

## RESEARCH ARTICLE

## The enigmatic *Megalopinus* fauna of Arizona (USA) – New distributional records and description of a new species (Coleoptera: Staphylinidae: Megalopsidiinae)

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### Abstract

Three species of the rove beetle genus *Megalopinus* Eichelbaum, 1915 are reported from Arizona, USA. One species, *Megalopinus billi* Mainda, spec. nov., is described from the Patagonia Mountains (Santa Cruz County) and Gardner Canyon (Pima County). *Megalopinus lingafelteri* Mainda, 2023 is recorded from two additional localities; the female is described and illustrated here for the first time. Finally, *Megalopinus rufipes* (LeConte, 1863) is confirmed from Arizona for the first time.

### Keywords

Rove beetles | taxonomy | faunistics | sky islands | Madrean Region

## 1 Introduction

The enigmatic rove beetle genus *Megalopinus* Eichelbaum, 1915 is currently represented in the United States by four species (Mainda 2023). Among these, only *Megalopinus lingafelteri* Mainda, 2023, has been documented in Arizona. This particular species was described from a single male specimen collected in an oak savanna in Cochise County, southern Arizona.

Southern Arizona is situated at the interface between the Sonoran and Chihuahuan deserts and constitutes part of the Madrean Sky Islands Archipelago. The region is characterized by numerous isolated mountain ranges that generate cooler and more humid “sky islands” within the surrounding desert landscape (Warshall 1994), predominantly composed of pine and oak woodlands. During the late Pleistocene (ca. 90,000–20,000 years BP),

the region experienced cooler climatic conditions, which facilitated the connection of many mountain ranges through extensive forests (Favé et al. 2015). However, between approximately 20,000 and 10,000 years BP, increasing temperatures led to the expansion of desert habitats, resulting in the isolation of both the mountain ranges and their associated biota (Favé et al. 2015). Notably, this pattern appears to be less applicable to the *Megalopinus* species inhabiting this area than might be anticipated.

Species of *Megalopinus* are generally associated with decaying wood in humid habitats (e.g., Leschen & Newton 2003, Mainda 2025, Mainda et al. 2026). Their occurrence in the cool semiarid environments of southern Arizona underscores the ecological significance of the Madrean Sky Islands for saproxylic beetles. The description of *M. lingafelteri* based on a single male



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specimen was justified despite the limited material, as discussed in detail by Mainda (2023) with reference to the discovery histories of closely related species.

Descriptions of species based on single specimens are inherently incomplete. Such records may merely reflect incidental findings, and conclusions regarding ecology, distribution, intraspecific variation, and sexual dimorphism remain tentative. This issue is particularly pertinent to *Megalopinus*, where sexual dimorphism and intraspecific variation can be significant (e.g., Puthz 2012). Fortunately, two additional specimens of *M. lingafelteri* have since become available, offering new insight into the species' distribution, intraspecific variation, and sexual dimorphism.

Furthermore, this study introduces a second new species of *Megalopinus* from southern Arizona. Similar to *M. lingafelteri*, this species is part of the *peploides*-group (Puthz 1994, 2012), a distinctive assemblage of small *Megalopinus* species traditionally classified under the subgenus *Megalopsidiella* Bernhauer, 1933 (Bernhauer 1933, Benick 1951). The defining characteristics of this group include a body length below 3.2 mm, a head narrower than or at most as wide as the pronotum, comparatively small and obliquely positioned eyes, absence of transverse pronotal furrows, elytra with deep furrows and/or rows of punctures, and a bilaterally symmetrical aedeagus lacking sclerotized internal structures and bearing simple parameres.

Recent studies of *Megalopinus* have predominantly utilized species groups rather than subgenera as the principal structure for representing the species diversity (e.g., Puthz 2012). However, the validity and taxonomic status of the currently recognized subgenera remain unresolved. Phylogenetic analyses are necessary to assess the monophyly of these species groups and to determine whether the existing subgenera should be retained, synonymized, or reclassified at different taxonomic levels.

