

THE LIFE HISTORY OF GLAUCIAS CRASSA (WEST-  
WOOD)—HEMIPTERA: PENTATOMIDÆ

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This bug was described from China by Westwood. Distant in 1902 considered it as a variety of *G. beryllus* (Fabricius) and several subsequent workers seconded him. As I indicated in an earlier paper (preceding issue of the *Ling. Sci. Jour.*), this insect is certainly distinct from *beryllus*. It has also been recorded from Assam. Westwood placed the species in *Pentatoma* while Distant included it under *Zangis*.

Miller (1932) records that *G. beryllus* feeds on cinnamon in Malaya. I am not aware of any other reference to the food habit of *beryllus* or to any published records of the host plant of *G. crassa*.

In the Canton area this species feeds on the Oo Kau, or tallow tree, [*Sapium sebiferum* (L.) Roxb.] and eggs and immature forms have been collected mostly, if not only, during the months of September and October. Although no special effort has been made to collect the species, it would seem that the nymphs would have been found in general collecting during the spring and summer if it were breeding at that time. As a matter of fact, the adults have also been taken primarily in the fall and winter. It must be noted, however, that this species has been found only on the trees in fruit and usually on the higher parts of these trees. Earlier in the season, when the foliage is heavy and no fruits are available, these specimens would not be easily seen unless actually searched for. By September the tallow tree begins to drop its leaves and the bugs are then easier to detect. This bug feeds on tender twigs, as well as on fruits. Whether it confines its feeding to this host plant or not is not known.

*Description of adult.*—Westwood's description is as follows: "Præcedentibus robustior, convexior; nitida, viridis, capite toto, thoraceque antice fulvis, abdominis et hemelytrorum margine laterali tenui fulvo; membrana apicali hyalina; pedibus viridibus, antennis articula 3 et 4 ad apicem nigris, abdomine subtus lutescenti."

"Long, Corp. Lin. 7. Habitat in China."

Freshly collected specimens appear as follows: Suboval. Above: green, yellowish-ochraceous on the head and anterior

part of pronotum. Female: 17 mm long; 4 mm wide at the head across the eyes; 10 mm wide across the humeri. The living specimens shiny green with head and anterior part (including entire lateral margins) of pronotum greenish-yellow, the color on pronotum being more yellow than on head. Antennae and legs green. Head with 2 longitudinal lines starting from a little behind the middle of the head, curving slightly outward a little beyond their middle and converging somewhat at the apex of head. Margin of head narrowly black; antennal segments 0.78, 1.47, 2.84, 2.84, and 1.65 mm, apical one-half of III and apical two-fifths of IV blackish. The male antennae measure 0.65, 1.80, 2.17, 2.17, 1.47 mm. Pronotum with the yellowish anterior portion set off by a curve line of black punctures—the line starting at middle of each humerus and extending forward to the anterior fourth of the pronotum along the median line. There are some black punctures along the lateral margin of pronotum which are contiguous at and near the anterior angle, and from four to six small black specks in the anterior fourth of the segment.

Corium uniformly densely punctate; pronotum and scutellum punctate but the punctures partly obscured by the rugulosity. Beneath: shiny, a more yellowish-green than above. Legs an intermediate green with an obscure bluish tint. Thorax with strongly developed pale-colored keel, extending from the anterior coxae to the posterior coxae. Abdominal basal tubercle pointed, prominent, and fits into a slight groove at the posterior end of the thoracic keel. Rostrum subunicolorous with legs but without the bluish tint and with apical third of segment IV blackish. Rostrum reaches beyond the posterior coxae.

The male is smaller than the female. Specimens in collections fade considerably so that they are more brownish and the color of the head and anterior pronotal area is ochraceous.

