

A new species of *Agaporomorphus* Zimmermann, 1921 from Peru (Coleoptera, Dytiscidae, Copelatinae)

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Abstract

Agaporomorphus julianae **sp. n.** is described from the Biological Field Station Panguana, in Huànuco province of central Peru. The new species belongs to the *A. knischi*-group sensu Miller 2005. Together with *A. knischi* Zimmermann, 1921 and *A. colberti* Miller & Wheeler, 2008 this is the third species of the genus with broadly enlarged male antennomeres. The new species can be separated from *A. colberti* and *A. knischi* by the smaller pleural expanded male antennomere VIII, and the form of the median lobe. Important species characters (median lobe, male antennae, metafemur, colour pattern) of the new species and *A. knischi* are figured, and the habitat, a temporary blackwater forest pond, and its species rich water beetle coenosis are illustrated and described in detail. The Brazilian *A. mecolobus* Miller, 2001, only known from the type material from Sao Paulo, is here recorded for Minas Gerais. Habitus photos of four additional *Agaporomorphus* species and *Hydrodytes opalinus* (Zimmermann, 1921) are provided. Altogether ten species of *Agaporomorphus* are now known.

Keywords

Dytiscidae, *Agaporomorphus*, *Hydrodytes*, new species, new records, habitat, Peru, Panguana, Neotropical region

Introduction

The diving beetle genus *Agaporomorphus* Zimmermann, 1921 is restricted to the Neotropical region and distributed from central Peru north to Suriname and Venezuela, and south to south-eastern Brazil and northern Argentina (Miller and Wheeler 2008, Libonatti et al. 2011). The genus was taxonomically reviewed by Miller (2001, 2005, 2014), and Miller and Wheeler (2008), who described seven of the nine known species (Nilsson 2015). Phylogenetic analyses of Copelatinae suggest a possible sister group relation of *Agaporomorphus* with the Malagasy *Madaglymbus* (Bilton et al. 2015).

Most *Agaporomorphus* are known from Brazil, Peru and Venezuela (Miller 2014). The new species of the *A. knischi*-group sensu Miller 2005 described herein is the fifth Peruvian species and the tenth species of *Agaporomorphus* to date. The biology of *Agaporomorphus* has remained virtually unknown. Almost all specimens were collected with different light traps (Miller 2001, 2005, Miller and Wheeler 2008) except for *A. sharynae* Miller, 2014 which was collected among accumulations of fallen leaves in a small backwater of a sandy and slow flowing forest stream in Venezuela (Miller 2014).

The research station Panguana, in the Peruvian lowland rainforest in Province Huànuco of central Peru, is situated close to the western slopes of the Andes on the southern bank of the Rio Llullapichis (= Yuyapichis) an eastern affluent of the Rio Pachitea, some 170 km south of the town of Pucallpa. The station was founded by the German zoologist couple Maria Koepcke and Hans-Wilhelm Koepcke in 1968 and is now operated by Juliane Diller and the Zoologische Staatssammlung in Munich, Germany (Schlüter 2005).

During eight field trips (1982–2013) E.-G. Burmeister spent several months collecting thousands of aquatic insects, including the first specimens of the new *Agaporomorphus* described herein. In 2013 R. Apenborn travelled to Panguana for eight weeks collecting aquatic beetles including additional specimens of *Agaporomorphus* and the first *Hydrodytes* known from that area. In an unpublished report Apenborn (2013) gave a first overview about the water beetle fauna of Panguana, listing 122 species in ten families.

Besides the description of the tenth species of the genus we present a detailed description of an *Agaporomorphus* habitat, which housed a stable population for many years, and its species rich water beetle coenosis. Furthermore, habitus photos of four additional *Agaporomorphus* species and *Hydrodytes opalinus* (Zimmermann, 1921) are provided for the first time.

Material and methods

Beetles were studied with a Leica MZ 12.5 microscope at 10–100×. Habitus photographs were taken with a digital photo imaging system, composed of a Leica Z 6 APO and a Nikon V1 camera. The genitalia images were produced with a Mitutoyo M Plan Apo ELWD lens attached via a bellows to a Nikon D3 camera. Image stacks were produced by moving the camera with a StackShot macrorail. Image stacks were aligned and assembled with the computer software Helicon Focus 4.77TM.