Despite the availability of only one male and one female specimen of the new species, this material allows for a direct evaluation of sexual dimorphism. Alongside the newly acquired specimens of *M. lingafelteri* and the initial record of *M. rufipes* in Arizona, these findings significantly enhance our understanding of the diversity, ecology, and biogeography of *Megalopinus* in the Madrean Sky Islands. Although this study is primarily taxonomic, it underscores the significance of this region for the genus.

## 2 Material and methods

**Material:** The material mentioned below is deposited in the following collections: **ASUHIC** – Arizona State

University, Hasbrouck Insect Collection, Tempe, Arizona, USA; **cTM** – collection Tobias Mainda, Greifswald, Germany.

**Methods:** The morphological studies were carried out using a stereoscopic microscope (Euromex DZ 1105) and a compound microscope (Euromex BB.1153.PLI). Habitus images were obtained using the BK PLUS Lab system with a customized Canon MPE 65 mm 1-5x micro-photography lens mounted on a Canon 6D camera. The images of the aedeagi were obtained using a Touptek microscope camera (ToupCam 14MP) attached to the Euromex BB.1153.PLI.

All labels are transcribed verbatim. For each specimen, the complete text of each individual label is enclosed in quotation marks ("); different labels are separated by a double slash (//); different lines are separated by a single slash (/); handwritten label data are indicated by [hw] following the respective text in the cited label.

The description of the elytral puncture-rows follows earlier papers of the first author. In addition, the sublateral complex (**slr-c**) is herein defined as a group of scattered punctures not arranged in a distinct sublateral row.

The following abbreviations are used: **BL** – length of body (from anterior edge of eyes to tip of abdomen); **dsr** – dorsal row; **EL** – maximum length of elytra; **EW** – maximum width of elytra; **FBL** – length of forebody (from anterior edge of eyes to posterior margin of elytra); **HW** – maximum head width; **DE** – distance between eyes (in middle of eye length); **PL** – maximum pronotal length; **PW** – maximum pronotal width; **shr** – subhumeral row; **SL** – sutural length of elytra; **slr-c** – sublateral complex; **ssr-c** – subsutural-complex.

## 3. Description of new species

### *Megalopinus billi* Mainda, spec. nov.

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(Figs 1–3)

**Type specimens:** **Holotype** ♂: white label 'USA: AZ: Santa Cruz Co. / 3.7 rd. mi. SE of Patagonia / on Harshaw Rd.; 31.5163° / -110.7043°; Jul. 24-Aug. 6. / 2019; V-flight intercept / trap; W. B. Warner' // red label '♂ – HOLOTYPE / *Megalopinus billi* / spec. nov. / design. Mainda 2026' (ASUHIC); **Paratype** ♀: white label 'USA: AZ: Pima Co.; 0.3 km / W Hwy. 83 on Gardner / Cyn. Rd.; 4722' 31.7367° / -110.6663°; July. 5-Aug. / 6, 2019; V-flight inter- / cept trap; W. B. Warner' // yellow label '♀ – PARATYPE / *Megalopinus billi* / spec. nov. / design. Mainda 2026' (cTM).

**Description of the holotype:** Measurements in mm: BL: 2.60, DE: 0.44, EL: 0.85, EW: 0.98, FBL: 1.60, HW: 0.70, PL: 0.63, PW: 0.73, SL: 0.70.

**Habitus** as in Fig. 1. Head reddish-brown, with blackish hue; pronotum reddish-brown, with blackish hue mainly in anterior half; elytra reddish-brown; tergites III-VI reddish-brown, with blackish hue at anterior and posterior margins; tergites VI-X light brown; paratergites brownish; legs unicolorous light brownish; tarsi orange-brownish; antennae orange-brownish, slightly darker than tarsi; microsculpture absent.

