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Množství mrtvého a odumírajícího dřeva jako faktor ovlivňující diverzitu čeledi Anthribidae (Insecta: Coleoptera: Curculionoidea), významných indikátorů zachovalosti lesů na Madagaskaru

Přílohy k disertační práci

Autor: Ing. Miloš Trýzna

Školitel: prof. Ing. Bc. Jaroslav Holuša, Ph.D.

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Czech University of Life Sciences

Faculty of Forestry and Wood Sciences

Department of Forest Protection and Entomology

Quantity of dead and dying wood as the factor influencing the diversity of the family Anthribidae (Insecta: Coleoptera: Curculionoidea), being a significant indicator of well-preserved forests on Madagascar

Ph.D. Thesis

(appendix)

Author: Ing. Miloš Trýzna

Supervisor: prof. Ing. Bc. Jaroslav Holuša, Ph.D.

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Díl II. Přílohy k disertační práci

11 Seznam příloh

Příloha č. 1

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Coleoptera: Anthribidae, Fungus Weevils

Miloš Trýzna

Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ–165 21 Praha 6 - Suchdol, Czech Republic; email: anthribidae@gmail.com

Introduction

The family Anthribidae is part of the order Coleoptera, superfamily Curculionoidea (=Rhynchophora). At present it encompasses about 3800 species worldwide, representing roughly 1% of all known beetles. Anthribidae are diverse particularly in tropical and subtropical regions. For their development they require fungus-infested deadwood of predominantly deciduous trees in relatively intact humid forests with a relatively stable climate and diverse number of tree species.

Within this superfamily, fungus weevils are considered as primitive members. An apt characterization of the family's placement within the Curculionoidea system is provided by E. C. Zimmerman (1994): "Anthribidae are atypical weevils. Their anatomical features are so unusual as to lead to the conclusion that they diverged from the mainstream of curculionid evolution and pursued an independent course a very long time ago. There appears to be no close nexus between them and Nemonychidae, which are among the oldest living members of the main stem of curculionid evolution. The Anthribidae appear to have come to a 'dead end'".

Morphology

The morphology of adults (imagos) within the Anthribidae is relatively diverse. The beetles are generally characterized by a strongly sclerotized body covered with setae and scales, the head is often prolonged into a rostrum (with the exception of the subfamily Choraginae), the antennae of Malagasy species always comprise 11 segments and unlike in true weevils of the family Curculionidae, they are never elbowed and end up in a more or less distinct 3-segmented antennal club. All tarsi are 5-segmented, with a very small tarsomere 4 covered by tarsomere 3, which is distinctly larger and deeply lobed. The size of Malagasy species is highly diverse, ranging from *Choragus fasciger* measuring a mere 1 mm, while representatives of the genus *Tophoderes*, for example *T. annulatus* and *T.*

murinus, are the largest with over 32 mm in length. Sexual dimorphism tends to be exhibited by longer antennae in males.

Biogeography and Species Diversity

The level of information on this family differs between geographical regions, specifically related to the extent of biological exploration. While knowledge concerning the number of species occurring in some areas is relatively comprehensive, there are regions of the world where we have only rudimentary data. An overview of the species occurring in different geographic regions can be found in the Illustrated Catalogue of Anthribidae of the World (Rheinheimer 2004). As this author states, the well-researched regions include Europe (56 known species to date), North America (91 species), Japan (177 species), New Zealand (61 species), and New Caledonia (58 species). On the other hand, other regions have yielded only fragmentary information, for example, only 386 species are known from the entire South America continent and 662 species from the Africa continent (Rheinheimer 2004).

Our knowledge on distribution and biology of Malagasy species of the family is at the starting stage. Rheinheimer (2004) listed 224 species occurring on Madagascar. At present 295 species have been described (Table 1), encompassing three subfamilies, 21 tribes, and 64 genera, including the genus *Triplodus* (incertae sedis) with a single species described from the island, *T. cuspis*. The number of known species has increased significantly since Rheinheimer's catalogue (2004) thanks the different studies of R. Frieser (Frieser 2005, 2007, 2009, 2010) and M. Trýzna (Trýzna 2012, 2017, 2019; Trýzna and Banař 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2016, 2017a, 2017b, 2020).

Systematics and Research History on Madagascar

In the past, the Anthribidae were classified into three subfamilies – Anthribinae, Choraginae, and Urodontinae (e.g. Alonso-Zarazaga and Lyal 1999). Trýzna and Valentine (2011) subsequently elevated tribus Apolectini to an independent subfamily Apolectinae. Currently, the family comprises four subfamilies. The Urodontinae do not occur on Madagascar and their closest occurrence is South Africa. The Apolectinae are known from the island and with six genera, including the diverse *Caranistes* (Figure 1A) with 31 species, and the balance (*Dinephrius*, *Duplionistes*, *Phrynoidius*, *Protomerus*, and *Rhinoscopis*), each have a single species.

The first species described from Madagascar, *Uterosomus verrucosus*, was named by the French entomologist Guillaume-Antoine Olivier in 1795. The foundation for systematic studies of the Malagasy Anthribidae was laid by the French entomologist Léon Marc Herminie Fairmaire, who published descriptions of 12 genera and 37 species that are still considered valid. The German-British entomologist Heinrich Ernst Karl Jordan described two genera and 17 species, while his German colleagues Paul Wolfrum described four genera and 75 species and Robert Frieser seven genera and 118 species. It is also noteworthy that the four aforementioned entomologists described a total of 246 species of the 295 species (83%) known today from the island. At present, Miloš Trýzna in collaboration with Université d´Antananarivo and Madagascar National Parks focuses on the study of Malagasy Anthribidae.

Faunal analysis

Anthribidae fauna of Madagascar is characterized by a high level of endemism, which reaches over 96%. Out of the 295 presently known species, 284 are clearly endemic and only 11 taxa occur outside the island and include, for example, *Plintheria trirudis* also known from the Comoros or *Noxius fallax* from Republic of South Africa. The other cases of species known from Madagascar having extralimital distributions are presented in Table 1. An unconfirmed species, *Blaberops macrocerus*, listed from Nosy Mitsio, Maroantsetra, and Antalaha by Wolfrum (1961) needs confirmation of its presence on the island (Trýzna and Baňař 2014a). Further, there are some errors in the literature about localities. For example, *Opanthribus scolytinus*, whose type locality is published as "Zaire, Congo da Lemba" by Frieser (1981) and this is repeated in Rheinheimer (2004), the holotype label is marked "Madagascar, Ambodivangy".

In total, 22 genera are endemic to Madagascar and within the subfamily Anthribinae the most species genera are *Diastatotropis* (14 species; Figure 1B), *Tophoderes* (14 species; Figure 1D), and *Tophoderellus* (11 species), and within the subfamily Apolectinae the most speciose genera include *Adapterops* (six species), *Epichoragus* (six species), and *Allochoragus* (five species). About 200 of the recognized species from Madagascar occur in the band of moist evergreen forest running on the eastern length of the island. Many species have been described from a few localities, including the Andasibe (formerly called Périnet), and the nearby sites of Analamazaotra and Mantadia. These forested areas are highly favorable for the occurrence of anthribids, but it is more likely that the high number of species known from this zone is associated with its easy

access from the nation's capital. The surroundings of the nearby town of Moramanga also represent an important collection area as well. Some species described from there, including *Epitaphius gilvipes* and *Litotropis infucata*, are known only from a single specimen. Sadly, forests surrounding this town have been largely destroyed in the last decades and the described species have not been recollected in the past years either here or in suitable nearby localities.

Another area with a high occurrence of species is the northern part of Madagascar, namely the medium altitude moist evergreen forests in the Montagne d'Ambre National Park. Moreover, some species seem to be microendemics to this site, and include *Tophoderes lidmilae, Sintor conglobatus, S. paradistans, Diastatotropis perrinae, Noxius tenebrosus, Duplionistes robustus,* and *Adapterops cedrici*.

On the basis of current information, many endemic anthribid species are rare and known from single isolated localities and by extrapolation may be highly vulnerable to the destruction of forest habitats where they have been found. Among such species is *Pantorhaenas inornatus* whose occurrence in the Central Highlands is limited to a tiny remnant of a forest near the village of Manankazo covering several hectares and the nearby Ambohitantely Special Reserve, which includes montane moist evergreen forests. Another example includes two species *Diastatotropis crassicornis* or *D. planifrons*, described from "Madagascar" and "Antananarivo", respectively, in the 19th century by Waterhouse and not found since.

However, within this family we can find some species which are still relatively common and widespread. For instance, *Phloeotragus albicans* occurs in the north (Montagne d'Ambre) to relatively far south (Midongy du Sud), as well as in the west (Andranofasika) and east (Andasibe). Another widespread and abundant species include *Tophoderes frenatus* (Figure 1D) occurring in the evergreen moist eastern forests from Andasibe to Midongy du Sud, *Uterosomus verrucosus* ranging from the near-shore island of Nosy Be to Midongy du Sud or some species of *Lemuricedus*, which are common in the eastern forested zone (*L. audouini, L. maculicollis*, and *L. madagascariensis*).

During each of our field collection missions to Madagascar, we are able to find unknown species of anthribids, particularly in the less explored areas. Such localities can be found in the dense moist evergreen forests surrounding Ivohibe, where *Tophoderes banari* was recently described from (Trýzna 2017), or the poorly known Anosyenne Mountains in the southeast, where *Diastatotropis lepida* was described (Trýzna and Baňař 2016).

Ecological notes

Remarkably few details have been published on the biology of Malagasy anthribids and these include ecological notes on some species (Trýzna and Baňař 2020) or broader aspects of the island's biodiversity of this family (Trýzna and Baňař 2012). Anthribids can be found only in largely intact or well-preserved forests across a range of different elevations. They are typically saproxylic organisms, that is to say dependent on dead and decaying wood in which their larvae develop. Adults can be found on dead wood of various types of trees and it is essential that the wood be infested with suitable fungi. Anthribids prefer primarily recent dead wood, often surrounded by dead leaves and intact bark. As a given wood mass gradually decays, the anthribid community decreases and most species disperse to fresh dead wood. There are some exceptions, for example, both named species of the genus *Holophloeus* (Figure 1E) can be found on dead wood which is partly devoid of bark and in more advanced stages of decay (Trýzna and Baňař 2020). As far as is known, the adults are primarily fungivores.

The highest species diversity of anthribids on Madagascar can be found on wood inside forests but in areas with some sun exposure. In such places, local species diversity can reach up to 30 species (Trýzna and Baňař 2012, 2017a). The smaller species from subfamilies Choraginae (e.g. *Adapterops* and *Perichoragus*) and Anthribinae (e.g. *Phrynoidius* and *Cleranthribus*) and particularly many still undescribed species of *Triplodus*, can be found on freshly dying branches or twigs and associated with dry leaves.

The majority of anthribids are good and nimble fliers. Only members of several larger-sized species belonging to the genera *Phloeotragus*, *Tophoderes* (Figure 1D), and *Holophloeus* (Figure 1E) appear as reluctant fliers despite having fully developed wings. All anthribid species possess cryptic coloring (homochromy) and even larger species, such as those of the genera *Tophoderes* (Figure 1D), *Litotropis* (Figure 1C), *Pseudobasidissus* (Figure 1F) or *Lemuricedus* are very difficult to find with the naked eye in their natural environment.

I use the following simple method for collecting anthribids on suitable dead wood: sweeping with an entomological net the lower side, where the beetles are most often found, of the branches and twigs. Quick movement with the net is very important because most Malagasy anthribids are generally very quick and nimble flyers. This method is used for capturing small-sized species because of their cryptic coloration and immobility on

the one hand and their quick movement and ability to fly unnoticed out of net on the other hand (Trýzna and Baňař 2012).

Conclusion and Further Directions

Beetles of the family Anthribidae are among Madagascar's little explored invertebrate groups. Following our studies of specimens in different entomological collections, as well as recent field collections, it is estimated that the currently recognized fungus weevil fauna of Madagascar of 295 species represents only about 30% of the island's total anthribid diversity and estimate that the anthribid fauna probably approaches 900 species.

The family's occurrence is strictly associated with native forest vegetation with sufficient amounts of dead and decaying wood. Species of this family do not occur in places which lack such wood. The anthribid community of Madagascar is unique, endemic, and largely unexplored despite the fact that many saproxylic organisms have been studied in recent years. As the deforestation of Madagascar continues, this family bound to intact forest environments will represent one of the most rapidly disappearing part of the island's biodiversity.

No molecular studies have been published in the family Anthribidae that included material from Madagascar, which is critical to provide a better understanding of the evolutionary history of the island's fungus weevils, including colonization history and patterns of speciation. These studies would be highly desirable. Nevertheless, the critical aspect is the continuation of field inventories, especially in protected areas, but also in other less explored areas of the island, and the training of national entomologists.

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Table 1. Checklist of the Malagasy species of the family Anthribidae. The checklist contains confirmed and revised geographic data. Several published type localities of certain species have not been found or verified and these are marked with a question mark in square brackets [?]. Details provided in Viette (1991) were used to identify certain localities. It must be taken into consideration that older specimens mainly from the 20th century and labeled "Antananarivo" may refer simply to Madagascar and such cases are presented between quotation marks. In cases when "Madagascar" was given as the type locality in the original description and no recent specimen is available, these are presented as "'Madagascar' [no recent specimens]". The checklist contains commonly used abbreviations describing cardinal points: N – north, W – west, E – east, S – south, and C – Central Highlands, * = endemic to Madagascar.

Family ANTHRIBIDAE Billberg, 1820

Subfamily ANTHRIBINAE Billberg, 1820

Tribe PTYCHODERINI Jekel, 1855

Genus *Phloeotragus* Schönherr, 1823

1	***P. albicans*** Fahraeus, 1839	N: Mt. d'Ambre, W: Andranofasika, E: Andasibe, S: Midongy

Tribe TOPHODERINI Lacordaire, 1865

Genus *Sternocyphus* Wolfrum, 1961

2	***S. atylus*** (Jordan, 1925)	NW: Ambanja, C: Moramanga, SW: Toliara, Sakaraha, Zombitse
3	***S. barbifer*** Wolfrum, 1961	W: Ankarafantsika (Ampijoroa)
4	***S. ferranti*** (Jordan, 1925)	S: Betioky
5	***S. quinquecarinatus*** Frieser, 2000	C: Moramanga, W: Morondava (Forêt de Kirindy), Ambodimanga
6	***S. stigma*** (Klug, 1833)	E: Antalaha

Genus *Tophoderellus* Wolfrum 1959

7	***T. aequalis*** Wolfrum, 1961	N: Nosy Komba
8	***T. compactus*** (Fairmaire, 1896)	'Madagascar' [no recent specimens]
9	***T. griseobrunneus*** Wolfrum, 1961	W: Andobo, Antsalova
10	***T. insignis*** Wolfrum, 1959	N: Androna Plateau, E: Antakotako, Maroantsetra
11	***T. major*** Wolfrum, 1961	N: Nosy Komba
12	***T. ovalimacula*** Wolfrum, 1961	E: Forêt nord of Anosibe
13	***T. ovalis*** Wolfrum, 1959	N: Androna Plateau, E: Antakotako, Maroantsetra, Navana
14	***T. parvus*** Wolfrum, 1959	N: Androna, E: Antakotako, Maroantsetra, W: Ampijoroa
15	***T. plagifer*** Wolfrum, 1961	E: Ambatovosira (=Andranomalaza)
16	***T. signatus*** Wolfrum, 1961	NE: Sambava, Marojejy, Andasy
17	***T. viridis*** Wolfrum, 1959	N: Androna Plateau (Mandritsara)

Genus *Tophoderes* Dejean, 1834

18	***T. acarinulus*** Wolfrum, 1959	N: Androna Plateau (Mandritsara)
19	***T. annulatus*** Waterhouse, 1875	C: Ambositra, E: Ranomafana

20	***T. banari*** Trýzna, 2017	E: Ivohibe, Vondrozo forêt
21	***T. ferrugatus*** (Klug, 1833)	'Antananarivo'
22	***T. frenatus*** (Klug, 1833)	E: Analamazaotra, Mantadia, SE: Midongy
23	***T. funebris*** (Klug, 1833)	E: Toamasina (forêts Alahakato)
24	***T. fuscoareatus*** Wolfrum, 1959	C: Moramanga, Antsianaka
25	***T. griseipes*** Fairmaire, 1901	E: Anjiro
26	***T. griseovarius*** Fairmaire, 1901	SE: Tolagnaro, Bezavona
27	***T. lidmilae*** Trýzna & Baňař, 2015	N: Montagne d'Ambre
28	***T. murinus*** Alluaud, 1899	SE: Ranomafana près Tolagnaro, Midongy, SW: Toliara
29	***T. nubeculosus*** Fairmaire, 1888	E: Antongil Bay, Maroantsetra
	ssp.*immaculatus* (Wolfrum, 1959)	E: Antsianaka
30	***T. sikorae*** Jordan, 1895	'Antananarivo', C: Moramanga
31	***T. sinuatocollis*** Jordan, 1895	'Antananarivo', C: Moramanga

Genus *Trachycyphus* Fairmaire, 1901

32	***T. cottae*** Fairmaire, 1901	E: Fénerive, forêts Alahakato, Vondrozo, SE: Tolagnaro

Genus *Uterosomus* Dejean, 1834

33	***U. verrucosus*** (Olivier, 1795)	N: Ambre, Nosy Be, W: Mahajanga, E: Andasibe, SE: Midongy

Tribe DISCOTENINI Lacordaire, 1865

Genus *Holophloeus* Jordan, 1928

34	***H. loebli*** Trýzna & Baňař, 2020	E: Analamazaotra, Ranomafana, Fénerive, C: Moramanga
35	***H. tuberosus*** (Fairmaire, 1897)	N: Nosy Be, Montagne d'Ambre, NE: Antakotako

Tribe SINTORINI Lacordaire, 1865

Genus *Anhelita* Jordan, 1895

36	***A. aphanes*** Wolfrum, 1959	E: Maroantsetra
37	***A. brevipes*** Wolfrum, 1961	E: Andranomandevy, Didy
38	***A. distans*** Wolfrum, 1959	N: Androna Plateau (Mandritsara)
39	***A. lineata*** Jordan, 1895	E: Analamazaotra, Mantadia, C: Moramanga
40	***A. unicarinata*** Wolfrum, 1959	N: Androna Plateau (Mandritsara), E: Maroantsetra

Genus *Sintor* Schönherr, 1839

41	***S. alternus*** Frieser, 2000	C: Moramanga
42	***S. conglobatus*** Wolfrum, 1961	N: Montagne d'Ambre
43	***S. frenatus*** Frieser, 2000	C: Moramanga
44	***S. impressus*** Frieser, 2000	C: Moramanga
45	***S. ochraceus*** Frieser, 2000	C: Moramanga, Antsahatsaka
46	***S. paradistans*** Wolfrum, 1961	N: Montagne d'Ambre
47	***S. sporadicus*** (Wolfrum, 1959)	E: Analamazaotra, Maromizaha, Ranomafana, C: Moramanga

Tribe CORRHECERINI Lacordaire, 1865

Genus *Aneurhinus* Thomson, 1858

48	***A. cylindricus*** Jordan, 1895	C: Moramanga

Genus *Apatenia* Pascoe, 1859

49	***A. fallax*** Frieser, 2010	E: Analamazaotra, C: Moramanga
50	***A. longiclava*** Wolfrum, 1955	N: Androna Plateau (Mandritsara), E: Maroantsetra
51	***A. mesostigma*** Wolfrum, 1961	E: Ranomafana, C: Moramanga

52	***A. oculifera*** Frieser, 2000	E: Analamazaotra, C: Moramanga
53	***A. quadristigma*** Frieser, 1981	E: Fampanambo, Mananara
54	***A. sulcicollis*** Frieser, 2000	C: Moramanga
55	***A. stysi*** Trýzna & Baňař, 2013	W: Andranofasika

Genus *Baseocolpus* Jordan, 1949

56	***B. punctifer*** Frieser, 2000	E: Mantadia, Maromizaha, Ranomafana, C: Moramanga

Genus *Lemurisintor* Frieser, 1981

57	***L. longiclava*** Frieser, 1981	E: Ambodivoangy, N: Nosy Be

Genus *Pantorhaenas* Jordan, 1928

58	***P. inornatus*** Frieser, 2010	C: Manankazo, Ambohitantely

Genus *Phaulimia* Pascoe, 1859

59	***P. lemura*** Wolfrum, 1961	E: Maroantsetra, Ambila, Fénerive forêt, Fampanambo

Genus *Ulorhinus* Sharp, 1891

60	***U. lemurus*** Wolfrum, 1959	E: Maroantsetra

Tribe TROPIDERINI Lacordaire, 1865

Genus *Lemuricedus* Jordan, 1911

61	***L. adhilaratus*** Wolfrum, 1961	N: Androna Plateau (Mandritsara), E: Fampanambo
62	***L. argyrodes*** Wolfrum, 1959	E: Antsianaka, Antongil Bay, Maroantsetra
63	***L. audouini*** (Fahraeus, 1839)	E: Analamazaotra, Maromizaha, Ranomafana, C: Moramanga
64	***L. brevirostris*** Wolfrum, 1961	C: Forêt d´Ivohibe
65	***L. cervinus*** Jordan, 1911	E: Analamazaotra, Antongil Bay, C: Moramanga
66	***L. dexius*** Jordan, 1911	N: Antsiranana, E: Andasibe, C: Ambohimahamasoa
67	***L. equulus*** Wolfrum, 1961	E: Toamasina, Fananadra, C: Moramanga
68	***L. guttulifer*** Frieser, 2007	E: Mantadia, C: Moramanga
69	***L. inferior*** Frieser, 1981	E: Analamazaotra
70	***L. integer*** Wolfrum, 1961	S: Marovato, C: Moramanga
71	***L. lacer*** Wolfrum, 1961	C: La Mandraka
72	***L. longior*** (Fairmaire, 1896)	'Madagascar' [no recent specimens]
73	***L. maculicollis*** (Fairmaire, 1896)	E: Analamazaotra, Ranomafana, C: Moramanga
74	***L. madagascariensis*** (Faust, 1889)	N: Mt. d'Ambre, E: Analamazaotra, Ranomafana, C: Moramanga
75	***L. microphthalmus*** Wolfrum, 1961	N: Antsiranana, Montagne des Français, W: Andranofasika
76	***L. ochrus*** Wolfrum, 1961	N: massif Tsaratanàna, C: Moramanga
77	***L. punctatipennis*** Frieser, 1959	N: Androna Plateau (Mandritsara), E: Maroantsetra
78	***L. subscutellatus*** (Fairmaire, 1896)	N: Nosy Be
79	***L. torvus*** (Jordan, 1895)	E: Analamazaotra, Ranomafana, NE: Vohémar
80	***L. vastus*** Wolfrum, 1961	W: Ankarafantsika (Ampijoroa)
81	***L. verrucosus*** (Jordan, 1895)	'Antananarivo', E: Analamazaotra

Genus *Mecotarsus* Schönherr, 1839

82	***M. longitarsis*** (Fairmaire, 1903)	N: Montagne d'Ambre, Nosy Be, C: Moramanga
83	***M. rosenschoeldi*** Fahraeus, 1839	E: Toamasina (forêts Alahakato), Fénerive, Antongil Bay

Genus *Pseudocedus* Fairmaire, 1901

84	***P. plagiatus*** **(**Jordan, 1895)	S: Betioky, Imanombo, Androy, Mahafaly, SE: Tolagnaro

Genus *Sphinctotropis* Kolbe, 1895

85	***S. celata*** Frieser, 2007	N: massif Tsaratanàna, Montagne d'Ambre (Ambohitra)
86	***S. leucosticta*** (Klug, 1833)	E: Maromizaha, W: Morondava

Genus *Tropideres* Schönherr, 1823

87	***T. amoenus*** Fairmaire, 1897	'Madagascar' [no recent specimens]
88	***T. grisescens*** Fairmaire, 1897	'Madagascar' [no recent specimens]
89	***T. minor*** Fairmaire, 1897	'Madagascar' [no recent specimens]

Tribe CAPPADOCINI Alonso-Zarazaga & Lyal, 1999

Genus *Diastatotropis* Lacordaire, 1865

90	***D. blazeji*** Trýzna, 2019	NE: Toamasina (Ambohitsitondrona), Antsiranana (Andapa)
91	***D. clavigera*** Frieser, 1992	E: Ranomafana, C: Moramanga
92	***D. crassicornis*** Waterhouse, 1882	'Madagascar' [no recent specimens]
93	***D. humeralis*** Trýzna & Baňař, 2016	E: Analamazaotra, Mantadia
94	***D. irrorata*** Lacordaire, 1865	E: Analamazaotra, Mantadia, Antongil Bay
95	***D. lepida*** Trýzna & Baňař, 2016	SE: chaînes Anosyennes
96	***D. nitidipennis*** Waterhouse, 1882	E: Antsianaka
97	***D. olivacea*** Waterhouse, 1877	E: Analamazaotra, C: Ambohitantely
98	***D. perrinae*** Trýzna & Baňař, 2017	N: Montagne d'Ambre
99	***D. planifrons*** Waterhouse, 1882	'Antananarivo'
100	***D. rubra*** Frieser, 1992	E: Ambodivoangy
101	***D. rubricollis*** (Fairmaire, 1892)	N: Antsiranana, Nosy Be, E: Antongil Bay
102	***D. tessellata*** Fairmaire, 1897	N: Montagne d'Ambre, Nosy Be, E: Ranomafana
103	***D. tigrina*** Lacordaire, 1865	E: Analamazaotra

Tribe STENOCERINI Kolbe, 1895

Genus *Allandrus* LeConte, 1876

104	***A. exul*** (Fairmaire, 1897)	'Madagascar' [no recent specimens]
105	***A. ruficornis*** (Wolfrum, 1961)	N: Antsiranana, Mt. des Français, E: Vohitrosa, C: Manankazo

Genus *Plintheria* Pascoe, 1859

106	***P. trirudis*** (Wolfrum, 1961)	'Madagascar, Mohéli Fomboni' [?]; also from Comoros

Tribe ZYGAENODINI Lacordaire, 1865

Genus *Blaberops* Jordan, 1904

107	***B. exilloides*** Frieser, 2000	E: Ambatondrazaka (Didy), Analamazaotra, C: Moramanga
108	***B. korinae*** Trýzna & Baňař, 2014	E: Analamazaotra
109	***B. macrocerus*** Jordan, 1904	NW: Nosy Mitsio, E: Maroantsetra, Antalaha; also from S. Africa

Genus *Nistacares* Fairmaire, 1898

110	***N. leucostictus*** Fairmaire, 1898	W: Suberbieville (=Maevatanana)

Genus *Noxius* Jordan, 1936

111	***N. albisparsa*** (Wolfrum, 1955)	E: Maroantsetra
112	***N. albomaculatus*** Wolfrum, 1961	E: Maroantsetra, Ambodivoangy
113	***N. albopunctulatus*** Frieser, 2000	N: Antsiranana
114	***N. basiensis*** Wolfrum, 1961	W: Morondava (forêt sud de Befasy)
115	***N. calvus*** Frieser, 2000	C: Moramanga

116 ***N. circumcinctus*** Frieser, 2000 C: Moramanga
117 ***N. circumflexus*** Frieser, 2000 C: Manankazo
118 ***N. exiguus*** Frieser, 2007 E: Analamazaotra
119 ***N. fallax*** (Fahraeus, 1839) SW: Sakaraha, W: Morondava (forêt Befasy); also S Africa
120 ***N. glaber*** Frieser, 2000 C: Moramanga
121 ***N. indecorus*** Frieser, 2007 E: Ambodidimaka, Andasibe
122 ***N. ocellatus*** Frieser, 2000 E: Ambohimanarivo (Ifanadiana), C: Moramanga, Antsahatsaka
123 ***N. producta*** (Wolfrum, 1961) W: Ankarafantsika (Ampijoroa)
124 ***N. punctulifer*** Frieser, 2007 E: Analamazaotra, Ranomafana, C: Manankazo
125 ***N. pupillata*** (Wolfrum, 1961) NE: Sambava, Marojejy
126 ***N. serenus*** Wolfrum, 1961 SW: Toliara
127 ***N. tenebrosus*** Frieser, 2010 N: Montagne d'Ambre (Ambohitra)
128 ***N. undulatus*** Frieser, 2000 C: Betroka (Vohitrosa forêt)
129 ***N. urbanus*** (Wolfrum, 1961) SW: Sakaraha, Zombitse
130 ***N. velatus*** Frieser, 2000 C: Manankazo

Genus *Rhaphitropis* Reitter, 1916

131 ***R. excisa*** Wolfrum, 1962 'Madagascar' [no recent specimens]

Tribe ORMISCINI LeConte, 1876

Genus *Hormiscops* Jordan, 1914

132 ***H. angustefasciatus*** Frieser, 2010 N: Antsiranana District, Sambirano River, Marovato village
133 ***H. blandus*** Frieser, 2007 E: Analamazaotra, Ranomafana, C: Moramanga
134 ***H. brevior*** Frieser, 2007 E: Analamazaotra, Maromizaha, C: Moramanga
135 ***H. bruneus*** Frieser, 2007 E: Analamazaotra
136 ***H. confluens*** Frieser, 2010 E: Analamazaotra, Ranomafana (Vohiparara), C: Ambositra
137 ***H. comes*** Frieser, 2007 E: Analamazaotra, Ranomafana, C: Manankazo, N: Anjanaharibe
138 ***H. frater*** Frieser, 2007 E: Analamazaotra, Ranomafana, Ambondrombe, C: Moramanga
ssp. ***striolatus*** Frieser, 2010 E: Analamazaotra, Ranomafana
139 ***H. fraternus*** Frieser, 2010 E: Analamazaotra
140 ***H. granulatus*** Frieser, 2007 C: Moramanga
141 ***H. inflexus*** Frieser, 2007 E: Analamazaotra
142 ***H. latus*** Frieser, 2007 E: Analamazaotra, Ranomafana (Vohiparara)
143 ***H. obtusus*** Frieser, 2007 E: Analamazaotra
144 ***H. quadrimaculatus*** Wolfrum, 1961 E: Sandrangato

Tribe ECELONERINI Lacordaire, 1865

Genus *Cenchromorphus* Fairmaire, 1892

145 ***C. barbicornis*** Fairmaire, 1892 N: Antsiranana
146 ***C. tuberosus*** (Fairmaire, 1901) S: Plateau de l'Androy, W: Ankatafantsika

Genus *Rawasia* Roelofs, 1880

147 ***R. rubroapicata*** Frieser, 2009 C: Ambositra

Tribe PLATYRHININI Bedel, 1882

Genus *Basidissus* Fairmaire, 1897

148 ***B. bendai*** Trýzna & Baňař, 2013 E: Analamazaotra
149 ***B. cirrifer*** Frieser, 2000 C: Moramanga
150 ***B. cristatus*** Fairmaire, 1897 N: Antsiranana
151 ***B. fulvitarsis*** Frieser, 2007 C: Moramanga
152 ***B. incilis*** Frieser, 2000 C: Moramanga
153 ***B. senilis*** Frieser, 2000 C: Moramanga

Genus *Pseudobasidissus* Trýzna & Baňař, 2014

154 ***P. barclayi*** Trýzna & Baňař, 2014 NE: Marojejy, E: Ranomafana, C: Anjozorobe-Angavo

Tribe PLATYSTOMINI Pierce, 1916

Genus *Entaphioides* Fairmaire, 1896

155 ***E. albiguttatus*** (Fahraeus, 1839) E: Antsianaka
156 ***E. brunneofasciata*** Wolfrum, 1961 W: Ankarafantsika (Ampijoroa), N: Nosy Be
157 ***E. discophora*** Wolfrum, 1961 E: Analamazaotra, Mantadia, Fampanambo
158 ***E. lacrymans*** Fairmaire, 1896 E: Antongil Bay, Maroantsetra

Genus *Epitaphius* Fairmaire, 1898

159 ***E. adiacens*** Wolfrum, 1961 W: Morondava (forêt sud de Befasy), C: massif Ankaratra
160 ***E. albatus*** Wolfrum, 1961 E: Fampanambo
161 ***E. albopictus*** Jordan, 1928 N: Antsiranana
162 ***E. annulicornis*** Fairmaire, 1898 W: Suberbieville (=Maevatanana)
163 ***E. cincticollis*** Frieser, 2004 C: Manankazo
164 ***E. decoratus*** (Jordan, 1895) E: Anjiro
165 ***E. fallax*** Frieser, 2004 W: Mahajanga District, Ampatika
166 ***E. geron*** Wolfrum, 1961 NE: Marojejy (Ambinanitelo)
167 ***E. gilvipes*** Frieser, 2004 C: Moramanga
168 ***E. gravis*** Frieser, 2004 C: Manankazo, Moramanga
169 ***E. griseatus*** Wolfrum, 1961 C: Moramanga
170 ***E. inconspicuus*** Wolfrum, 1959 E: Antsianaka
171 ***E. litotropioides*** Wolfrum, 1961 W: Morondava (forêt sud de Befasy)
172 ***E. melanopictus*** Frieser, 2004 E: Analamazaotra
173 ***E. menoides*** Wolfrum, 1959 E: Antsianaka
174 ***E. piceopictus*** (Fairmaire, 1902) W: Ankirihitra
175 ***E. pullatus*** Wolfrum, 1961 C: Moramanga
176 ***E. rheinheimeri*** Frieser, 2004 N: Montagne d'Ambre
177 ***E. sugillatus*** (Fahraeus, 1839) N: Androna Plateau (Mandritsara)
178 ***E. tetrastigma*** (Fairmaire, 1903) SE: Andrahomana

Genus *Gulamentus* Jordan, 1895

179 ***G. albinasus*** Jordan, 1922 E: Antongil Bay

Genus *Litotropis* Fairmaire, 1880

180 ***L. areata*** Wolfrum, 1961 E: Andranomandevy, Didy
181 ***L. cirrata*** Wolfrum, 1961 SW: Sakaraha, Lambomakanoro
182 ***L. infucata*** Frieser, 2000 C: Antsahatsaka
183 ***L. leuconota*** (Fairmaire, 1896) 'Madagascar' [no recent specimens]
184 ***L. marmorina*** Wolfrum, 1961 E: Analamazaotra, Sandrangato
185 ***L. provida*** (Fahraeus, 1839) N: Marovato, Ankarana
186 ***L. pustulosa*** Jordan, 1895 C: Moramanga
187 ***L. semipustulata*** Frieser, 2000 C: Moramanga, Antsahatsaka

Genus *Mentanus* Fairmaire, 1902

188 ***M. costulatus*** Fairmaire, 1902 N: Montagne d'Ambre, Montagne des Français, C: Bekily

Genus *Mylascopus* Fairmaire, 1901

189 ***M. pegasus*** Valentine, 1994 E: Maroantsetra
190 ***M. quagga*** Valentine, 1994 E: Maroantsetra

191 ***M. zebrinus*** Fairmaire, 1901 — C: Andrangoloaka

Genus *Phloeobius* Schönherr, 1823

192 ***P. gigas* ssp. *cervinus*** Klug, 1833 — 'Madagascar'; also from Comoros, Seychelles, Mauritius
193 ***P. penicillus*** Fairmaire, 1896 — 'Madagascar' [no recent specimens]
194 ***P. pustulosus*** Gerstaecker, 1871 — N: Sambirano, C: Moramanga, SE: Midongy; also from Africa

Genus *Pioenia* Pascoe, 1862

195 ***P. flavofasciata*** Frieser, 1981 — E: Maroantsetra

Tribe XYLINADINI Lacordaire, 1865

Genus *Cercotaphius* Wolfrum, 1959

196 ***C. abnormis*** Frieser, 2010 — N: Ankarana (Mahamasina)
197 ***C. nanos*** Frieser, 2004 — 'Madagascar, Amboasari' [?]
198 ***C. notabilis*** Wolfrum, 1959 — E: Antsianaka
ssp. *paululus* Frieser, 2004 — N: Antsiranana District, Sambirano River, Marovato village

Tribe BASITROPIDINI Lacordaire, 1865

Genus *Messalius* Fairmaire, 1903

199 ***M. puncticollis*** (Jordan, 1895) — 'SW Madagascar', W: Ankarafantsika, C: Moramanga, Isalo

Tribe ANTHRIBINI Billberg, 1820

Genus *Opanthribus* Schilsky, 1907

200 ***O. albocingulatus*** Frieser, 2004 — E: Analamazaotra
201 ***O. albosignatus*** Frieser, 2004 — E: Analamazaotra
202 ***O. aureofasciatus*** Frieser, 2004 — E: Analamazaotra
203 ***O. paraleuca*** (Wolfrum, 1955) — E: Maroantsetra
204 ***O. rubromaculatus*** Frieser, 2004 — E: Analamazaotra
205 ***O. scolytinus*** Frieser, 1981 — E: Ambodivoangy, C: Betroka (Vohitrosa forêt), Manankazo
206 ***O. scutatus*** Frieser, 2004 — E: Analamazaotra, C: Manankazo
207 ***O. scymnoides*** Frieser, 1981 — E: Ambodivoangy
208 ***O. stillinus*** (Wolfrum, 1961) — N: Montagne des Français
209 ***O. submetallicus*** (Wolfrum, 1961) — E: Sandrangato, C: Moramanga
210 ***O. undulatus*** Frieser, 2004 — E: Andasibe, Analamazaotra, Ranomafana

Tribe CRATOPARINI LeConte, 1876

Genus *Pseudeuparius* Jordan, 1914

211 ***P. laticlava*** Wolfrum, 1961 — N: Antsiranana District, Analamerana
212 ***P. monoceros*** (Fahraeus, 1839) — C: Manakazo, Moramanga, W: Ambodimanga; also from Africa
213 ***P. tuberidorsis*** (Fairmaire, 1897) — C: Moramanga

Tribe MAUIINI Valentine, 1989

Genus *Cleranthribus* Jordan, 1914

214 ***C. dyschirioides*** Wolfrum, 1961 — E: Maroantsetra, Ambodivoangy, Ambatovosira

Genus *Mauia* Blackburn, 1885

215 ***M. subnotata*** (Boheman, 1859) — E: Ambila; also from Oriental and Australian reg.

Subfamily APOLECTINAE Lacordaire, 1865

Tribe APOLECTINI Lacordaire, 1865

Genus *Caranistes* Schönherr, 1839

216	****C. albofuscus*** Wolfrum, 1959	'Madagascar' [no recent specimens]
217	****C. bipartitus*** Frieser, 2010	E: Analamazaotra, C: Moramanga
218	****C. cyphosis*** Wolfrum, 1959	E: Antsianaka
219	****C. deliciosus*** Fairmaire, 1898	N: Antsiranana, W: Suberbieville (=Maevatanana)
220	****C. directus*** Frieser, 2007	E: Analamazaotra
221	****C. dubius*** Frieser, 2007	C: Manankazo
222	****C. elegantulus*** Wolfrum, 1959	N: Antsiranana, C: Manankazo
223	****C. filitarsis*** (Fairmaire, 1897)	E: Analamazaotra, Antsianaka
224	****C. fulvopictus*** Fairmaire, 1898	E: Fénerive forêt
225	****C. gibbosus*** Frieser, 2007	E: Analamazaotra, C: Moramanga, Betroka (Vohitrosa forêt)
226	****C. griseatus*** Wolfrum, 1961	E: Analamazaotra, C: Ambatolampy (Andranotobaka)
227	****C. incultus*** Frieser, 2007	E: Fénerive forêt
228	***C. languidus*** Fahraeus, 1839	'Insulae Bourbon et Madagascar' [?] [no recent specimens]
229	****C. laticollis*** Frieser, 2007	N: Antsiranana District, Sambirano River, Marovato village
230	****C. latifrons*** (Fairmaire, 1901)	E: Fénerive forêt, Antakotako
231	****C. lineatus*** Fahraeus, 1839	'Madagascar' [no recent specimens]
232	****C. marmorinus*** Wolfrum, 1959	E: Analamazaotra, Mantadia, Ranomafana
233	****C. nigroflavus*** Frieser, 2007	C: Moramanga
234	****C. nitidus*** Frieser, 2007	C: Ambositra (Ambatofitoraharra)
235	****C. nobilis*** Frieser, 2007	C: Moramanga
236	****C. perrini*** Frieser, 2007	E: Andasibe, C: Moramanga, Antsahatsaka, Betroka (Vohitrosa)
237	****C. rhanisus*** Wolfrum, 1959	N: Ambohitra, E: Mantadia, C: Ambohitantely, Moramanga
238	****C. rufipes*** Jordan, 1895	'Antananarivo', N: Androna Plateau (Mandritsara)
239	****C. senex*** Frieser, 2007	C: Betroka (Vohitrosa forêt)
240	****C. sonjai*** Frieser, 2010	E: Analamazaotra
241	****C. strenus*** Frieser, 2007	E: Analamazaotra, Mananara
242	****C. subvittatus*** Frieser, 2007	E: Andasibe, C: Manankazo
243	****C. taeniatus*** Frieser, 2007	N: Antsiranana
244	****C. tenuiclavis*** Fairmaire, 1897	N: Nosy Be
245	****C. tenuilineatus*** (Brancsik, 1893)	'Madagascar' [no recent specimens]
246	****C. xanthographus*** Wolfrum, 1959	N: Androna Plateau (Mandritsara)

Genus *Dinephrius* Jordan, 1924

247	****D. artifrons*** Wolfrum, 1959	'Madagascar' [no recent specimens]

Genus *Duplionistes* Frieser, 2007

248	****D. robustus*** (Wolfrum, 1959)	N: Montagne d'Ambre

Genus *Phrynoidius* Fairmaire, 1897

249	****P. raffrayi*** Fairmaire, 1897	N: Androna Plateau (Mandritsara), E: Maroantsetra, Navana

Genus *Protomerus* Fairmaire, 1903

250	****P. longitarsis*** Fairmaire, 1903	SE: Tolagnaro

Genus *Rhinoscopis* Frieser, 2007

251	****R. heissi*** Frieser, 2007	SE: Tolagnaro (cap St. Luce)

Subfamily CHORAGINAE Kirby, 1819

Tribe ARAECERINI Lacordaire, 1865

Genus *Adapterops* Frieser, 2010

252	****A. cedrici*** Trýzna & Baňař, 2015	N: Montagne d'Ambre (Ambohitra)
253	****A. dimbyi*** Trýzna & Baňař, 2017	N: Ankarana
254	****A. hankae*** Trýzna, 2012	E: Analamazaotra, N: Montagne d'Ambre (Ambohitra)
255	****A. mamyi*** Trýzna & Baňař, 2017	N: Forêt d'Ambre
256	****A. nasalis*** Frieser, 2010	E: massif Ambondrombe, C: Ambohitantely
257	****A. festivus*** Frieser, 2010	E: Analamazaotra, N: Montagne d'Ambre, Forêt d'Ambre

Genus *Araecerus* Schönherr, 1823

258	***A. fasciculatus*** (DeGeer, 1775)	Cosmopolitan
259	***A. suturalis*** Boheman, 1839	N: Antsiranana District, E: Ranomafana; also Asia and Africa

Genus *Megatermis* Jordan, 1937

260	****M. rugipennis*** Frieser, 2000	E: Antananarivo, Ambodrona

Genus *Misthosimella* Jordan, 1914

261	***M. detracta*** Wolfrum, 1961	'Madagascar, Mohéli Fomboni' [?], W: Ampijoroa; also Comoros
262	***M. subgibba*** (Wolfrum, 1959)	E: Antakotako, Maroantsetra, Navana, N: Androna; also Comoros

Tribe CHORAGINI Kirby, 1819

Genus *Allochoragus* Frieser, 2000

263	****A. amictus*** Frieser, 2004	E: Analamazaotra
264	****A. crux*** Frieser, 2000	C: Moramanga
265	****A. dentatus*** Frieser, 2000	C: Moramanga
266	****A. inarmatus*** Frieser, 2000	C: Betroka (Vohitrosa forêt)
267	****A. rectimargo*** Frieser, 2004	E: Analamazaotra

Genus *Choragus* Kirby, 1819

268	****C. aethiops*** Frieser, 2010	E: Analamazaotra
269	****C. attactus*** Frieser, 2010	E: Analamazaotra
270	****C. cylindricollis*** Frieser, 2004	'Madagascar, 30 km NW Maramag, Bagonongsilang' [?]
271	****C. ebeninus*** Frieser, 2000	C: Betroka (Vohitrosa forêt)
272	****C. fasciger*** Frieser, 2010	E: Analamazaotra
273	****C. femoralis*** Frieser, 2010	E: Analamazaotra, C: Moramanga
274	****C. flavofasciatus*** Frieser, 2004	E: Andasibe
275	****C. fulvescens*** Frieser, 2004	E: Analamazaotra
276	****C. interruptofasciatus*** Frieser, 2004	E: Analamazaotra
277	****C. nitidus*** Frieser, 2010	E: Analamazaotra
278	****C. othiodes*** Frieser, 2004	C: Moramanga
279	****C. spadiceus*** Frieser, 2000	C: Moramanga
280	****C. vicinus*** Frieser, 2010	E: Analamazaotra

Genus *Dysnomelas* Frieser, 2007

281	****D. alboscutatus*** (Fairmaire, 1903)	W: Suberbieville (=Maevatanana)
282	****D. melagris*** Frieser, 1981	E: Ambodivoangy, Antalaha

Genus *Epichoragus* Frieser, 2010

283	****E. acutus*** Frieser, 2010	E: Analamazaotra

284 ***E. externus*** Frieser, 2010 — E: Analamazaotra, C: Moramanga
285 ***E. politus*** Frieser, 2010 — E: Ranomafana
286 ***E. tubericollis*** Frieser, 2010 — E: Analamazaotra
287 ***E. variolosus*** Frieser, 2010 — E: Analamazaotra
288 ***E. vulneratus*** Frieser, 2010 — E: Analamazaotra

Genus *Eudysnos* Frieser, 2010

289 ***E. pilicornis*** Frieser, 2010 — E: Analamazaotra

Genus *Perichoragus* Wolfrum, 1959

290 ***P. albicinctus*** Frieser, 2004 — E: Analamazaotra
291 ***P. duplus*** Frieser, 2004 — C: Manankazo
ssp. *inops* Frieser, 2004 — E: Andasibe, Maromizaha, C: Manankazo
292 ***P. erotyloides*** Frieser, 2004 — E: Analamazaotra
293 ***P. ovatus*** Frieser, 2004 — E: Maromizaha
294 ***P. tetraspilotus*** Frieser, 2004 — C: Manankazo

INCERTE SEDIS

Genus *Triplodus* Wolfrum, 1961

295 ***T. cuspis*** Wolfrum, 1961 — E: Andapa

References

Alonso-Zarazaga, M. A., and Lyal, C. H. C. 1999. *A World catalogue of families and genera of Curculionoidea (Insecta: Coleoptera) (excepting Scolytidae and Platypodidae).* Barcelona: Entomopraxis S.C.P.

Frieser, R. 1981. Beitrag zur Kenntnis der Anthribiden (Coleoptera, Anthribidae). *Entomologische Arbeiten aus dem Museum G. Frey* 29: 249-258.

Frieser, R. 2005. Betrag zur Kenntnis der Anthribiden (Coleoptera: Anthribidae). *Acta Coleopterologica* 21(2): 3-8.

Frieser, R. 2007. Ein neuer Beitrag zur Kenntnis der Anthribiden Madagascars (Coleoptera: Anthribidae). *Acta Coleopterologica* 23(3): 33-56.

Frieser, R. 2009. Beitrag zur Kenntnis der Anthribiden (Coleoptera: Anthribidae). *Acta Coleopterologica* 25(1): 46-70.

Frieser, R. 2010. Teilergebnisse der entomologischen Expedition von MILOS TRYZNA auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica* 26(1): 3-22.

Rheinheimer, J. 2004. Illustrierter Katalog und Bibliographie der Anthribidae der Welt (Insecta: Coleoptera). *Mitteilungen des Entomologischen Vereins Stuttgart* 39: 102-103.

Trýzna, M. 2012. In Trýzna, M., and Baňař, P. New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae* 52(2): 475-485.

Trýzna, M. 2017. Description of a new species of the genus *Tophoderes* Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus. *Zootaxa* 4221(3): 377-385.

Trýzna, M. 2019. In Trýzna, M., and Andrianomenjanahary, M. N. Description of a new species of the genus *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) with strikingly elongated elytral apices from north-eastern Madagascar. *Zootaxa* 4563(3): 444-450.

Trýzna, M., and Baňař, P. 2013a. A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa* 3609(5): 504-512.

Trýzna, M., and Baňař, P. 2013b. A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa* 3721(1): 71-78.

Trýzna, M., and Baňař, P. 2014a. A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa* 3826(2): 386-392.

Trýzna, M., and Baňař, P. 2014b. Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa* 3869(2): 180-188.

Trýzna, M., and Baňař, P. 2015a. A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae). *Zootaxa* 3905(2): 264-272.

Trýzna, M., and Baňař, P. 2015b. A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa* 4052(4): 485-489.

Trýzna, M., and Baňař, P. 2016. Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. *Zootaxa* 4161(3): 429-436.

Trýzna, M., and Baňař, P. 2017a. A new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from Montagne d'Ambre National Park, northern Madagascar. *Zootaxa* 4221(5): 537-544.

Trýzna, M., and Baňař, P. 2017b. Two new species of *Adapterops* (Coleoptera: Anthribidae) from protected areas of northern Madagascar, with a key to species, and new faunistic data on the genus. *Zootaxa* 4231(2): 238-250.

Trýzna, M., and Baňař, P. 2020. A new species of *Holophloeus* Jordan (Coleoptera: Anthribidae) from eastern Madagascar with ecological notes on it and *H. tuberosus* (Fairmaire, 1897). *Zootaxa* 4732(1): 79-98.

Trýzna, M., and Valentine, B. D. 2011. Anthribidae. In *Catalogue of Palaearctic Coleoptera. Volume 7: Curculionoidea*, eds. I. Löbl and A. Smetana, pp. 64-66, 90-107. Stenstrup: Apollo Books.

Viette, P. 1991. *Principales localités où des Insectes ont été recueillis à Madagascar. Faune de Madagascar*. Publiée sous les auspices de Gouvernement de la

République Malgache. Suplément 2. Publié à compte d´auteur. Privately published by the author, 1–88.

Wolfrum, P. 1961. Anthribiden aus dem Institut Scientifique de Madagascar. *Entomologische Arbeiten aus dem Museum G. Frey* 12: 291-325.

Zimmerman, E. C. 1994. *Australian Weevils (Coleoptera: Curculionoidea), Volume I. Orthoceri. Anthribidae to Attelabidae. The Primitive Weevils*. Melbourne: CSIRO.

Figure 1. A sampling of the diversity of Anthribidae beetles of Madagascar: **A)** *Caranistes* sp., Anjozorobe-Angavo, sexual behavior, the male protecting female with its antennae; **B**) *Diastatotropis irrorata*, Analamazaotra; **C**) *Litotropis pustulosa*, Zombitse; **D**) *Tophoderes frenatus*, Analamazaotra; **E**) *Holophloeus loebli*, Mantadia; and **F**) *Pseudobasidissus barclayi*, Anjozorobe-Angavo. (Photographs by M. Trýzna.)

Příloha č. 2

Check list of the Fungus Weevils of Madagascar (Insecta: Coleoptera: Anthribidae)

Miloš Trýzna

(manuskript)

Zootaxa

ANTHRIBIDAE BILLBERG, 1820

= *CHORAGIDAE* Kirby, 1818

ANTHRIBINAE Billberg, 1820

PTYCHODERINI Jekel, 1855

PHLOEOTRAGUS Schönherr, 1823: 1135

TYPE SPECIES: *Anthribus heros* Fabricius, 1801

albicans Fahraeus, 1839: 176
TYPE LOCALITY: Madagascar
DISTRIBUTION: N Madagascar (Mt. des Francais; Mt. d´Ambre Nat. Park, Ambohitra env.; Djangoa env.; Marojejy Nat. Park env.), E Madagascar (Moramanga env.; Andasibe Nat. Park, Analamazaotra forest; Antsahatsaka env.; Anjiro env.; Antsevabe, Forêt de Didy; Ranomafana Nat. Park), W Madagascar (Andranofasika env.); SE Madagascar: Midongy
= *Diastatotropis rugatula* Fairmaire, 1897: 188 (Wolfrum 1953: 12)
= *Phloeotragus nebulosus* Fairmaire, 1903a: 42 (Wolfrum 1953: 4)

TOPHODERINI Lacordaire, 1865

STERNOCYPHUS Wolfrum, 1961: 291

TYPE SPECIES: *Sternocyphus barbifer* Wolfrum, 1961

atylus (Jordan, 1925): 242 (*Tophoderes*) (Frieser, 1980: 953)
TYPE LOCALITY: Madagascar, Vohemar
DISTRIBUTION: E Madagascar, Moramanga env. (holotype of *Uterosomus longicornis*); SW Tulear, Sakaraha, Zombitsy, 630 m (paratype of *Uterosomus longicornis*)
= *Uterosomus longicornis* Wolfrum, 1961: 292 (Frieser 1980: 953)

barbifer Wolfrum, 1961: 291
TYPE LOCALITY: Madagascar, Ampijeron [printed, bad legible, = Ampijoroa], 170 m, Ankarafantsika
DISTRIBUTION: W Madagascar

ferranti (Jordan, 1925): 242 (*Tophoderes*) (Rheinheimer 2004: 18)
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

quinquecarinatus Frieser, 2000a: 36
TYPE LOCALITY: Madagascar, 6 km E Moramanga
DISTRIBUTION: also W Madagascar, 60 km NE Morondava, Forêt de Kirindi, 30 m a.s.l. (paratypes)

stigma (Klug, 1833): 192 (*Anthribus*) (Rheinheimer 2004: 18)
TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar (Antalaha)

TOPHODERELLUS Wolfrum 1959a: 151

TYPE SPECIES: *Tophoderellus ovalis* Wolfrum, 1959

aequalis Wolfrum, 1961: 292
TYPE LOCALITY: Madagascar, Nosy Komba, Crête Nord, Flanc Nord und alt 900 m
DISTRIBUTION: N Madagascar

compactus (Fairmaire, 1896): 360 (*Tophoderes*) (Frieser 1980: 953)
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

griseobrunneus Wolfrum, 1961: 293
TYPE LOCALITY: Madagascar, Andobo, 190 m, dct Antsalova
DISTRIBUTION: W Madagascar

insignis Wolfrum, 1959a: 152
TYPE LOCALITY: Madagascar, Region Androna
DISTRIBUTION: Madagascar, Antakotako; Maroantsetra (all specimens from type series)

major Wolfrum, 1961: 295
TYPE LOCALITY: Madagascar, Nosy Komba Flanc
DISTRIBUTION: N Madagascar

ovalimacula Wolfrum, 1961: 294
TYPE LOCALITY: Madagascar, Foret Nord d. Anosibe
DISTRIBUTION: E Madagascar

ovalis Wolfrum, 1959a: 152
TYPE LOCALITY: Madagascar, Navana (typus?)
DISTRIBUTION: Madagascar, Antakotako; Maroantsetra; Region Androna (all specimens from type series)

parvus Wolfrum, 1959a: 153
TYPE LOCALITY: Madagascar, Region Androna
DISTRIBUTION: Madagascar, Antakotako; Navana; Maroantsetra (all specimens from type series); Ampijoroa, 170 m a.s.l., Ankarafantsika

plagifer Wolfrum, 1961: 293
TYPE LOCALITY: Madagascar, Réserve nat III, Ambatovosira, Andranomalaza
DISTRIBUTION: E Madagascar

signatus Wolfrum, 1961: 295
TYPE LOCALITY: E Madagascar, Distrikt Sambava, Marojejy, Andasy II, 1300 m

DISTRIBUTION: NE Madagascar

viridis Wolfrum, 1959a: 154
TYPE LOCALITY: N Madagascar, Region Androna
DISTRIBUTION: N Madagascar

TOPHODERES Dejean, 1834: 236

TYPE SPECIES: *Anthribus frenatus* Klug, 1833

acarinulus Wolfrum, 1959a: 151
TYPE LOCALITY: Madagascar, Region Androna
DISTRIBUTION: N Madagascar

annulatus Waterhouse, 1875: 412
TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar (Ambositra; Ranomafana Nat. Park)
= *Tophoders hildebrandti* Dohrn, 1883: 157 (Wolfrum 1929: 16)

banari Trýzna, 2017: 378
TYPE LOCALITY: East Madagascar, Fianarantsoa province, Ivohibe, 1500 m
DISTRIBUTION: also E Madagascar, Vondrozo forest

ferrugatus (Klug, 1833): 191 (*Anthribus*) (Wolfrum, 1929: 16)
TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar, near Tananarivo

frenatus (Klug, 1833): 190 (*Anthribus*) (Wolfrum, 1929: 16)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Andasibe Nat. Park, Mantadia Nat. Park), SE Madagascar: Midongy

funebris (Klug, 1833): 191 (*Anthribus*) (Wolfrum, 1929: 16)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Tamatave, foréts Alahakato)

fuscoareatus Wolfrum, 1959b: 132
TYPE LOCALITY: Madagascar (typus)
DISTRIBUTION: Madagascar, Moramanga; Antsianaka (specimens from type series)

griseipes Fairmaire, 1901a: 199
TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar (Anjiro)

griseovarius Fairmaire, 1901a: 200
TYPE LOCALITY: S Madagascar, Fort-Dauphin
DISTRIBUTION: S Madagascar

lidmilae Trýzna & Baňař, 2015a: 265

TYPE LOCALITY: N Madagascar, Antsiranana prov., Montagne d´Ambre Nat. Park, Ambohitra env., S 12°28´34.7´´, E 49°13´07,5´´ [ca. 1000-1100 m a.s.l.]
DISTRIBUTION: only Montagne d´Ambre Nat. Park and „Diego Suarez“

murinus Alluaud, 1899: 366
TYPE LOCALITY: Madagascar, Ranomafana près Fort-Dauphin [= Ranomafana near Fort-Dauphin]
DISTRIBUTION: S Madagascar, Toliara prov., Chaines Anosyennes, massif nord, 1050 m a.s.l

nubeculosus* ssp. *nubeculosus Fairmaire, 1888: 32
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar, Baie de Antongil
= *Tophoderes marmoreus* Fairmaire, 1896: 360 (Frieser 1980: 952)

nubeculosus* ssp. *immaculatus (Wolfrum, 1959b): 133 (*T. marmoreus immaculatus*) (Frieser 1980: 953)
TYPE LOCALITY: Madagascar, Antsianaka
DISTRIBUTION: E Madagascar
= *marmoreus* ssp. *immaculatus* (Wolfrum, 1959b: 133) (Tophoderes) (Frieser 1980: 953)

sikorae Jordan, 1895a: 140
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: E Madagascar (Moramanga env.)

sinuatocollis Jordan, 1895b: 376
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: E Madagascar (Moramanga env.)
= *Tophoderes longirostris* Fairmaire, 1897: 187 (Frieser 1980: 952)

TRACHYCYPHUS Fairmaire, 1901a: 201

TYPE SPECIES: *Trachycyphus cottae* Fairmaire, 1901

cottae Fairmaire, 1901a: 201
TYPE LOCALITY: Madagascar, Fort-Dauphin
DISTRIBUTION: S Madagascar

UTEROSOMUS Dejean, 1834: 236

TYPE SPECIES: *Macrocephalus verrucosus* Olivier, 1795
= *Uterosomus* Schönherr, 1839 nec Dejean, 1834: 203 (Alonso-Zarazaga & Lyal 1999: 35)
= *Heterosomus* Agassiz, 1846: 385 (Alonso-Zarazaga & Lyal 1999: 35)

verrucosus (Olivier, 1795): 6 (*Macrocephalus*) (Wolfrum 1929: 17)
TYPE LOCALITY: [not mentioned in the original work]

DISTRIBUTION: E Madagascar (Andasibe env.; Moramanga env.; Ranomafana Nat. Park) W Madagascar (Mahajanga, Ampatika), N Madagascar (Ambohitra env.; Ambanza env.; Nosy Be isl, Lokobe Nat. Park), W Madagascar (Morondava env.), SE Madagascar: Midongy, also Comores
= *Anthribus scoparius* Klug, 1833: 192 (Wolfrum 1929: 17)
= *Uterosomus thoracicus* Fahraeus, 1839: 205 (Frieser 1980: 954)

DISCOTENINI Lacordaire, 1865

HOLOPHLOEUS Jordan, 1928b: 151

TYPE SPECIES: *Holophloeus irrasus* Jordan, 1928

loebli Trýzna & Baňař, 2020: 82
TYPE LOCALITY: E Madagascar, Tamatave province, Mantadia Nat. Park, Eulophia circuit, S 18°48´05.8´´, E 48°25´44.9´´, 993 m.
DISTRIBUTION: E Madagascar, Tamatave province, Andasibe Nat. Park, Analamazaotra forest; Moramanga env.; Fianarantsoa prov., Ranomafana env.; Antsianaka [= forest of Antsianaka near Lac Alaotra]; Fénerive

tuberosus (Fairmaire, 1897): 189 (*Ischnocerus*) (Frieser, 2007b: 33, erroneously as *H. tuberculosus*)
TYPE LOCALITY: Madagascar, Nosy-Bé
DISTRIBUTION: also N Madagascar: Montagne d´Ambre Nat. Park, Ambohitra env.; NE Madagascar, Maroantsetra distr., Antakotako [= Antakotaka]

SINTORINI Lacordaire, 1865

ANHELITA Jordan, 1895a: 142

TYPE SPECIES: *Anhelita lineata* Jordan, 1895

aphanes Wolfrum, 1959a: 155
TYPE LOCALITY: Madagascar, Maroantsetra
DISTRIBUTION: E Madagascar

brevipes Wolfrum, 1961: 298
TYPE LOCALITY: Madagascar, Andranomandevy, Didy, 1039 m, A. batondazaka (Sic!)
DISTRIBUTION: E Madagascar

distans Wolfrum, 1959a: 155
TYPE LOCALITY: Madagascar, Region Androna
DISTRIBUTION: N Madagascar

imperfecta Frieser (in litt.)
TYPE LOCALITY: [unknown, description not published but exist type series designated by Frieser before he died]
DISTRIBUTION: E Madagascar, Moramanga

lineata Jordan, 1895a: 142
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: E Madagascar (Moramanga env.)

unicarinata Wolfrum, 1959a: 155
TYPE LOCALITY: Madagascar, Region Androna
DISTRIBUTION: also E Madagascar (Maroantsetra env.)

SINTOR Schönherr, 1839: 148

TYPE SPECIES: *Sintor quadrilineatus* Fahraeus, 1839

alternus Frieser, 2000b: 24
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

conglobatus Wolfrum, 1961: 298
TYPE LOCALITY: N Madagascar, Montagne d´Ambre, les Roussettes, 1100 m
DISTRIBUTION: N Madagascar

frenatus Frieser, 2000b: 25
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

impressus Frieser, 2000b: 24
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

ochraceus Frieser, 2000b: 26
TYPE LOCALITY: Madagascar, Tomasina distr., Antsahatsaka env.
DISTRIBUTION: Madagascar, Tamatave prov., Moramanga env. (allotype, paratypes)

paradistans Wolfrum, 1961: 297
TYPE LOCALITY: N Madagascar, Montagne d´Ambre, les Roussettes, 1100 m
DISTRIBUTION: E Madagascar

sporadicus (Wolfrum, 1959b): 135 (*Tropiderinus*) (Frieser, 2000b: 23)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Moromizaha Spec. Res.; Moramanga env.; Andasibe env.; Ranomafana Nat. Park)

CORRHECERINI LACORDAIRE, 1865

ANEURHINUS Thomson, 1858a: 114

TYPE SPECIES: *Aneurrhinus variegatus* Thomson, 1858

cylindricus Jordan, 1895a: 195
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: E Madagascar (Moramanga env.)

APATENIA Pascoe, 1859: 434

TYPE SPECIES: *Apatenia viduata* Pascoe, 1859

fallax Frieser, 2010: 4
TYPE LOCALITY: Madagascar, Moramanga env.; Andasibe-Mantadia Nat. Park, Analamazaotra forest (allotype, paratypes)
DISTRIBUTION: E Madagascar

longiclava Wolfrum, 1955: 678
TYPE LOCALITY: N Madagascar, Androna (type?)
DISTRIBUTION: E Madagascar, Maroantsetra (specimens from type series)

mesostigma Wolfrum, 1961: 306
TYPE LOCALITY: E Madagascar, Moramanga, Rte d´Anosibe
DISTRIBUTION: also E Madagascar (Ranomafana Nat. Park)

oculifera Frieser, 2000a: 39
TYPE LOCALITY: E Madagascar, Analamazaotra env., E Moramanga
DISTRIBUTION: E Madagascar, Tamatave distr., Moramanga (allotype, paratype)

quadristigma Frieser, 1981: 253
TYPE LOCALITY: NE Madagascar, Fmpanambo
DISTRIBUTION: also E Madagascar, Mananara (allotype)

sulcicollis Frieser, 2000a: 39
TYPE LOCALITY: E Madagascar, Moramanga env.
DISTRIBUTION: E Madagascar

stysi Trýzna & Baňař, 2013a: 505
TYPE LOCALITY: NW Madagascar, Mahajanga prov., Andranofasika env., ca 100 m
DISTRIBUTION: only type locality

BASEOCOLPUS Jordan, 1949: 6

TYPE SPECIES: *Baseocolpus clivosus* Jordan, 1949

punctifer Frieser, 2000a: 47
TYPE LOCALITY: Madagascar, Moramanga env.
DISTRIBUTION: E Madagascar

LEMURISINTOR Frieser, 1981: 252

TYPE SPECIES: *Lemurisintor longiclava* Frieser, 1981

longiclava Frieser, 1981: 252
TYPE LOCALITY: Madagascar, Ambodivangy
DISTRIBUTION: also N Madagascar (Nosy Be isl., Lokobe Nat. Park)

PANTORHAENAS Jordan, 1928a: 126

TYPE SPECIES: *Pantorhaenas conspersus* Jordan, 1928

inornatus Frieser, 2010: 4
TYPE LOCALITY: C Madagascar, Antananarivo distr., Manankazo env.
DISTRIBUTION: C Madagascar

PHAULIMIA Pascoe, 1859: 437

TYPE SPECIES: *Phaulimia ephippiata* Pascoe, 1859

lemura Wolfrum, 1961: 308
TYPE LOCALITY: E Madagascar, Maroantsetra, Pampanambo [= Fampanambo]
DISTRIBUTION: E Madagascar, Ambila; Ténerive [= Fénérive] (boths specimens from type series)

ULORHINUS Sharp, 1891: 300

TYPE SPECIES: *Ulorhinus funebris* Sharp, 1891

lemurus Wolfrum, 1959a: 157
TYPE LOCALITY: Madagascar, Maroantsetra
DISTRIBUTION: E Madagascar

TROPIDERINI Lacordaire, 1865

LEMURICEDUS Jordan, 1911: 107

TYPE SPECIES: *Mecocerus audouini* Fahraeus, 1839

adhilaratus Wolfrum, 1961: 300
TYPE LOCALITY: N Madagascar, Region Androna
DISTRIBUTION: also E Madagascar, Fampanambo, 25 m, dct Maroantsetra (cotype)

argyrodes Wolfrum, 1959b: 133
TYPE LOCALITY: Madagascar, Antsianaka
DISTRIBUTION: Madagascar, S. Baie Antongil (female from type series)

audouini (Fahraeus, 1839): 184 (*Mecocerus*) (Jordan 1911: 108)
TYPE LOCALITY: Madagascar

DISTRIBUTION: E Madagascar (Andasibe env.; Moramanga env.; Maromizaha Spec. Res.; Ranomafana Nat. Park)

brevirostris Wolfrum, 1961: 301
TYPE LOCALITY: Madagascar, Forêt – Col d´Ivohibe
DISTRIBUTION: C Madagascar

cervinus Jordan, 1911: 109
TYPE LOCALITY: N. E. Madagascar, Bay of Antongil
DISTRIBUTION: E Madagascar (Moramanga env.; Andasibe Nat. Park, Analamazaotra forest)

dexius Jordan, 1911: 109
TYPE LOCALITY: N. E. Madagascar, Diego Suarez
DISTRIBUTION: C Madagascar (Ambohimahamasoa env.)

equulus Wolfrum, 1961: 301
TYPE LOCALITY: Madagascar, Fanandrana, Zamatave [= Tamatave]
DISTRIBUTION: E Madagascar

guttulifer Frieser, 2007b: 34
TYPE LOCALITY: E Madagascar, Moramanga env.
DISTRIBUTION: E Madagascar (Moramanga env.; Mantadia Nat. Park)

inferior Frieser, 1981: 249
TYPE LOCALITY: Madagascar, Foret d´Analamazaotra, Sta Perinet, 140 km East of Tananarivo
DISTRIBUTION: E Madagascar

integer Wolfrum, 1961: 301
TYPE LOCALITY: Madagascar, Marovato Rogez
DISTRIBUTION: S Madagascar; E Madagascar (Moramanga env.)

lacer Wolfrum, 1961: 302
TYPE LOCALITY: Madagascar, La Kamdraka [handwritten, bad legible, = La Mandraka],
DISTRIBUTION: C Madagascar

longior (Fairmaire, 1896): 363 (*Cedus*) (Wolfrum 1929: 30)
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

maculicollis (Fairmaire, 1896): 363 (*Cedus*) (Wolfrum 1929: 30)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Andasibe Nat. Park; Moramanga env.; Ranomafana Nat. Park)
= *Lemuricedus acoennus* Jordan, 1911: 107 (Frieser 1959: 417)

madagascariensis (Faust, 1889): 105 (*Litocerus*) (Jordan 1911: 30)
TYPE LOCALITY: Madagascar

DISTRIBUTION: E Madagascar (Andasibe Nat. Park; Moramanga env., Ranomafana Nat. Park)
= *Cedus lateralis* Fairmaire, 1896: 363 (Wolfrum 1953: 11)

microphthalmus Wolfrum, 1961: 302
TYPE LOCALITY: N Madagascar, dct Diego Suarez, Montagne des Francais
DISTRIBUTION: N Madagascar

ochrus Wolfrum, 1961: 299
TYPE LOCALITY: Madagascar. Mt. Tsaratanana, 1400 m
DISTRIBUTION: N Madagascar

punctatipennis Frieser, 1959: 416
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

subscutellatus (Fairmaire, 1896): 362 (*Cedus*) (Wolfrum 1929: 30)
TYPE LOCALITY: Madagascar, Nossi-Bé
DISTRIBUTION: [no recent specimens]

torvus (Jordan, 1895a): 163 (*Cedus*) (Wolfrum 1929: 30)
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: E Madagascar (Andasibe Nat. Park; Ranomafana Nat. Park), NE Madagascar (Vohémar)

vastus Wolfrum, 1961: 300
TYPE LOCALITY: Madagascar, Ampijeros [printed, bad legible = Ampijoroa], 170 m, Ankarafantsika
DISTRIBUTION: W Madagascar

verrucosus (Jordan, 1895b): 387 (*Cedus*) (Wolfrum 1929: 30)
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: E Madagascar (Rogez)

MECOTARSUS Schönherr, 1839: 186

TYPE SPECIES: *Mecotarsus rosenschoeldi* Fahraeus, 1839
= *Ennadius* Fairmaire, 1903c: 369 (Wolfrum 1953: 12)

longitarsis (Fairmaire, 1903c): 369 (*Ennadius*) (Wolfrum 1953: 12)
TYPE LOCALITY: Diégo-Suarez
DISTRIBUTION: Diego Suarez, Moramanga

rosenschoeldi Fahraeus, 1839: 188
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]
= *Tophoderes leucomelas* Fairmaire, 1896: 361 (Frieser 1980: 955)

PSEUDOCEDUS Fairmaire, 1901b: 74

TYPE SPECIES: *Pseudocedus costulatus* Fairmaire, 1901

plagiatus **(**Jordan, 1895b): 396 (*Caranistes*) (Frieser 2007b: 42)
TYPE LOCALITY: S.W. Madagascar
DISTRIBUTION: SW Madagascar
= *costulatus* Fairmaire, 1901b: 75 (*Pseudocedus*) (Frieser 2007b: 42)

SPHINCTOTROPIS Kolbe, 1895: 379

TYPE SPECIES: *Sphinctotropis albofasciata* Kolbe, 1895

celata Frieser, 2007b: 34
TYPE LOCALITY: Madagascar, Tsaratanana, Antsirasira-Morava [? Moravato] env.
DISTRIBUTION: also N Madagascar, Antsiranana prov., Ambohitra env. (paratype male)

leucosticta (Klug, 1833): 189 (*Anthribus*)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Maromizaha Spec. Res.), W Madagascar (Morondava env.)
= *Litocerus moestificus* Fahraeus, 1839: 185 (Wolfrum 1953: 11)

TROPIDERES Schönherr, 1823: 1135

TYPE SPECIES: *Curculio albirostris* Schaller, 1783

amoenus Fairmaire, 1897: 191
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

grisescens Fairmaire, 1897: 191
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

minor Fairmaire, 1897: 191
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

CAPPADOCINI Alonso-Zarazaga & Lyal, 1999

DIASTATOTROPIS Lacordaire, 1865: 520

= *Amecus* Fairmaire, 1897: 190 (Frieser, 1992: 46)
= *Vitalis* Fairmaire, 1893: 171 (Frieser, 1992: 46)

TYPE SPECIES: *Diastatotropis tigrina* Lacordaire, 1865

blazeji Trýzna, 2019: 445
TYPE LOCALITY: NE Madagascar, Toamasina prov., Ambohitsitondrona [ca. S 15°34′, E 50°00′]
DISTRIBUTION: only two localities on NE Madagascar: Toamasina prov. (Ambohitsitondrona) and Antsiranana prov. (Andapa, ca. S 14°39′, E 49°38′)

clavigera Frieser, 1992: 49
TYPE LOCALITY: Madagascar, Moramanga forêt
DISTRIBUTION: E Madagascar (Ranomafana Nat. Park)

crassicornis Waterhouse, 1882: 43 [*this taxon need revision*]
TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar
= *Amecus viridans* Fairmaire, 1897: 190 (Frieser, 1992: 46)
= *Diastatotropis striata* Wolfrum, 1961: 305 (Frieser, 1992: 46) [Type specimens: Madagascar, Fampanambo, 25 m, dct Maroantsetra (typus male); Montagne d´Ambre, Les Roussettes, 1100 m (cotype female); Ladhandraka (paratype female)]

elegans Fairmaire (in litt.)
TYPE LOCALITY: [unknown, description not published]
DISTRIBUTION: only N Madagascar (Montagne d´Ambre Nat. Park)

humeralis Trýzna & Baňař, 2016: 432
TYPE LOCALITY: E Madagascar, Tamatave prov., Andasibe-Mantadia Nat. Park, Analamazaotra forest, 990 m, S 18°56′43.9′′, E 48°25′16.0′′
DISTRIBUTION: Andasibe and Mantadia Nat. Parks

irrorata Lacordaire, 1865: 520
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Andasibe and Mantadia Nat. Parks; Baie d Antongil)

lepida Trýzna & Baňař, 2016: 430
TYPE LOCALITY: SE Madagascar, Toliara prov., Chaines Anosyennes, 1050 m
DISTRIBUTION: only type locality

nitidipennis Waterhouse, 1882: 45
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

olivacea Waterhouse, 1877: 11
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Andasibe Nat. Park, Analamazaotra forest), C Madagascar (Ambohitantely Spec. Res.)

perrinae Trýzna & Baňař, 2017a: 538
TYPE LOCALITY: N Madagascar, Antsiranana prov., Montagne d´Ambre Nat. Park, Ambohitra env., 1042 m, S 12°30′50.7′′, E 49°10′37.8′′
DISTRIBUTION: only N Madagascar (Montagne d´Ambre Nat. Park) and „Diego Suarez“

planifrons Waterhouse, 1882: 44
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

rubra Frieser, 1992: 48
TYPE LOCALITY: NE Madagascar, Ambodivoangy
DISTRIBUTION: only holotype female known

rubricollis (Fairmaire, 1892): 171 (*Vitalis*) (Frieser, 1992: 46)
TYPE LOCALITY: Diego-Suarez
DISTRIBUTION: N Madagascar (Nosy Be isl., Lokobe Nat. Park), E Madagascar (Baie d Antongil)

tessellata Fairmaire, 1897: 188
TYPE LOCALITY: Madagascar
DISTRIBUTION: N Madagascar (Mt d´Ambre Nat. Park; Nose Be isl., Lokobe Nat. Park), E Madagascar (Ranomafana Nat. Park)

tigrina Lacordaire, 1865: 520
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Andasibe Nat. Park)

STENOCERINI Kolbe, 1895

ALLANDRUS LeConte, 1876: 396

TYPE SPECIES: *Allandrus bifasciatus* LeConte, 1876

exul (Fairmaire, 1897): 190 (*Tropideres*) (Valentine 1998: 269)
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

ruficornis (Wolfrum, 1961): 310 (*Tropiderinus*) (Valentine 1998: 269)
TYPE LOCALITY: N Madagascar, dct Diego Suarez, Montagne des Francais
DISTRIBUTION: C Madagascar (Manankazo env.), E Madagascar (32 km ESE Betroka, Vohitrosa forest, 1650-1700 m a.s.l.)

