FACTORS INFLUENCING EGG SURVIVAL OF *SCOLYPOPA AUSTRALIS* WALKER (HEMIPTERA-HOMOPTERA: RICANIIDAE) IN THE SYDNEY AREA (N.S.W. AUSTRALIA)

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Summary

An analysis of oviposition materials of *Scolypopa australis* Walker, from the Sydney area, N.S.W., has been carried out to ascertain the factors influencing egg survival. This follows a similar assessment in New Zealand. Eggs have been classified under the categories: died during emergence; normal emergence; parasitized by the aphelinid *Centrodora scolypopae* Val.; parasitized by undetermined scelionid; shrivelled through various causes; destroyed by chrysopid.

INTRODUCTION

The Australian ricaniid bug *Scolypopa australis* Walker is a pest of considerable importance in the warmer North Island districts of New Zealand. It attacks a great number of plants, the withdrawal of sap causing general debility, stunting and wilting. In addition, it is responsible for the production of poisonous honey (Palmer-Jones *et al.*, 1947). A study of the factors influencing population levels in New Zealand was carried out (Cumber, 1966) in preparation for an examination of the parasite and predator complex in Australia. The present work examines the fate of the eggs in the Sydney-Gosford region of N.S.W., and provides an interesting comparison with the situation in New Zealand.

METHODS

During late February and early March, 1965, collections of eggs were made from a number of plants in Sydney and its suburbs, and inland from Gosford some forty miles to the north. These were taken as twigs studded with rows of implanted eggs, and kept in glass tubes to study parasite emergence. An analysis of these egg materials has now been made.

The fate of eggs is clearly revealed for quite some time after they normally would have hatched into nymphs, for the deep implantation in stems provides considerable protection from the weather. The conditions of old eggs is indicated in Fig. 1.

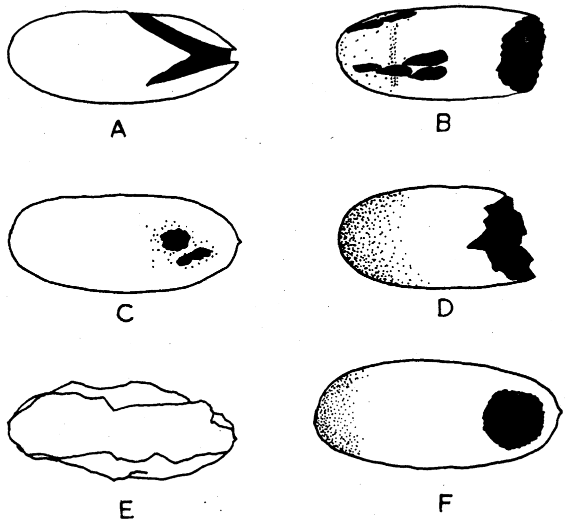

FIG. 1—The form of eggs in *S. australis*. A, Following normal nymphal emergence. B, Following emergence of *Centrodora*. C, Punctured by chrysopid. D, Following emergence of scelionid. E, Shrivelled—cause unknown. F, Following emergence of hyperparasite *Ablerus* sp.

The egg following normal nymphal emergence remains whitish, and is characteristically ruptured at the outer end (Fig. 1A). Occasionally the nymph leaves the egg but dies before reaching the exterior. Whether the deaths during emergence are due to the inability of the nymph to force open the pulped cap of the egg chamber, or to predation is not known. The emerging nymph pauses to cast a skin at the entrance to the chamber and so would offer a predator the advantage of a temporary immobility.

Many eggs present a shrivelled appearance (Fig. 1E). In some cases, such as in gross cross-implantation with the attendant spearing of eggs, the cause is quite obvious. Usually however, the reason is not evident and factors such as predation by mites, etc., damage by parasites during oviposition, and fungus attack, must be considered as possibilities.

Damage to eggs caused by a species of chrysopid has been identified (Fig. 1C). The larvae pierce the eggs *in situ* with their suctorial mouthparts, using one mandible at a time to reach them.

Three species of egg parasites are present, and each leaves the egg characteristically marked and chewed. The aphelinid *Centrodora scolypopae* Val., which also occurs in New Zealand, chews off the outer end of the egg, its small mandibles giving a finely serrated margin (Fig. 1B). Through the dull whitish wall of the egg, series of red-brown meconium pellets may be clearly seen, and there is a faint transverse line about one third of the distance from the base of the egg. In this species both the male and female emerge from the one egg. The female is much the larger of the two, and doubtless relieves the male of the task of chewing an exist hole, a feat which it might well be incapable of performing. The unidentified scelionid is more robust than *Centrodora* and chews a larger and more jagged hole in the host egg during emergence (Fig. 1D). The meconium is deposited as an undifferentiated mass at the base of the egg which takes on a yellowish-brown, shiny appearance. The third egg parasite is an unidentified species of *Ablerus* which itself is parasitic on *Centrodora*. It chews a small round hole in the side of the egg (Fig. 1F). The colour of the egg resembles that discarded by *Centrodora*, but the lateral meconium pellets are lacking, these latter being deposited as a basal undifferentiated mass. No males of this species have been seen. Parasitization appears to occur only when the developing larvae of *Centrodora* have undergone their winter diapause.

