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BIG-EYED BUGS OF THE MALAGASY REGION (HEMIPTERA: HETEROPTERA: LYGAEOIDEA: GEOCORIDAE)

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A synopsis of the geocorine true bugs distributed in the Malagasy biogeographic region is presented, including the description *Geocoris* (*Piocoris*) *petofii* **sp. n.** and proposal of the new synonymy *Geocoris* (*Geocoris*) *insularis* China, 1955 = *Geocoris* (*Geocoris*) *pallidipennis mauritii* Stål, 1854. Keys, diagnoses, taxonomic notes, and distribution data for discussed species are provided.

Keywords: Geocorinae, Malagasy region, new species, synonymy, keys

INTRODUCTION

The Malagasy biogeographic region consists of Madagascar, the Mascarene Islands, and several smaller islands, e.g., the Glorioso Islands and Tromelin, and is one of the major biodiversity hotspots of the world (Myers *et al.* 2000). The unique fauna of the region, and in particular of Madagascar – rate of endemic elements in vertebrate fauna is approximately 90% – are threatened by overexploitation of natural resources, habitat loss and fragmentation caused by agriculture and the introduction of non-indigenous, invasive species (Ralimanana *et al*. 2022). Though insects are not well-explored in these terms, according to the recent knowledge a similar statement can be made as for vertebrates (Antonelli *et al*. 2022, Fisher 2022).

The study of the fauna of the suborder Heteroptera – the largest and most diverse group of non-holometabolous insects (Schuh & Weirauch 2020) – received increasing attention in the past years, though monographs are available for only few families and subfamilies, as reviewed by Kment *et al*. (2016). More recently, groups such as the largest lygaeoid family, Rhyparochromidae (Zámbó *et al*. 2019, Kondorosy *et al*. 2020, Kondorosy & Zámbó 2021, Zámbó *et al*. 2022), family Aradidae (Baňař & Heiss 2018*a*, *b*), selected aquatic and semi-aquatic heteropteran taxa (Zettel 2020, Zettel & Laciny 2020), and assassin bugs (family Reduviidae) (Chłond *et al*. 2018, Weirauch 2022, Chen *et al*. 2022) received attention.

In terms of the peculiar, taxonomically complicated, and economically important lygaeoid subfamily Geocorinae Dahlbom, 1851 (Malipatil 1994, Kóbor 2020, 2022) seven species are reported from the region as summarized

in Table 1. Here, a new representative of the subgenus *Piocoris* Stål, 1872, is described from Madagascar along with an overview of the known species distributed in the Malagasy region.

MATERIAL AND METHODS

Specimens studied were borrowed from the following institutions: KNHM – Kimball Natural History Museum, California Academy of Sciences, San Francisco, USA; MFNB – Museum für Naturkunde, Berlin, Germany; MNHN – Muséum National d'Historie Naturelle, Paris, France; MZMB – Moravian Museum, Brno, Czech Republic; NMPC – National Museum, Prague, Czech Republic; PCPK – Personal Collection of Péter Kóbor, Centre for Agricultural Research, Plant Protection Institute, Budapest, Hungary.

A female and a male paratype of *Geocoris* (*Piocoris*) *petofii* sp. n. are deposited in the collection of the author (PCPK).

Label data cited verbatim; lines on label were separated by '/', content of different labels was separated by '//'.

Exoskeletal and genital structures were studied, photomicrographs were done, and measurements were performed with Kern Optics OZL 466 stereoscopic microscope mounted with Kern Optics OCD 832 (5 MPix) microscope camera (operating software: Kern & Sohn MicroscopeVIS 2.0 Pro). Photos of the type of *Geocoris* (*Piocoris*) *junodi* Montandon, 1907, were provided by Rachel Diaz-Bastin (KNHM). Photomicrographs were processed, and plates were prepared with GIMP 2.10.32 image manipulating software.

Genitalia were examined by removal of the whole abdomen and soaking it overnight in lactic acid solution at room temperature. When soaking in lactic acid, structures remain more flexible than by KOH maceration according to author's experiences. This method also prevents "over-clearing" of structures (Blahnik *et al*. 2007), thus additional dye staining is not necessary before further dissection, observation, or photographic documentation.

Morphological terminology was adapted from Tsai *et al*. (2011), Malipatil and Blackett (2013) (general morphology); Kment and Vilimová (2010) (metathoracic scent ef-

Table 1. Genera and species of subfamily Geocorinae known from the Malagasy region († – new synonymy, = *G. pallidipennis mauritii* Stål, 1854; * – new distribution data).

Genus	Species / subspecies	Distribution
Geocoris s. str. Fallén, 1814	*pallidipennis mauritii* Stål, 1854	Mauritius, Glorioso Islands*
	(*insularis* China, 1955) †	Tromelin Island
subgenus *Piocoris* Stål, 1872	*petofii* sp. n.	Madagascar
Germalus Stål, 1862	*banari* Kóbor et Kondorosy, 2016	Madagascar
	benyovszkyi Kóbor et Kondorosy, 2016	Madagascar
	kinbergi (Stål, 1860)	Mauritius, Réunion Island
Hypogeocoris Montandon, 1913	*alluaudi* (Montandon, 1908)	Madagascar
	violaceus (Signoret, 1881)	Madagascar

ferent apparatus); Slater (1977) (mesothoracic wing); Slater and Hurlbutt (1957) (metathoracic wing); and Gao e*t al*. (2017) (abdominal trichobothria).

