SHORT COMMUNICATION

First report of interspecific facultative social parasitism in the paper wasp genus *Mischocyttarus* Saussure (Hymenoptera, Vespidae)

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ABSTRACT. First report of interspecific facultative social parasitism in the paper wasp genus *Mischocyttarus* Saussure (Hymenoptera, Vespidae). Parasitism of colonies of the social wasp *Mischocyttarus cerberus* Ducke, 1918 by females of *Mischocyttarus consimilis* Zikán, 1949 was observed in a rural area of Dourados, state of Mato Grosso do Sul, Brazil. In all monitored cases, the invasion occurred in the pre-emergence colony stage, generally by a single female of *M. consimilis*. The period of establishment of the foreign female in the host colony was marked by antagonistic behaviors between the host female and the invasive. In general, the architecture of the parasitized nest was modified from the typical architecture of the host species nest.

KEYWORDS. Competition; interaction; independent foundation; neotropical wasp.

RESUMO. Primeiro registro de parasitismo social facultativo interespecífico em vespas do gênero *Mischocyttarus* Saussure (Hymenoptera, Vespidae). Parasitismo de colônias da vespa social *Mischocyttarus cerberus* Ducke, 1918 por fêmeas de *Mischocyttarus consimilis* Zikán, 1949 foram registrados em uma área rural no município de Dourados estado de Mato Grosso do Sul no Brasil. Em todos os casos monitorados a invasão ocorreu na fase colonial de pré-emergência, e em geral foi executado por uma única fêmea de *M. consimilis*. O período de estabelecimento da fêmea estrangeira na colônia hospedeira foi marcado por comportamentos antagônicos entre as fêmeas interespecíficas. Em geral, a arquitetura do ninho parasitado foi modificada em relação à arquitetura típica do ninho da espécie hospedeira.

PALAVRAS-CHAVE. Competição; interação; fundação independente; vespa neotropical.

Facultative social parasitism involving the invasion of a queenright colony by a foreign reproductive female has been documented in all three subfamilies of social wasps in the family Vespidae (Taylor 1939; Wilson 1971). In the subfamily Polistinae specifically, intraspecific facultative social parasitism has been described in both the genera *Polistes* Latreille, 1802 (Strassmann 1981; Klahn 1988) and *Mischocyttarus* Saussure, 1853 (Litte 1979); whereas interspecific facultative social parasitism has been described only in the genus *Polistes* (O' Donnell & Jeanne 1991; Giannotti 1995; Cervo & Dani 1996; Cervo *et al.* 2004). A single case of interspecific interaction in the genus *Mischocyttarus* was recorded by Pinto *et al.* (2004), in which two females coexisted in the initial phases of colony development. Here we provide the first report of the phenomenon of interspecific facultative social parasitism in the paper wasp genus *Mischocyttarus*.

Mischocyttarus cerberus Ducke, 1918 is a neotropical social wasp that occurs in central-western and southeastern Brazil. Colonies of *M. cerberus* are generally founded by a single female, and nests consist of one uncovered comb, which is attached to the substratum by a single peripheral petiole (Fig. 1A) (Giannotti 1998, 1999). Similarly, *Mischocyttarus consimilis* Zikán, 1949 is a neotropical social wasp, which until recently was known only from Paraguay but has now been reported from central-western Brazil. Relatively little is known about its life-history; the first studies were carried out only recently. Colonies of *M. consimilis* are generally founded by a single female, and nests consist of one uncovered comb, which is attached to the substratum by a single centralized petiole (Fig. 1B) (Montagna *et al.* 2010; Torres *et al.* 2011). Individuals of *M. consimilis* closely resemble individuals of *M. cerberus* in their body size and color pattern (Fig. 1). In agreement with Ortolani *et al.* (2010) the morphologic similarity among two species should motivate the parasitism for the invader species.

Parasitism of colonies was observed under field conditions in the municipal district of Dourados (22º13'16"S; 54º48'20"W), state of Mato Grosso do Sul, Brazil. The climate of this region, according to Zavatini (1992), is humid subtropical, with higher precipitation and temperatures in September through February (warm-rainy season), and less precipitation and mild temperatures in March through August (cold-dry season). All the parasitized colonies, located in a rural area, were monitored weekly from March 2010

