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Notes on *Megatharsis buckleyi* Waterhouse, 1891 (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini)

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초록

Megatharsis buckleyi Waterhouse, 1891은 Phanaeini족에 속하는 1속 1종의 단형속(單型屬) 종으로, 오랫동안 에콰도르 북부의 제한된 지역에만 분포하는 희귀한 쇠똥구리로 알려져 왔다. 최근 인접 국가에서의 추가 기록이 간헐적으로 보고되기 시작하였으나, 구체적인 생태와 생활사에 대해서는 여전히 알려진 바가 거의 없다. 본고에서는 *M. buckleyi*의 분포와 생태에 관한 기존 연구를 간략히 정리하고, 에콰도르 동부 지역의 나포 강 상류에서 채집된 표본을 새롭게 보고한다. 또한 기존에 제시되지 않았던 수컷 외생식기의 사진을 제공하며, Waterhouse (1891)의 원기재를 바탕으로 특징적인 형질을 간략히 소개하였다.

Abstract

Megatharsis Waterhouse, 1891 is a monotypic genus of the tribe Phanaeini, represented solely by *Megatharsis buckleyi* Waterhouse, 1891, which has long been regarded as a rare dung beetle restricted to a limited area in northern Ecuador. Although additional records from neighboring countries have been reported sporadically in recent years, its ecology and life history remain poorly understood. In this paper, we briefly review the published information on the distribution and ecology of *M. buckleyi* and report newly collected specimens from the upper Río Napo in eastern Ecuador. We also provide the first photographs of the male genitalia and briefly summarize the diagnostic morphological characters based on the original description by Waterhouse (1891).

Keywords: Scarabaeidae, Phanaeini, *Megatharsis*, *Dendropaemon*, Myrmecophily, Ecuador.

Introduction

Megatharsis buckleyi Waterhouse, 1891 is the sole representative of the monotypic genus *Megatharsis* within the tribe Phanaeini. For more than a century following its original description, the species was believed to be restricted to a limited area in northern Ecuador. Its distribution was later extended to southeastern Peru (Larsen et al., 2006), and subsequent studies provided a comprehensive review of the species, including the reexamination of historical specimens collected in Brazil (Gillett et al., 2009).

Despite these advances, the biology of this small and rarely encountered dung beetle remains almost entirely unknown. Most known specimens have been collected only occasionally using flight interception traps (FIT), and its apparent rarity in nature has further hindered ecological and biological investigations.

This paper provides a brief overview of *M. buckleyi* and reports a pair of specimens collected from the upper Napo River in Napo Province, eastern Ecuador, representing a new locality beyond the previously documented distribution. In addition, photographs of the male genitalia, which have not been illustrated in detail in previous studies, are presented. As the original description by Waterhouse (1891) provides a remarkably accurate and detailed diagnosis of the species, the morphological account presented herein is limited to several distinctive external characters rather than a complete redescription.

Materials & Methods

Photographs of the specimens were taken using a digital camera Canon EOS R6 Mark III with a macro lens AstrHori 25mm F2.8 Macro lens Image stacking was processed using Zerene Stacker and editing was processed using Adobe Photoshop (Adobe Inc. San Jose, CA, USA) Morphology was examined using a Leica S4E microscope.

Examined specimens are deposited in

GJC Gooyoung Jeong Collection, Daejeon, Republic of Korea

Taxonomy

Family Scarabaeidae

Subfamily Scarabaeinae

Tribe Phanaeini

Genus *Megatharsis*

Megatharsis buckleyi

Materials Examined. 1♂1♀ (Figs. 1, 2, 4): Ecuador: Napo Prov., Archidona Canton, Near Yanayaku Waterfall (FIT) X.2023-IV.2024 (GJC). 1 unsexed specimen: Ecuador: Morona