**Head** 0.71 times as broad as elytra, 0.96 times as broad as pronotum. Frons coarsely punctured; diameter of punctures as large as basal cross-section of antennomere III; interstices larger than diameter of punctures.

**Pronotum** 1.16 times as broad as long, widest in anterior third; posterior half with smooth, slightly elevated, anchor-shaped median carina; each lateral extremity of carina with large puncture approximately equal in diameter to median cross-section of antennomere II; diameter of smallest punctures as large as basal cross-

section of antennomere III; smooth posterior margin preceded by row of larger punctures; punctures always separate. Each side of pronotum with two distinct denticles in anterior third, and one indistinct denticle in posterior half.

**Elytra** 1.15 times as broad as long, broadest at middle; humeral calli prominent; each elytron with two narrow, elongate, indistinct oblique impression in posterior sutural third, extending from suture toward posterior margin; punctures on left elytron: slr-c (5), shr (13), dsr (10), ssr-c (3); punctures on right elytron: slr-c (6), shr (8), dsr (10), ssr-c (4); lateral margins convexly rounded anteriorly and posteriorly.

**Abdomen** broader than head, shiny; with distinct paratergites; basolateral striae of tergite V extending beyond middle of tergite length, not reaching posterior margin; tergite VII with membranous fringe at posterior margin (metathoracic wings fully developed).

**Male:** Antennomere XI 3.7 times as long and 1.4 times as wide as antennomere X (Fig. 1). Sternite VIII with convex posterior margin; tergite VIII with slightly



**Figures 1–2.** Habitus of *Megalopinus billi* spec. nov., male holotype (1); female paratype (2); scale = 1mm.

concave posterior margin; sternite IX spatula-shaped; tergite X finely and densely punctured. Aedeagus (Fig. 3) without sclerotized internal structures; apical portion concavely narrowed toward blunt apex; parameres slightly longer than median lobe, weakly incurved apically, with 3-4 longer setae.

**Female:** Antennomere XI 3.3 times as long and 1.4 times as wide as antennomere X (Fig. 2). Sternite VIII with slightly pointed posterior margin.

**Variation:** Elytral punctures of female paratype: punctures on left elytron: slr-c (3), shr (10), dsr (7), ssr-c (0); punctures on right elytron: slr-c (3), shr (9), dsr (7), ssr-c (0). Smooth, slightly elevated, anchor-shaped median carina in posterior half of pronotum more prominent in female paratype than in male holotype.



**Figure 3.** Aedeagus of *Megalopinus billi* spec. nov., male holotype; without scale.

**Comparative notes:** *Megalopinus billi* spec. nov. might be related to some larger species of the *peplodes*-group (Puthz 1994, 2012) with unicolorous elytra and non-confluent pronotal punctures. It is distinguished from *Megalopinus ogloblini* (Bernhauer, 1933), *Megalopinus paraguayanus* Puthz, 1984 and, *Megalopinus pumilio* Puthz, 2012 by a more densely punctured pronotum with narrower planar carina and slightly more densely punctured frons. The new species is separated from *Megalopinus ashei* Puthz, 1994 and *Megalopinus castaneus* Puthz, 1994 by a larger body size, slightly more sparsely punctured pronotum, more regularly punctured elytra, and an apically rounded apex of the median lobe of the aedeagus (more pointed in *M. ashei*, male unknown in *M. castaneus*). *Megalopinus billi* spec. nov. differs from *M. lingafelteri* by its larger body size, slightly larger eyes, the presence of a sublateral row complex of punctures, metatarsomere I distinctly longer than metatarsomere II, a rounded apex of the median lobe of the aedeagus (acuminate in *M. lingafelteri*), and a more elongate antennomere XI in males.

**Distribution:** *Megalopinus billi* spec. nov. is currently known from the Patagonia Mountains (Santa Cruz County) and from a section of Gardner Canyon Road in Pima County, Arizona, USA.

