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ANNALES

de la  
SOCIÉTÉ SUISSE DE ZOOLOGIE  
et du  
MUSÉUM D'HISTOIRE NATURELLE  
de la Ville de Genève

tome 119  
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# REVUE SUISSE DE ZOOLOGIE

TOME 119— FASCICULE 1

Publication subventionnée par:  
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VILLE DE GENÈVE  
SOCIÉTÉ SUISSE DE ZOOLOGIE

*Comité de rédaction*

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M. Ruedi (mammifères), A. Schmitz (amphibiens, reptiles), P. Schwendinger  
(arthropodes excl. insectes).

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La préférence sera donnée aux travaux concernant les domaines suivants: taxonomie, systématique, faunistique, phylogénie, évolution, morphologie et anatomie comparée.

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## **An annotated catalogue of the type material of the Orthoptera (Insecta) species described by Josef Redtenbacher deposited in the collections of the Muséum d'histoire naturelle de Genève**

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**An annotated catalogue of the type material of the Orthoptera (Insecta) species described by Josef Redtenbacher deposited in the collections of the Muséum d'histoire naturelle de Genève.** - Type specimens of 55 species described by J. Redtenbacher have been identified in the Orthoptera collection of the Geneva Natural History Museum. The names are listed alphabetically, and the sex, label data and condition of the specimens is given, along with their location within the collection and the current nomenclatural combination.

**Keywords:** Ensifera - Tettigoniidae - Conocephalinae - type-catalogue.

### INTRODUCTION

The Austrian teacher and entomologist Josef Redtenbacher (1856-1926) came from a family of scythe dealers. He was a nephew of Ludwig Redtenbacher (1814-1876), a coleopterist who became director of what is now the Naturhistorisches Museum Wien (NHMW), in Vienna, in 1860. Josef Redtenbacher was primarily interested in the Orthoptera and Phasmatodea.

Redtenbacher studied specimens in many European museums and private collections while preparing his monographs on the Conocephalidae (1891), the Mecopodidae (1892), (both now considered subfamilies of the Tettigoniidae), and the Phasmatodea in collaboration with Brunner von Wattenwyl (Brunner von Wattenwyl, 1907; Redtenbacher, 1906, 1908). Consequently, while the majority of his type material is now in the NHMW, types are found in many other museums, including the Muséum d'histoire naturelle de Genève (MHNG) (see Zompro & Brock, 2003). Redtenbacher did not nominate holotypes in his descriptions, and so type series must be considered syntypes. The descriptions normally state which sex(es) were treated, the locality and the institution where the material was deposited, but not the number of specimens he had studied.

Type material of fifty five species described by Redtenbacher has been identified in the MHNG collections. A number of other specimens are included in the catalogue because they have been labelled as possible types on the Orthoptera Species Files website (Eades *et al.*, 2011).

## ARRANGEMENT AND FORMAT

The species are listed alphabetically. The format for each is:

**species name** Author, work: page [*Original generic placement*].

Type locality as given in the description. Type series.

Number of type specimens. Specimen: "Label data" [format of label]. Following the recommendations of Ohl & Oswald (2004) the condition of each specimen is noted, although damage to the tips of the antennae or wear to wing margins is not enumerated. Unless otherwise stated, the specimens are directly pinned through the thorax. Other comments. Location of material in the MHNG main Orthoptera collection.

Currently valid combination of taxon (according to OSF).

The abbreviation OSF refers to *Orthoptera Species File Online* (Eades *et al.*, 2011).

## CATALOGUE

**aberrans** Redtenbacher, 1891: 516 [*Xiphidium*].

Rio Grande do Sul (Mus. Genf). More than one ♀ (measurements given as range).

Two ♀ syntypes. A ♀ with labels: "Brésil, Rio grande da Sul, D<sup>f</sup> Ihering, 614.16" [printed on white paper]; "Xiphidium aberrans Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded and has lost most of the left antenna. A ♂ with labels: "Brésil, Rio grande do Sul, Ihering" [printed on green paper]; "Xiphidium aberrans Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the left antenna is missing and the left hind leg lacks part of the tibia and the tarsi. Images on OSF. Box F23.

*Conocephalus aberrans* (Redtenbacher, 1891).

**acuminatus** Redtenbacher, 1891: 371 [*Pseudorhynchus*].

Calcutta (coll. Brunner); Birma (Mus. Genua); Java (k.k. Hofmuseum Wien & coll. Brunner), Langkat, Sumatra (Mus. Hamburg). More than one ♂ and ♀ (measurements given as range).

One ♀, possible syntype, with labels: "Carin, Asciiuli Cheba, 1200-1300m, L. Fea, i-88" [printed on white card]; "Pseudorhynchus acuminata Redtb." [handwritten on yellow paper]; "Possible syntype? Hollier 2011" [handwritten on red paper]. Specimen set with wings folded. There are also a ♂ and two ♀ from Java in the MHNG collection which were probably collected by Leo Zehntner after the publication of the description and thus not syntypes. Box F4.

*Pseudorhynchus acuminatus* Redtenbacher, 1891.

**adelphus** Redtenbacher, 1891: 438 [*Aethiomerus*].

Tamatave, Madagascar (Mus. Hamburg). Unspecified number of ♂.

A ♀ specimen with labels: "Saussure, Madagasc." [printed on white paper]; "Aethiomerus adelphus Redt. ♀" [handwritten on pink paper] is illustrated on OSF as

a possible type by P. Naskrecki. There are seven specimens (all ♀) with these labels in the collection, but MHNG is not mentioned as a depository in the original description, and the ♀ characters were not treated. The collection contains many specimens with this printed locality label, and it is unlikely that these specimens are part of the type series. Images of OSF. Box F15.

*Aethiomerus adelphus* Redtenbacher, 1891.

***adspersa*** Redtenbacher, 1889: 30 [*Euperprocnemis*].

Turcomania (Askhabad, Duschak, Elisabetpol) [no depository mentioned]. More than one ♂ and ♀ (measurements given as range).

One ♂ and three ♀ syntypes. A ♂ with labels: “16.viii.86, Aschabad” [handwritten on a strip of rough paper]; “Syntypus” [printed on red paper]. Specimen set with right wings spread and left wings roughly folded; the left antenna is missing. A ♀ with labels: “16.viii.86, Aschabad” [handwritten on a strip of rough paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is missing. A ♀ with labels: “12.viii.86, Aschabad” [handwritten on a strip of rough paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is missing and the left middle and hind legs lack the last tarsal segment. A ♀ with labels: “Euprop. *adspersa* Redt., Turkestan” [handwritten on blue card printed with black margins (in the style of an insect box species name label)]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left front leg and the tibia and tarsi of the right hind leg are missing. Box Z74.

*Heteracris adspersa* (Redtenbacher, 1889).

***affine*** Redtenbacher, 1891: 513-514 [*Xiphidium*].

Philippinen (Mus. Genf); Aru-Inseln (coll. Brunner); Samoa, Fidji-Inseln (coll. Brunner & Mus. Genf); Samoa, Ovalau (Mus. Hamburg). Unspecified number of ♂ and more than one ♀ (measurements given as range).

Four ♂ and five ♀ paralectotypes. A ♂ with labels: “Philippines” [handwritten on a strip of white paper]; “Xiphidium affine Redtb.” [handwritten on yellow paper]; “Paralectotype” [printed on white card disc with blue margin]. Specimen set with wings folded. A ♂ with labels: “Philippines” [handwritten on a strip of white paper]; “Xiphidium affine Redtb.” [handwritten on yellow paper]; “Paralectotype” [printed on white card disc with blue margin]. Specimen set with wings folded; the tarsi of both hind legs are missing. A ♂ with labels: “Philippines” [handwritten on a strip of white paper]; “Xiphidium affine Redtb.” [handwritten on yellow paper]; “Paralectotype” [printed on white card disc with blue margin]. Specimen set with wings folded; the tibia and tarsi of the left front leg are missing, as are the right middle and hind legs and most of the right antenna. A ♂ with labels: “Xiphidium affine Redtb.” [handwritten on lilac paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; there is a small square of lilac card on the pin like that on one of the ♀ from Ovalau. A ♀ with labels: “Ovalau” [handwritten on a strip of white card]; “Xiphidium affine Redtb.” [handwritten on lilac paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; there is also a small square of lilac card on the pin. A ♀ with labels: “Ovalau” [handwritten on a strip of white card]; “Xiphidium affine

Redtb.” [handwritten on lilac paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; the right antenna and right hind leg are missing. A ♀ with labels: “Ovalau” [handwritten on a strip of white card]; “Xiphidium affine Redtb.” [handwritten on lilac paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded. A ♀ with labels: “Samoa” [handwritten on a strip of white card]; “Xiphidium affine Redtb.” [handwritten on lilac paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; most of both antennae are lost, the abdomen droops so that the ovipositor points downwards. A ♀ with labels: “Ovalau (Iles Viti)” [handwritten on a strip of white paper]; “Xiphidium affine Redtb.” [handwritten on lilac paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; apparently a teneral specimen which has shrivelled. Pitkin (1980) did not discuss the specimens from Samoa and Fiji in her account of this species, probably because they are placed separately (with a purple-bordered species name label) from the Philippines specimens (with a yellow-bordered species name label) and were thus overlooked, and the paralectotype labels on the on those specimens were probably added by someone else. The lectotype, designated by Pitkin (1980: 239) is in the NHMW in Vienna. Images on OSF. Box F23.

A junior synonym of *Conocephalus oceanicus* (Le Guillou, 1841).

**argentinus** Redtenbacher, 1891: 406 [*Conocephalus*].

Buenos-Ayres (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “Buenos Ayres” [Handwritten on white card with inked margin]; “Conocephalus argentinus Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the right antenna is missing. Images on OSF. Box F9.

*Neoconocephalus argentinus* (Redtenbacher, 1891).

**armata** Redtenbacher, 1891: 482 [*Odontolakis*].

Mahanoro, Madagascar (coll. Brunner). Unspecified number of ♀.

A ♂ specimen with label: “Odontolakis armata Redtb.” [handwritten on pink paper] is illustrated as a possible syntype on OSF by Naskrecki. The absence of a locality label makes it difficult to evaluate the status of this specimen, but it is probably not a syntype because the ♂ characters were not treated in the original description. Images on OSF. Box F20.

*Odontolakis armata* Redtenbacher, 1891.

**australis** Redtenbacher, 1891: 550 [*Hexacentrus*].

Fidji-Inseln (coll. Brunner). Unspecified number of ♂ and more than one ♀ (measurements given as range).

Two ♂ and one ♀ syntype. A ♂ with labels: “603 34, Fidji IslDs” [handwritten on white paper]; “33” [handwritten on a square of white card]; “Hexacentrus australis Redtb.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♂ with labels: “Fidji IslDs” [handwritten on white paper]; “Hexacentrus australis Redtb.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the left antenna is missing. A ♀



with labels: “603 34, Fidji Islds” [handwritten on white paper]; “32” [handwritten on a square of white card]; “Hexacentrus australis Redtb.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. The syntype labels were probably added by P. Naskrecki, perhaps because the handwriting on the data labels resembles that of Brunner von Wattenwyl. Images on OSF. Box F26.

*Hexacentrus australis* Redtenbacher, 1891.

***brachypterum*** Redtenbacher, 1891: 523 [*Xiphidium*].

Venezuela; Colombien; Brasilien (coll. Brunner); Peru (Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ paralectotype with labels: “Perou, [illegible scrawl]” [handwritten on white paper]; “Xiphidium brachypterum Redtb.” [handwritten on green paper]; “Paralectotype” [printed on white card disc with blue margin]. The specimen has lost all of the right antenna and most of the left. The abdomen has some insect feeding damage. The lectotype, designated by Pitkin (1980: 347), is in the NMHW in Vienna. Box F23.

A junior synonym of *Conocephalus saltator* (Saussure, 1859).

***brachypterus*** Redtenbacher, 1891 : 400 [*Conocephalus*].

Brasilia (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “Brésil, Rio G d Sul, Ihering” [printed on green paper]; “Conocephalus bracypterus Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings closed; most of both antennae are missing. Images on OSF. Box F8.

*Neoconocephalus brachypterus* (Redtenbacher, 1891).

***brachyxiphus*** Redtenbacher, 1891: 413-414 [*Conocephalus*].

China (Mus. Genf); Java (coll. Brunner, Mus. Genf & k.k. Hofmuseum Wien); Borneo (coll. Brunner & k.k. Hofmuseum Wien); Sumatra; Philippinen; Penang; Cambodje (coll. Brunner); Perak, Malacca (Mus. Hamburg). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♂ and one ♀ syntype. A ♂ with labels: “Chine, A, Nav., 601/94” [number handwritten on white printed label]; “Conocephalus brachyxiphus Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings roughly folded; the right middle leg and both hind legs are missing, as are the antennae. A ♀ with labels: “Chine, A, Nav., 601/94” [number handwritten on white printed label]; “Conocephalus brachyxiphus Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left front leg lacks the tibia and tarsi, the right front leg, both middle legs and the left hind leg are missing, as are the antennae. The specimens from Java said to be in the MHNG in the description could not be located. Images on OSF. Box F10.

*Euconocephalus brachyxiphus* (Redtenbacher, 1891).

***breviceps*** Redtenbacher, 1891: 417, fig. 52 [*Conocephalus*].

Ceylon (coll. Brunner); Vorder-Indien, Pondichery [sic] (Mus. Genf); Java (Mus. Genf & k.k. Hofmuseum Wien); ? (Mus. Hamburg). Unspecified number of ♂ and more than one ♀ (measurements given as range).

Four ♀ syntypes. A ♀ with labels: “Java” [handwritten on a strip of white paper]; “*Conocephalus breviceps* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left front leg lacks two tarsal segments, the right front and middle legs are missing, as are the tarsi of the left middle leg and the tibia and tarsi of the right hind leg. The right antenna is lost, as is most of the left antenna. The thorax, abdomen and right hind femur have been damaged, probably by museum beetle. A ♀ with labels: “Pond.” [hand written on a square of card]; “*Conocephalus breviceps* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left antenna is lost, as are two tarsal segments from all legs except the right middle leg, there is minor damage to the abdomen, probably due to museum beetle. A ♀ with labels: “Indes orient., M<sup>r</sup> H<sup>v</sup> de Sauss.” [locality handwritten on strip of white paper with name printed]; “*Conocephalus breviceps* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is lost, as is most of the left antenna, the right middle leg is lost and the left hind leg lacks two tarsal segments. A ♀ with labels: “Coll. Schlagintweit, Sikkim, Nro 255” [number hand written on yellow printed card]; “*Conocephalus breviceps* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; both antennae, the right front tibia, right middle leg, left hind leg and part of the tarsus and the tibiae of the right hind leg are all lost. The body shows severe insect feeding damage. Box F10.

A junior synonym of *Euconocephalus incertus* (Walker, 1869).

***brevipennis*** Redtenbacher, 1891: 425 [*Conocephalus*].

Ostindia (coll. Brunner & Mus. Genf); Himalaya (Mus. Genf). One ♂ without hind legs and more than one ♀.

One ♂ and three ♀ syntypes. A ♂ with labels: “Himalaja, M<sup>r</sup> H<sup>v</sup> de Sauss.” [printed on white paper]; “*Conocephalus brevipennis* Redtb.” [handwritten on yellow paper]; “Musée de Genève, N<sup>o</sup> 248” [number handwritten on printed white card]; “Syntypus” [printed on red paper]. Specimen set with wings roughly spread; both hind legs are missing. A ♀ with labels: “Himalaja, M<sup>r</sup> H<sup>v</sup> de Sauss.” [printed on white paper]; “*Conocephalus brevipennis* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of both antennae are missing. A ♀ with labels: “Indes or., 72.” [handwritten on white paper]; “*Conocephalus brevipennis* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the left antenna is missing. A ♀ with labels: “Indes or., 72.” [handwritten on white paper]; “*Conocephalus brevipennis* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the hind wings are somewhat wrinkled and most of both antennae is lost. There is also an immature ♀ labelled “Indes or.” which may also be a syntype. Images on OSF. Box F13.

A junior synonym of *Ruspolia interruptus* (Walker, 1869).

***brunneri*** Redtenbacher, 1891: 423 [*Conocephalus*].

Brasilia, Theresopolis (coll. Brunner, Mus. Hamburg & Schulthess-Rechberg); Alto-Amazonas (coll. Dohrn); Argentinien, Buenos-Ayres (coll. Brunner, Mus. Genf &

Mus. Hamburg); Rosario, Yalapa (Mus. Hamburg). More than one ♂ and ♀ (measurements given as range).

One ♂ and two ♀ syntypes. A ♂ with labels: “Buenos Ayres” [handwritten on white paper]; “Conocephalus brunneri Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings roughly spread. A ♀ with labels: “Buenos Ayres” [handwritten on white paper]; “Conocephalus brunneri Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread. A ♀ with labels: “Buenos Ayres, Mars 1868” [handwritten on white paper]; “Conocephalus brunneri Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left antenna is missing, as are the tarsi of the left hind leg and two tarsal segments of the right hind leg. Images on OSF. Box F12.

*Neoconocephalus brunneri* (Redtenbacher, 1891).

**capreola** Redtenbacher, 1891: 532 [*Xiphidiopsis*].

Java (coll. Brunner). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♀ syntype with labels: “[illegible pencil marks]” [handwritten on grey card]; “Xiphidiopsis capreola Redtb.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right front and middle legs are lost, as are the left antenna and most of the right antenna. Images on OSF. Box F24.

*Leptoturatula capreola* (Redtenbacher, 1891).

**carbonarium** Redtenbacher, 1891: 530, fig. 92 [*Xiphidium*].

West-Africa, Acra [sic], Goldküste (coll. Brunner & Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Accra, Côte d’or. Afr.” [printed on pink paper]; “Xiphidium carbonarium Redtb.” [handwritten on pink paper]; “Syntypus” [printed on red paper]. The specimen is in poor condition, lacking most of both antennae, the left front leg and the left hind leg. The abdomen has suffered insect feeding damage. Images on OSF. Box F23.

*Conocephalus carbonarius* (Redtenbacher, 1891).

**carbonarius** Redtenbacher, 1891: 424 [*Conocephalus*].

Cuba (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: “Cuba” [handwritten on green paper]; “Conocephalus carbonarius Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the antennae, both front legs and the right middle leg are lost, as are the tarsi of the right hind leg and two tarsal segments of the left hind leg. Images on OSF. Box F12.

*Neoconocephalus carbonarius* (Redtenbacher, 1891).

**coniceps** Redtenbacher, 1891: 408-409, fig. 39 [*Conocephalus*].

Borneo (coll. Brunner); Bengalen (Mus. Genf). Unspecified number of ♂ and ♀.

One ♂ syntype with labels: “Musée de Genève, N° 124” [number handwritten on white printed card]; “*Conocephalus coniceps* Rdtb., Bengalen” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; both antennae, the left front leg, the tibia and tarsi of the right front leg, two tarsal segments of the left hind leg and the tarsi of the right hind leg have all been lost. Images on OSF, where the habitus photograph is erroneously labelled as ♀. Box F10.

*Euconocephalus coniceps* (Redtenbacher, 1891).

**cornutus** Redtenbacher, 1891: 411 [*Conocephalus*].

Aru-Inseln; Amboina (coll. Brunner & k.k. Hofmuseum Wien); Key-Inseln (coll. Brunner); Neu-Guinae (coll. Dohrn); Duke of York-Insel (Mus. Genf); Australien (Le Gouillou); Mioko (Mus. Hamburg). More than one ♂ and ♀ (measurements given as range).

One ♀ syntype with labels: “603 33, 16622 Mus, Gdfr. in litt., Duke of York Islands” [handwritten on a strip of white paper]; “*Conocephalus cornutus* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the front right and both middle legs lack two tarsal segments and most of both antennae are missing. A ♂ specimen with labels: “Amboine” [printed on strip of yellow paper]; “*Conoc. cornutus* Rt. ♂” [handwritten on yellow paper] is illustrated on OSF as a possible syntype. There is also a ♀ with the same labels (apart from the gender) in the MHNG collection. It is likely that these specimens were collected on Pictet and Bedot’s MHNG expedition to the “Malay Archipelago” in 1890-1891 (which included intensive sampling in Amboina) and not part of the type series, since although specimens from Amboina is mentioned in the original description, they were not in the MHNG. Images on OSF. Box F10.

*Pseudorhynchus cornutus* (Redtenbacher, 1891).

**curvipes** Redtenbacher, 1889: 29 [*Derocorystes*].

Turcomania (Askhabad, Karybend, Krasnowodsk). More than one ♂ and ♀ (measurement given as range).

One ♀ syntype with labels: “31.v.86, Karybend – Aschura Lschuckli [?]” [handwritten on white paper]; “*Derocorystes curvipes* Redt., Turkestan” [handwritten on blue card printed with black margins (as species name labels)]; “Syntypus” [printed on red paper]. Specimen set with wings spread; both hind claws are missing. Box Z15.

A junior synonym of *Dericorys albidula* Serville, 1838.

**dubius** Redtenbacher, 1891: 424 [*Conocephalus*].

Japan (k.k. Hofmuseum Wien) ; ? (Mus. Genf). More than one ♀.

One ♀ syntype with labels: “Musée de Genève, N°...” [printed on white card with a black margin]; “*Conocephalus dubius* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the right antenna is lost, as is most of the left antenna. The species name label in the insect box has the locality “Japonia” written in the bottom left corner (something often encountered in the MHNG collections), but it is not clear if this was based on definite locality information or added later because the type material in Vienna was from Japan. Box F12.

*Ruspolia dubius* (Redtenbacher, 1891).



*formosum* Redtenbacher, 1891: 530 [*Xiphidium*].

Ost-Java (coll. Brunner). Unspecified number of ♂ and ♀.

A ♂ specimen with labels: “Java or., Pasoeroean, 622 20.” [printed on yellow paper]; “*Xiphidium formosum* Redtb.” [handwritten on yellow paper] is illustrated on OSF as a possible type by P. Naskrecki. There are five specimens (3 ♂ and 2 ♀) with these labels in the collection, but MHNG is not mentioned as a depository in the original description, and it is unlikely that these specimens are part of the type series. Images on OSF. Box F23

*Conocephalus formosus* (Redtenbacher, 1891).

*frater* Redtenbacher, 1891: 399 [*Conocephalus*].

Cuba (Mus. Genf); St. Vincent, Kleine Antillen (Brit. Mus.); Trinidad (coll. Brunner); Brasilien (k.k. Hofmuseum Wien); Alto-Amazonas (coll. Brunner). Unspecified number of ♂ and more than one ♀ (measurements given as range).

Two ♂ and two ♀ syntypes. A ♂ with labels: “124 ♂, Cuba” [handwritten on white paper]; “*Conocephalus frater* Redtb.” [handwritten on green paper]; “*Syntypus*” printed on red paper]. Specimen set with wings folded; most of the right antenna is lost, the left middle and right hind legs lack two tarsal segments, the left hind leg lacks all tarsi. The thorax and abdomen are coming apart where the pin was inserted due to a build up of verdigris. A ♂ with labels: “Cuba” [handwritten on a strip of white paper]; “*Conocephalus frater* Redtb.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings folded; the antennae and right middle leg are missing, as are the tarsi of all the other legs. A ♀ specimen with labels: “59 Locustaire, les blanc [triangle], Cuba.” [handwritten on white paper]; “*Conocephalus frater* Redtb.” [handwritten on green paper]; “*Syntypus*” printed on red paper]. Specimen set with wings folded; the left hind leg is detached and pinned though the femur on the original pin. A ♀ with labels: “126 Cuba” [handwritten on white paper]; “*Conocephalus frater* Redtb.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings spread. Box F8.

Replaced by *Neoconocephalus fratellus* (Griffini, 1899).

*furcifer* Redtenbacher, 1891: 489, fig. 77 [*Dicranacrus*].

Nossi-Bé, Madagascar (coll. Brunner, coll. Dohrn & k.k. Hofmuseum Wien). Unspecified number of ♂ and ♀.

One possible ♀ syntype with labels: “nossi-bé” [handwritten on a strip of white paper]; “*Dicranacrus furcifer* Redtb.” [handwritten on pink paper]; “*Syntypus*” [printed on red paper]. The MHNG is not mentioned as a depository in the original description, but this specimen could be a syntype from the collection of Brunner von Wattenwyl or Dohrn, both of whom exchanged specimens with Saussure and the MHNG collections. Images on OSF. Box F21.

*Dicanacrus furcifer* Redtenbacher, 1891.

*fuscinervis* Redtenbacher, 1891: 427 [*Conocephalus*].

Cuba (Mus. Genf). Unspecified number of ♀.

Three ♀ syntypes. A ♀ with labels: “#” [handwritten on white paper]; “*Conocephalus fuscinervis* Redtb.” [handwritten on green paper]; “*Syntypus*” [printed on red

paper]. Specimen set with wings folded; both antennae and all legs are lost. A ♀ with labels: “#” [handwritten on white paper]; “*Conocephalus fuscinervis* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; both antennae and all legs except the left hind femur and tibia are lost. A ♀ with labels: “#” [handwritten on white paper]; “*Conocephalus fuscinervis* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; both antennae and all legs lost. Although there are no locality labels on the pins, the species name label in the insect box has “Cuba” written in the lower left corner. Box F13.

*Neoconocephalus fuscinervis* (Redtenbacher, 1891).

*fuscostriatus* Redtenbacher, 1891: 399 [*Conocephalus*].

Georgia, Missouri, Carolina (coll. Brunner); Texas (Mus. Genf); Mexico (Mus. Genf); Cuba (Mus. Genf & coll. Bolivar); Port au Prince (coll. Brunner); Quita (k.k. Hofmuseum Wien). Unspecified number of ♂ and ♀.

Seven ♂ syntypes. A ♂ with labels: “Texas, Dallas, Boll coll.” [handwritten on white card]; “5.” [handwritten on a square of white card]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♂ with labels: “Texas Boll., 601, 95” [printed on whitish paper]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left antenna is missing as are most of the right antenna, two tarsal segments of the left hind leg and one tarsal segment of the right hind leg. A ♂ with labels: “Texas Boll., 601, 95” [printed on whitish paper]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♂ with labels: “Texas Boll., 601, 95” [printed on whitish paper]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red card]. Specimen set with wings folded; most of the right antenna and the right hind leg are missing. The abdomen appears to have been eviscerated and stuffed with kapok, presumably before shipping to Europe. A ♂ with labels: “Texas Boll., 601, 95” [printed on whitish paper]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♂ with labels: “Mirador (t. temperes)” [handwritten on white paper]; “C. mexicanus Sss, M.H.S., Mexique T. chaudes” [handwritten on white paper]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. The specimen is set with wings folded; it has been hollowed out, probably by museum beetle, and lacks both front legs, the left middle leg and the abdomen. A ♂ with labels: “Cuba” [printed on a strip of whitish card]; “*Conocephalus fuscostriatus* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. The specimen is set with wings folded; the left hind leg lacks two tarsal segments. Box F8.

A junior synonym of *Neoconocephalus triops* (Linnaeus, 1758).

*geniculare* Redtenbacher, 1891: 527 [*Xiphidium*].

Molukken (coll. Brunner); Mioko (coll. Brunner & Mus. Hamburg); Vandiemensland (Erichson); Neu-Seeland (Scudder, Mus. Genf & k.k. Hofmuseum Wien). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♀ paralectotype with labels: "Nlle Zealande, 602 34" [printed on whitish paper]; "Xiphidium geniculare Redtb." [handwritten on lilac paper]; "Paralectotype" [printed on white card disc with blue margin]. The specimen lacks the tarsi of the right front leg and the ends of both antennae. The lectotype, designated by Pitkin (1980: 338), is in the NMHW in Vienna. Box F23.

A junior synonym of *Conocephalus semivittatus vittatus* (Redtenbacher, 1891).

**gladiator** Redtenbacher, 1891: 406 [*Conocephalus*].

Mexico (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: "Mexiq." [printed on white card]; "Conocephalus gladiator Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the specimen is in poor condition due to insect feeding damage; the antennae, front and middle legs are missing, the hind legs are reduced to remnants of the femurs. Images on OSF. Box F9.

*Neoconocephalus gladiator* (Redtenbacher, 1891).

**gracilis** Redtenbacher, 1891: 377, fig. 25 [*Caulopsis*].

Brasilia; Buenos-Ayres; Montevideo (coll. Brunner & Mus. Genf); Rosario (Mus. Hamburg); Cuba (coll. Bolivar). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: "609 33, Buen. Air., La Plata, M<sup>e</sup> H<sup>e</sup> de Sauss." [number and first part of locality handwritten on printed white card label]; "Caulopsis gracilis Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. A ♀ with labels: "Brésil, Rio Gr. d Sul, Ihering" [printed on green paper]; "Caulopsis gracilis Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. Box F5.

*Caulopsis gracilis* Redtenbacher, 1891.

**gracilis** Redtenbacher, 1891: 415-416 [*Conocephalus*].

Penang (coll. Brunner); Java (coll. Brunner & k.k. Hofmuseum Wien); Borneo (coll. Brunner & k.k. Hofmuseum Wien); Philippinen (coll. Brunner, coll. Dohrn & Mus. Genf); Carolinen, Yap, Pelew (coll. Brunner). More than one ♂ and ♀ (measurements given as range).

One ♀ syntype with labels: "Conocephalus sp., Br. Philippinen?" [handwritten on a strip of white paper]; "Conocephalus gracilis Redtb." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right antenna and most of the left antenna are missing, as is the right hind leg. A ♂ specimen with labels: "Conoc. gracilis Br., Aru, Br. det." [handwritten on a strip of yellowish paper]; "Conocephalus gracilis Redtb." [handwritten on yellow paper] is illustrated on OSF as a syntype by Naskrecki, and there is another ♀ from Aru present. Since the original description does not include Aru Islands (eastern Indonesia) as a locality these specimens are probably not syntypes. Images on OSF. Box F11.

*Euconocephalus gracilis* (Redtenbacher, 1891).

**indicus** Redtenbacher 1891: 408 [*Conocephalus*].

Himalaya (coll. Brunner); China (Mus. Hamburg); Birma (Mus. Genua); Penang (coll. Brunner); Borneo; Java (coll. Brunner); Sumatra (k.k. Hofmuseum

Wien); ? Bowen, Peak Downs, Australia (Mus. Hamburg). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♀ syntype with labels: “Java” [printed on a strip of white paper]; “Conoc. indicus Redt., e coll. Brunner-v.W.” [name and author handwritten on printed white card]; “Syntypus” [printed on red paper]; “ex coll. Nadig exotica” [typewritten on white card]. Specimen set with wings folded. Box F10.

*Euconocephalus indicus* (Redtenbacher, 1891)

**inermis** Redtenbacher, 1891: 501-502 [*Xiphidium*].

Texas (coll. Brunner, Scudder, Mus. Genf & k.k. Hofmuseum Wien); Kansas (Bruner). Unspecified number of ♂ and ♀.

One ♂ syntype with labels: “Texas Boll., 601, 95” [printed on white paper]; “Xiphidium inermis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the claw of the right middle leg is lost and the left hind leg is detached and pinned through the femur on the original pin. Box F22.

A junior synonym of *Orchelimum concinnum* Scudder, 1862.

**intermedius** Redtenbacher, 1891: 441-442 [*Oxystethus*].

Java (coll. Brunner). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♂, possible syntype, with labels: “Tengger Gieb., Ost-Java” [printed on whitish paper]; “Oxystethus intermedius Redtb.” [handwritten on yellow paper]; “Possible syntype? Hollier 2011” [handwritten on red paper]. Specimen lacks two tarsal segments of the left middle leg. There are a further five ♂ and two ♀ with the locality label “JAVA” [printed on a strip of yellowish paper] in the collection, but the style of the labels suggests that these were probably collected by Leo Zehntner after the publication of the description. Box F15

*Unalianus intermedius intermedius* (Redtenbacher, 1891).

**javanicum** Redtenbacher, 1891: 526 [*Xiphidium*].

Java (coll. Brunner). Unspecified number of ♀.

A ♂ specimen with labels: “Java or., Pasoeroean, 622 20.” [printed on yellow paper]; “Xiphidium javanicum Redtb.” [handwritten on yellow paper] is illustrated on OSF as a possible type by P. Naskrecki. There are seven specimens (4 ♂ and 3 ♀) with these labels in the collection, but MHNG is not mentioned as a depository in the original description and it is unlikely that these specimens are part of the type series, particularly since the description only treats the ♀ characters. OSF states that a ♀ specimen in the NHMW in Vienna is the holotype. Images of OSF. Box F23.

*Conocephalus javanicus* (Redtenbacher, 1891).

**latifrons** Redtenbacher, 1891: 526-527 [*Xiphidium*].

Neu-Süd-Wales (Mus. Genf); Sidney (Mus. Hamburg). Unspecified number of ♂ and ♀.

Lectotype ♀ designated by Pitkin (1980: 324) with labels: “603 34 (13), Clarence River, N. S. Wales” [handwritten on whitish paper]; “Xiphidium latifrons



Redtb.” [handwritten on lilac paper]; “Lectotype” [printed on white card disc with purple margin]; “LECTOTYPE selected by L.M. Pitkin, 1979” [typewritten on white card]. This specimen has lost most of both antennae, the right middle leg is detached and glued to the white card label. A ♀ paralectotype with labels: 603 34, Clarence River, New S. Wales” [handwritten on whitish paper]; “*Xiphidium latifrons* Redtb.” [handwritten on lilac paper]; “Paralectotype” [printed on white card disc with blue margin]. This specimen has lost most of the left antenna and the claw of the left hind leg. Box F23.

A junior synonym of *Conocephalus albescens* (Walker, 1869).

**lobatus** Redtenbacher, 1891: 442-443 [*Oxystethus*].

Carin-Cheba, Birma (Mus. Genua). Unspecified number of ♀.

One ♀, possible syntype, with labels: “*Oxystethus lobatus* Redtb.” [handwritten on yellow paper]; “*Liara lobatus* (REDTENBACHER, 1891), det. S. Ingrisch, 1998” [printed on white card]; “Possible syntype? Hollier 2011” [handwritten on red paper]. The species name label in the insect box has the locality “Birma” handwritten in the lower left corner. The spelling of the locality as “Birma” rather than “Birmanie” strongly suggests that the specimen was one collected by L. Fea for the Museo Civico di Storia Naturale “Giacomo Doria” (MCSN) in Genoa. Box F15.

*Liara lobatus* (Redtenbacher, 1891).

**longipes** Redtenbacher, 1891: 505, fig. 81 [*Xiphidium*].

Buenos-Ayres (coll. Brunner & Mus. Genf); Montevideo (coll. Brunner); Riogrande do Sul (Mus. Genf); Santa Catherina (Mus. Hamburg, coll. Dohrn & Brunner); Peru? (Scudder). More than one ♂ and ♀ (measurements given as range).

Three ♂, seven ♀ and one damaged specimen, all syntypes. A ♂ with labels: “Buenos Ayres” [handwritten on green paper]; “*Xiphidium longipes* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of the left antenna and both hind legs are missing. A ♂ with labels: “Bresil, Rio Gr d Sul, Ihering” [printed on green paper]; “*Xiphidium longipes* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left antenna and right middle leg are lost. A ♂ with labels: “Bresil, Rio Gr d Sul, Ihering” [printed on green paper]; “*Xiphidium longipes* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right front and right hind legs are missing. A ♀ with labels: “Buenos Ayres, Mars 1868” [handwritten on white paper]; “*Xiphidium longipes* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen with wings folded, pinned laterally through the side of the thorax. A ♀ with labels: “Buenos Ayres, Mars 1868” [handwritten on white paper]; “*Xiphidium longipes* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings roughly folded; most of the left and the entire right antenna lost, left hind leg lost, right hind leg detached and pinned through the femur on the original pin. A ♀ with labels: “Buenos Ayres, Mars 1868” [handwritten on white paper]; “*Xiphidium longipes* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; all legs apart from the left front are lost. A ♀ with labels: “Bresil, Rio Gr d Sul,

Ihering" [printed on green paper]; "Xiphidium longipes Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right front and left middle legs are lost, the right hind leg is detached and pinned through the femur on the original pin. A ♀ with labels: "Bresil, Rio Gr d Sul" [printed on green paper]; "Xiphidium longipes Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. A ♀ with labels: "Bresil, Rio Gr d Sul, Ihering" [printed on green paper]; "Xiphidium longipes Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the left front leg and the tarsi of the right front leg are missing. The right hind leg is detached and glued to a card on the original pin. A ♀ with labels: "Bresil, Rio Gr d Sul, Ihering" [printed on green paper]; "Xiphidium longipes Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; both hind legs are detached and pinned through the femur on the original pin, most of both antennae are lost. A specimen with labels: "Bresil, Rio Gr d Sul, Ihering" [printed on green paper]; "Xiphidium longipes Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. The head, wings, hind legs and the end of the abdomen are all lost. Box F22.

*Conocephalus longipes* (Redtenbacher, 1891).

***lugubre*** Redtenbacher, 1891: 518 [*Xiphidium*].

Egypten (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: "Egypte, Naville" [handwritten on pink paper]; "Xiphidium lugubris Redtb." [handwritten on pink paper]; "Holotypus" [printed on red card]. Specimen set with the left wings spread and right wings folded; most of both antennae are missing but a length of antenna is secured under the name label pinned to the floor of the insect box which may belong to this specimen. The right hind leg is detached and pinned through the femur on the main pin. Images on OSF. Box F23.

*Conocephalus lugubris* (Redtenbacher, 1891).

***macropterus*** Redtenbacher, 1891: 402 [*Conocephalus*].

Mexico (Mus. Genf); Martinique (coll. Brunner); St. Vincent, Kleine Antillen (Brit. Mus.); Cuba (coll. Bolivar); Brasilien; San Francisco; Pernambuco (coll. Brunner & Mus. Genf); Peru; Buenos-Ayres (Mus. Hamburg). More than one ♀.

One ♀ syntype with labels: "Cordova, (Mexique), t. chaudes" [handwritten on white paper]; "Conocephalus macropterus Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the antennae, right front leg and left hind leg are missing and there is insect feeding damage to the right wings, thorax and right hind femur. The specimens from Pernambuco mentioned in the original description as being in the MHNG could not be found. Box F8.

A junior synonym of *Neoconocephalus triops* (Linnaeus, 1758).

***macroxiphus*** Redtenbacher, 1891: 417 [*Conocephalus*].

Cayenne (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: "Cayenne, Portal Guyane" [printed on green paper]; "Conocephalus macroxiphus Redtb." [handwritten on green paper]; "Syntypus"

[printed on red paper]. Specimen set with wings folded; both antennae are lost. Images on OSF. Box F12.

*Ruspolia macroxiphus* (Redtenbacher, 1891).

***maculata*** Redtenbacher, 1891: 455-456, fig. 63 [*Agraecia*].

Brasilia, Theresopolis (coll. Brunner, coll. Dohrn, coll. Schulthess-Rechberg, Mus. Genf & Mus. Hamburg). More than one ♀.

One ♀ syntype with labels: "S Catherina, Rio Capivary, Fruhstorfer 1888" [printed on white paper with black margin]; "Uruguay" [printed on a strip of green paper]; "Agraecia maculate R." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left hind leg lacks one tarsal segment, the right hind leg lacks two tarsal segments. Although the locality is apparently different to that cited in the description, "Theresopolis" and "S Catherina" are frequently found on the same locality label in the MHNG collection. The Uruguay label, however, is presumably a lapse. According to OSF a specimen in the NHMW is the lectotype, but it is not clear whether this has been officially designated. Box F15.

*Agraecia maculata* Redtenbacher, 1891.

***modestum*** Redtenbacher, 1891: 510, fig. 86 [*Xiphidium*].

Cap York, Sidney, Neu-Süd-Wales; Neu-Caledonien; Lord Howes-Insel; Fidji-Inseln (coll. Brunner); Ovalaua; Neu-Guinea; Fidji- und Freundschafts-Inseln (Mus. Genf); patria? (k.k. Hofmuseum Wien); Sidney, Peak Downs.; Samoa-Inseln, Tongatabu (Mus. Hamburg). Unspecified number of ♂ and ♀.

Two ♂ paralectotypes. A ♂ with labels: "603 34, Friendly Islands" [handwritten on white paper]; "Xiphidium modestum Redtb." [handwritten on lilac paper]; "Paralectotype" [printed on white card disc with blue margin]. A ♂ with labels: "603 34, Katow, New Guinea" [handwritten on white paper]; "Xiphidium modestum Redtb." [handwritten on lilac paper]; "Paralectotype" [printed on white card disc with blue margin]. This specimen has lost the right middle leg, and both hind legs are detached and secured on a separate pin. A third ♂ with the label "B. W" [handwritten on a strip of white paper] could also be a paralectotype. The lectotype, designated by Pitkin (1980: 341) is in the NHMW in Vienna. Pitkin found that *modestum* Redtenbacher, 1891 was a junior homonym of *Xiphidium modestum* Bruner, 1891, and used the junior synonym *upoluensis* Karny as the replacement name. Images on OSF. Box F22.

Replaced by *Conocephalus upoluensis* (Karny, 1907).

***nigromaculatus*** Redtenbacher, 1891: 390 [*Conocephalus*].

Uruguay, Montevideo (coll. Brunner); Argentina, Buenos-Ayres (Mus. Genf). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♀ syntype with labels: "609 33, Buen. Air., La Plata, M<sup>e</sup> H<sup>v</sup> de Sauss." [number and first part of locality handwritten on printed white card]; "Conocephalus nigromaculatus Redt." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread. Images on OSF. Box F6.

*Neoconocephalus nigromaculatus* (Redtenbacher, 1891).

**nigropunctatus** Redtenbacher, 1891: 391-392, fig. 32 [*Conocephalus*].

Alto-Amazonas (coll. Brunner & Dohrn); Brasilia (k.k. Hofmuseum Wien); Surinam (coll. Brunner & Mus. Hamburg); Cuba; Cayenne (Mus. Genf). Unspecified number of ♂ and more than one ♀ (measurements given as range).

Two ♂ and one ♀ syntype. A ♂ with labels: "124=126, ohne namen, Cuba" [handwritten on white squared paper]; "*Conocephalus nigropunctatus* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. A ♂ with labels: "Cayenne, Portal Guyane" [printed on green paper]; "*Conocephalus nigropunctatus* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right antenna is lost and both hind legs are detached and pinned through the femur on the original pin. A ♀ with labels: "Cayenne, Portal Guyane" [printed on green paper]; "*Conocephalus nigropunctatus* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread. Box F6.

A junior synonym of *Neoconocephalus affinis* (Beauvois, 1805).

**nitidum** Redtenbacher, 1891: 503 [*Xiphidium*].

Georgia (coll. Brunner & Mus. Genf). Unspecified number of ♂ and ♀.

Two ♂ and two ♀ syntypes. A ♂ with labels: "Georgie, 599, 65" [printed on white paper]; "*Xiphidium nitidum* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right antenna is missing. A ♂ with labels: "Georgie, 599, 65" [printed on white paper, "*Xiphidium nitidum* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the left hind leg is detached and pinned through the femur on the original pin. A ♀ with labels: "Georgie, 599, 65" [printed on white paper]; "*Xiphidium nitidum* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. A ♀ with labels: "Georgie, 599, 65" [printed on white paper]; "*Xiphidium nitidum* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; both antennae are missing and the right hind leg is detached and pinned through the femur on the original pin. Images on OSF. Box F22.

A junior synonym of *Orchelimum agile* (DeGeer, 1773).

**obscurellus** Redtenbacher, 1891: 397-398 [*Conocephalus*].

Mexico, Cuernavaca (coll. Brunner); Guatemala (coll. Bolivar); Guita, Antillen (k.k. Hofmuseum Wien); Venezuela; Nicaragua (coll. Brunner); Cuba (coll. Brunner, Mus. Genf & coll. Bolivar). More than one ♂ (measurements given as range) and an unspecified number of ♀.

Four ♀ syntypes. A ♀ with labels: "110 68 ♀ de l'envoi de Cuba 1881" [handwritten on white card]; "*Conocephalus obscurella* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread. A ♀ with labels: "125 ♀, Cuba" [handwritten on white paper]; "Cuba, M. Leoes" [handwritten on white paper]; "*Conocephalus obscurella* Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right antenna is missing. A ♀ with labels: "Cuba" [handwritten on a strip of white card]; "à M de



Saussure par M Chevrolet de M Poey" [handwritten on white paper]; "Conocephalus obscurellus Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. A ♀ with labels: "Cuba" [handwritten on a strip of white card]; "Conocephalus obscurellus Redtb." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; both middle legs lack two tarsal segments. Box F8.

A junior synonym of *Neoconocephalus triops* (Linnaeus, 1758).

**pallidus** Redtenbacher, 1891: 414-415 [*Conocephalus*].

Ostindien, Silhet, Calcutta (coll. Brunner & k.k. Hofmuseum Wien); Ceylon (coll. Brunner); Birma (Mus. Genua); Tonking (Mus. Genf); Penang; Singapore (coll. Brunner); Java (k.k. Hofmuseum Wien & coll. Brunner); Borneo (k.k. Hofmuseum Wien & coll. Brunner); Philippinen (coll. Brunner). More than one ♂ and ♀ (measurements given as range).

One ♂ and two ♀ syntypes. A ♂ with labels: "Tonking, M<sup>r</sup> H<sup>v</sup> de Sauss." [printed on whitish paper]; "Conocephalus pallidus Redtb." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the antennae are lost, as are the tibia and tarsi of the left front leg, the tarsi of the right front leg, both middle legs, the left hind leg, the tibia and tarsi of the right hind leg and the abdomen. A ♀ with labels: "Tonking, M<sup>r</sup> H<sup>v</sup> de Sauss." [printed on whitish paper]; "Conocephalus pallidus Redtb." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the antennae, front legs and hind legs are all missing. The abdomen shows some insect feeding damage. A ♀ with labels: "Tonking, M<sup>r</sup> H<sup>v</sup> de Sauss." [printed on whitish paper]; "Conocephalus pallidus Redtb." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the antennae, front legs, hind legs and abdomen are all missing. Images on OSF. Box F10.

*Euconocephalus pallidus* (Redtenbacher, 1891).

**piceus** Redtenbacher, 1891: 490 [*Dicranacrus*].

Madagascar (coll. Brunner). Unspecified number of ♂ and ♀.

A ♂ specimen with labels: "Madagasc, Annanarivo" [printed on pink paper]; "Dicranacrus piceus Redt." [handwritten on pink paper] is illustrated as a possible syntype on OSF by P. Naskrecki. There are six specimens (4 ♂, 2 ♀) with these labels in the collection, but MHNG is not mentioned as a depository and it is unlikely that these specimens are part of the type series. Images on OSF. Box F21.