PLINTHERIA Pascoe, 1859: 435

TYPE SPECIES: *Plintheria luctuosa* Pascoe, 1859

trirudis (Wolfrum, 1961): 310 (*Tropiderinus*) (Rheinheimer 2004: 37)
TYPE LOCALITY: Madagascar, Mohéli Fomboni Pr. M. VI.
DISTRIBUTION: Madagascar, Comores

ZYGAENODINI Lacordaire, 1865

BLABEROPS Jordan, 1904: 238

TYPE SPECIES: *Blaberops macrocerus* Jordan, 1904

exilloides Frieser, 2000a: 48
TYPE LOCALITY: E Madagascar, Rég. Ambatondrazaka, 5 km N Didy, 1100-1200 m
DISTRIBUTION: E Madagascar: Andasibe (Pèrinet) (paratype); Moramanga env. (paratype); Toamasina distr., Antsahatsaka env. (paratype)

korinae Trýzna & Baňař, 2014a: 387
TYPE LOCALITY: E Madagascar, Tamatave prov., Andasibe (Pèrinet)
DISTRIBUTION: only type locality known

macrocerus Jordan, 1904: 239
TYPE LOCALITY: Magila (Natal)
DISTRIBUTION: S Africa, NW Madagascar, Nosy Mitsio island; Madagascar, Giste de Maroantsetra, Antalaha (this records need confirmation, see Discussion in Trýzna & Baňař 2014a: 391)

NISTACARES Fairmaire, 1898a: 419

TYPE SPECIES: *Nistacares leucostictus* Fairmaire, 1898

leucostictus Fairmaire, 1898a: 419
TYPE LOCALITY: Madagascar, Suberbieville [= Maevatanana]
DISTRIBUTION: W Madagascar

NOXIUS Jordan, 1936: 328

TYPE SPECIES: *Blaberus fallax* Fahraeus, 1839
= *Blaberus* Schönherr, 1839 nec Audinet-Serville, 1831: 248 (Jordan 1936: 328)

albisparsa (Wolfrum, 1955): 681 (*Enedreytes*) (Frieser, 200a: 35)
TYPE LOCALITY: Madagascar, Maroantsetra
DISTRIBUTION: E Madagascar

albomaculatus Wolfrum, 1961: 307
TYPE LOCALITY: Madagascar, Maroantsetra, Ambodivangy
DISTRIBUTION: E Madagascar

albopunctulatus Frieser, 2000a: 44
TYPE LOCALITY: N Madagascar, Diego Suarez
DISTRIBUTION: N Madagascar

basiensis Wolfrum, 1961: 307
TYPE LOCALITY: Madagascar, Morondava, forêt sud de Befasy
DISTRIBUTION: W Madagascar

calvus Frieser, 2000a: 42
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

circumcinctus Frieser, 2000a: 41
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

circumflexus Frieser, 2000a: 41
TYPE LOCALITY: Madagascar, Antananarivo prov., Manankazo env.
DISTRIBUTION: C Madagascar

exiguus Frieser, 2007b: 36
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

fallax (Fahraeus, 1839): 249 (*Blaberus*) (Jordan 1936: 328)
TYPE LOCALITY: Caffraria [Eastern Cape of South Africa]
DISTRIBUTION: S Africa: Eastern Cape prov., Madagascar (Sakaraha, Lambomakandro; Morondava, forêt sud de Befasy)

glaber Frieser, 2000a: 43
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

indecorus Frieser, 2007b: 36
TYPE LOCALITY: E Madagascar, Antsiranana prov., Ambodidimaka env., E Ambanja
DISTRIBUTION: also E Madagascar, Andasibe (allotype)

ocellatus Frieser, 2000a: 40
TYPE LOCALITY: Madagascar, Ambohimanarivo, S Ifanadiana, 150-550 m,
DISTRIBUTION: Madagascar, Moramanga env., Antsahasaka env. (allotype)

producta (Wolfrum, 1961): 311 (*Enedreytes*) (Frieser, 2000a: 35)
TYPE LOCALITY: Madagascar, Ampijoroa, 170 m, Ankarafantsika
DISTRIBUTION: W Madagascar

punctulifer Frieser, 2007b: 35
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: also SE Madagascar, Ranomafana, 90 km E of Fianarantsoa (paratype); C Madagascar, Manankazo env. (paratype)

pupillata (Wolfrum, 1961): 312 (*Enedreytes*) (Frieser, 200a: 35)
TYPE LOCALITY: E Madagascar, district Sambava, Marojejy, Matsabory, 2030 m
DISTRIBUTION: E Madagascar

serenus Wolfrum, 1961: 308
TYPE LOCALITY: S Madagascar, Tulear
DISTRIBUTION: S Madagascar

tenebrosus Frieser, 2010: 5
TYPE LOCALITY: N Madagascar, Montagne d´Ambre Nat. Park, Ambohitra env., 12,2834´7 N, 049,1307´5 E
DISTRIBUTION: N Madagascar

undulatus Frieser, 2000a: 43
TYPE LOCALITY: E Madagascar, 30 km SEE of Betroka, Vohitrosa forest, 1400-1670 m
DISTRIBUTION: E Madagascar

urbanus (Wolfrum, 1961): 314 (*Epitaphius*) (Frieser, 2004a: 13)
TYPE LOCALITY: Madagascar, Tuléar – Sakaraha, Zombitsy, 630 m
DISTRIBUTION: SW Madagascar

velatus Frieser, 2000a: 45
TYPE LOCALITY: Madagascar, Antanarivo prov., Manankazo env.
DISTRIBUTION: C Madagascar

RHAPHITROPIS Reitter, 1916: 5

TYPE SPECIES: *Anthribus marchicus* Herbst, 1797

excisa Wolfrum, 1962: 223
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

ORMISCINI LECONTE, 1876

HORMISCOPS Jordan, 1914a: 250

TYPE SPECIES: *Hormiscops tibialis* Jordan, 1914

angustefasciatus Frieser, 2010: 6
TYPE LOCALITY: N Madagascar, Antseranana distr, Sambirana riv., Marovato vill.
DISTRIBUTION: N Madagascar

blandus Frieser, 2007b: 37
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar (Moramanga env.; Ranomafana Nat. Park)

brevior Frieser, 2007b: 40
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar, Tamatave prov., Moramanga env. (paratype); Andasibe, Maromizaha (paratype)

bruneus Frieser, 2007b: 38
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

confluens Frieser, 2010: 8
TYPE LOCALITY: E Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar, Tamatave distr., Andasibe (Perinet) (allotype); E Madagascar, Ranomafana Nat. Park, Vohiparara, 1100-1200 m (paratypes); Madagascar, Ambositra (paratype)

comes Frieser, 2007b: 39
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: also Moramanga distr., Antsatratsaka env. (paratype); Antananarivo distr., Manankazo env. (patatype); Moramanga env. (paratype); Toamasina, road to Anosibe an´Ala, rd. Km 47 S Moramanga (paratype); N Madagascar, massiv Anjanaharibe Nord, sentier Ambodihasina – Ambalorombe, Riv. Andramonta env.; E Madagascar, Rég. Ambatondrazaka, 5 km N of Didy, 1100-1200 m a.s.l.; E Madagascar, Andasibe (Perinet) env., 950-1150 m a.s.l.; E Madagascar, P. N. Ranomafana env., Sahavondrona, 1150-1250 m a.s.l.; P. N. Ranomafana, Vohiparara, 1100-1200 m a.s.l.

frater* ssp. *frater Frieser, 2007b: 41
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar, Tamatave distr., Moramanga env. (paratype), Fianarantsoa distr., Ranomafana env. (paratype); Ambatondrazaka, 5 km N of Didy, 1100-1200 m a.s.l. (paratype); C Madagascar, Fianarantsoa reg., 4 km N of Ambohimahamasoa, 1200-1300 m a.s.l.; E Madagascar, massiv Ambondrombe, Ikoka env., 1100-1200 m a.s.l.; Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest

frater* ssp. *striolatus Frieser, 2010: 7
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar (Ranomafana Nat. Park)

fraternus Frieser, 2010: 7
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

granulatus Frieser, 2007b: 37
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

inflexus Frieser, 2007b: 40
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

latus Frieser, 2007b: 41
TYPE LOCALITY: C Madagascar, prov. Fianarantsoa, Vohiparara env.
DISTRIBUTION: E Madagascar, Tamatave distr., Andasibe (Perinet)

obtusus Frieser, 2007b: 39
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

quadrimaculatus Wolfrum, 1961: 309
TYPE LOCALITY: Madagascar, Sandrangato
DISTRIBUTION: E Madagascar

ECELONERINI Lacordaire, 1865

CENCHROMORPHUS Fairmaire, 1892: 170

TYPE SPECIES: *Cenchromorphus barbicornis* Fairmaire, 1892
= *Zopyrinus* Fairmaire, 1901b: 76 (Perrin 1989: 139)
= *Derographium* Jordan, 1903: 129 (Perrin 1989: 139)
= *Crypsinorhinus* Fairmaire, 1905: 131 (Perrin 1989: 139)

barbicornis Fairmaire, 1892: 170
TYPE LOCALITY: Diego-Suarez
DISTRIBUTION: N Madagascar
= *Crypsinorhinus chloropholoides* (Fairmaire, 1905): 132 (Perrin 1989: 139)

tuberosus (Fairmaire, 1901b): 77 (*Zopyrinus*) (Perrin 1989: 139)
TYPE LOCALITY: Madagascar, Plateau de l'Androy
DISTRIBUTION: Madagascar, Bwazaha, Ankarafantsika (holotype of *Derographium peniculosum*)
= *Derographium peniculosum* Wolfrum, 1961: 319 (Frieser 1980: 956)

RAWASIA Roelofs, 1880: 203

TYPE SPECIES: *Rawasia ritsemae* Roelofs, 1880

rubroapicata Frieser, 2009: 58
TYPE LOCALITY: E Madagascar, S Ambositra, RN 292-296 by Ambatofitorahana, ca. 700 m
DISTRIBUTION: Madagascar (paratype)

PLATYRHININI Bedel, 1882

BASIDISSUS Fairmaire, 1897: 192

TYPE SPECIES: *Basidissus cristatus* Fairmaire, 1897

bendai Trýzna & Baňař, 2013b: 72
TYPE LOCALITY: E Madagascar, Tamatave prov., Andasibe-Mantadia Nat. Park, Analamazaotra forest, 955 m, S 18°56´45.0´´, E 48°25´08.0´´
DISTRIBUTION: only female holotype known

cirrifer Frieser, 2000a: 37
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

cristatus Fairmaire, 1897: 192
TYPE LOCALITY: Madagascar, Diégo-Suarez
DISTRIBUTION: N Madagascar

fulvitarsis Frieser, 2007b: 34
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

incilis Frieser, 2000a: 38
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

senilis Frieser, 2000a: 36
TYPE LOCALITY: Madagascar, Moramanga
DISTRIBUTION: E Madagascar [only holotype female known]

PSEUDOBASIDISSUS Trýzna & Baňař, 2014b: 181

TYPE SPECIES: *Pseudobasidissus barclayi* Trýzna & Baňař, 2014

barclayi Trýzna & Baňař, 2014b: 181
TYPE LOCALITY: NE Madagascar, Antsiranana prov., Marojejy Nat. Park
DISTRIBUTION: CE Madagascar (Fianarantsoa prov., Ranomafana Nat. Park), C Madagascar (Anjozorobe forest)

PLATYSTOMINI Pierce, 1916

ENTAPHIOIDES Fairmaire, 1896: 364

TYPE SPECIES: *Entaphyoides lacrymans* Fairmaire, 1896

albiguttatus (Fahraeus, 1839): 243 (*Anthribus*) (Wolfrum 1953: 32)
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

brunneofasciata Wolfrum, 1961: 312
TYPE LOCALITY: Madagascar, Ampijaros [bad legible, = Ampijoroa], 170 m, Ankarafantsika
DISTRIBUTION: Madagascar, Sambirano, Nosy-Be, forêt Lokobe (specimen from type series)

discophora Wolfrum, 1961: 313
TYPE LOCALITY: Madagascar, Perinet
DISTRIBUTION: Madagascar, Fampanambo, 25 m, dct Maroantsetra (paratype); Mantadia Nat. Park

lacrymans Fairmaire, 1896: 364

TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar (Baie d Antongil; Maroantsetra)

EPITAPHIUS Fairmaire, 1898b: 493

TYPE SPECIES: *Epitaphius nigropictus* Fairmaire, 1898
= *Meriolus* Fairmaire, 1902: 244 (Valentine 1994: 205)

adiacens Wolfrum, 1961: 314
TYPE LOCALITY: Madagascar, Marondava [= Morondava], forêt sud de Befasy
DISTRIBUTION: Madagascar, Ankaratra, Atanjakafampo (paratype)

albatus Wolfrum, 1961: 313
TYPE LOCALITY: E Madagascar, Fampanambo, 25 m, dct Maroantsetra
DISTRIBUTION: E Madagascar

albopictus Jordan, 1928a: 108
TYPE LOCALITY: Diego Suarez
DISTRIBUTION: N Madagascar

annulicornis Fairmaire, 1898: 494
TYPE LOCALITY: Madagascar, Suberbieville [= Maevatanana]
DISTRIBUTION: W Madagascar

cincticollis Frieser, 2004a: 13
TYPE LOCALITY: Madagascar, Antananarivo distr., Manankazo env.
DISTRIBUTION: C Madagascar

decoratus (Jordan, 1895a): 199 (*Phloeophilus*) (Rheinheimer 2004: 79)
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: Madagascar (Anjiro)
= *Epitaphius nigropictus* Fairmaire, 1898: 493 (Wolfrum 1953: 33)

fallax Frieser, 2004a: 14
TYPE LOCALITY: Madagascar, Mahajanga distr., Ampatika env.
DISTRIBUTION: W Madagascar

geron Wolfrum, 1961: 316
TYPE LOCALITY: E Madagascar, dct Sambava, Marojejy, Ambinanitelo, 500 m
DISTRIBUTION: NE Madagascar

gilvipes Frieser, 2004a: 16
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

gravis Frieser, 2004a: 15
TYPE LOCALITY: C Madagascar, Moramanga env.
DISTRIBUTION: C Madagascar, Antananarivo prov., Manankazo env. (allotype, paratype)

griseatus Wolfrum, 1961: 317
TYPE LOCALITY: E Madagascar, P. K. 57 – Rte d´Anosibe, Moramanga
DISTRIBUTION: E Madagascar

inconspicuus Wolfrum, 1959b: 137
TYPE LOCALITY: Madagascar, Antsianaka
DISTRIBUTION: E Madagascar

litotropioides Wolfrum, 1961: 316
TYPE LOCALITY: Madagascar, Merondava [= Morondava], forêt sud de Befasy
DISTRIBUTION: W Madagascar

melanopictus Frieser, 2004a: 14
TYPE LOCALITY: Madagascar., Tam. [= Tamatave], Perinet, 1000 m
DISTRIBUTION: E Madagascar

menoides Wolfrum, 1959b: 136
TYPE LOCALITY: Madagascar, Antsianaka
DISTRIBUTION: E Madagascar

piceopictus (Fairmaire, 1902): 244 (*Meriolus*) (Valentine 1994: 205)
TYPE LOCALITY: Madagascar, Ankarahitra [= Ankirihitra, W Madagascar, 59 km SW of d'Ambato-Boeni]
DISTRIBUTION: W Madagascar

pullatus Wolfrum, 1961: 315
TYPE LOCALITY: E Madagascar, P. K. 57 – Rte d´Anosibe, Moramanga
DISTRIBUTION: E Madagascar

rheinheimeri Frieser, 2004a: 15
TYPE LOCALITY: N Madagascar, Montagne d´Ambre, Les Roussettes, 1000 m
DISTRIBUTION: N Madagascar

sugillatus (Fahraeus, 1839): 242 (*Anthribus*) (Wolfrum 1953: 34)
TYPE LOCALITY: Madagascar
DISTRIBUTION: N Madagascar (region Androna)

tetrastigma (Fairmaire, 1903a): 44 (*Tropideres*) (Wolfrum 1953: 26)
TYPE LOCALITY: Andrahomana, Madagascar Sud
DISTRIBUTION: S Madagascar

GULAMENTUS Jordan, 1895a: 200

TYPE SPECIES: *Gulamentus cylindricus* Jordan, 1895

albinasus Jordan, 1922: 155
TYPE LOCALITY: Antongil Bai
DISTRIBUTION: NE Madagascar

LITOTROPIS Fairmaire, 1880: 316

TYPE SPECIES: *Litotropis lateritia* Fairmaire, 1880

areata Wolfrum, 1961: 317
TYPE LOCALITY: Madagascar, Andranomandevy, Didy, 1039 m
DISTRIBUTION: E Madagascar

cirrata Wolfrum, 1961: 318
TYPE LOCALITY: Madagascar, Sakaraha, Lambomakanoro
DISTRIBUTION: W Madagascar

infucata Frieser, 2000b: 32
TYPE LOCALITY: Madagascar, Moramanga distr., Antsahatsaka env.
DISTRIBUTION: E Madagascar

leuconota (Fairmaire, 1896): 365 (*Euparius*) (Wolfrum 1953: 36)
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

marmorina Wolfrum, 1961: 318
TYPE LOCALITY: Madagascar, Périnet
DISTRIBUTION: E Madagascar, Sandrangato (paratype)

provida (Fahraeus, 1839): 222 (*Euparius*) (Wolfrum 1929: 80)
TYPE LOCALITY: Madagascar
DISTRIBUTION: N Madagascar (Marovato env.; Ankarana Nat. Park)
= *Litotropis lateritia* Fairmaire, 1880: 316 (Wolfrum 1953: 36)

pustulosa Jordan, 1895a: 192
TYPE LOCALITY: Madagascar, Antannarivo
DISTRIBUTION: E Madagascar (Moramanga env.)

semipustulata Frieser, 2000b: 31
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar, Moramanga env., Antsahatsaka (paratype)

MENTANUS Fairmaire, 1902: 243

costulatus Fairmaire, 1902: 243
TYPE LOCALITY: Madagaskar
DISTRIBUTION: N: Montagne d´Ambre, Montagne des Français, C: Bekily

MYLASCOPUS Fairmaire, 1901a: 202

TYPE SPECIES: *Mylascopus zebrinus* Fairmaire, 1901

pegasus Valentine, 1994: 205
TYPE LOCALITY: E Madagascar, Maroantsetra
DISTRIBUTION: E Madagascar

quagga Valentine, 1994: 204
TYPE LOCALITY: E Madagascar, Maroantsetra
DISTRIBUTION: E Madagascar

zebrinus Fairmaire, 1901a: 202
TYPE LOCALITY: Madagascar, Andrangoloaka (holotype female) [C Madagascar]
DISTRIBUTION: C Madagascar

PHLOEOBIUS Schönherr, 1823: 1135

TYPE SPECIES: *Anthribus griseus* Fabricius, 1792

gigas* ssp. *cervinus Klug, 1833: 188
TYPE LOCALITY: Madagascar
DISTRIBUTION: also Comoren, Seychellen, Mauritius

penicillus Fairmaire, 1896: 365
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

pustulosus Gerstaecker, 1871: 76
TYPE LOCALITY: [?]
DISTRIBUTION: Zimbabwe, Kenya, Malawi, Madagascar: E Madagascar (Moramanga env.), N Madagascar (Marovato env.), C Madagascar (Isalo Nat. Park, Amboandrika forest), SE Madagascar (Midongy)

PIOENIA Pascoe, 1862: 332

TYPE SPECIES: *Pioenia saginata* Pascoe, 1862

flavofasciata Frieser, 1981: 254
TYPE LOCALITY: Madagascar, Maroantsetra
DISTRIBUTION: E Madagascar [only holotype female known]

XYLINADINI Lacordaire, 1865

CERCOTAPHIUS Wolfrum, 1959b: 137

TYPE SPECIES: *Cercotaphius notabilis* Wolfrum, 1959

abnormis Frieser, 2010: 6
TYPE LOCALITY: Madagascar, Ankarana N. P., Mahamatsima env., 12,58´08´7 S, 049,08´10´3 E

DISTRIBUTION: N Madagascar

nanos Frieser, 2004b: 29
TYPE LOCALITY: Madagascar, Ampoasari [not found this locality]
DISTRIBUTION: [no recent specimens]

notabilis* ssp. *notabilis Wolfrum, 1959b: 137
TYPE LOCALITY: Madagascar, Antsianaka
DISTRIBUTION: E Madagascar

notabilis* ssp. *paululus Frieser, 2004b: 30
TYPE LOCALITY: Madagascar, Antseranana distr., Sambirana riv., Morovato will.
DISTRIBUTION: N Madagascar

BASITROPIDINI Lacordaire, 1865

MESSALIUS Fairmaire, 1903b: 247

TYPE SPECIES: *Messalius albidosparsus* Fairmaire, 1903

puncticollis (Jordan, 1895a): 195 (*Gynandrocerus*) (Wolfrum 1929: 81)
TYPE LOCALITY: Süd-West-Madagascar
DISTRIBUTION: E Madagascar (Moramanga env.), W Madagascar (Ankarafantsika), C Madagascar (Isalo Nat. Park)
= *Messalius albidosparsus* Fairmaire, 1903b: 247 (Wolfrum 1929: 81)

ANTHRIBINI Billberg, 1820

OPANTHRIBUS Schilsky, 1907: 74

TYPE SPECIES: *Brachytarsus tessellatus* Boheman, 1829
= *Paramesus* Fahraeus, 1871 nec Fieber, 1886: 443 (Frieser 1981: 255)
= *Kimenus* Wolfrum, 1961: 319 (Rheinheimer 2004: 90) (Frieser, 2005: 3, 8)

albocingulatus Frieser, 2004b: 32
TYPE LOCALITY: Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest

albosignatus Frieser, 2004b: 30
TYPE LOCALITY: Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: only type locality known

aureofasciatus Frieser, 2004b: 33
TYPE LOCALITY: E Madagascar, Andasibe (Perinet)
DISTRIBUTION: only type locality known

paraleuca (Wolfrum, 1955): 682 (*Tropidobasis*) (Frieser 2004b: 34)
TYPE LOCALITY: Madagascar, Maroantsetra

DISTRIBUTION: E Madagascar

rubromaculatus Frieser, 2004b: 33
TYPE LOCALITY: Madagascar, Tomasina distr., Analamazaotra env.
DISTRIBUTION: E Madagascar

scolytinus Frieser, 1981: 256
TYPE LOCALITY: 'Zaire, Congo da Lemba' (**see note**)
DISTRIBUTION: Madagascar: Antananarivo distr., Manankazo env.; E Madagascar, 32 km ESE of Betroka, 1650-1700 m, Vohitrosa forest, 0.5 km S of ▲ [peak] 1798 m;
NOTE: Frieser (1981: 256) mentioned locality and depositing of holotype as: '1 Exemplar, offensichtlich Weibchen: Zaire, Congo da Lemba, X.-XI. 1911, R. Mayné leg. Holotypus im Museum Tervuren'. Nevertheless, holotype is deposited in Frieser´s collection in ZSM Munich and it is labelled as: 'Madagascar, Ambodivangy, VII 1945'

scutatus Frieser, 2004b: 31
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: C Madagascar, Antananarivo prov., Manankazo env. (paratype); E Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest

scymnoides Frieser, 1981: 255
TYPE LOCALITY: Madagascar, Ambodivangy
DISTRIBUTION: E Madagascar

stillinus (Wolfrum, 1961): 320 (*Kimenus*) (Frieser, 2005: 3)
TYPE LOCALITY: N Madagascar, dct Diego Suarez, Montagne des Francais
DISTRIBUTION: N Madagascar

submetallicus (Wolfrum, 1961): 320 (*Kimenus*) (Frieser, 2005: 3)
TYPE LOCALITY: Madagascar, Sandrangato
DISTRIBUTION: E Madagascar, Moramanga (paratype)

undulatus Frieser, 2004b: 31
TYPE LOCALITY: Madagascar, Tamatave distr., Andasibe
DISTRIBUTION: E Madagascar, Fianarantsoa prov., Ranomafana (paratype); E Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest

CRATOPARINI LeConte, 1876

PSEUDEUPARIUS Jordan, 1914b: 344

TYPE SPECIES: *Cratoparis monoceros* Fahraeus, 1839

laticlava Wolfrum, 1961: 321
TYPE LOCALITY: N Madagascar, dct Diego Suarez, Analamerana, 80 m, 50 km SE Diégo
DISTRIBUTION: N Madagascar

monoceros (Fahraeus, 1839): 223 (*Cratoparis*) (Wolfrum 1929: 90)

TYPE LOCALITY: Promontorium Bonae Spei [= Cape of Good Hope, Western Cape Province of Republic of South Africa]
DISTRIBUTION: Tanzania, Malawi, Zimbabwe, Botswana, R.S.A., Madagascar: E Madagascar (Moramanga env.), C Madagascar (Manankazo env.) W Madagascar (Mahajanga prov., Ambodimanga env.)

tuberidorsis (Fairmaire, 1897): 192 (*Basitropis*) (Wolfrum 1953: 37)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Moramanga env.)

MAUIINI Valentine, 1989

CLERANTHRIBUS Jordan, 1914: 256

TYPE SPECIES: *Cleranthribus calydiopsis* Jordan, 1914

dyschirioides Wolfrum, 1961: 323
TYPE LOCALITY: Madagascar, Reserve nat III, Ambatovositra, Andranomalaza
DISTRIBUTION: E Madagascar, Maroantsetra, Ambondivoagy (cotype)

MAUIA Blackburn, 1885: 194

TYPE SPECIES: *Mauia satelles* Blackburn, 1885
= *Contexta* Jordan, 1902: 78 (Zimmerman 1994: 136)

subnotata (Boheman, 1859): 116 (*Araeocerus*) (Zimmerman 1994: 138)
TYPE LOCALITY: [?]
DISTRIBUTION: Cocos Isl., Keeling Isl., Japan, China, Hawai: Maui, India, Sri Lanka, New Caledonia, Loyalty Isl.: Lifu, Vanuatu, Solomon Isl., Niue, Tonga, Cook Isl., Society Isl., Tahiti, Seychellen, Madagascar (Mohéli Fomboni 7 M; Ambila)
= *Mauia satelles* Blackburn, 1885: 195 (Zimmerman 1994: 138)
= *Contexta murina* Jordan, 1902: 78 (Zimmerman 1994: 138)
= *Araecerus insularis* Fauvel, 1862: 152 (Zimmerman 1994: 138)

APOLECTINAE Lacordaire, 1865

(subfamily rank sensu Trýzna & Valentine 2011: 65)

APOLECTINI Lacordaire, 1865

CARANISTES Schönherr, 1839: 270

TYPE SPECIES: *Caranistes lineatus* Fahraeus, 1839
= *Arachnocaulus* Fairmaire, 1897: 189 (Wolfrum 1953: 46)
= *Batyrhinius* Fairmaire, 1901a: 202 (Frieser, 2007b: 50)
= *Holomecus* Brancsik, 1893: 241 (Wolfrum 1929: 104)

= *Leptonemus* Dejean, 1837: 256 (Wolfrum 1953: 46)
= *Palazia* Coquerel, 1866: Tab. 7 (Wolfrum 1929: 104)

albofuscus Wolfrum, 1959b: 144
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

bipartitus Frieser, 2010: 9
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar, Tamatave distr., Andasibe (Perinet) (paratype)

cyphosis Wolfrum, 1959b: 140
TYPE LOCALITY: Madagascar, Antsianaka
DISTRIBUTION: E Madagascar

deliciosus Fairmaire, 1898: 495
TYPE LOCALITY: Madagascar, Diégo-Suaréz; Suberbieville [= Maevatanana]
DISTRIBUTION: N and W Madagascar

directus Frieser, 2007b: 45
TYPE LOCALITY: E Madagascar, Andasibe (Perinet), 930-1000 m
DISTRIBUTION: E Madagascar

dubius Frieser, 2007b: 46
TYPE LOCALITY: C Madagascar, Antananarivo prov., Manankazo env.
DISTRIBUTION: C Madagascar

elegantulus Wolfrum, 1959b: 143
TYPE LOCALITY: N Madagascar, Diego Suarez env.
DISTRIBUTION: N Madagascar

filitarsis (Fairmaire, 1897): 189 (*Arachnocaulus*) (Wolfrum 1953: 46)
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Andasibe Nat. Park, Analamazaotra forest)
= *Caranistes opilio* Jordan, 1895b: 394 (Wolfrum 1953: 46)

fulvopictus Fairmaire, 1898: 494
TYPE LOCALITY: Madagascar, Ténérive
DISTRIBUTION: E Madagascar

gibbosus Frieser, 2007b: 50
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar, Moramanga env. (paratype); E Madagascar, 32 km SEE of Betroka, Vohitrosa forest, 1650-1700 m (allotype)

griseatus Wolfrum, 1961: 322
TYPE LOCALITY: Madagascar, Andranotobaka, 1400 m, Ambatolampy
DISTRIBUTION: C Madagascar

incultus Frieser, 2007b: 43

TYPE LOCALITY: E Madagascar, Fenerive forêt
DISTRIBUTION: E Madagascar

languidus Fahraeus, 1839: 272
TYPE LOCALITY: „Insulae Bourbon et Madagascar“
DISTRIBUTION: [no recent specimens]

laticollis Frieser, 2007b: 47
TYPE LOCALITY: N Madagascar, Antseranana distr., Sambirana riv., Moravato vill.
DISTRIBUTION: N Madagascar

latifrons (Fairmaire, 1901a): 202 (*Batyrhinius*) (Frieser, 2007b: 50)
TYPE LOCALITY: Madagascar, Fénérive
DISTRIBUTION: Madagascar, Antakotako

lineatus Fahraeus, 1839: 271
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

marmorinus Wolfrum, 1959b: 144
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Mantadia Nat. Park)

nigroflavus Frieser, 2007b: 47
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

nitidus Frieser, 2007b: 48
TYPE LOCALITY: E Madagascar, S of Ambositra, RN km 292-296 by Ambatofitoraharra, ca. 1700 m
DISTRIBUTION: E Madagascar

nobilis Frieser, 2007b: 48
TYPE LOCALITY: Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar

perrini Frieser, 2007b: 44
TYPE LOCALITY: E Madagascar, Tamatave distr., Moramanga env.
DISTRIBUTION: E Madagascar, Tamatave distr., Andasibe (paratype); Moramanga distr., Antsahatsaka (paratype); E Madagascar, 32 km ESE of Betroka, 1650-1700 m a.s.l., Vohitrosa forest, 0.5 km S of ▲ [peak] 1796 m a.s.l. (paratype)

rhanisus Wolfrum, 1959b: 141
TYPE LOCALITY: Madagascar
DISTRIBUTION: E Madagascar (Mantadia Nat. Park)

rufipes Jordan, 1895b: 395
TYPE LOCALITY: Madagascar, Antananarivo
DISTRIBUTION: N Madagascar, Region Androna (typus of *Caranistes virgatus*)
= *Caranistes virgatus* Wolfrum, 1959b: 142 (Rheinheimer 2004: 108)

senex Frieser, 2007b: 49
TYPE LOCALITY: E Madagascar, 30 km SE of Betroka, 1670-1700 m, Vohitrosa forest, 2 km E of 1825 m
DISTRIBUTION: only type locality known

sonjai Frieser, 2010: 8
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

strenus Frieser, 2007b: 45
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar, Mananara (paratype)

subvittatus Frieser, 2007b: 46
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe
DISTRIBUTION: C Madagascar, Tananarivo prov., Manankazo env (paratype)

taeniatus Frieser, 2007b: 43
TYPE LOCALITY: N Madagascar, Diego Suarez
DISTRIBUTION: N Madagascar

tenuiclavis Fairmaire, 1897: 193
TYPE LOCALITY: Madagascar, Nossi-Bé
DISTRIBUTION: N Madagascar

tenuilineatus (Brancsik, 1893): 241 (*Holomecus*) (Wolfrum 1929: 105)
TYPE LOCALITY: [?]
DISTRIBUTION: [no recent specimens]

xanthographus Wolfrum, 1959b: 142 (probably new synonymy of ***Caranistes fulvopictus*** Fairmaire, 1898: 494)
TYPE LOCALITY: N Madagascar, Region Androna
DISTRIBUTION: N Madagascar

DINEPHRIUS Jordan, 1924: 227

TYPE SPECIES: *Caranistes annulipes* Waterhouse, 1876

artifrons Wolfrum, 1959b: 147
TYPE LOCALITY: Madagascar
DISTRIBUTION: [no recent specimens]

DUPLIONISTES Frieser, 2007b: 42

TYPE SPECIES: *Caranistes robustus* Wolfrum, 1959

robustus (Wolfrum, 1959b): 145 (*Caranistes*) (Frieser 2007b: 33, 42)

TYPE LOCALITY: N Madagascar, Diego Suarez, Montagne d´Ambre
DISTRIBUTION: only N Madagascar

PHRYNOIDIUS Fairmaire, 1897: 194

TYPE SPECIES: *Phrynoidius raffrayi* Fairmaire, 1897

raffrayi Fairmaire, 1897: 194
TYPE LOCALITY: Madagascar
DISTRIBUTION: Madagascar, Region Androna (type of *Phrynoidius griseovarius*); Maroantsetra; Navana (all specimens from type series of *Phrynoidius griseovarius*)
= *Phrynoidius griseovarius* Wolfrum, 1959a: 169 (= female of *P. raffrayi* (Rheinheimer 2004: 109))

PROTOMERUS Fairmaire, 1903b: 247

TYPE SPECIES: *Protomerus longitarsis* Fairmaire, 1903

longitarsis Fairmaire, 1903b: 248
TYPE LOCALITY: S Madagascar, Fort-Dauphin
DISTRIBUTION: E Madagascar

RHINOSCOPIS Frieser, 2007b: 42

TYPE SPECIES: *Rhinoscopis heissi* Frieser, 2007

heissi Frieser, 2007b: 42
TYPE LOCALITY: Madagascar, Ft. Dauphin, cap St. Luce
DISTRIBUTION: only holotype known

CHORAGINAE Kirby, 1819

ARAECERINI Lacordaire, 1865

ADAPTEROPS Frieser, 2010: 18

TYPE SPECIES: *Adapterops nasalis* Frieser, 2010

cedrici Trýzna & Baňař, 2015b: 486
TYPE LOCALITY: N Madagascar, Antsiranana prov., Montagne d´Ambre Nat. Park, Ambohitra env., 1086 m, S 12°31´34.5´´, E 49°10´14.3´´
DISTRIBUTION: N Madagascar (Montagne d´Ambre Nat. Park; Forêt d´Ambre)

dimbyi Trýzna & Baňař, 2017b:243
TYPE LOCALITY: N Madagascar, Antsiranana prov., Ankarana Nat. Park, Benavony circuit, 132 m, S 12°58´07.3´´, E 49°08´12.9´´

DISTRIBUTION: only male holotype known

hankae Trýzna, 2012: 479
TYPE LOCALITY: E Madagascar, Tamatave prov., Andasibe-Mantadia Nat. Park, Analamazaotra forest, 955 m, S 18°56′45.0′′, E 48°25′08.0′′
DISTRIBUTION: N Madagascar (Antsiranana prov., Montagne d′Ambre Nat. Park, Ambohitra env.)

mamyi Trýzna & Baňař, 2017b: 239
TYPE LOCALITY: N Madagascar, Antsiranana prov., Forêt d′Ambre, 496 m, S 12°28′27.69′′, E 49°13′07.99′′
DISTRIBUTION: N Madagascar

nasalis Frieser, 2010: 18
TYPE LOCALITY: E Madagascar, Massiv Ambondrombe, 1300-1400 m, 1 km W de la Cote 1579, Camp 4
DISTRIBUTION: C Madagascar (Ambohitantely Spec. Res.)

festivus Frieser, 2010: 18
TYPE LOCALITY: E Madagascar, Moramanga env.
DISTRIBUTION: E Madagascar (Tamatave distr., Andasibe (Perinet); Andasibe-Mantadia Nat. Park, Analamazaotra forest), N Madagascar (Montagne d′Ambre Nat. Park, Ambohitra env.; Forêt d′Ambre)

ARAECERUS Schönherr, 1823: 1135

TYPE SPECIES: *Anthribus coffeae* Fabricius, 1801
= *Arrhaecerus* Germar, 1829: 357 (Alonso-Zarazaga & Lyal 1999: 37)
= *Araeocerus* Schönherr, 1839 nec Nordmann, 1837: 273 (Alonso-Zarazaga & Lyal 1999: 37)
= *Araeosarus* Walker, 1859: 262 (Frieser 1981: 98)

fasciculatus (DeGeer, 1775): 276
TYPE LOCALITY: Surinam
DISTRIBUTION: cosmopolitan
= *alternans* Germar, 1824: 175 (Anthribus)
= *cacao* Fabricius, 1775: 64 (Bruchus) (Valentine 1998: 287)
= *capsinicola* Fabricius, 1798: 159 (Bruchus)
= *coffeae* Fabricius, 1801: 411 (Anthribus) (Wolfrum 1929: 106)
= *griseus* Stephens, 1831: 211 (Phloeobius) (Wolfrum 1929: 106)
= *japonicus* Thunberg, 1815: 122 (Amblycerus) (Wolfrum 1929: 107)
= *mateui* Cobos, 1954: 41 (Tropideres) (Valentine 1998: 252)
= *parvirostris* J. Thomson, 1858b: 113 (Cratoparis)
= *peregrinus* Herbst, 1797: 168 (Bruchus) (Wolfrum 1929: 107)
= *seminarius* Chevrolat, 1871: 7 (Wolfrum 1929: 107)

suturalis Boheman, 1839: 273
TYPE LOCALITY: [?]

DISTRIBUTION: India, Nepal, Malaysia, south Africa (Transvaal, Natal), Seychelles, Mascarenes, Madagascar: N Madagascar (Antseranana distr., Sambirana riv., Marovato vill.), E Madagascar (Ranomafana Nat. Park)

MEGATERMIS Jordan, 1937: 338

TYPE SPECIES: *Megatermis mameti* Jordan, 1937

rugipennis Frieser, 2000a: 49
TYPE LOCALITY: Madagascar, Antanarivo, Ambodrona, 1250-1350 m
DISTRIBUTION: E Madagascar

MISTHOSIMELLA Jordan, 1914: 342

TYPE SPECIES: *Misthosimella alluaudi* Jordan, 1914

detracta Wolfrum, 1961: 323
TYPE LOCALITY: Madagascar, Mohéli Fomboni 7. M.
DISTRIBUTION: Madagascar (Ampijoroa, Tsaramandroso (paratype)), Comores

subgibba (Wolfrum, 1959a): 168 (*Araecerus*) (Rheinheimer 2004: 113)
TYPE LOCALITY: Madagascar, Antakotako (type?)
DISTRIBUTION: Madagascar, Region Androna; Maroantsetra; Navana (all specimens from type series); Comores

CHORAGINI Kirby, 1819

ALLOCHORAGUS Frieser, 2000b: 34

TYPE SPECIES: *Allochoragus crux* Frieser, 2000

amictus Frieser, 2004b: 34
TYPE LOCALITY: Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

crux Frieser, 2000b: 34
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

dentatus Frieser, 2000b: 35
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

inarmatus Frieser, 2000b: 35
TYPE LOCALITY: Madagascar, 32 km ESE Betroka, Vohitrosa forest, 1650-1700 m
DISTRIBUTION: C Madagascar

rectimargo Frieser, 2004b: 35
TYPE LOCALITY: Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

CHORAGUS Kirby, 1819: 447

TYPE SPECIES: *Choragus sheppardi* Kirby, 1819
= *Alticopus* Villa & Villa, 1833: 35 (Frieser 1981: 100)
= *Halticopus* Agassiz, 1846: 15 (Alonso-Zarazaga & Lyal 1999: 37)

aethiops Frieser, 2010: 16
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

attactus Frieser, 2010: 16
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

cylindricollis Frieser, 2004b: 37
TYPE LOCALITY: Madagascar, 30 km NW Maramag, Bagonongsilang, 1700 m [?, need check the locality]
DISTRIBUTION: Madagascar

ebeninus Frieser, 2000b: 33
TYPE LOCALITY: Madagascar, 32 km ESE Betroke, 0.5 km S Vohitrosa forest, 1650-1700 m
DISTRIBUTION: C Madagascar

fasciger Frieser, 2010: 17
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

femoralis Frieser, 2010: 14
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar, Moramanga env. (paratype)

flavofasciatus Frieser, 2004b: 35
TYPE LOCALITY: Madagascar, Tamatave distr., Andasibe
DISTRIBUTION: E Madagascar

fulvescens Frieser, 2004b: 37
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

interruptofasciatus Frieser, 2004b: 36
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

nitidus Frieser, 2010: 15

TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

othiodes Frieser, 2004b: 36
TYPE LOCALITY: Madagascar, Toamasina, road to Anosibe an´Ala, rd. km 47 S Moramanga
DISTRIBUTION: E Madagascar

spadiceus Frieser, 2000b: 32
TYPE LOCALITY: Madagascar, Tamatave prov., Moramanga env.
DISTRIBUTION: E Madagascar

vicinus Frieser, 2010: 15
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

DYSNOMELAS Frieser, 2007a: 9

TYPE SPECIES: *Dysnos transkeiicus* Frieser, 1993 (erroneously as *Dysnomelas transkaiicus* (Sic!) Frieser (1999) (Sic!) in Frieser, 2007a: 9)

alboscutatus (Fairmaire, 1903a): 44 (*Araecerus*) (Frieser, 2007a: 9)
TYPE LOCALITY: Madagascar, Suberbieville [= Maevatanana]
DISTRIBUTION: W Madagascar

melagris Frieser, 1981: 256 (*Dysnos*) (Frieser, 2007a: 9, erroneously as *D. meleagris*)
TYPE LOCALITY: Madagascar, Ambodivoangy
DISTRIBUTION: Madagascar, Antalaha (2 paratypes)

EPICHORAGUS Frieser, 2010: 11

TYPE SPECIES: *Epichoragus acutus* Frieser, 2010

acutus Frieser, 2010: 10
TYPE LOCALITY: Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

externus Frieser, 2010: 14
TYPE LOCALITY: Madagascar, Analamazaotra env., E of Moramanga
DISTRIBUTION: E Madagascar

politus Frieser, 2010: 12
TYPE LOCALITY: E Madagascar, Fianarantsoa prov., Ranomafana
DISTRIBUTION: E Madagascar

tubericollis Frieser, 2010: 13
TYPE LOCALITY: E Madagascar, Toamasina distr., Analamazaotra forest
DISTRIBUTION: E Madagascar

variolosus Frieser, 2010: 13
TYPE LOCALITY: E Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

vulneratus Frieser, 2010: 12
TYPE LOCALITY: E Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

EUDYSNOS Frieser, 2010: 10

TYPE SPECIES: *Eudysnos pilicornis* Frieser, 2010

pilicornis Frieser, 2010: 10
TYPE LOCALITY: E Madagascar, Andasibe-Mantadia Nat. Park, Analamazaotra forest
DISTRIBUTION: E Madagascar

PERICHORAGUS Wolfrum, 1959b: 147

TYPE SPECIES: *Perichoragus lasius* Wolfrum, 1959

albicinctus Frieser, 2004b: 40
TYPE LOCALITY: E Madagascar, Tamatave distr., Andasibe (Perinet)
DISTRIBUTION: E Madagascar

duplus* ssp. *duplus Frieser, 2004b: 39
TYPE LOCALITY: Madagascar, Antananarivo prov., Manankazo env.
DISTRIBUTION: C Madagascar

duplus* ssp. *inops Frieser, 2004b: 40
TYPE LOCALITY: Madagascar, Tamatave prov., Andasibe, Maromizaha
DISTRIBUTION: C Madagascar, Antananarivo prov., Manankazo env. (allotype, paratypes)

erotyloides Frieser, 2004b: 39
TYPE LOCALITY: Madagascar, Taomasina distr., Analamazaotra env.
DISTRIBUTION: E Madagascar

ovatus Frieser, 2004b: 41
TYPE LOCALITY: Madagascar, Tamatave prov., Maromizaha
DISTRIBUTION: E Madagascar

tetraspilotus Frieser, 2004b: 38
TYPE LOCALITY: Madagascar, Antananarivo prov., Manankazo env.
DISTRIBUTION: C Madagascar

INCERTAE SEDIS

TRIPLODUS Wolfrum, 1961: 324

TYPE SPECIES: *Triplodus cuspis* Wolfrum, 1961

cuspis Wolfrum, 1961: 324
TYPE LOCALITY: Madagascar, Andapa
DISTRIBUTION: E Madagascar

REFERENCES

Agassiz, J. L. R. (1846) *Nomenclatoris zoologici. Index universalis, continens nomina systematica classium, ordinum, familiarum et generum animalium omnium, tam viventium quam fossilium, secundum ordinem alphabeticum unicum disposita, adjectis homonymiis plantarum, nec non variis adnotationibus et emendationibus*. In: Agassiz, J. L. R. 1842–1846 - *Nomenclator Zoologicus, continens nomina systematica generum animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris, in quibus reperiuntur anno editionis, etymologia et familiis, ad quas pertinent, in singulis classibus.* Fasc.12. Jent & Gassmann, Soloduri, 1–393 (1842–1846).

Alluaud, C. (1899) Deux Coléoptères nouveaux du sud-est de Madagascar. *Bulletin du Muséum d'Histoire Naturelle.* Paris, 5: 366–367.

Alonso-Zarazaga, M. A. & Lyal, C. H. C. (1999) *A world catalogue of families and genera of Curculionoidea (Insecta: Coleoptera) (Excepting Scolytidae and Platypodidae).* Entomopraxis S. C. P. Edition, Barcelona, 1–315.

Blackburn, T.; Sharp, D. (1885) Memoirs on the Coleoptera of the Hawaiian Islands. *Scientific Transactions of the Royal Dublin Society*, Ser. 2 (N. Ser.), 3: 119–300, pl. 4–5.

Boheman, C. H. in: Schönherr, C. J. (1839) *Genera et species curculionidum, cum synonymia hujus familiae*. Roret, Paris. Fleischer, Lipsiae, 5 (1): 1–456.

Boheman, C. H. (1859) *Coleoptera. Species novas descripsit*. In: *Kongliga Svenska Fregatten Eugenies resa omkring Jorden under befäl af C. A. Virgin aren 1851–1853. Vetenskapliga iakttagelser Pa H. Majt Konung Oscar den Förstes befallning utgifna af K. Svenska Vetenskaps-Akademien. Zoologi. III. Insekter*. Norstedt & Söner, Stockholm, 113–217.

Brancsik, K. (1893) Beiträge zur Kenntnis Nossibés und dessen Fauna nach Sendungen und Mittheilungen des Herrn P. Frey. *Évkönyve. Jahresh. Natur. Ver. Trencséner Com.*, 15– 16: 202–258 [1892–1893].

Chevrolat, L. A. A. (1871) Description de six coléoptères exotiques éclos a Paris. *Annales de la Société Entomologique de Belgique*, 14 [1870-1871]: 5–8.

Cobos, A. (1954) Dos especies nuevas de Tropideres Schönh. (Col. Anthribidae) de España. *Archivos del Instituto de Aclimatacion*. Almeria 3: 41–44.

Coquerel, C. (1866) Faune de Bourbon (Ile de la Réunion). Coléoptères. *Annales de la Société Entomologique de France,* (4) 6: 293–340.

Degeer, C. (1775) *Memoires pour servir a l'histoire des insectes*. Hesselberg, Stockholm, 5: 1–448.

Dejean, P. F. M. A. (1834) *Catalogue des Coléoptères de la collection de M. le Comte Dejean*. [2. ed.]. Méquignon-Marvis & Sons, Paris (fasc. 3): 177–256.

Dejean, P. F. M. A. (1837) *Catalogue des Coléoptères de la collection de M. le Comte Dejean. Troisième édition, revue, corrigée et augmentée. Fasc. V*. Méquignon-Marvis & Sons, Paris: 1–503 Curc. S. 253–331, 469–503.

Dohrn, C. A. (1883) Exotisches. *Stettiner entomologische Zeitung,* 44: 156–160.

Fabricius, J. C. (1775) *Systema Entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Flensburgi et Lipsiae, [i-xxxii], 1–832.

Fabricius, J. C. (1798) *Supplementum entomologiae systematicae*. Proft & Storch, Hafniae, 1–572.

Fabricius, J. C. (1801) *Systema eleutheratorum secundum ordines, genera, species: adiectis synonymis, locis, observationibus, descriptionibus*. Bibliopolii Academici Novi, Kiliae 2: 1–687.

Fahraeus, O. I. in: Schönherr C. J. (1839) *Genera et species curculionidum, cum synonymia hujus familiae*. Roret, Paris. 1 (1–2): 1–685.

Fahraeus, O. I. (1871) *Coleoptera Caffrariae, annis 1838–1845 a J. A. Wahlberg collecta. Fam. Brenthidae, Anthribidae et Bruchidae*. Öfvers. K. Vetensk. Akad. Förh: 433–452.

Fairmaire, L. M. H. (1880) Diagnoses de coléoptères de Madagascar. *Naturaliste,* 1 (40): 316–317.

Fairmaire, L. M. H. (1888) Diagnoses de coléoptères nouveaux de Madagascar. *Naturaliste,* (2) 2: 32.

Fairmaire, L. M. H. (1892) [Descriptions de quelques Coléoptères de Madagascar, provenant de la région de Diego Suarez]. *Annales de la Société Entomologique de France*, Bulletin 61: 168–172.

Fairmaire, L. M. H. (1896) Matériaux pour la faune coléoptérique de la région malgache. *Annales de la Société Entomologique de Belgique*, 40: 336–398.

Fairmaire, L. M. H. (1897) Matériaux pour la faune coléoptérique de la région malgache. *Annales de la Société Entomologique de Belgique,* 41: 164–204.

Fairmaire, L. M. H. (1898a) Matériaux pour la faune coléoptérique de la région malgache. *Annales de la Société Entomologique de Belgique,* 42: 390–439.

Fairmaire, L. M. H. (1898b) Matériaux pour la faune coléoptérique de la région Malgache. Note 7. *Annales de la Société Entomologique de Belgique,* 42: 463–499.

Fairmaire, L. M. H. (1901a) Matériaux pour la faune coléoptérique de la région malgache (11^{e} note). *Revue d´Entomologie,* 20: 101–248.

Fairmaire, L. M. H. (1901b) Descriptions de quelques Coléoptères recueillis par M. le Dr Decorse dans le sud de Madagascar, Plateau de l'Androy. *Notes from the Leyden Museum,* 23: 65–84.

Fairmaire, L. M. H. (1902) Matériaux pour la faune coléoptérique malgache (13^{e} note). *Annales de la Société Entomologique Belgique,* 46: 236–271.

Fairmaire, L. M. H. (1903a) Matériaux pour la faune coléoptérique malgache. (15e note). *Revue d'Entomologie,* 22: 13–46.

Fairmaire, L. M. H. (1903b) Matériaux pour la faune coléoptérique de la Région malgache. (16e note). *Annales de la Société Entomologique de France,* 72: 181–259.

Fairmaire, L. M. H. (1903c) Matériaux pour la faune coléoptèrique de la région malgache; Anthribidae. *Annales de la Société Entomologique de Belgique*, 47: 369–370.

Fairmaire, L. M. H. (1905) Matériaux pour la faune coléoptérique malgache. *Annales de la Société Entomologique de Belgique*, 49: 114–138.

Faust, J. (1889) Beiträge zur Käferfauna zweier Inseln. *Stettiner entomologische Zeitung,* 50: 61–106.

Fauvel, C. A. A. (1862) Coléoptères de la Nouvelle-Calédonie, recueillis par M. E. Déplanche, chirurgien de la marine imperiále (1858-59-60). Notices entomologiques, première partie. *Bulletin de la Société Linnéenne de Normandie*. Caen, 7: 120–185.

Frieser, R. (1959) Einige neue Anthribiden (Col.). *Annalen des naturhistorischen Museums in Wien,* 63: 416–421.

Frieser, R. (1980) Zur Synonymie madegassischer und afrikanischer Anthribiden (Coleoptera Anthribidae). *Revue de Zoologie et de Botanique Africaines,* 94 (4): 951–958.

Frieser, R. (1981) Beitrag zur Kenntnis der Anthribiden (Coleoptera, Anthribidae). *Entomologische Arbeiten aus dem Museum G. Frey,* 29: 249–258.

Frieser, R. (1992) Zur Synonymie sowie zwei neue Arten der Gattung *Diastatotropis* Lacordaire Coleoptera: Anthribidae. *Acta Coleopterologica*, 8 (1): 46–50.

Frieser, R. (2000a) Einige neue Anthribiden von Madagaskar und der Île de la Réunion (Coleoptera: Anthribidae). *Acta Coleopterologica*, 16 (1): 35–51.

Frieser, R. (2000b) Neue Anthribiden von Madagaskar, Neu Guinea und aus der orientalischen Region (Coleoptera, Anthribidae). *Acta Coleopterologica,* 16 (2): 23–40.

Frieser, R. (2004a) Beitrag zur Kenntnis der Anthribidenfauna Madagaskars (Coleoptera: Anthribidae). *Acta Coleopterologica,* 20 (2): 13–20.

Frieser, R. (2004b) Ein weiterer Beitrag zur Kenntnis der Anthribiden Madagaskars (Coleoptera: Anthribidae). *Acta Coleopterologica,* 20 (2): 29–42.

Frieser, R. (2005): Betrag zur Kenntnis der Anthribiden (Coleoptera: Anthribidae). *Acta Coleopterologica,* 21 (2): 3–8.

Frieser, R (2007a) Ein weiterer Beitrag zur Kenntnis der Anthribiden (Coleoptera: Anthribidae). *Acta Coleopterologica*, 23 (3): 3–12.

Frieser, R. (2007b) Ein neuer Beitrag zur Kenntnis der Anthribiden Madagascars (Coleoptera: Anthribidae). *Acta Coleopterologica*, 23 (3): 33–56.

Frieser, R. (2009) Beitrag zur Kenntnis der Anthribiden (Coleoptera: Anthribidae). *Acta Coleopterologica,* 25 (1): 46–70.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von MILOS TRYZNA auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1): 3–22.

Germar, E. F. (1824) *Insectorum species novae aut minus cognitae, descriptionibus illustratae*. Hendelii et Filii, Halae: xxiv + 624, pl. I–II.

Germar, E. F. (1829) Curculionides. In: Ersch, J. S. & Gruber, J. G. – *Allgemeine Encyclopädie der Wissenschaften und Künste*, 22: 356–359.

Gerstaecker, C. E. A. (1871) Beitrag zur Insektenfauna von Zanzibar. III. Coleoptera. *Archiv für Naturgeschichte,* 37: 42–86.

Herbst, J. F. W. (1797) *Natursystem aller bekannten in- und ausländischen Insekten, als eine Fortsetzung der von Büffonschen Naturgeschichte*. Der Käfer. Pauli, Berlin 7, 1–346.

Jordan, K. (1895a) Beitrag zur Kenntnis der Anthribidae, II. *Stettiner entomologische Zeitung,* 56: 122–204.

Jordan, K. (1895b) Zur Kenntnis der Anthribidae. IV. *Stettiner entomologische Zeitung,* 56: 369–401.

Jordan, K. (1902) Neue Anthribiden, von Dr. W. Horn auf Ceylon gesammelt. *Deutsche Entomologische Zeitschrift*, 76–78.

Jordan, K. (1903) Some new African Anthribidae. *Novitates Zoologicae,* 10: 127–130.

Jordan, K. (1904) Some new African Anthribidae. *Novitates Zoologicae,* 11: 238–241.

Jordan, K. (1911) New Anthribidae. *Novitates Zoologicae,* 18: 92–116.

Jordan, K. (1914a) The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the leadership of Mr J. Stanley Gardiner, M. A., vol. V. No. XIII. - Coleoptera: Anthribidae. *Transactions of the Linnean Society of London,* (2) Zoology 16: 247–267, pl. 15 [1913–1914].

Jordan, K. (1914b) Insectes Coléoptères. X. Anthribidae. In: Voyage de Ch. Alluaud et R. Jeannel en Afrique orientale (1911-1912). *Resultats scientifiques*, Memoires no. 34, Coleoptera, 10: 327–346.

Jordan, K. (1922) Die von G. Teßmann in Spanisch Guinea gesammelten Anthribiden, nebst Beschreibungen einiger anderer afrikanischer Arten. (Col.). *Entomologische Mitteilungen*, 11: 131–158.

Jordan, K. (1924) Anthribidae from the island of Rodriguez. *Novitates Zoologicae,* 31: 227–230.

Jordan, K. (1925) Anthribidae from the eastern hemisphere. *Novitates Zoologicae,* 32: 242–257.

Jordan, K. (1928a) New Anthribidae from the old world. *Novitates Zoologicae*, 34: 105–128.

Jordan, K. (1928b) Some Anthribidae collected by R. E. Turner in South Africa. *Novitates Zoologicae*, 34: 151–158.

Jordan, K. (1936) Anthribidae from South America and Africa (Coleoptera). *Novitates Zoologicae,* 39: 326–329.

Jordan, K. (1937) Report on a second collection of Mauritian Anthribidae sent by Mr. J. Vinson. *Novitates Zoologicae,* 40: 336–343.

Jordan, K. (1949) Entomologocal results from the Swedish expedition 1934 to Burma and British India. Coleoptera: Anthribidae. Collected by René Malaise. *Arkiv för Zoologi,* 41 A: 1–9.

Kirby, W. (1819) A century of insects, including several new genera described from his cabinet. *Transactions of the Linnean Society of London*, 12: 375–453, pl. 21–22, legend pp. 480–481 [1818–1819].

Klug, F. (1833) *Bericht über eine auf Madagascar veranstaltete Sammlung von Insecten aus der Ordnung Coleoptera*. Abhandlungen der Königlich-Preussischen Akademie der Wissenschaft, Berlin, 1: 91–223 [1832–1833].

Kolbe, H. J. (1895) Coleopteren aus Afrika. II. *Stettiner entomologische Zeitung,* 55: 361–397 [1894].

Lacordaire, J. T. (1865) *Histoire naturelle des insectes. Genera des Coléoptères ou exposé méthodique et critique de tous les genres proposés jusqu'ici dans cet ordre d'insectes. (Contenant les familles des Curculionides (suite), Scolytides, Brenthides, Anthribides et Bruchides.)* Roret, Paris., 7: 1–620.

LeConte, J. L.; Horn, G. H. (1876) The Rhynchophora of America, north of Mexico. *Proceedings of the American Philosophical Society,* 15: 1–455.

Olivier, A. G. (1795) *Entomologie, ou histoire naturelle des insectes, avec leurs caractères génériques et spécifiques, leur description, leur synonymie, et leur figure enluminée. Coléoptères.* Desray, Paris., 4 (80): 1–16.

Pascoe, F. P. (1859) On some new Anthribidae. *Annals and Magazine of Natural History,* (3) 4: 431–439.

Pascoe, F. P. (1862) Notices of new or little-known genera and species of Coleoptera. Part III. *Journal of Entomology,* 1 (5): 319–370, pl. 16–17 [1860–1862].

Perrin, H. (1989) Priorité de Cenchromorphus Fairmaire, 1892 sur Zopyrinus Fairmaire, 1901 (Coleoptera, Anthribidae). *Revue francaise d'Entomologie (Nouvelle Serie),* 11: 139–141.

Reitter, E. (1916) *Fauna Germanica. Die Käfer des Deutschen Reiches. Nach der analytischen Methode bearbeitet*. Lutz, Stuttgart., 5: 1–343.

Roelofs, X. (1880) Description of a new genus and species of Ecelonerides (family Anthribidae) from Sumatra. *Notes from the Leyden Museum,* 2: 203–205.

Rheinheimer, J. (2004) Illustrierter Katalog und Bibliographie der Anthribidae der Welt (Insecta: Coleoptera). *Mitteilungen des Entomologischen Vereins Stuttgart*, 39 (1–2), 1–243.

Schilsky, J. (1907) In: Kuester, H. C.; Kraatz, G. - *Die Käfer Europa's. Nach der Natur beschrieben*. Heft 44. Bauer & Raspe, Nürnberg, Nr. 1–100.

Schönherr, C. J. (1823) *Tabulae synopticae familiae curculionidum*. Isis von Oken, (10): 1132–1146.

Schönherr, C. J. (1839) *Genera et species curculionidum, cum synonymia hujus familiae*. Roret, Paris, Fleischer, Lipsiae. 5 (1): 1–456.

Sharp, D. (1891) The rhynchophorous Coleoptera of Japan. Part II. Apionidae and Anthribidae. *Transactions of the Entomological Society of London*, 293–328.

Stephens, J. F. (1831) *Illustrations of British entomology; or, a synopsis of indigenous insects: containing their generic and specific distinctions; with an account of their metamorphoses, times of appearance, localities, food, and economy, as far as practicable. Mandibulata.* Baldwin & Cradock, London 4: 1–413.

Thomson, J. (1858a) Voyage au Gabon. Histoire naturelle des Insectes et des Arachnides recueillis pendant un voyage fait au Gabon en 1856 et en 1857 par M. Henry C. Deyrolle sous les auspices de MM. le Comte de Mniszech et James Thomson, précédée de l'histoire du voyage par J. Thomson; Arachnides par H. Lucas. *Archives entomologiques,* 2: 1–469.

Thomson, J. (1858b) Wallace. Voyage dans l´Asie Orientale. Fragments entomologiques renfermant la description de Coléoptères nouveaux ou rares. *Archives Entomologiques,* 1: 425-460.

Thunberg, C. P. (1815) De Coleopteris rostratis. *Nova Acta Regiae Societatis Scientiarum Upsaliensis,* 7: 104-125.

Trýzna, M. (2012) – In: Trýzna, M. & Baňař, P.: New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae,* 52 (2), 475–485.
Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (Accesed 10 February, 2020)

Trýzna, M. (2017) Description of a new species of the genus *Tophoderes* Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus. *Zootaxa,* 4221 (3), 377–385. https://doi.org/10.11646/zootaxa.4221.3.6

Trýzna, M. (2019) – In: Trýzna, M. & Andrianomenjanahary, M. N.: Description of a new species of the genus *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) with strikingly elongated elytral apices from north-eastern Madagascar. *Zootaxa,* 4563 (3), 444–450. https://doi.org/10.11646/zootaxa.4563.3.2

Trýzna, M. & Baňař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa,* 3609 (5), 504–512. http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3721 (1), 71–78. http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Baňař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3826 (2), 386–392. http://dx.doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Baňař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa,* 3869 (2), 180–188. http://dx.doi.org/10.11646/zootaxa.3869.2.8

Trýzna, M. & Baňař, P. (2015a) A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae). *Zootaxa,* 3905 (2), 264–272. http://dx.doi.org/10.11646/zootaxa.3905.2.7

Trýzna, M. & Baňař, P. (2015b) A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa,* 4052 (4), 485–489. http://dx.doi.org/10.11646/zootaxa.4052.4.8

Trýzna, M. & Baňař, P. (2016) Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. *Zootaxa,* 4161 (3), 429–436. http://doi.org/10.11646/zootaxa.4161.3.10

Trýzna, M. & Baňař, P. (2017a) A new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from Montagne d´Ambre National Park, northern Madagascar. *Zootaxa,* 4221 (5), 537–544. https://doi.org/10.11646/zootaxa.4221.5.3

Trýzna, M. & Baňař, P. (2017b) Two new species of *Adapterops* (Coleoptera: Anthribidae) from protected areas of northern Madagascar, with a key to species, and new faunistic data on the genus. *Zootaxa,* 4231 (2), 238–250. https://doi.org/10.11646/zootaxa.4231.2.6

Trýzna, M. & Baňař, P. (2020) A new species of *Holophloeus* Jordan (Coleoptera: Anthribidae) from eastern Madagascar with ecological notes on it and *H. tuberosus* (Fairmaire, 1897). *Zootaxa*, 4732 (1), 79–98. https://doi.org/10.11646/zootaxa.4732.1.3

Trýzna, M. & Valentine, B. D. (2011) Anthribidae, pp. 64–66, 90–107. In: I. Löbl & A. Smetana (ed.): *Catalogue of Palaearctic Coleoptera, Volume 7. Curculionoidea I.* Stenstrup, Apollo Books, 1–373.

Valentine, B. D. (1994) Two new species of Mylascopus Fairmaire and other Anthribidae (Coleoptera) from nests of Cerceris Latreille wasps in Madagascar. *Coleopterists Bulletin*, 48: 201–206.

Valentine, B. D. (1998) A review of Nearctic and some related Anthribidae (Coleoptera). *Insecta Mundi*, 12: 251–296.

Viette, P. (1991) *Principales localités où des Insectes ont été recueillis à Madagascar. Chief field stations where Insects were collected in Madagascar. Faune de Madagascar.* Publiée sous les auspices de Gouvernement de la République Malgache. Suplément 2. Publié à compte d´auteur. Privately published by the author, 1–88.

Villa, A. & Villa, G. B. (1833) Coleoptera Europae dupleta in collectione Villa quae pro mutua commutationeofferri possunt. *Mediolanum*, 1–36.

Walker, F. (1859) Characters of some apparently undescribed Ceylon insects. *Annals and Magazine of Natural History*, (3) 3: 258–265, 4: 217–224.

Waterhouse, C. O. (1875) Descriptions of some new genera and species of Coleoptera from South Africa, Madagascar, Mauritius, and the Seychelle Islands. *Annals and Magazine of Natural History*, (4) 15: 403–414.

Waterhouse, C. O. (1877) Descriptions of twenty new species of Coleoptera from various localities. *Transactions of the Entomological Society of London*, 1–13.

Waterhouse, C. O. (1882) Descriptions of new Coleoptera from Madagascar (Anthribidae and Longicornia). *Annals and Magazine of Natural History*, (5) 10: 43–47.

Wolfrum, P. (1929) *Coleopterorum Catalogus. Pars 102. Anthribidae*. W. Junk, Berlin, 1–145.

Wolfrum, P. (1953) *Coleopterorum Catalogus. Supplement 102. Anthribidae.* W. Junk, s'-Gravenhage, 1–63.

Wolfrum, P. (1955) Neue Anthribiden aus dem Museum G. Frey. *Entomologische Arbeiten aus dem Museum Frey*, 6: 674–683.

Wolfrum, P. (1959a) Anthribiden aus dem Museum G. Frey, Tutzing. *Entomologische Arbeiten aus dem Museum Frey*, 10: 151–170.

Wolfrum, P. (1959b) Neue und bemerkenswerte Käfer-Formen aus der Sammlung des Zoologischen Forschungsinstituts und Museums Aleander König. 6. Anthribiden. *Bonner Zoologische Beiträge,* 10: 132–148.

Wolfrum, P. (1961) Anthribiden aus dem Institut Scientifique de Madagascar. *Entomologische Arbeiten aus dem Museum G. Frey*, 12: 291–325.

Wolfrum, P. (1962) Eine neue Anthribidae aus Madagascar. *Naturaliste malgache*, 13: 223.

Zimmerman, E. C. (1994) *Australian weevils (Coleoptera: Curculionoidea). Volume 1. Orthoceri Anthribidae to Attelabidae, the primitive weevils.* CSIRO Australia, Melbourne: 1–741.

Příloha č. 3

A new species of *Holophloeus* Jordan (Coleoptera: Anthribidae) from eastern Madagascar with ecological notes on it and *H. tuberosus* (Fairmaire, 1897)

Miloš Trýzna & Petr Baňař

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A new species of *Holophloeus* Jordan (Coleoptera: Anthribidae) from eastern Madagascar with ecological notes on it and *H. tuberosus* (Fairmaire, 1897)

MILOŠ TRÝZNA[1, 2, 4] & PETR BAŇAŘ[3]
[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic.*
[2]*Municipal Museum of Ústí nad Labem, Natural History Department, Masarykova 1000/3, CZ-400 01 Ústí nad Labem, Czech Republic.*
[3]*Mendel University, Faculty of AgriSciences, Department of Zoology, Fisheries, Hydrobiology and Apiculture, Zemědělská 1, CZ-613 00 Brno, Czech Republic. E-mail: petrbanar@seznam.cz*
[4]*Corresponding author. E-mail: anthribidae@gmail.com*

Abstract

A new species, *Holophloeus loebli* Trýzna & Baňař **sp. nov.** (Anthribidae: Anthribinae: Discotenini), from east Madagascar is described. Male genitalia are studied and illustrated, and color photographs are provided. A comparison is provided with the other known Madagascan species of the genus, *H. tuberosus* (Fairmaire, 1897). Ecological notes, including color photographs of habitats, on *H. loebli* and *H. tuberosus* are provided.

Key words: Coleoptera, Anthribidae, Anthribinae, *Holophloeus*, taxonomy, new species, male genitalia, ecological notes, distribution, Madagascar, species discovery

Introduction

The genus *Holophloeus* Jordan, 1928 currently contains 7 species, known from Africa and Madagascar. *H. irrasus* Jordan, 1928, *H. laevicollis* Frieser, 1994 and *H. longipes* Jordan, 1928 are known from the Republic of South Africa, *H. nigellus* (Sparrman, 1785) from the Republic of South Africa and Burundi and *H. terminalis* Frieser, 1989 from Rwanda. The other two species are known from Madagascar: *H. tuberosus* (Fairmaire, 1897) from the north and *H. loebli* Trýzna & Baňař **sp. nov.** from the east.

In this work we describe a new species, *H. loebli* Trýzna & Baňař **sp. nov.** The new species was obtained during fieldwork carried out under our long-term research project in the cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Department of Entomology) (e.g. Frieser 2010, Trýzna 2017, Trýzna & Andrianomenjanahary 2019, Trýzna & Banař 2012, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2016, 2017a, 2017b) and was discovered in the Andasibe-Mantadia National Park and the Ranomafana National Park in the east of Madagascar.

Material and methods

In this work, we measure selected body parts as follows:
length of head = distance from basal margin of eyes to most anterior part of rostrum; length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements are taken in a strictly dorsal position. The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across the eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a).

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Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for description. Finally genitalia were mounted in Euparal on transparent labels, photographed and placed on the pin with the corresponding specimen. For the description of genitalia we use the terminology of Holloway (1982) and Wanat (2007).

The label data of the material examined are cited verbatim, including possible errors, using a slash (/) to separate lines on one label and a double slash (//) for dividing data on different labels. The following abbreviations are used: [p]—printed, [h]—handwritten.

Color photographs were taken with a Leica MSV266 camera.

The specimens studied are deposited in the following collections:

BMNH	Natural History Museum, London, U. K.,
BSNPC	Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna),
CMNC	Canadian Museum of Nature, Ottawa, Canada,
MMBC	Moravian Museum Brno, Czech Republic,
MNHN	Muséum national d´Histoire naturelle, Paris, France,
MTD	Senckenberg Museum für Tierkunde, Dresden, Germany,
MTDC	Miloš Trýzna collection, Děčín, Czech Republic,
NMPC	National Museum, Department of Entomology, Prague, Czech Republic,
ZSMC	Zoologische Staatssammlung, München, Germany.

Historical background

During the study of the Madagascan species of the genus *Holophloeus*, we had at our disposal the male type of *H. tuberosus* (Fairmaire, 1897) (Figs. 1–3) and 3 unidentified specimens, all deposited in MNHN. The specimen labelled "type" has the locality label 'Madag', although Fairmaire in his work mentioned the detailed locality 'Nossi-Bé (*Coquerel*)'. Unfortunately, the original description (Fairmaire 1897) does not indicate the number of specimens of the type series thus the status of the "type" is uncertain. One unidentified specimen (male) is labeled 'Mt. d´Ambre / Madagascar. // Dr. Sicard' [p] and 2 specimens (1 male, 1 female) are without locality details. All these three specimens have a typical blue acquisition label of MNHN: 'MUSÉUM PARIS / MADAGASCAR / COLL. SICARD 1930' [p]. Although there is no locality data of the two last specimens, they originate from the collection of Albert Sicard and they are glued on cards of the same design (cards with the same three transverse black lines on the base) as the male specimen from Mt. d´Ambre. A. Sicard (1864-1930), a doctor of the French Army and a specialist in world Coccinellidae, was undertaking collecting expeditions especially in Tunisia, Morocco and Madagascar. In Madagascar he accumulated a large number of Coleoptera from Montagne d'Ambre where he did research for several years (Cambefort 2006). It can thus be inferred with some confidence that the two specimens without data also came from Montagne d'Ambre. No other specimens of this species were found in any other examined collections.

Robert Frieser (2007) published data of two specimens in 2007, 1 male from 'Nord-Madagaskar, 1935-1938' and 1 female from 'MADAGASKAR c., MORAMANGA env., 10.-18.XII.1997, P. Pacholátko lgt.' as new records of *H. tuberosus* (erroneously published as *H. tuberculosus*). The second specimen, a female from Moramanga, is provided with the following two labels: '*Holophloeus tuberculosus* (sic!) Fairm. [h], det. R. Frieser [p] 2007 [h]' and 'CUM TYPO COMPARATUM' [red printed, a typical label used by Frieser]. This female specimen is also depicted in Frieser´s mentioned work (Frieser 2007: 51, Fig. 1) and it is deposited in the collection of Miloš Trýzna (MTDC). Although this specimen was determined by Frieser as *H. tuberculosus* (correctly *H. tuberosus*), and despite having been compared with the type (and labelled 'CUM TYPO COMPARATUM'), it is in fact not *H. tuberosus*, but a small and poorly developed female of the newly described species *H. loebli* Trýzna & Baňař **sp. nov.** Regarding the mentioned male from 'Nord-Madagaskar', Frieser did not publish any depositary for this specimen, and it was not found in Frieser´s collection (presently deposited in ZSMC), nor in any other examined collection. Hence, this male specimen was not available for our study, and we cannot confirm its identification.

Taxonomy

Tribe Discotenini Lacordaire, 1866

Holophloeus Jordan, 1928

Type species: *Holophloeus irrasus* Jordan, 1928

Diagnosis: Medium or large-sized species (ca. 5–11 mm), body elongate, head comparatively long, rostrum longer, subcylindrical, weakly extended apically, with one central longitudinal carina. Antennal scrobes foveiform. Eyes spherical, not emarginate. Antennae of males always extending posterior margin of pronotum, usually reaching the posterior margin of the elytra, sometimes longer or shorter; antennae of females shorter, approximately reaching the posterior margin of the pronotum. Scape and pedicel thick, funicle thin, antennomeres IX–XI not forming a compact club but antennomeres slack and gradually extended. Dorsal transversal carina of pronotum well-developed, often bent in middle, lateral carina short or absent, basal longitudinal carinula of pronotum (= carinula between dorsal transversal carina and posterior margin of pronotum) oblique and forming very shape angle with lateral carina, the carinula often missing. Pronotum with one or two distinct tubercles or tufts of setae, elytra with numerous tubercles or tufts. Mesosternal process small.

