

OBSERVATIONS ON THE BIOLOGY AND IMMATURE STAGES OF ANTESTIA ORBONA Kirkaldy
(HEMIPTERA, PENTATOMIDAE)

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The first record of *Antestia orbona* Kirkaldy in New Zealand is that of Woodward (1953) who noted specimens collected near Hastings in March 1950 and supplied by Dr W. Cottier. In December 1959 the insects were found in large numbers on trees in the grounds of Auckland University. I am indebted to Mr D. Challis and Mr D. Cowley of the University for the following observations on host plants and locality records in the Auckland area.

Auckland University grounds; December, 1959; *Pittosporum crassifolium*. Albany; February, 1960; *P. crassifolium*. Remuera, Auckland; December, 1960; *Pittosporum tenuifolium* and *P. crassifolium*. Parnell, Auckland; December, 1960; *P. crassifolium*. Auckland Domain; September, 1961; *Podocarpus totara*. Auckland Domain; October, 1960; *P. tenuifolium*.

The following records are from the entomology collection of the Plant Diseases Division, D.S.I.R., Mt Albert: Napier; March, 1950; W. Cottier; *Pittosporum* sp. Hastings; March, 1950; Department of Agriculture; *Pittosporum* sp. Napier; March, 1950; F. Jenkins; "Hedge plant". Masterton; March, 1951; Mr Anderson; *Pittosporum* sp. P.D.D. Owairaka, Auckland; March, 1959; B. M. May; *Coprosma* sp.

Eyles (1960) notes a specimen from the vicinity of a turnip crop at Masterton on 8.4.59 and other adults from bush at Palmerton North (27.9.58 and 30.4.59).

It will be seen that where the host plant has been identified there are only two records of bugs on plants other than *Pittosporum*. The observation of the bugs on totara is of interest. It was made in early September, 1961, and the bugs were found to be confined to totara although *Pittosporum* trees were nearby. In October, 1961, however, during warm spring weather *Antestia* was found to be on *Pittosporum tenuifolium* and absent from the nearby totara trees. It is possible that the bugs can overwinter on trees other than the usual host plants.

LIFE HISTORY IN AUCKLAND

Antestia orbona overwinters as the adult. In October, the adults are found to be active on *Pittosporum* trees and copulation begins in this month. Eggs are laid on the undersides of leaves from late October until early autumn. Nymphs were noted from November until April when 4th and 5th instar nymphs only were found. Adults and nymphs feed on the unripe fruits of the host plant.

During February and March, 1961, eggs and nymphs were taken from trees in the University grounds and allowed to complete development in the laboratory. The average temperature indoors would have been higher than that in the field because thermograph records show that in the laboratory there was little drop in temperature during the night. Kirkpatrick (1937) showed that temperature has a considerable effect on the length of the stadia in East African species of *Antestia* and it can be expected that development times in the field will be longer than those noted in the laboratory.

Stage	Average length in days				
Incubation	7
1st nymphal	5
2nd	8
3rd	8
4th	11
5th	13
					Total 52

DESCRIPTIONS OF IMMATURE STAGES

Egg:

The eggs are laid in batches cemented to the underside of the leaves of the host plant. The maximum number in a batch is 14 which is often the case in a pentatomid (14 ovarioles being the usual number). Sometimes smaller numbers (10-13) are laid and females nearing the end of their reproductive period may lay even fewer. Kirkpatrick reported that the East African species most often lay 12, sometimes 11 or 13, and the last one or two batches laid before the female ceases ovipositing may consist of 4-6 eggs only.

The newly laid egg is light blue-green in colour and is truly barrel-shaped with a length of 1.1 mm. and a maximum width of 0.9 mm. It thus resembles in shape the egg of *Glaucias amyoti* (White) (Myers, 1926) and differs from the more cylindrical eggs of *Dictyotus caenosus* (Westwood) (Myers, 1926) and *Nezara viridula* (Linnaeus) (Southwood, 1956). The micropylar processes are small and are about 18 in number. In addition to the irregular follicular cell impressions on the chorion there are large numbers of small bristle-like processes which under high magnification give the egg a tomentose appearance. These processes are probably follicular pit impressions.

At eclosion the chorion splits around the edge of the pseudo-periculum which is marked by an indistinct narrow region with smaller follicular cell impressions just inside the circle of micro-

pylar processes. The egg-burster is of the usual pattern in the Pentatominae (Fig. 6). Southwood found on the embryonic cuticle of a halysine, *Dalpada oculata* F. two rows of teeth similar to those found in the Cimicomorpha and he noted that further examination might show these hatching teeth to be widespread in the Pentatomomorpha. It is of interest then, to find two diverging rows of very small teeth on the embryonic cuticle of *Antestia orbona*. Between these rows of teeth the cuticle is slightly thickened in a characteristic pattern (Fig. 6). Southwood describes a sclerotised band or hatching ridge in a similar position in some Miridae.

