Original article

# Description of the V instar nymph of *Tolono confusus* Carvajal, Rider and Faúndez, 2015 (Hemiptera: Heteroptera: Acanthosomatidae)

Descripción de la ninfa V de *Tolono confusus* Carvajal, Rider y Faúndez, 2015 (Hemiptera: Heteroptera: Acanthosomatidae)

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**Abstract.** The fifth instar nymph of *Tolono confusus* Carvajal, Rider & Faúndez, 2015 is described and illustrated based on two specimens from Napo Province, Ecuador. The need for further work on South American pentatomoid immatures stages is briefly discussed.

Key words: Ditomotarsinae; immature stages; Pentatomoidea; Tolono.

**Resumen.** Se describe la ninfa de quinto estadio de *Tolono confusus* Carvajal, Rider y Faúndez, 2015 sobre la base de dos ejemplares de la provincia de Napo, Ecuador. Se discute brevemente el conocimiento actual de los estados inmaduros de pentatomoideos sudamericanos.

Palabras clave: Ditomotarsinae; estados inmaduros; Pentatomoidea; Tolono.

## Introduction

The Acanthosomatidae is a phytophagous pentatomoid family characterized by having only two tarsal segments. Some acanthosomatid species exhibit maternal care, which has been linked to a secondary loss of the Pendergrast's organs (Tsai *et al.* 2015), structures that are still present in females of several genera. There is a high generic diversity of acanthosomatids in the southern hemisphere. In South America, this diversity is represented by 40 species in 26 genera (Carpintero *et al.* 2020; Carvajal *et al.* 2021). In addition, during the last decade, several new species have been added to previously monospecific genera. While most of the knowledge on South American acanthosomatids comes from the southern Andean groups (where the highest diversity exists), Neotropical and northern Andean acanthosomatids have remained poorly studied.

The acanthosomatid genus *Tolono* Rolston & Kumar, 1975 contains three species: *Tolono decoratus* Rolston & Kumar, 1975, *T. pallidus* Carvajal, Rider & Faúndez, 2015 and *T. confusus* Carvajal, Rider & Faúndez, 2015. All three species are characterized by their bright colored dorsum. *Tolono* is distributed on the western slopes of the Andes mountains of Venezuela, Colombia and Ecuador. Populations of this group can be found in the Andes highlands,

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where the altitude can reach almost 3000 meters above sea level. The first host plant record was *Baccharis floribunda* (Ruiz & Pav.) (Asteraceae) for *T. pallidus* (Carvajal *et al.* 2015); then Carpintero (2021) included some photos of *Tolono* sp. on *Carex* sp. (Cyperaceae). No other biological information is known for any of the species in this genus.

*Tolono confusus* adults are black with a distinctive orange pattern, very similar to *T. decoratus*, causing both species to be easily confused if only the dorsum is observed (Carvajal *et al.* 2015). However, they can be distinguished from each other by the morphology of the male genitalia, which has a pointed edge in *T. confusus* whereas in *T. decoratus* it is rounded. Besides its original description, nothing else is known about *T. confusus*. The objective of this work is to provide a description of instar V of this species.

## Materials and Methods

Specimens used for the description were obtained from National Museum of Natural History, Prague. In morphology and format we follow Carvajal (2014). Pictures were taken with a digital camera adapted to a microscope. All measurements are in millimeters. Measurements taken as in Faúndez and Carvajal (2016).

Material examined. Ecuador, Napo Province, 1.5 Km from Baeza, 1950 m [00°28′21″S, 77°53′58″W]; 11/25/2006; leg. J. Skuhrovec; 2 nymphs.

#### Results

### Tolono confusus V instar nymph (Figs. 1-3)

Description. General body shape oval. Dorsum black with orange markings (Fig. 1). Head bell shaped, ventrally orange, dorsally black, with uniform concolorous punctation. Anteclypeus rounded, elongated, surpassing paraclypei, with fine sparse punctation, and finer rugae than rest of head. Paraclypei rounded apically, with transverse concolorous rugae. Eyes reddish, prominent, next to a callous indentation. Ocelli red, very small, contiguous with base of head. Apex of rostrum slightly surpassing mesocoxae. Antennae black, 4-segmented, with short, dense, brown pilosity on last two segments (Fig. 2). Pronotum transversally ovate, black, with a mesial, longitudinal line that reaches apex of protoscutellum. Punctation of pronotum concolorous with surface, denser towards lateral margins. Anterolateral angles indented, each forming an orange cleft with a distinct black band along lateral margin. Humeral angles slightly prominent, pointed apically. Orange transverse bands on each sides of mid line of pronotum, with fine, sparse punctation. Cicatrices on transverse band, elongate in shape, immaculate. Protoscutellum black, isosceles triangle shaped, wider than longer, with fine concolorous punctures, somewhat denser at apex. Orange spot on each side of longitudinal mid-line with small, sparse punctation. Protoclavus black, small, little developed, with a line of concolorous punctures. Pterothecae black, well developed, reaching abdominal tergite III, uniformly punctured. Coxae, trochanters, and femora black, with sparse caramel colored pilosity. Tibiae black, each with a transverse orange band near middle. Tarsi black, 2-segmented, with abundant pilosity. Abdomen red dorsally, darker ventrally. Protoconnexiva black, depressed relative to rest of abdomen, forming a cleft in juncture between each tergite, surrounded by a fine orange band. Dorsal abdominal glands (DAG) black (3) surrounded by an immaculate orange calloused band (Fig. 3). First DAG in a pair, striated, between segments II and III. Second and third DAGs fused, large, ovate in shape. Second DAG between segments III and IV; third DAG between segments IV and V. Spiracles small, dark brown to black.

