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Ikaros navarretei (Coleoptera, Staphylinidae, Staphylininae), a new apterous rove beetle species from high elevations in Colombia

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Abstract

A new species of the xanthopygine genus *Ikaros* Chatzimanolis & Brunke, 2021 is described from Colombia: *Ikaros navarretei* **sp. nov.** Illustrations and a key are provided to identify the four known species of *Ikaros*.

Key Words

Northern Andean páramo, Cauca, Staphylinini, Xanthopygina, new species, taxonomy

Introduction

The Staphylinini rove beetle genus *Ikaros* was established by Chatzimanolis and Brunke (2021) for three species and placed in the subtribe Xanthopygina. *Ikaros* may be distinguished from other genera of this subtribe by the reduction of elytra exposing tergum II, absence of hind wings and by the abdomen constricted anteriorly and expanded posteriorly (Chatzimanolis and Brunke 2021). The apterous condition in rove beetles can occur in different environments, e.g. isolated islands (Jenkins Shaw and Solodovnikov 2016; Jensen et al. 2020), hypogean in caves or crevices of talus (Solodovnikov and Hansen 2016; Hu et al. 2020), or at high elevations like that of *Ikaros* (Chatzimanolis and Brunke 2021). A significant portion of alpine insect communities, especially Coleoptera, show various degrees of wing reduction (Mani 1968). Given that loss of wings lowers dispersal capacity and as a consequence leads to higher level of endemism, combined with high specialization to adapt to harsh environmental conditions of high mountains (Mani 1968), discovery of new species for an apterous genus from the Andes mountains with little known rove beetle biodiversity (Méndez-Rojas et al. 2012) was anticipated. One new species was found in the institutional collection and is described here with an update to the identification key for all four currently known species of *Ikaros*. Interestingly, despite the comprehensive phylogenetic analysis in Chatzimanolis and Brunke (2021), the sister group relationships of this genus are still unclear. Presumably, a better understanding of the diversity of this peculiar xanthopygine genus will facilitate our understanding of its affinities and diversification process related to wing loss in rove beetles at high elevations.

Materials and methods

Depositories

CNC Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario, Canada (A. J. Brunke)

The specimen was examined using a Leica M125 dissecting microscope (Leica Microsystems, Switzerland). Photos were taken using a Canon 5D Mark III fitted with the Canon MP-E 65mm f/2.8 1-5x Macro lens (Canon, Japan). To obtain high-resolution photos a stacking system (StackShot 3x, Cognisys, USA) was utilized taking 25 images then combined in Zerene Stacker (Zerene Systems, USA) using the PMax function.

Photos were further processed in Adobe Lightroom 2022 (Adobe, USA) and Adobe Photoshop 2022 to adjust colors and remove minor dust specks. Line drawings were made by digitally inking a photo using Adobe Illustrator 2022 adding details by careful examination in the microscope.

Label data are provided verbatim and square brackets ([]) enclose our comments. A slash (/) is used to divide separate labels. Georeferencing and obtaining the elevation were done with Google Earth Pro 7.3. The map was made with QGIS 3.22.1 (QGIS Development Team 2021) and edited with Adobe Photoshop 2022. The spatial information was obtained from the following resources: Bioclimatic variables 1 (annual mean temperature), 12 (annual precipitation) and elevation with a resolution of 30 s (Fick and Hijmans 2017), bodies of water (Lehner and Döll 2004), and ecoregions (Dinerstein et al. 2017). To extract the attributes of the spatial layers for the localities, the QGIS plugin "point sampling tool" was used.

