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**PROGRAMA DE PÓS-GRADUAÇÃO EM BIOLOGIA ANIMAL**

**ANÁLISE CLADÍSTICA E REVISÃO DE *Schraderiellus* RIDER, 1998 (HEMIPTERA,  
PENTATOMIDAE, DISCOCEPHALINAE)**

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**PORTO ALEGRE, RS**

**2015**

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Dissertação apresentada ao Programa de Pós Graduação em Biologia Animal, Instituto de Biociências da Universidade Federal do Rio Grande do Sul, como requisito à obtenção do título de mestre em Biologia Animal.

Área de Concentração: Biologia Comparada.

Orientador: Prof. Dr. Luiz Alexandre Campos.

**PORTO ALEGRE, RS**

**2015**

**“Análise Cladística e Revisão de *Schraderiellus* Rider, 1998 (Hemiptera: Pentatomidae, Discocephalinae)”**

**Talita Roell Heinecke**

Dissertação apresentada como parte dos requisitos para obtenção do grau de Mestre em Biologia Animal, área de concentração: Biologia Comparada.

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Prof. Dr. Luiz Alexandre Campos (Orientador)

Porto Alegre, fevereiro de 2015

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## RESUMO

*Schraderiellus* Rider, 1998, pertencente à tribo Ochlerini, foi descrito para duas espécies da América Central, a espécie tipo *Schraderiellus hughesae* (Ruckes, 1959) e *Schraderiellus cinctus* (Ruckes, 1959). A análise de material obtido por empréstimo permitiu o reconhecimento de possíveis novas espécies de *Schraderiellus*. Sendo assim, foi efetuada uma análise cladística com 33 táxons e 71 caracteres para testar a monofilia do gênero e suas relações internas. Utilizou-se o método de comparação com grupo externo, buscas heurísticas com algoritmo TBR, sob pesagens iguais e pesagem implícita. O enraizamento dos cladogramas foi feito em *Euschistus hansii* Grazia, 1987. Como resultado a análise indicou a monofilia de *Schraderiellus* com seis espécies válidas, sendo quatro novas e a possível inclusão de *Ochlerus dentijugis* suportado no clado pela presença de um denticulo na lateral das placas mandibulares. Quatro novas espécies são descritas para *Schraderiellus*.

## 1 INTRODUÇÃO

Heteroptera contém mais de 40.000 espécies descritas e faz parte da radiação de maior sucesso de não holometábolos (Weirauch & Schuh, 2011). É o mais diverso grupo de hemípteros e tem distribuição cosmopolita (Schuh & Slater, 1995). Possuem as asas anteriores divididas em uma área proximal coriácea e outra distal membranosa, conhecidas como hemiélitros. Baseado em evidências de Carver et al., 1991 e Wheeler et al., 1993 as três principais características sinapomórficas para o grupo são: o lábio inserido em uma linha anterior na cabeça, a presença de glândulas metatorácicas em adultos e a presença de glândulas abdominais dorsais em ninfas (Weirauch & Schuh, 2011).

A família Pentatomidae é muito diversa e apresenta ampla distribuição mundial com maior diversidade nos trópicos (Schuh & Slater, 1995). A maioria de seus representantes são fitófagos, podendo causar danos a plantas (Hasan & Kitching, 1993). É uma família com limites bem estabelecidos, monofilética e organizada em nove subfamílias: Asopinae, Cyrtocorinae, Discocephalinae, Edessinae, Podopinae, Phyllocephalinae, Pentatominae, Aphyllinae e Strotarsinae (Grazia *et al.*, 2008).

Discocephalinae é endêmica da região Neotropical e inclui percevejos de tamanho pequeno a médio, corpo achatado e coloração escura. Uma das principais características da subfamília, a origem do primeiro segmento do rostro posterior à margem anterior dos olhos, foi proposta por Roltson (1979) e revisada posteriormente por Campos & Grazia (2006) e Garbelotto et al. (2013). Discocephalinae é dividida em duas tribos, Discocephalini e Ochlerini (Schuch & Slater, 1995; Rolston, 1981; Rider, 2014).

Ochlerini foi proposta por Rolston (1981) para incluir 23 dos 26 gêneros neotropicais de Halyini. Quando da formalização de sua descrição, Ochlerini contava com 28 gêneros e 101 espécies (Rolston, 1992) e após diversos estudos há o reconhecimento atual de 33 gêneros e 125 espécies (Rolston, 1992; Campos & Grazia, 2006; Garbelotto *et al.*, 2013; Cervantes-Peredo & Ortega-León, 2014; Garbelotto *et al.*, 2014; Simões & Campos, 2014). As espécies de Ochlerini estão distribuídas do México à Argentina, com a maioria dos gêneros representados na América do Sul. São caracterizados, principalmente, pela superfície dorsal do terceiro metatarsômero aplainada ou escavada nas fêmeas (Campos & Grazia, 2006).

*Schraderiellus* Rider, 1998 é um gênero que ocorre na América Central e foi descrito como *Schraderia* por Ruckes (1959) contendo duas espécies, *S. hughesae* (Ruckes, 1959) conhecida apenas do macho, e *S. cinctus* (Ruckes, 1959). Ruckes incluiu a descrição da

genitália externa e ilustrações do pigóforo de ambas as espécies, e comparou o gênero a *Ochlerus* Spinola, 1837 diferenciando-os pela estrutura do pigóforo, segmento X e parâmeros. Rolston (1992) considerou *Schraderiellus* pertencente a um grupo de gêneros de Ochlerini caracterizado por um escutelo longo e amplo, incluindo *Moncus* Stål, 1867, *Orbatina* Ruckes, 1961 e *Stalius* Rolston, 1992, além de *Ochlerus*.

*Schraderiellus* foi incluído por Campos & Grazia (2006) em uma análise cladística e biogeográfica de Ochlerini em que a tribo é sustentada como um grupo monofilético. Na filogenia proposta para os gêneros de Ochlerini foi reconhecida uma dicotomia basal entre os grupos *Adoxoplatys* + *Neoadoxoplatys* e *Pseudodoxoplatys*<sup>+</sup>. O último divide-se em dois grandes clados, *Herichella*<sup>+</sup> e *Ocellatocoris*<sup>+</sup> (Figura 1). *Schraderiellus* pertence a *Ocellatocoris*<sup>+</sup> (Figura 2), sendo este clado sustentado pelo escutelo alcançando o ápice do cório. *Schraderiellus* é grupo irmão do clado que inclui os gêneros *Ochlerus*, *Stalius*, *Parastalius* Matesco, Grazia & Campos, 2007 e *Moncus*, esta relação sendo sustentada pela fusão dos laterotergitos 9 aos gonocoxitos 9, e pela proximidade dos ocelos à margem posterior dos olhos (Campos & Grazia, 2006). Após estes trabalhos nenhuma outra investigação foi efetuada sobre o gênero.

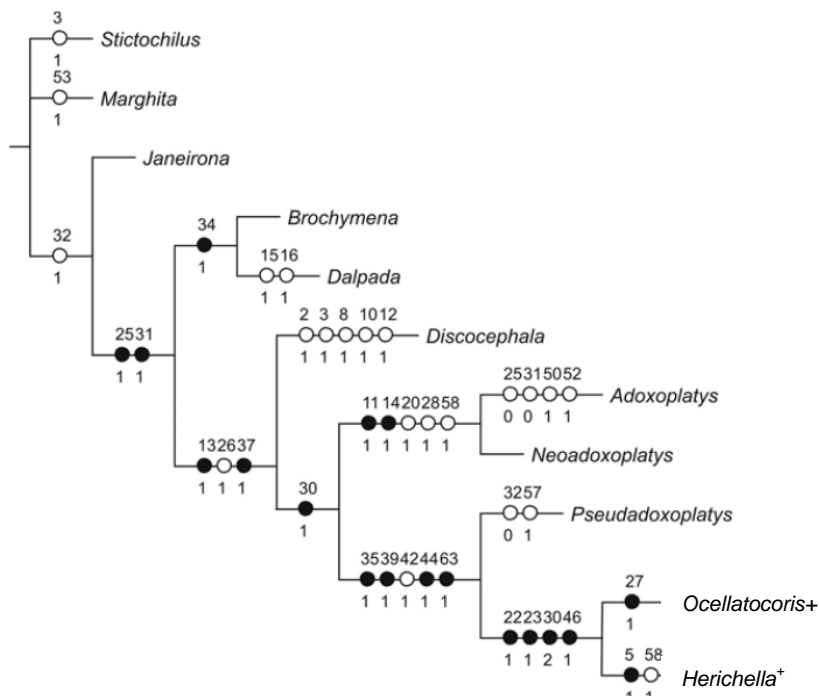


Figura 1 – Cladograma de consenso estrito para os gêneros de Ochlerini. Adaptado de Campos & Grazia (2006).



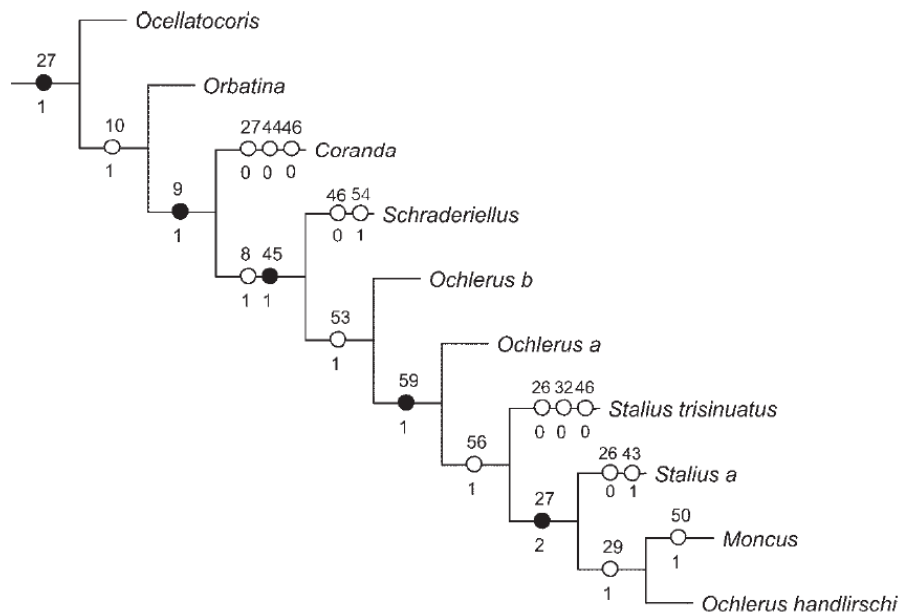


Figura 2 – Clado *Ocellatocoris*. Campos & Grazia (2006)

O exame de exemplares disponíveis na coleção entomológica do Laboratório de Entomologia Sistemática da Universidade Federal do Rio Grande do Sul (UFRGS), a qual possui espécimes obtidos por empréstimo, permitiu localizar exemplares pertencentes a *Schraderiellus hughesae* e *S. cinctus*, bem como possíveis espécies novas para o gênero. Compreender a posição filogenética do gênero contribuiu para o conhecimento de Ochlerini, acrescentando dados sobre a morfologia e a taxonomia do grupo. Desta forma, o objetivo geral deste trabalho foi realizar a análise cladística do grupo de espécies de *Schraderiellus*, testando a sua monofilia. A revisão incluiu a redescrição do gênero e de suas espécies, descrição de espécies novas e a elaboração de chave de identificação.

### Organização da dissertação

Esta dissertação é composta por uma introdução geral que inclui os objetivos do trabalho, um capítulo em formato de artigo que apresenta a análise cladística de *Schraderiellus* Rider, 1998, revisão do gênero e descrição de novas espécies, e uma conclusão geral. A formatação do capítulo segue as normas da revista à qual o artigo será submetido, cujas normas se encontram no Anexo I.

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## Capítulo 1

Normas editoriais: *Zootaxa*, Anexo I

**Cladistic analysis, revision and description of four new species of *Schraderiellus* Rider, 1998 (Hemiptera, Pentatomidae, Discocephalinae, Ochlerini)**

## Cladistic analysis, revision and description of four new species of *Schraderiellus* Rider, 1998 (Hemiptera, Pentatomidae, Discocephalinae, Ochlerini)

### Abstract

A cladistic analysis of *Schraderiellus* Rider, 1998 is provided in this study. Were used 70 morphological characters for 33 taxa, including the two known species of *Schraderiellus* and four new species in the ingroup, two species of Discocephalini and 24 species of Ochlerini in the outgroup, and *Euschistus hansii* Grazia, 1987 as root. The analyses was made using TNT through heuristic searches under equal and implied weighting of characters. The analysis indicates the monophyly of *Schraderiellus* with six valid species and the possible inclusion of *Ochlerus dentijugis* placed on the base of the clade. *Schraderiellus* is redescribed, four new species are described and a key for the species is presented.

