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Research

Synopsis of the genus *Aegopsis* Burmeister, 1847 (Coleoptera: Scarabaeidae: Dynastinae)

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Abstract

The neotropical genus *Aegopsis* Burmeister, 1847 is characterized by a pronotal horn and a pair of cephalic horns. Discussions and images of essential traits for identification are provided.

Keywords: *Aegopsis*, Agaocephalini, Brazil.

Introduction

Aegopsis Burmeister is a Neotropical genus distributed from Central America to Southern Brazil. Since the first description of the genus by Burmeister (1847), several species have been described. Sobral et al. (2018) recently described two new species, *A. dieratops* Sobral & Grossi, and *A. vazdemelloi* Sobral & Grossi, which followed *A. chaminadei* Dechambre. The second described species of the genus, *A. bolboceridus* (Thomson), has long been regarded as *Agaocephala* Lepeletier & Audinet-Serville until Dechambre and Grossi (1990) revised its generic placement. Currently, the genus Aegopsis comprises six valid species.

Aegopsis exhibits a distinct distribution pattern. A. curvicornis is found from Costa Rica to Northern South America, including Ecuador, Colombia, Venezuela, and Trinidad and Tobago (Endrődi, 1985; Sobral et al., 2018). *A. peruvianus*, *A. chaminadei*, and the *A. bolboceridus* species group are distributed in La Merced (Peru; Arrow, 1941), La Salvación (Peru; Dechambre, 1999), and southern Brazil, respectively. A geographical gap exists between *A. curvicornis* and the rest. From central Ecuador to central Peru, and the Colombian Amazonas to the Brazilian Cerrado, no specimens have been recorded. This geographical isolation corresponds with distinct differences in genital morphology between geographical groups (Fig. 1).

Although several taxa resembling *A. curvicornis* were synonymized (Endrödi, 1970; Ratcliffe,

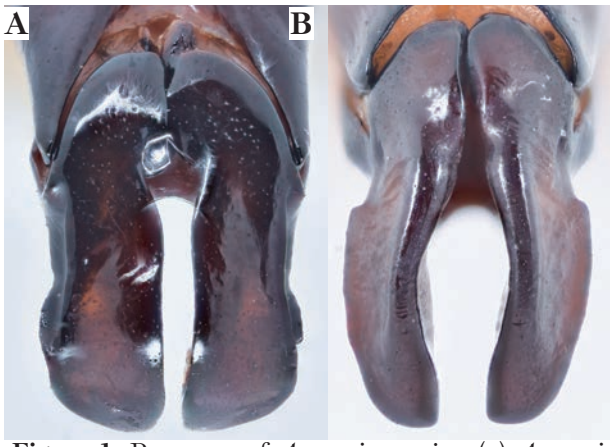

Figure 1. Paramere of *Aegopsis* species. (a) *Aegopsis curvicornis*, (b) *Aegopsis bolboceridus*.

2003), accurate identification of some species is still difficult due to the scarcity of reference specimens, lack of known visual information, and externally inconspicuous differences among related species. Here, detailed images for diagnosis and discussions are provided for each species.

Materials & Methods

Examined specimens in this study were housed in the following collections.

WCPC Wonseok Choi Private Collection, Seoul, Republic of Korea

NHM Natural History Museum, London, United Kingdom

OUMNH Oxford University Museum of Natural History, Oxford, United Kingdom

Specimens were examined using Nikon SMZ645 stereoscope and photographed with a Nikon D800 (Tokyo, Japan). Sequences of images of each specimen were stacked using Zerene Stacker (Zerene Systems, Richland, WA, USA), and further adjusted using Adobe Photoshop (Adobe Inc., San Jose, CA, USA).

Diagnosis & Discussions

***Aegopsis curvicornis* Burmeister, 1847**

= *Aegopsis westwoodi* Thomson, 1860
= *Aegopsis atra* Sternberg, 1904
= *Aegopsis nigricollis* Sternberg, 1904
= *Aegopsis rubricollis* Sternberg, 1904
= *Aegopsis trinidadensis* Sternberg, 1904

Discussion. *Aegopsis curvicornis* is the only species that has four teeth on the protibia (Plate 1). *A. westwoodi* was formerly considered as a valid species, which can be distinguished by antenna clubs and punctures on elytra (Endrődi, 1985). Although Endrődi (1970) did not synonymize *A. westwoodi*, the author noted that *A. westwoodi* and *A. curvicornis* share nearly identical paramere morphology. In 2003, Ratcliffe formally synonymized *A. westwoodi* with *A. curvicornis*.

