Short Communication

Note on predation of the brood of *Mischocyttarus injunctus* (de Saussure) by another social wasp in Caxiuanã, Pará, Brazil, with new records of species for the Ferreira Penna Research Station (Hymenoptera, Vespidae, Polistinae)

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**ABSTRACT**

Predation of the brood of *Mischocyttarus injunctus* by another polistine social wasp is reported from an Amazonian rainforest locality. This is the first report for the American tropics of naturally occurring predation by one social wasp on the brood of another. Three species are added to the list of the Ferreira Penna Research Station, raising known local richness to 81 species: *Mischocyttarus filiformis* (de Saussure, 1854), *Mischocyttarus vaqueroi* Zikán, 1949, and *Parachartergus griseus* (Fox, 1898).

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Observations reported in this note were made in the Ferreira Penna Research Station (ECFPn) of the Goeldi Museum, in Caxiuanã, Melgaço, Pará, Brazil. The general physiographic aspects of the region were described in Silveira (2002), together with an inventory of the local social wasp fauna, which is currently known to comprise 81 species. The area is covered mainly by typical lowland rain forest, and is drained by numerous variably sized mainly black water rivers (see also Lisboa et al., 2013). The Curuá River, with a generally north–south course is one of those streams flowing into the huge Caxiuanã Bay, and it is also the main access to the base of the ECFPn (Fig. 1(1a)). Near the station, this river is 70–150 m wide, its margins being covered by a narrow fringe of “igapó” vegetation, a kind of seasonally inundated forest (Fig. 1(3)).

On March 12, 2015, ca. 3:00 PM, the authors (by boat and helped by a native guard of ECFPn) discovered a relatively small polistine nest with a single unenveloped comb (Fig. 1(2)) amidst vegetation on the West bank of the Curuá River, some 500 m upstream from the ECFPn base (Fig. 1(1b)). As we approached the nest, which was fixed to a leaf ca. 1.50 m above the water surface (Fig. 1(3) – black arrow), two very large wasps, yellow with tip of the metasoma black, were perching on the nest as seen by all three observers. One of these wasps soon flew away. While one of us (SMCS) prepared to collect the individual that remained on the comb, the wasp quite rapidly removed a resident larva from its cell, and took off with the prey held in its forelegs and mandibles, only to land on the nearby vegetation some 5 m away (Fig. 1(3) – red arrow), where it stayed for a short time masticating the captured larva. The observers then decided to move the boat toward the sitting wasp, and tried (OTS) to collect it with a hand net, but this was not successful and the wasp escaped.

The observers returned to the site after some 45 min in the hope that wasps had returned to the nest. However, they were surprised to find a very different outcome. Considering that in this part of Amazonia there are only two species that make single open combs and are at the same time very large and yellow with the tip of metasoma black, the observers would expect to find on the nest individuals either of *Mischocyttarus flavicans* (Fabricius, 1804) (Fig. 1(4c)) or of *Polistes testaceicolor* Bequaert, 1937 (Fig. 1(4d)). Instead, it was noted that the nest cells were of a much smaller size than those of *M. flavicans* or of most *Polistes*, and furthermore there were upon the nest (comb with 24 cells, two capped) correspondingly much smaller and darker wasps. The nest and two female
Fig. 1. (1) General satellite view of the landscape in the region of the ECPFn (a) and (b) near the site where described events occurred in the Curuçá River, in Caxiuanã; (2) nest of M. injucndus on leaf of a tree in Igapó vegetation; (3) Curuçá River margin at the point where predation of the brood of M. injucndus was observed; black arrow: nest site; red arrow: site where the predatory wasp was observed masticating a larva of M. injucndus; (4) a) general views of M. injucndus (body length ca. 10 mm) and three other polistine species with body size and color fitting observed aspects of the predatory wasp: (b) A. testacea, (c) M. flavicans, (d) P. testaceicolor (all females, to same scale).

wasps were collected (a further female and a male emerged in the lab after several days) and identified as Mischocttatarus injucndus (de Saussure, 1854) (Fig. 1(4a)).

So what at first sight seemed to us to be an improbable instance of conspecific cannibalism, turned into an even less expected case of predation of the brood of a Mischocttatarus species by another polistine wasp. There are a few similarly sized and colored eumenine species in eastern Amazonia, but behavior and general morphological aspects (such as head and mandible proportions) seemed to rule out such a possibility. Furthermore, while eumenine wasps sting and paralyze prey before taking them to a nest, in the present case the M. injucndus larva was not observed to have been stung, while mastication movements by the predatory wasp could be definitely seen by two observers.