*Dicranacrus piceus* Redtenbacher, 1891.

**pusillus** Redtenbacher 1891: 548-549 [*Hexacentrus*].

Java (coll. Brunner). Unspecified number of ♂ and ♀.

A ♂ specimen with labels: "Java" [printed on yellow paper]; "Hexacentrus pusillus Redtb." [handwritten on yellow paper] is illustrated on OSF as a possible type by P. Naskrecki. There are three specimens (2 ♂ and 1 ♀) with these labels in the collection, but MHNG is not mentioned as a depository in the original description and it is unlikely that these specimens are part of the type series. Images on OSF. Box F26.

*Hexacentrus pusillus* Redtenbacher, 1891.

*pustulatus* Redtenbacher, 1891: 395, fig. 34 [*Conocephalus*].

Brasilia, Theresopolis (coll. Brunner, Dohrn, Schultess-Rechberg & Mus. Hamburg). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Con. *pustulatus*, Theresopolis, e coll. Brunner.v.W.” [name and locality handwritten on printed card label with black margins]; “Syntypus” [printed on red paper]; “ex coll. Nadig exotica” [typewritten on white card]. Specimen set with wings folded; the left middle leg lacks the tarsi, and both it and the left hind leg have been reattached with glue. Since the specimen came from Brunner von Wattenwyl’s collection it is not implausible that the syntype label is correct. Box F7.

A junior synonym of *Neoconocephalus exaltatus* (Walker, 1869).

*quadrituberculata* Redtenbacher, 1891: 460-461 [*Lobaspis*].

Australia, Rockhampton (coll. Brunner & Mus. Hamburg); Bowen, Sidney (Mus. Hamburg). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: “Rockhampton, Mus. Gdf.” [handwritten on whitish paper]; “*Lobaspis 4tuberculata* Redtb.” [handwritten on lilac paper]; “? Syntype, *Lobaspis quadrituberculata* R, Det. D.C. Rentz 1980” [handwritten on white card with Det. D.C. Rentz 19 printed]. Specimen set with wings spread; most of both antennae are missing. A ♀ with labels: “Sidney M.G.” [handwritten on whitish paper]; “*Lobaspis quadrituberculata* Redt.” [handwritten on lilac paper]; “? Syntype, *Lobaspis quadrituberculata* Red., Det. D.C. Rentz 1980” [handwritten on white card with Det. D.C. Rentz 19 printed]. Specimen set with wings folded. The MHNG is not mentioned as a depository in the original description, but the localities do suggest that these specimens could nevertheless be syntypes. Images on OSF. Box F17.

*Nicsara quadrituberculata* (Redtenbacher, 1891).

*roseipennis* Redtenbacher, 1889: 30 [*Deryocorystes*].

Turcomania (Ashkhabad, Karybend, Kranowodsk). More than one ♂ (measurements given as range) and an unspecified number of ♀.

One ♂ and one ♀ syntype. A ♂ with labels: “11.vii.86, Ashkhabad” [handwritten on a strip of white paper]; “*Derocorystes roseipennis* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the tibia and tarsi of the right middle leg, and the claw of the left hind leg are missing. A ♀ with labels: “11.vii.86, Ashkhabad” [handwritten on a strip of white paper]; “Ashkhabad” [handwritten on blue paper printed with black margins]; “*Derocor. Roseipennis* Redtb., Turkestan” [handwritten on blue card printed with black margins (as species name labels)]; “*Derocorystes roseipennis* Redtb.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; all of the left and most of the right antennae are missing, the base of the abdomen and left wings show signs of insect feeding damage. Box Z16.

A junior synonym of *Dericorys annulata* (Fieber, 1853).

*rufescens* Redtenbacher, 1891: 444 [*Liara*].

Birma, Carni-Cheba (Mus. Genua). Unspecified number of ♂.

One ♂, possible syntype, with labels: “Charin-Cheba” [handwritten on a strip of white paper]; “*Oxystethus rufescens* Redtb.” [handwritten on yellow paper]; “*Liara rufescens* (REDTENBACHER, 1891), det. S. Ingrisch, 1998” [printed on white card]; “Possible syntype? Hollier 2011” [handwritten on red paper]. The species name label in the insect box has the locality “Birma” handwritten in the lower left corner. The spelling of the locality as “Birma” rather than “Birmanie” strongly suggests that the specimen was one collected by L. Fea for the Museo Civico di Storia Naturale “Giacomo Doria” (MCSN) in Genoa. Box F15.

*Liara rufescens* Redtenbacher, 1891.

***sigma*** Redtenbacher, 1891: 473-474 [*Salomona*].

Neu-Britannien (coll. Dohrn); Neu-Irland (Mus. Genf); Mioko, Duke of York Island (Mus. Hamburg). More than one ♂ and ♀ (measurements given as range).

One ♂ and one ♀, possibly syntypes. A ♀ with labels: “6” [handwritten on a square of white paper]; “14656” [handwritten on a strip of white paper]; “*Salomona godeffroyi* Pict. Type!” [handwritten on green paper]; “Syntype of *S. sigma* Redtb.? Hollier 2010” [typewritten on white card]. Specimen set with wings folded. The abdomen has been eviscerated and stuffed (presumably before shipping to Europe). Although the original description states that there is type material of *S. sigma* in the MHNG, all of the specimens are labelled as *S. godeffroyi* Pictet (with which it was synonymised by Brongniart, 1897). The measurements of this specimen do not correspond to the description of *S. godeffroyi* however, the specimen being considerably smaller than Pictet’s but inside the range given by Redtenbacher. A ♂ specimen that does not quite match Pictet’s measurements could also be a syntype of *S. sigma*. Box F19.

A junior synonym of *Salomona godeffroyi* (Pictet, 1888).

***spiniger*** Redtenbacher, 1891: 349-350, fig. 8 [*Eriolus*].

Cayenne (Mus. Genf). Unspecified number of ♀.

Two ♀ syntypes. A ♀ with labels: “Cayenne, Portal Guyane” [printed on green paper]; “*Eriolus spiniger* Redtb.” [handwritten on green paper]; “*Eriolus spiniger* Redt.” [handwritten on white paper]; “Musée de Genève, N°...” [printed on white card with black margin]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left front and right hind legs have lost two tarsal segments. A ♀ with labels “Cayenne” [printed on green paper]; “*Eriolus spiniger* Redtb.” [handwritten on green paper]; “*Eriolus spiniger* Redt.” [handwritten on white paper]; “Musée de Genève, N°...” [printed on white card with black margin]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is lost, as are two tarsal segments of the left front leg, the claw of the left middle leg and two tarsal segments of the right middle leg. Box F2.

*Erioloides spiniger* (Redtenbacher, 1891).

***sulcata*** Redtenbacher, 1891: 435-436, fig. 51 [*Subria*].

Bombay (k.k. Hofmuseum Wien); Cambodje (coll. Brunner); Birma (Mus. Genua); Batavia, Java (Mus. Genf); Sumatra (coll. Dohrn & Schulthess-Rechberg); Alto-Amazonas? (coll. Brunner).

Two ♀ from Java that were part of the type series are present in the MHNG collection, but following the revision of Ingrisch (1998) these are not considered conspecific with *S. sulcata* and are paratypes of *Pseudosubria transversa* Ingrisch, 1998: 52. Two other ♀ specimens from Myanmar (Burma), collected by L. Fea, may also have been part of the type series, but were also considered distinct from *S. sulcata* and are paratypes of *Pseudosubria triangula* Ingrisch, 1998: 50. The lectotype of *S. sulcata* (designated by Ingrisch, 1998: 48) is in the NHMW in Vienna. Images of *P. triangula* on OSF. Box F14.

*Subria sulcata* Redtenbacher, 1891.

**surinamensis** Redtenbacher, 1891: 359 [*Oxyprora*].

Surinam, Paramaribo (Mus. Hamburg & coll. Brunner); Brasilia (Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Brésil [handwritten on a strip of white paper]; “*Oxyprora surinamensis* Redt.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with right wings spread and left wings folded; the abdomen and thorax have been partly hollowed out by insect feeding. Images on OSF. Box F3.

*Oxyprora surinamensis* Redtenbacher, 1891.

**tibialis** Redtenbacher, 1891: 484 [*Odontolakis*].

Nossi-Bé, Madagascar (coll. Brunner, Mus. Hamburg & coll. Dr. Brančik). Unspecified number of ♂ and ♀.

A ♂ specimen with labels: “Musée Senkenberg” [printed on white paper]; “*Odontolakis tibialis* Redtb.” [handwritten on pink paper] is illustrated as a possible syntype on OSF by P. Naskrecki. There is also a ♀ with the same labels in the collection. Neither MHNG nor Senckenberg are mentioned as depositories in the original description, but some specimens from Voeltzkow’s 1889-1895 expedition to Madagascar are deposited in the MHNG collection with similar labels and this is a more likely provenance for these specimens, which would not then be syntypes. Images on OSF. Box F19.

*Odontolakis tibialis* Redtenbacher, 1891.

**truncatirostris** Redtenbacher, 1891: 389-390, fig. 30 [*Conocephalus*].

Brasilia, Bahia, Theresopolis (coll. Brunner, Dohrn & Mus. Genf). Unspecified number of ♂ and more than one ♀ (measurements given as range).

One ♀ syntype with labels: “Bahia” [printed on a strip of white card]; “*Conocephalus truncatirostris* Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the right antenna and the last tarsal segment of the right hind leg are missing. A ♂ specimen without a locality label, set with wings spread, could also be a syntype. Box F6.

*Neoconocephalus truncatirostris* (Redtenbacher, 1891).

**versicolor** Redtenbacher, 1891: 493, fig. 79c [*Paraxiphidium*].

Peru (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: “Perou, M H [illegible]” [handwritten on white card]; “*Paraxiphidium versicolor* Redtb.” [handwritten on green paper]; “Holotypus”



[printed on red card]. The specimen is in poor condition with damage to the thorax, and the end of the abdomen partially detached. The holotype label is not justified. Images on OSF. Box F22.

*Paraxiphidium versicolor* Redtenbacher, 1891.

**vestitum** Redtenbacher, 1891: 529 [*Xiphidium*].

Philippinen (Mus. Genf). One ♂ without hind legs.

Holotype ♂ with labels: “Philippines, M. Petel, 603.74” [names printed and numbers handwritten on white paper]; “Xiphidium vestitum Redtb.” [handwritten on yellow paper]; “Holotypus” [printed on red card]. The specimen lacks both hind legs. Images on OSF. Box F23.

*Conocephalus vestitus* (Redtenbacher, 1891).

**virescens** Redtenbacher, 1891: 485 [*Odontolakis*].

Madagascar (coll. Brunner). More than one ♂ and ♀ (measurements given as range).

A ♂ specimen with labels: “Madagasc, Sikora” [printed on pink paper]; “Odontolakis virescens Redtb.” [handwritten on pink paper] is illustrated as a possible syntype on OSF by P. Naskrecki. There are eight specimens (5 ♂, 3 ♀) with these labels in the collection, but MHNG is not mentioned as a depository in the original description and it is unlikely that these specimens are part of the type series. Images on OSF. Box F20.

*Odontolakis virescens* Redtenbacher, 1891.

**viridis** Redtenbacher, 1891: 419-420 [*Conocephalus*].

Brasililia, Rio grande do Sul (coll. Brunner, Mus. Hamburg & Mus. Genf); Uruguay, Montevideo (coll. Brunner & Mus. Hamburg); Buenos-Ayres (coll. Brunner & Mus. Genf). Unspecified number of ♂ and more than one ♀ (measurements given as range).

Four ♂ and four ♀ syntypes. A ♂ with labels: “Buenos Ayres” [handwritten on a strip of white paper]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus [printed on red paper]. Specimen set with wings folded; most of the right antenna and two tarsal segments of the right hind leg are lost. A ♂ with labels: “Brésil, Rio Gr d Sul” [printed on green paper]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♂ with labels: “Brésil, Rio Gr d Sul” [printed on green paper]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right middle leg is missing. A ♂ with labels: “Brésil, Rio grande da Sul, Dr Ihering, 614.16.” [printed on white paper]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the right antenna is missing. A ♀ with labels: “Buenos Ayres” [handwritten on a strip of white card with black margin]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae are missing. A ♀ with labels: “Brésil, Rio Gr d Sul” [printed on green paper]; “Conocephalus viridis Redtb.” [handwritten on green

paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left antenna is missing, as are the claw of the left hind leg and the last tarsal segment of the right hind leg. A ♀ with labels: “Brésil, Rio Gr d Sul” [printed on green paper]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♀ with labels: “Brésil, Rio Gr d Sul” [printed on green paper]; “Conocephalus viridis Redtb.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. There are also three immature ♂ from Rio Grande do Sul that may also be syntypes. Images on OSF. Box F12.

*Neoconocephalus viridis* (Redtenbacher, 1891).

## DISCUSSION

Most of the type specimens located in the MHNG collections are of species described by Redtenbacher using specimens already in Geneva. It is interesting to note that although Henri de Saussure’s collection was only formally given to the museum in 1903 it was already treated as integral when Redtenbacher was working. Other type specimens are present due to exchanges of material, and it is possible if not probable that other syntypes remain unrecognised in the MHNG collections because of the uncertainty about the size of Redtenbacher’s type series and because types were not labelled as such at that period. The presence of syntypes from “Turkestan” is unexpected, and it is not clear why or when they are deposited in MHNG, although it may be connected to Saussure’s work on material collected in that region by Fedtchenko (Saussure, 1874).

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## **An annotated catalogue of the type material of Orthoptera (Insecta) described by Carl Brunner von Wattenwyl deposited in the Muséum d'histoire naturelle in Geneva**

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**An annotated catalogue of the type material of Orthoptera (Insecta) described by Carl Brunner von Wattenwyl deposited in the Muséum d'histoire naturelle in Geneva.** - Type specimens of 136 species described by Brunner von Wattenwyl have been identified in the Orthoptera collection of the Geneva Museum. The names are listed alphabetically, and the sex, label data and condition of the specimens is given, along with their location within the collection and the current nomenclatural combination.

**Keywords:** Caelifera - Ensifera - type-catalogue - Fea.

### INTRODUCTION

Carl (or Karl) Brunner von Wattenwyl (often shortened to Brunner) was born in Switzerland in 1823 and died in Austria in 1914. He was an important and prolific entomologist, specialising in the Orthoptera *sensu lato* (a grouping now divided into a number of orders including Blattodea, Mantodea, Phasmatodea and Orthoptera). He studied the specimens of many European museums and collectors, and build an impressive personal collection most of which is now in the Naturhistorisches Museum Wien (NHMW).

Type material of 136 species has been identified in the Muséum d'histoire naturelle de Genève (MHNG) collection, most are specimens that already belonged to the MHNG, but some were given or sold to the Museum subsequent to the publication of their description. The specimens of a further four species are missing from the collection. No trace of a further three species, for which Brunner stated in his descriptions that type material was in the MHNG, could be found. The status of the specimens of some 19 species described by Brunner from the material collected for the Museo Civico di Storia Naturale "Giacomo Doria" (MCSN) in Genoa by Leonardo Fea in Burma (now officially called Myanmar) is unclear. In the introduction to his treatment of this material (Brunner, 1893) it is implied that Brunner saw all of the Orthoptera collected by Fea. Once the work was published, Brunner received a part of the material (unpublished letter), and it appears that Fea also received some material back, some of which he exchanged or sold (Poggi, pers. comm.). This would suggest

that Fea material in the MHNG collections are syntypes. However, Henri de Saussure and Josef Redtenbacher both described species using Fea material, which might suggest that not all the specimens were sent to Brunner, or that he gave some to other experts before describing his new species, in which case the specimens in the MHNG might not be part of the type series. As well as the NHMW and MCSN, Brunner made extensive use of the specimens now housed in the Berlin Museum für Naturkunde (ZMHB).

Many of the specimens in the MHNG have a characteristic printed label “TYPE BRUNN”, but it is clear that this does not mean type in the modern sense because many specimens with the label are not from the type locality, and some were not described by Brunner. Brunner did not normally state how many specimens he examined, nor did he nominate holotypes; all type specimens are therefore considered as syntypes unless it is clear from the description that only one specimen was available.

## ARRANGEMENT AND FORMAT

The species are listed alphabetically. The format for each is:

*species name* Author, work: page [*Original generic placement*].

Type locality as given in description. Number and sex of specimens examined.

Number of type specimens in the MHNG. Specimen: “Label data” [format of label]. Following the recommendations of Ohl & Oswald (2004) the condition of each specimen is noted, although damage to the tips of the antennae (especially in the Ensifera) or wear to wing margins is not enumerated. Other comments. Location of material in the MHNG main Orthoptera collection.

Currently valid binomen of taxon (according to OSF).

The abbreviation OSF refers to *Orthoptera Species File Online* (Eades *et al.*, 2011).

## CATALOGUE

***aberrans*** Brunner von Wattenwyl, 1895: 117 [*Diacanthodis*].

New-Sud-Wales (Mus. Genav.). One damaged ♀.

Holotype ♀ with labels: “603 34, Richmond River, New S. Wales” [handwritten on lined white paper]; “2” [handwritten on a square of white card]; “*Diacanthodis aberrans* Brunn.” [handwritten on lilac paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; both hind legs are missing. The neotype designated by Rentz *et al.* (2005: 141) is invalid. Box E17.

*Phricta aberrans* (Brunner von Wattenwyl, 1895).

***abnormis*** Brunner von Wattenwyl, 1878: 357-358 [*Trigonocorypha*].

Inner-Indien (Mus. Genf). Unspecified number of ♀.

Two ♀ syntypes. A ♀ with labels: “Indes inter., Ms. Hy. de Sauss.” [handwritten locality on printed white card]; “*Trigonocorypha abnormis* Brun.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left front tibia is broken off about half way, the left middle leg lacks two tarsal segments, and both hind legs lack

the last tarsal segment. A ♀ with labels: “Indes inter., Ms. Hy. de Sauss.” [handwritten locality on printed white card]; “Trigonocorypha abnormis Brun.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the tarsi of the left front leg are missing as are the last tarsal segment of the left middle leg, the entire right middle and hind legs. The left hind leg has been reattached with glue, and lacks the claw. A third ♀, mounted exactly like the other two and set with wings spread, has the printed locality label “Himalaja Ms. Hy. de Sauss.” and may also be a syntype given that virtually the only access to the Himalayas was through what was then British India. Box B22.

*Trigonocorypha abnormis* Brunner von Wattenwyl, 1878.

*abnormis* Brunner von Wattenwyl, 1888: 281, fig. 13 [*Trihoplophora*].

Australia septentrionalis (Mus. Genav. & coll. Brunner). Unspecified number of ♂.

One ♂ syntype with labels: “Gayndah” [printed on a strip of white paper]; “8002” [handwritten on a strip of white paper]; “Trihoplophora abnormis Br” [handwritten on white paper]; “Trihoplophora abnormis Brun.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. The left front leg lacks two tarsal segments, the right front leg lacks the tarsi and the right middle leg lacks the last tarsal segment. In the collection the locality Gayndah (which is in Queensland) has been interpreted as Indian rather than Australian (yellow labels used rather than violet ones), despite the fact that the original description correctly indicates the latter. Box O4.

*Penalva abnormis* (Brunner von Wattenwyl, 1888).

*accola* Brunner von Wattenwyl, 1895: 167-168 [*Gongrocnemis*].

Guatemala (Mus. Genav. & coll. Brunner). Unspecified number of ♂ and ♀.

Two ♀ syntypes. A ♀ with labels: “2 14, Guatemala, M<sup>r</sup> H. d. Sauss” [handwritten on lined white card]; “33” [handwritten on white paper]; “Gongrocnemis accola Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with right wings spread and left wings folded; the right hind leg is missing. A ♀ with labels: “2 14, Guatemala, M<sup>r</sup> H. d. Sauss” [handwritten on lined white card]; “Gongrocnemis accola Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is missing, and the left hind leg lacks the last tarsal segment. The left front leg is detached and pinned through the femur on a separate pin. Box E20.

A junior synonym of *Ancistrocercus inficitus* (Walker, 1870).

*acuminata* Brunner von Wattenwyl, 1878: 320, fig. 91 [*Cora*].

Unknown (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “Cora acuminata Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. The species name label in the insect box has the locality “Ceylon” written in the lower left corner. Specimen set with left wings spread and right wings roughly folded; the right antenna and the right front and middle leg are lost. The left middle and right hind legs lack the tarsi, the left hind leg has been reattached with glue and lacks

two tarsal segments. Brunner gave no locality for the specimen(s) in the original description, and according to OSF the genus is known from India but not Sri Lanka, so the locality label in the insect box may be specious. The holotype label is unjustified. Box B33.

*Puerula acuminata* (Brunner von Wattenwyl, 1878).

***africana*** Brunner von Wattenwyl, 1878: 187, fig. 53 [*Poreuomena*].

Gaboun (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: "Gabon, M. Ed Sarazin" [handwritten on white paper]; "Poreuomena Africana Br." [handwritten on pink paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Holotypus" [printed on red card]. Specimen set with wings folded; most of both antennae are missing, as is the last tarsal segment of the left front leg and the right middle and hind legs. The left hind leg has been glued back upside down, and has lost most of the tibia and the tarsi. The holotype label is unjustified. Images on OSF. Box B15.

*Poreuomena africana* Brunner von Wattenwyl, 1878.

***albolineata*** Brunner von Wattenwyl, 1878: 327 [*Turpilia*].

Madagascar (Mus. Genf & coll. Brunner n° 11969). More than one ♀.

One ♀ syntype with labels: "Turpilia albolineata Br., Madagascar" [handwritten on pink paper]; "200, 69" [handwritten on disc of white paper (blue on other side)]; "TYPE BRUNN" [printed on a strip of white paper]; "Plangia albolineata (Br.), (= venata Griff.)" [handwritten on pink paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left front leg and both hind legs are lost. Box B30.

*Plangia albolineata* (Brunner von Wattenwyl, 1878).

***albosignata*** Brunner von Wattenwyl, 1878: 204 [*Taeniomena*].

Tarangower (coll. Brunner no 1122), Sidney (Mus. Genf), Port Adelaide (coll. Brunner n° 1432), Port Denison (coll. Brunner n° 6420). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: "N. Holld." [handwritten on a strip of white paper]; "Taeniomena albosignata Br." [handwritten on lilac paper]; "Syntypus" [printed on red paper]. The species name label in the insect box also has the locality "N<sup>elle</sup> Hollande" [ie. Australia] written in the lower left corner. Specimen set with wings folded; the antennae, right front leg and both middle legs are missing. Both hind legs have been glued back onto the thorax, the left lacks the tibia and tarsi and the right lacks the tarsi. Box B17.

*Tinzedda albosignata* (Brunner von Wattenwyl, 1878).

***aliena*** Brunner von Wattenwyl, 1878: 222 [*Allodapa*].

Ceylon (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: "Trincom., Ceylan." [printed on white card]; "Ceylan, M H de Saussure" [handwritten on white paper]; "Allodapa aliena Br." [handwritten on yellow paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Holotypus" [printed on red card]. Specimen set with wings spread; the left antenna,



right middle leg and left hind leg are missing, as are the tarsi of the left middle leg. The head and thorax have insect feeding damage, and the left hind wing is detached and glued to a transparent sheet secured on a separate pin. The holotype label is unjustified. Box B19.

*Pelerinus alienus* (Brunner von Wattenwyl, 1878).

***angustirostris*** Brunner von Wattenwyl, 1890: 107 [*Tetanorhynchus*].

San Jose, Rep. Argentinica (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: “San José, Entre Rios, env. Claraz” [handwritten on white paper]; “*Tetanorhynchus angustirostris* Br.” [handwritten on green paper]; “*Tetanorhynchus angustirostris* Br.v.W., Holotypus, C.S. Carbonell 1966” [handwritten by Carbonell on red card]; “*Astronascopia albrechti* (Zolessi), A. Bentos-Pereira det. / 98” [handwritten on white card]. The left antenna is lost, as is the right middle leg. The left middle leg lacks two tarsal segments and the left hind leg lacks the tarsi. A small vial secured on the main pin contains dissected parts. The holotype label is unjustified. Box T2.

*Orienscopia angustirostris* (Brunner von Wattenwyl, 1890).

***annulata*** Brunner von Wattenwyl, 1888: 333-334, fig. 41a [*Gryllacris*].

Ceylon (coll. Brunner); Assam (Mus. Genav.). Unspecified number of ♂ and ♀.

One ♂ and two ♀ syntypes. A ♂ with labels: “Assam” [handwritten on white card]; “coll. Guerin” [handwritten on white card]; “33” [handwritten on a square of white card]; “♂ zu brachyptera?, Gerstäcker 269 N° 16” [handwritten on white paper]; “voisin de, *G. postica*, Walk. Pg. 178” [handwritten on white paper]; “*Gryllacris annulata* ♂ Brun.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with left wings spread and right wings folded; the right antenna and right front leg are missing. A ♀ with labels: “Silhet, Assam” [handwritten on yellow paper]; “*Gryllacris annulata* Brun.” [handwritten on yellow paper]; “Musée de Genève, N° 14” [number handwritten on white, printed card]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of both antennae are lost. A ♀ with labels: “Silhet, Assam” [handwritten on yellow paper]; “623/12” [handwritten on white card]; “*Gryllacris annulata* Brun.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimens set with wings folded, the entire left and most of the right antenna are lost. Box N1.

*Diaphanogryllacris annulata* (Brunner von Wattenwyl, 1888).

***antennata*** Brunner von Wattenwyl, 1893: 125, fig. 49 [*Phlaeoba*].

Bhamó, Metanjá (also Cochinchina; Penang, Sumatra, Borneo (coll. Brunner)). Unspecified number of ♂ and ♀.

One ♀, a possible syntype, with labels: “Bhamó, Birmania, Fea viii 1886” [printed on white card with “viii” and last numeral handwritten]; “*Phlaeoba antennata* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both the antennae are missing. Box U14.

*Phlaeoba antennata antennata* Brunner von Wattenwyl, 1893.

*apterus* Brunner von Wattenwyl, 1888: 274, fig. 8a [*Schoenobates*].

Guatemala (Mus. Genav. & coll. Brunner). Unspecified number of ♂ and ♀.

One ♂ and five ♀ syntypes. A ♂ with labels: "Guatemala 603, Mr Oltram. 54" [printed on white paper]; "1" [handwritten on a square of green paper]; "Schoenobates apterus Br." [handwritten on green paper]; "Lectotypus, To be designated THH" [handwritten by Hubbell on red card with "Lectotypus" printed]. The right antenna is missing, as is the left front leg. The right fore leg lacks the tarsi, the right middle leg lacks the claws and the left hind leg lacks the last tarsal segment. A ♀ with labels: "Guatemala 603, Mr Oltram. 54" [printed on white paper]; "Schoenobates apterus Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. Most of the left antenna is missing. A ♀ with labels: "Guatemala 603, Mr Oltram. 54" [printed on white paper]; "Schoenobates apterus Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. A ♀ with labels: "Guatemala 603, Mr Oltram. 54" [printed on white paper]; "Schoenobates apterus Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. The left antenna is missing. A ♀ with labels: "Guatemala 603, Mr Oltram. 54" [printed on white paper]; "Schoenobates apterus Br" [handwritten on a strip of white paper]; "Schoenobates apterus Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. The right antenna is lost and the right front leg lacks the last tarsal segment. A ♀ with labels: "Guatemala 603, Mr Oltram. 54" [printed on white paper]; "Schoenobates apterus Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. A lectotype does not seem to have been formally designated. Box O3.

*Anabropsis aptera* (Brunner von Wattenwyl, 1888).

*arata* Brunner von Wattenwyl, 1878: 315 [*Phylloptera*].

Peru (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: "Phylloptera arata Brun., Perou" [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Holotypus" [printed on red card]. The species name label in the insect box also has the locality "Pérou" written in the lower left corner. Specimen set with wings folded; the left antenna and both front legs are lost. Both middle legs lack two tarsal segments, and the right hind leg lacks the last tarsal segment. The holotype label is unjustified. Images on OSF. Box B32.

*Phylloptera arata* Brunner von Wattenwyl, 1878.

*areolatus* Brunner von Wattenwyl, 1895: 208 [*Cocconotus*].

Cumbase in Peru (coll. Brunner & coll. Dohrn); Montivideo? (Mus. Genav.). More than one ♀.

One ♀, possibly a syntype, with labels: "Perou, M<sup>r</sup> H de Sauss" [handwritten on white paper]; "Cocconotus areolatus Br." [handwritten on green paper]. Specimen set with wings folded; the entire left antenna and most of the right antenna are lost as are the right middle and hind legs. The left hind leg and the abdomen are detached and secured with pins next to the specimen. The original description gives the locality of the Geneva specimen(s) as "Mondevideo?", and there is a specimen with this locality present but it is a ♂ and so apparently not part of the type series. Box E25.

*Schedocentrus areolatus* (Brunner von Wattenwyl, 1895).

**atrosignata** Brunner von Wattenwyl, 1895: 168 [*Gongrocnemis*].

Peru (Mus. Genav.). One damaged ♂.

Holotype ♂ with labels: “Perou” [handwritten on white paper]; “Gongrocnemis atrosignata Brunn.” [handwritten on green paper]; “Holotypus” [printed on red card]. The left front leg tibia and tarsi are missing, as are the right front leg tarsi and the left middle leg tibia and tarsi, the right middle leg tibia is broken about half way down, and its end and the tarsi lost, and the hind legs lack the tarsi. The abdomen has suffered extensive insect feeding damage. Images on OSF. Box E20.

*Ancistrocercus atrosignatus* (Brunner von Wattenwyl, 1895).

**attenuata** Brunner von Wattenwyl, 1895: 110 [*Acanthodis*].

Bahia (coll. Brunner & Mus. Genav.). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Bahia” [printed on white paper]; “Acanthodis attenuata Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is missing, as is most of the left antenna and the left middle leg lacks two tarsal segments. The right hind leg is detached and pinned through the femur on a separate pin. Box E15.

*Championica attenuata* (Brunner von Wattenwyl, 1895).

**bidentata** Brunner von Wattenwyl, 1878: 319 [*Hyperphrona*].

Cayenne (Mus. Genf.). Unspecified number of ♂.

One ♂ syntype with labels: “bidentata lg Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Hyperphrona bidentata Br.” [handwritten on green paper]; “Holotypus” [printed on red card]. The species name label in the insect box has the locality “Cayenne” written in the lower left corner. Specimen set with wings folded; the right antenna is lost, the right front leg lacks the tarsi, the right front leg lacks the tibia and tarsi, the left middle leg lacks the tarsi and the right middle leg lacks the claw. Both hind legs have lost two tarsal segments. The specimen is in poor condition, having been completely hollowed out, presumably by museum beetles, and the end of the abdomen is detached and glued to a transparent sheet secured on the original pin. The holotype label is unjustified. Images on OSF. Box B33.

*Hyperphrona bidentata* Brunner von Wattenwyl, 1878.

**birmanicum** Brunner von Wattenwyl, 1893: 104, fig. 37 [*Gavialidium*].

Carin Chebá. Unspecified number of ♂ and ♀.

One ♂ and one ♀, possibly syntypes. A ♂ with labels: “Carin Cheba, 1300-1400m, L. Fea II.86” [printed on white card]; “Gavialidium birmanicum Br.” [handwritten on white paper]; “Gavialidium birmanicum Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the right antenna, the tarsi of the left hind leg and two tarsal segments of the right hind leg are lost. A ♀ with labels: “Carin Cheba, 400-900m, L. Fea iv.86” [locality and collector printed on white card with altitude and date handwritten]; “Gavialidium birmanicum Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae are missing. Box Q2.

*Indoscelimena birmanica* (Brunner von Wattenwyl, 1893).

**bivittata** Brunner von Wattenwyl, 1895: 166-167 [*Gongrocnemis*].

Guatemala (Mus. Genav.); Mexico (coll. Bol.). Unspecified number of ♂ and ♀.

One ♂ syntype with labels: "Guatemala 603, Mr Oltram. 54, Guatemala 603" [printed on yellow paper]; "Gongrocnemis bivittata Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the right middle and hind legs are missing and the left hind leg lacks the last tarsal segment. Box E20.

*Gongrocnemis bivittata bivittata* Brunner von Wattenwyl, 1895.

**borneensis** Brunner von Wattenwyl, 1895: 80 [*Chondrodera*].

Borneo (Mus. I. R., coll. Brunner, coll. Dohrn & Mus. Genav.); Deli in insula Sumatra (Mus. Berol.). Unspecified number of ♂ and ♀.

One ♂ and two ♀ syntypes. A ♂ with labels: "Brunnei [sic], N E Borneo, Staudinger" [printed on yellow paper]; "Chondrodera borneensis Brunn." [handwritten on yellow paper]; "Chondrodera borneensis B.v.W, ♂, det C. de Jong 1938" [determination handwritten on white card with name and date printed]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left forewing is torn and the left middle leg lacks the tarsi. A ♀ with labels: "Brunnei [sic], N E Borneo, Staudinger" [printed on yellow paper]; "Chondrodera borneensis Brunn." [handwritten on yellow paper]; "Chondrodera borneensis B.v.W, ♀, det C. de Jong 1938" [determination handwritten on white card with name and date printed]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the right hind leg is lost. A ♀ with labels: "Brunnei [sic], N E Borneo, Staudinger" [printed on yellow paper]; "Chondrodera borneensis Brunn." [handwritten on yellow paper]; "Chondrodera borneensis B.v.W, ♀, det C. de Jong 1938" [determination handwritten on white card with name and date printed]; "Syntypus" [printed on red paper]. Specimen set with left wings spread and right wings folded; the right middle leg is missing and the left front leg lacks the tarsi. Box E10.

*Chondroderella borneensis* (Brunner von Wattenwyl, 1895).

**brasiliensis** Brunner von Wattenwyl, 1878: 304 [*Ctenophlebia*].

Brasilien (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: "Brésil" [handwritten on white paper]; "Ctenophlebia brasiliensis Brunn." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Holotypus" [printed on red card]. Specimen set with wings spread; the right antenna is missing, the left middle leg lacks the tarsi, the right middle leg lacks the last tarsal segment, as does the right hind leg, and the left hind leg lacks the tarsi. The holotype label is unjustified. Images on OSF. Box B32.

*Viadana brasiliensis* (Brunner von Wattenwyl, 1878).

**brasiliensis** Brunner von Wattenwyl, 1878: 126 [*Hyperophora*].

Brasilien (Mus. Wien, Mus. Genf & Mus. Berlin). One ♂ and more than one ♀.

One ♀ syntype with labels: "Brésil" [handwritten on a strip of white paper]; "Hyperophora brasiliensis Br." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Syntypus" [printed on red paper]. Specimen set



with wings spread; most of both antennae and the last tarsal segment of the right middle and left hind legs are lost. Images on OSF. Box B9.

*Hyperophora brasiliensis* Brunner von Wattenwyl, 1878.

***brasiliensis*** Brunner von Wattenwyl, 1878: 61 [*Isophya*].

Am Fluss Jugneri grande, Entre Rios, in einem Palmenwald (coll. Brunner n° 8783); Bahia Blanca (Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Bahia Blanca, env. Claraz” [handwritten on white paper]; “TYPE BRUNN” [printed on a strip of white paper]; “*Isophya brasiliensis* Br.” [handwritten on white card label with printed black margins]; “Syntypus” [printed on red paper]. Specimen lacks both antennae and the tibia and tarsi of the right hind leg. The left middle and hind legs have been repaired with glue. Images on OSF. Box B3.

*Isophya brasiliensis* Brunner von Wattenwyl, 1878.

***brevifissa*** Brunner von Wattenwyl, 1878: 178-179, fig. 50 [*Holochlora*].

Ceylon (Mus. Genf). Unspecified number of ♂ and ♀.

One ♂, possibly a syntype, with labels: “Ile Maurice, 602 97” [number handwritten, locality printed on white paper]; “*Holochlora brevifissa* Br.” [handwritten on yellow paper]; “Cette détermination est évidemment fausse. La forme des lobes du dernier segment dorsal et l’incision arrondie de la plaque sous-génitale ainsi que les styli cylindrique s’applique parfaitement à *Holochl. biloba* Stål ♂. Br. add. Monog. Phan. 91, 31, 4” [handwritten on yellow paper (by Jean Carl, former curator of arthropods at the MHNG?)]. The species name label in the insect box has the locality “Ceylon” written in the lower left corner. Specimen set with wings spread; most of the left antenna and the tarsi of the right front leg are missing. Although the original description gave Geneva as the depository, this specimen is apparently not from Sri Lanka, and the measurements do not exactly match those of the description. According to OSF there are syntypes of *H. brevifissa* in the Staatlichts Museum für Naturkunde in Stuttgart (SMNS), and it seems likely that the specimen in MHNG is not a type, but that the depository reference in the description is a lapse. This being the case, it is unclear why the species name label in the MHNG collection has the type locality written on it. Images on OSF. Box B16.

*Hoplocholora brevifissa* Brunner von Wattenwyl, 1878.

***brevipennis*** Brunner von Wattenwyl, 1895: 114 [*Adeclus*].

Orizaba in Mexico (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: “Orizaba, Sumichrast” [handwritten on white paper]; “*Adeclus brevipennis* Brunn.” [handwritten on green paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; most of both antennae are lost, as are the tarsi of the left front and right hind legs. There are two ♂ with the same data present in the collection, but the original description only treats the ♀ characters. The holotype label is unjustified. Box E15.

*Adeclus brevipennis* Brunner von Wattenwyl, 1895.

***brevipennis*** Brunner in Saussure, 1878: 527-528 [*Piestodactylus*].

Australie septentrionale; Polynésie, Iles Upolu, Iles Navigator (Godeffroy). Coll. Brunner de Wattenwyl n° 3764, 6217, 6087. Unspecified number of ♂ and more than one ♀ (measurement given as size range).

Four ♀, possibly syntypes. A ♀ with labels: “4” [handwritten on a square of white paper]; “603 34, Percy Island, N.E. Australia” [handwritten on a strip of white paper]; “*Piestodactylus brevipennis* Br.” [handwritten on lilac paper]; “*Syntypus*” [printed on red paper]. Specimen set with brachypterous wings folded; most of the left and all of the right antenna missing, left hind leg lost. A ♀ with labels: “Percy Islands” [handwritten on a strip of white paper]; “*Piestodactylus brevipennis* Br.” [handwritten on lilac paper]; “*Syntypus*” [printed on red paper]. Specimen set with brachypterous wings folded; both hind legs are lost. A ♀ with labels: “Upolu, Schiffer Is., Mr H.d.Sauss.” [handwritten on white card with ruled lines]; “*Piestodactylus brevipennis* Br.” [handwritten on lilac paper]; “*Syntypus*” [printed on red paper]. Specimens set with brachypterous wings slightly spread. A ♀ with labels: “Upolu” [handwritten on white card with ruled lines]; “*Piestodactylus brevipennis* Br.” [handwritten on lilac paper]; “*Syntypus*” [printed on red paper]. Specimen set with brachypterous wings folded; both antennae, both front legs, the right middle leg and the left hind leg are missing. Since the description of this species appeared in Saussure’s monograph it is likely that he retained some of the specimens. Box A25.

A junior synonym of *Myara sordida* (Walker, 1869).

***californicus*** Brunner von Wattenwyl, 1888: 305 [*Gammarotettix*].

California (Mus. Genav. & coll. Brunner). Unspecified number of ♂ and ♀.

Three ♂ and one ♀ syntypes. A ♂ with labels: “Conge” [handwritten on pinkish paper]; “Californie, M H. de S.” [handwritten on white paper]; “*Gammarotettix californicus* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. A ♂ with labels: “Sance” [handwritten on pinkish paper]; “Californie, M H. de S.” [handwritten on white paper]; “101” [handwritten on a square of green paper]; “*Gammarotettix californicus* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Most of both antennae is missing. A ♂ with labels: “Conge” [handwritten on pinkish paper]; “Californie, M H. de S.” [handwritten on white paper]; “99” [handwritten on a square of green paper]; “*Gammarotettix californicus* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. The left front leg is missing. A ♀ with labels: “Sanulito” [handwritten on pinkish paper]; “Californie, M H. de S.” [handwritten on white paper]; “100” [handwritten on a square of green paper]; “*Gammarotettix californicus* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. The left front leg is missing. Box O8.

A junior synonym of *Gammarotettix bilobatus* (Thomas, 1872).

***capensis*** Brunner von Wattenwyl, 1888: 387 [*Comicus*].

Cap Bonae Spei (Mus. Berol. & Mus. Genav.). More than one ♀.

One ♀ paralectotype with labels: “Cap b.sp., M. Peringuey” [locality printed and name handwritten on ruled white card]; “Peringuey, Renvoyer” [printed on blue paper]; “148” [handwritten on a strip of white paper]; “105” [handwritten on orange paper]; “*Comicus capensis* Br.” [handwritten on pink paper]; “*Comicus capensis* m., Br.v.” [handwritten on white paper]; “Musée de Genève, No 96” [number handwritten on printed white card]; “*Paralectotypus*, *Comicus capensis*, Brunner von Wattenwyl, 1888, des. J. Irish, 1986” [all handwritten except “*Lectotypus*” on white card with red margin]. The left middle leg is lost and the right front leg lacks the tarsi.

The lectotype, designated by Irish (1988: 147) is in the ZMHB in Berlin.  
*Comicus capensis* Brunner von Wattenwyl, 1888.

**castus** Brunner von Wattenwyl, 1895: 210 [*Cocconotus*].

Mexico (Mus. Genav.). Unspecified number of ♂.

One ♂ syntype with labels: “Mexique” [handwritten on white paper]; “Cocconotus castus Br.” [handwritten on green paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; the left front leg is missing. The holotype label is unjustified. Images on OSF. Box E25.

A junior synonym of *Calamoptera imhoffiana* (Saussure, 1861).

**connata** Brunner von Wattenwyl: 1878: 115 [*Pyrrhicia*].

Indien (Mus. Genf.). Unspecified number of ♂ and ♀.

Two ♂ and one ♀ syntypes. A ♂ with labels: “Indes or., 72.” [handwritten on white paper]; “Pyrrhicia connata Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Letana nigrosarsa (Walker), det. Ingrisch 1989” [typewritten on white card]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the last tarsal segment of the right middle leg and most of the tibia of the right hind leg are missing. A ♂ with labels: “Indes or., 72.” [handwritten on white paper]; “Pyrrhicia connata Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Letana nigrosarsa (Walker), det. Ingrisch 1989” [typewritten on white card]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the last tarsal segment of the right middle leg and the left hind leg are missing. Part of the genitalia is dissected and glued to a card on the original pin. A ♀ with labels: “Indes or., 72.” [handwritten on white paper]; “Pyrrhicia connata Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Letana nigrosarsa (Walker), det. Ingrisch 1989” [typewritten on white card]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the last tarsal segment of the front right and left hind legs is missing. The specimens are mentioned as syntypes by Ingrisch (1990: 266). Images on OSF. Box F8.

A junior synonym of *Letana nigrosarsa* (Walker, 1871).

**connexus** Brunner von Wattenwyl, 1895: 192 [*Bliastes*].

Cayenne (Mus. Genav.); Ucayali in territorio Amazonico (coll. Dohrn). Unspecified number of ♂ and ♀.

One ♂ syntype with labels: “Cayenne, Portal Guyane” [printed on green paper]; “Bliastes connexus Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; both hind legs are missing and the left middle leg lacks the tarsi. Images on OSF. Box E23.

*Xiphophyllum connexum* (Brunner von Wattenwyl, 1895).

**convergens** Brunner von Wattenwyl, 1893: 107-108, fig. 40 [*Mazarredia*].

Carin Chebá, Tenasserim. Unspecified number of ♂ and ♀.

One ♀, possibly a syntype, with labels: “Carin Cheba, 400-900m, L. Fea v-xii.88” [printed on white card]; “Mazarredia convergens Br.” [handwritten on yellow

paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both middle legs have lost two tarsal segments. Box Q4.

*Bolivaritettix convergens* (Brunner von Wattenwyl, 1893).

*cornea* Brunner von Wattenwyl, 1878: 354 [*Stibara*].

Brasilien (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “a/1595” [handwritten on white disc of card]; “coll. Jurine” [handwritten on white paper]; “Stibara cornea Brunn.” [handwritten on yellow paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; the antennae, both front legs, the right middle leg and the right hind leg are missing. The left middle and hind legs lack the tarsi. The original description gives the provenance as “Brasilien” (i.e. Brazil), but the species is native to South East Asia (as is indicated by the yellow name label). The fact that the locality data was confused might imply that the holotype label is justified. Box B37.

A junior synonym of *Stibaroptera nitidifolia* (Haan, 1842).

*cubensis* Brunner von Wattenwyl, 1888: 367 [*Dibelona*].

Cuba (Mus. Genav. & Mus. Madrid.). More than one ♀.

Three ♀ syntypes. A ♀ with labels: “Cuba, M H de Sauss.” [handwritten on white paper]; “39” [handwritten on white paper]; “90” [handwritten on white paper]; “Dibelona cubensis ♀ Br.” [handwritten on green paper]; “Musée de Genève, No 78” [number handwritten on printed white card]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of both antennae are missing. A ♀ with labels: “36” [handwritten on white paper]; “Dibelona cubensis ♀ Br.” [handwritten on green paper]; “Musée de Genève, No 80” [number handwritten on printed white card]; “boite intitulée Bayano” [handwritten on white paper]; “Syntypus” [printed on red paper]. Specimen set with wings roughly spread; the left front and right middle legs lack the tarsi. A ♀ with labels: “35” [handwritten on white paper]; “3” [handwritten on white paper]; “Dibelona elegans [sic] ♀ Br.” [handwritten on green paper]; “Musée de Genève, No 79” [number handwritten on printed white card]; “boite intitulée Bayano” [handwritten on white paper]; “Dibelona cubensis Brunner ♀” [handwritten by A. Griffini on ruled white card]; “Lectotypus, Dibelona cubensis Br.v.W., T.H.H.” [handwritten by Hubbell on red card printed with “Lectotypus”]. Specimen set with wings folded; the right antenna has been repaired with glue. The lectotype designation has apparently not been published. Box N5.

*Brachybaenus cubensis* (Brunner von Wattenwyl, 1888).

*decolor* Brunner von Wattenwyl, 1878: 156 [*Aphidnia*].

Brasilien (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “Aphidnia decolor Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. The species name label in the insect box has the locality “Brésil” handwritten in the bottom left corner. Specimen set with wings folded; both antennae and the right hind leg are missing. The holotype label is unjustified. Box B11.