Distribution data were recorded in Microsoft Excel program in comma-delimited text format (.csv) and processed with QGIS 3.16 "Hannover software". WorldClim altitude raster layer (Fick & Hijmans 2017) and WWF terrestrial ecoregions shape files (Olson *et al*. 2001) was used to visualise and interpret distribution and habitat data.

RESULTS

Key to genera and species of Geocoridae of the Malagasy region

1 Compound eyes moderately stylate, sometimes projected; ocular sulcus complete, well-defined. Scutellum subequilateral triangular with median trifurcate carina always well-defined. Punctuation of corium arranged in lines along veins (Figs 16–18). Peritreme with dorsal supporting projection, i.e., spout type; evaporatorium covering mesepimeron and metepisternum. 2. (Genus *Germalus* Stål, 1862; 3 spp.)

– Compound eyes slightly stylate, never projected; ocular sulcus at least partly reduced, weakly defined. Scutellum elongate triangular with median trifurcate carina weakly defined or reduced. Punctuation of corium arranged along claval furrow, Cu and an apical triangular spot at apex (e.g., Figs 6, 12, 19–20). Peritreme vesiculiform auricle; evaporatorium reduced to immediate surroundings of peritreme (Fig. 7) 4

2 Body length ≥7 mm. Colouration ochraceous, humeral angles and apices of corium with a rounded dark brown spot (Fig. 17)
Germalus benyovszkyi Kóbor et Kondorosy, 2016

– Body length ≤ 5 mm. Body more decorated with fuscous but lacking spots at apices of corium (Figs 16, 18) 3

3 Eye stalks straight. Lateral margins of pronotum straight. Punctuation along R-M reaching almost posterior margin of corium (Fig. 18)
Germalus kinbergi (Stål, 1860)

– Eye stalks slightly projected. Lateral margins of pronotum constricted medially. Punctuation along R-M reaching about third of corium (Fig. 16) *Germalus banari* Kóbor et Kondorosy, 2016

4 Posterior edge of compound eyes not touching anterior edges of pronotum. Pronotal callosities conspicuously bulging. Hemelytron polymorphic (Figs 19–20) 5. (Genus *Hypogeocoris* Montandon, 1913; 2 spp.)

– Posterior edge of compound eyes touching or encompassing anterior edges of pronotum. Pronotal callosities not bulging. Hemelytron always macropterous (e.g., Fig. 6) 6. (Genus *Geocoris* Fallén, 1814; 2 spp.)

5 Head with clypeus, antennae, and posterior angle of eye stalks infuscate ochraceous. Costal margins ochraceous, semi-hyaline. Thoracic dorsum with fine, dense pubescence (Fig. 20)
Hypogeocoris violaceus (Signoret, 1881)

– Vertex and eye stalks uniformly dark brown; antennomere I and base of antennomere II dark brown, antennomere III and IV dark ochraceous. Costal margins dark brownish like the rest of corium. Thoracic dorsum lacking pubescence (Fig. 19) *Hypogeocoris alluaudi* (Montandon, 1908)

6 Compound eyes touching anterior edges of pronotum. Integument of vertex corrugate, covered with dense pubescence. Labiomere II shorter than labiomere III. Apex of scutellum sharply pointed (Fig. 15)
Geocoris (*Geocoris*) *pallidipennis mauritii* Stål, 1854

– Compound eyes encompassing anterior edges of pronotum. Integument of vertex smooth, shiny, lacking pubescence. Length of labiomere II subequal to length of labiomere III. Apex of scutellum rounded (Fig. 1)
Geocoris (*Piocoris*) *petofii* sp. n.

Family Geocoridae
Subfamily Geocorinae
Genus *Geocoris* Fallén, 1814
Subgenus *Geocoris* Fallén, 1814

Type species: *Cimex grylloides* Linnaeus, 1761: 264 (subsequent designation by Oshanin, 1912)

Geocoris (*Geocoris*) *pallidipennis mauritii* Stål, 1854
(Fig. 15)

Geocoris (*Geocoris*) *insularis* China, 1955 **syn. n.**

Material studied. 2 f, 3 m, MNHN: "I. Glorieuses / 16-17. IX. 58 / R. Paulian // INSTITUT SCIENTIFIQUE / MADAGASCAR".

Diagnosis. Vertex of head dark brown except apex of clypeus and surroundings of antenniferous tubercles. Antennomere I and II fuscous with apex ochraceous; antennomere III and IV ochraceous, slightly infuscate basally. Pronotum with large, dark brown spot at callosities and two faded, irregular spots posterior to callosities (spots posteriad to callosities well-defined,

not faded in type of *G. pallidipennis mauritii*). Scutellum mostly dark brown, apex sometimes ochraceous. Corium with small, irregular brown spots near apex of clavus. Head with eyes slightly stylate, ocular sulcus slightly defined but distinct. Integument of vertex corrugate, covered with dense, silvery pubescence. Labiomere II shorter than labiomere III. Pronotum trapeziform with anterior edges acute; callosities well-defined, but not bulging. Scutellum elongate triangular with apex sharply pointed. Peritreme vesiculiform auricular, evaporatorium reduced to immediate surroundings of peritreme.

Distribution. *G. pallidipennis* is widely distributed throughout the tropical and subtropical regions of the Old World, from Southern Europe to the Indomalayan Archipelago (Slater 1964, Péricart 2001). From the Malagasy region a subspecies, *G. pallidipennis mauritii* Stål, 1854 is known. Specimens examined in the present study are the first known records of the species from the Glorioso Islands.

