

Notes on the Life History and Distribution of *Anagotus helmsi* (Coleoptera: Curculionidae)

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INTRODUCTION

Anagotus helmsi Sharp 1882 is a large New Zealand weevil of the subfamily Aterpinae. The adult (Fig. 5) is very variable in size and colouring of the squamosity, which perhaps explains why the species was described under two other names by Broun (*Heteraomus longipes* Broun, 1893 and *Anagotus pallescens* Broun, 1903).

Very little has been recorded previously of the life history and distribution of *A. helmsi*. The present study began in August 1958 in Mahinapua State Forest, Westland, and has continued intermittently since then.

BIOLOGY

Hudson (1934: 131) records *A. helmsi* in beech forests in both islands. My observations show that adults will feed on the foliage of all five indigenous *Nothofagus* species. They have been found also on *Astelia*, *Aristotelia serrata* and on *Weinmannia racemosa* blossom, but a search of these and many other plants showed no signs of larvae or their workings.

A. helmsi was found at Mahinapua in *Pinus radiata* all the year round from 1958 to 1961. There is no *Nothofagus* within 20 miles of Mahinapua. Adults were collected from trunks, and larvae, pupae and adults were found under bark and in wood.

Mr W. A. Holloway (N.Z. Forest Service) has recorded *A. helmsi* from *Pseudotsuga menziesii* and *Pinus ponderosa* at Tawhai State Forest, Reefton, on 11 March 1966 and from *Ps. menziesii* at Golden Downs State Forest, Nelson, in April 1968. However, the weevil appears to prefer *P. radiata*, in which at Mahinapua logs were infected at the rate of up to 130 insects per m² (14 to the square foot), or exceptionally even more.

A. helmsi will infest trees, logs or stumps which have been dead or felled for at least 4 months. Although under experimental conditions *P. radiata* log sections were provided as an oviposition site, eggs were not laid, even though up to 13 weevils were placed on one log.

When foliage of *Nothofagus fusca*, *N. truncata*, *N. solandri*, *N. menziesii* and *N. cliffortioides* and several *Pinus* species was fed to adults separately, it was eaten by them. However, only *Nothofagus menziesii* was eaten when all plant species were offered at the same time, which suggests that this foliage is the preferred food for adults.

For successful development, *A. helmsi* apparently requires high moisture in the tunnels. Dead pupae and adults were found in timber which had dried out. Dead larvae, pupae and adults were found in the wood and under the bark of trees attacked by the pathogenic fungus *Armillaria mellea*.

The larvae of a species of *Thoramus* (Elateridae) prey on prepupal larvae of *A. helmsi* in the pupal chambers. A hymenopterous parasite *Proctotrupes* sp. (Proctotrupidae) was found in *A. helmsi* larvae in *Pseudotsuga menziesii* by Mr W. A. Holloway.

*This work was undertaken while the writer was employed by Forest Research Institute and Entomology Division, DSIR.

