

Artículos

Two new species of *Trigonogenius* (Coleoptera: Ptinidae: Ptininae) from Northwest Argentina and a revision of the Argentinian species

Dos nuevas especies de *Trigonogenius* (Coleoptera: Ptinidae: Ptininae) del Noroeste argentino y una revisión de las especies argentinas

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Abstract: Two new species in the genus *Trigonogenius* are described from Argentina. The fauna of this country now includes five species with a new record for *T. squalidus*. Diagnoses and photos of all species found in Argentina are given. Some morphological traits, including the prosternum shape and elytral pattern and color, are compared between South American species. The status of the specific names *globulus*, *globosus* and *squalidus* are discussed.

Keywords: Introduced species, Desert fauna, Spider beetles, Patagonian Desert, Taxonomy.

Resumen: Se describen dos nuevas especies del género *Trigonogenius* Solier (Coleoptera: Ptinidae) para Argentina. La fauna de este país incluye ahora cinco especies con un nuevo registro para *T. squalidus* Boieldieu. Se dan diagnósticos y fotografías de todas las especies que se encuentran en Argentina. Se comparan entre las especies sudamericanas algunos rasgos morfológicos como la forma del prosterno y el patrón y color de los élitros. Se discute el estado de los nombres específicos *T. globulus* (Solier), *T. globosus* (Solier) y *T. squalidus*.

Palabras clave: Desierto Patagónico, Escarabajos araña, Especies introducidas, Fauna del desierto, Taxonomía.

INTRODUCTION

Spider beetles (Coleoptera: Ptinidae) are a small group of insects generally found in the more xeric regions of Argentina and elsewhere in the world. Many species are well adapted to the dry conditions found in much of the Andes and the desert regions of this country, and have evolved quiescent behavior, a globular body shape, and flightlessness that aids in water conservation (Philips, 2000; Benoit et al., 2005). Individuals are usually about 2-4 mm long and lack wings, which results in a low potential for dispersal. In some regions, potentially suitable habitat is separated by vast expanses of barren land. For example, at higher elevations, plant life is usually restricted to drainages where sparse runoff from rain or snowmelt accumulates; the adjacent upper pediments often lack any permanent vegetation to support invertebrate populations (Le Houérou et al., 2006). This has led to isolated populations among pockets of vegetation where the beetles can obtain food from organic matter, including dung (Busso & Bonvissuto, 2009; Howe & Burges, 2009). These small “island” populations have the potential to differentiate and speciate via natural selection and/or genetic drift.

The native spider beetles of Argentina currently consists of 13 species in the genera *Bellesus* Özdikmen, *Niptomezium* Pic, *Prosternoptinus* Bellés, *Ptinus* Linnaeus, *Trigonogenius* Solier, and *Tropicoptinus* Bellés; additional introduced stored product pest genera with either one or two species from the Old World can also be found, including *Epauloecus unicolor* (Piller & Mitterpacher), *Niptus hololeucus* (Faldermann), *Gibbium* Scopoli spp., *Mezium* Curtis spp., and *Sphaericus gibboides* Boieldieu (Blackwelder, 1944; Philips, 2008).

Species of *Trigonogenius* are endemic throughout the drier regions of mostly western South America from Ecuador through Peru, Bolivia, Chile, and into southern Argentina. The drier regions of Argentina include three deserts; part of the Atacama Desert (*sensu lato*) extends from Chile east into the northwestern provinces of Jujuy, Salta, and Catamarca where it is known as the Puna province [region] (Morrone, 2015). Two additional desert belts include the Monte and Patagonian Deserts that together run nearly the entire length of the country in the west and with the latter xeric region of the Patagonian province making up most of the southern 2/5 of the country (Morrone, 2015 and Arana et al., 2017 for more details on habitats and their locations). These deserts result from rain shadows created by the Andes mountains (Iglesias et al., 2011). The dominant vegetation is made up of deciduous forests and steppe in higher elevations (Paruelo et al., 1998), to desert scrub in lower elevations. Due to the aridity of these regions, biodiversity is low, but endemism is higher than the wetter surrounding areas (Roig-Juñent et al., 2001).