Label data of type material are cited in quotation marks. All type specimens of the herein described species are provided with red labels. The terminology to denote the orientation of the genitalia follows Miller and Nilsson (2003). The following abbreviations were used: TL (total length), TL-H (total length without head), and MW (maximum width). Exact label data are cited for the type material. Additional remarks are found in square brackets.

We used Google Earth (<http://earth.google.com>) to locate localities and the coordinates are given in decimal notation. Our map bases on "MICROSOFT ENCARTA World-Atlas 2000".

The specimens included in this study are deposited in the following collections:

- MUSM** Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru
MNHN Muséum national d'Histoire naturelle, Paris, France
NMPC Národní muzeum, Praha, Czech Republic
SMTD Staatliches Museum für Tierkunde Dresden, Germany
UFMT Universidade Federal de Mato Grosso, Brazil
ZSM Zoologische Staatssammlung, München, Germany

The descriptive style follows Miller (2014).

Checklist of *Agaporomorphus*

<i>Agaporomorphus colberti</i> Miller & Wheeler, 2008	Venezuela
<i>Agaporomorphus dolichodactylus</i> Miller, 2001	Brazil, Bolivia
<i>Agaporomorphus grandisinuatus</i> Miller, 2001	Brazil, Peru
<i>Agaporomorphus julianae</i> sp. n.	Peru
<i>Agaporomorphus knischi</i> Zimmermann, 1921	Brazil, Peru, Bolivia
<i>Agaporomorphus mecolobus</i> Miller, 2001	Brazil
<i>Agaporomorphus pereirai</i> Guignot, 1957	Brazil, Surinam
<i>Agaporomorphus sharynae</i> Miller, 2014	Venezuela
<i>Agaporomorphus silvaticus</i> Miller, 2005	Peru
<i>Agaporomorphus tambopatensis</i> Miller, 2005	Peru

Taxonomy and faunistics

Agaporomorphus julianae sp. n.

<http://zoobank.org/50D5990E-3D52-4592-82AA-B06D7B885E2B>

Figs 1, 3, 6, 8, 10–14

Type locality. Peru, Huànuco province, Rio Yuyapichis, Biological Field Station Panguana, 260 m [9°37'S, 74°56'W], temporary forest pond.



Figure 1. Habitus of *Agaporomorphus julianeae* sp. n., paratype, male, 3.5 mm.