A single dry specimen was first relaxed in warm soapy water, and then the aedeagus was removed from the inside of the abdomen for study. The aedeagus was cleared and stripped of excessive muscle layers by being placed in a 10% KOH solution, then rinsed with water, and finally placed in glycerin for preservation and later observation. Total body length was measured from the anterior margin of frons (thus excluding mouthparts) to the posterior margin of segment VIII; width: length ratio measurements were made on the widest and longest parts of each structure. Measurements were made with an ocular micrometer. All measurements were taken in millimeters. The terminology used for characters is the same as Chatzimanolis and Brunke (2021); that said, the original description of the genus and species (Chatzimanolis and Brunke 2021) used some ambiguous terms. Therefore, we here present our interpretation of these:

1. "*…the shape of the abdomen: constricted anteriorly and expanded posteriorly*". We interpreted this as the abdomen not being parallel-sided or evenly constricting posteriorly, but instead expanding until the posterior part of tergite V, where it is widest, then constricting towards the terminalia.
2. "*Pronotum … with stark polygon-shaped microsculpture*". We interpreted this as having clear isodiametric microsculpture.

Results

***Ikaros navarretei* sp. nov.**

http://zoobank.org/2C1E9003-82DD-4CF6-900D-16451E23B9E4

Type locality. Colombia, Cauca, Silvia, 2.5889, -76.24886, 3400 m a.s.l.

Generic placement. Our specimen fully agrees with the generic diagnosis and description provided by Chatzimanolis and Brunke (2021).

Diagnosis. *Ikaros navarretei* sp. nov. can be distinguished from all other species in this genus by the combination of the presence of an arch-like carina on terga III–V; the meshed to isodiametric microsculpture on the dorsal surface of the head, thorax, and mesoscutellum; antennomeres with crown-like macrosetae shorter than the length of antennomere.

Etymology. The species epithet is in recognition (patronymic) of José Luis Navarrete Heredia for his contribution to the knowledge of the family Staphylinidae and training of many coleopterologists in Latin America.

Type material. ***Holotype.*** Male, point mounted, with genitalia in a separate microvial, with labels as follows: "COLOMB. [COLOMBIA], 20 km E Silvia, Cauca, [~ 2.5889, -76.24886, 3400 m a.s.l.] VII.16.1970 [16 June 1970], II, 000' J.M. Campbell / Xantopygina sic? gen. det. Newton 1998 / HOLOTYPE *Ikaros navarretei* Reyes-Hernández, Hansen and Solodovnikov, des. Reyes-Hernández, Hansen and Solodovnikov 2022" CNC.

Description. Habitus as in Fig. 1A. Total body length 10.06 mm. Forebody length 5.25 mm long.

Coloration of body reddish-brown, with abdomen having undertones of metallic green-brown.

Head subrectangular, slightly wider than long, HW/HL ratio = 1.1. Epicranium with numerous large punctures, except impunctate center; punctures not contiguous, the distance between punctures typically equals the width of 1–2 punctures; with transversely meshed to isodiametric microsculpture (Fig. 1B). Labial palpus with palpomere 3 (apical) widest before the apex. Antennomeres with crown-like macrosetae shorter than length of antennomere.

Pronotum longer than wide, PW/PL ratio = 0.9; surface of pronotum with a median impunctate area as wide as 3–5 punctures; with multiple rows of irregular punctures in addition to rows flanking impunctate center; with meshed to isodiametric microsculpture (Fig. 1C).

Elytra shorter than pronotum, EL/PL ratio = 0.83. Elytra with large, deep punctures, the distance between punctures equals to width of 0.5–2 punctures; only with isodiametric microsculpture at mesoscutellum, disc of elytra with micropunctuation (Fig. 1D).

Abdominal terga III–V with arch-like carina (Fig. 1E), arch-like carina on terga IV and V nearly straight. Male secondary sexual structures with very shallow emargination on sternum VII; with deep, broad V-shaped emargination on sternum VIII; borders of emargination on sterna VII and VIII appearing 'shaved' (with no setae); lateral tergal sclerites IX subcylindrical and the same length as sternum IX; tergum X subtruncate medio-apically; sternum IX with basal portion symmetrical, about 0.57× as long as distal portion and subtruncate apically.

