

SHORT COMMUNICATION

Feeding behavior of trunk-living jumping spiders (Salticidae) in a coastal primary forest in The Gambia

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Abstract. We provide a brief report on the feeding behavior of two salticid species in Bijilo Forest, The Gambia: *Holcolaetis vellerea* Simon 1909 and *Menemerus bivittatus* (Dufour 1831). The former was observed consuming a giant huntsman spider ?*Heteropoda* sp. (Sparassidae), which was much larger than itself and represents the first published evidence of araneophagy in this genus. *M. bivittatus* was frequently observed loitering close to, and orientated towards the nest entrance of stingless bees (Apidae, Apinae, Meliponini), watching them as they entered and left, but no other salticid species were observed doing this. Araneophagy and prey-specific predation behavior are well known in salticids but the behaviors reported here have not previously been documented.

Keywords: Araneophagy, *Holcolaetis vellerea*, *Hypotrigona*, *Meliponula*, *Menemerus bivittatus*, Sparassidae

The spider fauna of The Gambia, West Africa is widely unknown (see distribution data in Dippenaar-Schoeman & Jocqué 1997). Indeed, more than ten years on, the African Arachnid Database (AFRAD 2008) lists only five spider species as officially recorded from the country (A. Dippenaar-Schoeman pers. comm. 2007). Although The Gambia is the smallest country on mainland Africa, it contains a wide variety of habitat types, including Bijilo Forest—a 51.3 ha, rhun-palm, *Borassus aethiopum*-dominated, coastal primary forest, which stretches for approximately 2 km along the coast, some 10 km south of the capital, Banjul.

Jumping spiders (Salticidae) are diverse in Bijilo Forest, with at least 21 different species identified to date (DP unpublished data). All Salticidae have complex eyes with exceptional spatial acuity and some of the most elaborate vision-guided predatory strategies ever documented for any animal of their size (Su et al. 2007). Most salticids are more or less generalist predators of insects, although there are some pronounced examples of jumping spiders that have specialized preferences and exhibit prey specific prey-capture behavior (Cross & Jackson 2006). Araneophagy and prey-specific predation behavior are well known in salticids (see Jackson & Pollard 1996 for a comprehensive review), but neither of the behaviors we discuss here have been previously documented. This brief report concerns the interesting feeding behavior of two widespread Afrotropical species: *Holcolaetis vellerea* Simon 1909 and *Menemerus bivittatus* (Dufour 1831) which appear to be specialist trunk-dwellers within the forest. The former species, however, is sometimes found on hanging dead palm fronds, while the latter is often found outside the forest on vertical surfaces such as walls. Similar habitat preferences have been observed in South Africa (Cumming & Wesolowska 2004). Both represent new spider species records for The Gambia, but neither is a surprising find based on its known distribution (Wanless 1985; Wesolowska 1999, 2007; Platnick 2008). However, very little is known about the biology of these two spider species (Wanless 1985; Wesolowska 1999).

Araneophagy has been noted in the salticid literature in numerous contexts, such as targeting spiders with prey-specific tactics and singling out spiders with prey-choice behavior to name a few. The terms “araneophagy” and “araneophagic” require more refined definitions than they have at present in order to differentiate between opportunistic and specialized (not necessarily obligatory, i.e., in versatile predators) predation on spiders (R.R. Jackson pers. comm. 2008). Araneophagic behavior in *Holcolaetis* has been mentioned

(without examples) by Su et al. (2007), but no published data exist and the relevant research work is still in progress (R.R. Jackson pers. comm. 2008). Here, we confirm araneophagy by recording *H. vellerea* consuming a giant huntsman spider ?*Heteropoda* sp. (Sparassidae), which is much larger than itself (Fig. 1).

Unfortunately, we did not observe *H. vellerea* capture the sparassid. One of the rear legs of the sparassid, was missing and the wound looked fresh in the field suggesting that it was lost during the attack. In addition, there was no shrinkage of the abdomen, which would have been present if the sparassid had been dead for some time. Thus, this is unlikely to be a scavenging event by *Holcolaetis*. In this instance, *H. vellerea* consumed the sparassid prey via the pedicel (Fig. 1), which serves to join the prosoma with the opisthosoma and acts as a conduit for the aorta, intestine, and the abdominal nerve (Foelix 1996). Perhaps this was also the site of the first strike. Whatever the case, the salticid must have either highly potent venom or a highly efficient attack behavior in order to overcome an equally voracious predator much larger than itself.