A junior synonym of *Valna melaleuca* Walker, 1869.



**deflorata** Brunner von Wattenwyl, 1888: 339 [*Gryllacris*].

India (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: “Indes orient., N72” [handwritten on ruled white paper]; “13” [handwritten on a square of white paper]; “Musée de Genève, No 28” [number handwritten on printed white card]; “*Gryllacris deflorita* ♀ Brun.” [handwritten on yellow paper]; “Holotypus” [printed on red card]. Specimen set with wings spread; most of both antennae are lost, the right middle leg lacks the tarsi and the left hind leg lacks half of the tibia and the tarsi. The holotype label is unjustified. Box N2.

*Haplogryllacris deflorata* (Brunner von Wattenwyl, 1888).

**defloratus** Brunner von Wattenwyl, 1893: 116 [*Erianthus*].

Bhamó. Unspecified number of ♂.

Two ♂, possibly syntypes. A ♂ with labels: “Bhamó, Birmania, Fea ix 1886” [printed on white card with “ix” and last numeral handwritten]; “*Erianthus defloratus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with left wings spread and right wings roughly folded; the antennae are lost. A ♂ with labels: “Bhamó, Birmania, Fea viii 1886” [printed on white card with “viii” and last numeral handwritten]; “*Erianthus defloratus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings roughly folded; both antennae, the tarsi of the left front leg and the entire left hind leg are lost. The left front leg has been reattached with glue slightly in front of the original position. Box S1.

*Erianthina deflorata* (Brunner von Wattenwyl, 1893).

**deflorita** Brunner von Wattenwyl, 1878: 105-106, fig. 13 [*Exora*].

Ceylon (Mus. Genf & Mus. Berlin); Java (Mus. Berlin). Unspecified number of ♂ and more than one ♀ (measurements given as size ranges).

Two ♀ paralectotypes. A ♀ with labels: “*Exora deflorita* Br., Ceylon” [handwritten on yellow paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; the left antenna and most of the right antenna are missing, as is the right hind leg. A ♀ with labels: “*Exora deflorita* Br., Ceylon” [handwritten on yellow paper]; “Paralectotypus” [printed on orange card]. Specimen set with wings folded; most of the right antenna is missing as are the right middle and left hind legs. The lectotype designated by Ingrisch (1998: 100) is in the ZMHB in Berlin. Box B7.

*Deflorita deflorita* (Brunner von Wattenwyl, 1878).

**deminuta** Brunner von Wattenwyl, 1895: 166 [*Gongrocnemis*].

Guatemala (Mus. Genav. & coll. Bol.). Unspecified number of ♂ and ♀.

Three ♂ syntypes. A ♂ with labels: “3 28, Guatemala, Mr H. d. Sauss.” [handwritten on ruled white card]; “*Gongrocnemis deminuta* Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the left front leg is missing, the right front leg lacks the tarsi and the right hind leg lacks the last tarsal segment. A ♂ with labels: “3 28, Guatemala, Mr H. d. Sauss” [handwritten on ruled white card]; “*Gongrocnemis deminuta* Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with left wings spread and right wings

folded; most of both antennae are missing. The abdomen shows insect feeding damage. A ♂ with labels: "Duenas, Guatemala, G.C. Champion" [printed on white card]; "Gongrocnemis diminuta Brunner." [handwritten on green paper]; "Holotypus" [printed on red card]; "Not Holotype! Could be Syntype. Hollier 2010" [handwritten on red paper]. Specimen set with right wings spread and left wings folded; the left middle leg lacks two tarsal segments and the left hind leg lacks the last tarsal segment. Images on OSF. Box E20.

*Gongrocnemis diminuta* Brunner von Wattenwyl, 1895.

***diminuta*** Brunner von Wattenwyl, 1888: 338-339 [*Gryllacris*].

China (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: "CHINE A. NAV., 601/94" [numbers hand written on printed white card]; "22" [handwritten on white paper]; "Gryllacris diminuta ♀ Brun." [handwritten on yellow paper]; "Holotypus" [printed on red card]. Specimen set with wings spread. The holotype label is unjustified. Box N2.

*Haplogryllacris diminuta* (Brunner von Wattenwyl, 1888).

***distincta*** Brunner von Wattenwyl, 1888: 332 [*Gryllacris*].

Unknown (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: "354" [handwritten on whitish paper]; "30" [handwritten on white card]; "Gryllacris distincta ♀ Brunner." [handwritten on lilac paper]; "Musée de Genève, No 5" [number handwritten on white, printed card]; "Holotypus" [printed on red card]. The purple bordered species name label in the insect box has the locality "N<sup>le</sup> Hollande" (i.e. Australia) written in the lower left corner. Most of both antennae and the right hind leg are missing. The left middle leg lacks the tarsi. There is insect feeding damage to the left wings and the thorax. The description did not give the provenance of the specimen, and it is not clear why Australia was added to the species name label. Since the type material was without a locality, it is likely that the holotype label is justified. Box N1.

*Larnaca distincta* (Brunner von Wattenwyl, 1888).

***emarginata*** Brunner von Wattenwyl, 1878: 77-78 [*Dichopetala*].

Texas (coll. Brunner n° 11093 & Mus. Genf). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: "Dallas Texas, Boll. collect." [handwritten on white paper]; "3" [handwritten on a square of white card]; "Dichopetala emarginata" [handwritten on yellow paper]; "Geneva" [typewritten on a strip of yellow paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Syntypus" [printed on red paper]. Specimen lacks left antenna, right front leg, left middle leg and both hind legs. A ♀ with labels: "Dallas, Texas" [printed on white card]; "Dichopetala emarginata" [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Syntypus" [printed on red paper]. Specimen lacks the right antennae, the tarsi of the left front leg and two tarsal segments of the left middle leg. There are another six ♀ and one ♂ with locality labels mentioning combinations of "Dallas", "Texas" and "Boll." but without "TYPE BRUNN" labels which may also be syntypes. Images on OSF. Box F4.

*Dichopetala emarginata* Brunner von Wattenwyl, 1878.



*errabunda* Brunner von Wattenwyl, 1878: 349, fig. 101 [*Apoballa*].

Mexico (Mus. Genf). Unspecified number of ♂

One ♂ syntype with labels: “Apoballa errabunda Br.” [handwritten on green paper]; “Holotypus” [printed on red card]. The species name label in the insect box has the locality “Mexique” written in the lower left corner. Specimen set with wings spread; most of both antennae and the right hind leg are missing. The right front leg lacks two tarsal segments, the right middle leg and left hind leg each lack the last tarsal segment. The holotype label is unjustified. Images on OSF. Box B37.

*Apoballa errabunda* Brunner von Wattenwyl, 1878.

*excelsa* Brunner von Wattenwyl, 1888: 351-352, fig. 41a [*Gryllacris*].

Duke of York Island (Mus. Genav. & Mus. Berol.). Unspecified number of ♂ and ♀.

One ♀ paralectotype with labels: “603 33, Gryllacris sp. nov., Duke of York Island, Mus. Godfr.” [handwritten on white paper]; “15899” [handwritten on white paper]; “15” [handwritten on white paper]; “Gryllacris excelsa Br. ♀” [handwritten on lilac paper]; “Musée de Genève, No 49” [number handwritten on printed white card]; “Paralectotypus” [printed on orange card]. Specimen set with wings spread; most of the left antenna is missing and the right has been repaired with glue. The left front leg is lost. The lectotype, designated by Gorokhov (2007: 855), is in the ZMHB in Berlin. Box N3.

*Gigantogryllacris excelsa* (Brunner von Wattenwyl, 1888).

*falcata* Brunner von Wattenwyl, 1888: 341 [*Gryllacris*].

China (Mus. Genav.); Java (Mus. Genav., Vindob., Madrid. & Stuttg.), Sumatra (coll. Brunner). Unspecified number of ♂ and ♀.

One ♂ and two ♀ syntypes. A ♂ with labels: “CHINE a. NAV., 601/94” [numbers handwritten on printed white paper]; “17” [handwritten on a square of white paper]; “Gryllacris falcata ♂ Br.” [handwritten on yellow paper]; “Musée de Genève, N° 30” [number written on printed white card]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of the left antenna and the entire right antenna are missing, as are the left middle and right hind legs. The right front leg lacks the tarsi, the right middle leg lacks tibia and tarsi, and the left hind leg lacks the last tarsal segment. A ♀ with labels: “Java, 601 39” [the second number handwritten on printed white paper]; “19” [handwritten on a square of white paper]; “Gryllacris falcata Br. ♀” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of both antennae and the right middle leg are missing. The right hind leg is detached and pinned through the femur on the original pin. A ♀ with labels: “Java, 601 39” [the second number handwritten on printed white paper]; “20” [handwritten on a square of white paper]; “Gryllacris falcata Br. ♀” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left middle leg lacks two tarsal segments and both hind legs lack the tarsi. A further ♂ and ♀ without locality labels may also be syntypes.

A junior synonym of *Prosopogryllacris personata* (Serville, 1831).

*fasciata* Brunner von Wattenwyl, 1878: 260-261 [*Scaphura*].

Brasilien (Mus. Wien & Mus. Genf). More than one ♀.

One ♀ syntype with labels: “? Daube Serville” [handwritten on white paper]; “Scaphura fasciata Br.” [handwritten on green paper]; “Gymnocera fasciata Br.” [handwritten on white card with printed black margin]; “TYPE BRUNN” [printed on a strip of white paper]; “Geneva” [typewritten on a strip of yellow paper]; “Syntypus” [printed on red paper]. The species name label in the insect box has the locality “Brésil” written in the lower left corner. Specimen set with wings spread; both antennae and both hind legs are missing. Box B24.

*Scaphura fasciata* Brunner von Wattenwyl, 1878.

*fasciata* Brunner von Wattenwyl, 1895: 91-92 [*Tarphe*].

Silhet (coll. Brunner); Sikkim (Mus. Genav.). More than one ♀.

Three ♀ syntypes. A ♀ with labels: “Sikkim” [printed on white card]; “1950” [handwritten on white paper]; “Tarphe fasciata Brunn.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the entire left antenna and most of the right are missing. The left hind leg lacks most of the tibia and the tarsi and the right middle leg lacks the last tarsal segment. The abdomen is detached and secured on a separate pin along with the right hind leg and another hind leg, both pinned through the femur. A ♀ with labels: “Dam Dim, 3546/8” [locality handwritten on irregularly shaped card with printed number]; “1939” [handwritten on white paper]; “Tarphe fasciata Brunn.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread. A ♀ with labels: “1184/1 Tulpir” [handwritten on white card disc]; “1934” [handwritten on white paper]; “Tarphe fasciata Brunn.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right front leg is lost and the tarsi of the right hind leg are detached and glued to a strip of card secured on the original pin. The specimen in the NHMW referred to as the holotype on OSF is actually a syntype from Brunner’s collection. Box E12.

A junior synonym of *Tegra viridivitta* (Walker, 1870).

*fasciatus* Brunner von Wattenwyl, 1893: 202, fig. 72 [*Liphoplus*].

Carin Chebá. Unspecified number of ♂ and ♀.

One ♀, possibly a syntype, with labels: “Carin Cheba, o Bia po, (1000 m cima), vi.88” [handwritten in pencil on white paper]; “Liphopl. fasciatus Br.” [handwritten on a strip of white paper]; “Liphoplus fasciatus Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. The left hind leg, which lacks the last tarsal segment, is detached and glued to a card secured on the original pin. Box A18.

*Ornebius fasciatus* (Brunner von Wattenwyl, 1893).

*fastigiosus* Brunner von Wattenwyl, 1878: 370 [*Posidippus*].

Quito (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: “Quito, Perou, M. H de Saussure” [handwritten on ruled white card]; “Posidippus fastigiosus Br.” [handwritten on green paper]; “TYPE

BRUNN” [printed on a strip of white paper]; “Geneva” [typewritten on a strip of yellow paper]; “Holotype ♂, *Posidippus fastigosus* Brunner, 1878” [handwritten on red card with “type” printed]; “Identified as Holotype, Emsley 1969” [handwritten in pencil on white card]. Specimen set with left fore wing spread, other wings folded; the antennae are missing, as are the claws of the left middle leg and the last tarsal segment of the right hind leg. Emsley (1970: 182) refers to the specimen as the holotype without discussion. Images on OSF. Box B27.

*Steirodon fastigosum* (Brunner von Wattenwyl, 1878).

*flavipes* Brunner von Wattenwyl in Saussure, 1878: 465-466, fig. 47 [*Trigonidium*].

Iles Fidji; Samoa; Tonga; Australie (coll. Brunner no 9082). Three ♂ and eight ♀.

One ♂ and five ♀ syntypes. A ♂ with labels: “Ovalau, Isles Viti, M. H. d. Sauss.” [handwritten on ruled white card]; “*Trigonidium flavipes* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen glued onto a card point; the entire left antenna and most of the right antenna are missing, as are the legs. A detached front and hind leg are glued to the card. A ♀ with labels: “Ovalau, Isles Viti, M. H. d. Sauss.” [handwritten on ruled white card]; “*Trigonidium flavipes* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen glued onto a card point; most of the left antenna and the left front leg are missing. A ♀ with labels: “Ovalau, Isles Viti, M. H. d. Sauss.” [handwritten on ruled white card]; “*Trigonidium flavipes* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen glued onto a card point; most of both antennae and the right hind leg are lost. A ♀ with labels: “Viti Levu, M. H. d. Sauss.” [handwritten on ruled white card]; “*Trigonidium flavipes* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen glued onto a card point; both antennae and the left hind leg are missing. Two ♀ on one pin with labels: “♀ Ovalau, Isles Viti” [handwritten on ruled white card]; “2692” [handwritten in pencil on lilac paper]; “*Trigonidium flavipes* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Upper specimen glued onto a card point; most of both antennae are lost. Lower specimen glued onto a card point, most of both antennae are lost. Box A22.

*Metioche flavipes* (Brunner von Wattenwyl in Saussure, 1878).

*forcipata* Brunner von Wattenwyl, 1878: 242 [*Scudderia*].

Mexico (Mus. Genf). Unspecified number of ♂.

One ♂, probably a syntype, with labels: “*Scudderia forcipata* Br.” [handwritten on green paper]; “Probable syntype of *forcipata* Br., Hollier 2010” [handwritten on red paper]. The species name label in the insect box has the locality “Mexique” written in the bottom left corner. Specimen set with wings spread; most of the left antenna, the left middle leg and the last tarsal segment of both hind legs are missing. Another specimen in the MHNG collection, which is labelled as the holotype and illustrated on OSF, was collected by H.H. Smith (who worked in Mexico after 1889) and it is unlikely to have been collected before the publication of the original description. The measurements in the original description match the spread specimen labelled as a syntype better than the one labelled as holotype, which probably entered the MHNG

collection as part of the material studied by Saussure & Pictet (1897). Images on OSF. Box B21.

*Chloroscirtus forcipatus* (Brunner von Wattenwyl, 1878).

**fulvus** Brunner von Wattenwyl in Saussure, 1878: 481-482, fig. 5 [*Cyrtoxiphus*].

Iles Fidji; Opolu, Ovalau. Four ♂ and one ♀.

One ♀ syntype with labels: "♀ Ovalau, Iles Viti" [handwritten on white card with ruled lines]; "fulvum" [written in pencil on strip of white paper]; "Cyrtoxiphus fulvus Brunn." [handwritten on lilac paper], "Syntypus" [printed on red paper]. Specimen set with wings folded; most of both antennae are lost, as is the left middle leg and the right hind leg. Since the description appeared in Saussure's monograph it seems likely that he retained one of the specimens. Box A24.

*Nausorixipha fulva* (Brunner von Wattenwyl, 1878).

**fumosa** Brunner von Wattenwyl, 1895: 103 [*Xeropteryx*].

America meridionalis (coll. Brunner); Guadeloupe (Mus. Genav.). Unspecified number of ♂ and more than one ♀ (measurements given as size ranges).

Five ♂ and three ♀ syntypes. A ♂ with labels: "Guadeloupe" [handwritten on a strip of white paper]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; both middle legs lack the last tarsal segment. The left hind leg is detached and pinned through the femur on a separate pin. A ♂ with labels: "Guadeloupe" [handwritten on a strip of white paper]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with left wings spread and right wings roughly folded; the right front leg lacks the claw. A ♂ with labels: "Guadeloupe" [handwritten on a strip of white paper]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded. A ♂ with labels: "3 33, Guadeloupe, M<sup>r</sup> H. d. Sauss." [handwritten on ruled white card]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; most of both antennae are missing, as is the left middle leg. The left hind leg lacks the last tarsal segment. A ♂ with labels: "3 33, Guadeloupe, M<sup>r</sup> H. d. Sauss." [handwritten on ruled white card]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right front leg and both hind legs are missing. A ♀ with labels: "3 33, Guadeloupe, M<sup>r</sup> Schramm." [handwritten on ruled white card]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left hind leg is missing and the right front leg lacks the last tarsal segment. The left front and right hind legs are detached and each is pinned through the femur on a separate pin. The abdomen is coming apart in the middle and has been repaired with glue. A ♀ with labels: "#" [handwritten on white paper]; "Xeropteryx fumosa Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. The species name label in the insect box has the locality "Guadeloupe" written in the lower left corner. Specimen set with wings folded; most of both antennae are lost, and the right middle and right hind legs each lack the claws. A ♀ with labels: "Xeropteryx fumosa Brunn." [handwritten on green paper];



“Syntypus” [printed on red paper]. The species name label in the insect box has the locality “Guadeloupe” written in the lower left corner. Specimen set with wings folded and the ends of the wings are damaged; the antennae and left front leg are missing. Both middle legs and the left hind leg lack the tarsi, the right hind leg lacks the last tarsal segment. A juvenile ♀ labelled “Guadeloupe” may also be considered a syntype. Box E14.

*Xerophyllopteryx fumosa* (Brunner von Wattenwyl).

***furculata*** Brunner von Wattenwyl, 1878: 239-240, fig. 72b [*Scudderia*].

Mexico (Mus. Genf & coll. Brunner nos 151, 1863, 6829 etc); Texas (Mus. Genf & coll. Brunner no 10589). More than one ♂ and ♀.

One ♂ and three ♀ syntypes. A ♂ with labels: “Mexique, Sumichrast” [handwritten on white paper]; “furculata Br.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the left and all of the right antenna is missing, both front legs lack tibiae and tarsi and both hind legs are missing. A ♀ with labels: “Orizaba, Sumichrast” [handwritten on white paper]; “Scudderia furculata Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae are missing, as are the right middle leg and the left hind leg, and the last tarsal segment of the right front leg. A ♀ with labels: “6 68, Dallas, Texas, Mr Pasteur” [handwritten on lined white card]; “furculata Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae are missing. A ♀ with labels: “furculata Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the antennae, left front leg and right middle leg are lost. The left front leg lacks the last tarsal segment, as do both hind legs. The left middle leg lacks the tibia and tarsi. Box B21.

A junior synonym of *Scudderia mexicana* (Saussure, 1861).

***gracile*** Brunner von Wattenwyl, 1888: 284, fig. 17 [*Glaphyrosoma*].

Mexico (Mus. Genav. & coll. Brunner); Guatemala (Mus. Genav. & Mus. Stuttg.): Unspecified number of ♂ and more than one ♀ (measurement given as size range).

Three ♂ and 7 ♀ syntypes. A ♂ with labels: “3 28, Guatemala, M H. d. Sauss.” [handwritten on ruled white card]; “4” [handwritten on a strip of white card]; “Glaphyrosoma gracile Brun.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Both antennae are missing, as are the left middle and hind legs. The other legs all lack the tarsi. A ♂ with labels: “Potrero, Sumichrast” [handwritten on white paper]; “Musée de Genève, No 74” [number handwritten on white printed card]; “Glaphyrosoma gracile Brun.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Most of both antennae is lost, as is the left hind leg. A ♂ with labels: “Potrero, Sumichrast” [handwritten on white paper]; “Musée de Genève, No 73” [number handwritten on white printed card]; “Glaphyrosoma gracile Br.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Most of the left and the entire right



antenna are lost, the right middle leg lacks half the tibia and the tarsi, and the left middle leg and both hind legs lack the last tarsal segment. A ♀ with labels: "Potrero, Sumichrast" [handwritten on white paper]; "Glaphyrosoma gracile Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. Both front legs are lost and the left hind leg lacks two tarsal segments. A ♀ with labels: "Orizaba, Sumichrast" [handwritten on white paper]; "Musée de Genève, No 72" [number handwritten on white printed card]; "Glaphyrosoma gracile Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. The right antenna is lost and the left hind leg lacks the tarsi. A ♀ with labels: "Orizaba, Sumichrast" [handwritten on white paper]; "Glaphyrosoma gracile Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. A ♀ with labels: "Orizaba, Sumichrast" [handwritten on white paper]; "Musée de Genève, No 70" [number handwritten on white printed card]; "Glaphyrosoma gracile Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. The specimen is splitting where the pin enters between thorax and abdomen. A ♀ with labels: "Mistantla, M E<sup>d</sup> Sarazin" [handwritten on white paper]; "Musée de Genève, No 76" [number handwritten on white printed card]; "Glaphyrosoma gracile Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. The specimen has been repaired with glue where the pin is inserted between pro and mesothorax. A ♀ with labels: "Mistantla, M E<sup>d</sup> Sarazin" [handwritten on white paper]; "Musée de Genève, No 77" [number handwritten on white printed card]; "Syntypus" [printed on red paper]. Most of both antennae is lost, as are the tarsi of the left middle leg and the last tarsal segment of the left front leg, right middle leg and both hind legs. A ♀ with labels: "Mistantla, M Ed Sarazin" [handwritten on white paper]; "Musée de Genève, No 79" [number handwritten on white printed card]; "Glaphyrosoma gracile Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen on its side glued to white card after apparently breaking where the pin had been inserted. Box O5.

*Glaphyrosoma gracile* Brunner von Wattenwyl, 1888.

*gracilis* Brunner von Wattenwyl, 1890: 99-100, fig. 3 [*Apioscelis*].

Provincia Alto Amazonas (coll. Dohrn & coll. Brunner), Bolivia (Mus. Genav.). Unspecified number of ♂ and ♀.

Two ♀ syntypes. A ♀ with labels: "'Proscopia sp.nov. Haute Amazon det. Brunner" [handwritten on green paper]; "Apioscelis gracilis Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. The left front leg lacks the last tarsal segment. A ♀ with labels: "Alto Amazon" [handwritten on green paper]; "Apioscelis gracilis Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. The left front and right hind legs each lack the last tarsal segment. Box T1.

A junior synonym of *Apioscelis bulbosa* (Scudder, 1869).

*gracillima* Brunner von Wattenwyl, 1878: 231 [*Hormilia*].

Guatemala (Mus. Genf & coll. Brunner no 6989); Mexico, Cordova (Mus. Genf). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: "Oaxaca, Mexique, M<sup>r</sup> Sordel" [handwritten on white paper]; "gracillima Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; most of the left

and the entire right antenna are missing, as is the right hind wing, the last tarsal segment of the left middle leg, the tibia and tarsi of the right middle leg and both hind legs. A ♀ with labels: “*gracillima* Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the hind tibiae have been bent, presumably soon after death, to facilitate storage. The species name label in the insect box has the locality “Mexique” handwritten in the lower left corner. The specimen(s) from Guatemala mentioned in the description could not be located. Box B20.

*Insara gracillima* (Brunner von Wattenwyl, 1878).

***granosus*** Brunner von Wattenwyl, 1895: 192 [*Bliastes*].

Peru centralis (Mus. Genav.); Cumbase in territorio Amazonico (coll. Bol.). Unspecified number of ♂ and ♀.

One ♂ syntype with labels: “PEROU CENT” [printed on whitish card]; “*Bliastes granosus* Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; both antennae and the right hind leg are missing. Images on OSF. Box E23.

*Xiphophyllum granosum* (Brunner von Wattenwyl, 1895).

***guatemalae*** Brunner von Wattenwyl, 1888: 262 [*Stenopelmatus*].

Guatemala (Mus. Genav. & coll. Brunner). More than one ♀.

One ♀ syntype with labels: “2 14, Guatemala, M<sup>r</sup> H. d. Sauss.” [handwritten on ruled white card]; “*St. scaptericus* Ser. ♀” [handwritten on a strip of white paper]; “18” [handwritten on a square of white card]; “18” [handwritten on a square of green paper]; “*Stenopelmatus guatemalae* Brun.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Most of the left and the entire right antenna are missing, as are the tarsi of the left front leg. The abdomen has been eviscerated and stuffed, presumably before being shipped to Europe. The specimen in the NHMW in Vienna, referred to as the holotype on OSF, is a syntype from Brunner’s collection. Box O1.

*Stenopelmatus guatemalae* Brunner von Wattenwyl, 1888.

***hastata*** Brunner von Wattenwyl, 1891: 150 [*Grammadera*].

Cayenna (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: “Cayenne” [printed on green paper]; “*Grammadera hastata* Brun.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the tarsi of the left front leg and the entire left hind leg are missing. A ♂ specimen in the collection, also labelled Cayenne, has been labelled as a syntype and is illustrated as such on OSF, but the original description only treats the ♀ characters. Images on OSF. Box B31.

*Grammadera hastata* Brunner von Wattenwyl, 1891.

***hirsutus*** Brunner von Wattenwyl, 1893: 110, fig. 43 [*Paratettix*].

Teinzó, Kathá, Bhamó. Unspecified number of ♂ and ♀.

Three ♂ and three ♀, possibly syntypes. A ♂ with labels: “Katha, Birmania, Fea vi 1886” [printed on white card with “vi” and the last numeral handwritten];

“*Paratettix hirsutus* BR.” [handwritten on white paper]; “*Paratettix hirsutus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded, the left antenna and left hind leg are lost. A ♂ with labels: “Bhamo, Birmania, Fea vii 1886” [printed on white card with “vii” and the last numeral handwritten]; “*Paratettix hirsutus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae are lost. A ♀ with labels: “Teinzo, Birmania, Fea, Maggio 1886” [printed on white card]; “*Paratettix hirsutus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded. A ♀ with labels: “Teinzo, Birmania, Fea, Maggio 1886” [printed on white card]; “*Paratettix hirsutus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae and the right middle leg are missing. A ♀ with labels: “Teinzo, Birmania, Fea, Maggio 1886” [printed on white card]; “*Paratettix hirsutus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the left antenna is lost. There is also ♂ with labels: “Carin, Asciiu Ghescu, 1100-1300m, L. Fea iii-iv.88” [printed on white card]; “*Paratettix hirsutus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded. This locality is not mentioned in the original description, but if the other specimens are syntypes then this is almost certainly one as well. Box Q5.

*Paratettix hirsutus* Brunner von Wattenwyl, 1893.

***hispidulus*** Brunner von Wattenwyl, 1890: 103 [*Corynorhynchus*].

Pernambuco (Mus. Berol.), Brasilia (coll. Brunner & Mus. Berol.), Bahia (Mus. Genav.). Unspecified number of ♂ and ♀.

Two ♀ paralectotypes. A ♀ with labels: “Bahia” [printed on white paper]; “*Cor. hispidulus* Br” [handwritten on green paper]; “*Paratypus*, C S C 1966” [handwritten by Carbonell on a strip of red card]. The antennae and the left middle leg are missing. The right front leg lacks the last tarsal segment, the right middle leg lacks two tarsal segments, the left hind leg lacks two tarsal segments and the right hind leg lacks the tarsi. A ♀ with labels: “Bahia” [printed on white paper]; “*Cor. hispidulus* Br” [handwritten on green paper]; “*Paratypus*, C S C 1966” [handwritten by Carbonell on a strip of red card]. The antennae and right front leg are lost. The tibia of the left front leg and the left hind leg is broken about half way along, and the right hind leg lacks two tarsal segments. The lectotype, designated by Jago (1990: 273), is in the ZMHB in Berlin. Box T2.

*Corynorhynchus hispidulus* Brunner von Wattenwyl, 1890.

***inaequalis*** Brunner von Wattenwyl, 1893: 106-107, fig. 39 [*Mazarredia*].

Carin Chebá. Unspecified number of ♂ and ♀.

Three ♂ and three ♀, possibly syntypes. A ♂ with labels: “Carin Cheba, 900-1100m, L. Fea v-xii.88” [printed on white card]; “*Mazarredia inaequalis* Br. [handwritten on white paper]; “*Mazarredia inaequalis* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae and the right front leg are lost. A ♂ with labels: “Carin Cheba,

900-1100m, L. Fea v-xii.88” [printed on white card]; “Mazarredia inaequalis Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the left antenna and the tarsi of the left middle leg are missing. A ♂ with labels: “Carin Cheba, 900-1100m, L. Fea v-xii.88” [printed on white card]; “Mazarredia inaequalis Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the left antenna and the tarsi of the left front leg are missing. A ♀ with labels: “Carin Cheba, 900-1100m, L. Fea v-xii.88” [printed on white card]; “Mazarredia inaequalis Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae and the tarsi of the left middle leg are missing. A ♀ with labels: “Carin Cheba, 900-1100m, L. Fea v-xii.88” [printed on white card]; “Mazarredia inaequalis Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae are lost. . A ♀ with labels: “Carin Cheba, 900-1100m, L. Fea v-xii.88” [printed on white card]; “Mazarredia inaequalis Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the right antenna is missing. Box Q4.

*Falconius inaequalis* (Brunner von Wattenwyl, 1893).

**incerta** Brunner von Wattenwyl, 1895: 167 [*Gongrocnemis*].

Guatemala (coll. Brunner); Mexico (Mus. I. R., & Mus. Genav.). Unspecified number of ♂ and ♀.

One ♂ and two ♀, possibly syntypes. A ♂ with labels: “3 28, Guatemala, M H. d. Sauss.” [handwritten on ruled white card]; “Gongrocnemis incerta Brunn.” [handwritten on green paper]. Specimen set with wings spread; the right antenna, right front leg, left middle leg and both hind legs are missing. There is a detached right hind leg pinned through the femur next to the specimen which may belong to it. A ♀ with labels: “2 14, Guatemala, M H. d. Sauss.” [handwritten on ruled white card]; “Gongrocnemis incerta Brunn.” [handwritten on green paper]. Specimen set with wings folded; most of both antennae are missing (having been repaired with glue) and the left hind leg lacks the last tarsal segment. A ♀ with labels: “3 28, Guatemala, M H. d. Sauss.” [handwritten on ruled white card]; “Gongrocnemis incerta Brunn.” [handwritten on green paper]. Specimen set with wings spread; most of both antennae are lost, as are the left front and middle legs. The right front leg lacks the tarsi and the right back leg lacks two tarsal segments. The original description gives the provenance of the MHNG specimens as Mexico, but the type series also included specimens from Guatemala and specimens from Mexico in another collection, and so confusion in Brunner’s notes is possible. Box E20.

A junior synonym of *Gongrocnemis deminuta* Brunner von Wattenwyl, 1895.

**inconspicua** Brunner von Wattenwyl, 1888: 342 [*Gryllacris*].

Celebes (coll. Brunner); Insulae Moluccae (Mus. Genav.), Halmahera insula Moluccensis (Mus. Stuttg.), Java (Serv.). More than one ♂.

One ♂ syntype with labels: “Moluques, Mr Griolet. 602 68” [printed on white paper]; “Gr. inconspicua Br.” [handwritten on pink card]; “Gryllacris inconspicua ♂



Br. “[handwritten on yellow paper]; “Musée de Genève, No 34” [number handwritten on printed white card]; “Syntypus” [printed on red paper]. Specimen set with wings spread; most of the left antenna is missing. Box N2.

*Aphanogryllacris inconspicua inconspicua* (Brunner von Wattenwyl, 1888).

*inconstans* Brunner von Wattenwyl, 1895: 170 [*Anchiptolis*].

Mexico, Orizaba (coll. Brunner & Mus. Genav.), San Salvador in Mexico (coll. Brunner); Guatemala (Mus. Genav.). Unspecified number of ♂ and ♀.

One ♂ and two ♀, probably syntypes. A ♂ with labels: “Orizaba, Sumichrast” [handwritten on white paper]; *Anchiptolis mexicana* Sauss.” [handwritten on green paper]; “Syntype of *inconstans* B.v.W.?” [handwritten on red paper]. Specimen set with left wings spread and right wings folded; most of the right antenna is lost and the left hind leg lacks the last tarsal segment. A ♀ with labels: “Mr Oltram. 51, Guatemala 603” [printed on white paper]; *Anchiptolis mexicana* Sauss.” [handwritten on green paper]; “Syntype of *inconstans* B.v.W.?” [handwritten on red paper]. Specimen set with wings spread; the left front leg has lost the tarsi, the right middle leg has lost two tarsal segments and both hind legs have lost the last tarsal segment. A ♀ with labels: “Orizaba, Sumichrast” [handwritten on white paper]; *Anchiptolis mexicana* Sauss.” [handwritten on green paper]; “Syntype of *inconstans* B.v.W.?” [handwritten on red paper]. Specimen set with left wings spread and right wings folded. The identity of these specimens as syntypes remains conjectural because there are no identification labels with the name *inconstans* on the pins but the species name label in the insect box reads “*mexicana* Sauss. (*inconstans* Brunn.)” Box E21.

A junior synonym of *Gongrocnemis mexicana* (Saussure, 1859).

*inflata* Brunner von Wattenwyl, 1878 : 116 [*Pyrrhicia*].

Ceylon (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: “*Pyrrhicia inflata* Br, Humb. Ceylon” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; the left antenna is lost, as are most of the right antenna, the tibia and tarsi of the left middle leg and the right hind leg. The left hind leg has been re-attached to the body with glue. The holotype label is unjustified. Images on OSF. Box B8.

*Letana inflata* (Brunner von Wattenwyl, 1878).

*infumata* Brunner von Wattenwyl, 1893: 124-125 [*Phlaeoba*].

Bhamó, Teinzó, Metanjá (Catcin), Palon (Pegú),Thagatà (Tenasserim). Unspecified number of ♂ and ♀.

Three ♂ and two ♀, possibly syntypes. A ♂ with labels: “Birmania, Metanja, Fea, Ag. 1885” [printed on white card with “Metanja”, “Ag.” and the last numeral handwritten]; *Phlaeoba infumata* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the claws of the right front and middle legs, and the entire right hind leg are lost. A ♂ with labels: “Palon, (Pegu), L. Fea viii 1887” [printed on white card]; *Phlaeoba infumata* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper].



Specimen set with wings folded. A ♂ with labels: “Birmania, Metanja, Fea, Ag. 1885” [printed on white card with “Metanja”, “Ag.” and the last numeral handwritten]; “Phlaeoba infumata Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae, the left hind leg and the claw of the right hind leg are missing. A ♀ with labels: “Metanja, (Catcin), Fea viii-85” [handwritten on white card]; “Phlaeoba infumata Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded. A ♀ with labels: “Teinzo, Brimania, Fea, Maggio 1886” [printed on white card]; “Phlaeoba infumata Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded. Box U14.

*Phlaeoba infumata* Brunner von Wattenwyl, 1893.

*infuscata* Brunner von Wattenwyl, 1878: 262 [*Scaphura*].

Brasilien (Mus. Wien & Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Scaphura infuscata Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Geneva” [typewritten on a strip of yellow paper]; “Syntypus” [printed on red paper]. The species name label in the insect box has the locality “Brésil” written in the lower left corner. Specimen set with wings spread; the entire left antenna and most of the right antenna are missing, as are the left middle and right hind legs. The right front leg lacks the tarsi and the right middle leg lacks the last tarsal segment. The left hind leg has been repaired with glue, and lacks the tibia and tarsi. Box B24.

*Scaphura infuscata* Brunner von Wattenwyl, 1878.

*insignis* Bruner von Wattenwyl, 1895: 156 [*Mormotus*].

Kamerun (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: “Camerun” [printed on pink paper]; “Mormotus insignis Brunn.” [handwritten on pink paper]; “Holotypus” [printed on red card]. Specimen set with left wings spread and right wings folded; both front legs lack the tarsi and the right middle leg lacks the claws. The holotype label is unjustified. Box E19.

A junior synonym of *Tympanocompus acclivis* Karsch, 1891.

*intermedia* Brunner von Wattenwyl, 1878: 232 [*Hormilia*].

Mexico, Cordova (Mus. Genf); Guatemala (Mus. Genf). Unspecified number of ♂ and ♀.

Two ♂ and three ♀ syntypes. A ♂ with labels: “2 14, Guatemala, M<sup>r</sup> H d Sauss.” [handwritten on lined white card]; “Hormilia intermedia Brunn.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the left antenna is missing. A ♂ with labels: “3 28, Guatemala, M<sup>r</sup> H. d. Sauss.” [handwritten on lined white card]; “Hormilia intermedia Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the antennae and all legs apart from the left front leg are missing, and there is extensive insect feeding damage. A ♀ with

labels: “2 14, Guatemala, M<sup>r</sup> H. d. Sauss.” [handwritten on lined white card]; “*Hormilia intermedia* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings folded; both antennae, the left front leg, both middle legs and the right hind leg are missing. The left hind leg is detached and pinned through the femur on the original pin, the last tarsal segment is lost. A ♀ with labels: “2 14, Guatemala, M<sup>r</sup> H. d. Sauss.” [handwritten on lined white card]; “*Hormilia intermedia* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings folded; the right front leg, the tibia and tarsi of the right middle leg and the right hind leg are missing. A ♀ with labels: “*Hormilia intermedia* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings folded; the tarsi of the left front leg and the right front and middle legs are lost. Images on OSF. Box B20.

*Insara intermedia* (Brunner von Wattenwyl, 1878).

*intermedius* Brunner von Wattenwyl, 1895: 150-151, fig. 66 [*Meroncidius*].

Rio de Janeiro, Theresopolis, Cantogallo (coll. Brunner), Bahia (Mus. Genav.); Cayenne (Mus. Genav.). Unspecified number of ♂ and ♀.

One ♂ and two ♀ syntypes. A ♂ with labels: “Cayenne” [handwritten on white paper]; “Cayenne, Mr Sarazin” [handwritten on white paper]; “*Meroncidius intermedius* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings spread; the right middle leg lacks the last tarsal segment and the right hind leg lacks the claws. A ♀ with labels: “a/1676” [handwritten on a white card disc]; “Cayenne, Serville” [handwritten on whitish paper]; “*Meroncidius intermedius* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. Specimen set with wings spread; the left middle leg lacks the tibia and tarsi, the right middle leg lacks the claws and the right hind leg lacks the last tarsal segment. A ♀ with labels: “276/28” [handwritten on a white card disc]; “*Meroncidius intermedius* Brunn.” [handwritten on green paper]; “*Syntypus*” [printed on red paper]. The species name label in the insect box has the locality “Brasilia” written in the lower left corner. Specimen set with wings spread; most of both antennae are missing, the left front leg lacks two tarsal segments as does the left hind leg, the right middle leg lacks the last tarsal segment. The right hind leg is detached and pinned through the femur on a separate pin, it lacks the tarsi. The underside of the body is covered in an unknown white substance. Boxes E18 and E19.

*Meroncidius intermedius* Brunner von Wattenwyl, 1895.

*interruptus* Brunner von Wattenwyl, 1893: 109-110 [*Paratettix*].

Carin Chebá, Bhamó, Teinzó. More than one ♀.

One ♂, possibly a syntype, with labels: “Teinzo, Birmania, Fea Maggio 1886” [printed on white card]; “*Paratettix interruptus* Br.” [handwritten on white paper]; “*Paratettix interruptus* Br.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. The specimen is card mounted with the wings folded; the left antenna is missing. Box Q5.

*Ergatettix interruptus* (Brunner von Wattenwyl, 1893).

*inversus* Brunner von Wattenwyl, 1895: 57-58 [*Phyllomimus*].

Java (Mus. Genav., Mus. Brux., coll. Dohrn & coll. Brunner), Deli (coll. Dohrn). More than one ♂ and ♀ (measurements given as size ranges).

One ♀ syntype with labels: "621 16, Java" [printed on whitish paper]; "Phyllomimus inversus Brunn." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of the right antenna is missing. The left front leg lacks two tarsal segments, the right front and middle legs each lack the last tarsal segment. Box E7.

*Phyllomimus inversus* Brunner von Wattenwyl, 1895.

*laminata* Brunner von Wattenwyl, 1891: 125-126 [*Homotoicha*].

Rio grande da Sul [sic] (Mus. Genav., coll. Brunner). Unspecified number of ♂ and ♀.

Two ♀ syntypes. A ♀ with labels: "Brésil, Rio Grande da Sul, D' Ihering, 614.16" [printed on white paper]; "Homotoicha laminata Br." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; both front legs and the left middle leg missing. The right middle and hind legs lack the last tarsal segment. A ♀ with labels: "Brésil, Rio Grande da Sul, D' Ihering, 614.16" [printed on white paper]; "Homotoicha laminata Br." [handwritten on green paper]; "Geneva" [typewritten on a strip of yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of both antennae and the right hind leg are missing. The right front leg lacks two tarsal segments, the right middle and left hind legs lack the last tarsal segment. A juvenile ♀ with a locality label "Brésil, Rio Gr d Sul" may also be considered a syntype. Images on OSF. Box B22.

*Homotoicha laminata* Brunner von Wattenwyl, 1891.

*latelineolata* Brunner von Wattenwyl, 1888: 372 [*Paragryllacris*].

Australia meridionalis (coll. Brunner & Mus. Genav.), Melbourne (Mus. Stuttg.). Unspecified number of ♂ and more than one ♀ (measurements given as size ranges).

Two ♀ syntypes. A ♀ with labels: "Gaulor, Austr. merid" [handwritten on whitish paper]; "14" [hand written on yellowish paper]; "Paragryllacris latelineolata ♀ Br." [handwritten on lilac paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread. A ♀ with labels: "334, Gryllacris n. sp., Australie" [handwritten on white paper]; "334" [printed on a square of yellow paper]; "5" [handwritten on square of white paper]; "Paragryllacris latelineolata ♀ Br." [handwritten on lilac paper]; "Musée de Genève, N° 86" [number handwritten on printed white card]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the right antenna has been repaired with glue. Both front legs and the left middle leg are detached and pinned through the femur on a separate pin. A third ♀ with labels: "1" [handwritten on white paper]; "Gryllacris trisignata Br, Rokhampton [sic]" [handwritten on white paper]; "Musée de Genève, N° 87" [number handwritten on printed white card]; "Paragryllacris latelineolata ♀ Br." [handwritten on lilac paper]; "Syntypus" [printed on red paper], may also be a syntype, although Rockhampton is in Queensland and not in the south of Australia. Box N5.

A junior synonym of *Hadrogryllacris longa* (Walker, 1869).

**latior** Brunner von Wattenwyl, 1878: 351 [*Philophyllia*].

Brasilien (Mus. Genf, Mus. Dresden & Mus. Wien). Unspecified number of ♂ and more than one ♀ (measurements given as size ranges).

One ♀ syntype with labels: "Jurine" [handwritten on whitish paper]; "Philophyllia latior Br." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Holotypus" [printed on red card]. Specimen set with wings folded; the antennae, left front leg and right hind leg are lost. The right front leg lacks two tarsal segments and the right middle leg the last tarsal segment. The holotype label is erroneous. Images on OSF. Box B37.

*Philophyllia latior* Brunner von Wattenwyl, 1878.

**ledereri** Brunner von Wattenwyl in Saussure, 1888: 185-186 [*Thalpomena*].

Asia Minor, Taurus (leg. Lederer). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: "Oedipoda Ledereri Br., Taurus, coll. Lederer" [handwritten on white paper]; "Kasli Baghad" [handwritten on a strip of white paper]; "120" [handwritten in red ink on white card with printed border]; "Thalpomena Ledereri Brunn." [handwritten on blue paper]; "Thalpomena ledereri Brunn." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; both antennae, the left hind leg and the abdomen are lost. The right hind leg is detached and secured through the femur on the original pin. The thorax shows considerable insect feeding damage, and the head appears to have been reattached with glue. A ♀ with labels: "Thalpomena Ledereri Brunn." [handwritten on blue paper]; "Thalpomena ledereri Brunn." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. The species name label in the insect box has the locality "Taurus" handwritten in the lower right corner. Specimen set with wings spread; the left antenna, the tarsi of the left middle leg, the tarsi of the left hind leg, the entire right hind leg and the abdomen are missing. The head and thorax show considerable insect feeding damage. Box V27.

*Pseudocoles ledereri ledereri* (Brunner von Wattenwyl in Saussure, 1888).

**lobata** Brunner von Wattenwyl, 1878: 205 [*Taeniomena*].

Sidney (Mus. Genf), Adelaide (Mus. Berlin). More than one ♂ (measurements given as size range) and an unspecified number of ♀.

One ♂ syntype with labels: "Sidney" [printed on white card]; "Taeniomena lobata Brunn." [handwritten on lilac paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Syntypus" [printed on red paper]. Specimen set with wings roughly folded; both hind legs are missing. Box B17.

*Tinzeda lobata* (Brunner von Wattenwyl, 1878).

**magnifica** Brunner von Wattenwyl, 1888: 327 [*Gryllacris*].

Australia meridionalis (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: "603 34, South Australia" [handwritten on a strip of white paper]; "Gryllacris magnifica ♀ Brun." [handwritten on lilac paper]; "1" [handwritten on white card]; "45" [handwritten on white paper]; "6" [handwritten on white paper]; "Musée de Genève, N° 1" [number handwritten on printed white card];



“Holotypus” [printed on red card]. Specimen set with wings spread. The thorax is starting to come apart where the pin was inserted and is now hollow. The holotype label is unjustified. Box N1.

*Hadrogryllacris magnifica magnifica* (Brunner von Wattenwyl, 1888)

**major** Brunner von Wattenwyl, 1878: 126 [*Hyperophora*].

Buenos-Ayres (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “Buenos Ayres” [handwritten on a strip of white paper]; “Hyperophora major Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. Specimen set with wings spread. The holotype label is unjustified. Images on OSF. Box B9.

*Hyperophora major* Brunner von Wattenwyl, 1878.

**marginata** Brunner von Wattenwyl, 1878: 118 [*Himerta*].

Indien (Mus. Genf); Himalaja (Mus. Wien). Unspecified number of ♂ and ♀.

One ♂ and two ♀ syntypes. A ♂ with labels: “Himerta marginata Br., Indes or.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna and both hind legs are missing. A ♀ with labels: “Himerta marginata Br., Indes or.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the right antenna, the right hind leg and the tarsi of the left hind leg are lost. The femur of the left middle leg is missing and the tibia and tarsi are glued on at the point of articulation. A ♀ with labels: “Himerta marginata Br., Indes or.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the left antenna, the tarsi of the right middle leg, the right hind leg and the tarsi of the left hind leg are missing. Images on OSF. Box B8.