The genus *Trigonogenius* currently has seven species, three of which were described by Borowski (2006). The first four were documented in the late 19th and early 20th centuries and lack clarity on defining characteristics. In this paper we describe two new species of the genus and include photos and diagnoses of the other three described species found in Argentina. We also discuss the diversity in *Trigonogenius*, clarify details on the name change of *T. globulus* (Solier) to *T. globosus* Boieldieu and discuss the distribution of this widespread stored product pest, whose native distribution is currently unknown within South America.

MATERIAL AND METHODS

This paper is based on the study of 35 *Trigonogenius* specimens from the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN). New species are based on single holotypes from this material, with other specimens representing the other Argentinian species. Additional material examined included ~ 300 specimens from Peru (Museo de Historia Natural, Lima, and the T. K. Philips collection, Western Kentucky University, Bowling Green, KY), 39 specimens from the Instituto Argentino de Investigaciones de Zonas Áridas, Mendoza, four specimens from Ecuador (Smithsonian Institution, Washington, D. C., 11 specimens from California (Essig Museum, Berkeley. Nearly all Peruvian material examined for morphological comparison consisted of what are hypothesized as undescribed species. Photos were taken with a JVC digital camera (model KY-F75U) attached to a Leica MZ16 microscope, and auto montaged using Syncroscopy version 5.02 beta, provided by Western Kentucky University. The map was made in ArcGIS Pro, using online version 11.1.

RESULTS

Trigonogenius auris Askren and Philips, sp. n. (Figs. 1, 2)

urn:lsid:zoobank.org:act:475E7136-F376-458F-BAE6-D93B63D5C84



Fig. 1.

Map of Argentina with records of the five species of *Trigonogenius*.

Some localities were reported by Borowski (2007) and included are two localities from Chile to better depict the range of *T. squalidus*.

Holotype. ARGENTINA: Santa Catalina, Jujuy Province, coll. December 1917 by C. Bruch. Deposited in MACN.

Diagnosis. Overall larger, darker brown colored, and more elongate than congeners. The pronotum displays laterally a uniquely shaped protruding tori with a distinct ovoid cavity unseen in any other species known. Antennal insertions relatively close together, separated by a distance equal to $\frac{1}{2}$ the length of the scape. Conspicuous parallel longitudinal, low ridges and narrow grooves lined with setal hairs on the elytra are visible with the naked eye. The prosternum is highly prominent ventrally and distinctly widened anteriorly. This species is the largest of its Argentinian congeners.

Description

Body approximately 3.5 mm long, overall dark brown coloration, darker ventrally than dorsally.

Head. Eyes slightly protruding. Frons barely convex. Antennae inserted close together, separated by a distance equal to $\frac{1}{2}$ the length of the scape.