*Eggs.*—One mass of eggs contained 110 eggs; another, about 140. One mass was on the upper surface of the leaf and about 20 feet high on the tree. It was somewhat triangular, 15 mm long and 11 mm in greatest width, and pointed at one end (toward the apex of the leaf). The second mass was on a blade of grass near a tallow tree. The eggs were collected one day before hatching and they already showed the signs of hatching. The eggs are whitish-yellow and measure about 1.52 mm long and 1.08 mm wide; the diameter of the operculum is about 0.87 mm. They are reticulated and possess

an operculum just below which is a ring of thin, white processes, perhaps about 30 in number. Before hatching the eyes and the egg-burster are clearly seen and the color of the same (which could not be positively determined) is perhaps dark reddish-brown. At the intersection of the operculum and the egg on the opposite side of the operculum from the egg-burster, there are two longitudinal marks. The basal part of the egg-burster is heavier and darker than the remainder. The egg-burster in most cases was located at the cap ring (operculum), its point usually a little below the cap. The incubation period has not been determined.

*First instar nymphs.*—Upon hatching, the head and thorax of the young nymph are pale yellowish, the abdomen brownish with the dorsal plates pale yellowish. When an hour or so old, the nymphs are brownish, except at the basal part of the head, a thin median longitudinal pale line on thorax and base of abdomen, all of which are whitish-yellow. The thorax is darker than the abdomen and the dorsal abdominal plates darker than the thorax; eyes darkest of all. Nymphs about eight hours old have the head (except a basal white triangle) brown; thorax and dorsal abdominal plates blackish-brown; abdomen whitish at base; the remainder (except dorsal plates) greenish. These young nymphs are very attractive and rather unusual in appearance among pentatomid nymphs in general.

About one day after hatching, the nymphs scattered and ran around rapidly and restlessly. This gave us the clue that the nymphs might be hungry, so they were provided with tender terminal branches of Oo Kau. The nymphs commenced feeding on the leaf petioles at once. In the case of many pentatomids whose first-instar nymphs do not take food, the nymphs remain clustered and inactive. Nymphs about 48 hours old were very plump. The antennæ and legs were pale brown and shining but not as shiny as the dorsum of the bug. Beneath: pale brown. The abdomen and the legs are of about the same color; the thorax and rostrum a little darker.

*Head.*—Length, 0.54 mm; at about the middle a pale median line starts and extends backward into a large pale area on posterior third; the antennal segments 0.14 (as seen from above), 0.28, 0.25, and 0.48 mm. The apices of segments I and II dark. The head is 0.74 mm wide across the eyes. The greatest width of the thorax is 1.14 mm and that of the abdomen 1.28 mm. The pro- and mesonota together are 0.42 mm in

length along the median line. Second segment of anterior tarsus is 0.25 mm in length. Abdomen I to III and most of IV white.

Beneath: Brown. The first tarsal segment, the rostrum, and the lateral plates darker; rostrum reaches middle of abdomen.

*Second instar.*—The second instar is much blacker than the first instar but has some white markings which give it a very contrasty appearance. The rostrum reaches the apex of the abdomen. A second-instar nymph immediately upon molting has the head and thorax yellowish-white; the eyes very black; the antennæ pale with a little yellowish on the apical segment; the legs pale yellowish; tarsi whitish; base of abdomen white; connexival plates yellowish-white, dorsal plates yellowish, the remainder blackish.

*Head.*—The central dark portion becomes much wider in the middle third of head and extends all over the posterior third, the remainder yellowish, with black punctures. The extreme margin (antero-lateral and lateral) black. The explanate margin of pro- and mesonota broadly pale yellow but blackish on the extreme edge. A little pale on the lateral margin of the metanotum; the remainder of the thorax very blackish and shiny and with a very thin median pale line, which on the pronotum is ochraceous and extends to either side along the anterior margin of the pronotum but does not reach the lateral margin. The two basal abdominal segments largely whitish; connexival plates dark with a longitudinal whitish band in center. Dorsal plates dark and shiny. When nearing completion, this instar looks much like the third instar, especially on the abdomen. The head and thorax, however, are much more extensively black. Beneath: thorax brown, except centrally between the pairs of legs where pale and the explanate margin which is the same as dorsal portion. Abdomen pale brown, central plates darker, lateral plates as in connexival plates. Legs brown, with apical half of femora paler; rostrum brown, with apical half of terminal segment dark brown.

