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Vol. 58, N° 1, Pp. 1-157, Enero-Junio 2024

UNA REVISTA INTERNACIONAL DE BIOLOGÍA PUBLICADA
POR

LA UNIVERSIDAD DEL ZULIA, MARACAIBO, VENEZUELA



NOTA CIENTÍFICA.

**Notes on the genera *Suphisellus* Crotch, 1873 and *Suphisellus*
Zimmermann, 1919, a cocktail of encrypted *Suphiselloides* genera
(Coleoptera: Noteridae: Noterinae: Noterini)**

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ABSTRACT

The genus *Suphisellus* harbors genetically divergent taxa due to poor characterization and lack of comparison with the type species, *S. bicolor* Crotch, 1873. These differences are manifested in the genitalia and other morphological characters of all species considered to belong to the genus. However, they all share one common character state (the pseudo-triangular proventral process) and two additional ones (a cleft of the fourth maxillary palpomere and a lateral fold of the pronotum). The latter two are not found in all species and, when present, show great variability, indicating the presence of different generic taxa. Currently, 51 species of *Suphisellus* are recorded, but not all have the genital terminalia and their genitalia studied, especially the genitalia of the female. The genus itself represents a mixture or assemblage of Neotropical and Nearctic generic taxa encrypted. This situation, together with the morphological variations of groups of taxa that have been grouped under common characters, creating new genera, suggests the creation of a "*Suphisellus* or *Suphiselloides* genus group". Key is constructed to separate the *Suphiselloides* genera and a map with the geographic distribution in Venezuela.

Key words: aquatic coleopteran; Genus Group; Nearctic; Neotropics; *Suphisellus*; Taxonomy.

Notas sobre el género *Suphisellus* Crotch, 1873 and *Suphisellus* Zimmermann, 1919, un Cóctel de géneros *Suphiselloides* encriptados (Coleoptera: Noteridae: Noterinae: Noterini)

RESUMEN

El género *Suphisellus* alberga taxones genéticamente divergentes debido a una caracterización deficiente y la falta de comparación con la especie tipo, *S. bicolor* Crotch, 1873. Estas diferencias se manifiestan en los genitales y otros caracteres morfológicos de todas las especies consideradas como pertenecientes al género. No obstante, todas comparten un estado de carácter común (la apófisis proventral pseudo triangular) y dos adicionales (una hendidura del cuarto palpómero maxilar y un pliegue lateral del pronoto). Estos dos últimos no se encuentran en todas las especies y, cuando están, presentan gran variabilidad, lo que indica la presencia de diferentes taxones genéricos. Actualmente, se registran 51 especies de *Suphisellus*, pero no todas tienen la terminalia genital y sus genitales estudiados, sobre todo el genital de la hembra. El género en sí mismo representa una mezcla o un conjunto de taxones genéricos Neotropicales y Neártica encriptados. Esta situación, junto con las variaciones morfológicas de grupos de taxones que han sido agrupados bajo caracteres comunes, creando nuevos géneros, sugiere la creación de un "Grupo de géneros *Suphisellus* o *Suphiselloides*". Se construye una clave para separar los géneros *Suphiselloides* y un mapa con la distribución geográfica en Venezuela.

Palabras clave: coleóptero acuático; Grupo de Géneros; Neártico; Neotrópico; Taxonomía; *Suphisellus*.

Recibido / Received: 10-03-2024 ~ **Aceptado / Accepted:** 31-05-2024

INTRODUCTION

In 1948, H. B. Leech designated *Noterus bicolor* Say, 1830 as the type species of the genus *Suphisellus* Crotch, 1873. In 1921, A. Zimmermann coined the same name for an identical generic concept. Leech mentioned that Zimmermann had not known Crotch's proposal for the generic name *Suphisellus*. It should be noted that earlier Guignot (1946) had designated *Suphisellus variicollis* Zimmermann, 1921 as the type species of the genus *Suphisellus*, already occupied by Crotch's (1873) pro-

posal (Leech 1948). Although there is no conclusive evidence, it is evident that Zimmermann was aware of the generic concept of *Suphisellus*. Despite this, he named as *Suphisellus* the species he had previously included in the genus *Canthydrus* in Junk's *Coleopterorum Catalogus* of 1920, except for *C. buqueti* (Laporte) and the two species *C. octoguttatus* and *C. imijormis*, all from South America (Leech 1970).

