

## Oophagy by *Hyllus semicupreus* (Araneae: Salticidae: Plexippina)

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**Abstract:** A female *Hyllus semicupreus* was observed feeding on the eggs of a coreid hemipteran in Andhra Pradesh, India.

**Key words:** *Anastatus*, Andhra Pradesh, biocontrol, Coreidae, egg feeding, jumping spider

*Hyllus* C. L. Koch, 1846 is a large tropical Afroeurasian genus that includes mid-sized to large jumping spiders with stout, hirsute bodies, a rounded carapace, and in many species tufts of long setae on either side of the eye region (Wesołowska, 2008; Caleb et al. 2014). Of the 71 species presently placed in this genus only five have been reported from India (Table 1; WSC 2018).

**Table 1.** Jumping spiders of the genus *Hyllus* reported from India.

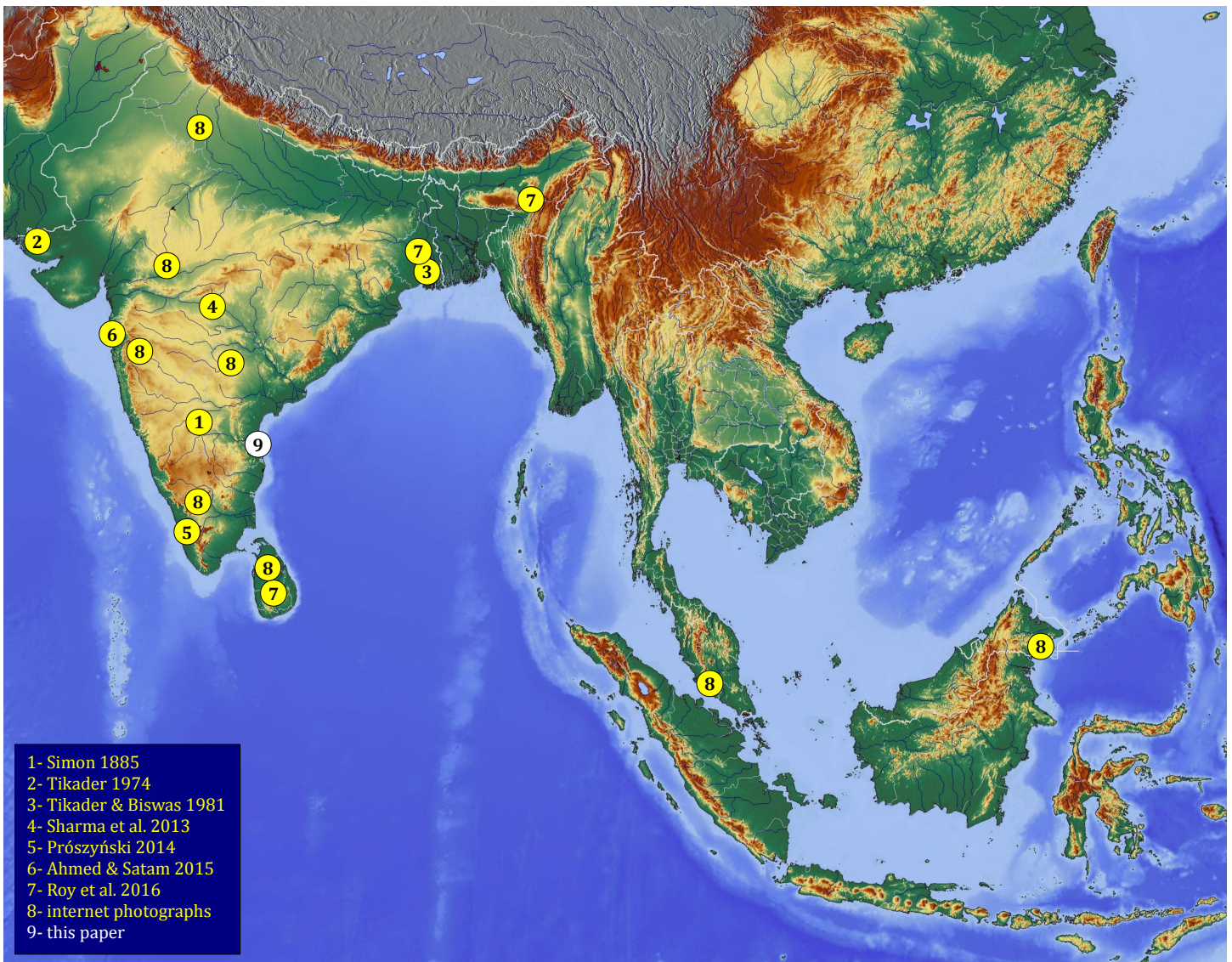
species	distribution	notes
<i>H. bos</i> (Sundevall, 1833)	India	Named in a short note without a description. Simon (1903) guessed that this species probably belongs in <i>Hyllus</i> .
<i>H. diardi</i> (Walckenaer, 1837)	widespread from south to southeast Asia and Indonesia (Sunda)	This is the best-known member of the genus, frequent in the international pet trade.
<i>H. manu</i> (Caleb, Christudhas, Laltanpuii & Chitra, 2014)	Chennai, South India	Known only from the Madras Christian College campus.
<i>H. pudicus</i> (Thorell, 1895)	Tharawaddy, Myanmar and India	According to Prószyński (1992) distribution in south to southeast Asia in uncertain.
<i>H. semicupreus</i> (Simon, 1885)	India and Sri Lanka according to published accounts, but photographed in Malaysia	One of the better-known <i>Hyllus</i> that may also be common in southeast Asia and Sunda.