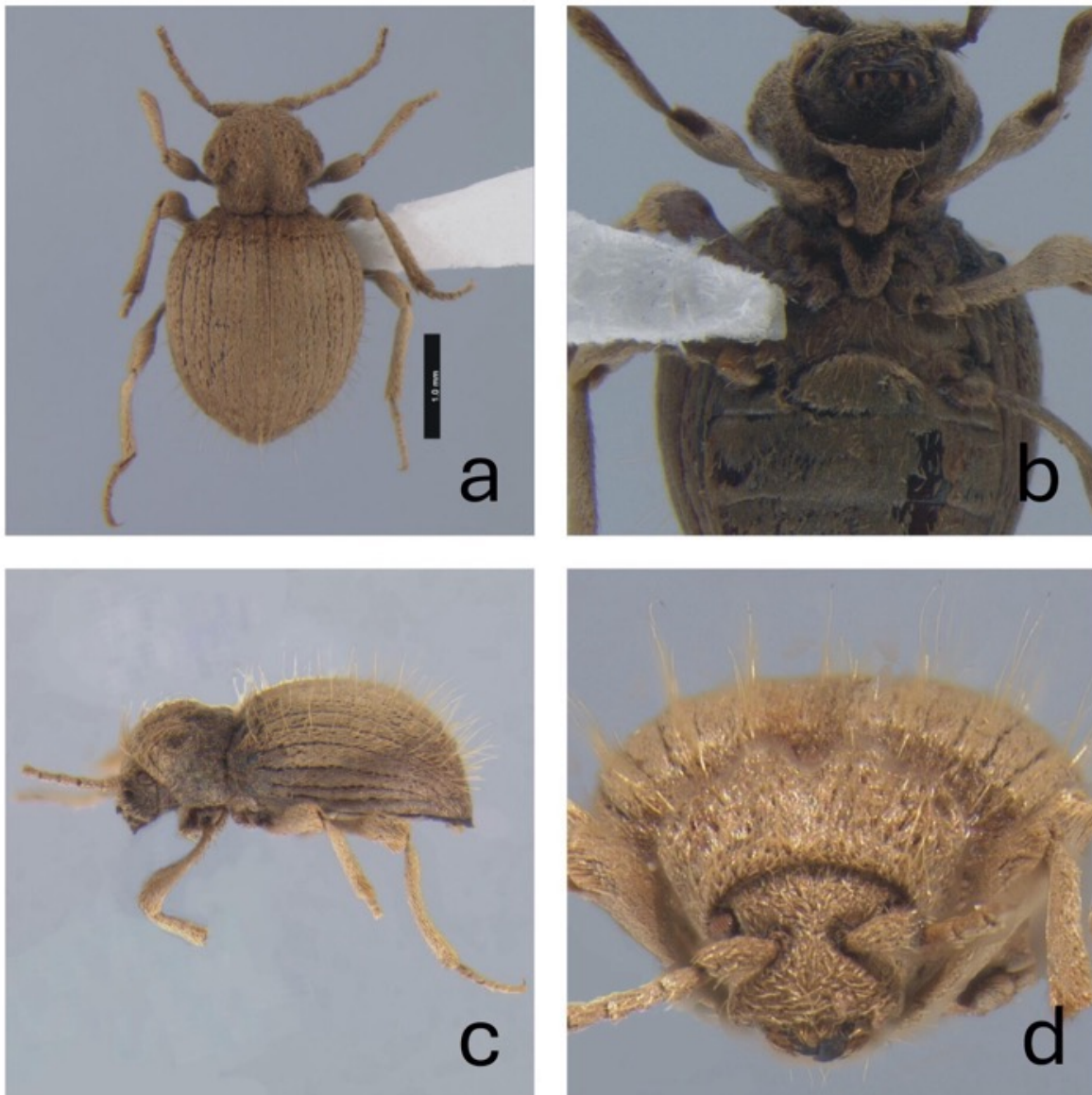


Fig. 2.

***Trigonogenius auris* sp. n. Holotype specimen.**

a. Dorsal habitus. b. Ventral habitus. c. Lateral view. d. Frontal view. Scale bar = 1.0 mm.

Pronotum dark, setae are brownish gray. Pronotal longitudinal ridges relatively acute. Median groove deep posteriorly, shallower anteriorly. Lateral grooves curve outward posteriorly, creating protruding bumps on posterior end of median ridges. Lateral ridges form a torus on each side, the posterior edges of which are especially prominent.

Elytra evenly covered with shallow, straight striae extending from apex to base, with long, erect setae present on intervals 1, 3, 5, and 7.

Narrow grooves in scales differentiate the ridges clearly. Scales are uniformly brownish gray.

Ventral surface dark, prosternum very prominent ventrally, narrow posteriorly between procoxae, increasing in width anteriorly, to almost as wide as head.

Etymology. *Auris* is a Greek root word meaning ear. This refers to the torus or donut shape on each side of the pronotum, giving the effect of the beetle having ears.

***Trigonogenius crenatus* Askren and Philips, sp. n. (Figs. 1, 3)**

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C9944

Holotype. ARGENTINA: Antofalla, Catamarca Province, coll. March 1923 by C. Bruch. Deposited in MACN.