The head is 0.71 mm long and 1.08 mm wide across the eyes. The width of the pronotum is 1.43 mm and that of the mesonotum 1.71 mm. Width of abdomen 1.71 mm. The length of all three thoracic segments together 0.71 mm and length of entire nymph 2.43 mm. The antennal segments are 0.17 (as seen from above), 0.62, 0.57 and 0.71 mm. The second segment of anterior tarsus 0.37 mm. The rostrum extends 0.80 mm beyond the apex of abdomen.

*Third instar.*—A nymph one hour before molting to the fourth instar was observed. It was very plump, probably about 5 mm long and 4 mm wide. Antennæ black and shiny except segment I which was pale but black at the apex. Head as in the fifth instar except that the two central lines were closer together and the black marking near inner margin of eye was more definite and prominent; the ground color of the rest of the bug was yellowish-white. The remainder of the bug was orange colored except the disc of the abdomen which was white. The black markings were more extensive in proportion to size of nymph than in the fifth instar. The pronotum had the lateral margin black and a black mark parallel to it; between these two marks white. The mesonotum was much the same as in the fifth instar but the white was at the anterior part of the lateral margin only and the remainder was yellowish, while the black marking parallel to the margin was broader. The mesonotum had six black spots. The abdomen had three black spots on either side midway between the median line and the lateral margin.

A third instar nymph three or four days old measured as follows: Head across eyes 1.57 mm; width of pronotum 2.37; width of mesonotum 2.74; width of abdomen 3.14; length of head 1.14; length of antennal segments 0.28, 0.94, 0.80, 1.14; length of pronotum at median line 0.71; length of mesonotum at median line 0.85; entire length of nymph 4.86 mm.

#### THIRD-INSTAR *G. CRASSA* COMPARED WITH THIRD-INSTAR *RHYNCHOCORIS HUMERALIS* (THUNBERG)

The nymphs of *G. crassa* and those of *R. humeralis* have been confused and at first glance they do have considerable resemblance. The head of *Glaucias* has four black markings and the margin is black, while the head of *R. humeralis* is blackish on the posterior part to the anterior margin of the eyes and thence forward along the central lobe. Pronotum: The pronotum of *R. humeralis* has two large transverse black spots on disc, extending to posterior margin and occupying the basal two-thirds of the segment. Mesonotum: This segment resembles that of *Glaucias* considerably since it also has six large black spots. These spots, however, are near the posterior margin. Metanotum: Much alike in both species.

*Abdomen.*—In *Glaucias* there is some whitish on the disc and the fourth dorso-median plate is much broader than the third. In *Rhynchocoris* there is no white present and there

are no spots other than the dorso-median and connexival plates. The fourth dorsal plate is much narrower than the third and all five of the dorso-median plates are black and their margins very definite. Beneath: *Rhynchocoris* has no black markings on the thorax while on the abdomen only the ventral and connexival plates are black. The rostrum reaches the apex of the abdomen.

*Fourth instar.*—A specimen of *G. crassa*, less than hour old, is described. About 7 mm long by 5 mm wide. The head whitish, the thorax orange, and the abdomen yellow. The antennæ and legs a sort of translucent gun-metal color; the two dorsal plates brownish and very shiny; the dorsal and mid-lateral markings black.

The same nymph four days old is about 8.5 mm in length and 6 mm in width (across the abdomen). The antennæ are very black; the femora green, as is also the outer surface of the tibiæ. The ground color of the head is whitish and that of the thorax orange, while the abdomen is yellow. All of the black markings of the abdomen are very black, even the mid-lateral ones. Those on the inner side of the connexival plates, however, are a little less black than the others. Beneath: There is some black outside each coxa and also toward the lateral margin of each thoracic segment. On the abdomen there is a small black spot near the lateral margin of segment I. The ventral median plates dark, not black, the first being only obscurely dark.