### Introduction

Ochlerini is a Neotropical group proposed by Rolston (1981) to include 23 genera classified previously in Halyini (Rolston & McDonald, 1979; Rolston, 1981). By the time it was described, Ochlerini had 28 genera and 101 species (Rolston, 1992); however, through recent taxonomical and phylogenetic works the tribe reached 33 genera and 125 species (Rolston 1992; Campos & Grazia 2006; Garbelotto *et al.* 2013; Cervantes-Peredo & Ortega-León 2014; Simões & Campos 2014; Garbelotto *et al.* 2014). The monophyly of this taxon was corroborated by Campos & Grazia (2006).

*Schraderiellus* Rider, 1998 was described as *Schraderia* by Ruckes (1959) containing two species, *S. hughesae* (Ruckes, 1959) known only from the male, and *S. cinctus* (Ruckes, 1959). Ruckes (1959) compared *Schraderiellus* with *Ochlerus* Spinola, 1837 differentiating them by structures of the pygophore, i.e. according Ruckes (1959) *Ochlerus* has the genital capsule much longer than wide, the parameres are subparallel in position, the segment X is longer than wide and possesses only an insignificant brush of short pale hairs on its lateral surfaces. Rolston (1992) considered *Schraderiellus* as pertaining to one genera group of Ochlerini characterized by a long and ample scutellum, including *Moncus* Stål, 1867, *Orbatina* Ruckes, 1961, *Stalius* Rolston, 1992 and *Ochlerus*. *Schraderiellus* was included by Campos & Grazia (2006) in the cladistic analysis of Ochlerini in which it came up as part of the *Ocellatocoris* clade, that is a group formed by *Ocellatocoris* Spinola, 1837, *Orbatina*

Ruckes, 1961, *Coranda* Rolston, 1992, *Schraderiellus* Rider, 1998, *Ochlerus* Spinola, 1837, *Stalius* Rolston, 1992 and *Moncus* Stal, 1867 sharing the apex of scutellum reaching apex of corium. Here we provide a cladistic analysis of *Schraderiellus* and its internal relationships, as well as its position within Ochlerini group. The genus and its two known species are redescribed and four new species are described.

## Material and methods

### Taxon sampling

A total of 33 taxa (listed in the data matrix) was included in the cladistic analysis, two species of *Schraderiellus* already described and 4 new species for the ingroup, 24 species of Ochlerini and two of Discocephalini make up the outgroup, while one Pentatominae species is placed as root.

The specimens examined belong to the following collections. Acronyms according to Evenhuis (2014): American Museum of Natural History, New York, USA (AMNH); Bishop Museum Honolulu, USA (BPBM); California Academy of Sciences, San Francisco, USA (CAS); David A. Rider Collection, Fargo, USA (DARC); Departamento de Zoologia da Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil (UFRG); Donald B. Thomas Collection, Weslaco, USA (DBTC); Florida State Collection of Arthropods, Gainesville, USA (FSCA); Instituto Nacional de Biodiversidad, San Domingo de Heredia, Santo Domingo de Heredia, Costa Rica (INBio); Joseph E. Eger Collection, Tampa, USA (JEE); United States National Museum, USA (USNM); State Biological Survey of Kansas, Lawrence, USA (KSBS).

Digital photographs of the holotypes of *Schraderiellus cinctus* and *Schraderiellus hughesae* were provided by AMNH.

### Cladistic Analysis

The matrix contains 70 morphological characters. Of these, 37 were taken and reevaluated from Campos & Grazia, 2006, 4 from Garbelotto *et al.*, 2013, 7 from Barão *et al.* in prep. and 5 from Roell & Campos in prep. The remaining 17 characters are new propositions.

The characters from different parts of body are divided as follows: 32 of general morphology, five of external female genitalia, 14 of external male genitalia, 13 of internal female genitalia and six of internal male genitalia.

Characters were treated as unordered and discrete. The description of characters and states followed Sereno (2007). The initial fit was calculated based on Mirande (2009). The symbols “?” and “-” were used for unobserved and noncomparable data, respectively.

The cladistic methodology through parsimony was used to hypothesize the relations through the outgroup method (Nixon & Carpenter, 1993). The data matrix was made using Mesquite (Madison & Madison, 2014). Trees were searched using TNT (Goloboff, Farris & Nixon, 2008) through heuristic algorithms using the TBR algorithm. Implied weighting (IW), following Mirande (2009), was calculated with 11 k-values for an average character fit ranging from 50 to 90% of a perfectly hierarchical character. The strict consensus of the trees for each k-value was calculated, and then a similarity matrix of Subtree Pruning Regrafting (SPR distances of the 11 consensus trees) was constructed. The highest sums of similarity values of SPR distances indicate more stable (i.e. robust) K-values. Visualization of cladograms were performed in WinClada 1.00.08 (Nixon, 2002).

## Taxonomy

The specimens were observed, measured, and photographed under light stereomicroscope following Garbelotto *et al.* (2013). Measurements (mean  $\pm$  standard deviation, minimum and maximum) are given in millimeters. Pygophores and female genital plates were photographed using dry specimens; phallus and female ectodermal ductus were studied after boiling in 10% KOH aqueous solution. The terminology of Baker (1931), Dupuis (1970), Campos & Grazia (2006), Garbelotto *et al.* (2013) and Garbelotto *et al.* (2014) was adopted for genital structures. The terminology of Kment & Vilímová (2010) and Barão *et al.* in prep. was adopted for cuticular structures of the external scent efferent system. Photographs were made with Nikon AZ100M stereomicroscope with the software NIS-Elements Advanced Research.

## Results and discussion

### Cladistic Analysis

The analysis under equal weights resulted in 20 most parsimonious trees with 205 steps (length, L), a consistency index (Ci) of 39, and a retention index (Ri) of 69. The strict

consensus (L= 218; Ci = 36; Ri = 65) is shown in Figure 1. The highest sum of SPR distances of consensus trees was obtained for the five to nine K-values (K interval = 3.745–9.859). We opted on choosing the consensus tree with highest K-value (K = 9.859) among the best SPR range to propose a classification for the *Schraderiellus* group (Figure 2). There were no differences in the relationships within the ingroup regardless of the weighting scheme in use, then we opted on choosing the consensus of trees with equal weights to propose a classification. The clades of consensus are similar to Campos & Grazia (2006) and Garbelotto *et al.* (2013). The differences observed between our results and the previous works are due to the smaller taxon sampling we used, since our focus was investigating the phylogeny of the species of *Schraderiellus* and not the groupings within Ochlerini. In our results the topology of the *Orbatina* clade is divergent from Campos & Grazia, 2006 (fig. 1). The increase of taxa and different characters should have an influence on the differences. In the analysis, *Orbatina* forms a clade with *Moncus obscurus*, *Ochlerus dentijugis*, and *Schraderiellus* sharing a sigmoid outer margin of metapleural evaporatorium, (but concave in *Moncus obscurus*).

*Schraderiellus* was recovered as monophyletic in both weighting schemes and was supported, mainly, by characters of male genitalia (pygophore, characters 44-48). The relationships between the species of *Schraderiellus* were not fully resolved, and only the clade *Schraderiellus* sp. 2 + *Schraderiellus* sp. 3 was recovered. The absence of available data of male or female of most species probably prevented a better phylogenetic resolution within the *Schraderiellus* clade. *Schraderiellus* sp. 1 is known only from one male and one female, thus they were not dissected. The internal male genitalia of *Schraderiellus* -sp. 3 is also not known and the male of *Schraderiellus* sp. 4 is unknown.

Both analyses recovered *Ochlerus dentijugis* as sister group of the *Schraderiellus* clade, as already observed by Simões & Campos (2014). This relationship is supported by the presence of 1+1 tooth-like projection at the apex of mandibular plates (character 9:1), but this result should be viewed with caution because of the lack of data for *O. dentijugis*, known only from a single male. According to Ruckes (1959) and Rolston (1992), *Ochlerus* and *Schraderiellus* have different construction of the male genitalia, and we observed these differences between *Ochlerus dentijugis* and *Schraderiellus*.

## Taxonomy

### ***Schraderiellus* Rider, 1998**

*Schraderia* Ruckes, 1959; Schrader, 1960: 505; Rolston, 1992: 04–10 (Junior Homonym)



*Schraderiellus* Rider, 1998: 505; Campos & Grazia, 2006: 151–161

Type species: *Schraderia hughesae* Ruckes, 1959, by original designation.

**Description.** Body oval, general color dark brown to black, some species with yellow spots; punctures confluent, sometimes forming wrinkles. Female larger than male.

Head triangular, wider than long, declivous. Mandibular plates slightly longer than clypeus, apices acute and declivous, margins reflexed sinuate midway between base and apex, terminating subapically in a very small tooth-like projection; margin sinuous between the projection and the apex of each mandibular plate. Wrinkles from posterior margin of head to apex of clypeus and mandibular plates, sub-parallel at clypeus and diagonal at mandibular plates. Eyes large, ocelli yellow to red. Antennae five-segmented, setose, dark brown with light spots between the segments; segment I exceeding the apex of the head and slightly wider than the remaining segments; subequal in length; segments progressively larger from II to V; proportion:  $I \geq II < III < IV < V$ . Antennal tubercles with lateral spine visible from above. Bucculae subparallel, evanescent posteriorly, elevated anteriorly with acute tooth-like anterior projections. Labbium long, reaching urosternites VI to VII; first segment shortest reaching prosternum, second segment longest attaining or surpassing the mesocoxae; insertion of first segment of the labbium before the middle of bucculae; proportion:  $I < II > III < IV$ .

Pronotum trapezoidal, about twice as wide as long, anterior half declivous; anterior margin concave mesially, with a submarginal sulcus. Punctures sparse confluent forming shallow wrinkles. Cicatrices flat with less punctures. Anterior angle of pronotum with a small acute projection lateral directed, slightly exceeding the lateral margin of eyes. Lateral margins rectilinear; posterior margin sinuate. Humeri obtuse, not produced. Posterolateral angles obtuse. Scutellum longer than wide reaching connexival segment VI; punctures sparse, denser and sometimes confluent near lateral margins. Foveae at basal angles black and shallow. Corium as long as scutellum, apical margin sinuate reaching connexival segment VI; punctures sparse. Membrane reaching or slightly surpassing apex of abdomen, with ten to twelve subparallel veins not forming cells. Prosternum sulcate, meso- and metasternum flat, non-punctured, with median longitudinal carina. Mesopleural evaporatorium occupying an area posterior to the limit of meso- and metapleura; metapleural evaporatorium occupying half the width of metapleura. Peritreme spout, reaching more than half of metapleural evaporatorium. Tibiae sulcate laterally and dorsally, third metatarsi segment of females dorsally depressed.

Connexivum exposed with sparse punctures. Spiracles black, circular. Trichobothria lateral to imaginary line tangent to spiracles; shrouded area of tubercle of the trichobothria yellowish.

Male: Pygophore subglobular; external surface castaneous to black. Posterolateral angles may be divergent or subparallel, concolor with pygophore or yellowish, posteriorly depressed, apices obtuse. Base of posterolateral angles, at the lateral limits of the ventral rim, bearing 1+1 projections with a tuft of setae. Dorsal rim moderately sinuate, median third concave. Ventral rim moderately sinuate, median third concave. Inferior layer U-shaped. Surface between inferior and superior layers of ventral rim excavated and wrinkled. Segment X subcylindrical surpassing the inferior layer of ventral rim and facing posteriorly with a fringe of setae on the lateral borders and the apex; basal half membranous and apical half sclerotized, visible from below; anal opening apical, genital opening as a ventral longitudinal crevice at the apical half of segment X; ventral portion sclerotized. Parameres laterad to segment X, subparallel to posterolateral angles. Phalloteca globose, vesica sinuous covering ductus seminis distalis throughout.

Female: Gonocoxites 8 oval, as wide as long, posterior margin subrectilinear to sinuous, covering the base of laterotergites 9; surface irregular with a light lateral depression. Posterolateral angles laminar over the base of laterotergites 8; sutural margins juxtaposed. Laterotergites 8 triangular, wider than long, with spiracles on basal angle. Gonocoxites 9 diamond shaped, longitudinally sulcate. Laterotergites 9 digitiform directed to each other touching at apex, depressed along median margin. Gonapophyses 9 partly exposed. Segment X membranous. Gonapophyses 9 posteriorly bending, with lateral thickenings following arms of gonocoxites 9. Ring sclerites laterally to folds of gonapophyses 9. Thickening of vaginal intima fold in the center; ventrally sub-triangular, laterally sub-cylindrical. Orificium receptaculi in the apex of the thickening of vaginal intima. Basal half of external tube of vesicular area narrowing in a constriction, apical half evenly extended. Medium and internal tubes with uniform caliber. Pars intermedialis three times longer than capsula seminalis, basal third narrow, with half of width of apical 2/3. Capsula seminalis globose with three processes of different sizes, equal to or longer than pars intermedialis. Annular flanges convergent.