A small number of twigs (Table 1) with oviposition scars were found to contain a central mass of frass left by tunnelling larvae.

RESULTS AND DISCUSSION

The fate of eggs taken from three localities is shown in Fig. 2. Additional details are given in Table 1. The Gosford sample was taken from a roadside

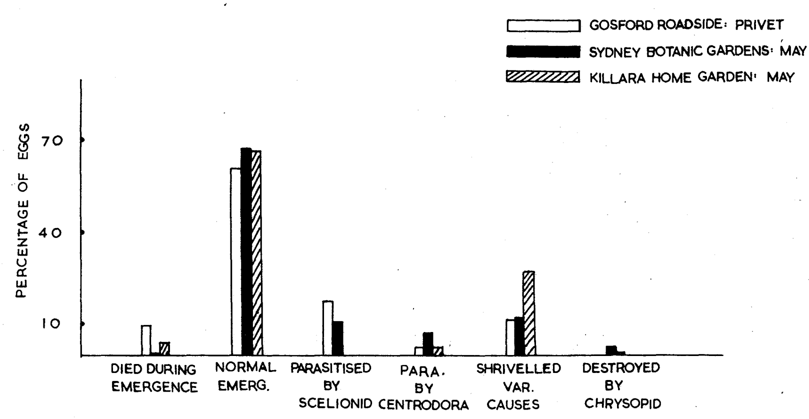

FIG. 2—Fate of *S. australis* eggs in three samples. This excludes eggs destroyed by larvae tunnelling in twigs.

privet hedge on 26.2.65. This had been trimmed two or three years previously and the rough state of the surrounding cover suggested that the area was relatively undisturbed and unaffected by any spraying

TABLE 1—Summarized Data on Fate of *Scolypopa* Eggs

Collection Site	Gosford Roadside (Privet)	Sydney Botanic Gardens (May)	Killara Home Garden (May)
Date	26.2.65	23.2.65	24.2.65
No. Eggs Examined	647	780	626
Died During Emergence	9%	1%	4%
Normal Emergence	61%	67%	66%
Parasitised by Scelionid	17%	10%	nil
Parasitised by *Centrodora*	2%	7%	2%
Destroyed by Chrysopid	nil	3%	1%
Shrivelled var. causes	11%	12%	27%
Twigs with Tunnelling Larvae	7	1	10

programme. The Sydney Botanic Gardens sample was taken from many bushes (23.2.65) under conditions of clean tending, and probably was little affected by spraying programmes. The sample from a private garden at Killara (24.2.65) however, which was also from may bushes, had come under the effects of fairly regular spraying.

The scelionid at the three above sites accounted for 17, 10, and nil %, and the aphelinid *Centrodora* for 2, 7, and 2 % respectively, of the eggs. The outstanding feature is the near elimination of the egg parasites from the sprayed home garden, which in turn was accompanied by far the highest population of the pest.

The percentage of nymphs dying during emergence was highest (9%) in the Gosford sample. The possibility that this may be due to undetermined predation has been mentioned above.

The percentage of normal emergences (61–67%) is relatively even and very high by New Zealand standards (Cumber, 1966) where an overall survival rate of 27% is indicated for areas north of Auckland.

It is seen that the percentage of eggs shrivelled through various causes is noticeably higher in the Killara home garden. This is due mainly to the relatively high adult population and the heavy demand on suitable twigs for oviposition space, which results in cross oviposition and puncturing of adjacent eggs.

The visit to Australia was timed to coincide with the anticipated peak adult population. This enabled a study both of newly deposited eggs and of the parasites emerging from eggs of the previous season. Observations on nymphs were confined to very occasional late individuals.

The high percentage of successful nymphal emergence in low adult population areas suggests that there may be considerable parasitism or predation in the nymphal stages under normal conditions. The only information on this obtained during the observation period, which, as indicated above, was too late to observe nymphal stages, was provided by the larval stages of a chrysopid species. This was observed in the field preying on the eggs, and was seen to use the nymphal skins of *Scolypopa* as trash to cover the dorsal aspects. This however, appeared to consist, at least in part, of normally shed exuviae. These observations did not cover any of the activities of younger chrysopid stages which might well take advantage of the relative immobility of the host at stadia changes. The highest percentage of eggs destroyed by the chrysopid was 3 in the sample from the Sydney Botanic Gardens. The possibility of birds and spiders playing an important part in the reduction of nymphal populations cannot be overlooked.

ACKNOWLEDGMENTS

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