

Notes on Colony Composition in the Social Wasp *Mischocyttarus baconi* (Hymenoptera: Vespidae)

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ABSTRACT

Aspects of colony composition during the founding stage of the colony cycle are described for *Mischocyttarus baconi*, based on 20 colonies studied in Trinidad, West Indies. About half of our colonies were founded by a single adult female, the others by up to five females. Colony growth in this stage is slow, with a high rate of failure. We found no evidence that larger founding groups build larger nests, on average.

Key words: Founding Stage

INTRODUCTION

Mischocyttarus is a New World genus of about 250 species of social wasps (Silveira 2008). In the English-speaking West Indies, *Mischocyttarus* and the more familiar *Polistes* are commonly known as Jack Spaniards. The nesting biology of four *Mischocyttarus* species have been studied in depth (Jeanne 1972; Litte 1977, 1979, 1981).

As in *Polistes*, a new *Mischocyttarus* colony is founded by one or several queens without the aid of workers (Jeanne 1980, Gadagkar 1991). The emergence of the first workers marks the end of the founding stage and the start of the growth stage of the cycle. Emergence of the first males and gynes (new queens) marks the start of the reproductive stage towards the end of the cycle. Males typically begin emerging before gynes and are physically distinguishable from them, so that the start of the reproductive stage can be known with some exactness.

Also in common with other independent-founding polistines, typical *Mischocyttarus* colonies are small, and the nest is a single uncovered comb of cells. *Mischocyttarus baconi* is found throughout Trinidad, West Indies and may have an extensive distribution in northern South America east of the Andes. In Trinidad it commonly nests in and on buildings. *M. baconi* co-occurs in Trinidad with *M. trinitatis* (formerly regarded as a form of *M. alfkennii*; Silveira 2013). The two are virtually indistinguishable, except that they build two distinct types of nests (O'Connor *et al.* 2011; Scobie and Starr 2012).

The founding stage is expected to be an especially testing time, with implications for the colony's ultimate reproductive success and a high rate of colony failure. Our purpose here is to record the first information on *M. baconi* in this part of the cycle.

METHODOLOGY

Twenty colonies of *M. baconi*, situated under the concrete eaves of a building were examined and the following

noted: a. nest size in the founding stage, and censuses of b. adult females in the founding stage, c. eggs hatched, d. larvae pupated, and e. adults eclosed. Full censuses were taken on three occasions during the study, supplemented by 34 partial censuses during July and September 2000. We did not mark wasps for individual recognition, thus turnover among foundresses may have been missed.

RESULTS AND DISCUSSION

The composition of founding-stage *M. baconi* colonies examined are provided in Table 1. The number of foundresses varied between one and five. Eleven of the 20 colonies never had more than one foundress during the founding stage. Six of these were censused on one day, the others on up to 27 of 37 census days. There was a weak positive correlation between number of founding females and nest size (Spearman's $\rho = 0.33$; $p > 0.05$). In the absence of direct observations of rates of nest growth, this is consistent with the hypothesis that colony growth is limited by factors other than the number of available nest builders. The production of new adults was slow, with just 24 emerging in 254 colony-days.

In *Mischocyttarus* and other independent-founding wasps, survivorship and productivity of multiple-foundress colonies tend to be higher than those founded by single females (Gadagkar 1991, Reeve 1991). Our results corroborate this tendency for *M. baconi*. Six of nine multi-foundress colonies survived to the end of the observation period, significantly greater than the two out of 11 single-foundress colonies that survived (Table 1; χ^2 test, $p < 0.05$). Except for one single-foundress colony (F3), those that survived to the end of the observation period were the same as those that produced adult offspring, so that multi-foundress colonies likewise performed better by this index.

In four colonies (A9, B1, B7, and B8) some larvae and

Table 1. Composition of founding-stage *Mischocyttarus baconi* colonies. Colony numbers match those of Scobie and Starr (2012). Nest size is expressed as number of cells at the end of the 37-day observation period. The number of foundresses is the maximum number of adult females observed on the nest during the founding stage. Duration is the number of days that wasps were present in the observation period. Survival is expressed as the last day of the observation period on which adult wasps were present; a double asterisk indicates that adults were present to the end (day 37). Emerged adults are expressed as females + males.

Colony	Nest size	Foundresses	Duration (days)	Survival	Eggs hatched	Larvae pupated	Adults emerged
E1	2	1	3	19			
G3	3	2	2	16			
A3	3	1	1	6			
F3	5	1	16	**			
B7	5	1	27	**	6	4	1+0
A9	5	2	31	**	8	3	1+0
B2	5	2	30	**	5	4	4+0
B4	6	2	1	8			
C8	7	1	1	6			
B1	8	5	32	**	7	5	2+1
A4	9	1	1	8			
D1	12	1	9	22			
C10	16	5	30	**	5	5	2+3
G2	18	3	30	**	10	10	8+1
A8	20	1	1	15			
C11	24	1	5	31			
C1	29	1	1	27			
B5	56	4	2	8			
B8	60	3	30	**	2	1	1+0
D2	68	1	1	8			
Mean	18.1	2.0					
Total					43	32	19+5

pupae went missing. There was no indication whether these fell victim to predators or were aborted by adults.

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REFERENCES

Gadakar, R. 1991. *Belonogaster*, *Mischocyttarus*, *Parapolybia*, and independent-founding *Ropalidia*. p. 149-190. In: **K.G. Ross** and **R.W. Matthews**, eds. The Social Biology of Wasps. Cornell University Press, Ithaca. New York 678p.

Jeanne, R.L. 1972. Social biology of the neotropical wasp *Mischocyttarus drewseni*. *Bulletin of the Museum of Comparative Zoology* 144:65-142.

Jeanne, R.L. 1980. Evolution of social behavior in the Vespidae. *Annual Review of Entomology* 25:371-396.

Litte, M. 1977. Behavioral ecology of the social wasp *Mischocyttarus mexicanus*. *Behavioral Ecology and Sociobiology* 2:229-246.

Litte, M. 1979. *Mischocyttarus flavitarsus* in Arizona:

Social and nesting biology of a polistine wasp. *Zeitschrift für Tierpsychologie* 50:282-312.

Litte, M. 1981. Social biology of the polistine wasp *Mischocyttarus labiatus*: Survival in Colombian rain forest. *Smithsonian Contributions to Zoology* 327:1-27.

O'Connor, T.K., Starr, C.K. and Cameron, S.A. 2011. The neotropical social wasp *Mischocyttarus "alfkenii"* Ducke (Hymenoptera: Vespidae) is a pair of ethospecies. *Systematic Entomology* 36:446-452.

Reeve, H.K. 1991. *Polistes*. p. 99-148. In: K.G. Ross and R.W. Matthews, eds. The Social Biology of Wasps. Cornell Univ Press, Ithaca. New York 678p.

Scobie, A.A. and Starr, C.K. 2012. Nest structure of the neotropical social wasp *Mischocyttarus baconi* (Hymenoptera: Vespidae). *Sociobiology* 59:235-239.

Silveira, O.T. 2008. Phylogeny of the genus *Mischocyttarus* de Saussure (Hymenoptera, Vespidae, Polistinae). *Revista Brasileira de Entomologia* 52:510-549.

Silveira, O.T. 2013. The *Mischocyttarus* (subgenus *Phi*) social wasps related to *M. alfkenii* (Ducke) and *M. paraguayensis* Zikán (Hymenoptera, Vespidae, Polistinae). *Revista Brasileira de Entomologia* 57:173-196.