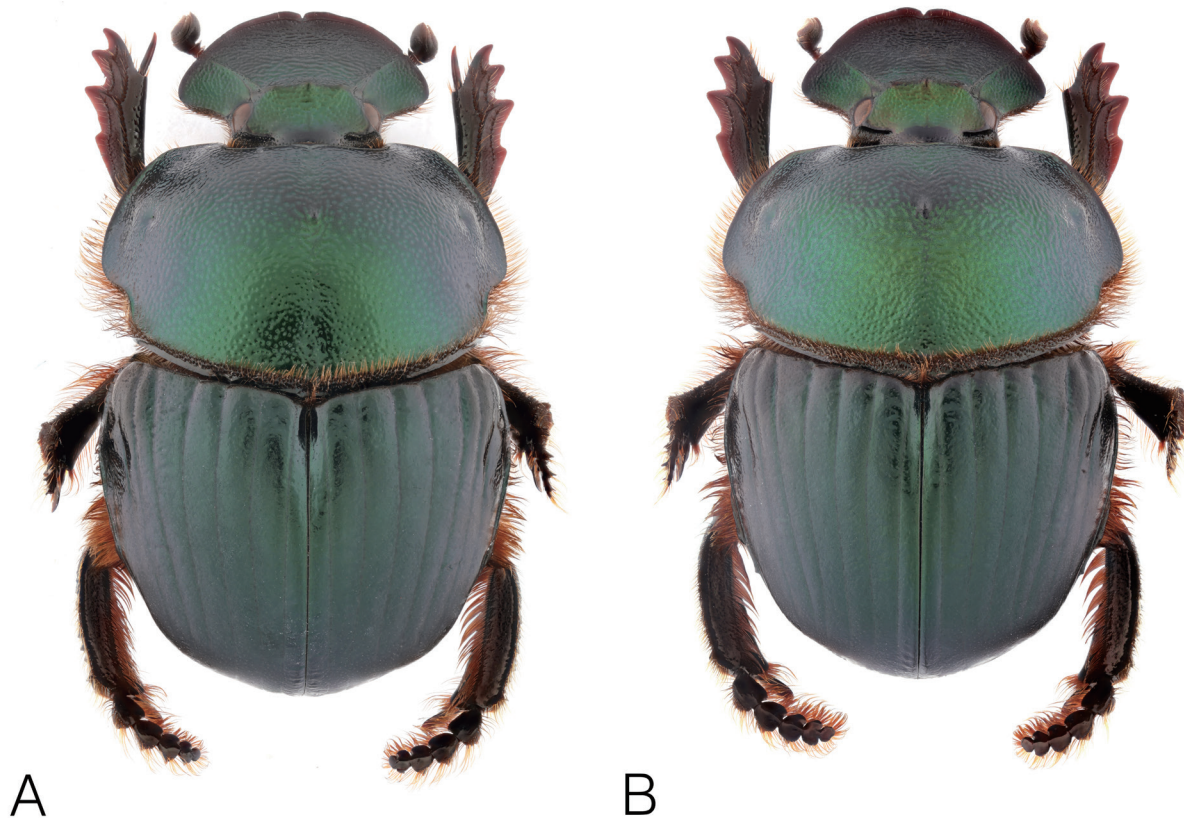


Figure 1. Dorsal habitus of *Megatharsis buckleyi*. (A) Male dorsal view; (B) Female dorsal view.

Santiago Prov., Santa Rosa, Wapula River Bridge IV.2023 (-2.196823; -78.069450 (FIT)
IV.2023 (GJC)

Diagnosis. Body rotundately oval, strongly convex, shiny, predominantly aeruginous, with the ventral surface more or less infusate. Head black anteriorly, densely rugose; frons bearing a transverse carina with a small median tubercle; vertex punctate. Pronotum densely punctate and slightly rugulose, with a dark black discal spot anteriorly; lateral and basal margins fringed with fulvous setae. Elytra rather dull, with moderately broad and shallow striae, the striae becoming deeper toward the base; interstriae nearly flat, finely and indistinctly punctulate, convex and suffused with black only at the base. Abdomen very short, with fringes of dense hair beneath, with four acute tubercles on each side, projecting beyond the margin of the elytra. Legs piceous with an aeruginous sheen; ventral surfaces more or less aeruginous, densely fringed with long fulvous setae. Pygidium densely punctate.

Description. Male genitalia: The genitalia gradually taper toward the apex without any distinct curvature, with the apical portion forming a gently rounded profile in lateral view. The paramere lack any conspicuous projecting processes or other specialized structures and are generally similar in shape to those of *Dendropaemon convexus*.