**Distribution:** Nicaragua, Costa Rica, Panama, Colombia, Ecuador.

Key to the species of *Schraderiellus*

1. Connexivum, apex of hemelytra, radial vein, base and apex of scutellum with large yellow spots..... *Schraderiellus* sp.1 (figs. 3C, 4C, 5C)
- 1'. Connexivum without spots, dark castaneous or marked with a lateral yellowish to reddish band, hemelytra and scutellum occasionally with small yellow spots ..... 2
2. Tibia and tarsi yellowish to light castaneous; variable yellow spots present on pronotum, hemelytra and scutellum..... *Schraderiellus* sp.3 (figs. 3E, 4E, 5E)
- 2'. Tibia dark castaneous, concolor with femur, tarsi variable..... 3
3. Posterolateral angles of pygophore with 1+1 projections directed dorsally. Posterior margins of gonocoxites 8 sinuous or obtusely rounded (Fig 5 A, D) ..... 4
- 3'. Posterolateral angles of pygophore without dorsal projections. Posterior margins of gonocoxites 8 bisinuous (Fig. 5 B, C, E) ..... 5
4. Dorsal surface dark castaneous with small yellow spots adjacent to the cicatrices on pronotum, at scutellum and hemelytra, anterolateral margin of pronotum and hemelytra dark castaneous or yellowish, margin of connexivum dark castaneous to black. Parameres cylindrical digitiform, apex slightly flattened..... *S. hughesae* (Ruckes, 1959) (figs. 3A, 4A, 5A)
- 4'. Dorsal surface without spots or with a conspicuous spot at radial vein, band lining the body reddish, including connexivum. Parameres spatular, base cylindrical and apex expanded flattened ..... *Schraderiellus* sp.2 (figs. 3D, 4D, 5D)
5. Dorsal surface dark castaneous with variable yellow spots, band lining the body orange or yellowish, including connexivum ..... *S. cinctus* (Ruckes, 1959) (fig. 3B, 4B, 5B)
- 5' Anterolateral margin of pronotum and hemelytra black or yellowish, margin of connexivum black..... *Schraderiellus* sp.4 (fig. 3F, 4F)

***Schraderiellus hughesae* (Ruckes, 1959)**

*Schraderia hughesae* Ruckes, 1959; Schrader, 1960: 499

*Schraderiellus hughesae*; Rider, 1998: 505; Campos & Grazia, 2006: 154

(Figs. 3A, 4A, 5A, 6A, 7A)

**Holotype:** male, AMNH

**Type locality:** COSTA RICA, Turrialba

**Description.** Dark castaneous to black. Margins of pronotum, hemelytra and connexivum generally dark castaneous to black, but some specimens may have a light yellow line outlining anterolateral margins of pronotum and basal half of corium. Yellowish spots variable, generally three or four spots adjacent to the cicatrices on pronotum and others spread on pronotum; three on base of scutellum and three at apex; one spot at apex of radial vein. Connexivum black with few punctures (fig. 3A). Coxae, trochanter, femora and tibiae dark castaneous. Tarsi yellowish or light brown stained.

Male. Measurements (n=4): head length  $2.74 \pm 0.08$  (2.68–2.80); width  $3.26 \pm 0.03$  (3.24–3.28); pronotum length  $3.24 \pm 0.04$  (3.21–3.27); width 6.17 (6.17); scutellum length  $5.23 \pm 0.09$  (5.16–5.29); width  $4.01 \pm 0.15$  (3.90–4.11); length of abdomen  $5.22 \pm 0.15$  (5.11–5.32); width 6.31 (6.31); length of antennal segments: I  $1.28 \pm 0.06$  (1.24–1.32); II 1.20 (1.20); III  $2.22 \pm 0.25$  (2.04–2.40); IV 2.16 (2.16); V 2.60 (2.60); length of labial segments I  $1.64 \pm 0.23$  (1.48–1.80); II  $3.20 \pm 0.28$  (3.00–3.40); III  $2.54 \pm 0.08$  (2.48–2.60); IV  $2.72 \pm 0.11$  (2.64–2.80); total length  $13.49 \pm 0.55$  (13.10–13.88).

Genitalia. Pygophore subglobular, external surface dark brown, posterolateral angles moderately divergent, dark brown or yellowish, stout, posteriorly depressed, apices obtuse (fig 4A, pla). Parameres yellowish to castaneous subparallel to posterolateral angles, in line with apex of segment X, flattened digitiform, apices obtusely rounded with a subapical denticle (fig. 3A, par). Segment X subcylindrical, basal portion membranous forming a concave line at the limit of the sclerotized area; ventral portion sclerotized (fig. 3A, X). Phallosome globose (Fig. 6A, ph); vesica sinuous, almost as long as phallosome (fig. 6A, v), covering ductus seminis distalis throughout (fig. 6A, ds).

Female. Measurements (n=34): head length  $2.97 \pm 0.11$  (2.80–3.20); width  $3.24 \pm 0.10$  (2.92–3.36); pronotum length  $3.49 \pm 0.28$  (2.46–3.78); width  $6.68 \pm 0.15$  (6.39–6.95); scutellum length  $5.82 \pm 0.19$  (5.48–6.30); width  $4.42 \pm 0.11$  (4.26–4.61); length of abdomen  $6.16 \pm 0.21$  (5.75–6.74); width  $7.16 \pm 0.64$  (6.03–8.20); length of antennal segments I  $1.30 \pm 0.07$  (1.20–1.44); II  $1.21 \pm 0.09$  (1.08–1.40); III  $2.19 \pm 0.13$  (2.00–2.48); IV  $2.25 \pm 0.13$  (2.00–2.44); V  $2.61 \pm 0.10$  (2.40–2.80); length of labial segments I  $1.77 \pm 0.09$  (1.60–1.96); II  $3.34 \pm 0.10$  (3.08–3.48); III  $2.66 \pm 0.11$  (2.44–2.84); IV  $2.89 \pm 0.14$  (2.68–3.12); total length  $14.65 \pm 0.53$  (13.41–15.44).

Genitalia. Gonocoxites 8 as wide as long, covering the base of laterotergites 9; posterior margins of gonocoxites 8 slightly sinuous or subrectilinear (fig. 5A, gc8). Laterotergites 9 digitiform, apices round, directed to each other (fig. 5A, la9). Arms of gonocoxites 9 widening to apex, more sclerotized than disc (fig. 7A, gc9). Vesicular area about six times longer than the summed length of the pars intermedialis and capsula seminalis. Basal half of external tube of vesicular area not extended, ampoule-shaped. Apical half evenly extended (fig. 7A, od

**Distribution.** Costa Rica. NEW RECORDS: Panamá, Colombia.

**Material examined.** COSTA RICA, *Limon*: (Siquirres 100-200m), 1 male, 14.VIII.1970, J. & M.Sedlacek (BPBM); PANAMÁ, *Bocas*: (Dist. Miramar, 9°N, 82°15' W), 1 female, 26.XI.1978, Henk Wolda (DARC); (Dist. Corriente Grande, 9°17'30'' N 82°32'41'' W 100m), 7 females, 30.IV-5.V.1980, Henk Wolda (DARC); *Cerro Campana*: (8°40' N 79°56' W 850m), 1 female, 29.V.1972, Wm. Bivin (DARC); (8°40' N 79°56' W, 800m), 1 female, 29.VI.1974, Engleman (DARC); (8°40' N 79°56' W 850m), 10 females, 31.VII.1974, Stockwell, (DARC); 3 females, 12.VII.1975, B. Ratcliffe (DARC); 2 males, 5.VII.1974, O'Brien & Marshall (JEE); 1 male, 12.VII.1975, B. Ratcliffe (DARC); 1 female, 13-14.V.1996, Wappes Huether & Marris, (JEE), 5 females, 5.VII.1974, O' Brien & Marshall (JEE); *Prov. El Llano Carti* (Rd. K 8 – 11), 1 female, 26.IV-2.V.1992, JE Wappes (DBTC); (Rd. Km 9-11), 2 females, 17.VII.1994, B & I. Ratcliffe, M.Jameson (DBTC), 1 male, 12.VII.1975, B. Ratcliffe (DARC); COLOMBIA: *Rio D'agua*, 1 female, WFH Rosenberg (USNM), 1 female (AMNH).

***Schraderiellus cinctus* (Ruckes, 1959)**

*Schraderia cinctus*; Ruckes, 1959; Schrader, 1960: 499

*Schraderiellus cinctus* Rider, 1998: 505; Campos & Grazia, 2006: 154

(Figs. 3B, 4B, 5B, 6B, 7B)

**Holotype:** male, AMNH

**Type locality:** COSTA RICA, Turrialba

**Description.** Dark castaneous to black. Lateral margins of pronotum, hemelytra and connexivum generally outlined in yellow or orange. Often with a yellow spot at radial vein.

Pronotum, scutellum and hemelytra may have variable yellow spots. Coxae, trochanter, femora and tibiae dark castaneous concolorous. Tarsi yellowish (fig. 3B).

Male. Measurements (n=8): head length  $2.65 \pm 0.15$  (2.41–2.80); width  $3.11 \pm 0.08$  (3.04–3.24); pronotum length  $3.37 \pm 0.14$  (3.25–3.60); width  $6.17 \pm 0.13$  (6.03–6.39); scutellum length  $5.12 \pm 0.20$  (4.80–5.35); width  $4.27 \pm 0.32$  (3.90–4.72); length of abdomen  $4.92 \pm 0.42$  (4.26–5.46); width  $6.22 \pm 0.20$  (6.03–6.60); length of antennal segments: I  $1.23 \pm 0.05$  (1.20–1.32); II  $1.17 \pm 0.15$  (1.00–1.40); III  $2.09 \pm 0.14$  (2.04–2.40); VI  $2.23 \pm 0.15$  (2.04–2.40); V  $2.56 \pm 0.17$  (2.44–2.76); length of labial segments I  $1.64 \pm 0.09$  (1.55–1.79); II  $2.99 \pm 0.13$  (2.80–3.16); III  $2.30 \pm 0.22$  (1.92–2.48); IV  $2.72 \pm 0.10$  (2.60–2.84); total length  $13.17 \pm 0.58$  (12.48–14.00).

Genitalia. Pygophore subglobular castaneous, posterolateral angles moderately divergent, stout, posteriorly depressed, apices rounded, inner surface yellowish (fig. 4B). Parameres yellowish subparallel to posterolateral angles, in line with apex of segment X or slightly shorter, cylindrical digitiform, apices flattened with 1+1 subapical denticle (fig. 4B). Segment X subcylindrical, basal portion dorsal membranous forming a subtriangular line on limit with sclerotized area (fig. 4B). Phallosome globose, vesica sinuous, slightly longer than phallosome and covering ductus seminis distalis throughout (fig. 6B).

Female. Measurements (n=11): head length  $2.40 \pm 0.19$  (2.80–3.20); width  $3.16 \pm 0.08$  (3.03–3.28); pronotum length  $3.66 \pm 0.17$  (3.30–3.78); width  $6.60 \pm 0.23$  (6.10–6.81); scutellum length  $5.73 \pm 0.24$  (5.35–5.98); width  $4.23 \pm 0.15$  (4.04–4.47); length of abdomen  $6.27 \pm 0.31$  (5.68–6.53); width  $6.88 \pm 0.20$  (6.53–7.1); length of antennal segments I  $1.17 \pm 0.12$  (1.00–1.26); II  $1.14 \pm 0.09$  (1.05–1.26); III  $2.18 \pm 0.10$  (2.04–2.32); IV  $2.31 \pm 0.11$  (2.17–2.45); V  $2.64 \pm 0.12$  (2.51–2.75); length of labial segments I  $1.60 \pm 0.16$  (1.42–1.85); II  $3.00 \pm 0.22$  (2.62–3.30); III  $2.40 \pm 0.21$  (2.13–2.75); IV  $2.58 \pm 0.27$  (2.13–2.85); total length  $14.75 \pm 0.74$  (13.57–15.44).

Genitalia. Gonocoxites 8 oval, longer than wide, posterior margins bisinuous, covering the base of laterotergites 9 (fig. 5B). Laterotergites 9 digitiform subrectangular, diagonally directed to apex (fig. 5B). Arms of gonocoxites 9 widening to apex, sclerotized, decreasing towards apex. Vesicular area about six times longer than the summed length of the pars intermedialis and capsula seminalis.

