Taxonomic revision of *Agraphydrus* RÉGIMBART, 1903 IV. Africa, Western Asia, and redescription of the genus (Coleoptera: Hydrophilidae: Acidocerinae)

A. KOMAREK

Abstract

The species of *Agraphydrus* RÉGIMBART, 1903 from Africa and Western Asia are revised, and the genus *Agraphydrus* is redescribed based on the hitherto known species.

Agraphydrus albescens (RÉGIMBART, 1903), A. minutissimus (KUWERT, 1890), A. praecipuus (OR-CHYMONT, 1937), A. punctatellus RÉGIMBART, 1903, and A. villiersi (BALFOUR-BROWNE, 1958) are redescribed. Twenty-five new species are described: A. acutus sp.n., A. aethiopicus sp.n., A. andringitra sp.n., A. angustatus sp.n., A. atripalpis sp.n., A. bicoloratus sp.n., A. bilardoi sp.n., A. biltoni sp.n., A. camerunensis sp.n., A. congolensis sp.n., A. flavescens sp.n., A. flavipes sp.n., A. fontis sp.n., A. gereckei sp.n., A. goldschmidti sp.n., A. madagascarensis sp.n., A. malkini sp.n., A. matoposensis sp.n., A. pauper sp.n., A. rhodesiensis sp.n., A. rivalis sp.n., A. scutifer sp.n., A. tumidus sp.n., A. usambaraensis sp.n., A. vadoni sp.n. A lectotype is designated for A. albescens.

The genus Agraphydrus is recorded from Angola, Botswana, D.R. Congo, Djibouti, Eswatini (formerly Swaziland), Ethiopia, Ghana, Iran, and Nigeria for the first time. First country records: A. albescens (Botswana, Cameroon, D.R. Congo, Kenya, Republic of South Africa), A. minutissimus (Djibouti, Eritrea, Iran), A. punctatellus (Eswatini), A. villiersi (Nigeria).

A total of 31 species is now known from the Afrotropical Region (sensu HANSEN 1999b). One of these species, *Agraphydrus minutissimus*, occurs also in the Western Palearctic Region (northern part of Saudi Arabia and southern Iran), where it is the only known *Agraphydrus* species.

The habitats of *A. camerunensis*, *A. matoposensis*, and *A. rhodesiensis* are unknown, *A. vadoni* is probably terrestrial, all other species were collected in various aquatic habitats, including several hygropetric ones. Four species were collected at light.

Habitus, male genitalia and femora of all species are illustrated, distribution maps are presented. A key to the species of the Afrotropical Region and photographs of sampling localities are added.

Key words: Coleoptera, Hydrophilidae, *Agraphydrus*, taxonomy, revision, key to species, new species, Afrotropical Region, Western Palearctic Region.

Introduction

Following HANSEN (1999b), the Afrotropical Region comprises Africa south of the Sahara and the southern Arabian Peninsula.

Agraphydrus minutissimus (KUWERT, 1890) belongs to the first ever collected species of *Agraphydrus*. It is widespread on the Arabian Peninsula, occurs in East Africa, and is also found in northern Saudi Arabia and southern Iran, thus representing the only *Agraphydrus* species occurring in the Western Palearctic Region. Since 1937, collecting trips to the Arabian Peninsula were conducted by H. Scott and E.B. Britton in Yemen, by C. Holzschuh and W. Büttiker in Saudi Arabia, by M.A. Jäch and J.-L. Gattolliat in the United Arab Emirates, and by C. Holzschuh, G. Wewalka, M.D. Gallagher, and recently by I. Ribera, A. Cieslak & C. Hernando in Oman. Only one additional species, *A. elongatus* RIBERA et al., 2019, was found on the Arabian Peninsula.

In Africa, the French entomologist Charles A. Alluaud (1861–1949) was the first known scientist collecting specimens of *Agraphydrus* on his numerous expeditions (1893–1909), mainly in Madagascar and Kenya. Three of the species collected by him in Madagascar, *A. albescens* (RÉGIMBART, 1903), *A. punctatellus* RÉGIMBART, 1903, and *A. praecipuus* (ORCHYMONT, 1937) have been subsequently described.

Since that time, about 40 researchers sporadically sampled *Agraphydrus* in 20 African countries. The material collected in 1946 by A. Villiers in Ivory Coast resulted in the description of *A. villiersi* (BALFOUR-BROWNE, 1958). More fruitful were the sampling activities by R. Gerecke (12 spp.) and T. Goldschmidt (9 spp.) in Madagascar, and by J. Balfour-Browne (5 spp.), D.T. Bilton (4 spp.), as well as M. Hess and U. Heckes (3 spp.) in southern Africa. In total, 25 new species are described in this contribution.

The description of *Agraphydrus* RÉGIMBART, 1903 was based on the Afrotropical *A. punc-tatellus*. The genus was separated from *Philhydrus* SOLIER, 1834 (= *Enochrus* THOMSON, 1859) because of the absence of a sutural stria, the only generic character mentioned by RÉGIMBART (1903). ORCHYMONT (1937, 1939) regarded *Agraphydrus* as subgenus of *Helochares* MULSANT, 1844. Eventually, SATÔ (1965) re-established the generic status, followed by HANSEN (1991), and confirmed by SHORT & FIKÁČEK (2013) by molecular data.

HANSEN (1991) provided a detailed morphological description of the genus, based on *A. punc-tatellus*, *A. pauculus* (KNISCH, 1924), and "various unidentified spp.". A re-description of the genus based on all known species is presented herein.

