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NOTA / NOTE

First record of *Zelus armillatus* (Lepeletier & Serville, 1825) in Costa Rica, with notes on taxonomic problems regarding the genus *Zelus* Fabricius, 1803 (Hemiptera: Heteroptera: Reduviidae: Harpactorinae: Harpactorini).

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Abstract: New records of different morphs of *Zelus armillatus* (Lepeletier & Serville, 1825) in Costa Rica are reported. Additional information about the biology, the ecology and the distribution of this species is also given. Taxonomic problems regarding the genus *Zelus* Fabricius, 1803 are discussed. This is the twelfth part of a series of publications about different Heteroptera in Costa Rica.
Key words: Hemiptera, Heteroptera, Reduviidae, Harpactorinae, Harpactorini, *Zelus armillatus*, *Zelus conjungens*, first record, Costa Rica.

Resumen: Primera cita de *Zelus armillatus* (Lepeletier & Serville, 1825) en Costa Rica, con notas sobre problemas taxonómicos relativos al género *Zelus* Fabricius, 1803 (Hemiptera: Heteroptera: Reduviidae: Harpactorinae: Harpactorini). Se citan por primera vez diferentes formas de *Zelus armillatus* (Lepeletier & Serville, 1825) en Costa Rica. Se aporta también información adicional sobre la biología, la ecología y la distribución de esta especie. Se discuten problemas taxonómicos relativos al género *Zelus* Fabricius, 1803. Esta es la duodécima parte de una serie de publicaciones sobre diferentes heterópteros en Costa Rica.
Palabras clave: Hemiptera, Heteroptera, Reduviidae, Harpactorinae, Harpactorini, *Zelus armillatus*, *Zelus conjungens*, primera cita, Costa Rica.

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Introduction

Reduviidae is the second largest family of true bugs (Hemiptera: Heteroptera) and almost all its members are predators on insects or other arthropods (Schuh & Slater, 1995), with Harpactorini as the most diversified group in this family in the Neotropical region (Gil-Santana & Forero, 2009). Members of Harpactorini are commonly associated with plant crops and some have been studied as biological control agents of crop pests (Grundy & Maelzer, 2003; Grundy, 2007). Several observations show that certain Harpactorini may be associated with particular plants (Bérenger & Pluot-Sigwalt, 1997). These polyphagous predators often live on a single plant species, not only as adults, but sometimes also as eggs and immature instars. While seeking prey, some Harpactorini apparently found certain plants to have other advantages and became adapted to visiting these plants species exclusively. In addition to hosting

the arthropod prey species the assassin bugs feed on, these plants provide additional resources, such as sugary or proteinaceous secretions produced in extrafloral nectaries or other structures (Bérenger & Pluot-Sigwalt, 1997; Gil-Santana & Alves, 2011).

Notes on the genus *Zelus* Fabricius, 1803

In Brazil, while Habib (1976) noted that several cultivated tree species seem to be inhabited by *Zelus leucogrammus* (Perty, 1834), Gil-Santana & Alves (2011) observed an association between *Zelus versicolor* (Herrich-Schäffer, 1848) and *Bidens rubifolia* (Asteraceae). In French Guiana, Bérenger & Pluot-Sigwalt (1997) observed that *Zelus araneiformis* Haviland, 1931 may complete its postembryonic development feeding exclusively on glandular formations of *Cecropia obtusa* (Cecropiaceae).

Although *Zelus armillatus* (Lepeletier & Serville, 1825) has been considered as a common species in Brazil (Costa Lima, 1940), data on the biology of this species are scarce. *Z. armillatus* was found on trees of *Caryocar brasiliense* (Caryocaraceae) in Brazilian savanna (*Leite et al.*, 2012a, 2012b) and as a predator of *Thyrinteina arnobia arnobia* (Stoll, 1782) (Lepidoptera: Geometridae) on *Eucalyptus* sp. (Myrtaceae) trees, in Brazil too (Barreto & Mojena, 2014).

