BROOD DEVELOPMENT IN THE SUBSOCIAL WASP
PARISCHNOGASTER MELLYI (SAUSSURE)
(STENOGASTRINAE, HYMENOPTERA)

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SUMMARY

The duration of the egg, larval and pupal stages of Parischnogaster mellyi was established and the mean duration for the whole developmental sequence was found to be about 53 days. Evidence from larval head-widths suggested the presence of only 3 or 4 larval instars. Eggs were observed to be placed in the cell with the mouthparts. The unique white secretion which accompanies stenogastrine eggs and young larvae was observed to be produced from the tip of the gaster. The Dufour’s gland is proposed as a possible source of the secretion. The number of males per nest was found to be positively correlated with brood size. A considerable proportion of the brood (84%) was lost, the majority apparently through cannibalism by colony members. The maximum number of eggs + larvae that a single female could look after was found to be 8 or 9.

RESUME

Le développement du couvain chez la Guêpe Parischnogaster mellyi (Saussure) (Stenogastrinæ, Hymenoptera) Les durées du stade-œuf, des stades larvaires et du stade nympha! ont été mesurées chez la Guêpe Parischnogaster mellyi dont la durée moyenne de développement est d’environ 53 jours. Les mesures de largeur de tête laissent penser qu’il y a seulement 3 ou 4 stades larvaires. Les œufs sont déposés dans la cellule au moyen des pièces buccales. La sécrétion blanche qui accompagne les œufs et les jeunes larves de Sténo-gastrine provient de l’extrémité du gaster. La glande de Dufour est peut-être la source de cette sécrétion. Nous avons observé que le nombre de mâles est en corrélation positive avec la quantité de couvain. Une proportion importante de couvain a disparu, apparemment surtout à cause du cannibalisme des membres de la colonie. Le nombre maximum d’œufs et de larves dont peut s’occuper une femelle est de 8 ou 9.
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INTRODUCTION

SPRADBERY (1975) pointed out characters of the Stenogastrinæ intermediate between Vespidæ and Eumenidæ, as well as some features unique to the group. VAN DER VECHT (1977) concluded that the Stenogastrinæ might be treated as a separate family or as a sub-family of the Eumenidæ, instead of as a sub-family of the Vespidæ.

The Stenogastrinæ are therefore a somewhat isolated group known to have features of their biology quite different from those of other social wasps. The subfamily spans the range of social development from essentially solitary to subsocial; however the absence of any eusocial species among them suggests that some aspect or aspects of their distinctive biology have allowed evolution to progress beyond the solitary Eumenidæ but only a limited way. The purpose of this paper is to build up a more detailed picture of the biology and development of the brood of Parischnogaster mellyi.

METHODS

The study was carried out from July 1976 to March 1977 in southern Thailand. The main source of information was from alternate-day observations on nests found on the Prince of Songkla University campus, Hatyai. Each nest was visited either morning or afternoon and the time of the visit was recorded. As many wasps as possible on these nests were individually marked so that the identity of wasps on each nest could be noted. The number and state of growth of all cells on each nest was recorded, the cells being individually recognised by their position on the nest. The state of development of the larva within each occupied cell was also noted.

The histories of 31 nest colonies on 28 nest sites were recorded in this way for periods of up to 7 1/2 months. Weekly visits were also made to 4 nests at Buri Pat Waterfall, a forest edge site, 35 km from Hatyai.

Information on egg laying, and the production of abdominal secretion, was obtained from 34 one hour observations spread over 60 days carried out on campus nest P3, 12 hours spread over 38 days on nest P5 and shorter programmes of 1 hour observations at 4 other campus nests. At the end of the 7 1/2 month observation programme, any nests still remaining were collected and the head widths of the larvae they contained were measured using the calibrated moving stage of a microscope.

Colonies were initially identified as P. mellyi by field observations. The identities of all collected wasps were checked by laboratory examination and most of these were also sent to Professor VAN DER VECHT, who provided confirmation of identity.

RESULTS

P. mellyi lives in forest edge habitats but is rather uncharacteristic of Stenogastrinæ in also occurring in places disturbed by human cultivation. The nests are quite commonly found under the roofs of thatched huts, built upon hanging strands of roofing material. Colonies are founded by a single female. Both males and females remain for a while on the parental nest but