Harpactor angulosus (Reduviidae: Harpactorinae), A Predator of Neotropical Saturniids, *Hylesia* spp. in Brazil

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HARPACTOR ANGULOSUS (REDUVIIDAE: HARPACTORINAE), A PREDATOR OF NEOTROPICAL SATURNIIDS, *HYLESIA* SPP. IN BRAZIL[1]

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ABSTRACT: Caterpillars of the genus *Hylesia* (Lepidoptera: Saturniidae: Hemileucinae) can cause agricultural damages and dermatological lesions by direct contact to its urticating bristles. The biological control can regulate populations of these insects, but their natural enemies are poorly known. The occurrence of *Harpactor angulosus* (Lepeletier and Serville, 1825) (Reduviidae: Harpactorinae) predating caterpillars of *Hylesia* spp. is described. Adults of this predator were captured in an area of secondary forest in Viçosa, Minas Gerais State, Brazil and their pairs individualized in the field to obtain eggs. Adults of this predator presented sex dimorphism, with smaller males than females. They were found predating caterpillars of *Hylesia* spp., isolated from others to avoid the aposematic defense of this prey, when grouped. The presence of this predator, in the field, demonstrates its potential for the biological control of defoliating caterpillars. Studies on biological aspects and alimentary habits are important to understand the importance of *H. angulosus* in the biological control of defoliating caterpillars.

KEY WORDS: Biological control, predator, Harpactorinae, Saturniidae

Arthropods are important for the public health in several areas of the world because some of its species are vectors of infectious microorganisms (Pereira et al., 1998; Lounibos, 2002; Costa et al., 2007) and the use of poisonous substances to defend themselves against natural enemies. These compounds can cause irritating allergic reactions when in direct contact with humans (Carrijo-Carvalho and Chudzinski-Tavassi, 2007; Pereira et al., 2007).

Neotropical moths of the genus *Hylesia* are distributed from Mexico to Argentina, and they have urticating bristles. The burns caused by its urticating bristles are one of the main causes of dermatological burns in humans in America (Iserhard et al., 2007). These burns occur because the moths possess night habit, and they are attracted by public illumination. Such areas present high population

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and increased possibilities of direct contact with their larvae due to its aposematic aspect is what makes children and adults pay more attention to them.

Caterpillars of *Hylesia* spp. (Lepidoptera: Saturniidae), also, present potential as agricultural and forest pests in Brazil (Specht et al., 2006) and high taxonomic diversity (Lemaire, 2002), which hinders its recognition and control. Few chemical products are registered for controlling these insects in Brazil, which are considered secondary pests in eucalyptus plantations (Zanuncio et al., 1994) and *Ilex paraguaiensis* (Borges et al., 2003).

The knowledge of potential biological control agents of *Hylesia* spp. can be important for controlling these insects and reducing ecological disadvantages of chemical products application (Sengonca, 1998). *Hylesia* spp. have been controlled in Venezuela with aerial application of *Bacillus thuringiensis* var. *kurstaki* (Osborn et al., 2002), but this technique is unviable in some situations.

Caterpillars of *Hylesia* spp. are parasitized by tachinids (Diptera) as well as scelionids and ichneumonids (both Hymenoptera) (Pleigler, 1994). Caterpillars of *Hylesia metabus* Cramer (Lepidoptera: Saturniidae) were infected by microsporide in Ecuador (Osborn, 2002). However, predators of *Hylesia* spp. are poorly known, and the number of natural enemies of these Saturniidae is underestimated. The objective of this work was to register the occurrence of the predator *Harpactor angulosus* (Lepeletier and Serville, 1825) (Reduviidae: Harpactorinae) predating caterpillars of *Hylesia* spp. (Lepidoptera: Saturniidae) in the municipality of Viçosa, Minas Gerais State, Brazil.

METHODS

Three transects in line were established in an area along existent trails where insects were collected. Each one of these transects had 200 m length, 20 m width and a total sampled area of 12000 m^2. Each transect was walked, slowly, from 09:00 to 12:00 A.M., three times per week in September, October and November 2007, being considered, mainly, the transect and their margins. The collections were done by sweeping the vegetation because the use of light traps does not allow defining the alimentary diet of reduviids (Gil-Santana and Zeraik, 2003).