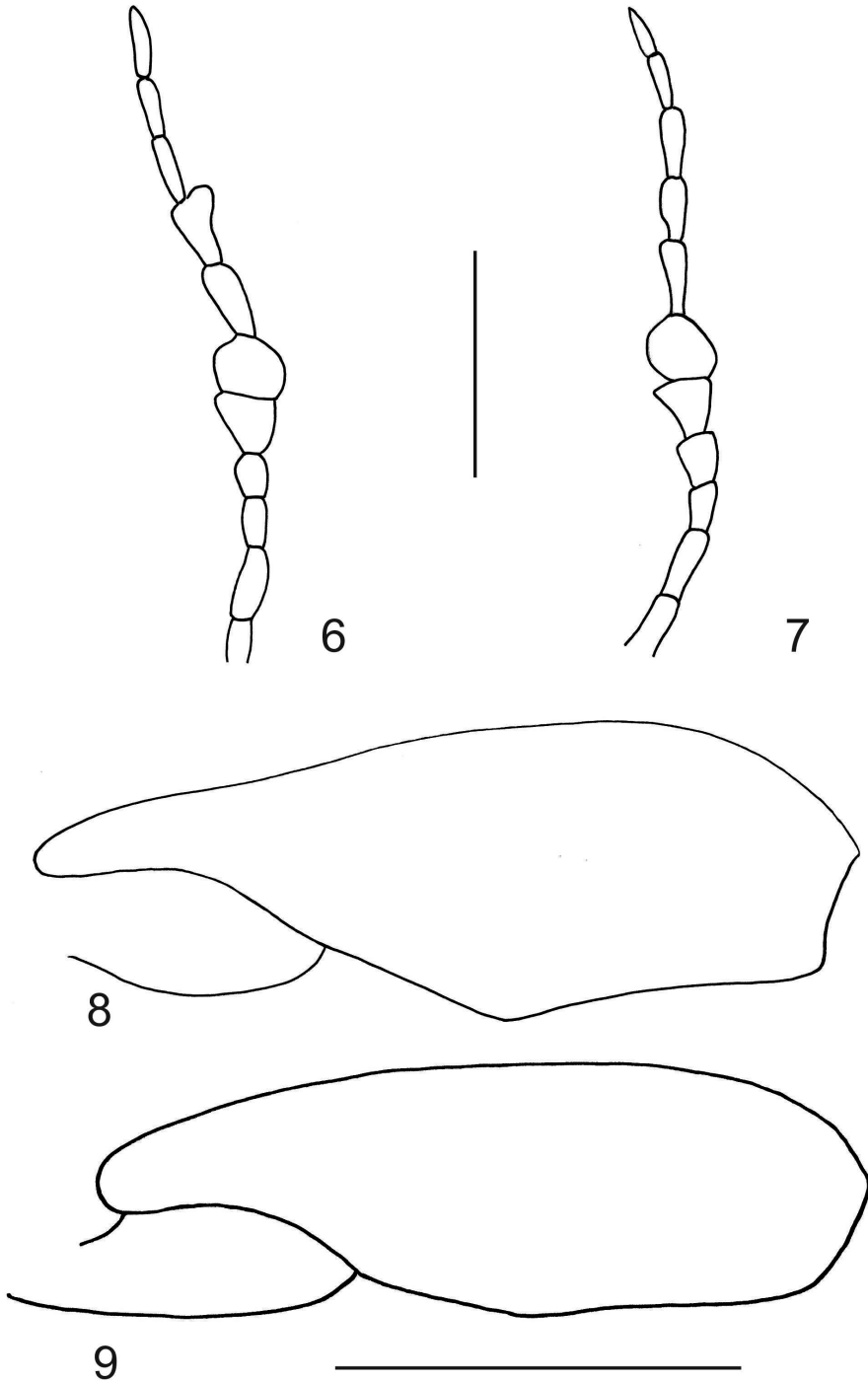
Type material. Holotype ♂: “Peru, Prov. Huànuco, Rio Yuyapichis, Biol. Stat. Panguana östl. Ort, 9°37'S, 74°56'W 6–17. April 2003 leg. H.J. u. E.-G. Burmeister”; “HOLOTYPE *Agaporomorphus julianeae* sp. nov. Hendrich, Apenborn, Balke & Burmeister des. 2013 [red label, printed]” (MUSM). **Paratypes:** 2 ♂♂ 5 ♀♀, same label data as holotype (ZSM); 3 ♂♂ 8 ♀♀, “Peru, Dept. Huànuco, ACP Panguana, Rio Yuyapichis, östl. Ort, 9°37'S, 74°56'W, 230m, 10.05.–25.7.2013, leg. R. Apenborn” (NMPC, ZSM). Each paratype is provided with the respective red printed label.



Figures 2–5. Aedeagus of *Agaporomorphus julianeae* sp. n., **2–3** median lobe in lateral view, right and left side; *A. knischi* **4–5** median lobe in lateral view, right and left side. Scale bar = 0.4 mm.

Description of male holotype. Measurements. Holotype: TL = 3.5 mm, TL-H = 3.2 mm, MW = 1.65 mm. Paratypes: TL = 3.3–3.5 mm, TL-H = 3.0–3.2 mm, MW = 1.6–1.7 mm.

Coloration (Fig. 1). **Head** yellowish-brown to brown. Pronotum yellowish-brown medially and lighter laterally. Elytra with most of surface yellowish-brown to brown,



Figures 6–9. Right male antennae of *A. julianae* sp. n. (6) and *A. knischi* (7); right metatrochanter and metafemur, anterior aspect of *A. julianae* sp. n. (8) and *A. knischi* (9). Scale bars = 0.5 mm.