Remarks. *G. pallidipennis* is one of the most widely distributed and most variable species of genus *Geocoris* with its 6 recognized subspecies. Furthermore, 6 formally described species were synonymized with subspecies *G. pallidipennis pallidipennis* (see Dellapé & Henry 2023). However, it must be noted that due to the inaccuracies and uncertainties regarding the taxonomy of subfamily Geocorinae and genus *Geocoris* in particular – as emphasized by e.g., Torre-Bueno (1946), Readio and Sweet (1982), and Malipatil (1994) – the status of these taxa should be carefully revised based on the novel morphological knowledge.

The specimens examined in course of recent study meet the most recent description and diagnosis of *G. pallidipennis* (see Péricart 1999) and were compared to series of specimens representing the species from various locations (e.g., the Mediterranean region, Sudan, and the Malay Peninsula) including the type of *Geocoris pallidipennis mauritii* Stål, 1854 (NHRS). Though differences in colouration of pronotum and scutellum are observable, considering the high degree of variability of these characters in *G. pallidipennis*, these specimens are identified as *G. pallidipennis mauritii*.

Another species of subgenus *Geocoris*, *Geocoris insularis* China, 1955 was described from the Tromelin Island. In the discussion of its relationship to other *Geocoris* species the author states that *G. insularis* resembles to *Ophthalmicus pygmaeus* Fieber, 1861 [currently syn. of *G. pallidipennis pallidipennis* (Péricart, 2001)] and only minor differences in colouration are denoted. Though the locality of types is uncertain – the holotype and a paratype should be found in MNHN, a paratype should be found in Natural History Museum, London, United Kingdom according to the original description, but the author of present study was unable to locate them – considering the contents of the original description and the high degree of intraspecific variability colour pattern of *G. pallidipennis* (author's unpublished notes) it is to be concluded that *G. insularis*

is a colour variant of *G. pallidipennis* and does not merit the recognition of the species rank. Therefore, the following synonymy is proposed here: *Geocoris insularis* China, 1955 = *Geocoris pallidipennis mauritii* Stål, 1854.

Subgenus *Piocoris* Stål, 1872

Type species: *Salda erythrocephala* Lepeletier et Serville, 1825: 321 (subsequent designation by Stål, 1872).

Geocoris (Piocoris) petofii sp. n.
http://zoobank.org/59CFB817-9878-4022-837E-CDD1280BA93F
(Figs 1–11, 21)

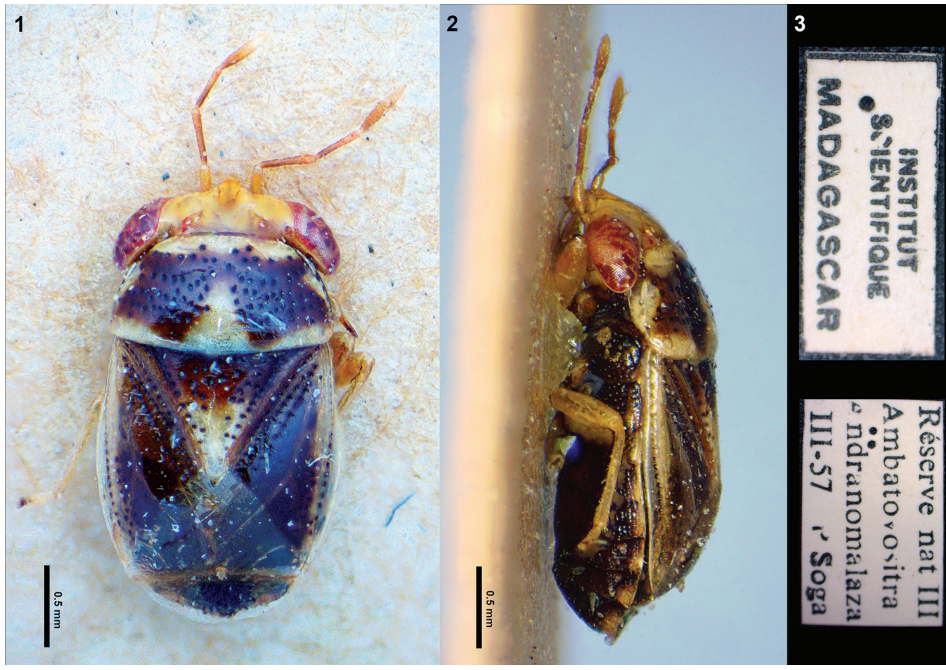
Studied material – Holotype: female, MNHN: „Réserve nat. III / Ambatovositra / Andranomalaza / II-57 P Soga // INSTITUT SCIENTIFIQUE / MADAGASCAR".

Paratypes: 1 m, MMBC: „MADAGASCAR, 2007, / Isalo Nat. Park, forest / Amboandrika, / M. Trýzna leg., 19.i."; 2 f, MNHN: „Réserve nat. III / Ambatovositra / Andranomalaza / III-57 P Soga // INSTITUT SCIENTIFIQUE / MADAGASCAR"; 3 f, MNHN: „Réserve nat. III / Mananilaza / Andranomalaza / IX. 57 P. Soga // INSTITUT SCIENTIFIQUE / MADAGASCAR"; 1 f, MNHN: „Madagascar (Sud) / Basin du Mandraré / Allaud 1900 44 // MUSEUM PARIS / MADAGASCAR / COLL. CH. ALLAUD 1904"; 1 f, PCPK: „Réserve nat. III / Ambatovositra / Andranomalaza / III-57 P Soga // INSTITUT SCIENTIFIQUE / MADAGASCAR"; 1 m, PCPK: „Réserve nat. III / Ambatovositra / Andranomalaza / II-57 P Soga // INSTITUT SCIENTIFIQUE / MADAGASCAR".