Diagnosis. Lower “eyelid” or ridge on the ventral edge of the eye much less prominent and antennal insertions much wider than in *T. squalidus* and *T. setosus*, about as wide or wider than the length of the scape. Pronotal grooves relatively shallow but wide and the overall pronotum is longer than congeners. Prosternum is wide anteriorly and protrudes ventrally, similar to but less

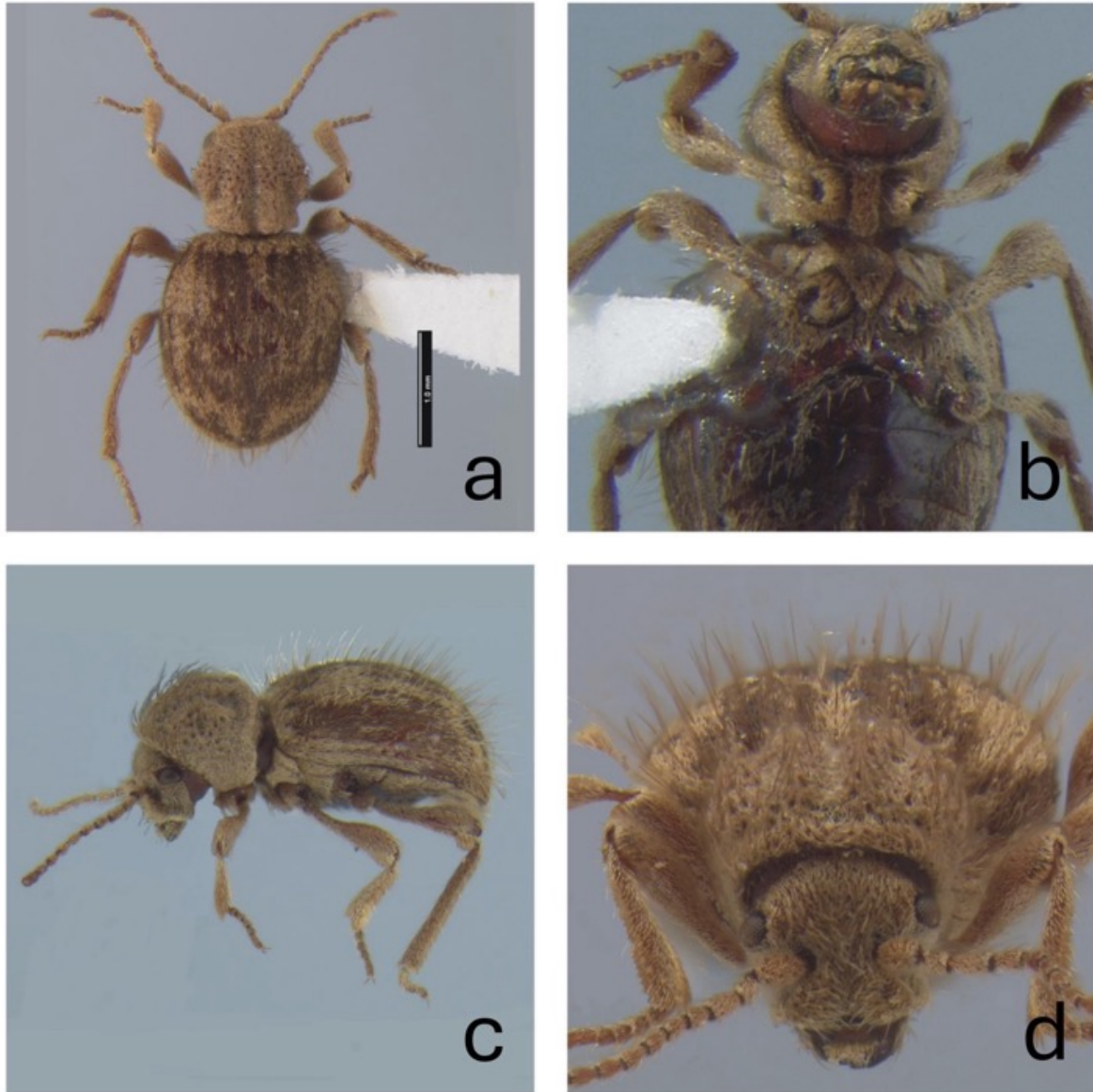


Fig. 3.

***Trigonogenius crenatus* sp. n. Holotype specimen.**

a. Dorsal habitus. b. Ventral habitus. c. Lateral view. d. Frontal view. Scale bar = 1.0 mm.

prominent than *T. auris*. A collar at the elytral base is formed with lighter, crenate clumps of setae (at least four on either side of midline) that are very distinctive.

Description

Body approximately 3.2 mm, somewhat round.

Head with antennal insertions somewhat far apart, about as wide or wider than length of scape. Slight lower “eyelid” or projection present.