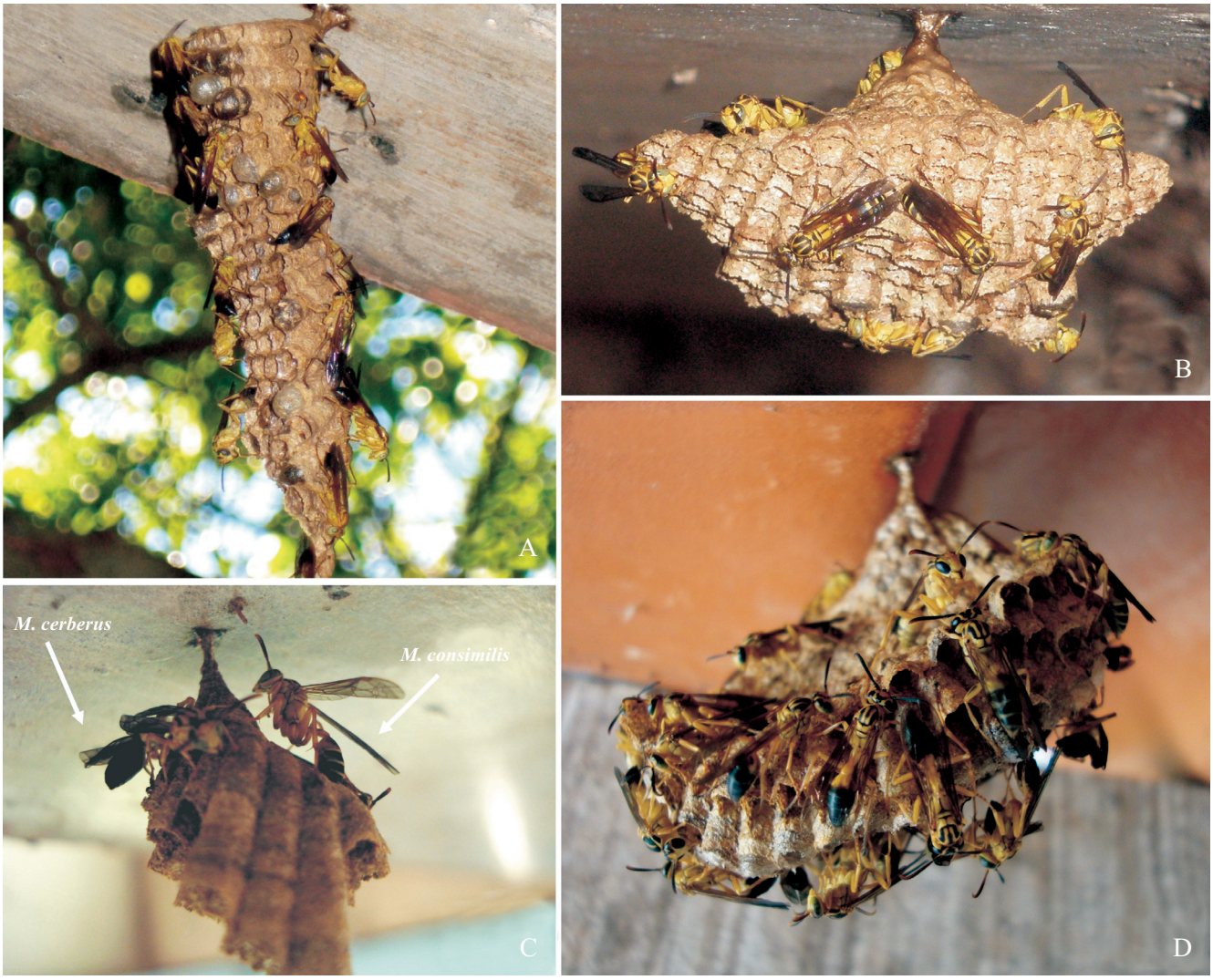

Fig. 1 (A) Typical nest of *M. cerberus* showing peripheral petiole, according to Giannotti (1999); (B) typical nest of *M. consimilis* showing centralized petiole, according to Montagna *et al.* (2010); (C) beginning parasitism in nest of *M. cerberus* by *M. consimilis*; and (D) nest of *M. cerberus* parasitized by *M. consimilis*.

through June 2011. Within an area of approximately two hectares, all cases of parasitism of colonies of *M. cerberus* were recorded. This location has low human presence and predominantly arboreal vegetation. All the parasitized colonies were attached to the edges of roofs of old outbuildings and vacant houses.

The events of parasitism of colonies of *M. cerberus* by females of *M. consimilis* were observed during both climate seasons. We recorded 11 cases of parasitism during the study period, but monitored only five parasitized colonies from the beginning of the parasitism until the colony declined. All the monitored colonies were founded by haplometrosis, and were in pre-emergence when the invasion occurred (17.2 ± 8.2 cells; mean ± SD; n = 5) (Fig 1C). Four colonies were invaded by a single female, and the other was invaded simultaneously by three females of *M. consimilis*. Giannotti (1998) demonstrated that most of the colonies of *M. cerberus* are founded by haplometrosis, and this behavior may have favored the invasion by females of *M. consimilis* observed in this study. In general, colonies founded by haplometrosis have low potential defenses against invaders compared to those founded by pleometrosis (Gamboa 1978; Gamboa *et al.* 1992).

The invasion and the period of establishment of the foreign female in the host colony were marked by antagonistic behaviors between the host and foreign females, mainly combat with attacks in the form of bites and lunges. The conflict period lasted three to five days, and during this period the host female dedicated most of her time to attempting to expel the foreign female. Subsequently, the aggressive behaviors gradually decreased and the host and foreign females began to coexist in the colony. Previous studies with social wasps of independent-foundation have demonstrated that the invader female must develop several strategies to attain success in the invasion, for instance acting more aggressively (Cervo & Lorenzi 1996; Cervo *et al.* 2004), or still more

complex strategies such as mimicking the chemical signature of the host colony (Lorenzi *et al.* 2004; 2007). Queens of both species divided their reproductive activities equally, and the first offspring of *M. consimilis* emerged after a mean period of 75.2 ± 6.3 days (mean ± SD; $n = 5$). The individuals of the two species that emerged during the remaining colony's cycle shared equally in the maintenance of the host colony, confirming this phenomenon as facultative social parasitism (Taylor 1939).

The architecture of all the old parasitized nests differed from the typical architecture of the host-species nest. Giannotti (1999) described an elongated comb and peripheral petiole for the nest of *M. cerberus*, and Montagna *et al.* (2010) described an elliptical comb and centralized petiole for the nest of *M. consimilis*. Old parasitized nests had the peripheral petiole typical of the host species; however, the combs were elliptical, similar to those constructed by the invader species (Fig. 1D). This suggests that the tasks of constructing the nest were shared among the offspring of the two species.

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