Description – Colouration. Body generally pale ochraceous with variably extended brown or fuscous decoration. Head with vertex uniformly ochraceous and with base sometimes slightly darker in hue. Eyes and ocelli reddish. Antennomere I ochraceous, antennomere II–IV fuscous or reddish with antennomere IV apically ochraceous. Labiomeres dark ochraceous. Thorax. Pronotum with punctuation dark brown; pronotal callosities brown. Two, irregular brown or blackish spots of various extent extending from posterior margin of callosities to posterior margin of pronotum and humeral angles. Scutellum mostly brown with apical third pale ochraceous. Hemelytron strongly infuscate at clavus, along Cu and apex of corium; hemelytral membrane hyaline. Thoracic pleurites and sternites mostly fuscous with dark brown punctuation; prosternal collar, supracoxal lobes, and peritreme ochraceous. Legs ochraceous, femora with slight, irregular infuscate annulation subapically. Abdomen. Tergites V–VI with oval ochraceous spot medially. Sternites with small, irregular spots at posterodorsal edges.

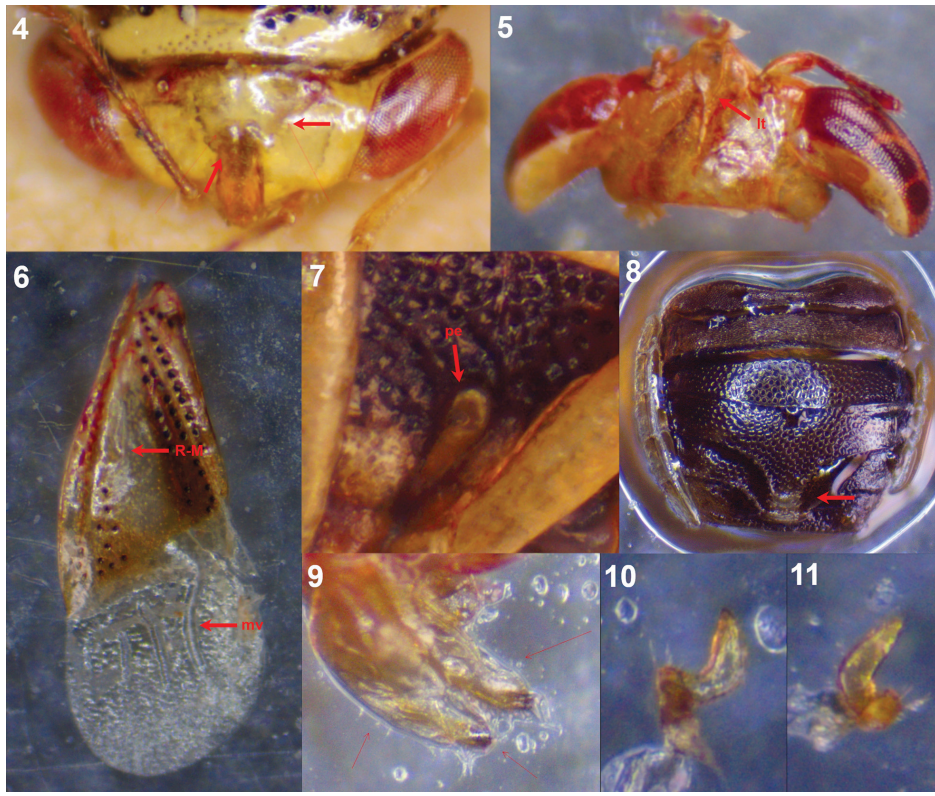
Structure. Habitus ovoid, profile conspicuously convex. Head lunulate, i.e., vertex widened; eyes slightly stylate, elongate reniform with posterior edges encompassing the anterior edges of pronotum. Head length to width: 1 : 3.44. Vertex with slight transversal impressions anteriad to ocelli (Fig. 4). Ocelli situated at base of vertex, interocellar distance in subequal to distance of ocelli to posterior edge of compound eyes; ratio: 1 : 0.98. Clypeus with median longitudinal furrow and apex rounded, slightly surpassing mandibular plates; margins of clypeus subparallel, slightly constricted basally; base appearing to be slightly bulging (Fig. 4). Antenniferous tubercles reduced, almost indistinct. Antennomere

I shortest, II and III subequal, IV longest; ratio of antennomeres: 1 : 2.71 : 2.42 : 3.00. Bucculae not produced, slightly distinct. Labial trough closed, oval with suture reaching the middle of venter of head (Fig. 5). Labiomere I not reaching anterior margin of prothorax, labiomeres II–III and I–IV subequal in length, apex of labiomere IV reaching metacoxae; ratio of labiomeres: 1 : 0.77 : 0.80 : 0.95. Thorax. Pronotum semicircular, i.e., conspicuously widened, anterior edges slightly obtuse and anterior margin slightly rounded; posterior margin convex; length to width: 1 : 1.96. Integument with coarse, sparse, irregular punctuation except anterior margin, pronotal callosities, humeral angles, and a median triangular spot adjacent to posterior margin. Pronotal callosities not bulging, indicated by the impunctate spots only. Scutellum elongate triangular with apex conspicuously rounded; length to width: 1 : 0.87. Integument with coarse punctuation except weakly developed trifurcate median carina. Hemelytron macropterous, membrane slightly surpassing the apex of abdomen. Margins of clavus converging towards apex, claval commissure reduced, indistinct. Scutellar margin with 2–4 punctures basally, corial margin evenly punctate at entire length. Corium moderately sclerotized, integument punctate along claval furrow, Cu and in a triangular spot near apex. R-M of corium well-defined, but reduced, not reaching half of length (Fig. 6). Costal margin narrow, gradually widening towards apex. Membrane with 4 simple, but well-defined longitudinal veins (Fig. 6). Hamus of metathoracic wing reduced to an almost indistinct stub, intervannals missing. Thoracic pleurites and sternites with dense, deep punctuation except on narrow prothoracic collar, supracoxal lobes and posterodorsal edge of pleurites. Integument of prothoracic collar and supracoxal lobes are rather corrugate. Prothoracic collar narrow, but well-defined, moderately bulging. Osti-