Specimens of harpactorine reduviids were collected in the experimental area of the beekeeping section of the Federal University of Viçosa (UFV) in Viçosa, Minas Gerais State, Brazil. This area had a secondary forest located at the southeast region of the Minas Gerais State (Figure 1) with geographical coordinates of 20˚ 28' and 21˚ 20' South Latitude and 42˚ 20' and 43˚ 13' West Longitude and 651 m altitude above sea level and with steep or soft and slopes hillsides. The climate is of Cwb type of tropical altitude with rainy summers and cold and dry winters with monthly mean annual temperature from 20 to 22˚C and mean annual rainfall of 1,221.4 mm (Meira Neto and Martins, 2002). This area presents a fragment of secondary forest with native and exotic herbaceous and arboreal species including *Psidium guajava* (Myrtaceae) and *Eucalyptus* spp. (Myrtaceae) around 100 meters from the beehives.

The individuals collected were identified as *Harpactor angulosus* (Lepeletier and Serville, 1825) (Wygodzinsky 1946) by comparing them with the material deposited at the Entomological Collections of the National Museum of Rio de Janeiro (MNRJ) and Oswaldo Cruz Institute (IOC).

Figure 1. Location of the Municipality of Viçosa, Minas Gerais State, Brasil, and the area where *Harpactor angulosus* (Reduviidae: Harpactorinae) was collected.

RESULTS AND DISCUSSION

Predators of the subfamily Harpactorinae are very common with 2059 species in almost 300 genera (Brailovsky et al., 2007) and with large geographical distribution in America, Asia and Oceania (Forero, 2006; Zhao et al., 2007, respectively). However, the real number of species of this subfamily and information about the biology and ecology of many of their species are still ignored (Zhao et al., 2007).

Three nymphs and four adults of *H. angulosus* were found preying on isolated caterpillars of *Hylesia* spp. Also, specimens of the reduviid were collected under leaves of plants with vacuum cleaners entomological suckers (250 ml) and brought alive to the Laboratory of Biological Control of the Institute of Applied Biotechnology to the Agriculture (BIOAGRO) of UFV where nymphs and adults of this predator received, every 48 hours, sixth instar caterpillars of *Hylesia paulex* Dognin (Lepidoptera: Saturniidae). Two pairs of *H. angulosus* were put in white organza bags (20 x 30 cm) in the field involving extremities of guava tree branches and closed with strings (Zanuncio et al., 2004; Zanuncio et al., 2006) to obtain eggs to rear this Reduviidae predator.