Since 2015, a total of 147 new species of *Agraphydrus* was described by MINOSHIMA, KOMAREK & ÔHARA (2015: 7 spp.), MINOSHIMA (2016: 1 sp.), KOMAREK & HEBAUER (2018: 33 spp.), KOMAREK (2018: 36 spp., 2019: 60 spp.), RIBERA, HERNANDO & CIESLAK (2019: 1 sp.), KOMAREK & FREITAG (2020: 9 spp.). At present, 199 species are known from the Australian, Afrotropical, Oriental, and Palearctic regions, including the 25 new species described in this contribution.

Material and methods

About 1000 specimens of *Agraphydrus*, including type specimens and unidentified material from Angola, Botswana, Cameroon, D.R. Congo, Djibouti, Eritrea, Eswatini (formerly Swaziland), Ethiopia, Gabon, Ghana, Iran, Ivory Coast, Kenya, Madagascar, Malawi, Mozambique, Namibia, Nigeria, Oman, Republic of South Africa, Saudi Arabia, Sudan, Tanzania, United Arab Emirates, Yemen, and Zimbabwe were examined.

For methods concerning preparation of specimens and illustration, see KOMAREK (2018). The morphological terminology is explained in KOMAREK (2004) and KOMAREK & HEBAUER (2018).

Within the precisely cited label data square brackets "[...]" are used for remarks by the author, a backslash "\" indicates the change of line, a straight line "|" the change of label. Additional notes on geographical and ecological details are based on personal information by the collectors.

Abbreviations:

- C.I. clypeal index = ratio greatest width / median length of clypeus anterior to eyes
- E.I. elytral index = ratio greatest elytral length / greatest elytral width
- P.I. pronotal index = ratio greatest pronotal width / median pronotal length
- RSA Republic of South Africa
- UAE United Arab Emirates
- CAS California Academy of Sciences, San Francisco, USA (D. Kavanaugh, N.D. Penny, C. Grinter)
- CBP Coll. David Bilton, Plymouth, UK

- CGF Coll. Garth N. Foster, Ayr, Scotland, UK
- CHM Coll. Lars Hendrich, München, Germany
- CSG Coll. Andre Skale, Gera, Germany
- HUB Museum für Naturkunde Leibniz Institute for Evolution and Biodiversity Science, Berlin, Germany (J. Frisch)
- ISNB Institut des Sciences naturelles de Belgique, Bruxelles, Belgium (P. Limbourg, Y. Gérard)
- MHNP Muséum national d'Histoire naturelle, Paris, France (T. Deuve, A. Mantilleri)
- MLSF Museo di Storia Naturale La Specola, Firenze, Italy (L. Bartolozzi)
- MNS Museum für Naturkunde, Stuttgart, Germany (C. König, W. Schawaller)
- NHM Natural History Museum, London, UK (C. Taylor)
- NHMB Naturhistorisches Museum Basel, Switzerland (M. Borer)
- NMP National Museum, Prague, Czechia (M. Fikáček)
- NMW Naturhistorisches Museum Wien, Austria (M.A. Jäch)
- SEMC Biodiversity Institute, University of Kansas, Lawrence, USA (A.E.Z. Short)
- ZMUC Zoological Museum, University of Copenhagen, Denmark (A. Solodovnikov, S.G. Selvantharan)

Checklist of the species of *Agraphydrus* of Africa and Western Asia

- 1. A. acutus sp.n. NAMIBIA, RSA
- 2. *A. aethiopicus* sp.n. ETHIOPIA
- A. albescens (RÉGIMBART, 1903) BOTSWANA, CAMEROON, D.R. CONGO, KENYA, MADAGASCAR, MALAWI, NAMIBIA, RSA, TANZANIA, ZIMBABWE – not in Sudan
- 4. *A. andringitra* sp.n. MADAGASCAR
- 5. *A. angustatus* sp.n. ANGOLA, NAMIBIA
- A. atripalpis sp.n. RSA, TANZANIA, ZIMBABWE
- 7. *A. bicoloratus* sp.n. GABON
- 8. *A. bilardoi* sp.n. GABON
- 9. A. biltoni sp.n. RSA
- 10. *A. camerunensis* sp.n. CAMEROON
- 11. *A. congolensis* sp.n. D.R. CONGO
- 12. A. elongatus RIBERA, HERNANDO & CIESLAK, 2019 OMAN, UAE
- 13. *A. flavescens* sp.n. CAMEROON, GHANA

- 14. *A. flavipes* sp.n. MADAGASCAR
- 15. *A. fontis* sp.n. MADAGASCAR
- 16. *A. gereckei* sp.n. MADAGASCAR
- 17. *A. goldschmidti* sp.n. MADAGASCAR
- 18. *A. madagascarensis* sp.n. MADAGASCAR
- 19. *A. malkini* sp.n. CAMEROON
- 20. *A. matoposensis* sp.n. ZIMBABWE
- A. minutissimus (KUWERT, 1890)
 DJIBOUTI, ERITREA, IRAN, OMAN, SAUDI ARABIA, SUDAN, UAE, YEMEN not confirmed for Syria, not in Kenya, Madagascar, Namibia, RSA
- 22. *A. pauper* sp.n. MADAGASCAR
- 23. *A. praecipuus* (ORCHYMONT, 1937) MADAGASCAR
- A. punctatellus RÉGIMBART, 1903 ESWATINI, MADAGASCAR, MOZAMBIQUE, RSA – not confirmed for Tanzania
- 25. *A. rhodesiensis* sp.n. ZIMBABWE
- 26. *A. rivalis* sp.n. MADAGASCAR
- 27. *A. scutifer* sp.n. MADAGASCAR
- 28. *A. tumidus* sp.n. MADAGASCAR
- 29. *A. usambaraensis* sp.n. TANZANIA
- 30. *A. vadoni* sp.n. MADAGASCAR
- A. villiersi (BALFOUR-BROWNE, 1958) GUINEA, IVORY COAST, NIGERIA – not in Cameroon and Gabon