Aedeagus as in Fig. 2; in parameral view apex of paramere nearly reaching apex of median lobe (Fig. 2A); paramere broadest at the middle of its length, converging to rounded tip (violin-like shape), characteristic arrangement of peg setae in two sublateral rows containing 4–5 setae with an additional single setae closer to apex (Fig. 2B); in lateral view paramere narrower apically; median lobe in dorsal view narrowing to small, rounded apex; in

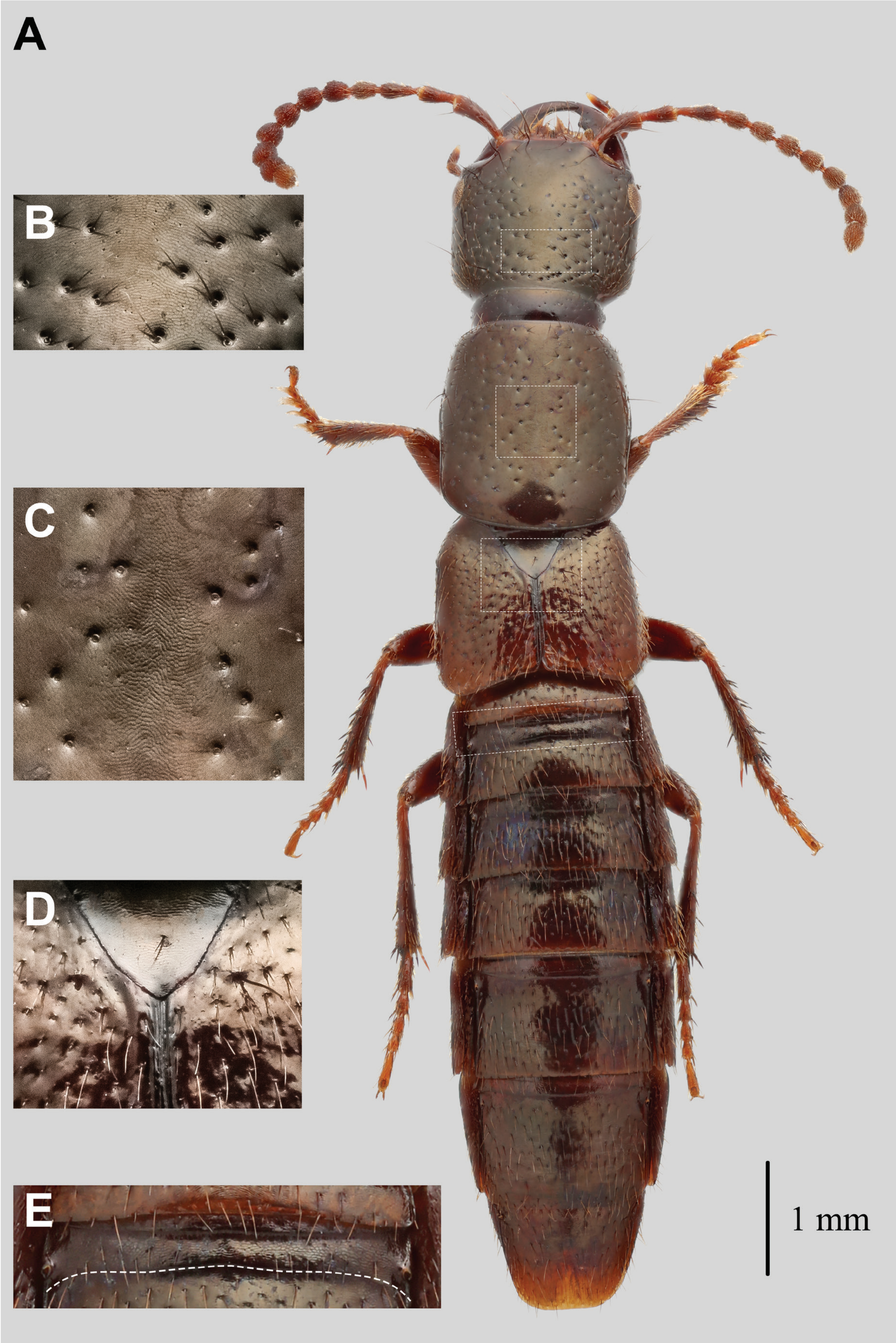

Figure 1. Dorsal view of *Ikaros navarretei* sp. nov. **A.** Habitus; **B.** Close up of head punctation and meshed to isodiametric microsculpture; **C.** Close up of pronotum punctation and meshed to isodiametric microsculpture; **D.** Close up of mesoscutellum and elytra punctation and microsculpture; **E.** Close up of abdominal tergite III with arch-like carina highlighted by white dashed line.

