

ARTIGO / ARTÍCULO / ARTICLE

Aposematism and unpalatability in the Chilean milkweed bug
Oncopeltus (Erythriscius) miles (Blanchard, 1852)
(Heteroptera: Lygaeidae): experiences with spiders
(Arachnida: Araneae).

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Abstract: Observations of the interaction between the Chilean milkweed bug *Oncopeltus (Erythriscius) miles* (Blanchard, 1852) (Heteroptera: Lygaeidae) and three spider species: *Steatoda grossa* (C.L. Koch, 1838) (Theridiidae), *Argiope argentata* (Fabricius, 1775) (Araneidae) and *Frigga crocuta* (Taczanowski, 1878) (Salticidae) are reported. In no case the spiders made attempt to attack the bugs. It is believed that this is a result of the trophic habits of the bug which feeds on Asclepiadoideae, making them unpalatable, as it has been observed in other milkweed bugs within this genus. In addition, its aposematic coloration may play a role in these associations, but also a chemical clue may be involved due the restricted vision of some spiders.

Key words: Hemiptera, Arachnida, Aposematism, unpalatability, predation, Asclepiadoideae, *Oncopeltus*.

Resumen: Aposematismo y mal sabor en la chinche chilena de las asclepias *Oncopeltus (Erythriscius) miles* (Blanchard, 1852) (Heteroptera: Lygaeidae): experiencias con arañas (Arachnida: Araneae). Se realizaron observaciones sobre la interacción de *Oncopeltus (Erythriscius) miles* (Blanchard, 1852) (Heteroptera: Lygaeidae) con tres especies de arañas: *Steatoda grossa* (C.L. Koch, 1838) (Theridiidae), *Argiope argentata* (Fabricius, 1775) (Araneidae) y *Frigga crocuta* (Taczanowski, 1878) (Salticidae). En ninguno de los casos las arañas intentaron atacar a las chinches. Se cree que se debe a los hábitos tróficos del hemíptero, que se alimenta de Asclepiadoideae, lo que le brinda mal sabor, tal como se ha observado en otras especies de este género. En adición, su coloración aposemática puede jugar un rol en estas asociaciones, pero se cree que también existen señales químicas, debido a la visión disminuida de algunas especies de arácnidos.

Palabras clave: Hemiptera, Arachnida, Aposematismo, mal sabor, predación, Asclepiadoideae, *Oncopeltus*.

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Introduction

Oncopeltus Stål, 1868 is a Lygaeinae genus currently comprising 39 species classified in two subgenera (Slater & O'Donnell, 1995) and distributed in both hemispheres in tropical and temperate areas. Species within this genus are commonly known as milkweed bugs, because of their trophic association with plants in the family Apocynaceae and subfamily Asclepiadoideae (Scudder & Duffey, 1971; O'Rourke, 1979).

The Chilean milkweed bug *Oncopeltus (Erythrischius) miles* (Blanchard, 1852) is a species of Chile and a small portion of Argentina (Rio Negro Province). In Chile, it is distributed from Tarapaca to Los Rios Regions (Faúndez & Rocca, 2016). About its biology, *O. miles* has been cited feeding on unidentified Amaranthaceae and *Chenopodium quinoa* Krock. (Amaranthaceae) (González, 1989; Artigas, 1994); more recently, Faúndez & Rocca (2016) provided the first record on an unidentified Asclepiadoideae and *Tweedia birostrata* (Hook. & Arn.) Hook. & Arn. (Asclepiadoideae). The purpose of this contribution is to provide the first observations of *O. miles* interacting with predators.

Material and methods

Observations were made in Antofagasta city, Antofagasta Region, north of Chile, where the behaviour was followed and recorded. Photos were taken with a high resolution digital camera. Specimens of *O. miles* have been constantly observed on Asclepiadoideae plants in the studied area (Fig. 1).

Results

Oncopeltus miles (Blanchard, 1852) and *Steatoda grossa* (C.L. Koch, 1838) (Araneae: Theridiidae)

A specimen of *O. miles* became trapped in the web of a female specimen of the synanthropic false widow *S. grossa* (Fig. 2). The bug was clearly noticed by the spider, because the bug shook the web numerous times trying to get free. This process lasted several hours until the bug finally escaped. During the entire time, the spider made no attempt to attack the bug.