The natural history, including behaviour, biology and distribution of these spiders, with few exceptions (Ahmed & Satam, 2015; Gilman, 2016), is little known. In this paper we document, for the first time, oophagy by a female *Hyllus semicupreus* (Figure 1), a widely-distributed and relatively well-known species in India and Sri Lanka that may also be found far to the southeast from the Malayan peninsula to Borneo (Figure 2).



**Figure 1.** Oophagy by a female *Hyllus semicupreus* in Andhra Pradesh. 1-2, Feeding on the first egg in a line of 16 coreid eggs. 3, Subsequent feeding on the second egg in this line. 4-6, Line of eggs after this spider finished feeding. Only 7 (numbered) of the 16 eggs were eaten. Note the small eupelmid (cf. *Anastatus* sp.) wasp (5-6). Photographs by A. N. Suresh Kumar.





**Figure 1.** Range of *Hyllus semicupreus* in south and southeast Asia. Although published records for this species are confined to India and Sri Lanka, photographs posted on the internet (8) indicate that it is widely distributed from Delhi to Borneo. The background relief map is in the public domain (CC0), courtesy of maps-for-free (<https://maps-for-free.com>).

This incident of oophagy (Figure 1) was documented by one of the authors (ANSK) while photographing terrestrial invertebrates on privately owned agricultural land, located at Pellakuru Mandal, Nellore District, Andhra Pradesh, India (25 AUG 2018, 09:00, N13.8305399°, E79.8096502°). Initially this author approached a lone dragonfly perched atop a dried stem, part of a natural barricade system of thorny shrubbery bordering the property to dissuade cattle and intruders alike from trespassing, a common practice in the countryside across India. Upon drawing near, a female *Hyllus semicupreus* was observed resting on a row of bright red eggs. Based on their distinctive shape and coloration we have subsequently determined that these eggs had been laid by a leaf-footed bug (Hemiptera: Coreidae). This spider remained absolutely motionless as she fed, even when approached and photographed from various directions. In order to get a better look at the egg under the spider, the spider was gently nudged, and as she proceeded to move further along the row of eggs, the egg she was sitting on was found to be cut open and the contents consumed. The spider was then left in place.

When the site was revisited later in the day (~16:30), this spider was missing. The row of eggs was then photographed (Figure 1:4-6). Out of a total of 16 eggs that had been deposited on the stem, ranging in length from ~1.95-2.05 mm, seven had been consumed, while the remaining nine eggs were still intact. At this time the eggs were also visited by a diminutive parasitoid wasp (Hymenoptera: Eupelmidae, cf. *Anastatus* sp.; Figure 1:5-6). After inspecting the eggs for several seconds this wasp flew away, leaving the intact eggs that remained untouched. Wasps of the genus *Anastatus* are known to parasitise the eggs of a wide range of insects, including Blattaria, Hemiptera, Lepidoptera, Mantodea, Neuroptera, Orthoptera, Heteroptera and Phasmida (Hanson & Gauld, 1995).

*Oophagy by salticid spiders.* Oophagy (egg eating) by salticid spiders may be relatively common and this behavior has now been documented in a number of species (Table 2).

