had roasted in deep holes in the sand. I bought four sacks full. They are a valued source of supply to the inhabitants of the Nedjd. Their flights across the sky are watched by many anxious eyes and they are followed wherever they settle. Holes are dug in the ground, wherein they are roasted with all speed." According to Bodenheimer:

Guarmani claims that experience had taught him that locusts are not to be recommended as food for man, in spite of the enthusiastic remarks to the contrary made by the greedy orientals. When roasted they are tasteless, and when boiled they become watery, although for horses they are as good as oats. They fill their stomachs and increase their muscle without making them fat . . . The traveller should have them gathered and after the legs and wings are taken off should buy them at the price of barley. The peasant reaps an immense harvest from this plague.

Dickson (1949, pp. 447-454), a Kuwait government official concerned with locust control, published extracts from his official diaries of 1929-1932. They are reminiscent, in their vividness, of Whiting's account of the Jerusalem plague. Dickson says of the species involved:

The flying ones we see and know in Kuwait and North-East Arabia are of two main types, the carmine or red-coloured ones known locally as the *Yakhakh* (*Nomadacris septemfasciata*) and the Common Desert Yellow variety with brown markings (*Schistocerca gregaria*) known as *Jarad*. The red locust is the kind most eaten by the inhabitants of Arabia. They eat only the females - and quite good they are, fried in butter with salt, or boiled. They taste much like roast chestnuts, and no doubt one pleasure the Arab has in eating them is the feeling that he is avenging himself for all the damage the insect has done him - at least this is what my Badawin friends say, and I can understand it.

Relative to the term, *Yakhakh*, Dickson says, "Strictly speaking this is the name given to any kind of grasshopper, which it is *haram* (unlawful) to eat as opposed to the locust proper, which is *halal* (lawful). The red locust is definitely *halal*."

According to Dickson, the source of locusts in Arabia seems generally to be Africa, from where they migrate first from Ethiopia to Yemen and then select one of two routes, one along the south coast of Arabia to southern Pakistan and India, the other north to Hijaz, Najd, and northeastward to Iraq and Iran. There are, of course, subsidiary migration routes. Also, some swarms enter Palestine and Northern Hijaz probably via Egypt and the Sinai, and others cross the Red Sea north of Jiddah, but the main route appears to be from Ethiopia to the southwestern part of the Arabian Peninsula.

As part of his account of destruction caused by the locusts, Dickson describes the convergence of a band of *dibba* (wingless young hoppers) converging in April, 1929, on the oasis of Jahrah, 20 miles west of Kuwait.

[They were] advancing on a 4-mile front with a depth of two miles. The ground was seething with them, like a moving and undulating carpet, each *dibba* marching shoulder to shoulder with his neighbour, and in such a thick mass that as the car drove through them the wheels left regular lanes, as if we were driving through yellow-black snow. The millions of insects that were crushed in this process were instantly devoured by their companions and in a few seconds our car tracks were obliterated. The country through which the insects had passed was stripped quite bare, and where bushes had previously been seen, nothing but bare desert sand remained. Even the thick stalks of large bushes 3 feet high were entirely devoured. [When this band reached Kuwait] myriads upon myriads of the *dibba*, in spite of all efforts to check them, swept over the city wall into the town, in a horrible sort of yellow-black wave, destroying on their way every single

garden lying between the walls of the city and the houses proper. The ravages of the creatures and the persistent way in which they swarmed over every building and invaded the innermost apartments, had to be seen to be believed. The Agency Building, my own house endured a five-day assault, and in spite of gauze doors and windows everywhere, a great many got into the public rooms, where they did much damage to carpets and furniture.

In a similar invasion by the *dibba* in May, 1931, a mass of billions of the crawlers "once again surged over the walls of the city much as molten lava tips over the edge of a crater of a volcano and progresses slowly down the side of the mountain . . . this time the shops in the bazaar seemed to attract the insects more than in the previous year, and hundreds of yards of silk and cotton material were devoured or rendered useless. Again the loathsome swarms invaded private houses, kitchens and food."

Dickson states that the Badawin proper, the migrating camel tribes, do not mind the locusts so much, in fact, rejoice in a way when they see them.

It does not worry these nomads if large tracts are denuded of fodder; they simply move off to country which has not been visited. They know that the damage done by locust swarms is more or less local, and that the insect will move to more favourable country lying to the north (Iraq) and will not bother them for long. They also enjoy the wonderful opportunity to satisfy for once in a while their ever-prevailing hunger. Nor is this all, for their horses, camels and dogs all get their fill, as well as foxes, bustard, monitor lizards, kites, shrikes and a dozen other denizens of the desert.

Dickson mentions visiting a Badawin camp which had just received a visitation of red locusts:

The whole camp had turned out to slay and collect the insects for food, and from the numbers collected it was evident that they had had a most successful day. The roofs of all the black tents were strewn from end to end with dead locusts spread out to dry, every available mat, rug and *lahaf* was also laid out to take the excess catch, and camels, dogs, mares and human beings were hard at work eating the insects, whilst cooking pots, bags, paniers and water-skins were crammed to overflowing with dried ones.

Dickson concludes: "I, personally, never could fancy locusts much, but my wife and daughter, especially the daughter, revelled in them. I am told that even Badawin enjoy them for a few days only, after which their gorge seems to rise against the food, and they give the remnants of their catch to their animals."

