

**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 – Suchbát, 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@nps.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 anatin'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

Measurements 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) \times 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.

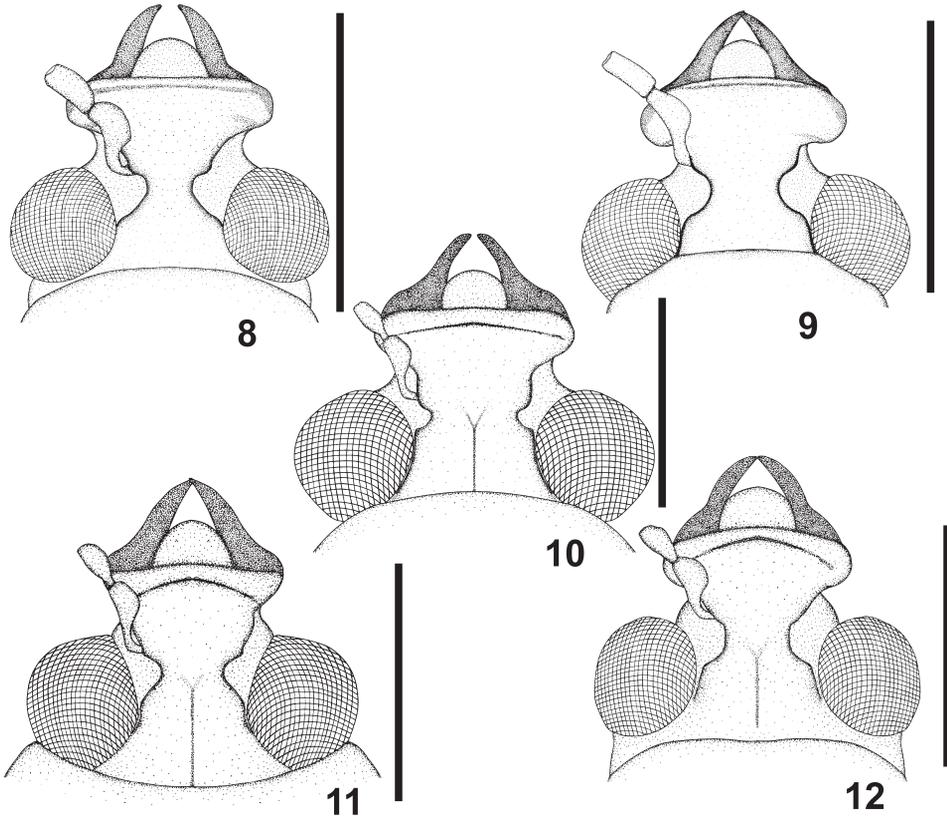
Habitat. All specimens from the Andasibe-Mantadia NP were captured by beating lower dead branches of deciduous trees in secondary forest at altitude ca. 900–950 m.

Adapterops hankae Trýzna sp. nov.

(Figs. 3, 10, 15)

Type locality. East Madagascar, Tamatave province, Andasibe-Mantadia National Park, Analamazaotra forest.

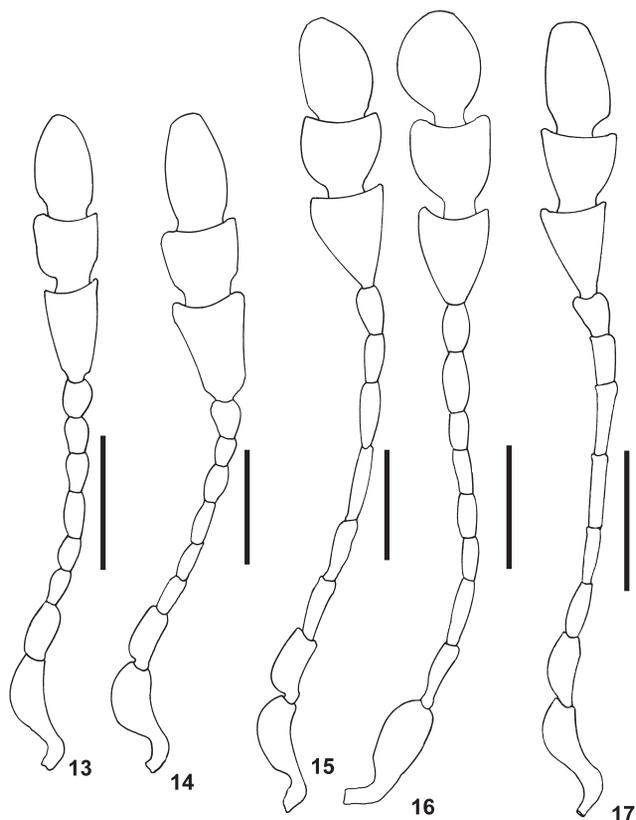
Type material. HOLOTYPE: ♀, **MADAGASCAR: TAMATAVE:** ‘Madagascar, 5.-13.ii.2007, / Andasibe-Mantadia N.P., / Analamazaotra forest, // S 18°56’45.0’’; / E 48°25’08.0’’; / 955 m, M. Trýzna leg.’ // ‘HOLOTYPE / *Adapterops hankae* sp. nov., / M. Trýzna det., 2012’ [p, red label] (BSNPC).