*Himertula marginata* (Brunner von Wattenwyl, 1878).

**marginatum** Brunner von Wattenwyl, 1878: 336 [*Microcentrum*].

Pernambuco (Mus. Genf). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: “2 25, Pernamb., Brésil, M<sup>r</sup> De Lessert” [handwritten on ruled white card]; “Microcentrum marginatum Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Geneva” [typewritten on a strip of yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♀ with labels: “Pernambuco” [handwritten on a strip of white card]; “Microcentrum marginatum Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna is missing and the right front leg, right middle leg and left hind leg each lack the last tarsal segment. Images on OSF. Box B35.

*Microcentrum marginatum* Brunner von Wattenwyl, 1878.

**marginatus** Brunner von Wattenwyl, 1895: 214 [*Nannotettix*].

Orizaba in Mexico (Mus. Genav.). Unspecified number of ♂.

One ♂ syntype with labels: "Orizaba, envoi Sumichrast" [handwritten on white paper]; "Nannotettix marginatus Brunn." [handwritten on green paper]; "Holotypus" [printed on red card]. The left hind leg is detached and pinned through the femur on the original pin. The left front and middle legs each lack the last tarsal segment. The holotype label is unjustified. Box E26.

*Beierotettix marginatus* (Brunner von Wattenwyl, 1895).

**minor** Brunner von Wattenwyl, 1878: 129, fig. 26 [*Engonia*].

Novo-Friburge in Brasilien (Mus. Wien & Mus. Berlin); Buenos-Ayres (Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: "Buenos Ayres, Febr. 1868" [handwritten on white paper]; "Engonia minor Br." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; two tarsal segments of the left front and middle legs, the tibia and tarsi of the right middle leg and the entire right hind leg are missing. Images on OSF. Box B9.

*Engonia minor* Brunner von Wattenwyl, 1878.

**modestus** Brunner von Wattenwyl, 1895: 204 [*Cocconotus*].

Guatemala (Mus. Genav. & coll. Dohrn). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: "Guatemala 603, M<sup>r</sup> Oltram. 51" [printed on whitish paper]; "Cocconotus modestus Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left middle and hind legs are missing. Box E25.

A junior synonym of *Calamoptera immunis* (Walker, 1870).

**moristoides** Brunner von Wattenwyl, 1895: 193 [*Bliastes*].

Martinique (Mus. I. R. & Mus. Brux); Mexico (Mus. Genav.). More than one ♂ (measurements given as size range) and an unspecified number of ♀.

One ♂ syntype with labels: "Mexique, Sumichrast" [handwritten on white paper]; "Bliastes moristoides Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; both antennae are missing, and the left front, middle and hind legs each lack the extremity of the tibia and the tarsi. There are two ♀ without locality labels that may also be syntypes (the species name label in the insect box has the locality "Mexico" written in the lower left corner). Images on OSF. Box E23.

A junior synonym of *Mastophyllum scabricolle* (Serville, 1828).

**munda** Brunner von Wattenwyl, 1895: 169 [*Gongrocnemis*].

Mexico (Mus. Genav.). Unspecified number of ♂.

One ♂ syntype with labels: "Orizaba, Sumichrast" [handwritten on white paper]; "Gongrocnemis munda Brunn." [handwritten on green paper]; "Holotypus" [printed on red card]. Specimen set with left wings spread and right wings folded; the left hind leg is missing and the right hind leg lacks the last tarsal segment. The holotype label is unjustified. Images on OSF. Box E20.

*Gongrocnemis munda* Brunner von Wattenwyl, 1895.

**mutica** Brunner von Wattenwyl, 1895: 168 [*Gongrocnemis*].

Vera Cruz in Mexico (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: "Misauilla, Prov. de Vera Cruz, Mexique, M. Ed Sarazin" [handwritten on white paper]; "Gongrocnemis mutica Brunn." [handwritten on green paper]; "Holotypus" [printed on red card]. Specimen set with wings spread; the right antenna is missing and the left hind leg lacks two tarsal segments. The holotype label is unjustified. Images on OSF. Box E20.

A junior synonym of *Gongrocnemis bivittata bivittata* Brunner von Wattenwyl, 1895.

**nigrifrons** Brunner von Wattenwyl, 1893: 199, fig. 68 [*Grylloides*].

Tenasserim (M. Mooleyit 1100-1300m). Unspecified number of ♂.

One ♂, possibly a syntype, with labels: "Tenasserim, M. Mooleyit, 1000-13000, Fea, Apr. 1887" [printed on white card]; "Grylloides nigrifrons Br." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Box A14.

*Velarifictorus nigrifrons* (Brunner von Wattenwyl, 1893).

**nigrovittata** Brunner von Wattenwyl: 1878: 117 [*Pyrrhicia*].

Himalaja (coll. Brunner no 1079); Indien (Mus. Genf). Unspecified number of ♂. (♀ symbol over measurements a lapse?).

Two ♂ syntypes. A ♂ with labels: "Indes or., M<sup>r</sup> H<sup>v</sup> de Sauss" [locality handwritten on printed white label]; "TYPE BRUNN" [printed on a strip of white paper which has torn in the middle, both halves secured on the original pin]; "Pyrrhicia nigrovittata Br." [handwritten on yellow paper]; "Syn. von Letana linearis Walker, det. Ingrisch, 1989" [typewritten on white card]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the last tarsal segment of the left hind leg is missing. An immature ♂ with labels: "Indes or., M<sup>r</sup> H<sup>v</sup> de Sauss" [locality handwritten on printed white label]; "TYPE BRUNN" [printed on a strip of white paper which has torn in the middle, both halves secured on the original pin]; "Pyrrhicia nigrovittata Br." [handwritten on yellow paper]; "Syn. von Letana linearis Walker, det. Ingrisch, 1989" [typewritten on white card]; "Syntypus" [printed on red paper]. The tarsi of the left front and middle legs are lost, as is the entire left hind leg. Ingrisch (1990: 268) notes the status of these specimens as syntypes. Box B8.

A junior synonym of *Letana linearis* Walker, 1869.

**nitida** Brunner von Wattenwyl, 1878: 183 [*Liotrachelia*].

Philippinen (coll. Brunner no 3034), unknown (Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: "Liotrachelia nitida Br., Indes or." [handwritten on yellow paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; the left antenna is missing, as are the tarsi of the left front leg, the left middle leg, the last tarsal segment of the right middle leg and the tarsi of the left hind leg. Although the provenance was unknown to Brunner the species name label in the insect box has "Indes Orient." handwritten in the lower left corner. Box B17.

*Liotrachelia nitida* Brunner von Wattenwyl, 1878.

*nitidum* Brunner von Wattenwyl, 1893: 209, fig. 75 [*Paratrigonidium*].

Bhamó. Unspecified number of ♂ and ♀.

One ♂ and five ♀, possibly syntypes. A ♂ with labels: "Bhamo, Birman." [handwritten on yellow paper]; ""Paratrigonidium nitidum Brunn." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimen set with wings folded; the antennae, left front leg, both middle legs and two tarsal segments of the left hind leg are lost. The left hind leg is detached and secured through the femur on the original pin. A ♀ with labels: "Paratrig. nitid. Br." [handwritten on a strip of white paper]; "Paratrigonidium nitidum Brunn." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimen set with wings roughly folded; the antennae are lost. The left hind leg is detached and secured through the femur on the original pin. A ♀ with labels: "Bhamó, Birmania, Fea viii 1886" [printed on white card with "viii" and last numeral handwritten]; "Paratrigonidium nitidum Brunn." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimen card mounted with wings folded. A ♀ with labels: "Bhamó, Birmania, Fea vi 1886" [printed on white card with "vi" and last numeral handwritten]; "Paratrigonidium nitidum Br." [handwritten on white paper]; "Paratrigonidium nitidum Brunn." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimen card mounted with wings folded; the right front leg is lost. A ♀ with labels: "Bhamo, Birman." [handwritten on yellow paper]; ""Paratrigonidium nitidum Brunn." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimen set with wings folded; two tarsal segments of the left hind leg and the entire right hind leg are lost. A ♀ with labels: "Bhamo, Birman." [handwritten on yellow paper]; ""Paratrigonidium nitidum Brunn." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimen set with wings folded; the antennae and both hind legs are lost. Box A23.

*Paratrigonidium nitidum* Brunner von Wattenwyl, 1893.

*notabilis* Brunner von Wattenwyl, 1888: 311, fig. 35 [*Heteromallus*].

Chile (Mus. Genav. & coll. Brunner), Porto Montt [sic] in Chile (Mus. Berol.). Unspecified number of ♂ and ♀.

Two ♂ and one ♀ syntype. A ♂ with labels: "Chile" [printed on a strip of white card]; "6." [handwritten on a square of green paper]; "Heteromallus notabilis Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. The left middle leg is lost, and there is damage to the left side of the thorax and abdomen, probably caused by museum beetle. The hind legs are detached and pinned through the femur on separate pins. A ♂ with labels: "Chile" [printed on a strip of white card]; "7." [handwritten on a square of green paper]; "Heteromallus notabilis Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. Most of the left and the entire right antennae is lost; the right middle leg lacks two tarsal segments and the left hind leg lacks the last. A ♀ with labels: "5." [handwritten on a square of green paper]; "Heteromallus notabilis Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. The species name label in the insect box has the locality "Chili" written in the lower left corner. The left front leg is missing and the right lacks part of the femur



and the tibia and tarsi. The left middle leg lacks the tarsi. The specimen has been reinforced with a pin passing through both hind femurs and the abdomen. Box O9.

*Heteromallus notabilis* Brunner von Wattenwyl, 1888.

**notata** Brunner von Wattenwyl, 1893: 130, fig. 50 [*Mestra*].

Carin Chebá. Unspecified number of ♂ and ♀.

One ♀, possibly a paralectotype, with labels: "Palon, (Pegu), L. Fea viii-ix.87" [printed on white card]; "Mestra notata Br." [handwritten on white paper]; *Pseudomorphacris notata* (Br.) Det. D. K. McE. Kevan, 1960" [handwritten on white card with "Det. D. K. McE. Kevan, 195" printed]; "Possible syntype? Wrong locality! Hollier 2010" [handwritten on red paper]. Specimen set with left wings spread and right wings folded. This specimen is somewhat enigmatic because the locality is not that given in the original description. The ♂ lectotype, (designated by Kevan, 1963: 209) is in the MCSN in Genoa. Kevan (loc. cit.) mentions the specimen in the MHNG without discussing its status. Box X4.

*Pseudomorphacris notata* (Brunner von Wattenwyl, 1893).

**oblongoculata** Brunner von Wattenwyl, 1878: 326 [*Turpilia*].

Oaxaca in Mexico (coll. Brunner n° 1862); Guatemala (coll. Brunner n° 5620, Mus. Genf). Unspecified number of ♂ and ♀.

The ♂ lectotype (designated by Nickle, 1984: 608) is stated to be in the MHNG but the specimen is missing from the collection. Box B34.

*Montezumina oblongoculata* (Brunner von Wattenwyl, 1878).

**obtusangula** Brunner von Wattenwyl, 1878: 329 [*Turpilia*].

Cuba (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: "Cuba, Mr H de Saussure" [handwritten on white paper]; "*Turpilia obtusangula* Brunn." [handwritten on green paper]; "Holotypus" [printed on red card]. Specimen set with wings folded; the left antenna and most of the right antenna are missing, as are the left front leg and right middle and hind legs. The right front and left middle legs each lack one tarsal segment and the left hind leg lacks two. There is also a ♂ with the labels "Cuba" and "TYPE BRUNN", but since the original description only treats the £ characters it is not a syntype. The holotype label is unjustified. Images on OSF. Box B33.

*Turpilia obtusangula* Brunner von Wattenwyl, 1878.

**olivacea** Brunner von Wattenwyl, 1891: 123 [*Amaura*].

Rio grande da Sul [sic] (Mus. Genav.). Unspecified number of ♂ and ♀.

Two ♂ syntypes. A ♂ with labels: "Brésil, Rio Gr d Sul" [printed on green paper]; "*Amaura olivacea* Brunn." [handwritten on green paper]; "Geneva" [typed on a strip of yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of both antennae, the tarsi of the right front leg and the tibiae and tarsi of both hind legs is missing. A ♂ with labels: "Brésil, Rio Grande da Sul, Dr Ihering, 614.16" [printed on white paper]; "*Amaura olivacea* Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of the

left antenna, the tarsi of the left middle leg and the entire right hind leg are missing. No ♀ syntypes could be located in the MHNG collection. Images on OSF. Box B22.

*Ligocatinus olivaceus* (Brunner von Wattenwyl, 1891).

**opaca** Brunner von Wattenwyl, 1878: 329-330 [*Turpilia*].

Buenavista in Mexico (Mus. Genf). Unspecified number of ♂ and ♀.

Three ♂ and two ♀, possibly syntypes. A ♂ with labels: "Cuba" [handwritten on white paper]; "Turpilia opaca Brunn." [handwritten on green paper]. Specimen set with wings spread; the left hind leg lacks the tarsi, the right hind leg the last tarsal segment. A ♂ with labels: "Turpilia opaca Brunn." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]. Specimen set with wings folded; the left antenna and right middle leg are missing. The left front leg lacks the tarsi, the left middle leg and right hind leg lack the last tarsal segment. A ♂ with labels: "Cuba" [handwritten on white paper]; "Turpilia opaca Brunn." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Geneva" [typewritten on a strip of yellow paper]. Specimen set with wings folded; the right antenna and right hind leg are missing. The right middle leg and left hind leg lack the last tarsal segment. A ♀ with labels: "Cuba ad # 37" [handwritten on white paper]; "Turpilia opaca Brunn." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]. Specimen set with wings spread; most of both antennae is missing. A ♀ with labels: "Turpilia opaca Brunn." [handwritten on green paper]; "Geneva" [typewritten on a strip of yellow paper]. Specimen set with wings spread; the left hind leg is missing. It is not clear whether the locality or the depository given by Brunner in the original description is wrong, because the presence of supposed syntypes in the MHNW in Vienna (illustrated on OSF) could mean that Brunner was given part of the type series. Notwithstanding the "TYPE BRUNN" labels, it seems more likely that the depository was a lapse and that the specimens in the MHNG are not syntypes. Box B34.

*Turpilia opaca* Brunner von Wattenwyl, 1878.

**opacus** Brunner von Wattenwyl, 1888: 288 [*Onosandrus*].

Capetown (coll. Brunner & Mus. Genav.) More than one ♂.

One ♂ syntype with labels: "Onosandrus opacus m., Cap, B.v" [handwritten on white paper]; "Onosandrus opacus Brunn." [handwritten on pink paper]; "Syntypus" [printed on red paper]. The right front leg is lost and all the other legs lack the tarsi. The specimen in the NHMW in Vienna, referred to erroneously as the holotype on OSF, is a syntype from Brunner's collection. Box O5.

*Onosandrus opacus* Brunner von Wattenwyl, 1888.

**opacus** Brunner von Wattenwyl, 1893: 178, fig. 63 [*Phanerotus*].

M. Mooleyit (Tenasserim). Unspecified number of ♂ and ♀.

One ♂, possibly a syntype, with labels: "Tenasserim, Thagátá, Fea, Marzo 1887" [printed on white card]; "Phanerotus opacus Br." [handwritten on yellow paper]; "Syntypus? Hollier 2010" [handwritten on red paper]. Specimens set with wings folded; the abdomen has been eviscerated and stuffed. Box E13.

*Callimenellus opacus* (Brunner von Wattenwyl, 1893).

***pallidegeniculatus*** Brunner von Wattenwyl, 1893:201-202, fig. 71 [*Ectatoderus*].

Bhamó. Unspecified number of ♂ and ♀.

One ♂, possibly a syntype, with labels: “Bhamo, ix.85” [handwritten in pencil on white card]; “Ectatoderus pallidegeniculatus Brunn.” [handwritten on yellow paper]; “d. pallidegeni” [handwritten on a strip of white paper torn at both ends]; “Syntypus? Hollier 2010” [handwritten on red paper]. The tarsi of the right middle leg are lost. Two immature specimens with labels: “Bhamo, Birma” [handwritten on yellow paper]; “Ectatoderus pallidegeniculata Brunn.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper], one of them with the right hind leg missing, may also be considered syntypes. Box A18.

*Ectatoderus pallidegeniculatus* Brunner von Wattenwyl, 1893.

***pancici*** Brunner von Wattenwyl, 1882: 252-253, fig. 58 [*Callimenus*].

Nisch, Serbien, Türkei. Unspecified number of ♂ and more than one ♀ (measurement given as size range).

Two ♂ syntypes. A ♂ with labels: “609 56, Nisch, Serbia, Brunner d. W.” [handwritten on ruled white card]; “Callimenus Pancici Br., Nisch” [handwritten on white card with printed margins designed as name label for insect box]; “Callimenus Pancici, Serbia, Br. 609/56” [handwritten on white paper]; “Callimenus pancici Brun.” [handwritten on blue paper]. The tarsi of the right front and left middle legs are lost. A ♂ with labels: “609 56, Nisch, Serbia, Brunner d. W.” [handwritten on ruled white card]; “Callimenus Pancici, Serbia, Br. 609/56” [handwritten on white paper]; “Callimenus pancici Brun.” [handwritten on blue paper]. The acquisition number on the labels show that these specimens were part of a small collection purchased from Brunner in 1883, while the locality data strongly suggest that the specimens are part of the type series. Box I3.

A junior synonym of *Callimenus macrogaster longicollis* Fieber, 1853.

***pallidemaculata*** Brunner von Wattenwyl, 1895: 96 [*Capnoptera*].

Umaria (?) (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: “Umaria 169/6” [locality hand written on irregular pentagon of card with number printed]; “1912” [handwritten on white paper]; “Capnoptera pallidemaculata Brunn.” [handwritten on yellow paper]; “Holotypus” [printed on red card]. Specimen set with wings spread; both front legs and the right hind leg are lost. The labels are similar to those of other specimens from India (see *Tarpe fasciata* for example). The holotype label is unjustified. Box E13.

*Typhoptera pallidemaculata* (Brunner von Wattenwyl, 1895).

***pergamicus*** Brunner von Wattenwyl, 1891: 29 [*Poecilimon*].

Pergamon in Asia minore (coll. Brunner). Unspecified number of ♂ and ♀.

Two ♀ paralectotypes. A ♀ with labels: “Poecilimon Pergamicus sp. n., Bergamie” [handwritten on blue paper]; “Syntypus” [printed on red paper]. The last tarsal segment of the left hind leg is missing. A ♀ with labels: “Poecilimon Pergamicus sp. n., Bergamie” [handwritten on blue paper]; “Syntypus” [printed on red paper]. Most of the right and the entire left antenna are lost, as are the right front leg and left hind

leg. The lectotype, designated by Ünal (2010: 146) is in the NHMW in Vienna. Box B2.

*Poecilimon pergamicus* Brunner von Wattenwyl, 1891.

**punctata** Brunner von Wattenwyl, 1878: 248-249 [*Amaura*].

Peru (Mus. Genf). Unspecified number of ♀.

Two ♀ syntypes. A ♀ with labels: “*Amaura punctata* Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the antennae and all of the legs are lost. A ♀ with labels: “*Amaura punctata* Brunn.” [handwritten on green paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the antennae are missing. The species name label in the insect box has the locality “Perou” written in the lower left corner. Images on OSF. Box B22.

*Ligocatinus punctatus* (Brunner von Wattenwyl, 1878).

**punctatus** Brunner von Wattenwyl, 1893: 204, fig. 73 [*Scleopterus*].

Unspecified. More than one ♂ (measurements given as size ranges) and an unspecified number of ♀.

Four ♂ and one ♀, possibly syntypes. A ♂ with labels: “Tenasserim, Meetan, Fea, Apr. 1887” [printed on white card]; “*Scleopterus punctatus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the antennae and both hind legs are missing. The left middle leg is detached and glued to the underside of the thorax. A ♂ with labels: “Carin Cheba, 900-1100 m, L. Fea v-xii.88” [printed on white card]; “*Scleopterus punctatus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen card mounted; the right hind leg is missing. A ♂ with labels: “Tenasserim, Meetan, Fea, Apr. 1887” [printed on white card]; “*Scleopterus punctatus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen card mounted; the right hind leg lacks two tarsal segments. A ♂ with labels: “Kathá, Birmania, Fea vi 1886” [printed on white card with “vi” and the last numeral handwritten]; “*Scleopterus punctatus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the right antenna, the tarsi of the left front leg and both of the hind legs are missing. A ♀ with labels: “Tenasserim, Plapoo, Fea, Apr. 1887” [printed on white card]; “*Scleopterus punctatus* Br.” [handwritten on yellow paper]; “Syntypus? Hollier 2010” [handwritten on red paper]. Box A18.

*Sclerogryllus punctatus* (Brunner von Wattenwyl, 1893).

**reticulatus** Brunner von Wattenwyl, 1895: 236 [*Scopiorus*].

Mexico (Mus. Genav.). Unspecified number of ♂.

One ♂ syntype with labels: “Mexique, Sumichrast” [handwritten on white paper]; “*Scopiorus reticulatus* Brunn.” [handwritten on green paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; the right front and middle legs each lack the last tarsal segment. The left middle leg is detached and pinned through the femur on the original pin. The abdomen has insect feeding damage. The holotype label is unjustified. Box E27.

A junior synonym of *Caloxiphus brevifolius* (Brunner von Wattenwyl, 1895).



*rugulosa* Brunner von Wattenwyl, 1878: 328 [*Turpilia*].

Cuba (coll. Brunner no 7827 & Mus. Genf); Mexico, Buenavista (Mus. Genf). Unspecified number of ♂ and more than one ♀ (measurement given as size range).

One ♂ and two ♀ syntypes. A ♂ with labels: "Cuba, M H de S." [handwritten on white paper]; "Turpilia rugulosa Brun." [handwritten on green paper]; "Geneva" [typewritten on a strip of yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; all of the legs and the abdomen are missing. A ♀ with labels: "Turpilia rugulosa Brun." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Geneva" [typewritten on a strip of yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of the left antenna and the entire right antenna are missing, as are the left front and middle legs and the right middle and hind legs. The right front leg lacks two tarsal segments, while the left hind leg has been reattached with glue and lacks the tarsi. A ♀ with labels: "37/28 Phylloptera?" [handwritten on white paper]; "Turpilia rugulosa Brun." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left antenna, right front leg and both middle legs are lost. The hind legs have been glued to the abdomen, the left one lacks the tarsi. The species name label in the insect box has the locality "Amer. centr." written in the lower left corner. Box B34.

*Turpilia rugulosa* Brunner von Wattenwyl, 1878.

*saussurei* Brunner von Wattenwyl, 1888: 287 [*Onosandrus*].

Cap (Mus. Genav.). Unspecified number of ♀.

One ♀ syntype with labels: "Cap B sp." [handwritten on white paper]; "Onosandrus saussurei Br" [handwritten on pink paper]; "Holotypus" [printed on red card]. Most of both antennae are missing. The holotype label is unjustified. Box O5.

*Onosandrus saussurei* Brunner von Wattenwyl, 1888.

*schochii* Brunner von Wattenwyl in Saussure, 1884: 153 [*Oedipoda*].

Syria, circum Aleppo (leg. Schoch); Caucasia (var.). Unspecified number of ♂ and ♀.

Six ♂ and three ♀ syntypes. A ♂ with labels: "856" [printed on white paper]; "Aleppo, 602 36" [handwritten on white card]; "Cotype" [handwritten on red paper]; "Oedipoda Schochii, Brun., ♂, Aleppo" [handwritten on whitish paper]; "Oedipoda schochi Brunn." [handwritten on yellow paper]; "Oedipoda schochi Brun" [handwritten on blue paper]. Specimen set with fore wings roughly spread. A ♂ with labels: "856" [printed on white paper]; "Aleppo, 602 36" [handwritten on white card]; "Oedipoda schochi Brunn." [handwritten on yellow paper]; "Oedipoda schochi Brun" [handwritten on blue paper]; "Ctyphippus schochii Br." [handwritten on white paper]; "Syntypus" [printed on red paper]. Specimen set with wings splayed about half spread. A ♂ with labels: "Aleppo" [printed on white paper]; "Oedip. Schonchi Br., Elisabetpol (Cauc.)." [handwritten on blue card with black printed borders in the form of a label to be placed in an insect box]; "Oedipoda schochi Brunn." [handwritten on yellow paper]; "Oedipoda schochi Brun" [handwritten on blue paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; both front legs are missing. A ♂ with labels: "Oed. Schochii Br., Elisabetpol (Caucas.), Br." [handwritten on white paper];

“*Oedipoda schochi* Brun” [handwritten on blue paper]; “Cotype” [handwritten on red paper]. Specimen set with wings spread. A ♂ with labels: “Oedip. Schonchi Br., Elisabetpol (Cauc.)” [handwritten on blue card with black printed borders in the form of a label to be placed in an insect box]; “*Oedipoda schochi* Brunn.” [handwritten on yellow paper]; “*Oedipoda schochi* Brun” [handwritten on blue paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded. A ♂ with labels: “*Schochi* Brunn., Caucas.” [handwritten on yellow paper]; “*Oedipoda schochi* Brunn.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with left wings spread and right wings folded. A ♀ with labels: “*Oedipoda Schochii*, Brun., ♀, Aleppo” [handwritten on whitish paper]; “*Oedipoda schochi* Brunn.” [handwritten on yellow paper]; “*Oedipoda schochi* Brun” [handwritten on blue paper]; “Type, Oed. Schochi, Saussure 1884” [handwritten on red paper, the word “Type” being at right-angles to the rest]. Specimen set with wings spread; the right antenna and both front legs are missing. The right hind leg is detached and secured through the femur on a separate pin. A ♀ with labels: “850” [printed on white card]; “*Clyphippus Shochi* Brunner v. Wattenwyl in literis. Aleppo.” [handwritten on white paper]; “*Oedipoda schochi* Brunn.” [handwritten on yellow paper]; “*Oedipoda schochi* Brun” [handwritten on blue paper]; “Syntypus” [printed on red paper]. Specimen set with wings splayed about half spread. A ♀ with labels: “Oed. Schochii Br., Elisabetpol (Caucas.), Br.” [handwritten on white paper]; “*Oedipoda schochi* Brun” [handwritten on blue paper]; “Type, Oed. Schochi var. caucasica” [handwritten on red paper, the word “Type” being at right-angles to the rest]. Specimen set with wings splayed about half spread; the left antenna and the tibia and tarsi of the left middle leg are missing. A further ♂ and ♀ without locality labels, and a juvenile specimen from Aleppo may also be syntypes. Box V22.

*Oedipoda schochi* Brunner von Wattenwyl in Saussure, 1884.

*securigera* Brunner von Wattenwyl, 1878: 93-94 [*Elimaea*].

Ostindien, Simla (Mus. Genf). Unspecified number of ♂ and ♀.

Five ♂ and one ♀ syntypes. A ♂ with labels: “Indes or., 72.” [handwritten on white card]; “*Elimaea securigera* Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings spread; the right antenna, the last tarsal segment of the right front leg and left middle leg, the tibia and tarsi of the left hind leg and the last tarsal segment of the right hind leg are all missing. The left hind tibia has been repaired with glue. A ♂ with labels: “Indes or., 72.” [handwritten on white card]; “*Elimaea securigera* Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae, the tarsi of the left front leg and both hind legs are lost. A ♂ with labels: “Coll. Schlagintweit, Simla, Nro 12.” [number handwritten on printed green card]; “*Elimaea securigera* Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna, the last tarsal segment of both front legs and the right middle leg, two tarsal segments of the left middle leg, part of the femur (along with tibia and tarsi) and the entire left leg are missing. A ♂ with labels: “coll. Guérin” [handwritten

on a strip of white paper] “*Elimaea securigera* Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; the right antenna, left front leg, right middle leg, the tibia and tarsi of the left middle leg and the tarsi of the right hind leg are missing. A ♂ with the labels: “Indes or., 72.” [handwritten on white card]; “*Elimaea securigera* Br.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of the right antenna and the last tarsal segment of the left front leg are missing. A ♀ with labels: “Indes or., 72” [handwritten on white card]; “*Elimaea securigera* Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae, the left front leg and the right hind leg are missing. Images on OSF. Box B6.

*Elimaea securigera* Brunner von Wattenwyl, 1878.

*signata* Brunner von Wattenwyl, 1888: 276-277 [*Carcinopsis*].

Nova Caledonia (Mus. Genav. & coll. Brunner). Unspecified number of ♂ and more than one ♀ (measurements given as size ranges).

One ♂ and one ♀ syntype. A ♂ with labels: “N<sup>le</sup> Caladonie, ach. à Deyrolle” [handwritten on lilac paper]; “*Carcinopsis signatus* Brun.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. The left antenna has been repaired with glue. A ♀ with labels: “N<sup>le</sup> Caladonie, ach. à Deyrolle” [handwritten on lilac paper]; “14” [handwritten on a square of green paper]; “*Carcinopsis signatus* Brun.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. The left front leg lacks the last tarsal segment. Box O4.

*Carcinopsis signata* Brunner von Wattenwyl, 1888.

*simplicipes* Brunner von Wattenwyl, 1878: 157 [*Aphidnia*].

Mexico (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: “Mexique, Sumichrast” [handwritten on white paper]; “*Aphidnia simplicipes* Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. Specimen set with wings spread; the left antenna and most of the right antenna are lost, as are the right hind leg and the tarsi of the left hind leg. The holotype label is unjustified. Box B11.

*Valna simplicipes* (Brunner von Wattenwyl, 1878).

*soror* Brunner von Wattenwyl, 1878: 204-205 [*Taeniomena*].

Neuholland (coll. Brunner no 8819 & Mus. Genf), Adelaide (Mus. Berlin). Unspecified number of ♂ and more than one ♀ (measurement given as size range).

One ♂ and three ♀ syntypes. A ♂ with labels: “Sidney” [printed on white card]; “*Taeniomena soror* Brunn.” [handwritten on lilac paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings roughly folded; the antennae, left middle leg and both hind legs are lost, as is most of the right hind tibia and tarsi. A ♀ with labels: “603 36 South Australia” [handwritten on white paper]; “*Taeniomena soror* Brunn.” [handwritten on lilac paper]; “Syntypus”

[printed on red paper]. Specimen set with wings folded; the entire right antenna and most of the left antenna are missing, as are the left front, left middle and both hind legs. The right middle leg lacks the tarsi. A ♀ with labels: "603 36 South Australia" [handwritten on white paper]; "Taeniomena soror Brunn." [handwritten on lilac paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; both antennae, both front legs, the left middle leg and the right hind leg are missing, and the left hind leg lacks the tarsi. A ♀ with labels: "Taeniomena soror Brunn." [handwritten on lilac paper]; "Syntypus" [printed on red paper]. The species name label in the insect box has the locality "Nlle Hollande" written in the lower left corner. Specimen set with wings folded; both antennae, both front legs, the left middle leg and both hind legs are lost. OSF has pictures of a specimen labelled as lectotype, but is not clear if such a designation has been formally published. Box B17.

*Tinzedo soror* (Brunner von Wattenwyl, 1878).

*spinata* Brunner von Wattenwyl, 1878: 248 [*Amaura*].

Buenos-Ayres (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: "Amaura spinata Br." [handwritten on green paper]; "Holotypus" [printed on red card]. The species name label in the insect box has the locality "Amer. Mérid." written in the lower left corner. Specimen set with wings folded; the left antenna and most of the right are missing, and the right middle and both hind legs are lost. There is insect feeding damage to the thorax and abdomen. The holotype label is unjustified. Images on OSF. Box B22.

*Ligocatinus spinatus* (Brunner von Wattenwyl, 1878).

*striolatus* Brunner von Wattenwyl, 1878: 366-367 [*Peucestes*].

Pernambuco (Mus. Genf), Bahia (Mus. Wien & coll. Brunner n° 5731); Panama (Mus. Wien); Peru (coll. Brunner no 11248). More than one ♂ and ♀.

Three ♀, possibly syntypes. A ♀ with labels: "Amer. merid, coll. Jurine" [handwritten on ruled white card]; "Peucestes striolatus Brunn." [handwritten on green paper]; "TYPE BRUNN" [printed on a strip of white paper]; "Geneva" [typewritten on a strip of yellow paper]; "*Cnemidophyllum citrifolium* (Linnaeus, 1758), Det. M. G. Emsley, 1969" [printed on white card]. Specimen set with wings folded; the antennae, both front legs and both middle legs are missing. The left hind leg lacks the claws, the right hind leg is detached and pinned through the femur on a separate pin, and lacks the last tarsal segment. The terminalia are detached and placed in a vial secured by a separate pin. A ♀ with label: "Peucestes striolatus Brun." [handwritten on green paper]. The species name label in the insect box has the locality "Amer. mérid." written in the lower left corner. Specimen set with wings folded; most of both antennae are missing, the left front leg has lost the tibia and tarsi, the right front and middle leg have lost the tarsi. A ♀ with label: "Peucestes striolatus Brun." [handwritten on green paper]. The species name label in the insect box has the locality "Amer. mérid." written in the lower left corner. Specimen set with wings spread; both antennae are lost, the left front leg lacks the tarsi and the left hind leg has lost the last tarsal segment. Although the original description included the MHNG as a depository of type material none of the specimens has the precise locality given in the original description. Emsley (1970:



194) considered the specimen from Jurine's collection to be a syntype, presumably on the basis of the "TYPE BRUNN" label. Box B26.

*Steirodon striolatus* (Brunner von Wattenwyl, 1878).

**sublaevis** Brunner von Wattenwyl, 1890: 105-106, fig. 5 [*Tetanorhynchus*].

Theresopolis in Santa Catherina in Brasilia (coll. Brunner & Mus. Genav.). Unspecified number of ♂ and ♀.

Two ♂ syntypes. A ♂ with labels: "S. Catherina, Rio Capivary, Fruhstorfer 1888" [printed on white paper, with last numeral added in red ink]; "Tetanorynchus [sic] sublaevis Br." [handwritten on green paper]; "Tetanorhynchus sublaevis Br.v.W., Paratypus ♂, C S Carbonell 1966" [handwritten by Carbonell on red card]. The femur of the right front leg is broken about half way along, and the left front leg lacks the tarsi. A ♂ with labels: "S. Catherina, Rio Capivary, Fruhstorfer 1888" [printed on white paper, with last numeral added in black ink]; "Tetanorynchus [sic] sublaevis Br." [handwritten on green paper]; "Tetanorhynchus sublaevis Br.v.W., Paratypus ♂, C S Carbonell 1966" [handwritten by Carbonell on red card]. The left front and middle legs each lack the tibia and tarsi, and the right middle leg is lost. OSF states that a ♂ in the NHMW in Vienna is the holotype, but no such designation was made in the original description. Box T2.

*Cephalocoema sublaevis* (Brunner von Wattenwyl, 1890).

**submaculata** Brunner von Wattenwyl, 1878: 317-318 [*Hyperphrona*].

Peru (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: "Perou, M. H de S." [handwritten on white paper]; "Hyperphrona submaculata Brunn." [handwritten on green paper]; "Holotypus" [printed on red card]. There is also a small square of white paper with four sketches labelled "plaque sousanale", "plaque subanale" and "cerci" fixed on the original pin. Specimen set with wings folded; both antennae and both front legs are missing. The left middle leg lacks the last tarsal segment, and the right middle leg the claw. The hind legs have been reattached with glue; the left lacks the tibia and tarsi, the right the tarsi. A detached front leg, which may belong to this specimen, is secured by two pins beside it. The holotype label is unjustified. Images on OSF. Box B33.

*Hyperphrona submaculata* Brunner von Wattenwyl, 1878.

**superba** Brunner von Wattenwyl, 1895: 68-69, figs 27a & 27b [*Despoina*].

Brunei in insula Borneo (coll. Dohrn & Mus. Genav.). Unspecified number of ♂ and more than one ♀ (measurements given as size range).

One ♂ and two ♀ syntypes. A ♂ with labels: "Brunnei [sic], N E Borneo, Staudinger" [printed on yellow paper]; "Despoina superba Brunn." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the left hind leg has lost the last tarsal segment. A ♀ with labels: "Brunnei [sic], N E Borneo, Staudinger" [printed on yellow paper]; "Despoina superba Brunn." [handwritten on yellow paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; the right front and left middle legs are missing and the left hind leg lacks the tarsi. There is some insect feeding damage to the thorax and abdomen. A ♀ with labels:

“Brunnei [sic], N E Borneo, Staudinger” [printed on yellow paper]; “Despoina superba Brun.” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. Specimen set with right wings spread and left wings folded; the right antenna is lost. The prothorax has been hollowed out, and it and the head are secured to the rest of the body with glue. Box E9.

*Despoina superba* Brunner von Wattenwyl, 1985.

**tectiformis** Brunner von Wattenwyl, 1878: 353, fig. 104 [*Acra*].

Quito (Mus. Genf). Unspecified number of ♀.

One ♀ syntype with labels: “Quito, M H de Saussure” [handwritten on white card]; “Acra tectiformis Br.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. Specimen set with wings folded; the left antenna, both front legs, the right middle leg and the right hind leg are missing. The left middle leg lacks two tarsal segments and the left hind leg lacks the last tarsal segment. The holotype label is unjustified. There is a second ♀, without a locality label on the pin, which may be part of the type series. Images on OSF. Box B37.

*Acropsis tectiformis* (Brunner von Wattenwyl, 1878).

**tenella** Brunner von Wattenwyl, 1878: 329 [*Turpilia*].

Buenavista in Mexico (Mus. Genf). Unspecified number of ♂.

One ♂ syntype with labels: “Turpilia tenella Brun.” [handwritten on green paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Holotypus” [printed on red card]. The species name label in the insect box has the locality “Mexique” written in the lower left corner. Specimen set with wings folded; the left antenna, both front legs and the right hind leg are lost. The right middle leg lacks the tarsi, and the left middle and hind legs each lack the last tarsal segment. The holotype label is unjustified. Box B34.

*Phylloptera tenellus* (Brunner von Wattenwyl, 1878).

**tenera** Brunner von Wattenwyl, 1893: 157, fig. 53 [*Carsula*].

Carin Chebá. Unspecified number of ♂ and ♀.

One ♀, probably a syntype, with labels: “Carin Cheba, 900-1100m, L. Fea V XII.88” [printed on white card]; “Carsula tenera Br.” [handwritten on white card]; “Possible syntype of C. tenera BvW, 1893? Hollier 2010” [handwritten on red paper]. Specimen set with wings folded. According to OSF a ♂ specimen in the MCSN in Genoa is the holotype, but as the original description mentions both sexes and no holotype was designated this must be incorrect. In a footnote Brunner says that Saussure gave the species this name, but the description is Brunner’s. Box Z22.

*Carsula tenera* Brunner von Wattenwyl, 1893.

**transfuga** Brunner von Wattenwyl, 1878: 72 [*Odontura*].

Bahia Blanca in Brasilien (Mus. Genf & coll. Brunner n° 10598). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntypes. A ♂ with labels: “Bahia Blanca, env. G. Claraz” [handwritten on white paper], “TYPE BRUNN” [printed on a strip of white paper];

“*Odontura transfuga* Br.” [handwritten on green paper]; “1” [typewritten on a strip of white card]; “*Syntypus*” [printed on red paper]. Specimen lacks both antennae, both front legs, both middle legs and the right hind leg. A ♀ with labels: “Bahia Blanca, env. G. Claraz” [handwritten on white paper], “TYPE BRUNN” [printed on a strip of white paper]; “*Odont. transfuga* Br.” [handwritten on a strip of white card with a printed central line]; “2” [typewritten on a strip of white card]; “*Syntypus*” [printed on red paper]. Specimen lacks the right antenna and the tibia and tarsi of the left hind leg. The right hind tarsus has been repaired with glue. There are two immature ♀ with the same locality, identification and “TYPE BRUNN” labels as the ♂, which might be considered syntypes. Since the material was collected by Georges Claraz, the locality is probably in Argentina rather than Brazil. Images on OSF. Box B3.

*Dichopetala transfuga* (Brunner von Wattenwyl, 1878).

***triangulatum*** Brunner von Wattenwyl, 1878: 338 [*Microcentrum*].

Guadeloupe (Mus. Genf); St Thomas (coll. Brunner n° 7826). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “Guadeloupe” [handwritten on a strip of white paper]; “*Microcentrum triangulatum* Br.” [handwritten on green paper]; “Allotypoid, *Amblycorypha triangulum* BvW. should be designated” [handwritten on red card]. Specimen set with wings spread; the left hind leg lacks the last tarsal segment. The abdomen shows some insect feeding damage. It is unclear who added the red label. Box B36.

*Microcentrum triangulatum* Brunner von Wattenwyl, 1878.

***truncatus*** Brunner von Wattenwyl, 1893: 200-201, fig. 70 [*Loxoblemmus*].

Teinzó, Bhamó. Unspecified number of ♂ and ♀.

Two ♂ and one ♀, possibly syntypes. A ♂ with labels: “Teinzo, vi.86” [handwritten on white card]; “*Loxoblemmus truncatus* Brunner” [handwritten on yellow paper]; “*Loxoblemmus truncatus* Brunner, Det. R. L. Randell, 1963” [handwritten on white card with “Det. R. L. Randell, 19” printed]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; the hind legs are detached and secured through the femurs on the original pin. A ♂ with labels: “Teinzo, vi.86” [handwritten on white card]; “*Loxoblemmus truncatus* Brunner” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; most of the left antenna, the right middle leg and both hind legs are lost. A ♀ with labels: “Teinzo, vi.86” [handwritten in pencil on white paper]; “*Loxoblem. truncat. Br., Bhamo*” [handwritten on white card]; “*Loxoblemus* [sic] *truncatus* Brunner” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both middle legs and the last tarsal segment of the right hind leg are lost. Box A16.

*Loxoblemmus truncatus* Brunner von Wattenwyl, 1893.

***turpis*** Brunner von Wattenwyl, 1895: 130 [*Lichenochrus*].

Casamana in sinu Guineensi (Mus. Genav.); Brasilien (Mus. Genav.). Unspecified number of ♂ and ♀.

One ♂ and one ♀ syntype. A ♂ with labels: "50" [handwritten on a square of white paper]; "Brésil" [handwritten in pencil on lined white paper]; "Lichenochrus turpis Brunn." [handwritten on pink paper]; "Syntypus" [printed on red paper]. Specimen set with wings spread; most of both antennae, the left front leg and the left hind leg are lost. The left middle leg lacks two tarsal segments and the right hind leg lacks the last. A ♀ with labels: "Casamana, Mr Ed Sarazin" [handwritten on white paper]; "Lichenochrus turpis Brunn." [handwritten on pink paper]; "Holotypus" [printed on red card]. Specimen set with right wings spread and left wings folded, the right hind wing is very tattered; most of the right antenna is lost, as is the right middle leg. The right front and left middle legs lack the tarsi. The abdomen has been reinforced with a pin entering below the ovipositor and directed towards the thorax. Brunner described the ♀ (from West Africa) under this name, and tentatively considered the ♂ to be conspecific but labelled with the incorrect provenance (Brazil). Box E16.

*Paralichenochrus turpis* (Brunner von Wattenwyl, 1895).

**unicolor** Brunner von Wattenwyl, 1893: 131, fig. 51 [*Chlorizeina*].

Palon (Pegú), Bhamó. Unspecified number of ♂ and ♀.

One ♀ syntype with labels: "Palon, (Pegu), L. Fea viii-ix.87" [printed on white card]; "Chlorizeina unicolor Br." [handwritten on yellow paper]; "Syntypus? Hollier 2010 [handwritten on red paper]. Part of the left antenna, the tarsi of the right middle leg and the claw of the right hind leg are missing. Kevan (1969) considered that this specimen was part of the type series, and that Rehn (1951) had designated the ♂ specimen in the MCSN in Genoa as the lectotype (although there is no formal designation in the latter publication). Box X7.

*Chlorizeina unicolor unicolor* Brunner von Wattenwyl, 1893.

**variabilis** Brunner von Wattenwyl, 1895: 128 [*Lichenochrus*].

Pernambuco (Mus. Genav., coll. Brunner & Mus. Zurig.): Colombia (Mus. Berol.). Unspecified number of ♂ and ♀.

Two ♂ and two ♀ syntypes. A ♂ with labels: "2 25, Pernamb., Brésil, M<sup>r</sup> De Lessert" [handwritten on ruled white card]; "Lichenochrus variabilis Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with left wings spread and right wings folded; most of both antennae are lost and all of the right legs lack the last tarsal segment. A ♂ with labels: "2 25, Pernamb., Brésil, M<sup>r</sup> De Lessert" [handwritten on ruled white card]; "Lichenochrus variabilis Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of both antennae are lost and the right front leg lacks the tarsi. A ♀ with labels: "2 25, Pernamb., Brésil, M<sup>r</sup> De Lessert" [handwritten on ruled white card]; "Lichenochrus variabilis Brunn." [handwritten on green paper]; "Syntypus" [printed on red paper]. Specimen set with wings folded; most of the left antenna is lost, as is the right hind leg. The left front leg lacks the tarsi, the right middle leg lacks the last tarsal segment. A ♀ with labels: "2 25, Pernamb., Brésil, M<sup>r</sup> De Lessert" [handwritten on ruled white card]; "Lichenochrus variabilis Brunn." [handwritten on green paper];



“Syntypus” [printed on red paper]. Specimen set with wings roughly folded; most of both antennae are lost and the left hind leg lacks the last tarsal segment. There is a juvenile ♂ that may also be a syntype. Box E16.

A junior synonym of *Paraplemia viridinervis* (Kirby, 1890).

**variegatus** Brunner von Wattenwyl, 1888: 300, fig. 27 [*Neonetus*].

Nova Seelandia (Mus. Genav. & coll. Brunner). Unspecified number of ♂ and ♀.

One ♂ and three ♀ syntypes. A ♂ with labels: “Nlle Zealand, 602 34” [printed on white paper]; “Musée de Genève, No 106” [number handwritten on white printed card]; “*Neonetus variegatus* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. The left antenna is lost. A ♀ with labels: “Nlle Zealand, 602 34” [printed on white paper]; “Musée de Genève, No 104” [number handwritten on white printed card]; “*Neonetus variegatus* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. The right middle leg lacks the tarsi. A ♀ with labels: “Nov. Zealand, 619 41” [printed on lilac paper]; “*Neonetus variegatus* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Both antennae and the right middle leg are lost. There is some insect feeding damage to the thorax and abdomen on the right side. A ♀ with labels: “Nlle Zealand, 602 34” [printed on white paper]; “*Neonetus variegatus* Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. The right antenna, right middle leg and left hind leg are lost. The left middle leg lacks tibia and tarsi. Box O7.