Figure 10. Records of *Agaporomorphus* species in Peru. *Agaporomorphus julianeae* sp. n. and *A. tambopatensis* (Panguana, red dot); *A. grandisinuatus*, *A. knischi*, *A. silvaticus* and *A. tambopatensis* (Posadas Amazonas, black square).

with broad, yellow basal band. Ventral surfaces and appendages yellow except abdominal ventrites yellowish-brown.

Sculpture and structure. Head and pronotum with microreticulation consisting of fine cells, with few very fine punctures interspersed; pronotum with narrow lateral pronotal margin. Prosternum medially strongly carinate, carina extending onto prosternal process; prosternal process medially with a rounded longitudinal carina extending to apex, laterally with strongly beaded margins, apex pointed. Elytron covered with extremely fine, evenly spaced, short striae, striae more punctiform laterally and apically. Metafemur moderately broad, length about $2.8 \times$ greatest width (Fig. 8). Metacoxae smooth, impunctate; metacoxal lines closely approximated.

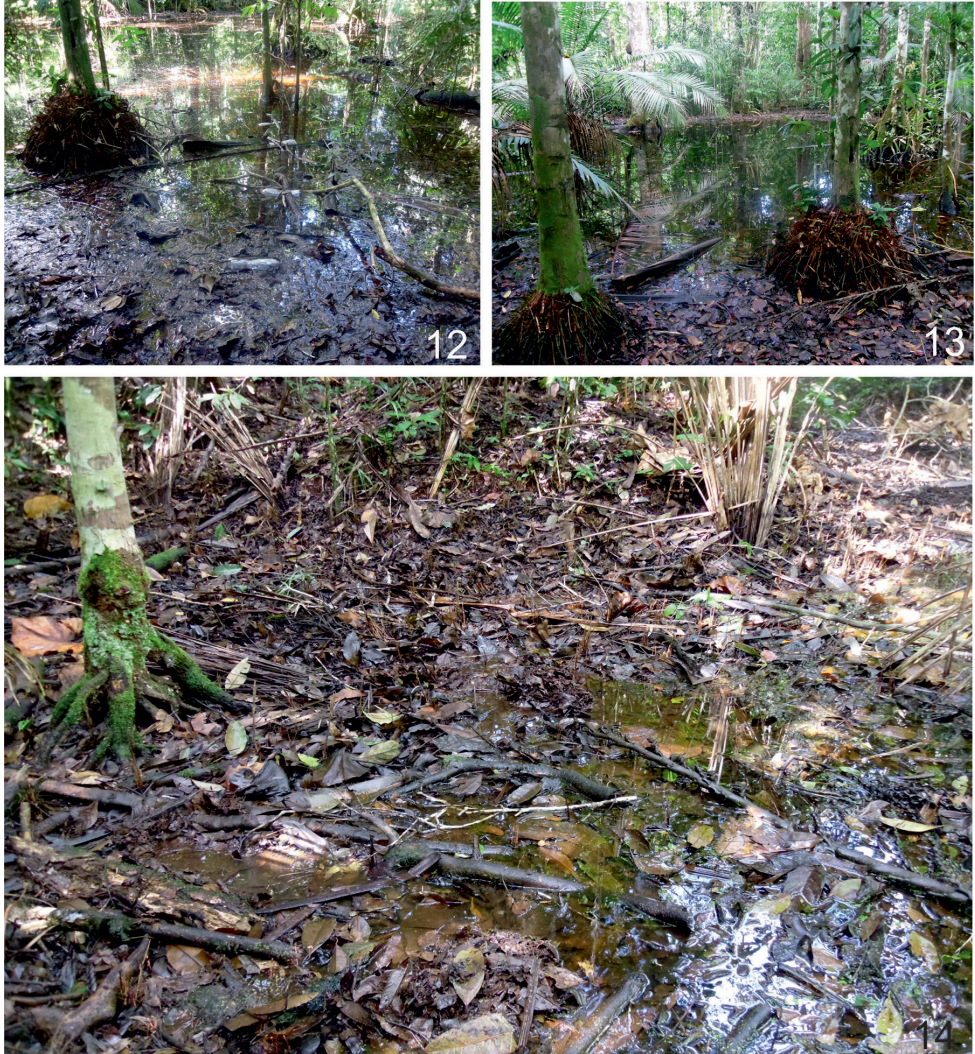
Male genitalia. Median lobe in lateral aspect robust and strongly curved medially; apex elongate, with distinct dorsally-directed lobe on right side medially and very broad, angular region sub-basally, with linear series of fine setae on each side of dorsal midline (Figs 2, 3). Parameres broad, strongly curved, apex strongly curved, with series of long setae medially along internal membrane.