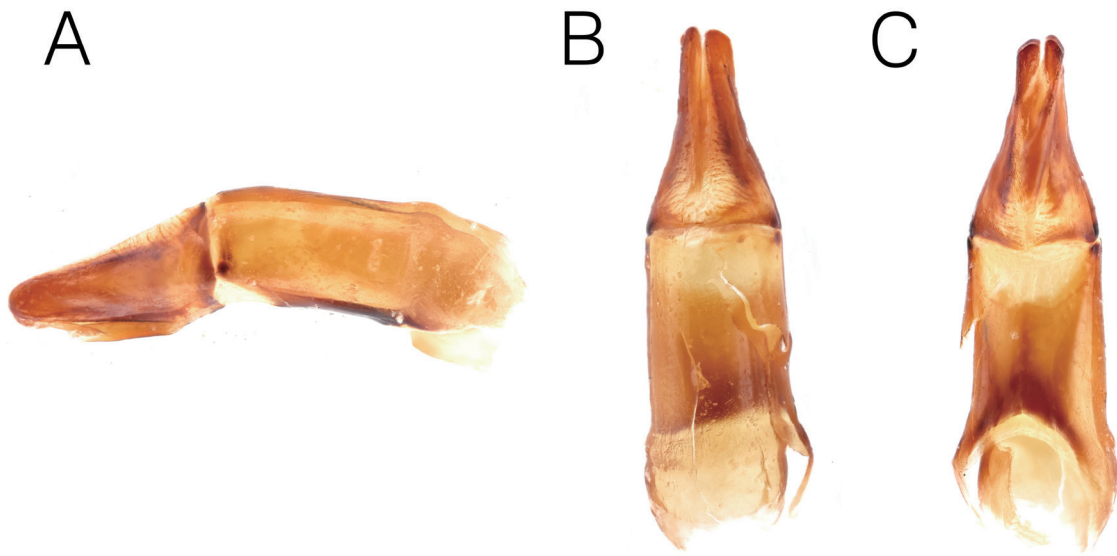


Figure 2. Male genitalia of *Megatharsis buckleyi*. (A) lateral view; (B) dorsal view; (C) ventral view.



Figure 3. Dorsal habitus of *Dendropaemon convexus*.

Comparison species: *Dendropaemon convexus*

Material examined. *D. convexus* (Fig. 3): BRAZIL: Minas Gerais State, Lavras Mun. XII.2010 (GJC)

Discussion

Distribution. Although the type locality of *M. buckleyi*, Chiquinda in Ecuador, is situated at an elevation exceeding 2,000 m in the Andean highlands, all recently collected specimens indicate that the species primarily inhabits the lowland Amazonian rainforest along the eastern foothills of the Andes. Gillett et al. (2009) suggested that this apparent discrepancy most likely resulted from inaccurate locality data, reflecting the limitations of specimen trading and documentation during the nineteenth century when the type material was obtained by Clarence Buckley. A comparable situation can be seen today, where specimens collected from various localities in the Peruvian Amazon are frequently distributed with Iquitos as the recorded locality.

In this paper, two recent observations made in the Napo and Santiago-Morona regions of Ecuador are reported, aiming to provide additional direct and indirect information regarding their habitat. FITs in both regions were installed by the same collector (Olivier Boilly), with three traps placed at each site, and according to his accounts, the conditions at each location differed.

Ecological observations and potential myrmecophily. As the genus name implies, the hind tarsi of *Megatharsis* are hypertrophied into thick, round, bead-like shapes, and are densely covered with long, orange setae. This morphology suggests the presence of evolutionary pressures that required a specific morphological adaptation. Closely related genera with modified appendicular apices include *Homalotarsus* Janssens, 1932, and *Dendropaemon* Perty, 1830. These three genera, including *Megatharsis*, share a common ancestor and possess more than 10 synapomorphies (controverted characters) (Philips et al., 2004). They are all known to be rarely attracted to standard dung-baited traps or pitfall traps, and are instead collected almost exclusively using Flight Interception Traps (FITs) (Arnaud & Génier, 2016).

These morphological characteristics and collecting patterns suggest that these genera are likely not typical coprophagous or necrophagous dung beetles, and a myrmecophilous association has long been suspected. Indeed, several studies have recorded *D. ganglbaueri* and *D. convexus*, considered the closest relatives of *Megatharsis*, being collected from the nests of leaf-cutter ants (Genus *Atta*) in the Brazilian Cerrado (Vaz-de-Mello et al., 1998). Nevertheless, direct observations of host utilization by *Megatharsis* remain unconfirmed to date.

Among the two recent collected site, Santiago-Morona was a secondary forest within a 2-meter radius of a *Atta* nest, where several individuals were collected. Meanwhile, in Archidona, Napo Province, the traps were set in a forest bordering a cattle pasture—a dung-rich environment—



Figure 4. Hind leg and tarsus. (A) Male tarsus; (B) Female tarsus.



Figure 5. The site near a pasture in Archidona where *Megatharsis buckleyi* was collected and its capture in a Flight Interception Trap (FIT).

where a significant number of individuals were reportedly collected over an extended period.

Current observations alone are insufficient to define this species as an obligate myrmecophilous dung beetle with absolute host dependency. However, the indirect confirmation of a potential association with leaf-cutter ants in its natural habitat provides a crucial clue for understanding the ecological characteristics of this genus. In particular, leaf-cutter ants are representative social insects known to associate with various insect groups; thus, this association is significant for examining the potential ant dependency and ecological adaptation patterns of *Megatharsis*.

On the other hand, some African Cetoniinae, such as species of the genus *Scaptobius* Schaum, 1841, include many myrmecophilous species, whose larvae and adults are frequently found in animal feces (Choi, 2026). Considering such cases, the occurrence pattern of *Megatharsis*, evidenced by the discovery of numerous individuals in a pastoral environment, suggests that this genus may not exhibit obligate dependency on social insects, or that it may possess a complex ecological strategy utilizing different resources depending on its life history stage. Therefore, further studies are necessary regarding the reproductive ecology, larval developmental environment, and the presence of direct interactions with social insects in this genus.

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