Measurements (n=2): Total length: 6.67; head length: 1.33; head width: 1.95; pronotum length: 1.22; pronotum width: 3.59; pterothecae length: 2.21; pterothecae width: 1.05; protoscutellum length: 1.34; protoscutellum width: 1.54. Antennae: I=0.43, II=0.97, III=0.83, IV=1.18.



**Figures 1-3.** *Tolono confusus* instar V nymph. 1. Habitus. 2. Head and antennae, detail. 3. Dorsal abdominal glands (DAG), detail DI = first DAG, DII = second DAG, DIII = third DAG. Scale: 1 mm. / *Tolono confusus* ninfa de V estadio. 1. Habito. 2. Detalles de cabeza y antena. 3. Glándulas abdominal dorsales (DAG), detalle DI = primera DAG, DII = segunda DAG, DIII = tercera DAG. Escala: 1 mm.

#### Discussion

While the knowledge on acanthosomatid immature stages is more concentrated on their biology, especially their association with maternal care, morphological traits remain poorly studied. Additionally, most of the data on this topic comes from the Old World fauna. Currently, in South America, immature stages of only six species are entirely or partially known, *Sinopla perpunctatus* Signoret, 1864 has been studied the most extensively. All immature stages of this species were described by Martínez *et al.* (2003); additionally, the feeding habits on *Nothofagus antarctica* Blume (Nothofagaceae) and association with maternal care were reported by Faúndez (2007) and Faúndez and Osorio (2010), respectively. Another acanthosomatid which has had the immature stages described is *Ditomotarsus* 

*hyadesi* Signoret, 1881, which feeds on several different plants. It also exhibits gregarious behavior, thus resulting in damage to crops (Carvajal and Faúndez 2015). The fifth instar of *Phorbanta variabilis* (Signoret, 1864) was illustrated by Schlatter (1976) who reported their occurrence on Magellan burberry (Berberidaceae). The fifth instar of *Cylindrocnema plana* Mayr, 1864 has been described by Carvajal (2014). Finally, Carpintero and De Biase (2019) described the las instar nymphs of *Hellica nitida* Haglund, 1868 and *Hellicoides johni* (Froeschner, 2000).

The knowledge of pentatomoid immature stages, in general, is relatively low in comparison to what is known about adults. This is probably because the study of this topic can be complicated. For example, morphologically, nymphs are very similar among taxa; that is, it can be difficult to find reliable characters to separate related species. Often times they are collected in groups of cohabiting species, then deposited in collections without association to adult specimens (Faúndez and Carvajal 2016). Additionally, rearing immatures in order to obtain an adult for association can be a challenge, especially if nutritional requirements are unknown (Carvajal *et al.* 2015). At the same time, the economic importance of pentatomoids (*e.g.*, the acanthosomatids named above) is often difficult to determine due to the lack of knowledge of the immatures, which is usually the stage that has the highest potential for causing damage to crops.

Of the known immatures of South American Acanthosomatidae, *C. plana, D. hyadesi, H. nitida* and *He. johni* belong in the Ditomotarsinae. Nymphs V of *T. confusus* can be differentiated from those species in that they have the pronotum black and ovate in shape with a pale transhumeral band (absent in the other four), and DAGs are surrounded by a pale calloused band. *Ditomotarsus hyadesi* has a deltoid shaped pronotum; and this structure is more trapezoid with projected humeral angles in *C. plana. Hellica nitida* and *Hellicoides johni* have a transverse pattern of brownish-yellowish bands constrasting with the pattern here described for this species. *Tolono confusus* is the first species of this genus for which an immature stage is known. Its description contributes to the knowledge of the northern Andean acanthosomatids, for which no data is available on this topic.

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