As reported in the *San Francisco Chronicle* (September 22, 1988), the worst locust plague in 25 years has provided a gastronomical delight for some Saudi Arabians who have taken to grilling them like shrimp. In sort of a new twist to the old insecticide residue problem, however, health officials warned them to stop eating the insects because they may be tainted with lethal insecticides.

TURKEY

Coleoptera

Tenebrionidae (darkling beetles)

Blaps sp., adult

Pimelia sp., adult

Tenebrio sp., adult

Shaw (1738), and, according to Bodenheimer (1951, pp. 207, 209), **Bargagli (1877, p. 4)**, Niebuhr and many travelers, particularly in the 18th century, reported on the habit of Turkish and North African women of eating adult tenebrionid beetles (*Blaps*, *Tenebrio*, and *Pimelia*) when they wished to put on weight. Plump women were "the beauty ideal of the Levant."

Homoptera

Aphididae (aphids)

In discussing Kurdish manna, **Bodenheimer (1951, p. 222)** says, "When I obtained the first specimen in Turkey, I was certain that it was a stone covered superficially with a small amount of hardened honeydew mixed with the fragments of oak leaves. We learned much later only that the entire 'stone' was manna." On page 224,

Bodenheimer writes:

From Turkey the writer was able to obtain much less precise information. It is common in the vilayets of Mardin, Van, Siirt and Elazig, where, suddenly in May or June, clouds are assumed to appear over different parts of the country which shed a certain liquid, which solidifies into a sugary solution, looking just like hoarfrost. It is white. What drops on the soil is lost. As no forecast of the manna dropping can be given, much manna is lost in this way. The manna which falls on the oaks solidifies and the villagers collect it without delay, as it soon dissolves and its collection becomes impossible. Within the same village the manna may fall on one field, yet not on that adjoining. Manna collects also on other plants, such as *Thuja*. The manna from walnut trees or from tobacco leaves (other honeydew excretions of known aphids) has a bitter taste. The green colour of the sample comes from the leaves of the oaks. Manna itself is a sugary syrup, white and transparent. After melting, it becomes reddish. In certain years manna may be found in the vilayet of Mardin, but it is absent from Siirt and with very little only at Van. In some years it does not fall at all. To conclude, writes our correspondent, the fall of the manna remains an inexplicable mystery.

Hymenoptera

Apidae (honey bees)

Bodenheimer (1942) discusses beekeeping in Turkey.

Cynipidae (gall wasps)

Aulacidea levantina Hed., galls

Olivier (1813, I, p. 139; vide Bodenheimer 1951, p. 67) confirms an earlier report that the galls of sage (*Salvia* spp.) are gathered as food by the inhabitants of Crete. He adds, as summarized by Bodenheimer, that the galls, "are esteemed in the Levant for their aromatic and acid flavour, especially when prepared with honey and sugar, and form a considerable article of commerce from Scio to Constantinople [Istanbul], where they are regularly on sale in the market." According to Bodenheimer, this is the gall of the cynipid, *Aulacidea levantina* Hed.

SOUTHWEST ASIA: GEOGRAPHICALLY UNSPECIFIC

Orthoptera

Acrididae (short-horned grasshoppers)

Brygoo (1946), cited by **Bodenheimer (1951: 44)**, quotes from the treatise on zoology by Abu Osuran: "I do not know a more delicate dish than their meat. Roasted locusts have the same taste and smell as have roasted scorpions, both of which resemble that of chicken meat."

The great zoological Lexicon (Hayat al-hayawan, Ed., LondonBombay, 1906, I, pp. 413 ff.), in which Kamal-ad-Din ad-Damiri (1341-1408) discussed the "Lawfulness and unlawfulness" of eating locusts from the standpoint of Islamic tradition, is quoted as follows by Bodenheimer (pp. 43-44):

All of the Muslims are agreed that its eating is permitted. Abdallah ben Abi-Awfa said: 'We went with the Prophet on seven military expeditions and we used to eat locusts.' Abu-Dawud, al Bukhari and the Hafid Abu-Nu'aim states: 'And the Prophet used to eat them with us.' Ibn-Majah recalls in the name of Anas how the wives of the Prophet used to send them locusts on trays as presents. Omar was asked about locusts and replied: 'I wish I had a basketful of them to eat.' . . . Yahya ben Zakariya used to eat locusts . . . The four imams state that the eating of locusts is equally permissible when they have died a natural death or have been killed lawfully or have died after being hunted by a Majian or a Muslim, and whether or not any part of them has been cut off. It is said in the name of Ahmed that if they have died from cold they ought not to be eaten, and the school of Malik holds that if their heads are cut, they are lawful, but otherwise unlawful. The proof, however, of their being lawful under all circumstances is the statement of the Prophet: 'Lawful for us are two dead (animals) and two bloods, - liver and spleen, fish and locusts.' . . .

Our theologians and other sages differ as to whether locusts are land or sea game It is permissible to make an advance of money or property and to receive payment for it in locusts and fish, both alive and dead, when they are to be had in abundance, but every article has to be renamed for what is worthy of it (in return) Among the proverbs we read: 'A date is better than a locust.'

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