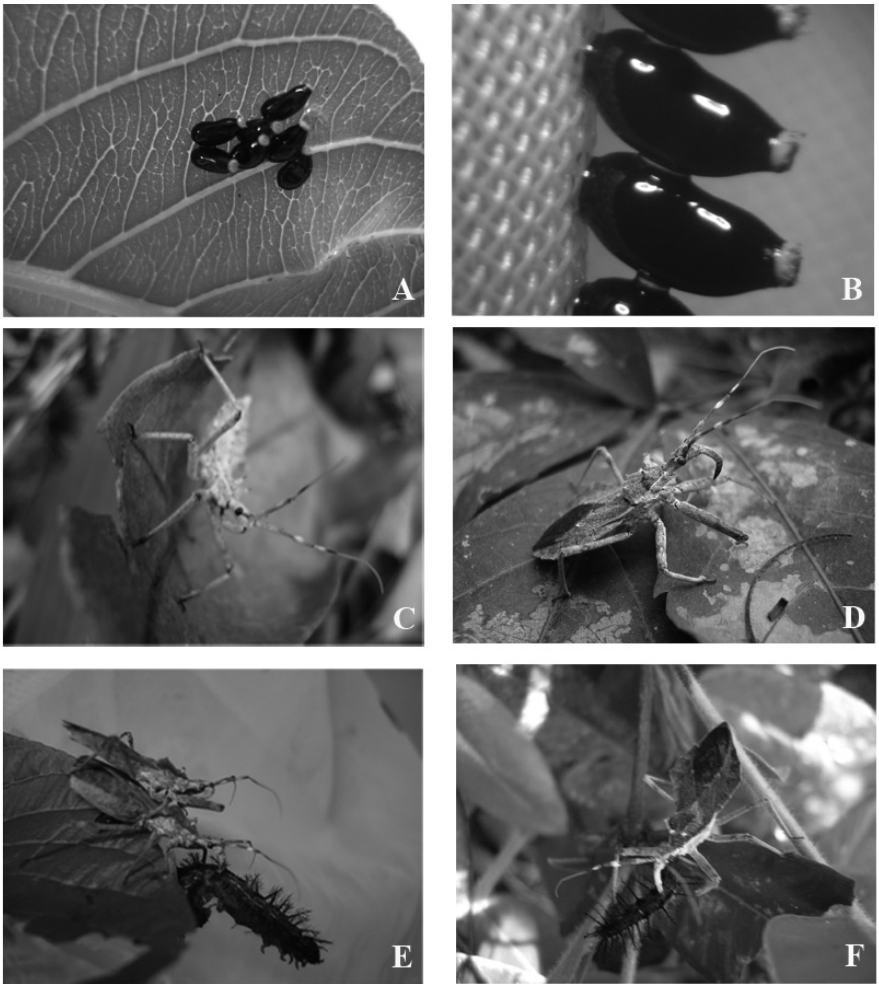

Fig. 2. A. *Harpactor angulosus* (Reduviidae: Harpactorinae) clutch under a *Psidium guajava* L. (Myrtaceae) leaf. B. Egg, detail. C. Late instar nymph. D. *H. angulosus* female. E. Two *H. angulosus* reared in laboratory conditions. F. Natural predation on *Hylesia* sp. (Lepidoptera: Saturniidae) larvae by *H. angulosus*.

Harpactor angulosus laid its first egg batches five days after mating on the abaxial area of guava leaves in the organza bags (Figure 2A). However, egg masses of this predator were not found on guava leaves in the field which indicates that the oviposition substratum of this species remains unknown.

The eggs of each egg mass were glued sidelong to the substratum by an adherent substance which also linked them to the oviposition substratum. The production and/or use of adherent substances for individuals of the subfamily Harpactorinae has ecological importance to fix the eggs to the oviposition substratum and to reduce predation such as reported for species of the tribe Apiomerini (Gil-Santana et al., 2003) or to join soil or vegetable remains particles under the body as a disguise against natural enemies as found for nymphs of several species such as *Rhynocoris erythropus* Linnaeus (Heteroptera: Reduviidae) (Weirauch, 2006). Eggs of *H. angulosus* (Figure 2B) presented dark brown color, except for the operculum that is clear beige (Wygodzinsky, 1946).

Nymphs of *H. angulosus* (Figure 2C) were, easily, identified in the field by their clear white color while the adults were grayish (Figure 2D). The adults of this species present spiniform processes of variable sizes in the lobes of pronotum and lateral saliencies at the abdomen, which are more or less apparent (Wygodzinsky, 1946). The females are larger than the males (Figure 2E) which is common for Harpactorinae (Gil-Santana and Milano, 2007). However, a useful and secure way to determine the sex is the observation of the globe aspect of the external male genital capsule (pygophore), which has greater importance to sex *H. angulosus* due to intraespecific variability in size in the same sex as observed for *H. angulosus*. Males were commonly found on the back of the females in laboratory, and they only abandoned this behavior to feed. Females fed with a male on its back (Figure 2E). Many Reduviidae species present parental care with the offspring (Ambrose, 1999; Tallamy et al., 2004), but this was not observed for *H. angulosus*. Males and females of this predator did not approach the egg mass, and they stayed indifferent when the egg masses were removed with a brush.

Caterpillars of *H. paulex* were preyed on almost immediately after they were offered to *H. angulosus* in the laboratory. This predator was observed feeding only on isolated caterpillars of *Hylesia* spp., suggesting larger success with this behavior to avoid the aposematic defense of this prey in colonies (Specht et al., 2006).

The attacks of *H. angulosus* on caterpillars of *Hylesia* spp. were done in the medium area of the body of this prey (Figure 2F). These preys become immobilized soon after being attacked by the probes of this predator which suggests a reduced handling time. The typical behavior of attack, with elevation of the first pair of paw legs as observed for *H. angulosus* is similar to that for *Apiomerus pilipes* Fabricius (Heteroptera: Harpactorinae) (Silva and Gil-Santana, 2004), with subsequent capture and inserting the probes of the rostrum into the prey.

Harpactor angulosus preyed on *Tenebrio molitor* L. (Coleoptera: Tenebrionidae) pupae and *Anticarsia gemmatalis* Huebner (Lepidoptera: Noctuidae) caterpillars in the laboratory. This reinforces the generalist feeding habit of this predator. This agrees with previous observations that Reduviidae species are usually polyphagous (Sahayaraj and Paulraj, 2001; Lioni and Cividanes, 2004) and also feeding on beneficial insects as bees and ladybugs (Gil-Santana et al., 2003; Silva and Gil-Santana, 2004; Marques et al., 2006). *Harpactus angulosus* is probably polyphagous too, since *Hylesia* spp. did not occur during the whole year but only in the period from the beginning of the spring to the end of the summer in Brazil.

The number of prey and biological aspects of *H. angulosus* should be studied to evaluate the potential of this natural enemy in biological control programs of defoliating caterpillars in agricultural and forest systems.

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