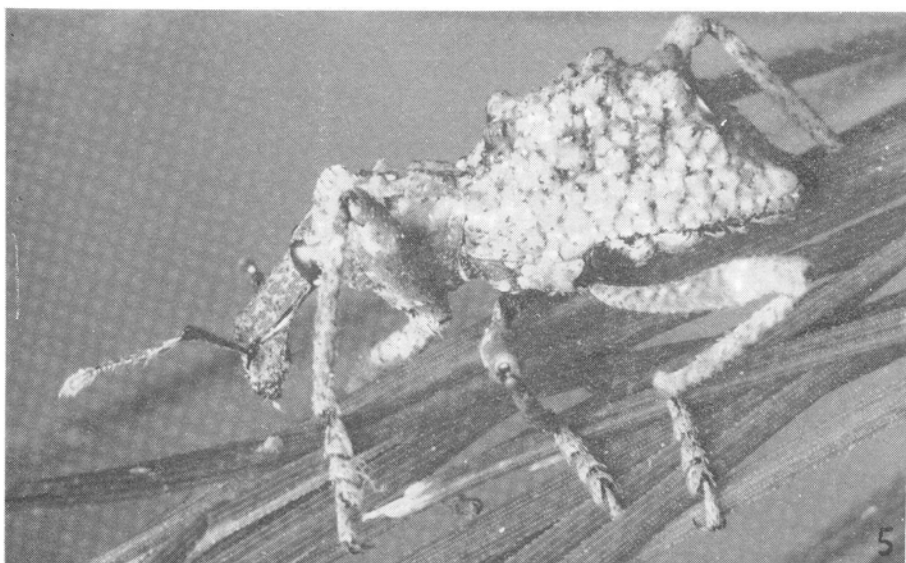
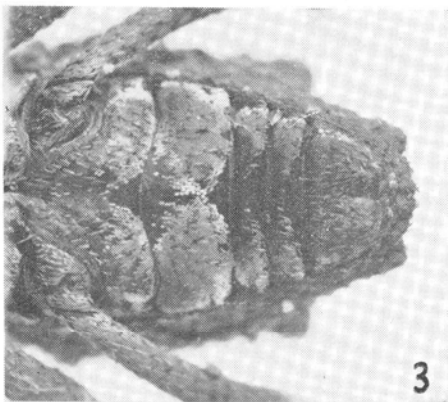
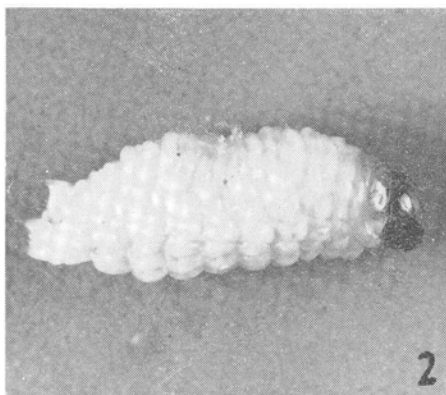
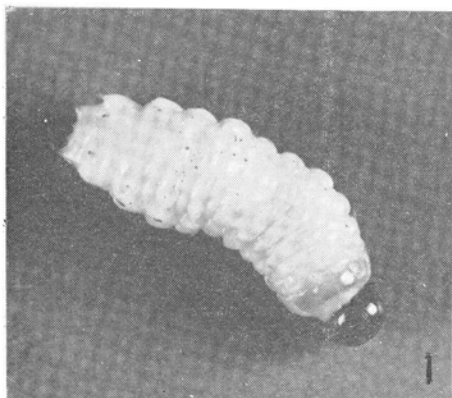


Fig. 1 & 2 Anagotus helmsi larva

Fig. 4 Female sternite

Fig. 3 Male sternite

Fig. 5 A. helmsi adult

LIFE HISTORY AND HABITS

Eggs

The eggs, 1.5 x 1.0 mm, creamy in colour, are deposited singly in cracks and furrows in the bark. They are laid from August to November and were also found in the last week of May. They hatch in 7-14 days. In the insectary, a mated female laid 13 eggs, but all were infertile.

Larvae

The larvae (Figs. 1, 2) are dense white with a red-brown head, and are characterised by four upstanding cuticular processes at the caudal end. They attain a size of 20.0 x 6.0 mm when mature. There are probably five instars. Approximately 50 head capsules were collected and sorted into five size groups.