Pronotum longer than wide. Median groove wider than deep, extending from base to apical collar. Lateral grooves shallow, starting halfway down and curving laterally, not reaching base. Lateral ridges

are rounded into humps, median ridges curve with lateral grooves towards the lateral edge.

Elytra covered in erratic interspersal of yellow-tan and brown-gray scales. 8 light yellow clumps of setae create a crenate pattern at the base. Short, thin, erect setae interspersed across scales, some clumped anteriorly with setal scales.

Etymology. Referring to the pattern of lightened setal scales along the base of the elytra, creating a crenate pattern.

Remarks. Antennae are inserted farther apart than any other species known within *Trigonogenius*.

Trigonogenius globosus(Solier, 1849) (Figs. 1, 4)

Ptinus globulus var. *globosus* Solier, 1849: 464,

syn. *Trigonogenius fractus* LeConte, 1866: 100,

syn. *Trigonogenius tropicus* Kirsch, 1889: 12,

syn. *Trigonogenius nigronotatus* Pic, 1901: 278,

syn. *Niptus tournoueri* Pic 1917: 258,

syn. *Trigonogenius curtus* Pic, 1947: 6.

Diagnosis. This species has a very rounded body, 2.8-3.3 mm long. The eyes are surrounded by a narrow, glabrous ring. The pronotum has a relatively shallow median longitudinal groove on the basal half and lateral rounded depressions near the base. Elytra typically have four black to brown longitudinal bands at the base, varying in width, and extending approximately $\frac{1}{4}$ or less than the total elytral length, with two situated on either side of midline and two at each humeral angle. The remaining surface is variable in pattern and color.

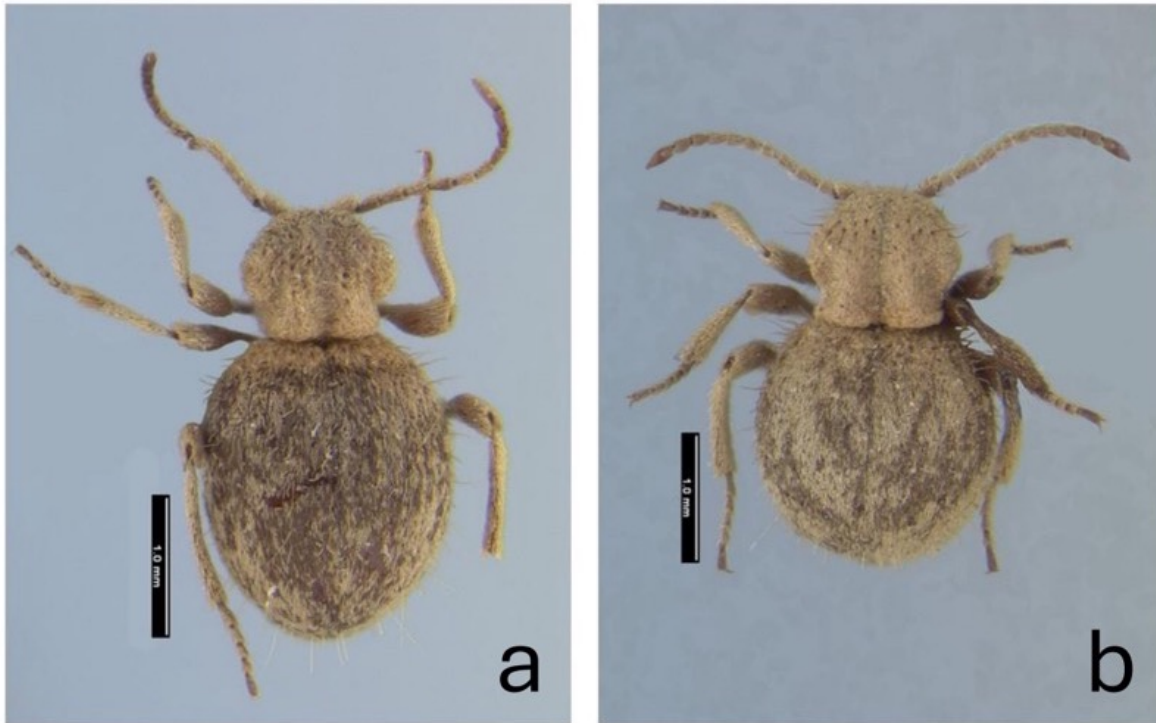


Fig. 4.