Nymphal Instars:

In descriptions of the nymphs the body length has not been included because this varies considerably according to the amount of distension of the abdomen. The head capsule width (including the eyes) and the pronotal width (the pronotum at its widest) have been found to be more satisfactory. The most useful measurements for sorting out the various instars are the proportions of the notal lengths in the mid-line. The proportions given are averages and are in eyepiece micrometer units. 100 units = 1.3 mm.

First Instar:

Nymphs of this instar have the rounded, almost hemispherical shape so characteristic of first instar Pentatomidae. (Fig. 1.)

Mean head capsule width: 0.65 mm.

Mean pronotal width : 0.9 mm.

Proportional lengths in mid-line: pronotum 18; mesonotum 8; metanotum 4.

Soon after hatching general dorsal colour brown; head and thorax darken to black after first day often with a very narrow white stripe marking mid-line of nota; abdomen dark brown sometimes black, stink-gland areas black, lateral margins of abdomen marked by semicircular black patches; a pair of oval white patches lie on each side near anterior end of abdomen. Ventral surface lighter; abdominal margins with black patches as on dorsum. Antennae black except second segment and proximal half of third which may be dark brown or grey. Legs dark brown or black with tarsi grey.

Second Instar:

Second instar nymphs are distinguished by the white metanotal flange. (Fig. 2.)

Mean head capsule width: 0.94 mm.

Mean pronotal width : 1.35 mm.

Proportional lengths in mid-line: pronotum 32; mesonotum 16; metanotum 5.

Dorsally, general colour black except white metanotal flange and pair of oval markings antero-laterally on abdomen which are white but may become yellow near end of stadium; abdomen may be dark brown or very dark purple with stink-gland areas and marginal patches black. Ventrally abdomen lighter with black marginal markings and four median black patches on last four visible segments. Antennae black usually with articular regions brown or reddish. Legs black or dark brown.

Third Instar:

In this instar the metanotal flange which was white in the preceding instar, is now black. Nymphs at this stage can be distinguished from those of the fourth instar by the absence of rudimentary hemelytral pads. (Fig. 3.)

Mean head capsule width: 1.18 mm.

Mean pronotal width : 1.76 mm.

Proportional lengths in mid-line: pronotum 40; mesonotum 27; metanotum 6.

Colour generally like that of preceding stage with oval abdominal markings deep yellow; metanotal flange black. Ventrally on each of last 5 visible abdominal segments a median black patch, anterior patch triangular and preceded on each side of the mid-line by three transverse black lines.

Fourth Instar:

Fourth instar nymphs have rudimentary hemelytral pads. (Fig. 4.)

Mean head capsule width: 1.56 mm.

Mean pronotal width : 2.64 mm.

Proportional lengths in mid-line: pronotum 62; mesonotum 55; metanotum 6.

Dorsally head and thorax black; abdomen very dark purple with black punctures, pair of yellow oval patches anterolaterally on abdomen; stink-gland areas and marginal patches black. Ventrally abdomen lighter and marked in mid-line by black patches on last seven visible segments; front three patches triangular, each

Fig. 1—First instar, dorsal; legs and right antenna omitted.