Portia, another araneophagic salticid certainly appears to employ attack-orientation rules, apparently as a risk-reduction strategy. These include a spider-specific decision concerning the targeted region of the prey's body (Harland & Jackson 2006). It is possible that araneophagic spiders may be able to prepare for such a specialized attack behavior after a single successful encounter with previous spider prey, although this has yet to be thoroughly investigated (Jackson & Li 2004). It has been suggested that predators that evolve prey-specific capture behavior for dangerous prey also tend to evolve specific preferences for this prey type and that, in Salticidae, their exceptionally acute vision capabilities have facilitated the evolution of such specialized behavior (Li & Jackson 1996).

In most cases, when *H. vellerea* was observed in this area, the spider was not feeding. Thus, confirmation of araneophagy as a preferred trophic strategy awaits future observations and it is currently unknown whether these are stenophagous or euryphagous predators.

Social, stingless bees (Hymenoptera, Apidae, Apinae, Meliponini) are common in the Afrotropical region, with both *Meliponula (Axestotrigona) ferruginea* (Lepelletier 1841) and *Hypotrigona gribodoi* (Magretti 1884) known to occur in The Gambia (Eardley 2004). These species usually construct their nests inside existing cavities on tree trunks with characteristic, telltale entrance tubes of wax or mud jutting out from the surface (Fig. 2). The entrance is guarded by worker bees, which form a circle around the lip on the interior of the



Figures 1,2.—Predatory behavior of Gambian salticids. 1. *Holcolaetis vellerea* feeding on a sparassid spider via the pedicel; 2. *Menemerus bivittatus* observing stingless bees *Hypotrigona gribodoi* as they enter and depart their nest (with different nest entrances inset).

tube. There is a constant coming and going of individuals entering or leaving the nest, with occasional swarming around the nest entrance. It is not uncommon to find an individual of *M. bivittatus* loitering close to, and orientated towards, the entrance watching the bees as they enter and leave (Fig. 2), but no other salticid species have been observed doing this. In a preliminary three-day survey, four out of six nests were found to have a “resident” spider present on at least two of the days. There appears to be at least two strategies by which *Menemerus* hunts these bees. In instances where the entrance tube is made of wax (probably *Hypotrigona gribodoi*), the spider is able to see the movement of the bees through the semi-transparent surface of the tube, particularly when it is viewed from below (Fig. 2). On one occasion a spider was observed leaping upwards towards the rim. It dangled there for several seconds, before losing its foothold but was unable to capture a bee. When the entrance tube is made of mud (probably *Meliponula ferruginea*) this strategy cannot be employed, because the spider cannot see the bees as they prepare to leave the nest. In this situation (and presumably also in the former), the spider probably preys on the bees as they return to the nest. It is much easier for a bee to leave the nest than it is for it to return. They seem to fly out without any trouble whatsoever, but on their return they often hesitate, hovering outside the entrance as they try to align themselves to enter. The bees are only 2–3 mm long, so even a slight breeze can send them off course. In one instance, a bee was observed to miss the entrance during its approach and it was pounced on and captured by the jumping spider.

In Azerbaijan, *Menemerus semilimbatus* (Hahn 1827) has been shown to employ a specialized, prey-specific tactic for preying on flies that differs from the standard salticid technique of orientation, pursuit and attack, as has *M. bivittatus* in India (Guseinov 2004). Indeed, the same behavior described by these authors, of the jumping spider approaching flies from behind, has also been observed in *M. bivittatus* in The Gambia (DP pers. obs.). Furthermore, *M. semilimbatus* is euryphagous and a versatile predator, using a repertoire of disparate predatory tactics, adopting different behaviors depending upon the prey type (Guseinov 2004). Our observations of this species combined with what is known about *Menemerus* species suggest that pronounced development of prey-specific tactics may be common in this genus. Our observations also indicate that *M. bivittatus* adopts prey-specific tactics for predation on stingless bees, this being something that is otherwise unknown in the Salticidae. More extensive research aimed at testing this hypothesis is planned.

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