*Neonetus variegatus* Brunner von Wattenwyl, 1888.

**verrucosa** Brunner von Wattenwyl, 1878: 95 [*Elimaea*].

Unknown (Mus. Genf). Unspecified number of ♂ and ♀.

One ♀ syntype with labels: “*Elimaea verrucosa* Br.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; both antennae, the left front and middle legs, the last tarsal segment of the right middle leg and most of the tibia and the tarsi of the right hind leg are missing. The left hind leg is detached and pinned through the femur on a separate pin; the tibia shows insect feeding damage, and the tarsi are lost. The male syntype(s) referred to in the description could not be found. The yellow identification label indicates that the specimen was thought to come from the oriental region. Images on OSF. Box B6.

*Elimaea verrucosa* Brunner von Wattenwyl, 1878.

**vicinus** Brunner von Wattenwyl, 1888: 262 [*Stenopelmatus*].

Guatemala (Mus. Genav.). Unspecified number of ♂.

One ♂ syntype with labels: “3 28, Guatemala, M<sup>r</sup> H. d. Sauss.” [handwritten on ruled white card]; “16” [handwritten on green paper]; “*Stenopelmat. vicinus* Br.” [handwritten on green paper]; “*Stenopelmatus vicinus* Brun.” [handwritten on green paper]; “Holotypus, *Stenopelmatus vicinus* Br.v.W. THH” [handwritten by Hubbell on red card with “Holotypus” printed]. Most of the left antenna and the entire right antenna are lost, as is the left front leg. The right front leg lacks the tarsi, both middle

legs lack the tibiae and tarsi, the left hind leg lacks two tarsal segments and the right hind leg lacks the tibia and tarsi. The specimen has been repaired with glue where the abdomen and thorax join. The holotype label is unjustified. Box O1.

*Stenopelmatus vicinus* Brunner von Wattenwyl, 1888.

**vittata** Brunner von Wattenwyl, 1895: 52 [*Promeca*].

Java (coll. Brunner, Mus. Genav. & coll. Dohrn). Unspecified number of ♂ and more than one ♀ (measurements given as size ranges).

Two ♂ and four ♀ syntypes. A ♂ with labels: “621 19, Java” [printed on whitish paper]; “*Promeca vittata* Brunn.” [handwritten on yellow paper]; “*Promeca fuscescens* de Haan, det. C. de Jong 1938” [determination handwritten on white card with name and date printed]; “*Syntypus*” [printed on red paper]. Specimens set with wings folded. A ♂ with labels: “621 17, Java” [printed on whitish paper]; “*Promeca vittata* Brunn.” [handwritten on yellow paper]; “*Promeca fuscescens* de Haan, det. C. de Jong 1938” [determination handwritten on white card with name and date printed]; “*Syntypus*” [printed on red paper]. Specimens set with wings folded. A ♀ with labels: “621 17, Java” [printed on whitish paper]; “*Promeca vittata* Brunn.” [handwritten on yellow paper]; “*Promeca fuscescens* de Haan, det. C. de Jong 1938” [determination handwritten on white card with name and date printed]; “*Syntypus*” [printed on red paper]. Specimens set with wings folded. A ♀ with labels: “621 16, Java” [printed on whitish paper]; “*Promeca vittata* Brunn.” [handwritten on yellow paper]; “*Promeca fuscescens* de Haan, det. C. de Jong 1938” [determination handwritten on white card with name and date printed]; “*Syntypus*” [printed on red paper]. Specimens set with wings folded. A ♀ with labels: “621 19, Java” [printed on whitish paper]; “*Promeca vittata* Brunn.” [handwritten on yellow paper]; “*Promeca fuscescens* de Haan, det. C. de Jong 1938” [determination handwritten on white card with name and date printed]; “*Syntypus*” [printed on red paper]. Specimen set with wings folded. A ♀ with labels: “621 17, Java” [printed on whitish paper]; “*Promeca vittata* Brunn.” [handwritten on yellow paper]; “*Promeca fuscescens* de Haan, det. C. de Jong 1938” [determination handwritten on white card with name and date printed]; “*Syntypus*” [printed on red paper]. Specimens set with wings folded. Box E7.

A junior synonym of *Promeca fuscescens* (Haan, 1842).

**vittatum** Brunner von Wattenwyl, 1893: 210, fig. 76 [*Paratrigonidium*].

Carin Chebá. Unspecified number of ♀.

One ♀, possibly a syntype, with labels: “Carin Cheba” [handwritten on a strip of white card]; “*Paratrig. vittat. Br.*” [handwritten on a strip of white paper]; “*Paratrigonidium vittatum* Brunn.” [handwritten on yellow paper]; “*Syntypus?* Hollier 2010” [handwritten on red paper]. Specimen set with wings folded; both antennae and about half of the right cercus are missing. The left hind leg is detached and secured through the femur on the original pin. Box A23.

*Paratrigonidium vittatum* Brunner von Wattenwyl, 1893.

**vittatus** Brunner von Wattenwyl in Saussure, 1878: 621-622, fig 68 [*Hemiphonus*].

Nouvelle-Hollande septentrionale; Iles Viti [no depository given]. Unspecified number of ♂ and ♀.

Two ♀ syntypes. A ♀ with labels: “Rockhampton, Nouv. Holl., M<sup>r</sup> H.d.Sauss.” [handwritten on white card with “Nouv. Holl.” printed and ruled lines]; “4628” [written in pencil on a strip of white paper]; “Hemiphonus vittatus Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae lost, as is the last tarsal segment of the right hind leg. A ♀ with labels: “♀ Iles Viti” [handwritten on white card with ruled lines]; “Hemiphonus vittatus Br.” [handwritten on lilac paper]; “Syntypus” [printed on red paper]. Specimen set with wings folded; most of both antennae are missing, as are two tarsal segments from the right front leg and both middle legs. Part of the ovipositor is detached and glued to a card on a separate pin. The original description includes the male characters, but no male syntype(s) could be found in the MHNG. Box A28.

A junior synonym of *Hemiphonus continuus* (Walker, 1869).

*yersini* Brunner von Wattenwyl, 1882: 200-201 [*Porthetis*].

Candia (Yersin & coll. Brunner); ausserdem in Beirut (coll. Brunner). More than one ♂ and ♀.

Three ♂ syntypes. A ♂ with labels: “Beyrut, Syrie, Mr Brisout” [handwritten on ruled white card]; “Beyrouth, Syrie, Brisout” [handwritten by Yersin on white paper]; “a/1704” [handwritten on white card disk]; “Porthetis raulinii Lucas” [handwritten on a label once fixed into an insect box but now folded and placed on the pin]; “Pamphigus yersini Brunner” [handwritten on yellow paper]; “Syntypus” [printed on red paper]. A ♂ with labels: “609 56. Haifa, Syrie, Brunner d. W.” [handwritten on ruled white card]; “Porthetis yersini Brunn.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. A ♂ with labels: “609 56. Haifa, Syrie, Brunner d. W.” [handwritten on ruled white card]; “Porthetis yersini Brunn.” [handwritten on yellow paper]; “TYPE BRUNN” [printed on a strip of white paper]; “Syntypus” [printed on red paper]. The right front leg lacks two tarsal segments. Hollier (2008) incorrectly referred to the name *Porthetis raulinii* Yersin, 1860 as a junior homonym of *P. raulinii* Lucas, 1854, and *P. yersini* as a replacement name. In fact, Yersin described what he thought was the ♂ of Lucas’ species without realising that this was a different species. Brunner recognised that the species is not conspecific and subsequently gave it the name *P. yersini* with his description. However, since Brunner referred to Yersin’s material and publication, the material studied by Yersin is part of the syntype series for Brunner’s species, although Brunner cited the locality data incorrectly. Should the designation of a lectotype be necessary, a specimen studied by Yersin should be selected. Box Y5.

*Orchamus yersini* (Brunner von Wattenwyl, 1882).

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## ***Rasbora rheophila*, a new species of fish from northern Borneo (Teleostei: Cyprinidae)**

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***Rasbora rheophila*, a new species of fish from northern Borneo (Teleostei: Cyprinidae).** - *Rasbora rheophila*, new species, is described from Borneo in Sabah (Malaysia) and northern Kalimantan Timur (Indonesia). It is distinguished from all other species of the genus by the combination of a slender body, the backward position of the dorsal fin, a rounded snout, a dark midlateral stripe from head to end of hypural plate, over the axial streak, the caudal fin with a greyish to black posterior margin, restricted to upper lobe in some populations, 14 circumpeduncular scale rows, 31-34 + 2-3 lateral line scales, and 18-19 + 18-20 = 36-38 vertebrae.

**Keywords:** *Rasbora* - Borneo - Malaysia - Sabah - Indonesia - Kalimantan Timur.

### INTRODUCTION

The genus *Rasbora* includes small cyprinid fishes found throughout South and Southeast Asia. The genus presently includes some 120 valid species, of which many have been discovered in the last 20 years (see, e.g., Hadiaty & Kottelat, 2009; Tan, 1999, 2009; Kottelat, 1991, 1995, 2000, 2005, 2008; Kottelat & Tan, 2011; Lumbantoging, 2010). I describe here a new species from northeastern Borneo.

### MATERIAL AND METHODS

Material examined is deposited in: IRSNB, Institut Royal des Sciences Naturelles de Belgique, Bruxelles; MHNG, Muséum d'Histoire Naturelle, Genève; RMNH, Nationaal Natuurhistorisch Museum, Leiden; ZRC, Raffles Museum of Biodiversity Research, National University of Singapore; and CMK, the collection of the author. Specimens were measured on the left side using dial callipers (accuracy 0.1 mm). Meristic and measurements were taken according to Kottelat (2001) and Kottelat & Freyhof (2007). Vertebrae counts follow Roberts (1989). SL is standard length.

## SYSTEMATIC PART

***Rasbora rheophila*, new species**

Figs. 1-2

*Rasbora cf. sumatrana* 1: Kottelat & Vidthayanon, 1993: 164.

HOLOTYPE: IRSNB 874, 59.4 mm SL; Borneo: Sabah: Sungai Pangakatan (a tributary of Sungai Liwagu), near Ranau on road to hot spring; Leopold III & J. P. Gosse, 8 October 1971.

PARATYPES: IRSNB 875 [ex 17554], 83, 37.8-58.8 mm SL; CMK 21901, 10, 39.7-58.3 mm SL; same data as holotype. – CMK 9461, 5, 20.0-57.5 mm SL; Borneo: Kalimantan Timur: Sebuku drainage: Sungai Bantul at Bantul logging camp, draining to Tulit; 4°08.9'N 116°48.3'E; M. Kottelat & P. McKee, 10 February 1993. – MHNG 2542.37, 9, 20.1-39.0 mm SL; Borneo: Sabah: Long Pa Sia; about 60 km South-East of Lawas, 135 km south of Beaufort, tributary of Sungai Padas; 4°25'N 115°43'E; J. Binggeli, October 1992. – ZRC 47505, 1, 68.4 mm SL; Borneo: Sabah: Kota Marudu: Marak Parak, Sungai Kinarom, Kampung Loguhang, about 6 km downstream of Serinsim Station (6°19.733'N 116°44.403'E, 120 m asl); Tan H. H. et al., 15 December 2000.

DIAGNOSIS: *Rasbora rheophila* is distinguished from all its congeners by the combination of the following characters: body slender, depth 21-25 % SL (4.0-4.7 times in SL); predorsal length 49-56 % SL, dorso-hypural distance, when carried forward, falling before nostrils; 14 circumpeduncular scale rows; 31-34 + 2-3 lateral line scales; rounded snout; a dark lateral stripe from head to end of hypural plate, over axial streak; caudal fin with a greyish to black posterior margin, restricted to upper lobe in some populations; caudal peduncle 1.9-2.2 times longer than deep; 18-19 + 18-20 = 36-38 vertebrae.

DESCRIPTION: General appearance is shown in Figures 1-2 and morphometric data of holotype and 8 paratypes are given in Table 1. Dorsal fin with 2 simple and 7-8½ branched rays; origin above lateral line scale 12 (1), 13 (7) or 14 (2). Pectoral fin slightly falcate, with 14-16 rays; a small axillary lobe present. Pelvic fin slightly pointed, with 9 rays; axillary scale present. Anal fin with 3 simple and 5½ branched rays. Caudal fin with 10+9 principal rays, 9+8 being branched. Caudal peduncle 1.94-2.24 times longer than deep. 31 (1), 32 (2), 33 (4) or 34 (2) scales along lateral line + 2-3 pored scales on caudal-fin base. Lateral line complete. 12 (1), 13 (5) or 14 (4) predorsal scales, ¼/1½ scales in transverse line, ¼/1½ scales in transverse line on caudal peduncle (½/1/1½ in holotype), 1½ scales between lateral line and pelvic-fin origin. Vertebral formula: 18+18=36 (1), 18+19=37 (4), 18+20=38 (1), 19+18=37 (5), and 19+19=38 (8) (from Kottelat & Vidthayanon, 1993: 164). A few scattered and irregularly shaped tubercles on lower jaw of Sebuku specimens.

COLORATION: The colour pattern of the Pangakatan and Sebuku populations are illustrated in Figures 1-2. A dark stripe from head to end of hypural plate, over axial streak. Axial streak extending forward to gill opening. Lateral stripe black below axial streak and much paler, brownish or greyish, above. A blackish mid-dorsal stripe from nape to caudal-fin base. Dorsum greyish, with crescentic paler marks parallel to posterior scale margins. A narrow and faint line of black pigments above anal-fin base. Belly pale yellowish, with a few brown crescentic marks on anterior medio-lateral scales. In Sebuku specimens, caudal fin with a dark grey posterior margin, broader near the tip of the lobes; in Pangakatan specimens, margin narrow or absent on lower lobe and broader and more intense on upper lobe. In Kinarom specimen, margin very faint on lower lobe and narrow on upper lobe. Other fins hyaline. The paler coloration of





FIG. 1

*Rasbora rheophila*, Borneo: Sabah: Ranau; a, IRSNB 874, holotype, 59.4 mm SL (photographed in 2011); b, CMK 21901, paratype, 58.3 mm SL (photographed in 1985).



FIG. 2

*Rasbora rheophila*, CMK 9641, paratype, 57.5 mm SL; Borneo: Kalimantan Timur: Sebuku drainage.

specimen in Figure 2 compared to that in Figure 1b is apparently due to it having been collected in a rainy period in murky water.

Live coloration not observed due to very heavy rains at time of collecting of Sebuku specimens. When first observed at day light (following day), specimens with same colour pattern as described above.

**DISTRIBUTION:** *Rasbora rheophila* is known from Sabah (Labuk, Padas and Kinarom drainages) and Kalimantan Timur (Sebuku drainage) (Fig. 3). It is expected

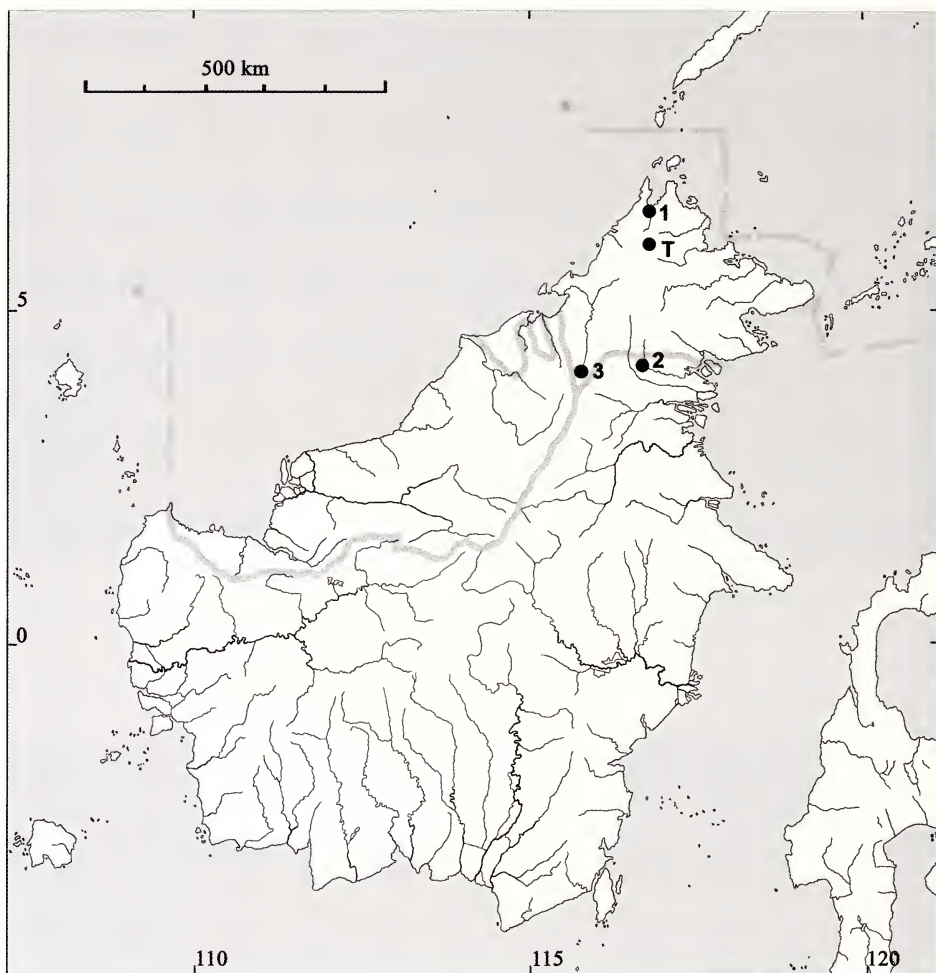


FIG. 3

Borneo, showing known localities of *Rasbora rheophila*. T, type locality (Ranau); 1, Marudu; 2, Sebuku; and 3, Long Pa Sia.

to occur in the headwaters of other drainages of Sabah, as well as in the northernmost part of Kalimantan Timur (for example in Sembakung drainage, which originates in Sabah).

**HABITAT:** The Sebuku specimens were obtained from a high gradient mountain stream in a large and deep pool somewhat isolated from the main stream and with counter current. The Ranau specimens were collected at an altitude of ca. 550 masl. The Kinarom specimen was collected at 120 masl, in a fast flowing hill stream draining from the northern area of Mount Kinabalu.

**ETYMOLOGY:** From the Greek *rheos*, stream and *philos*, loving. Treated as an adjective.

REMARKS: The known populations of *R. rheophila* differ slightly in coloration of the caudal fin (see above and Figs. 1-2), head length and predorsal length (see Table 1). Part of the differences in coloration (not pattern) between the specimens on Figures 1 and 2 results from the holotype having been fixed about 14 (Fig. 1b) and 40 years (Fig. 1b) before photography and stored in ethanol denaturated with campher, while the specimen in Figure 2 was photographed about 2 weeks after fixation, while still in formalin. Also, this last specimen was collected in a rainy period and in murky water, while the intensity of the pattern of the specimens in Figure 1b suggests that they were collected in clear water. I cannot, however, exclude the possibility that they actually might represent two species. Samples from intermediate areas are needed to investigate this possibility.

I have observed that the fish populations from eastern and northern Borneo show much greater interdrainage variation than those of the remaining drainages of the island. This seems to reflect more difficult connections between the drainages. During glacial periods, when the sea level decreased and exposed the Sunda Shelf around western and southern Borneo and between Borneo, Java, Sumatra and the Malay Peninsula, connections were established between these rivers, resulting in a few large drainages (Molengraaff & Weber, 1919; de Beaufort, 1951; Sathiamurthy & Voris, 2006), allowing gene flow and contributing to retain some homogeneity within species. Along the coasts of eastern and northern Borneo, the continental shelf is very narrow and the structure of the river network is quite simple, made of many relatively short rivers. Even with the lowered sea level, these small river drainages remained largely unconnected during glacial periods, allowing differentiation of the respective populations. In several cases, the apparent random interdrainage variability observed today is likely to turn out as interspecific differences when more material will become available (more samples from each drainage, and from several localities within each drainage). Similar variability patterns have been observed in *Puntius sealei* (Herre, 1933), *Nematabramis* spp., *Glyptothorax* spp., *Nemacheilus longipectoralis* Popta, 1905, *N. olivaceus* Boulenger, 1894, etc. (pers. obs.). The same mechanism also explains the high endemism level in the drainages of the southwestern (Indian Ocean) slope of Sumatra (e.g. Ng & Hadiaty, 2005, 2008; Hadiaty & Siebert, 1998, 2001; Lumbantobing, 2010) or allows to predict that dozens of species still await discovery in the many coastal drainages isolated by steep hills and the absence of continental shelf.

Using Brittan's (1954: 205) key, *R. rheophila* falls within a group of species with 14 circumpeduncular scale rows, the dorso-hypural distance falling in front of the posterior margin of the eye when carried forward, 1 or 1½ scale row between the lateral line and the origin of the pelvic fin and a continuous dark midlateral stripe from the gill opening to the base of the caudal fin. This group includes *R. myersi* Brittan, 1954 (erroneously synonymised with *R. dusonensis* (Bleeker, 1850) by Kottelat, 1991: 187), *R. argyrotaenia* (Bleeker, 1849) and *R. philippina* (Günther, 1864). *Rabora hubbsi* Brittan, 1954 also has 14 circumpeduncular scales rows, the dorso-hypural distance falling at or in front of the tip of the snout, 1½ scale rows between the lateral line and the origin of the pelvic fin, but the midlateral stripe is more intense posteriorly, with an abrupt transition to the much diffuse anterior portion (vs. equal intensity along whole

TABLE 1. *Rasbora rheophilata*, morphometric data of holotype (IRSNB 874) and 8 paratypes.

	IRSNB 874		IRSNB 875		CMK 9461		
Standard length (mm)	59.4	59.1	58.8	58.1	57.2	49.7	48.8
<b>Percent of standard length</b>							
Total length	131.3	130.0	138.4	130.3	130.4	132.4	132.6
Head length	25.3	25.9	24.9	25.1	25.0	23.9	23.8
Predorsal length	52.2	53.1	55.9	52.0	51.7	49.0	49.8
Prepelvic length	48.8	48.4	50.5	48.7	47.3	45.8	47.1
Precanal length	67.8	67.7	71.7	67.3	65.6	66.6	65.8
Body depth at pelvic origin	22.9	25.0	24.7	23.9	21.0	22.0	21.7
Depth of caudal peduncle	11.3	11.5	12.2	11.5	11.0	11.5	11.1
Length of caudal peduncle	21.9	25.0	24.9	24.3	23.3	25.9	24.6
Body width behind pectoral base	11.4	11.8	2.5	11.9	11.2	11.5	11.1
Length of dorsal fin	21.7	20.6	22.9	21.0	22.3	24.9	23.4
Length of anal fin	16.5	16.4	17.7	16.5	17.7	17.5	18.4
Length of pelvic fin	15.8	15.7	16.5	15.7	15.0	19.0	16.4
Length of pectoral fin	19.2	19.1	21.0	19.6	19.2	21.4	19.5
Length of upper caudal lobe	30.8	29.8	32.6	30.1	28.3	32.9	32.4
Length of median caudal rays	15.5	15.2	14.7	13.6	15.4	17.9	16.2
Length of lower caudal lobe	31.6	29.1	33.3	31.3	31.0	38.3	31.6
<b>Percent of head length</b>							
Head depth at nape	65	63	65	66	65	65	68
Snout length	27	27	29	27	28	30	28
Eye diameter	31	31	32	33	31	33	32
Interorbital width	32	32	36	32	32	35	32



length of the stripe or with gradual change in these species) and it belongs to the *R. trifasciata* group. *Rasbora dusonensis* and *R. tornieri* Ahl, 1922 [erroneously synonymised by Kottelat, 1991: 187] also have 14 circumpeduncular scale rows but the dorso-hypural distance falls behind the posterior margin of the eye when carried forward. *Rasbora rheophila* is also distinguished from them by having a hyaline caudal fin with a grayish posterior margin (vs. bright yellow with a broad black margin in *R. dusonensis* and deep red in *R. tornieri*; pers. obs.).

*Rasbora rheophila* is distinguished from *R. philippina*, a species endemic to Mindanao, Philippines, by its slender body (depth 4.0-4.7 times in SL, vs. 3.1-3.8; Brittan, 1954: 128) and a different appearance (see Brittan, 1954: 128, fig. 28).

As presently recognised, *R. argyrotaenia* is a species widely distributed in Java, Sumatra, Borneo and the Malay Peninsula (Brittan, 1954). In fact, it is a complex assemblage, which will eventually be shown to include several species (Kottelat & Vidthayanon, 1993). The type locality of *R. argyrotaenia* is in Java, the type series is a composite of several localities and possibly several species. A comparison of material from East Java (an area part of the type locality) with material from southern and eastern Borneo show they are specifically distinct (unpubl., pers. obs.) and that the name *R. vaillantii* (Pošta, 1905) (type locality: Borneo: Mahakam drainage) is the oldest available name for the species from Borneo (Fig. 4). The known range of *R. vaillantii* possibly extends in the eastern half of Borneo from the Barito to the Sebuks drainages.

*Rasbora rheophila* and *R. vaillantii* occur in sympatry in the Sebuks drainage (but not in syntopy). The two species have very different habitats (mountain stream for *R. rheophila*, lowland slow flowing streams and rivers for *R. vaillantii*), they differ in head shape and general appearance (compare Figures 1, 2 and 4), a more forward dorsal fin (dorso-hypural distance, when carried forward, falling in front of nostril, vs. on eye), and number of vertebrae ( $18-19 + 18-20 = 36-38$ , vs.  $17-18 + 14-15 = 31-33$  [Mahakam],  $17+16=33$  [Sebuks] in *R. vaillantii*). Material of *R. vaillantii* (identified as *R. argyrotaenia*) and *R. latilavia* from the Barito also has 32-34 total vertebrae (Siebert & Richardson, 1997). *Rasbora rheophila* also differs from *R. vaillantii* by the structure of the midlateral stripe. In *R. rheophila* the midlateral stripe is made of a black or dark brown part below the axial streak, and a grey part above. This corresponds to the dark lateral stripe and dorso-lateral stripe, respectively, of Brittan (1954). These two stripes are contiguous, while in most other species of *Rasbora* the two stripes are separated by a paler stripe. In *R. vaillantii*, the dorso-lateral stripe is very narrow, indistinct posteriorly and separated from the 'dark lateral stripe' by a narrow paler area).

*Rasbora rheophila* differs from *R. myersi*, also a species widely distributed in Southeast Asia but apparently absent from northern and eastern Borneo, by having a slender body (depth 4.0-4.7 times in SL, vs. 3.4-4.6), more vertebrae ( $18-19 + 18-20 = 36-38$ , vs.  $16-19 + 13-15 = 31-33$ ), a more rounded head, more forward dorsal fin (dorso-hypural distance, when carried forward, falling in front of nostril, vs. on eye), and more lateral line scales ( $31-34 + 2-3$ , vs.  $29-31 + 2-3$ ). Morphometric data of *R. myersi* are from Brittan (1954: 119).

*Rasbora borneensis* Bleeker, 1860, was considered a synonym of *R. argyrotaenia* by Brittan (1954) and revalidated by Roberts (1989: 71). It is also a slender



FIG. 4

*Rasbora vaillantii*, CMK 9523, 69.7 mm SL mm SL; Borneo: Kalimantan Timur: Sebuku drainage.

species with relatively small head. *Rasbora rheophila* is distinguished from *R. borneensis* by having more vertebrae ( $18-19 + 18-20 = 36-38$ , vs.  $18-19 + 16-17 = 35$ ), a more rounded head, a very narrow adipose eye-lid (vs. broad), more forward dorsal fin (dorso-hypural distance, when carried forward, falling in front of nostril, vs. on eye or just behind), fewer predorsal scales (12-14, vs. 15-16), a somewhat longer head (3.9-4.3 times in SL, vs. 4.2-4.5; Roberts, 1989: 72), and structure of the midlateral stripe (black lower half adjacent to axial streak on all its length, vs. running slightly below axial streak in front of dorsal-fin origin). *Rasbora leptosoma* (Bleeker, 1855), described from Lahat (Sumatra) and known only from two poorly preserved syntypes, is possibly a senior synonym of *R. borneensis* but fresh topotypes are needed to reach a reliable conclusion.

*Rasbora rheophila* shares with *R. volzii* Popta, 1905 (Fig. 5) and *R. everetti* Boulenger, 1895 (Fig. 6) the vertebrae count of 36-38; all other species of the *R. sumatrana* group have 31-35 (see Kottelat & Vidthayanon, 1993, for vertebrae counts of most species of *Rasbora*). *Rasbora rheophila* differs from *R. everetti* by its more rounded snout (compare Figs. 1, 2 and 6) and interorbital area, more lateral line scales ( $31-34 + 2-3$ , vs.  $27-30 + 2-3$ ), more circumpeduncular scales (14 vs. 12 [14 in a few specimens]), a more backward dorsal fin (dorso-hypural distance, when carried forward, falling before nostrils, vs. between nostril and eye), and the structure of the midlateral stripe (made of a black or dark brown stripe below the axial streak, and a contiguous grey stripe above vs. the black and grey stripes are separated by a narrow pale stripe above the lateral streak).

*Rasbora rheophila* differs from *R. volzii* by snout shape (compare Figs. 1, 2 and 5), snout length (27-30 % HL, vs. 30-34), interorbital distance (about equal to eye diameter, vs. 1.25-1.5 times eye diameter) and shape (rounded, vs. almost flat), colour pattern made of a continuous stripe (vs. a narrow stripe widened into an elongate blotch on the anterior part of the body and at the posterior extremity of the caudal peduncle), number of circumpeduncular scales (14, vs. 12), distribution of pigments along the posterior margin of the caudal fin (on membranes and rays, vs. on membranes only), and head length (23-26 % SL, vs. 25-27).



FIG. 5

*Rasbora volzii*, RMNH 7622 [holotype of *R. v. fasciata*], 100.9 mm SL; Borneo: Kalimantan Timur: Kayan drainage.



FIG. 6

*Rasbora everetti*, CMK 11970, 52.9 mm SL; Philippines: Palawan: Malatgao drainage.

COMPARISON MATERIAL: *Rasbora borneensis*: CMK 10460, 1, 64.2 mm SL; Borneo: Kalimantan Barat: Kapuas.

*Rasbora dusonensis*: CMK 20592, 25, 50.2-72.3 mm SL; Sumatra: Sumatera Selatan: Musi drainage: Sungai Gelam.

*Rasbora everetti*: CMK 11970, 28, 15.6-53.4 mm SL; CMK 11962, 49, 27.3-45.6 mm SL; Philippines: Palawan: Malatgao River. – CMK 8850, 3, 53.7-68.0 mm SL; Philippines: Palawan: Lake Manguao.

*Rasbora leptosoma*: RMNH 4981, lectotype, 67.9 mm SL; Sumatra: Lahat.

*Rasbora myersi*: CMK 10592, 10, 75.8-95.4 mm SL; Borneo: Kalimantan Barat: Kapuas drainage: Sungai Melawi.

*Rasbora tornieri*: CMK 20593, 28, 39.9-74.1 mm SL; Sumatra: Sumatera Selatan: Musi drainage: Sungai Gelam.

*Rasbora vaillantii*: CMK 9523, 68, 13.1-69.7 mm SL; Borneo: Kalimantan Timur: Sebuku drainage: Sungai Tulit.

*Rasbora volzii*: RMNH 7621, 6 syntypes, 45.1-74.1 mm SL; Borneo: Kalimantan Timur: Mahakam drainage, Howong. – RMNH 7620, 4 paralectotypes,

80.7-91.7 mm SL; Borneo: Kalimantan Barat: Kapuas drainage, Bongan. – RMNH 7622, holotype of *R. v. fasciata*, 100.9 mm SL; Borneo: Kalimantan Timur: Kajan [Kayan] drainage. – ZRC 45691, 10, 22.8-78.2 mm SL; Borneo: Kalimantan Timur: Kayan drainage, Sungai Bako. – ZRC 45627, 3, 29.9-115.0 mm SL; Borneo: Kalimantan Timur: Kayan drainage, Bahau, Sungai Batu Bayak. – ZRC 45635, 12, 19.1-86.6 mm SL; Borneo: Kalimantan Timur: Kayan drainage, Bahau, Sungai En'ggeng l'ut. – ZRC 45656, 12, 26.6-89.2 mm SL; Borneo: Kalimantan Timur: Kayan drainage, Bahau, Lalut [= sungai] Birai. – ZRC 47524, 19, 30.2-86.1 mm SL; CMK 17816, 4, 38.2-70.7 mm SL; Borneo: Kalimantan Timur: Kayan drainage, Usat Aran.

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**Uropodina species from the Montagne d'Ambre National Park, Madagascar  
(Acari: Mesostigmata)**

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**Two new Uropodina species from the Montagne d'Ambre National Park, Madagascar (Acari: Mesostigmata).** - Two new Uropodina species (*Urobovella madagascariensis* n. sp. and *Nenteria madagascariensis* n. sp.) are described and illustrated on the basis of mite material collected from the Montagne d'Ambre National Park, Madagascar.

**Keywords:** Acarology - turtle mites - taxonomy - Afrotropical region.

INTRODUCTION

Madagascar is the largest Afrotropical island near the eastern coast of Africa, which was separated from the continent in the Mesozoic (Flynn & Wyss, 2003). Hence the fauna of Madagascar has evolved in almost isolation from Africa resulting in a high degree of endemisms on this island (Paulian & Viette, 2003). Besides well known endemics to Madagascar, e.g. lemurs, other mammals, reptiles, etc. (Rabearivony *et al.*, 2010), there are several soil inhabiting groups with high endemisms, e.g. mites (Mahunka, 2009, 2011; Niedbała, 2004) and earthworms (Razafindrakoto *et al.*, 2010).

The Uropodina mite fauna of Madagascar is still poorly documented, with information available only for a dozen species. The first three species were presented by Vitzthum (1921), but these species were described on the basis of nymphs, hence they are only very poorly defined. Later, Hirschmann (1989, 1990, 1991), Hirschmann & Wiśniewski (1986, 1987), Wiśniewski & Hirschmann (1992) and Wiśniewski *et al.* (1992) published on Uropodina mites from Madagascar and described seven new species. Unfortunately, as in Vitzthum's (1921) work, papers of Hirschmann (1990), Hirschmann & Wiśniewski (1986, 1987) and Wiśniewski *et al.* (1992) contain original descriptions based only on nymphs, without any information about the adults. The mature stages are known only for two species (*Oplitis euchroea* Wiśniewski & Hirschmann in Hirschmann 1991 and *O. solmani* Wiśniewski & Hirschmann in Hirschmann 1991). More recently Kontschán (2007, 2010) worked on the Uropodina mites of Madagascar and presented three new species of the family Rotundabaloghiidae. Up to now, 14 Uropodina species have been recorded from Madagascar, but adults of only five species are known and hence only these can be properly identified.

The present paper contains the descriptions of two new species, which were collected by Dr Petr Baňář in the Montagne d'Ambre National Park.

## MATERIAL AND METHODS

Specimens were cleared in lactic acid and drawings were made with the aid of a drawing tube. All specimens are stored in 70% ethanol and deposited in the Soil Zoology Collections of the Hungarian Natural History Museum, Budapest (HNHM), in the Biology Centre AS CR, Institute of Soil Biology, České Budějovice (ISB) and in the Natural History Museum of Geneva (MHNG). Abbreviations: h: hypostomal setae, St: sternal setae, im: internal malae, pl: paracaliniae of gnathosoma. All measurements and the scale line lengths are given in micrometres ( $\mu\text{m}$ ).

## DESCRIPTIONS OF THE NEW SPECIES

### ***Uroobovella madagascariica* sp. n.**

Figs 1-12

**HOLOTYPE:** MHNG, without registration number; female; Madagascar, Nord, Montagne d'Ambre National Park, altitude 1100m, litter sifting; 30.10.2010; leg. P. Baňář.

**PARATYPES:** MHNG, without registration number, two females and five males; HNHM, one female and two males; ISB, one female and two males. All with same data as for holotype.

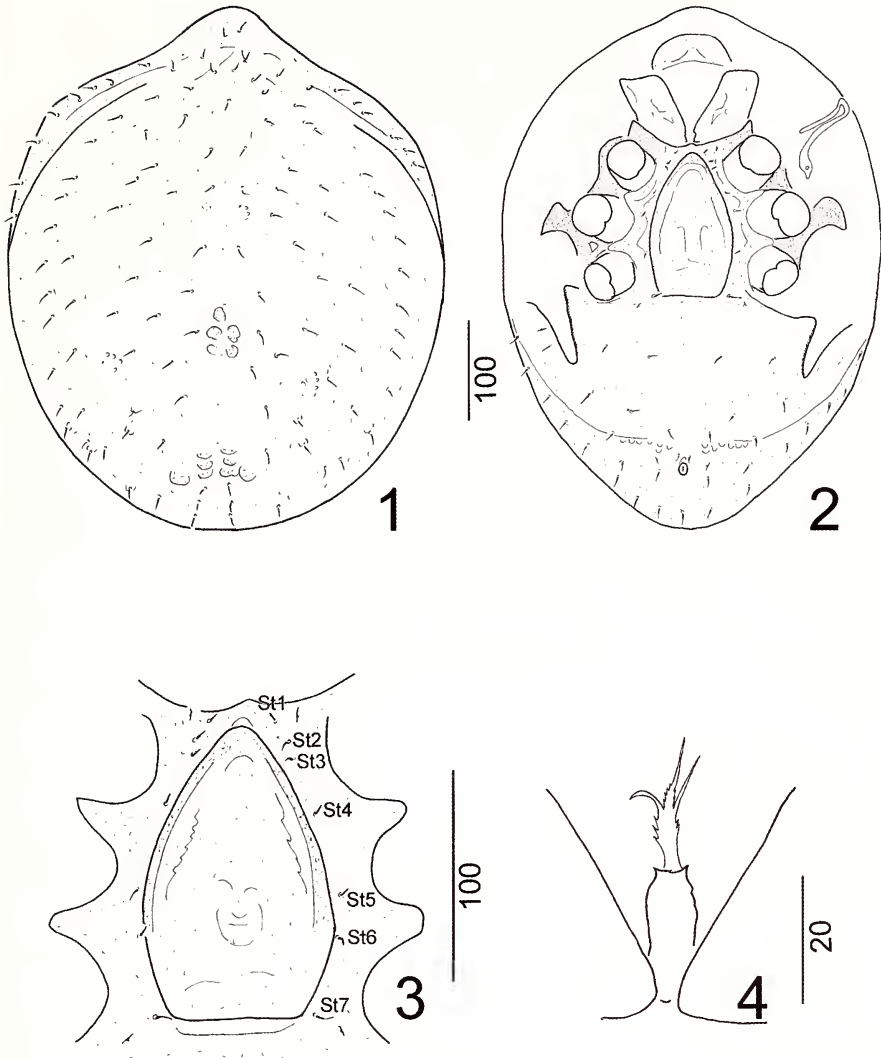
**DIAGNOSIS:** All dorsal and marginal setae short and needle-like, dorsal, ventral and marginal shields without sculptural pattern. Genital shield of female scutiform, situated between coxae II and IV, with smooth surface. St1-St3 situated near anterior margin of genital shield of female. Metapodal lines weakly developed, ventral lines anteriorly reaching level of anal platelets.

**DESCRIPTION OF FEMALE:** Length of idiosoma 510-540  $\mu\text{m}$ , width 410-420  $\mu\text{m}$  (n=5). Body shape oval, color reddish brown.

**Dorsal aspect of idiosoma** (Fig. 1): Dorsal and marginal shields fused anteriorly. All dorsal setae short (about 12-14  $\mu\text{m}$ ), smooth and needle like. Dorsal shield without sculptural pattern, several muscle impression present in central area of dorsal shield. Marginal shield smooth and bearing short (about 12-14  $\mu\text{m}$ ), needle-like setae.

**Ventral aspect of idiosoma** (Fig. 2): Ornamentation of sternal shield absent, all sternal setae short (about 4-5  $\mu\text{m}$ ), smooth and needle-like. St1-St3 situated near anterior margin of genital shield, St4 at level of posterior margin of coxae II, St5 at level of posterior margin of coxae III, St6 at level of anterior margin of coxae IV, St7 near basal edges of genital shield (Fig. 3). Ventral shield smooth, several oval pits situated posteriorly near inner end of ventral lines. Ventral setae smooth, needle-like and short (about 8-9  $\mu\text{m}$ ), setae ad1 needle-like and about 4-5  $\mu\text{m}$  long. Four pairs of lyriform fissures present on ventral idiosoma, first pair of them situated near anterior margin of sternal shield, second pair near St7, third pair near margins of pedofossae, fourth pair at level of ad1. Stigmata situated between coxae II and III. Peritremes hook-shaped, poststigmatid part short. Genital shield of female scutiform, placed between coxae II and IV, without sculptural pattern and anterior process (Fig. 3). Pedofossae deep, their surface smooth, with separate furrows for tarsi IV, metapodal lines weakly developed. Base of tritosternum narrow, its laciniae trifurcate and its margins serrate (Fig. 4).

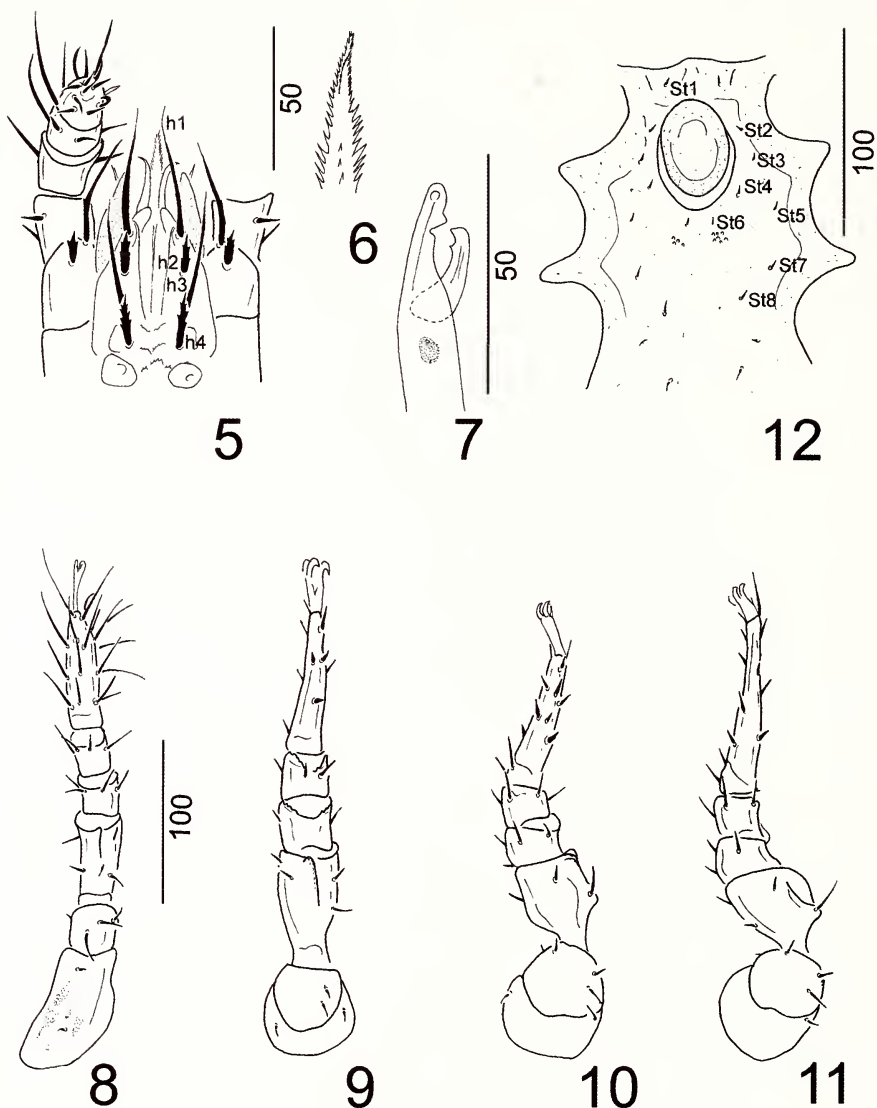




FIGS 1-4

*Urobovella madagascariensis* sp. n., female, holotype. (1) Body in dorsal view. (2) Body in ventral view. (3) Intercoxal area. (4) Tritosternum.

*Gnathosoma* (Fig. 5): Corniculi horn-like, internal malae longer than corniculi and smooth. Labrum marginally pilose. Hypostomal setae: h1 long (about 47  $\mu\text{m}$ ), smooth and setiform; h2 short (about 13  $\mu\text{m}$ ) and marginally serrate; h3 long (about 38  $\mu\text{m}$ ) and smooth; h4 long (about 16  $\mu\text{m}$ ) and marginally serrate. Epistome basally serrate and apically pilose (Fig. 6). Chelicerae with sclerotised internal nodes, fixed digit longer than movable digit, both digits bearing a single tooth each (Fig. 7).



FIGS 5-12

*Uroobovella madagascariensis* sp. n., female holotype (5-11) and male paratype (12). (5) Gnathosoma and palp in ventral view. (6) Epistome. (7) Chelicera in lateral view. (8) Leg I in ventral view. (9) Leg II in ventral view. (10) Leg III in lateral view. (11) Leg IV in lateral view. (12) Intercoxal area of male.

*Legs* (Figs 8-11): All legs bearing claws on tip of tarsi, legs I bearing needle-like setae on all segments, legs II-IV bearing short and robust setae on each tarsus and needle-like setae on all segments.

DESCRIPTION OF MALE: Length of idiosoma 480-520  $\mu\text{m}$ , width 390-410  $\mu\text{m}$  (n=9). Shape of idiosoma, ornamentation and chaetotaxy of dorsal parts as in female. Sternal setae short (about 4-5  $\mu\text{m}$ ) and needle-like. St1 placed near anterior margin of sternal shield, St2-St4 near lateral margins of genital opening, St5 at level of central area of coxae III, St6 near posterior margin of genital shield, St7 and St8 at level of coxae IV. Sternal shield smooth, only some small oval pits situated posteriorly to St6. Sternal shield bearing two pairs of lyriform fissures, first pair situated near St1, second pairs at level of coxae IV. Genital shield oval and situated between coxae II and III (Fig. 12). Shape of ventral setae and ornamentation as in female.

Larva and nymphs unknown.

ETYMOLOGY: The name of the new species refers to the island where the specimens examined were collected.