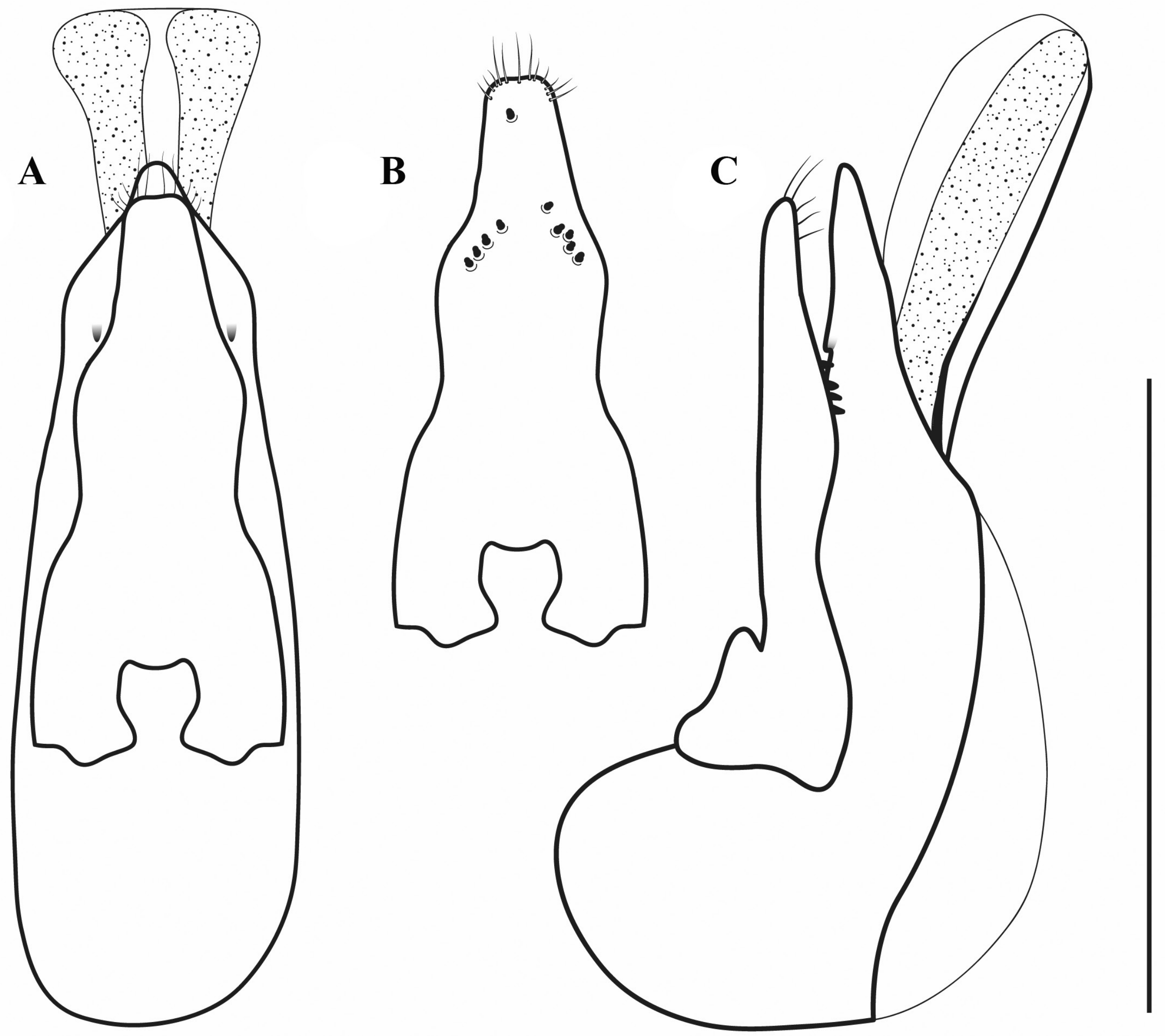

Figure 2. Aedeagus of *Ikaros navarretei* sp. nov. **A.** Aedeagus in parameral view; **B.** Paramere in antiparameral view with peg setae; **C.** Aedeagus in lateral view. Scale bar: 1 mm.