The genus *Holophloeus* differs from the similar genus *Meconemus* Labram & Imhoff, 1838 (distribution in north, central and south America) mainly by the closed antennal scrobes; *Meconemus* have the antennal scrobes open posteriorly.

Holophloeus tuberosus (Fairmaire, 1897)

(Figs. 1–3, 5, 11–15, 17, 19, 21, 23, 25, 27, 29–33, 42)

Studied material

Type material. Type (male) labelled: MADAGASCAR: Antsiranana province: 'Ischnocerus / tuberosus / Fairm. 1896 / Madag. [h] // TYPE [p, red color] // madag. (Sic!) [p, blue color]' // 'MUSEUM PARIS / Collection Léon Fairmaire / 1906' [p, typical blue acquisition label of MNHN] (MNHN).

Other material: 1 male: **Antsiranana province:** 'N MADAGASCAR, 8.i.2015, Mt. d'Ambre N.P., circuit near crater lake, 1169 m, S 12°31´52.0´´, E 49°10´17.2´´, Miloš Trýzna leg.' (MTDC); **72 males, 57 females**: 'N MADAGASCAR, 10.-21.i.2016, Mt. d'Ambre N.P., Mille arbres circuit, 1046 m, S 12°31´10.9´´, E 49°10´32.3´´, M. Trýzna leg.' (MTDC, 4 pairs in MMBC, 1 pair each in BMNH, CMNC, MNHN, MTD, NMPC and ZSMC); **1 male:** 'Mt.d´Ambre, / Madagascar. // Dr. Sicard' [p]; **1 male, 1 female:** without locality labels [see the section Historical background]; all three specimens with typical blue acquisition label of MNHN: 'MUSÉUM PARIS / MADAGASCAR / COLL. SICARD 1930' [p] (MNHN); **1 female:** 'MADAGASCAR-EST / Dist. Maroantsetra / Antakotako [= Antakotaka] / Vadon-Peyrieras' [p] (MTDC).

Note: *Holophloeus tuberosus* is similar to *H. loebli* Trýzna & Bařňař **sp. nov.** but can be easily distinguished by morphological characters given in the key. Our studies have also shown that both species have different distributions (Fig. 42). For the comparison we provide below the basic dimensions of *H. tuberosus*.

Measurements (in mm): male (female), both specimens from Mt. d'Ambre Nat. Park, Mille arbres circuit, 1046 m a.s.l.: Total body length—7.43 (6.91). Head: total length—1.51 (1.44), length of rostrum—0.87 (0.88), maximum width of rostrum—0.80 (0.96), length of eye—0.64 (0.60), maximum width across eyes—1.33 (1.28), minimum distance between eyes—0.42 (0.56). Antenna: length of segments: II—0.28 (0.23), III—0.60 (0.40), IV—0.62 (0.38), V—0.62 (0.30), VI—0.62 (0.28), VII—0.59 (0.28), VIII—0.44 (0.20), IX—0.36 (0.28), X—0.22 (0.15), XI—0.31 (0.25), width of segment IX—0.25 (0.23). Pronotum: maximum length—1.89 (1.76), maximum width—2.13 (2.20), minimum width—1.13 (1.24). Elytra: maximum length—3.81 (3.64), maximum width—2.49 (2.56).

FIGURES 1–3. *Holophloeus tuberosus* (Fairmaire, 1897), type (male). **1,** dorsal view; **2,** lateral view; **3,** original labels.

***Holophloeus loebli* Trýzna & Baňař sp. nov.**
(Figs. 4, 6–10, 16, 18, 20, 22, 24, 26, 28, 34–42)

Type locality. East Madagascar, Toamasina province, Mantadia National Park, S 18°48′05.8′′, E 48°25′44.9′′, 993 m.

Type material. Holotype (male): MADAGASCAR: Toamasina province:

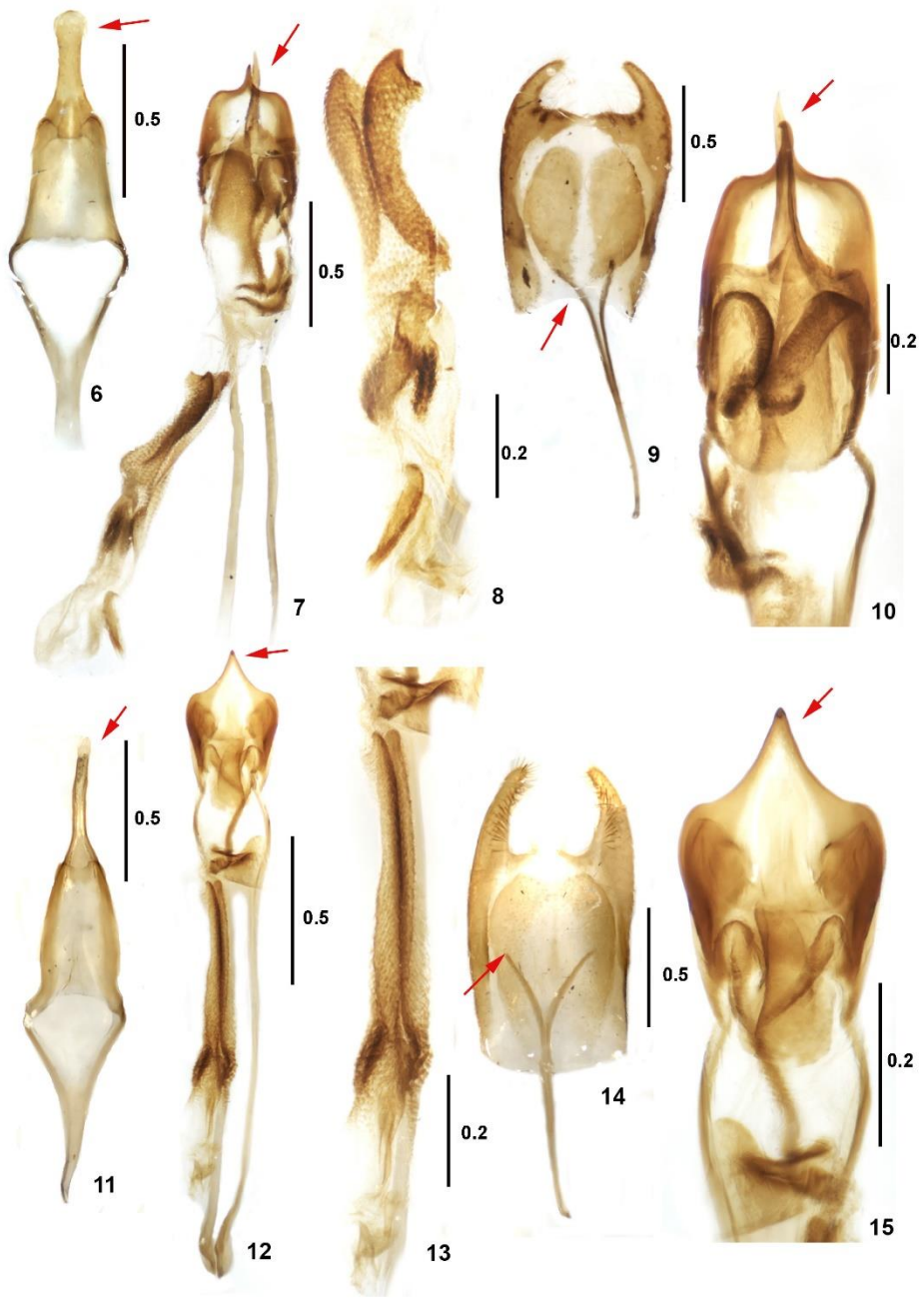
'E MADAGASCAR, 30.xii. / 2016, Mantadia N. P., 993 m, "Eulophia circuti", / S 18°48′05.8′′, E 48°25′44.9′′, / Miloš Trýzna leg.' [p] (BSNPC). **Allotype (female):** the same data as holotype (MTDC). **Paratypes (40 males, 48 females): 23 males, 20 females:** the same data as holotype (MTDC, 3 pairs in MMBC, 1 pair each in BMNH, CMNC, MNHN, MTD, NMPC and ZSMC); **11 males, 18 females:** the same data as holotype but 17.-22.i.2017 (MTDC); **2 females:** 'E MADAGASCAR, 5.-13.ii. / 2007, Andasibe N.P., 955 m, / "Analamazaotra forest", / S 18°56′45.0′′, E 48°25′08.0′′, / Miloš Trýzna leg.' [p] (MTDC); **1 male:** 'E MADAGASCAR, 5.ii.2016, / Andasibe N.P., "Analamazaotra / forest", circuit Indri 1, / 979 m, S 18°56′16.8′′, / E 48°25′09.1′′, M. Trýzna leg.' [p] (MTDC); **1 female:** 'MADAGASCAR, 947 m, / Andasibe N.P., 22.-29.i.2019, / Analamazaotra, Aventure circ., / S 18°56′40.6′′, E 48°25′26.7′′, / primary forest, M. Trýzna leg.' [p] (MTDC); **1 female:** 'MADAGASKAR c. / MORAMANGA env. / 10.-18.xii.1997 / P. Pacholátko lgt.' [p] // 'Holophloeus / tuberculosus (Sic!) / Fairm. [h] /det. R. Frieser [p] 2007 [h]' // 'CUM TYPO / COMPARATUM' [red printed, a typical label used by Frieser] (MTDC); **1 male, 2 females:** 'Madagascar / Antsianaka [= forest Antsianaka near Lac Alaotra] / Perrot Frères / 2e Semestre 1893 [p]' // 'Muséum Paris / ex. Coll. / R. Oberthür / 1952' [p, typical blue acquisition label of MNHN] (1 pair in MNHN, 1 female in MTDC); **1 female:** 'Madagascar / Fénerive / E. Perrot [p] // Muséum Paris / ex. Coll. / R. Oberthür / 1952' [p, typical blue acquisition label of MNHN] (MNHN); **2 males:** 'Madagascar / Fénerive / Per-

rot Frères, 1er Trim. 1896' [p] // 'Muséum Paris / ex. Coll. / R. Oberthür / 1952' [p, typical blue acquisition label of MNHN] (1 ex. in MNHN, 1 ex. in MTDC); **1 female: Fianarantsoa province:** 'MADAGASKAR / Ranomafana res. [= Ranomafana National Park] / 15.-25. xii. 2004 / R. Andreeva, I. Andreev leg.' [p] (MTDC); **1 male, 1 female:** 'MADAGASCAR, 1000 m / Ranomafana N.P., circuit / Talatakely, 8.-12.i.2019, / S 21°15′47.2′′, E 47°25′20.7′′, / primary forest, M. Trýzna leg.' [p] (MTDC); **1 male, 1 female:** 'Madagascar' [p] (MNHN).

Red label [p]: 'HOLOTYPE / ALLOTYPE / PARATYPE / ***Holophloeus* / *loebli* sp. nov.** / M. Trýzna & P. Baňař det., 2018 (resp. 2019)'.

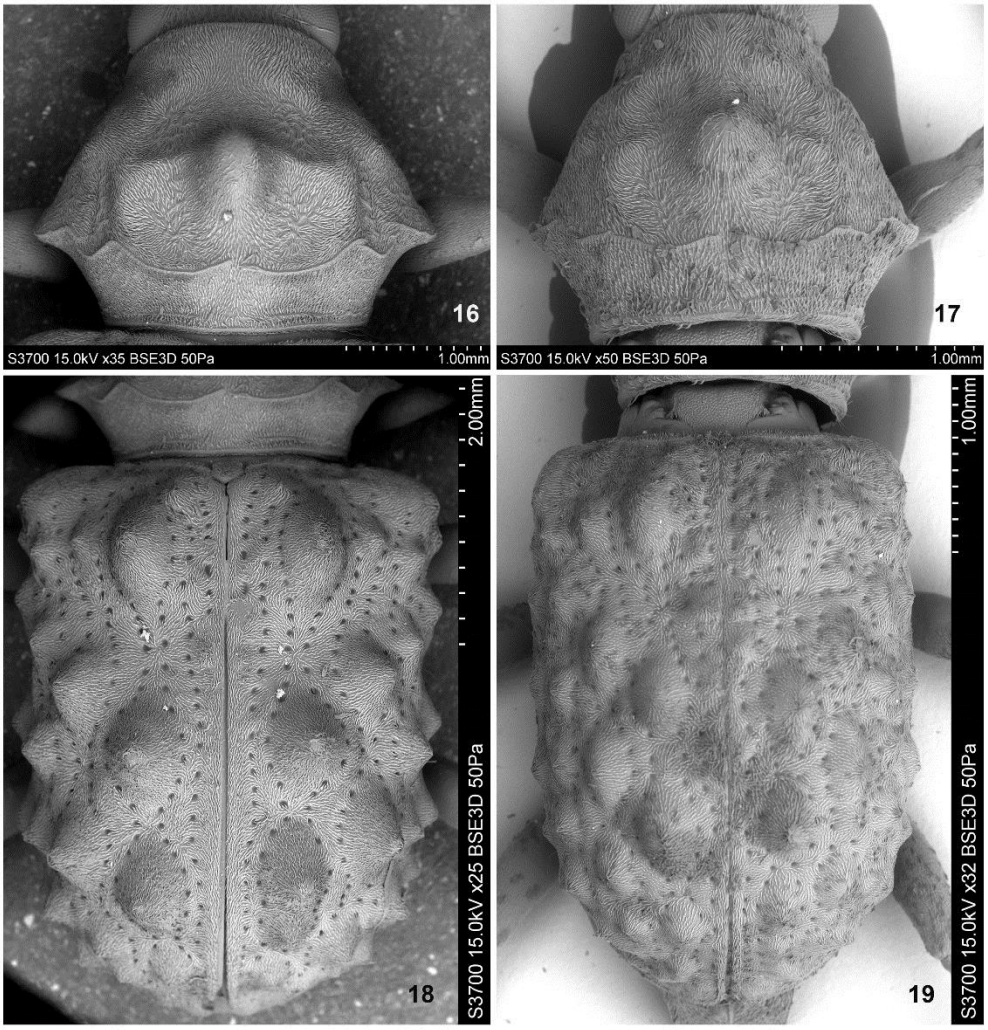
Description. Male holotype (female allotype). *Measurements* (in mm): Total body length—8.82 (8.00). Head: total length—1.96 (1.80), length of rostrum—1.29 (1.12), maximum width of rostrum—1.04 (1.12), length of eye—0.67 (0.68), maximum width across eyes—1.49 (1.52), minimum distance between eyes—0.56 (0.60). Antenna: length of segments: II—0.33 (0.28), III—0.71 (0.45), IV—0.69 (0.45), V—0.62 (0.35), VI—0.67 (0.28), VII—0.53 (0.25), VIII—0.44 (0.20), IX—0.33 (0.28), X—0.22 (0.18), XI—0.38 (0.28), width of segment IX—0.28 (0.25). Pronotum: maximum length—2.09 (1.88), maximum width—2.73 (2.72), minimum width—1.33 (1.44). Elytra: maximum length—4.45 (4.08), maximum width—3.31 (3.32).

FIGURES 4–5. 4, *Holophloeus loebli* **Trýzna & Baňař sp. nov.,** holotype, male; **5,** *Holophloeus tuberosus* (Fairmaire, 1897), male from Mt. d'Ambre National Park.



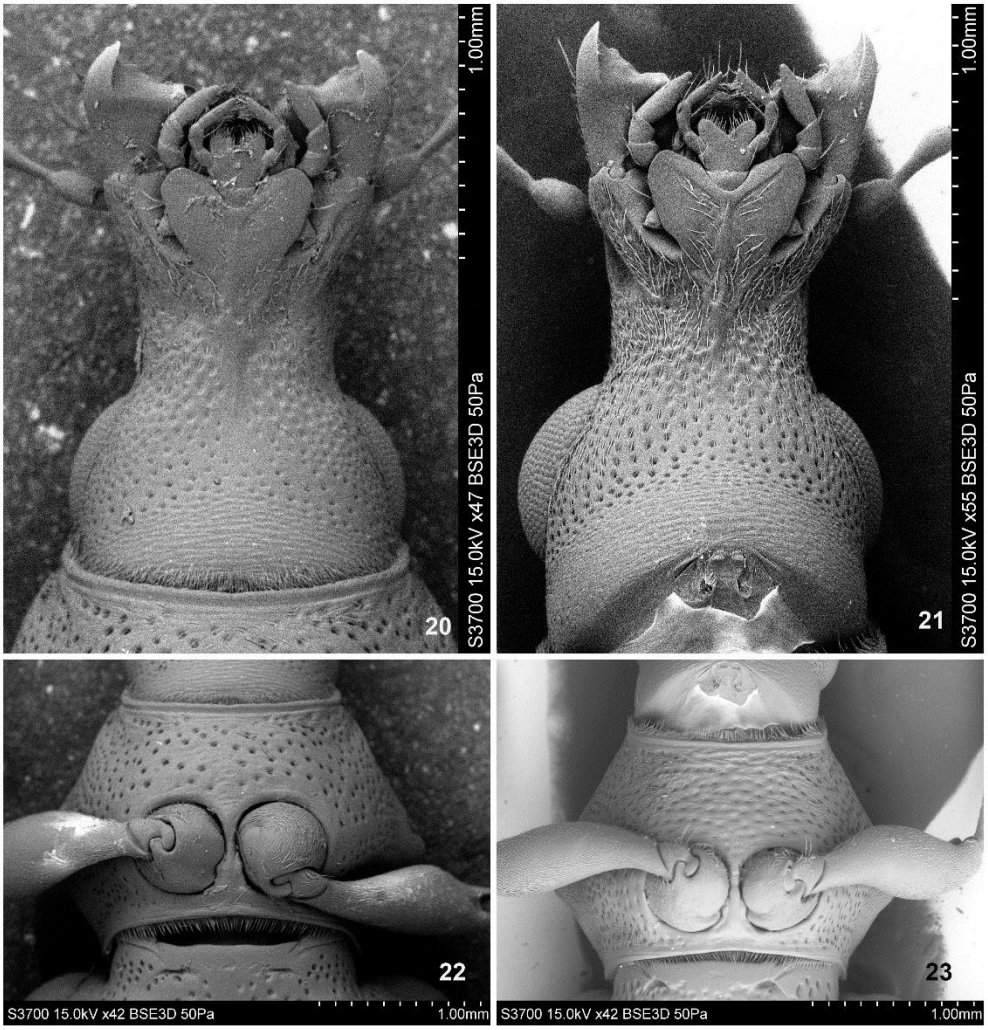
FIGURES 6–15. Male terminalia. **6–10,** *Holophloeus loebli* **Trýzna & Baňař sp. nov.,** holotype male; **11–15,** *Holophloeus tuberosus* (Fairmaire, 1897), male from Mt. ďAmbre National Park; **6, 11,** tegmen, dorsal view; **7, 12,** aedeagus, ventral view; **8, 13,** inner sac of aedeagus, latero-ventral view; **9, 14,** segment VIII and sternite IX, ventral view; **10, 15,** apex of aedeagus, dorsal view. Red arrows indicate important details (see Key). Scale bars in mm.

Coloration of the cuticle black, only tarsomeres III–IV in all legs dark brown, claws slightly lighter. Proximal and distal part of tarsomere I and proximal part of tarsomere II covered with dense whitish hairs (Fig. 4).



FIGURES 16–19. 16, 18, *Holophloeus loebli* **Trýzna & Baňař sp. nov.,** holotype, male; **17, 19,** *Holophloeus tuberosus* (Fairmaire, 1897), male from Mt. d'Ambre National Park; **16–17,** pronotum, dorsal view; **18–19,** elytra, dorsal view.

Vestiture. *Head* naked, *pronotum* covered with very fine sparse indistinct appressed blackish setae, on lateral sides of pronotum and on prosternum setae whitish. *Elytra*, including all tubercles covered with very short fine sparse appressed blackish setae. *Antennae* with short fine appressed setae, antennomeres VIII–XI in addition with several long hairs on distal part. All *legs* covered with fine setae, all femora with indistinct light sparse appressed setae particularly in distal part, all tibiae with dense black setae, appressed on external part and distinctly subdecumbent in internal part. All tarsomeres covered with decumbent dense black setae, proximal and distal part of tarsomere I and proximal part of tarsomere II also covered with dense whitish decumbent hairs. Venter of thorax and abdominal sternites with very short sparse whitish pubescence. *Pygidium* covered with very fine appressed dark setae.



FIGURES 20–23. 20, 22, *Holophloeus loebli* **Trýzna & Baňař sp. nov.,** holotype, male; **21, 23,** *Holophloeus tuberosus* (Fairmaire, 1897), male from Mt. d'Ambre National Park; **20–21,** head, ventral view; **22–23,** prosternum, dorsal view.

Structure. *Head* relatively long, rostrum broad (Figs. 4, 20), flat in middle, with indistinct depression between antennal scrobes, with distinct longitudinal carina in central part of rostrum. Dorsal part of rostrum and frons very strongly sculptured, this sculpturation also on lateral sides of rostrum. Ratio of rostrum length to maximum width 1.24 in male, 1.00 in female. Ventral part of head only with fine and sparse punctation (Fig. 20). Eyes not emarginate anteriorly, dorsal ocular index 1.20 in male, 1.30 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.43 in male, 1.36 in female. *Antennae* (Fig. 4) of male distinctly extended to posterior margin of pronotum, antennae of females shorter, reaching approximately posterior margin of pronotum. Scape and pedicel thick, funicle thin, antennomeres IX–XI not forming compact club but slack and gradually extended in both sexes. Antennomere IX only slightly longer than wider in both sexes, X as long as wide in male, slightly transverse in female, XI slightly longer than wider in male, as long as wide in female. *Pronotum* transverse, ratio of its length to maximum width 0.77 in male, 0.69 in female, widest at distinct dorsal transverse carina, from which strongly narrowed

anteriad and posteriad (Fig. 16). Dorsal antebasal transverse carina with arch in middle, here shortly interrupted, continuously-undulate to sides and interrupted before lateral lobe. Lateral carina of pronotum short, in contact with dorsal transverse carina forming a distinct lobe. Basal longitudinal carinula of pronotum absent. Pronotal disc with one well-defined tubercle, surrounding area with shallow depressions. *Elytra* broadly suboval to rectangular (Fig. 18), narrowed evenly in distal fifth of their length, ratio of the maximum length to maximum width of elytra 1.34 in male, 1.23 in female. Elytra with numerous well-defined tubercles on even-numbered elytral intervals: second elytral interval with three well-defined protruded subbasal, median and postmedian and one small preapical tubercles, fourth elytral interval with two well-defined antemedian and postmedian and one small preapical tubercles, sixth and eighth elytral intervals with numerous small tubercles (Figs. 4, 18). *Abdomen* shorter than broad. Ventrites II–V with prominent margins on proximal part in male (Figs. 26, 28). *Pygidium* longer than wide in male, wider than long in female, slightly narrowing posteriorly.

Male genitalia and surrounding structures. Tegmen robust (Fig. 6), tegminal plate wide, basal piece strongly, tegminal apodeme weakly sclerotized. Apex of tegmen conspicuously broadened. Aedeagus long and robust (Fig. 7), its inner sac (Fig. 8) with several symmetrical and asymmetrical densely serrated structures. Pedon sub-rectangular in shape, with short and strongly sclerotized apical projection. Tectum with very long process, longer than apex of pedon (Figs. 7, 10). Tergite VIII strongly sclerotized, with two antero-lateral projections, sternite VIII (Fig. 9) sub-divided into two kidney-shaped hemisternites. Sternite IX (= spiculum gastrale) with strongly sclerotized arms touching sternite VIII on its posterior margin (Fig. 9).

Sexual dimorphism. *Males:* body comparatively more slender than in females, rostrum slightly longer and more slender. Antennae extended distinctly beyond posterior margin of pronotum, antennomere X as long as wide. Abdominal ventrites flat in middle, ventrites II–V with prominent margins on proximal part. *Females:* body more robust than in male. Antennae shorter, approximately reaching posterior margin of pronotum, antennomere X slightly transverse. Abdominal ventrites rounded.

Etymology. Patronym, dedicated to our dear colleague and friend Ivan Löbl (Geneva), eminent specialist in the field of the taxonomy of Coleoptera.

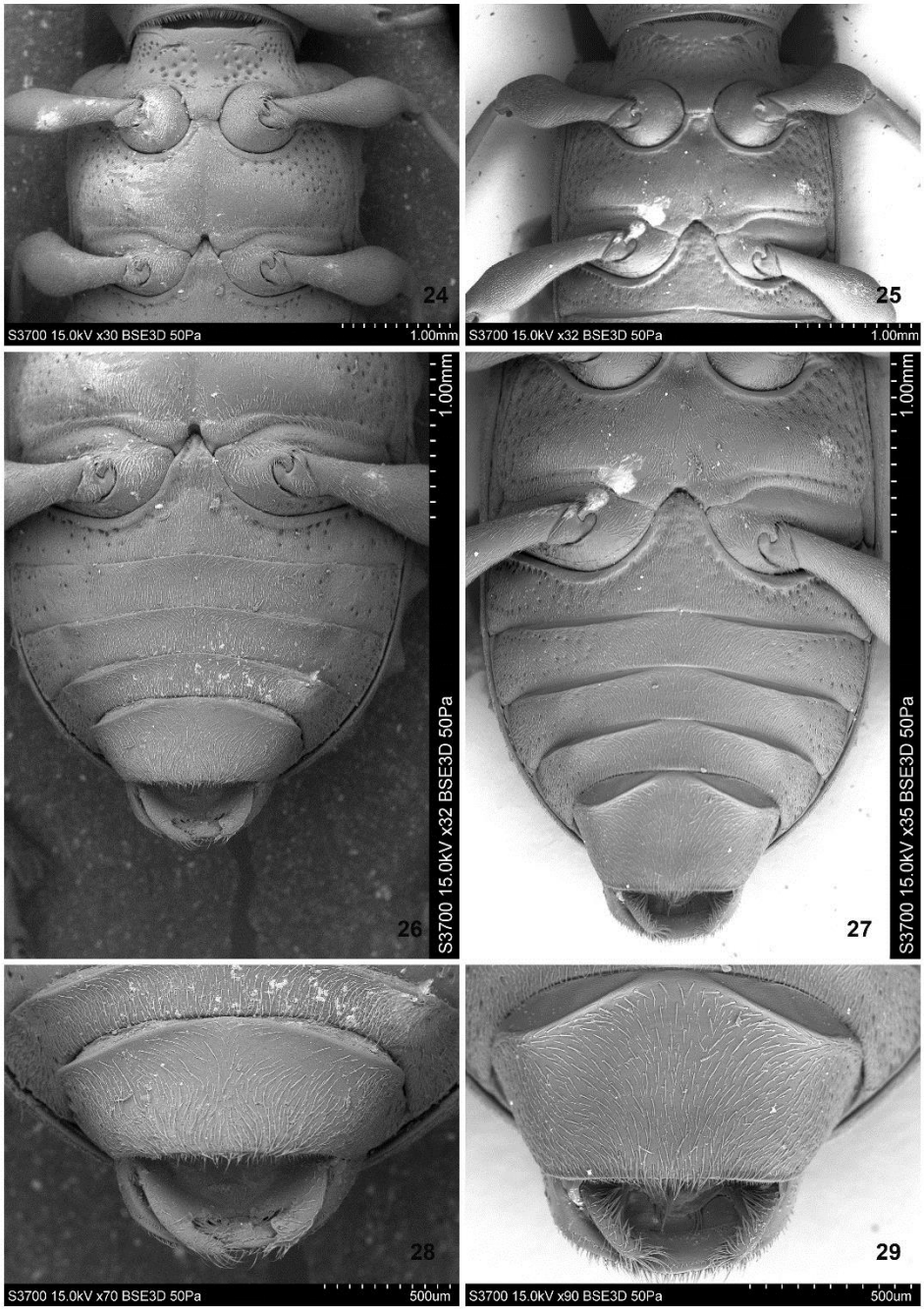
Collecting circumstances. The holotype, allotype and most of the paratypes were collected in tropical moist primary forest at an elevation of 993 metres on the lower side of a fallen tree trunk. The rotten trunk had a diameter about 50 cm and was located in a distinctly shaded area. Microhabitat of the type locality is on Figs. 37–41. For details, see section on Ecological notes on Madagascan species of the genus *Holophloeus*.

Distribution. All specimens were collected in east Madagascar, in Toamasina and Fianarantsoa Provinces.

Differential diagnosis. *Holophloeus loebli* Trýzna & Bařař **sp. nov.** is similar to *H. tuberosus* (Fairmaire, 1897) from which it can be distinguished by the morphological characters given in the following key:

(1) Specimens more robust, ratio of body length to maximum width 2.66 in male, 2.41 in female (Fig. 4). Pronotum transverse (Fig. 16), ratio of its length to width at carina 0.77 in male, 0.69 in female. Elytra suboval (Fig. 18), ratio of the maximum length to maximum width of elytra 1.34 in male, 1.23 in female. Elytral tubercles robust, more prominent, in cross-section rather spherical. Subbasal, median and postmedian tubercles on the second elytral interval very prominent (see also from lateral view). Pronotal and elytral tubercles entirely black. Lateral carina of pronotum reaching one third of pronotal length. Prosternum and mesosternum with deep sparse microsculpture (Figs. 22, 24). Male abdominal ventrite V short and transverse (Figs. 26, 28), ratio of its length to width 0.40, and distinctly wider than width of pygidium in apical view. Antennomere IX in male shorter, only 1.19x longer than wide (Fig. 4). *Male terminalia:* tegminal plate wider and robust, its apex broadened (Fig. 6). Tectum with very long process, longer than apex of pedon (Figs. 7, 10). Sternite IX (= spiculum gastrale) touching sternite VIII at its posterior margin (Fig. 9) ..... ***H. loebli* Trýzna & Bařař sp. nov.**

(2) Specimens more slender, ratio of body length to maximum width 2.98 in male, 2.70 in female (Fig. 5). Pronotum slightly transverse (Fig. 17), ratio of its length to width at carina 0.89 in male, 0.80 in female. Elytra suboval (Fig. 19), ratio of the maximum length to maximum width of elytra 1.53 in male, 1.42 in female. Elytral tubercles smaller, less prominent, in cross-section suboval. Subbasal, median and postmedian tubercles on the second elytral interval not prominent (see also from lateral view). Pronotal and elytral tubercles each with apex brownish. Lateral carina of pronotum very short to almost lacking. Prosternum and mesosternum with shallow dense microsculpture (Figs. 23, 25). Male abdominal ventrite V weakly transverse (Figs. 27, 29), ratio of its length to width 0.60, and slender, only slightly wider than width of pygidium in apical view. Antennomere IX in male longer, 1.44x longer than wide (Fig. 5). *Male terminalia:* tegminal plate narrower, its apex thin, not broadened (Fig. 11). Tectum strongly reduced, without process (Figs. 12, 15). Sternite IX (= spiculum gastrale) touching sternite VIII in the middle of its length (Fig. 14) ..... ***H. tuberosus* (Fairmaire, 1897)**



FIGURES 24–29. 24, 26, 28, *Holophloeus loebli* **Trýzna & Baňař sp. nov.,** holotype, male; **25, 27, 29,** *Holophloeus tuberosus* (Fairmaire, 1897), male from Mt. d'Ambre National Park; **24–25,** mesosternum and metasternum, dorsal view; **26–27,** abdominal ventrites I–V, dorsal view; **28–29,** abdominal ventrite V, dorsal view.

FIGURES 30–31. Collecting site of *Holophloeus tuberosus* (Fairmaire, 1897) in Mt. d'Ambre National Park, near crater lake, 2015.

FIGURES 32–33. Collecting site of *Holophloeus tuberosus* (Fairmaire, 1897) in Mt. d'Ambre National Park, Mille arbres circuit, 2016.

FIGURES 34–35. Collecting site of *Holophloeus loebli* **Trýzna & Baňař sp. nov.** in Andasibe National Park, Analamazaotra forest, 2016.

FIGURES 36–37. Collecting site of *Holophloeus loebli* **Trýzna & Baňař sp. nov.; 36,** Andasibe National Park, Analamazaotra forest, 2016; **37,** type locality in Mantadia National Park, Eulophia circuit, 2017.

FIGURES 38–39. Type locality of *Holophloeus loebli* **Trýzna & Baňař sp. nov.** in Mantadia National Park, Eulophia circuit, 2017; **38,** primary forest with single huge torso of lying trunk; **39,** detail of cover of bark with specimens.

FIGURES 40–41. Type locality of *Holophloeus loebli* **Trýzna & Baňař sp. nov.** in Mantadia National Park, Eulophia circuit, 2017, detail with specimen and exit hole.

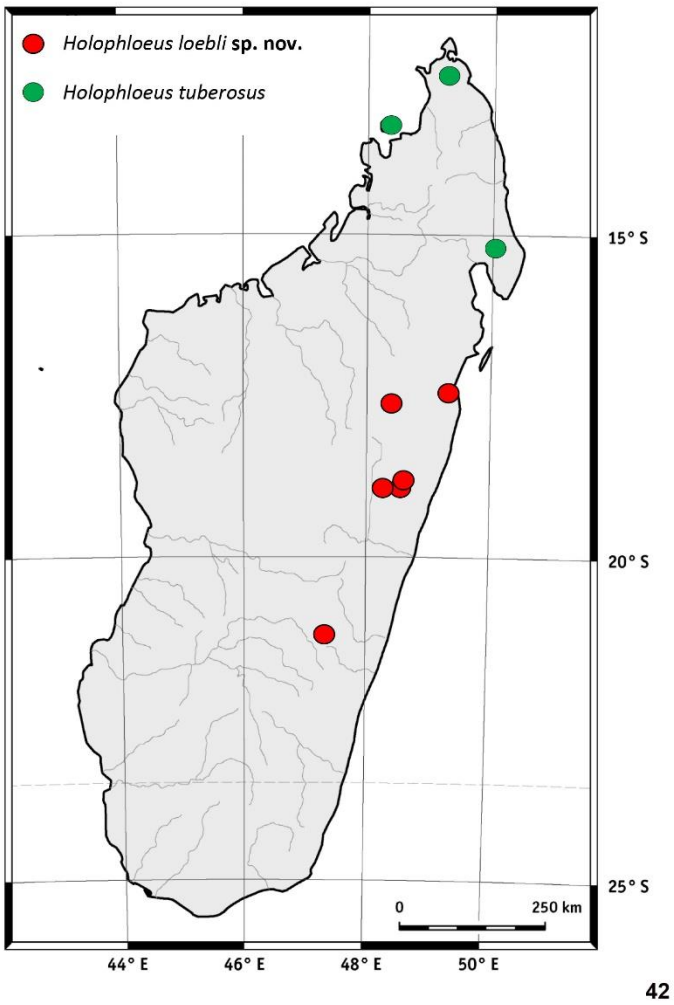


FIGURE 42. Distribution of *Holophloeus* species in Madagascar.

Ecological notes on Madagascan species of the genus *Holophloeus*

Both species of the Madagascan genus *Holophloeus* appear to occur in well-preserved forests with dead wood of larger diameters. We had the opportunity and good luck to observe and collect both of the rare Madagascan species of this genus.

***Holophloeus tuberosus* (Fairmaire, 1897)** was described from Nosy Be [= Nossi-Bé], a small island on the northwest coast of Madagascar, which is located about eight kilometers from the coast of Madagascar. During our research we found this species in Montagne d´Ambre National Park, near Joffreville village [= Ambohitra], northern Madagascar, which is approximately 130 km north-east by air from the type locality. In 2015 we found only 1 male specimen (Mt. d'Ambre N.P., near crater lake, S 12°31´52.0´´, E 49°10´17.2´´, 1169 m, 8.i.2015, for habitats see Figs. 30–31) but a year later we found 129 specimens on a single dead branch during 6 collecting days (Mt. d'Ambre

N.P., Mille arbres circuit, S 12°31′10.9′′, E 49°10′32.3′′, 1046 m, 10.-21.i.2016, for habitats see Figs. 32–33). We swept the lower side of the branch and twigs, combined with occasional strong beating with a net, and we repeated this collecting method several times a day. This dead branch, broken off from a deciduous tree in primary forest, had a diameter ca. 20–25 cm (Fig. 33) and was located in a notably shaded part of the forest (shading ca. 90%). Together with this species we observed only 1 specimen of *Diastatotropis tessellata* Fairmaire, 1897 during these 6 days. Such an unexpectedly small community of another species of anthribids we explained mainly by a slightly more developed stage of decay of the wood. Another factor could be the considerable shading of the site. As our experience from various localities in Madagascar shows, a low number of species appears to be directly correlated with the increasing shading of the site.

The first two specimens of ***H. loebli* Trýzna & Baňař sp. nov.** were already found by the first author in 2007 in Andasibe National Park, east Madagascar (Analamazaotra forest, S 18°56′45.0′′, E 48°25′08.0′′, 955 m, 5.-13.ii.2007). Both specimens (females) were found within several days of detailed observation of one single branch in secondary forest (Trýzna & Banař 2012). In this work, both of these specimens were incorrectly listed under the name *H. tuberosus* (table on page 484). Both specimens were captured by beating a dead branch lying on the ground. The branch with the widest twigs about 15 cm in diameter had broken off from an unidentified species of deciduous tree in secondary forest, most probably no more than 2 years previously. It was still covered with bark and situated in a slightly sunny location. Together with this species, another 30 species of anthribids were observed and collected on this branch. We attribute such high diversity of anthribids to the fact that the branch was found at an optimal period after having broken off from the tree, remaining covered with intact bark, attacked by suitable fungi and situated in a sunny location.

The other specimen (male) also came from Andasibe National Park (Analamazaotra forest, S 18°56′16.8′′, E 48°25′09.1′′, 979 m, 5.ii.2016) and was found in secondary forest on a broken trunk about 20 cm in diameter, covered with intact bark. This trunk was located on the footpath, in the flight corridor of insects (shading about 30%, Figs. 34–36). This species was observed together with other anthribids—*Apatenia fallax* Frieser, 2000, *A. sulcicollis* Frieser, 2000, *Diastatotropis olivacea* Waterhouse, 1877, *Uterosomus verrucosus* (Olivier, 1795), *Lemuricedus* **sp. n.**, *Litotropis* **sp. n.**, *Caranistes sonjai* Frieser, 2010 and *Dysnomelas melagris* (Frieser, 1981).

Most specimens of both sexes (74) were found one year later in adjacent Mantadia National Park. All specimens were found in primary forest on a single huge torso of a lying trunk of about 50 cm in diameter over the course of 4 days. The torso of the trunk was located on the Eulophia circuit (S 18°48′05.8′′, E 48°25′44.9′′ E, 993 m, 30.xii.2016 and 17.-22.i.2017). The trunk of this undetermined deciduous tree was located near an indistinct footpath with about 70% shading (Figs. 37–41). It was covered with peeling bark and thanks to the developed stage of wood decomposition many species of plants had already grown from the trunk. Due to its advanced decay, only a small range of other anthribids were found there, namely common species without specific requirements—*Lemuricedus audouini* (Fahraeus, 1839), *L. maculicollis* (Fairmaire, 1896) and *Diastatotropis irrorata* Lacordaire, 1866. A large number of exit holes were found on the trunk (Figs. 39–41). It was possible to observe a large number of males and females, although pre-mating and mating behaviour was not observed. Although we spent several hours a day by watching of this trunk, we did not see any specimens flying.

During collecting, it was found that individuals of both Madagascan species of the genus *Holophloeus*, unlike other anthribids, did not attempt to fly and climbed slowly on the trunk (as well as into the entomological net).

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Forestry and Wood Sciences, Czech University of Life Sciences, Prague (Miloš Trýzna) and by grant MENDELU AF-IGA-2018-tym004 (Petr Baňař). The research received support from the SYNTHESYS Project (http://www.synthesys.info) which is financed by the European Community Research Infrastructure Action under the FP7 'Capacities' Program (visit to Natural History Museum, London) for the project *'Research into Madagascan fungus weevils of the family Anthribidae'* (Miloš Trýzna) with the kind co-operation of Maxwell V. L. Barclay. We would like to thank Dr. Hélène Perrin for supporting our work during our study in Muséum national d´Histoire naturelle, Paris. We are indebted to Maxwell V. L. Barclay, Robert Anderson, Peter Hlaváč and Cheong Loong Fah for reading the manuscript.

References

Alonso-Zarazaga, M.A. & Lyal, C.H.C. (1999) *A world catalogue of families and genera of Curculionoidea (Insecta: Coleoptera) (Excepting Scolytidae and Platypodidae).* Entomopraxis S. C. P. Edition, Barcelona, 315 pp.

Cambefort, Y. (2006) *Des coléopières, des collections, des hommes*. Muséum national d´Histoire naturelle, collection Archives, Paris, 293 pp.
https://doi.org/10.4000/books.mnhn.2265

Fairmaire, L.M.H. (1897) Matériaux pour la faune coléoptérique de la région malgache. 3e note (suite). *Annales de la Société Entomologique de Belgique*, 41, 164–204.

Frieser, R. (2007) Ein neuer Beitrag zur Kenntnis der Anthribidae Madagaskars (Coleoptera: Anthribidae). *Acta Coleopterologica*, 23 (3), 33–56.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica*, 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand. Vol. 3*. Science Information Division, DSIR, Wellington, 264 pp.

Rheinheimer, J. (2004) Illustrierter Katalog und Bibliographie der Anthribidae der Welt (Insecta: Coleoptera). *Mitteilungen des Entomologischen Vereins Stuttgart*, 39 (1–2), 1–243.

Trýzna, M. (2017) Description of a new species of the genus *Tophoderes* Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus. *Zootaxa,* 4221 (3), 377–385.
https://doi.org/10.11646/zootaxa.4221.3.6

Trýzna, M. & Andrianomenjanahary, M.N. (2019) Description of a new species of the genus *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) with strikingly elongated elytral apices from north-eastern Madagascar. *Zootaxa*, 4563 (3), 444–450.
https://doi.org/10.11646/zootaxa.4563.3.2

Trýzna, M. & Baňař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: https://www.aemnp.eu/pdf/52_2/52_2_475.pdf (accessed 24 October 2019)

Trýzna, M. & Baňař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa*, 3609 (5), 504–512.
https://doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3721 (1), 71–78.
https://doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Baňař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3826 (2), 386–392.
https://doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Baňař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa*, 3869 (2), 180–188.
https://doi.org/10.11646/zootaxa.3869.2.8

Trýzna, M. & Baňař, P. (2015a) A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae). *Zootaxa*, 3905 (2), 264–272.
https://doi.org/10.11646/zootaxa.3905.2.7

Trýzna, M. & Baňař, P. (2015b) A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa*, 4052 (4), 485–489.
https://doi.org/10.11646/zootaxa.4052.4.8

Trýzna, M. & Baňař, P. (2016) Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. *Zootaxa*, 4161 (3), 429–436.
http://doi.org/10.11646/zootaxa.4161.3.10

Trýzna, M. & Baňař, P. (2017a) A new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from Montagne d´Ambre

National Park, northern Madagascar. *Zootaxa*, 4221 (5), 537–544.
https://doi.org/10.11646/zootaxa.4221.5.3
Trýzna, M. & Baňař, P. (2017b) Two new species of *Adapterops* (Coleoptera: Anthribidae) from protected areas of northern Madagascar, with a key to species, and new faunistic data on the genus. *Zootaxa*, 4231 (2), 238–250.
https://doi.org/10.11646/zootaxa.4231.2.6
Wanat, M. (2007) Alignment and homology of male terminalia in Curculionoidea and other Coleoptera. *Invertebrate Systematics*, 21, 147–171.
https://doi.org/10.1071/IS05055

Příloha č. 4

Description of a new species of the genus *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) with strikingly elongated elytral apices from north-eastern Madagascar

Miloš Trýzna & Mamy Nandrianina Andrianomenjanahary

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Description of a new species of the genus *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) with strikingly elongated elytral apices from north-eastern Madagascar

MILOŠ TRÝZNA[1,3] & MAMY NANDRIANINA ANDRIANOMENJANAHARY[2]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz, anthribidae@gmail.com*
[2]*University of Antananarivo, Laboratory of Ecology and Biodiversity, Doctoral School of Natural Resource Management and Development, Graduate School of Agronomical Science, ESSA BP 175 Ambohitsaina – Antananarivo 101, Madagascar. E-mail: maminandrianina27@gmail.com*
[3]*Corresponding author*

Abstract

A new species, *Diastatotropis blazeji* **Trýzna sp. nov.** (Anthribidae: Anthribinae: Cappadocini), from north-eastern Madagascar is described. Male and female genitalia are studied and illustrated and colour photographs are provided. It is distinguished from all species of the genus by the strikingly elongated apices of the elytra and the distinctly bright golden green colour of the upper side of the body.

Key words: Coleoptera, Anthribidae, Anthribinae, *Diastatotropis*, taxonomy, new species, male and female genitalia, Madagascar

Introduction

The endemic Madagascan genus *Diastatotropis* Lacordaire, 1866 comprises 15 known species, all found in well-preserved forests with large diameter dead wood. In this article a new species, *Diastatotropis blazeji* **Trýzna sp. nov.**, is described. The new species comes from collection of the Muséum national d´Histoire naturelle, Paris (MNHN) and was studied thanks our long-term research project in cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Faculty of Sciences, Department of Entomology) (Frieser 2010).

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum; length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position. The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for

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description and illustration. Finally genitalia were stored in glycerol in a small vial mounted on the pin with the corresponding specimen. For the description of both male and female genitalia we use the terminology of Holloway (1982) and Wanat (2007).

The label data of the material examined are cited verbatim, using a slash (/) to separate lines on one label. The following abbreviations are used: [p]—printed, [h]—handwritten.

Colour photographs were taken with a camera Canon EOS 6D and objektive Canon MP-E 65 mm or objective Nikon BD Plan (in case of genitalia).

The specimens studied are deposited in the following collections:

MNHN Muséum national d´Histoire naturelle, Paris, France,
MTDC Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Tribe Cappadocini Alonso-Zarazaga & Lyal, 1999

Diastatotropis Lacordaire, 1866

Type species: *Diastatotropis tigrina* Lacordaire, 1866

Recognition. Body elongate. Head comparatively long, rostrum longer, extended apically, without deep depression in the middle, with one central longitudinal carina (or without this carina in case of *D. nitidipennis* Waterhouse, 1882 and *D. planifrons* Waterhouse, 1882) and two lateral carinae. Eyes spherical or elliptical, not emarginate. Antennae of males usually reaching posterior margin of pronotum or beyond, antennae of females shorter, not reaching posterior margin of pronotum. Funicle thin, antennal club 3-segmented or antennomeres continuously extended. Dorsal transverse carina of pronotum distinct. Pronotal declivity wide. Medium- or large-sized species, from 6 mm (small specimens of *D. rubricollis* (Fairmaire, 1893)) to more than 18 mm (*D. olivaceus* Waterhouse, 1877).

Diastatotropis blazeji Trýzna sp. nov.

(Figs. 1–10)
http://zoobank.org/urn:lsid:zoobank.org:act:D8091DE1-C500-486D-A1A6-A84D64E0B131

Type locality. North-eastern Madagascar, Toamasina province, Ambohitsitondrona [ca. S 15°34´, E 50°00´].

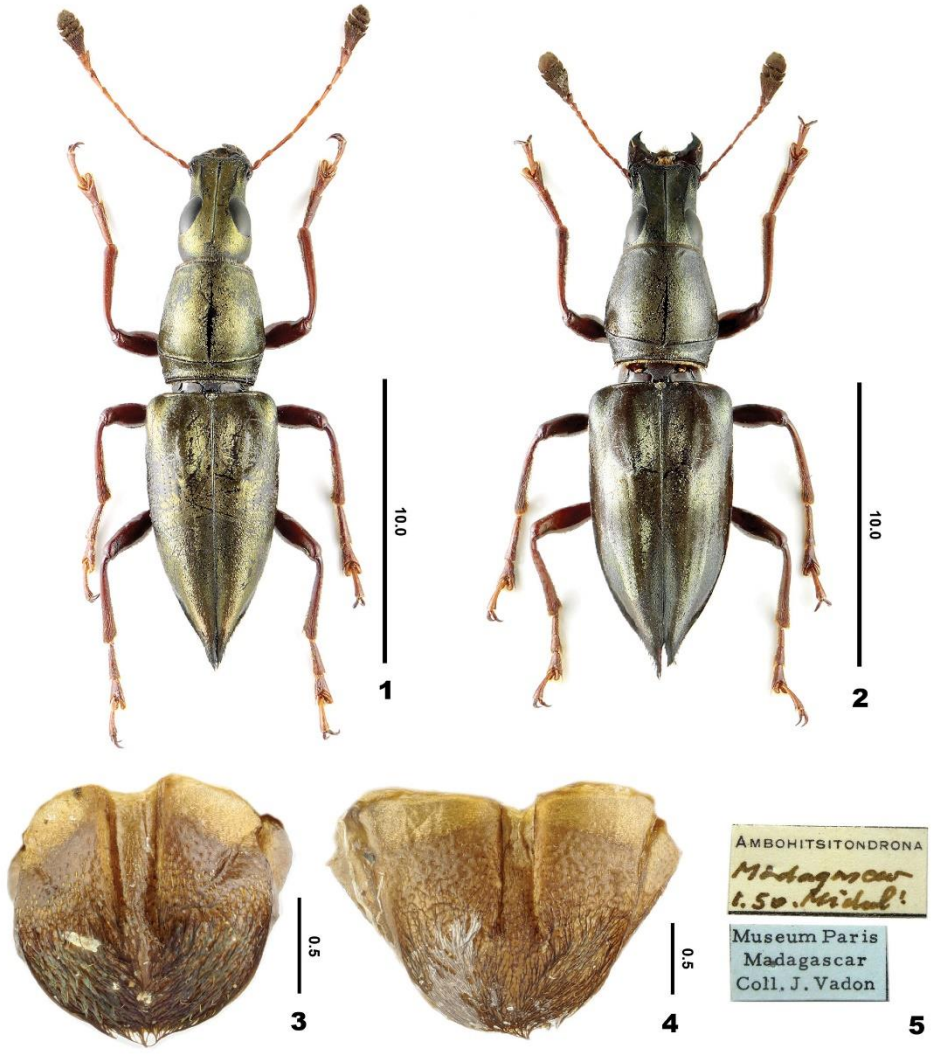
Type material. Holotype (male): NE MADAGASCAR, TOAMASINA PROVINCE: 'Ambohitsitondrona [p] / Madagascar [h] / I. 50. Michel! [h]' (MNHN); Allotype (female): ANTSIRANANA PROVINCE: 'Madagascar / Andapa / XII. [19]51. C [collection] J. Vadon! [h]' [ca. S 14°39´, E 49°38´] (MNHN); Paratypes: 4 males and 1 female the same data as holotype (MNHN, 2 males, 1 female in MTDC); 1 male and 1 female the same data as allotype (MNHN). All specimens with a typical blue acquisition label of MNHN: 'Museum Paris / Madagascar / Coll. J. Vadon' [p]. Red label [p] HOLOTYPE / ALLOTYPE / PARATYPE / *Diastatotropis* / *blazeji* **sp. nov.** / M. Trýzna det., 2018.

Identification. Distinguished from all species of the genus by strikingly elongated apices of elytra, unknown in other species of the genus. Apices extend distinctly beyond pygidium in both sexes, pygidium is partially hidden and invisible from above. Species with one central and two lateral longitudinal carinae on the rostrum. Color of the upper side of the body distinctly bright golden green. Legs, scape, pedicel and funicle bronze brown, antennal club dark brown to blackish. Large-sized species (13–19 mm).

Description. Male holotype (female allotype). *Measurements* (in mm): Total body length—17.53 (18.24). Head: total length—3.25 (3.25); length of rostrum—1.80 (2.00); maximum width of rostrum—2.05 (2.55); length of eye—1.40 (1.35); maximum width across eyes—2.55 (2.70); minimum distance between eyes—0.95 (1.25). Antenna: length of segments: II—0.50 (0.45), III—0.98 (0.75), IV—0.75 (0.63), V—0.70 (0.40), VI—0.65 (0.33),

VII—0.70 (0.33), VIII—0.55 (0.33), IX—0.75 (0.70), X—0.25 (0.25), XI—0.50 (0.55), width of segment VIII—0.43 (0.38). Pronotum: maximum length—4.25 (4.10); width at carina—3.75 (4.00); minimum width—2.75 (3.00). Elytra: maximum length—9.70 (10,00); maximum width—4.60 (5.00).

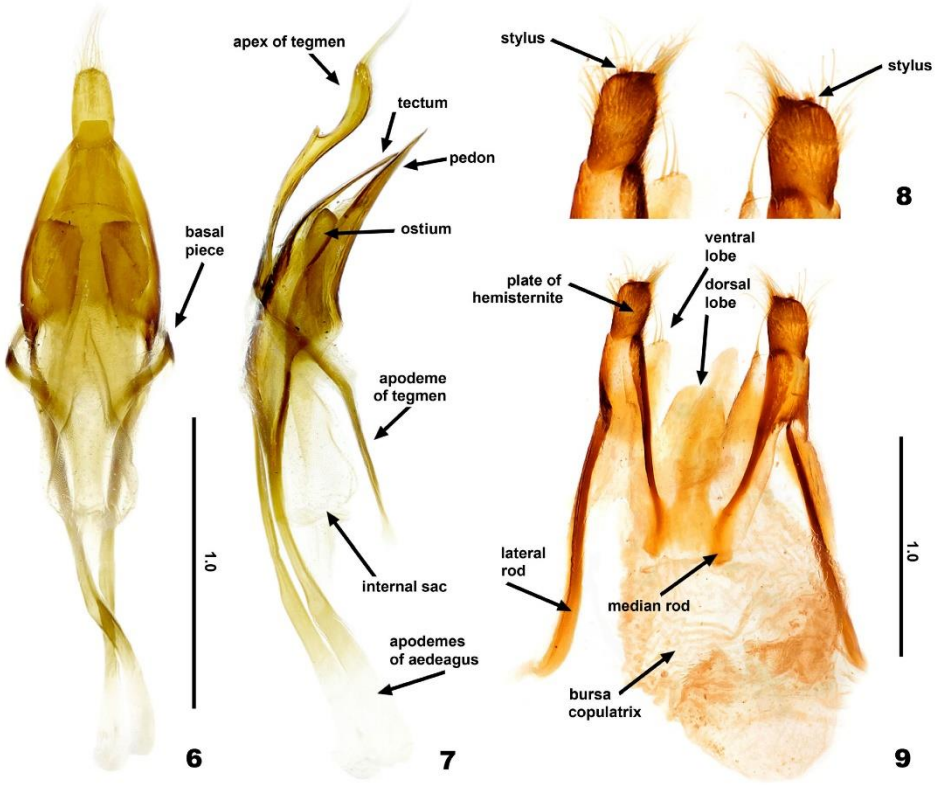
Colouration of the cuticle of entire body black. Legs, scape, pedicel and funicle bronze brown, antennal club and claws dark brown to blackish. Head, pronotum and elytra covered by dense flakes of distinctly bright golden green color. Pro-, meso- and metasternum and abdominal ventrites with delicate and sparser flakes of the same color.



FIGURES 1–5. *Diastatotropis blazeji* **Tryzna sp. nov.;** 1–4, dorsal habitus; 1, male, paratype no. 1; 2, female, paratype no. 2; 3, male pygidium; 4, female pygidium; 5, original labels. Scale bars in mm.

Vestiture. Head, disc of pronotum and elytra covered by slightly prolonged, very dense, minute flakes. Disc of pronotum with indistinct slender longitudinal central black stripe, resulting from absence of flakes. Anterior

margin of pronotum with longer, strictly appressed forward-facing scales. Apices of elytra with longer decumbent blackish setae. Lower part of head almost naked, lateral sides of pronotum well covered with flakes, disppearing downwards. Mesosternum naked with coarse sparse sculpturation. Mesepisternum, mesepimeron, metepisternum and metasternum covered by dense flakes. Abdominal ventrites I–V naked in central part, covered only by very sparse subdecumbent setae. Pygidium and distal margin of ventrite V with subdecumbent setae in both sexes. All femora almost naked, only in lower part indistinct strip of short subdecumbent setae, all tibiae with distinct subdecumbent setae in distal two thirds. Tarsomere I with subdecumbent, II–V with appressed setae. Scape, pedicel and antennomeres III–VII naked, VIII with short setae on distal margin, club covered by dense short appressed setae in both sexes.



FIGURES 6–9. *Diastatotropis blazeji* **Tryzna sp. nov.;** 6–7, aedeagus including tegmen; 6, dorsal aspect; 7, lateral aspect; 8, detail of plates of hemisternites, ventral aspect; 9, hemisternites, ventral aspect. Scale bars in mm.

Structure. *Head* appropriately long, sides of rostrum almost parallel, distal part weakly extended apically. Rostrum flat, with one long central carina extended in distal part of rostrum and reaching vertex behind posterior margin of eyes, and two short lateral carinae. Ratio of rostrum length to maximum width 0.88 in male, 0.78 in female. Eyes elliptical, not emarginate, dorsal ocular index 1.19 in male, 1.72 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.24 in male, 1.06 in female. *Antennae* reaching to posterior margin of pronotum in male, female antennae noticeably shorter. Scape moderately swollen, rest of antennomeres flattened, club well developed in both sexes. Antennomere VIII longer than wide in male, as long as wide in female. *Pronotum* longitudinal, ratio of its length to width at carina 1.13 in male, 1.03 in female, gradually extended anteriorly to quarter of its length, here widest (at the carina), then narrowed to distal part. Dorsal transverse carina sinuated with indistinct interruption in the middle. Lateral carina of pronotum developed but very short, not extending half of pronotum, rounded at contact with dorsal transverse carina. *Elytra* almost triangular in male, suboval to triangular in female, with

significant elongation of apices of elytra in both sexes, ratio of the maximum length to maximum width of elytra 2.11 in male, 2.00 in female. Shape of male pygidium Fig. 3, female pygidium Fig. 4.

Male genitalia. Compared to overall size of body, male genitalia small. Tegminal plate with distinct tooth visible in lateral view, apex of tegmen slightly bent, its tip densely covered by long setae. Apodeme of tegmen straight. Pedon and tectum moderately wide. Apodemes of aedeagus moderately curved (Figs. 6–7).

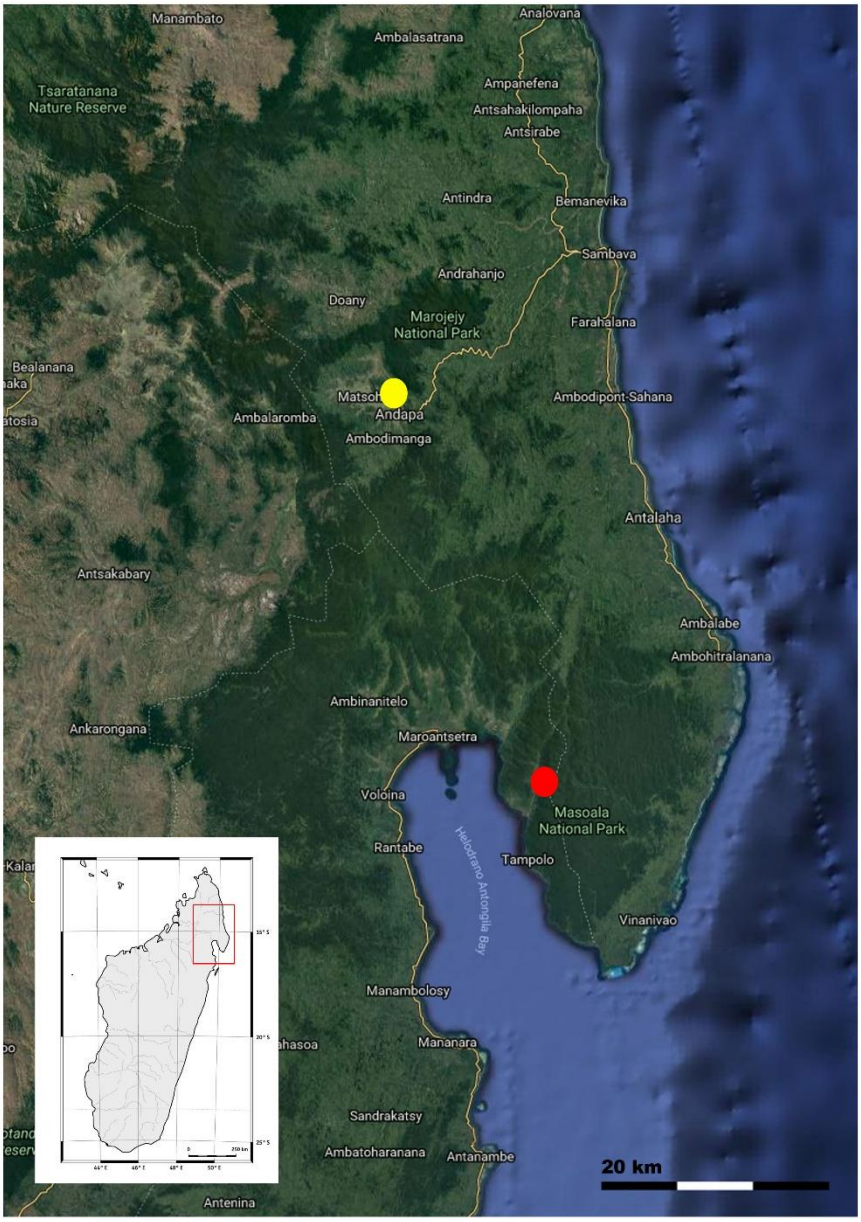


FIGURE 10. Type locality of *Diastatotropis blazeji* **Trýzna sp. nov.** Red spot – holotype, Ambohitsitondrona, Toamasina province; yellow spot – allotype, Andapa, Antsiranana province. Google Earth Pro, modified.

Female genitalia. Hemisternites conspicuously short and delicate, lateral and median rods very short, median rod reaching to half of length of lateral rod. Dorsal lobe broadly rounded and naked, ventral lobes slender, with long setae on apex. Transverse bar almost invisible. Plates of hemisternites without teeth, covered by long scattered setae, each plate with short indistinct stylus (Figs. 8–9).

Sexual dimorphism. *Male:* generally more slender, elytra almost triangular, from half of length of elytra narrowed to distal part, antennae reaching to posterior margin of pronotum, antennomere VIII longer than its wide. Abdominal ventrite V the same length as IV. Shape of pygidium as in Fig. 3. *Female:* body more robust, elytra suboval to triangular in female, up to from apical third narrowed to distal part, antennae shorter, not reaching to posterior margin of pronotum, antennomere VIII as long as wide. Abdominal ventrite V longer than IV. Shape of pygidium as in Fig. 4.

Etymology. Patronym, dedicated to my friend Lukáš Blažej (Varnsdorf), a specialist mainly in Spheciformes (Hymenoptera: Aculeata) and Carabidae (Coleoptera).

Collecting circumstances. Unknown.

Distribution. NE Madagascar. The species is only known from the type locality Ambohitsitondrona (Toamasina province), and the locality Andapa (Antsiranana province); the two localities are ca. 100 km apart.

Differential diagnosis. *Diastatotropis blazeji* **Trýzna sp. nov.** can be distinguished mainly by its unique prolongation of the elytral apices in both sexes, a character that is unknown in other species of the genus, and the distinctly bright golden green colour of the upper side of the body, which does not resemble any other species of the genus.

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References

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand*, 3. Science Information Division, DSIR, Wellington, 264 pp.

Lacordaire, J.T. (1866) Histoire naturelle des insectes. *Genera des Coléoptères ou exposé méthodique et critique de tous les genres proposés jusqu´ici dans cet ordre d´insectes. Tome septième contenant les familles des curculionides (suite), scolytides, brenthides, anthribides et bruchides*. Librairie Roret, Paris, 7, 520 pp.

Trýzna, M. & Bařař, P. (2013) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa* 3609 (5), 504–512.
https://doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2014) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa* 3826 (2), 386–392.
https://doi.org/10.11646/zootaxa.3826.2.8
Wanat, M. (2007) Alignment and homology of male terminalia in Curculionoidea and other Coleoptera. *Invertebrate Systematics*, 21, 147–171.
https://doi.org/10.1071/IS05055

Příloha č. 5

Description of a new species of the genus *Tophoderes* Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus

Miloš Trýzna

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Description of a new species of the genus *Tophoderes* Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus

MILOŠ TRÝZNA
Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com

Abstract

A new species *Tophoderes banari* Trýzna **sp. nov.** (Anthribidae: Anthribinae: Tophoderini) from east Madagascar is described. Both sexes and male and female genitalia are illustrated. Colour photographs of all Madagascan species of the genus *Tophoderes* are added.

Key words: Coleoptera, Anthribidae, Anthribinae, *Tophoderes*, taxonomy, new species, genitalia, Madagascar

Introduction

The genus *Tophoderes* Dejean, 1834 contains 14 Madagascan species, all of which occur in well-preserved forests with the presence of large diameter dead wood. In this article a new species *Tophoderes banari* Trýzna **sp. nov.** is described from the Madagascan province of Fianarantsoa. A previous paper (Trýzna & Baňař 2015a) produced a list of all Madagascan species of this genus with their type localities and references to primary literature.

The new species was studied thanks our long-term research project in cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Department of Entomology) (e.g. Frieser 2010, Trýzna & Baňař 2012, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2016).

Material and methods

In this work, we measure selected body parts as follows: length of head = distance from basal margin of eyes to most anterior part of rostrum; length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position.

The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for description and illustration. Finally genitalia were stored in glycerol in a small vial mounted on the pin with the corresponding specimen. For the description of both male and female genitalia we use the terminology of Holloway (1982).

The label data of the material examined are cited verbatim, including possible errors, using a slash (/) to separate lines on the same label, and double slash (//) for dividing data on different labels. The following abbreviations are used: [p]—printed, [h]—handwritten.

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Colour photographs were taken with a camera Canon EOS 6D and objektive Canon MP-E 65mm.

The specimens studied are deposited in the following collections: BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna); MTDC = Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Tophoderes Dejean, 1834

Recognition. Head comparatively long, rostrum longer, extended apically, with one central longitudinal carina, without depression in the middle. Eyes spherical, not emarginate. Antennae of males reaching to posterior margin of pronotum or longer (two last antennomeres can extend beyond this margin), antennae of females shorter, not reaching posterior margin of pronotum. Funicle thick, robust, antennal club 3-segmented. Pronotum with or without forward oriented spine on lateral side; slightly transverse, dorsal transverse carina distinct. Large-sized species, from 11 mm (small specimens of *T. sinuatocollis* Jordan, 1895) to more than 32 mm (*T. annulatus* Waterhouse, 1875; *T. murinus* Alluaud, 1899). For comparative purposes all known species of the genus in Madagascar are illustrated in Figures 1–4 and 11–22.

Tophoderes banari Trýzna sp. nov.

(Figs. 1–2, 5–10, 23)

Type locality. East Madagascar, Fianarantsoa province, Ivohibe, 1500 m a.s.l.

Type material. Holotype (male): MADAGASCAR, FIANARANTSOA PROVINCE: 'Madagascar / Ivohibe (1500 m) / R. Decary 1926 [p] (BSNPC). **Allotype (female):** 'Madagascar Est / Vondrozo [p] / I. 1976 [h] // A. Peyrieras [h] (MTDC). Red label [p] HOLOTYPE / ALLOTYPE / *Tophoderes / banari* **sp. nov.** / M. Trýzna det., 2016.

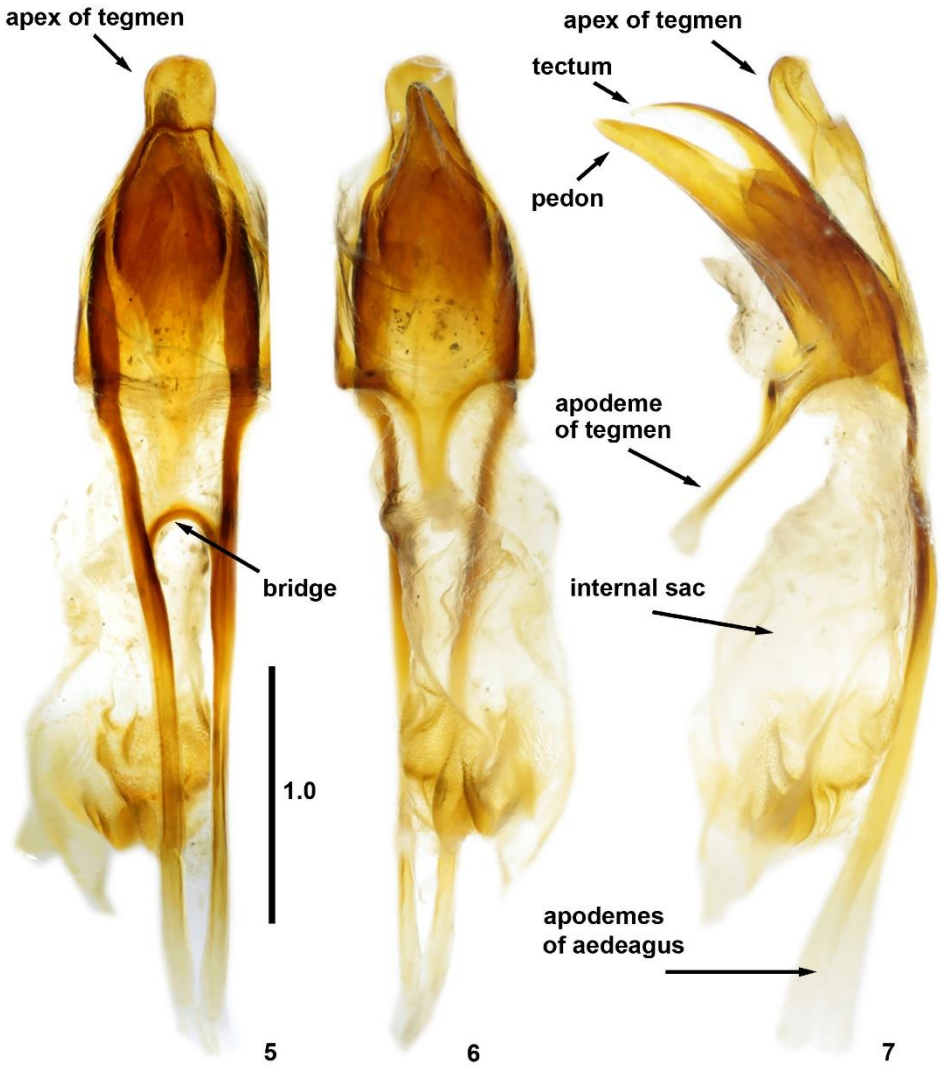
Description. Male holotype, (female allotype). *Measurements* (in mm): Total body length—14.78 (15.50). Head: total length—2.48 (2.60); length of rostrum—1.59 (1.59); maximum width of rostrum—1.95 (2.14); length of eye—0.98 (1.07); maximum width across eyes—2.34 (2.55); minimum distance between eyes—1.20 (1.36). Antenna: length of segments: II 0.41 (0.34), III—0.64 (0.59), IV—0.66 (0.50), V—0.52 (0.45), VI—0.45 (0.34), VII—0.43 (0.34), VIII—0.45 (0.36), IX—0.61 (0.55), X—0.45 (0.41), XI—0.52 (0.57). Pronotum: maximum length—3.50 (3.10); width at carina—5.10 (5.80); maximum width—5.10 (5.80); minimum width—2.30 (2.50). Elytra: maximum length—8.80 (9.80); maximum width—6.10 (7.00).

Colouration of the cuticle of whole body black, only distal part of tarsomere V and claws dark brown in both sexes.

Vestiture. *Head* predominantly covered with dense whitish appressed setae on dorsal part, this pubescence covering entire dorsal part of rostrum, on vertex formed as wide stripe as wide as interocular width. *Pronotum* and *elytra* of marmorated appearance. *Pronotum* with two large spots of black setae distinctly bordered by dense stripes of whitish setae in its proximal part. Two black spots in anterior corners of pronotum, rest of pronotum with characteristic pattern formed of black and whitish pubescence, with indistinct tuft of very short black setae on disc. Pronotal declivity black, with narrow central stripe and two wide areas in lateral parts covered with dense whitish setae. *Elytra* with typical marmorated pattern, whitish pubescence comprises two indistinct transverse stripes in sub-basal and post-median part; these stripes often interrupted in elytral intervals. Particularly on second, fourth and sixth elytral interval, are several indistinct tufts of very short black setae. If such tufts are involved in sub-basal or post-median transverse stripes, they are also formed of whitish setae. Preapical tubercle indistinct, its tip covered with bright whitish setae. Scutellum with sparse whitish setae.

Antennae with indistinct sparse pubescence, mainly antennomeres VII–VIII covered by longer whitish appressed setae, antennomeres IX–XI (club) with denser, more rusty setae in both sexes. *Legs* covered with dense setae. All femora with whitish stripe on the distal quarter and whitish tip. Tibiae covered with whitish setae appressed in proximal part and subdecumbent to suberect in distal part; wide stripe in the middle and apical part of

FIGURES 1–4. 1–2, *Tophoderes banari* Trýzna **sp. nov.**; 1, male holotype, dorsal habitus; 2, female allotype, dorsal habitus; 3–4, *Tophoderes annulatus* Waterhouse, 1875; 3, male, 29 mm, Ankarampotsy, Tantamala; 4, female, 29 mm, Ambositra.

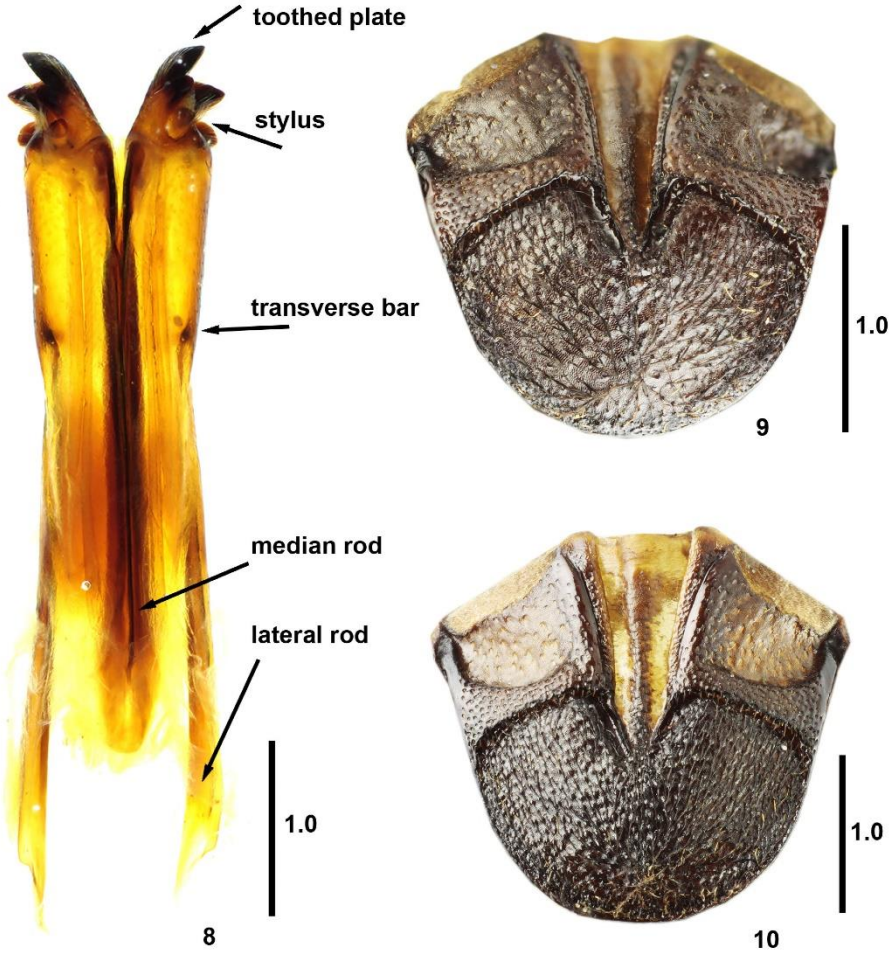


FIGURES 5–7. *Tophoderes banari* Trýzna **sp. nov.,** male holotype, eadeagus including tegmen; 5, dorsal aspect; 6, ventral aspect; 7, lateral aspect. Scale bar in mm.

tibiae with black setae in both sexes. Tarsomeres predominantly with black setae, only proximal part of tarsomere I and distal part of tarsomere V with whitish setae in both sexes. Venter predominantly with dense blackish or dark brownish pubescence, only lateral part of metasternum and abdominal sternites I–V with mixed sparse whitish setae.