REMARKS: The new species belongs to the *Uroobovella vinicolora*-group (Hirschmann, 1989) due to the shape of its peritremes, the number of sternal setae and the presence of claws on the tip of legs I. Up to now, ten species are known in this group, but two of them are known only from deutonymphs [*U. michiganensis* (Vitzthum, 1926) from the USA and *U. wichmanni* (Vitzthum, 1923) from India]. Three species (*U. neoamericana* Hirschmann in Hirschmann & Zirngiebl-Nicol, 1972; *U. feideri* Huřu, 1976 and *U. bucovensis* Huřu, 1976) have separated marginal shields in the posterior area of the dorsal idiosoma. In the other species (including the new one) the marginal shields are fused posteriorly.

One of the species in this group with posteriorly fused marginal shields (*U. erlangensis* Hirschmann & Zirngiebl-Nicol, 1962) has long j1 setae. These are similar in length and shape to other dorsal setae in the new species. The other two species with posteriorly fused marginal shields (*U. baloghi* Hirschmann & Zirngiebl-Nicol, 1962 and *U. vinicolora* (Vitzthum, 1926) have an ornamented ventral shield, whereas in the new species the ventral shield is smooth. The remaining two species [*U. bistellaris* (Vitzthum, 1935) and *U. rubra* Athias-Binche, 1983] have a smooth ventral shield as in the new species, but in the two previously described species the metapodal lines are well-developed and the ventral lines end at the level of the anal platelets, while in the new species the metapodal lines are weakly developed and the ventral lines end anteriorly to the anal platelets.

Two *Uroobovella* species (*U. madagascariensis* Wiřniewski & Hirschmann, 1992 and *U. pygorana* Wiřniewski & Hirschmann, 1992) were previously reported from Madagascar, but their adults are still unknown. The herein described new species is placed into the *Uroobovella vinicolora*-group. The two, previously known species from Madagascar belong to two different species groups [*Uroobovella madagascariensis* Wiřniewski & Hirschmann, 1992 to the *Uroobovella ipidis*-group and *U. pygorana* Wiřniewski & Hirschmann, 1992 to the *Uroobovella fracta*-group (Hirschmann, 1989)].

*Nenteria madagascarensis* sp. n.

Figs 13-25

HOLOTYPE: MHNG, without registration number; female; Madagascar, Nord, Montagne d' Ambre National Park, 1100m, litter sifting; 30.10.2010; leg. P. Bařar.

PARATYPES: MHNG, without registration number, one male; HNHM, one female and one male; ISB, one female and one male. All with same data as for holotype.

**DIAGNOSIS:** Dorsal shield with needle-like and marginally pilose dorsal setae, dorsal surface covered by large irregularly outlined and small oval pits. Genital shield of female scutiform, with V-like process on its anterior margin. Paralacinae on gnathosoma longer and wider than internal malae.

**DESCRIPTION OF FEMALE:** Length of idiosoma 470-480  $\mu\text{m}$ , width 340-350  $\mu\text{m}$  (n=3). Body shape oval, color reddish brown.

*Dorsal aspect of idiosoma* (Fig. 13): Dorsal and marginal shields fused anteriorly. Two types of dorsal setae present: first type long (about 14-18  $\mu\text{m}$ ) and marginally pilose, situated in central and caudal area. Second type smooth and needle-like, mostly long (about 14-15  $\mu\text{m}$ ), but some setae in row j short (about 6-7  $\mu\text{m}$ ). These smooth setae present all over dorsal shield, but most numerous in anterior area. Dorsal shield covered by large irregularly outlined and small oval pits. Surface of marginal shield with oval pits, marginal setae short (about 12-13  $\mu\text{m}$ ) smooth and needle-like.

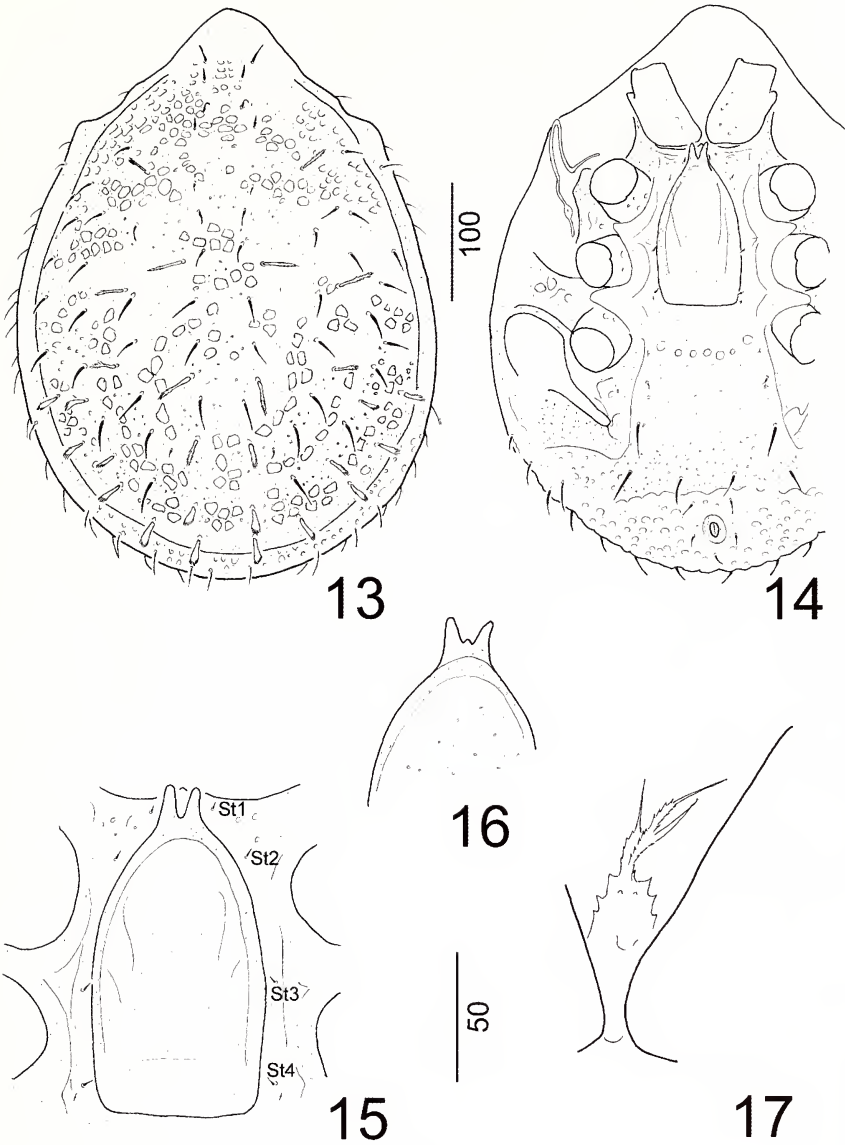
*Ventral aspect of idiosoma* (Fig. 14): Sternal shield ornamented with small oval pits near its anterior margin, other areas of this shield smooth. All sternal setae short (about 3-4  $\mu\text{m}$ ), smooth and needle-like. St1 situated near anterior margin of sternal shield, St2-4 at level of anterior margin of coxae II, St3 at level of anterior margin of coxae III, St4 at level of posterior margin of coxae III (Fig. 15). Ventral shield smooth anteriorly, several oval pits situated between coxae IV, surface posterior to setae V2 covered by small and large oval pits. Ventral setae smooth, needle-like, V1 short (about 5  $\mu\text{m}$ ), other setae long (about 25-28  $\mu\text{m}$ ), adanal and postanal setae smooth, needle-like and about 12  $\mu\text{m}$  long. Two pairs of lyriform fissures present on ventral idiosoma, first pair of them situated near St4, second pair at level of coxae IV. Peritremes U-shaped, poststigmatid part short. Genital shield of female scutiform, placed between coxae II and III, without sculptural pattern and with V-shaped anterior process (Fig. 15), this process W-shaped in one paratype (Fig. 16). Pedofossae deep, their surface smooth, with separate furrows for tarsi IV, metapodal lines well developed. Base of tritosternum narrow, with serrate margins, laciniae trifurcate and marginally serrate (Fig. 17).

*Gnathosoma* (Fig. 18): Corniculi short, horn-like, internal malae longer than corniculi and smooth, paralacinae longer and wider than internal malae. Hypostomal setae: h1 long (about 30  $\mu\text{m}$ ), smooth and setiform; h2 robust, smooth and short (about 11  $\mu\text{m}$ ); h3 (about 27  $\mu\text{m}$ ) and h4 (about 31  $\mu\text{m}$ ) long and marginally serrate. Epistome smooth, anterior margin rounded. Chelicerae with sclerotised internal nodes, fixed digit longer than movable digit, both digits bearing a single tooth (Fig. 19), palp with needle-like setae (Fig. 20).

*Legs* (Figs 21-24): All legs bearing claws on tip of tarsi, legs I bearing needle-like setae on all segments and one pilose seta on trochanter. Legs II-IV bearing short and robust setae on each tarsus and needle-like setae on all segments.

**DESCRIPTION OF MALE:** Length of idiosoma 470-480  $\mu\text{m}$ , width 340-350  $\mu\text{m}$  (n=3). Shape of idiosoma, ornamentation and chaetotaxy of dorsal parts as in female. Sternal setae short (about 6-7  $\mu\text{m}$ ) and needle-like, St1 situated at level of central region of coxae II, St2 and St3 near lateral margin of genital opening, St4 at level of

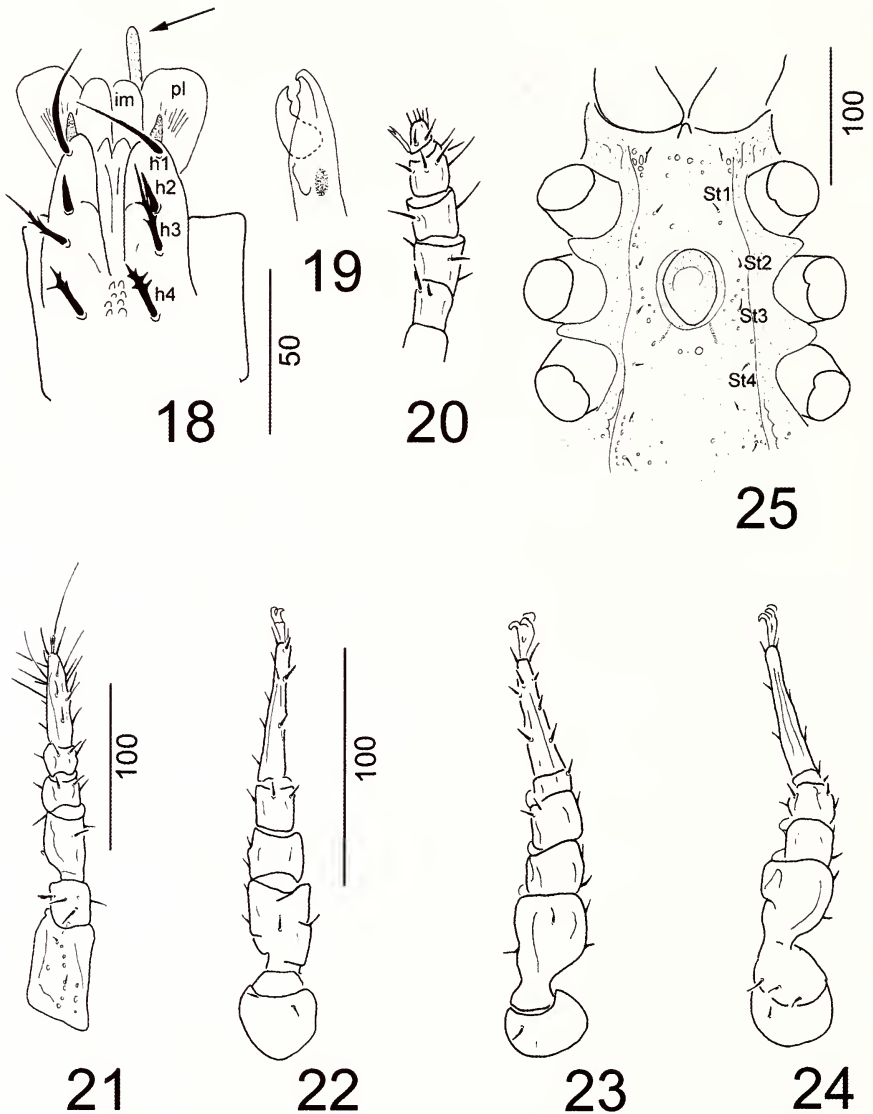




FIGS 13-17

*Nenteria madagascarensis* sp. n., female holotype (13-15, 17) and female paratype (16). (13) Body in dorsal view. (14) Body in ventral view. (15) Intercoxal area. (16) Apical process on genital shield of different specimen. (17) Tritosternum.

central area of coxae IV. Sternal shield covered by some oval pits. Sternal shield bearing two pairs of lyriform fissures, first pair of them situated near anterior margin of sternal shield, second pair at level of posterior margins of coxae IV. Genital shield oval and situated between coxae III (Fig. 25).



FIGS 18-25

*Nenteria madagascarensis* sp. n., female holotype (18-24) and male paratype (25). (18) Gnathosoma in ventral view (arrow indicating apical part of epistome). (19) Chelicera in lateral view. (20) Palp in ventral view. (21) Leg I in ventral view. (22) Leg II in ventral view. (23) Leg III in ventral view. (24) Leg IV in ventral view. (25) Intercoxal area of male.

Ventral setae and ornamentation as in female.

Larva and nymphs unknown.

ETYMOLOGY: The name of the new species refers to the island where the specimens examined were collected.

REMARKS: Although the new species possesses several unusual characters, it is placed in the genus *Nenteria* Oudemans, 1915 due to the presence of paralacinae and due to the shape of the tritosternum and of the processes of the gnathosoma.

The dorsal ornamentation, the shape of the dorsal setae, the shape of internal malae and paralacinae of the new species were up to now unknown for the widely distributed genus *Nenteria*.

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**On nomenclature and identity of *Scarabaeus aeruginosus* Linnaeus, *S. aeruginosus* Drury and *S. speciosissimus* Scopoli (Coleoptera: Scarabaeoidea: Cetoniinae and Rutelinae)**

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**On nomenclature and identity of *Scarabaeus aeruginosus* Linnaeus, *S. aeruginosus* Drury and *S. speciosissimus* Scopoli (Coleoptera: Scarabaeoidea: Cetoniinae and Rutelinae).** - The valid name for the largest European species of Cetoniinae is *Protaetia speciosissima* (Scopoli, 1786), with *Protaetia aeruginosa* (Medvedev, 1964) as a junior synonym. The specimen illustrated by Scopoli in the original description is designated as the lectotype of *Scarabaeus speciosissimus* Scopoli, 1786. Since the lectotype is lost, a neotype from Piedmont, Italy, is designated and deposited in the Museo Civico di Storia Naturale Carmagnola, Italy. The name *Scarabaeus aeruginosus* Drury, 1773 is unavailable since Drury did not describe a new species but misidentified *Scarabaeus aeruginosus* Linné, 1767. A specimen figured by Gronovius in 1764 and cited by Linné is designated as the lectotype of *Scarabaeus aeruginosus* Linné, 1767. This species remains dubious, but it can be assigned to the ruteline subtribe Anticheirina.

**Keywords:** Revision - taxonomy - lectotype - beetles - Linnaeus.

## INTRODUCTION

For the largest European flower chafer (Cetoniinae) species two specific names are currently in use, the prevailing *aeruginosa* assigned to the authors Drury, 1770 (or 1773) or Linné, 1767 and, less often, *speciosissima* Scopoli, 1786 (Ádám 1994, 2003; Tezcan & Pehlivan 2001; Chimisliu 2002 [incorrect spelling *speciosisima*]; Istrate & Chimişliu 2004; Enyedi 2004, Ballerio *et al.* 2010). These specific names are combined with the genus names *Potosia* Mulsant & Rey, 1871 (e.g. Rataj 1998, Mitter 2000, Tezcan & Pehlivan 2001, rarely in newer literature), *Cetonischema* Reitter, 1899 (e.g. Baraud 1992, Tausin 1992, Ádám 1994, 2003, Micó & Galante 2002, Negrobov 2009),

or *Protaetia* Burmeister with *Cetonischema* as subgenus (Mikšić 1987, Krell & Fery 1992, Nádai & Vig 2006, Smetana 2006, Tauzin 2008, Ballerio *et al.* 2010, Breljih *et al.* 2010, Chimişliu & Mogoşanu 2011). The combination with *Protaetia* has become predominant in recent years. *Cetonischema* Reitter, 1899 was recently found to be a junior synonym of *Potosia* Mulsant & Rey, 1871 (Branco 2007).

The simultaneous usage of two specific names and three genus-group names, one of them being a junior synonym, for a well-known and magnificent species demands a resolution. Here we clarify the identity and nomenclatural status of the names involved (*Scarabaeus aeruginosus* Linnaeus, *S. aeruginosus* Drury, *S. speciosissimus* Scopoli, and *Cetonischema* Reitter) and present a solution by strictly applying the International Code of Zoological Nomenclature (ICZN 1999).

***Scarabaeus aeruginosus* Linné, 1767 (Rutelinae: Anticheirina), *nomen dubium*, lectotype designation**

In the twelfth edition of *Systema Naturae*, Linné (1767: 558) described *Scarabaeus aeruginosus* from Tunisia ("in regno Tunetano"). He refers to Gronovius (1764: 144, no. 424) without giving any unequivocal indication of additional specimens. The reference to a Tunisian origin might either indicate a clerical error or Tunisian specimens that Linnaeus had seen. Schaum (1847) could not find a labeled specimen in Linné's collection. He considers Linné's description to be applicable to only one specimen in the collection: a specimen of the Indonesian *Anomala viridis* (Fabricius, 1775) with a label "viridulus" of Linné's hand. This specimen is still present in Linné's collection in London (Fig. 1) and might be the specimen that Burmeister (1844) had called a few years earlier "Original exemplar der Linnéschen Sammlung, welche sich gegenwärtig im Besitz der Linnéschen Gesellschaft zu London befindet". Burmeister did not explain why he considered it "original". He identified it as *Pelidnota glauca* (Oliv.), but the specimen in Linné's collection has a typical Anomalini sternum and a membranous border at the lateral and apical margin of the elytra, hence does not belong to *Pelidnota*.

Burmeister either misidentified this specimen, or studied another specimen that currently cannot be traced. No specimen labeled *S. aeruginosa* exists in the Linnaean collection in the Zoological Museum of Uppsala University (Wallin 1993). With specimens labeled as *aeruginosa* missing in Linné's collections, the type series consists only of the specimens referred to in the literature references that Linné gave which comprise only Gronovius (1764).

It is unclear whether Gronovius had a series of syntypes or just one specimen which then could be considered the holotype. Because of this irresolvable uncertainty we herewith **designate** the specimen illustrated by Gronovius (1764) on plate 15, fig. 7, as the **lectotype** of *Scarabaeus aeruginosus* Linné, 1767 (Fig. 2). Contrary to Schaum's (1847) opinion, Gronovius's figured specimen and the specimen labeled "viridulus" in Linné's collection do belong to different species, the former having a long scutellum (Fig. 2) whereas the latter having a short one (Fig. 1).

Research for Gronovius's original specimen was unsuccessful. Gronovius received this specimen from Daniel Luycx Massis with the origin "Habitat in Indiis".



FIG. 1

"*Scarabaeus aeruginosus*" (LINN 3471) from Linné's collection at the Linnean Society London, published with permission of the Linnean Society of London. (A) Dorsal view. (B) Ventral view. (C) Lateral view. (D) Labels.

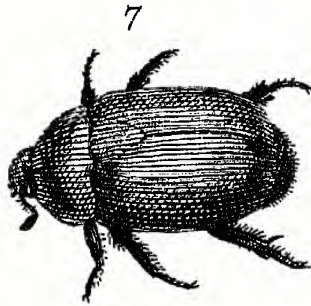


FIG. 2

Lectotype of *Scarabaeus aeruginosus* Linné, 1767, figured by Gronovius (1764).

This material cannot be traced (Smit *et al.* 1986; Horn *et al.* 1990). Luycx Massis was a Dutch merchant in Middelburg and a board member of the West-Indische Compagnie. He had a collection of West-Indian naturalia (Smit *et al.* 1986; Zuidervaart 2002) indicating that "in Indiis" refers to the Caribbean. Neither Luycx Massis material nor any other beetles are preserved in the collections of the Koninklijk Zeeuwsch Genootschap der Wetenschappen in Middelburg (K. Heyning in litt. 2011). Likewise,



the Nationaal Natuurhistorisch Museum Naturalis, Leiden does not own specimens that could be type material of *S. aeruginosus* from Gronovius's or Luycx Massis's collections (E. Gassó i Miracle in litt. 2011). Having studied early Zeeland collectors of natural history specimens, H Zuidervaard (in litt. 2011) could not determine the whereabouts of Luycx Massis's or Gronovius's material. Giovanni Antonio Scopoli received at least one specimen from Gronovius (Scopoli 1772: 84), but Scopoli's collection is considered lost (Evenhuis 1997). Therefore the lectotype of *Scarabaeus aeruginosus* Linné, 1767 is to be considered lost. These circumstances provide the opportunity to designate a neotype which might rather be done by the next reviser of this group, if considered useful or necessary.

*Scarabaeus aeruginosus* was transferred to the genus *Pelidnota* MacLeay, 1833 by Hope (1837: 17, in the wrong spelling *Æruginosa*) where it has remained since despite several authors having stated its dubious identity (Schaum 1847; Bates 1904: 258; Soula 2009). The lectotype, i.e. the specimen on fig. 7 on plate 15 in Gronovius (1764), has the overall shape of a species of *Pelidnota*, but has a larger scutellum. The scutellum of the lectotype is just under a third as long as the elytra, a pattern that resembles several genera in the subtribe Anticheirina, but not any *Pelidnota* species. Schönherr (1817: 157) had already placed Gronovius's species between two *Anticheirina* species. Burmeister (1844: 402) doubted Schönherr's classification and assumed it to belong to Cetoniinae, but Gronovius's figure disproves Burmeister's unexplained opinion. The only *Anticheirina* known to occur in the Caribbean islands are *Chlorota tristis* Arrow, *Macraspis tetradactyla* (L.), and *M. tristis* Castelnau (Chalumeau 1984), none of them having the green color described by Gronovius. Several *Anticheirina* species from South and Central America resemble Gronovius's species (cf. Soula 2002, 2003) and could have been considered to occur "in Indiis".

The name *Pelidnota aeruginosa* has rarely been used in the primary literature (e.g., Ohaus 1900: 185; Ohaus 1908: 250; Ohaus 1934: 13; Azevedo de Freitas *et al.* 2002; Bernardi *et al.* 2010), but has continuously been used in catalogues as valid species (Ohaus 1934: 79; Blackwelder 1944; Machatschke 1972: 21; Krajcik 2007 [with question mark]). In his revision of "Pelidnotinae", Bates (1904: 258) considered *P. aeruginosa* a nomen dubium ("bewildering form"). Considering Soula's (2009) revision of *Pelidnota*, the specimens referred to as *Pelidnota aeruginosa* in the literature might belong to either *Pelidnota alliacea* (Germar, 1824), *P. arnaudi* Soula, 2009, or *P. semiaurata* Burmeister, 1844. Either of those could turn out to be a junior synonym of *Pelidnota glauca* (Olivier, 1789), *P. americana* (Herbst, 1790), or *P. prasina* (Germar, 1824) (see Soula 2009), if their type specimens are rediscovered, but the name *Scarabaeus aeruginosus* cannot be applied with any certainty to any of them.

Currently, *Scarabaeus aeruginosus* Linné, 1767, is to be considered a **nomen dubium** for the time being, but the name does not refer to a species of Cetoniinae. Drury's (1773) interpretation of Linné's name is a misidentification.

*Scarabaeus aeruginosus* Drury, 1773, unavailable

In the first volume of his *Illustrations of Natural History*, Drury (1770: 72) described a species from Smyrna (= İzmir, Turkey) that he refers to "Lin., Syst. page 558.



No 80. (*Æruginosus*.) Gron. Mus. 424. tab. 15. fig. 7." In the Index to the *Illustrations*, which is the only nomenclaturally available part of Drury's work and dated 1773 (ICZN 1957), Drury called the species "*Æruginosus*, Linn. P. 558. N. 80. Scar." These references make clear that Drury did not introduce a new species, but simply referred to Linné's *Scarabaeus aeruginosus* which he misinterpreted. According to Art. 49 (ICZN 1999) "*Scarabaeus aeruginosus* Drury" is not an available name as already stated by Bedel (1909). It correctly is not included in Hayek's (1985) list of species described by Drury.

Drury's (1770) description and colour illustration (figure 4 on plate 33) clearly refer to a species of the former flower chafer subgenus *Cetonischema* that contained two species: *Protaetia speciosa* (Adams, 1817) and *P. aeruginosa* sensu Drury that we will be calling *P. speciosissima*. In the Aegean coastal region of İzmir, both species are likely to occur. *Protaetia speciosa venusta* (Ménétrières, 1836) was recorded from İzmir by Tauzin (1992). İren & Ahmed (1973) list *P. aeruginosa* as a fruit pest from the Aegean region of Turkey. Tezcan & Pehlivan (2001) record *P. speciosissima* from the Manisa Province (38°39'N, 27°20'E), eastwardly adjacent to the İzmir Province. However, according to Legrand (1991) *P. speciosissima* and *P. speciosa venusta* are reliably distinguishable by genital examination only.

Original Drury material is difficult to recognize and partly lost (Hayek 1985), but since Drury did not describe a new species, it is unnecessary to exactly determine the species he called *Scarabaeus aeruginosus* L.

Since Medvedev (1964) fixed "*Scarabaeus aeruginosus* Drury" as type species of the genus *Cetonischema* Reitter, according to Art. 11.10. (ICZN 1999), the species name is available from this act as *Potosia (Cetonischema) aeruginosa* Medvedev, 1964. Since Medvedev also mentioned *P. speciosa* and its subspecies and figured their genitalia, the identity of *P. aeruginosa* Medvedev is clear, the species name being a synonym of what we call *Protaetia speciosissima* (Scopoli).

### ***Scarabaeus speciosissimus* Scopoli, 1786, valid name, currently in *Protaetia***

With Drury's name being unavailable, according to current synonymy lists (Dutto 2005, Smetana 2006) the oldest names for this species are *Scarabaeus viridis germanus* Voet, "1778", *Scarabaeus auratus* Fülleby, 1782, *Scarabaeus viridis* Fülleby, 1786 and *Scarabaeus speciosissimus* Scopoli, 1786.

*Scarabaeus viridis germanus* was published in a work that is not consistently binominal (Voet 1766-1778), being unavailable for nomenclatural purposes (cf. Krell, in press).

According to Art. 49 (ICZN 1999) *Scarabaeus auratus* Fülleby, 1782 is not an available name since Fülleby did not propose a new species but just referred to "*Scarabæus auratus* [...] Linn. Syst. Nat. ed. XII. pag. 557. 78", i.e. *Cetonia aurata* (Linnaeus, 1758) which he misinterpreted.

*Scarabaeus viridis* Fülleby, 1786 is available by indication, referring to references listed under *Scarabaeus auratus* by Fülleby (1782). By simply adopting Voet's (1766-1778) name Fülleby makes it available under his own authorship. Under his *Scarabaeus valgus*, Linné (1764: 15) cites a "*Scarabaeus marianus viridis*" with the

reference of "Pet. gaz. t. 27. f. 8" (Petiver 1704) which was re-published in Petiver (1764). This work is not consistently binominal, hence not fulfilling the requirements of Art. 11.4 for nomenclaturally available works. *Scarabaeus viridis* Füebly, 1786 is not threatened by an older homonym.

In the same year Füebly's name was published, Scopoli (1786: 48) introduced the name *Scarabaeus speciosissimus* Scopoli, 1786. According to Evenhuis (1997) this work appeared between January and June 1786. Based on this information, the date of publication according to Art. 21.3.1. (ICZN 1999) is 31 June 1786. We could not find unequivocal information whether *S. speciosissimus* or *S. viridis* were published earlier. The only indication for a later publication of *S. viridis* we found in Anonymous (1793: no. X.1588) where the year 1787 is given for the first part of volume 3 of Füebly's *Neues Magazin*. Since all other sources we know give 1786 as year of publication, we consider, in lack of any more detailed dating, a publication date of 31 December 1786 (according to Art. 21.3.2., ICZN 1999). Hence, *Scarabaeus speciosissimus* Scopoli, 1786 has precedence over *Scarabaeus viridis* Füebly, 1786. As Bedel formally stated in 1909, Scopoli's name is the valid name for the species that Drury called *Scarabaeus aeruginosus*.

*S. speciosissima* was described from Insubria (Duchy of Milan) based on "In Museo Ill. comitis Castiglioni." This most likely refers to the collection of the Count Luigi Castiglioni who studied under Scopoli at the University of Pavia (Marraro 1950). It is unclear whether Scopoli had a series of syntypes or just one specimen which then could be considered the holotype. Because of this irresolvable uncertainty we herewith designate the specimen illustrated by Scopoli (1786) on plate 21, fig. A, as the **lectotype** of *Scarabaeus speciosissimus* Scopoli, 1786 (Fig. 3).

Castiglioni material does not exist in the Museo Civico di Storia Naturale di Milano (F. Rigato, in litt. 2011). Castiglioni and its collection are neither mentioned in Goidanich (1975), Horn *et al.* (1990) nor in Poggi & Conci (1996). Scopoli's early collections were presumably destroyed around 1766; later material is not mentioned by Horn *et al.* (1990) and is likely to be untraceable or lost (Poggi & Conci 1996; Evenhuis 1997; Violani in litt. 2011). A lost lectotype provides the opportunity to designate a neotype.

Dutto (2005: 111) indicated that Estefania Micó had designated a neotype for *Scarabaeus speciosissimus* Scopoli, a specimen deposited in the Museo Civico di Storia Naturale Carmagnola, Italy. Since this designation has never been published fulfilling the qualifying conditions of Code Art. 75.3 (ICZN 1999), no neotype currently exists.

We herewith **designate** this specimen as the **neotype** of *Scarabaeus speciosissimus* Scopoli, 1786 to clarify the taxonomic identity of Scopoli's nominal species once and for all, and to back up its subjective synonymy with *Potosia aeruginosa* Medvedev.

The male specimen bears the labels "VALLE TICINO / BELLINZAGO / VI-86. brughiera / lg Pescarolo", red label: "NEOTYPE / *Cetonischema* / *speciosissimum* (Scop.) / Det.: E. Micó 2001", "*Scarabaeus* / *speciosissimus* / Scop, 1786 / NEOTYPUS / des. Krell, Rey, Mico & Dutto 2011". The locus typicus Bellinzago Novarese is in the Province of Novara, Piedmont, 45°34'N 8°38'E, an area that belonged to the former Duchy of Milan (Insubria), the locus typicus of the lost lectotype.

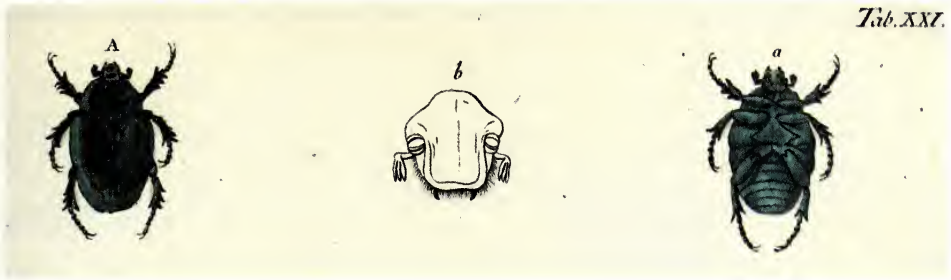


FIG. 3

Lectotype of *Scarabaeus speciosissimus* Scopoli, 1786, figured by Scopoli (1786).



FIG. 4

Neotype of *Scarabaeus speciosissimus* Scopoli, 1786. (A) Dorsal view. (B) Parameres from dorsal. (C) Labels.

The specimen shows the following characters of the former subgenus *Cetonischema*: Elytra without juxtasternal depression, finely punctuated, without toment spots; front end of pronotum bulgy in the middle; mesometasternal process subtriangular and smooth; pronotum with fine and dispersed punctures, being almost absent on the disc; body length: 28.9 mm.

The following species-diagnostic characters distinguish it from *Protaetia speciosa*, the only other species in the former subgenus *Cetonischema*: Dorsally uniformly metallic green with slight reddish reflexes; parameres completely shiny, distal part not velvety (Fig. 5).



In northern Italy, only this one species of the former subgenus *Cetonischema* is present.

### ***Cetonischema*, *Potosia* or *Protaetia*?**

Reitter (1899) introduced the subgenus *Cetonischema* "nom.nov." for *Potosia aeruginosa* Drury and *P. speciosa* Adams. Since he mentioned that Dr. Schoch had created the "Genus *Cetonia*" for *speciosissima*, but this was already given to the *aurata*-like species, it looks as if Reitter introduced a replacement name. However, in this paper Reitter used the abbreviation "nom.nov." for all new genera he described. Moreover, Schoch had never created a genus *Cetonia*, but had used *Cetonia* F. for *aurata*-like species and *Potosia* for *P. speciosissima* (Schoch 1897). *Cetonischema* was described by Reitter (1899) as a new subgenus of *Potosia* without fixing a type species. The first author to fix a type species, "*Scarabaeus aeruginosus* Drury (1770)", was Medvedev (1964: 197) in the Fauna SSSR. However, as Branco (2007) brought to our attention, Arrow (1910: 136) had already fixed "*Cetonia speciosissima*, Scop." (= *Scarabaeus speciosissimus* Scopoli, 1786) as type species for *Potosia* Mulsant & Rey, 1871 resulting in the confusing situation that two lately well distinguished subgenera or genera, *Cetonischema* Reitter, 1899 and *Potosia* Mulsant & Rey, 1871, become synonyms. Löbl & Smetana (2007: 26) took the necessary steps and used *Potosia* as valid name for *Cetonischema* and transferred all former species of the subgenus *Potosia* to the subgenus *Netocia* Costa, 1852. Without the discovery of an older type species fixation for *Potosia* or a Case presented to the ICZN, we cannot use *Cetonischema* as valid genus-group name. Therefore, we suggest to follow Mikšić (1987) and Smetana (2006) by using the genus name *Protaetia* Burmeister for the former *Cetonischema* species. If mentioning a subgenus name is deemed necessary, *Potosia* Mulsant & Rey needs to be used. However, the transfer of the name *Potosia* to the taxon formerly known as *Cetonischema* might be quite confusing.

### **Synonymy**

As it stands we cannot but confirm the following genus-group level synonymy:  
*Potosia* Mulsant & Rey, 1871

(type species by subsequent designation by Arrow (1910): *Scarabaeus speciosissimus* Scopoli, 1786)

= *Cetonischema* Reitter, 1899 (type species by subsequent designation by Medvedev (1964): *Potosia (Cetonischema) aeruginosa* Medvedev, 1964), syn.

Since this synonymy with its transfer of *Potosia* from one established to another well-known subgenus undoubtedly causes confusion, a Case to be submitted to the International Commission on Zoological Nomenclature might be considered. This Case would apply for setting aside Arrow's (1910) type species designation. A type species designation in accordance with the common use would need to be determined.

We propose the following synonymy at species level:

*Protaetia speciosissima* (Scopoli, 1786)

= *aeruginosa* (Medvedev, 1964), nec (Linné, 1767), nec (Drury, 1773)

*Protaetia speciosissima* (Scopoli, 1786) is the valid name for Europe's largest flower chafer species.



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## **Bats from the wet: two new species of Tube-nosed bats (Chiroptera: Vespertilionidae) from Meghalaya, India**

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**Bats from the wet: two new species of Tube-nosed bats (Chiroptera: Vespertilionidae) from Meghalaya, India.** - The bat fauna of Meghalaya, north-eastern India, is very diverse but still improperly known. Recent field work revealed several previously unrecorded bats, especially in the southern and eastern hill ranges known as the Khasi and Jaintia Hills. We resolve here the systematic position of two *Murina* species that belong to the “*suilla*-group” and “*cyclotis*-group”, respectively, using a combination of morphological and molecular characters. Both taxa proved to be morphologically and genetically distinct from any known species and are therefore described here as new species. So far, *M. jaintiana* sp. nov. has been found both in the Jaintia Hills of eastern Meghalaya, and in the Chin Hills of north-eastern Myanmar, while *M. pluvialis* sp. nov. is only known from the dense evergreen forests of the Khasi Hills, close to the Meghalaya border with Bangladesh. During the last few decades, these areas have suffered serious habitat degradation due to deforestation associated with mining activities, and both require urgent conservation measures to preserve their unique natural resources.

**Keywords:** *Murina* - cryptic species - mitochondrial DNA - nuclear DNA – phylogenetics - systematics

### INTRODUCTION

The north-eastern states of India lie in the foothills of the Himalaya and harbour one of the most biodiverse regions of Asia (Lamoreux *et al.*, 2006). The Meghalaya Subtropical Forests ecoregion (Wikramanaye *et al.*, 2000) is also one of the wettest ecoregions in the Indo-Pacific region. In the southern fringes of the Shillong plateau, dense evergreen forests facing the Bangladesh plains receive more than 11 meters of rainfall yearly (Rai, 2010), one of the highest recorded in the world. Many caves were formed in this region by the combination of high seasonal rainfalls and extensive limestone areas. They provide numerous roosting opportunities for troglophilous bat species. Part of the fauna of this region has been studied largely in the context of cave

occupation, which highlighted the presence of numerous endemics in vertebrates (e.g. Kottelat *et al.*, 2007) and invertebrates (reviewed in Harries *et al.*, 2008). The bat fauna of this region has been explored on several occasions (Sinha, 1999), revealing that the Meghalaya Subtropical Forests ecoregion support several rare or otherwise unknown species elsewhere in India (Thabah & Bates, 2002, Thabah, 2005). However only a few major caves from the Garo Hills (reviewed in Sinha, 1999) and Khasi Hills (Thabah, 2005) have been adequately surveyed for bats, while the vast majority and their surrounding forested areas are still largely unexplored.

The lacunar knowledge of the bat fauna from this region is also due to the difficulty of differentiating taxa among some species-groups of Rhinolophidae, Hipposideridae and Vespertilionidae. One such difficult group is the Tube-nosed bats from the genus *Murina* (family Vespertilionidae, subfamily Murinae), which has a relatively conservative external and dental morphology. These forest bats are typically rare in collections because they require specialized trapping skills for capture (Kingston *et al.*, 2003). In classical taxonomic accounts (Corbet & Hill, 1992, Bates & Harrison, 1997), only six species of *Murina* are reported for India, four of which occur in Meghalaya (Bates & Harrison, 1997, Sinha, 1999). However, recent revisions of *Murina* species elsewhere in South-east Asia have revealed the existence of many cryptic species and inappropriate systematic arrangements (Csorba & Bates, 2005, Csorba *et al.*, 2007, Furey *et al.*, 2009, Kruskop & Eger, 2009, Kuo *et al.*, 2009, Csorba *et al.*, 2011), which suggest that *Murina* is much more diverse than currently known. For instance, the apparently widespread *M. tubinaris*, originally described from Kashmir, is now believed to be restricted to the north-west Himalayan foothills, while further east, from Nepal eastwards, a different species *Murina cineracea* occurs (Csorba *et al.*, 2011).

During an on-going survey of karstic cave formation in the Khasi and Jaintia Hills of Meghalaya organized by the “Caving in the Abode of the Clouds Project”, we were invited to survey the bat fauna of caves being mapped, in an attempt to understand the significance of these karstic formations for conservation of local biodiversity. We used a combination of morphological and genetic analyses to resolve the taxonomic status of two *Murina* specimens collected in this region, which proved to be unidentifiable by external characters. We show that these specimens differ in colouration and dental characteristics compared to any described species and also differ considerably on both mitochondrial and nuclear genes from other related species. Both are consequently described here as new species.

## MATERIALS AND METHODS

Bats were captured with mistnets set in forests surrounding cave entrances or across small rivers flowing out of them. In addition, we also used a 3-banks harp-trap (Austbat, Faunatech, Australia) placed in vegetation corridors to catch the smaller species which usually avoid mistnets (Kingston *et al.*, 2003). Upon capture, bats were stored temporarily in cotton bags. Prior to release, they were measured, identified and photographed, and a small biopsy punch was taken for further genetic analyses. A few specimens that did not key out to known species were taken as vouchers and kept temporarily at the Natural History Museum of Geneva, Switzerland for closer exa-

mination. These specimens will be deposited at the Zoological Survey of India's (ZSI) Shillong zoological collection.

### *Morphological comparisons*

External measurements were taken from live specimens, dry skins or alcohol-preserved museum specimens to the nearest 0.1 mm. Craniodental measurements were taken to the nearest 0.01 mm using digital calipers under a stereo-microscope. Only fully grown adults were measured and included in the morphological comparisons. A list of abbreviations for institutions and comparative material examined is given in the Appendix. Abbreviations and definitions for measurements are FA: forearm length – from the extremity of the elbow to the extremity of the carpus with the wings folded; STOTL: total length of skull – from the anterior rim of the alveolus of the first upper incisor to the most projecting point of the occipital region; CCL: condylo-canine length – from the exoccipital condyle to the most anterior part of the canine;  $C^1C^1W$ : width across the upper canines – greatest width, taken across the outer borders of upper canines;  $M^3M^3W$ : width across the upper molars – greatest width, taken across the outer crowns of the last upper molars; ZYW: zygomatic width – greatest width of the skull across the zygomatic arches; MAW: mastoid width – greatest distance across the mastoid region; IOW: interorbital width – least width of the interorbital constriction; BCH: braincase height – from the basisphenoid at the level of the hamular processes to the highest part of the skull, including the sagittal crest (if present);  $CM^3L$ : maxillary tooththrow length – from the front of upper canine to the back of the crown of the third molar; ML: mandible length – from the anterior rim of the alveolus of the first lower incisor to the most posterior part of the condyle;  $CM^3L$ : mandibular tooththrow length – from the front of the lower canine to the back of the crown of the third lower molar; CPH: coronoid process height – from the tip of the coronoid process to the apex of the indentation on the inferior surface of the ramus adjacent to the angular process.

Absolute height was employed in all height comparisons for individual teeth (e.g.  $C^1$  versus  $P^4$ ). Height comparisons of hypoconids relative to entoconids were standardised by ensuring the rami of the mandible overlapped in the lateral view in each instance. Dental terminology was used after Menu (1985).

### *Genetic comparisons*

Twelve individual bats were newly sequenced in this study. They represent 10 individuals of *Murina*, one *Kerivoula* and one *Myotis* species (Table 1). In addition, we also downloaded from the GenBank 17 reference sequences of various *Murina*, 10 of *Kerivoula*, 4 of *Harpiocephalus*, 18 of *Myotis* and 2 of *Cistugo* to serve in genetic comparisons. The genera *Kerivoula*, *Myotis* and *Cistugo* were used as increasingly divergent outgroups in phylogenetic reconstructions.

Total genomic DNA was isolated from ~25 mg tissue sample using a DNeasy Tissue Kit (Qiagen GmbH, Hilden, Germany), eluted and stored in a final volume of 200  $\mu$ L AE Buffer (provided elution buffer) for further sequence analyses. The complete mitochondrial cytochrome *b* gene (cyt-*b*) was amplified and sequenced using the pair of primers Molcit-F (5'-AATGACATGAAAAATCACCGTTGT-3'; Ibáñez *et al.*, 2006) and CytB-H (5'-CTTTTCTGGTTTACAAGACCAG-3'; Weyeneth *et al.*, 2008). To maximize the amplification of the target gene, we used a touchdown PCR

TABLE 1 : Taxonomic sampling, geographic origin, tissue and GenBank accession numbers (cyt-b = cytochrome b gene and rag 2 = recombination-activating protein 2 gene) of the bats included in the phylogenetic reconstructions. References are : a = Anwarali Khan *et al.* (2010); b = Han *et al.* (unpublished 2009); c = Hasan & Abdulllah (unpublished 2009); d = Lack *et al.* (2010); e = Ruedi & Mayer (2001); f = Sakai *et al.* (2003); g = Stadelmann *et al.* (2004a); h = Stadelmann *et al.* (2004b); i = Stadelmann *et al.* (2007); j = Thabab *et al.* (2007); k = this study.