Dorsal habitus of *Trigonogenius globosus* Solier from four localities

- a. Collected in Camarones, Chubut province, Argentina. b. Collected near Arequipa, Arequipa province, Peru. c. Collected in Quito, Pinincho province, Ecuador. d. Collected in California, USA.

Material examined. Ten specimens from the Museo Argentino de Ciencias Naturales. Specimens studied from outside of Argentina were from other collections including those from previous field work in Peru and housed at WKU. They include more than 100 individuals from Arequipa, Peru, four from Quito, Ecuador, and 11 from California, USA. The Lectotype and Paralectotypes in the Muséum national d'Histoire naturelle, Paris were also examined. Specimens from Argentina include: 1- Chilecito, Mendoza prov., Argentina, coll. Unknown; 8 - Camarones, Chubut prov., Argentina, coll. J. Wiederrecht; 1 - Pucapampa, Sta. Cataline, Jujuy prov., Argentina, coll. C. Bruch, 1917.

Remarks. All specimens of *T. globosus* that we have examined from Argentina, Peru, Ecuador, and the United States are consistently uniform in the pronotal morphology and have the four distinct longitudinal bands of darker setae on the base of the elytra (Fig. 4). The elytral and pronotal features do exhibit some obvious but slight differences, such as color, pattern, and the number and length of setae; all these features are known to vary within populations of the same species of spider beetles. Excluding the two dark basal maculations characteristic of this species, some individuals have

completely tan colored elytra while others have the posterior half or 3/5 with dark colored setae in various patterns.

***Trigonogenius setosus* Borowski, 2007 (Figs. 1, 5a)**

Diagnosis. See Borowski (2006) for a diagnosis.

Material examined. Five specimens from the Museo Argentino de Ciencias Naturales. Specimens from Argentina include: 2 - Troquero, Jujuy Prov., Argentina, coll. C. Bruch, 1920; 3 - Tesoro, Catamarca Prov., Argentina, coll. Weiser.

***Trigonogenius squalidus* Boieldieu 1856 (Figs. 1,5b)**

Ptinus globulus Solier, 1849: 464,

Trigonogenius squalidus Boieldieu, 1856: 667

Diagnosis. Broad bodied, 2.5-3.1 mm in length. The eyes are angled upward, half obscured with setae as a lower “eyelid.” The antennal insertions are relatively close together, separated by a distance equal to about 3/4 the length of the scape. The three pronotal longitudinal grooves are wider than deep, and all extend to apical collar. The median groove widens basally and the lateral grooves curve outward to the lateral edges and create rounded lateral protrusions. Elytra are light tan interspersed with darker brown setal scales. Rows of short, erect, light setae across entire elytral surface, slightly more clumped towards base.