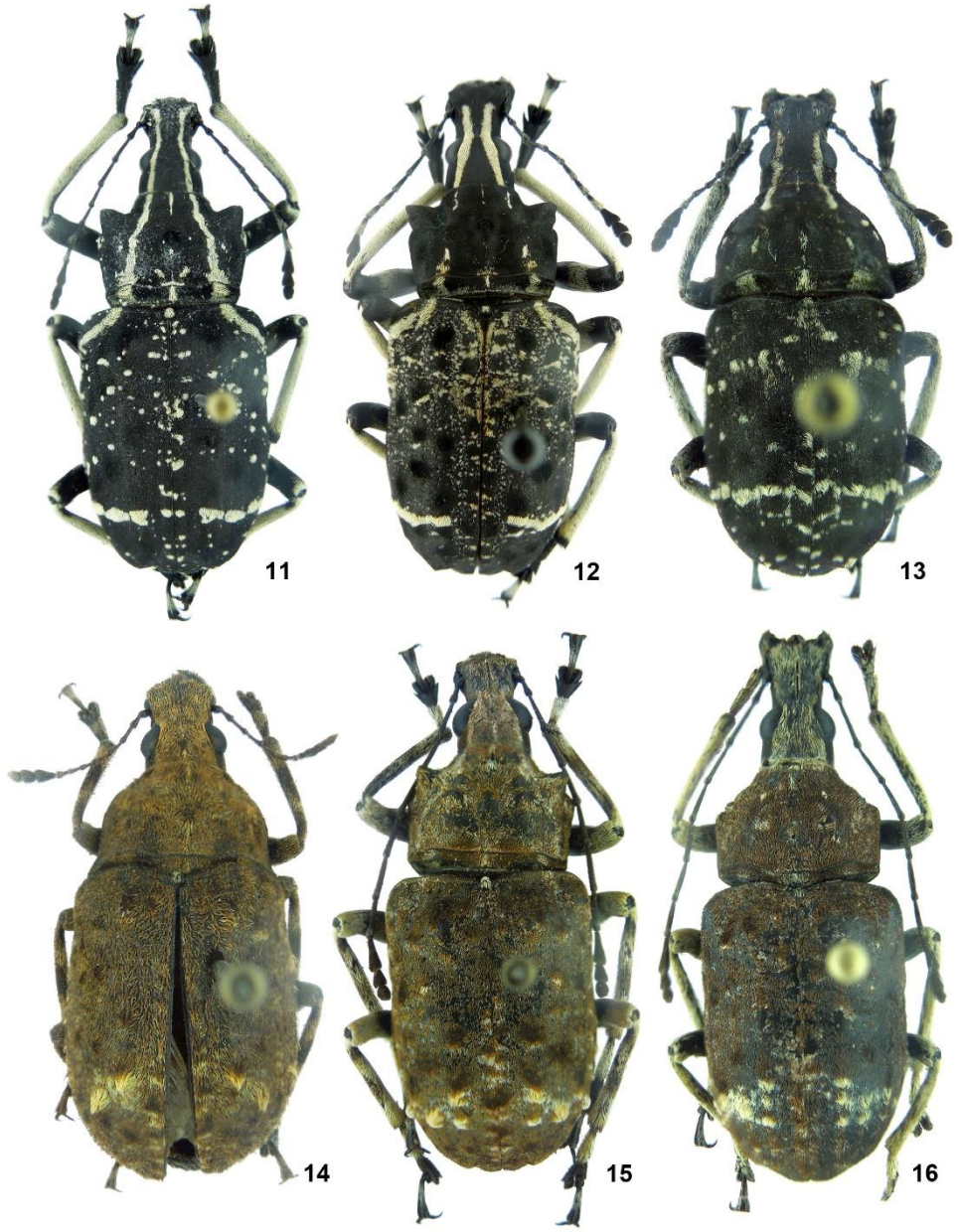
Distal part of prosternum without pair of spots. *Pygidium* covered with sparse whitish setae.

Structure. *Head* relatively short, rostrum weakly extended apically, dorsum convex, not depressed in middle, with one fine longitudinal carina reaching between eyes in both sexes. Ratio of rostrum length to maximum width 0.82 in male, 0.74 in female. Eyes spherical, not emarginate, dorsal ocular index 2.11 in male, 2.29 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.20 in male, 1.19 in female.

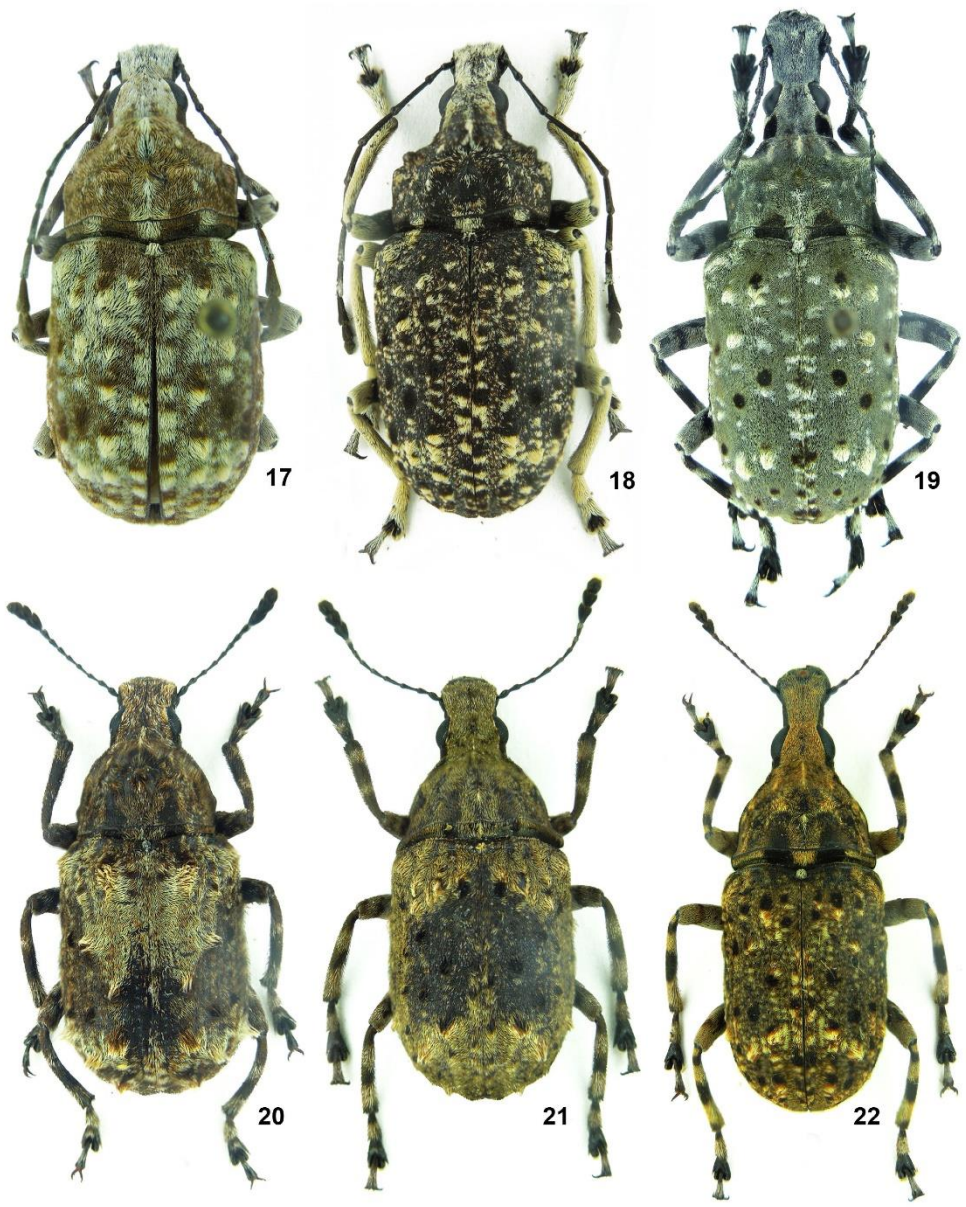


FIGURES 8–10. *Tophoderes banari* Trýzna **sp. nov.;** 8, female allotype, hemisternites, ventral aspect; 9, male holotype, pygidium, dorsal aspect; 10, female allotype, pygidium, dorsal aspect. Scale bars in mm.

Antennae barely reaching to posterior margin of pronotum in male, females antennae noticeably shorter. Funicle thick, club moderately robust, antennomeres IX and XI as long as wide, X wider than long in both sexes. *Pronotum* transverse, bell-shaped, widest in proximal part, then gradually narrowing anteriorly. Ratio of its length to width at carina 0.69 in male, 0.53 in female. Lateral side rounded, without spine in both sexes. Disc moderately convex, without tubercles. Dorsal transverse carina bisinuate, concave in middle, not interrupted. Lateral carina of pronotum well-developed, long, nearly reaching anterior margin of pronotum, in contact with dorsal transverse carina acute-angled. *Elytra* broadly suboval, ratio of the maximum length to maximum width of elytra 1.44 in male, 1.40 in female. Sub-basal tubercles indistinct. *Abdomen* slightly transverse in both sexes. *Pygidium* transverse, ratio of its maximum length to maximum width 0.75 in male (Fig. 9), 0.72 in female (Fig. 10). *Male genitalia.* Aedeagus robust (Figs. 5–7), pedon and tectum wide, both in distal part pointed, apodemes moderately curved. Tegmen robust, its apex wide rounded, without visible setae. *Female genitalia.* Hemisternites long and robust (Fig. 8), lateral and median rods very long, median rod reaching to three quarter of length of lateral rod. Toothed plate well developed, apical stylus present but small.



FIGURES 11–16. 11, *Tophoderes frenatus* (Klug, 1833), 29 mm, Andasibe-Mantadia Nat. Park, Analamazaotra forest; **12,** *T. lidmilae* Trýzna & Bařař, 2015, 27 mm, Montagne d´Ambre Nat. Park, Ambohitra env.; **13,** *T. funebris* (Klug, 1833), 17 mm, Tamatave, forêts d´Alahakato; **14,** *T. acarinulus* Wolfrum, 1959, 17 mm, Maroantsetra; **15,** *T. nubeculosus* Fairmaire, 1888, 23 mm, Baie d´Antongil; **16,** *T. ferrugatus* (Klug, 1833), 23 mm, Tananarivo env.



FIGURES 17–22. 17, *Tophoderes griseovarius* Fairmaire, 1901, 18 mm, Madagascar Sud, vallée d´Ambolo; **18,** *T. griseipes* Fairmaire, 1901, 24 mm, Anjiro; **19,** *T. murinus* Alluaud, 1899, 28 mm, Chaines Anosyennes, Massif nord, Ranomandry; **20,** *T. sikorae* Jordan, 1895, 14 mm, Moramanga; **21,** *T. fuscoareatus* Wolfrum, 1959, 13 mm, Moramanga; **22,** *T. sinuatocollis* Jordan, 1895, 16 mm, Moramanga.

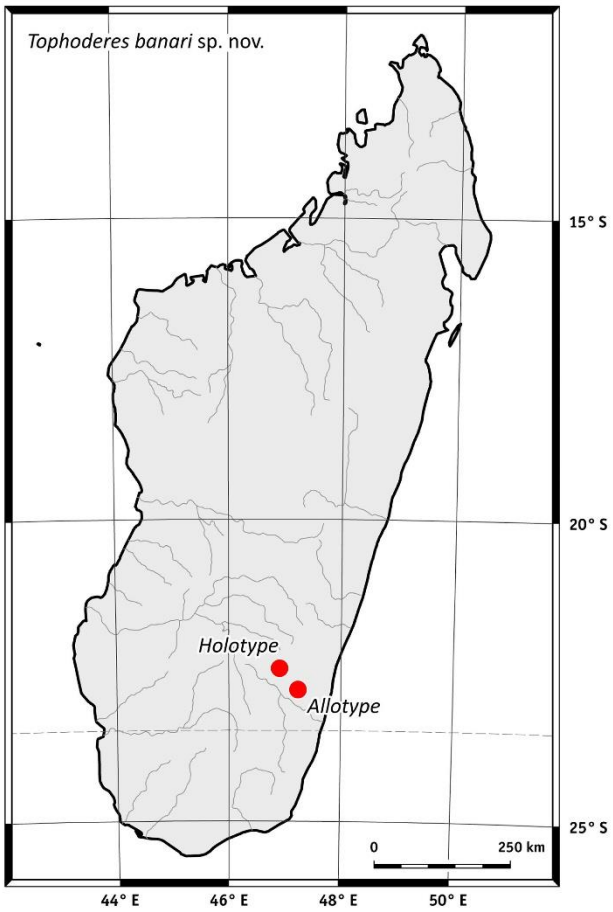


FIGURE 23. Distribution of *Tophoderes banari* Trýzna **sp. nov.**

Sexual dimorphism. Male antennae moderately longer, reaching approximately to posterior margin of pronotum, abdominal ventrites slightly flattened.

Etymology. Patronym, dedicated to my friend Petr Baňař, well-known heteropterist and member of many expeditions to Madagascar.

Distribution. Both known specimens were collected in east Madagascar, Fianarantsoa province. The holotype comes from "Ivohibe, 1500 m". All of the remaining tropical humid rainforests and dense mountain forests here are extremely significant, because these habitats support animal and plant species with a high rate of endemism. The allotype comes from ca 60-70 km distant "Vondrozo", also known as "Vondrozo forest", which has an elevation from ca 270 to 670 m.

Differential diagnosis. *Tophoderes banari* **sp. nov.** resembles *T. annulatus* Waterhouse, 1875 in its similar colour pattern. However, it clearly differs in the characters given in the following key:

1. Lateral side of pronotum rounded, without spine in both sexes. Disc of pronotum moderately convex, without tubercles. Pronotum bell-shaped, widest in proximal part. Dorsal transverse carina of pronotum bisinuate, concave in the middle, not interrupted. Sub-basal elytral tubercles indistinct, flattened. Rostrum relatively short, weakly extended apically. Antennomere IX as wide as long, X wider than long in both sexes. Smaller species, ca 15 mm . . . . . ***Tophoderes banari* Trýzna sp. nov.**

- Lateral side of pronotum with distinct spine in both sexes. Disc of pronotum with three tubercles. Pronotum hexagonal, widest in central part. Dorsal transverse carina of pronotum trisinuate, interrupted in middle. Sub-basal elytral tubercles distinct, protruded. Rostrum relatively long, strongly extended apically. Antennomere IX longer than wide, X as wide as long in both sexes. Large-sized species, ca 24–26 mm ..... ***T. annulatus*** Waterhouse, 1875

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References

Dejean, P.F.M.A. (1834) *Catalogue des Coléoptères de la collection de M. le Comte Dejean.* [2. ed.]. Méquignon-Marvis & Sons, Paris (Fasc. 3), 177–256.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand*, 3. Science Information Division, DSIR, Wellington, 264 pp.

Trýzna, M. & Bařnař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (Accessed 10 Aug. 2016)

Trýzna, M. & Bařnař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa,* 3609 (5), 504–512.
http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Bařnař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3721 (1), 71–78.
http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Bařnař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3826 (2), 386–392.
http://dx.doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Bařnař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa,* 3869 (2), 180–188.
http://dx.doi.org/10.11646/zootaxa.3869.2.8

Trýzna, M. & Bařnař, P. (2015a) A new species of *Tophoderes* Dejean from northen Madagascar with checklist of the species (Coleoptera: Anthribidae). *Zootaxa,* 3905 (2), 264–272.
http://dx.doi.org/10.11646/zootaxa.3905.2.87

Trýzna, M. & Bařnař, P. (2015b) A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa*, 4052 (4), 485–489.
http://dx.doi.org/10.11646/zootaxa.4052.4.8

Trýzna, M. & Bařnař, P. (2016) Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. *Zootaxa,* 4161 (3), 429–436.
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Příloha č. 6

A new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from Montagne d´Ambre National Park, northern Madagascar

Miloš Trýzna & Petr Baňař

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A new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from Montagne d'Ambre National Park, northern Madagascar

MILOŠ TRÝZNA[1,2] & PETR BAŇAŘ[1]

[1] *Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: petrbanar@seznam.cz*
[2] *Corresponding author. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com*

Abstract

A new species, *Diastatotropis perrinae* Trýzna & Baňař **sp. nov.** (Anthribidae: Anthribinae: Cappadocini), from north Madagascar is described. Male genitalia are studied and illustrated and colour photographs are added. A comparison with the most similar known species, *D. tigrinus* Lacordaire, 1866, is provided.

Key words: Coleoptera, Anthribidae, Anthribinae, *Diastatotropis*, taxonomy, new species, male genitalia, Madagascar

Introduction

The endemic Madagascan genus *Diastatotropis* Lacordaire, 1866 contains 14 known species, all species occur in well-preserved forests with large diameter dead wood. In this article we describe a new species, *Diastatotropis perrinae* Trýzna & Baňař **sp. nov.** The new species was obtained through our long-term research project in cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Department of Entomology) (e.g. Frieser 2010, Trýzna & Baňař 2012, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2016), and was discovered in Montagne d´Ambre National Park in the far north of Madagascar.

The authors had the opportunity to study the collections of the genus *Diastatotropis* in the Natural History Museum, London (BMNH) and Muséum national d´Histoire naturelle, Paris (MNHN). In addition, we also have our own material of this genus acquired during our project (see Acknowledgements) as well as material from other entomological colleagues. Detailed study of unidentified material showed that the genus *Diastatotropis* is much more speciose than we had previously thought, and in the near future several new species will be described, mainly from the collection of MNHN.

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum;

length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum;

total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position.

The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several

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minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for description and illustration. Finally genitalia were stored in glycerol in a small vial mounted on the pin with the corresponding specimen. For the description of genitalia we use the terminology of Holloway (1982) and Wanat (2007).

The label data of the material examined are cited verbatim, including possible errors, using a slash (/) to separate lines on one label and double slash (//) for dividing data on different labels. The following abbreviation is used: [p]—printed, [h]—handwritten.

Colour photographs were taken using a Leica MSV266 camera. The specimens studied are deposited in the following collections:

BMNH Natural History Museum, London, U. K.,
BSNPC Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna),
MMBC Moravian Museum Brno, Czech Republic,
MNHN Muséum national d´Histoire naturelle, Paris, France,
MTDC Miloš Trýzna collection, Děčín, Czech Republic,
NMPC National Museum (Department of Entomolgy), Prague, Czech Republic
ZSMC Zoologische Staatssammlung, München, Germany.

Taxonomy

Diastatotropis Lacordaire, 1866

Recognition. Body elongate. Head comparatively long, rostrum longer, extended apically, without depression in the middle, with one central longitudinal carina or without this carina (in case of *D. nitidipennis* Waterhouse, 1882 and *D. planifrons* Waterhouse, 1882). Eyes spherical, not emarginate. Antennae of males reach usually to posterior margin of pronotum or further, antennae of females shorter, not reaching posterior margin of pronotum. Funicle thin, antennal club 3-segmented or antennomeres gradually extended. Dorsal transverse carina of pronotum distinct. Medium- or large-sized species, from 6 mm (small specimens of *D. rubricollis* (Fairmaire, 1893)) to more than 18 mm (*D. olivaceus* Waterhouse, 1877).

Diastatotropis perrinae Trýzna & Baňař sp. nov.

(Figs. 1, 3, 5, 7, 9–11)

Type locality. North Madagascar, Antsiranana province, Montagne d´Ambre Nat. Park.

Type material. Holotype (male): N MADAGASCAR, ANTSIRANANA PROVINCE: 'N MADAGASCAR, 7.-16.i.2015, / Mt. d´AMBRE N. P., 1042 m., / upper camp near Ambohitra, / S 12°30´50.7´´; E 049°10´37.8´´, / Loc. No. 1B/2015, M. Trýzna leg.' [p] (BSNPC). **Allotype (female):** the same data as holotype (MTDC). **Paratypes: 7 males, 4 females:** the same data as holotype (MTDC, 1 pair in MMBC); **62 males, 60 females:** 'N MADAGASCAR, 10.-21.i.2016, / Mt. d´AMBRE N. P., 1040 m., / upper camp near Ambohitra, / S 12°31´37.831´´; E 049°10´15.893´´, / M. Trýzna leg.' [p] (MTDC, 2 pairs in BMNH, 5 pairs in MMBC, 2 pairs in NMPC, 4 pairs in ZSMC); **1 male, 1 female:** 'Madagascar bor. / Jofferville (Sic!) [= Joffreville (=Ambohitra)] / 3.i.2007, lgt. J. Vybíral' [p] (MTCD); **1 female:** 'N Madagascar, Ambohitra env. / Montagne d´Ambre N.P. / S 12°28´34,7´´ E 049°13´07,5´´ / F. Pavel leg., 1.-3.1.2007' [p] (MTCD); **2 males, 1 female:** 'Diego Suarez [= Antsiranana] [h] // Karl Jordan Coll. / B.M. 1940-109 [p]' (BMNH); **1 male:** 'Madagas. [h] // Karl Jordan Coll. / B.M. 1940-109 [p]' (BMNH); **2 males, 2 females:** 'Madagascar / Diego-Suarez / Ch. Alluaud 1893 [p, yellow label] // Museum Paris / Coll. Ch. Alluaud [p, blue label]' (MNHN, 1 pair in MTCD); **2 males, 2 females:** 'Mt. D´Ambre / Madagascar [p, white label] // Muséum Paris / 1934 / Drouhard [p, blue label]' (MNHN, 1 pair in MTCD); **1 female:** Nord Madagascar / (Antakares) / Isokitraá Diego Suarez / Mai à Octobre 1891 / E. & B. Perrot [p, white label] // Muséum Paris / ex. Coll. / R. Oberthür / 1952 [p, blue label]' (MNHN); **2 females:** 'Mt. d´Ambre

/ Madagascar. // Dr. Sicard [p, white label] // Muséum Paris / Madagascar / Coll. Sicard 1930 [p, blue label]' (MNHN); **1 female:** 'Diastatotropis / tigrinus v. / Mont. D´amber (Sic!) / Janvier man [h, white label] // Muséum Paris / Madagascar / Coll. Sicard 1930 [p, blue label]' (MNHN); **23 males, 17 females:** '[without locality data] Muséum Paris / Madagascar / Coll. Sicard 1930 [p, blue label]' (MNHN).

Note. Although locality data are not given for the latter reported series of paratypes, they originate from the collection of Albert Sicard (1864–1930) deposited in MNHN. Albert Sicard, a doctor in the French Army and a specialist in world Coccinellidae, undertook collecting expeditions especially in Tunisia, Morocco and Madagascar. In Madagascar he accumulated a large number of Coleoptera only from Montagne d'Ambre where he did research for several years (Cambefort 2006). It can thus be inferred with some confidence that his material without data also comes from Montagne d'Ambre.

The newly described species *D. perrinae* **Trýzna & Baňař sp. nov.** is very similar to *D. tigrinus* Lacordaire, 1866, and the two species were often confused in collections. The authors revised all available material of *D. tigrinus* in private and museum collections, where they found specimens of the newly described species. These specimens also come solely from Montagne d'Ambre (Diego Suarez). In addition, the authors do not know of any records of *D. tigrinus* from Montagne d'Ambre, and it appears that the distribution of this species does not extend so far north.

Description. Male holotype (female allotype). *Measurements* (in mm): Total body length—11.49 (11.68). Head: total length—2.69 (2.78); length of rostrum—1.58 (1.69); maximum width of rostrum—1.60 (1.98); length of eye—1.04 (1.11); maximum width across eyes—1.89 (2.07); minimum distance between eyes—0.67 (0.87). Antenna: length of segments: II—0.49 (0.43), III—0.87 (0.73), IV—0.62 (0.48), V—0.60 (0.33), VI—0.58 (0.27), VII—0.56 (0.27), VIII—0.53 (0.22), IX—0.71 (0.62), X—0.27 (0.24), XI—0.47 (0.37). Pronotum: maximum length—3.00 (2.78); width at carina—3.10 (3.35); minimum width—1.75 (2.08). Elytra: maximum length—5.82 (5.18); maximum width—3.76 (3.92).

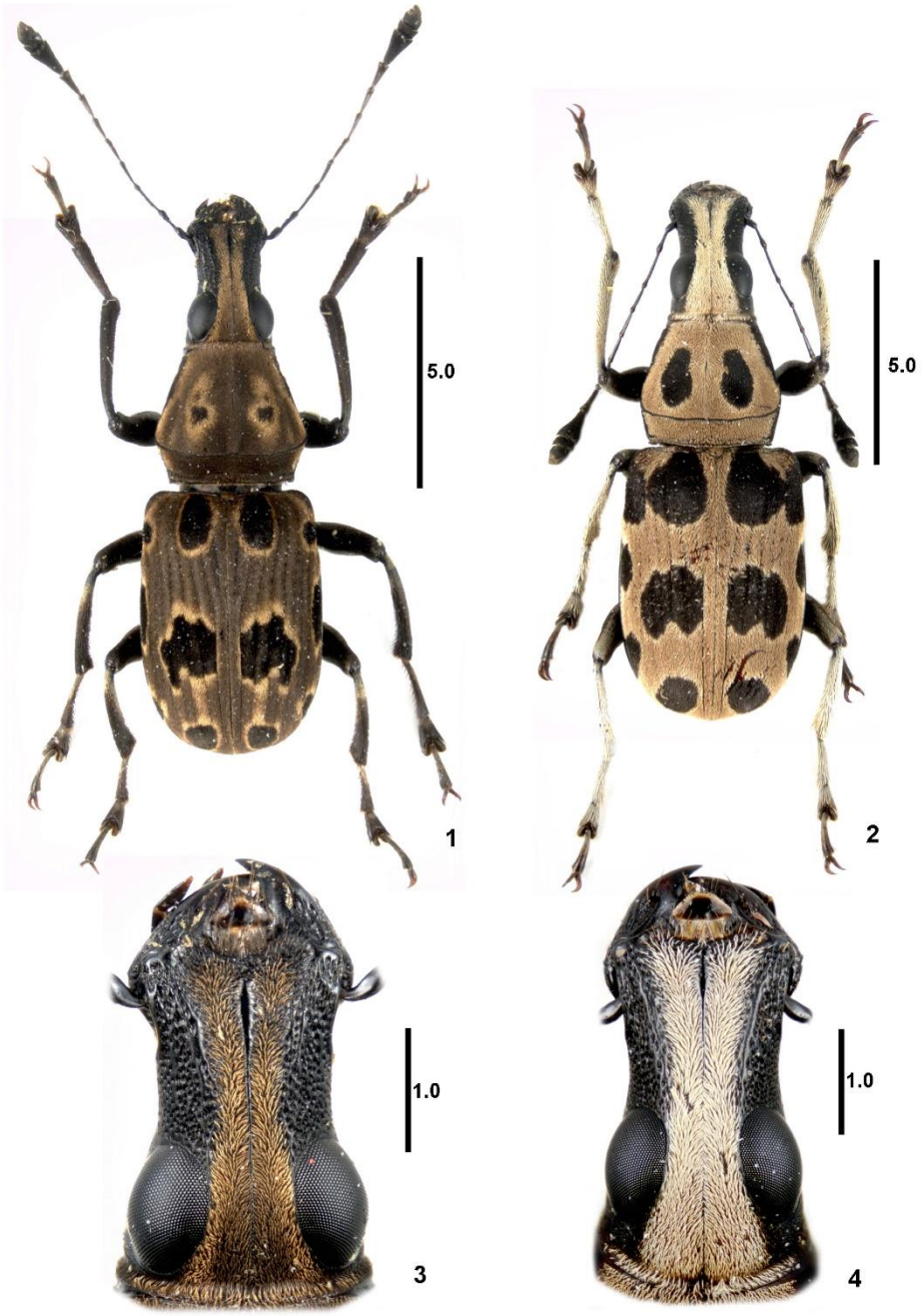
Colouration of the cuticle of entire body black, only tibiae, tarsomeres and funicle dark brown in both sexes.

Vestiture. *Head* predominantly with yellowish appressed setae along central longitudinal carina. Lateral sides of head and rostrum bare, without setae, this part only with coarse sculpture. *Pronotum* with two large distinct longitudinal spots of black setae on disc, surrounded by light, narrow but distinct margin composed of yellowish setae. Rest of pronotum covered by brown appressed setae. Each *elytron* with six large distinct spots; one elongate in basal part, one larger emarginate in median part (from elytral intervals I to V), one small in preapical part (from elytral intervals I to IV), and with three smaller spots on lateral side of elytron: one in posthumeral part (from elytral intervals V to VIII) and two subsequent spots on elytral intervals VII to IX. Each spot covered with black setae with distinct light yellow margin, rest of elytra covered with brown appressed setae. *Scutellum* with brown setae. *Antennae* with indistinct black pubescence, only with very short, soft, sparse setae in both sexes. All *legs* covered with dense, fine setae, all femora with indistinct light setae on the distal quarter. Tibiae nearly unicolorous, covered by dense indistinct yellowish setae appressed in proximal part and subdecumbent in distal part. All tarsomeres with yellowish setae. Lateral parts of venter of thorax and abdominal sternites with dense pubescence with yellow and brown setae. *Pygidium* covered with brown appressed short setae.

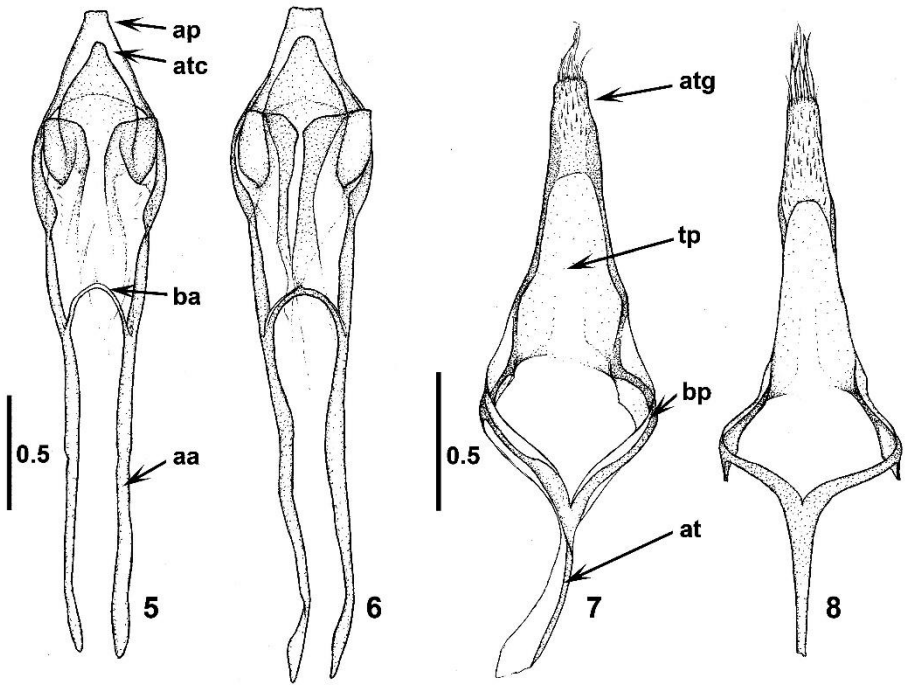
Structure. *Head* relatively long (shorter in females), rostrum extended apically, not depressed in middle, with one fine longitudinal carina extended in distal part of rostrum and reaching behind eyes, and two lateral carinae in both sexes. Ratio of rostrum length to maximum width 0.99 in male, 0.85 in female. Eyes spherical, not emarginate, dorsal ocular index 1.10 in male, 1.45 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.18 in male, 1.05 in female. Antennae extended beyond posterior margin of pronotum in male; female antennae shorter, not reaching to posterior margin of pronotum. Pedicel not robust, funicle thin, club adequately widened, antennomere IX three-times longer than wide in male, as long as wide in female.

Pronotum slightly transverse, ratio of length to width at carina 0.97 in male, 0.83 in female, gradually extended anteriorly to quarter of length, here widest, then narrowed to distal part. Dorsal transverse carina bisinuate with indistinct arch in middle. Lateral carina of pronotum well-developed, reaching to half of pronotum, in contact with dorsal transverse carina rounded. *Elytra* suboval, ratio of maximum length to maximum width of elytra 1.55 in male, 1.32 in female.

Male genitalia. Aedeagus smaller, pedon and tectum wide, apodemes moderately curved. Apex of pedon completely straight, apex of tectum narrowly rounded (Fig. 5). Tegmen relatively robust, tegminal plate wide, its sides bent, apex of tegmen with distinct setae (Fig. 7).



FIGURES 1–4. 1,3, *Diastatotropis perrinae* **sp. nov.**, male holotype; 2, 4, *Diastatotropis tigrinus* Lacordaire, male, Andasibe-Mantadia National Park, Analamazaotra forest; 1–2, dorsal habitus; 3–4, head, dorsal view. Scale bars in mm.



FIGURES 5–8. 5, 7, *Diastatotropis perrinae* **sp. nov.**; 6, 8, *Diastatotropis tigrinus* Lacordaire, 1866; 5–6, aedeagus, dorsal view; 7–8, tegmen, ventral view; aa—apodemes of aedeagus, ap—apex of pedon, at—apodeme of tegmen, atc—apex of tectum, atg—apex of tegmen, ba—bridge of aedeagus, bp—basal piece, tp—tegminal plate. In situ. Scale bars in mm.

Sexual dimorphism. *Males*: body comparatively more slender than in females, rostrum longer and more slender, legs slightly longer. Abdominal ventrites I–III slightly depressed in middle. Antennae reaching to posterior margin of pronotum. Antennomere IX three-times longer than wide. *Females*: abdominal ventrites not depressed. Antennae not reaching to posterior margin of pronotum. Antennomere IX as long as wide.

Etymology. Patronym, dedicated to Dr. Hélène Perrin (Muséum national d´Histoire naturelle, Paris).

Collecting circumstances. The holotype, allotype and part of paratypes were collected by the authors in tropical moist forest at an elevation of 1042 metres by sweeping the lower side of the lying trunk of an unidentified species of deciduous tree with diameter ca 40 cm. The trunk was located inside the forest and was completely overshadowed by the surrounding vegetation. Beetles were found only on the underside of the trunk, which can be explained by the colder, rainy and windy weather. During the monitoring we found no other beetles from the family Anthribidae there. Microhabitat of the type locality is shown in Fig. 9.

More paratypes were captured one year later, on a dead lying tree. It was located on the edge of the forest in sunlight (at 1040 m a.s.l.). In this case, the beetles were found everywhere, both on the trunk and on the branches, and also on its upper side. Together with this new species we found on this single tree about 20 other species of the family Anthribidae during 7 days. In both cases, the trunks were covered with predominantly intact bark. Microhabitat of this locality is shown in Fig. 10. For details of collecting methods used see Trýzna & Baňař (2012).

Distribution. All specimens were collected in north Madagascar, Antsiranana province, Montagne d´Ambre National Park.

Differential diagnosis. *Diastatotropis perrinae* **Trýzna & Baňař sp. nov.** is similar to *D. tigrinus* Lacordaire, 1866 from which it can be distinguished by characters given in the following key:

FIGURES 9–10. 9, lying trunk inside forest in Montagne d´Ambre Nat. Park, type locality, microhabitat of *Diastatotropis perrinae* **sp. nov.**; 10, dead tree on margin of forest in Montagne d´Ambre Nat. Park., habitat of *Diastatotropis perrinae* **sp. nov.** and next ca. 20 species of anthribids.

(1) Dorsal part of body with pale brown or brown (rarely dark brown) colouration in both sexes. Black spots on pronotum and elytra with distinct pale yellowish margins. Elytral spots in basal part elongate. Dorsum of rostrum and tibiae with brownish pubescence. Lateral sides of rostrum with coarse sculpture. Pygidium unicolorous with brown setae in both sexes. Apex of pedon straight and slender, apex of tectum narrowly rounded, tegminal plate wide (Figs. 5, 7) ..... ***D. perrinae* Trýzna & Baňař sp. nov.**

(2) Dorsal part of body with yellow colouration in both sexes. Black spots on pronotum and elytra without pale margins. Elytral spots in basal parts nearly rounded. Dorsum of rostrum and tibiae with bright yellow pubescence. Lateral sides of rostrum with fine sculpture. Pygidium with two yellow spots in both sexes. Apex of pedon straight and wider, apex of tectum broadly rounded, tegminal plate very slender (Figs. 6, 8) ..... ***D. tigrinus*** Lacordaire, 1866

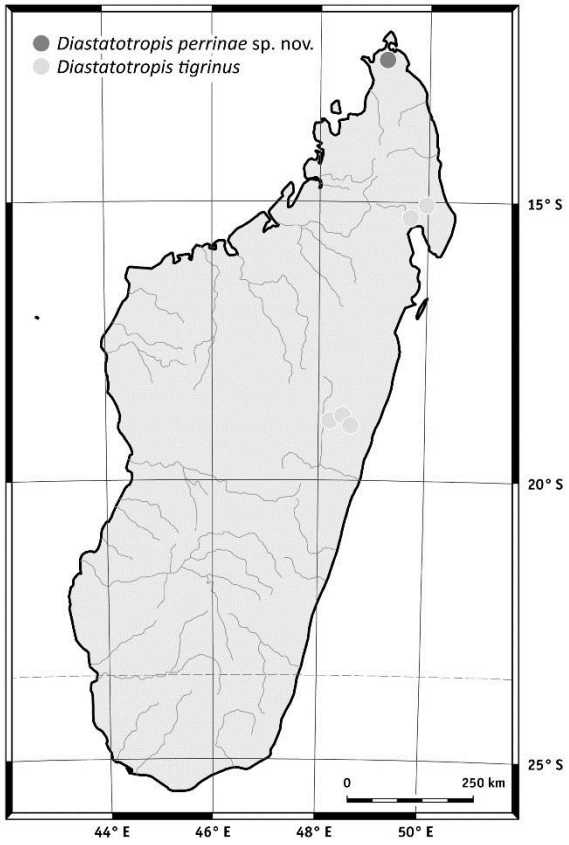


FIGURE 11. Distribution of *Diastatotropis perrinae* **sp. nov.** and *Diastatotropis tigrinus* Lacordaire.

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nocturne dans les localités préalablement sélectionnées en considération de la recherche et la protection de la biodiversité dans les aires protégées de Madagascar. Analyse des risques potentiels d'influencer négativement la biodiversité dans les régions étudiées'. This work was supported by the Internal Grant Agency (IGA no. A04/15; IGA no. 20124364) Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague. The research received support from the SYNTHESYS Project (http://www.synthesys.info) which is financed by the European Community Research Infrastructure Action under the FP7 'Capacities' Program (visit to Natural History Museum, London) for the project *'Research into Madagascan fungus weevils of the family Anthribidae'* (Miloš Trýzna) with the kind co-operation of Maxwell V. L. Barclay. We would like to thank Dr. Hélène Perrin for supporting our work during our study in MNHN. We are indebted to Maxwell V. L. Barclay and Robert Anderson for reading the manuscript. For preparing the images we are indebted to Lukáš Blažej (Figs. 5–8) and Oldřich Holešinský (Fig. 11).

References

Cambefort, Y. (2006) *Des coléoptères, des collections, des hommes*. Muséum national d'Histoire naturelle, collection Archives, Paris, 293 pp.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand*, 3. Science Information Division, DSIR, Wellington, 264 pp.

Lacordaire, J.T. (1866) Histoire naturelle des insectes. *Genera des Coléoptères ou exposé méthodique et critique de tous les genres proposés jusqu'ici dans cet ordre d'insectes. Tome septième contenant les familles des curculionides (suite), scolytides, brenthides, anthribides et bruchides*. Librairie Roret, Paris, 7, 1–520.

Trýzna, M. & Bařnař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (Accesed 5 Sept. 2015)

Trýzna, M. & Bařnař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa,* 3609 (5), 504–512.
http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Bařnař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3721 (1), 71–78.
http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Bařnař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3826 (2), 386–392.
http://dx.doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Bařnař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa,* 3869 (2), 180–188.
http://dx.doi.org/10.11646/zootaxa.3869.2.8

Trýzna, M. & Bařnař, P. (2015a) A new species of *Tophoderes* Dejean from northen Madagascar with checklist of the species (Coleoptera: Anthribidae). *Zootaxa,* 3905 (2), 264–272.
http://dx.doi.org/10.11646/zootaxa.3905.2.87

Trýzna, M. & Bařnař, P. (2015b) A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa,* 4052 (4), 485–489.
http://dx.doi.org/10.11646/zootaxa.4052.4.8

Trýzna, M. & Bařnař, P. (2016) Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. *Zootaxa,* 4161 (3), 429–436.
http://doi.org/10.11646/zootaxa.4161.3.10

Wanat, M. (2007) Alignment and homology of male terminalia in Curculionoidea and other Coleoptera. *Invertebrate Systematics,* 21, 147–171.

Příloha č. 7

Two new species of *Adapterops* (Coleoptera: Anthribidae) from protected areas of northern Madagascar, with a key to species, and new faunistic data on the genus

Miloš Trýzna & Petr Baňař

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Two new species of *Adapterops* (Coleoptera: Anthribidae) from protected areas of northern Madagascar, with a key to species, and new faunistic data on the genus

MILOŠ TRÝZNA[1,2] & PETR BAŇAŘ[1]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz; petrbanar@seznam.cz*
[2]*Corresponding author. E-mail: m.tryzna@npcs.cz, anthribidae@gmail.com*

Abstract

Two new species, *Adapterops mamyi* Trýzna & Baňař **sp. nov.** and *A. dimbyi* Trýzna & Baňař **sp. nov.** (Anthribidae: Choraginae: Araecerini), from northern Madagascar are described and illustrated. A key to the species of the genus *Adapterops* Frieser, 2010 is given. New and interesting faunistic records of the genus are provided. Male terminalia are described for the first time, tegminal process is reported as a unique feature within the family.

Key words. Coleoptera, Anthribidae, Choraginae, *Adapterops*, taxonomy, new species, male terminalia, tegminal process, key, faunistics, Madagascar

Introduction

The endemic Madagascan genus *Adapterops* Frieser, 2010, was established for two species from east Madagascar (*A. nasalis* Frieser, 2010 (type species) and *A. festivus* Frieser, 2010). Subsequently Trýzna (Trýzna & Baňař 2012) described a third species of this genus, *A. hankae* Trýzna, 2012 from Andasibe-Mantadia National Park, east Madagascar, with a key to species and notes on sexual dimorphism in the genus. The fourth species, *A. cedrici* Trýzna & Baňař, 2015, was described from rich material acquired during the authors´ expedition in Montagne d´Ambre National Park in January 2015. In the present paper we describe and key two new species, *Adapterops mamyi* Trýzna & Baňař **sp. nov.** (from Forêt d´Ambre) and *A. dimbyi* Trýzna & Baňař **sp. nov.** (from Ankarana National Park) collected during our expedition in January 2016.

On the basis of our experiences, all species of this genus occur in forested areas around dead wood and lianas. The new species was acquired during our long-term research project in cooperation with the University of Antananarivo (Department of Entomology) and the Madagascan National Parks (MNP) (e.g. Frieser 2010, Trýzna 2017, Trýzna & Baňař 2012, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b, 2016, 2017).

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum;

length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position. The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and

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placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for description and illustration. Finally genitalia were stored in glycerol in a small vial mounted on the pin with the corresponding specimen. For the description of genitalia we use the terminology of Holloway (1982) and Wanat (2007).

The label data of the material examined are cited verbatim, using a slash (/) to separate lines on one label. Colour photographs were taken with a Leica MSV266 camera. The specimens studied are deposited in the following collections:

BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna);

MTDC = Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Adapterops Frieser, 2010

Type species. *Adapterops nasalis* Frieser, 2010: 18 (by original designation).

Diagnosis. Head small, eyes large, situated laterally, conspicuously convex, separated from each other, not emarginate. Dorsal pronotal transverse carina basal, sinuate laterally, most lateral part curved posteriorly. Postero-lateral edges of pronotum somewhat protruding posteriorly in lateral view, more or less acutangulate, lateral carina absent, sides of pronotum rounded.

Male terminalia. Pygidium (= tergite VII) heavily sclerotized, approximatelly as long as wide (Figs. 9, 16). Segment VIII: tergite VIII robust, heavily sclerotized, sternite VIII consists of pair of sternal lobes (= laterosternites) and robust medial part (= mediosternite) bearing long apodeme (Figs. 10, 17). Apodeme of sternite VIII as long (*Adapterops dimbyi*, Fig. 17) or longer (*A. mamyi*, Fig. 10) than segment VIII. Sternite IX (= spiculum gastrale) composed of long, apically curved apodeme. Tegmen robust, basal piece slightly shorter than apodeme, tegminal plate very wide, from ventral and dorsal views almost parallel-sided, its lateral parts weakly sclerotized, contrasting with roughly sclerotized medial part (Figs. 8, 15). Basal margin of tegminal plate with strongly sclerotized process (arrows on Figs. 8, 15) protruding towards apodeme. Body of aedeagus strongly sclerotized, tectum small, shorter than pedon in lateral view. Apodemes longer than body of aedeagus, bridge wide. Body of aedeagus from ventral view of almost rectangular shape with strictly narrowed apical part (Figs. 6, 13). Internal sac consists of ventral lobe, dorsal lobe missing or rudimentary, not visible in studied specimens. Ventral lobe beset with cuticular teeth (Figs. 5–6, 12–13).

The genus *Adapterops* is similar to the genus *Pilitrogus* Frieser, 1980 (both classified in the tribe Araecerini) which is known from three species from Réunion Island (Frieser 1980). From the latter, *Adapterops* can be distinguished by antennal scrobe large, carinate on dorsal margin, reaching towards middle of rostrum; rostrum with lateral margins strongly sinuate at antennal scrobes, strongly narrowed between antennal scrobes, minimum distance between scrobes about half of the eye width (see Trýzna & Baňař 2012: Figs. 8–12).

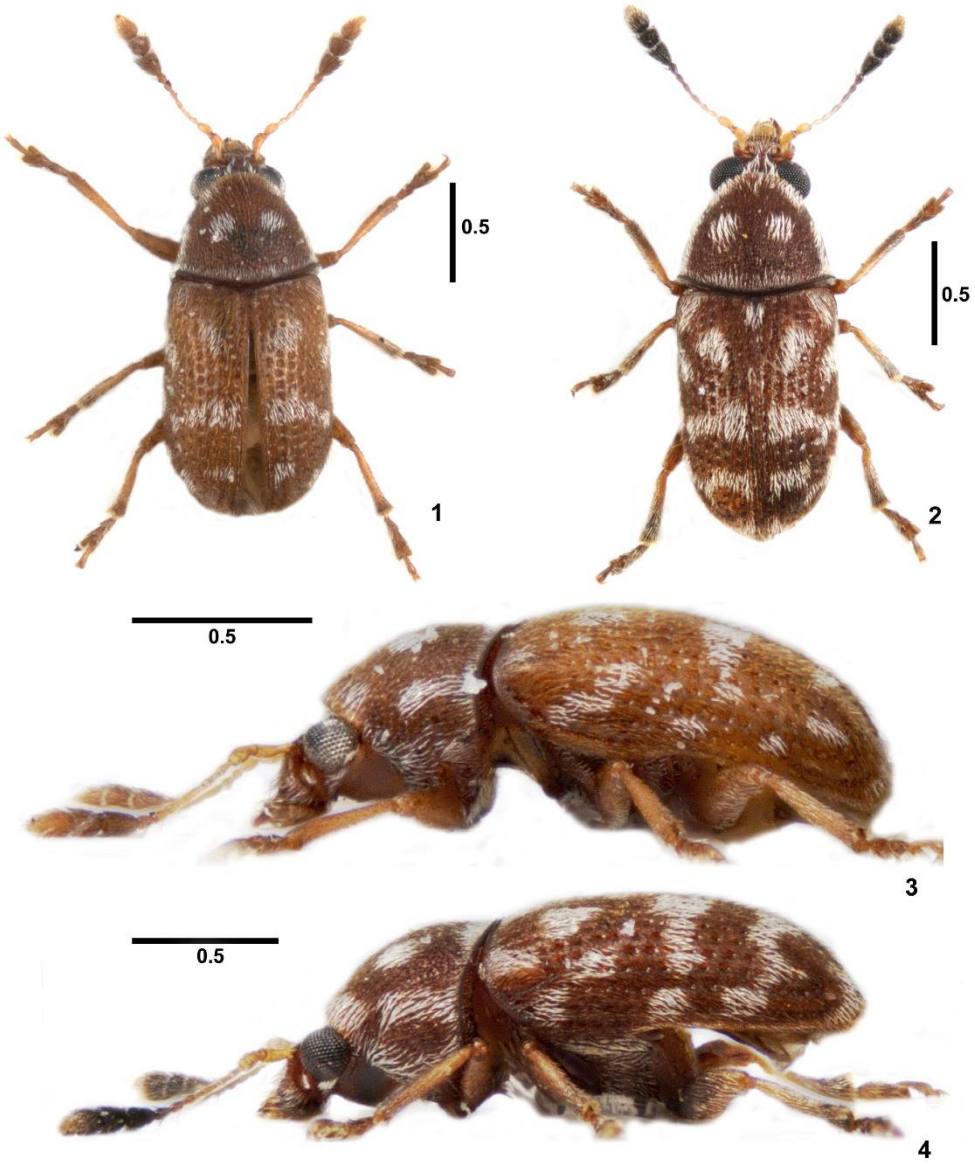
In the study of male terminalia, the basal margin of tegminal plate with strongly sclerotized process (arrows on Figs. 8, 15) protruding towards apodeme is a feature not seen in other Anthribidae.

Adapterops mamyi Trýzna & Baňař sp. nov.

(Figs. 1, 3, 5–11, 23)

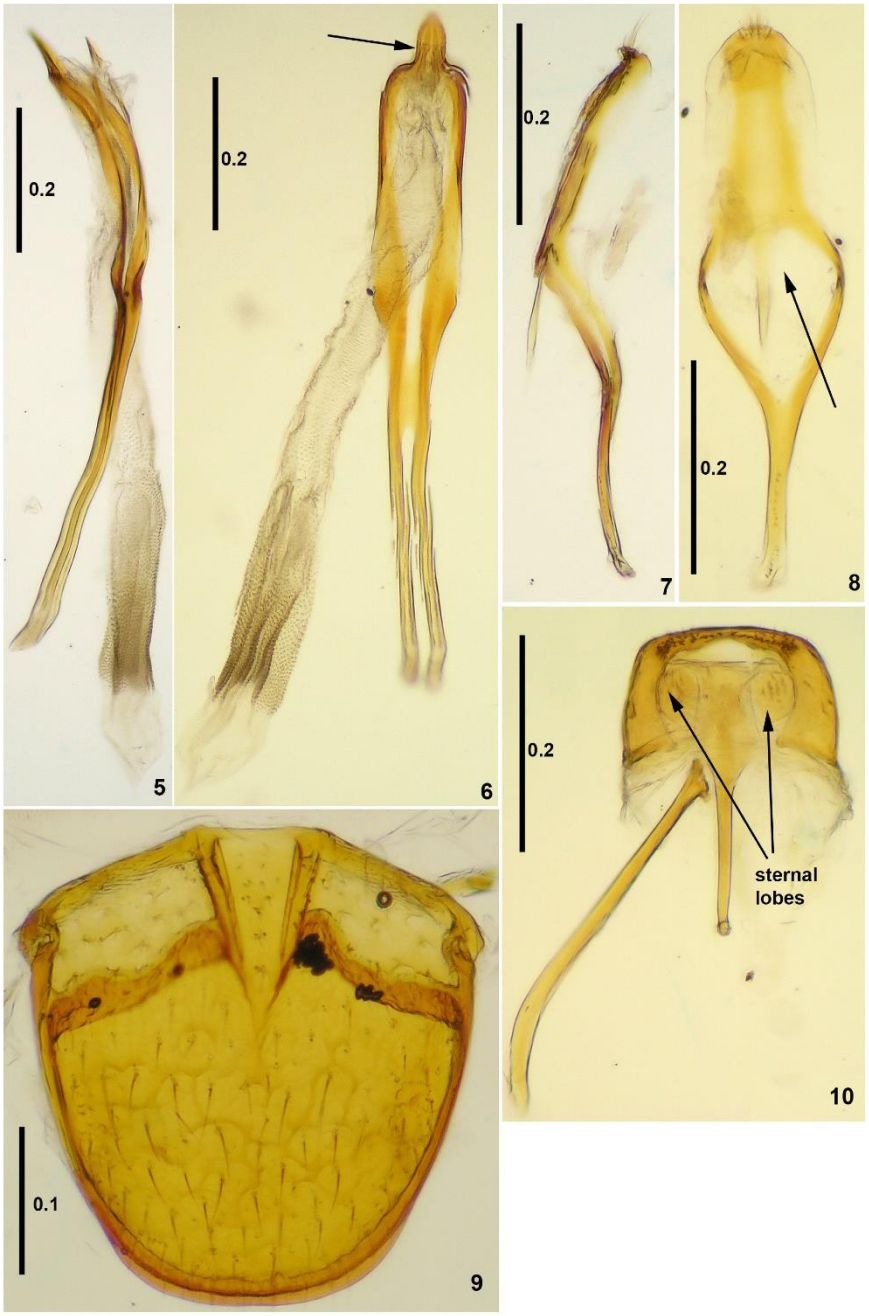
Type locality. North Madagascar, Antsiranana province, Forêt d´Ambre, S 12°28´27.69´´, E 49°13´07.99´´, 496 m.

Type material. Holotype (male): N MADAGASCAR, ANTSIRANANA PROVINCE: 'N MADAGASCAR, 19.i.2016, / Forêt d´Ambre, 496 m / S 12°28´27.697´´, E 49°13´07.995´´/ M. Trýzna leg., *night / beating of dead branches*' (BSNPC). **Allotype (female), Paratype (male):** the same data as holotype (MTDC). Red label [p] HOLOTYPE / ALLOTYPE / PARATYPE / *Adapterops / mamyi* **sp. nov.** / M. Trýzna & P. Baňař det. 2016.



FIGURES 1–4. 1, 3, *Adapterops mamyi* **sp. nov.**, male holotype; 2, 4, *Adapterops dimbyi* **sp. nov.**, male holotype; 1–2, dorsal habitus; 3–4, lateral habitus. Scale bars in mm.

Description. Male holotype. *Measurements* (in mm): Total body length—1.83. Head: total length—0.25; length of rostrum—0.14; maximum width of rostrum—0.29; length of eye—0.12; maximum width across eyes—0.47; minimum distance between eyes—0.14. Antenna: length of segments: II—0.07, III—0.04, IV—0.04, V—0.05, VI—0.05, VII—0.04, VIII—0.04, IX—0.11, X—0.09, XI—0.16. Pronotum: maximum length—0.58; width at carina—0.67; minimum width—0.36. Elytra: maximum length—1.07; maximum width—0.73.



FIGURES 5–10. *Adapterops mamyi* **sp. nov.**, male holotype; 5, aedeagus, lateral view; 6, aedeagus, ventral view (arrow indicates regularly narrowing apex of pedon); 7, tegmen, lateral view; 8, tegmen, ventral view (arrow indicates tegminal process); 9, pygidium, dorsal view; 10, segment VIII and sternite IX, ventral view. Scale bars in mm.

FIGURE 11. Rain forest in Forêt d´Ambre, type locality of *Adapterops mamyi* **sp. nov.**

Colouration of all body parts generally brown; scape, pedicel and funicle pale brown, antennomere VIII dark brown; antennal club dark brown, only antennomere XI slightly pale. Legs brown, distal part of tibiae dark brown. Pronotum and elytra with almost regular spots of whitish pubescence. Entire ventral part of body dark brown.

Vestiture. Head with sparse appressed setae, whitish between eyes, yellowish on dorsal part of rostrum. Antennae with pubescence, scape, pedicel and funicle covered by sparse brown suberect setae, antennal club with blackish appressed setae. Pronotum with whitish setae forming regular spots: two distinct on disc, two small indistinct on its anterior margin and two distinct longitudinal spots on lateral part of pronotum. Elytra also covered with whitish setae. Conspicuous transverse, more or less distinct stripe in central part of elytra, this narrow stripe is interrupted in its sutural part. Each elytron with less distinct spot on the second elytral interval in subbasal part and further spot on the first and the second elytral interval in preapical part, which can extend, though not clearly, to the sixth interval; on lateral part of elytron oblique stripe on the sixth to the eighth elytral interval. Apical margin of elytra with whitish edge. Legs including tarsomeres covered with dense, fine whitish decumbent setae. Venter of thorax and abdominal sternites with dense whitish pubescence. Pygidium covered with sparse whitish appressed setae.

Structure. *Head.* Dorsum of head without narrow longitudinal carina in the middle. Rostrum very weakly convex, anterior part with gentle sculpture. Eyes large, not emarginate, ocular index 0.85. Ratio of maximum width across eyes to the maximum width of rostrum 1.62. Antennae slightly longer than head and pronotum together in both sexes. Funicle thin, club moderately robust. *Pronotum* transverse (ratio of its length to its width at carina 0.87), gradually narrowed anteriorly, disc convex in middle. Dorsal transverse carina slightly curved. Postero-lateral edges of pronotum obtuse-angular. Posterior margin conspicuously convex, fitting in concavity on base of elytra. *Elytra* oval, slightly narrowed posteriorly. Ratio of maximum length of elytra to maximum width 1.47. Anterior margin of elytra concave, corresponding with the convexity of posterior margin of pronotum. Surface of

elytra deeply striate, width of each stria distinctly narrower than width of elytral interval. Abdominal ventrites I–V flattened in the middle.

Male terminalia (Figs. 5–10). As generally described for genus, anterior margin of tergite VIII slighly convex, apodeme of sternite VIII slightly longer than segment VIII, tegminal process well developed, branches of basal piece divergent (Fig. 8), apex of pedon regularly narrowing in ventral view (Fig. 6).

Female. Abdominal ventrites I–V appropriately convex, without flattened area in the middle. Antennae as long as in male.

Differential diagnosis. Generally, the new species is similar to *Adapterops cedrici* Trýzna & Baňař 2015 and *A. dimbyi* Trýzna & Baňař **sp. nov.** From these species, it can by distinguished by brown antennal club in both sexes and its different colour pattern (Figs. 1, 3). From *A. dimbyi* differs by diverging branches of basal piece (Fig. 8) (converging in *A. dimbyi*); convex anterior margin of tergite VIII (Fig. 10) (straight in *A. dimbyi*); more robust and denser sclerotized teeth on internal sac of aedeagus (sparsely distributed and smaller in *A. dimbyi*) and regularly narrowing apex of pedon (Fig. 6) (constricted basally in *A. dimbyi*).

Etymology. Patronym, dedicated to Dr. Mamy A. Rakotoarijaona from Madagascar National Parks (Directeur des Opérations).

Habitat. Three specimens of the type series were collected by beating a single freshly dead branch of an unidentified species of deciduous tree. The small branch, lying on the ground, was still covered with intact bark layer and dry leaves; the largest diameter of branch did not exceed 5 cm. The branch was located in secondary forest (496 m a.s.l.) scarred by human activities along a path used by local people. Beating using an entomological net (for methods see Trýzna & Baňař, 2012) took place in early night time after nightfall between 8–11 o´clock p.m. The type locality of this species is shown in Fig. 11.

Distribution. North Madagascar, Forêt d´Ambre (Fig. 23).

Adapterops dimbyi Trýzna & Baňař sp. nov.

(Figs. 2, 4, 12–18, 23)

Type locality. North Madagascar, Antsiranana province, Ankarana National Park, S 12°58´07.3´´, E 49°08´12.9´´, 132 m.

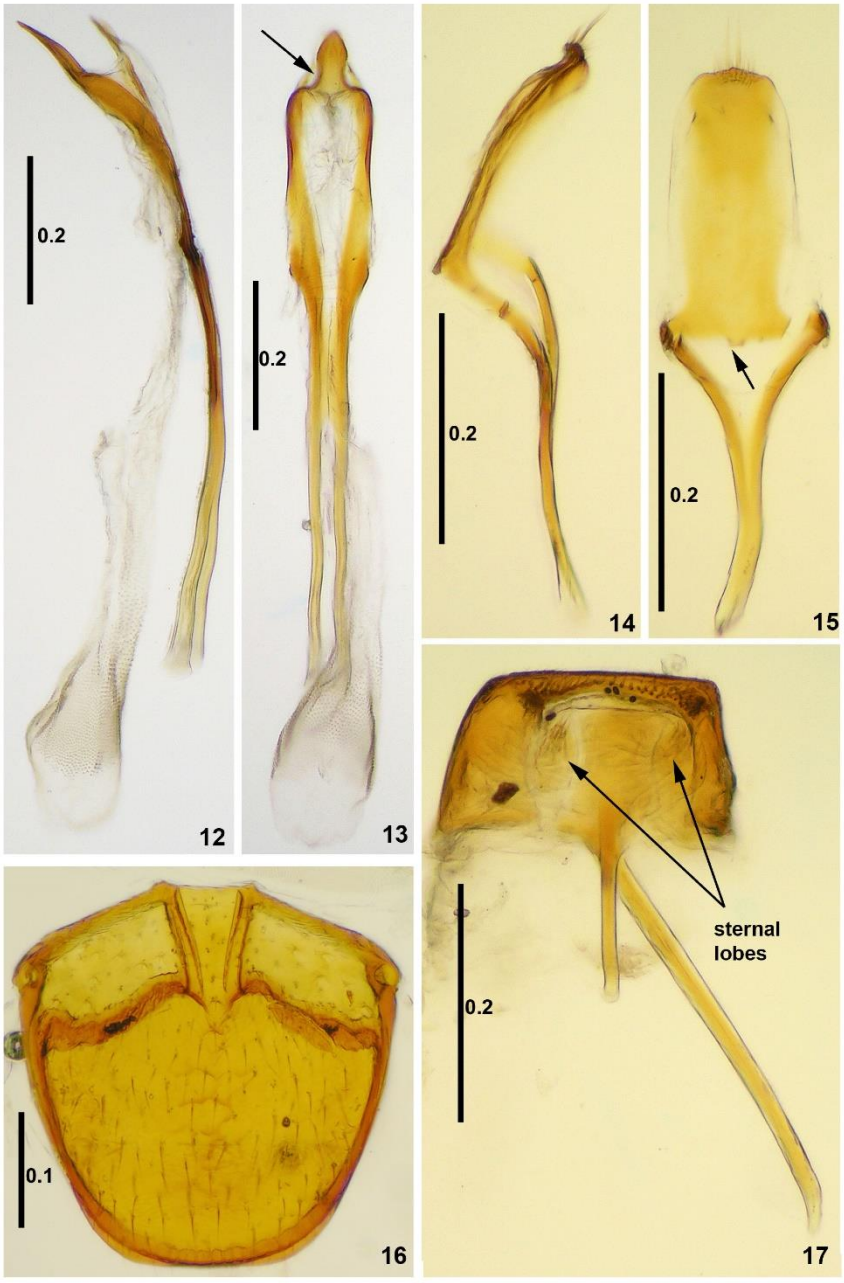
Type material. Holotype (male): N MADAGASCAR, ANTSIRANANA PROVINCE: 'N MADAGASCAR, 24.i.2016, / Ankarana National Park, 132 m / S 12°58´07.3´´, E 49°08´12.9´´/ Benavony circuit, M. Trýzna leg.' (BSNPC). Red label [p] HOLOTYPE / *Adapterops / dimbyi* **sp. nov.** / M. Trýzna & P. Baňař det. 2016.

Description. Male holotype. *Measurements* (in mm): Total body length—2.10. Head: total length—0.32; length of rostrum—0.14; maximum width of rostrum—0.29; length of eye—0.18; maximum width across eyes—0.49; minimum distance between eyes—0.16. Antenna: length of segments: II—0.08, III—0.07, IV—0.06, V—0.05, VI—0.06, VII—0.06, VIII—0.04, IX—0.11, X—0.09, XI—0.14. Pronotum: maximum length—0.51; width at carina—0.78; minimum width—0.27. Elytra: maximum length—1.22; maximum width—0.81.

Colouration of all body parts generally dark brown; scape, pedicel and antennomeres III–V brown, VI–VIII dark brown to blackish; antennal club entire black, only tip of antennomere XI dark brown. Legs dark brown, distal part of tibiae and tarsomeres

gloomy. Pronotum with spots, elytra with spots and stripes of whitish pubescence. Entire ventral part of body dark brown.

Vestiture. Head with sparse appressed setae, whitish between eyes, yellowish on dorsal part of rostrum. Antennae with pubescence, scape, pedicel and funicle covered with sparse blackish suberect setae, antennal club with black appressed setae. Pronotum with whitish setae forming regular spots: two distinct on disc, two distinct longitudinal spots on lateral part of pronotum. Anterior part of pronotum with transverse stripe interrupted in the middle, posterior part of pronotum covered by sparse undistinguished setae. Elytra also covered with whitish setae. Each elytron with one distinct spot in humeral part, one triangular spot in subbasal part from the second to the fourth elytral interval, next spot from the fifth to sixth elytral interval. Two conspicuous transverse stripes in central and preapical part of elytra, these narrow stripes are interrupted in sutural part and reached to lateral edges of elytra. Apical margin of elytra with whitish edge. Legs including tarsomeres covered with dense, fine yellowish decumbent setae. Venter of thorax and abdominal sternites with dense yellowish pubescence. Pygidium covered with sparse yellow appressed setae.



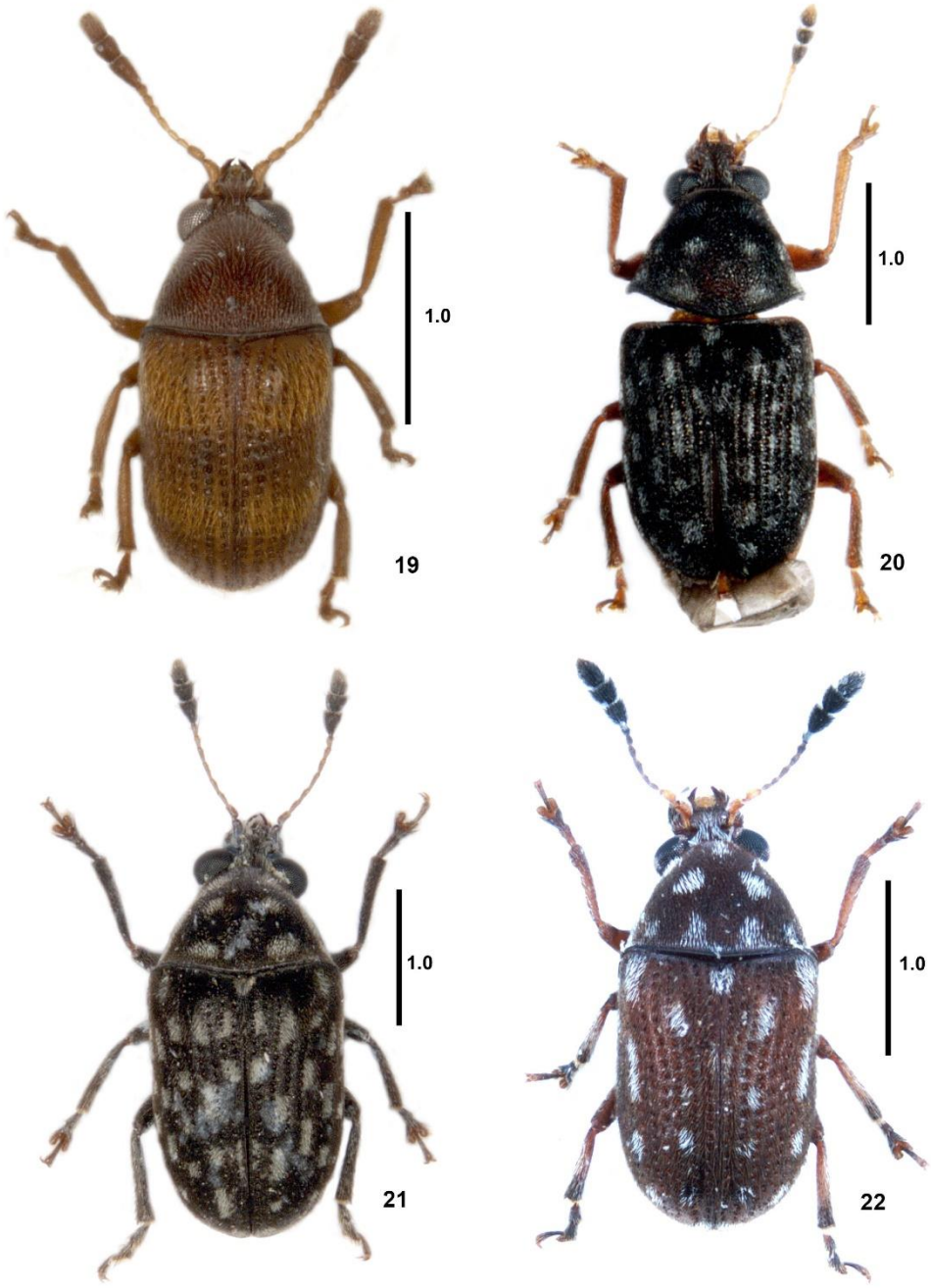
FIGURES 12–17. *Adapterops dimbyi* **sp. nov.**, male holotype; 12, aedeagus, lateral view; 13, aedeagus, ventral view (arrow indicates strangled apex of pedon); 14, tegmen, lateral view; 15, tegmen, ventral view (arrow indicates tegminal process, broken off); 16, pygidium, dorsal view; 17, segment VIII and sternite IX, ventral view. Scale bars in mm.

FIGURE 18. Dead trunk of a deciduous tree in Ankarana National Park, microhabitat of *Adapterops dimbyi* **sp. nov.**

Structure. *Head.* Rostrum very weakly convex, anterior part with gentle sculpture. Dorsum of head without longitudinal carina in the middle. Eyes large, not emarginate, ocular index 0.97. Ratio of maximum width across eyes to the maximum width of rostrum 1.67. Antennae slightly longer than head and pronotum together. Funicle thin, club moderately robust. *Pronotum* transverse (ratio of its length to its width at carina 0.65), gradually narrowed anteriorly, disc convex in middle. Dorsal transverse carina slightly curved. Postero-lateral edges of pronotum obtuse-angular. Posterior margin conspicuously convex, fitting in concavity on base of elytra. *Elytra* elongated oval, slightly narrowed posteriorly. Ratio of maximum length of elytra to maximum width 1.51. Anterior margin of elytra concave, corresponding with the convexity of posterior margin of pronotum. Surface of elytra deeply striate, width of each stria distinctly narrower than width of elytral interval. Abdominal ventrites I–V flattened in the middle.

Male terminalia (Figs. 12–17). As generally described above, anterior margin of tergite VIII straight, apodeme of sternite VIII of the same length as segment VIII, tegminal process broken off in studied specimen, but basalmost part of the process remaining on the tegminal plate, branches of basal piece convergent (Fig. 15), apex of pedon basally with conspicuous constriction (Fig. 13).

Female. Unknown.



FIGURES 19–22. Habitus of *Adapterops* species, dorsal view; 19, *A. festivus* Frieser, 2010 (male); 20, *A. nasalis* Frieser, 2010 (male); 21, *A. hankae* Trýzna, 2012 (female holotype); 22, *A. cedrici* Trýzna & Baňař, 2015 (female holotype). Scale bars in mm.

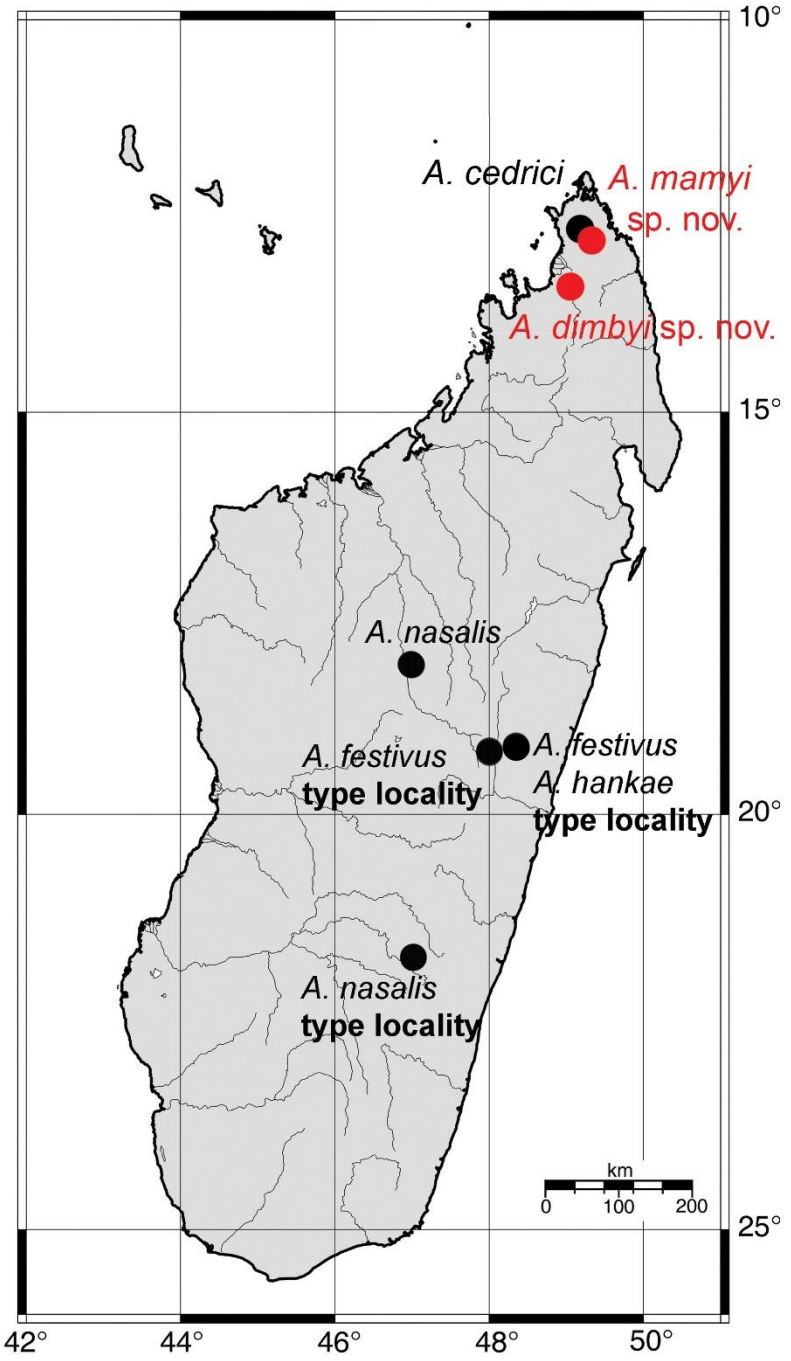


FIGURE 23. Distribution of *Adapterops* species in Madagascar.