Figs 1–3. *Geocoris* (*Piocoris*) *petofii* sp. n. (holotype, female, MNHN): 1 = dorsal habitus, 2 = lateral view, 3 = labels. Scale bar = 0.5 mm for Figs 1 and 2, Fig. 3 not to scale

olar plate oval, slightly bulging. Metepimeral pseudosuture indistinct, weakly defined. Arrangement of peritreme vesiculiform auricle with terminal lobe moderately protruding, dorsally slightly reclining lacking incision and indentations (Fig. 7). Orifice small, oval. Vestibular scar weakly defined but reaching venter. Evaporatorium reduced to immediate surroundings of peritreme. Femora of prothoracic legs more incrassate than those of meso- and metathoracic legs. Fore femora bearing simple trichobothria arranged in a single line on the slightly keeled ventral side. Tibiae and tarsi with sparse decumbent pubescence; apex of tibiae and tarsomeres with a single, strong spine ventrally. Fore tibia with strong setosity ventrally. Length of tarsomere I subequal to sum of length of tarsomere II and III; tarsomere II shortest. Tarsal claws evenly curved with a minute, stout spur basally; unguitractor plates bearing small, leaf-like parempodia. Abdomen. Integument of sternites III–VI with dense, groove-like rugosity (Fig. 8). Sutures 4/5 and 5/6 inclined medially with apices rounded; suture 4/5 more strongly inclined medially than suture 5/6 (Fig. 8). Genital plate creased. Integument of abdominal sternites moderately creased subdorsally. Abdominal



Figs 4–11. Selected morphological characteristics of *Geocoris* (*Piocoris*) *petofii* sp. n.: 4 = furrows of vertex and clypeus (red arrows indicate transversal furrow anteriad to ocelli and median longitudinal furrow); 5 = venter of head [red arrow indicates labial trough (lt)]; 6 = hemelytron [red arrows indicate apex of reduced R-M and venation of membrane (mv)]; 7 = exoskeletal structures of MTSEA [red arrow indicates peritreme (pe)]; 8 = abdominal dorsum (red arrow indicates inclined sutures of tergites IV/V–V/VI); 9 = female ovipositor; 10–11 = male paramere from various angles. Images are not to scale

trichobothria on sternites III–IV situated submedially, consisting of three simple bothrium fused; trichobothria on sternites V–VII consisting of three weakly bulging, simple bothrium arranged in triangular form. Genitalia. Male pygophore with posterior opening rounded, lateral processes moderately pointed; parameres overlapping in situ. Parameres with trunk stout, bearing 4–5 setae apically; blade spatulate, evenly curved (Figs 10–11). Female ovipositor spatulate, stout (Fig. 9); bisecting only the sternite of genital segment. Spermatheca bulbous, spermathecal duct long with 3–4 coils and sometimes bent between coils.

Measurements (holotype, in mm). Total body length: 2.98, head length: 0.45, head width: 1.55, interocellar distance: 0.54; antennomeres I–IV: 0.14-0.38-0.34-0.42; labiomeres I–IV: 0.39-0.30-0.31-0.37; pronotum length: 0.86; pronotum width: 1.57; scutellum length: 0.93; scutellum width: 0.81.

Diagnosis. The species resembles African species *Geocoris* (*Geocoris*) *amabilis* Stål, 1855, *G.* (*G.*) *aethiops* Distant, 1901 and the Malagasy species *G.* (*G.*) *pallidipennis mauritii* Stål, 1854 in general facies and colour pattern. However, there are remarkable morphological differences that allow ready distinction: in *G. petofii* length of labiomere II subequal to length of labiomere III (in *G. aethiops*, *G. amabilis* and *G. pallidipennis* labiomere II conspicuously shorter than labiomere III); pronotum of *G. petofii* impunctate in a triangular spot medially, posteriad to callosities (in *G. aethiops*, *G. amabilis* and *G. pallidipennis* pronotum posteriad to callosities uniformly punctate except posterior margin); in *G. petofii* basal angles of trifurcate carina of scutellum reduced, median part and apical angle distinct, slightly bulging (in *G. aethiops* an *G. amabilis* basal angles partly reduced, median part bulging; in *G. pallidipennis* trifurcate carina almost completely reduced, except median part); in *G. petofii* apex of scutellum rounded (in *G. aethiops*, *G. amabilis* and *G. pallidipennis* apex of scutellum sharply pointed). From amongst the representatives of subgenus *Piocoris*, *G. junodi* Montandon, 1907 was described from Mozambique, nearest to Madagascar. The study of Montandon's type (KNHM, Figs 12–14) and three additional specimens from NMPC concluded that besides the conspicuous differences in colour pattern (compare Figs 1 and 12), the following character readily separate the two species: pronotum of *G. petofii* is impunctate in a triangular spot adjacent to posterior margin (pronotum of *G. junodi* only impunctate at margins); apex of scutellum in *G. petofii* is moderately rounded, not explanate (apex of scutellum in *G. junodi* strongly rounded, explanate).

