

# A NATIVE ICHNEUMONID, *CERTONOTUS TASMANIENSIS* TURN. PARASITISING *SIREX NOCTILIO* F. (SIRICIDAE) IN TASMANIA

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[Manuscript received January 4, 1967]

## Abstract

A native ichneumonid, *Certonotus tasmaniensis* Turn., has been found to parasitise *Sirex noctilio* F. in Tasmania. The females probe into the wood to deposit their eggs and the larvae are external parasites on *Sirex* larvae. The final instar larva is illustrated and its principal features described. The possible significance of *Certonotus* in the biological control of *Sirex* is discussed.

## INTRODUCTION

In April 1964 logs of *Pinus radiata* D. Don from Bruny Island, Tasmania, were found to contain, in addition to larvae of *Sirex noctilio* F., larvae of an unknown ichneumonid parasite. The presence of emergence holes and larvae indicated that the trees had been attacked and killed by *Sirex* in the summer of 1962/63, and that the *Sirex* larvae had been parasitised in the following spring prior to any emergence. The parasite larvae were found in the tunnels of *Sirex* where they had consumed their hosts. Mandibles, pleurostomal sclerites and tail spines of the *Sirex* larvae were attached to the cocoons of the parasite. Several of the parasite larvae were placed in tubes, in which they later pupated, and the adult wasps were sent to the British Museum for identification. The insects were identified by Mr. G. J. Kerrich as *Certonotus tasmaniensis* Turner (Ichneumonidae, Labenini).

This species was described from a single female collected at 1,300 ft on Mount Wellington, southern Tasmania (Turner 1919). Records of *Certonotus tasmaniensis* attacking *S. noctilio* were obtained in three sites in southern Tasmania, isolated from each other by mountain and sea barriers (Fig. 1). These sites at Taranna, Grove and South Bruny Island have in common the proximity or interspersed of various species of native trees and shrubs. *Certonotus* has not been recorded from the Pittwater plantation of *P. radiata*, although it has the largest population of *Sirex* in the area. This forest has been virtually cleared of other species of trees and invasion from its perimeter is minimized by its peninsularity.

The geographic range and natural host of *Certonotus* is unknown, but the host is probably a native insect which has invaded the exotic *Pinus*.

## LIFE HISTORY AND BIOLOGY

The flight season of *Certonotus*, as indicated by emergence in open insectaries, extends from the beginning of September to mid-October, i.e., early spring, with males tending to emerge earlier than females (Table 1). The sex ratio ( $\delta : \text{♀}$ ) of 2 to 1 is low compared with many ichneumonids.

Mating was observed in cages shortly after emergence, and oviposition began several days later. During their adult life *Certonotus* fed on honey water or natural honeydew on oak leaves (*Quercus robur* L.) placed in their cages, and lived for approximately four to five weeks at ambient spring temperatures. The females oviposited readily in pieces of *Pinus* regrowth containing only *Sirex* larvae. They searched over the bark, palpating its surface with their antennae in the same manner as *Rhyssa persuasoria* L., an introduced ichneumonid parasite of *Sirex* (Chrystal and Myers 1928). Having selected a site, the female drew the ovipositor upwards so that it was at a right angle to the bark and pushed it rapidly into the wood. The maximum depth of parasitised larvae in the samples from Bruny Island was  $\frac{3}{4}$  in., and the mean depth about  $\frac{1}{2}$  in., measured from that part of the tunnel closest to the surface. The length of the ovipositor limits parasitism to larvae lying close to the bark surface and rather small hosts (up to about  $\frac{1}{2}$  in. only) were selected.