Differential diagnosis. Generally, the new species is similar to *Adapterops cedrici* Trýzna & Baňař 2015 and *A. mamyi* Trýzna & Baňař **sp. nov.** It can be distinguished from *A. cedrici* by two transverse stripes on elytra in median and preapical parts and the light coloured tip of antennomere XI; from *A. mamyi* by black antennal club (with exception of mentioned light coloured tip of club), blackish antennomeres VI–VIII and two transverse distinct stripes in central and preapical parts of elytra. Comparatively narrower species. From *A. mamyi* it differs by converging branches of basal piece (Fig. 15) (diverging in *A. mamyi*); straight anterior marging of tergite VIII (Fig. 17) (convex in *A. mamyi*); finer and sparser sclerotized teeth on internal sac of aedeagus (denser and more robust in *A. mamyi*) and basally constricted apex of pedon (Fig. 13) (regularly narrowing in *A. mamyi*).

Etymology. Patronym, dedicated to Dr. Dimby Raharinjanahary from Madagascar National Parks (Chargé des Bases de données de suivi biodiversité et recherche).

Habitat. Species was collected in Ankarana National Park, Benavony circuit, in western dry forest at an altitude of 132 m. A single male specimen was collected by sweeping of the main trunk of a deciduous tree. A local guide who was present identified this trunk as an ebony tree (Ebenaceae, *Diospyros* sp.). The standing trunk was old, covered with only discontinuous, disrupted and peeling bark. The largest diameter of this trunk at its base was ca 15–18 cm and height ca 7 m. The new species was collected together with other anthribid species, namely species of *Mecotarsus, Dysnos* and several further species of the subfamily Choraginae. Microhabitat of this species is shown in Fig. 18.

Distribution. North Madagascar, Ankarana National Park (Fig. 23).

New and interesting faunistic records of the genus *Adapterops*

Adapterops cedrici Trýzna & Baňař, 2015

Adapterops cedrici Trýzna & Baňař, 2015: 486

Type locality. North Madagascar, Antsiranana province. Montagne d´Ambre National Park, upper camp near Ambohitra [= Joffreville], S 12°31´34.5´´, E 049°10´14.3´´, 1086 m.

New material examined. 1 male, 2 females: N Madagascar, Montagne d´Ambre National Park, upper camp near Ambohitra [= Joffreville], circuit Mille arbres, 1086 m. S 12°31´08.860´´, E 49°10´30.352´´, 10.–19.i.2016, M. Trýzna leg.; **1 female:** N Madagascar, Forêt d´Ambre, 496 m, S 12°28´27.697´´, E 49°13´07.995´´, 19.i.2016, M. Trýzna leg., *night beating of dead branches*. (MTDC).

Note on sexual dimorphism. Male moderately less robust than female. Ventrites I–V weakly depressed in the middle in male.

Adapterops festivus Frieser, 2010

Adapterops festivus Frieser, 2010: 18

Type locality. East Madagascar, Tamatave province. Moramanga town surroundings.

New material examined. 1 male: N Madagascar, Montagne d´Ambre National Park, upper camp near Ambohitra [= Joffreville], circuit Mille arbres, 1086 m. S 12°31´08.860´´, E 49°10´30.352´´, 10.–19.i.2016, M. Trýzna leg.; **1 female:** N Madagascar, Forêt d´Ambre, 496 m, S 12°28´27.697´´, E 49°13´07.995´´, 20.i.2016, M. Trýzna leg.; **1 female:** Madagascar, 5 km E Moramanga, S 18°57´10.3´´, E 048°16´07.0´´, 3.–4.i.2010, F. Pavel leg. (MTDC).

Adapterops hankae Trýzna, 2012

Adapterops hankae Trýzna, 2012 (in Trýzna & Baňař, 2012: 479)

Type locality. East Madagascar, Tamatave province. Andasibe-Mantadia National Park, Analamazaotra forest, S 18°56´45.0´´, E 48°25´08.0´´, 955 m.

New material examined. 3 males, 18 females: N Madagascar, Montagne d´Ambre National Park, upper camp near Ambohitra [= Joffreville], circuit Mille arbres, 1086 m. S 12°31´08.860´´, E 49°10´30.352´´, 10.–19.i.2016, M. Trýzna leg. (MTDC).

Note on sexual dimorphism. Male moderately less robust than female. Ventrites I–V weakly depressed in the middle in male.

Key to *Adapterops* species

1.	Pronotum and elytra generally reddish-brown to brown; dorsum of head without longitudinal carina 2
-	Pronotum and elytra generally black; dorsum of head with longitudinal carina reaching from proximal edge of eyes to the narrowest part of rostrum 5
2	Pronotum and elytra without spots, elytra with two indistinct transverse stripes in basal and median part ..... ***Adapterops festivus*** Frieser, 2010
-	Pronotum and elytra with almost regular distinct spots of whitish pubescence 3
3	Scape, pedicel and funicle light brown; antennal club brown to dark brown .... ***Adapterops mamyi* Trýzna & Baňař sp. nov.**
-	Scape and pedicel brown, antennomeres III–V brown, VI–VIII dark brown to black; antennal club entire black or only tip of antennomere XI dark brown 4
4	Antennal club entire black. Elytra covered by whitish setae forming predominantly short longitudinal spots on the second and the sixth elytral interval ..... ***Adapterops cedrici*** Trýzna & Baňař, 2015
-	Antennal club black, only tip of antennomere XI dark brown. Elytra covered by whitish setae forming two triangular spots in subbasal part and two transverse irregular stripes in median and preapical part interrupted in sutural part ..... ***Adapterops dimbyi* Trýzna & Baňař sp. nov.**
5	Legs, ventrites I–V and pygidium uniformly brown, head dorsally dark brown, antennal segments I–VIII light brown in both sexes. Female: ocular index 1.23; ratio of length of antennal segment IX to its maximum width 1.15; scrobes broadly expanded towards middle of the rostrum ..... ***Adapterops nasalis*** Frieser, 2010
-	Legs, venter of body, pygidium and dorsum of head black, antennomeres II–VIII dark brown, scape dark brown to blackish. Female: ocular index 1.13; ratio of length of antennal segment IX to its maximum width 1.54; scrobes smaller, less expanded towards middle of the rostrum ..... ***Adapterops hankae*** Trýzna, 2012

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References

Frieser, R. (1980) Die Anthribiden (Coleoptera) der Mascarenen. *Revue Suisse de Zoologie,* 87, 201–252. https://doi.org/10.5962/bhl.part.85515

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand,* 3. Science Information Division, DSIR, Wellington, 264 pp.

Trýzna, M. (2017) Description of a new species of the genus *Tophoderes* Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus. *Zootaxa,* 4221 (3), 377–385.
https://doi.org/10.11646/zootaxa.4221.3.6

Trýzna, M. & Baňař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (accessed 22 September 2016)

Trýzna, M. & Baňař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa,* 3609 (5), 504–512.
http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa,* 3721 (1), 71–78.
http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Baňař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3826 (2), 386–392.
http://dx.doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Baňař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa,* 3869 (2), 180–188.
http://dx.doi.org/10.11646/zootaxa.3869.2.8

Trýzna, M. & Baňař, P. (2015a) A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae). *Zootaxa,* 3905 (2), 264–272.
http://dx.doi.org/10.11646/zootaxa.3905.2.7

Trýzna, M. & Baňař, P. (2015b) A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa,* 4052 (4), 485–489.
http://dx.doi.org/10.11646/zootaxa.4052.4.8

Trýzna, M. & Baňař, P. (2016) Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. *Zootaxa,* 4161 (3), 429–436.
http://doi.org/10.11646/zootaxa.4161.3.10

Trýzna, M. & Baňař, P. (2017) A new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from Montagne d´Ambre National Park, northern Madagascar. *Zootaxa*, 4221 (5), 537–544.
https://doi.org/10.11646/zootaxa.4221.5.3

Wanat, M. (2007) Alignment and homology of male terminalia in Curculionoidea and other Coleoptera. *Invertebrate Systematics,* 21, 147–171.
https://doi.org/10.1071/IS05055

Příloha č. 8

Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus

Miloš Trýzna & Petr Baňař

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Two new species of *Diastatotropis* Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus

MILOŠ TRÝZNA[1,2] & PETR BAŇAŘ[1]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: petrbanar@seznam.cz*
[2]*Corresponding author. E-mail: m.tryzna@npcs.cz, anthribidae@gmail.com*

Abstract

Two new species, *Diastatotropis lepidus* Trýzna & Baňař **sp. nov.** and *Diastatotropis humeralis* Trýzna & Baňař **sp. nov.** (Anthribidae: Anthribinae: Cappadocini), from Madagascar are described. Colour habitus photographs are provided. A key to the known species of the genus *Diastatotropis* is provided.

Key words: Coleoptera, Anthribidae, Anthribinae, *Diastatotropis*, taxonomy, new species, Madagascar

Introduction

The endemic Madagascan genus *Diastatotropis* Lacordaire, 1866 comprises 13 known species, all found in well-preserved forests with large diameter dead wood. In this article we describe two new species, *Diastatotropis lepidus* Trýzna & Baňař **sp. nov.** and *Diastatotropis humeralis* Trýzna & Baňař **sp. nov.** The new species were obtained thanks to our long-term research project in cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Department of Entomology) (e.g. Frieser 2010, Trýzna & Baňař 2012, 2013a, 2013b, 2014a, 2014b, 2015a, 2015b). *Diastatotropis lepidus* Trýzna & Baňař **sp. nov.** comes from the locality of Chaines Anosyennes, Anosy, Toliara province in south-east Madagascar. The second species, *Diastatotropis humeralis* Trýzna & Baňař **sp. nov.**, was collected recently in Analamazaotra forest, Andasibe National Park in east Madagascar by the authors in 2016 (see Acknowledgements). Both species come from the narrow strip of the remaining disjunct rain forests on the Madagascan east coast.

Material and methods

In this work, we measure selected body parts as follows:
length of head = distance from basal margin of eyes to most anterior part of rostrum; length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position. The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a). Genitalia of the new species described here were not dissected because only females are known.

The label data of the material examined are cited verbatim, using a slash (/) to separate lines on one label. Colour photographs were taken with a Leica MSV266 camera. The specimens studied are deposited in the following collections:

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BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna);

MTDC = Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Diastatotropis Lacordaire, 1866

Recognition. Body elongate. Head comparatively long, rostrum longer, extended apically, without deep depression in the middle, with one central longitudinal carina (or without this carina in case of *D. nitidipennis* Waterhouse, 1882 and *D. planifrons* Waterhouse, 1882) and two lateral carinae. Eyes spherical or elliptical, not emarginate. Antennae of males usually reaching posterior margin of pronotum or longer, antennae of females shorter, not reaching posterior margin of pronotum. Funicle thin, antennal club 3-segmented or antennomeres continuously extended. Dorsal transverse carina of pronotum distinct. Pronotal declivity wide. Medium- or large-sized species, from 6 mm (small specimens of *D. rubricollis* (Fairmaire, 1893)) to more than 18 mm (*D. olivaceus* Waterhouse, 1877).

Diastatotropis lepidus Trýzna & Baňař sp. nov.

(Figs. 1, 3, 6)

Type locality. South-east Madagascar, Toliara province, Chaines Anosyennes, 1050 m.

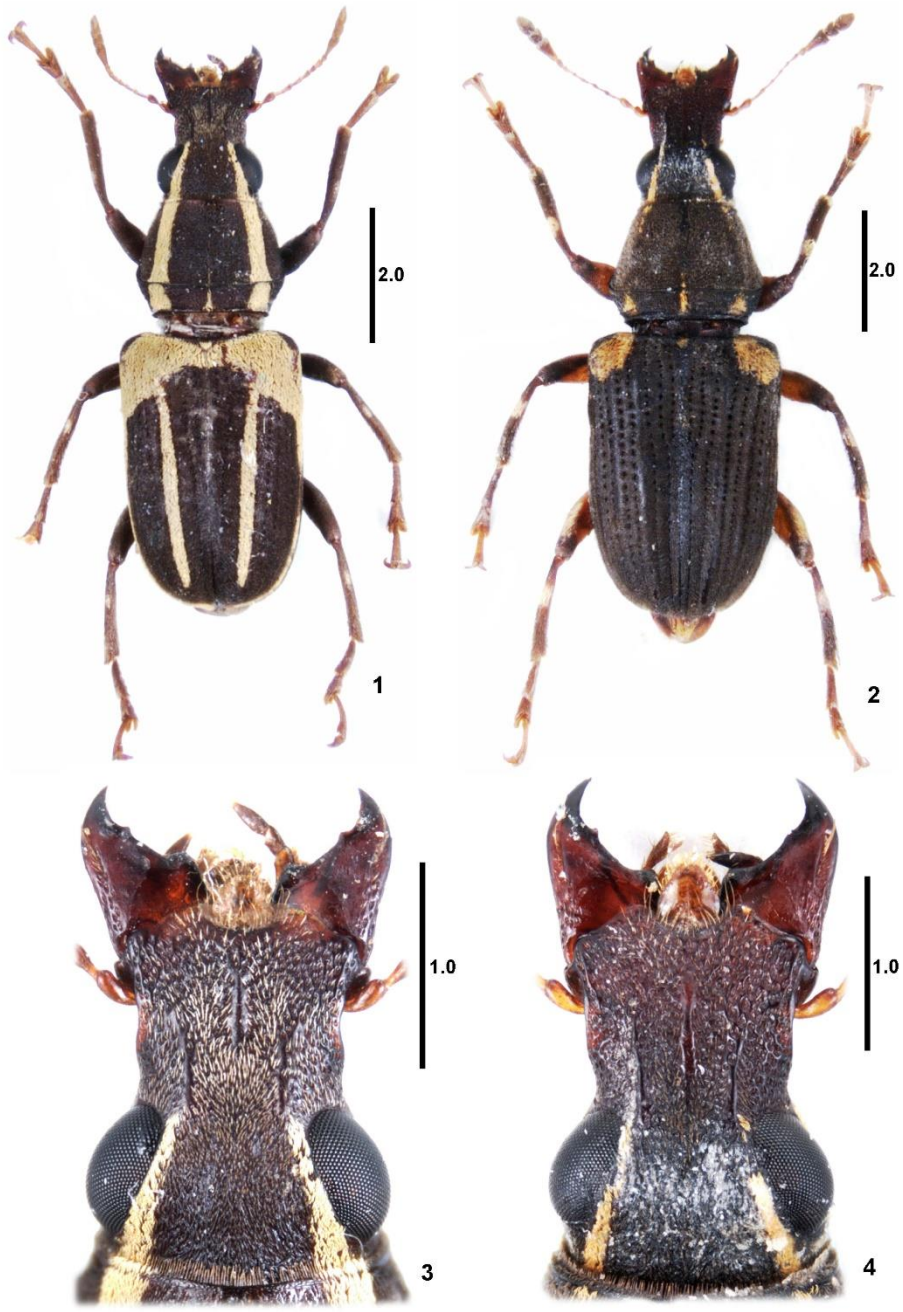
Type material. Holotype (female): SE MADAGASCAR, TOLIARA PROVINCE: 'Chaines anosyennes [Sic!] / Massif nord, 1050 m / moyenne Ranomandry / 11/30-XI-1971' [p] (BSNPC). Red label [p] HOLOTYPE / *Diastatotropis / lepidus* **sp. nov.** / M. Trýzna & P. Baňař det., 2016.

Description. Female holotype *Measurements* (in mm): Total body length—8.32. Head: total length—1.82; length of rostrum—1.07; maximum width of rostrum—1.27; length of eye—0.78; maximum width across eyes—1.62; minimum distance between eyes—0.78. Antenna: length of segments: II—0.24, III—0.31, IV—0.22, V—0.22, VI—0.16, VII—0.16, VIII—0.11, IX—0.38, X—0.20, XI—0.36. Pronotum: maximum length—1.76; width at carina—2.27; minimum width—1.53. Elytra: maximum length—4.32; maximum width—2.75.

Colouration of the cuticle of entire body dark brown, tarsomeres and antennae light brown.

Vestiture. Head with indistinct sparse yellowish appressed setae along central longitudinal carina on rostrum and in depression above this carina. Frons with only very short and almost invisible setae. Lateral sides of rostrum almost bare, this part only with coarse sculpture. Labrum yellowish with a few longer light setae. Vertex with two stripes behind lateral carinae of rostrum and continued to inner margin of eyes, these stripes bright yellow with very dense appressed setae. Antennae with indistinct light pubescence, only with very short, soft, sparse setae. Pronotum with two wider distinct longitudinal stripes posteriorly extended to transverse pronotal carina. Pronotal declivity with very narrow stripe in central part. All stripes covered with dense yellow setae. Rest of pronotum with delicate sculpture, covered with very short dark brown appressed setae. Elytra with wide humeral part covered with bright yellow setae. Each elytron with two distinct longitudinal stripes; one stripe on the second elytral interval extended from indistinct subbasal tubercle, continuing to preapical part but not reaching apical margin of elytra; the second stripe in lateral part on the eighth elytral interval reaching the tip of elytron. Rest of elytra covered with dense brown appressed setae. Humeral angle without yellow colouration, with only sparse short brown setae. Scutellum with yellow setae. All legs covered with dense fine yellowish setae. Tibiae covered with dense indistinct yellowish setae appressed in proximal part and subdecumbent in distal part. All tibiae on dorsal side with small spot of yellow setae in proximal third. Tarsomeres with yellowish setae. Lateral parts of venter of thorax and abdominal sternites with dense pubescence with short brown setae. Pygidium covered with short dense brown appressed setae.

Structure. Head appropriately long, rostrum noticeably extended apically, weakly depressed in the middle, with one short longitudinal carina in depression of rostrum, not reaching anterior margin of eyes, and two short indistinct lateral carinae. Ratio of rostrum length to maximum width 0.92. Eyes elliptical, not emarginate, dorsal ocular index 1.86. Ratio of maximum width across eyes to maximum width of rostrum 1.28. *Antennae* shorter, not reaching to posterior margin of pronotum. Pedicel not robust, funicle thin, club somewhat widened, antennomere



FIGURES 1–4. 1, 3, *Diastatotropis lepidus* **Trýzna & Baňař sp. nov.**, holotype female; 2, 4, *Diastatotropis humeralis* **Trýzna & Baňař sp. nov.**, holotype female; 1–2, dorsal habitus; 3–4, head, dorsal view. Scale bars in mm.

IX and XI longer than wide, antennomere X moderately wider than long. Pronotum slightly transverse, ratio of its length to width at carina 0.78, gradually extended anteriorly to quarter of its length, here widest (at the carina), then narrowed to distal part. Dorsal transverse carina subtly bisinuate with indistinct arch in middle. Lateral carina of pronotum well-developed but short, scarcely extending to half of pronotum, rounded at contact with dorsal transverse carina. Elytra suboval, ratio of the maximum length to maximum width of elytra 1.57.

Male. Unknown.

Etymology. Based on the Latin word *lepidus* (= nice, good-looking, charming), from the unique and remarkable appearance of this new species.

Collecting circumstances. Unknown.

Distribution. Only known from the type locality.

Differential diagnosis. *Diastatotropis lepidus* Trýzna & Baňař **sp. nov.** can be distinguished by its characteristic colour pattern, not resembling any other species of the genus and by characters given in the key.

Diastatotropis humeralis Trýzna & Baňař sp. nov.

(Figs. 2, 4, 5, 6)

Type locality. East Madagascar, Tamatave province, Andasibe-Mantadia National Park, Analamazaotra forest, 990 m.

Type material. Holotype (female): E MADAGASCAR, TAMATAVE PROVINCE: 'Madagascar, 5.ii.2016, / Andasibe-Mantadia N.P., / Analamazaotra forest, / circuit 'Indri 2' // S 18°56′43.9′′, / E 48°25′16.0′′, / 990 m, M. Trýzna leg.' (BSNPC). **Paratype (female)** (without antennae and anterior legs)**:** 'E Madagascar / Tamatave distr. / ANDASIBE, 17.–30.xii 2001, J. Horák lgt.' (MTDC). Red label [p] HOLOTYPE / PARATYPE / *Diastatotropis / humeralis* **sp. nov.** / M. Trýzna & P. Baňař det., 2016.

Description. Female holotype *Measurements* (in mm): Total body length—9.14. Head: total length—2.04; length of rostrum—1.22; maximum width of rostrum—1.36; length of eye—0.82; maximum width across eyes—1.67; minimum distance between eyes—0.78. Antenna: length of segments: II—0.29, III—0.34, IV—0.24, V—0.24, VI—0.18, VII—0.20, VIII—0.13, IX—0.38, X—0.20, XI—0.33. Pronotum: maximum length—1.96; width at carina—2.53; minimum width—1.67. Elytra: maximum length—4.95; maximum width—3.22.

Colouration of the cuticle of entire body black, proximal part of gula, distal part of rostrum and mandible dark brown. Scape, pedicel and funicle light brown, antennal club dark brown. All femora bright pale brown, only distal part darker; tibiae and tarsomeres I–II dark brown, rest of tarsomeres pale.

Vestiture. Head almost bare, nearly invisible sparse yellowish appressed setae along central longitudinal carina on rostrum. Frons bare, without setae. Lateral sides of rostrum almost bare, only with coarse sculpture, the same sculpture also on vertex. Labrum yellowish with a few longer light setae. Vertex (as in *D. lepidus*) with two stripes behind to lateral carinae of rostrum and continued to inner margin of eyes, these narrow stripes rusty-yellow with dense appressed setae. Antennae with indistinct light pubescence, only with very short, soft, sparse setae. Disk of pronotum with fine sculpture, covered with indistinct brown setae, lateral parts of pronotum with more distinct yellowish setae. Basal part of disc with narrow indistinct stripe, pronotal declivity with two triangular spots in lateral part and one narrow stripe in middle covered with rusty-yellow pubescence. Elytra with short dense black setae, each elytron in humeral part with one rusty-yellow spot extended from third to sixth elytral interval. Rest of elytra as well as humeral angle black, without any spots. Scutellum with short rusty-yellowish setae. All legs covered with dense setae. Ventral face of all femora with bright yellow pubescence on distal half and dark brown distal tip. Tibiae covered with dense brown setae appressed in proximal part and subdecumbent in distal part. All tibiae with yellowish stripe in proximal third interrupted in ventral part. Tarsomeres I–II with brownish setae, rest of antennomeres pale. Lateral parts of venter of thorax and abdominal sternites with dense pubescence and short dark setae. Pygidium covered with short dense brown appressed setae, yellowish stripe in central part.

Structure. Head moderately long, rostrum extended apically, weakly depressed in middle, with one longitudinal carina in depression of rostrum, almost reaching anterior margin of eyes, and two short distinct lateral carinae. Ratio of rostrum length to maximum width 0.89. Eyes elliptical, not emarginate, dorsal ocular index 1.75. Ratio of maximum width across eyes to maximum width of rostrum 1.23. Antennae shorter, not reaching posterior margin of pronotum. Pedicel not robust, funicle thin, club widened, antennomere IX and XI longer than wide,

antennomere X slightly wider than long. Pronotum slightly transverse, ratio of its length to width at carina 0.77, gradually extending anteriorly to a quarter of its length, here widest, then narrowed to distal part. Dorsal transverse carina almost straight without arch in middle. Lateral carina of pronotum well-developed but short, scarcely reaching to half of pronotum, contact with dorsal transverse carina rounded. Elytra suboval, ratio of the maximum length to maximum width of elytra 1.54.

Male. Unknown.

Etymology. Based on the Latin word *humeralis* (= shoulder), due to the two well-marked rusty-yellow spots in humeral part.

Collecting circumstances. The type specimen was collected by the authors inside secondary forest at an elevation of 990 metres by sweeping the trunk of an unidentified species of deciduous tree with diameter ca 10 cm (Fig. 5).

Distribution. This species is known only from its type locality in Andasibe National Park, Analamazaotra forest, east Madagascar.

Differential diagnosis. *Diastatotropis humeralis* Trýzna & Baňař **sp. nov.** can be distinguished from all other species of the genus mainly by the two unique rusty-yellow spots in the humeral part of the elytra and by characters given in the key.

FIGURE 5. Microhabitat of the type locality of *Diastatotropis humeralis* **Trýzna & Baňař sp. nov.** in Andasibe–Mantadia NP, Analamazaotra forest. Black arrow indicates the position of siting holotype specimen.

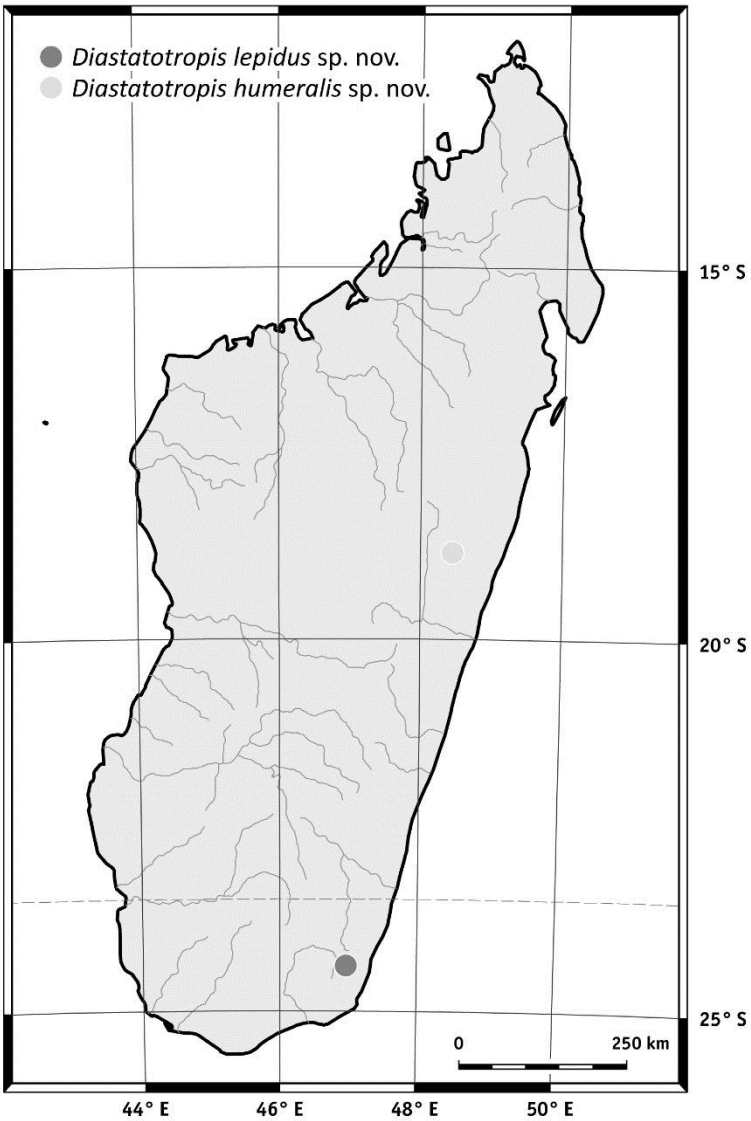


FIGURE 6. Type localities of *Diastatotropis lepidus* **Trýzna & Baňař sp. nov.** and *D. humeralis* **Trýzna & Baňař sp. nov.**

Key to *Diastatotropis* species (see also Frieser, 1992)

1	Antennal club slender and cylindrical. Terminal segment elongate-oval, always distinctly longer than wide. Antennomere X as long as wide (or weakly wider than long in females of *D. tessellatus*) 2
-	Antennal club wide and stout. Terminal segment not longer than wide. Antennomere X approximately twice as wide as long 5
2	Sub-basal tubercle of elytra high and obvious 3
-	Sub-basal area of elytra flat. 4

3	Central longitudinal carina of rostrum long, almost reaching to posterior margin of eyes. Elytral intervals II, IV and VI strongly elevated. Elytra spotted and tessellated. ***D. tessellatus*** Fairmaire
-	Central longitudinal carina of rostrum very short, reaching only to middle of rostrum. Elytral intervals flat. Elytra brown, each elytron with large yellow spot behind sub-basal tubercle, reaching from elytral interval I to IX and four small yellow spots on elytral interval II and VIII on median and preapical part ***D. elegans*** Fairmaire
4	Central longitudinal carina of rostrum very short, reaching only to middle of rostrum, depression here shallow. Head and disc of pronotum with fine sculpture. Elytra dark brown with wide humeral yellow part, each elytron with two longitudinal stripes on elytral interval II and VIII reaching to apical part ***D. lepidus*** Trýzna & Bañař **sp. nov.**
-	Central longitudinal carina of rostrum longer, almost reaching anterior margin of eyes, depression here deeper. Head and disc of pronotum with coarse sculpture. Elytra blackish with two unique rusty-yellow spots in the humeral part ***D. humeralis*** Trýzna & Bañař **sp. nov.**
5	Elytra spotted. Tibia brightly coloured 6
-	Elytra differently patterned, not spotted. Tibia dark coloured 7
6	Rostrum with depression in middle, sides of rostrum with coarse sculpture. Head, pronotum and elytra predominantly black, head and pronotum with two longitudinal whitish stripes. Each elytron with oblique short stripes in humeral parts, rest with numerous more or less irregular delicate whitish spots. All tibia and tarsomere I covered with whitish setae ***D. irroratus*** Lacordaire
-	Rostrum without depression in middle, sides of rostrum with fine sculpture. Dorsum of head, pronotum and elytra predominantly yellowish, disc of pronotum with two large black spots. Each elytron with six large black spots. All tibia and tarsomere I covered with yellowish setae ***D. tigrinus*** Lacordaire
7	At least pronotum always brightly red 8
-	Pronotum always dark, blackish or dark with greenish shine 9
8	Head and elytra blackish. Pronotum red, only narrow anterior margin of pronotum blackish. Pronotum with dense sculpture ***D. rubricollis*** Fairmaire
-	Head, pronotum and elytra red, pronotum and elytra polished with fine pubescence. Pronotum with sparse sculpture ***D. ruber*** Frieser
9	Rostrum without carinnae 10
-	Rostrum with three distinct carinae. 11
10	Elytra metallic, shiny. Central part of rostrum with very shallow depression. Slender species, ratio of maximum length of elytra to maximum width 2.0 ***D. nitidipennis*** Waterhouse
-	Elytra dark brown to blackish, matte. Central part of rostrum flat, without depression. Stouter species, ratio of maximum length of elytra to maximum width 1.7 ***D. planifrons*** Waterhouse
11	Rostrum distinctly wider than long . . . . . ***D. claviger*** Frieser
-	Rostrum distinctly longer than wide 12
12	Rostrum very narrowed in central part, all three longitudinal carinae of rostrum distinct. Antennae continuously extended from antennomere VI (only holotype of female is known). Elytra shorter, ratio of maximum length of elytra to maximum width 1.4. Head, pronotum and elytra predominantly dark with greenish shine ***D. crassicornis*** Waterhouse
-	Rostrum wide, sides parallel, not narrowed, lateral longitudinal carinae of rostrum indistinct. Funicle thin, antennal club three-segmented. Elytra longer, ratio of maximum length of elytra to maximum width 1.7. Head, pronotum and elytra predominantly black or dark brown, without shine. . . . . ***D. olivaceus*** Waterhouse

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We would like to thank Dr. Lala Harivelo Ravaomanarivo Raveloson (University of Antananarivo, Faculty of Sciences, Department of Entomology), Dr. Mamy A. Rakotoarijaona (Directeur des Opérations, Madagascar National Parks) and Dr. Dimby Raharinjanahary (Chargé des Bases de données de suivi biodiversité et recherche, Madagascar National Parks) for supporting our research project: *'Étude à long terme de la biodiversité des groupes choisis d'insectes: Coléoptères, Hétéroptères, Homoptères, Lépidoptères et quelque famille de Micro Lépidoptères nocturne dans les localités préalablement sélectionnées en considération de la recherche et la protection de la biodiversité dans les aires protégées de Madagascar. Analyse des risques potentiels d'influencer négativement la biodiversité dans les régions étudiées'*. This work was supported by the Internal Grant Agency (IGA no. A28_16; IGA no. 20124364) Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague. The research received support from the SYNTHESYS Project (http://www.synthesys.info) which is financed by the European Community Research Infrastructure Action under the FP7 'Capacities' Program (visit to Natural History Museum, London) for the project *'Research into Madagascan fungus weevils of the family Anthribidae'* (Miloš Trýzna) with the kind co-operation of Maxwell V. L. Barclay. We would like to thank Dr. Hélène Perrin for supporting our work during our study in MNHN. We are indebted to Maxwell V. L. Barclay and Robert Anderson for reading the manuscript and Oldřich Holešinský for the distribution map.

References

Frieser, R. (1992) Zur Synonymie sowie zwei neue Arten der Gattung *Diastatotropis* Lacordaire. Coleoptera: Anthribidae. *Acta Coleopterologica,* 8 (1), 46–50.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Lacordaire, J.T. (1866) Histoire naturelle des insectes. *In*: *Genera des Coléoptères ou exposé méthodique et critique de tous les genres proposés jusqu'ici dans cet ordre d'insectes. Tome septième contenant les familles des curculionides (suite), scolytides, brenthides, anthribides et bruchides. Vol. 7.* Librairie Roret, Paris, pp. 520.

Trýzna, M. & Baňař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (accesed 15 June 2016)

Trýzna, M. & Baňař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa*, 3609 (5), 504–512.
http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3721 (1), 71–78.
http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Baňař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3826 (2), 386–392.
http://dx.doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Baňař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa*, 3869 (2), 180–188.
http://dx.doi.org/10.11646/zootaxa.3869.2.8

Trýzna, M. & Baňař, P. (2015a) A new species of *Tophoderes* Dejean from northen Madagascar with checklist of the species (Coleoptera: Anthribidae). *Zootaxa*, 3905 (2), 264–272.
http://dx.doi.org/10.11646/zootaxa.3905.2.87

Trýzna, M. & Baňař, P. (2015b) A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. *Zootaxa*, 4052 (4), 485–489.
http://dx.doi.org/10.11646/zootaxa.4052.4.8

Příloha č. 9

A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae)

Miloš Trýzna & Petr Baňař

2015a

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A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae)

MILOŠ TRÝZNA[1] & PETR BAŇAŘ[1, 2]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com*
[2]*Corresponding author. E-mail: petrbanar@seznam.cz*

Abstract

A new species, *Tophoderes lidmilae* Trýzna & Baňař **sp. nov.**, from north Madagascar is described. Male genitalia are studied and illustrated and colour photographs of both sexes are added. A comparison with the most similar known species *T. frenatus* (Klug, 1833) is provided. A checklist of species of the Madagascan genus *Tophoderes* (Anthribidae: Anthribinae: Tophoderini) is provided.

Key words: Coleoptera, Anthribidae, Anthribinae, *Tophoderes*, list of species, taxonomy, new species, genitalia, Madagascar

Introduction

The endemic Madagascan genus *Tophoderes* Dejean, 1834 contains 13 species, all of which occur in well-preserved forests with the presence of dead wood of large diameter trees. In this article we produce a description of a new species, *Tophoderes lidmilae* Trýzna & Baňař **sp. nov.** and provide a checklist of all species with their type localities and references to primary literature. The new species was acquired during our long-term research project in cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Department of Entomology) (*e.g.* Frieser 2010, Trýzna & Baňař 2012, 2013a, 2013b, 2014a, 2014b). It was discovered in Montagne d´Ambre National Park in the far north of Madagascar.

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum;

length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position.

The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for description and illustration. Finally, genitalia were stored in glycerol in a small vial mounted on the pin with the corresponding specimen. For the description of male genitalia we use the terminology of Holloway (1982).

264 *Accepted by R. Anderson: 3 Dec. 2014; published: 12 Jan. 2015*

The label data of the material examined are cited verbatim, including possible errors, using a slash (/) to separate lines on one label. The following abbreviation is used: [p]—printed, [TL]—type locality.

Colour photographs were taken with a Leica MSV266 camera. Drawings were made using a SZP 11 ZOOM stereoscopic microscope.

The specimens studied are deposited in the following collections:

BSNPC Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna);
MTDC Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Tophoderes Dejean, 1834

Recognition. Head comparatively long, rostrum longer, extended apically, with one central longitudinal carina, without depression in middle. Eyes spherical, not emarginate. Antennae of males reaching to posterior margin of pronotum or longer (last two antennomeres can extend beyond this point), antennae of females shorter, not reaching posterior margin of pronotum. Funicle thick, robust, antennal club 3-segmented. Pronotum slightly transverse, dorsal transverse carina distinct. Large-sized species, from 11 mm (smallest specimens of *T. sinuatocollis* Jordan, 1895) to more than 32 mm (*T. amulatus* Waterhouse, 1875 and *T. murinus* Allaud, 1899) in body length.

Tophoderes lidmilae Trýzna & Baňař sp. nov.
(Figs. 5–15)

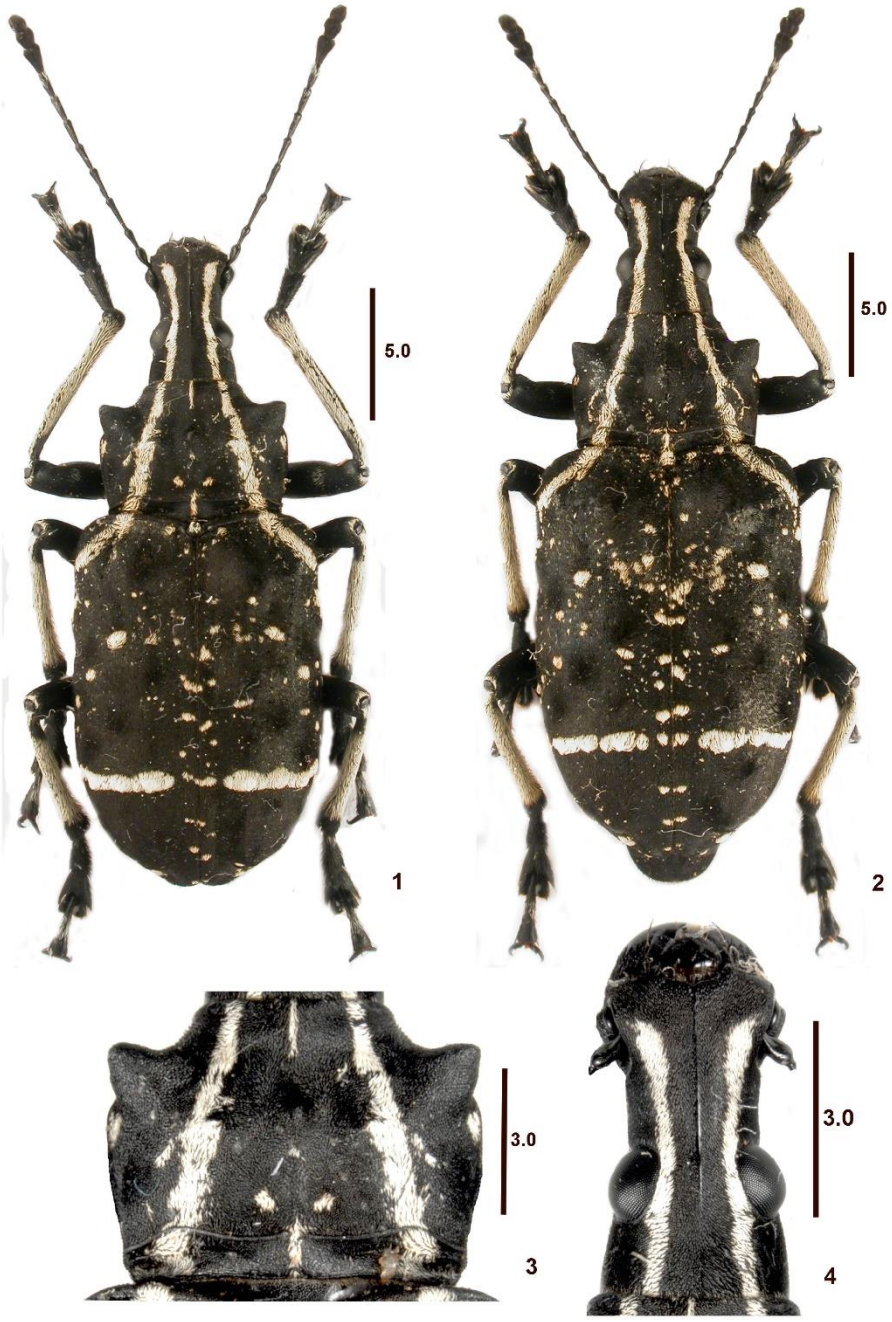
Type locality. North Madagascar, Antsiranana province, Montagne d´Ambre Nat. Park.

Type material. Holotype (male): N MADAGASCAR, ANTSIRANANA PROVINCE: 'N Madagascar, Ambohitra env. / Montagne d´Ambre N.P. / S 12°28´34,7´´; E 049°13´07,5´´ / J. Vybíral leg., 1.–3.1.2007' (BSNPC). **Allotype (female):** 'Madagascar N / Antsiranana prov. / Ambohitra env. / 20.–26. XII. 2002 / Ivo Jeniš leg.' (MTDC). **Paratype (female):** 'N Madagascar, 28.x.2010 / Mt. d´Ambre Nat. Park, 1048 m a.s.l., / S 12°32´04.1´´; E 049°10´34.0´´ / M. Trýzna leg.' (MTDC). Red label [p] HOLOTYPE / ALLOTYPE / PARATYPE / *Tophoderes / lidmilae* **sp. nov.** / M. Trýzna & P. Baňař det., 2014.

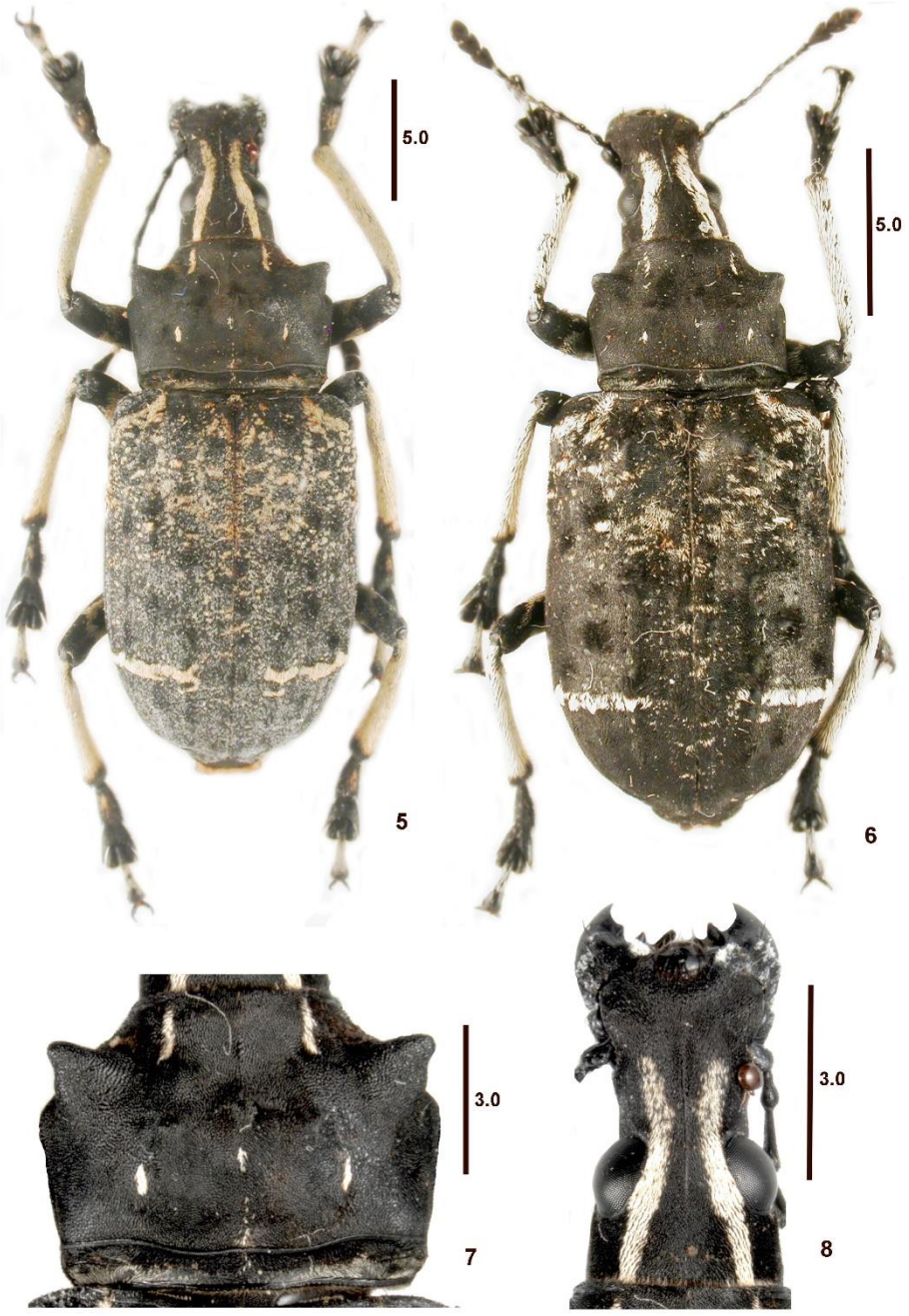
Description. Male holotype, (female paratype). *Measurements* (in mm): Total body length—26.20 (21.20). Head: total length—5.10 (4.70); length of rostrum—3.50 (2.10); maximum width of rostrum—3.40 (2.80); length of eye—1.60 (1.20); maximum width across eyes—3.85 (3.10); minimum distance between eyes—1.50 (1.50). Antenna: length of segments: II 1.00 (0.60), III—1.60 (0.80), IV—1.50 (0.70), V—1.25 (0.55), VI—1.10 (0.50), VII—1.10 (0.50), VIII—1.00 (0.55), IX—1.00 (0.75), X—0.80 (0.55), XI—0.75 (0.60). Pronotum: maximum length—6.10 (4.20); width at carina—7.70 (5.70); maximum width—8.40 (6.00); minimum width—4.00 (3.30). Elytra: maximum length—15.00 (12.30); maximum width—10.30 (8.70).

Colouration of cuticle of entire body black, only distal part of tarsomere V dark brown in both sexes.

Vestiture. *Head* predominantly with black appressed setae. On dorsal part of head two distinct yellowish longitudinal stripes located from vertex along inner margins of eyes to dorsal part of rostrum, but not reaching half of its length. These stripes composed of light yellow appressed setae, weakly mixed with brown setae. *Pronotum* with five more or less distinct longitudinal spots of light yellow setae, two on distal margin and three on proximal third of pronotum, rest of pronotum covered with black appressed setae. *Elytron* with one distinct transverse narrow band on distal third and one short indistinct oblique pinstripe in humerus which blends in with adjacent similarly coloured spots. Rest of elytra speckled, covered by mixed yellow and brown appressed setae (more noticeable in male than in female). Scutellum with yellowish setae. *Antennae* with black pubescence, distal part of



FIGURES 1–4. *Tophoderes frenatus* (Klug, 1833); 1, male dorsal habitus; 2, female dorsal habitus; 3, pronotum, male; 4, head dorsal, male. Scale bars in mm.



FIGURES 5–8. *Tophoderes lidmilae* **sp. nov.** Trýzna & Bařař; 5, male holotype dorsal habitus; 6, female allotype dorsal habitus; 7, pronotum, male; 8, head dorsal, male. Scale bars in mm.

FIGURES 9–10. *Tophoderes lidmilae* **sp. nov.** Trýzna & Baňař, holotype male; 9, aedeagus, lateral view; 10, tectum, dorsal view. Scale bars in mm.

antennomeres III–VIII in male and VI–VIII in female covered by longer conspicuous yellowish appressed setae, remaining antennomeres and primarily antennomeres IX–XI (club) only with very short, soft, dense setae in both sexes. Legs covered with dense, fine black setae, all femora with indistinct light distal part, with yellowish stripe on the distal quarter. Tibiae unicolorous, covered with dense distinct yellow setae appressed in proximal part and subdecumbent in distal part, apical part of tibiae with only black setae in both sexes. All tarsomeres with black setae; tarsomere I with sparse yellowish to brown indistinct setae in male and tarsomere V with distinct yellow distinct setae in both sexes. Lateral parts of venter of thorax and abdominal sternites with dense black pubescence mixed with yellow and brown setae. Distal part of prosternum with one pair of rusty (male) or yellow (female) spots.

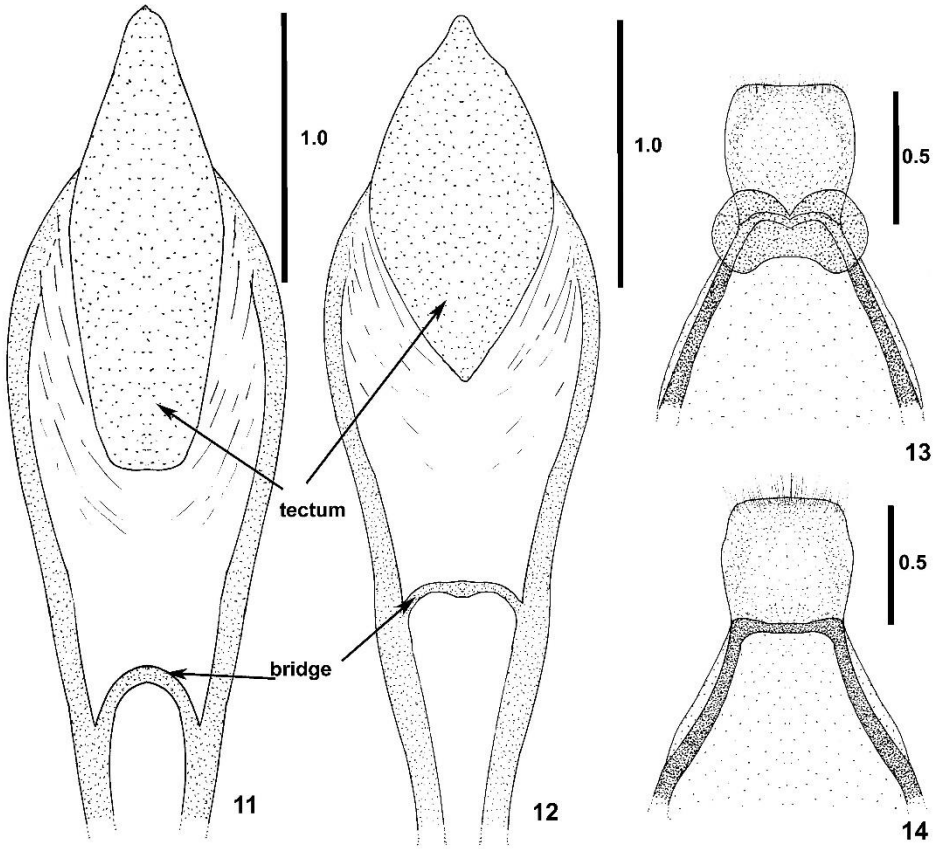
Structure. *Head* relatively long, rostrum extended apically (Fig. 8), not depressed in middle, with one fine longitudinal carina reaching between eyes in both sexes. Ratio of rostrum length to maximum width 1.03 in male, 0.75 in female. Eyes spherical, not emarginate, dorsal ocular index 1.28 in male, 1.87 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.13 in male, 1.11 in female. Antennae reaching to posterior margin of pronotum in male, females antennae shorter. Funicle thick, club moderately robust, antennomere IX longer than wide in male. *Pronotum* slightly transverse (Fig. 7), ratio of its length to width at carina 0.79 in male, 0.74 in female, gradually extended anteriorly to half of its length, here widest, then narrowed to distal part. Disk of pronotum with three distinct humps and two considerable horns protruded obliquely forward from line of pronotum in both sexes. Dorsal transverse carina bisinuate with indistinct arch in middle. Lateral carina of pronotum well-developed, sharp, reaching beyond basal half of pronotum in lateral view, meeting with dorsal transverse carina at right-angle. *Elytra* broadly suboval (Figs. 5–6), ratio of maximum length to maximum width of elytra 1.46 in male,

1.41 in female. *Abdomen* as long as wide. *Male genitalia.* Aedeagus robust (Fig. 9), internal sac, consisting of ventral lobe only, very wide and long, reaching the apices of apodemes. Tectum very wide, its sclerotized plate broadly oval, almost egg-shaped (Figs. 10, 12). Apodemal bridge irregularly rounded, widest in middle (Fig. 12). Tegmen robust, its apex subrectangular (Fig. 14), preapical flange simple.

Sexual dimorphism. Male antennae are more robust and moderately longer, reaching approximately to posterior margin of pronotum, abdominal ventrites are more slightly flattened.

Etymology. Patronym, dedicated to the memory of the mother of the first author, Mgr. Lidmila Trýznová (†).

Distribution. Three specimens were collected in northern Madagascar, Antsiranana province, Montagne d´Ambre National Park, which is covered by a volcanic massif composed mainly of basaltic rocks. The paratype was collected by the authors in tropical moist forest near a crater lake at 1048 meters elevation.



FIGURES 11–14. 11, 13; *Tophoderes frenatus* (Klug, 1833) male; 12, 14, *Tophoderes lidmilae* **sp. nov.** Trýzna & Bañař, holotype male; 11, 12, tectum, dorsal view; 13, 14, apex of tegmen, dorsal view. Scale bars in mm.

Diferential diagnosis. *Tophoderes lidmilae* **sp. nov.** is very similar to *T. frenatus* (Klug, 1833) from which it can be distinguished by characters given in the key below:

(1) Pair of longitudinal stripes on head extended from vertex to only half of length of rostrum; pronotum without pair of well-marked longitudinal stripes, with only five small longitudinal spots; humerus with only indistinct smudgy oblique stripes; surface of elytra mottled, covered with mix of yellow and brown setae; sclerotized plate of tectum broad, almost egg-shaped (Fig. 12), apodemal bridge irregularly rounded (Fig. 12), preapical flange of tectum simple (Fig. 14) ..... *T. lidmilae* Trýzna & Bañař **sp. nov.**

(2) Pair of longitudinal stripes on head extended from vertex to distinctly beyond half of length of rostrum; pronotum with pair of well-marked longitudinal stripes subsequent to head and short humeral stripes; humerus with distinct oblique stripes; surface of elytra covered with brightly bordered spots with yellow setae; sclerotized plate of tectum narrow, longitudinal (Fig. 11), apodemal bridge regularly rounded (Fig. 11), preapical flange of tectum broadly flattened (Fig. 13). . . *T. frenatus* (Klug, 1833)

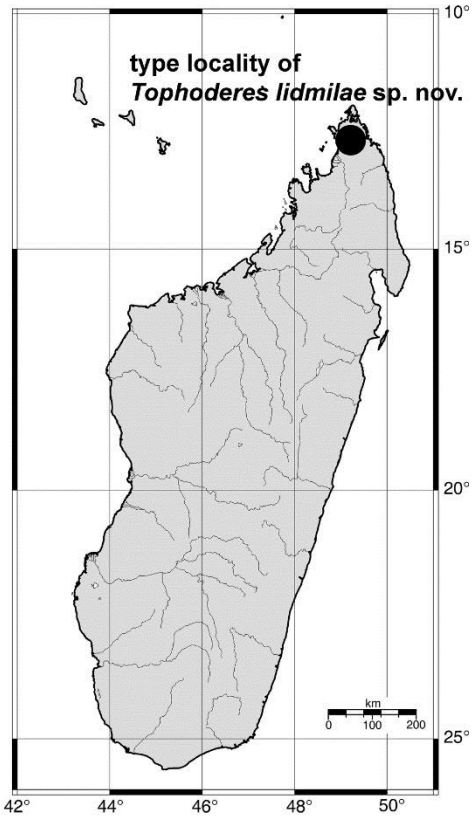


FIGURE 15. Type locality of *Tophoderes lidmilae* **sp. nov.** Trýzna & Baňař.

Checklist of species of the genus *Tophoderes* Dejean, 1834

***Tophoderes* Dejean, 1834: 236**

Type species: *Anthribus frenatus* Klug, 1833
Gender: Masculine.

(1) *T. acarinulus* Wolfrum, 1959b: 151
TL: 'Madagascar, Region Androna'

(2) *T. annulatus* Waterhouse, 1875: 412
TL: 'Madagascar'
syn: *T. hildebrandti* Dohrn, 1883: 157 (synonymized by Wolfrum 1929: 16)
TL: 'Madagascar orientalis'

(3) *T. ferrugatus* (Klug, 1833): 103 (as *Anthribus*) (synonymized by Wolfrum 1929: 16)
TL: 'Madagascar'

(4) *T. frenatus* (Klug, 1833): 103 (as *Anthribus*) (synonymized by Wolfrum 1929: 16)
TL: 'Madagascar'

(5) *T. funebris* (Klug, 1833): 103 (as *Anthribus*) (synonymized by Wolfrum 1929: 16)
TL: 'Madagascar'

(6) *T. fuscoareatus* Wolfrum, 1959a: 132
TL: 'Madagascar. 1 male ohne näheren Fundort (Typus), 1 female Moramanga, 1 female Antsianaka'

(7) *T. griseipes* Fairmaire, 1901: 199
TL: 'Madagascar'

(8) *T. griseovarius* Fairmaire, 1901: 200
TL: 'Fort-Dauphin'

(9) *T. lidmilae* Trýzna & Baňař sp. nov.
TL: N Madagascar, Montagne d´Ambre National Park

(10) *T. murinus* Allaud, 1899: 366
TL: 'Madagascar'

(11) *T. nubeculosus* Fairmaire, 1888: 32
TL: 'Madagascar'
syn: *T. marmoreus* Fairmaire, 1896: 360 (synonymized by Frieser 1980: 952)
TL: 'Nossi-Bé'
***T. nubeculosus* ssp. *immaculatus* Wolfrum, 1959a:** 133 (as *T. marmoreus* ssp. *immaculatus*)
TL: 'Madagascar, Antsianaka'

(12) *T. sikorae* Jordan, 1895a: 140
TL: 'Antananarivo, Madagascar'

(13) *T. sinuatocollis* Jordan, 1895b: 376
T. sinuaticollis [sic!]: Frieser 1980: 952
TL: 'Antananarivo, Madagascar'
syn: *T. longirostris* Fairmaire, 1897: 187 (synonymized by Frieser 1980: 952)
TL: 'Madagascar'

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Anthribidae' (Miloš Trýzna) with the kind co-operation of Maxwell V. L. Barclay. We are indebted to R. Anderson for reading the manuscript.

References

Allaud, C. (1899) Deux Coléoptères nouveaux du sud-est de Madagascar. *Bulletin du Muséum d'Histoire Naturelle*, 5, 366–367. [Paris]

Dejean, P.F.M.A. (1834) *Catalogue des Coléoptères de la collection de M. le Comte Dejean. Fasc. 3. 2nd Edition.* Méquignon-Marvis & Sons, Paris, 80 pp. [pp. 177–256]

Dohrn, C.A. (1883) Exotisches. *Stettiner entomologische Zeitung,* 44, 156–160.

Fairmaire, L.M.H. (1888) Diagnoses de coléoptères nouveaux de Madagascar. *Naturaliste,* Series 2, 2, 32.

Fairmaire, L.M.H. (1896) Matériaux pour la faune coléoptèrique de la région malgache. *Annales de la Société Entomologique de Belgique,* 40, 336–398.

Fairmaire, L.M.H. (1897) Matériaux pour la faune coléoptèrique de la région malgache. *Annales de la Société Entomologique de Belgique,* 41, 164–204.

Fairmaire, L.M.H. (1901) Matériaux pour la faune coléoptèrique de la région malgache (11e note). *Revue d'Entomologie,* 20, 101–248.

Frieser, R. (1980) Zur Synonymie madegassischer und afrikanischer Anthribiden (Coleoptera Anthribidae). *Revue de Zoologie et de Botanique Africaines,* 94 (4), 951–958.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand. Vol. 3.* Science Information Division, DSIR, Wellington, 264 pp.

Jordan, K. (1895a) Beitrag zur Kenntnis der Anthribidae. II. *Stettiner entomologische Zeitung,* 56, 122–204.

Jordan, K. (1895b) Zur Kenntnis der Anthribidae. IV. *Stettiner entomologische Zeitung,* 56, 369–401.

Klug, F. (1833) *Bericht über eine auf Madagascar veranstaltete Sammlung von Insecten aus der Ordnung Coleoptera.* Abhandlungen der Königlich-Preussischen Akademie der Wissenschaft, Berlin, 1, 91–223.

Trýzna, M. & Baňař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (accesed 25 November 2014)

Trýzna, M. & Baňař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa* 3609 (5), 504–512.
http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3721 (1), 71–78.
http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Baňař, P. (2014a) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3826 (2), 386–392.
http://dx.doi.org/10.11646/zootaxa.3826.2.8

Trýzna, M. & Baňař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa*, 3869 (2), 180–188.
http://dx.doi.org/10.11646/zootaxa.3869.2.8

Waterhouse, C.O. (1875) Descriptions of some new genera and species of Coleoptera from South Africa, Madagascar, Mauritius, and the Seychelle Islands. *Annals and Magazine of Natural History,* Series 4, 15, 403–414.
http://dx.doi.org/10.1080/00222937508681110

Wolfrum, P (1929) *Coleopterorum Catalogus. Pars 102. Anthribidae*. W. Junk, Berlin, 1–145.

Wolfrum, P. (1959a) Neue und bemerkenswerte Käfer-Formen aus der Sammlung des Zoologischen Forschungsinstituts und Museums Alexander König. 6. Anthribiden. *Bonner Zoologische Beiträge,* 10, 132–148.

Wolfrum, P. (1959b) Anthribiden aus dem Museum G. Frey, Tutzing. *Entomologische Arbeiten aus dem Museum Frey,* 10, 151–170.

Příloha č. 10

A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species

Miloš Trýzna & Petr Baňař

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A new species of the genus *Adapterops* (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species

MILOŠ TRÝZNA[1,2] & PETR BAŇAŘ[1]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Game Management, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail:anthribidae@gmail.com; petrbanar@seznam.cz*
[2]*Corresponding author. E-mail: m.tryzna@npcs.cz*

Abstract. A new species, *Adapterops cedrici* Trýzna & Baňař **sp. nov.** (Anthribidae: Choraginae: Araecerini), from northern Madagascar is described and illustrated. A key and catalogue of the genus *Adapterops* Frieser, 2010 is given.

Key words: Coleoptera, Anthribidae, Choraginae, *Adapterops*, taxonomy, new species, catalogue, key, faunistics, Madagascar

Introduction

The genus *Adapterops* Frieser, 2010, with the type species *A. nasalis*, was established for two species from east Madagascar. Subsequently Trýzna (Trýzna & Baňař 2012) described a third species of this genus, *A. hankae* Trýzna, 2012 from Andasibe-Mantadia National Park, east Madagascar, with a key to species and notes on sexual dimorphism in the genus. In the present paper we describe and key a new species, *A. cedrici* Trýzna & Baňař **sp. nov.**, from Montagne d´Ambre National Park, northern Madagascar. All species of this endemic genus occur in forested areas around dead wood and lianas. The new species was acquired during our long-term research project in cooperation with the University of Antananarivo (Department of Entomology) and the Madagascan National Parks (MNP) (e.g. Frieser 2010, Trýzna & Baňař 2012, 2013a, 2013b, 2014a, 2014b, 2015). It was discovered in Montagne d´Ambre National Park in the far north of Madagascar.

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum;

length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position. The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014a). Genitalia of the new species described here were not dissected because only three females are known. The label data of the material examined are cited verbatim, using a slash (/) to separate lines on one label. The following abbreviation is used: [TL]—type locality. Colour photographs were taken with a Leica MSV266 camera. The specimens studied are deposited in the following collections:

BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna);

MTDC = Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Adapterops Frieser, 2010

Type species. *Adapterops nasalis* Frieser, 2010: 18 (by original designation).

Accepted by R. Anderson: 21 Oct. 2015; published: 4 Dec. 2015

Diagnosis. Head small, eyes large, situated laterally, conspicuously convex, separated from each other, not emarginate. Dorsal pronotal transverse carina basal, sinuate laterally, most lateral part curved posteriorly. Postero-lateral edges of pronotum somewhat protruding posteriorly in lateral view, more or less acutangulate, lateral carina absent, sides of pronotum rounded.

The genus *Adapterops* is similar to the genus *Pilitrogus* Frieser, 1980 (both classified in the tribe Araecerini) which is known from three species from Réunion Island (Frieser 1980). From the latter, *Adapterops* can be distinguished by antennal scrobe large, carinate on dorsal margin, reaching towards middle of rostrum; rostrum with lateral margins strongly sinuate at antennal scrobes, strongly narrowed between antennal scrobes, minimum distance between scrobes about half of the eye width (see Trýzna & Baňař 2012: Figs. 8–12).

Adapterops cedrici Trýzna & Baňař sp. nov. (Figs. 1–3)

Type locality. North Madagascar, Antsiranana province, Montagne d´Ambre National Park.

Type material. Holotype (female): N MADAGASCAR, ANTSIRANANA PROVINCE: 'N MADAGASCAR, 14.i.2015, / Mt. d´AMBRE N. P., 1086 m., / upper camp near Ambohitra, / S 12°31´34.5´´; E 049°10´14.3´´, / Loc. No. 5/ 2015, M. Trýzna leg.' (BSNPC). **Paratype (2 females):** the same data as holotype (MTDC). Red label [p] HOLOTYPE / PARATYPE / *Adapterops / cedrici* **sp. nov.** / M. Trýzna & P. Baňař det., 2015.

Description. Female holotype. *Measurements* (in mm): Total body length—2.58. Head: total length—0.40; length of rostrum—0.19; maximum width of rostrum—0.38; length of eye—0.17; maximum width across eyes—0.64; minimum distance between eyes—0.23. Antenna: length of segments: II—0.11, III—0.09, IV—0.08, V—0.10, VI—0.09, VII—0.07, VIII—0.07, IX—0.13, X—0.11, XI—0.20. Pronotum: maximum length—0.67; width at carina—1.02; minimum width—0.47. Elytra: maximum length—1.56; maximum width—1.09.

Colouration of all body parts generally brown; scape, pedicel and legs pale brown. Funicle dark brown, darker than scape and pedicel, antennomeres VII-VIII almost black, antennal club completely black. Distal part of tibiae dark brown to blackish. Pronotum and elytra with almost regular spots of whitish pubescence.

Vestiture. Head with sparse whitish appressed setae (Fig. 3). Antennae with pubescence, scape and pedicel covered by whitish suberect setae, antennomeres III-VIII with sparse black suberect setae, antennal club with black appressed setae. Pronotum with whitish setae formed to regular spots. Elytra also covered with whitish setae, each elytron with two indistinct spots in sutural part, four spots on the second elytral interval and six spots on sixth elytral interval. Apical margin of elytra with whitish edge. Legs including tarsomeres covered with dense, fine whitish decumbent setae. Venter of thorax and abdominal sternites with dense whitish pubescence. Pygidium covered with sparse whitish appressed setae.

Structure. *Head.* Rostrum weakly convex, anterior part with fine sculpture. Frons without narrow longitudinal carina in the middle. Eyes large, not emarginate, ocular index 1.12. Ratio of maximum width across eyes to the maximum width of rostrum 1.68. Antennae slightly longer than head and pronotum together. Funicle thin, club moderately robust. *Pronotum* (Fig. 1) transverse (ratio of its length to its width at carina 0.66), gradually narrowed anteriorly, disc convex in middle (Fig. 2). Dorsal transverse carina slightly curved. Postero-lateral edges of pronotum obtuse-angular. Posterior margin conspicuously convex, fitting in concavity on base of elytra. *Elytra* oval, slightly narrowed posteriorly. Ratio of maximum length of elytra to maximum width 1.43. Anterior margin of elytra concave (Fig. 1), corresponding with the convexity of posterior margin of pronotum. Surface of elytra deeply striate, width of each stria distinctly narrower than width of elytral interval.

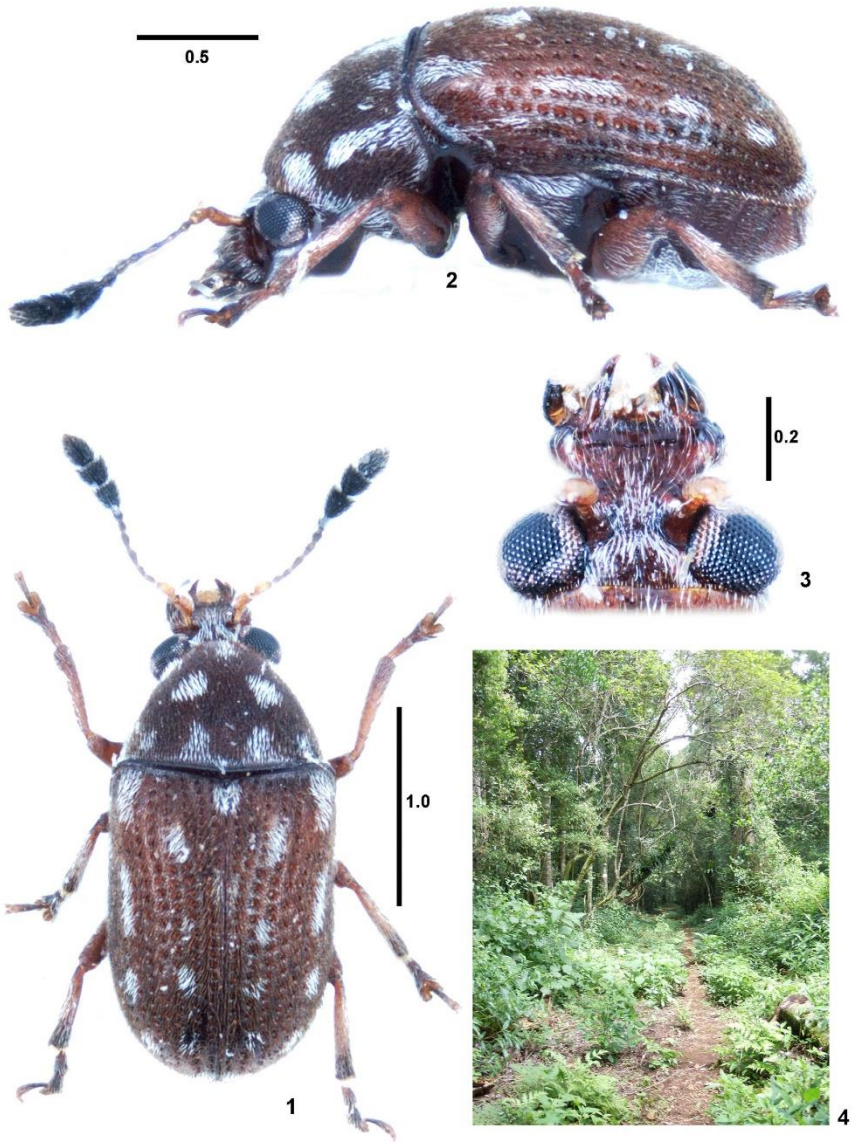
Male. Unknown.

Differential diagnosis. The new species differs from all other species of the genus in its different colour pattern and characters given in the key.

Etymology. Patronym, dedicated to our friend Mr. Cedric Ralaison Nalintsoa, a member of our Czech-Madagascan expeditions in 2011, 2013, 2014 and 2015.

Habitat. All three specimens of the type series were collected by beating dead branches of an unidentified species of deciduous tree. The branches were at a height of ca 2-4 m above ground level and had a diameter of 2 to 3 cm. The dead twigs were estimated to be no older than one year, and were still covered with an intact bark layer. The tree was situated in a slightly sunny place at the edge of a forest path, in the primary forest with visible mining activities. The type locality of this species is shown in Fig. 4.

Distribution. North Madagascar (Fig. 5).



FIGURES 1–4. 1–3, *Adapterops cedrici* **sp. nov.**, female holotype, 1, dorsal habitus; 2, lateral habitus; 3, head, dorsal view; 4, type locality of *Adapterops cedrici* **sp. nov.** in Montagne d´Ambre National Park. Scale bars in mm.

Key to *Adapterops* species

1 Pronotum and elytra generally reddish-brown to brown; dorsum of head without longitudinal carina 2
- Pronotum and elytra generally black; dorsum of head with longitudinal carina reaching from proximal edge of eyes to the narrowest part of rostrum 3
2 Pronotum and elytra with almost regular distinct spots of whitish pubescence, antennal club black..... ***Adapterops cedrici* Trýzna & Baňař sp. nov.**
- Pronotum and elytra without spots, elytra with two indistinct transverse stripes in basal and median part, antennal club brown ....

..... ***Adapterops festivus*** Frieser, 2010

3 Legs, ventrites I–V and pygidium uniformly brown, head dorsally dark brown, antennal segments I–VIII light brown in both sexes. Female: ocular index 1.23; ratio of length of antennal segment IX to its maximum width 1.15; scrobes broadly expanded towards middle of the rostrum..... ***Adapterops nasalis*** Frieser, 2010

– Legs, venter of body, pygidium and dorsum of head black, antennomeres II–VIII dark brown, scape dark brown to blackish. Female: ocular index 1.13; ratio of length of antennal segment IX to its maximum width 1.54; scrobes smaller, less expanded towards middle of the rostrum..... ***Adapterops hankae*** Trýzna, 2012

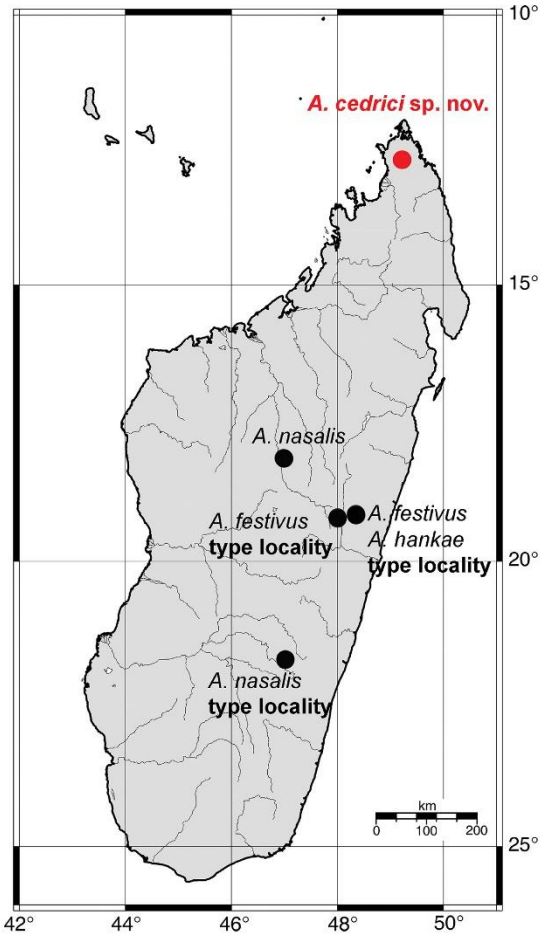


FIGURE 5. Distribution of *Adapterops* species in Madagascar.

Catalogue of species of the genus *Adapterops* Frieser, 2010

Adapterops Frieser, 2010: 18
Type species: *Adapterops nasalis* Frieser, 2010: 18

(1) *A. cedrici* Trýzna & Baňař sp. nov.
TL: N Madagascar, Montagne d´Ambre National Park, 1086 m

(2) *A. festivus* Frieser 2010: 18
TL: '[E] Madagascar, Moramanga env.'

Frieser 2012: 18 (description), 22 (dorsal habitus, Fig. 18);
Trýzna & Bařnař 2012: 477 (dorsal habitus, Figs. 1-male, 2-female), 480 (drawing of head, dorsal view, Figs. 8-male, 9-female), 481 (drawing of right antenna, Figs. 13-male, 14-female)

(3) *A. hankae* Trýzna, 2012: 479 (in Trýzna & Bařnař 2012)
TL: 'E Madagascar, Andasibe-Mantadia National Park, Analamazaotra forest, 955 m'

Trýzna & Bařnař 2012: 477 (dorsal habitus, Fig. 3), 479 (description), 480 (drawing of head, holotype female, dorsal view, Fig. 10), 481 (drawing of right antenna, Fig. 15)

(4) *A. nasalis* Frieser, 2010: 18
TL: 'Madagascar East, Massif Ambondrombe, 1300-1400 m'

Frieser 2012: 18 (description), 22 (dorsal habitus, Fig. 17);
Trýzna & Bařnař 2012: 477 (dorsal habitus, Figs. 4-male, 5-female), 480 (drawing of head, dorsal view, Figs. 11-male, 12-female), 481 (drawing of right antenna, Figs. 16-male, 17-female).