Species	Origin	Tissue	cyt-b	Ref	rag 2	Ref
<i>Murina aenea</i>	Malaysia		GQ168906	b	-	
<i>Mu. sp. A A</i>	Phongsaly, Laos PDR	MHNG 1926.034 M1179	JQ044688	k	JQ044699	k
<i>Mu. sp. A B</i>	Nam Et, Laos PDR	CMF 980322.66	AJ841972	h	-	
<i>Mu. sp. A C</i>	Xuan Nha, Vietnam	IEBR_XN100	JQ044700	k	-	
<i>Mu. bicolor A</i>	Taiwan		GQ168921	b	-	
<i>Mu. bicolor B</i>	Taiwan	M605	JQ044696	b	-	
<i>Mu. cineracea A</i>	Mondolkiri Province, Cambodia	HNHM 2005.81.36	GQ168915	b	-	
<i>Mu. cineracea B</i>	Phongsaly, Laos PDR	MNHN CG2006-79 M1167	JQ044694	k	JQ044705	k
<i>Mu. cineracea C</i>	Phongsaly, Laos PDR	MHNG 1926.035 M1172	JQ044693	k	JQ044704	k
<i>Mu. cyclotis</i>	Meghalaya, India	M1605	JQ044691	k	JQ044703	k
<i>Mu. cf. cyclotis A</i>	Mondolkiri Province, Cambodia	HNHM 2005.81.48	GQ168916	b	-	
<i>Mu. cf. cyclotis B</i>	Quang Tri Province, Vietnam	HNHM 2007.27.40	GQ168917	b	-	
<i>Mu. cf. cyclotis C</i>	Phongsaly, Laos PDR	MHNG 1926.033 M1209	JQ044692	k	JQ044706	k
<i>Mu. cf. cyclotis D</i>	Nam Ha, Laos PDR	CMF 980420.14	AJ841973	h	-	
<i>Mu. florium</i>	Papua New Guinea	ABTC 43635	GQ168902	b	-	
<i>Mu. hilgendorfi</i>	Hamakita, Japan	ZMMU S-175150	AB085733	f	-	
<i>Mu. cf. huttoni A</i>	Phu Khanh, Vietnam	ROM 107739	JQ044695	k	-	
<i>Mu. cf. huttoni B</i>	Dak Lak, Vietnam	MHNG 1976.072 M1619	GU328073	d	-	
<i>Mu. jainitiana</i> sp. nov.	East Jaintia Hills, India		JQ044690	k	JQ044702	k
<i>Mu. leucogaster A</i>	Henan, China	GGJ-2006	GQ168912	b	-	
<i>Mu. leucogaster B</i>	Beijing, China	HNHM 2005.81.16	DQ435071	j	-	
<i>Mu. peninsularis</i>	Mondolkiri Prov., Cambodia	MHNG 1976.071 M1646	JQ044689	k	JQ044701	k
<i>Mu. phuiialis</i> sp. nov.	Cherrapunjee, India		GQ168901	b	-	
<i>Mu. puta</i>	Taiwan	ABTC 48019	GQ168905	b	-	
<i>Mu. suilla</i>	Java, Indonesia	HNHM 2007.28.1	GQ168913	b	-	
<i>Mu. tiensa A</i>	Bac Kan Province, Vietnam	CMF 980329.19	AJ841974	h	-	
<i>Mu. tiensa B</i>	Nam Et, Laos PDR					



## Outgroups

<i>Harpiocephalus harpia A</i>	Nam Et, Laos PDR	ROM 118236	AJ841971	<i>h</i>	AM265701	<i>i</i>
<i>H. harpia B</i>	Bac Kan Province, Vietnam	HNHM 2007.27.4	GQ168923	<i>b</i>	-	
<i>H. harpia C</i>	Taiwan		GQ168918	<i>b</i>	-	
<i>Kerivoula hardwickii</i>	Sarawak, Malaysia	TK 152407	GU585657	<i>a</i>	FJ744334	<i>c</i>
<i>K. kachinensis A</i>	Nam Et, Laos PDR	ROM 118279*	AJ841969	<i>g</i>	-	
<i>K. kachinensis B</i>	Cherrapunjee, India	M1643	JQ044697	<i>k</i>	JQ044707	<i>k</i>
<i>K. intermedia</i>	Pahang, Malaysia	TK 152060	EU188791	<i>a</i>	FJ744343	<i>c</i>
<i>K. cf. lenis</i>	Dong Nai, Vietnam	ROM 110520*	AJ841970	<i>g</i>	-	
<i>K. papillosa</i>	Pahang, Malaysia	TK 152062	EU188785	<i>a</i>	FJ744327	<i>c</i>
<i>K. pellucida</i>	Pahang, Malaysia	TK 152055	EU188788	<i>a</i>	FJ744335	<i>c</i>
<i>Myotis alcaethoe</i>	Franche-Comté, France	MHNG 1970.099 M1575	JQ044687	<i>k</i>	JQ044698	<i>k</i>
<i>My. annectans</i>	Ban Navang, Laos PDR	ROM 106376	AJ841956	<i>h</i>	AM265663	<i>i</i>
<i>My. brandtii</i>	Russia	NMP 49269 pb916	AM261886	<i>i</i>	AM265647	<i>i</i>
<i>My. cf. brownii</i>	Mindanao, Philippines	FMNH 147067	AF376859	<i>e</i>	AM265648	<i>i</i>
<i>My. formosus</i>	Dong Amphan, Laos PDR	CMF 970510.6	AJ841950	<i>h</i>	AM265658	<i>i</i>
<i>My. gracilis</i>	Japan	KK0005	AB106609	<i>f</i>	AM265660	<i>i</i>
<i>My. keaysi</i>	Yucatan, Mexico	TK 13532	AF376852	<i>e</i>	GU328083	<i>d</i>
<i>My. myotis</i>	Spain	EBD 15969	AM261883	<i>i</i>	AM265679	<i>i</i>
<i>My. nattereri</i>	Thrace, Greece	M764	AF376863	<i>e</i>	AM265681	<i>i</i>
<i>My. riparius</i>	Permambuco, Brasil	MVZ 185996	AF376866	<i>e</i>	AM265687	<i>i</i>
<i>Cistugo seabrae</i>	Goodhouse, South Africa	M977	AJ841962	<i>h</i>	GU328052	<i>d</i>

\* see Anrawali Khan *et al.* 2010 for correct reference number



TABLE 1 : Taxonomic sampling, geographic origin, tissue and GenBank accession numbers (cyt-b = cytochrome b gene and rag 2 = recombination-activating protein 2 gene) of the bats included in the phylogenetic reconstructions. References are : a = Anwarali Khan *et al.* (2010); b = Han *et al.* (unpublished 2009); c = Hasan & Abdullah (unpublished 2009); d = Lack *et al.* (2010); e = Ruedi & Mayer (2001); f = Sakai *et al.* (2003); g = Stadelmann *et al.* (2004a); h = Stadelmann *et al.* (2004b); i = Stadelmann *et al.* (2007); j = Thabah *et al.* (2007); k = this study.

Species	Origin	Tissue	cyt-b	Ref	rag 2	Ref
<i>Murina aenea</i>	Malaysia		GQ168906	<i>b</i>	-	
<i>Mu. sp. A A</i>	Phongsaly, Laos PDR	MHNG 1926.034 M1179	JQ044688	<i>k</i>	JQ044699	<i>k</i>
<i>Mu. sp. A B</i>	Nam Et, Laos PDR	CMF 980322.66	AJ841972	<i>h</i>	-	
<i>Mu. sp. A C</i>	Xuan Nha, Vietnam	IEBR XN100	JQ044700	<i>k</i>	-	
<i>Mu. bicolor A</i>	Taiwan		GQ168921	<i>b</i>	-	
<i>Mu. bicolor B</i>	Taiwan	M605	JQ044696	<i>k</i>	-	
<i>Mu. cineracea A</i>	Mondolkiri Province, Cambodia	HNHM 2005.81.36	GQ168915	<i>b</i>	-	
<i>Mu. cineracea B</i>	Phongsaly, Laos PDR	MNHN CG2006-79 M1167	JQ044694	<i>k</i>	JQ044705	<i>k</i>
<i>Mu. cineracea C</i>	Phongsaly, Laos PDR	MHNG 1926.035 M1172	JQ044693	<i>k</i>	JQ044704	<i>k</i>
<i>Mu. cyclotis</i>	Mcghalaya, India	M1605	JQ044691	<i>k</i>	JQ044703	<i>k</i>
<i>Mu. cf. cyclotis A</i>	Mondolkiri Province, Cambodia	HNHM 2005.81.48	GQ168916	<i>b</i>	-	
<i>Mu. cf. cyclotis B</i>	Quang Tri Province, Vietnam	HNHM 2007.27.40	GQ168917	<i>b</i>	-	
<i>Mu. cf. cyclotis C</i>	Phongsaly, Laos PDR	MHNG 1926.033 M1209	JQ044692	<i>k</i>	JQ044706	<i>k</i>
<i>Mu. cf. cyclotis D</i>	Nam Ha, Laos PDR	CMF 980420.14	AJ841973	<i>h</i>	-	
<i>Mu. florium</i>	Papua New Guinea	ABTC 43635	GQ168902	<i>b</i>	-	
<i>Mu. hilgendorfi</i>	Hamakita, Japan		AB085733	<i>f</i>	-	
<i>Mu. cf. huttoni A</i>	Phu Khanh, Vietnam	ZMMU S-175150	JQ044695	<i>k</i>	-	
<i>Mu. cf. huttoni B</i>	Dak Lak, Vietnam	ROM 107739	GU328073	<i>d</i>	-	
<i>Mu. jaintiana sp. nov.</i>	East Jaintia Hills, India	MHNG 1976.072 M1619	JQ044690	<i>k</i>	JQ044702	<i>k</i>
<i>Mu. leucogaster A</i>	Henan, China		GQ168912	<i>b</i>	-	
<i>Mu. leucogaster B</i>	Beijing, China	GGJ-2006	DQ435071	<i>j</i>	-	
<i>Mu. peninsularis</i>	Mondolkiri Prov., Cambodia	HNHM 2005.81.16	GQ168911	<i>b</i>	-	
<i>Mu. pluvialis sp. nov.</i>	Cherrapunjee, India	MHNG 1976.071 M1646	JQ044689	<i>k</i>	JQ044701	<i>k</i>
<i>Mu. puta</i>	Taiwan		GQ168901	<i>b</i>	-	
<i>Mu. suilla</i>	Java, Indonesia	ABTC 48019	GQ168905	<i>b</i>	-	
<i>Mu. tiensa A</i>	Bac Kan Province, Vietnam	HNHM 2007.28.1	GQ168913	<i>b</i>	-	
<i>Mu. tiensa B</i>	Nam Et, Laos PDR	CMF 980329.19	AJ841974	<i>h</i>	-	
<b>Outgroups</b>						
<i>Harpiocephalus harpia A</i>	Nam Et, Laos PDR	ROM 118236	AJ841971	<i>h</i>	AM265701	<i>i</i>
<i>H. harpia B</i>	Bac Kan Province, Vietnam	HNHM 2007.27.4	GQ168923	<i>b</i>	-	
<i>H. harpia C</i>	Taiwan		GQ168918	<i>b</i>	-	
<i>Kerivoula hardwickii</i>	Sarawak, Malaysia	TK 152407	GU585657	<i>a</i>	FJ744334	<i>c</i>
<i>K. kachinensis A</i>	Nam Et, Laos PDR	ROM 118279*	AJ841969	<i>g</i>	-	
<i>K. kachinensis B</i>	Cherrapunjee, India	M1643	JQ044697	<i>k</i>	JQ044707	<i>k</i>
<i>K. intermedia</i>	Pahang, Malaysia	TK 152060	EU188791	<i>a</i>	FJ744343	<i>c</i>
<i>K. cf. lenis</i>	Dong Nai, Vietnam	ROM 110520*	AJ841970	<i>g</i>	-	
<i>K. papillosa</i>	Pahang, Malaysia	TK 152062	EU188785	<i>a</i>	FJ744327	<i>c</i>
<i>K. pellicuda</i>	Pahang, Malaysia	TK 152055	EU188788	<i>a</i>	FJ744335	<i>c</i>
<i>Myotis alcaethoe</i>	Franché-Comté, France	MHNG 1970.099 M1575	JQ044687	<i>k</i>	JQ044698	<i>k</i>
<i>My. annectans</i>	Ban Navang, Laos PDR	ROM 106376	AJ841956	<i>h</i>	AM265663	<i>i</i>
<i>My. brandtii</i>	Russia	NMP 49269 pb916	AM261886	<i>i</i>	AM265647	<i>i</i>
<i>My. cf. browni</i>	Mindanao, Philippines	FMNH 147067	AF376859	<i>e</i>	AM265648	<i>i</i>
<i>My. formosus</i>	Dong Amphan, Laos PDR	CMF 970510.6	AJ841950	<i>h</i>	AM265658	<i>i</i>
<i>My. gracilis</i>	Japan	KK0005	AB106609	<i>f</i>	AM265660	<i>i</i>
<i>My. keaysi</i>	Yucatan, Mexico	TK 13532	AF376852	<i>e</i>	GU328083	<i>d</i>
<i>My. myotis</i>	Spain	EBD 15969	AM261883	<i>i</i>	AM265679	<i>i</i>
<i>My. nattereri</i>	Thrace, Greece	M764	AF376863	<i>e</i>	AM265681	<i>i</i>
<i>My. riparius</i>	Pernambuco, Brasil	MVZ 185996	AF376866	<i>e</i>	AM265687	<i>i</i>
<i>Cistugo seabrae</i>	Goodhouse, South Africa	M977	AJ841962	<i>h</i>	GU328052	<i>d</i>

\* see Anwarali Khan *et al.* 2010 for correct reference number

protocol detailed in Stadelmann *et al.* (2007). In short, the initial annealing temperature was set at 50°C and decreased by one degree every other cycle, to reach the touch-down temperature at 45°C. The PCR procedure was completed by 35 cycles at 45°C annealing temperature. PCR products were submitted for sequencing to Macrogen Europe (The Netherlands).

Part of the Recombination Activating Gene 2 (Rag 2), a nuclear gene, was also sequenced using the primer-pair combination 179F (5'-CAGTTTTCTCTAAG-GAYTCCTGC-3') and 1458R (5'-TTGCTATCTTCACATGCTCATTGC-3'), as described in Stadelmann *et al.* (2007).

The overlapping sequences were aligned and assembled to produce sequences of 1140 base pairs (cyt-b) or 749 bp (Rag 2), using the software Sequencher version 4.6 (Gene Codes Corp.). Sequences shorter were completed with N's to replace missing data. These new sequences were aligned with 35 cyt-b and 16 Rag 2 sequences, respectively, obtained from GenBank (Table 1). Sequencher was also used to ensure that all sequences were coding for amino acids, with no stop codons, and hence were assumed to represent orthologous genes. Sequences generated in this study have been submitted to GenBank (Accession numbers JQ044688-JQ044707; see Table 1). For measures of DNA sequence divergence, we used the K2P model of correction (K2P distance) that is commonly used for this purpose in bat systematics (see e.g. Bradley & Baker, 2001, Ibáñez *et al.*, 2006).

We used Bayesian (BA) inference and neighbour-joining (NJ) methods to separately reconstruct phylogenetic relationships for the cyt-b and Rag 2 data sets. For the BA inference and NJ method, the appropriate model of nucleotide substitutions was determined with the program MrModeltest version 2.2 (Nylander, 2004). The HKY + I + G and HKY + I models best described the cyt-b and Rag 2 data sets, respectively (cyt-b: I = 0.4922, gamma distribution with shape parameter  $\alpha$  = 0.9659; Rag 2: I = 0.6778).

Bayesian posterior probabilities were calculated using a Metropolis-coupled, Markov chain Monte Carlo (MCMCMC) sampling approach with four simultaneous Markov chains run for 1 million generations and trees sampled every 1000 generations as implemented in the software MrBayes version 3.1.2 (Huelsenbeck & Ronquist, 2001). After the log-likelihoods of trees reached stationarity, the initial 10% of trees were discarded as burn-in and posterior probabilities were computed from the consensus of the remaining trees. NJ analyses were based on the distance matrix calculated with the DNA model of evolution selected with MrModeltest. Bootstrap analyses of 1000 replicates were performed and NJ using the same settings in MEGA version 5 (Tamura *et al.*, 2011).

## RESULTS

### *Morphological comparisons*

#### ***Murina pluvialis* sp. nov.**

HOLOTYPE: MHNG 1976.071 (field number M1646), adult female, in spirit, skull removed, collected by MR and JB on 21 February 2011.

TYPE LOCALITY: India, Meghalaya, Khasi Hills, village of Laitkynsew, 780 ma.s.l. (metres above sea level); geographic coordinates: N 25°13', E 91°40'.



**ETYMOLOGY:** The name *pluvialis* (“related to rain” in Latin) refers to the habitat of the new species, which reportedly receives the highest annual rainfall in the world. The proposed English name is Rainforest tube-nosed bat.

**DIAGNOSIS:** The plagiopatagium is attached to the base of the claw of the outer toe. Dorsal hairs dark brown basally, the distal part reddish, the fur without shiny individual hairs; ventrally the hairs black at their basal half and light grey on the upper half. Basal area of  $C^1$  equals that of  $P^4$ , mesostyles of  $M^1$  and  $M^2$  reduced but possessing distinct cusps. Forearm 36.6 mm, maxillary tooththrow length 5.49 mm.

**DESCRIPTION:** A medium-sized species of *Murina* (Table 2). External measurements of the holotype female are: head and body 44 mm, tail 34 mm, ear 16 mm, tragus 7.5 mm, hindfoot 6.5 mm, tibia 17.6 mm and forearm 36.6 mm. On the dorsal surface the hairs show a clear banding pattern: the basal third is very dark brown, almost black, the middle part yellowish-reddish, and the tip bright red; fur without shiny guard hairs. The upper surface of uropatagium near the body is densely covered in long reddish hairs. Ventrally, hairs are dark grey for the proximal half, while the upper portion is silvery grey (Figs 1-2). The ventral side of uropatagium has sparse whitish hairs. The ear is evenly rounded and without an emargination. The plagiopatagium is attached to the very base of the claw on the outer toe (Fig. 3).

The skull is medium sized (Table 2). The braincase is domed, with rostrum not inflated. A sagittal crest is evident and runs continuously from the frontal part of the skull posteriorly to the lambda. The lambdoid crests are also well pronounced. The narial emargination is as wide as long and the zygoma are strong but lack any dorsal prominences (Figs 4-5).

The maxillary tooththrows are convergent anteriorly ( $C^1C^1W/M^3M^3W = 0.76$ ).  $I_2$  is largely obscured in the lateral view, exceeds in height  $I^3$  and comprises less than one half of the latter’s basal area. The basal area of  $C^1$  equals that of  $P^4$  and clearly exceeds  $P^4$  in height.  $P^2$  basal area and height are approximately two-thirds that of  $P^4$ . The mesostyles of  $M^1$  and  $M^2$  are reduced but retain distinct cusps and equal their respective paracones in height.

The lower canine ( $C_1$ ) exceeds  $P_4$  in height and is greater in basal area;  $P_2$  is compressed antero-posteriorly, while its basal area is less than that of  $P_4$  and nearly attains its height. The crown area of the  $M_1$  talonid equals its trigonid while the  $M_2$  talonid is clearly smaller than its corresponding trigonid and the entoconids of these teeth exceed their hypoconids in height. The postcristid possess a deep indentation and end posterior to the tip of the entoconid.

**COMPARISONS WITH OTHER TAXA:** On the basis of its dentition ( $I^2$  obscured by  $I^3$  in lateral view,  $C^1$  basal area not less than that of  $P^4$ ,  $P^2$  basal area more than half that of  $P^4$ ) *M. pluvialis* belongs to the “*cyclotis*-group” and is therefore readily distinguished from all members of the “*suilla*-group” currently described. Within the “*cyclotis*-group” *M. aenea* and *M. cyclotis* are characterised by the reduced cusp-pattern of molars with missing mesostyles on  $M^1$  and  $M^2$  and by  $M^1$  and  $M^2$  with a talonid much smaller in area than their respective trigonids. Among these species, only *M. cyclotis* is known to occur in continental South Asia (Srinivasulu *et al.*, 2010); this species has dorsal and ventral pelage, ear shape and craniodental measurements similar to those of

TABLE 2. Selected external and craniodental measurements (in mm) of some *Murina* species. Values are given as min–max, (n). Acronyms and definitions for measurements are given in the text.

Character	<i>M. pluvialis</i> sp. nov.	<i>M. sp. A</i>	<i>M. cyclotis</i>	<i>M. rozendaali</i>
FA	36.6	30.0-31.7 (3)	29.4-34.5 (18)	31.2-33.2 (5)
STOTL	16.4	15.63-16.09 (3)	15.66-17.62 (20)	14.81-16.05 (4)
CCL	14.5	13.75-14.21 (3)	13.56-15.41 (21)	13.09-13.97 (4)
C <sup>1</sup> C <sup>1</sup> W	4.21	3.86-3.91 (3)	3.73-4.68 (21)	3.78-4.31 (5)
M <sup>3</sup> M <sup>3</sup> W	5.52	5.24-5.30 (3)	5.08-5.89 (21)	5.25-5.50 (5)
ZYW	9.26	8.63-8.96 (3)	8.76-10.17 (21)	8.85-9.41 (5)
MAW	7.78	7.59-7.69 (3)	7.54-8.31 (21)	7.35-7.74 (5)
IOW	4.32	4.04-4.21 (3)	3.89-4.50 (22)	3.95-4.31 (5)
BCH	6.43	6.01-6.26 (3)	5.98-6.81 (21)	5.86-6.23 (5)
CM <sup>3</sup> L	5.49	5.23-5.29 (3)	5.12-5.86 (21)	5.16-5.53 (5)
ML	11.18	10.43-10.62 (3)	10.41-12.10 (22)	10.30-10.89 (5)
CM <sub>3</sub> L	5.93	5.7-5.84 (3)	5.56-6.26 (21)	5.76-6.14 (5)
CPH	4.02	3.64-3.73 (3)	3.77-4.78 (21)	3.33-4.03 (5)

*M. pluvialis*, but is readily distinguishable from the latter by its smaller forearm and especially by the above mentioned cusp arrangement on the upper molars (Fig. 6). In relation to other members of the ‘*cyclotis*-group’ in the Indomalayan Region, *M. harri-soni*, *M. huttoni*, *M. puta* and *M. tiensa* are all much larger craniodentally with no overlap in CCL, MAW, CM<sup>3</sup>L and CM<sub>3</sub>L measurements (Csorba *et al.*, 2007) and none of them possess predominantly dark belly fur. The only species with similar craniodental dimensions and with distinct mesostyles on upper molars and developed talonids on lower molars in the “*cyclotis*-group” are *M. sp. A* (a currently unnamed taxon from Indochina) and *M. rozendaali* (Fig. 5).

The pelage of *M. sp. A* is basically the same being predominantly reddish brown dorsally without shiny guard hairs and dark-based ventrally but is distinguished externally by its much shorter forearm. Cranially *M. sp. A* is characterised by the lack of sagittal crest (developed in *M. pluvialis*) and dentally by the following features: CM<sup>3</sup>L 5.30 mm or less; P<sup>2</sup> approximately the same height as P<sup>4</sup>, mesostyles of M<sup>1</sup> and M<sup>3</sup> are higher than corresponding paracones; and M<sup>2</sup> talonid equals its trigonid (whereas *M. pluvialis* has a longer upper tooththrow; P<sup>2</sup> reaches only two-third of P<sup>4</sup> in height; mesostyles and corresponding parastyles of M<sup>1</sup> and M<sup>2</sup> are subequal; and M<sup>2</sup> talonid decidedly smaller than the trigonid).

The pelage of *M. rozendaali* completely differs from that of *M. pluvialis* being dorsally dark brown with shining yellow or golden tips and uniformly white on the belly. In the dentition of *M. rozendaali* mesostyles are well developed and entoconids are of equal height as hypoconids, whereas in *M. pluvialis* the mesostyles of M<sub>1</sub> and M<sub>2</sub> are poorly developed and entoconids of M<sub>1</sub> and M<sub>2</sub> exceed their hypoconids in height.

**DISTRIBUTION AND ECOLOGY:** The holotype and currently only known specimen of *M. pluvialis* was an adult female with no external sign of reproduction, caught in the secondary, dense evergreen forest located close to the village of Laitkynsew. This forest lies on the steep slopes of the southern ridge of the Shillong plateau and receives very high orographic rains brought by the seasonal monsoons (Thabah & Bates, 2002).



FIG. 1

Living specimens of (a) *M. pluvialis* (holotype, MHNG 1976.071) and (b) *M. jaintiana* (holotype, MHNG 1976.072).



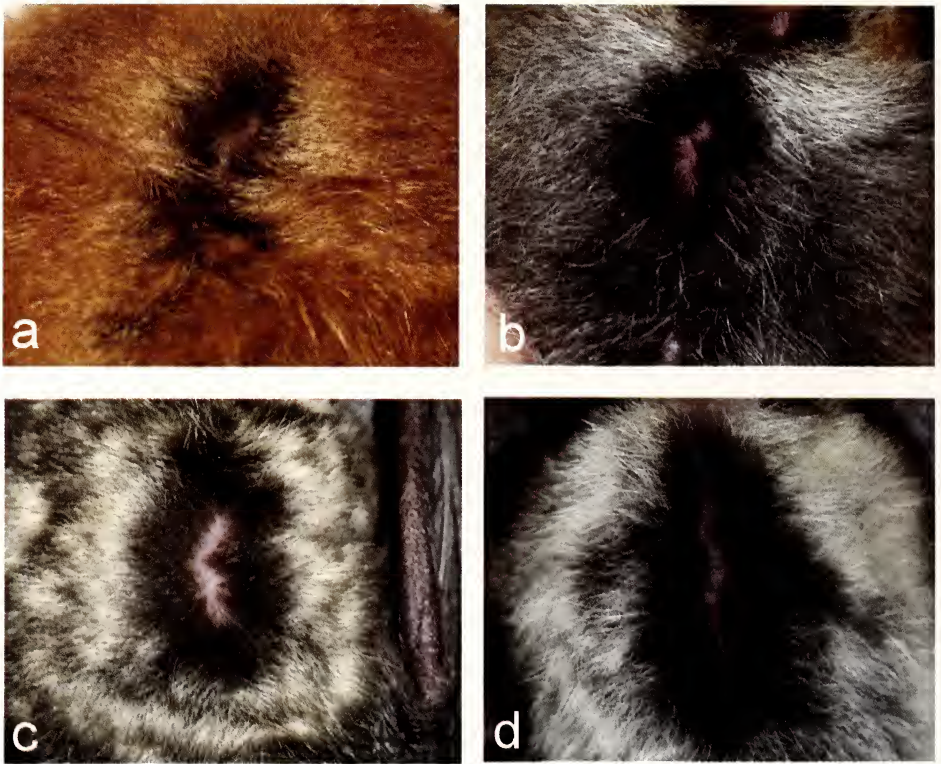


FIG. 2

Detailed view of (a) dorsal and (b) ventral pelage of *M. pluvialis* (holotype, MHNG 1976.071) and (c) dorsal and (d) ventral pelage of *M. jaintiana* (holotype, MHNG 1976.072).

The harp-trap that caught *M. pluvialis* was set up across a small path leading through a small bamboo grove intermixed with other native flora. Other bat species caught in the same harp-trap included *Rhinolophus pearsoni*, *R. macrotis*, *Hipposideros fulvus* and *Kerivoula kachinensis*. No other information is currently available on the ecology of *M. pluvialis*, but Bates & Harrison (1997) mention that *M. "cyclotis"* (i.e. the taxon with which *pluvialis* was most likely confounded) appears to have been a relatively common species in the Khasi Hills of Meghalaya, with some 30 specimens collected for the Field Museum of Natural History, Chicago (FMNH) (Bates & Harrison, 1997: p. 207).

***Murina jaintiana* sp. nov.**

in part *Murina tubinaris* Bates & Harrison 1997: 207.  
in part *Murina cineracea* Csorba *et al.* 2011: 896.

HOLOTYPE: MHNG 1976.072 (field number M1619), adult male, in spirit, skull removed, collected by MR and JB on 12 February 2011.

TYPE LOCALITY: India, Meghalaya, Jaintia Hills, 2.3 km east of the village of Kseh, 720 m a.s.l.; geographic coordinates: N 25°26', E 92°36'.





FIG. 3

Dorsal view of hindfoot of *M. pluvialis* (holotype, MHNG 1976.071) showing the attachment point of plagiopatagium.

REFERRED SPECIMENS: Myanmar, Chin State, Chin Hills BM(NH) 16.3.26.5., 16.3.26.7-8, 16.3.26.85-88, HNHM 2000.20.1.

ETYMOLOGY: The name refers to the local tribe, the Jaintias and the mountains named after them where the type of the new species was collected. The proposed English name is Jaintia tube-nosed bat.

DIAGNOSIS: The plagiopatagium is attached to the base of claw of the outer toe. General impression of the dorsal aspect is medium-grey; ventrally the hairs black at their basal two-third and white at the tip. Basal area of  $C^1$  less than that of  $P^4$ , mesostyles of  $M^1$  and  $M^2$  rudimentary or completely missing. Forearm 29.1-31.1 mm, maxillary toothrow length 4.81-5.09 mm.

DESCRIPTION: A small-sized species of *Murina* (Table 2). External measurements of the holotype male are: head and body 40 mm, tail 33 mm, ear 13.9 mm, tragus 6.3 mm, hindfoot 6.8 mm, tibia 17.1 mm and forearm 29.1 mm. On the dorsal surface, the hairs have three distinct bands: basal half dark grey, almost black, middle part dirty white, distal end brownish-grey; there are no shiny guard hairs. The upper surface of uropatagium – especially along the tibia and near the body – is well haired with long



FIG. 4

Lateral, dorsal and occlusal views of skull and mandible of *M. pluvialis* (holotype, MHNG 1976.071). Scale = 10 mm.

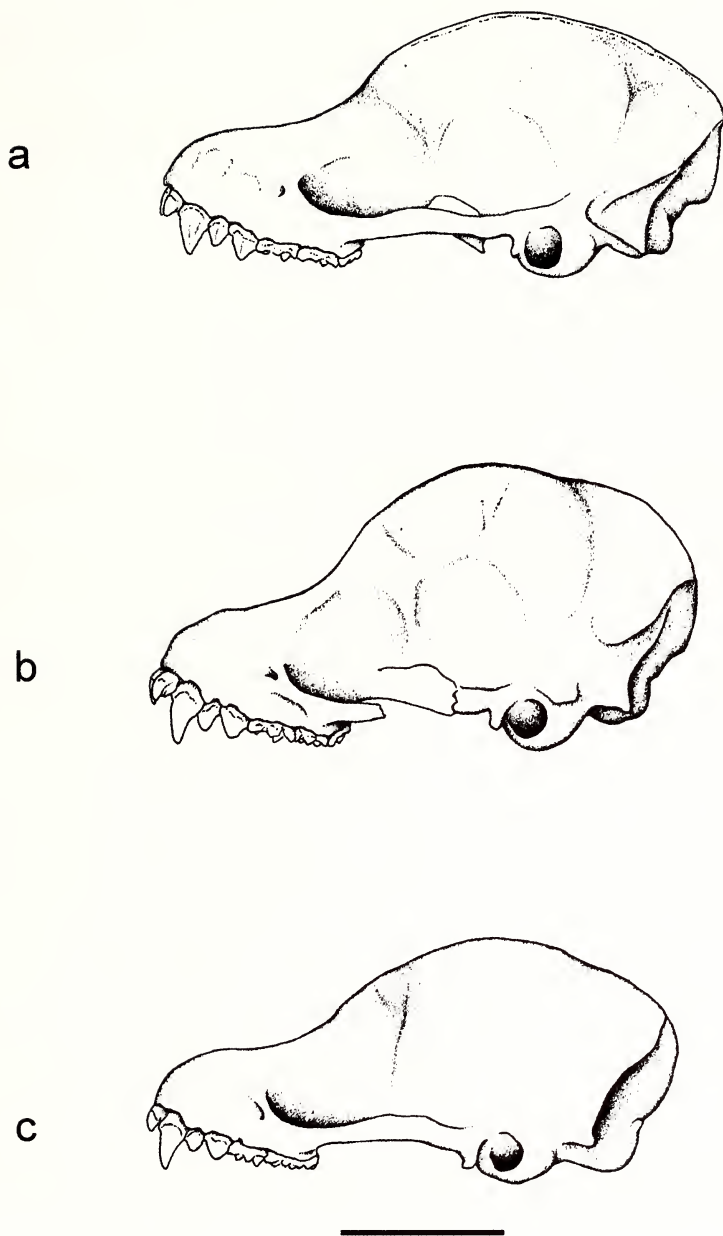


FIG. 5

Lateral views of skulls of (a) *M. pluvialis* (holotype, MHNG 1976.071); (b) *M. sp. A* (Laos, MHNG 1926.034); (c) *M. rozendaali* (holotype, BM(NH) 83.360). Scale = 5 mm.

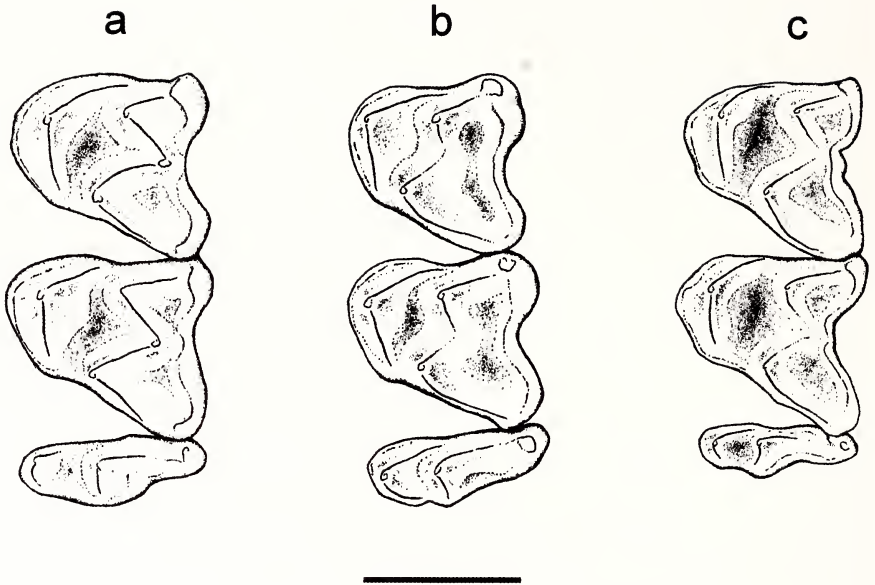


FIG. 6

Occlusal view of the upper molar row of a) *M. pluvialis* (holotype, MHNG 1976.071); (b) *M. cyclotis* (holotype, BM(NH) 9.4.4.4); (c) *M. jaintiana* (holotype, MHNG 1976.072). Scale = 1 mm.

grey-brown hairs, some of which reach beyond the free edge of the tail membrane. Ventrally, hairs are black for the proximal two-thirds, while the upper portion is a well demarcated pure white. The ventral aspect of the uropatagium has sparse whitish hairs (Figs 1-2). The ear is evenly rounded and without an emargination and the plagio-patagium is attached to the base of the claw on the outer toe.

The skull is small-sized (Table 3). The braincase is domed, and the rostrum not inflated. There is no sagittal crest and the lambdoid crests are only moderately developed. The narial emargination are as wide as long and the zygoma are strong with a low dorsal prominence (Figs 7-8).

The maxillary toothrows are convergent anteriorly ( $C^1C^1W/M^3M^3W = 0.69-0.71$ ).  $I^2$  is only partly obscured in lateral view, slightly exceeded in height by  $I^3$  and comprises approximately one third of the latter's basal area. The basal area of  $C^1$  is less than that of  $P^4$ , and the tooth is slenderly built and exceeds  $P^4$  in height. The basal area of  $P^2$  is approximately half that of  $P^4$  and its height hardly reaches two-thirds that of  $P^4$ . The mesostyles of  $M^1$  and  $M^2$  are rudimentary or missing.

The lower canine ( $C_1$ ) exceeds  $P_4$  in height and is greater in basal area;  $P_2$  basal dimensions and height are markedly less than those of  $P_4$ .  $M_1$  and  $M_2$  talonids equal their corresponding trigonids in area and the entoconids of these teeth exceed their hypoconids in height. The postcristid have a deep indentation and runs straight to the tip of entoconid.



TABLE 3. Selected external and craniodental measurements (in mm) of some species within the *Murina* "suilla" group. Values are given as min-max, (n). Acronyms and definitions for measurements are given in the text.

Character	<i>M. jaintiana</i> sp. nov.	<i>M. beelzebub</i>	<i>M. cineracea</i>	<i>M. tubinaris</i>
FA	29.1-31.1 (5)	33.7-36.3 (4)	27.5-33.8 (21)	31.0-32.9 (4)
STOTL	14.75-15.25 (6)	16.54-16.77 (4)	14.78-16.35 (22)	14.92-15.74 (6)
CCL	13.36-13.61 (2)	14.53-14.99 (4)	12.95-14.30 (23)	13.08-13.89 (5)
C <sup>1</sup> C <sup>1</sup> W	3.52-3.74 (6)	3.82-3.95 (4)	3.4-3.96 (23)	3.59-3.78 (5)
M <sup>3</sup> M <sup>3</sup> W	5.04-5.2 (6)	5.25-5.75 (4)	4.9-5.6 (23)	4.97-5.32 (5)
ZYW	8.26-8.68 (4)	8.98-9.36 (4)	8.22-9.23 (21)	8.07-8.66 (4)
MAW	7.23-7.43 (5)	7.65-8.08 (4)	7.19-7.82 (23)	7.27-7.51 (5)
IOW	4.02-4.36 (6)	4.46-4.74 (4)	4.09-4.62 (23)	4.26-4.51 (6)
BCH	5.96-6.17 (2)	6.28-6.44 (4)	5.71-6.34 (22)	5.55-5.86 (4)
CM <sup>3</sup> L	4.81-5.09 (6)	5.41-5.54 (4)	4.84-5.36 (23)	4.88-5.19 (6)
ML	9.85-10.28 (6)	10.90-11.34 (4)	9.75-10.92 (23)	10.07-10.62 (6)
CM <sub>2</sub> L	5.18-5.46 (6)	5.81-6.00 (4)	5.15-5.78 (23)	5.37-5.69 (6)
CPH	3.2-3.4 (6)	3.72-3.77 (4)	3.04-4.02 (23)	3.04-3.39 (4)

COMPARISONS WITH OTHER TAXA: On the basis of its dentition ( $I^2$  only partly obscured by  $I^3$  in lateral view,  $C^1$  basal area decidedly less than that of  $P^4$ ,  $P^2$  basal area equals half that of  $P^4$ ) *M. jaintiana* is a member of the "suilla-group" and is therefore readily separable from all species of the "cyclotis-group". Within the "suilla-group", only *M. beelzebub*, *M. cineracea* and *M. tubinaris* exhibit predominantly greyish dorsal fur; all other species in the group have reddish or brownish dorsal pelage without signs of any greyish-blackish tint. *M. jaintiana* is, however, easily separable from the latter three greyish species by the lack of mesostyles on  $M^1$  and  $M^2$  (on the other species these cusps are reduced in bulk but still clearly defined). *M. jaintiana* is further distinguished from these species by the following features.

*M. beelzebub* is larger in all respects with no overlap in forearm and craniodental measurements. The closely related and similar-sized *M. cineracea* differs in the ventral pelage where only the proximal half is dark brown (in *M. jaintiana* the very dark colouration extends to two-third of the length of individual hairs). In addition, the rostrum of *M. cineracea* is deep, the sagittal crest always present, albeit weak, the zygoma are stronger,  $C^1$  and  $P^2$  are wider at the base and more robust. In *M. jaintiana*, the rostrum is less massive in lateral view, there is no sagittal crest, the zygoma are weaker, and it has more slender  $C^1$  and  $P^2$  (Fig. 8).

In *M. tubinaris* the plagiopatagium is attached to the proximal phalanx of the outer toe and the zygoma are characteristically weak (whereas in *M. jaintiana* the attachment point is the base of the claw and the zygomatic arch is relatively strong) (Fig. 8).

Although it exhibits distinctive differences in colour and in general dental structure, the sympatrically occurring *M. cyclotis* is also characterised by the lack of mesostyles on  $M^1$  and  $M^2$ . However, in the case of this species the position of paracones and metacones in relation to the protocone shows a different cusps pattern (Fig. 6).

DISTRIBUTION AND ECOLOGY: The holotype specimen of *M. jaintiana* was caught in a harp-trap set in the understory of a bamboo grove growing along a small



FIG. 7

Lateral, dorsal and occlusal views of skull and mandible of *M. jaintiana* (holotype, MHNG 1976.072). Scale = 10 mm.

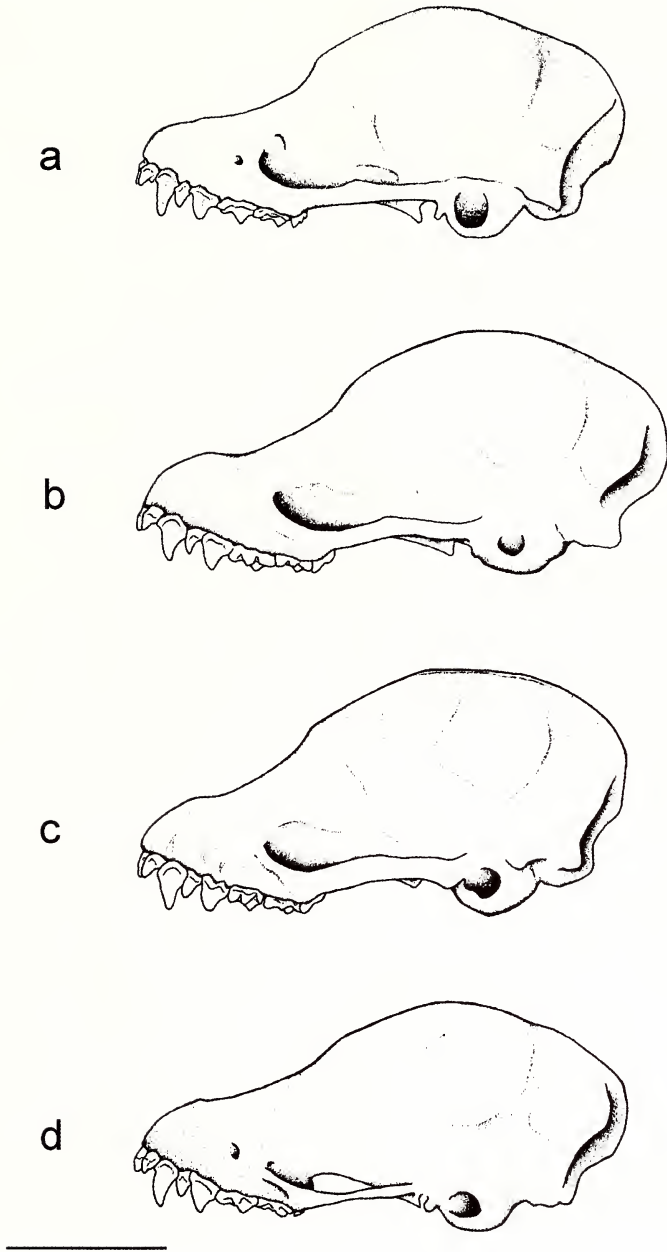


FIG. 8

Lateral views of skulls of (a) *M. jaintiana* (holotype, MHNG 1976.072); (b) *M. beelzebub* (holotype, HNHM 2007.50.24.); (c) *M. cineracea* (holotype, HNHM 2005.81.35.); (d) *M. tubinarius* (Pakistan, HNHM 99.14.7.). Scale = 5 mm.

tributary of the Kopili River. This narrow stretch of bamboos is surrounded by secondary, semi-deciduous forest located close to the village of Kseh. This forested area is heavily exploited for firewood and regularly burnt for the needs of shifting cultivation practice. Other species of bats captured in the same area include typical forest species (*Murina cyclotis*), and species more linked to cave roosts (*Rhinolophus affinis*, *R. pusillus*, *R. macrotis*, *R. pearsoni*, *R. luctus*, *Hipposideros cineraceus*, *H. larvatus*, *H. lankadiva*, *Myotis cf. longipes*, *Miniopterus magnater* and *Ia io*). Several karstic caves are indeed found in the same area and bats roosting there were observed using the bamboo grove as an alley to reach feeding areas along the Kopili River and surrounding forests. It is thus unclear if *M. jaintiana* was roosting, hunting or commuting through this bamboo grove. The holotype male had enlarged testis, suggesting that it was sexually active at that time of the year (February). Specimens in the Chin Hills were collected at an elevation of ca. 1500 m; according to its label, one of them was caught in a hollow in a ficus tree. The Chin Hills are covered by semi-deciduous forests similar to those found in the Jaintia Hills.

#### *Molecular comparisons*

Ten of the 12 essayed specimens yielded cyt-b and rag 2 sequences (Table 1); all sequences were in frame for coding proteins, with no stop codon or insertion that could suggest the presence of non-functional copies of these genes (paralogs). The new sequences were blasted against all available sequences in the GenBank (as of 4 November 2011), but none matched those of *M. jaintiana* or *M. pluvialis*. For the cyt-b gene, the divergence within species of *Murina* (mean K2P distance = 1.9%) was about ten times smaller than interspecific divergence (mean 17.0%), which correspond with the general pattern of divergence measured among bat taxa (Bradley & Baker, 2001, Anrawali Khan *et al.*, 2010). Likewise, the cyt-b sequence of *M. jaintiana* differed from any other *Murina* by at least 9.6%, whereas a minimum distance of 16.9% distinguished *M. pluvialis* from other taxa (Table 4).

For the more conserved nuclear rag 2 gene, these figures of divergence are lower, but still *M. jaintiana* and *M. pluvialis* had unique sequences, differing by at least 2 to 10 mutations from any other related taxa (data not shown). The mean intraspecific divergence for that gene was 0% (all conspecific sequences being identical), while they differed by a mean of 2.0% in interspecific comparisons.

Phylogenetic reconstructions were largely congruent between the two methods used (BA and NJ). The more rapidly evolving and longer (1140 bp) mitochondrial cyt-b gene expectedly yielded more resolved nodes (Fig. 9), compared to the smaller (749 bp) and more conserved fragment of nuclear rag 2 gene (Fig. 10), but the different taxon sampling in both data sets impaired further comparisons of phylogenetic performance. In all reconstructions, *M. jaintiana* appeared closely related but distinct from Southeast Asian *M. cineracea*, and also differed significantly from other sympatric species sequenced from Meghalaya (i.e. *M. pluvialis* and *M. cyclotis*). The phylogenetic position of *M. pluvialis* using the cyt-b data set and BA was unresolved within the *Murina* radiation (Fig. 9), but NJ reconstructions placed it sister to the Southeast Asian *M. sp. A*, albeit with low support (34% bootstrap). The nuclear rag 2 data set was more decisive in this situation, and clearly placed *pluvialis* sister to *M. sp. A* with 100% posterior probability (BA) or 83% bootstrap support (Fig. 10).