Distribution. Costa Rica, Panama, Colombia, Ecuador, Venezuela, Trinidad and Tobago (Endrödi, 1985; Ratcliffe et al., 2020).

***Aegopsis bolboceridus* (Thomson, 1860)**

Discussion. *Aegopsis bolboceridus* was originally described in the genus *Agaocephala*. Considering that *A. bolboceridus* was the first species of Brazilian *Aegopsis* and both genera exhibit morphological similarities, particularly in cephalic horns, Thomson's original placement is understandable. Interestingly, one of the '*Agaocephala bolbocerida*' specimens in Thomson's collection was later described as *Minisiderus minicola* (Ohaus) (Endrödi, 1970). After the first description, *A. bolboceridus* has been rarely recorded until Dechambre and Grossi (1990) reported a new collection of the species. Ironically, *A. bolboceridus* has become the most widely distributed *Aegopsis* species in Brazil (Sobral et al., 2018).

Distribution. Southern Brazil (Sobral et al., 2018).

Diagnosis. Since Sobral et al. (2018) described two morphologically similar species, the indentifying of *A. bolboceridus* has become more difficult. Members of the *A. bolboceridus* species group, as well as *A. peruvianus* and *A. chaminadei*, are easily distinguished from *A. curvicornis* by the number of protibial teeth. For diagnostic characteristics of *A. diceratops* and *A. vazdemelloi*, see the Diagnosis section of each species. In *A. bolboceridus*, clypeus broad, subrectangular, and apex emarginated; and ocular canthi not prominent, outer edge stretches forward (Fig. 2a). In *A. peruvianus*, clypeus round; ocular canthi prominent, rounded (Dechambre, 1999). In *A. chaminadei*, clypeus rounded, ocular canthi rectangular (Fig. 2b).