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References

Frieser, R. (1980) Die Anthribiden (Coleoptera) der Mascarenen. *Revue Suisse de Zoologie*, 87, 201–252.
Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica*, 26 (1), 3–22.
Trýzna, M. & Bařnař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (accessed 5 Sept. 2015)
Trýzna, M. & Bařnař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa*, 3609 (5), 504–512.
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Trýzna, M. & Bařnař, P. (2014b) Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar. *Zootaxa*, 3869 (2), 180–188.
http://dx.doi.org/10.11646/zootaxa.3869.2.8
Trýzna, M. & Bařnař, P. (2015) A new species of *Tophoderes* Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae). *Zootaxa*, 3905 (2), 264–272.
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Příloha č. 11

A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species

Miloš Trýzna & Petr Baňař

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A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species

MILOŠ TRÝZNA[1] & PETR BAŇAŘ[1, 2]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com*
[2]*Corresponding author. E-mail: petrbanar@seznam.cz*

Abstract

A new species, *Blaberops korinae* Trýzna & Baňař **sp. nov.** (Anthribidae: Anthribinae: Zygaenodini), from east Madagascar is described. Colour photographs and a key to Madagascan species of the genus *Blaberops* are provided. Male and female genitalia of the genus are studied and illustrated for the first time.

Key words: Coleoptera, Anthribidae, Anthribinae, *Blaberops*, taxonomy, new species, genitalia, Madagascar, key

Introduction

The genus *Blaberops* Fairmaire, 1898 is distributed in the Afrotropical and Lemurian regions and comprises 4 species. Two species (*B. exilloides* Frieser, 2000 and *B. korinae* **sp. nov.**), both of them endemic, are known from Madagascar, and there are two species from continental Africa (*B. asemus* Jordan, 1936 and *B. macrocerus* Jordan, 1904). *Blaberops macrocerus* has also been recorded from Madagascar but this requires confirmation.

In the present paper we describe this new species from east Madagascar, in the vicinity of Andasibe-Mantadia National Park, an evergreen humid forest reserve known for its high diversity of Anthribidae (e.g. Frieser 2010, Trýzna & Baňař 2012, 2013b).

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum; length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are measured in its strictly dorsal position.

The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to maximum width of the eye; it is easiest to calculate if measured as 2 times minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, Štys & Baňař 2013, Baňař & Štys 2013).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and warmed to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for description and illustration. Finally genitalia were stored in glycerol in a small vial mounted on the pin with the corresponding specimen. For the description of both male and female genitalia we use the terminology of Holloway (1982).

The label data of the material examined, as well as type localities in the list of *Blaberops* species are cited verbatim, including possible errors, using a slash (/) to separate lines on one label, and double slash (//) for dividing data on different labels. The following abbreviations are used: [p]—printed, [h]—handwritten, [TL]—type locality.

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Colour photographs were taken with a Leica MSV266 camera. Drawings were made using a SZP 11 ZOOM stereoscopic microscope.

The specimens studied are deposited in the following collections:

BSNPC Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna);
MTDC Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Blaberops Jordan, 1904

Type species: *Blaberops macrocerus* Jordan, 1904: 238, by original designation.

Recognition. Head relatively short, rostrum flat, simple, without longitudinal carina, with only weak depression in middle. Eyes emarginate anteriorly. Antennae of males reach from mid-point of elytra to four times the length of the body. Carina of pronotum antebasal, broadly and rather deeply concave in the middle, shortly flexed anteriorly at side of pronotum, angle rounded. Elytra longitudinally oval.

Blaberops korinae sp. nov.
(Figs. 1–2, 5–15)

Type locality. East Madagascar, Tamatave province, Andasibe (Pèrinet).

Type material. Holotype (male) labelled: '**E MADAGASCAR**, 2001 / **TAMATAVE** distr. / ANDASIBE (Perinet) / D. Hauck leg., 17.-30.XII. (BSNPC). **Allotype (female)**, **Paratype (female)** labelled: same locality as holotype, allotype J. Horák leg., paratype D. Hauck leg. (MTDC). Red label [p] HOLOTYPE / ALLOTYPE / PARATYPE / *Blaberops korinae* **sp. nov.** / M. Trýzna & P. Baňař det., 2014.

Description. Male holotype, (female allotype). *Measurements* (in mm): Total body length—3.38 (4.37). Head: total length—0.60 (0.67); length of rostrum—0.29 (0.37); maximum width of rostrum—0.60 (0.76); length of eye—0.31 (0.31); maximum width across eyes—0.78 (1.00); minimum distance between eyes—0.31 (0.44). Antenna: length of segments: II—0.16 (0.14), III—0.27 (0.22), IV—0.26 (0.22), V—0.23 (0.22), VI—0.22 (0.18), VII—0.23 (0.20), VIII—0.26 (0.16), IX—0.27 (0.29), X—0.18 (0.20), XI—0.20 (0.24). Pronotum: maximum length—1.02 (1.27); width at carina—1.20 (1.47); minimum width—0.69 (0.89). Elytra: maximum length—1.76 (2.42); maximum width—1.27 (1.69).

Colouration of the cuticle generally brown, pro-, meso-, metasternum and ventrites dark brown, covered with dense whitish hairs. Legs brown, covered with sparse whitish hairs, distal half of tibiae and all tarsomeres in male and fifth tarsomere in female dark brown to black. Antennae black with whitish hairs on antennomere VIII in male; antennomere I-VIII brown, IX-XI black in female. Surface of head covered with whitish hairs, pronotum and elytra with distinct rows of whitish stripes.

Vestiture on head with whitish setae, pronotum with setae joined into one central and on each side three lateral distinct whitish stripes, last two lateral stripes joined anteriorly. Each elytron with five longitudinal stripes of whitish setae, space between them covered with yellowish and brownish setae. Scales of cutellum bright white. Vestiture of antennae short, sparse, appressed; all legs covered with dense whitish setae. Prosternum and venter of abdomen with very dense whitish pubescence.

Structure. *Head* relatively short, rostrum flat, simple, without longitudinal carina, only with weak depression in the middle, ratio of rostrum length to maximum width 0.48 in both sexes. Scrobes not visible dorsally, scape only slightly hidden in scrobe in dorsal view. Eyes emarginate anteriorly, ocular index 1.32 in male, 1.58 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.30 in male, 1.32 in female. Antennae (Figs. 1–2) reaching to mid-point of elytra in male and to posterior margin of pronotum in female. Funicle thin, club more robust in female, narrower in male.

FIGURES 1–4. 1–2, *Blaberops korinae* **sp. nov.**, 1, male holotype (3.38 mm); 2, female allotype (4.37 mm); 3–4, *Blaberops exilloides* Frieser, 2000; 3, male (4.72 mm); 4, female (4.87 mm). All specimens collected in Andasibe village environs.

Pronotum slightly longitudinal, ratio of its length to width at carina 0.85 in both sexes, gradually narrowed anteriorly, widest at dorsal transverse carina. Dorsal transverse and very short lateral carina of pronotum formed in wide arch. Dorsal transverse carina distinctly bisinuate (Figs. 1–2), lateral carina short, reaching only basal fifth of the pronotum length, lateral margins of pronotum regularly rounded from dorsal view, convergent anteriorly.

Elytra longitudinally oval (Figs. 1–2), proximal three quarters parallel, narrowed posteriorly from distal quarter of their length. Ratio of the maximum length to maximum width of elytra 1.38 in male, 1.43 in female.

Genitalia. Male. Segment 8 with robust tergite and paired, well differentiated sternal lobes (= sternite 8) (Fig. 9). Minute apodeme of sternite 8 present. Sternite 9 formed as a long apodeme with two short basal branches. The body of aedeagus strongly sclerotized, internal sac with fine denticulation, ejaculatory duct short, apodemes long (Fig. 5). Tegmen (Figs. 7–8) strongly sclerotized.

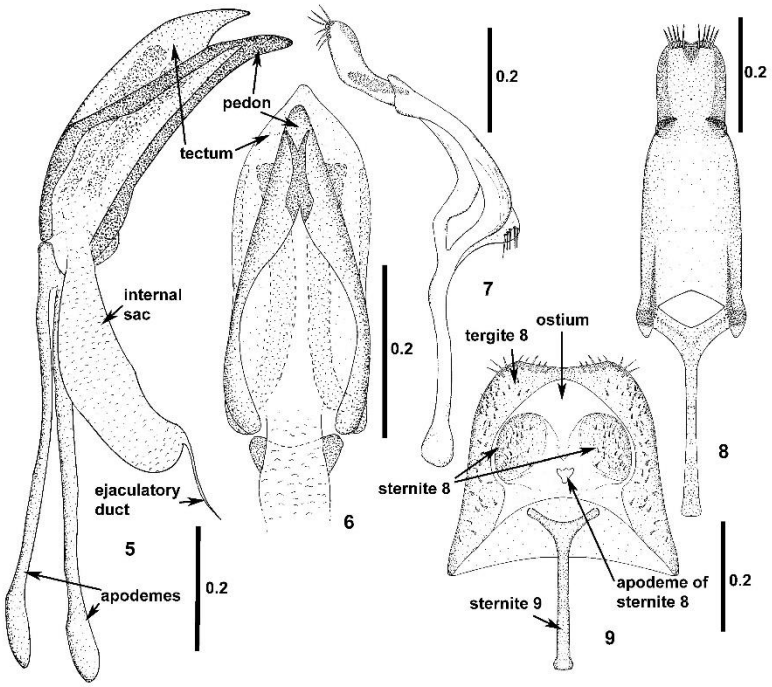
Female. Sternite 8 strongly sclerotized, proximal apodeme long (Fig. 13), tergite 8 weakly sclerotized except for narrow median plate and paired sublateral plates, lateral parts of tergite 8 (joining sternite 8) with numerous long setae (Fig. 14). Hemisternites (Fig. 10) with distal body cylindrical, lateral apodemes (= lateral rods) subparallel, toothed plate well developed with short stylus (Fig. 11). Spermatheca as in Fig. 12; bursa copulatrix and spermathecal gland damaged, not studied in detail.

Sexual dimorphism. Male antennae moderately long, reaching approximately to mid-point of elytra (antennae extend slightly beyond posterior margin of pronotum in female), antennomere VIII with white setae in male, conspicuously contrasting with remaining antennomeres (antennomere VIII in female of same colour as antennomeres I-VII), antennal club longer and narrower in male (Fig. 1) than in female (Fig. 2).

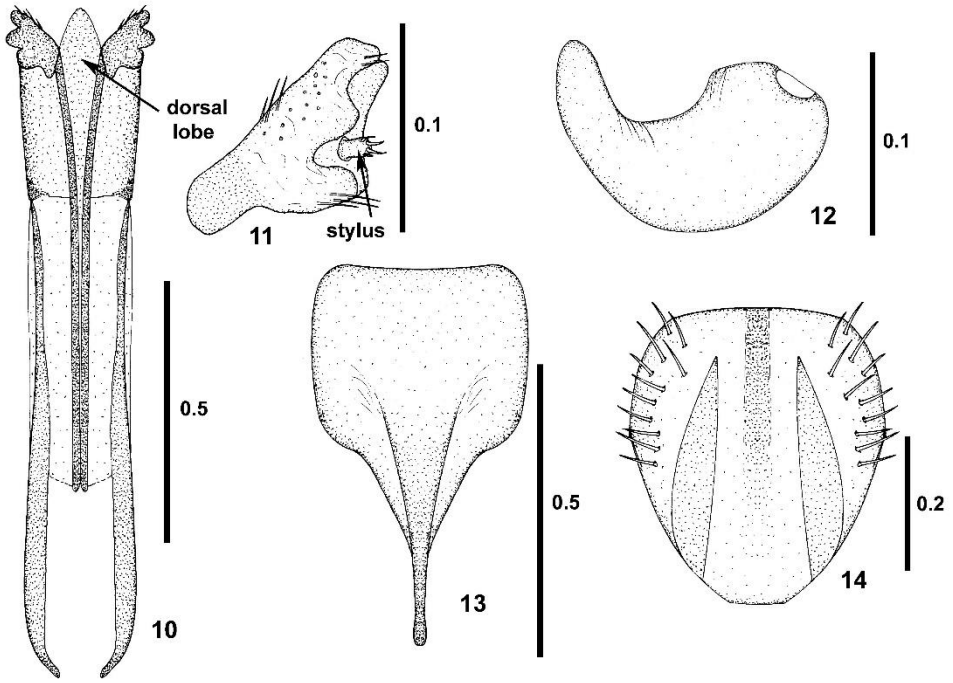
Etymology. Patronym, dedicated to our friend Mrs. Korina Kudrnová from Děčín (Czech Republic).

Distribution. East Madagascar: Andasibe (Pèrinet) surroundings (Fig. 15).

Differential diagnosis. *Blaberops korinae* **sp. nov.** can be easily distinguished from other species of the genus by its unique, conspicuous colour pattern (also see Key).



FIGURES 5–9. *Blaberops korinae* **sp. nov.**, male holotype; 5, aedeagus, lateroventral view; 6, body of aedeagus, ventral view; 7, tegmen, lateral view; 8, tegmen, dorsal view; 9, segment 8 and sternite 9. Scale bars in mm.



FIGURES 10–14. *Blaberops korinae* **sp. nov.**, female allotype; 10, hemisternites, ventral view; 11, toothed plate with stylus, lateroventral view; 12, spermatheca; 13, sternite 8; 14, tergite 8. Scale bars in mm.

List of *Blaberops* species from Madagascar

1. *B. exilloides* Frieser, 2000: 48; TL: 'East Madagascar, Rég. Ambatondrazaka, 5 km N Didy, 1100-1200 m'; other so far known localities for *B. exilloides*: East Madagascar: Andasibe (Pèrinet) env., Moramanga env., Antsahatsaka env.

2. *B. korinae* **sp. nov.**; TL: 'East Madagascar, Toamasina prov., Andasibe (Pèrinet) env.'

3. *B. macrocerus* Jordan, 1904: 239; TL: 'Magila' (Natal); only one locality so far known from north-west Madagascar: Nosy Mitsio island. This record needs confirmation.

Key to Madagascan *Blaberops* species

1 Pronotum and elytra covered with more or less irregular mixed whitish and brownish setae, without longitudinal stripes. Antennal segments IX-XI as thick as previous segments, not forming distinct antennal club in male ..... *B. macrocerus* Jordan, 1904

\- Pronotum and elytra with longitudinal stripes. Antennal segments IX-XI distinctly thicker than previous segments, forming thin antennal club in male 2

2 Pronotum and elytra covered with almost concolorous brownish setae, pronotum with three, elytra with two very indistinct yellowish longitudinal stripes. Dorsal transverse carina inconspicuously bisinuate (Figs. 3–4). ..... *B. exilloides* Frieser, 2000

\- Pronotum and elytra covered with brownish setae, pronotum with seven, each elytron with five distinct whitish rows of longitudinal stripes. Dorsal transverse carina distinctly bisinuate (Figs. 1–2) ..... *B. korinae* **sp. nov.**

Discussion

Wolfrum (1961: 308) mentioned the occurrence of *Blaberops macrocerus* Jordan, 1904 in Madagascar, citing two males from 'Madagascar Nord-Ouest Nosy Mitsio 13.-14. I. 1960 R. Paulian; Giste de Maroantsetra, Antalaha' but we suggest that this record requires confirmation. *Blaberops macrocerus* was described from South Africa, 'Magila' (Natal). The second species from continental Africa, *B. asemus* Jordan, 1936 was described from Zaire ('Lomami-Kaniama'). Jordan (1936) distinguished *B. asemus* from *B. macrocerus* mainly by its much broader antennal club, longer lateral carina of pronotum and shorter tarsi, but unfortunately without examination of the genitalia. We observed huge intraspecific antennal variability (particularly in males) in anthribids in a previous paper (Trýzna & Bařař 2013a), and hence we do not consider lengths and ratios of antennal segments to be critical or reliable taxonomic characters. Examination of terminalia (which provide numerous reliable characters in both sexes) is necessary to distinguish very similar species of anthribids. We have not seen the two specimens attributed to *B. macrocerus* from Nosy Mitsio Island, but, considering the intraspecific variability mentioned above, we cannot confirm with certainty the occurrence of *B. macrocerus* in the fauna of Madagascar.

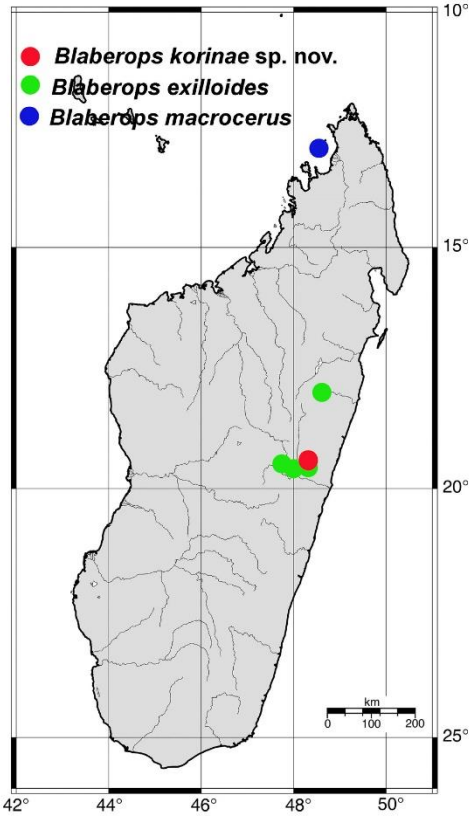


FIGURE 15. Distribution of *Blaberops* species in Madagascar.

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References

Bařnař, P. & Štys, P. (2013) Two new species of *Oncylocotis* (Hemiptera: Heteroptera: Enicocephalidae) from Australia. *Acta Musei Moraviae, Scientiae biologicae*, 98 (2), 317–325.

Frieser, R. (2000) Einige neue Anthribiden von Madagaskar und der Île de la Réunion (Coleoptera: Anthribidae). *Acta Coleopterologica*, 16 (1), 35–51.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica*, 26 (1), 3–22.

Holloway, B.A. (1982) Anthribidae (Insecta: Coleoptera). *Fauna of New Zealand*, 3, 1–264. [Science Information Division, DSIR, Wellington]

Jordan, K. (1904) Some new African Anthribidae. *Novitates Zoologicae*, 11, 238–241.

Jordan, K. (1936) Anthribidae from South America and Africa. *Novitates Zoologicae*, 39, 326–329.

Štys, P. & Bařnař, P. (2013) Eastern Arc Mountains in Tanzania: Hic sunt Aenictopecheidae. The first genus and species of Afrotropical Aenictopecheidae (Hemiptera: Heteroptera: Enicocephalomorpha). *European Journal of Entomology*, 110 (4): 677–688.
http://dx.doi.org/10.14411/eje.2013.091

Trýzna, M. & Bařnař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (Accessed 27 Jun. 2014)

Trýzna, M. & Bařnař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa*, 3609 (5), 504–512.
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http://dx.doi.org/10.11646/zootaxa.3721.1.3

Wolfrum, P. (1961) Anthribiden aus dem Institut Scientifique de Madagascar (Col.). *Entomologische Arbeiten aus dem Museum G. Frey*, 12, 291–325.

Příloha č. 12

Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar

Miloš Trýzna & Petr Baňař

2014b

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Description of a new genus and species, *Pseudobasidissus barclayi* (Coleoptera: Anthribidae), from east Madagascar

MILOŠ TRÝZNA[1] & PETR BAŇAŘ[1, 2]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com*
[2]*Corresponding author. E-mail: petrbanar@seznam.cz*

Abstract

A new genus and species, *Pseudobasidissus barclayi* Trýzna & Baňař **gen. nov.** et **sp. nov.** (Anthribidae: Anthribinae: Platyrhinini), from Madagascar is described. Male and female genitalia are studied and illustrated. Colour photographs of the holotype and genitalia of both sexes are provided. Comparison is made with the similar genus *Basidissus* Fairmaire.

Key words: Coleoptera, Anthribidae, Anthribinae, *Pseudobasidissus*, taxonomy, new genus, new species, genitalia, Madagascar, key

Introduction

During our long-term research project in cooperation with the Madagascan National Parks (MNP) and the University of Antananarivo (Department of Entomology) we received specimens of many undescribed genera and species of anthribids. Thanks to this project, which started in 2007 (e.g. Frieser 2010, Trýzna & Baňař 2012, 2013a, 2013b, 2014), we have had the unique opportunity to study the biodiversity of Anthribidae inside protected areas, mainly national parks and special reserves. As the discovery of this new genus indicates, some areas of this large island deserve further detailed and specific field research (for methods see Trýzna & Baňař 2012).

The new genus *Pseudobasidissus* Trýzna & Baňař **gen. nov.** is similar to the genus *Basidissus* Fairmaire, 1897, from which it can be distinguished by the unique suite of morphological characters described herein. For an overview of the similar Madagascan species of the genus *Basidissus* see Trýzna & Baňař (2013b).
The new genus was discovered in a narrow strip of surviving rain forest in eastern Madagascar.

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to most anterior part of rostrum;

length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are taken in a strictly dorsal position.

The term 'dorsal ocular index' refers to the ratio of the minimum width of the vertex to the maximum width of the eye; it is easiest to calculate if measured as twice the minimum interocular distance / maximum width across eyes minus minimum interocular distance (e.g. Trýzna & Baňař 2013a, 2014).

Genitalia were prepared from a gently moistened specimen from which the whole abdomen was separated and placed in a small tube with 12% potassium hydroxide solution (KOH) and heated to boiling point for several minutes until all soft tissues were adequately macerated. Genitalia were subsequently placed in distilled water for

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The label data of the material examined are cited verbatim, including possible errors, using a slash (/) to separate lines on one label. The following abbreviation is used: [p]—printed.

Colour photographs were taken with a Leica MSV266 camera. Drawings were made using a SZP 11 ZOOM stereoscopic microscope.

The specimens studied are deposited in the following collections:

BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna);

MTDC = Miloš Trýzna collection, Děčín, Czech Republic.

Taxonomy

Pseudobasidissus Trýzna & Baňař gen. nov.

(Figs. 1–8, 10, 12–16, 18–19)

Type species. *Pseudobasidissus barclayi* Trýzna & Baňař **sp. nov.**, by original designation.

Placement. Tribe Platyrhinini Bedel, 1882

Name derivation. *Pseudobasidissus*, gender masculine, *Pseudo-* (not real or genuine, false), *-basidissus* (denoting resemblance to the genus *Basidissus*).

Description. Body medium-sized. *Head* relatively short, eyes of medium size, situated laterally, hemispherical, convex laterally, and well separated from each other, ocular index more than 1.50. Rostrum depressed in the middle part, with distinct longitudinal carina reaching between eyes in both sexes. Lateral margins of rostrum almost parallel in male, slightly expanding anteriorly in female in dorsal view, anterior part emarginate. Antennal scrobes not visible in dorsal view, dorsal margins of scrobes slightly elevated and carinate in their dorsal parts, forming a slightly top-shaped elevation. Scrobes reaching bases of mandibles anteriorly and distant from anterior margin of eyes.

Antennae reaching to posterior margin of pronotum in both sexes. Antennomeres continuously extended apically in both sexes, not forming a distinct antennal club, although this feature is more noticeable in male than female. Basalmost part of scape only hidden in scrobe in dorsal view. Antennomeres V–VIII with conspicuously long appressed setae in both sexes, remaining antennomeres only with very short, soft, dense setae.

Pronotum transverse, widest at dorsal transverse carina, where it is as wide as elytra. Dorsal transverse carina separated from basal margin of pronotum, distinctly bisinuate, convex in the middle. Lateral carina of pronotum deeply emarginate in dorsal view, angulate, in contact with dorsal transverse carina lobe-like. Pronotum with one central distinct tuft of setae.

Elytra broadly suboval to rectangular, narrowed even in distal fifth of length. Each elytron with a distinct hump on humeral part, here with two subbasal erect tufts of setae, and with one smaller antemedian tuft on the fourth elytral interval, one larger postmedian tuft on the second elytral interval and five preapical tufts of setae.

Abdomen shorter than broad, sternites with long, dense appressed setae. *Pygidium* subquadrate in male (Fig. 15), wider than long in female (Fig. 16).

Differential diagnosis. The new genus resembles the genus *Basidissus* Fairmaire, 1897 in general appearance, from which it can be distinguished by the morphological characters given in the key below:

1. Rostrum depressed in the middle part, with distinct longitudinal carina. Dorsal margins of antennal scrobes slightly elevated and carinate in their dorsal parts. Scrobes distant from anterior part of eyes. Antennae longer, reaching to posterior margin of pronotum in both sexes or extending slightly beyond this margin in males. Antennomeres continuously extended apically in both sexes, not forming a distinct antennal club. Pygidium subquadrate (Figs. 15–16). Male: internal sac of aedeagus finely serrated, with well differentiated ventral and dorsal lobes, dorsal one beak-shaped, strongly sclerotized (Figs. 7–8). Female: bursa copulatrix (Figs. 18–19) strongly widened basally, almost bilobate, with single sclerotized plate in the central part . . . . . *Pseudobasidissus* Trýzna & Baňař **gen. nov.**
2. Rostrum flat, without depression in the middle part, without longitudinal carina. Dorsal margins of antennal scrobes not elevated. Scrobes approach anterior part of eyes. Antennae shorter, not reaching posterior margin of pronotum in either sex.

-. Antennomeres I-VIII thin, IX-XI wide, forming distinct antennal club. Pygidium conspicuously narrowing posteriorly, regularly rounded (Fig. 17). Male: internal sac of aedeagus roughly serrated, with ventral lobe only, dorsal lobe missing (Fig. 9). Female: bursa copulatrix (Figs. 20–21) simple, continuously widening apically, with paired sclerotized plate in the central part ..... *Basidissus* Fairmaire, 1897

***Pseudobasidissus barclayi* Trýzna & Baňař sp. nov.**
(Figs. 1–8, 10, 12–16, 18–19)

Type locality. North-east Madagascar, Antsiranana province, Marojejy Nat. Park.

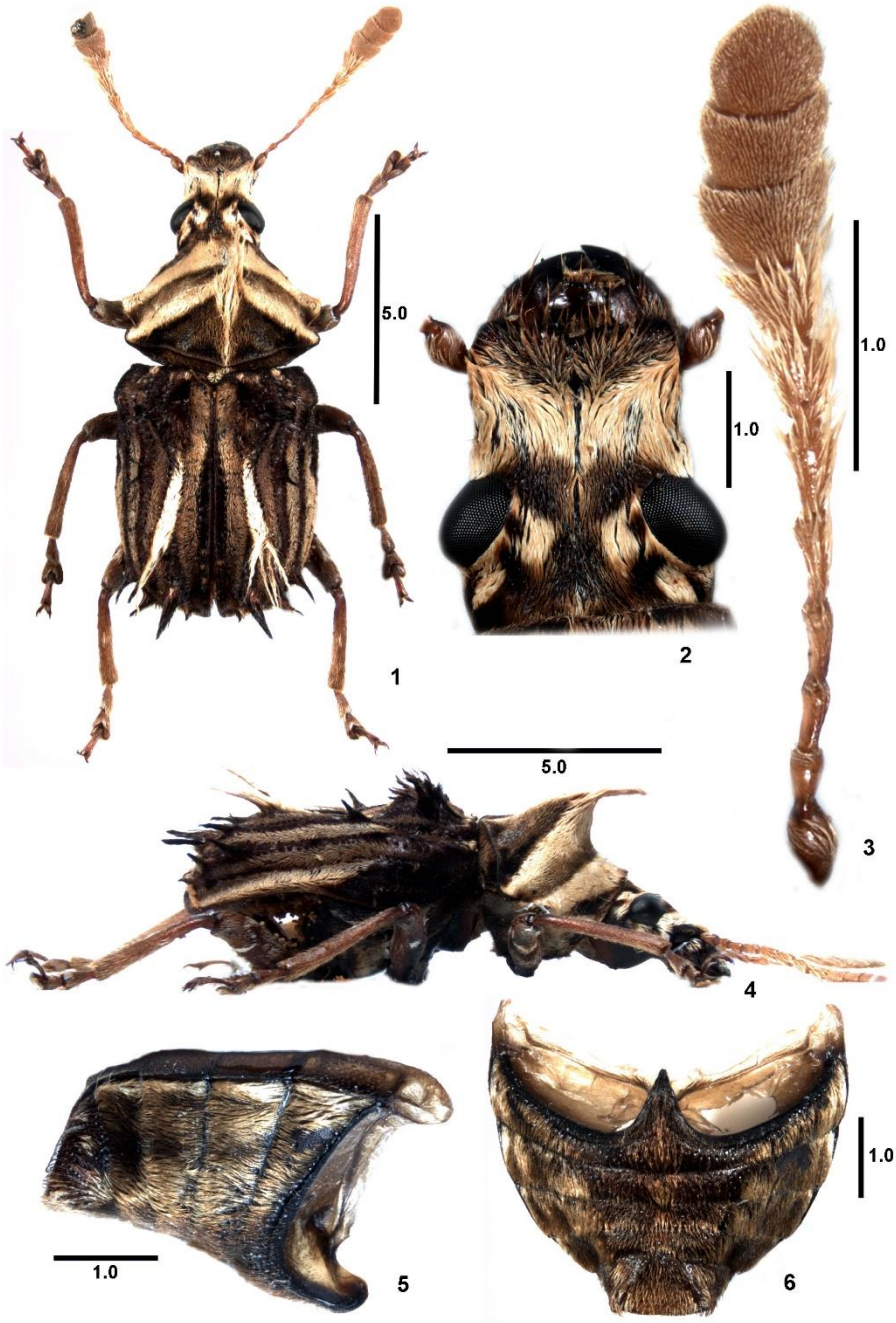
Type material. Holotype, male: NE MADAGASCAR, ANTSIRANANA PROVINCE: 'Madagascar NE / Marojejy NP, 1.–4.xi.2005 / J. Šťastný lgt.' (BSNPC). **Allotype: CE MADAGASCAR, FIANARANTSOA PROVINCE:** 'CE Madagascar / Ranomafana Nat. Park / S 21°15′48.6″, / E 047°25′23.2″ // near main entrance / 984 m a.s.l. / 26.–31.i.2007 / M. Trýzna leg.' (MTDC). **Paratype male:** same locality as holotype (MTDC). Red label [p] HOLOTYPE / ALLOTYPE / PARATYPE / *Pseudobasidissus barclayi* / **gen. nov.** et **sp. nov.** / M. Trýzna & P. Baňař det., 2014.

Description. Male holotype, (female allotype). *Measurements* (in mm): Total body length—12.25 (9.64). Head: total length—2.35 (1.73); length of rostrum—1.29 (0.91); maximum width of rostrum—1.78 (1.56); length of eye—0.91 (0.71); maximum width across eyes—2.40 (2.02); minimum distance between eyes—1.04 (0.91). Antenna: length of segments: II—0.33 (0.24), III—0.44 (0.27), IV—0.44 (0.27), V—0.56 (0.36), VI—0.49 (0.22), VII—0.51 (0.18), VIII—0.44 (0.22), IX—0.58 (0.27), X—0.49 (0.29), XI—0.64 (0.49). Pronotum: maximum length—3.56 (2.73); width at carina—5.00 (4.08); minimum width—2.15 (1.78). Elytra: maximum length—6.75 (5.54); maximum width—5.18 (4.37).

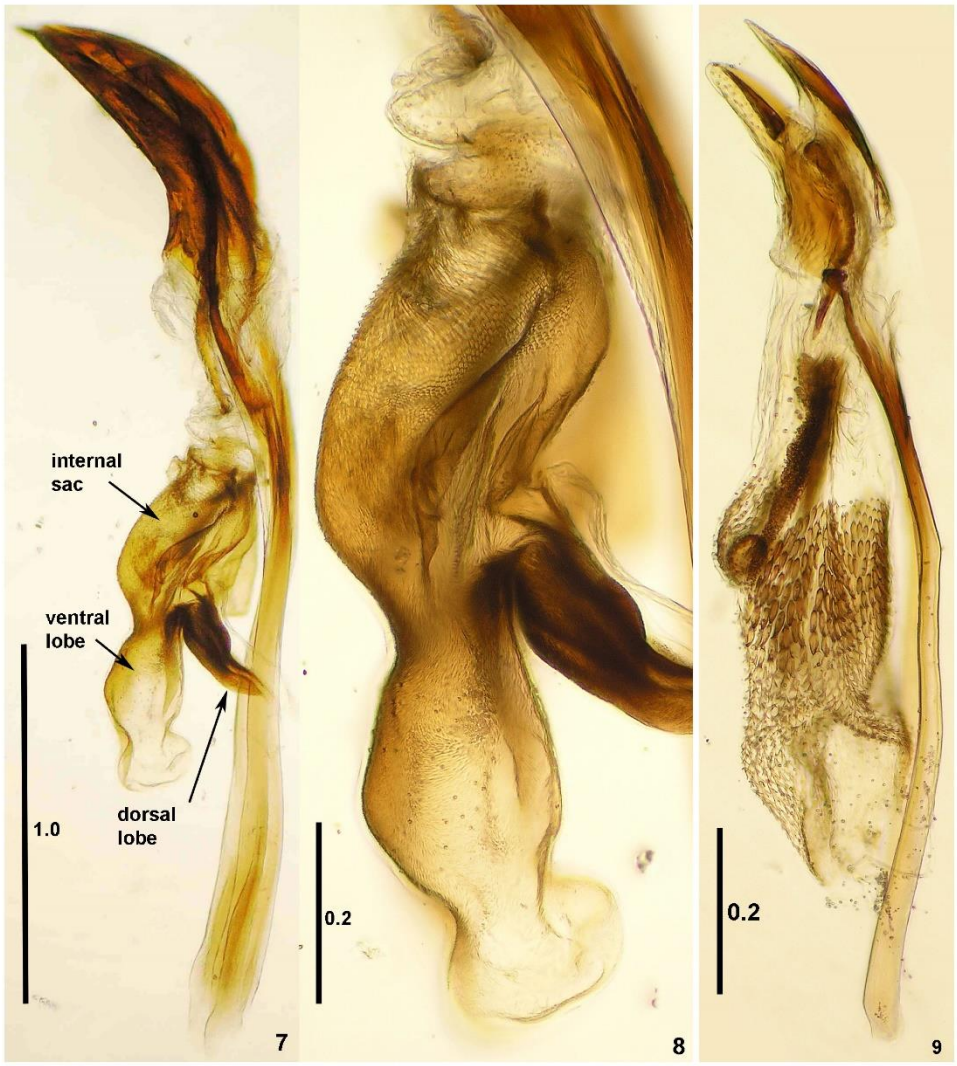
Colouration of the cuticle generally brown, pro-, meso-, metasternum and ventrites dark brown to black, covered with dense yellowish hairs. Proximal half of femora dark brown to black, rest of femora, tibiae and tarsi light brown. Antennae light brown to yellowish.

Vestiture. *Head* predominantly with light yellowish setae, mixed with darker, brown setae on distal part of rostrum, frons and around eyes. *Pronotum* with characteristic transverse stripes of light yellow and brown setae (Fig. 1, 4). Proximal part of pronotum with transverse dark triangular patch covered by brown and whitish mixed pubescence, distal part with dark transverse stripe. Disc of pronotum with yellowish pubescence formed into a single central tuft of erect yellowish setae. *Elytra* covered with light brownish, dark brownish and yellowish longitudinal stripes of setae (Fig. 1, 4). Each elytron with nine tufts of setae; two dark brown to black subbasal tufts, one smaller brown-black antemedian tuft on the fourth elytral interval, one bigger yellowish postmedian tuft on the second elytral interval and five dark brown tufts in the preapical part. Scutellum with yellowish setae. *Antennae* with yellowish pubescence, antennomeres V–VIII covered by longer conspicuous appressed setae in both sexes, remaining antennomeres and primarily antennomeres IX–XI only with very short, soft, dense setae in both sexes. All *legs* covered with dense, fine yellowish setae, all femora with indistinct light distal part, with crooked interrupted slender white stripe on the distal quarter. Tibiae unicolorous with indistinct white stripe on proximal third. All tarsomeres with yellowish setae. Lateral parts of venter of thorax and abdominal sternites with dense yellowish pubescence mixed with brown setae. *Pygidium* covered with dense yellow appressed setae, margins of pygidium with sparse dark brown setae.

Structure. *Head* relatively short, rostrum broad (Fig. 2), depressed in the middle, with distinct longitudinal carina reaching between eyes in both sexes. Ratio of rostrum length to maximum width 0.72 in male, 0.58 in female. Eyes slightly emarginate anteriorly, dorsal ocular index 1.52 in male, 1.64 in female. Ratio of maximum width across eyes to maximum width of rostrum 1.35 in male, 1.29 in female. Shape of individual antennomeres of male shown in Fig. 3. *Pronotum* slightly transverse, ratio of its length to width at carina 0.71 in male, 0.67 in female, gradually narrowed anteriorly, widest at dorsal transverse carina. Dorsal transverse carina bisinuate with wide, deep arch in the middle. Lateral carina of pronotum very short, deeply emarginate in dorsal view, angulate, in contact with dorsal transverse carina lobe-like. *Elytra* broadly suboval to rectangular (Fig. 1), narrowed even in distal fifth of their length, ratio of the maximum length to maximum width of elytra 1.30 in male, 1.27 in female. *Abdomen* shorter than broad. *Pygidium* robust, almost subquadrate in male (Fig. 15), wider than long in female (Fig. 16), slightly narrowing posteriorly, ratio of its maximum length to maximum width 1.02 in male, 0.88 in female.



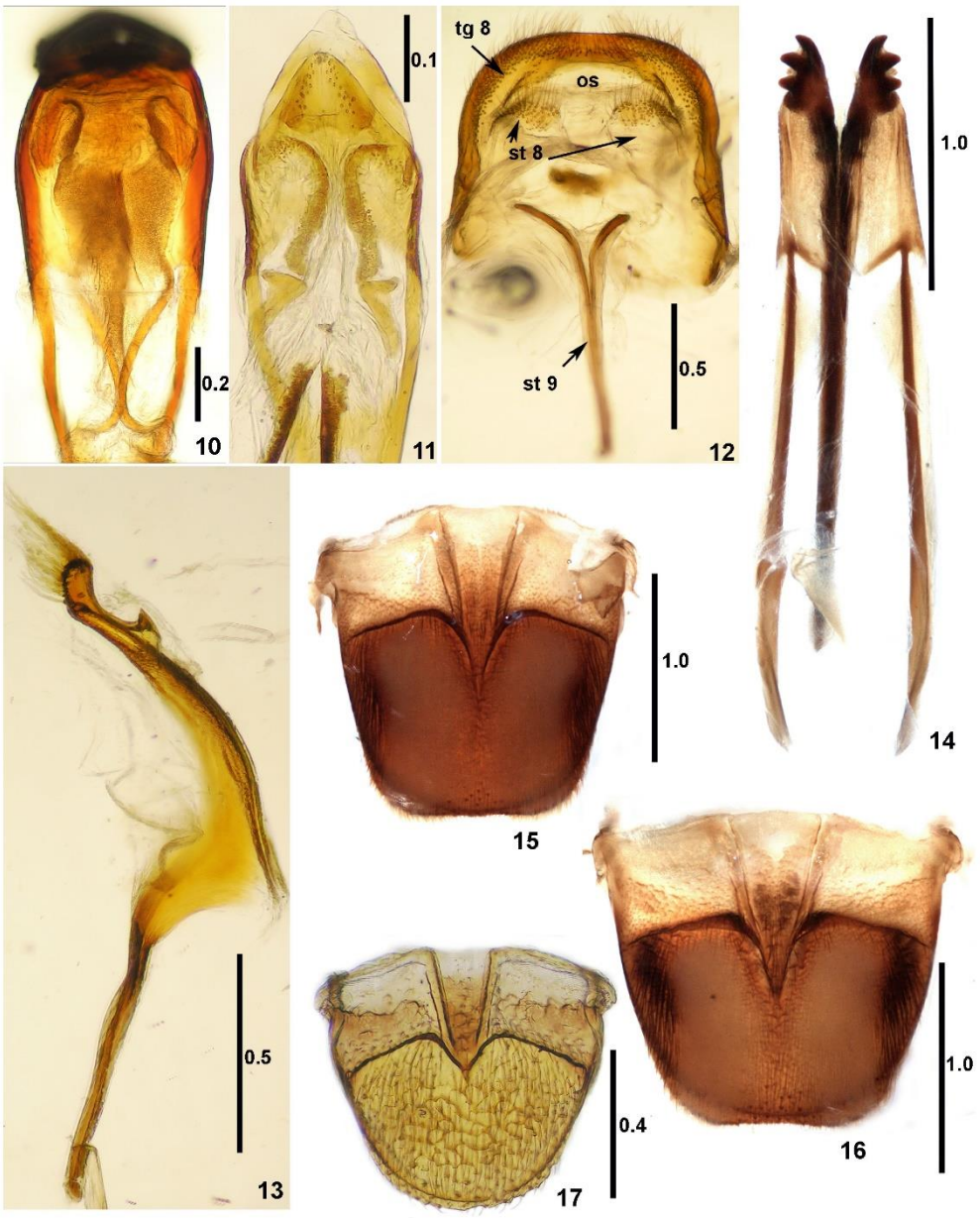
FIGURES 1–6. *Pseudobasidissus barclayi* **gen. et sp. nov.**, male holotype; 1, dorsal habitus; 2, head, dorsal view; 3, right antenna, dorsal view; 4, lateral habitus; 5, abdomen, lateral view; 6, abdomen, ventral view. Scale bars in mm.



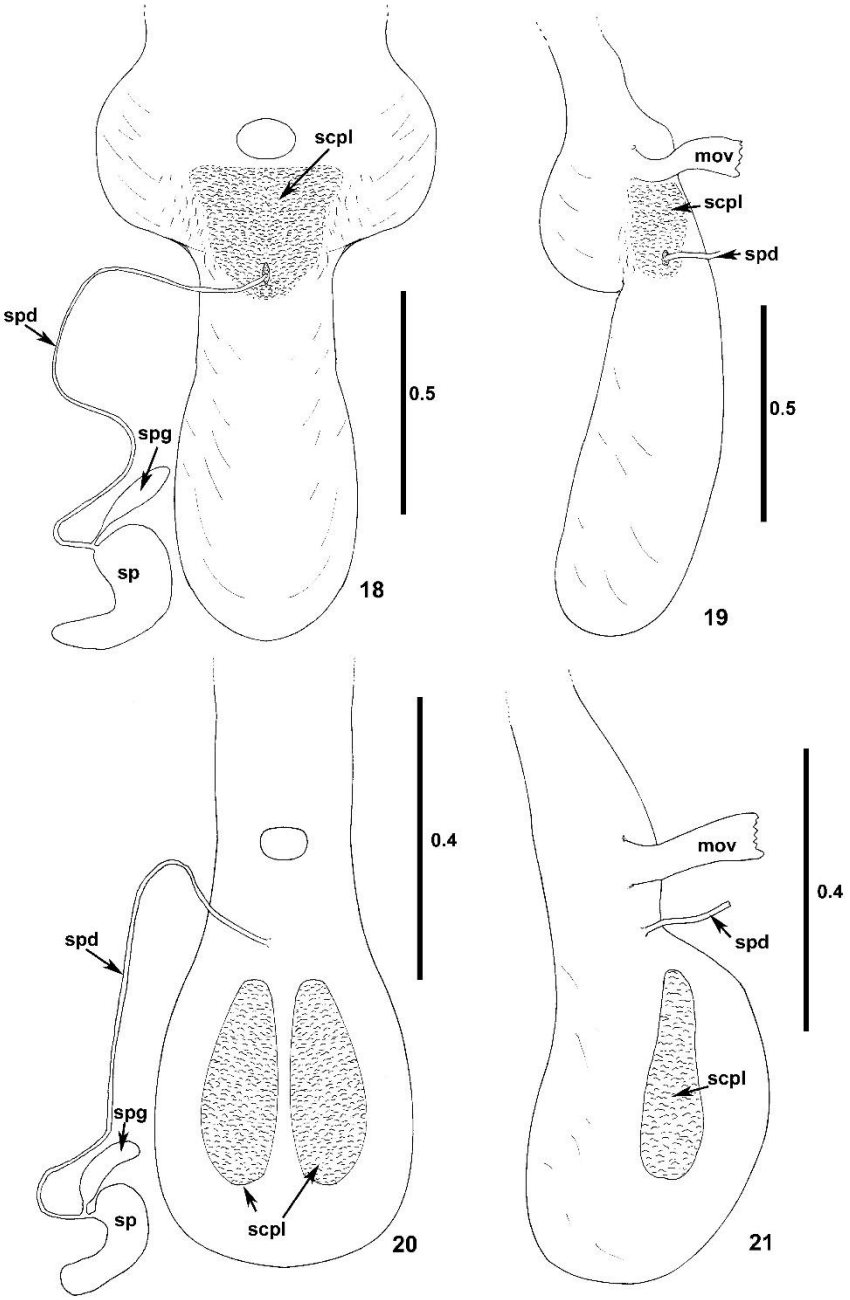
FIGURES 7–9. 7–8, *Pseudobasidissus barclayi* **gen. et sp. nov.**, male holotype; 9, *Basidissus cristatus* Fairmaire, 1897, male; 7, aedeagus, lateral view; 8, internal sac of aedeagus, lateral view; 9, aedeagus, lateral view. Scale bars in mm.

Male genitalia and associated structures. Segment 8 (Fig. 12) robust and wide, tergite 8 roughly sclerotized, sternite 8 forming from two semicircular sclerites, separted from each other. Sternite 9 thin, with long basal arms. Aedeagus robust, tectum and pedon wide, apodemes thick, only slightly curved. Tegmen (Fig. 13) robust, its apex densely covered with long setae. Internal sac of aedeagus finely serrated on all faces, consisting of well differentiated ventral and dorsal lobe (Figs. 7–8). Dorsal lobe beak-shaped, roughly sclerotized.

Female genitalia. Hemisternites robust (Fig. 14), lateral and median rods long, median rod reaching to two fifths of length of lateral rod. Toothed plates with five teeth each, stylus present. Bursa copulatrix (Figs. 18–19) strongly widened basally, almost bilobate, with single sclerotized plate in its central part. Spermatheca as figured (Fig. 18), spermathecal gland thin and long.



FIGURES 10–17. 10, 12–13, 15, *Pseudobasidissus barclayi* **gen. et sp. nov.**, male holotype; 11, 17, *Basidissus cristatus* Fairmaire, 1897, male; 14, 16, *Pseudobasidissus barclayi* **gen. et sp. nov.**, female allotype; 10–11, body of aedeagus, ventral view; 12, segment 8 and sternite 9, ventral view; 13, tegmen, lateral view; 14, hemisternites, ventral view; 15–17, pygidium, dorsal view. Abbreviations: *os* = ostium; *st 8* = sternite 8; *st 9* = sternite 9; *tg 8* = tergite 8. Scale bars in mm.



FIGURES 18–21. 18–19, *Pseudobasidissus barclayi* **gen. et sp. nov.**, female allotype; 20–21, *Basidissus cristatus* Fairmaire, 1897, female; 18, 20, bursa copulatrix and spermatheca, ventral view; 19, 21, bursa copulatrix, lateral view. Abbreviations: *mov* = median oviduct; *scpl* = sclerotized plate; *sp* = spermatheca; *spd* = spermathecal duct; *spg* = spermathecal gland. Scale bars in mm.

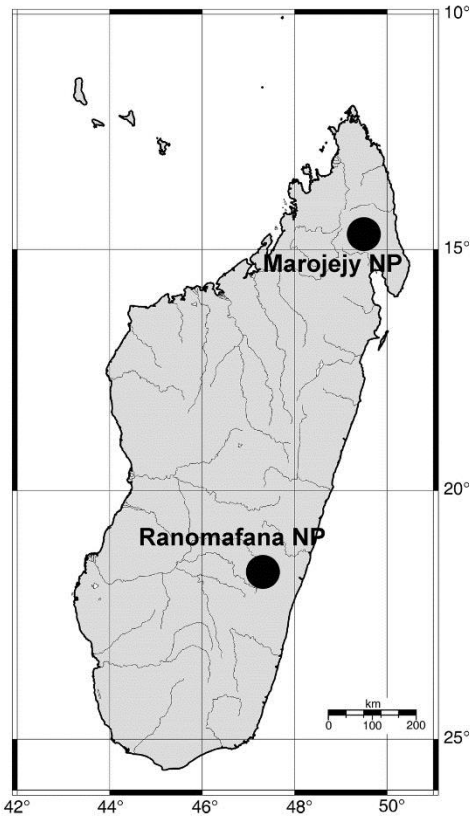


FIGURE 22. Distribution of *Pseudobasidissus barclayi* **gen. et sp. nov.**

Sexual dimorphism. Male antennae moderately long, reaching approximately to posterior margin of pronotum (or extending slightly beyond this margin), scape more robust.

Etymology. Patronym, dedicated to our friend and colleague Maxwell V. L. Barclay (Natural History Museum, London).

Distribution. Two males (holotype and paratype) were collected in NE Madagascar, Antsiranana province, Marojejy National Park, one female (allotype) in CE Madagascar, Fianarantsoa province, Ranomafana National Park. Both national parks are significant areas of dense primary rain forest.

Résumé en malgache

Nandritra ny asam-pikarohana tsy voafetra nataonay izay nahitana fiaraha-miasa naharitra niaraka amin'ny valan-javaboaharin'i Madagasikara sy ny anjerimanotolon'Antananarivo (Departemantan'ny entomologia), dia nahazo zanra maro sy karazam-pianakaviambe tsy mbola voafaritra mazava izahay. Misaotra an'ity tetik'asa ity izahay fa nanan-potoana tokana hianarana ireo karazana misy eo amin'ny tontolon'ny Anthribidae izay hita ao anatin'ireo velarana arovana, indrindra fa ireo ao anatin'ny valan-javaboahary sy ireo faritra voatokana. Ny famaritana an'ireo zanra vaovao dia azo ilazaina fa ny faritra sasany eto amin'ny nosy dia mila fampahafantarana bebe kokoa amin'ny antsimpirihan'ireo asa fikarohana indrindra fa ny amin'ny faritra voatokana.

Ao anatin'ity tahirim-pahalalana misy ity dia manana zanra iray vavao sy karazana, *Pseudobasidissus barclayi*

Trýzna & Baňař **gen. nov.** sy **sp. nov.** (Anthribidae: Anthribinae: Platyrhinini), dia voafaritra, ireo taovampananahana'ny lahy sy vavy dia nianarana sy nohamarinina, ary voaravaka loko ihany koa ireo taova roa izay voangona.

Mitovy amin'ny zanra *Basidissus* Fairmaire, izay tamin'ny taona 1897 no tokony efa voavaka tsara ny fitohizana tokan'ireo toetra mampiavaka ny haiendrika voalaza ao anatin'ny tahirim-pahalalana nisy. Ny tena mahasamihafa azy ireo dia ireto avy: (1) ireo kantsana salazantsambo mifanohy mivelatra antendrontaovan' lahy sy vavy, dia tsy ao anatin'ny langilangi-tsalazantsambo misaraka, sy (2) vatantsambo miandava izay samihafa eo amin'ny faritry anelanelany maso.

Ity karazana iray vaovao ity dia hita ao amin'ny faritri'avaratra antsinanan'i Madagasikara, faritan'i Antsiranana: Valan-javaboaharin'i Marojejy. Mbola hita ao amin'ny faritra afovoany antsinanan'i Madagasikara ihany koa izy ity, faritan'i Fianarantsoa: Valan-javaboaharin'i Ranomafana. Ireo valan-javaboahary ireo no tena faritra arovana noho izy voasokajy sy mbola ahitana ala matevina natoraly.

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We would like to thank Dr. Lala Harivelo Ravaomanarivo Raveloson (University of Antananarivo, Faculty of Sciences, Department of Entomology) and Dr. Chantal Andrianarivo (Madagascar National Parks) for supporting our research project: *'Étude à long terme de la biodiversité des groupes choisis d'insectes (Coléoptères, Hétéroptères, Lépidoptères et Homoptères) dans les localités préalablement sélectionnées en considération de la recherche et la protection de la biodiversité dans les aires protégées de Madagascar'*. This work was supported by the Internal Grant Agency (IGA no. 20124364) Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague. The research received support from the SYNTHESYS Project (http://www.synthesys.info) which is financed by the European Community Research Infrastructure Action under the FP7 'Capacities' Program (visit to Natural History Museum, London) for the project *'Research into Madagascan fungus weevils of the family Anthribidae'* (Miloš Trýzna) with the kind co-operation of Maxwell V. L. Barclay. We are indebted to Jaroslav Šťastný (Liberec, Czech Republic) for interesting material, Maxwell V. L. Barclay for reading the manuscript and Marie Estherine Rabotoson (Antananarivo) for translation of the Summary to Malagasy language.

References

Fairmaire, M.L. (1897) Matériaux pour la faune coléoptérique de la région malgache. *Annales de la Société Entomologique de Belgique*, 41, 164–204.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand. Vol. 3*. Science Information Division, DSIR, Wellington, 264 pp.

Trýzna, M. & Baňař, P. (2012) New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. *Acta Entomologica Musei Nationalis Pragae*, 52 (2), 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (accesed 1 August 2014)

Trýzna, M. & Baňař, P. (2013a) A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species. *Zootaxa*, 3609 (5), 504–512.
http://dx.doi.org/10.11646/zootaxa.3609.5.6

Trýzna, M. & Baňař, P. (2013b) A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa*, 3721 (1), 71–78.
http://dx.doi.org/10.11646/zootaxa.3721.1.3

Trýzna, M. & Baňař, P. (2014) A new species of the genus *Blaberops* (Coleoptera: Anthribidae) from east Madagascar, with a key to species. *Zootaxa* 3826 (2), 386–392.
http://dx.doi.org/10.11646/zootaxa.3826.2.8

Příloha č. 13

A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species

Miloš Trýzna & Petr Baňař

2013a

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A new species of the genus *Apatenia* (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of *Apatenia quadristigma* Frieser and list of Madagascan species

Miloš TRÝZNA[1,2] & Petr BAŇAŘ[1,3]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Game Management, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic*
[2]*Bohemian Switzerland National Park Administration, Research and Nature Conservation Department, Pražská 52, CZ-407 46 Krásná Lípa, Czech Republic. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com*
[3]*Corresponding author. E-mail: petrbanar@seznam.cz*

Abstract

A new species, *Apatenia stysi* Trýzna & Bañař **sp. nov.** (Anthribidae: Anthribinae: Corrhecerini), from north-west Madagascar is described and the female allotype of *Apatenia quadristigma* Frieser, 1981 is redescribed. Female genitalia of *A. stysi* **sp. nov.** are studied and illustrated.

Key words: Coleoptera, Anthribidae, Anthribinae, *Apatenia*, taxonomy, new species, female genitalia, Madagascar

Introduction

The genus *Apatenia* Pascoe, 1859, is distributed in the Afrotropical, Lemurian, Oriental and Australian regions and comprises altogether 49 species (Rheinheimer 2004).

Seven species have been described so far from Madagascar, all of which are endemic.

In the present paper we describe a new species from north-west Madagascar. Frieser´s (1981) original description of *Apatenia quadristigma* lacks any photographs or drawings. Reading the text of its description, some character states seem to be similar to the newly described species *A. stysi* **sp. nov.**, hence *A. quadristigma* is redescribed and illustrated herein. Madagascan species of the genus *Apatenia* need revision and some species share character states of the genus *Phaulimia* Pascoe, 1859.

Material and methods

Body parts of Anthribidae have been measured inconsistently by many authors in the past. In this work, we measure selected body parts as follows: length of head = distance from basal margin of eyes to most anterior part of rostrum; length of rostrum = distance from anterior margin of eyes to most anterior part of rostrum; total body length = distance from pygidium to anterior margin of pronotum and total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are measured in its strictly dorsal position. We use the term 'ocular index' as a ratio of minimum width of vertex to maximum width of eye; an objective measurement of the latter is rather difficult, however, the width of eye is equal to maximum width across eyes minus minimum distance between eyes × 0.5. Hence the ocular index is equivalent to 2 times minimum distance between eyes / maximum width across eyes minus minimum distance between eyes. For the description of female genitalia we use the terminology of Holloway (1982).

The label data of the material examined, as well as type localities in the list of *Apatenia* species are cited verbatim, including potential errors, using a slash (/) to separate rows on one label, and double slash (//) for

504 *Accepted by R. Anderson: 5 Dec. 2012; published: 1 Feb. 2013*

dividing data on different labels. The following abbreviations are used: [p]—printed, [h]—handwritten, [TL]—type locality.

Colour photographs were taken with a Leica MSV266. Drawings were made using a SZP 11 ZOOM stereoscopic microscope.

The studied specimens are deposited in the following collections: BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic; MMBC = Moravian Museum Brno, Czech Republic; ZSMC = Zoologische Staatssammlung München, Germany

Taxonomy

Apatenia Pascoe, 1859

Type species: *Apatenia viduata* Pascoe, 1859: 434, by original designation.

Recognition. Head long, narrow, rostrum lengthened, flat and broad, mandibles robust, strongly toothed. Eyes laterally situated. Antennae inserted at about midway between anterior margin of eyes and mandibles and longer than head, first two segments thick, third to sixth more or less cylindrical, seventh to to eighth subtriangular, ninth to eleventh forming loose club with the first two segments triangular and the last one rounded.

Prothorax slightly transverse, narrow in front. Dorsal transverse carina convex in the middle, its lateral margins directed anteriorly to about halfway along the side of prothorax. Elytra slightly depressed. Legs moderate, tarsi rather short.

Notes. The classification of the genera *Apatenia* and *Phaulimia* need to be revised. *Apatenia stysi* Trýzna & Baňař **sp. nov.** belongs to the '*Apatenia*' lineage based on the character states listed above. Both genera contain numerous species, occur in a large area (Oriental + Afrotropical regions), and generic descriptions were based upon the description of the first included species and have not been suitably adjusted to accomodate subsequent species. It is likely that the two genera will be maintained but perhaps with different species compositions. This is the subject of a future study.

Apatenia stysi sp. nov.

(Figs. 1–4, 8, 10–11, 13–18)

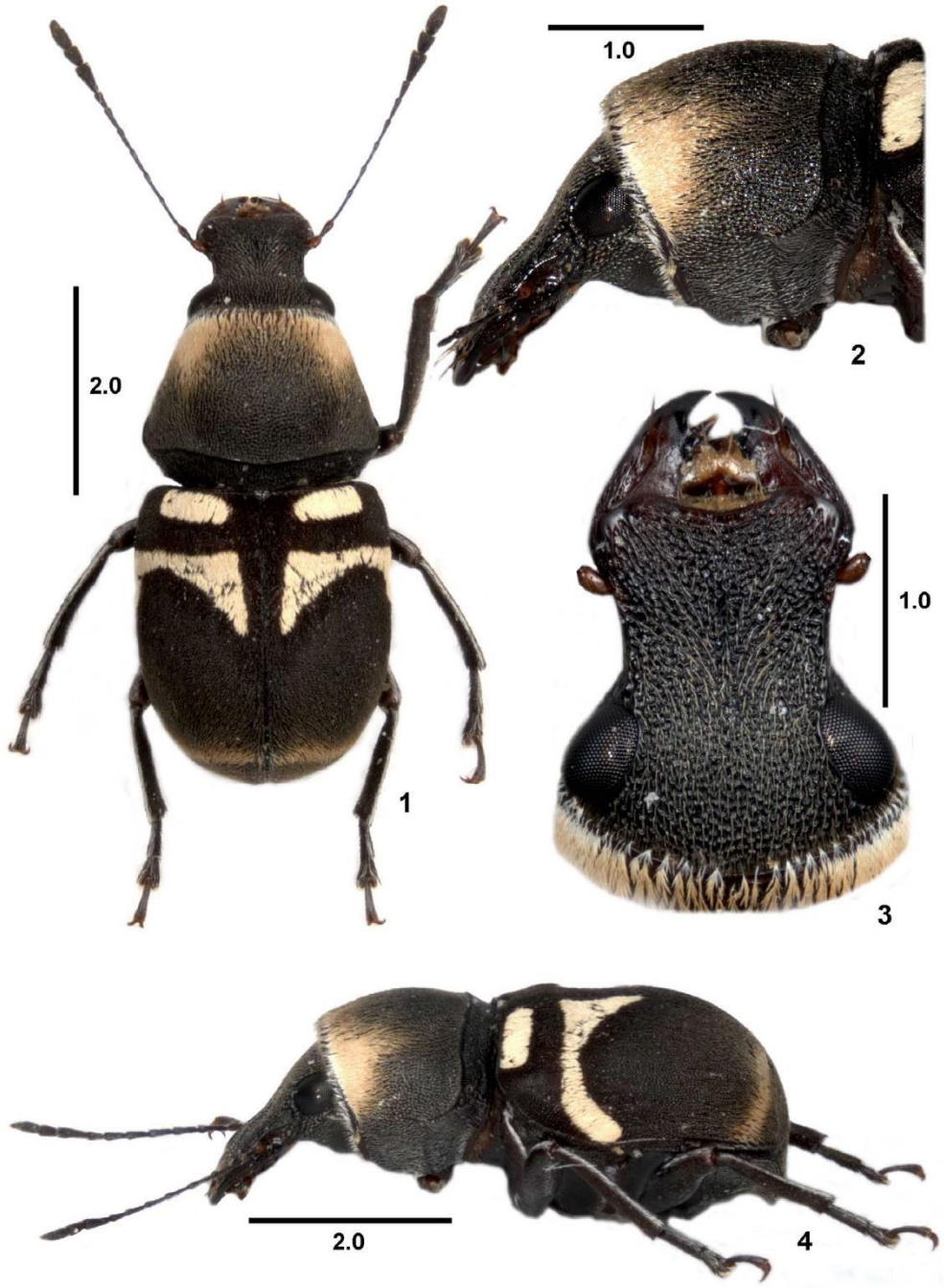
Type locality. North-west Madagascar, Mahajanga Province, Andranofasika town surroundings, approximately 100 m a.s.l.

Material examined. Holotype female, labelled: 'N MADAGASCAR, / Mahajanga env., / ANDRANOFASIKA env. / Z. Mráček leg., 2.I. 2003 [p, white label] // HOLOTYPE / *Apatenia stysi* **sp. nov.** / M. Trýzna & P. Baňař det.' [p, red label] (BSNPC); paratype female, the same locality as holotype, specimen with red label 'PARATYPE / *Apatenia stysi* **sp. nov.** / M. Trýzna & P. Baňař det.' (MMBC). Both specimens are dry mounted on rectangular card, holotype without left fore leg, paratype without right fore leg.

Description. Female holotype; (female paratype). *Measurements* (in mm): Total body length—6.32 (6.67). Head: total length—1.33 (1.47); length of rostrum—0.91 (0.93); maximum width of rostrum—1.09 (1.11); length of eye—0.42 (0.53); maximum width across eyes—1.38 (1.44); minimum distance between eyes—0.76 (0.78). Antenna: length of segments: II—0.18 (0.22), III—0.36 (0.34), IV—0.26 (0.27), V—0.27 (0.25), VI—0.24 (0.22), VII—0.23 (0.22), VIII—0.16 (0.17), IX—0.29 (0.26), X—0.22 (0.18), XI—0.31 (0.28). Pronotum: maximum length—1.71 (1.82); width at carina—2.24 (2.49); minimum width—1.42 (1.44). Elytra: maximum length—2.92 (3.07); maximum width—2.42 (2.71).

Colouration of the cuticle generally black, meso- and metasternum partially dark brown; anterior-most part of pronotum somewhat paler brownish. Scape dark brown, rest of antennae black. Cuticle semi-lustrous.

Vestiture on head, pronotum and distal third of elytra light brown, setae longer and wider on anterior half of pronotum, giving pale brown colouration to this part (Figs. 1–2). Distal part of elytra similar, with setae forming a pale brown transverse strip. Proximal two thirds of elytra with blackish vestiture, except for four characteristic transverse spots, formed by long, wide, scale-like whitish setae (Figs. 1, 4). Vestiture on antennae short, appressed,



FIGURES 1–4. *Apatenia stysi* **sp. nov.**, female holotype, 1, habitus dorsal view; 2, head and pronotum, lateral view; 3, head, dorsal view; 4, habitus lateral view. Scale bars in mm.

blackish. All legs covered with dense black setae, dorsal face of all femora, tibiae and tarsi with narrow, contrasting strips comprised of white setae (these narrow strips occur also on meso- and meta-sternum). Prosternum and venter of abdomen with whitish pubescence.

Structure. Head long and narrow (Figs. 3, 8), rostrum flat, simple, without longitudinal carina, ratio of rostrum length to maximum width 0.83. Scrobes not visible dorsally, scape partly hidden in scrobe in dorsal view. Eyes small, ocular index 2.45. Ratio of maximum width across eyes to maximum width of rostrum 1.27. Antennae (Figs. 1, 10) sub-equal in length to head and pronotum together. Funicle and club thin.

Pronotum transverse, ratio of length to width at carina 0.76, gradually narrowed anteriorly, widest at dorsal transverse carina. Dorsal transverse carina bisinuate (Fig. 13), conspicuously convex in the middle, lateral margins in obtuse arch directed anteriorly (Fig. 2).

Elytra broadly oval (Fig. 1), conspicuously narrowed posteriorly from two thirds of their length. Ratio of the maximum length of elytra to maximum width 1.20.

Abdomen shorter than broad (Fig. 11), pygidium (Fig. 14) robust, ratio of maximum width to maximum length 1.21.

Female genitalia. Sternite of segment 8 with long apodeme (Fig. 16), slightly widened apically. Hemisternites wide and robust (Fig. 15), apex of each with robust, strongly sclerotized toothed plate (Figs. 15, 17). Toothed plate without (or with extremely reduced?) stylus, with group of 5–6 strong setae on base. Bursa copulatrix simple (Fig. 18) with small sclerites at insertion of spermathecal duct. Spermatheca strongly sclerotized, sickle-shaped, spermathecal gland spherical (Fig. 18).

Male unknown.

Etymology. Patronym, dedicated to our teacher and friend, Professor Pavel Štys, eminent scholar of many groups of true bugs (Heteroptera).

Distribution. North-west Madagascar (Fig. 19).

Differential diagnosis. Female *Apatenia stysi* **sp. nov.** differs from female *A. quadristigma* Frieser, 1981 by larger body length (more than 6 mm; 4.33 mm in allotype of *A. quadristigma*); much smaller eye (ocular index 2.45; 0.59 in *A. quadristigma*); shape of dorsal pronotal carina (Figs. 12–13) and different colour patterns of the dorsum of body (Fig. 1). *Apatenia stysi* **sp. nov.** differs from all other Madagascan species of the genus *Apatenia* (with an exception of *A. quadristigma*) by its totally different colour pattern composed mainly of four characteristics transverse white spots on the elytra (Figs. 1, 4).

Apatenia quadristigma Frieser, 1981

(Figs. 5–7, 9, 12)

Apatenia quadristigma Frieser, 1981: 253–254

Type locality. East Madagascar, Fmpanambo (Sic!) [Fampanambo] (holotype), Mananara (allotype).

Material examined. Allotype female, labelled: 'COLL. MUS. TERVUREN / Madagascar: Mananara / X. 1963 / J. Vadon [p, white label] // ALLOTYPE [p, red label] // *Apatenia* / *quadristigma* / Allotypus sp.n. / det. R. Frieser 19780'. [h, partly printed red label] (ZSMC). Specimen mounted on triangular point, right antenna (antennomeres III–XI) mounted separately.

Redescription. Female (allotype). *Measurements* (in mm): Total body length—4.33. Head: total length—0.95; length of rostrum—0.44; maximum width of rostrum—0.82; length of eye—0.51; maximum width across eyes—0.96; minimum distance between eyes—0.22. Antenna: length of segments: II—0.15, III—0.17, IV—0.15, V—0.14, VI—0.12, VII—0.12, VIII—0.11, IX—0.36, X—0.16, XI—0.27. Pronotum: maximum length—1.18; width at carina—1.49; minimum width—0.92. Elytra: maximum length—2.11; maximum width—1.78.

Colouration of cuticle generally black, including venter of body, antennae, and legs. Elytra in proximal half partially dark brown.

Vestiture. Head, thorax and abdomen uniformly covered with appressed whitish setae. Vestiture on antennae short, appressed to semierect, blackish. All legs covered with dense black setae (longer on ventral faces), dorsal face of all femora, tibiae, and tarsi with narrow, inconspicuous strip comprised of white setae (narrow strips also occur on meso- and metasternum). Elytra with very short, appressed, scale-like whitish setae, except for four characteristic spots, formed by long, wide, whitish setae (Fig. 5).

Structure. Head robust (Figs. 6–7), rostrum short, without longitudinal carina, ratio of rostrum length to its maximum width 0.54. Scrobes not visible dorsally. Eyes large, ocular index 0.59. Ratio of maximum width across eyes to maximum width of rostrum 1.17. Antennae (Fig. 9) much shorter than head and pronotum together. Funicle thin, club robust.

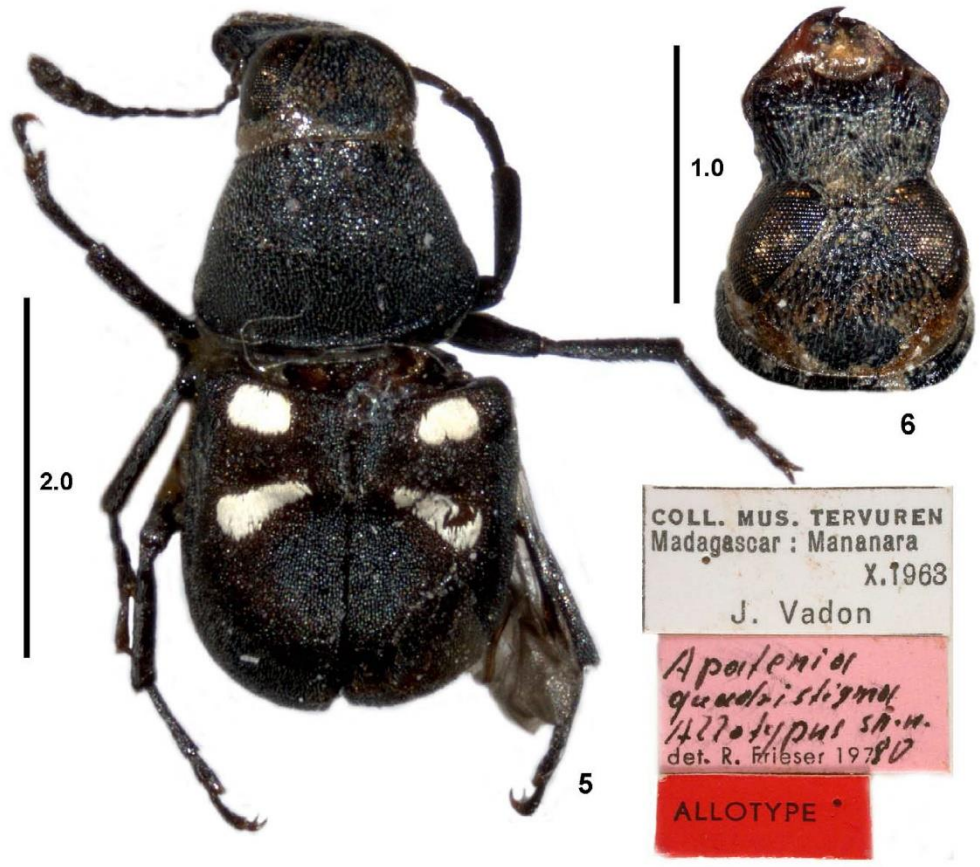
Pronotum transverse, ratio of length to width at carina 0.79, gradually narrowed anteriorly, widest at dorsal transverse carina. Dorsal transverse carina convex (Fig. 12), dorso-lateral margins moderately directed anteriorly, forming slightly obtuse angle with its dorsal part.

Elytra broad, sub-quadratic, narrowed in distal quarter (Fig. 5). Ratio of maximum length of elytra to maximum width 1.18. Each elytron with two conspicuous tubercles in proximal part, one tubercle in humeral part of elytron, second more medial.

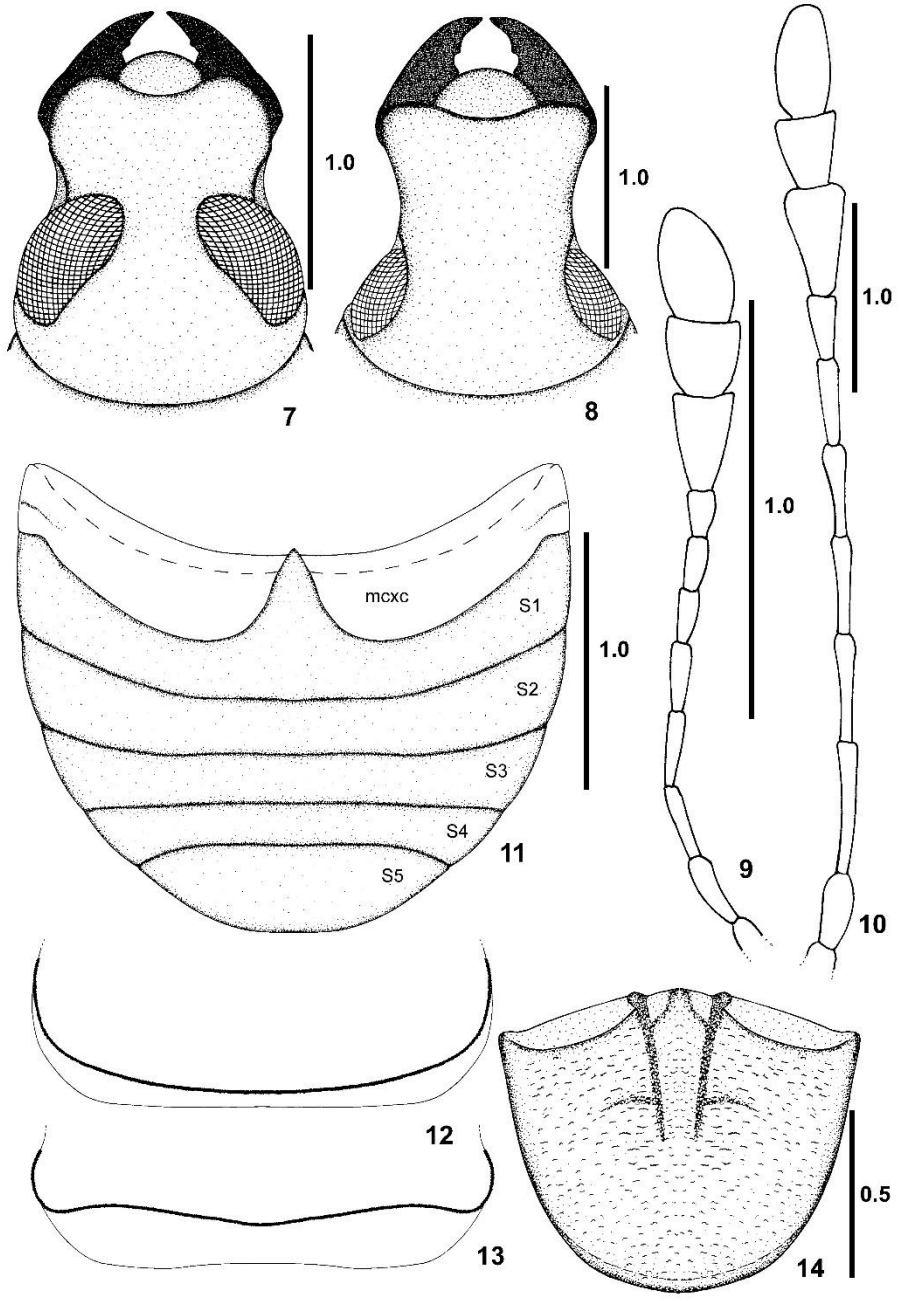
Abdomen shorter than broad, length of pygidium sub-equal to its width.

