THE LIFE HISTORY AND BEHAVIOUR OF THE SUBSOCIAL AMAUROBIOID SPIDER *BADUMNA CANDIDA*

Thesis submitted by
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Frontispiece. Homespun Badumna candida

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M F Downes
13 May 1992

CONTENTS

Tables

FIGURES

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ABSTRACT

This study was a broad autecological investigation of the life history and behaviour of the amaurobioid spider Badumna candida (L. Koch), primarily comprising a two-year sampling program of nests and a number of field and laboratory experiments, the latter including rearing from egg to adult at constant temperature.

The main host plants of B. candida nests in the study site at Townsville, North Queensland, were Zizyphus mauritiana (the chinee apple) and Dolichondrone heterophylla. The nests were prevalent at ecotones, though they did not seem to thrive better there.

B. candida was univoltine. Males developed (egg to adult) in about 210 days at 25°C; females in about 265 days. Continuous temperatures below 21°C and above 29°C impaired normal development. The threshold of development for early life history stages was about 17-18°C. Most nests were founded between January and February by solitary subadult females, and mating took place in them in February and March. Both sexes were capable of multiple matings, and the mating position was one as yet unrecorded among the Cribellatae. A mean of six egg sacs, each containing a mean of 27 eggs, were produced between March and October. The primary sex ratio was even. The nest was a non-territorial, uniform structure to which all siblings contributed. At the peak of colony growth in October and November, about 100 spiders, the progeny of the single founder female, inhabited each colony. Subadult females began to disperse before subadult males appeared in the nests. Adult males did not appear until most or all of the subadult females had dispersed. Since males matured earlier than females when

reared singly in the laboratory, it is possible that the development of males is retarded in natural nests, thus synchronizing the maturation of the sexes.

Dispersal may have reached about 50m, but half that distance seemed optimum for successful establishment. Dispersing spiders sometimes reinitiated dispersal if the habitat was unfavourable. Founder females that failed to travel far from the home nest may have suffered more from predation by birds. 23% of nests founded in March survived to the time of the start of dispersal (November); the corresponding survival rate per female dispersing from the home nest was 2%. Groups of spiders sometimes dispersed together (i.e. by sociotomy), but this appeared to be a transitory phenomenon in dispersal.

The scelionid parasitoid Ceratobaeus setosus caused losses of about 20% of B candida eggs. The egg sacs were camouflaged, and were most often clumped in groups, perhaps to facilitate guarding them from this wasp. Along with C. setosus and the spider hosts, numerous other nest associates comprised a complex community within B. candida nests; among these associates, two oecophorid moths in particular were prominent and often caused serious damage.

The colony was most active in the early evening, improving the web, feeding and (over a restricted season) dispersing. Nests were not cleaned of prey remains and exuvia, but faeces were deposited clear of the nest. Nests fell into disrepair at the peak time of dispersal, usually being abandoned by March.

Although prey was subdued by several spiders and feeding was communal, the behaviour of individuals in predation and feeding was not cooperative; only the usual level of tolerance of conspecifics made it appear so. Other things being equal, attacks on prey were most likely from the largest spiders and from females. Extra-oral digestion and communal feeding created a potential avenue

for the distribution within the colony of substances involved in control of development and/or behaviour.

Spiderlings emerged from the egg sac without assistance and shared the prey of their mother and of their elder siblings; the chances of survival of first instar spiderlings were limited otherwise, for they did not prey and feed effectively. The parent female did not feed her young by regurgitation. In the laboratory, cannibalism between siblings was very rare at 20°C and 25°C, but at 30°C it was frequent (48%). One possible explanation for this difference was that recognition and tolerance were mediated by a volatile body-borne pheromone that dissipated rapidly at sustained high temperatures.

Interattraction was very high among juveniles under normal conditions, but subadult females and adult males (the life stages for which xenophobia was most adaptive) were intolerant of conspecifics of the same age and sex. Adult females, which rarely contacted spiders other than their own offspring, were variable in their reactions to other adult females; but in general they had lost the tolerance levels characteristic of their earlier communal life. In behaviour, as in development, pheromones (silk-borne or body-borne) are invoked as potential explanations of these phenomena.

B. candida was classified as a periodic-social or communal, non-territorial, subsocial (matrifilial) species. Some of the adaptations of its present level of sociality may preadapt it to a more advanced social organization - in particular, if development of conspecifics is really being influenced (retarded, for instance) pheromonally, an independent avenue to eusociality seems a possible feature of its destiny.