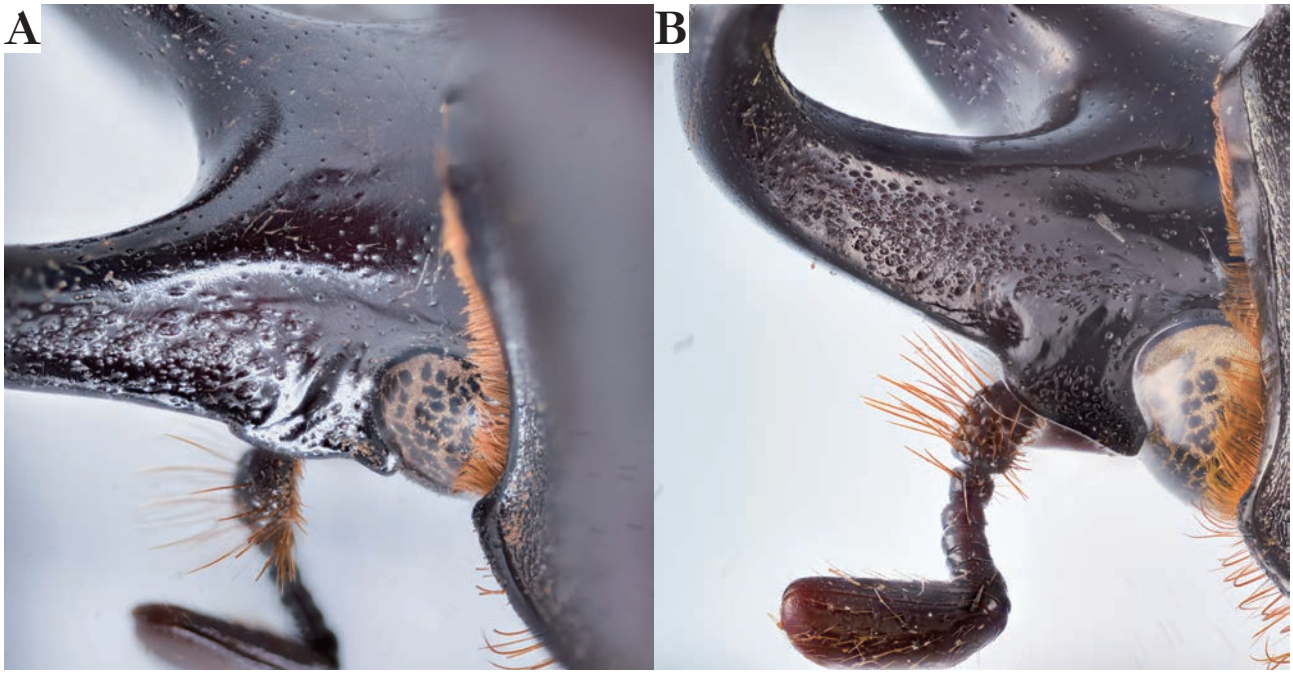

Figure 2. Ocular canthi of *Aegopsis* species. (a) *Aegopsis bolboceridus*, (b) *Aegopsis chaminadei*.

***Aegopsis peruvianus* Arrow, 1941**

Discussion. *Aegopsis peruvianus* is one of the two species known from Peru. This species is perhaps the rarest in any collection. Nearly all of the available information is based solely on the holotype specimen housed at NHM. Multiple literatures report that 'a carina connecting the base of cephalic horns' is a key characteristic of *A. peruvianus* (Dechambre, 1999; Dechambre & Grossi, 1990; Sobral et al., 2018). However, the original description by Arrow (1941) and

Endrödi's monograph in (1970) did not describe about the structure at the base of the horns. Personal observations of the holotype and other specimens by the author could not confirm the presence of a conspicuous carina at the base of the horns that is distinct to *A. peruvianus*. Earlier authors might overlook or omit it because of taxonomic confusion of that time when *A. bolboceridus* was not recognized as an *Aegopsis* species. Nevertheless, the presence of a carina itself cannot be excluded, and further examination of a larger series of specimens is required.

Distribution. Chanchamayo, Peru (Arrow, 1941).

Diagnosis. Since the type specimen and other topotype specimens are not readily accessible to the author, the diagnosis section adheres to previous descriptions. All examined literatures describe a round, protruded clypeus and prominent, projected, and rounded ocular canthi. Additionally, Arrow and Endrödi described the unique rugosity of the pygidium. This combination of the characters distinguishes *A. peruvianus* from related species.

***Aegopsis chaminadei* Dechambre, 1999**

Discussion. The second *Aegopsis* species from Peru was described from specimens collected in Villa Salvación, Madre de Dios, Peru. Despite the brief description by Dechambre and type specimens reportedly lost after his death (pers. comm., Y. Ponchel and P. Arnaud), a relatively large number of specimens – 27 males and 1 female – still remain available for study.

Distribution. Villa Salvación, Madre de Dios, Peru (Dechambre, 1999).

Diagnosis. *A. chaminadei* can be distinguished from *A. peruvianus* by short, rounded clypeus, and non prominent, straight ocular canthi (Fig. 2b).

***Aegopsis diceratops* Sobral & Grossi, 2018**

Discussion. *A. diceratops* is morphologically closely related to *A. bolboceridus*; thus, it forms the *A. bolboceridus* species group along with *A. vazdemelloi*. *A. diceratops* is distributed from Northwestern Minas Gerais to Brasilia **(new record)**. Although a new record may indicate that *A. diceratops* and *A. bolboceridus* share a part of their habitats, the solid collecting data of type specimens and distinct ecological features of habitats can further support their isolated distribution.

Distribution. Northwestern Minas Gerais (Sobral et al., 2018), Brasilia **(new record)**, Brazil.

Diagnosis. In *A. diceratops*, clypeus rectangular, apex convex (Fig. 3a); ocular canthi acute posteriorly and ocular canthi carinae broad (Fig. 3b); mentum subtrapezoidal on ventral side. Contrarily, in *A. bolboceridus*, clypeus apex emarginated, apex of ocular canthi carina inconspicuous, mentum sub-rectangular on ventral side.