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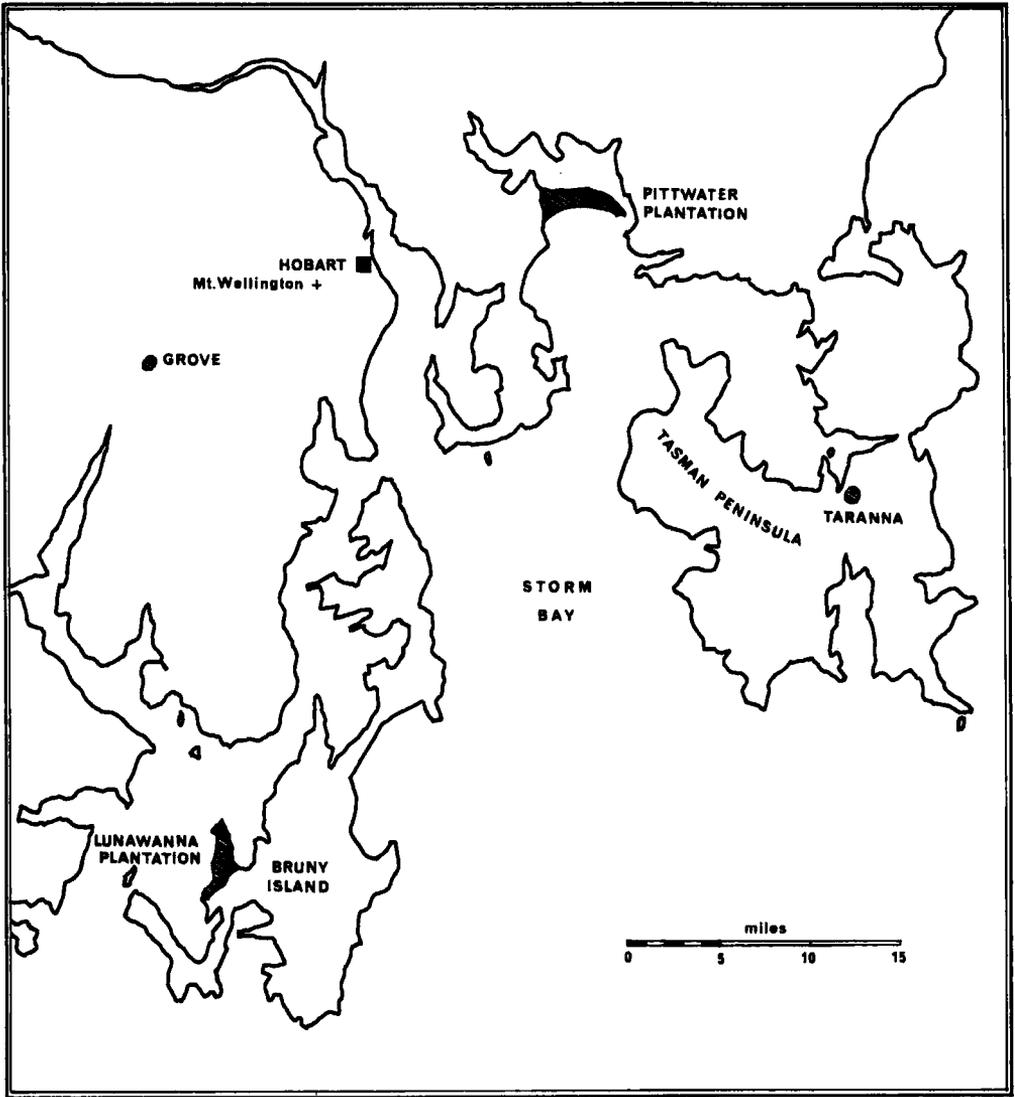


FIG. 1.—Map of south-eastern Tasmania, showing localities of *Certonotus tasmaniensis* Turn.

TABLE I  
EMERGENCE OF *Certonotus tasmaniensis*

1964			1965		
Field collected population			Insectary reared population		
Week ending	♂	♀	Week ending	♂	♀
4. 9.64	6	0	3. 9.65	3	0
11. 9.64	19	0	10. 9.65	4	0
18. 9.64	44	8	17. 9.65	5	2
25. 9.64	37	16	24. 9.65	5	7
2. 10.64	23	35	1. 10.65	0	5
9. 10.64	8	7	8. 10.65	0	0
16. 10.64	2	4	15. 10.65	0	1
	139	70		17	15

The larvae probably feed entirely externally, completing digestion of the host in about 7-8 weeks. The wood in the region of marked oviposition sites on the culture logs was dissected a few weeks after oviposition and young *Certonotus* larvae were found feeding on the *Sirex* host. One *Certonotus* larva was found within the remains of an adult *Sirex* which had been parasitised just prior to its emergence.

Fully-fed *Certonotus* larvae spin discrete cocoons of silk incorporating wood fibres from the walls of the chamber and the sclerotized remains of the *Sirex* larva. The larvae remain in the cocoons until the following spring when pupation takes place. There is a distinct pre-pupal stage when the integument becomes wrinkled and the pigmented eye spots appear in the head region.

An estimate of parasitism by *Certonotus* in the naturally infested population from Bruny Island was made from 15 sample blocks four inches in thickness. These samples were taken at intervals of 7 feet from three mature trees. A count was made of emergence holes, and of *Sirex* and *Certonotus* larvae in all samples from trees where any parasitism occurred, and this gave a mean value of 12 per cent. parasitism by *Certonotus*, individual samples ranging from 0 to 30 per cent.