Female genitalia not examined.

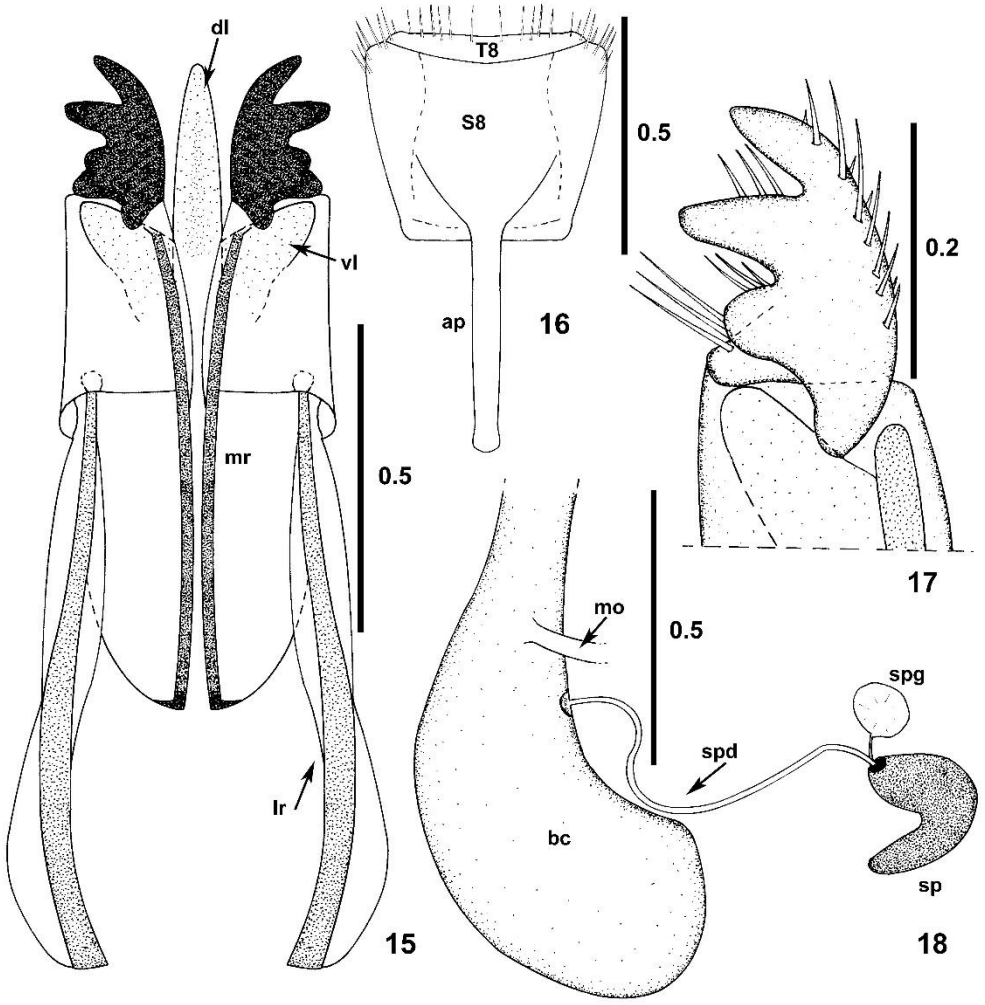
Distribution. East Madagascar (Fig. 19).



FIGURES 5–6. *Apatenia quadristigma* Frieser, 1981, female allotype, 5, habitus dorsal view with original labels; 6, head, dorsal view. Scale bars in mm.



FIGURES 7–14. 7, 9, 12, *Apatenia quadristigma* Frieser, 1981, female allotype; 8, 10–11, 13–14, *Apatenia stysi* **sp. nov.,** female holotype; 7–8, head, dorsal view; 9–10, right antenna; 11, abdomen, ventral view; 12–13, dorsal pronotal carina; 14, pygidium, posterior view. Scale bars in mm. Lettering: mcxc—metacoxal cavity; S1–S5—sternites 1 to 5, respectively.



FIGURES 15–18. *Apatenia stysi* **sp. nov.**, female holotype, genitalia; 15, hemisternites, ventral view; 16, segment 8, ventral view; 17, toothed plate of right hemisternite, ventral view; 18, bursa copulatrix and spermatheca. Scale bars in mm. Lettering: ap—apodeme; bc—bursa copulatrix; dl—dorsal lobe; lr—lateral rod; mo—median oviduct; mr—median rod; S8—sternite 8; sp—spermatheca; spd—spermathecal duct; spg—spermathecal gland; T8—tergite 8; vl—ventral lobe.

List of Madagascan species of the genus *Apatenia*

1. *A. fallax* Frieser, 2010: 4; TL: 'Mormanga (Sic!) env.' [Moramanga env.]
2. *A. longiclava* Wolfrum, 1955: 678; TL: 'Umgebung aus Androna (Nord-Madagaskar)'
3. *A. mesostigma* Wolfrum, 1961: 306; TL: 'Moramanga Rte d´Anosibe`
4. *A. oculifera* Frieser, 2000: 39; TL: 'Analamaraotra (Sic!) env., E Moramanga' [Analamazaotra env.]
5. *A. quadristigma* Frieser, 1981: 253; TL: 'Madagascar: N. E., Fmpanambo (Sic!)' [Fampanambo]
6. *A. stysi* **sp. nov.**; TL: North-west Madagascar, Mahajanga Province, Andranofasika town surroundings
7. *A. sulcicollis* Frieser, 2000: 39; TL: 'Moramanga env'

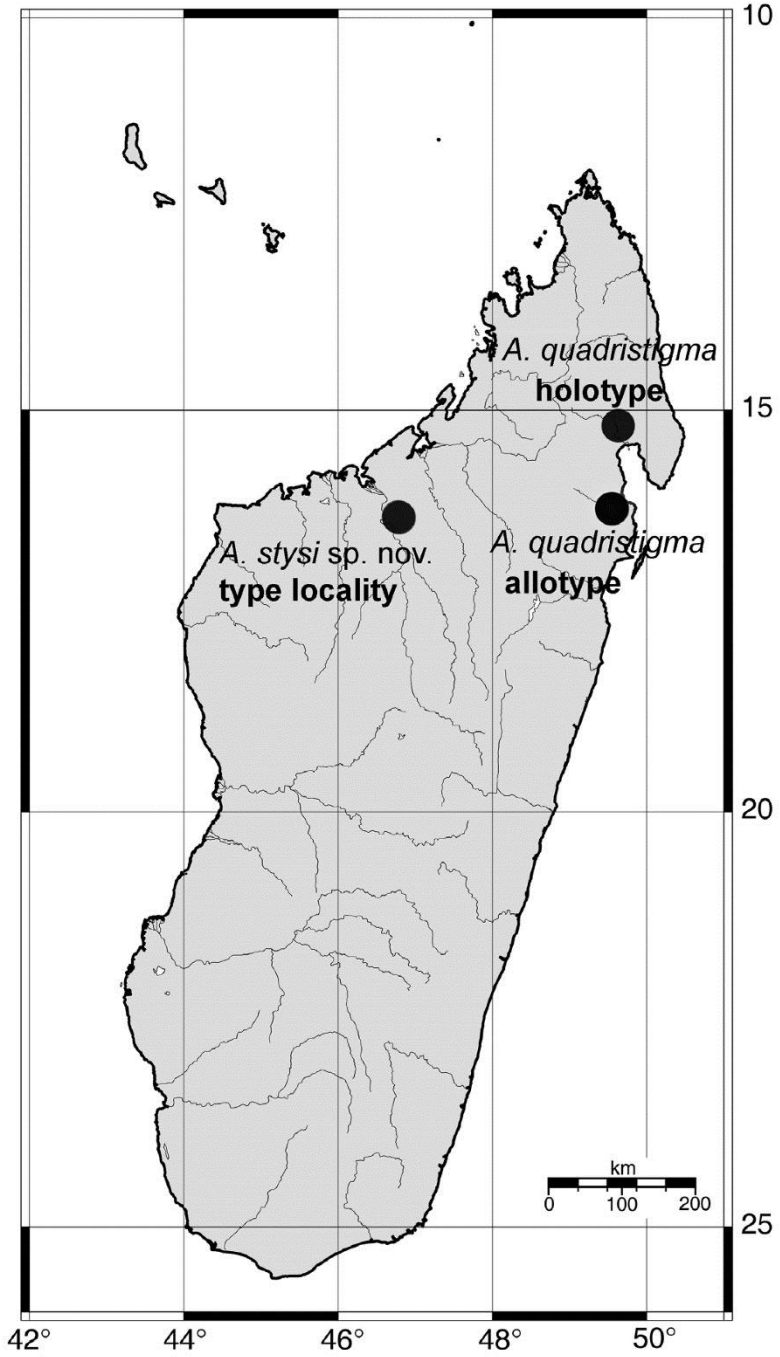


FIGURE 19. Distribution of *Apatenia stysi* **sp. nov.** and *A. quadristigma* Frieser, 1981 in Madagascar.

Discussion

The length of the antenna, and the length and shape of its segments generally show a high degree of variability in anthribids. These disproportions are generally connected with total body length and also occur between males and females (e. g. Valentine 1960). In our experience, especially in a long series of conspecific males, we can find huge differences in the proportions of antennal segments. Although the paratype of *Apatenia stysi* **sp. nov.** is a larger and more robust specimen than the holotype (both females), it has shorter antennae (total length and particularly length of club segments, see measurements of antennal segments of both specimens under 'Description') with slightly differently shaped club segments. Hence, the length of the antennae and shape of their segments should not by used as a crucial character in the taxonomy of anthribids, but has to be interpreted in combination with other characters.

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We would like to thank Dr. Lala Harivelo Ravaomanarivo Raveloson (University of Antananarivo, Faculty of Sciences, Department of Entomology) and Dr. Chantal Andrianarivo (Madagascar National Parks) for supporting our research project: 'Étude à long terme de la biodiversité des groupes choisis d'insectes (Coléoptères, Hétéroptères, Lépidoptères et Homoptères) dans les localités préalablement sélectionnées en considération de la recherche et la protection de la biodiversité dans les aires protégées de Madagascar'. This work was supported by a project of the Ministry of Agriculture of the Czech Republic (project No. QH 91097). The research received support from the SYNTHESYS Project (http://www.synthesys.info) which is financed by the European Community Research Infrastructure Action under the FP7 'Capacities' Program (visit to Natural History Museum, London) for the project 'Research into Madagascan fungus weevils of the family Anthribidae' (Miloš Trýzna) with the kind co-operation of Maxwell V. L. Barclay. We are indebted to Michael Balke (ZSMC) for the loan of the allotype of *A. quadristigma*, Robert Anderson (Ottawa) for important comments to the manuscript and Maxwell V. L. Barclay for reading the manuscript.

References

Frieser, R. (1981) Beitrag zur Kenntnis der Anthribiden (Coleoptera, Anthribidae). *Entomologische Arbeiten aus dem Museum G. Frey*, 29, 249–258.

Frieser, R. (2000) Einige neue Anthribiden von Madagaskar und der Île de la Réunion (Coleoptera: Anthribidae). *Acta Coleopterologica*, 16(1), 35–51.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica*, 26(1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand*, 3. Science Information Division, DSIR, Wellington, 1–264.

Pascoe, F.P. (1859) On some new Anthribidae. *Annals and Magazine of Natural History*, (3)4, 431–439.

Rheinheimer, J. (2004) Illustrierter Katalog und Bibliographie der Anthribidae der Welt (Insecta: Coleoptera). *Mitteilungen des Entomologischen Vereins Stuttgart*, 39(1/2), 1–243.

Valentine, B.D. (1960) The genera of the weevil family Anthribidae north of Mexico (Coleoptera). *Transactions of the American Entomological Society*, 86, 41–85.

Wolfrum, P. (1955) Neue Anthribiden aus dem Museum G. Frey. *Entomologische Arbeiten aus dem Museum G. Frey*, 6, 674–683.

Wolfrum, P. (1961) Anthribiden aus dem Institut Scientifique de Madagascar (Col.). *Entomologische Arbeiten aus dem Museum G. Frey*, 12(2), 291–325.

Příloha č. 14

A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species

Miloš Trýzna & Petr Baňař

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A new species of the genus *Basidissus* (Coleoptera: Anthribidae) from east Madagascar, with a key to species

MILOŠ TRÝZNA[1] & PETR BAŇAŘ [1, 2]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. E-mail: m.tryzna@npcs.cz; anthribidae@gmail.com*
[2]*Corresponding author. E-mail: petrbanar@seznam.cz*

Abstract

A new species, *Basidissus bendai* Trýzna & Baňař **sp. nov.** (Anthribidae: Anthribinae: Platyrhinini), from east Madagascar is described, female genitalia are studied and illustrated, and the mobility of the stylus of the toothed plate is discussed. Colour photographs as well as a key to Madagascan species of the genus *Basidissus* are provided.

Key words: Coleoptera, Anthribidae, Anthribinae, *Basidissus*, taxonomy, new species, female genitalia, stylus, Madagascar

Introduction

The genus *Basidissus* Fairmaire, 1897 (Anthribinae: Platyrhinini) is distributed in the Afrotropical region and Madagascar and comprises altogether seven species (Frieser 2007, Rheinheimer 2004). Six species, all of them endemic, have so far been described from Madagascar, and one species, *B. simplicicorne* (Wolfrum, 1958), from Zaire (originally described in the genus *Derographium* Jordan, 1903 from 'Bumbuli').

In the present paper we describe a new species from east Madagascar, based on a single female.

Material and methods

In this work, we measure selected body parts as follows:

length of head = distance from basal margin of eyes to anteriormost part of rostrum;
length of rostrum = distance from anterior margin of eyes to anterirormost margin of rostrum; total body length = distance from posterior margin of pygidium to anterior margin of pronotum plus total length of head. Antennomere I is partially hidden in the scrobe, and is hence excluded from measurement. All measurements of the head are measured in its strictly dorsal position. Under the term 'ocular index' we understand the ratio minimum width of vertex to maximum width of eye; it is easiest measured as 2 times minimum interocular distance / (maximum width across eyes minus minimum interocular distance).

The label data of the material examined, as well as type localities in the list of *Basidissus* species are cited verbatim, including possible errors, using a slash (/) to separate rows on one label, and double slash (//) for dividing data on different labels. The following abbreviations are used: [p]—printed, [TL]—type locality. Colour photographs were taken with a Leica MSV266 camera. Drawings were made using a SZP 11 ZOOM stereoscopic microscope.

The single female specimen available for our study has damaged genitalia (see description). For the description of the genitalia we use the terminology of Holloway (1982).

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The specimen studied is deposited in the following collection:

BSNPC = Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic (M. Trýzna).

Taxonomy

Basidissus Fairmaire, 1897

Type species: *Basidissus cristatus* Fairmaire, 1897: 192, by original designation.

Recognition. Head relatively short (Figs. 1, 7, 15), rostrum flat, without longitudinal carina, with only weak transversal impression in the middle, sides of rostrum parallel. Eyes large, convex (Fig. 15). Scrobes not visible dorsally, scape slightly hidden in scrobe in dorsal view. Antennae reaching to posterior margin of pronotum in both sexes. Funicle thin, club robust. Pronotum transverse with one, two or three tufts of setae, transverse carina antebasal, not reaching the middle of prothorax. Elytra broadly oval with sub-basal, median and preapical tufts of erect setae or tubercles.

Basidissus bendai sp. nov.

(Figs. 1, 7, 13–22)

Type locality. East Madagascar, Tamatave province, Andasibe-Mantadia National Park, Analamazaotra forest, 955 m.

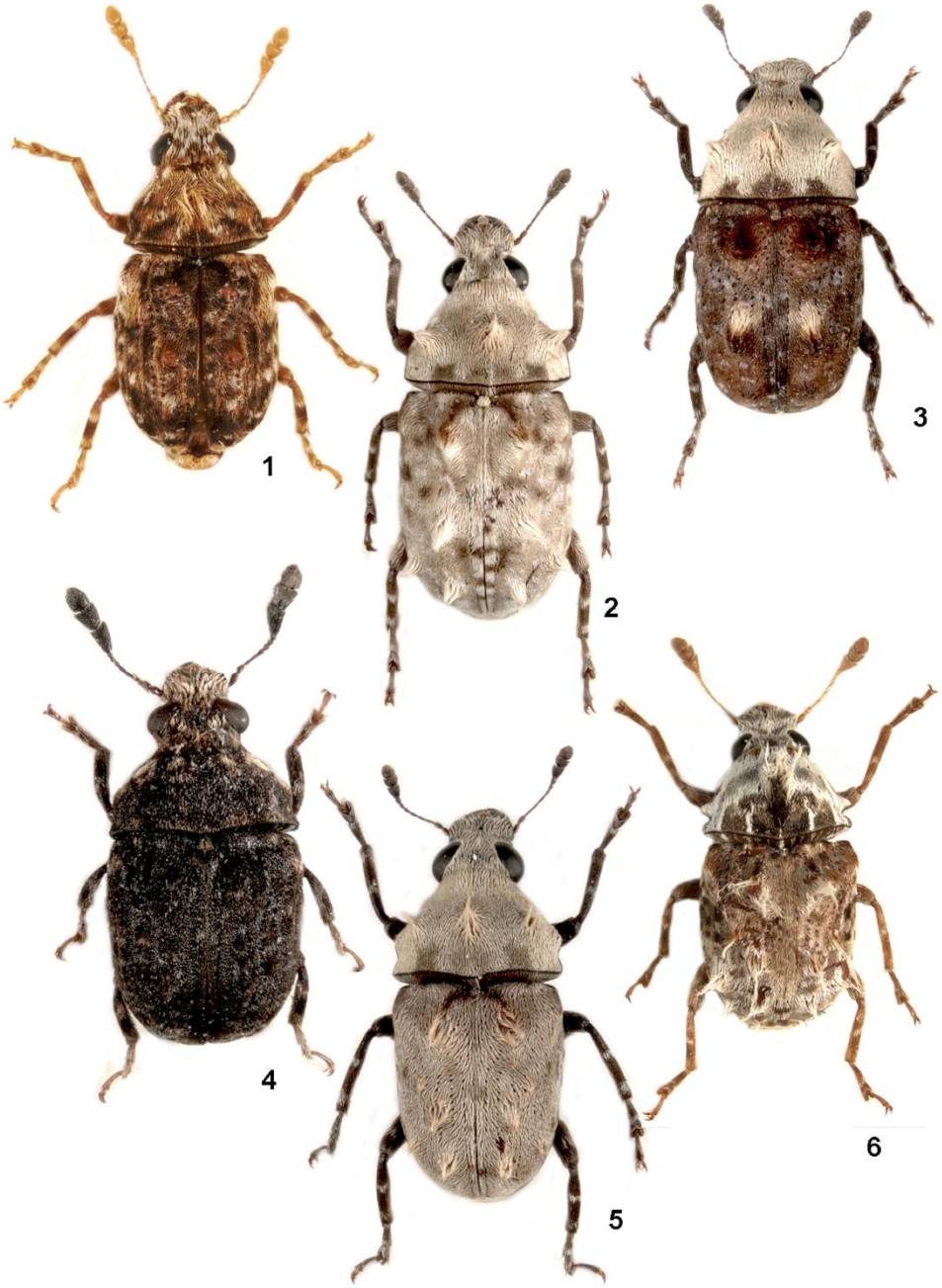
Type material. Holotype, female: **MADAGASCAR: TAMATAVE:** 'Madagascar, 5.–13.ii.2007, / Andasibe-Mantadia N.P., / Analamazaotra forest, // S 18°56´45.0´´, / E 48°25´08.0´´ / 955 m, M. Trýzna leg. Red label [p] HOLOTYPE / *Basidissus bendai* **sp. nov.** / M. Trýzna & P. Baňař det., 2013 (BSNPC).

Description. Female holotype. *Measurements* (in mm): Total body length—3.02. Head: total length—0.60; length of rostrum—0.31; maximum width of rostrum—0.49; length of eye—0.29; maximum width across eyes—0.73; minimum distance between eyes—0.36. Antennomeres: II—0.10, III—0.10, IV—0.07, V—0.08, VI—0.06, VII—0.06, VIII—0.07, IX—0.13, X—0.11, XI—0.14. Pronotum: maximum length—0.84; width at carina—1.22; minimum width—0.56. Elytra: maximum length—1.58; maximum width—1.36.

Colouration of the cuticle generally brown, meso- and metasternum dark brown, proximal half of femora black, rest of femora, tibiae, tarsi and antennae light brown. **Vestiture** on head whitish with mixed yellowish setae, pronotum with yellowish setae complemented by whitish, with irregular small spots. Elytra mixed with brownish, yellowish and whitish, irregularly distributed setae, only vaguely forming coloured spots. Pronotum with a single central tuft of erect yellowish setae. Humeral part of elytra light, tubercles covered by short undistinguished brownish setae. Vestiture on antennae short, appressed, brownish. All legs covered by dense, fine brown setae, all femora light in distal part, tibiae with a wide dark strip bordered by two narrow indistinct whitish stripes. Lateral parts of venter of thorax and abdominal sternites with sparse and yellow-whitish pubescence.

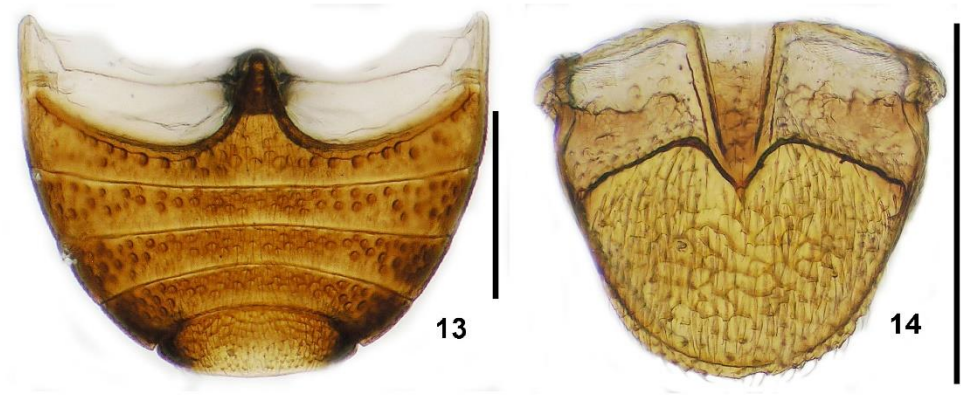
Structure. *Head* relatively short, rostrum flat and broad, without longitudinal carina (Fig. 15), only with inconspicuous median depression, ratio of rostrum length to maximum width 0.63. Scrobes not visible dorsally, scape slightly hidden in scrobe in dorsal view. Eyes large, convex, ocular index 1.94. Ratio of maximum width across eyes to maximum width of rostrum 1.49. Antennae (Fig. 18) reaching to posterior margin of pronotum. Funicle thin, club robust. *Pronotum* transverse, ratio of length to width at carina 0.69, gradually narrowed anteriorly, widest at dorsal transverse carina. Dorsal transverse carina very slightly bisinuate (Fig. 17), convex in the middle. Lateral carina only slightly emarginate in dorsal view terminating in half of pronotum length (Fig. 16) Dorsal transverse carina in contact with lateral carina right-angled from dorsal view (Fig. 17).

Elytra broadly suboval (Fig. 1), narrowed in distal third of their length. Ratio of the maximum length of elytra to maximum width 1.16. *Abdomen* shorter than broad (Fig. 13), sternites coarsely punctate. Pygidium (Fig. 14) robust, ratio of maximum width to maximum length 1.17. *Female genitalia* damaged: segment 8, lateral rod of right hemisternite, bursa copulatrix and spermatheca missing; medial rods broken in the middle, but present.



FIGURES 1–6. Madagascan *Basidissus* species, dorsal view, 1, *B. bendai* **sp. nov.**, female holotype (3.0 mm); 2, *B. cirrifer* Frieser, 2000 (7.2 mm); 3, *B. cristatus* Fairmaire, 1897 (4.9 mm); 4, *B. fulvitarsis* Frieser, 2007 (4.6 mm); 5, *B. incilis* Frieser, 2000 (6.1 mm); 6, *B. senilis* Frieser, 2000 (6.5 mm).

FIGURES 7–12. Madagascan *Basidissus* species, lateral view, 7, *B. bendai* **sp. nov.**, female holotype (3.0 mm); 8, *B. cirrifer* Frieser, 2000 (7.2 mm); 9, *B. cristatus* Fairmaire, 1897 (4.9 mm); 10, *B. fulvitarsis* Frieser, 2007 (4.6 mm); 11, *B. incilis* Frieser, 2000 (6.1 mm); 12, *B. senilis* Frieser, 2000 (6.5 mm).



FIGURES 13–14. *Basidissus bendai* **sp. nov.**, female holotype, 13, abdominal sternites, ventral view; 14, pygidium, dorsal view. Scale bars 0.5 mm.

Hence, the total figure of both hemisternites (Fig. 19) is the reconstruction of a natural state. Medial and lateral rods long and slender. Apex of each hemisternite with robust, strongly sclerotized toothed plate (Figs. 19–21). Toothed plate consists of four teeth, apical one longest, two basalmost teeth partly fused. Lateral face of toothed plate with robust stylus (which is movable) anchored in distinctly membranous area (also see Comments).

Etymology. Patronym, dedicated to our friend and colleague Pavel Benda, director of the Bohemian Switzerland National Park (Czech Republic) and member of the 2013 Czech-Madagascan expedition.

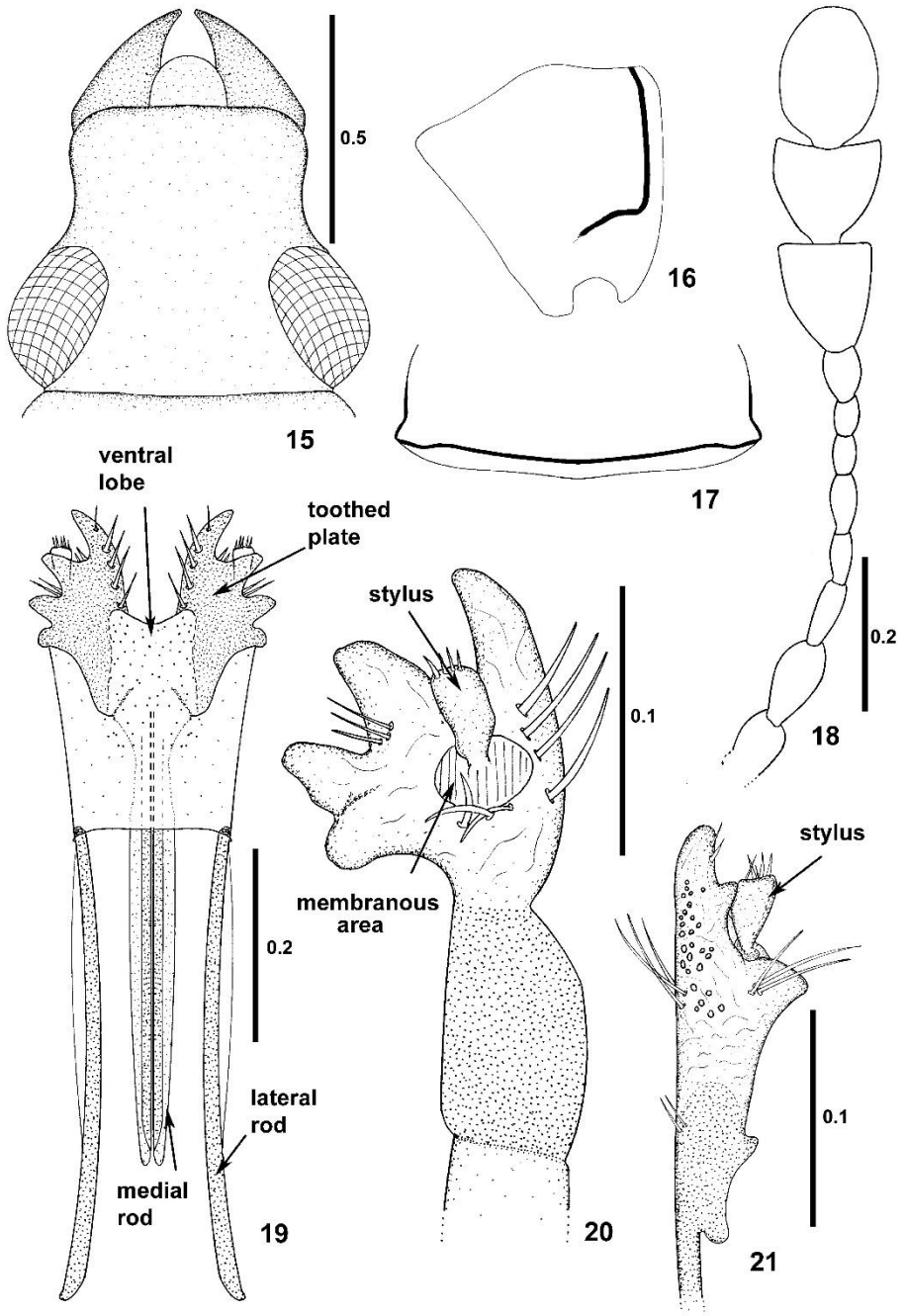
Distribution. East Madagascar, Andasibe-Mantadia National Park, Analamazaotra forest (Fig. 22).

Differential diagnosis. *Basidissus bendai* **sp. nov.** is easily the smallest known species of the genus. Moreover, it differs from all other species by its totally different colour pattern and characters in the key (Fig. 1, 7).

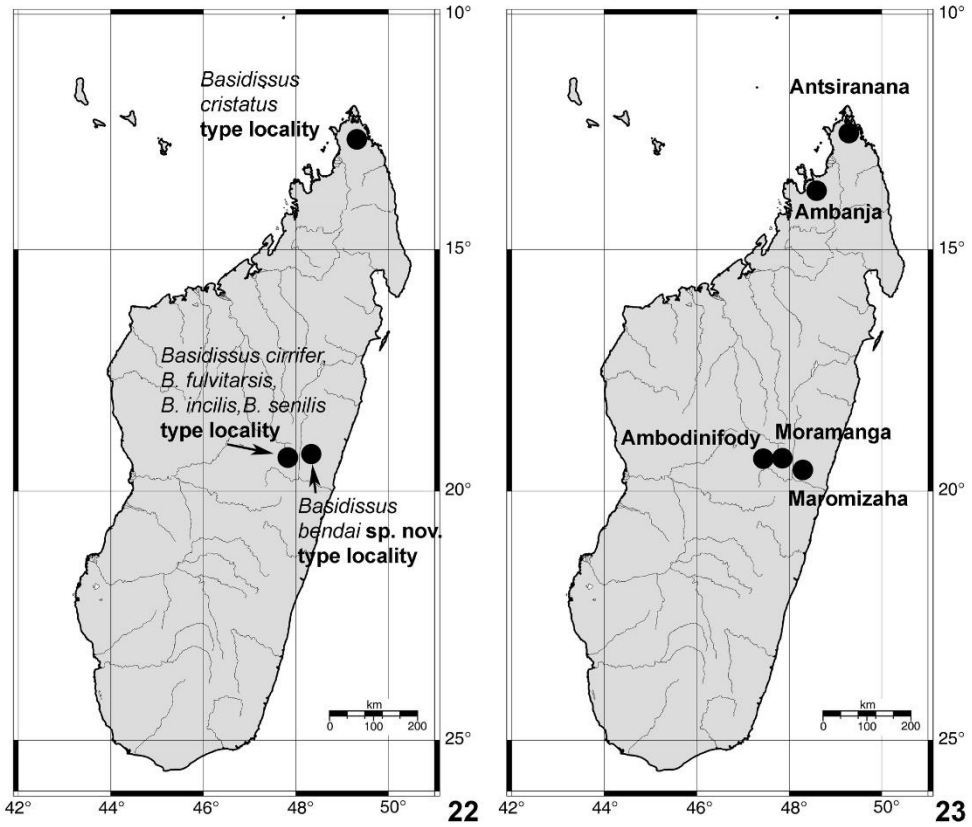
Comments. A detailed study of the female terminalia of *Basidissus bendai* **sp. nov.** has clearly shown that the stylus on the toothed plates is movable, anchored in a circular membranous part of the toothed plate and surrounded by a group of strong, curved setae (Figs. 20–21). We assume that the stylus on the toothed plate of the hemisternites (if present and not extremely reduced) of the female genitalia of most anthribids could be generally movable. This character has not been studied so far, or has generally been overlooked and requires more detailed study in future.

List of Madagascan *Basidissus* species

1. *B. bendai* **sp. nov.**; TL: Analamazaotra forest near Andasibe vill.
2. *B. cirrifer* Frieser 2000: 37; TL: Moramanga env.
3. *B. cristatus* Fairmaire, 1897: 192; TL: Diégo-Suarez [= Antsiranana town]
4. *B. fulvitarsis* Frieser, 2007: 34; TL: Moramanga env.
5. *B. incilis* Frieser, 2000: 38; TL: Moramanga env.
6. *B. senilis* Frieser, 2000: 36; TL: Moramanga env.



FIGURES 15–21. *Basidissus bendai* **sp. nov.**, female holotype: 15, head, dorsal view; 16, pronotum, lateral view, scheme; 17, proximal part of pronotum, dorsal view, scheme; 18, right antenna; 19, hemisternites, ventral view; 20, toothed plate with stylus, lateral view, seen in situ; 21, toothed plate, dorsal view, seen in situ. Scale bars in mm.



FIGURES 22–23. 22, type localities of *Basidissus* species in Madagascar; 23, distribution of *Basidissus cristatus* in Madagascar.

Key to Madagascan *Basidissus* species

1 Pronotum with two low, inconspicuous tufts of setae forming only small tubercles, colour of body uniformly dark, only anterior part of pronotum and dorsum of head with yellow pubescence (Figs. 4, 10) ..... *B. fulvitarsis* Frieser, 2007

\- Pronotum with one or three distinctly erect tufts of setae, colour of body different. 2

2 Pronotum with one central distinct and erect tuft of setae 3

\- Pronotum with three long (one central and two dorso-lateral), conspicuously erect tufts of setae. 4

3 Lateral carina only slightly emarginate in dorsal view, in contact with dorsal transverse carina right-angled. Elytra with low and inconspicuous tufts of hairs; total body length about 3.0 mm ..... *B. bendai* **sp. nov.** (Figs. 1, 7)

\- Lateral carina deeply emarginate in dorsal view, angulose, in contact with dorsal transverse carina lobe-like. Elytra with conspicuously erect tufts of setae; total body length about 6.5 mm ..... *B. senilis* Frieser, 2000 (Figs. 6, 12)

4 Lateral carina of pronotum straight in dorsal view, not emarginate ..... *B. cirrifer* Frieser, 2000 (Figs. 2, 8)

\- Lateral carina of pronotum emarginate in dorsal view 5

5 Lateral carina conspicuously emarginate in dorsal view, with obtuse angle in the middle of emargination. Dorsum of body uniformly greyish, tufts of setae somewhat lighter. ..... *B. incilis* Frieser, 2000 (Figs. 5, 11)

\- Lateral carina shallowly, regularly emarginate in dorsal view, without obtuse angle in the middle of emargination. Dorsum of head and pronotum greyish, elytra dark copper with numerous whitish spots. Central tufts of hairs on elytra particularly greyish ..... *B. cristatus* Fairmaire, 1897 (Figs. 3, 9)

Distribution of Madagascan *Basidissus* species. The new species of the genus *Basidissus* was collected on the first author's 2007 Madagascan expedition (Frieser 2010). At that time the author observed and collected anthribid species from a single dead branch in secondary forest in the Analamazaotra forest, Andasibe-Mantadia National Park. For details of habitat, collecting circumstances, list of species collected and collecting methods, see Trýzna & Bañař (2012).

The type locality of four species of the genus *Basidissus* (*B. cirrifer*, *B. fulvitarsis*, *B. incilis* and *B. senilis*) is the environs of the village Moramanga (Tamatave province). *Basidissus bendai* **sp. nov.** is known only from a single female specimen from Analamazaotra forest in Andasibe-Mantadia National Park (Fig. 22). This is very close to the type locality of the four species mentioned above; the distance from Analamazaotra forest to Moramanga is about 25–30 km. The type locality of the remaining Madagascan species, *B. cristatus,* is Diégo-Suarez [= Antsiranana town] in northern Madagascar (Antsiranana province), and we have seen other specimens of this species from Ambanja env. (Antsiranana province), Moramanga, Ambodinifody and Andasibe - Maromizaha (Tamatave province) (Fig. 23). Although we have seen relatively rich material of miscellaneous anthribid species from Madagascar, we found no recent records of the *Basidissus* species from other localities than from Tamatave province: Moramanga (*B. cirrifer*, *B. cristatus*, *B. fulvitarsis*, *B. incilis* and *B. senilis*) and from near Analamazaotra forest (*B. bendai* **sp. nov.**).

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References

Fairmaire, M.L. (1897) Matériaux pour la faune coléoptérique de la région malgache. *Annales de la Société Entomologique de Belgique*, 41, 164–204.

Frieser, R. (2000) Einige neue Anthribiden von Madagaskar und der Île de la Réunion (Coleoptera: Anthribidae). *Acta Coleopterologica*, 16 (1), 35–51.

Frieser, R. (2007) Ein neuer Beitrag zur Kenntnis der Anthribiden Madagaskars (Coleoptera: Anthribidae). *Acta Coleopterologica*, 23 (3), 33–56.

Frieser, R. (2010) Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica,* 26 (1), 3–22.

Holloway, B.A. (1982) *Anthribidae (Insecta: Coleoptera). Fauna of New Zealand*, 3, 1–264.

Rheinheimer, J. (2004) Illustrierter Katalog und Bibliographie der Anthribidae der Welt (Insecta: Coleoptera). *Mitteilungen des Entomologischen Vereins Stuttgart,* 39 (1/2), 1–243.

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Příloha č. 15

New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family

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New species of *Adapterops* (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family

Miloš TRÝZNA[1,2] & Petr BAŇAŘ[1,3]

[1] Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Game Management, Kamýcká 1176, CZ-165 21 Praha 6 – Suchdol, Czech Republic

[2] Bohemian Switzerland National Park Administration, Research and Nature Conservation Department, Pražská 52, CZ-407 46 Krásná Lípa, Czech Republic; e-mail: m.tryzna@npcs.cz, anthribidae@gmail.com

[3] E-mail: petrbanar@seznam.cz

Abstract. A new species, *Adapterops hankae* Trýzna sp. nov. (Anthribidae: Choraginae: Araecerini), from east Madagascar is described and illustrated. Key to the genus *Adapterops* Frieser, 2010 is given including notes on sexual dimorphism of *A. nasalis* Frieser, 2010 and *A. festivus* Frieser, 2010. The microhabitat of *Adapterops hankae* Trýzna sp. nov. is described and list of 29 co-occurring anthribid species is given, and diversity of Madagascan Anthribidae is briefly discussed.

Famintinana. Ny zanra vaovao, *Adapterops hankae* Trýzna sp. nov. (Anthribidae: Choraginae: Araecerini) ao atsinanan'i Madagascar dia hita sy voamarina. Ny lakile famantarana ny zanra *Adapterops* Frieser, 2010 dia nomena ary ao anatiny ny marika fahasamihafana mahalahy sy vavy ny *A. nasalis* Frieser, 2010 sy *A. festivus* Frieser, 2010. Faritra kely *Adapterops hankae* Trýzna sp. nov. dia niadiana hevitra ary misa 29 araka ny tombatombana ny karazana Anthribid.

Key words. Coleoptera, Anthribidae, Choraginae, *Adapterops*, taxonomy, new species, key, sexual dimorphism, habitat, faunistics, Madagascar

Introduction

The genus *Adapterops* Frieser, 2010 (type species *A. nasalis* Frieser, 2010) from the tribe Araecerini was established for two species from east Madagascar. In this paper we describe and key out a new species from this endemic genus. FRIESER's (2010) original descriptions are based only on females; thanks to newly examined material of males we add notes to sexual dimorphism of *A. nasalis* Frieser, 2010 and *A. festivus* Frieser, 2010.

Material and methods

Measurings of body parts of Anthribidae were taken inconsistently by many authors in the past. In this work, we measure selected body parts as follows:

length of head = distance from posterior margin of eyes to the most anterior part of rostrum;

length of rostrum = distance from anterior margin of eyes to the most anterior part of rostrum;

total body length = distance from posterior apex of pygidium to anterior margin of pronotum + total length of head.

All measurements of head are taken in strictly dorsal position. We use the term 'ocular index' as ratio of minimum width of vertex to maximum width of eye; an objective measurement of the latter is rather difficult. However, width of eye is equal to (maximum width across eyes minus minimum distance between eyes) × 0.5. Hence ocular index = 2 times minimum distance between eyes / (maximum width across eyes minus minimum distance between eyes).

Male and female genitalia were not dissected in this contribution. Authors are preparing a publication with key to the genera of Madagascan Choraginae with list of species and review of crucial morphological characters including descriptions of terminalia. So far the genital characters have been ignored in studies of Madagascan Anthribidae, therefore more extensive study is required to understand these characters.

The label data of the material examined are cited verbatim, including potential errors, using a slash (/) to separate rows on the same label, and double slash (//) for dividing data on different labels. Following abbreviations are used: [p] – printed, [h] – handwritten.

Colour photographs were taken by Leica MSV266. Drawings were made using the stereoscopic microscope SZP 11 ZOOM.

The specimens studied are deposited in the following collections:

BSNPC Bohemian Switzerland National Park Administration collection, Krásná Lípa, Czech Republic;
MTDC Miloš Trýzna collection, Děčín, Czech Republic;
ZSMC Zoologische Staatssammlung, München, Germany.

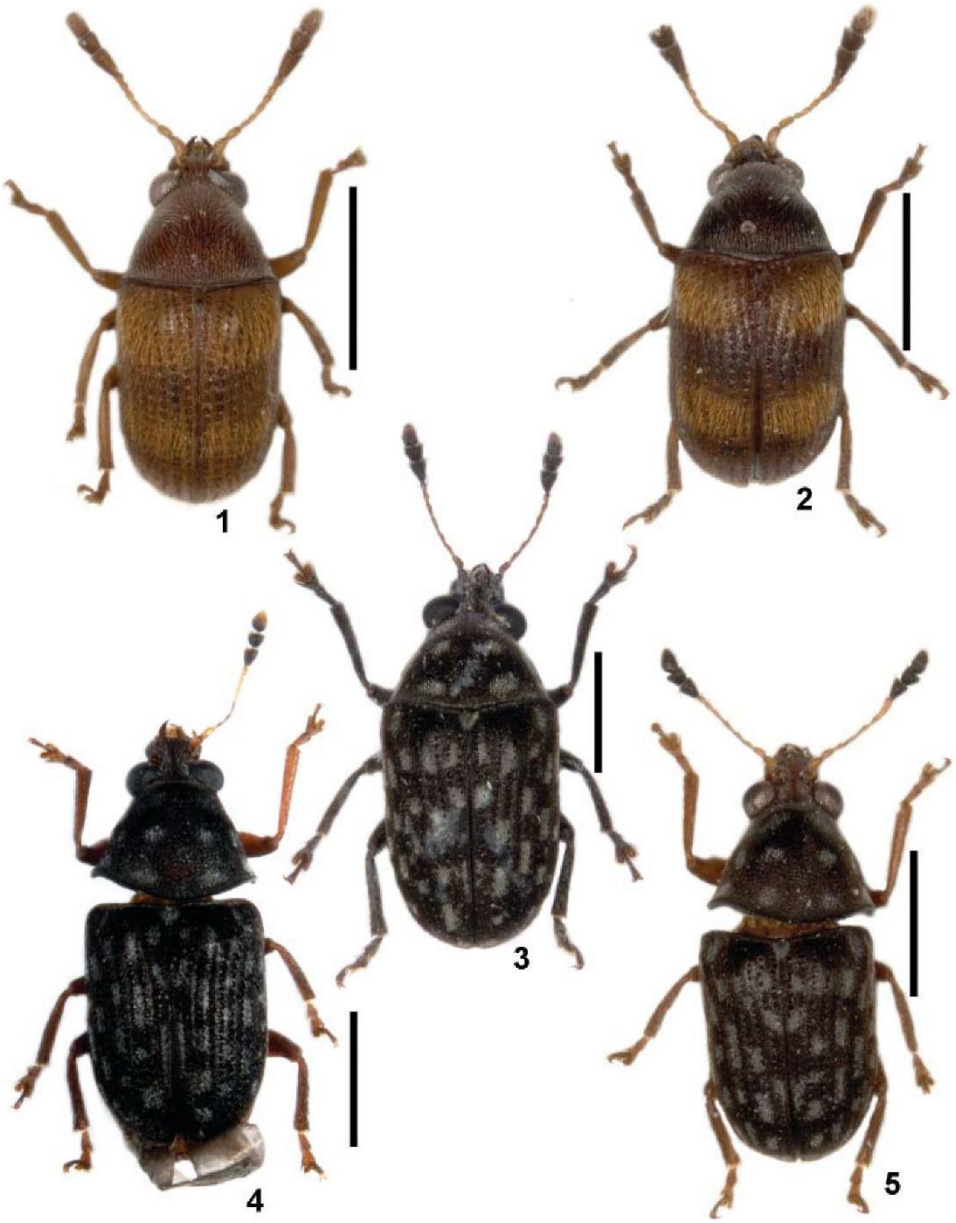
Taxonomy

Adapterops Frieser, 2010

Type species. *Adapterops nasalis* Frieser, 2010: 18, by original designation.

Diagnosis. Head small, eyes large, situated laterally, conspicuously convex, separated from each other, not emarginate. Dorsal pronotal transverse carina basal, sinuate laterally, most lateral part curved posteriorly. Postero-lateral edges of pronotum somewhat protruding posteriorly in lateral view, more or less acutangulate, lateral carina absent, therefore sides of pronotum rounded.

The genus *Adapterops* is similar to the genus *Pilitrogus* Frieser, 1980 (both classified in the tribe Araecerini) which is hitherto known from three species from Réunion Island (Frieser 1980). From the latter, *Adapterops* can be distinguished by antennal scrobe large, carinate



Figs. 1–5. Habitus of *Adapterops* species. 1–2 – *A. festivus* Frieser, 2010: 1 – male, 2 – female; 3 – *A. hankae* Trýzna, sp. nov., female holotype; 4–5 – *A. nasalis* Frieser, 2010: 4 – male, 5 – female paratype. Scale bar = 1.0 mm.

Figs. 6–7. 6 – dead branch inside forest in Andasibe-Mantadia NP, Analamazaotra forest, microhabitat of *Adapterops hankae* Trýzna, sp. nov.; 7 – rain forest in Ambondrombe Massif, type locality of *Adapterops nasalis* Frieser, 2010.

on dorsal margin, conspicuously reaching towards middle of rostrum; rostrum with lateral margins strongly sinuate at antennal scrobes, strongly narrowed between antennal scrobes, minimum distance between scrobes about half of the eye width (Figs. 8–12).

Adapterops nasalis Frieser, 2010

(Figs. 4–5, 11–12, 16–17)

Adapterops nasalis Frieser, 2010: 18.

Type locality. East Madagascar, Massif Ambondrombe, 1300–1400 m a.s.l. Holotype in ZSMC.
Type material examined. PARATYPE: 1 ♀, **MADAGASCAR: FIANARANTSOA:** 'Madagascar Est / 1300-1400 m / Massiv [sic!] Ambondrombe / J. Janák + P. Moravec lgt. // 1 km ouest de la cote 1579 / 14.iii.1996 forêt humide / arbres, arbustes, camp 4' [p] // PARA- / TYPE [red label, p] // Adapterops / nasalis sp. n. / Paratypus [h] / det. R. Frieser 2009 [p] (MTDC).
Additional material examined. 1 ♂, **MADAGASCAR: ANTANANARIVO:** 'MADAGASCAR 2011 / AMBOHITANTELY Spec. Res. / S 18°11'51"; E 47°17'03" / 1530 m, 24.-29.xi. / M. Trýzna lgt.' (MTDC).

Note on sexual dimorphism. Male (Fig. 4) differs from female (Fig. 5) in narrower head, different shape of dorsal margin of scrobe (Figs. 11–12) and in larger eyes (ocular index 1.00 in male, 1.23 in female). Ventrites I–V in male strongly depressed along midline.
Habitat. The species is hitherto known from two females found in wet primary forest (type specimens) in east Madagascar, Ambondrombe Massif, 1300–1400 m a.s.l. (Fig. 7) and collected by beating trees and shrubs, and a single male from central Madagascar, Ambohitantely Special Reserve, collected by beating lower thin and dry branches of deciduous trees and bushes in secondary forest.

Adapterops festivus Frieser, 2010

(Figs. 1–2, 8–9, 13–14)

Adapterops festivus Frieser, 2010: 18.

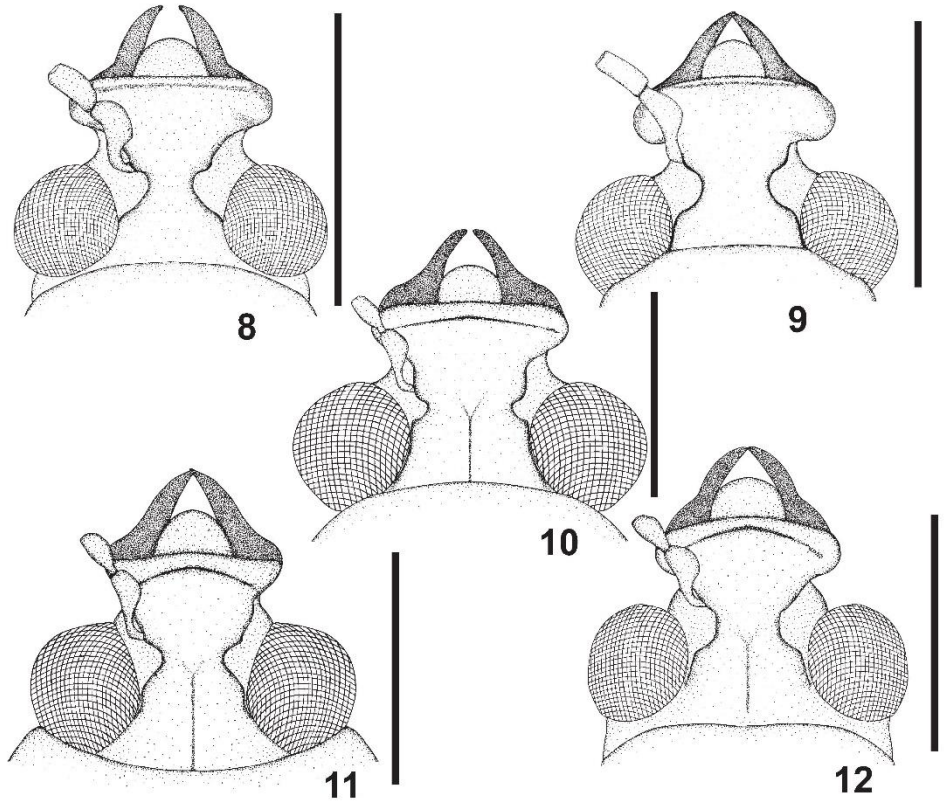
Type locality. East Madagascar, Moramanga town surroundings. Holotype in ZSMC.
Material examined. MADAGASCAR: TAMATAVE: 1 ♂ 2 ♀♀, 'E Madagascar, 2001 / Tamatave distr. / Andasibe (Perinet) / D. Hauck leg., 17.-30.xii.' (MTDC); 1 ♂, 'Madagascar, 26.xi.2010, / Andasibe-Mantadia N.P., / Analamazaotra forest, // S 18°56´42.4´´, / E 048°25´04.8´´, / 925 m, M. Trýzna leg.' (MTDC).

Note on sexual dimorphism. Female (Fig. 2) generally more robust than male (Fig. 1). Male differs from female also in narrower head, different shape of dorsal margin of scrobe (Figs. 8–9) and in larger eyes (ocular index 1.07 in male, 1.33 in female). Antennal club more robust and wider in female (Fig. 14) than in male (Fig. 13). Ventrites I–V in male strongly depressed in middle.
Habitat. All specimens from the Andasibe-Mantadia NP were captured by beating lower dead branches of deciduous trees in secondary forest at altitude ca. 900–950 m.

Adapterops hankae Trýzna sp. nov.

(Figs. 3, 10, 15)

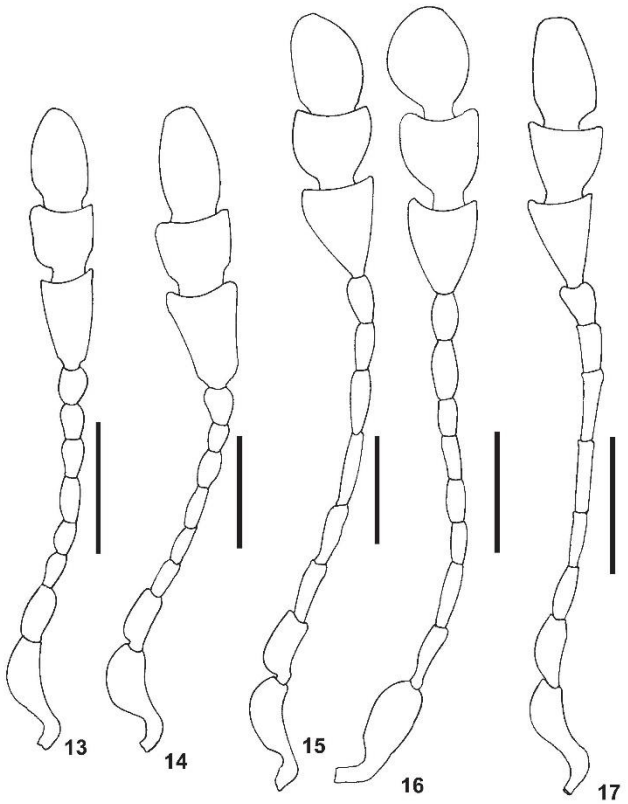
Type locality. East Madagascar, Tamatave province, Andasibe-Mantadia National Park, Analamazaotra forest.
Type material. HOLOTYPE: ♀, **MADAGASCAR: TAMATAVE:** 'Madagascar, 5.-13.ii.2007, / Andasibe-Mantadia N.P., / Analamazaotra forest, // S 18°56´45.0´´, / E 48°25´08.0´´, / 955 m, M. Trýzna leg.' // 'HOLOTYPE / *Adapterops hankae* sp. nov., / M. Trýzna det., 2012' [p, red label] (BSNPC).



Figs. 8–12. Head of *Adapterops* species, dorsal view, vestiture omitted. 8–9 – *A. festivus* Frieser, 2010: 8 – male, 9 – female; 10 – *A. hankae* Trýzna sp. nov., female holotype; 11–12 – *A. nasalis* Frieser, 2010: 11 – male, 12 – female paratype. Scale bar = 0.5 mm.

Description. ***Female*** (holotype). *Measurements* (in mm): Total body length – 3.49. Head: total length – 0.59; length of rostrum – 0.28; maximum width of rostrum – 0.47; length of eye – 0.31; maximum width across eyes – 0.94; minimum distance between eyes – 0.34. Antenna: length of segments: I – 0.24, II – 0.11, III – 0.13, IV – 0.13, V – 0.14, VI – 0.12, VII – 0.11, VIII – 0.09, IX – 0.20, X – 0.14, XI – 0.20. Pronotum: maximum length – 1.22; width at carina – 1.42; minimum width – 0.80. Elytra: maximum length – 2.42; maximum width – 1.60.

Colour of all body parts generally black; scape, proximal part of pedicel and tarsomeres 3–5 somewhat paler, dark brown to blackish. Funicle paler than rest of antenna, brown. Antennal club black. Pronotum and elytra with almost regular spots of whitish to pale yellow pubescence.



Figs. 13–17. Right antenna of *Adapterops* species, vestiture omitted. 13–14 – *A. festivus* Frieser, 2010 (13 – male, 14 – female); 15 – *A. hankae* Trýzna sp. nov., female holotype. 16–17 – *A. nasalis* Frieser, 2010 (16 – male, 17 – female paratype). Scale bar = 0.2 mm.

Head. Rostrum weakly convex, anterior part with fine sculpture. Frons with narrow longitudinal carina in middle (Fig. 10), reaching from proximal edge of eyes to the narrowest part of rostrum. Eyes large, ocular index 1.13. Ratio of maximum width across eyes to maximum width of rostrum 2.00. Antennae (Fig. 15) slightly longer than head and pronotum together. Funicle thin, club robust.

Pronotum transverse (ratio of its length to its width at carina 0.86), gradually narrowed anteriorly, disc convex in its middle. Dorsal surface with several whitish to pale yellow spots. Coarse sculpture of basal half becomes more delicate anteriorly. Dorsal transverse carina strongly curved. Postero-lateral edges of pronotum protruding posteriorly, forming almost acutangulate apex. Posterior margin conspicuously convex, fitting in concavity on basis of elytra. Ventral part of thorax with dense, appressed yellowish pubescence.

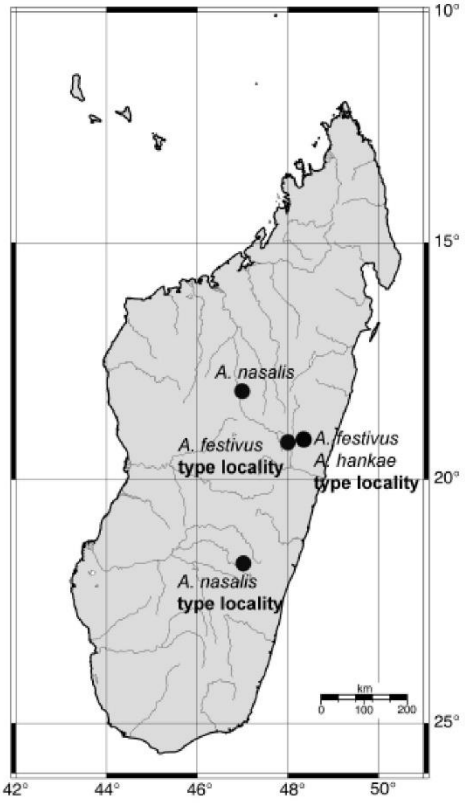


Fig. 18. Distribution of *Adapterops* species in Madagascar.

Elytra oval, slightly narrowed posteriorly, with numerous brightly bordered whitish spots (Fig. 3). Ratio of maximum length of elytra to their maximum width 1.51. Anterior margin of elytra concave, corresponding with convexity of posterior margin of pronotum. Surface of elytra deeply striate, width of each stria distinctly narrower than width of interval.

Legs densely covered with semi-erect whitish pubescence.

Abdomen including pygidium ventrally covered with fine, appressed, yellowish pubescence.

Male. Unknown.

Diferential diagnosis. The new species is similar to *A. nasalis* in general appearance. It differs from the latter in habitus somewhat more robust; eye larger; dorsal margin of scrobes less expanded to the rostrum; frons and rostrum black; legs distinctly black (with exception of tarsomeres 3–5 which are dark brown); venter of thorax and abdomen including pygidium uniformly black (these parts brown to dark brown in *A. nasalis*); pedicel dark brown to blackish (light brown in *A. nasalis*). See also the Key.

Etymology. Dedicated to Mrs Hanka Obereiterová, the member of Czech-Madagascan expedition in 2011.

Habitat. The holotype was captured by beating a dead branch lying on the ground. The branch with the widest twigs ca. 15 cm in diameter had broken off from an unidentified species of deciduous tree in secondary forest, most probably no more than 2 years ago, was still covered with the bark and situated in a slightly sunny place (Fig. 6) (see more in Discussion).

Distribution. East Madagascar.

Key to *Adapterops* species

1 Colouration of pronotum and elytra generally reddish-brown; dorsum of head without longitudinal carina (Figs. 8–9). ..... ***Adapterops festivus*** Frieser, 2010

– Colouration of pronotum and elytra generally black with whitish to yellowish spots; dorsum of head with longitudinal carina reaching from proximal edge of eyes to the narrowest part of rostrum (Figs. 10–12). 2

2 Legs, ventrites I–V and pygidium uniformly brown, head dorsally dark brown, antennal segments I–VIII light brown in both sexes. Female: ocular index 1.23; ratio of length of antennal segment IX to its maximum width 1.15; scrobes broadly expanded towards middle of the rostrum (Fig. 12). ..... ***Adapterops nasalis*** Frieser, 2010
– Legs, venter of body, pygidium and dorsum of head black, antenomeres II–VIII dark brown, scapus dark brown to blackish. Female: ocular index 1.13; ratio of length of antennal segment IX to its maximum width 1.54; scrobes smaller, less expanded towards middle of the rostrum (Fig. 10). ..... ***Adapterops hankae*** Trýzna **sp. nov.**

Discussion

During the Madagascan expedition in 2007, the first author discovered a dead branch broken off from a deciduous tree in secondary forest inside the Analamazaotra forest (Andasibe-Mantadia National Park, 18°56′45.0″S 48°25′08.0″E, 955 m a.s.l.) (details mentioned also under Habitat of *A. hankae* Trýzna sp. nov. above). He had an opportunity to observe this branch between February 5–13, and every day spent ca. 5 hours observing and collecting beetles from the branch. Surprisingly, during these 9 days, 30 species of Anthribidae were collected on this single branch, including 2 genera and 11 species new to science. These taxa were mostly described by Frieser (2010), with the exception of *A. hankae* Trýzna sp. nov., described here. So far, 285 species of the family Anthribidae are known from Madagascar (Trýzna, unpubl.). The number of species found just on this single branch thus represented approximately 11 % of all known Madagascan anthribid species; every day another species previously not discovered was found. A simple collecting method was used: sweeping the lower side of the branch and twigs with their strong occasional beating by net. Quick movement with the net is very important because most tropical anthribids are very nimble flyers. This collecting was repeated four times every hour and results were always fruitful. After several days of intensive collecting the bark of the branch became rather abraded and the number of freshly flown in anthribids was lower but still very high, with different spectrum of species. Seeking anthribids (including large species) by eye was surprisingly unsuccessful because of their faultless cryptic colouration. List of species co-occurring with *Adapterops hankae* Trýzna sp. nov. in this microhabitat is given in Table 1. This sample included 30 species belonging to the subfamilies Anthribinae (47 %), Apolectinae (13 %), Choraginae (40 %). Proportion of undescribed species from these subfamilies was very interesting; it was 83 % in Choraginae (10 species out of 12, including two undescribed genera), but only 7 % in Anthribinae (1 species out of 14). In our opinion this was caused by: i) finding of a branch in condition optimal for occurrence of anthribid species, and ii) proficiency of the collecting method in catching small-sized anthribids (very quick movement with net, strong occasional beating of lower sides of branches, using a net with dimension 35 cm as it is a compromise between sufficient size of the effective surface of net and ability to move it quickly in scrubby brushwood). Another crucial moment is a quick and safe capturing (by hand, into the bottle or using an aspirator) of netted specimens. The above mentioned method is important just when capturing the small-sized species because of their faultless cryptic colouration and immobility

Table 1. List of anthribid species collected on a single branch in Andasibe-Mantadia National Park (taxa undescribed at the moment of collecting are shown in bold).

Subfamily	Genus	Species
Anthribinae	*Diastatotropis*	*D. clavigera* Frieser, 1992
		D. olivacea Waterhouse, 1877
	Holophloeus	*H. tuberosus* (Fairmaire, 1897)
	Hormiscops	***H. confluens* Frieser, 2010**
		H. frater Frieser, 2007
	Lemuricedus	*L. audouini* (Fahraeus, 1839)
		L. maculicollis (Fairmaire, 1896)
		L. madagascariensis (Faust, 1889)
	Opanthribus	*O. albocingulatus* Frieser, 2004
		O. scutatus Frieser, 2004,
		O. undulatus Frieser, 2004
	Phloeotragus	*P. albicans* Fahraeus, 1839
	Tophoderes	*T. frenatus* (Klug, 1833)
	Uterosomus	*U. verrucosus* (Olivier, 1795)
Apolectinae	*Caranistes*	*C. cyphosis* Wolfrum, 1959
		C. rhanisus Wolfrum, 1959
		C. rufipes Jordan, 1895
		C. tenuiclavis Fairmaire, 1897
Choraginae	*Adapterops*	***A. hankae* Trýzna sp. nov.**
	Dysnomelas	*D. melagris* Frieser, 1981
	Epichoragus	***E. acutus* Frieser, 2010**
		***E. vulneratus* Frieser, 2010**
	Eudysnos	***E. pilicornis* Frieser, 2010**
	Choragus	***Ch. aethiops* Frieser, 2010**
		***Ch. attactus* Frieser, 2010**
		***Ch. fasciger* Frieser, 2010**
		***Ch. femoralis* Frieser, 2010**
		***Ch. nitidus* Frieser, 2010**
		***Ch. vicinus* Frieser, 2010**
	Triplodus	*Triplodus* sp.

on the one hand and their quick movement and ability to quickly fly out of net, unnoticed, on the other hand. The reasons why the mentioned branch was suitable for such diverse material of anthribids were not precisely ascertained. We assume the branch was found in optimal period after having broken off from the tree, all the time covered with bark and attacked by some fungi. Mating and pre-mating behaviour was also observed. Author tried to collect also on similar branches in close surroundings at the same time, but without any success.

All species of *Adapterops* are known from semi-deciduous rain forests of east and central Madagascar. Ambondrombe Massif and Andasibe-Mantadia National Park are situated in the narrow strip of the remaining rain forests on the Madagascan east coast; Ambohitantely Special Reserve, situated in central Madagascar, comprises small remnants of rain forests surrounded by savannas and agricultural landscape.

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References

FRIESER R. 1980: Die Anthribiden (Coleoptera) der Mascarenen. *Revue Suisse de Zoologie* **87**: 201–252.

FRIESER R. 2010: Teilergebnisse der entomologischen Expedition von Milos Tryzna auf Madagaskar in 2007 mit Genehmigung ANGAP (Coleoptera: Anthribidae). *Acta Coleopterologica* **26(1)**: 3–22.

Příloha č. 16

Dead wood dependent organisms in tropical forests thrive from open canopy: diversity of fungus weevils in Madagascar

Miloš Trýzna, Jakub Horák & Jaroslav Holuša

(manuskript)

Forest Ecology and Management

Dead wood dependent organisms in tropical forests thrive from open canopy: diversity of fungus weevils in Madagascar

Miloš TRÝZNA[1,2], **Jakub HORÁK**[1] **& Jaroslav HOLUŠA**[1]

[1]*Czech University of Life Sciences, Faculty of Forestry and Wood Sciences, Department of Forest Protection and Entomology, Kamýcká 1176, CZ-165 21 Praha 6-Suchdol, Czech Republic. anthribidae@○gmail.com; Jakub.sruby@seznam.cz; holusaj@seznam.cz*

[2]*Municipal Museum of Ústí nad Labem, Natural History Department, Masarykova 1000/3, CZ-400 01 Ústí nad Labem, Czech Republic*

Key words: decay, primary forest, saproxylic beetles, successional forest, *Anthribidae*

Abstract

Tropical forests are important cradles of biodiversity. Organisms obligatory dependent on dead wood are the most threatened by altering and abuse of forests worldwide. Neverthless, the knowledge about saproxylic guild from tropics was highly understudied.

Our aim was to investigate the response of the saproxylic beetles to changing environment of the equatorial tropical forests.

We studied the reaction of diverse saproxylic taxa of beetles, fungus weevils (Anthribidae), in the Madagascar during three consecutive years (2015-2017). We used the standardized collection of the adults. The variables that describe the environment of the tropical forests were used: stage of the forest, its canopy openness and elevation, together with dead wood amount and quality, flight corridors, sampling occasions and year of sampling.

We trapped 202 species of which more than 50% were new for science. The openness of canopies increased the species richness, was highly influental and independent on the stage of forest (old-growth vs. secondary). The species richness was, furthermore, promoted by dead wood quantity and quality. The number of new species was higher in old-growth forests.

Our research fills the knowledge gap about saproxylic organisms in tropics. Surpringly, the results were mainly consistent with their known biodiversity patterns – as we predicted that in climate with higher annual temperatures, canopy openness would not

be a limiting factor for a group of saproxylics – especially, those that are highly connected with tropical climate as fungus weevils.

This is novel knowledge regarding the management implications of tropical forests. Forests with disturbed canopies are more suitable for saproxylic beetles. This can be reached by natural gap disturbance dynamics in old-growth forests and by cutting of trees with large crowns in secondary forests. The management recommendation for secondary forests in tropics is the leaving of diversified dead wood after the felling of trees.

Introduction

Tropical forests are among the most biodiverse ecosystems on the planet. They harbor many species including those undiscovered to science. They appear to be cradles for species that cannot persist in degraded forests (Barlow et al., 2007a,b; Gibson et al., 2011). Primary old-growth tropical forests are also important for cultural reasons – for example as a source of livelihoods (Mackey and Claudie, 2015).

Old-growth forests are still abundant in Madagascar. Although, their area have been decreasing (Humbert & Cours Darne, 1965; Gade, 1996; Harper et al., 2007). This trend of loss of the old-growth forests is causing a loss of habitats for unique species (Jorg et al., 2001; Clark, 2012). Madagascar is one of the eight most important biodiversity hotspots based on richness and endemism of plants (Schatz, 2000) and vertebrates (Langrand and Wilme, 1997).

One of the important attributes of conservation forests is dead wood. Deadwood has been identified as one of the most important habitats for biodiversity (Speight, 1989; Siitonen, 2001; Grove, 2002; Stokland and Siitonen, 2012). The importance of dead wood for insect biodiversity has been addressed by many authors, but significantly less works are from tropical forests, especially those close to Equator (e.g., Erwin, 1983; Nummelin and Hanski, 1989; Holloway et al., 1992; Kalif et al., 2001; Grove, 2002; Lachat et al., 2006; Ødegaard, 2006; Weiss et al., 2019).

Among forest organisms, the diverse guild of saproxylic invertebrates has a unique status (Speight, 1989). Beetles are considered the most studied and ecologically significant taxon of the saproxylic invertebrates (Jonsell et al., 1998; Stokland et al., 2012). Hence, saproxylic beetles seem to be an appropriate umbrella group for valuable forest conservation (Ranius and Jansson, 2002; Müller et al., 2013, 2014; Bell et al., 2015;

Foit et al., 2016; Eckelt et al., 2018). Unfortunately, no study on saproxylic beetles was conducted in Madagascar.

Research on dead wood biodiversity and its conservation has long focused on the role of dead wood characteristics such as tree species, stem diameter, stage of decay or position (Grove, 2002; Jonsell and Weslien, 2003; Similä et al., 2003; Lindhe et al., 2004; Johansson et al., 2017; Junninen and Komonen, 2011). Many studies in boreal and temperate forests conclude that the insect diversity increases as stands become more open due to improvement of microclimate (e.g. higher temperature; Ranius and Jansson, 2000; Warriner et al., 2002; Widerberg et al., 2012; Bouget et al., 2013). The question remains whether openess will positively influence the diversity of saproxylic beetles in the tropics with high temperatures.

Based on this knowledge, we hypotetized that majority of factors studied in temperate and boreal forest ecosystems would influence beetle species richness differently than in tropics. We mainly predicted that one of the most important factors that increase the species richness in boreal and temperate forest, openness in canopy, would not have important effect due to high temperature in tropics. For these reasons, we chose species rich taxa of saproxylic beetles in tropics – fungus weevils (Anthibidae).

We aimed on the most important environmental variables that affected the species richness and composition of saproxylic beetles in Madagascar, namely, stage of the forest, canopy openness, dead wood size, number of present size-fractions of dead wood, wood decay stage, presence or absence of flight corridor, and elevation.

Material and methods

Madagascar is with its 587,000 square kilometres the fourth-largest island in the world (i.e. equal to France and larger than California). This country lies very close to Equator and lies on the tropic of Capricorn (latitudes 12-26°S; longitudes 43-51°E). The combination of southeastern trade winds and northwestern monsoons produces a hot rainy season from November to April (with frequent destructive cyclones) and cooler dry season during the rest of the year (Vences et al., 2009).

Majority of the remaining tropical lowland forests are along the eastern coast. The central plateau of the island reaches the elevation of 1,500 m above sea level (i.e. equal to majority of the central European mountain ridges).

Madagascar is home to various plants and animals found nowhere else on Earth (90% of all known species are endemic), which is the result of the long isolation by the

Indian Ocean (Tattersall, 2006). This island is under the threat by ongoing loss of the old-growth forest vegetation due to timber harvest (Ganzhorn et al., 2001; Harper et al., 2007) even if nearly 11% of th ecountry is covered by terrestric protected areas (Goodman et al., 2018a).

Study localities

The community of beetles of the family Anthribidae was studied in ten large-scale protected sites that are representative of the major forest types in Madagascar (Fig. 1). The vegetation in study localities was characterised by dominance of various deciduous trees and lianas in the canopy and epiphytes mainly in case of evergreen humid forests (Fig. 2). In three localities the study sites were only in old-growth (close to primary conditions) forest; four localities had sites only in secondary forest; and in three localities sites included both primary and secondary forest (Table 1). Mean annual precitipation in our study sites was 1614mm (1172-2066) and mean annual temperature was 21.3°C (14.2-30.9).

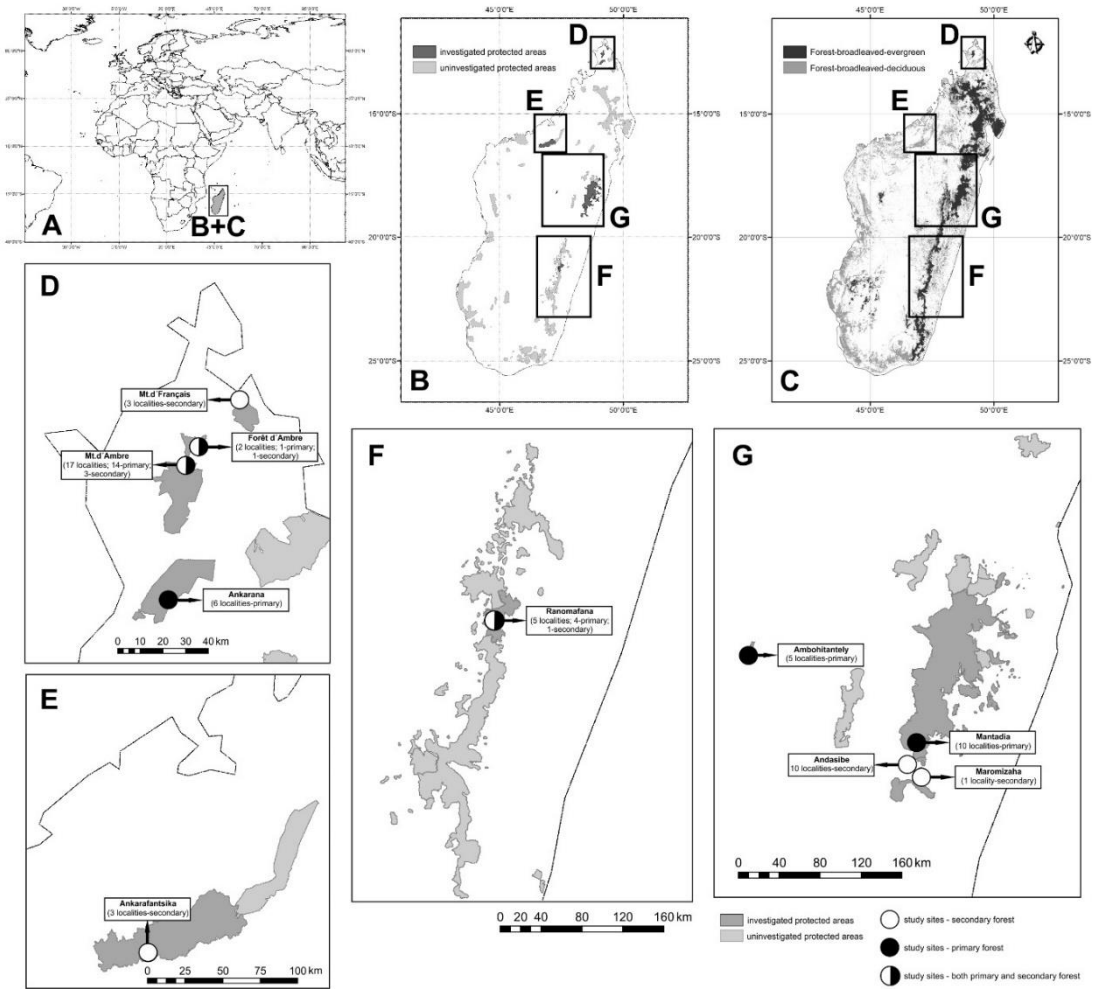

Fig. 1. Detailed map of the study sites in Madagascar (A). Investigated protected areas (B)and extant of forest types (C); detailed positioning of all studied localities according to the presence of old-growth (black circle) and secondary forests (empty circle) in individual localities (D-G) are visualized.