A fourth-instar nymph ready to molt to the fifth measured as follows: Head across eyes 2.17 mm; width of anterior margin of pronotum 2.47; width of posterior margin of pronotum 3.61; length of second segment of anterior tarsus 0.65; antennal segments 0.34, 1.52, 1.14, 1.34; length of pronotum 1.08; length of mesonotum 1.43; length of rostral segments 0.70, 1.30, 1.43, 1.04 mm; length of tibiæ of pro-, meso-, and metathoracic legs 1.52, 2.08, and 2.61 mm.

#### COMPARISON OF THIRD, FOURTH, AND FIFTH INSTARS OF *G. CRASSA*

The pronotum is alike in the third and fourth instars but in the fifth instar the two black spots are much smaller and the black band parallel to the lateral margin is narrower.

The mesonotum has six black spots in the third instar and an additional very tiny one on each wing-pad in the fourth instar. The margin of wing-pad is also black. In the fifth instar the spots on the mesonotum are smaller and one on

either side (in the angle formed by the wing-pad and the remainder of the segment) has disappeared, so there are only six spots.

The metanotum of the fourth instar is smaller than that of the third instar and proportionately it has more orange on it. The abdomen is essentially the same in the third and fourth instars.

*Fifth instar.*—The following description is based on a male specimen three days before becoming adult. It is about 12 mm by 8.5 mm, yellowish and shiny. The colors are yellow, brownish-yellow, and gun-metal, as well as black and white. Head very pale yellow, with two black median lines extending throughout the length of the head. The lateral and anterior margins from the eye onward margined with black. There is also a short black mark on either side between the eye and the central marking. The antennæ and legs are gun-metal colored; the antennæ a little darker than the eyes. Thorax brownish-yellow, except the anterior half of the pronotum, which is yellowish and with a pair of black discal spots each of which is on a line with the short black marking on the head referred to above. The lateral margin is black and there is a black line parallel to it, the space in between being white. There is a faint pale longitudinal median line on the posterior half. The disc of mesonotum has a pair of black spots near the anterior margin, in line with those of the pronotum. There is another spot on each basal angle. There are also a very tiny pair of median black spots at the extreme posterior margin and a small longitudinal black marking in the center of each wing-pad.

The metanotum is seen as a small inverted V on either side and each side has two black markings, the lower and outer one about twice as large as the other.

The abdomen is a very intense yellow, except the "dorsal patch" and the connexival area, which are white and black, while the dorsal glands are pale yellow. In the dorsal patch (which appears to start on the fourth abdominal segment) there are three pairs of dark brown spots, the second and third of which are in line with the lateral margins of the dorsal plates and are kidney-shaped, the convex side being on the outside. Between the first and second of these spots, there is a pair of transverse dark spots and between the second and third spots a second pair. Midway between the dorsal patch and the con-

nexivum there are three more pairs of these dark transverse spots. The ground color of the entire dorsal patch is white as is also the area containing the connexival plates. Each connexival plate has the outer edge black, a longitudinal central black line, and a dark area adjoining the inner margin. The glands located on the posterior margins of abdominal segments III and IV extend posteriorly in such manner as to appear, at first glance, as though belonging to the succeeding segments.

**Beneath:** Head and central part of thorax and abdomen very pale, the head perhaps pale yellow. The rest of thorax and abdomen yellow. There is a black spot on each thoracic segment a little above the coxæ. There is also a very tiny black spot at the upper inner margin of the prosternum. The rostrum is more or less flesh colored, black on the apical one-third (or thereabout) of the last segment and reaches beyond the posterior coxæ. The four segments are about of equal length but the fourth a little shorter than the others and blackish on its apical one-fourth or one-third. The femora fairly pale with a bluish-green tint. The bug beneath is shiny.