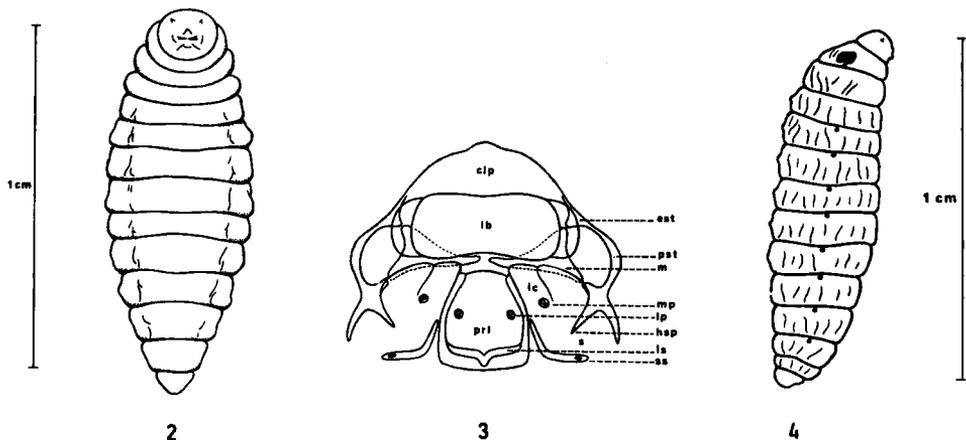
An internal parasite of *Sirex* larvae, *Ibalia leucospoides* Hochenw., has extended to all the *Sirex* infested plantations in southern Tasmania (K. L. Taylor—unpublished data). It is not known yet whether *Certonotus* attacks *Sirex* larvae already parasitised by *Ibalia*.

#### DESCRIPTION OF LARVAE

*Early Instars.*—Studies of the exuviae of earlier instars found within the tunnel or attached to the *Certonotus* cocoon indicated that there are four larval instars. The first is prognathous; the two succeeding instars progressively more hypognathous, the final instar fully so.

*Final Instar.*—The final instar larva of *Certonotus* is illustrated in Figs. 2 and 3. The nomenclature is that of Short (1952). The larva has the typical structure of the final instar ichneumonid larva and the mouthparts closely resemble those of *Labena* (Labenini) described by Short (1959). The pleurostoma, hypostoma, hypostomal spur and stipital sclerite are well sclerotized. The stipital sclerite is less acutely V-shaped than in *Labena* and not broadened laterally. Each maxillary and labial palp bears a pair of round sensilla of unequal size. The mandibles are toothless and the labrum very lightly sclerotized. The dorsal part of the epistoma is more strongly sclerotized than that of *Labena*. The antenna is papilliform.

The prepupal stage, recognised by the wrinkled skin and eye spots, is illustrated in Fig. 4. This stage lasts only a few days prior to pupation.



FIGS. 2-4.—*Certonotus tasmaniensis* Turn.: (2) final instar larva; (3) mouthparts of same; (4) prepupal stage.

Symbols: clp., clypeus; est., epistoma; hsp., sclerotic spur of hypostoma; lb., labium; lc., lacinia; lp., labial palp; ls., labial sclerite; m., mandible; mp., mandibular palp; pri., prelabium; pst., pleurostoma; s., stipes; ss., stipital sclerite.

## DISCUSSION

*Certonotus tasmaniensis* is a native insect parasitising an exotic pest in an exotic tree. Its life cycle parallels that of *Rhyssa persuasoria* (Chrystal and Myers 1928). However its earlier flight season and limitation to small host larvae near the surface of the wood suggest that it would not compete with *Rhyssa* either for hosts or for food in the adult stage. Its sporadic occurrence and apparent confinement to the smaller wood lots suggest that it would probably not make a significant contribution to the biological control of *Sirex* in larger plantations in Australia.

## ACKNOWLEDGEMENTS

The author is indebted to Mr. G. J. Kerrich of the British Museum (Natural History) for the identification of *Certonotus tasmaniensis*.

## REFERENCES

- CHRYSTAL, R. N. and MYERS, J. G. (1928).—Natural enemies of *Sirex cyaneus* Fabr. in England and their life history. *Bull. ent. Res.* **19**: 67-77.
- SHORT, J. R. T. (1952).—The morphology of the head of larval Hymenoptera with special reference to the head of Ichneumonoidea. *Trans. R. ent. Soc. Lond.* **103**: 27-84.
- SHORT, J. R. T. (1959).—A description and classification of the final instar larvae of the Ichneumonoidea (Insecta, Hymenoptera). *Proc. U.S. natn. Mus.* **110**: 391-511.
- TURNER, R. E. (1919).—Notes on the Ichneumonoidea in the British Museum. *Ann. Mag. nat. Hist.* **3**: 550-1.