Sexual dimorphism. Male protarsal claws unmodified; pro- and mesotarsal claws about half length of mesotarsomere V; without apical lobe on mesotarsomere V; protarsomeres I and II broadened, protarsomere I with two large adhesive setae, protarsomere II without adhesive setae; mesotarsomeres I and II slightly broadened, mesotarsomere I



Figure 11. Biological Field Station Panguana, Huànuco province of central Peru: Aguajal forest pond, habitat of *Agaporomorphus julianeae* sp. n.

with one large, medial adhesive seta and two large, apical adhesive setae, mesotarsomere II with two moderately sized apical sucker disks. Male with small but distinct triangular, posteriorly-directed tooth-like prominence medially along posterior margin of visible



Figures 12–14. Biological Field Station Panguana, Huànuco province of central Peru: Estanque forest pond (**12**, **13**), Shallow puddles and accumulations of fallen wet leaves at the edge of Aguajal (**14**), habitat of *Agaporomorphus julianae* sp. n. and *A. tambopatensis*, and *Hydrodytes opalinus*.

abdominal ventrite V and with broad and shallow depression medially on abdominal ventrite VI. Male with vague parallel series of rugulosity on each side of midline on abdominal ventrite III. Antennomeres V, VI and VIII modified; V broadly triangular, VIII broad with large posterior emargination (as in Fig. 6). Pro- and mesotarsomeres of female unmodified. Shallow depression medially on abdominal ventrite VI and parallel series of rugulosity on each side of midline on abdominal ventrite III absent. Antennomeres and femur of female unmodified.

Measurements. TL = 3.3–3.5 mm, TL-H = 3.0–3.2 mm, MW = 1.6–1.7 mm.

Etymology. The new species is named after Juliane Diller, deputy director of the Zoologische Staatssammlung in Munich, and head and owner of the Biological Field Station Panguna, in recognition of her longstanding efforts in biological research and nature conservation in Peru.

Affinities. The new species can be clearly placed in the *A. knischi* species-group sensu Miller 2005, characterized by distinctly modified male genitalia and expanded male antennomeres. Within this group, *A. julianeae* sp. n. is most similar to *A. knischi*, but differs from that species in the shape of the median lobe (Figs 2–5), expanded male antennomere VIII (Figs 6, 7) and different form of the metafemur (Figs 8, 9). Furthermore, the posteromedial triangular spine on abdominal ventrite V is slightly larger in *A. julianeae* sp. n. than in *A. knischi* (see Miller 2001, Fig. 32).

Distribution. Only known from the type locality in Panguana, Peru. The occurrence in other parts of Peru is likely (Fig. 10).

Habitat. Collected from two mainly shaded forest ponds, seasonally flooded during the rainy season from October to April, and with high fluctuation level. The ponds are rainwater fed and located in a primary tropical lowland rainforest surrounded by Aguaje palm trees (Figs 11–14). The muddy bottom is covered by broad layers of fallen and rotten leaves and twigs. In the dry season when the surface of the water goes down, a huge, wet area of these leaves and twigs remains. There, and at the edge of the ponds, in small isolated puddles (Fig. 12) of the shallow water zone (less than 10 cm), *Agaporophus julianeae* sp. n. was collected with a dip net, among accumulations of fallen leaves. The species was associated with *A. tambopatensis* Miller, 2005, *Hydrodytes opalinus* (Zimmermann, 1921), *Vatellus grandis* Buquet, 1840, several unidentified species of *Copelatus*, *Hydaticus subfasciatus* Laporte, 1835 (all Dytiscidae), *Tropisternus chalybeus* Laporte, 1840 and several unidentified species of *Helochares* (all Hydrophilidae). In general specimens of *A. julianeae* sp. n. were collected rarely but continuously in the time of observation from May to July (Apenborn 2013).