**Table 2.** Records of oophagy by salticid spiders. Clade is based on Maddison (2015).

species	clade	references	notes
<i>Brettus</i> sp.	Spartaeina	Jackson & Hallas, 1986	Fed on eggs of theridiid and amaurobiid spiders.
<i>Cosmophasis</i> cf. <i>thalassina</i>	Chrysillini	Donovan & Hill, 2017	Female fed on a series of butterfly (Lepidoptera: Nymphalidae) eggs.
<i>Cyrba</i> sp.	Spartaeina	Jackson & Hallas, 1986; Hallas, 1988; Jackson, 1990	Fed on eggs of theridiids and amaurobiids. In captivity some hatchlings fed on eggs in brood sac.
<i>Evarcha albaria</i>	Plexippina	Cushing, 2012	Robbed ants of prey and brood (eggs and larvae).
<i>Habronattus coecatus</i>	Harmochirina	Nyffeler et al., 1990	Fed on insect eggs.
<i>Hentzia</i> sp.	Dendryphantina	Nyffeler et al., 1990	Fed on insect eggs.
<i>Hentzia palmarum</i>	Dendryphantina	Pfannenstiel, 2008	Fed on eggs of Lepidoptera.
<i>Hyllus semicupreus</i>	Plexippina	this study	Female fed on eggs of a coreid bug.
<i>Jacksonoides queenslandica</i>	Astiini	Jackson, 1988a	Fed on unattended eggs of other salticid spiders.
<i>Menemerus fulvus</i>	Chrysillini	Cushing, 2012	Robbed ants of prey and brood (eggs and larvae).
<i>Metaphidippus flavipedes</i>	Dendryphantina	Nyffeler et al., 1990	Fed on insect eggs.
<i>Metaphidippus galathea</i>	Dendryphantina	Nyffeler et al., 1990	Fed on insect eggs.
<i>Neobrettus</i> cf. <i>tibialis</i>	Spartaeina	Ahmed et al., 2018	Females fed on their own and conspecific eggs, and may feed on eggs of other salticids.
<i>Opisthoncus necator</i>	Viciriini	Nyffeler et al., 1990	Fed on spider eggs.
<i>Paracyrba wanlessi</i>	Spartaeina	Žabka & Kovac, 1996	Fed on insect eggs.
<i>Phidippus</i> sp.	Dendryphantina	Nyffeler et al., 1990	Fed on insect eggs.
<i>Phidippus audax</i>	Dendryphantina	Nyffeler et al., 1990	Fed on insect eggs.
<i>Phyaces comosus</i>	? Sимаethina	Jackson, 1986b; Moffet, 1991	Fed on eggs of larger salticids.
<i>Plexippus setipes</i>	Plexippina	Cushing, 2012	Robbed ants of prey and brood (eggs and larvae).
<i>Portia</i> sp.	Spartaeina	Jackson & Hallas, 1986; Hallas, 1988	Fed on eggs of other spiders.
<i>Portia fimbriata</i>	Spartaeina	Jackson & Blest, 1982; Jackson, 1985, 1986b	Fed on eggs of other spiders.
<i>Siler cupreus</i>	Chrysillini	Cushing, 2012	Robbed ants of prey and brood (eggs and larvae).
<i>Tauala lepidus</i>	Astiini	Jackson, 1988b	Fed on eggs of conspecifics and other salticids.

**Ecological significance.** Spiders are significant terrestrial predators, consuming an estimated 400-800 million tons of animal prey annually (Nyffeler & Birkhofer, 2017). Although parasitoids such as the eupelmid wasps (e.g. *Anastatus* spp.) are considered to be potentially important agents for the biocontrol of harmful insects (Roversi, 1990; Ulber et al., 2010; Ramos et al., 2018), the potential for biocontrol by spiders has been open to more debate (Betz & Tscharnatke, 2017; Cotes et al., 2018; Ndava et al., 2018). In part this is due to the notion that spiders are generalists and in part due to the assumption that prey must be moving in order to attract the attention of spiders. Given the importance of eggs and larval stages in the life cycles of many invertebrates, the potential of spiders as biocontrol agents has sometimes been brought into question (Finke & Denno, 2004; Hodge, 1999). Increasing evidence shows that, whilst many spiders may play a generalist role, others are more selective in their feeding preferences. Consumption of eggs may have a greater impact on populations of coreid bugs than consumption of nymphs or adults which may already have caused plant damage. *Hyllus semicupreus* and eupelmid parasitoids like *Anastatus* may compete as important control agents for coreid bug populations. The relative impact of oophagous spiders like *H. semicupreus* and parasitoid wasps on populations of coreid bugs and other insects deserves further study.

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