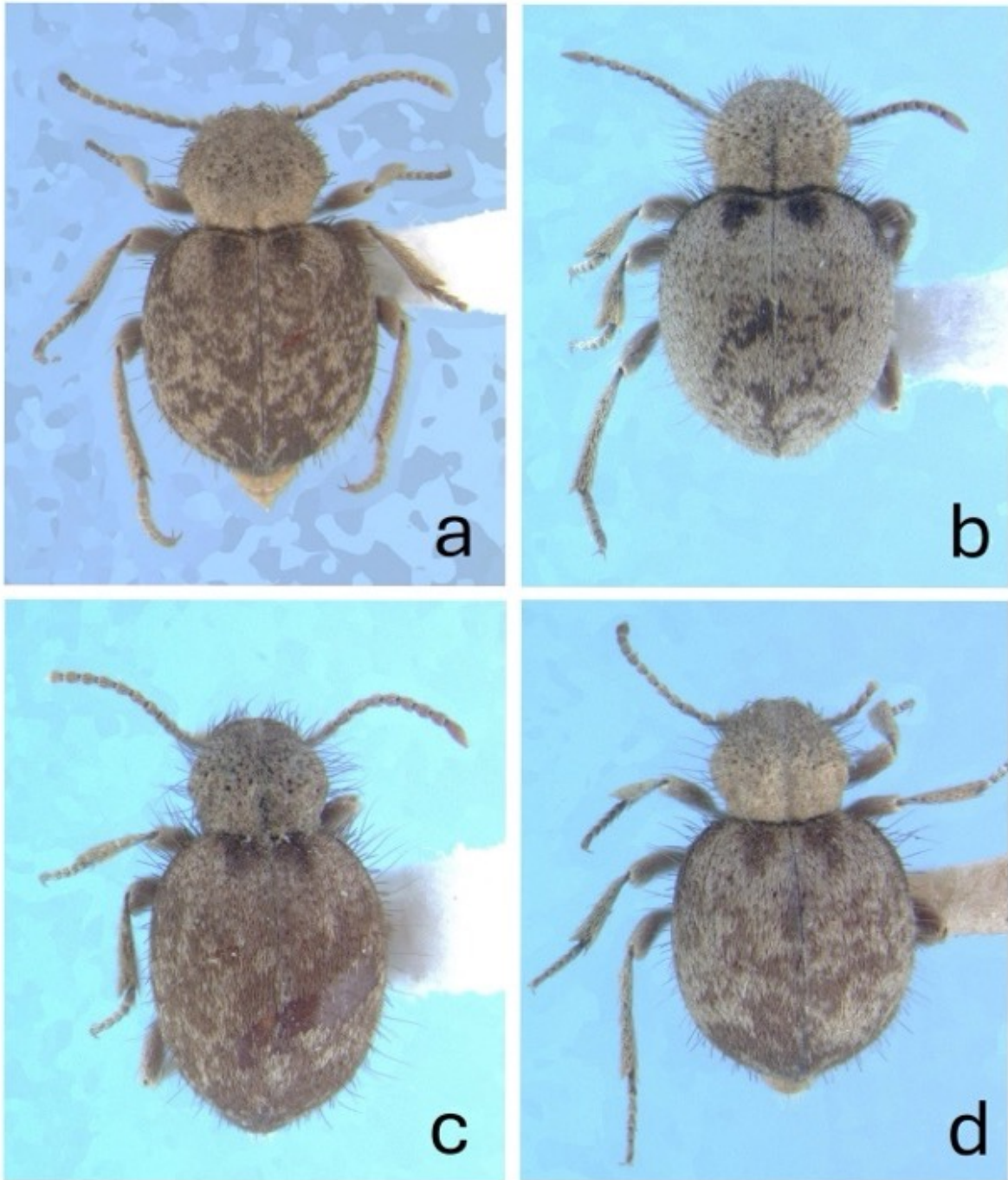


Fig. 5.

Dorsal habitus.

a. *Trigonogenius setosus* Borowski b. *Trigonogenius squalidus* Boieldieu (right). Scale bar = 1.0 mm.

Material examined. Eighteen specimens from the Museo Argentino de Ciencias Naturales, as well as those currently in the Paris Museum. Specimens from Argentina include: 12 - Tesoro, Catamarca Prov., Argentina, coll. Weiser; 6 - Cerrillos, Catamarca Prov., Argentina, coll. Weiser.

DISCUSSION

Diversity and morphology

Our two new species increase the Argentinian fauna for this genus to five species; likely many more exist in this country and elsewhere. Both new species of Argentinian *Trigonogenius* have the anterior margin of the prosternum expanded ventrally to various degrees (Figs. 2; 3; 6), which likely functions to help protect the mouthparts, possibly from ant attack. *Trigonogenius auris* represents the taxon with the most expansion of this structure, with *T. crenatus* having an intermediate form. *Trigonogenius globosus*, found globally, and undescribed *Trigonogenius* species from Peru display a completely diminished or reduced anterior margin, as well as a diminished prosternum overall. This prosternal enlargement is not unique within the Ptininae and is a defining characteristic of the New World genus *Prosternoptinus* Bellés 1985. Two Old World genera also have this feature that include species of *Silisoptinus* Pic 1917 and to a lesser extent *Sundaptinus* Bellés 1991.

Trigonogenius globosus displays a wide variety of setal color and shape, Major features such as size, pronotal features, and elytral shape are uniform across specimens, but color, pattern, and width of the dark basal maculations vary greatly. We include multiple specimens from the Americas to display this variety, including California, Ecuador, Peru, and Argentina (Fig. 4).