Agraphydrus RÉGIMBART, 1903

Agraphydrus RÉGIMBART 1903: 33. Type species: Agraphydrus punctatellus RÉGIMBART, 1903.
Gymnhelochares ORCHYMONT 1932: 692. Type species: Helochares geminus (ORCHYMONT, 1932).
Pseudohelochares SATÔ 1960: 76. Type species: Pseudohelochares narusei SATÔ, 1960; SATÔ 1965: 128.
Pseudopelthydrus JIA 1998: 225 ff. Type species: Pseudopelthydrus longipalpus JIA, 1998; KOMAREK 2003: 384.
Megagraphydrus HANSEN 1999a: 137. Type species: Megagraphydrus siamensis HANSEN, 1999; HANSEN 1999b: 157; MINOSHIMA, KOMAREK & ÔHARA 2015: 7.

DIAGNOSIS: For contrasting juxtaposition of *Agraphydrus* to other genera of Acidocerinae (sensu SHORT & FIKÁČEK 2013), see KOMAREK & HEBAUER (2018).

Among Acidocerinae the genus is defined by the combination of the following characters: (1) Body length 1.4–4.8 mm; (2) outline of body not interrupted between pronotum and elytra; (3) labrum not concealed by clypeus; (4) anterior margin of clypeus emarginate; (5) compound eyes present, not subdivided, not or very weakly excised anteriorly; (6) mentum without ventral ridge; (7) maxillary palpi 0.7–1.6 times as long as maximum width of clypeus; (8) palpomeres straight, palpomere 2 club-shaped, widening to apex (character unique among Acidocerinae); (8) ground punctation present, not granulate; (9) systematic punctures present on head, pronotum and elytra; (9) mesoventrite without strong carina; (10) metaventrite without projection; (11) scutellary stria absent; (12) sutural stria absent.

REDESCRIPTION (Fig. 1): Total body length ca. 1.4–4.8 mm, total body width 0.6–2.4 mm. E.I.: 1.0–1.6, P.I.: 1.8–2.6, elytra 2.4–3.5 times as long as pronotum. Habitus slender to broadly oval, weakly to strongly convex; elytra evenly oval, or parallel-sided, or widening posterior to mid-length, or attenuating to apex; its outline not interrupted between pronotum and elytra. Coloration yellow, brown or black.

Head: Labrum well developed, distinctly exposed; frontal portion weakly emarginate, weakly flexed ventrad; fine long setae present. Mandible with broadly rounded lateral margin or with indistinct obtuse angle between basal and apical portion; apex bifid; row of long and fine setae present in middle of mesal margin. Clypeus and frons with fine to coarse irregular ground punctation. Systematic punctures present, indistinct to very distinct, arranged in clusters at antero-lateral portion of clypeus and posterior to frontoclypeal suture. Anterior margin of clypeus distinctly or weakly concave, or rarely with angular excision. C.I. = 2.5-5.5, length ratio clypeus/eyes = 1.2-4.5; microreticulation present or absent. Frontoclypeal suture visible as fine line along entire length. Eyes small to large, separated by 3.4–9.1 times the width of one eye, not or slightly protruding, hemispherical or oblong-oval in dorsal view; anterior margin not or very slightly emarginate anteriorly. Antennae with eight or nine antennomeres; scapus slightly longer and generally wider than pedicellus; first intermediate segment longer than intermediate segments 2 and 3. Galea with six regular rows of recurved fine long setae. Maxillary palpi slender to stout, longer than antennae, 0.7-1.5 times as long as pronotum in midline, 0.7-1.6 times as long as maximum width of clypeus; palpomere 1 very small, spherical or slightly ovoid; length ratio palpomeres 4:2 = 0.8-1.2; length ratio palpomeres 4:3 = 0.9-1.6; palpomere 2 straight or very slightly arcuate, distinctly widening apicad, club-shaped; palpomeres 3 and 4 straight, palpomere 4 symmetrical, or slightly asymmetrical with arcuate lateral margin and straight mesal margin. Mentum slightly wider than long, flat, or impressed in anterior half; anterior margin rounded with mesal emargination, antero-lateral angles distinctly projecting; lateral margins straight, nearly parallel, or weakly rounded, sparsely set with fine long setae; ventral face unpunctate or with fine to coarse irregular punctation, evenly distributed or grouped laterally; microsculpture (wrinkles) present or absent. Prementum partly visible in front of mentum, lateral sclerites slightly protruding, densely fringed with very fine long setae. Submentum with narrow glabrous anterior portion and large pubescent posterior portion. Labial palpomere 2 longer than palpomere 3, with few long setae. Gula well developed, weakly narrowed anteriorly, gular sutures in slightly concave lines. Submento-gular sutures absent.