Table 1. Study localities in Madagascar and their main environmental characteristics. Note that naturalness was classified as old-growth forets that very very close to the pristine state with not visible influence by the human and secondary were all other forest vegetation that do not fulfil mentioned conditions.

Locality name	Number of study sites	Elevation (m a.s.l.)	Stage of forest	Shade (%)	Dimension of wood	Present size-fractions of dead wood	Wood decay stage	Corridor	Number of sampling	Year
Mt. d´Ambre	17	1064.8±45.2	Both	45.0±22.0	3.2±1.3	2.5±1.4	2.2±0.6	0.6±0.5	3.6±2.5	2015, 2016
Ambohitantely	5	1624.0±9.5	Old-growth	37.0±25.0	3.7±0.6	3.0±1.0	2.0±0	0.3±0.6	1.7±0.6	2016, 2017
Andasibe	10	968.9±27.0	Secondary	34.0±22.7	3.8±0.4	2.4±1.2	2.0±0	0.9±0.3	2.1±2.3	2015-2017
Ankarafantsika	3	105.3±19.2	Secondary	30.1±10.5	2.3±0.6	2.3±0.6	2.0±0	1.0±0	1.0±0	2015
Ankarana	6	125.7±7.9	Old-growth	37±23	3.3.±0.8	2.0±1.3	2.0±0	0.7±0.5	1.0±0	2016
Forêt d´Ambre	2	496.0±0	Both	40.0±14.1	4.0±0	4.0±0	2.0±0	0.5±0.7	1.0±0	2016
Mt. d´Français	3	270.7±66.4	Secondary	6.7±5.8	2.0±1.0	2.0±1.0	2.0±0	1.0±0	2.0±0	2015
Mantadia	10	969.1±15.3	Old-growth	35.0±21.2	3.8±0.6	3.2±1.3	2.3±0.5	0.6±0.5	2.6±1.8	2015-2017
Maromizaha	1	1063	Secondary	30	4	4	2	1	3	2016
Ranomafana	5	1028.6±88.2	Both	48.0±16.4	3.4±0.5	2.6±1.5	2.2±0.4	0.8±0.4	1.8±1.3	2017

Study taxa

The Anthribidae family currently includes roughly 3,800 species described (Rheinheimer, 2004; Mermudes et Leschen, 2014). Majority of species is distributed in tropical and partly subtropical areas (Rheinheimer, 2004). Anthribids are typical representatives of obligatory saproxylic organisms. Their larvae generally develop in dead wood under the bark and are associated with deadwood decayed by fungi (e.g. Anderson, 1995; Kuschel, 1995; Marvaldi et al., 2002). They demonstrate a preference for deciduous trees. Neither do they associate with any specific type of fungus as food for larvae and mature beetles (Hoffmann, 1945). Adults are predominantly fungivorous (Mermudes et Leschen 2014). This family is a important part of biological diversity of Madagascar and includes many endemic species (e. g. Wolfrum, 1961; Frieser, 2000a, 2000b, 2007; Trýzna, 2017; Trýzna et Baňař, 2012, 2013a, 2014b, 2020).

Sampling method

Based on our previous investigation (Malaise trap, window trap, yellow and blue pan trap, light trap, sifting of litter, observation and manual collection, sweeping and beating) of the anthribid diversity (Holloway, 1982; Trýzna and Baňař, 2012, 2020) and sampling

possibilities in Madagascar, we used the most optimal and standardized method of sampling.

Namely, we used the modified sweeping and beating of dead wood by entomological net (Trýzna and Baňař, 2012). It represents sweeping the lower side of the trunk, branch and twigs with strong regular beating of them by net. The very quick movement during sweeping with net with dimension 40cm was applied due to activity of adult beetles in tropics. Size of net was a compromise between sufficient size of effective surface of net, and quick movement with it in scrubby brushwood. This was standardized by only one collector (MT). Sweeping was followed by catching of netted specimens and direct placement into the collection bottle or using an aspirator. Each bottle was them marked by the code of each sample and locality.

We sampled all suitable dead wood for development of anthribids. This means already dead, attacked by fungi (indicated by fruiting bodies), with bark coverage and without abundant dead leaves – this means that optimal was initial (freshly dead) and partly intermediate stage of decay.

In the course of the three-year study (2015–2017), a total of 62 sites in ten study areas (Table 1) were sampled. The most suitable climate for sampling was roughly two weeks after the start of the rainy season, when it rains for just a few hours a day, mostly at night.

As a standardization of the sampling, each piece of dead wood was sampled for 15 minutes – sweeping and beating all trunks, branches, and twigs. The area was covered in the same way three times more, always over a period of 15 minutes with five minutes break. Thus, there were a total of four samplings made in the course of 60 minutes. The next sampling (if any) at the same study site was repeated after a 24-hour interval.

Species identification

Determination of individual Anthribid species was conducted by comparing captured specimens with reference specimens (holotype, type, lectotype) held by respected scientific institutions (mainly the Zoologische Staatssammlung in Munich, the Natural History Museum in London, and the Muséum national d'Histoire naturelle in Paris). The new species were first divided to the morphospecies and majority of them were published (Trýzna 2017; Trýzna and Andrianomenjanahary, 2019; Trýzna and Banař, 2012, 2013a,

2013b, 2014a, 2014b, 2015a, 2015b, 2016, 2017a, 2017b, 2020) or are prepared for publication.

Study environmental parameters

A series of habitat factors were chosen for which there exists an assumed relationship to species composition and abundance for beetles of the Anthribidae family. Our contribution analyzed the main factors influencing anthribid species bound to dead wood: 1) stage of the forest, 2) canopy openness, 3) dead wood size, 4) number of present size-fractions of dead wood, 5) wood decay stage, 6) presence or absence of flight corridor, 7) elevation, 8) numbers of sampling occasions and 9) year.

Stage of the forest

We used two categories of the stage of the forests studied in Madagascar. Namely, (i) old-growth and (ii) secondary forests. We classified as old-growth the forests that very very close to the pristine state (i.e. primary regarding Goodman et al., 2018a,b,c) with no visible influence by the human.

Old-growth forests were typical by the complex layers of overstorey. The ground floor was generally poor on herbs.

Secondary was all other forest vegetation that do not fulfil mentioned conditions. The secondary forests were almost human-disturbed. The most often they were degraded, recovered after logging. Several of them were regenerated after slash-and-burn agroforestry. They had almost smaller-diameter trees. Ground vegetation was mainly more abundant (Fig. 2).

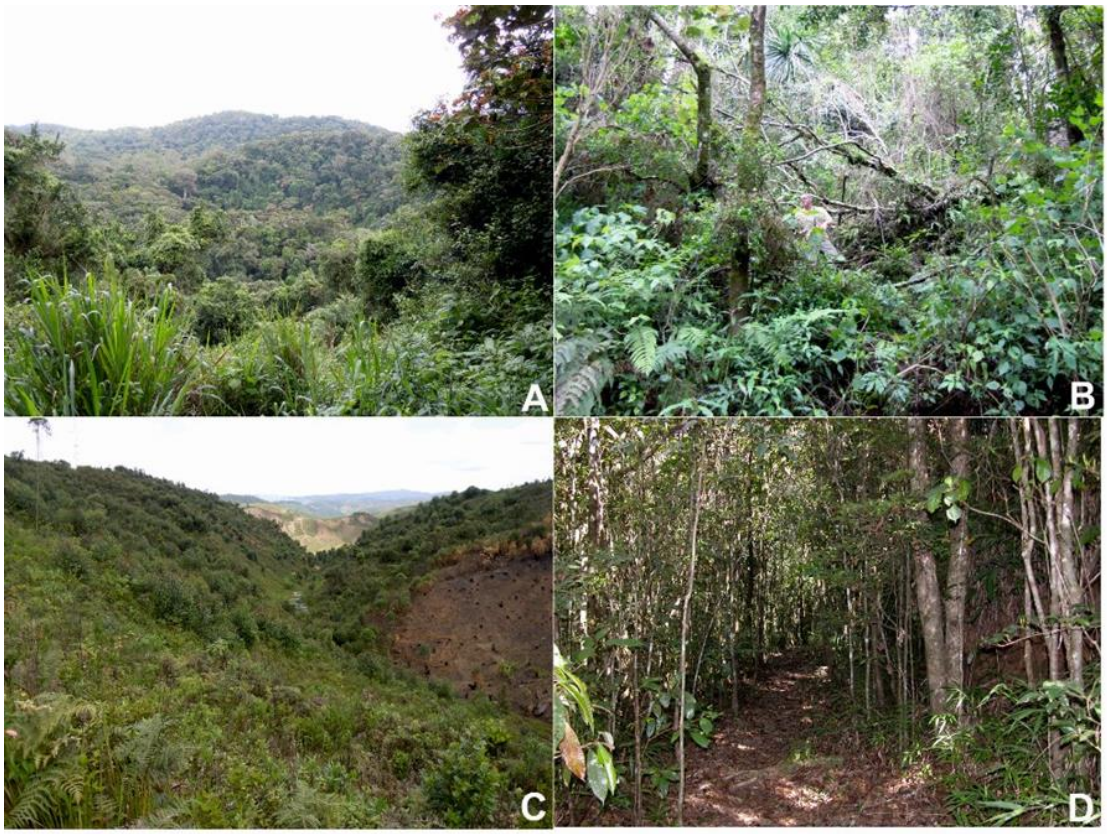

Fig. 2. Illustration of the study forest structure in Madagascar. Old-growth forest (Mt. d´Ambre) in view from a distance (A) and forest interior with the first author (MT) in the middle for the comparison (B). Typical secondary forest (Maromizaha) in view from a distance (C) and forest interior (D).

Canopy openness

This quantity was expressed as a percentage of sunlit that penetrate to the understorey. A qualified estimate of the same person (MT) with the control of the picture of the canopy layer (Nikon Coolpix S8000) was used. Estimation and photographs were taken after the sampling of beetles. At each sampling site, we took four estimations and photos of the sky approximately from the place of sweeping straight up. The photos were converted to monochrome images and processed to make the open sky (including clouds) all white. They were then analysed for percentage white (sky) and black (canopy) using ImageJ, v.1.47 (Korhonen et al., 2006). This give us a value of canopy openness in each site. Estimation values were used for corrections in the case when pictures were taken in the time of high sunlit that caused light spots.

Dead wood size and number of present size-fractions of dead wood

Due to the almost complex structure of environment and irregular shape of the dead wood diameter in studied tropical forests, we classified sampled dead wood into the categories. We used the estimation of the diameter of the dead wood. Therefore, the studied dead wood was classified according to the diameter to four categories: (i) twigs less than 2cm in diameter; (ii) branches 2-9cm; (iii) limbs or trunks 10-19cm; (iv) trunks more than 20cm in diameter.

Each site was also classified by the total number of wood size-fractions present on each site (Fig. 3). Both independent variables reflected the amount and diversity of dead wood.

Fig. 3. Illustration of the dead wood types sampled in Madagascar. Number of dead wood size fractions. A – only category (iv) (see methods) trunks more than 20 cm in diameter; B – only category (i) twigs less than 2 cm in diameter; C – categories (i)-(iii); D – all categories of wood are presented. A, B, D – Mt. d´Ambre, C – Ankarafantsika.

Wood decay stage

We sampled only dead wood potentially suitable for fungus weevils as described above. However, this type of wood was also diversified. We modified categories used by several authors (Tarasov and Birdsey, 2001; Tikkanen et al., 2007) for the best description of the stage of decomposition of the wood. Therefore, we used 3 categories. Namely, (i) initiatial stage with the wood covered with bark, branches were partly with dry leaves; (ii) intermediate stage with the wood still covered with intact bark, but twigs without leaves; (iii) advanced stage with bark of wood already peeling off or partly missing with beginning of degradation of the wood structure, small twigs are already fallen off (Fig. 4).

Fig. 4. Illustration of individual stages of wood decomposition. A - initiation stage (Mt. d´Ambre); B - middle stage, wood still with dry hanging brown leaves (Mantadia); C - middle stage, wood already without leaves, but with the presence of even the thinnest twigs (Mt. d´Ambre); D - more advanced stage, wood without leaves and thinner branches, the bark of the wood may already start to peel off slightly and in some places may be missing (Mt. d´Ambre).

Presence of flight corridor

This variable was not studied in the past studies on saproxylics, however, we hypothetized that it could have importance for our study taxa – e.g. similar to clear cuts in boreal and temperate forests. Presence or absence of clear corridor leading to the study site was defined (e.g., hiking trail, footpath, logging trail, man-made utility corridor, corridors cut in the course of scientific research; Fig. 5).

Fig. 5. Examples of flight corridors in Madagascar. Corridor created by hiking trail in Andasibe (left) and old forest path in Foret d´Ambre (right).

Elevation

It was represented by elevation (m a.s.l.) of study sites centres (Table 1). The localities covered a range of elevations (Table 1) from 88 m a.s.l. (Ankarafantsika) to 1,634m a.s.l. (Ambohitantely). As the locations of study sites had a range of widely different elevations, we used the elevation of the place that was sampled.

Number of sampling ocassions

The number of dead wood pieces (due to specific stage of decay) and the permit to access forests in Madagascar was highly limited. Therefore, we sampled several pieces of dead wood more times. This variable therefore reflected the sampling intensity (i.e. time-spent for sampling).

Year of sampling

We sampled sited during three consecutive years. Even if, the conditions in tropics are relatively stable, we rather used the year of sampling as the reflection of the potential change of climatic conditions.

Statistical analyses

Species richness of the study taxa was used a dependent variable. Linear regression analyses were used for search of the most important environmental variables that influenced species richness. Species richness was first third-root transformed due to reach of normal distribution of model residuals. Variance inflation factors (VIFs) of particular independent variables were lower than 2 and, thus, our results were not influenced by the multi-collinearity. For the search of the most influential environmental variables we used model selection and multi-model interference with the AICc criterion. From 511 models, we selected only those, which Δ AICc was lower than 2 (only 1 model). The analysis on the species richness of new species to the science was computed using linear regression with Poisson distributed dependent variable.

Data were analyzed in SAM v4.0.

Results

Species composition and abundances

We trapped 2,767 specimens of beetles of the family Anthribidae during our three-year long study in Madagascar. This quantity represented altogether 202 species from 36 genera. This includes 2 genera and 108 species (53.5%) new for the science (Appendix 1). The most of species new for the science were found in the genus *Choragus* (30 new species), followed by genera *Caranistes* (14), *Noxius* (11), *Hormiscops* (7), *Lemuricedus* (6), *Diastatotropis* (5), *Triplodus* (5), *Sintor* (4), *Adapterops* (3), *Anhelita* (3), *Litotropis* (3), *Tophoderellus* (2), *Apatenia* (1), *Cenchromorphus* (1), *Epitaphius* (1), *Holophloeus* (1), *Perichoragus* (1), *Sphinctotropis* (1), *Sternocyphus* (1), Tophoderes (1), *Ulorhinus* (1), six species were members of two new genera.

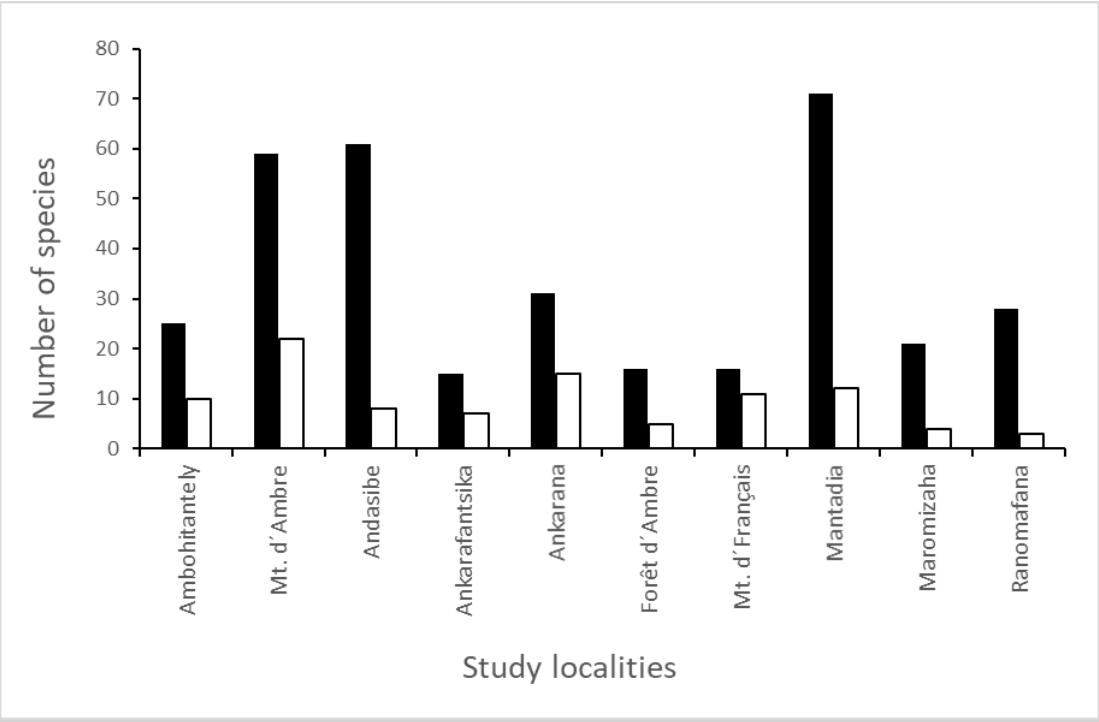

Fig. 6. Numbers of anthribids found in study localities in Madagascar. Black color is number of species and white numbers of newly discovered species.

The total number of species found in each study area (Table 1) ranged from 15 (Ankarafantsika) to 71 (Mantadia) and the share of species collected that were new to science (Fig. 6) ranged from 11% (Ranomafana) to 69% (Mt. des Français). The number of species collected per site varied considerably between 4 and 28 species, as did the number of specimens, which ranged from 5 to 444 (Fig. 7).

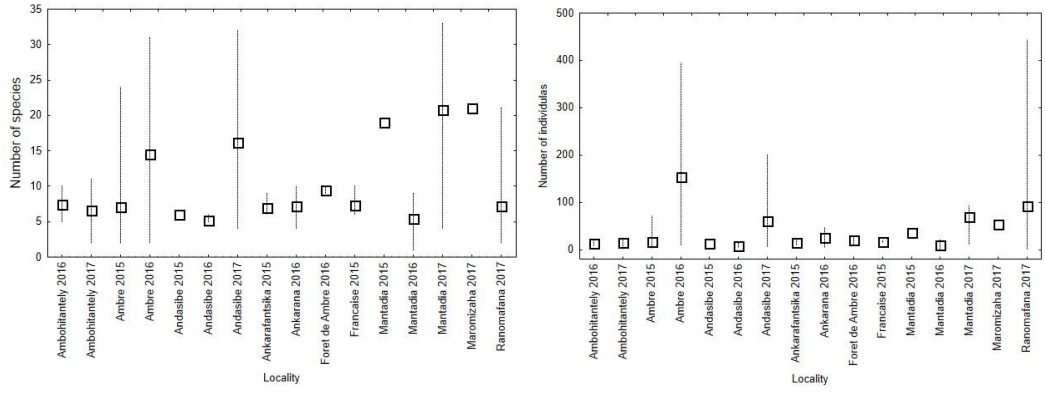

Fig. 7. Mean numbers of anthribid species (left) and specimens (right) per site sampled in localities in 2015-2017 (square-median; lines - minimum and maximum)

The numbers of uniques (species sampled only once) was relatively high. They represent 32% of total species richness. Only 6% (i.e., 14 species) of species were collected in more than 50 individuals (Fig. 7; Appendix 1); namely: *Choragus* sp. 27, *Dysnomelas melagris*, *Diastatotropis perrinae*, *Lemuricedus audouini*, *Holophloeus tuberosus*, *Caranistes fulvopictus*, *Sintor paradistans*, *Choragus* sp. 05, *Caranistes rufipes*, *Holophloeus loebli*, *Lemuricedus madagascariensis*, *Hormiscops* cf. *angustefasciatus*, *Choragus attactus*, and *Lemuricedus maculicollis.*

A total of 93 and 42 species were observed in old-growth forest and secondary forests, respectively. There were 67 species in our sample that appeared in both forest types (Appendix 1).

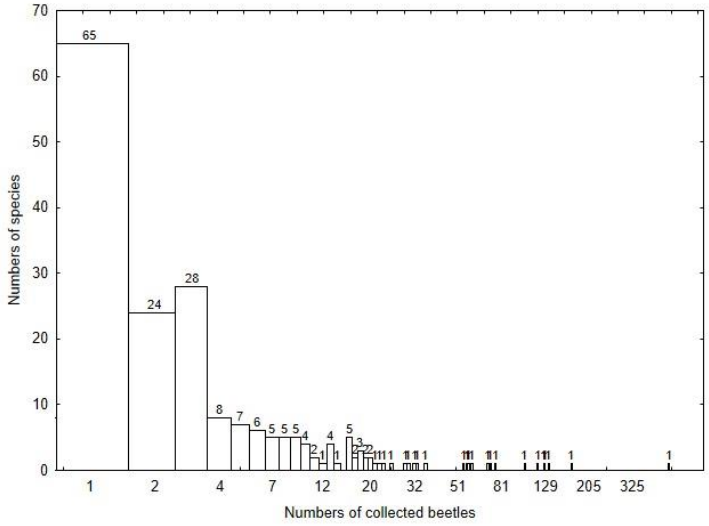

Fig. 8. Observed species abundance of Anthribids collected in Madagaskar (the bars have different widths because the scale is logarithmic).

Species richness and environment

Linear regression analysis was significant ($F = 10.91$; $P < 0.001$; AICc = 63.37) and indicated 60.2% of adjusted explained variance in data. We found that the canopy openess significantly influenced the number of species. Namely, the number of species significantly increased with increasing disturbance in canopy. Higher wood decay stage of studied dead wood significantly decreased the number of species. The numbers of samplings per study site has also significant positive effect on number of species (Table 2).

Table 2. Influence of the studied environmental variables on the number of species found in forests of Madagascar (significant variables are in bold)

Variable	VIF	t	P Value
Constant	-	-0.20	0.840
Numbers of sampling ocassionss	1.32	5.92	**< 0.001**
Year	1.38	0.22	0.827
Elevation	1.211	-0.62	0.536
Canopy openess	1.855	3.15	**0.003**
Dead wood size	1.793	0.50	0.623
Present size-fractions of dead wood	1.8	1.88	0.065
Forest type	1.365	0.15	0.881
Flight corridor	1.511	-0.68	0.503
Wood decay stage	1.416	-2.01	**0.049**

Table 3. Influence of the most influential studied environmental variables on the number of species found in forests of Madagascar (significant variables are in bold).

Variable	VIF	t	P Value
Constant	-	7.77	**< 0.001**
Numbers of sampling ocassions	1.24	6.35	**< 0.001**
Canopy openness	1.28	3.55	**< 0.001**
Present size-fractions of dead wood	1.36	2.53	**0.014**
Wood decay stage	1.28	-2.37	**0.021**

The best OLS model according to the AICc revealed that the numbers of samplings, canopy openness, wood decay stage and its decay stage were the most influential variables. This significant model (F = 25.97; P = < 0.001; AICc = 51.05) explained 62.7% of adjusted variance. The influence of canopy openness, dead wood decay and number of observations remained the same as in the full model. The diversity of dead wood dropped to the significant level and, therefore, higher diversity of dead wood increased the number of species (Table 3).

Table 4. Influence of the studied environmental variables on the number of new species species for science found in forests of Madagascar (significant variables are in bold)

Variable	VIF	z	P Value
Constant	0	-0.60	0.548
Numbers of sampling ocassionss	**1.33**	**3.94**	**< 0.001**
Year	1.37	0.61	0.54
Elevation	1.2	-1.56	0.12
Canopy openess	**1.82**	**-3.15**	**0.002**
Dead wood size	1.74	-1.39	0.164
Dead wood fractions	1.8	0.97	0.334
Forest type	**1.42**	**-2.43**	**0.015**
Flight corridor	1.54	-0.36	0.714
Wood decay stage	**1.41**	**-2.68**	**0.007**

Our analysis on the species richness of the new species for the science revealed that the highest numbers were trapped when forest site was old-growth, had open canopy with fresh dead wood. The sampling intensity had also positive effect (Table 4).

Discussion

Our findings indicate that the most important environmental variables were canopy openness and wood decay stage. We also observed the influence of the number of deadwood size fractions present. The number of collections made, specifically the number of return visits to the site was also significant, which was not surprising. Old-growth forests have strong impact on the trapping of the number of new species for the science.

Canopy openness and flight corridors

The data gathered indicate that canopy openness was a key environmental predictor for the occurrence of a broad spectrum of anthribids. With increasing canopy openness, the species spectrum increases, although there is a lot of light present in general in tropical areas (Malhi and Wright, 2004). The same result was in the case of new species.

These results correspond to the findings of multiple authors that the species richness of deadwood dwellers, including rare and threatened beetles, correlates with the degree and duration of direct sunlight exposure. This fact has been clearly demonstrated

in boreal and mountain forests where summer is shorter and there is a short growing season and a very cold winter (Kaila et al., 1997; Sverdrup-Thygeson and Ims, 2002; Lindhe et al., 2004). Stand openness is important also in temperate deciduous forests where it is also a key habitat feature on a range of spatial scales from regional to object level (Ranius et al., 2011; Bouget et al., 2013; Seibold et al., 2015). This dependence has also been partly demonstrated in the subtropics (Wu et al., 2013).

The richest spectrum of anthribids was found on deadwood located in forest settings in a sunny spot. Such sites in open areas are likely to be visited more frequently because the flight activity of insects is greater in open sunshine than in shade (Jonsell et al., 2004; Lachat et al., 2007). But also, higher habitat heterogeneity due to microclimatic variability explain why species richness, but not only abundance, of saproxylic beetles increased as the amount of deadwood in sunny forest gaps increased.

Other significant open spaces are linear corridors along paths, walks, and forest trails. These were marked and studied as potential flight corridors. We assumed that the presence of a flight corridor could be an important variable for the occurrence of beetles at observed sites. However, this assumption was not confirmed. The likely reason is that most beetles are excellent flyers (with the exception of some of the physically larger species such as the genera *Tophoderes*, *Phloeotragus* and *Holophloeus*) and can easily fly and maneuver through dense vegetation (MT, personal observation). In some regions (e.g., Malaysia or South America) Anthribidae number among the very fastest flying beetles (Trýzna personal observation).

The relationship of beetles to canopy openness in boreal forests is not surprising (Kaila et al., 1997; Sverdrup-Thygeson & Ims, 2002; Lindhe et al., 2004), as they are ectotherms (Danks, 2007; Sformo et al., 2010). However, the effect has also been confirmed in temperate ecosystems (e.g. Ranius and Jansson, 2000; Warriner et al., 2002; Widerberg et al., 2012; Bouget et al., 2013) and some indication of a positive effect is also demonstrated in subtropics (Wu et al., 2013). Due to the temperature limits in boreal and temperate forests, the effect of sun exposure on beetle activity is not very surprising. But it is already quite surprising in the subtropics (Wu et al., 2013), where it could be justified by increasingly less favorable conditions in some parts of the season. However, in the tropics with a stable climate, the positive effect is relatively interesting. According to our assumptions, the effect should be either neutral or rather negative. Nevertheless, it turned out that the species richness of the family Anthribidae reacts very positively to a

higher degree of sun exposure. In addition, it has led to more new species being found for science.

Sun exposure is therefore very important for the species richness of forest beetles, however, for beetles bound to dead wood, a certain quantity and quality of deadwood is assumed to be expressed differently than by sun exposure (Seibold et al., 2016).

Dead wood decay stage and size

Generally, deadwood in different stages of decay is home to different saproxylic fauna (Jonsell et al., 1998) and increases the heterogeneity of deadwood. The stage of decomposition for deadwood is a very important factor for the presence of members of the Anthribidae family (Hoffmann, 1945; Anderson, 1995; Kuschel, 1995; Marvaldi et al., 2002). As a rule, the greatest array of species occurs on deadwood where the trunk, branches, and twigs are still covered with intact bark. This was confirmed by us. At this stage it was possible (in six repetitions) to collect as many as 33 anthribid species on a single piece of deadwood.

It would seem that optimal conditions for anthribids, in contrast to several other groups of saproxylic organisms (Jonsell et al., 1998), persist for just one lone season. If suitable conditions for species development are created and deadwood or dying wood is colonized by suitable fungi then members of the family occur in larger numbers and dozens of species can be found on such suitable deadwoods (Trýzna and Baňař, 2012, Appendix 1). Such wood in tropical primary and secondary forests are surprisingly few and far between for the simple reason that the rate of decomposition in that setting is quite high (Cleveland and Townsend, 2006).

The number of deadwood fractions was another significant factor. The greater the wood heterogeneity, the greater was the spectrum of species found. In general, there is a direct correspondence to the size of the individual species. Larger species (e.g., species of the genera *Tophoderes*, *Lemuricedus*, some *Diastatotropis*, etc.) can only develop on deadwood of larger dimensions. Physically smaller species, in contrast, prefer branches of corresponding size (e.g., genera *Caranistes*, *Litotropis*, *Noxius*, *Sintor* etc.) and the smallest species (e.g., *Choragus*, *Perichoragus*) are only able thrive on finer branches. Furthermore, the smallest species were observed on tree lianas as well (e.g., *Adapterops* and *Triplodus*).

The importance of old-growth forests

Old-growth primary forests close to pristine stage are indicated to support a high concentration of species (Mackey et al., 2014). No major difference in species richness has been detected between primary forest and secondary or degraded (logged) forest for some arthropod assemblages (e.g., Nummelin and Hanski, 1989; Holloway et al., 1992; Kalif et al., 2001; Lachat et al., 2006). Important information in our case is that number of new species was higher in old-growth than in secondary forests. More than fitty percent found anthribids were not known for science. This actually confirms that biodiversity is hidden and if we logged out old forests, we will not even discover many species.

Obviously, an increase in anthropogenic disturbance intensity in old-growth (logging, tree plantation, annual crop) is associated with changes in vegetation and spatial structure. In turn, these factors can affect local temperature and humidity, determining feeding resources and microhabitat availability. Overall species richness tends to decrease with increasing habitat modification. The specific reaction of a particular group of insects depends on the change in its required microhabitat (Schulze et al., 2004, Louzada et al., 2010).

Forest habitat heterogeneity and host plant diversity are a strong influencing factor for arthropod species composition (Tews et al., 2004; Macedo-Reis et al., 2016; Seibold et al., 2016). Natural forests are indeed expected to provide more of the ecological niches and plant diversity that are acknowledged drivers of tropical herbivore diversity (Macedo-Reis et al., 2016). Similarly, a significant difference between primary and secondary forests was not observed for anthribids because the presence of suitable dead or dying wood infested with fungi was of far greater importance (e.g. Anderson, 1995; Kuschel 1995; Marvaldi et al., 2002). The tree species present are not significant (Hoffmann, 1945).

Diversity of fungus weevils

At the current time there have been known 295 known species of the family Anthribidae on the territory of Madagascar (unpublished data). In the course of our study a total of 108 species new to science were collected of a total of 202 species collected. This resulted to 53.5% of total collected specimens (Appendix 1).

The collected share of uniques (one third) is not, however, very high; there have been cases where they account for more than 50% of the assemblage (Buse et al., 2008).

Large proportion of uniques could indicate undersampling (Buse et al., 2008), but we do not believe that this phenomenon indicates very small populations of anthribid species, which is common in the tropics (Rheinheimer, 2004). Generally, for many anthribids only a single specimen is known. Many species have been documented on the basis of a holotype and have never been sighted again (Rheinheimer, 2004).

Nevertheless, some of our sample sizes were seriously affected by one or a few abundant species. This is known; abundant species can make up a large proportion, even up to 70%, of the total catch of forest beetles (e.g. in Similä et al., 2002). Our 202 collected species, however, fulfill the requirement for a large sample size (more than 200 species) when studying threatened species (Martikainen and Kouki, 2003).

Most abundant are the physically smaller species of the subfamily Choraginae that often live gregariously (Trýzna, personal observation). Representatives of two other subfamilies, Anthribinae and Apolectinae, do not live in colonies. Generally, smaller species are more difficult to find by direct searching than large ones, and their abundance per unit area is higher than that of larger species (Stork and Blackburn, 1993).

Conclusions and management implications

Our research fills the knowledge gap about saproxylic organisms in tropics. Surpringly, the results were mainly consistent with their known biodiversity patterns – as we predicted that in climate with higher annual temperatures, canopy openness would not be a limiting factor for a group of saproxylics – especially, those that are highly connected with tropical climate as fungus weevils.

This is novel knowledge regarding the management implications of tropical forests. Forests with disturbed canopies are more suitable for saproxylic beetles. This can be reached by natural gap disturbance dynamics in old-growth forests and by cutting of trees with large crowns in secondary forests. The management recommendation for secondary forests in tropics is the leaving of diversified dead wood after the felling of trees.

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References

ANDERSON, R.S. (1995) An evolutionary perspective on diversity in Curculionoidea. Memoirs of the Entomological Society of Washington, 14: 103–114.

BARLOW, J., GARDNER, T.A., ARAUJO, I.S., ÁVILA-PIRES, T.C., BONALDO, A.B., COSTA, J.E., ESPOSITO, M.C., FERREIRA, L.V., HAWES, J., HERNANDEZ, M.I.M. (2007a) Quantifying the biodiversity value of tropical primary, secondary, and plantation forests. PNAS. 104 (47): 18555–18560. doi:10.1073/pnas.0703333104

BARLOW, J.A., OVERALL, W.L., ARAUJO, I.S., GARDNER, T.A., PERES, C.A. (2007b) The value of primary, secondary and plantation forests for fruit-feeding butterflies in the Brazilian Amazon. Journal of Applied Ecology, 44: 1001–1012.

BELL, D., HJÄLTEN, J., NILSSON, C., JÖRGENSEN, D., JOHANSSON, T. (2015) Forest restoration to attract a putative umbrella species, thewhite-backedwoodpecker, benefited saproxylic beetles. Ecosphere, 6 (12): 1–14.

BOUGET, C., LARRIEU, L., NUSILLARD, B., PARMAIN, G. (2013) In search of the best local habitat drivers for saproxylic beetle diversity in temperate deciduous forests. Biodiversity Conservation, 22: 2111–2130. doi.org/10.1007/s10531-013-0531-3

BUSE, J., LEVANONY, T., TIMM, A., DAYAN, T., ASSMANN, T. (2008) Saproxylic beetle assemblages of three managed oak woodlands in the Eastern Mediterranean. Zoology in the Middle East, 45 (1): 55–66.

CLARK, M. (2012) Deforestation in Madagascar: Consequences of Population Growth and Unsustainable Agricultural Processes. Global Majority E-Journal, 3 (1): 61–71.

CLEVELAND, C.C., TOWNSEND, A.R. (2006) Nutrient additions to a tropical rain forest drive substantial soil carbon dioxide losses to the atmosphere. Proceedings of the National Academy of Sciences, 103 (27): 10316–10321. doi:10.1073/pnas.0600989103

DANKS, H.V. (2007) The elements of seasonal adaptations in insects. The Canadian Entomologist, 139: 1–44. doi:10.4039/n06-048

ECKELT, A., MÜLLER, J., BENSE, U., BRUSTEL, H., BUßLER, H., CHITTARO, Y., CIZEK, L., FREI, A., HOLZER, E., KADEJ, M., KAHLEN, M., KÖHLER, F., MÖLLER, G., MÜHLE, H., SANCHEZ, A., SCHAFFRATH, U., SCHMIDL, J., SMOLIS, A., SZALLIES, A., NÉMETH, T., WURST, C., THORN, S., CHRISTENSEN, R.H.B., SEIBOLD, S. (2018) "Primeval forest relict beetles" of Central Europe: a set of 168 umbrella species for the protection of primeval forest remnants. Journal of Insect Conservation, 22: 15–28.

ERWIN, T.L. (1983) Beetles and other insects of the tropical forest canopies at Manaus, Brazil, sampled with insecticidal fogging techniques. In: Sutton, S.L, Whitmore,

T.C., Chadwick, A.C. (eds.) Tropical Rain Forest: Ecology and Management. Blackwell Scientific Publications, Oxford, 59–75.

FOIT, J., KASAK, J., NEVORAL, J. (2016) Habitat requirements of the endangered longhorn beetle Aegosoma scabricorne (Coleoptera: Cerambycidae): a possible umbrella species for saproxylic beetles in European lowland forests. Journal of Insect Conservation, 20: 837–844.

GIBSON, L., LEE, T.M., KOH, L.P., BROOK, B.W., GARDNER, T.A., BARLOW, J., PERES, C.A., BRADSHAW, C.J.A., LAURENCE, W.F., LOVEJOY T.E., SODHI, N.S. (2011) Primary forests are irreplaceable for sustaining tropical biodiversity. Nature, 478 (7369): 378–381. doi:10.1038/nature10425

FRIESER, R. (2000a) Einige neue Anthribiden von Madagaskar und der Ile de la Réunion (Coleoptera: Anthribidae). Acta Coleopterologica, 16 (1): 35–51.

FRIESER, R. (2000b) Neue Anthribiden von Madagaskar, Neu Guinea und aus der orientalischen Region (Coleoptera, Anthribidae). Acta Coleopterologica, 16 (2): 23–39.

FRIESER, R. (2007) Ein neuer Beitrag zur Kenntnis der Anthribiden Madagascars (Coleoptera: Anthribidae. Acta Coleopterologica, 23 (3): 33–56.

GADE, D.W. (1996) Deforestation and its effects in highland Madagascar. Mountain Research and Development, 16 (2): 101–116.

GANZHORN, J.U., LOWRY, P.P., SCHATZ, G.E., SOMMER, S. (2001) The biodiversity of Madagascar: one of the world's hottest hotspots on its way out. Oryx, 35 (4): 346–348.

GOODMAN, S.M., RAHERILALAO, M.J., WOHLAUSER, S. (eds.) (2018a) Les aires protégées terrestres de Madagascar: Leur histoire, description at biote. The terrestrial protected areas of Madagascar: Their history, description, and biota. Tome I. Introduction. Association Vahatra, Antananarivo, Madagascar, 1–424.

GOODMAN, S.M., RAHERILALAO, M.J., WOHLAUSER, S. (eds.) (2018b) Les aires protégées terrestres de Madagascar: Leur histoire, description at biote. The terrestrial protected areas of Madagascar: Their history, description, and biota. Tome II. Northern and eastern Madagascar. Association Vahatra, Antananarivo, Madagascar, 425–1231.

GOODMAN, S.M., RAHERILALAO, M.J., WOHLAUSER, S. (eds.) (2018c) Les aires protégées terrestres de Madagascar: Leur histoire, description at biote. The terrestrial protected areas of Madagascar: Their history, description, and biota.

Tome III. Western and southwestern Madagascar - Synthesis. Association Vahatra, Antananarivo, Madagascar, 1232–1716.

GROVE, S.J. (2002) Tree basal area and dead wood as surrogate indicators of saproxylic insect faunal integrity: a case study from the Australian lowland tropics. Ecological Indicators 1: 171–188.

HARPER, G.J., STEININGER, M.K., TUCKER, C.J., JUHN, D., HAWKINS, F. (2007) Fifty years of deforestation and forest fragmentation in Madagascar. Environmental Conservation 34 (4): 325–333. doi:10.1017/S0376892907004262

HOFFMANN, A. (1945) Coléoptères Bruchides et Anthribides. Faune de France, 44: 1–184.

HOLLOWAY, B.A. (1982) Anthribidae (Insecta: Coleoptera). Fauna of New Zealand, 3: 1–269.

HOLLOWAY, J.D., KIRK-SPRIGGS, A.H., KHEN, C.V. (1992) The response of some rain forest insect groups to logging and conversion to plantation. In: Marshall, A.G., Swaine M.D. (eds.) Tropical Rain Forest: Disturbance and Recovery. Philosophical Transactions of the Royal Society of London Series B. 335: 425–436.

HUMBERT, H., COURS DARNE, G. (eds.) (1965) Notice de la Carte Madagascar. Puducherry, India: Section Scientifique et Technique de L'Institut Francais de Pondich´ery.

JOHANSSON, T., GIBBB, H., HJÄLTÉN, J., DYNESIUS, M. (2017) Soil humidity, potential solar radiation and altitude affect boreal beetle assemblages in dead wood. Biological Conservation, 209: 107–118.

JONSELL, M., NITTÉRUS, K., STIGHÄLL, K. (2004) Saproxylic beetles in natural and man-made deciduous high stumps retained for conservation. Biological Conservation, 118: 163–173.

JONSELL, M., WESLIEN, J. (2003) Felled or standing retained wood - it makes a difference for saproxylic beetles. Forest Ecology and Management, 175: 425–435.

JONSELL, M., WESLIEN, J., EHNSTRÖM, B. (1998) Substrate requirements of red-listed saproxylic invertebrates in Sweden. Biodiversity and Conservation, 7: 749–764.

JÖRG, U., GANZHORN, P.P., LOWRY, II, SCHATZ, G.E., SOMMER S. (2001) The Biodiversity of Madagascar: One of the World's Hottest Hotspots on Its Way Out. Oryx 35 (4): 346–348.

JUNNINEN, K., KOMONEN, A. (2011) Conservation ecology of boreal polypores: a review. Biological Conservation, 144: 11–20.

KAILA, L., MARTIKAINEN, P., PUNTTILA, P. (1997) Dead trees left in clear-cuts benefit saproxylic Coleoptera adapted to natural disturbances in boreal forest. Biodiversity and Conservation 6: 1–18.

KALIF, K.A.B., AZEVEDO-RAMOS, C., MOUTINHO, P., MALCHER, S.A.O. (2001) The effect of logging on the ground-foraging ant community in eastern Amazonia. Studies on Neotropical Fauna and Environment, 36: 1–5.

KORHONEN, L., KORHONEN, K.T., RAUTIAINEN, M., STENBERG, P. (2006) Estimation of forest canopy cover: a comparison of field measurement techniques. Silva Fennica, 40 (4): 577–588.

KUSCHEL, G. (1995) A phylogenetic classification of Curculionoidea to families and subfamilies. Memoirs of the Entomological Society of Washington, 14: 5–33.

LACHAT, T., ATTIGNON, S., DJEGO, J., GOERGEN, G., NAGEL, P., SINSIN, B., PEVELING, R. (2006) Arthropod diversity in Lama forest reserve (South Benin), a mosaic of natural, degraded and plantation forests. Biodiversity and Conservation, 15: 3–23. doi:10.1007/s10531-004-1234-6

LACHAT, T., PEVELING, R., ATTIGNON, S., GOERGEN, G., SINSIN, B., NAGEL P. (2007) Saproxylic beetle assemblages on native and exotic snags in a West African tropical forest. African Entomology, 15 (1):13–24.

LANGRAND, O., WILMÉ, L. (1997) Effects of forest fragmentation on extinction patterns of the endemic avifauna on the central high plateau of Madagascar. In: Natural Change and Human Impact in Madagascar (Goodman, S.M., Patterson B.D., eds.), 280–308. Smithsonian Institution Press, Washington DC.

LINDHE, A., ÅSENBLAD, N., TORESSON, H.-G. (2004) Cut logs and high stumps of spruce, birch, aspen and oak - nine years of saproxylic fungi succession. Biological Conservation, 119: 443–454.

LOUZADA, J., GARDNER, T., PERES, C., BARLOW, J. (2010) A multi-taxa assessment of nestedness patterns across a multiple-use Amazonian forest landscape. Biological Conservation, 143: 1102–1109.

MACEDO-REIS, L.E., NOVAIS, S.M., MONTEIRO, G.F., FLECHTMANN, C.A., FARIA, M.L., DE NEVES, F.S. (2016) Spatio-temporal distribution of bark and ambrosia beetles in a Brazilian tropical dry forest. Journal of Insect Science, 16: 1–9.

MACKEY, B., CLAUDIE, D. (2015) Points of contact: Integrating traditional and scientific knowledge for biocultural conservation. Environmental Ethics, 37: 341–357.

MACKEY, B., DELLASALA, D.A., KORMOS, C., LINDENMAYER, D., KUMPEL, N., ZIMMERMAN, B., HUGH, S., YOUNG, V., FOLEY, S., ARSENIS, K., WATSON J.E.M. (2014) Policy options for the world's primary forests in multilateral environmental agreements. Conservation Letters 8: 139–147.

MALHI, Y., WRIGHT, J. (2004) Spatial patterns and recent trends in the climate of tropical rainforest regions. Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 359 (1443): 311–329. doi:10.1098/rstb.2003.1433

MARTIKAINEN, P., KOUKI, J. (2003) Sampling the rarest: threatened beetles in boreal forest biodiversity inventories. Biodiversity and Conservation, 12: 1815–1831.

MARVALDI, A.E., SEQUEIRA, A.S., O'BRIEN, C.W., FARRELL, B.D. (2002) Molecular and morphological phylogenetics of weevils (Coleoptera, Curculionoidea): do niche shifts accompany diversification? Systematic Biology, 51: 761–785.

MERMUDES, J.R.M., LESCHEN, R.A.B. (2014) 3.2. Anthribidae Billberg, 1820, pp. 309-315, In: R.A.B. Leschen, R.G. Beutel. Handbook of Zoology. Arthropoda: Insecta. Coleoptera, Beetles. Volume 3: Morphology and Systematics (Phytophaga). Hubert & Co. GmbH & Co. KG, Gottingen, 1–675.

MÜLLER, J., BRUNET, J., BRIN, A., BOUGET, C., BRUSTEL, H., BUSSLER, H., FORSTER, B., ISACSSON, G., KOHLER, F., LACHAT, T., GOSSNER, M.M. (2013) Implications from large-scale spatial diversity patterns of saproxylic beetles for the conservation of European Beech forests. Insect Conservation and Diversity, 6: 162–169.

MÜLLER, J., JARZABEK-MULLER, A., BUSSLER, H., GOSSNER, M.M. (2014) Hollow beech trees identified as keystone structures for saproxylic beetles by analyses of functional and phylogenetic diversity. Animal Conservation, 17: 154–162.

NUMMELIN, M., HANSKI, I. (1989) Dung beetles of the Kibale Forest, Uganda; comparison between virgin and managed forests. Journal of Tropical Ecology, 5: 349–352.

ØDEGAARD, F. (2006) Host specifity, alpha- and beta- diversity of phytophagous Beatles in two tropical forests in Panama. Biodiversity and Conservation, 15: 83–105.

RANIUS, T., JANSSON, N. (2000) The influence of forest regrowth, original canopy cover and tree size on saproxylic beetles associated with old oaks. Biological Conservation, 95: 85–94. doi.org/10.1016/S0006-3207(00)00007-0

RANIUS, T., JANSSON, N. (2002) A comparison of three methods to survey saproxylic beetles associated with old oaks. Biodiversity and Conservation, 11: 1759–1771.

RANIUS, T., MARTIKAINEN, P., KOUKI, J. (2011) Colonisation of Ephemeral Forest Habitats by Specialised Species: Beetles and Bugs Associated with recently Dead Aspen Wood. Biodiversity and Conservation, 2903–2915.

RHEINHEIMER, J. (2004) Illustrierter Katalog und Bibliographie der Anthribidae der Welt (Insecta: Coleoptera). Mitteilungen des Entomologischen Vereins, 39: 102–103.

SCHATZ, G.E. (2000) Endemism in the Malagasy tree flora. In: Biogeography of Madagascar (Lourenco, W.R., Goodman S.M. (eds.). Memoires de la Societe de Biogeographie, Paris, 1–9.

SCHULZE, CH., WALTERT, M., KESSLER, P.J.A., PITOPANG, R., VEDDELER, D., MÜHLENBERG, M., GRADSTEIN, S.R., LEUSCHNER, C., STEFFAN-DEWENTER, I., TSCHARNTKE, T. (2004) Biodiversity indicator groups of tropical land-use systems: Comparing plants, birds, and insects. Ecological Applications, 14: 1321–1333.

SEIBOLD, S., BÄSSLER, C., BRANDL, R., BÜCHE, B., SZALLIES, A., THORN, S., ULYSHEN, M.D., MÜLLER, J. (2016) Microclimate and habitat heterogeneity as the major drivers of beetle diversity in dead wood. Journal of Applied Ecology, 53: 934–943.

SEIBOLD, S., BÄSSLER, C., BRANDL, R., GOSSNER, M.M., THORN, S., ULYSHEN, M.D., MÜLLER, J. (2015) Experimental studies of dead-wood biodiversity — A review identifying global gaps in knowledge. Biological Conservation, 191: 139–149.

SFORMO, T., WALTERS, K., JEANNET, K., WOWK, B., FAHY, G.M., BARNES, B.M., DUMAN, J.G. (2010) Deep supercooling, vitrification and limited survival to -100 °C in the Alaskan beetle Cucujus clavipes puniceus (Coleoptera: Cucujidae) larvae. Journal of Experimental Biology, 213 (3): 502–509. doi:10.1242/jeb.035758

SIITONEN, J. (2001) Forest management, coarse woody debris and saproxylic organisms: Fennoscandian boreal forests as an example. Ecological Bulletins, 49, 11–41.

SIMILÄ, M., KOUKI, J., MARTIKAINEN, P. (2003) Saproxylic beetles inmanaged and seminatural scots pine forests: quality of dead wood matters. Forest Ecology and Management, 174: 365–381.

SIMILÄ, M., KOUKI, J., MARTIKAINEN, P., UOTILA, A. (2002) Conservation of beetles in boreal pine forests: the effects of forest age and naturalness on species assemblages. Biological Conservation, 106: 19–27. doi.org/10.1016/S0006-3207(01)00225-7

SPEIGHT, M.C.D. (1989) Saproxylic Invertebrates and their Conservation. Council of Europe, Strasbourg, 1–78.

STOKLAND, J.N., SIITONEN, J. (2012) Biodiversity in Dead Wood. Cambridge University Press, Cambridge, 1–524.

STORK, N.E., BLACKBURN, T.M. (1993) Abundance, body size and biomass of arthropods in tropical forest. Oikos, 67: 483–489.

SVERDRUP-THYGESON, A., IMS, R.A. (2002) The effect of forest clearcutting in Norway on the community of saproxylic beetles on aspen. Biological Conservation, 106: 347–357. doi.org/10.1016/S0006-3207(01)00261-0

TARASOV, M.E., BIRDSEY, R.A. (2001) Decay rate and potential storage of coarse woody debris in the Leningrad region. Ecological Bulletins, 49: 137–147.

TATTERSALL, I. (2006) Origin of the Malagasy Strepshirhine Primates. Springer. pp. 1–6. ISBN 978-0-387-34585-7.

TEWS, J., BROSE, U., GRIMM, V., TIELBÖRGER, K., WICHMANN, M.C., SCHWAGER, M., JELTSCH, F. (2004) Animal species diversity driven by habitat heterogeneity/ diversity: the importance of keystone structures. Journal of Biogeography, 31: 79–92.

TIKKANEN, O., HEINONEN, T., KOUKI, J., MATERO, J. (2007) Habitat suitability models of saproxylic red-listed boreal forest species in long-term matrix management: cost-effective measures for multi-species conservation. Biological Conservation, 140: 359–372.

TRÝZNA, M. (2017) Description of a new species of the genus Tophoderes Dejean (Coleoptera: Anthribidae) from east Madagascar, with images of all Madagascan species of the genus. Zootaxa, 4221 (3): 377–385. doi.org/10.11646/zootaxa.4221.3.6

TRÝZNA, M., ANDRIANOMENJANAHARY, M.N. (2019) Description of a new species of the genus Diastatotropis Lacordaire (Coleoptera: Anthribidae) with strikingly elongated elytral apices from north-eastern Madagascar. Zootaxa, 4563 (3): 444–450. doi.org/10.11646/zootaxa.4563.3.2

TRÝZNA, M., BAŇAŘ, P. (2012) New species of Adapterops (Coleoptera: Anthribidae) from east Madagascar with a key to species and notes on sexual dimorphism and biodiversity of the family. Acta Entomologica Musei Nationalis Pragae, 52 (2): 475–485. Available from: http://www.aemnp.eu/pdf/52_2/52_2_475.pdf (Accessed 26 April, 2020)

TRÝZNA, M., BAŇAŘ, P. (2013a) A new species of the genus Apatenia (Coleoptera: Anthribidae) from Madagascar with notes on female genitalia, redescription of the female of Apatenia quadristigma Frieser and list of Madagascan species. Zootaxa, 3609 (5): 504–512. doi.org/10.11646/zootaxa.3609.5.6

TRÝZNA, M., BAŇAŘ, P. (2013b) A new species of the genus Basidissus (Coleoptera: Anthribidae) from east Madagascar, with a key to species. Zootaxa, 3721 (1): 71–78. doi.org/10.11646/zootaxa.3721.1.3

TRÝZNA, M., BAŇAŘ, P. (2014a) A new species of the genus Blaberops (Coleoptera: Anthribidae) from east Madagascar, with a key to species. Zootaxa, 3826 (2): 386–392. doi.org/10.11646/zootaxa.3826.2.8

TRÝZNA, M., BAŇAŘ, P. (2014b) Description of a new genus and species, Pseudobasidissus barclayi (Coleoptera: Anthribidae), from east Madagascar. Zootaxa, 3869 (2): 180–188. doi.org/10.11646/zootaxa.3869.2.8

TRÝZNA, M., BAŇAŘ, P. (2015a) A new species of Tophoderes Dejean from northern Madagascar with a checklist of the species (Coleoptera: Anthribidae). Zootaxa, 3905 (2): 264–272. doi.org/10.11646/zootaxa.3905.2.7

TRÝZNA, M., BAŇAŘ, P. (2015b) A new species of the genus Adapterops (Coleoptera: Anthribidae) from northern Madagascar, with a catalogue and key to species. Zootaxa, 4052 (4): 485–489. doi.org/10.11646/zootaxa.4052.4.8

TRÝZNA, M., BAŇAŘ, P. (2016) Two new species of Diastatotropis Lacordaire (Coleoptera: Anthribidae) from east Madagascar with a key to species of the genus. Zootaxa, 4161 (3): 429–436. doi.org/10.11646/zootaxa.4161.3.10

TRÝZNA, M., BAŇAŘ, P. (2017a) A new species of Diastatotropis Lacordaire (Coleoptera: Anthribidae) from Montagne d´Ambre National Park, northern Madagascar. Zootaxa, 4221 (5): 537–544. doi.org/10.11646/zootaxa.4221.5.3

TRÝZNA, M., BAŇAŘ, P. (2017b) Two new species of Adapterops (Coleoptera: Anthribidae) from protected areas of northern Madagascar, with a key to species, and new faunistic data on the genus. Zootaxa, 4231 (2): 238–250. doi.org/10.11646/zootaxa.4231.2.6

TRÝZNA, M., BAŇAŘ, P. (2020) A new species of Holophloeus Jordan (Coleoptera: Anthribidae) from eastern Madagascar with ecological notes on it and H. tuberosus (Fairmaire, 1897). Zootaxa, 4732 (1): 79–98. doi.org/10.11646/zootaxa.4732.1.3

VENCES, M., WOLLENBERG, K.C., VIEITES, D.R., LEES, D.C. (2009) Madagascar as a model region of species diversification. Trends in Ecology and Evolution, 24 (8): 456–465.

WARRINER, M.D., NEBEKER, T.E., LEININGER, T.D., MEADOWS, J.S. (2002) The effects of thinning on beetles (Coleoptera: Carabidae, Cerambycidae) in bottomland hardwood forests. Gen. Tech. Rep. SRS–48. U.S. Department of Agriculture, Forest Service, Southern Research Station, Asheville, 569–573.

WEISS, M., DIDHAM, R. K., PROCHÁZKA, J., SCHLAGHAMERSKÝ, J., BASSET, Y., ØDEGAARDH, F., TICHECHKIN, A., SCHMIDL, J., FLOREN, A., CURLETTI, G., ABERLENC, H.-P., BAIL, J., BARRIOS, H., LEPONCE, M., MEDIANERO, E., FAGAN, L.L., CORBARA, B., CIZEK, L. (2019) Saproxylic beetles in tropical and temperate forests – A standardized comparison of vertical stratification patterns. Forest Ecology and Management, 444: 50–58.

WIDERBERG, M.K., RANIUS, T., DROBYSHEV, I., NILSSON, U., LINDBLADH, M. (2012) Increased openness around retained oaks increases species richnessof saproxylic beetles. Biodiversity Conservation, 21: 3035–3059. doi.org/10.1007/s10531-012-0353-8

WOLFRUM, P. (1961) Anthribiden aus dem Institut Scientifique de Madagascar. Entomologische Arbeiten aus dem Museum G. Frey, 12: 291–325.

WU, J., PAN, H., YANG, S., NIU, X. (2013) Tree species and elevation influence the assemblage composition of saproxylic beetles in subtropical forest of east China. Forest Ecology and Management, 292: 29–38.

Appendix 1: Survey of found species and their collected numbers

Number of species	New species for science found during present study (*)	Name of species	Number of individuals found in old-growth forest	% (old-growth forest)	Number of individuals found in secondary forest	% (secondary forest)	Total number of individuals found during present study
1	*	Adapterops cedrici Trýzna & Bařař, 2015	3	0,14	4	0,71	7
2	*	Adapterops dimbyi Trýzna & Bařař, 2017	1	0,05	0	0,00	1
3		Adapterops festivus Frieser, 2010	4	0,18	14	2,49	18
4		Adapterops hankae Trýzna, 2012	23	1,04	0	0,00	23
5	*	Adapterops mamyi Trýzna & Bařař, 2017	0	0,00	3	0,53	3
6		Anhelita lineata Jordan, 1895	5	0,23	11	1,96	16
7	*	Anhelita sp. n. 01	16	0,73	0	0,00	16
8	*	Anhelita sp. n. 02	2	0,09	4	0,71	6
9	*	Anhelita sp. n. 03	0	0,00	2	0,36	2
10		Apatenia fallax Frieser, 2010	14	0,63	6	1,07	20
11		Apatenia longiclava Wolfrum, 1955	19	0,86	3	0,53	22
12	*	Apatenia sp. n. 01	13	0,59	0	0,00	13
13		Apatenia sulcicollis Frieser, 2000	0	0,00	7	1,25	7
14		Baseocolpus punctifer Frieser, 2000	0	0,00	1	0,18	1
15		Basidissus cristatus Fairmaire, 1897	3	0,14	0	0,00	3
16		Basidissus fulvitarsis Frieser, 2007	1	0,05	0	0,00	1
17		Blaberops korinae Trýzna & Bařař, 2014	0	0,00	1	0,18	1
18		Caranistes cyphosis Wolfrum, 1959	19	0,86	17	3,02	36
19		Caranistes dubius Frieser, 2007	1	0,05	0	0,00	1
20		Caranistes filitarsis (Fairmaire, 1897)	1	0,05	2	0,36	3
21		Caranistes fulvopictus Fairmaire, 1898	113	5,12	6	1,07	119
22		Caranistes gibbosus Frieser, 2007 (cf.)	10	0,45	6	1,07	16
23		Caranistes laticollis Frieser, 2007 (cf.)	0	0,00	4	0,71	4
24		Caranistes latifrons (Fairmaire, 1901) (cf.)	2	0,09	1	0,18	3
25		Caranistes lineatus Fahraeus, 1839	1	0,05	1	0,18	2
26		Caranistes marmorinus Wolfrum, 1959	9	0,41	0	0,00	9
27		Caranistes rhanisus Wolfrum, 1959	9	0,41	9	1,60	18
28		Caranistes rufipes Jordan, 1895	16	0,73	56	9,96	72
29		Caranistes sonjai Frieser, 2010	0	0,00	1	0,18	1
30	*	Caranistes sp. n. 01	2	0,09	0	0,00	2
31	*	Caranistes sp. n. 02	16	0,73	1	0,18	17
32	*	Caranistes sp. n. 03	1	0,05	0	0,00	1
33	*	Caranistes sp. n. 04	0	0,00	1	0,18	1
34	*	Caranistes sp. n. 05	0	0,00	1	0,18	1
35	*	Caranistes sp. n. 06	1	0,05	0	0,00	1
36	*	Caranistes sp. n. 07	2	0,09	0	0,00	2
37	*	Caranistes sp. n. 08	1	0,05	0	0,00	1

Number of species	New species for science found during present study (*)	Name of species	Number of individuals found in old-growth forest	% (old-growth forest)	Number of individuals found in secondary forest	% (secondary forest)	Total number of individuals found during present study
38	*	Caranistes sp. n. 09	0	0,00	1	0,18	1
39	*	Caranistes sp. n. 10	1	0,05	0	0,00	1
40	*	Caranistes sp. n. 11	0	0,00	1	0,18	1
41	*	Caranistes sp. n. 12	2	0,09	1	0,18	3
42	*	Caranistes sp. n. 13	1	0,05	0	0,00	1
43	*	Caranistes sp. n. 14	1	0,05	0	0,00	1
44		Caranistes strenus Frieser, 2007 (cf.)	1	0,05	0	0,00	1
45		Caranistes subvittatus Frieser, 2007 (cf.)	2	0,09	0	0,00	2
46		Caranistes taeniatus Frieser, 2007	0	0,00	4	0,71	4
47	*	Cenchromorphus sp. n. 01	2	0,09	0	0,00	2
48		Diastatotropis clavigera Frieser, 1992	6	0,27	4	0,71	10
49		Diastatotropis elegans Fairmaire (in litt.)	9	0,41	0	0,00	9
50	*	Diastatotropis humeralis Trýzna & Bařař, 2016	7	0,32	2	0,36	9
51		Diastatotropis irrorata Lacordaire, 1866	15	0,68	17	3,02	32
52		Diastatotropis olivacea Waterhouse, 1882	10	0,45	11	1,96	21
53	*	Diastatotropis perrinae Trýzna & Bařař, 2017	134	6,08	0	0,00	134
54	*	Diastatotropis sp. n. 01	0	0,00	3	0,53	3
55	*	Diastatotropis sp. n. 02	1	0,05	0	0,00	1
56	*	Diastatotropis sp. n. 03	1	0,05	0	0,00	1
57		Diastatotropis tessellata Fairmaire, 1897	11	0,50	1	0,18	12
58		Diastatotropis viridans Fairmaire, 1897	5	0,23	0	0,00	5
59		Dysnomelas melagris Frieser, 1981	152	6,89	19	3,38	171
60		Entaphoides brunneofasciata Wolfrum, 1961	1	0,05	0	0,00	1
61		Epitaphius albatus Wolfrum, 1961	1	0,05	0	0,00	1
62		Epitaphius annulicornis Fairmaire, 1898 (cf.)	3	0,14	0	0,00	3
63		Epitaphius cincticollis Frieser, 2004	3	0,14	0	0,00	3
64		Epitaphius inconspicuus Wolfrum, 1959	1	0,05	0	0,00	1
65		Epitaphius rheinheimeri Frieser, 2004	1	0,05	0	0,00	1
66	*	Epitaphius sp. n. 01	0	0,00	1	0,18	1
67		Eudysnos pilicornis Frieser, 2010	2	0,09	2	0,36	4
68	*	Genus near Tropideres sp. n. 01	1	0,05	1	0,18	2
69	*	Genus near Tropideres sp. n. 02	2	0,09	0	0,00	2
70	*	Genus near Tropideres sp. n. 03	3	0,14	0	0,00	3
71	*	Genus near Tropideres sp. n. 04	1	0,05	0	0,00	1
72	*	Genus near Tropideres sp. n. 05	1	0,05	0	0,00	1
73	*	Genus near Caranistes sp. n. 01	8	0,36	0	0,00	8
74		Holophloeus tuberosus (Fairmaire, 1897)	127	5,76	0	0,00	127
75	*	Holophloeus loebli Trýzna & Bařař, 2020	69	3,13	1	0,18	70
76		Hormiscops angustefasciatus Frieser, 2010 (cf.)	55	2,49	2	0,36	57

Number of species	New species for science found during present study (*)	Name of species	Number of individuals found in old-growth forest	% (old-growth forest)	Number of individuals found in secondary forest	% (secondary forest)	Total number of individuals found during present study
77		Hormiscops blandus Frieser, 2007	2	0,09	1	0,18	3
78		Hormiscops brevior Frieser, 2007	1	0,05	2	0,36	3
79		Hormiscops confluens Frieser, 2010	7	0,32	2	0,36	9
80		Hormiscops frater Frieser, 2007	13	0,59	1	0,18	14
81		Hormiscops frater Frieser, 2007 (cf.)	18	0,82	12	2,14	30
82	*	Hormiscops sp. n. 01	7	0,32	1	0,18	8
83	*	Hormiscops sp. n. 02	2	0,09	0	0,00	2
84	*	Hormiscops sp. n. 03	2	0,09	0	0,00	2
85	*	Hormiscops sp. n. 04	1	0,05	0	0,00	1
86	*	Hormiscops sp. n. 05	0	0,00	2	0,36	2
87	*	Hormiscops sp. n. 06	1	0,05	0	0,00	1
88	*	Hormiscops sp. n. 07	1	0,05	0	0,00	1
89		Choragus attactus Frieser, 2010	51	2,31	5	0,89	56
90		Choragus fasciger Frieser, 2010	17	0,77	2	0,36	19
91		Choragus flavofasciatus Frieser, 2004	3	0,14	5	0,89	8
92		Choragus interuptofasciatus Frieser, 2004	1	0,05	0	0,00	1
93	*	Choragus sp. n. 01	7	0,32	0	0,00	7
94	*	Choragus sp. n. 02	4	0,18	1	0,18	5
95	*	Choragus sp. n. 03	8	0,36	0	0,00	8
96	*	Choragus sp. n. 04	7	0,32	10	1,78	17
97	*	Choragus sp. n. 05	75	3,40	1	0,18	76
98	*	Choragus sp. n. 06	0	0,00	4	0,71	4
99	*	Choragus sp. n. 07	0	0,00	4	0,71	4
100	*	Choragus sp. n. 08	0	0,00	2	0,36	2
101	*	Choragus sp. n. 09	11	0,50	0	0,00	11
102	*	Choragus sp. n. 10	3	0,14	0	0,00	3
103	*	Choragus sp. n. 11	1	0,05	0	0,00	1
104	*	Choragus sp. n. 12	2	0,09	1	0,18	3
105	*	Choragus sp. n. 13	1	0,05	0	0,00	1
106	*	Choragus sp. n. 15	15	0,68	1	0,18	16
107	*	Choragus sp. n. 16	33	1,50	0	0,00	33
108	*	Choragus sp. n. 17	29	1,32	0	0,00	29
109	*	Choragus sp. n. 18	3	0,14	0	0,00	3
110	*	Choragus sp. n. 19	3	0,14	0	0,00	3
111	*	Choragus sp. n. 20	1	0,05	0	0,00	1
112	*	Choragus sp. n. 21	1	0,05	0	0,00	1
113	*	Choragus sp. n. 22	8	0,36	0	0,00	8
114	*	Choragus sp. n. 23	1	0,05	0	0,00	1
115	*	Choragus sp. n. 24	1	0,05	2	0,36	3

Number of species	New species for science found during present study (*)	Name of species	Number of individuals found in old-growth forest	% (old-growth forest)	Number of individuals found in secondary forest	% (secondary forest)	Total number of individuals found during present study
116	*	Choragus sp. n. 25	18	0,82	7	1,25	25
117	*	Choragus sp. n. 26	2	0,09	1	0,18	3
118	*	Choragus sp. n. 27	397	18,00	86	15,30	483
119	*	Choragus sp. n. 28	2	0,09	0	0,00	2
120	*	Choragus sp. n. 29	1	0,05	0	0,00	1
121	*	Choragus sp. n. 30	0	0,00	2	0,36	2
122	*	Choragus sp. n. 31	2	0,09	0	0,00	2
123		Lemuricedus audouini (Fahraeus, 1839)	95	4,31	33	5,87	128
124		Lemuricedus dexius Jordan, 1911	0	0,00	1	0,18	1
125		Lemuricedus equulus Wolfrum, 1961	9	0,41	4	0,71	13
126		Lemuricedus guttulifer Frieser, 2007	3	0,14	0	0,00	3
127		Lemuricedus inferior Frieser, 1981	17	0,77	2	0,36	19
128		Lemuricedus inferior Frieser (cf.)	12	0,54	1	0,18	13
129		Lemuricedus integer Wolfrum, 1961	0	0,00	2	0,36	2
130		Lemuricedus maculicollis (Fairmaire, 1896)	35	1,59	19	3,38	54
131		Lemuricedus madagascariensis (Faust, 1889)	52	2,36	7	1,25	59
132		Lemuricedus microphtalmus Wolfrum, 1961	2	0,09	0	0,00	2
133		Lemuricedus punctatipennis Frieser, 1959	0	0,00	1	0,18	1
134	*	Lemuricedus sp. n. 01	12	0,54	1	0,18	13
135	*	Lemuricedus sp. n. 02	1	0,05	0	0,00	1
136	*	Lemuricedus sp. n. 03	0	0,00	1	0,18	1
137	*	Lemuricedus sp. n. 04	3	0,14	0	0,00	3
138	*	Lemuricedus sp. n. 05	16	0,73	0	0,00	16
139	*	Lemuricedus sp. n. 06	2	0,09	0	0,00	2
140		Lemuricedus subscutellatus (Fairmaire, 1896)	6	0,27	0	0,00	6
141		Lemuricedus subscutellatus (Fairmaire, 1896) (cf.)	10	0,45	0	0,00	10
142		Lemuricedus torvus (Jordan, 1895)	5	0,23	1	0,18	6
143		Litotropis semipustulata Frieser, 2000	0	0,00	5	0,89	5
144		Litotropis semipustulata Frieser, 2000 (cf.)	1	0,05	0	0,00	1
145	*	Litotropis sp. n. 01	1	0,05	0	0,00	1
146	*	Litotropis sp. n. 02	0	0,00	6	1,07	6
147	*	Litotropis sp. n. 03	1	0,05	1	0,18	2
148		Mecotarsus longitarsis (Fairmaire, 1903)	10	0,45	0	0,00	10
149		Megatermis rugipennis Frieser, 2000	2	0,09	0	0,00	2
150		Mentanus costulatus Fairmaire, 1902	0	0,00	1	0,18	1
151		Nistacares leucostictus Fairmaire, 1898	0	0,00	4	0,71	4
152		Noxius albomaculatus Wolfrum, 1961	5	0,23	1	0,18	6
153	*	Noxius sp. n. 01	0	0,00	3	0,53	3
154	*	Noxius sp. n. 02	0	0,00	5	0,89	5

Number of species	New species for science found during present study (*)	Name of species	Number of individuals found in old-growth forest	% (old-growth forest)	Number of individuals found in secondary forest	% (secondary forest)	Total number of individuals found during present study
155	*	Noxius sp. n. 03	0	0,00	7	1,25	7
156	*	Noxius sp. n. 04	0	0,00	1	0,18	1
157	*	Noxius sp. n. 05	0	0,00	1	0,18	1
158	*	Noxius sp. n. 06	1	0,05	0	0,00	1
159	*	Noxius sp. n. 07	1	0,05	0	0,00	1
160	*	Noxius sp. n. 08	3	0,14	0	0,00	3
161	*	Noxius sp. n. 09	1	0,05	0	0,00	1
162	*	Noxius sp. n. 10	0	0,00	1	0,18	1
163	*	Noxius sp. n. 11	0	0,00	1	0,18	1
164		Opanthribus paraleuca (Wolfrum, 1955) (cf.)	2	0,09	8	1,42	10
165		Opanthribus scuttatus Frieser, 2004	1	0,05	0	0,00	1
166		Opanthribus undulatus Frieser, 2004	1	0,05	2	0,36	3
167		Pantorhaena inornatus Frieser, 2010	1	0,05	0	0,00	1
168	*	Perichoragus sp. n. 01	1	0,05	0	0,00	1
169		Phloeotragus albicans Fahraeus, 1839	3	0,14	0	0,00	3
170		Sintor conglobatus Wolfrum, 1961 (cf.)	6	0,27	0	0,00	6
171		Sintor frenatus Frieser, 2000	1	0,05	4	0,71	5
172		Sintor impressus Frieser, 2000	3	0,14	1	0,18	4
173		Sintor ochraceus Frieser, 2000	2	0,09	1	0,18	3
174		Sintor ochraceus Frieser, 2000 (cf.)	3	0,14	0	0,00	3
175		Sintor paradistans Wolfrum, 1961	103	4,67	1	0,18	104
176	*	Sintor sp. n. 01	0	0,00	1	0,18	1
177	*	Sintor sp. n. 02	1	0,05	0	0,00	1
178	*	Sintor sp. n. 03	1	0,05	0	0,00	1
179	*	Sintor sp. n. 04	1	0,05	0	0,00	1
180		Sintor sporadicus (Wolfrum, 1959)	11	0,50	7	1,25	18
181		Sphinctotropis celata Frieser, 2007	6	0,27	3	0,53	9
182	*	Sphinctotropis sp. n. 01	0	0,00	1	0,18	1
183	*	Sternocyphus sp. n. 01	0	0,00	2	0,36	2
184		Sternocyphus ferranti (Jordan, 1925)	0	0,00	5	0,89	5
185	*	Tophoderellus sp. n. 01	0	0,00	3	0,53	3
186	*	Tophoderellus sp. n. 02	0	0,00	1	0,18	1
187		Tophoderes annulatus Waterhouse, 1875	1	0,05	0	0,00	1
188		Tophoderes frenatus (Klug, 1833)	0	0,00	3	0,53	3
189		Tophoderes fuscoareatus Wolfrum, 1959	4	0,18	0	0,00	4
190		Tophoderes griseipes Fairmaire, 1901	1	0,05	0	0,00	1
191	*	Tophoderes lidmilae Trýzna & Bařař, 2015	5	0,23	0	0,00	5
192		Tophoderes nubeculosus Fairmaire, 1888	1	0,05	1	0,18	2
193		Tophoderes sikorae Jordan, 1895	6	0,27	1	0,18	7

Number of species	New species for science found during present study (*)	Name of species	Number of individuals found in old-growth forest	% (old-growth forest)	Number of individuals found in secondary forest	% (secondary forest)	Total number of individuals found during present study
194		**Tophoderes sinuatocollis Jordan, 1895**	1	0,05	2	0,36	3
195		**Triplodus cuspis Wolfrum, 1961**	4	0,18	7	1,25	11
196	*	**Triplodus sp. n. 01**	1	0,05	0	0,00	1
197	*	**Triplodus sp. n. 03**	2	0,09	0	0,00	2
198	*	**Triplodus sp. n. 04**	2	0,09	0	0,00	2
199	*	**Triplodus sp. n. 05**	1	0,05	0	0,00	1
200	*	**Triplodus sp. n. 06**	0	0,00	1	0,18	1
201	*	**Ulorhinus sp. n. 01**	1	0,05	0	0,00	1
202		**Uterosomus verrucosus (Olivier, 1795)**	11	0,50	9	1,60	20
			2205	100,00	562	100,00	2967