TABLE 4 : Mean K2P genetic distance within (diagonal, *underlined italics*) and between (below diagonal) species of *Murina* calculated for the mitochondrial cytochrome b gene. Values are given as percentages.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 <i>M. aena</i>	-															
2 <i>M. sp. A</i>	18.3	<u>1.7</u>														
3 <i>M. bicolor</i>	19.0	17.9	<u>0.9</u>													
4 <i>M. cineracea</i>	15.8	16.0	16.9	<u>2.3</u>												
5 <i>M. cf. cyclotis</i>	16.8	17.8	18.4	16.4	<u>5.3</u>											
6 <i>M. cyclotis</i>	16.7	16.8	19.1	16.6	12.8	-										
7 <i>M. florum</i>	15.7	18.4	17.9	14.9	19.1	18.0	-									
8 <i>M. hilgendorfi</i>	16.9	18.0	14.5	17.3	18.7	17.0	18.6	-								
9 <i>M. cf. huttoni</i>	19.4	18.1	18.6	18.4	17.5	16.3	19.2	18.8	-							
10 <i>M. jaintiana</i> sp. nov.	18.8	17.1	17.5	9.6	17.4	18.7	15.8	18.8	18.8	-						
11 <i>M. leucogaster</i>	18.0	18.9	9.0	16.8	16.6	18.0	16.8	14.8	19.3	17.1	<u>0.8</u>					
12 <i>M. peninsularis</i>	17.4	18.3	18.3	17.3	14.8	15.8	20.1	18.5	19.8	19.1	18.9	-				
13 <i>M. phivalis</i> sp. nov.	17.7	16.9	19.2	17.9	18.0	17.4	18.6	19.1	17.9	18.0	20.0	17.8	-			
14 <i>M. puta</i>	20.0	18.7	17.6	18.2	19.6	18.4	19.8	18.4	8.6	20.3	18.3	18.7	20.5	-		
15 <i>M. suilla</i>	14.5	18.7	21.2	16.9	18.1	18.7	8.3	18.8	19.3	17.8	18.6	19.1	17.6	21.1	-	
16 <i>M. tiensa</i>	18.0	17.5	18.7	17.4	17.8	18.3	18.4	17.9	14.8	18.2	19.6	17.3	17.3	14.3	19.3	<u>0.7</u>

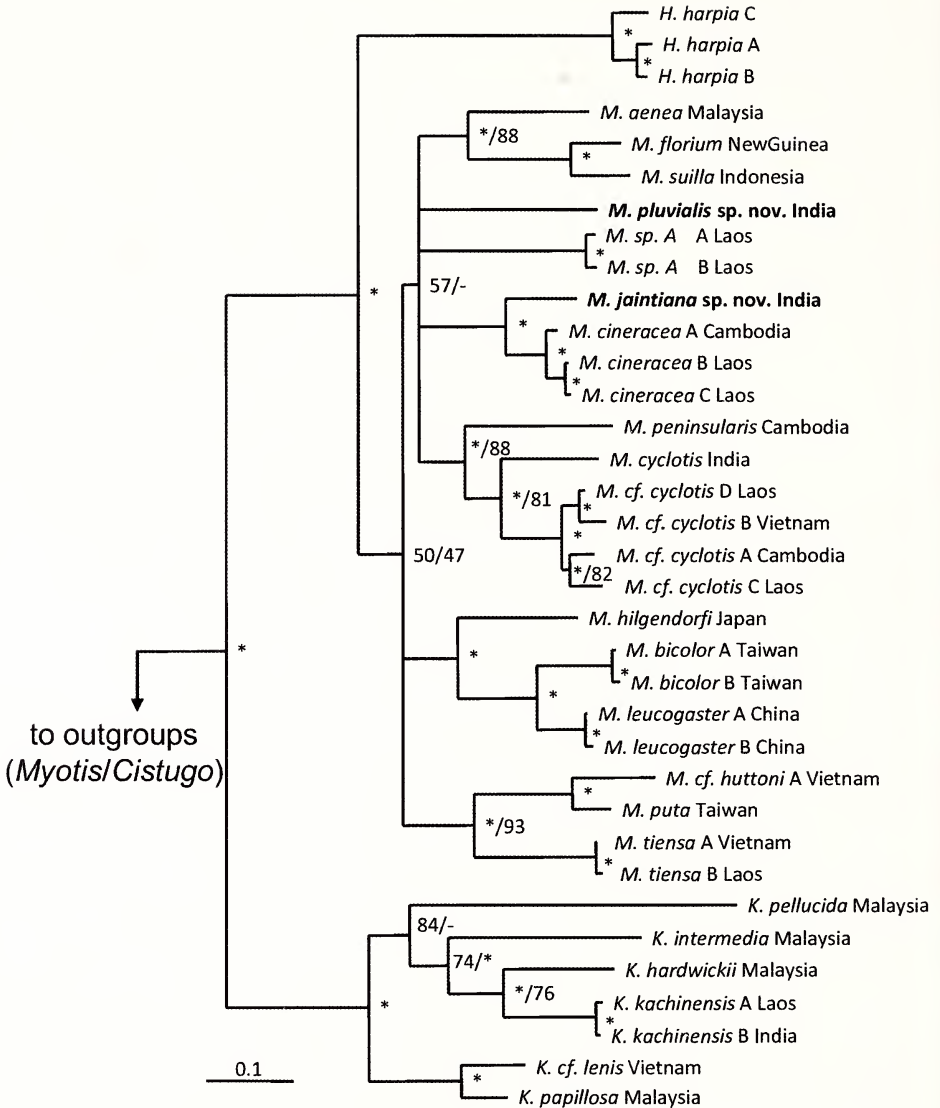


FIG. 9

Bayesian consensus tree representing the phylogenetic relationships of *Murina* (*M.*), *Kerivoula* (*K.*) and *Hapiocephalus* (*H.*) based on sequences (1140 bp) of the mitochondrial *cyt-b* gene. Some outgroups (genus *Myotis* and *Cistugo*) were omitted. An asterisk (\*) associated to a node denotes that it is supported by at least 95% posterior probability (BA reconstructions) and /or 95% bootstrap (NJ reconstructions): other values are given as percentages. The scale bar represents 0.1 changes.

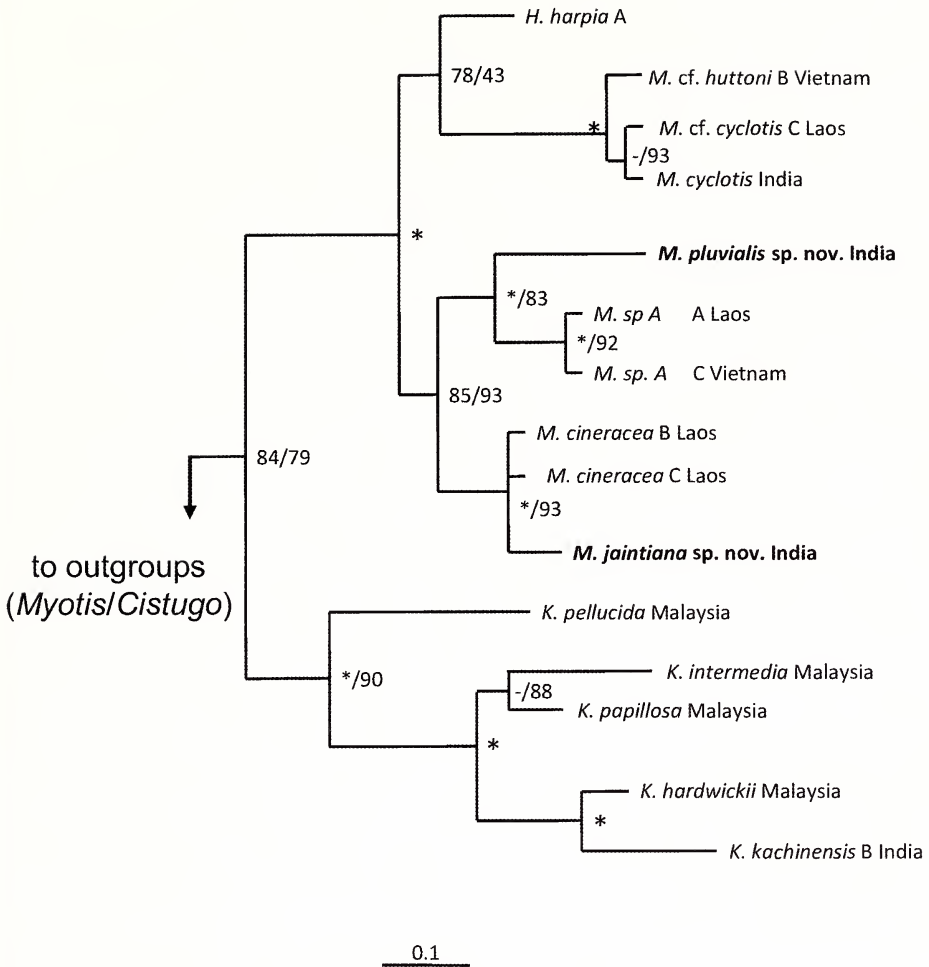


FIG. 10

Bayesian consensus tree representing the phylogenetic relationships of *Murina* (*M.*), *Kerivoula* (*K.*) and *Hapiocephalus* (*H.*) based on sequences (749 bp) of the nuclear rag 2 gene. The legend is otherwise the same as for Fig. 9.

## DISCUSSION

The use of previous keys to identify Indian bats (e.g. Bates & Harrison, 1997, Sinha, 1999, Srinivasulu *et al.*, 2010) would classify *M. pluvialis* as “*M. cyclotis*” albeit with unusually large forearm and a unique mixture of whitish and dark ventral coloration; while *M. jaintiana* would key out as “*M. tubinaris*”. This latter species has now been confined to the extreme western Himalayan foothills and specimens outside this area formerly regarded as belonging to this species were described as *M. cineracea* (Csorba *et al.*, 2011). While describing *M. cineracea*, the authors were already aware of the peculiar cranial and dental characters specific to the Chin Hills specimens

but these morphological features alone were not considered sufficiently convincing to separate them from Indochinese *M. cineracea* at species level.

The use of molecular sequences, both from the mitochondrial and nuclear genome, and careful examination of anatomic details of vouchered specimens were essential elements which helped us resolve the taxonomic and systematic position of these enigmatic specimens. As a consequence of these taxonomic changes, the geographic area formerly regarded as occupied by "*M. tubinaris*" now harbours at least four different, apparently parapatric species, namely *M. tubinaris* (sensu stricto) in the northwest Himalayas; *M. jaintiana* sp. nov. in the Jaintia Hills, India and in the Chin Hills, Myanmar; *M. cineracea* in Indochina; and *M. beelzebub* in the Central Annamites, Indochina. The specific identity of specimens from West Bengal, Arunachal Pradesh and areas of northern Myanmar, as well as the exact distributional limits of these cryptic species still remains to be investigated.

The significance of the karstic caves found in the vicinity of capture areas of both of the new *Murina* species is unknown as yet. But because Indomalayan *Murina* in general are forest bats not associated with caves for roosting they are probably not directly affected by the continued existence of caves, but rather more dependent on the forested habitats. However, the increased demand for firewood and deforestation associated with mining activities certainly threaten the long-term existence of all forest species. Heavily exploited forests for firewood and shifting cultivation practiced in the immediate areas of the type locality of both *M. jaintiana* (Harries *et al.*, 2008) and *M. pluvialis* (Biswas, 2009) represent important threats to the survival of these (and other) bats. The use of new collection techniques and the re-examination of previously preserved museum material in the light of new external and dental characters given in this study will provide a better understanding of the exact distribution and conservation status of these new species. At least *M. jaintiana* is now recorded in the nearby forests of Myanmar, that harbour more extensive forests similar to those of Meghalaya (e.g. Struebig *et al.*, 2005), and thus may provide adequate habitats for sustainable populations of these forest bats.

The current checklist of Indian bats includes 117 species (Talmale & Pradhan, 2009), of which 58 occur in the state of Meghalaya (Bates & Harrison, 1997, Sinha, 1999, Thabab, 2005). To this figure, we add two species previously unknown to science (*M. pluvialis* and *M. jaintiana*) and record *Kerivoula kachinensis* for the first time (Table 1), which again highlight that this region needs continued studies to be properly surveyed.

#### ACKNOWLEDGEMENTS

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## APPENDIX

INSTITUTIONAL ABBREVIATIONS: Specimens and tissue samples included in this study are held in the collections of BM(NH): The Natural History Museum, London, UK, formerly British Museum (Natural History). – CMF: Charles M. Francis collection, Canada). – EBD: Estacion Biologica de Doñana, Sevilla, Spain). – FMNH: Field Museum of Natural History, Chicago, USA. – HNHM: Hungarian Natural History Museum, Budapest, Hungary. – HZM: Harrison Institute, Sevenoaks, UK, formerly Harrison Zoological Museum. – IEBR: Institute of Ecology and Biological Resources, Hanoi, Vietnam. – KK: Kuniko Kawai collection, Japan. – M: Manuel Ruedi collection, Switzerland. – MHNG: Muséum d'histoire naturelle, Geneva, Switzerland. – MVZ: Museum of Vertebrate Zoology, Berkeley, USA. – NF: Kim Hy Nature Reserve Collection, Vietnam. – NMP: National Museum Prague, Prague, Czech Republic. – RMNH: National Museum of Natural History, Leiden, the Netherlands, formerly Rijksmuseum van Natuurlijke Historie. – ROM: Royal Ontario Museum, Toronto, Canada; TK. – Museum of Texas Tech University, Texas, USA. – ZMMU: Zoological Museum of Moscow University, Moscow, Russia.

## Comparative material examined

*Murina aenea*: MALAYSIA (Pahang) – BM(NH) 64.770 (holotype).

*Murina* sp. A: LAOS – MHNG 1926.034; VIETNAM – HNHM 2008.23.10., IEBR XN100.

*Murina beelzebub*: VIETNAM – HNHM 2007.50.24. (holotype), HNHM 2007.50.6., 2007.50.7., HZM 3.32053.

*Murina cineracea*: CAMBODIA – HNHM 2005.81.35. (holotype), 2005.84.4., 2005.81.36., 2005.81.49.-53., 2006.34.40.; LAOS – MHNG 1926.035; VIETNAM – HNHM 2000.84.7., HZM 1.31524, 1.31780, IEBR QHB005, TS12, 32CMR, T210708.1, T251107.5, T290708.8, T250607.1, T112, T83, VN01-C4; NF 071206.2, 250407.1.

*Murina cyclotis*: CAMBODIA – HNHM 2005.81.33., 2005.81.48., 2006.34.2., 2006.34.34., 2006.34.38., 2007.49.10.; INDIA – BM(NH) 9.4.4.4 (holotype), 15.9.1.38, 16.3.25.28-29, 20.6.24.1; LAOS – MHNG 1926.033; MYANMAR – BM(NH) 16.3.26.3-4, 16.3.26.89, 50.484; NEPAL – HNHM 98.7.3.; THAILAND – BM(NH) 78.2383, 82.165; VIETNAM – BM(NH) 1997.384, HNHM 2000.84.3., 98.3.3., IEBR NTS1597.

*Murina harrisoni*: Cambodia – HZM 1.36316 (holotype).

*Murina huttoni*: INDIA – BM(NH) 79.11.21.685 (holotype).

*Murina peninsularis*: MALAYSIA (Pahang) – BM(NH) 64.771 (holotype).

*Murina puta*: TAIWAN – HNHM 98.19.4., 98.19.6.

*Murina rozendaali*: MALAYSIA, SABAH – BM(NH) 83.36 (holotype), 84.2025, 1999.300; RMNH 32235; PENINSULAR MALAYSIA – BM(NH) 1999.301.

*Murina tiensa*: VIETNAM – HZM 2.38178 (holotype).

*Murina tubinaris*: INDIA (Himachal Pradesh) – MHNG 1926.060; “KASHMIR” – BM(NH) 3.9.29.2; PAKISTAN – BM(NH) 65.1023, HNHM 99.14.6. HNHM 99.14.7., BM(NH) 1999.151.





***Pseudocrepidobothrium ludovici* sp. n.  
(Eucestoda: Proteocephalidea), a parasite of *Phractocephalus  
hemiolepis* (Pisces: Pimelodidae) from Brazilian Amazon**

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***Pseudocrepidobothrium ludovici* sp. n. (Eucestoda: Proteocephalidea), a parasite of *Phractocephalus hemiolepis* (Pisces: Pimelodidae) from Brazilian Amazon.** - *Pseudocrepidobothrium ludovici* sp. n., is described from the intestine of the pimelodid fish, *Phractocephalus hemiolepis* (Bloch and Schneider, 1801) (Pisces: Pimelodidae), from the Amazon River in Brazil. The new species differs from the only other known congeneric species *Pseudocrepidobothrium eirasi* (Rego & de Chambrier, 1995), by the absence of ventral lateral posterior appendix on each side of the proglottides. Furthermore, the new species differs from *P. eirasi* by several other morphological characters such as the number of testes (21-51,  $x = 32$  versus 37-79,  $x = 55$ ), the absence of polar structure in the eggs, the structure of the scolex and the disposition of vitelline follicles. Prevalence of infection with *Pseudocrepidobothrium ludovici* is 12/29 (41%) in Brazil. No *P. ludovici* was found in Peru into the 11 *P. hemiolepis* studied. A total of 12228 proteocephalidean cestodes were found in a single host specimen: 10641 *Pseudocrepidobothrium eirasi* (Rego & de Chambrier, 1995) (87 % of counted tapeworms), 1100 *P. ludovici* sp. n. (9%), 383 *Scholzia emarginata* (Diesing, 1850), 84 *Chambriella* sp., 15 *Proteocephalus hemiolepteri* de Chambrier & Vaucher, 1997, 4 *Zygobothrium megacephalum* Diesing, 1850, and 1 *Ephedrocephalus microcephalus* Diesing, 1850. *Pseudocrepidobothrium ludovici* sp. n. represents the seventh proteocephalidean species found in *Phractocephalus hemiolepis*.

**Keywords:** Taxonomy - morphology - Pisces - South America - new species - tapeworm - distribution - guild.

## INTRODUCTION

Among the six proteocephalidean species (Cestoda) found in the pimelodid catfish *Phractocephalus hemiolepis* (Bloch & Schneider, 1801), one was classified provisionally into the genus *Crepidobothrium* Monticelli, 1900 as *Crepidobothrium eirasi* Rego & de Chambrier, 1995 (Rego and de Chambrier, 1995). Based on distinct scolex suckers and morphology of reproductive organs, this species was later allocated to a new genus, *Pseudocrepidobothrium* (see Rego & Ivanov, 2001). Another unknown proteocephalidean tapeworm belonging to *Pseudocrepidobothrium* Rego & Ivanov,

2001 was discovered in the intestine of *P. hemioliopterus* during a survey of fish parasites conducted in Brazil between 1992 and 1995 by Amilcar Arandas Rego and the junior author. Since this cestode differs from the only other known species of *Pseudocrepidobothrium*, it is described here as a new taxon.

## MATERIALS AND METHODS

Twenty-nine specimens of *Phractocephalus hemioliopterus* (Bloch & Schneider, 1801) (vernacular name in Brazil "Pirarara") were caught by local fishermen at Itacoatiara, Amazon River, about 200 km east of Manaus, Brazil, on 15-25 October 1992 (8 specimens) and 1-21 November 1995 (21 specimens). Eleven specimens of *P. hemioliopterus* were also obtained from the Iquitos market at Loreto, Peru, on 23 May 2005 (2 specimens), on 9-19 September 2006 (2 specimens), on 12-20 October 2009 (4 specimens), and on 4-12 October 2011 (3 specimens).

The fish were examined for internal parasites immediately after their capture. The parasites were isolated from the host intestine and fixed with hot 4% neutral formaldehyde solution and subsequently stored in 70% ethanol. These specimens were then stained with Mayer's hydrochloric carmine solution, dehydrated in an ethanol series, cleared with eugenol (clove oil) and mounted in Canada balsam. For histology, fragments of strobila were embedded in paraffin wax, transversely sectioned at 15-18  $\mu\text{m}$  intervals, stained with Weigert's hematoxylin and counterstained with 1% eosin B with one drop of acetic acid/100 ml solution (Scholz & Hanzelová, 1998; de Chambrier, 2001; Oros *et al.*, 2010). Eggs were examined in distilled water. Three specimens were used for scanning electron microscope observations using the procedure outlined by de Chambrier *et al.* (2008). Furthermore, numerous additional specimens of the new *Pseudocrepidobothrium* were found among the Woodland material (slides and spirit material) deposited at the Natural History Museum, London (NHMUK) 1964.12.15.71-86, 1965.2.23.156-158, 1983.5.17.2-10 and 1965.2.23.146-155, ("Cotype" of *Myzophorus pirarara*), mixed with *M. pirarara* [= *Scholzia emarginata* (Diesing, 1850)].

The specimens described hereafter are deposited in the helminthological collection of the Natural History Museum, Geneva, Switzerland (MHNG), the Natural History Museum London (NHMUK), the Institute of Parasitology, Ceské Budejovice (IPCAS) and the Helminthological collection of the Museo Argentino de Ciencias Naturales, Buenos Aires (MACN). All measurements are given in micrometers unless otherwise indicated. Abbreviations used in descriptions are as follows:  $\bar{x}$  = mean;  $n$  = number of measurements; CV = coefficient of variation.

## RESULTS

### *Pseudocrepidobothrium ludovici* sp. n.

Figs 1-16

TYPE MATERIAL: Holotype MHNG INVE 22003, 1 whole mounted slide, field number Br 334. – 29 paratypes MHNG INVE 22000, 22108, 30531-32, 79281-85, 79302, 79306-20, 79327, 79335, 79340-41. – 2 paratypes IPCAS C-610, field number Br 785, Br 649 3/5z; 1 paratype NHMUK 2012.1.23.1, field number Br 785.

OTHER MATERIAL: From Itacoatiara, Amazon River, Amazonas Province, Brazil; collected 15-17.09.1992; MHNG INVE 22001, 22003, 22016, 79281-85, 79305. – Same locality as in

previous series, collected 01-18.10.1995: MHNG INVE 22000, 22047, 22103, 22108, 25600, 25610, 27437, 28298, 30531-32, 31199, 35186, 79302-04, 79306-20, 79327, 79333, 79335, 79337-42, 79345, 79349-50, 79354, 79356, 79360, 79363-64, 79388; NHMUK 2012.1.12.1; IP-CAS No C-610 (Br 695z paratypes, cross section; Br 649 3/5 & Br 804, Br 804a), MACN No. 520/1-3 (Br 649 3/5y).

TYPE LOCALITY: Itacoatiara, Amazon River, Amazonas Province, Brazil, 17.09.1992. 03.1536°S 58.4382°W, Field number Br 334, A. de Chambrier & A. A. Rego leg.

DESCRIPTION (BASED ON 32 ENTIRE SPECIMENS): Proteocephalidae, Proteocephalinae. Small-sized worm, 7-23 mm long, up to 1150 wide, flattened dorsoventrally. Strobila acraspedote, anapolytic, bearing 20-36 proglottides in total, 9-22 immature, 1-6 mature, 3-19 gravid. Proliferation zone posterior to scolex short, up to 620 long and 283-765 wide. Immature and mature proglottides wider than long; pregravid proglottides wider than long, then longer than wide and gravid proglottides longer than wide. Some abnormal proglottides (e.g. with hypertrophy of vitelline follicles) were not considered in this study.

Scolex massive, round, 515-1020 in diameter ( $x = 775$ ,  $n = 23$ ) (Figs 1-4, 7), clearly separated from strobila. Apical tegumental folds present (Figs 2, 4). Four heart-shaped suckers, with notched posterior margin, disposed dorsally and ventrally by pairs, 230-385 ( $x = 290$ ;  $n = 12$ ) in diameter (Fig. 5). Apical organ absent. Scolex usually rectangle-shaped in apical view. Surface of scolex uniformly covered with capilliform filitriches (Fig. 6).

Internal longitudinal musculature weakly developed (Figs 13, 14) forming small anastomosed bundles of muscular fibers. Osmoregulatory canals usually situated between vitellaria and testes. Ventral canals about 35 in diameter with a secondary canal situated posteriorly near lateral margin and which seems to end at ventral surface (Fig. 8). Dorsal osmoregulatory canals about 15 in diameter, sometimes anastomosed or double.

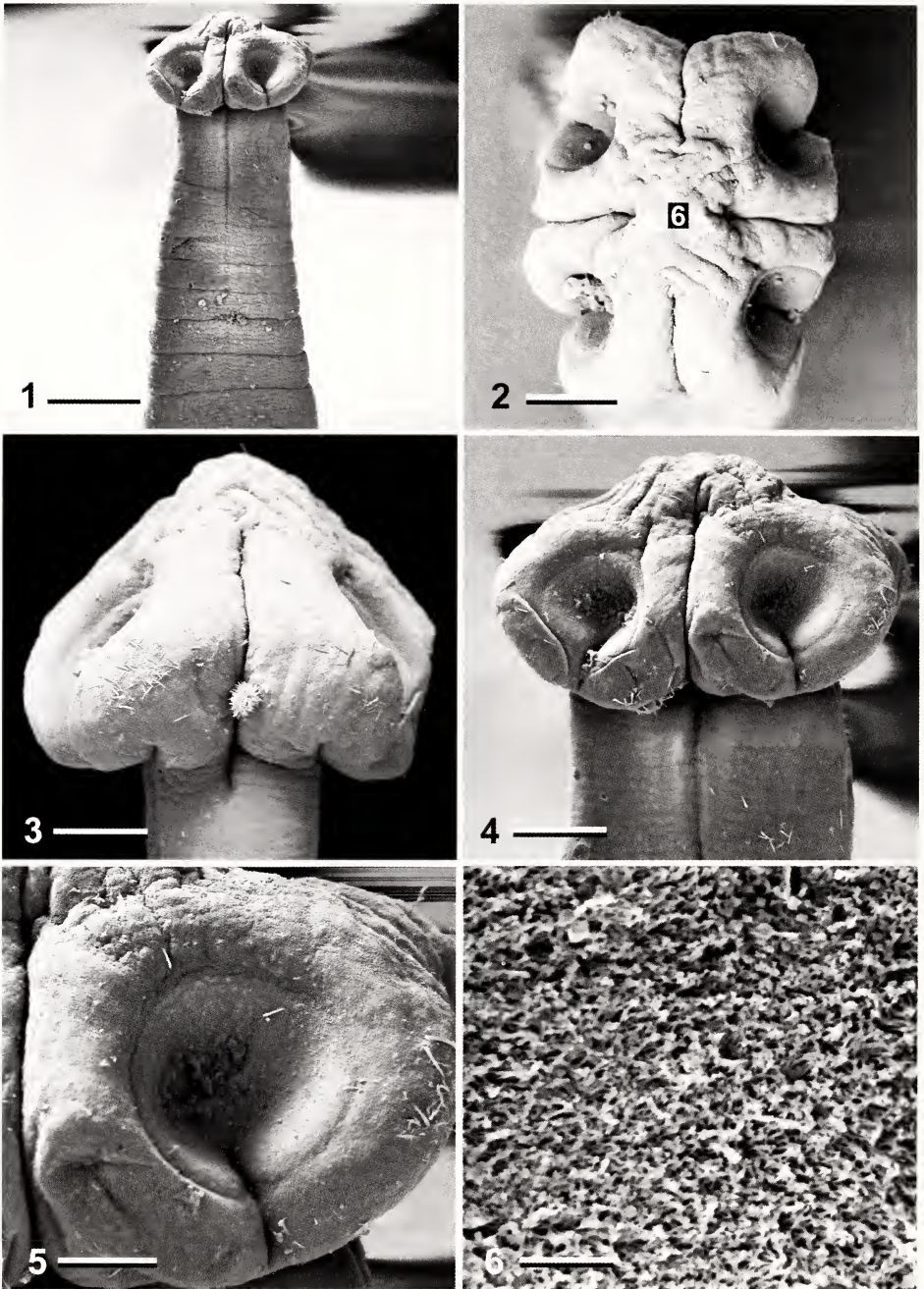
Testes medullary, spherical to oval, 50-95 by 25-85 in diameter, numbering 37-79 ( $x = 55$ ,  $n = 37$ ,  $CV = 19\%$ ), in one (rarely two) layer, in two lateral fields (Figs 8-10, 13), usually connected with some testes anteriorly; testes degenerated in last gravid proglottides. Vas deferens coiled, very thin-walled, reaching to midline of proglottis, rarely overlapping it (Fig. 8). Cirrus-sac elongate to piriform, thin-walled, 155-260 long and 65-125 wide, representing 25-35% ( $x = 30\%$ ,  $n = 30$ ,  $CV = 9\%$ ) of proglottis width. Cirrus occupying 35-57% ( $n = 26$ ) of cirrus-sac length (Fig. 11).

Genital ducts passing between osmoregulatory canals. Genital atrium present. Genital pores irregularly alternating, situated at 15-29% ( $x = 22\%$ ,  $n = 28$ ,  $CV = 14\%$ ) of proglottis length.

Vagina posterior (in 53% of proglottides) or anterior (in 47% of proglottides,  $n = 112$ ) to cirrus-sac, in proximal part lined with chromophil cells. Muscular terminal sphincter present (Fig. 11). Mehlis' glands 35-100 in diameter, representing 6-14% of proglottis width.

Ovary medullary, bilobed, butterfly-shaped in gravid proglottides, 310-565 wide, occupying 53-67% ( $x = 59\%$ ,  $n = 30$ ,  $CV = 6\%$ ) of proglottis width (Figs 8-10, 14).





FIGS 1-6. *Pseudocrepidobothrium ludovici* sp. n. from *Phractocephalus hemioliopterus*. Scanning electron photomicrographs. MHNG INVE 79302, paratype. (1) Scolex, dorsoventral view, with a anterior part of strobila. (2) Scolex, apical view. (3) Scolex, lateral view. (4) Scolex, dorsoventral view. (5) Detail of a sucker. (6) Capilliform filitriches near the center of the apical region. Scale-bars: 1 = 300  $\mu$ m; 2 = 130  $\mu$ m; 3 = 95  $\mu$ m; 4 = 110  $\mu$ m; 5 = 60  $\mu$ m; 6 = 3  $\mu$ m.



Vitelline follicles medullary and paramuscular (according to de Chambrier, 1990), oval to elongate, small, in two lateral fields, absent in preporal area, occupying porally 63-78% ( $x = 69\%$ ;  $n = 16$ ) and aporally 75-95% ( $x = 84\%$ ;  $n = 17$ ) (Figs 8-10, 13, 14).

Anlage of uterus medullary, already present in immature proglottides. Uterus with 14-20 very short lateral diverticula on each side (Fig. 12). Formation of uterus of type 1 according to de Chambrier et al. (2004a): uterine stem with tubular concentration of numerous intensely staining cells and with lumen in last immature and first mature proglottides (Figs 8, 9, 13, 14). In mature proglottides, thin-walled lateral diverticula appear. In pregravid proglottides, eggs filling uterine stem and diverticula. In gravid proglottides, uterus sometimes opening precociously ventrally by one longitudinal aperture and sometimes conserving eggs up to last proglottis. In last proglottides, uterus occupies up to 71% of proglottis width (Fig. 11)

Eggs spherical, with thin, hyaline outer envelope, up to 60 in diameter; inner envelope consisting in two-layered embryophore, with external thick layer, 17 in diameter, and nucleate irregular envelope, 12-14 in diameter; oncospheres 8-9 in diameter, with 3 pairs of embryonic hooks, 5-6 long (Figs 15, 16).

TYPE-HOST: *Phractocephalus hemioliopterus* (Bloch & Schneider, 1801), (Siluriformes: Pimelodidae).

SITE OF INFECTION: From anterior to middle of the intestine.

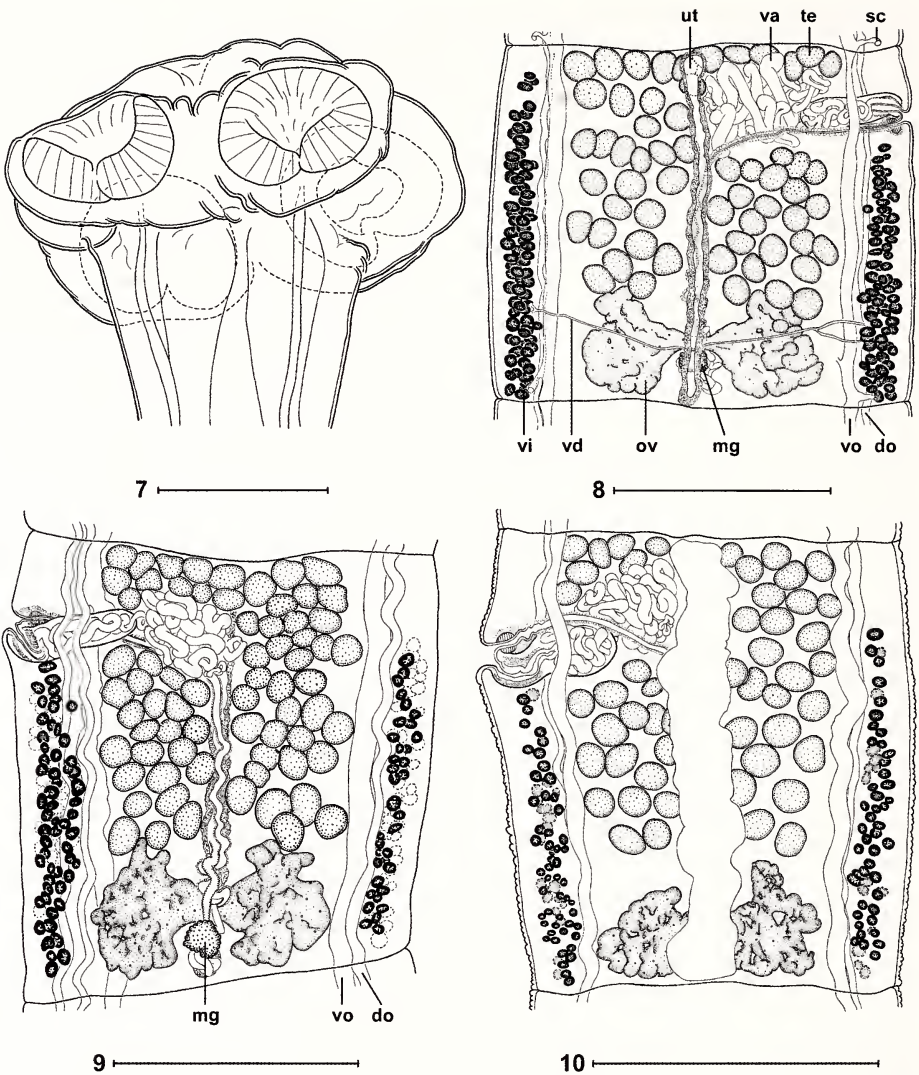
PREVALENCE: 12/29 (41%) in Brazil, 0/11 (0%) in Peru.

ETYMOLOGY: The new species is named in honour of Ludovic Ruedi, brother of the first author.

DIFFERENTIAL DIAGNOSIS: The present species is placed in *Pseudocrepidobothrium* Rego and Ivanov, 2001 (Proteocephalinae) because of the medullary position of the genital organs, the medullary and paramuscular position of vitellaria and the heart-shaped structure of suckers (Freze, 1965; Schmidt, 1986; Rego and Ivanov, 2001).

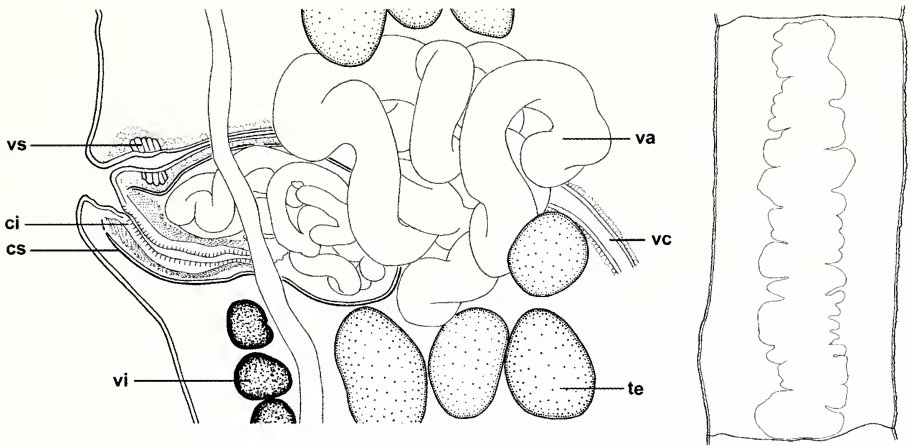
The present species differs from *Pseudocrepidobothrium eirasi*, the only other species known in that genus, by the following characters: absence of appendix at the ventral posterior edge of each side of the proglottis, absence of a polar structure on the egg, number of testes (37-79,  $x = 55$  in *P. ludovici* versus 21-51,  $x = 32$ ), the disposition of vitelline follicles (more numerous posteriorly in *P. eirasi*) the number of segments (20-36 in *P. ludovici* versus 7-12 for *P. eirasi*) and the shape of the scolex (which is usually rectangular in apical view in *P. ludovici* and square in apical view in *P. eirasi*, see Fig. 2 in the present paper, and Fig. 9 in Rego and Ivanov, 2001).

In a recent paper (de Chambrier et al., 2004a, Fig. 1), the genus *Pseudocrepidobothrium*, including by *P. eirasi* and *Pseudocrepidobothrium* sp. (= *P. ludovici* sp. n.) represented a natural taxon, because the 28S sequences data strongly supported a close relationship between both species. In a forthcoming paper dealing with molecular reconstructions, both species also represent a monophyletic group (unpublished data).

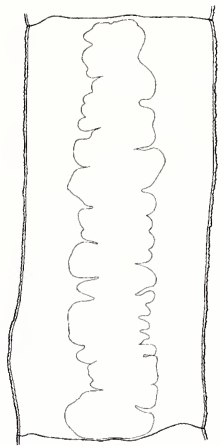


FIGS 7-10. *Pseudocrepidobothrium ludovici* sp. n. from *Phractocephalus hemiliopterus*. (7) MHNG INVE 79281, paratype. Scolex, dorsoventral view. (8) MHNG INVE 22003, holotype. Mature proglottis, ventral view. (9) Mature proglottis, dorsal view; note secondary canals of the ventral osmoregulatory canals. (10) Gravid proglottis, ventral view. *Abbreviations:* do = dorsal osmoregulatory canal; mg = Mehlis gland; ov = ovary; sc = secondary canal; te = testes; ut = uterus; va = vas deferens; vd = vitelloduct; vi = vitellaria; vo = ventral osmoregulatory canal. Scale-bars: 7 = 250  $\mu$ m; 8-10 = 500  $\mu$ m.

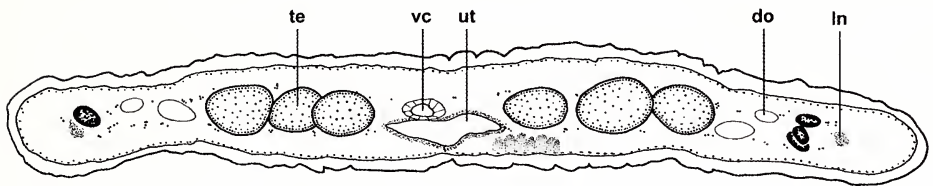
FIGS 11-16. *Pseudocrepidobothrium ludovici* sp. n. from *Phractocephalus hemiliopterus*. (11) MHNG INVE 79283, paratype. Cirrus-sac and vagina, dorsal view; note the presence of a vaginal sphincter. (12) Schematic view of the uterus in gravid proglottis. (13) MHNG INVE 79341, paratype. Pregravid proglottis, transverse section at testes level. (14) MHNG INVE 79341, paratype. Pregravid proglottis, transverse section at ovarian level. (15, 16) Eggs in distilled water, captured with Leica DMLB, showing the bi-layered embryophore. (15) IPCAS C-610,



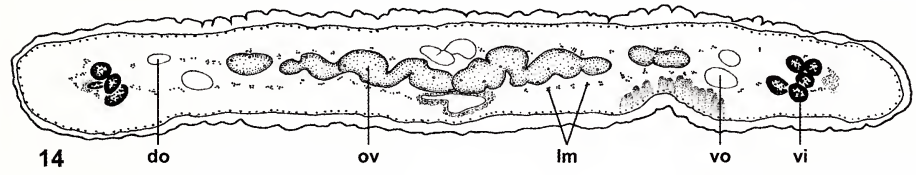
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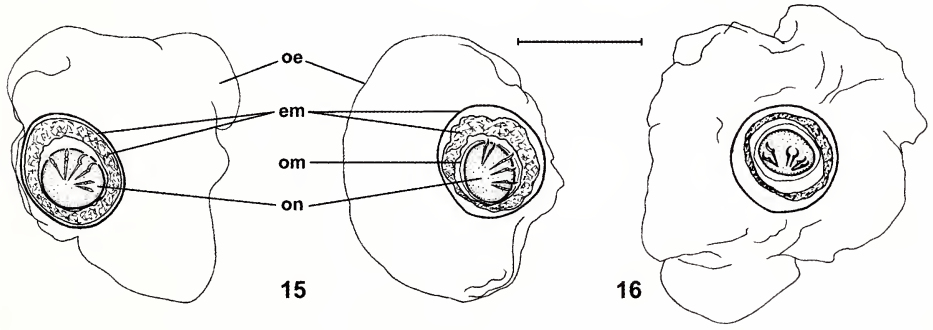
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13



14



15

16

(Field number Br 649 3/5w). (16) MHNG INVE 22103, (field number Br 445). *Abbreviations:* ci = cirrus; cs = cirrus-sac; do = dorsal osmoregulatory canal; em = embryophore; lm = internal longitudinal musculature; ln = longitudinal lateral nerves; oe = outer envelope; om = oncospheric membrane; on = oncosphere; ov = ovary; te = testes; ut = uterus; va = vas deferens; vc = vaginal canal; vi = vitellaria; vo = ventral osmoregulatory canal; vs = vaginal sphincter. Scale-bars: 12 = 500  $\mu$ m; 11, 13, 14 = 250  $\mu$ m; 15, 16 = 20  $\mu$ m.



## DISCUSSION

The catfish *Phractocephalus hemiliopterus* from the Amazon River basin has been found to host the following six tapeworm species: 1) *Zygobothrium megacephalum* Diesing, 1850; 2) *Scholzia emarginata* (Diesing, 1850), [synonyms: *Tetrabothrium emarginatum* Diesing, 1850; *Nomimoscolex emarginatum* (Diesing, 1850) Rego *et al.*, 1999; *Myzophorus pirarara* Woodland, 1935; *Nomimoscolex pirarara* (Woodland, 1935); *Proteocephalus pirarara* (Woodland, 1935) de Chambrier & Vaucher, 1997]; 3) *Proteocephalus hemiliopteri* de Chambrier & Vaucher, 1997 [synonyms: *Myzophorus woodlandi* Rego, 1984; *Nomimoscolex woodlandi* (Rego, 1984) Rego & Pavanelli, 1992]; 4) *Pseudocrepidobothrium eirasi* (Rego & de Chambrier, 1995); 5) *Ephedrocephalus microcephalus* Diesing, 1850; 6) *Chambriella* sp. (Diesing, 1850; Woodland, 1935; Rego, 1984; Rego & Pavanelli, 1992; Rego & de Chambrier, 1995; de Chambrier & Vaucher, 1997, 1999; Rego *et al.*, 1999; de Chambrier *et al.*, 2004b; de Chambrier *et al.*, 2006). *Pseudocrepidobothrium ludovici* sp. n. represents the seventh proteocephalidean species parasitizing the intestines of *P. hemiliopterus*.

The uterus of *Pseudocrepidobothrium* occupies the whole length of the proglottis and reaches beyond the ovary, which is unusual among Proteocephalidea. All *Rudolphiella* species [*R. lobosa* (Riggenbach, 1895), *R. piranabu* (Woodland, 1934), *R. myoides* (Woodland, 1934), *R. szidati* Gil de Pertierra & de Chambrier, 2000, *R. piracatinga* (Woodland, 1935)], and some other taxa such as *Brooksiella praeputialis* (Rego, Dos Santos & Silva, 1974), *Proteocephalus sophiae* de Chambrier & Rego, 1994 or *Cairaella henrii* Coquille & de Chambrier, 2008 possess an uterus occupying the whole length of the proglottis (Riggenbach, 1896; Woodland, 1934, 1935; Rego, Santos & Silva, 1974; de Chambrier & Rego, 1994; Gil de Pertierra & de Chambrier, 2000; Coquille & de Chambrier, 2008). In comparison with the about 400 known proteocephalidean species, which possess a uterus rarely overlapping the ovary isthmus posteriorly (Freze, 1965; Schmidt, 1986; Rego *et al.*, 1999; de Chambrier & Vaucher, 1999; de Chambrier *et al.*, 2004b), this character is interesting as discriminant character.

In one *Phractocephalus hemiliopterus* measuring 108 cm in length (field number Br 649), we divided the intestine into five parts and fixed each part separately. We found a total of 12228 proteocephalidean cestodes: 84 *Chambriella* sp., 1 *Ephedrocephalus microcephalus*, 15 *Proteocephalus hemiliopteri*, 10641 *Pseudocrepidobothrium eirasi*, 1100 *P. ludovici* sp. n., 383 *Scholzia emarginata*, and 4 *Zygobothrium megacephalum* in the entire intestine. We sorted each part of the intestine separately and calculated the percentage of each species in each region (see Table 1). *P. eirasi* represented the most abundant species in this individual host with 87% of all tapeworms, followed by *P. ludovici* with 9%. It was observed that 97.6% of *P. eirasi* specimens were situated in the first two fifth of the intestine, and 74.1% of *P. ludovici* tapeworms occupied the same location. *Zygobothrium megacephalum* and *Ephedrocephalus microcephalus* were situated in the last three region of the intestine.

We found neither *P. eirasi* nor *P. ludovici* in the 11 *Phractocephalus hemiliopterus* dissected at Iquitos, Peru. This suggests that Peru might be out of the distribution of these two parasites. If we compare the prevalence of *P. eirasi* and *P. ludovici* in Brazil (55% and 41%, respectively), it is surprising not to observe these parasites in



TABLE 1. Species recovered Region of the intestine (from the anterior to the posterior end)

<i>Phractocephalus hemioliopus</i>	I	II	III	IV	V	Total number (Int)
<i>Pseudocrepidobothrium ludovici</i>	295 (26.8%)	520 (47.3%)	232 (21.1%)	41 (3.7%)	12 (1.1%)	1100 (9.0%)
<i>Pseudocrepidobothrium eirasi</i>	7058 (66.3%)	3325 (31.2%)	225 (2.1%)	27 (0.3%)	6 (0.1%)	10641 (87%)
<i>Scholzia emarginata</i>	310 (80.9%)	73 (19.1%)				383 (3.1%)
<i>Chambriella</i> sp.	33 (39.3%)	51 (60.7%)				84 (0.7%)
<i>Proteocephalus hemioliopleri</i>	13 (86.7%)	1 (6.7%)	1 (6.7%)			15 (0.1%)
<i>Zygobothrium megacephalum</i>			3 (75%)	1 (25%)		4 (0.03%)
<i>Ephedrocephalus microcephalus</i>				1 (100%)		1 (0.008%)
Total number of worms (Int)						12228 (100%)

the same river, just slightly upstream from the type locality. These variations in local prevalence might therefore depend on unknown biotic or abiotic factors.

*P. ludovici* is the seventh species and the sixth genus of Proteocephalidea described from *P. hemioliopus*. It is interesting to note that some Amazonian siluriforms also host a huge diversity of proteocephalidean genera: *Paulicea luetkeni* (= *Zungaro zungaro*) hosts seven genera representing seven species, *Pseudoplatystoma fasciatum* (= *P. punctifer*) can be infected with six genera representing seven species and *Brachyplatystoma flavicans* (= *B. rousseauxi*) harbours four genera representing five species (Rego *et al.*, 1999).

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