Thorax: Anterior margin of pronotum weakly bisinuate with anterior corners slightly projecting cranio-ventrad, posterior margin straight or very weakly bisinuate; lateral margins almost straight to distinctly convex, converging anteriorly, with tender bead. Irregular pronotal ground punctation obsolete to distinctly impressed, punctures fine to coarse; systematic punctures present antero-laterally, indistinct to very distinct, arranged semicircularly or divided in one anterior and one posterior cluster, rarely with irregular distribution. Transverse fold distinct, short. Hypomeral process with short pointed apex. Notosternal suture distinct. Prosternum almost flat, not carinate, very slightly projecting anteriorly towards gula, with pointed posterior prosternal process, extending to almost middle of procoxae. Procoxal bridge distinct but weakly sclerotized. Procoxal fissure narrow. Accessory ridge below posterior pronotal margin continuing as transverse fold laterad. Profurca composed of short narrow stalk and leaf-shaped apical extension. Mesoscutum without microsculpture. Scutellar shield well exposed, moderately sized, equilateral triangular or slightly longer than wide. Elytra without microsculpture, sutural stria absent; with fine or coarse, rarely obsolete, irregular, or rarely subseriate ground punctation; systematic punctures present, indistinct to very distinct, generally arranged in four longitudinal rows, with reduced number of punctures in mesal rows; rarely with ten subserial rows of very coarse punctures. Elytral margins evenly arcuate, rarely very weakly explanate posteriorly. Pseudepipleura glabrous, narrow, reaching apex of elytra. Epipleura pubescent, moderately wide anteriorly, reaching to less than elytral mid-length. Mesoventrite flat or with bulge; in some species with postero-median horizontal ridge, or with short low longitudinal carina posteriorly; with short, narrow extension posteriorly between mesocoxae. Anapleural sutures weakly visible in posterior section, absent anteriorly, thus an pisterna not separable from mesoventrite in anterior section. Anterior collar distinctly marked, widening laterad. Pleural sutures well visible. Furcal arms short, connected by short extension with inner wall of mesoventrite, with small plate-like extension apically. Transverse suture present, separating katepisternum from metaventrite. Metacoxal processes exposed, very small. Metaventrite with gently raised, slightly convex middle portion, with dense hydrofuge pubescence, reduced or absent on mesal portion; with very short, narrow anterior projection between mesocoxae, meeting mesoventral process. Anepisternum 3 about three times as long as wide, subparallel-sided, anapleural sutures very indistinct. Metepimeron not visible. Metafurcal stalk without basal extensions, gradually widening; furcal arms with large extensions, forming common plate-like structure.

Legs: Procoxae subglobular. Mesocoxae almost horizontal, slightly separated by posterior process of mesoventrite and anterior process of metaventrite. Femora flattened. Profemur 2.2–2.7 times as long as wide. Tibial grooves on mesal face present. Hydrofuge pubescence reduced on trochanters, present on ventral face of profemur, present or absent on meso- and metafemur. Tibiae with oval profile; with rows of fine spines and two longer and two shorter distal spurs. Tarsomeres generally sparsely set with fine setae ventrally. Metatarsomere 1 very short, distinctly shorter than following tarsomeres, metatarsomere 2 and 5 longer than metatarsomeres 3 and 4. Claws moderately sized, evenly curved; empodium bisetous, small.

Abdomen with five pubescent ventrites, ventrite 1 slightly shorter than ventrite 2, not carinate; ventrite 5 with several fine spine-like setae apically, with or without apical emargination.

Aedeagus of trilobate type, median lobe often with reinforcing structures, such as styli or plates.

Agraphydrus acutus sp.n.

TYPE LOCALITY: Namibia, Karas Region, Aar Farm Waterhole.

TYPE MATERIAL: Holotype σ (NHM): "sandy & stoney [sic!] \ banks of pools | S.W.AFRICA (12) \ Aar Farm Waterhole \ 27 mls.ESE.Aus \ 16.i.1972 | Southern \ African Exp. \ B M.1972-I | HOLOTYPUS \ Agraphydrus \ cylindricus sp. n. \ des.F.Hebauer". Paratypes: NAMIBIA: 34 exs. (NHM, NMW, ZMUC): same sampling data as holotype; 1 σ , 2 $\varphi \varphi$ (NMW): Kunene Reg., Uniab River, Palmwag N.P., near Palmwag Lodge, 19°53'S 13°50'E, leg. C. Mentzel "PQ II (17) \ 16.2.1997 (4)"; 1 φ (NMW): same sampling data, but "PQ II (16) \ 16.2.1997 (1)". RSA: Eastern Cape Province: 3 exs. (NHM, ZMUC): Chris Hani Distr., road between Queenstown (= Komani) and Lady Frere (settlement), ca. 3800 ft a.s.l., on stones in running water in small stream, 26.III.1954, leg. J. Balfour-Browne, Stn. 97; Northern Cape Province: 1 ex. (CBP): Calvinia, Hantamsberg summit, 1 km N of radio mast, 31°22'29.5"S 19°46'10.2"E, ca. 1570 m a.s.l., pools in stream flow, 26.IX.2010, leg. D.T. Bilton; 4 exs. (CBP,

NMW): Namaqualand, stream along Road 355, ca. 5 km E of Spektakel Pass, 29°43'41.1"S 17°31'12.6"E, ca. 450 m a.s.l., 9.IX.2016, leg. D.T. Bilton; 9 exs. (CBP, NMW): Namaqualand, stream with tussocks along Road 355, west of Spektakel Pass, 29°41'50.1"S 17°41'53.0"E, ca 550 m a.s.l., 9.IX.2016, leg. D.T. Bilton.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and largely infuscated maxillary palpomere 4, together with *Agraphydrus atripalpis* and *A. malkini*. Differs in larger body size, very slender habitus, elytra widening behind mid-length, longer maxillary palpi, and features of aedeagus (e.g., basal lobe about as long as parameres, manubrium undefined, apex of parameres pointed) from these species; differs moreover in finer elytral ground punctation, more extended femoral pubescence, and presence of apical emargination on abdominal ventrite 5 from *A. malkini*.