**Habitat and collecting method:** The holotype was collected during the wet monsoon season using a flight intercept trap in the northern foothills of the Patagonia Mountains along Harshaw Road at approximately 1,300 m elevation. The road traverses a narrow valley lined with evergreen oak woodlands (Fig. 7). The female paratype was collected during the wet monsoon season in a broad, flat, wooded wash near Arizona State Route 83 in Gardner Canyon, east of the Santa Rita Mountains, at approximately 1,400 m elevation, using a flight intercept trap (Fig. 6).

**Etymology:** The species epithet ‘*billi*’ (genitive) honors the collector of the new species, William (“Bill”) B. Warner (Chandler, Arizona), in recognition of his outstanding contributions to the knowledge of the *Megalopinus* fauna of Arizona.

## 4 New records

### *Megalopinus lingafelteri* Mainda, 2023

*Megalopinus lingafelteri* Mainda, 2023: 18-19.  
(Figs 4, 5)

**Material examined:** **Holotype** ♂: white label ‘USA: Arizona: Cochise Co. / Hereford: 8920 S. Bryerly Ct. / N 31°24’14”, W 110°13’52” / 1500m, 15 Aug - 15 Sept 2021 / V-FIT - Steven W. Lingafelter’ // red label ‘♂ – HOLOTYPE / *Megalopinus lingafelteri* / nov. sp. / design. Mainda 2023’ (cTM); **Non-type material:** 1 ♀: white

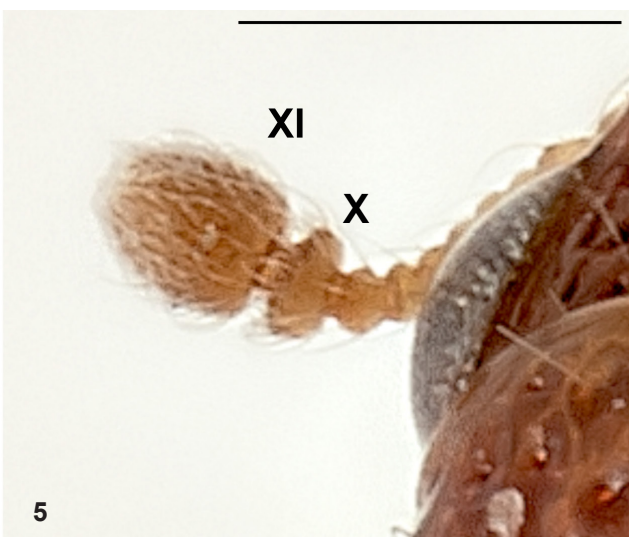
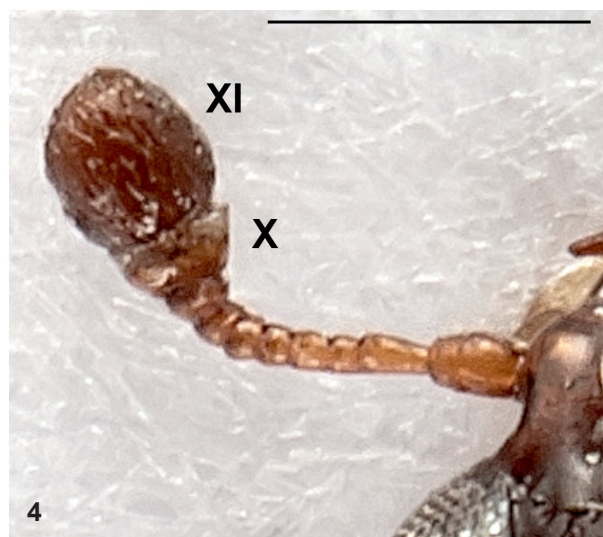
labels 'ARIZONA: Cochise Co. / Chiricahua Mountains / Southwestern Research Station / 31°53.006'N, 109°12.355'W / 1645m 12-16 July 2023 / C. Carlton V-FIT trap' // 'Megalopinus [hw] / lingafelteri [hw] / Mainda [hw] / Det. S. W. Lingafelter 2023' (ASUHC); 1 ♀: white labels 'USA: AZ: Santa Cruz Co. / 3.7 rd. mi. SE of Patagonia / on Harshaw Rd.; 31.5163° / -110.7043°; Jul. 24-Aug. 6. / 2019; V-flight intercept / trap; W. B. Warner' // 'MEGALOPINUS [hw] / det. W. B. Warner 2022' (cTM). All non-type specimens with additional white label '*Megalopinus lingafelteri* / Mainda, 2023 / det. Mainda 2026'.