The newly hatched larva bores directly through the bark until it reaches the cambium layer, by which time, if the bark is thick, it will have moulted to second instar. The entry tunnel is blocked with frass. The larva then works in the cambium, usually with the grain, for a distance of 2.0-2.5 cm before turning around and tunnelling into the sapwood from a point about halfway along. Sometimes these early workings are Y-shaped with the sapwood tunnel commencing in a branch gallery (Fig. 6). The growing larva commutes actively between the bark, where it feeds, and the sapwood tunnel which it progressively widens, and lengthens to a maximum of 5.5 cm. At the same time, the initial cambium working is enlarged to become the pupal chamber. Frass is packed tightly in some of the bark galleries but the tunnel and pupal chamber are kept clear. No frass pellets or wood scrapings could be found on the outside of the bark. When a cut is made across a tunnel with an axe, exposing a larva, it will immediately retreat. If it should happen to be at the end of the tunnel, heading inwards, it will continue boring into the timber, covering itself with wood scrapings in a very short time. The duration of the larval stage was not checked.

Pupae

The prepupal larva spends up to 3½ months in the pupal chamber. It no longer feeds but prepares the cell by sealing it off with shreds of wood. The pupal stage is short, lasting only 2 weeks. Pupae are white at first but darken to brown a few days before emergence. Pupation occurs from mid-November to mid-March.

Adults

The teneral adult takes 2 weeks to harden, then bores its way out of the opposite end of the chamber to which it entered as a first instar larva. The round exit hole does not exceed 10 mm diameter. Adults remain stationary on the bark, in a shaded position during daylight hours but they move around freely after dark. They retreat rapidly from water. They may be collected throughout the year but are more numerous between December and March.

The sexes may be distinguished by the shape of the last abdominal sternite. In the male (Fig. 3) this sternite is approximately half as long as wide, with a concave area apically which is free of setae and punctures. In the female (Fig. 4), the length and width are subequal, the surface is uniformly convex and the clothing evenly distributed.

DISTRIBUTION

The only published locality records are Greymouth (type locality of *A. helmsi*), Boatmans (=Capleston) near Reefton (type locality of *Heteraomus longipes*) and Te Oneroa, South Westland (type locality of *A. pallescens*). The following locality records are based on specimens in Entomology Division, National Museum and Forest Research Institute collections.