DESCRIPTION: Total length: 2.5–3.2 mm; elytral width: 1.0–1.4 mm; E.I.: 1.3–1.4, P.I.: 1.8–1.9, elytra 3.0–3.3 times as long as pronotum. Habitus (Fig. 64) slender, elytra widening posterior to mid-length, weakly convex.

Coloration: Labrum, clypeus and frons black; clypeus with narrow yellow preocular patches, as wide as diameter of eye or smaller; maxillary palpi dark yellow, palpomere 4 entirely darkened, infuscation rarely restricted to more than distal half; distal portion of palpomere 3 darkened in some individuals; pronotum blackish brown or black with very narrow yellow lateral rims, yellow anterior margins present in most specimens; elytra black with yellowish posterior area and narrow yellow lateral margins, or entirely dark brown in rare cases; ventrites black; legs light to dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 2.7, lateral length ratio clypeus/eyes = 1.7-1.9; microreticulation absent; ground punctation moderately fine, distinctly impressed, interspaces 1-3 times as wide as punctures. Systematic punctures moderately distinct. Eyes large, slightly protruding, slightly oblong in dorsal view. Antennae usually with eight antennomeres with elongate intermediate segment 1; rarely with nine antennomeres; different numbers of antennomeres not gender-related and without geographical correlation. Maxillary palpi slender, 1.3 times as long as pronotum in midline, 1.3 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3-1.4; palpomere 4 asymmetrical. Mentum with very fine, very widely spaced, evenly distributed punctures; microsculpture absent.

Thorax: Pronotal ground punctation as fine as on head, interspaces 1-2 times as wide as punctures; systematic punctures distinct. Elytral ground punctation slightly coarser and denser than on pronotum; four rows of indistinct systematic punctures present, with reduced number of punctures, mesal rows not reaching anterior margin. Mesoventrite with distinct mesal bulge.

Femora (Fig. 33): Pubescence present on proximal half of profemur, on proximal 2/3 of mesofemur, on more than proximal half of metafemur; hairlines very slightly oblique.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 2): Length: 0.52–0.56 mm; distinctly pigmented. Phallobase about as long as parameres, longer than wide, margins evenly curving to undefined manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct, reaching manubrium. Parameres with weakly sigmoid margins, converging to apex, weakly inclining mesad; apex pointed, bending laterad; basal portion reaching deeply into phallobase mesally; ventral face wider than dorsal face. Median lobe wide, apex bluntly rounded, not reaching apex of parameres; corona situated subapically; basal apophyses moderately sized.

ECOLOGY: Collected in pools, rivers, and streams; found together with Agraphydrus angustatus in Namibia.

DISTRIBUTION (Fig. 95): Namibia, RSA.

ETYMOLOGY: The name acutus (Latin adjective) (= acute) refers to the acute apex of the parameres.

Agraphydrus aethiopicus sp.n.

TYPE LOCALITY: Ethiopia, Amhara Region, Simien Mountains.

TYPE MATERIAL: Holotype σ (NMW): "ETHIOPIA: Amhara \ Simien Mts., Jinbar Riv. \ leg. H. Löffler, 15.IV.1976".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, maxillary palpi unicolored yellow, clypeus dark brown or black, pronotum dark brown, unicolored or with undefined darker brown mesal area, and body length less than 2.9 mm, together with *Agraphydrus congolensis*, *A. rivalis*, and *A. usambaraensis*. Shares 2.2 mm body length with *A. rivalis*, differs in nine antennomeres and absence of mesoventral carina from this species. Differs in slightly stronger ground punctation from *A. usambaraensis*. Differs in smaller size, lesser extension of metafemoral pubescence, and features of aedeagus (e.g., basal lobe evenly curving, median lobe shorter than parameres, apex of median lobe not reaching apex of parameres; parameres with sigmoid mesal margins, with weak subapical indentation on lateral margins) from *A. congolensis* and *A. usambaraensis*.

DESCRIPTION: Total length: 2.2 mm; elytral width: 1.1 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.5 times as long as pronotum. Habitus (Fig. 65) moderately broad, evenly oval, moderately to strongly convex.

Coloration: Labrum, clypeus, and frons black, clypeus with indistinct yellow lateral margins; maxillary palpomeres 1–3 unicolored yellow; pronotum dark brown mesally with decreasing intensity of coloration to narrow yellow lateral margins; elytra dark brown, with undefined yellowish brown lateral margins and posterior area; ventrites black; legs light brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.9, lateral length ratio clypeus/eyes = 2.1; microreticulation absent; ground punctation fine, interspaces 3-4 times as wide as punctures; systematic punctures distinct. Eyes small, not protruding, slightly oblong oval in dorsal view. Antennae with nine antennomeres, second intermediate segment minute. Maxillary palpi stout, 0.8 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0; palpomere 4 almost symmetrical. Mentum with few, very fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation as fine as on head, interspaces about twice as wide as punctures; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of distinct systematic punctures present, mesal rows present in anterior half, but not reaching anterior margin; additional row of few punctures present along lateral margin. Mesoventrite with mesal bulge.

Femora (Fig. 34): Pubescence present on proximal 2/3; hairlines straight to very slightly oblique.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 3): Length: 0.32 mm. Phallobase shorter than parameres, slightly wider than long, margins rounded, evenly curving to very short manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct. Parameres moderately wide, with distinctly curving mesal margins, with slight subapical indentation on lateral margin; apex asymmetrical, slightly inclining mesad; basal portion of dorsal face distinctly extending into phallobase mesally. Median lobe with bluntly rounded apex, not reaching apex of parameres; dorsal face widest in mid-length; corona in subapical position; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in a river.

DISTRIBUTION (Fig. 98): Ethiopia.