**Measurements of ♂ holotype in mm (see note in Section 2):** BL: 2.40, DE: 0.36, EL: 0.80, EW: 0.93, FBL: 1.40, HW: 0.61, PL: 0.56, PW: 0.66, SL: 0.69. **Measurements of ♀ specimens in mm:** Cochise County:

BL: 2.10, DE: 0.40, EL: 0.75, EW: 0.87, FBL: 1.40, HW: 0.62, PL: 0.60, PW: 0.68, SL: 0.62; Santa Cruz County: BL: 2.30, DE: 0.39, EL: 0.74, EW: 0.85, FBL: 1.45, HW: 0.63, PL: 0.58, PW: 0.65, SL: 0.63.

**Sexual dimorphism of antennomeres:** In both, male and female, antennomere XI is 3.6 times as long and 1.5 times as wide as antennomere X. However, antennomere XI is more spherical in males (Fig. 4), whereas in females it is slightly more elongate and weakly narrowed apically (Fig. 5).

**Variation of elytral punctures:** Holotype - left elytron: shr (13), dsr (14); right elytron: shr (14), dsr (12). Chiricahua Mountains ♀ - left elytron: shr (11), dsr (8); right elytron: shr (10), dsr (6). Patagonia Mountains ♀ - left elytron: shr (11), dsr (10); right elytron: shr (10), dsr (10).



**Figures 4–5.** Antennomeres XI and X of *Megalopinus lingafelteri*, male holotype (4); female from Chiricahua Mountains (5); scale = 0.25 mm.



**Figures 6–7.** Flight intercept trap, Gardner Canyon, August 2019 (6); surrounding of the collecting site in the Patagonia Mountains (7); photos: William B. Warner.

**Distribution:** This species is currently known only from southern Arizona, where it has been recorded from the Chiricahua Mountains and the foothills of the Huachuca Mountains in Cochise County (Mainda 2023: Fig. 2), as well as from the Patagonia Mountains in Santa Cruz County (Fig. 7). The currently known records indicate that the distribution of this species might not be restricted to a single mountain range within the Madrean Sky Islands. Rather, it could occur more widely throughout the archipelago, including adjacent areas of New Mexico (USA) and the Mexican states of Sonora and Chihuahua, wherever suitable habitats are present.

### *Megalopinus rufipes* (LeConte, 1863)

*Megalops rufipes* LeConte, 1863: 51.

**Specimen studied:** 1 ♂: white labels 'USA: Arizona: Cochise Co. / Hereford: 8920 S. Bryerly Ct. / N 31°24'14", W 110°13'52" / 1500m, 27 Jul - 8 Aug 2019 / V-FIT - Steven W. Lingafelter' // 'Megalopinus [hw] / rufipes ? [hw] / (LeConte) [hw] / Det. S. W. Lingafelter 2021' // 'Megalopinus rufipes / (LeConte, 1863) / det. Mainda 2026' (cTM).

**Habitat and collecting method:** The specimen was collected using a flight intercept trap during the monsoon season on the collector's property in the foothills of the Huachuca Mountains, within the upper transition zone of an oak savanna (Mainda 2023: Fig. 2).

