

OBSERVATION ON THE AGGREGATION BEHAVIOUR OF *ARCTE COERULA* GUENÉE (LEPIDOPTERA: NOCTUIDAE)

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ABSTRACT

The formation and course of a mass aggregation of the ramie moth *Arcte coerula* is described and the observations are discussed in the context of dry season aggregations.

Key words: ramie moth, defence mechanism, dry season aggregation

INTRODUCTION

The temporary assembly for the purpose of mating, feeding or hibernation in response to pheromones is referred to as aggregation. In general, the formation of an aggregation is considered as a defence mechanism, thus increases the chances of a species' survival. The most famous examples exhibiting aggregation behaviour are migrating grasshoppers or locusts (Orthoptera: Acrididae) but the phenomenon can be also found in longhorned grasshoppers (Orthoptera: Tettigoniidae), cockroaches (Blattodea), stick and ghost insects (Phasmatodea), true bugs (Hemiptera), true flies (Diptera) as well as in moths and butterflies (Lepidoptera). Well elucidated are the mass aggregations of migrating locusts occurring during out-breaks. However, only a few observations on longterm dry season aggregations have been reported (Muyschondt & Muyschondt 1974; Monteith 1982) whereas shortterm roosting aggregations seem to be more

common in the tropics (Poulton 1931; Benson & Emmel 1973).

This paper describes and discusses a peculiar mass aggregation of the ramie moth *Arcte coerula* Guenée, 1852 (Lepidoptera: Noctuidae) which was incorrectly identified as *Nagia episcopalis* in Schneider, (1999) (p. 40, Figures 3-6 and Figures 5-52 L). The species shown on Figure 1a is widespread in the Indoaustralian tropics but uncommon in Australia. Further taxonomic details are given by Boisduval & Guenée (1852); Barlow (1982); Inoue (1982); Holloway (1989) and Nielsen *et al.* (1996). The larvae have pest status in some areas seriously affecting the Stinging Nettle, *Urtica dioica* and prefer to feed on Urticaceae (Arif & Kumar 1995). Like other Noctuidae and Sphingidae *A. coerula* is capable of active and passive large-scale movements (Yoshi-matsu & Nakamura 1992). Phase polymorphism has been described for this species exhibiting a density-related colour change of the larvae regulated by juvenile hormones

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(Ohtaishi 1980; Ikemoto 1984; Ikemoto 1989).

OBSERVATIONS

The aggregation of *Arcte coerulea* was observed on the ceiling under a residential house on the campus of the Bulolo University College, at Bulolo (7° S, 147° E, 700 m. a. s. l., mean annual temperature of 24.3° C, mean annual rainfall of 1513 mm), Morobe Province, Papua New Guinea during October and November 1997, when the area was severely affected by a prolonged drought caused by El Niño.

The aggregation started with a few individuals and boomed to several thousands during the course of about four weeks. Initially a few adults were attracted to a fluorescent lamp which was turned on regularly every night and where the moths gathered and subsequently increased in number. The nocturnal fruit-loving adults did not leave their roosting place during day and only a few moths of the aggregate were observed flying around during night visiting ripe fruits such as bananas and papaw. The fast-flying moths occasionally bumped obstacles during the flight particularly after being confused by light or upon disturbance. In the latter case the moths additionally discharged the contents of the rectum.

During the climax of the aggregation (Figure 2) the females laid their eggs all over the ceiling, including the wings of other moths as shown on Figure 1b. After the hatch innumerable caterpillars were suspended from the ceiling on silken threads resembling a thick curtain. The small larvae remained under the house since they were not drifted away by wind.

The increasing number of dead rotting adults and caterpillars released an unpleasant stench. An additional nuisance were the faeces so that the adults finally were dispersed mechanically by the help of twigs. After this remedy the adults did not return.

DISCUSSION

Long-term aggregations of hemipteran bugs (Scutelleridae, Alydidae, Coreidae, Plataspidae), true flies (Diptera: Milichiidae, Dolichopodidae, Calliphoridae) and Nymphalidae butterflies have been observed in northern Australia during the dry 'winter' months from April to November with no or only little precipitation (e. g. Monteith 1982). The insects escaped from the unfavourable conditions of the open forest and sheltered in the closed monsoon forest offering a more suitable microclimate. However, there is also one record of a dry season aggregation of bugs of the genus *Leptocoris* (Hemiptera: Alydidae) occurring in Papua New Guinea (Sands 1978). The observed aggregation of the ramie moth apparently was a dry season aggregation although the phenomenon seemed to be a unique rather than a regular seasonal event as in the case of aggregations in the Australian monsoon forests. In general, aggregation behaviour reinforces the natural defence mechanisms of individual insects, i. e. mainly chemical defence strategies in conjunction with aposematism. In the case of the harmless *A. coerulea* a combination of scare tactics such as the discharge of the rectum as well as a swirling flight accompanied by clearly audible humming sounds seem to be an effective means to deter predators, particularly when synchronously performed by many individuals.

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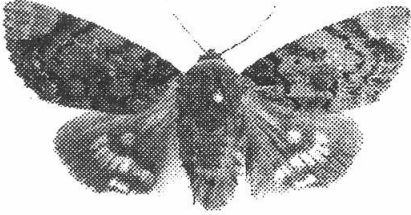


Figure 1a. Adult *Arcte coerula* Guenée

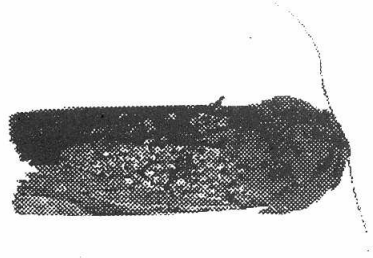


Figure 1b. Eggs laid on the forewings of an adult

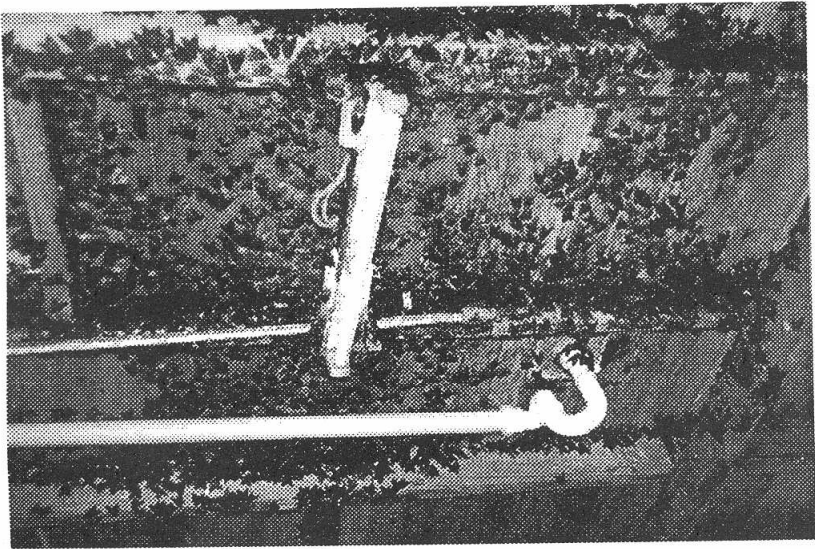


Figure 2. Mass aggregation of the ramie moth *Arcte coerula* Guenée (Lepidoptera: Noctuidae) around a fluorescent light on the ceiling under a residential house.