**Distribution:** Costa Rica. NEW RECORDS: Nicaragua, Panamá.

**Material examined.** NICARAGUA, *Zelaya*: (Sulum, 14°15' N 84°36' W), 1 female, I.1996 Maes & Hernandez (UFRG); COSTA RICA, *San Carlos*: 1 male, Schild & Burgdorf (USNM); *Los Diamantes*: 1 male and 1 female, 31.V.1948, F. Schrader (USNM); *Turrialba*:

1 female, 22.V.1951, OL Cartwright (USNM); 1 female, 21.I.1965, J.A Slater & N.T Davis (DARC); 1 female, 13-17.III.1965, SS& Duckworth (USNM); (Cartago, 646mm), 1 female, 9.VII.1965 M.G Naumann (KSBS); *Heredia*: (La Selva 3km S Pto. Viejo 10°26' N 84°01' W), 1 female, 1983, HA. Hesperheide (DARC); 1 male, 3-5.VI.1984, Riley, Rider & LeDoux (DARC); 1 male, 11-17.VI.1986, W. Hanson & G. Bohart (JEE); (Est. Biol La Selva 150m), 1 male, 20.IV-30.V.1993, Paul M. Freytag & Thomas V. Myers (JEE); (Est. Biol La Selva), 1 female, 11-13.I.1995, E.G. Riley (JEE); (Est. Biol La Selva 10°26' N 84°01' W 50-150m), 1 male and 1 female, 19-23.VIII.1999, DM. & S. Davis (USNM); *Alajuela*, (750m) 1 male, 19.IV.1988, J. Soto (DARC); [no state], 1 female, G.R Wilson Collector (CAS). PANAMA, *Bocas*: (DT Miramar 9° N, 82°15' W), 1 female, 25.IV.1979 (DARC); (DT Corriente Grande 9°17'30'' N 82°32'41'' W, 100mm), 1 female, 24.III.1980, Henk Wolda (DARC); *Cerro Campana*: 1 male, 5.VI.1995, B. Ratcliffe & M. Jameson (JEE).

***Schraderiellus* sp. 1** (Figs. 3C, 4C, 5C)

Holotype: male, here designated. PANAMA, *Colon*: (Parque Nac. Soberania: Pipeline Rd Km 0-4.6 09°07' N 79°45' W), 19.V.1995, J. Jolly. G. Kidd, C. Chaboo & B. Haylord (KSBS). Deposited in: KSBS.

Paratypes: one female. PANAMA, *Colon*: (Parque Nac. Soberania: Pipeline Rd Km 0 - 4.6 09° 07' N 79° 45' W), 19.V.1995, J. Jolly. G. Kidd, C. Chaboo & B. Haylord (KSBS). Deposited in: KSBS.

**Description.** Dark castaneous to black. Lateral of pronotum and basal half of corium outlined in yellow. Big yellow spots in the scutellum, hemelytra and connexivum: scutellum with three basal spots and two apical spots; one spot at apex of radial vein; connexivum with one central spot in each segment. Coxae, trochanter, femora and tibiae dark castaneous; tarsi yellowish (fig. 3C).

Male. Measurements (n=1): head length 2.76; width 3.24; pronotum length 3.40; width 6.24; scutellum length 5.22; width 4.04; length of abdomen 5.39; width 6.39; length of antennal segments: I 1.20; II 1.24; III 2.00; length of labial segments I 1.75; II 3.15; III 2.75; IV 2.70; total length 13.41

Genitalia. Pygophore subglobular castaneous, posterolateral angles moderately divergent, yellowish, stout, posteriorly depressed, apices obtuse (fig. 4C). Parameres yellowish subparallel to posterolateral angles surpassing the apex of segment X, flattened digitiform, base cylindrical and apex expanded flattened terminating with an apical tooth-like

projection laterad (fig. 4C). Segment X subcylindrical, basal portion dorsal membranous forming a concave line on the limit of the sclerotized area (fig. 4C).

Female. Measurements (n=1): head length 2.90; width 3.40; pronotum length 3.78; width 6.74; scutellum length 5.79; width 4.47; length of abdomen 6.39; width 6.95; length of antennal segments: I 1.40; II 1.28; III 2.00; VI 2.20; V 2.60; length of labial segments I 1.80; II 3.25; III 2.75; IV 2.80; total length 14.50

Genitalia. Gonocoxites 8 oval, longer than wide, covering the base of laterotergites 9, posterior margins bisinuous (fig. 5C). Laterotergites 9 digitiform, directed diagonally to apex (fig. 5C).

**Distribution:** PANAMA.

***Schraderiellus* sp. 2** (Figs. 3D, 4D, 5D, 6D, 7D)

Holotype: male, here designated. COSTA RICA, *Puntarenas*: (Las Alturas Field Station, 20km N San Vito de Hava), 26-30.III.1991, DeVries (AMNH) Deposited in: AMNH.

Paratypes. COSTA RICA, 2 males (USNM) Deposited in: USNM ; *Prov. Cartago*, (Tapanti, 1200m), 1 male, M. Valerio (CAS) Deposited in: CAS; *Puntarenas*: (Monte Verde), 1 male, 3.VI.84, E. Riley, D. Rider & LeDoux (DARC) Deposited in: DARC; 1 female, 26.V.1992, B.C Ratcliffe & M.L. Jameson (AMNH) Deposited in: AMNH; (Rio Bellavista, 8°95'1'' N 82°84'6'' W, 1400m), 1 female, 8-9.IV.1987, Holzenthal, Hamilton & Heyn (JEE) Deposited in: JEE; (Las Alturas Field Station 20km N San Vito de Hava, 1400m), 2 females and 1 male, 20-24.V.91, DeVries (AMNH) Deposited in: AMNH; (Las Alturas Field Station 20km N San Vito de Hava, 1540m), 1 male, 10-31.VII.92, Snyder (AMNH) Deposited in: AMNH; PANAMÁ, *Chiriqui*: (2-3000ft; 25-4000ft Champion), 2 females and 3 males, Uhler, Godman & Slavin (USNM) Deposited in: USNM; 2 males (AMNH), Deposited in: AMNH (Prov. Santa Clara), 24 females and 22 males, 23-25.V.1980, E. Riley & LeDoux, (DARC; 2FSCA) Deposited in: DARC , FSCA; (Boquete), 10 females and 5 males, VI.39, JR Slevin (CAS; 1DARC) Deposited in: CAS; (Boquete, 1250m 8°48' N 82°26' W), 5 females, 24.VIII.1975 - 29.IX.1975 - 8.IX.1977 - 4.III.1978, H. Wolda (DARC) Deposited in: DARC; (Santa Clara, Dist. Renacimiento), 1 females, 21.V.77, Al Thurman (DARC) Deposited in: DARC; 1 female, 20-22.V.77, Engleman (DARC) Deposited in: DARC; 6 females and 1 male, 23-26.V.1980, BC Ractliffe (DARC) Deposited in: DARC; (Fortuna, 1050m. 8°44' N, 15' W), 11 females, 20.X.1977, 27.I.1978, 2.II.1978, 27.III.1978, 19.IV.1978, Henk Wolda (DARC, 1JEE) Deposited in: DARC, JEE; (Fortuna, 82°15' W,



8°44' N), 3 females and 1 male, 16-19.V.1978, O'Briens & Marshall; (Hartmann's Finca), 2 females, 4-7.VII.1997, Morris & Wappes (JEE) Deposited in: UFRG; *Altos de Majé*: (Isla, 9°8' N 78°49' W), 1 female, 28-30.V.1982; ECUADOR, (Rio Pesado), 1 female, 5.21.22, GHH Tate, (USNM) Deposited in: USNM.

**Description.** Dark castaneous with orange-red line in the lateral margins of the body (pronotum, scutellum, corium, connexivum). Little to no yellow spots on surface. Coxae, trochanter, femora and tibiae dark castaneous (fig. 3D). Tarsi castaneous, yellowish or little brown stained.

Male. Measurements (n=41): head length  $2.55 \pm 0.06$  (2.44–2.64); width  $2.95 \pm 0.06$  (2.88–3.04); pronotum length  $3.20 \pm 0.17$  (2.96–3.46); width  $6.13 \pm 0.14$  (5.82–6.24); scutellum length  $5.19 \pm 0.15$  (4.91–5.41); width  $4.04 \pm 0.12$  (3.90–4.26); length of abdomen  $5.00 \pm 0.14$  (4.82–5.11); width  $6.35 \pm 0.19$  (6.03–6.74); length of antennal segments: I  $1.17 \pm 0.06$  (1.08–1.24); II  $1.14 \pm 0.07$  (1.04–1.16); III  $1.98 \pm 0.03$  (1.96–2.00); IV  $2.12 \pm 0.10$  (2.00–2.20); V  $2.46 \pm 0.08$  (2.40–2.60); length of labial segments I  $1.61 \pm 0.08$  (1.52–1.68); II  $2.84 \pm 0.15$  (2.60–3.08); III  $2.28 \pm 0.15$  (2.08–2.60); IV  $2.60 \pm 0.12$  (2.36–2.76); total length  $12.80 \pm 0.42$  (12.16–13.41).

Genitalia. Pygophore subglobular castaneous, posterolateral angles moderately divergent, inner surface castaneous or yellowish, generally stout, posteriorly depressed, apices obtuse (fig. 4D). Sometimes the apex of the posterolateral angle is thinner than the base and ventrally curved. Parameres subparallel to posterolateral angles, in line or slightly surpassing the apex of segment X, spatular, base cylindrical and apex expanded flattened terminating with an apical tooth-like projection laterad, sometimes lateral sinuous; setae on antero-lateral portion of parameres, directed to posterolateral angles (fig. 4D). Segment X subcylindrical, basal portion dorsally membranous forming a concave line at the limit with the sclerotized area; (fig. 4D). Phallosome globose, vesica sinuous, almost as long as phallosome and vesica sinuous covering ductus seminis distalis throughout (fig. 6D).

Female. Measurements (n=71): head length  $2.67 \pm 0.17$  (2.34–3.10); width  $3.07 \pm 0.11$  (2.88–3.28); pronotum length  $3.47 \pm 0.21$  (3.08–3.90); width  $6.77 \pm 0.35$  (6.53–8.03); scutellum length  $5.70 \pm 0.26$  (4.82–6.04); width  $4.52 \pm 0.40$  (4.04–4.85); length of abdomen  $6.15 \pm 0.49$  (5.68–7.60); width  $7.62 \pm 0.70$  (6.24–8.60); length of antennal segments I  $1.24 \pm 0.06$  (1.08–1.40); II  $1.18 \pm 0.08$  (1.00–1.32); III  $2.03 \pm 0.12$  (1.80–2.28); IV  $2.18 \pm 0.09$  (2.04–2.32); V  $2.56 \pm 0.19$  (2.00–2.84); length of labial segments I  $1.71 \pm 0.07$  (1.60–1.84); II  $3.03 \pm 0.14$  (2.68–3.20); III  $2.44 \pm 0.13$  (2.20–2.80); IV  $2.71 \pm 0.12$  (2.40–2.84); total length  $14.51 \pm 0.58$  (12.79–15.44).

Genitalia. Gonocoxites 8 oval, longer than wide, covering the base of laterotergites 9, margins slightly sinuous, posterior margins obtusely rounded (fig. 5D). Laterotergites 9 digitiform, directed diagonally to apex (fig. 5D). Arms of gonocoxites 9 widening towards apex, more sclerotized than disc (fig. 7D). Vesicular area about six times longer than the summed length of the pars intermedialis and capsula seminalis.

**Distribution:** COSTA RICA, PANAMA and ECUADOR.

*Schraderiellus* sp. 3 (Figs 3E, 4E, 5E, 6E)

Holotype: male, here designated. ECUADOR, *Esmeraldas*: (Quininde), 9.XII.1983, MI Salazar. Deposited in: AMNH

Paratypes. COLOMBIA, *Cauca*: (Isla Gorgona, malaise trap), 1 female, 29.II-5.III.2000, B. Brown, G. Kung & M. Sharkey (JEE) Deposited in: JEE; *Rio Dagua*: 1 female, WFH Rosenberg (USNM) Deposited in: USNM; *Dept. Valle Lower Anchicayá*: (400m, tropical very wet forest), 1 female, 5.III.1976, R Wilkerson (JEE) Deposited in: JEE; ECUADOR, 1 female, Rosenberg (USNM) Deposited in: USNM; *Pichincha*: (Sto. Domingo), 1 female, 25.XII.1971, N Venedictaff (UFRG) Deposited in: Ufrg; (Tinalandia, 15km from Sto Domingo toward Quito), 1 female, 15.VIII.1975, J Longino (FSCA) Deposited in: FSCA.

**Description.** Dark castaneous to black. May have a light yellow line in the lateral margins of the pronotum and in the basal half of corium. One yellow spot at radial vein of hemelytra and generally one yellow spot at the base of the scutellum and three at the apex. Coxae, trochanter, femora castaneous. May have a yellow spot on the coxae and trochanter. Tibiae and tarsi yellowish (fig. 3E).