**Measurements:** Length of head 1.43 mm; length of antennal segments 0.65, 2.43, 1.85, and 1.71; length of pronotum along median line 2.00; length of mesonotum 2.71; length of entire nymph 13.00 mm; length of second segment of the anterior tarsus 1.00 mm; width of head across eyes 2.86; greatest width of pronotum 7.4; greatest width of abdomen 9.5 mm.

**Rate of development.**—There are five instars and nymphal development in the Autumn of 1950 required one month. Nymphs which hatched on September 26, 1950, were three and four days in the first stadium and one nymph of this lot of 44 was ten days in the second, but most of them were five days each in the second and third stadia. A third instar which molted to a fourth on September 30 spent five and a half days in the fourth instar. Another which molted to the fourth instar on October 1 required slightly over six days for development, while two others spent seven days. The duration of the fifth stadium was nine and ten days.

**Egg parasites.**—A mass of about 140 eggs collected on September 28 showed signs of parasitism twenty-four hours later. They had a dark red ring inside of the operculum and in the more advanced cases the entire operculum was dark red and the entire upper half of the egg was blackish. Twelve hours



later about half of the eggs and within one or two days all but one or two eggs showed parasitism. By the evening of October 7, three or four hymenopterous parasites had emerged and by the following noon about 40, at which time the observation was discontinued.

These parasites were 1.52 mm in length, with antennæ about 1.08 mm. The thorax was very robust and the antennæ and legs pale reddish-brown. The wings were hyaline and broadly rounded at the apex.

*Number of generations.*—Information on the number of generations is wanting. Four females and several males which became adults on September 28 and the two following days are being kept under observation but no eggs have been laid and mating has not been observed up to the present (October 10).

*Rearing method.*—The nymphs were kept in Petri dishes, jelly jars (1¾ by 3½ and 1¾ by 7 inches), and stender dishes (5 by 9 and 7 by 11 cm) on the floor of all of which filter paper was used. In order to maintain sufficient moisture a few drops of water were placed on the filter paper daily. Perforated screw caps on the jelly jars and screen or cloth covers on the stenders provided sufficient ventilation. The Petri dishes were provided with their own covers. Young and old twigs and fruits in all stages of development were supplied, but leaves were provided very sparingly since they apparently served no useful purpose. The twigs were renewed daily; new fruits were added almost daily, but those already in the container were not always removed at once because it was observed that certain fruits were preferred by the nymphs and fed on for several days in succession while fresher fruits were not utilized. Their choice was not determined, however, by the state of maturity, since half matured, mature but green, ripe, and very dry and hard fruits were fed on indiscriminately. Except in the first instar, the nymphs fed out sparingly on very succulent twigs but the more mature ones were preferred. The nymphs fed on twigs from time to time throughout their development, but more extensively on the fruit.

The adults were kept in glass jars that were 10 inches wide by 14 inches deep which were covered with screen. They fed on the fruits more extensively than did the nymphs, but they also attached on twigs to some extent. Both nymphs and adults fed by either day or night.

## REFERENCES

- DISTANT, W. L. The fauna of British India, including Ceylon and Burma. Rhynchota. Vol. I (Heteroptera). London, Taylor and Francis, 1902. xxviii, 438p. 249 figs.
- HOFFMANN, W. E. Second supplement to catalogue of Scutelleroides. *Long. Sci. Jour.* 23 (1959) 21-42.
- MILLES, N. C. E. Preliminary list of food-plants of some Malayan insects. S. S. and Fed. Malay states, Dept. of Agric., Suppl. to Bull. 38 (1932) 54p.
- WESTWOOD, J. O. A catalogue of Hemiptera in the collection of the Rev. P. W. Hope, with short Latin diagnosis of the new species. Part I. 1937. 46p.