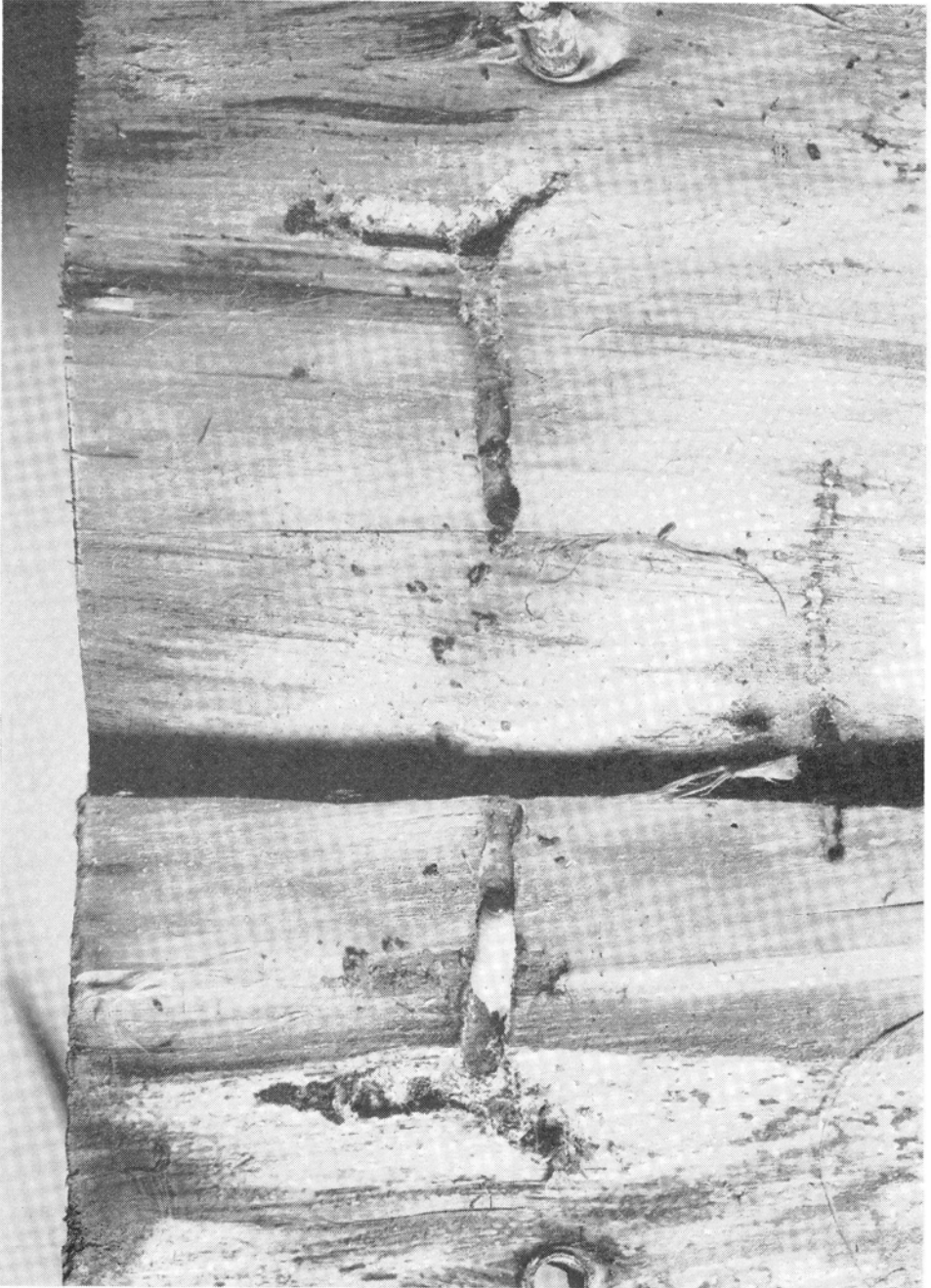


Fig. 6 Bark folded away from wood of Pinus radiata showing A. helmsi larva and workings.

NORTH ISLAND: Mt Te Aroha; Mt Egmont 853 m; West Wanganui; Hunterville; Mt Wharite Ridge; Tokomaru Gorge 457 m; Field Hut 1066 m; Mt Dinnan, Mt Quoin, Mt Holdsworth (Tararua Ra.); Akatarawa; Upper Hutt; Martinborough; Wainuiomata. SOUTH ISLAND: Mt Stokes 1172 m; Rai Valley; Nelson; Baton Saddle 1370 m; Mt Arthur 914-1370 m; Leslie Valley; Flora Saddle; Balloon Hut; Takaka Hill 609 m; Canaan; Tarakohe; Aorere; Dun Mt Track; Aniseed Valley; Golden Downs; Mt Robert; Speargrass Creek 1096 m; Travers River; Cupola Basin; Matukituki; Inangahua; Karamea Bluff; Metro Cave, Charleston; Tawhai State Forest, Reefton; Reefton Saddle; Mt Dewar, Paparua Ra. 1000-1060 m; Stillwater; Greymouth; Kumara; Moana; Mahinapua; Arthur's Pass 914 m; Cass; Mt Greensland; Ross; Lake Paringa; Haast; Caswell Sound; Homer; Wilmot Pass 630 m; Mica Burn, West Arm, Manapouri 230 m; Routeburn Valley; Glade House, Te Anau; Milford Sound; Lake Monowai; Haldane; Riverton; Alton Valley; Tapanui; S.E. Stewart Island.

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REFERENCES

- BROUX, T., 1893: *Manual of New Zealand Coleoptera Part V*: 1215. Government Printer, Wellington.
- HUDSON, G. V., 1934: *New Zealand Beetles and their larvae*. Ferguson & Osborn Ltd., Wellington. 236 pp.
- SHARP, D., 1822: *Transactions of the Entomological Society of London, 1822*: 90.
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