Male. Measurements (n= 1): head length 2.80; width 3.12; pronotum length 3.35; width 6.39; scutellum length 5.67; width 3.90; length of abdomen 5.18; width 6.39; length of antennal segments: I 1.40; II 1.12; III 2.40; VI 2.40; V 2.60; length of labial segments I 1.70; II 3.00; III ?; IV 2.25; total length 13.26.

Genitalia. Pygophore subglobular castaneous, posterolateral angles subparallel, stout, posteriorly depressed, apices rounded, inner surface yellowish (fig. 4E). Parameres yellowish, subparallel to posterolateral angles, spatulate, base cylindrical, apices flattened with 1+1 subapical denticle laterally directed (fig. 4E). Segment X subcylindrical, basal portion membranous forming a concave line on the limit with the sclerotized area (fig. 4E).

Female. Measurements. (n=6): head length  $2.82 \pm 0.07$  (2.88–2.72); width  $3.16 \pm 0.06$  (3.08–3.16); pronotum length  $3.63 \pm 0.12$  (3.50–3.78); width  $6.65 \pm 0.21$  (6.90–6.88); scutellum length  $5.82 \pm 0.15$  (5.60–5.82); width  $5.18 \pm 0.74$  (4.47–5.82); length of abdomen  $6.18 \pm 0.68$  (5.46–6.80); width  $7.72 \pm 0.91$  (6.67–8.30); length of antennal segments I  $1.24 \pm 0.06$  (1.20–1.32); II  $1.21 \pm 0.02$  (1.20–1.24); III  $2.27 \pm 0.09$  (2.20–2.40); IV  $2.32 \pm 0.12$  (2.20–2.44); V  $2.65 \pm 0.13$  (2.56–2.80); length of labial segments I  $1.75 \pm 0.10$  (1.60–1.80); II  $3.04 \pm 0.12$  (2.92–3.20); III  $2.50 \pm 0.10$  (2.40–2.60); IV  $2.67 \pm 0.02$  (2.64–2.68); total length  $14.35 \pm 0.28$  (14.04–14.66).

Genitalia. Gonocoxites 8 oval, posterior margins bisinuous, longer than wide, covering the base of laterotergites 9 (fig. 5E). Laterotergites 9 digitiform, directed diagonally to apex (fig. 5E). Arms of gonocoxites 9 widening to apex. Vesicular area about five times longer than the summed length of the pars intermedialis and capsula seminalis.

**Distribution:** COLOMBIA, ECUADOR

*Schraderiellus* sp. 4 (Figs 3F, 4F, 6F)

Holotype: male, here designated. PANAMA, *Cerro Campana*, 5.VII.1974 O'Briens & G Marshall (JEE) Deposited in: AMNH

Paratypes. PANAMA, *Cerro Campana*: 1 male, 29.VI.1974 (DARC), 4 males, 5.VII.1974, O'Briens & G Marshall (JEE) Deposited in: JEE

**Description.** Dark castaneous. May have a yellow line on the lateral margin of pronotum. One yellow spot at the apex of radial vein, other variable spots on hemelytra. Coxae, trochanter, femora and tibiae dark castaneous. Tarsi yellowish (fig. 3F).

Male. Measurements (n=6): head length  $2.64 \pm 0.08$  (2.60–2.76); width  $3.05 \pm 0.09$  (2.92–3.12); pronotum length  $3.12 \pm 0.16$  (2.89–3.27); width  $6.01 \pm 0.30$  (5.60–6.31); scutellum length  $4.99 \pm 0.19$  (4.72–5.72); width  $3.84 \pm 0.10$  (3.69–3.90); length of abdomen  $4.85 \pm 0.40$  (4.26–5.18); width  $5.91 \pm 0.27$  (5.53–6.17); length of antennal segments: I  $1.14 \pm 0.05$  (1.08–1.20); II  $1.13 \pm 0.06$  (1.08–1.16); III  $1.97 \pm 0.12$  (1.80–2.08); IV  $2.01 \pm 0.08$  (1.92–2.08); V  $2.40 \pm 0.04$  (2.40–2.36); length of labial segments I  $1.61 \pm 0.10$  (1.52–1.72); II  $3.20 \pm 0.16$  (3.04–3.36); III  $2.40 \pm 0.04$  (2.40–2.36); IV  $2.84 \pm 0.12$  (2.72–2.96); total length  $12.87 \pm 0.70$  (12.01–13.72).

Genitalia. Pygophore subglobular castaneous, posterolateral angles slightly parallel, stout, apices rounded, inner surface yellowish (fig. 4F). Parameres yellowish moderately

divergent to the median line, shorter than segment X, cylindrical digitiform, apices slightly flattened with 1+1 subapical denticle (fig. 4F). Segment X subcylindrical, basal portion membranous forming a concave line on limit with sclerotized area; ventrally sclerotized (fig. 4F). Phallosome globose, vesica sinuous, subequal than phallosome in length and covering ductus seminis distalis throughout (fig. 7F).

**Distribution:** PANAMA.

Female unknown.

**Comments.** The species of *Schraderiellus* have a very similar general morphology. The differences occur, mainly, in the gonocoxites 8, laterotergites 9 and gonocoxites 9 in the females and in the structures of the pygophore and phallus in males. *Schraderiellus cinctus*, *Schraderiellus* sp. 3., and *Schraderiellus* sp. 1 have the posterior margins of gonocoxites 8 bisinuous and *Schraderiellus* sp. 1, *Schraderiellus* sp. 4, and *Schraderiellus* sp. 3 have an apparently similar pygophore, especially the spatulated parameres.

Supporting Information

**Appendix 1.** Character matrix of the 33 taxa, 70 characters and states.

**Appendix 2.** List of the 70 characters, and respective states, of the cladistic analysis.

Acknowledgments

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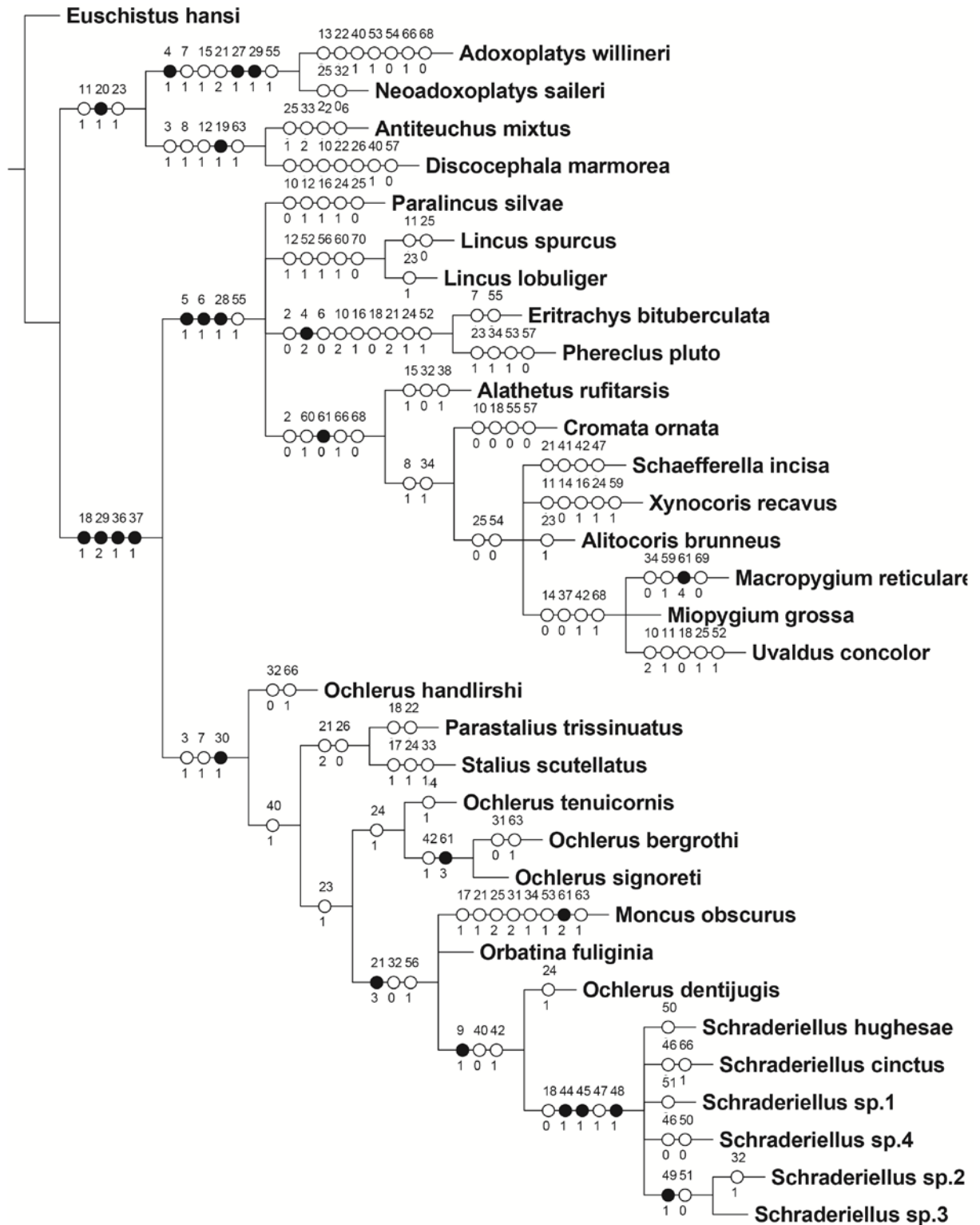
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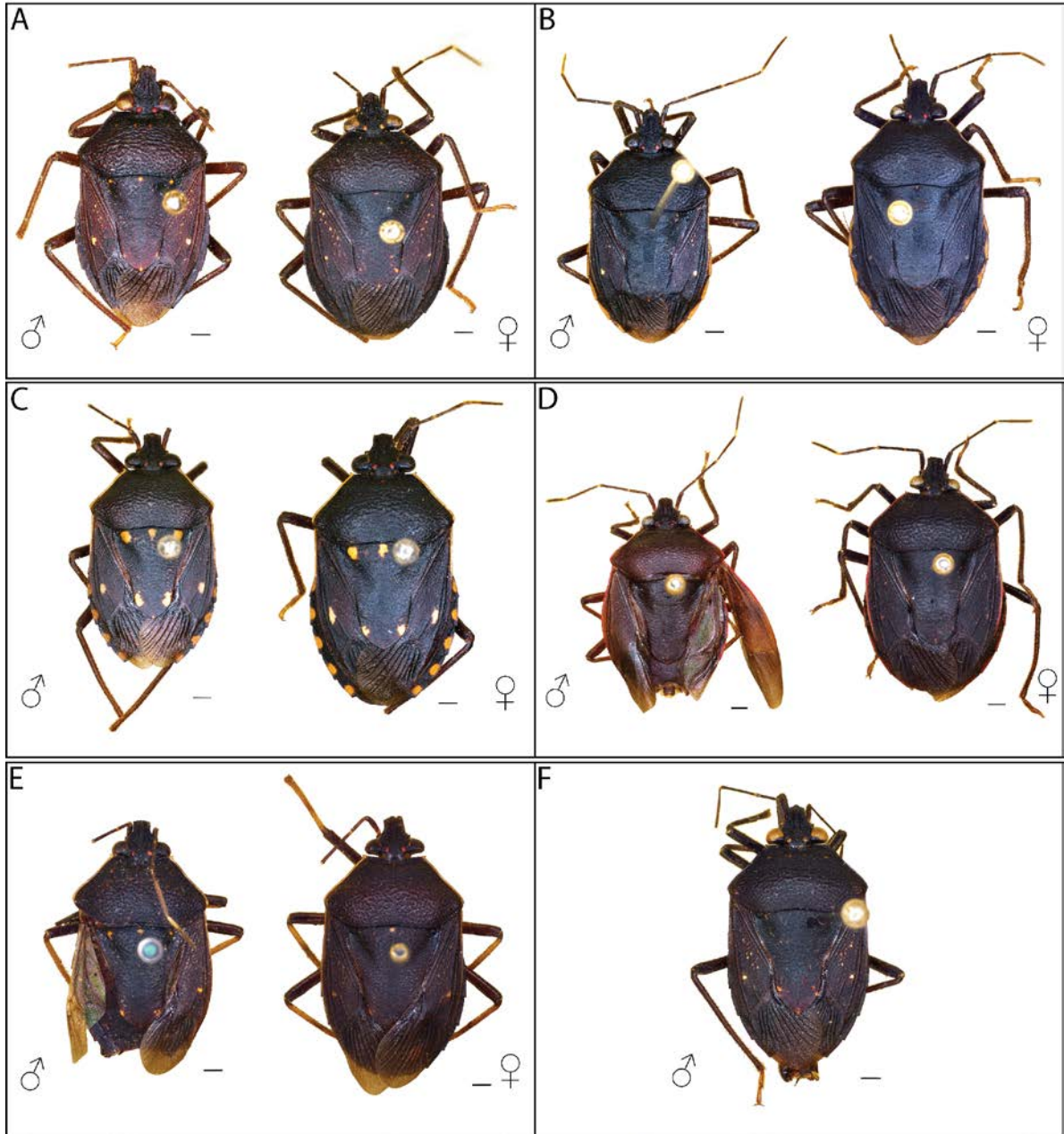
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**FIGURE 1.** Strict consensus (218 steps; Ci = 36; Ri = 65) of 20 equally parsimonious trees (205 steps; Ci = 39; Ri = 69) calculated under equal weights.