The issue does not lie in a plagiarism of the generic concept, but rather that both Crotch and Zimmermann were referring to different taxa from a systematic and biogeographical point of view. Crotch's taxon *Suphisellus* is confined to the Nearctic region, whereas Zimmermann's is restricted to species of the Neotropical region. Both groups present divergent morphological characteristics. In fact Zimmermann did not include the species *Suphisellus* bicolor within the genus *Suphisellus*, therefore the names of both authors are considered different taxa. Thus *Suphisellus* described by Zimmermann in 1921 becomes a homonym and junior synonym of *Suphisellus* coined by Crotch in 1873.

Between 2018 and 2019, García and collaborators described six new genera. While these genera share a variable pattern of the pseudo-triangular proventral process; characters such as the cleft of the fourth maxillary palpomere is found only in some genera and species, and the lateroposteroangular fold of the pronotum is only present in some genera; such that there is considerable divergence in their external and internal morphology (character states) of the genital terminalia and genitalia of both males and females. It is important to note that each genus maintains a unique pattern in these structures.

MATERIAL Y MÉTODOS

The *Suphiselloides* Genus Group comprises a diverse collection of aquatic beetles, consisting of eight genera: *Aponwaopterus*: described by García and Jiménez-Ramos in 2019a; *Bicarinaus*: introduced by García in 2018a; *Polylobata*: García described it in 2019; *Shepardhydras*: named by García in 2018a; *Llanoterus*: described by García and Camacho in 2018; *Jolyssellus*: introduced by García and Jiménez-Ramos in 2019b; *Suphisellus*: this genus is the oldest and gives name to the group, it is the best known.

The material studied is deposited in the collection of the Museo de Artrópodos de La Universidad del Zulia (MALUZ). It should be noted that the syntypes of *Suphisellus* bicolor, originally described from Louisiana, USA, are missing (Nilsson 2005).

In this study, individual characterizations of genera or species were not performed but character states were identified in a general way, establishing differences between them, due to the fact that they are already being performed in an anatonomic study of the genus group. Taxa whose research is in preparation or in press were included to expand the comparative aspect and evaluation of the *Suphiselloides* Genus Group.

RESULT AND DISCUSSION

Suphiselloides Genus Group.

This research proposes the creation of the "*Suphiselloides* Genus Group" or "*Suphisellus* Genus Group".

TAXONOMY

Coleoptera.

Noteridae Thomson, 1860.

Noterinae Thomson, 1860.

Noterini Thomson, 1860.

***Suphiselloides* Genus Group:** *Aponwaopterus*, *Bicarinaus*, *Jolyssellus*, *Llanoterus*, *Polylobata*, *Shepardhydras* and *Suphisellus*.

***Aponwaopterus* García and Jiménez-Ramos, 2019a:3**

Aponwaopterus pemonus **García and Jiménez-Ramos, 2019a: 9; TL:** Venezuela, Bolívar, La Gran Sabana; Holotipo MALUZ. Distribution: Venezuela.

***Bicarinaus* García 2018a: 359**

Bicarina uveritensis **García, 2018a:360; TL:** Venezuela, Monagas, Uverito; Holotype MIZA.

Bicarinaus uveritensis **García, 2018a:360**; N. Nom.: **García 2018b:417**
Distribution: Venezuela.

Jolyssellus **García and Jiménez-Ramos, 2019b:95**

Hydrocanthus nigrinus **Aubé, 1838:411**; TL: Antilles, Brazil; Syntypes MNHN; Descr.: Young 1979b:424; N. Comb.: Zimmermann 1921:205.