Oncopeltus miles (Blanchard, 1852) and *Argiope argentata* (Fabricius, 1775) (Araneae: Araneidae)

Because of the observation described above, two specimens of *O. miles* were collected and each one placed on a web of *Argiope argentata* (Fig. 3). The specimens were placed on the web at 2:15 p.m. Observations of the bugs trying to escape from the web were made for several hours. After a couple hours, both specimens of *O. miles* eventually escaped from the web. As in the previous example of *S. grossa*, the spider did not approach the bugs, and made no attempt to attack the specimens.

Oncopeltus miles (Blanchard, 1852) and *Frigga crocuta* (Taczanowski, 1878) (Araneae: Salticidae)

In the same area, specimens of *F. crocuta* were dominant and ferocious predators on most of the arthropods all over the place. However, when *F. crocuta* specimens got closer to adults of *O. miles* there was no interaction. Furthermore, there was found together, in the same shelter inside of a decay leaf of the host, a specimen of *O. miles* with recently emerged nymphs and a female of *F. crocuta* with its ootheca. In that reduced space there was no interaction between any specimen of *Oncopeltus miles* and the spider. Little after the emergence, the nymphs started to invade the space of the spider (Fig. 4). Even in that situation, the spider made no attempt to attack the bugs. In addition, we found in the same plant two egg batches of *O. miles* deposited in a dry leaf which was previously occupied by an ootheca of *F. crocuta* (Fig. 5).

Discussion and conclusions

Several species of *Oncopeltus* are known for sequester cardenolides from plants of the subfamily Asclepiadoideae (Scudder & Duffey, 1971; Duffey & Scudder, 1972; O'Rourke, 1979), thus explaining their reddish colorations because of aposematism. In the case of *O. miles*, little is known about its biology, and just recently has been reported for the first time feeding on Asclepiadoideae

(Faúndez & Rocca, 2016). In that paper, the authors mention that it is unclear how much *O. miles* is dependent on the plants of this subfamily and if these chemical defensive properties are used at all. The observations here made with spiders seem to support the idea that *O. miles* follows the pattern of other *Oncopeltus* species. It probably sequesters cardenolides from plants of the subfamily Asclepiadoideae which make it unpalatable to certain predators. However, the observations here provided (i.e. with the spiders kept far away from the prey constantly, and being not primarily visual predators in some cases) suggest that not only a visual clue is involved, but also a chemical one. The chemical clue is probably expelled from the metathoracic scent glands (in adults) and dorsal abdominal glands (in immatures), which are a wide known defense method in the Heteroptera (Schuh & Slater, 1995). In addition to the above, the observations made on both nymphs and adults suggest that these capabilities are transversal to all the life stages on this species. Furthermore, up to this point, we almost have only recorded immature stages grouping together in Asclepiadoideae. Thus, nymphs are probably even more dependent on this defense mechanism.

Although the observations here provided are mostly circumstantial, these are a first approach to understand the behaviour and interactions of *O. miles* with predators. Therefore, further research is needed in order to fully demonstrate the *O. miles* capabilities as unpalatable/aposematic species. In addition, the possibility of finding substances which are useful as a spider repellent in *O. miles* should be taken into account, especially if it can keep away medically important species. On this specific case, it may be worth it to perform additional experiments with synanthropic species in the genus *Steatoda* which, although are not lethal, can cause several unwelcome effects to humans (Faúndez & Téllez, 2016). In addition, it may be interesting to explore these repellent properties on immatures, which may need additional defenses than adults, as these are flightless.

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Fig. 1.- *Oncopeltus miles* on Asclepiadoideae, Antofagasta city.

Fig. 2.- *Oncopeltus miles* in the web of *Steatoda grossa*.

Fig. 3.- *Oncopeltus miles* in the web of *Argiope argentata*.

Fig. 4.- *Oncopeltus miles* recently emerged nymphs with *Frigga crocuta* adult and its ootheca.

Fig. 5.- *Oncopeltus miles* egg batches placed near a *Frigga crocuta* ootheca.



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