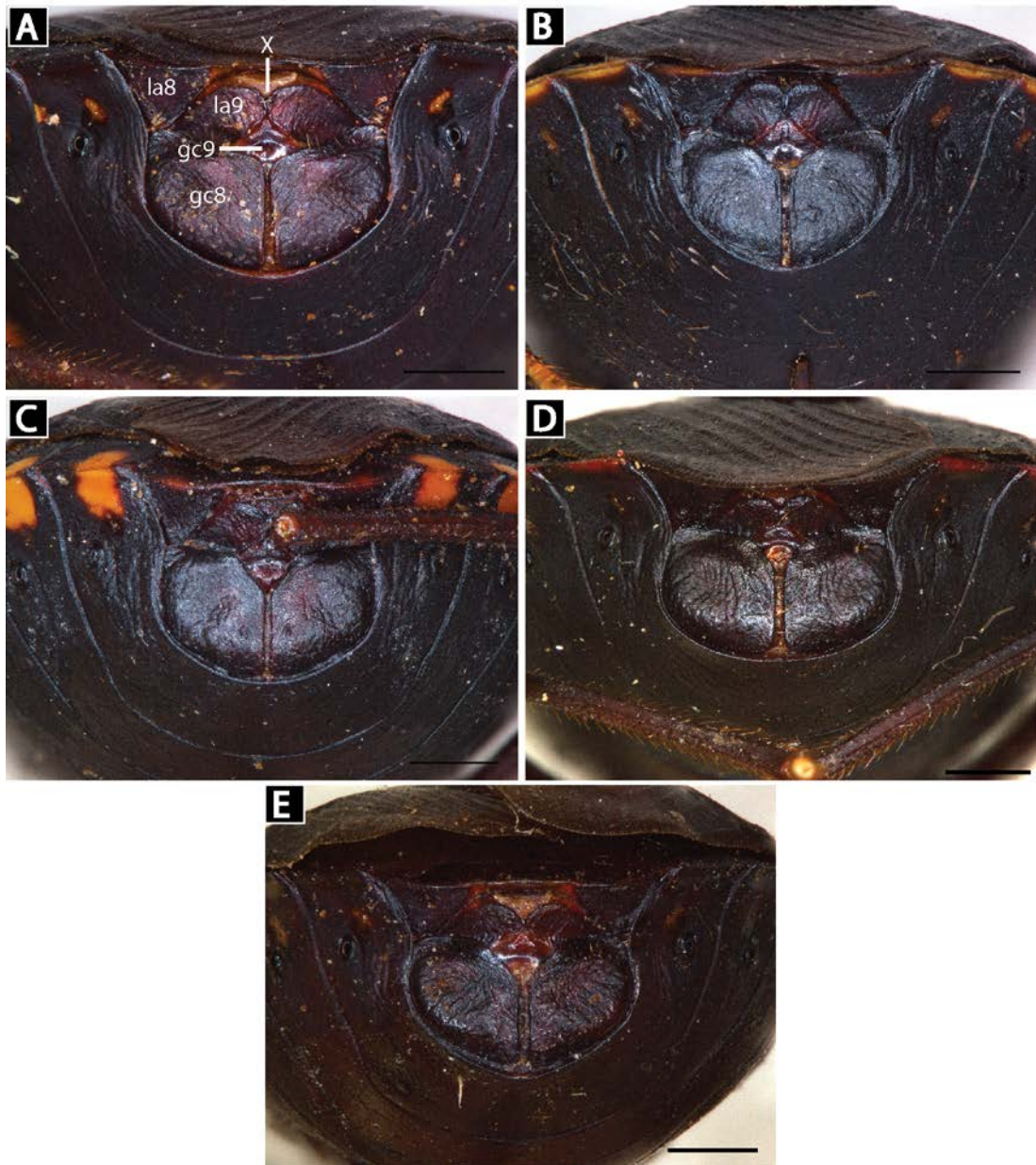


**FIGURE 2.** Species of *Schraderiellus*, dorsal view. A, *Schraderiellus hughesae* (Ruckes, 1959); B, *Schraderiellus cinctus* (Ruckes, 1959); C, *Schraderiellus* sp. 1; D, *Schraderiellus* sp. 2; E, *Schraderiellus* sp. 3; F, *Schraderiellus* sp. 4.

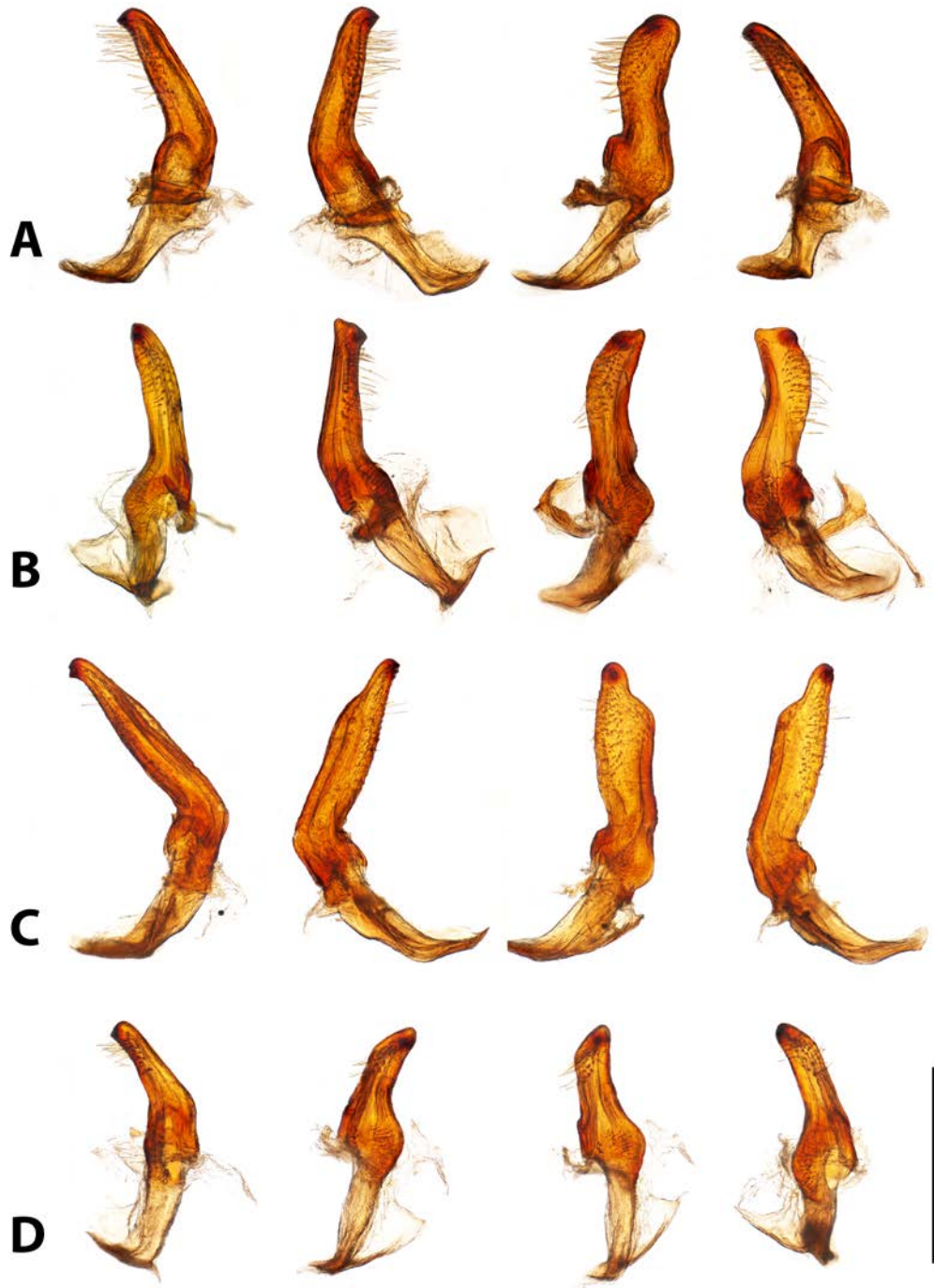




**FIGURE 3.** Species of *Schraderiellus*, pygopore posterior and dorsal views. A, *Schraderiellus hughesae* (Ruckes, 1959); B, *Schraderiellus cinctus* (Ruckes, 1959); C, *Schraderiellus* sp. 1; D, *Schraderiellus* sp. 2; E, *Schraderiellus* sp. 3; F, *Schraderiellus* sp. 4. Abbreviations: be, basal excavation; dr, dorsal rim; par, paramere; pla, posterolateral angle; pr1, posterior projection; pr2, dorsal projection; X, segment X. Scale bar: 1mm



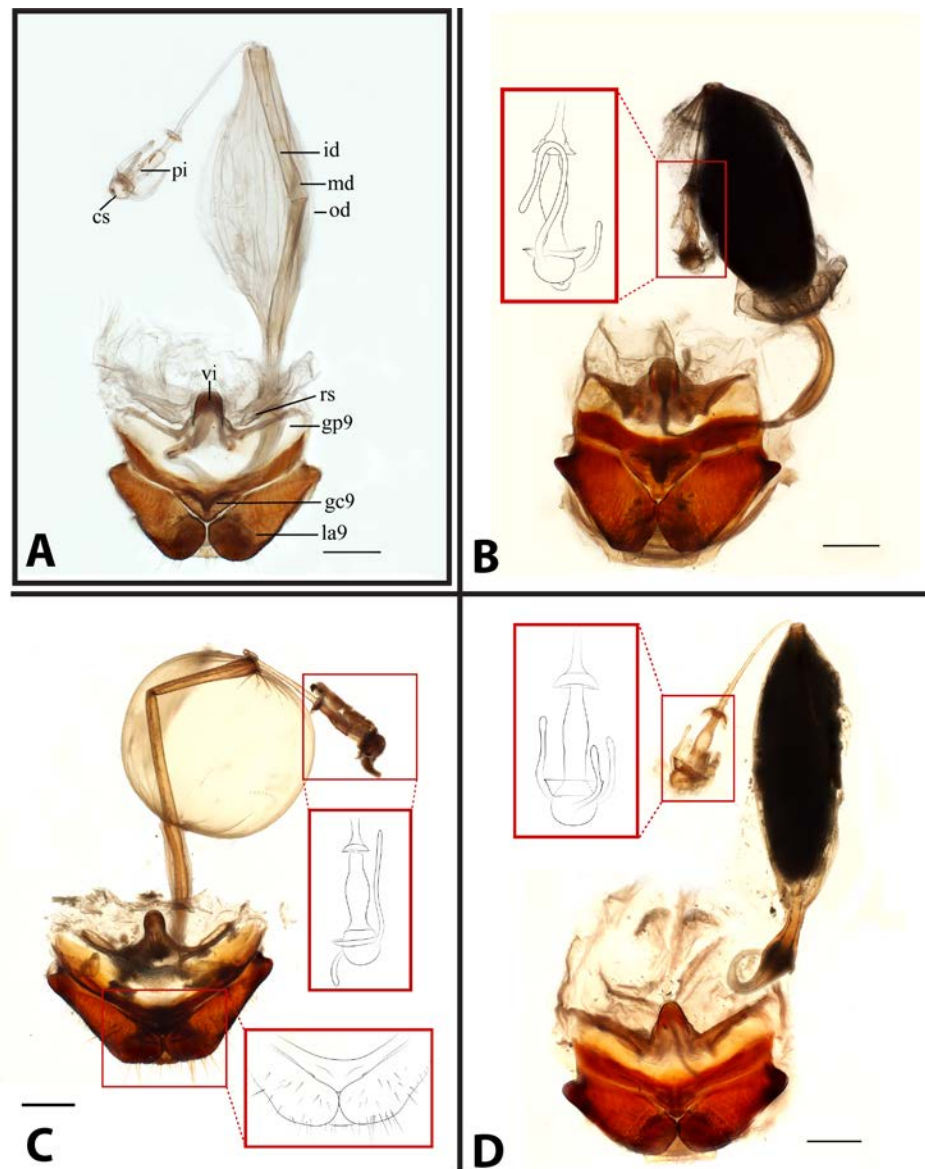
**FIGURE 4.** Species of *Schraderiellus*, female genital plates, posterior view. A, *Schraderiellus hughesae* (Ruckes, 1959); B, *Schraderiellus cinctus* (Ruckes, 1959); C, *Schraderiellus* sp. 1; D, *Schraderiellus* sp. 2; E, *Schraderiellus* sp. 3. Abbreviations. gc8, gonocoxites 8; gc9, gonocoxites 9; la8, laterotergites 8; la9, laterotergites 9; X, segment X. Scale bar: 1mm