Distribution. According to current knowledge the species is distributed throughout Madagascar. Localities where studied specimens were collected can be found in the Madagascar dry deciduous forests, Madagascar lowland forests, and Madagascar subhumid forests ecoregions.

Etymology. Patronym. The species is named in the honour of Sándor Petőfi (1823–1849), Hungarian poet and revolutionist for the 200th anniversary of his birthday.

Notes. *Geocoris* (*Piocoris*) *junodi* was described on an unspecified number of specimens (Montadon 1907). In the collection of KMNH only a single spec-

imen bearing Montandon's handwritten label was found. As the existence of additional syntypes cannot be excluded, therefore the specimen is considered a syntype and accordingly it is here designated as lectotype (International Code of Zoological Nomenclature, 4th ed., recommendation 73F).

Genus *Germalus* Stål, 1862

Type species: *Henestaris kinbergi* Stål, 1860: 248 (subsequent designation by Stål, 1865).

Germalus banari Kóbor et Kondorosy, 2016 (Fig. 16)

Material studied: as listed in Kóbor and Kondorosy (2016).

Diagnosis. Colouration generally ochraceous with a narrow, but well-defined, brown median longitudinal stripe extending from apex of clypeus to the middle of scutellar trifurcate carina; a thin, partly faded longitudinal fuscous line across each pronotal callosities; a rounded black spot at each humeral angle and variably defined brown sublateral bands on abdominal tergites. Eyes moderately stylate, eye stalks slightly projected; ocular sulcus complete and well-defined. Integument of vertex smooth, lacking furrows and pubescence. Pronotum trapeziform with lateral margins slightly constricted medially and posterior margin slightly convex. Scutellum subequilateral triangular with median trifurcate carina well-developed, basal angles slightly flared. Clavus of hemelytron with margins subparallel, claval commissure developed. Corial margin of clavus only punctate at basal third. Punctuation along R-M of corium not reaching corium-membrane margin. Peritreme spout, i.e., auricle with dorsal supporting projection; dorsal supporting projection moderately elongate with apex recurving; evaporatorium covering mesepimeron and metepisternum.

Distribution. Endemic to Madagascar (Kóbor & Kondorosy 2016).

Germalus benyovszkyi Kóbor et Kondorosy, 2016 (Fig. 17)

Material studied: as in Kóbor and Kondorosy (2016).

Diagnosis. Colouration generally ochraceous with rounded dark brown spots at each humeral angles and oval dark brown spot at apex of corium. Conspicuously large species, body length above 7 mm. Eyes moderately stylate with eye stalks straight, not projected; ocular sulcus complete, well-defined. Antenniferous tubercles protruding, visible from anterior view. Pronotum campanulate, i.e., with anterior margin strongly rounded, lateral margin

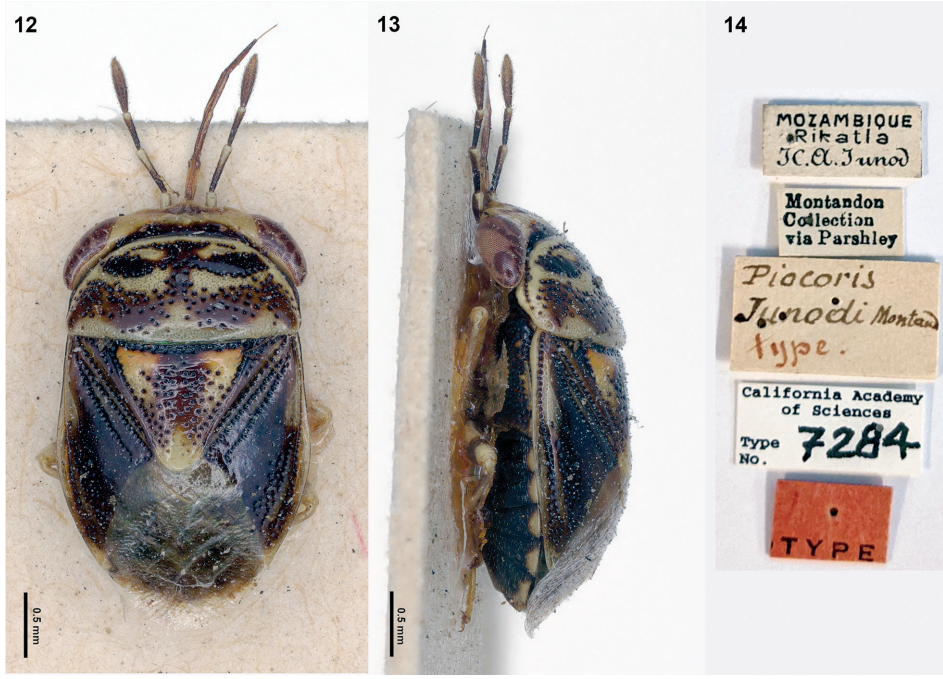
posteriad to callosities constricted. Scutellum subequilateral triangular with trifurcate carina well-developed, but not flared at basal angles. Clavus of corium with corial margin punctate at entire length. Punctuation along R-M of corium reaching corium-membrane margin. Peritreme spout, i.e., auricle with dorsal supporting projection; dorsal supporting projection straight, moderately elongate; evaporatorium covering mesepimeron and metepisternum.