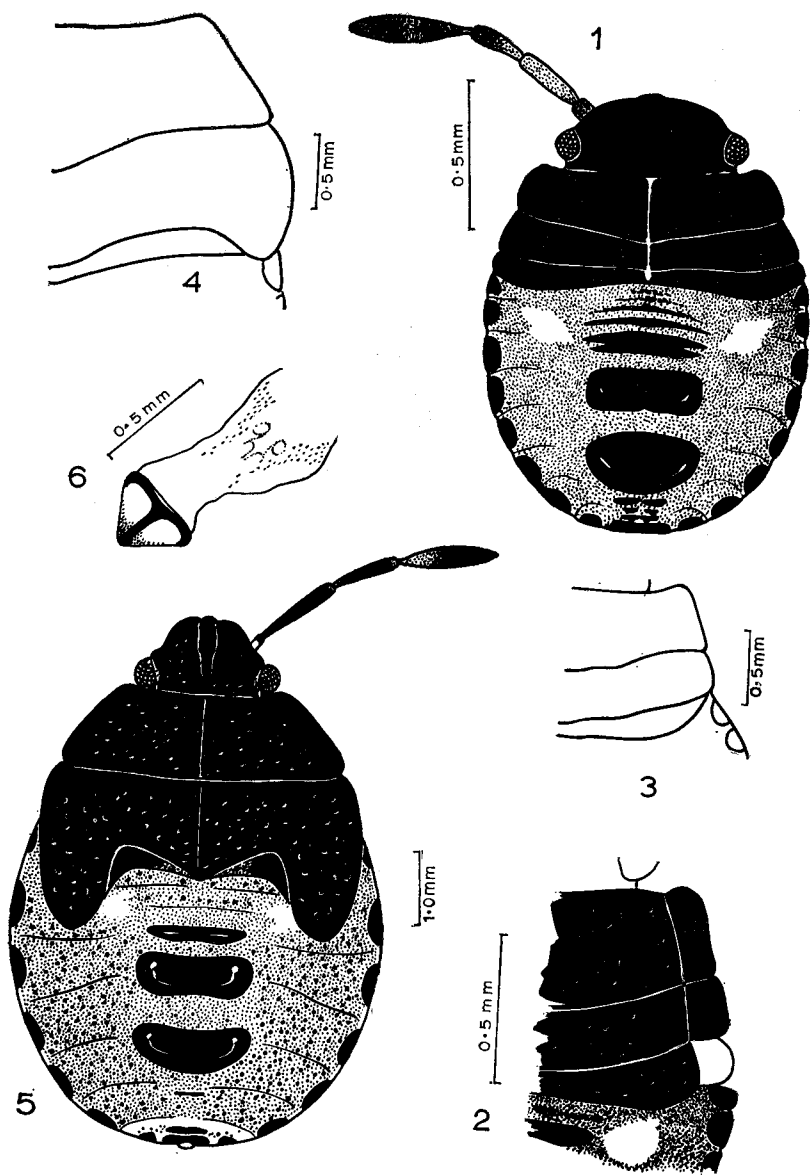
Fig. 2—Second instar, dorsal; right side of thorax and anterior end of abdomen.

Fig. 3—Third instar, dorsal; right side of thorax.

Fig. 4—Fourth instar, dorsal; right side of thorax.

Fig. 5—Fifth instar, dorsal; legs and left antenna omitted.

Fig. 6—Embryonic cuticle with egg-burster.



preceded by pair of black lines; marginal patches black; abdominal spiracles marked with black and more obvious than in preceding instars. Legs black. Laterally mesonotum covers metanotum.

Fifth Instar:

Nymphs of this instar are easily distinguished from the preceding by the hemelytral pads. (Fig. 5.) In the fifth instar differences associated with the two sexes become apparent and this leads to a considerable range in the measurements. For this reason maximum and minimum head and pronotal widths are included here.

Maximum head capsule width:	2.07 mm.
Minimum " " " :	1.82 mm.
Mean " " " :	1.95 mm.
Maximum pronotal width:	4.36 mm.
Minimum " " " :	3.73 mm.
Mean " " " :	3.95 mm.

Proportional lengths in mid-line: pronotum 97; mesonotum 107; metanotum 0.

Dorsally head and thorax black or very dark brown; eyes red-brown; abdomen dark purple with black punctuation, black marginal patches, black stink-gland areas with orifices marked with white; pair of antero-lateral yellow spots with indefinite margins. Ventrally head white except for black margins; thorax dark brown laterally, lighter or pinkish in mid-line; abdomen with black punctures and black marginal markings, spiracles conspicuous and marked with black, median black markings as in fourth instar but more conspicuous. Antennae black except for white or grey proximal three-quarters of first segment and proximal third of fourth segment, articular regions between second and third and fourth segments pink. Legs mottled black and white. Hemelytral pads reach back as far as anterior stink-gland area.

Parasites:

Several groups of eggs collected in the University grounds were black in colour and from these scelionid parasites emerged which have been identified by the writer as a species of **Microphanurus** Kieffer.

REFERENCES

- EYLES, A. C., 1960: Insects associated with major fodder crops in the North Island. II Hemiptera. N.Z. J. agric. Res., 3; 994-1008.
- KIRKPATRICK, T. W., 1937: Studies on the ecology of coffee plantations in East Africa. II. The autecology of **Antestia** spp. with a particular account of a strepsipterous parasite. **Trans. R. ent. Soc. Lond.**, 86; 247-343.

- MYERS, J. G., 1926: Biological notes on New Zealand Heteroptera.
Trans. Proc. N.Z. Inst., 56: 449-511.
- SOUTHWOOD, T. R. E., 1956: The structure of the eggs of the
terrestrial Heteroptera and its relationship to the classification
of the group. **Trans. R. ent. Soc. Lond.**, 108: 163-221.
- WOODWARD, T. E., 1953: The Heteroptera of New Zealand. Part
I—Introduction; Cydnidae; Pentatomidae. **Trans. roy. Soc.
N.Z.**, 80: 299-321.