**FIGURE 5.** Parameres; dorsal, posterior, inner lateral and external lateral respectively. A, *Schraderiellus hughesae* (Ruckes, 1959); B, *Schraderiellus cinctus* (Ruckes, 1959); C, *Schraderiellus* sp. 2.; D, *Schraderiellus* sp. 4. Scale bar: 1mm



**FIGURE 6.** Species of *Schraderiellus*, internal male genitalia (phallus), lateral view. A, *Schraderiellus hughesae* (Ruckes, 1959); B, *Schraderiellus cinctus* (Ruckes, 1959); C, *Schraderiellus* sp. 2; D, *Schraderiellus* sp. 4. Abbreviations. ds, ductus seminis distalis; ph, phalloteca; v, vesica. Scale bar: 0.5mm



**FIGURE 7.** Species of *Schraderiellus*, internal female genitalia, posterior view. A, *Schraderiellus hughesae* (Ruckes, 1959); B, *Schraderiellus cinctus* (Ruckes, 1959); C, *Schraderiellus* sp. 2.; D, *Schraderiellus* sp. 3. Abbreviations: cs, capsula seminalis; gc9, gonocoxites 9; gp9, gonapophyses 9; id, inner ducts; la9, laterotergites 9; md, medium ducts; od, outer ducts; pi, pars intermedialis; rs, ring sclerites; vi, vaginal intima. Scale bar: 0.5mm

## Supporting Information

### Appendix 1. Character matrix of the 33 taxa, 70 characters and states

	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	3
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
<i>Euschistus_hansi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Antiteuchus_mixtus</i>	0	1	1	0	0	0	0	1	0	1	1	1	1	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0	0
<i>Discocephala_marmorea</i>	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	1	1	0	1	1	0	1	0	0	0	0	0
<i>Adoxoplatus_willineri</i>	0	1	0	1	0	0	1	0	0	-	1	0	0	0	1	0	0	0	0	1	2	1	1	0	1	1	1	0	1	0
<i>Alathetus_rufitarsis</i>	0	0	0	0	1	1	0	0	0	-	0	0	1	1	1	0	-	1	0	0	0	0	0	0	1	1	0	1	2	0
<i>Cromata_ornata</i>	0	0	0	0	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	2	?
<i>Eritrachys_bituberculata</i>	0	0	0	2	1	0	1	0	0	2	0	0	1	1	0	1	0	0	0	0	2	0	0	1	1	1	0	1	2	0
<i>Lincus_spurcus</i>	0	1	0	0	1	1	0	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2	0
<i>Lincus_lobuliger</i>	0	1	0	0	1	1	0	0	0	1	0	1	1	1	0	0	0	1	0	0	0	0	1	0	1	1	0	1	2	0
<i>Macropygium_reticulare</i>	1	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	1	2	0
<i>Miopygium_grossa</i>	1	0	0	0	1	1	0	1	0	-	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2	0
<i>Moncus_obscurus</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	1	0	1	0	2	1	0	0	2	1
<i>Neodoxoplatus_saileri</i>	0	1	0	1	0	0	1	0	0	1	1	0	1	1	1	0	0	0	0	1	2	0	1	0	2	1	1	0	1	0
<i>Ochlerus_bergrothi</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	1	1	1	1	0	0	2	1
<i>Ochlerus_tenuicornis</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	1	1	1	1	0	0	2	1
<i>Ochlerus_handlirshi</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	2	1
<i>Ochlerus_dentijugis</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	1	0	0	3	0	1	1	1	1	0	0	?	?
<i>Ochlerus_signoreti</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0	1	1	1	1	0	0	2	1
<i>Orbatina_fuliginia</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	3	0	1	0	1	1	0	0	2	1
<i>Paralincus_silvae</i>	0	1	0	0	1	1	0	0	0	0	0	1	1	1	0	1	0	1	0	0	0	0	0	1	0	1	0	1	2	0
<i>Parastalius_trissinuatus</i>	0	?	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	2	1	0	0	1	0	0	0	2	1
<i>Phereclis_pluto</i>	0	0	0	2	1	0	0	0	0	2	0	0	1	1	0	1	0	0	0	0	2	0	1	1	1	1	0	?	2	0
<i>Schaefferella_incisa</i>	0	0	0	0	1	1	0	1	0	1	0	0	1	1	0	0	0	1	0	0	1	0	0	0	0	1	0	1	2	0
<i>Stalius_scutellatus</i>	0	1	1	0	0	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	2	0	0	1	1	0	0	0	2	1
<i>Uvaldus_concolor</i>	0	0	0	0	1	1	0	1	0	2	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	2	0
<i>Xynocoris_recavus</i>	0	0	0	0	1	1	0	1	0	1	1	0	1	0	0	1	0	1	0	0	0	0	0	1	0	1	0	1	2	0
<i>Alitocoris_brunneus</i>	0	0	0	0	1	1	0	1	0	1	0	0	1	1	0	0	0	1	0	0	0	0	1	0	0	1	0	1	2	0
<i>Schraderiellus_hughesae</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	3	0	1	0	1	1	0	0	2	1
<i>Schraderiellus_cinctus</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	3	0	1	0	1	1	0	0	2	1
<i>Schraderiellus_sp.1</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	?	0	0	3	0	1	0	1	1	0	?	2	1
<i>Schraderiellus_sp.2</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	3	0	1	0	1	1	0	0	2	1
<i>Schraderiellus_sp.3</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	3	0	1	0	1	1	0	0	2	1
<i>Schraderiellus_sp.4</i>	0	1	1	0	0	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	3	0	1	0	1	1	0	0	?	?

	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>5</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>0</b>
<i>Euschistus_hansi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	-	-	-
<i>Antiteuchus_mixtus</i>	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	-	0	0	-	-
<i>Discocephala_marmorea</i>	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	-	-
<i>Adoxoplatys_willineri</i>	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	-	0	0	-	-
<i>Alathetus_rufitarsis</i>	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	-	?	?	-	-
<i>Cromata_ornata</i>	0	1	0	1	0	1	1	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Eritrachys_bituberculata</i>	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0	-	?	?	0	-
<i>Lincus_spurcus</i>	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0	-	0	0	-	-
<i>Lincus_lobuliger</i>	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0	-	0	0	-	-
<i>Macropygium_reticulare</i>	0	1	0	0	0	1	0	1	1	1	1	1	0	0	0	-	1	0	-	-
<i>Miopygium_grossa</i>	0	1	0	1	0	1	0	0	1	0	0	1	0	0	0	0	-	1	0	-
<i>Moncus_obscurus</i>	2	0	0	1	0	1	1	0	1	1	0	0	0	0	0	-	0	0	-	-
<i>Neodoxoplatys_saileri</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	-	-
<i>Ochlerus_bergrothi</i>	0	1	0	0	0	1	1	0	1	1	0	1	0	0	0	-	0	0	-	-
<i>Ochlerus_tenuicornis</i>	1	1	0	1	0	1	1	0	1	1	0	0	0	0	0	-	0	0	-	-
<i>Ochlerus_handlirshi</i>	2	0	0	0	0	1	1	0	1	0	0	0	0	0	0	-	0	0	-	-
<i>Ochlerus_dentijugis</i>	?	0	?	?	?	?	?	?	0	1	0	0	0	0	0	-	0	0	-	-
<i>Ochlerus_signoreti</i>	1	1	0	0	0	1	1	0	1	1	0	1	0	0	0	-	0	0	-	-
<i>Orbatina_fuliginia</i>	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	-	0	0	-	-
<i>Paralincus_silvae</i>	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0	-	0	0	-	-
<i>Parastalius_trissinuatus</i>	1	1	0	0	0	1	1	0	1	1	0	0	0	0	0	-	0	0	-	-
<i>Phereclus_pluto</i>	0	1	0	1	0	1	1	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Schaefferella_incisa</i>	0	1	0	1	0	1	1	0	1	1	1	1	0	0	0	-	0	0	-	-
<i>Stalius_scutellatus</i>	2	1	1	0	0	1	1	0	1	1	0	0	0	0	0	-	0	0	-	-
<i>Uvaldus_concolor</i>	0	1	0	1	0	1	0	1	1	0	1	1	0	0	0	-	1	0	-	-
<i>Xynocoris_recavus</i>	0	1	0	1	0	1	1	0	1	0	0	0	0	0	0	-	1	0	-	-
<i>Alitocoris_brunneus</i>	0	1	0	1	0	1	1	0	1	1	0	0	0	0	0	-	1	0	-	-
<i>Schraderiellus_hughesae</i>	1	0	0	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	0	0
<i>Schraderiellus_cinctus</i>	1	0	0	0	1	1	1	0	1	0	0	1	1	1	1	0	1	1	0	1
<i>Schraderiellus_sp.1</i>	1	0	0	0	1	1	1	0	1	0	0	1	0	1	1	1	1	1	0	1
<i>Schraderiellus_sp.2</i>	1	1	0	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1
<i>Schraderiellus_sp.3</i>	1	0	0	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1
<i>Schraderiellus_sp.4</i>	1	0	?	?	?	?	?	?	0	1	0	1	1	1	0	1	1	0	0	0

	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>7</b>		
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>0</b>	
<i>Euschistus_hansi</i>	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0
<i>Antiteuchus_mixtus</i>	-	0	0	1	0	0	1	0	0	0	-	0	1	0	0	1	0	1	1	1	1
<i>Discocephala_marmorea</i>	-	0	0	1	0	0	0	0	0	0	-	0	1	0	0	0	0	1	1	1	1
<i>Adoxoplatys_willineri</i>	-	0	1	0	1	0	1	0	0	0	-	0	0	0	0	1	0	0	1	1	1
<i>Alathetus_rufitarsis</i>	-	0	1	1	1	1	1	0	0	1	0	0	0	0	?	1	0	0	1	1	1
<i>Cromata_ornata</i>	?	0	0	1	0	0	0	0	0	1	0	0	0	0	?	?	?	?	?	?	?
<i>Eritrachys_bituberculata</i>	-	1	0	1	0	0	1	0	0	0	-	0	0	0	0	1	0	1	1	1	1
<i>Lincus_spurcus</i>	-	1	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	0
<i>Lincus_lobuliger</i>	-	1	0	1	1	1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	0
<i>Macropygium_reticulare</i>	-	0	1	0	1	1	1	1	1	1	4	0	0	0	1	1	1	1	0	1	0
<i>Miopygium_grossa</i>	-	0	1	0	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	1
<i>Moncus_obscurus</i>	-	0	1	1	0	1	1	0	0	1	2	1	1	0	0	0	0	1	1	1	1
<i>Neodoxoplatys_saileri</i>	-	0	0	1	1	0	1	0	0	0	-	0	0	0	0	0	0	1	1	1	1
<i>Ochlerus_bergrothi</i>	-	0	0	1	0	0	1	0	0	1	3	0	1	0	0	1	0	1	1	1	1
<i>Ochlerus_tenuicornis</i>	-	0	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	1
<i>Ochlerus_handlirshi</i>	-	0	0	1	0	0	1	0	0	0	-	0	0	0	0	1	0	1	1	1	1
<i>Ochlerus_dentijugis</i>	-	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Ochlerus_signoreti</i>	-	0	0	1	0	0	1	0	0	1	3	1	0	0	0	0	0	1	1	1	1
<i>Orbatina_fuliginia</i>	-	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Paralincus_silvae</i>	-	0	0	1	1	0	1	0	0	0	-	0	0	0	0	0	0	1	1	1	1
<i>Parastalius_trissinuatus</i>	-	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Phereclus_pluto</i>	?	1	1	1	1	0	0	0	0	0	-	0	0	0	?	?	?	?	?	?	?
<i>Schaefferella_incisa</i>	-	0	1	0	1	0	1	1	0	1	0	0	0	0	1	1	0	0	1	1	1
<i>Stalius_scutellatus</i>	-	0	0	1	1	0	1	0	0	?	?	?	?	?	?	0	0	?	0	?	?
<i>Uvaldus_concolor</i>	-	1	1	0	1	1	1	1	0	1	0	0	0	0	?	1	0	?	?	?	?
<i>Xynocoris_recavus</i>	-	0	1	0	1	1	1	0	1	1	0	0	0	0	1	1	0	0	1	1	1
<i>Alitocoris_brunneus</i>	-	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Schraderiellus_hughesae</i>	1	0	0	1	0	1	1	0	0	1	1	0	0	1	0	0	0	1	1	1	1
<i>Schraderiellus_cinctus</i>	1	0	0	1	0	1	1	0	0	1	1	0	0	1	0	1	0	1	1	1	1
<i>Schraderiellus_sp.1</i>	0	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
<i>Schraderiellus_sp.2</i>	0	0	0	1	0	1	1	0	0	1	1	0	0	1	0	0	0	1	1	1	1
<i>Schraderiellus_sp.3</i>	0	0	0	1	0	1	1	0	0	1	1	0	0	1	?	?	?	?	?	?	?
<i>Schraderiellus_sp.4</i>	1	?	?	?	?	?	?	?	?	?	?	?	?	?	0	0	0	1	1	1	1