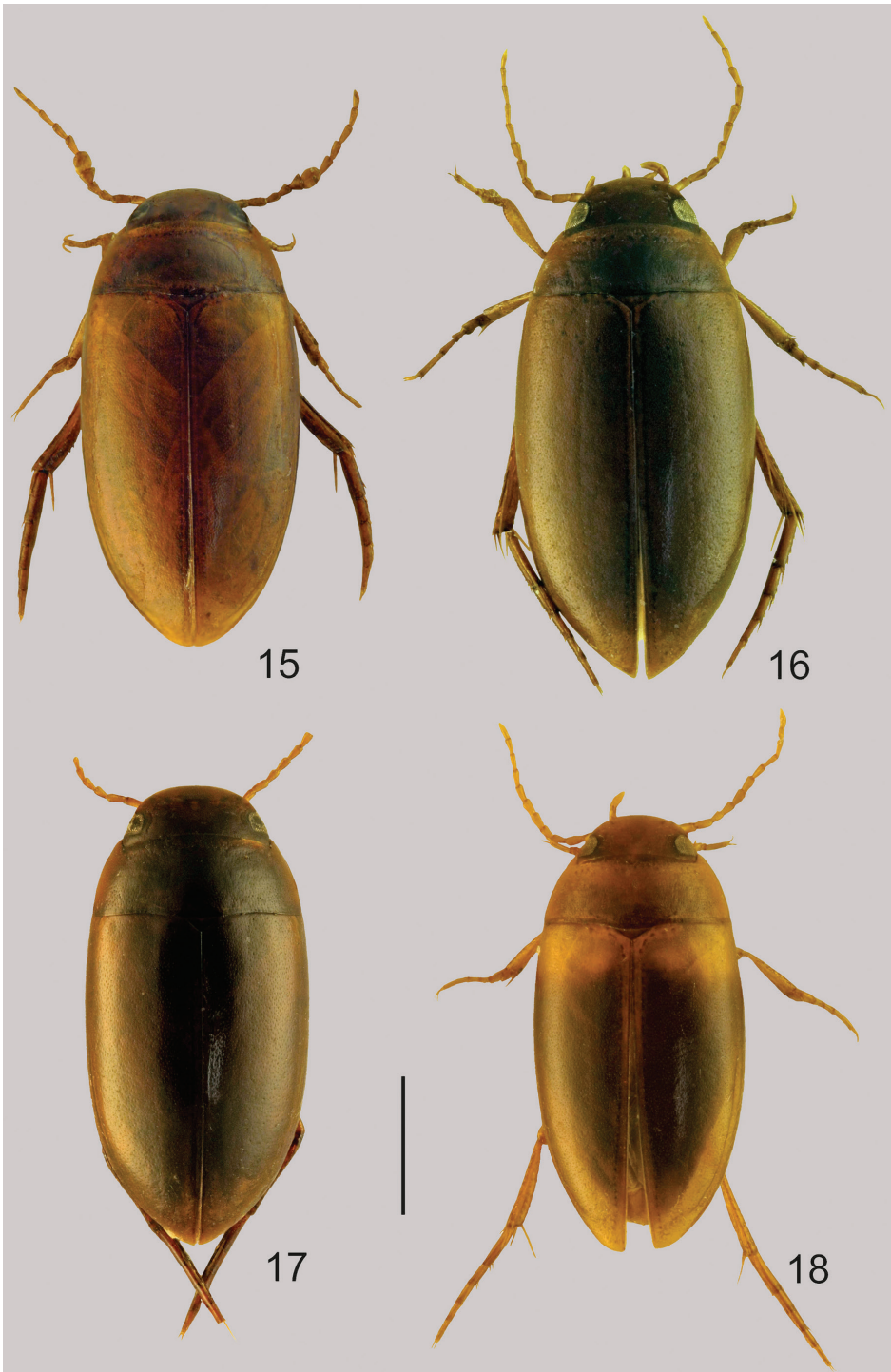
Type material examined for comparison

Agaporomorpha knischi Zimmermann, 1921

Fig. 15

Lectotype. ♂, “Brasilien”, “Mato Grosso Corumba”, “Type” [blue handwritten label], “Lectotype *Agaporomorpha knischi* Zimmermann, 1921 des. K.B. Miller 2001 [red printed label] (ZSM).

Paralectotypes. 12 ♂♂, 28 ♀♀, same data as lectotype (ZSM); 10 ♂♂, 10 ♀♀, “Corumba [Brazil], Matt [Matto] Grosso”, “W.M. Muche Radebeul Ankauf”, “Staatl. Museum für Tierkunde Dresden” (SMTD).



Figures 15–18. Habitus of *Agaporomorphus knischi*, male, paralectotype (15); *A. mecolobus*, male (16); *A. pereirai*, male, paratype (17) and *A. tambopatensis*, male (18). Scale = 1 mm.

***Agaporomorphus pereirai* Guignot, 1957**

Fig. 17

Paratypes. 3 ♂♂, 5 ♀♀, “Brasilien, Para Cachimbo X 1955 Pereira”, printed genus label, “Paratype” [red printed label], “Museum Paris 1960 Coll. F. Guignot” [light blue printed label] (MNHN).

Faunistic notes***Agaporomorphus mecolobus* Miller, 2001**

Fig. 16

Agaporomorphus mecolobus Miller, 2001a: 527 (orig. descr.); Miller 2005: 49 (system., catal.); Miller and Wheeler 2008: 64 (catal.); Miller 2014: 181 (system., catal.); Nilsson 2015: 46 (catal.).

Material studied. 20 ♂♂, 40 ♀♀, “Brasil/Minas Gerais Cordisburgo, Faz. Potinha, XII.1993 [at light] Vaz de Mello leg.” (NMPC, UFMT, ZSM).