Nomenclature

The nomenclature of the cosmopolitan species of *Trigonogenius* spread via commerce has unknowingly been confused. The original description of *T. globulus* by Solier (1849) as a *Ptinus* species was based on three specimens collected in “Chili” [Chile], including one labeled as a variety *globosus* (that lacks the locality label). These types of the original *Trigonogenius globulus* in the Paris Museum were recently examined by the second author, confirming that two of them are what is known currently as *T. squalidus* Boieldieu. The specimen labeled as “variety *globosus*” is actually the well-known pest species referred to in numerous publications (e.g. Hinton, 1941) as *T. globulus*. Type specimens have been designated by Borowski, 2007: A lectotype and a paralectotype label (with the name *T. globulus*) has been added to the two specimens of *T. globulus* and the single specimen (the variety *globosus*) has a lectotype label (with the name *T. globosus*) added.

We clarify the taxonomy as follows. Borowski (2000) validated *T. globosus* (Solier) and synonymized four additional species, three *Trigonogenius* and one “*Niptus*.” He noted that *T. globulus* (Solier) is a rarely captured species and *T. globosus* (Solier) is the stored product pest species that has been spread globally. The latter species has been known until recently under *T. globulus* while the former is known as

T. squalidus Boieldieu. In a later publication (Borowski, 2006), he listed the valid species *T. squalidus* and its synonym *T. globulus*. While *T. globulus* is the older synonym, its original iteration, *Ptinus globulus* Solier (1849) is a junior homonym of *Ptinus globulus* Illiger (1807) and therefore permanently invalid. Hence *T. globulus* Solier should be considered a junior homonym with the replacement name of *T. squalidus* Boieldieu.



Fig. 6.

Differing prosternum sizes in four species of *Trigonogenius*.

- a. *Trigonogenius auris* n. sp. collected in Sta. Catalina, Jujuy province, Argentina. b. *Trigonogenius crenatus* n. sp. collected in Antofalla, Catamarca province, Argentina. c. *Trigonogenius* sp. collected in Ayacucho province, Peru. d. *Trigonogenius globosus* Solier collected in Camarones, Chubut province, Argentina.

Distribution

The cosmopolitan distribution of *T. globosus* has occurred through the global commerce of various foodstuffs, and this species has been

reported (as *T. globulus*) from all continents (except Antarctica), as well as various islands such as Jamaica, Tasmania, and New Zealand (Hinton, 1941; Borowski, 2006). Specimens analyzed in this study include those from Peru, Ecuador, Colombia, and California, USA (Figure 4). These records may possibly represent additional species of *Trigonogenius*. Notably, various Peruvian species have been reared in the lab on a ground dry dog food-oatmeal mix, evidence that many *Trigonogenius* species are generalists and have potential to be spread outside their native range in commercial foodstuffs.

Trigonogenius squalidus has been reported in coastal Peru (Giraldo-Mendoza 2021), but we believe this to be a different, undescribed species found locally near Ica and Paracas, in the Ica province. *T. squalidus* has also been reported far from its purported native distribution of Argentina and Chile, such as New Grenada [Colombia or near] (Borowski, 2006). If accurate and not a misidentification, this is almost certainly due to commerce as there is no xeric habitat connection between the Andes Mountains and the Northern edge of South America. This is certainly needed for a small flightless species of spider beetle with limited dispersal ability.

Key to the Argentinian *Trigonogenius* species

- 1- Elytra with a uniform color and longitudinal shallow grooves.....*T. auris* n. sp.
- 1'- Elytra with interspersed tan and brown setae and lacking visible grooves.....2
- 2(1')- Elytra about as wide as long*T. squalidus* Boieldieu
- 2'- Elytra longer than wide, more or less than 1.5 times as long as wide.....3
- 3(2')- Pronotum without accentuated grooves and ridges, almost smooth.....*T. globosus* Solier
- 3'- Pronotum with accentuated grooves and ridges.....4
- 4(3')- Setae clumped at base of elytra uniform and in a crenate pattern.....*T. crenatus* n. sp.
- 4'- Setae clumped at base of elytra non-uniform, thicker laterally.....*T. setosus* Borowski

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