**Appendix 2.** List of the 70 characters and the respective states of the cladistic analyses.

- 1) Head, length before eyes: at least 0.7 times the interocular distance (0); 0.5 times the interocular distance or less (1) (Campos & Grazia, 2006: character 2)
- 2) Head, eye, width: less or equal than 1/3 of interocular distance (0); equal or more than half of interocular distance (1) (Campos & Grazia, 2006: character 9)
- 3) Head, eyes, posterior margin, distance from head base relative to length of the eyes: subequal (0); no longer than ½ (1) (Campos & Grazia, 2006: character 10)
- 4) Head, eyes, frontal view, slope: none (0); downwards (1); upwards (2) (Campos & Grazia, 2006: character 11)
- 5) Head, eyes: not pedunculate (0); pedunculate (1) (Campos & Grazia, 2006: character 05)
- 6) Head, eyes, posterior carina: absent (0); present (1) (Campos & Grazia, 2006: character 06)
- 7) Head, anteocular process: present (0); absent (1) (Campos & Grazia, 2006: character 4)
- 8) Head, mandibular plates, apex: parallel, separated by clypeus (0); convergent (1) (modified from Campos & Grazia, 2006: character 3)
- 9) Head, mandibular plates, subapical region, tooth-like process: absent (0); present (1)
- 10) Head, antennal segments I and II, relative length: segment II 2x longer than I (0); subequal (1); segment I 2x longer than II (2) (modified from Garbelotto *et al.*, 2013: character 12) Inapplicable for species with four-segmented antennae.
- 11) Head, bucculae, anterior angle, shape: obtusely rounded (0); triangular (1) (Roell & Campos, in prep.)
- 12) Head, labium, first segment, insertion: before middle of bucculae (0); after middle of bucculae (1)
- 13) Head, labium, second segment, apex: between pro- and mesocoxae (0), reaching or surpassing mesocoxae (1) (modified from Campos & Grazia, 2006: character 15)

- 14) Head, rostrum, apex: not surpassing posterior margin of urosternite III (0); reaching or surpassing urosternite IV (1) (modified from Campos & Grazia, 2006: character 16)
- 15) Thorax, pronotum, before humeral angles: declivous (0); not declivous (1) (Campos & Grazia, 2006: character 20)
- 16) Thorax, pronotum, cicatrices, median tubercle: absent (0); present (1) (Campos & Grazia, 2006: character 21)
- 17) Thorax, pronotum, anterior angle, projection, direction: laterally (0); anteriorly (1)
- 18) Thorax, mesopleura, postero-lateral angle, evaporatorium: present (0); absent (1) (Barão *et al.*, in prep.)
- 19) Thorax, mesopleura, outer margin, evaporatorium: absent (0); present (1) (Barão *et al.*, in prep.)
- 20) Thorax, metapleura, evaporatorium, range: half of metapleura or less (0); two thirds of metapleura (1) (Campos & Grazia, 2006: character 22)
- 21) Thorax, metapleura, evaporatorium, outer margin, shape: straight (0); concave (1); convex (2); sigmoid (3) (Barão *et al.*, in prep.)
- 22) Thorax, metapleura, evaporatorium, wrinkles posterior to peritreme: present (0); absent (1) (Barão *et al.*, in prep.)
- 23) Thorax, metapleura, evaporatorium, punctures: present (0); absent (1) (Barão *et al.*, in prep.)
- 24) Thorax, metapleura, evaporatorium, setae: absent (0); present (1) (Barão *et al.*, in prep.)
- 25) Thorax, metapleura, evaporatorium, ostiole, opening orientation: laterally (0); ventrolaterally (1); ventroposteriorly (2) (Barão *et al.*, in prep.)
- 26) Thorax, metasternum, longitudinal carina: absent (0); present (1) (Campos & Grazia, 2006: character 26)
- 27) Thorax, legs, anterior femur, ventral line of spines: absent (0); present (1) (modified from Campos & Grazia, 2006: character 28)

- 28) Male, thorax, hind legs, hind tarsi, apical segment, surface: convex (0); depressed (1);  
(Campos & Grazia, 2006: character 29)
- 29) Female, thorax, hind legs, hind tarsi, apical segment, surface: convex (0); flattened (1);  
depressed (2) (Campos & Grazia, 2006: character 30)
- 30) Female, thorax, hind legs, hind tarsi, third segment relative to first segment, width:  
equal or narrower (0); wider (1)
- 31) Scutellum, apex, range: not reaching corium apex (0); reaching corium apex (1);  
surpassing corium apex (2) (Campos & Grazia, 2006: character 27)
- 32) Abdomen, tricothria of segments IV and V, distance relative to diameter of  
respective spiracles: subequal (0); at least twice longer (1) (modified from Campos &  
Grazia, 2006: character 33)

#### External female genitalia

- 33) Gonocoxites 9: exposed (0); hidden by gonocoxites 8 (1) (Campos & Grazia, 2006:  
character 43)
- 34) Gonocoxites 9, median longitudinal carina: absent (0); present (1) (modified from  
Campos & Grazia, 2006: character 42)
- 35) Gonocoxites 9, surface: uniform (0); with 1+1 intumescences (1)
- 36) Laterotergites 9, median margins: apart from each other (0); touching each other (1)  
(Campos & Grazia, 2006: character 44)
- 37) Segment X: exposed (0); hidden by laterotergites 9 (1) (modified from Campos &  
Grazia, 2006: character 46)

#### External male genitalia. Pygophore

- 38) Ventral rim, conical median projection: absent (0); present (1) (Campos & Grazia,  
2006: character 36)

- 39) Segment X, dorsal membranous area: absent (0); present (1) (modified from Campos & Grazia, 2006: character 37)
- 40) Parameres, head, placement relative to segment X: lateral (0); ventral (1) (Garbelotto *et al.*, 2013: character 47)
- 41) Segment X, ventral surface, region ventral to anus, post anal projection: absent (0); present (1) (Campos & Grazia, 2006: character 38)
- 42) Segment X, ventral region, sub anal sclerotization: absent (0); present (1) (modified from Campos & Grazia, 2006: character 39)
- 43) Pygophore, dorsal view, posterolateral angles, position: parallel (0); divergent (1)
- 44) Pygophore, dorsal view, ventral rim: visible (0); not visible (1)
- 45) Pygophore, basal dorsal excavation on postero lateral angles: absent (0); present (1) (Figure 4 ; be)
- 46) Pygophore, posterolateral angle, dorsal projection: absent (0); present (1). (Figure 4, pr2). Applicable only for pygophores that have a dorsal basal constriction on base of posterolateral angles
- 47) Pygophore, segment X, anal opening: facing ventrally (0); facing posteriorly (1) (Roell & Campos, in prep.)
- 48) Pygophore, ventral rim, base of posterolateral angle, 1+1 projections with tuft of setae: absent (0); present (1)
- 49) Pygophore, posterolateral angles, length relative to distance between projections: about half (0); about  $2/3$  of the distance (1). Applicable only in the presence of the projections in the base of posterolateral angles.
- 50) Pygophore, parameres, length relative to distance between projections: shorter than half of the distance (0); longer than half of the distance (1). Applicable only in the presence of the projections in the base of posterolateral angles.
- 51) Pygophore, parameres of *Schraderiellus*: spatular (0); cylindrical (1)

## Internal female genitalia

- 52) Ring sclerites: present (0); absent (1) (Campos & Grazia, 2006: character 48)
- 53) Vesicular area, median duct, dilation at base: absent (0); present (1) (Campos & Grazia, 2006: character 50)
- 54) Pars intermedialis and capsula seminalis, combined length related to length of vesicular area: about half the length (0); about 1/3 the length or less (1) (Campos & Grazia, 2006: character 52)
- 55) Pars intermedialis, shape: barrel, wider on middle and narrowing towards base and apex (0); cylindrical, width almost the same from the base to apex (1) (modified from Campos & Grazia, 2006: character 53)
- 56) Pars intermedialis, length relative to capsula seminalis: up to two times longer (0); at least three times longer (1) (modified from Campos & Grazia, 2006: character 54)
- 57) Capsula seminalis, projections, width: robust, almost equal or wider than pars intermedialis (0); slender, one third or less the width of pars intermedialis (1) (modified from Campos & Grazia, 2006: character 57)
- 58) Caliber of ductus receptaculi anterior to vesicular area: at least three times thinner than outer duct of vesicular area (0); the same caliber of outer duct of vesicular area (1) (Campos & Grazia, 2006: character 49)
- 59) Inner duct of vesicular area: uniform (0); narrowing towards pars intermedialis (1) (Campos & Grazia, 2006: character 51)
- 60) Thickening of gonapophyses 9: absent (0); present (1) (Garbelotto *et al.*, 2013: character 66)
- 61) Thickening of gonapophyses 9, extension: transversal median line (0); 1+1 bands (1); 1+1 circles or semicircles (2); 1+1 sub rectangular spots (3) one subtriangular central spot (4) (modified from Garbelotto *et al.*, 2013: character 67)
- 62) Vesicular area, inner duct, apex, corrugation: absent (0); present (1)
- 63) Vesicular area, inner duct, apex near pars intermedialis, caliber: uniform (0); progressively wider at apex (1) (Roell & Campos, in prep.)

64) Vesicular area, outer duct, base: continuous (0); narrowing in a constriction (1)

#### Internal male genitalia

65) phallosome, lateral process: absent (0); present (1)

66) Vesica, length relative to phallosome: less or, at most, equal (0); longer (1) (modified from Campos & Grazia, 2006: character 58)

67) Vesica, bending: absent (0); present (1) (Campos & Grazia, 2006: character 60)

68) Phallosome, distal area near base of vesica: continuous with vesica (0); with a basal constriction (1) (Roell & Campos, in prep.)

69) Conjunctiva: present (0); absent (1)

70) Vesica: not following ductus seminis distalis to opening (0); following ductus seminis distalis to opening (1) (Roell & Campos, in prep.)

## CONCLUSÕES GERAIS

O estudo taxonômico e sistemático de *Schraderiellus* com a descrição de quatro novas espécies contribui para o conhecimento de Pentatomidae, com principal foco à tribo Ochlerini, acrescentando dados sobre as relações de grupos na tribo.

Este estudo pode servir de base para outros estudos sobre *Schraderiellus*, uma vez que a falta de um dos sexos para uma espécie e o baixo número de espécimes ainda deixaram lacunas de informação que podem ser estudadas futuramente. Além disso, este trabalho pode contribuir na investigação de grupos próximos.

O uso de caracteres já utilizados anteriormente permite a análise de como eles se comportam em conjunto de dados diferentes, bem como novas interpretações podem ser efetuadas. Diferentes caracteres avaliados para *Schraderiellus* poderão ser revistos futuramente e avaliados para outros grupos.

Finalmente, a pouca resolução do clado de *Schraderiellus* pode gerar discussões sobre as metodologias utilizadas e a busca por novas ferramentas que aprimorem o estudo.

## ANEXO I

Normas aos autores:

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These short contributions should have no more than **20 references** and its **total length should not exceed four printed pages (except editorials)**. Neither an abstract nor a list of key words is needed; major headings (Introduction, Material and methods...) should NOT be used,



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Smith, A. (1999) Title of the paper. *Title of the journal in full*, volume number, page range.

B) **Book chapter:**

Smith, A. & Smith, B. (2000) Title of the Chapter. *In*: Smith, A, Smith, B. & Smith, C. (Eds), *Title of Book*. Publisher name and location, pp. x–y.

C) **Book:**

Smith, A., Smith, B. & Smith, C. (2001) *Title of Book*. Publisher name and location, xyz pp.

#### D) **Internet resources**

Author (2002) Title of website, database or other resources, Publisher name and location (if indicated), number of pages (if known). Available from: <http://xxx.xxx.xxx/> (Date of access).

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- Six setae present on tarsus I; three setae present on tibia I; leg I shorter than the body; legs brown in color ... 2

2 Leg II longer than leg I ... Genus B

- Leg II shorter than leg I ... Genus C

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