lateral view, median lobe becoming narrower near apex, with one subapical tooth (Fig. 2C).

Distribution and habitat. Known only from the type locality near Silvia in the Cauca Department, Colombia (Fig. 3).

Note. In *Ikaros navarretei* sp. nov. a structure which we call the arch-like carina on the abdominal terga for the sake of compatibility with other literature on Xanthopygina, appears to be somewhat similar to a structure usually called in the Staphylinini literature as the posterior basal tergal carina (PBTC). This is a very different condition from other species of *Ikaros* and, as far as we are aware, all other Xanthopygina where the arch-like carina is more of a curved fragment that does not reach the spiracles as in the PBTC.

Key to the species of *Ikaros* after Chatzimanolis and Brunke (2021)

1 Abdominal terga III–V with arch-like carina 2
– Abdominal terga III–V without arch-like carina.......... 3
2 Crown-like macrosetae of antennae long (as least twice as long as antennomeres). Arch-like carina on terga IV and V distinctly curved. Paramere almost parallel side converging to broad rounded tip; median lobe in lateral view without subapical tooth (see Fig. 5 in Chatzimanolis and Brunke 2021).......... *I. polygonos*
– Crown-like macrosetae of antennae short (not even as long as antennomeres). Arch-like carina on terga IV and V nearly straight. Paramere with violin-like shape; median lobe in lateral view with subapical tooth (Fig. 2) .... *I. navarretei* sp. nov.
3 Disc of pronotum with only a short dorsal row of a few punctures .... *I. apteros*
– Disc of pronotum with multiple long rows of punctures .... *I. paramo*