Given that the large yellow-and-black wasps seen on the nest so typical of polistine independent founders did not build it, the list of candidates for the observed predatory behavior then should also include Agelaia testacea (Fabricius, 1804) (Fig. 1(4b)). According to Silveira (2002), this species has been found in the area of the ECPFn. However, it was not collected at river margins but only at interior forest habitats, and was quite uncommon, much less frequent than Agelaia angulata (Fabricius, 1804), a similarly sized congener. It was also not found among several Agelaia species collected in intensive sampling with carrion traps in that locality by Silveira et al. (2005). Indeed, A. testacea was not collected by the present authors after four days exploring forest habitats at the ECPFn in the same period in which this observation was made. In another site in Caxiuanã (PPBio site), 30 km distant from the ECPFn, Silva and Silveira (2009) found A. testacea at somewhat higher frequency, being the seventh most common species. In that site, M. flavicans was collected with very small frequency at interior forest habitats, and P. testaceicolor was again absent.

Two circumstances deserve emphasis in the context of the events here described. First, no adult individuals of M. injucndus were seen at the focal nest or in the proximity during the short period in which the large yellow-and-black wasps were observed. Second, there were two individuals of the large species, as noted by all observers, and they apparently did not reciprocally display aggressive behaviors. Given that forager recruitment of the kind occurring in ants and A. mellierra (with information of specific locations or food resources) is up to now unknown in Neotropical social wasps (Jeanne et al., 1995; Taylor et al., 2011), the simultaneous presence of the two invading individuals could possibly result from regular exploration of river margins by foragers of that species. In this regard, ODonnel and Hunt (2013), in explaining occurrences of group hunting in two epiponine species [Parachartergus apicalis (Fabricius, 1804) and Agelaia cf. angulata] admit that the responses by conspecific foraging (nestmates) to local cues could help to promote formation of such hunting groups (local enhancement). Actually, A. testacea may have very large colonies (Jeanne, 1970) which enhances the chances of two foragers of meeting at a point resource such as this M. injucndus nest but, as mentioned above, A. testacea is relatively rare in the ECPFn area, and unknown to forage there at river margins. Regarding the other two candidate species, M. flavicans and P. testaceicolor, they have much smaller colonies, and furthermore have not yet been recorded at the ECPFn.

M. injucndus (reported by Silveira, 2002 as M. juruanus Richards, 1978; see also Silveira, 2006 for synonymy between these names) is the most commonly found species of social wasp nesting at river margins in the region of Caxiuanã, followed by M. foveatus Richards, 1940 and Apoica pallida (Olivier, 1791). Brood of these colonies may thus constitute a regular and relatively abundant resource for predatory wasps powerful enough to overcome their defensive capacity. We believe this is the first report for the American tropics of interspecific predation by one social wasp on the brood of another. Such predator–prey relations between vespid species have been commonly reported in the Old World tropics, involving species of Vespa. Vespa tropica (Linnaeus, 1758) specializes upon species of Polistes, Ropalidia, Parischognaster and Stenogaster, and V. mandarinia has been reported to prey on the brood of Vespula spp. (Matsuura and Yamane, 1990). Some of these species may indeed be mentioned as possibly playing a significant role controlling polistine populations in Asia (Miyano, 1980). Regarding Neotropical social wasps, only in experimental conditions has a similar phenomenon been observed in Costa Rica, with P. occidentalis (Olivier, 1791) preying upon the brood of artificially approximated (1.8 cm) colonies of M. rufidens (de Saussure, 1854) from which adults had been removed (London and Jeanne, 1997).

Planned and more intensive studies of natural populations of M. injucndus will be necessary to attest the true importance of predation by other social polistes in the ecology of the species. Of course, the findings here reported also alert us to the possibility of similar naturally occurring phenomena involving other species of tropical Polistinae. A large size difference between the involved species appears to be a prerequisite for brood predation since, due to the probable lack of forager recruitment, massive invasions (as in mass-recruiting ants) seem to be improbable between polistine wasps unless in very special conditions of close proximity between colonies (see London and Jeanne, 1997).
Update of the species list of Polistinae of the ECFPN. Since the paper by Silveira (2002) in which 79 polistine species were listed for the ECFPN, only three other species can now be confirmed as new to the area:


Because Silveira (2006) synonymized one of the specific names in the 2002 list [*Mischocyttarus juruanus* Richards, 1978, to *M. injucundus* (de Saussure, 1854)], the currently known social wasp richness reaches 81 species. Other improvements to that list are the identifications of *Apoica thoracica* du Buysson, 1906 (by K.M. Pickett; originally listed as “sp. 30 – *Apoica* sp. nr. *thoracica*”), and *Agelaia timida* Cooper, 2000 (listed as “sp. 38 – *Agelaia* sp. nr. *cajennensis*”), and the description of *Protopolybia aliciae* Silveira, 2004 (listed as “sp. 51 – *Protopolybia* sp. nr. *scutellaris*”).

**Conflicts of interest**

The authors declare no conflicts of interest.

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**References**