ETYMOLOGY: The name aethiopicus (adjective) refers to Ethiopia, where this species has been collected.

Agraphydrus albescens (RÉGIMBART, 1903)

Helochares albescens RÉGIMBART 1903: 27. Helochares (s.str.) albescens RÉGIMBART; KNISCH 1924: 196. Helochares (Agraphydrus) albescens RÉGIMBART; ORCHYMONT 1939: 198. Agraphydrus (s.str.) albescens (RÉGIMBART); HANSEN 1999b: 156; HEBAUER 2005: 39; HEBAUER 2006: 27.

TYPE LOCALITY: Madagascar, Toliara Province, Androy Region.

TYPE MATERIAL (examined): Lectotype $_{\text{Q}}$ (MHNP), by present designation: "Madagascar Sud \ Pays Androy (Nord) \ Alluaud 1900 36 ["36" handwritten, framed, at the right side of the bottom of the label] | MUSEUM PARIS \ CH. ALLUAUD 1893 | A.d'Orchymont det. 1927 \ Helochares (s.str.) \ albescens \ Rég. [label handwritten]". The type label is missing, but the label data correspond with the original description ("Centre-Sud de Madagascar (Alluaud)"), the number of syntypes was not mentioned in the original description. Paralectotype $_{\text{Q}}$ (MHNP): "Madag. \ Centre Sud [label handwritten] | coTYPE ["co" handwritten] | MUSEUM PARIS \ COLL. MAURICE RÉGIMBART \ 1908 | Helochares \ albescens Rég. [label handwritten] | albescens Rég. [label handwritten] | A.d'Orchymont vid. 1927 \ Helochares (s.str.) \ albescens \ Rég.".

ADDITIONAL MATERIAL EXAMINED:

- B O T S W A N A: Central District: 43 exs. (NHM): Nata (small town), Nata River, 20°12'S 26°11'E, at light, 23.IV.1972, Southern African Expedition "B21"; North-East District: 11 exs. (NHM, ZMUC): Shashe River, 20 miles NW Francistown, at light, 24.IV.1972, Southern African Expedition "B24"; 1 ♂ (CAS): 27 miles NE Francistown, 1600 ft a.s.l., 23.II.1970, leg. E.S. Ross.
- C A M E R O O N: Central Region: 3 exs. (SEMC): Mbam Djerem Park, Ganga Camp, 60 km SE Tibati, 5°59.857'N 12°52.668'E, without date, leg. K.B. Miller "KBM19030902".
- C O N G O (D.R.): Haut Lomami Province: 1 ♂ (ISNB): Mulongo (town), "Niunzu", 20.–30.V.1930, leg. P. Gérard; South Kivu Province: 14 exs. (CAS): 44 miles SW of Kamituga, 650 m a.s.l., 17.VIII.1957, leg. E.S. Ross & R.F. Leech.
- K E N Y A: Nyanza Province: 1 ♂ (ISNB): Kisumu County, Kisumu, "Baie Kavirondo" [= Winam Gulf = Lake Nyanza Gulf, extension of Lake Victoria], XII.1909, leg. C. Alluaud.
- M A D A G A S C A R: Toliara Province: 1 ♂ (ISNB): "Madagascar \ Centre-Sud \ Alluaud 1901 66 ["66" handwritten, framed, at the dexter bottom of the label] [label glued on a larger card "Coll. R. I. Sc. N. B. \ coll. \ d'Orchymont] | TOPOTYPE \ comparéé à un \ Cotype: plus petit [label handwritten] | A.d'Orchymont det. \ *Helochares (Agraphydrus)* [handwritten] \ *albescens* Régimb. [handwritten]"; 20 exs. (CAS): Androy Reg., "Antanemora" (= Antanimora Atsimo, town), 300 m a.s.l., 11.XI.1959, leg. E.S. Ross; 3 exs. (NMP): Atsimo-Andrefana Reg., Ejeda (community), Manakaravavy, bridge on Route Nationale 10 before village, 24.52°S 44.62°E, 235 m a.s.l., sandy pools in drying river bed, 7.I.2010, leg. M. Ferreux & P. Obrdlik "WWF 59A"; Antananarivo Province: 1 ex. (NMP): Vakinankaratra Reg., Betafo Distr., Mandoto, bridge RN34 before village, 19°34'S 46°16'E, 800 m a.s.l., muddy river, 17.XII.2009, leg. Ferreux & Ravelomanana "WWF 14A".
- M A L A W I: Southern Region: 1 & (NMW): Mangochi Distr., Lake Malawi N.P., Cape Maclear, 12.III.1991, leg. C. Bayer.
- N A M I B I A: Erongo Region: 19 exs. (NHM): Erongo Mountains, Ameib Farm, 19 miles NW Karibib (town), at light, 31.I.-2.II.1972, Southern African Expedition "30"; 1 ♀ (NMW): Namib Naukluft Park, Gobabeb (Training and Research Centre), Kuiseb River, 23°3'S 15°0'E, ca. 400 m a.s.l., 20.II.-6.III.1979, leg. H. Roer; Hardap Region: 1 ♀ (HUB): Namib Naukluft Park, Tsams Ost, 24°14.8'S 16°6.1'E, 7.-8.IV.2000, leg. B. & M. Uhlig; 1 ♀ (HUB): Garies Rest, Hardap Fountain, 24°27.38'S 17°42.29'E, 30.XI.1997, leg. M. Uhlig; Khomas Region: 2 exs. (NMW): Döbra (settlement, mountain) near Windhoek, 27.III.1988, leg. H. Roer; Kunene Region: 1 ♀ (HUB): Epupa Falls, 17°0'S 13°15'E, at light, 20.-21.II.1994, leg. M. Uhlig; 9 exs. (NHM): Otjitambi Farm, 27 miles ESE Kamanjab, at light, 13.-15.II.1972, Southern African Expedition "W37"; Otjozondjupa Region: 1 ex. (ZMUC): 3 miles S Okahandja (community), Swakop River, "floating refuse", 7.IV.1972, Southern African Expedition; 2 exs. (NMW): Okahandja, 1240 m a.s.l., 14.III.1979, leg. H. Roer; 4 exs. (NHM): Okahandja, 19.-29.III.1928, leg. R.E. Turner; 2 ♂ ♂, 1 ♀ (HUB): Otjiamongombe West 44 (Erichsfelde), 43 km N Okahandja, 21°35'45"S 16°56'17"E, 17.-19.IV.2002, leg. V. Richter, F. Koch & M. Uhlig "BIOTA 05.072,