Distribution. The species is currently known from a single location in Northern Madagascar (Kóbor & Kondorosy 2016).

Germalus kinbergi (Stål, 1860)
(Fig. 18)

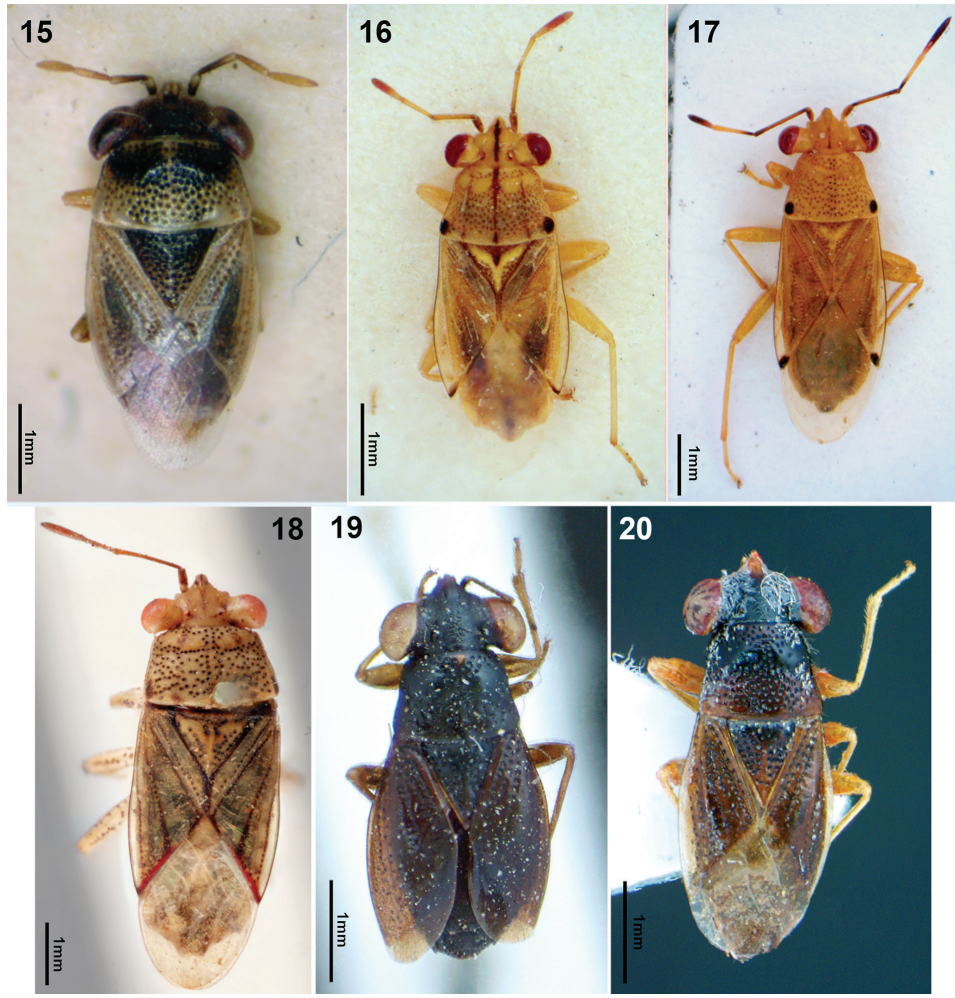
Material studied: as in Kóbor and Kondorosy (2016).

Diagnosis. Colouration generally ochraceous with dark fuscous punctuation. Vertex with a median longitudinal fuscous stripe extending from apex of clypeus to middle of vertex. Humeral angles with rounded, pale brownish spots. Corium-membrane margin sometimes red. Abdominal dorsum with dark brown, irregular longitudinal bands laterally. Eyes moderately stylate



Figs 12–14. Lectotype (present designation) of *Geocoris (Piocoris) junodi* Montandon, 1907: 12 = dorsal habitus; 13 = lateral view; 14 = labels. Scale bar = 0.5 mm for figures 12–13, Fig. 14 not to scale. (Photos: Rachel Diaz-Bastin, KNHM)

with eye stalks straight. Ocular sulcus complete, well-defined. Antennomere I maculate. Pronotum trapeziform with lateral margins slightly constricted. Scutellum subequilateral triangular with trifurcate median carina well-developed but interrupted by punctures medially. Clavus of hemelytron with margins subparallel and claval commissure complete; corial margin with a line of puncutres "breaking" at two-third of length (Fig. 18). Peritreme spout,



Figs 15–20. Geocorine true bugs of the Malagasy region (dorsal habitus): 15 = *Geocoris pallidipennis mauritii* Stål, 1854 (male, MNHN); 16 = *Germalus banari* Kondorosy et Kóbor, 2016 (paratype, male, MNHN); 17 = *Germalus benyovszkyi* Kondorosy et Kóbor, 2016 (holotype, male, MNHN); 18 = *Germalus kinbergi* Stål, 1860 (lectotype, female, NHRS); 19 = *Hypogeocoris alluaudi* (Montandon, 1908) (male, MNHN); 20 = *Hypogeocoris violaceus* (Signoret, 1881) (female, NHMW). Scale bar = 1 mm for all images

i.e., auricle with dorsal supporting projection; dorsal supporting projection curved, moderately elongate; evaporatorium covering mesepimeron and metepisternum. Femora with brown maculae.