Canthydrus rufipes **Sharp, 1882a:273**; TL: Cuba; Young 1979b:424 BMNH; N. Syn.: Young 1979b:424.

Canthydrus nigrinus (**Aubé, 1838**): Sharp 1882a:273 (Antilles, Brazil); Branden 1885:17 (South America); Régimbart 1889a:261; (Argentina, Paraguay); 1889b:384 (Venezuela); Fleutiaux y Sallé 1890: 370 (Guadaloupe); Régimbart 1903:64 (Argentina, Brazil, Paraguay); Zimmermann 1919:116 (Central and South America); 1920a:12 (South America).

Canthydrus rufipes **Sharp, 1882a:273** (orig. descr., Brazil, Cuba); 1882b:7 (Brazil, Cuba, Guatemala, Nicaragua, Panamá); 1887:749; (México); Branden 1885:18 (Brazil, Cuba); Régimbart 1895:342 (México); 1903c: 64 (Argentina, Brazil, Uruguay); Zimmermann 1919:117 (Argentina); 1920a:13 (Argentina, Brazil, Cuba, México); Blackwelder 1944:73 (Argentina, Brazil, Chaco, Cuba, México, Nicaragua, Panamá).

Hydrocanthus nigrinus **Aubé, 1838:411** (orig. descr., Antillas, Brazil); Gemminger and Harold 1868:444 (Antilles).

Suphisellus nigrinus (**Aubé, 1838**); Zimmermann 1921:205 (Brazil); 1925a:1 (Paraguay); Blackwelder 1944:73 (Argentina, Brazil, Guadaloupe, Paraguay); Guignot 1957b:4 (Bolivia); Young 1979a:2 (Cuba, México, Panamá, South America, West Indies); 1979b:424 (Antigua, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, Jamaica, México, Panamá, Surinam, Trinidad, Venezuela); Spangler 1981:167 (Cuba); Benetti and Hamada 2003:704 (Brazil); Nilsson 2005:131 (cat.).
Suphisellus rufipes (**Sharp, 1882**): Benetti and Hamada 2003:704 (Brazil).

Jolyssellus nigrinus (**Aubé 1838**); N. Comb: García and Jiménez-Ramos: 2019b:129 (Venezuela) MALUZ.

Distribution: (NT) Antigua, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, Guadalupe, Guatemala, Jamaica, México, Nicaragua, Panamá, Paraguay, Suriname, Trinidad, Uruguay, Venezuela.

Llanoterus **García and Camacho 2018:173**

Suphisellus shorti **García, Benetti and Camacho, 2012:63**; TL: Venezuela, Apure, Biruaca; Holotype MALUZ.

Llanoterus shorti (**García, Benetti and Camacho**), 2012:63; N. Comb.: García and Camacho 2018:174. Distribution: Venezuela.

Polylobata **García, 2019:380**

Polylobata guaricoa **García, 2019:384**; TL: Venezuela, Guárico, Holotype MALUZ. Distribution: Venezuela

Shepardhydras **García, 2018:365**

Shepardhydras dytiscoide **García, 2018a:366**; TL: Venezuela, Apure, Samán de Apure; Holotype MALUZ. Distribution: Venezuela.

Suphisellus **Crotch, 1873:397**

Noterus bicolor **Say, 1830:33**; TL: U.S., Louisiana (orig. descr.); Syntypes lost; Descr.: Young 1979b:424; N. Comb.: Leech 1970:241.

Noterus bicolor **Say, 1834:446**; TL: U.S., Louisiana (2nd descr.); Syntypes lost; preoccupied by Say 1830:33; N. Syn.: Nilsson 2005:127.

Canthydrus bicolor (**Say, 1830**): Sharp 1882a:271 (Carolina); Branden 1885:15 (North America); Leng y Mutchler 1918: 78 (Florida); Zimmermann 1919:115 (Louisiana); 1920a:10 (North America); Leng 1920:76 (Carolina, Florida, Luisiana). *Suphis bicolor* (Say, 1830): Gemminger y Harold 1868:444 (North America); Crotch 1873:397 (Florida, Georgia, Pennsylvania).