**Distribution:** Newton (2026) also lists the species from Arizona, apparently referring to Puthz (2012), although no specific source is cited for the distribution in Arizona. Since Puthz (2012) does not report the species from Arizona, the Cochise County record presented here constitutes the first confirmed published record from the state. The first record from Arizona is consistent with the known distribution of this widespread species in the USA, which, according to Puthz (2012), includes the following states: Alabama, Florida, Georgia, Indiana, Louisiana, Maryland, Missouri, North Carolina, South Carolina, Texas, and Virginia. It is also known from a single male specimen from Sinaloa, Mexico. Its occurrence in the western Mexican state of Sinaloa on the Gulf of California suggests that the species may be widespread in northern Mexico as well, provided suitable habitats are available.

**Note:** The coloration and punctuation of the elytra are illustrated in Fig. 97, and the aedeagus in Fig. 337 of Puthz (2012).

## Acknowledgement

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## References

- Benick, L. (1951): Spezielles und Allgemeines über die Subfam. Megalopsidiinae (Col. Staph.). *Entomologische Blätter für Biologie und Systematik der Käfer* 47: 58–87.
- Bernhauer, M. (1933): Neue Staphyliniden aus Argentinien (I) (Col.). *Revista de Entomologia* 3(3): 326–334.
- Favé, M.-J., Johnson, R. A., Cover, S., Handschuh, S., Metscher, B. D., Müller, G. B., Gopalan, S. & Abouheif, E. (2015): Past climate change on Sky Islands drives novelty in a core developmental gene network and its phenotype. *BMC Evolutionary Biology* 15: 183. <http://doi.org/10.1186/s12862-015-0448-4>.
- Leschen, R. A. B. & Newton, A. F. (2003): Larval description, adult feeding behavior, and phylogenetic placement of *Megalopinus* (Coleoptera: Staphylinidae). *The Coleopterists Bulletin* 57(4): 469–493.
- Mainda, T. (2025). Three species of *Megalopinus* Eichelbaum, 1915 from Central Laos (Coleoptera, Staphylinidae, Megalopsidiinae). *Baltic Journal of Coleopterology* 25(2): 317–323. [doi.org/10.59893/bjc.25\(2\).018](https://doi.org/10.59893/bjc.25(2).018)
- Mainda, T., Gogoi, H., Dobiam, T., Singh, S. & Betz, O. (2026): The genus *Megalopinus* Eichelbaum, 1915 in Arunachal Pradesh, India (Coleoptera: Staphylinidae: Megalopsidiinae). *Soil Organisms* 98(1): 91–99.
- Newton, A. (2026). StaphBase (version Aug 2022). In O. Bánki, Y. Roskov, M. Döring, G. Ower, D. R. Hernández Robles, C. A. Plata Corredor, T. Stjernegaard Jeppesen, A. Örn, T. Pape, D. Hobern, S. Garnett, H. Little, R. E. DeWalt, J. Miller, T. Orrell, & R. Aalbu, Catalogue of Life (2026-06-19 XR). Catalogue of Life Foundation, Amsterdam, Netherlands. [doi.org/10.48580/d3gk](https://doi.org/10.48580/d3gk) (accessed 8 July 2026)
- Puthz, V. (1994): Die Gruppe des *Megalopinus peploides* (Sharp) (Coleoptera, Staphylinidae). *Entomologische Blätter* 90: 16–34.
- Puthz, V. (2012): Über die neuweltlichen *Megalopinus*-Arten (Coleoptera, Staphylinidae). *Linzer Biologische Beiträge* 44(1): 613–834.
- Warshall, P. (1994): The Madrean Sky Island Archipelago: a planetary overview. In: DeBano, L., Ffolliott, P., Ortega-

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*Biodiversity and Management of the Madrean Archipelago:  
The Sky Islands of Southwestern United States and  
Northwestern Mexico.* – Fort Collins: US Department of  
Agriculture, Forest Service: 6–18.