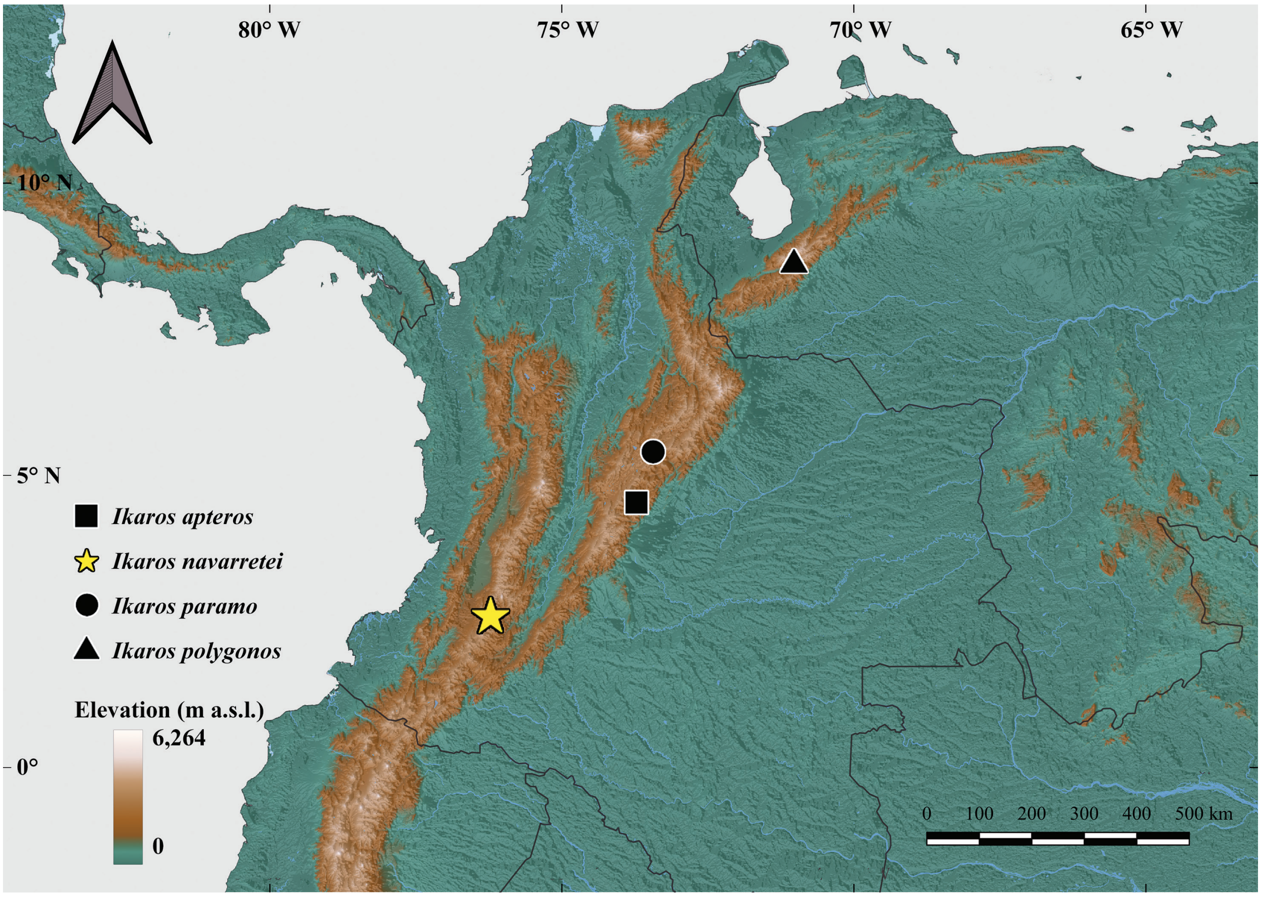

Figure 3. Distribution of *Ikaros*. Elevation colored from green (low) across brown (middle) to white (high). Black square (■) *Ikaros apterus*. Yellow star (★) *Ikaros navarretei* sp. nov.. Black circle (●) *Ikaros paramo*. Black triangle (▲) *Ikaros polygonos*.

Table 1. *Ikaros* genus species' habitat, geographical and environmental characteristics.

Species	Coordinates (Latitude, Longitude)	Elevation (m a.s.l.)	Annual mean temperature (°C)	Annual precipitation (mm)	Ecoregion	Biome
Ikaros apteros	4.5166, -73.7501	3230	9.2	1543	Northern Andean páramo	Montane Grasslands & Shrublands
Ikaros navarretei sp. nov.	2.5889, -76.2488	3400	8.3	1623	Northern Andean páramo	Montane Grasslands & Shrublands
Ikaros paramo	5.7040, -73.4380	3500	8.4	971	Northern Andean páramo	Montane Grasslands & Shrublands
Ikaros polygonos	8.6277, -71.0085	3400	9.4	921	Cordillera de Merida páramo	Montane Grasslands & Shrublands

Discussion

According to the georeferencing that was carried out from the collection data of all the *Ikaros* species, the altitude range where they are found is from 3000 to 3600 m a.s.l. The genus is found in ecoregions characterized by shrubby páramo in the Montane Grasslands and Shrublands biome (Dinerstein et al. 2017; Chatzimanolis and Brunke 2021). Information on the environmental conditions in which the *Ikaros* species is found is provided in Table 1.

As species of this genus are rarely collected and poorly represented in collections, much is still unknown about their biology, systematic position, and conservation status. As the Andes are one of the most important conservation hotspots due to their high species richness and endemism (Myers et al. 2000; Larsen et al. 2011), efforts to discover new endemic apterous species in sites such as these are of high priority. In the case of the rather enigmatic genus *Ikaros*, a complete species inventory is also an opportunity to resolve its phylogenetic position and study the evolution of morphological characters in Xanthopygina associated with adaptations to alpine habitats.

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