Suphisellus bicolor (Say, 1830): Leech 1970:241 (Alabama, Arkansas, California, Louisiana, Texas); Folkerts 1978:347 (Alabama); Young 1979a:1 (Arkansas, California, Indiana, Louisiana, Texas); Whiteman and Sites 2003:226 (Missouri).

Suphisellus bicolorbicolor (Say, 1830): Young 1979b:424 (Alabama, Arkansas, California, Indiana, Louisiana, Mississippi, Texas); White *et al.* 1985:361 (Indiana); Nilsson 2005:127 (cat.). Distribution: (NA) U.S. (Alabama, Arkansas, California, Florida, Georgia, Indiana, Louisiana, Mississippi, Missouri, Texas).

Key to separate taxa of the *Suphiselloides* Genus Group.

- 1.- Pronotal lateroposteroangular pronotal fold absent; very convex rounded ovoid body shape; single metatibial spur: laterodorsal margin of gonocoxa single*Llanoterus*.
- Pronotal lateroposteroangular fold present; elongated oval or robust body shape; simple or serrated metatibial spur; laterodorsal margin of gonocoxa simple, serrated or lobed.....2
- 2.- Metatibial spur with double serrations.....3
- Metatibial spur with a sierra.....4
- 3.- Oval shape with head and pronotum not forming a robust mass in line with the elytral margin; laterodorsal margin of gonocoxa microtoothed; surface VII abdominal ventrite laterally depressed in both sexes; (not published).....**Gen. nov.1**
- Oval shape forming a robust mass anteriorly, much attenuated towards the elytral apex; surface VII abdominal ventrite laterally depressed in both sexes; gonocoxa with simple laterodorsal margin.....*Bicarinaus*.
- 4.- Ventroabdominal surface VII transverse depresses transversely..... 5
- Ventroabdominal surface VII does not depress transversely..... 6
- 5.- Surface with a distinct broad transverse depression in males and females; lateral margin continuous between head, pronotum and elytron; metatibial spur serrate at apex; gonocoxa with one, two or three lobes at apex.....*Polylobata*.
- Surface slightly depressed at abdominal apex, only in male; lateral margin very discontinuous between head, pronotum and elytra; metatibial spur serrate at apex; gonocoxa simple.....*Aponwaopterus*.
- 6.- VII abdominal ventrite with lateral depressions only in females.....7
- VII abdominal ventrite with lateral depressions in male and females.....8
- 7.- Metatibial spur serrate; lateral depression of VII abdominal ventrite separated by a narrow convex longitumeral septum (male not depressed or slightly so); laterodorsal margin of gonocoxa coarsely serrated with acute apex.....*Jollysellus*.

- Metatibial spur simple; lateral depression of VII abdominal ventrite very narrow separated by a wide trident-shaped convex surface (males not depressed); laterodorsal margin of gonocoxa simple with non-acute apex.....*Suphisellus*.
- 8.- Surface with elytral pattern of two transverse bands per elytron; robust body shape; serrated metatibial spur; laterodorsal margin of gonocoxa micro crenulated.*Shepardhydras*.
- Elitral surface with banded or macular patterns scattered over the entire surface; body shape not robust 8
- 8.- Longitudinal and lateral thin banded design; one metatibial spur with double serrated margin; laterodorsal margin of single gonocoxa with acute apex; lateral surface glabrous; (not published).....**Gen. nov.2**
- Irregular macula design; single metatibial spur; laterodorsal margin of single gonocoxa and acute apex; lateral surface micro-spinous; (not published).....**Gen. nov.3**

Note: Descriptions of taxa Gen. nov. 1, 2 and 3 are part of further individual research.