Distribution. The species is known from Mauritius and Réunion islands (Kóbor & Kondorosy 2016).

Genus *Hypogeocoris* Montandon, 1913

Type species: *Germalus violaceus* Signoret, 1881: 1 (by original designation).

Hypogeocoris alluaudi (Montadon, 1908) (Fig. 19)

Material studied: 1 f, MFNB: "Madagaskar / Schaufuss // Geocoris cf. [?] mauritii / Stål [labels handwritten] // Museum für / Naturkunde Berlin"; 1 f, NHMW: "Sikora / Madagasc. // 67 [label handwritten]; 1f, 1m, NHMW: "Mdgk, Sikora / Ampasimena".

Diagnosis. Colouration mostly dark brown or black. Antennomere I and base of antennomere II dark brown, antennomeres III and IV dark ochraceous. Legs pale brown. Integument of dorsum shiny without conspicuous pubescence. Punctuation of pronotum and scutellum coarse and sparse. Brachypterous species; clavus and corium distinguished by lines of punctures along the claval fold, membrane reduced to flaps, not reaching genital plate. Peritreme vesiculiform auricle with anterior margin of terminal lobe slightly indented.

Distribution. The species is known to be endemic to Madagascar (Slater 1964, present study).

Hypogeocoris violaceus (Signoret, 1881) (Fig. 20)

Material studied: m, MNHN: "Maroantsetra / Ambodivoangy // INSTITUT / SCIENTIFIQUE / MADAGASCAR".

Diagnosis. Colouration mostly dark brown or black. Clypeus, surroundings of antenniferous tubercles, antennomeres, prothoracic, and legs collar infuscate ochraceous. Margin of exocorium narrowly semi-hyaline ochraceous. Integument of dorsum shiny with dense, fine pubescence. Punctuation of pronotum and scutellum fine and dense. Only submacropterous morph of this species is known; hemelytron with claval fold of hemelytron developed, clavus and corium distinct; membrane reaching genital plate, but not surpassing it. Peritreme vesiculiform auricle with dorsal margin of terminal lobe slightly indented.

Distribution. The species is known to be endemic to Madagascar (Slater, 1964; present study).

Remarks. The species greatly resembles *H. alluaudi* in general facies and colouration. Especially, because the extent of ochraceous of decoration of *H. violaceus* is variable. However, there are three characters which provide secure basis for separation of the two species: integument of vertex and thoracic dorsum with fine, dense pubescence in *H. violaceus* (pubescence missing in *H. alluaudi*); pronotum with fine, dense punctuation in *H. violaceus* (punctuation of pronotum is rather coarse and sparse in *H. alluaudi*); terminal lobe of peritreme indented dorsally in *H. violaceus* (terminal lobe indented anteriad in *H. alluaudi*).

DISCUSSION

In present study a new species belonging to subgenus *Piocoris* Stål, 1872 is described along with the review of the Malagasy representatives of family Geocoridae. The Malagasy fauna of big-eyed bugs currently consists of seven species of two genera, all assigned to subfamily Geocorinae.

The subgenus *Piocoris* Stål, 1872 consists of twelve species with six subspecies and distributed from East-Central Europe in the north to South Africa in the south and from the Canary Islands in the West to India in the East. *Geocoris* (*Piocoris*) *petofii* sp. n. is the first species of the subgenus reported from Madagascar. The status of *Piocoris* was subject of debates: the taxon was described originally as genus of Geocorinae, closely allied to *Geocoris*. Linnavuori (1972) proposed to reduce the taxon to subgenus of *Geocoris* because the diagnostic character (i.e., labiomere II longer than III was considered ineligible to retain generic status. Readio and Sweet (1982) argued this action citing the case of *Isthmocoris* McAtee, 1914 as an example where similar structure was found to be adequate for separation at generic level. On the other hand, it must be noted that experiences of the author in taxon-

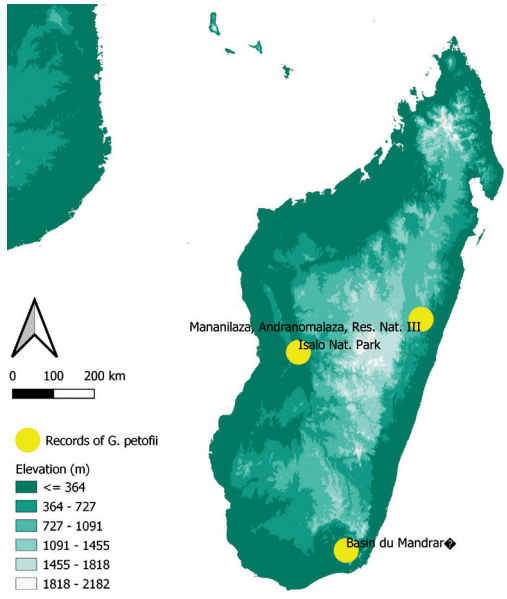


Fig. 21. Distribution of *Geocoris* (*Piocoris*) *petofii* sp. n.

omy of Geocorinae suggest that most taxa within the subfamily – in particular *Geocoris* sensu lato and closely allied genera – are rather to be diagnosed by a combination of suspectedly homoplasious characters than by striking autapomorphies or synapomorphies. The redefinition of included taxa along this consideration may result the revision of the taxonomic status of the subgenera of *Geocoris*, too. Such redefinition is found to be required in case of the genus *Hypogeocoris* because the diagnosis of both the genera and the included species were found to be dubious in course of the preparation of present study (author's unpublished notes).

*

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