2002.7.01.347"; 2 $\varphi \varphi$ (HUB): Otjiamongombe West 44 (Erichsfelde), 43 km N Okahandja, 21°35'48.7"S 16°56'16.9"E, thornbush savannah, light trap, 17.–20.IV.2002, leg. V. Richter, F. Koch & M. Uhlig "BIOTA 05.003.2002.7.01.338".

- R S A: Eastern Cape Province: 12 exs. (CBP, NMW): Garden Route N.P., Nature's Valley, pools beside Groot River, 33°57'59"S 23°33'32"E, 20 m a.s.l., 9.II.2017, leg. D.T. Bilton; 12 exs. (CBP, NMW): Garden Route N.P., Platbos, Tsitsikamma Section, pools besides Storm River, 33°59'19.5"S 23°55'08.4"E, ca. 90 m a.s.l., 7.II.2017, leg. D.T. Bilton; 6 exs. (NHM): Van Staden's Pass, in gravel at edge of fast stream, 21.III.1954, leg. J. Balfour-Browne, Stn. 84; Limpopo Province: 1 & (NHM): Kafferboom, "unnamed spruit [small stream], gravel & sand", 17.IV.1954, leg. J. Balfour-Browne, Stn. 169a; 4 & d, 1 Q (NHM, ZMUC): Shingwedzi River, pools in dry sand bed, 1800 ft a.s.l., 26.IV.1954, leg. J. Balfour-Browne, Stn. 198; 2 99 (MNS, NMW): Waterberg Distr., Thabaphaswa Mountain Sanctuary, N Potgietersrus (= Mokopane), N Soutpansberg Mountains, 1400 m a.s.l., 13.-14.XII.2003, leg. W. Schawaller; 2 & d, 1 Q (NHM): Waterberg Distr., Kareefontein (farm), near Nylstroom (= Modimolle, town), ca. 4800 ft a.s.l., rapid stream over rock and gravel, 16.IV.1954, leg. J. Balfour-Browne, Stn. 164; 1 ex. (NHM): Waterberg Distr., Magalakwena (local municipality), 23°26'S 28°37'E, at light, 26.IV.1972, leg. J. Balfour-Browne "S19"; 1 J, 1 Q (MNS, NMW): Vhembe Distr., N Soutpansberg Mountains, Amatola Farm, NE Vivo, 1000 m a.s.l., 15.-17.XII.2003, leg. W. Schawaller; Western Cape Province: 1 ex. (NMW): Du Toits Mountains, 15 km E Paarl, ca. 33°45'S 18°58'E, 1.III.1997, leg. M. Hess & U. Heckes "14"; 1 ex. (NMW): Heidelberg, 4.I.1994, leg. G. Wewalka "16"; 11 exs. (NMW): Hex River Mountains, 7 km SW Ceres, at Michell's Pass, 400 m a.s.l., 26.II.1997, leg. M. Hess.
- T A N Z A N I A: 1 ♂ (ISNB): "Zanzibar".
- Z I M B A B W E: 2 ♂♂, 1 ♀ (NHM): "S. Rhodesia", 30.VIII.1948, leg. J. Omer-Cooper; Mashonaland West Province: 1 ex. (NMW): Kariba N.P., Charara Safari Area, 30 km SE Kariba, ca. 700 m a.s.l., 16°40'S 29°01'E, at light, 19.III.2000, leg. U. Heinig; Masvingo Province: 1 ex. (HUB): Kyle Recreation Park at Lake Mutirikwi, 20°13'S 31°0'E, at light, 1.-5.VII.1993, leg. M. Uhlig; 14 exs. (NHM, NMW): Nuanetsi (= Mwenezi) River, Malapati, bush, IV.-V.1961, Rhodesian Schoolboys Expedition "Stn. M1, M13, M18"; Matabeleland South Province: 1 ex. (HUB): Matopos N.P., 20°33'S 28°30'E, at light, ca. 1300 m a.s.l., 28.-30.XI.1993, leg. J. Deckert; 9 exs. (HUB, NMW): same sampling data, but 28.XI.-1.XII.1993, leg. M. Uhlig; 1 ex. (NMW): Road Zvishavane Mbalabala, ca. 80 km W Zvishavane, 20°28'S 29°24'E, 1260 m a.s.l., at light, 10.III.2000, leg. U. Heinig.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and apically infuscated maxillary palpomere 4, together with *Agraphydrus angustatus*, *A. biltoni*, *A. elongatus*, *A. minutissimus*, and *A. matoposensis*. Differs in yellow pronotum and nine antennomeres from *A. biltoni* and *A. elongatus*; in black clypeus and nine antennomeres from *A. matoposensis*. Aedeagus very similar to aedeagus of *A. minutissimus*, differs mainly in presence of apical emargination on abdominal ventrite 5 from this species. Differs in shorter maxillary palpomeres, broader habitus, more extended femoral pubescence, and features of aedeagus (parameres with apical extension) from *A. elongatus*. Differs in larger lateral extension on apex of parameres from *A. angustatus*.