***Aegopsis vazdemelloi* Sobral & Grossi, 2018**

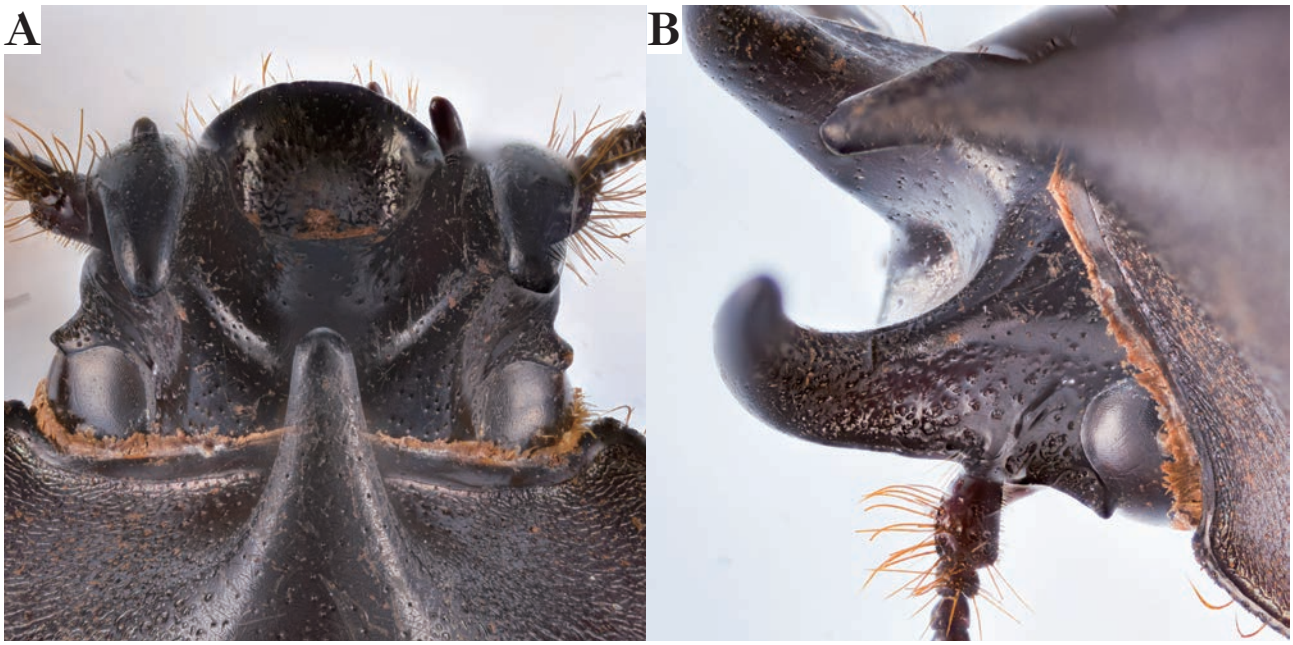

Figure 3. Clypeus and ocular canthus of *Aegopsis diceratops*. (a) clypeus, (b) ocular canthus.

Discussion. *A. vazdemelloi* is found in the easternmost part of the Cerrado, where climate is more humid and comprises of valley forests, unlike the habitat of *A. bolboceridus* (Sobral et al., 2018). The author examined a specimen fitting the diagnostic traits of *A. vazdemelloi*, reportedly collected from Bahia. Its locality is highly questionable because the recorded collecting area is in the Atlantic forest bioregion. Considering *A. curvicornis*, which is distributed across the Andes, another *Aegopsis* species can be found outside the Cerrado. However, *A. vazdemelloi* has been recorded in the eastern part of Brazil, and it makes the locality data of the examined specimen more doubtful. Therefore, Bahia will not be included here as a new record of habitat.

Distribution. Chapada dos Guimarães, Mato Grosso, Brazil (Sobral et al., 2018).

Diagnosis. Mentum sub-triangular, apex of ocular canthi carina acute (Sobral et al., 2018). The most notable trait of *A. vazdemelloi* is the presence of micropunctures on the anterior parts of the pronotum (Fig. 4a), which is absent in other species of the *A. bolboceridus* species group (Fig. 4b).