Characteristics of the *Suphiselloides* Genus Group

The name "*Suphiselloides*" does not imply that they are groups of species similar to *Suphisellus*. In fact, the genera that make up this group present a great morphological diversity. If we make a morphological comparison of the habitus of the species in dorsal or ventral view, we will not find significant changes and everything will seem similar.

The true comparison of specimens must be made in lateral view because we can observe that the profile of *Suphisellus bicolor*, for example, presents a different pattern than the species of *Polylobata*, *Jolyssellus*, *Bicarinaus*, *Llanoterus*, *Shepardhydras* and *Aponwaopterus*. Each of these species has a unique pattern that is only observed in the other species of the same genus.

Thus, there is a great diversity of forms in the species classified as *Suphisellus*, both in their general morphology and in their genital sclerites. In the case of the male genitalia, only some species of *Suphisellus* have been illustrated, but in the ca-

se of the genera named above it can be said that if there are illustrations where it is observed that the median lobe maintains an observable pattern among the species in the genus, the same happens with the female genital sclerites. The records of female genitalia made by Miller (2009), have contributed to the search have contributed to the search for differences between the different genera, which has allowed the separation of taxa. These differences are based on the character states of the gonocoxa, gonocoxoesternites or laterotergites. In gonocoxae there are several character states such as large or very small serrations or teeth, long or short crenulae and apex with one or more lobes or simply the absence of them. These character states allow distinguishing one taxon from another.

Character states of metatibial spurs and tarsal nails in different species allow identification of morphological changes unique to each *Suphiselloides* genus. For example, in some genera, one metatibial spur may have a serration on the apical margin, while the second spur is simple. In other cases, both spurs may have serrations on the apical margins, or even with the apical margin doubly serrated. There are also cases in which both spurs do not present any modification. Likewise, the nails show a great variability between genera. In each genus, species have a specific tarsal formula in which the claws may be modified with teeth on the ventral margin. Some common tarsal nail formulas are (3-3-3), (3-2-2), (2-3-3), (2-2-2) and (1-1-1) or (0-0-0).

In summary, the process of morphological comparison of *habitus* in lateral view, as well as the combination of character states in the genital sclerites, metatibial spurs and tarsal nails constitutes a useful tool for the identification of the different *Suphiselloides* genera other than *Suphisellus*.

Macular elytral patterns also present a generic pattern in the *Suphiselloides* group. Likewise, it is important to note that genera with more than one species with homogeneous coloration (without elytral bands or macules) differ from species with heterogeneous coloration with banded or macular designs.

The author working on four species groups of *Suphiselloides* genera (in preparation). Three of them have more than 30 species with the same elytral pattern of bands or maculae. These bands or maculae vary among species of the same gen-

nus, as well as their lateral *habitus*; but maintaining the same generic pattern that identifies them. This pattern has been corroborated with the genital structure of the species of each genus *Suphiselloides*; no two specimens with almost similar banding patterns and coloration have the same genital structure, examples of this descriptive process can be found in the research of García and Briceño (2023) and García (2024, in press).

In the first part of their study on the genus *Llanoterus*, García and Briceño (2023) describe in detail more than 30 species using the same patterns of differentiation that are presented in this research. This work represents a significant contribution to the knowledge of this genus of beetles. Similarly, in García (2024, in press), “Discovery of two new genera and nine species of detritivorous noterids in the Venezuelan Amazon (Coleoptera: Noteridae: Noterinae)” is presented. This research expands the information available on this genus and provides new data on its taxonomy and distribution.

Both investigations are examples of the application of the descriptive method in the study of beetle taxonomy. Through detailed observation and comparison of specimens, the author has been able to identify and characterize new taxa, which contributes to a better understanding of the diversity of these insects.

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BOLETIN
DEL CENTRO DE INVESTIGACIONES BIOLÓGICAS
 AN INTERNATIONAL JOURNAL OF BIOLOGY
 PUBLISHED BY THE UNIVERSITY OF ZULIA, MARACAIBO, VENEZUELA
 Vol.58, No1, Pp. 1-157, January-June 2024

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