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.

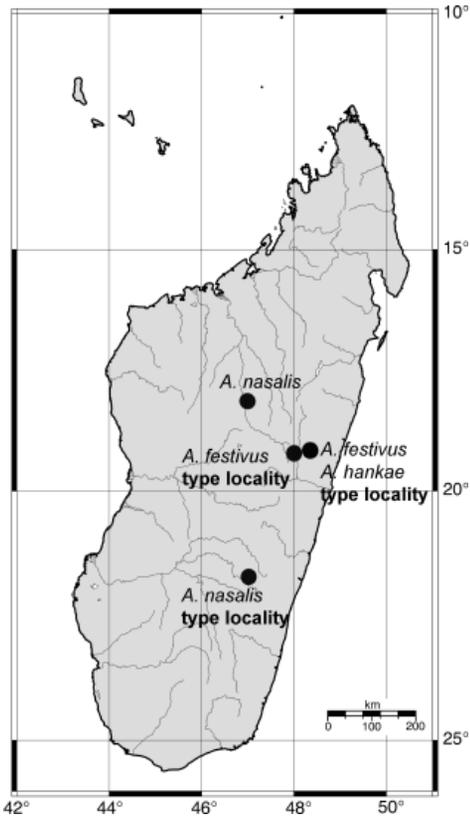


Fig. 18. Distribution of *Adapterops* species in Madagascar.

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.

Differential 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 Oberreiterová, 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, antennomeres 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 Madagascar 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	<i>Diastatotropis</i>	<i>D. clavigera</i> Frieser, 1992
		<i>D. olivacea</i> Waterhouse, 1877
	<i>Holophloeus</i>	<i>H. tuberosus</i> (Fairmaire, 1897)
	<i>Hormiscops</i>	<i>H. confluens</i> Frieser, 2010
		<i>H. frater</i> Frieser, 2007
	<i>Lemuricedus</i>	<i>L. audouini</i> (Fahraeus, 1839)
		<i>L. maculicollis</i> (Fairmaire, 1896)
		<i>L. madagascariensis</i> (Faust, 1889)
	<i>Opanthribus</i>	<i>O. albocingulatus</i> Frieser, 2004
		<i>O. scutatus</i> Frieser, 2004,
		<i>O. undulatus</i> Frieser, 2004
<i>Phloeotragus</i>	<i>P. albicans</i> Fahraeus, 1839	
<i>Tophoderes</i>	<i>T. frenatus</i> (Klug, 1833)	
<i>Uterosomus</i>	<i>U. verrucosus</i> (Olivier, 1795)	
Apolectinae	<i>Caranistes</i>	<i>C. cyphosis</i> Wolfrum, 1959
		<i>C. rhanisus</i> Wolfrum, 1959
		<i>C. rufipes</i> Jordan, 1895
		<i>C. tenuiclavis</i> Fairmaire, 1897
Choraginae	<i>Adapterops</i>	<i>A. hankae</i> Trýzna sp. nov.
	<i>Dysnomelas</i>	<i>D. melagris</i> Frieser, 1981
	<i>Epichoragus</i>	<i>E. acutus</i> Frieser, 2010
		<i>E. vulneratus</i> Frieser, 2010
	<i>Eudysnos</i>	<i>E. pilicornis</i> Frieser, 2010
	<i>Choragus</i>	<i>Ch. aethiops</i> Frieser, 2010
		<i>Ch. attactus</i> Frieser, 2010
		<i>Ch. fasciger</i> Frieser, 2010
		<i>Ch. femoralis</i> Frieser, 2010
		<i>Ch. nitidus</i> Frieser, 2010
<i>Ch. vicinus</i> Frieser, 2010		
<i>Triplodus</i>	<i>Triplodus</i> 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.

Acknowledgements

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'. We would like to thank also Mr. Herinirina Ramanankirija, the head of Nature Conservation Department, Andasibe-Mantadia National Park and Mr. Arthur M. Ramarovelovelo, the director of Ambohitantely Special Reservation for their kind facilitation of our field work. This work was supported by a project of the Ministry of Agriculture of the Czech Republic (project No. QH 91097). The research received support also from the SYNTHESYS project financed by the European Community Research Infrastructure Action (www.synthesys.info) (visit to Natural History Museum, London) for the project 'Research into Madagascan fungus weevils of the family Anthribidae' (Miloš Trýzna) with kind co-operation of Maxwell V. L. Barclay. We would like to express our thanks to Jiří Janák (Rtyně nad Bílinou) for the photograph of the Ambondrombe Massif, Chris Lyal (London) and Jiří Skuhrovec (Praha) for comments on the manuscript and Lalao Sahondra Rahanitriniaina (Antananarivo) for translation of the Abstract to Malagasy language.

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.