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Figure 4. Pronota of *Aegopsis* species. (a) *Aegopsis bolboceridus*, (b) *Aegopsis vazdemelloi*.

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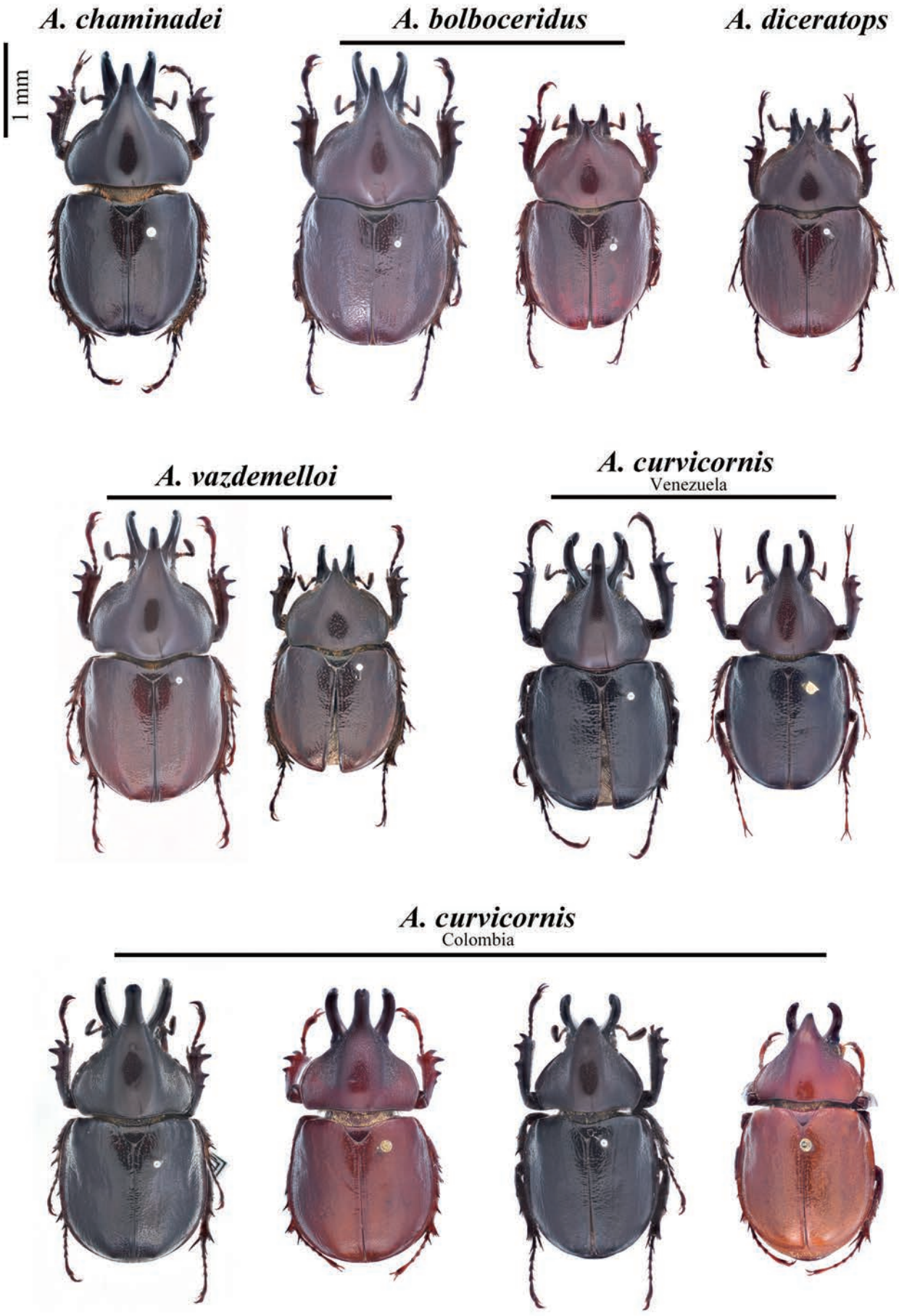

Plate 1. *Aegopsis* species.