Remarks. This species was only known after the few type specimens from Sao Paulo (Miller 2001). It is here recorded for the first time for Minas Gerais in Brazil.

***Agaporomorphus tambopatensis* Miller, 2005**

Fig. 18

Agaporomorphus tambopatensis Miller, 2005: 52 (orig. descr.); Miller and Wheeler 2008: 64 (system., catal.); Miller 2014: 181 (system., catal.); Nilsson 2015: 46 (catal.).

Material studied. 1 ♂ and 1 ♀, “Peru, Dept. Huànuco, ACP Panguana, Rio Yuyapichis, östl. Ort, 9°37'S, 74°56'W, 230 m, 10.05.–25.7.2013, leg. R. Apenborn” (ZSM).

Remarks. Described from Madre de Dios, Rio Tambopata in Peru and just known from the type material (Miller 2005). This is the second record of the species in Peru.

***Hydrodytes opalinus* (Zimmermann, 1921)**

Fig. 19

Agaporomorphus opalinus Zimmermann, 1921: 204 (orig. descr.); Guéorguiev 1968: 37 (system., catal.).

Hydrodytes opalinus (Zimmermann, 1921); Miller 2001b: 77 (system.); Miller 2002: 6 (system.); Nilsson 2015: 95 (catal.).



Figure 19. Habitus of *Hydrodytes opalinus*, male (7). Scale = 1 mm.

Material studied. 1 ♂ 3 ♀♀, “Peru, Dept. Huànuco, ACP Panguana, Rio Yuyapichis, östl. Ort, 9°37'S, 74°56'W, 230m, 10.05.–25.7.2013, leg. R. Apenborn” (ZSM).

Remarks. Described from Mato Grosso, Brazil and widespread in northern South America (Miller 2002). This is the third record of the species in Peru.

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