Colouration has traditionally been used to separate and identify species in Harpactorini. However, because some species may show extreme colour variation among individuals, they have been considered as separate species, as several species of *Zelus*, which currently include various junior synonyms, described first as separate taxa (Hart, 1986; Gil-Santana, 2008). Morphological characters, in particular male and female genitalia, have been shown to be more useful than colouration to delimit these taxa (e.g., Hart, 1972, 1986). Therefore, colour variation should be documented, coupled with morphological characters to avoid future confusions (Gil-Santana & Forero, 2009). If this documentation could be done with living specimens, it would contribute to a better knowledge of the real colouration of a given species. Many colours are lost or changed in preserved specimens, including harpactorines.

As *Z. armillatus* is also a species with a great range of variation in colour, several colour morphs were described as separate species and are currently included as its junior synonyms (Mayr, 1868; Berg, 1879; Maldonado Capriles, 1990). Among these numerous synonyms, *Zelus conjungens* (Stål, 1860) has been considered as valid in two doctoral theses (Hart, 1972; Zhang, 2012). So, if this statement is formally presented in the future or further studies can find acceptable morphological or other (molecular, biological, ecological) features, then this last taxon would stand as a different taxon. If not, the synonym must remain.

Z. armillatus was described based on female specimens from Brazil (Le Peletier de Saint-Fargeau & Serville, 1825), with further records from Argentina (Berg, 1879; Melo *et al.*, 2004), Paraguay (Lethierry & Severin, 1896) and Bolivia (Maldonado Capriles, 1990).

Z. armillatus (Lepeletier & Serville, 1825) in Costa Rica

Recently, the second author was able to find and photograph adults of *Z. armillatus* with different colouration in Costa Rica. The site of the findings is located in Vuelta de Jorco, county of Aserrí in the province of San José, about 1100 m above sea level. The specimens were found at a plantation of *Zea mays* (Poaceae), which was mixed with other cultivated plants as *Cucurbita argyrosperma* (Cucurbitaceae) and *Coriandrum sativum* (Apiaceae).

Just a few days before finding specimens of *Z. armillatus*, the second author had found eggs, immature instars and adults of *Leptoglossus gonagra* (Fabricius, 1775) (Coreidae: Coreinae: Anisoscelini) at the same site, the first record of this species in Costa Rica (van der Heyden & Gamboa Hidalgo, 2014).

On 29.7.2014, a specimen of *Z. armillatus* was found near to the base of a leaf of *Z. mays*, feeding on a spider (Fig. 1). A dead bee was observed nearby (to be seen in fig. 1, too), which might imply that the reduviid bug was hiding among the leaves, waiting for prey. Large parts of the body of this specimen (pronotum, wings) were black, its legs were completely black, too.

On the same day, another specimen of *Z. armillatus* (Fig. 2) was found near to the base of a leaf of *Z. mays*, too. The body of this specimen had a yellowish colouration, parts of the -mostly black- legs were yellow, too. When the second author got closer, moving the leaves of the plant, the bug let itself fall down, probably a kind of defence, and secreted a scentless liquid, which was milky-yellowish.

One week later, on 5.8.2014, the second author found three more specimens of *Z. armillatus* at the same site. One specimen (Fig. 3) was yellowish, two specimens were partly black (Figs. 4 and 5).

The yellowish specimens of *Z. armillatus* were larger (about 20 mm) than the darker ones (about 15 mm), a sexual dimorphism, with females being larger than males.

As *Z. armillatus* has not been reported from Costa Rica yet, these records are the first ones of this species in this country.

Figs. 1-3.- *Zelus armillatus* (Lepeletier & Serville, 1825), Vuelta de Jorco, Aserrí, San José, Costa Rica. **1.-** Male, feeding on a spider, dorsal view, 29.7.2014. **2.-** Female, dorsal view, 29.7.2014. **3.-** Female, lateral view, 5.8.2014.

Figs. 4-5.- *Zelus armillatus* (Lepeletier & Serville, 1825), Vuelta de Jorco, Aserrí, San José, Costa Rica, 5.8.2014. **4.-** Male, lateral view. **5.-** Male, dorsal view. (All photographs: Ignacio Gamboa Hidalgo.)

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