REDESCRIPTION: Total length: 1.8–2.5 mm, elytral width: 0.8–1.5 mm. E.I.: 1.4–1.5, P.I.: 1.8–2.1, elytra 3.0–3.5 times as long as pronotum. Habitus (Fig. 66) slender, elytra widening behind mid-length, weakly to moderately convex.

Coloration: Labrum, clypeus and frons black, clypeus with distinct yellow preocular patches, about as wide as diameter of eye; maxillary palpi pale yellow, palpomere 4 infuscated in apical third; pronotum and elytra unicolored light or dark yellow, in some cases with undefined dark brown mesal area; ventrites dark brown to black; legs yellowish to light brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.1-3.3, lateral length ratio clypeus/eyes = 1.7; microreticulation absent; ground punctation fine, interspaces 2-4 times as wide as punctures; systematic punctures distinct. Eyes moderately sized, very slightly protruding, oval-shaped in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 1.0-1.3 times as long as pronotum in midline, 1.0-1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2-1.4; palpomere 4 slightly asymmetrical. Mentum with very few, fine punctures laterally; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with distinct median bulge.

Femora (Fig. 35): Pubescence present on more than proximal half of profemur with oblique hairline; on proximal 2/3 of meso- and metafemur, slightly more extended on meso- than on metafemur with straight to slightly convex hairline.

Abdomen: Ventrite 5 with very shallow to almost semicircular apical emargination, $4-10 \ \mu m$ deep.

Aedeagus (Fig. 4): Length: 0.30–0.43 mm. Phallobase about as long as parameres, evenly converging to very short, indistinct manubrium. Lateral margins of parameres slightly sigmoid, constricted subapically; apex pointed, with strong, bluntly rounded, lateral projection; basal portion of dorsal face not deeply reaching into phallobase. Median lobe slightly shorter than parameres; dorsal face narrow; ventral face very wide, wider than parameres, tongue-shaped; apex bluntly rounded; corona situated subapically; basal apophyses short, reaching distal third of phallobase.

COMMENT: RÉGIMBART (1903) described as specific diagnostic characters the black head with distinct yellow preocular patches, the light brown coloration of pronotum and elytra ("la couleur testacé blanchâtre"), and the pronotal systematic punctures forming large impressions ("séries systématiques du pronotum réduits à deux ou troi énormes points"). In fact, *A. albescens* shares these character states with *A. minutissimus*. The similarity of these two species was already emphasized by ORCHYMONT (1939).

Specimens from Botswana and Zimbabwe are on average smaller (body length less than 2.0 mm), and the coloration is pale yellow; individuals from Namibia and RSA are larger (body length mostly more than 2.0 mm), and dark yellow.

ECOLOGY: Collected in rivers, streams, pools, lakes, also in polluted water; at light; found together with *A. praecipuus* in Madagascar, and with *A. punctatellus* in RSA.

DISTRIBUTION (Fig. 96): Cameroon (first record), D.R. Congo (first record), Kenya (first record), Tanzania, Madagascar, Malawi, Zimbabwe, Botswana (first record), Namibia, RSA (first record).

This species was erroneously recorded from Sudan by HEBAUER (2006) based on misidentification (see under *A. minutissimus*).

Agraphydrus andringitra sp.n.

TYPE LOCALITY (Fig. 100): Madagascar, Fianarantsoa Province, Haute Matsiatra Region, Andringitra N.P., Mount Ambatoberger, 22°7'52.0"S 46°51'51.1"E.

 $\label{eq:transformation} TYPE MATERIAL: Holotype & (NMW): "MADAGASCAR: Andringitra NP \ (Fianarantsoa) \ M. Ambatoberger \ 12.04.2011 \ leg. R. Gerecke (MD 203) | spring area Exp. W \ S22°07'52.0"/E46°51'51.1" \ 2105 m"; collected in a weakly flowing seepage spring, unshadowed, substrate mainly consisting of solid rock, organic material, and plant roots. Paratypes: 2 & d, 1 & (NMW): same sampling data as holotype.$

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended metafemoral pubescence and absence of apical infuscation on maxillary palpomeres. Shares dense, strongly impressed, dorsal ground punctation and dark coloration of pronotum and elytra with *A. flavipes* and *A. fontis*, both species from Madagascar; differs in larger size from these species, in eight antennomeres from *A. fontis*. Differs in infuscation of proximal portions of maxillary palpomeres 2–4 from all known species of *Agraphydrus*.

DESCRIPTION: Total length: 2.5 mm; elytral width: 1.2 mm; E.I.: 1.2, P.I.: 2.0, elytra 2.7 times as long as pronotum. Habitus (Fig. 67) moderately broad, elytra evenly oval, strongly convex.

Coloration: Labrum, clypeus, and frons black; maxillary palpi yellow, palpomeres 2–4 slightly infuscated in proximal portions; pronotum dark brown with narrow, undefined, rufous margins; elytra largely black with undefined brighter margins; ventrites and legs brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.1, lateral length ratio clypeus/eyes = 1.8; microreticulation absent; ground punctation moderately coarse, interspaces as wide as punctures or smaller; systematic punctures moderately distinct. Eyes large, not protruding, slightly oblong oval in dorsal view. Antennae with eight antennomeres. Maxillary palpi moderately stout, 0.9 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 almost symmetrical. Mentum with sparse fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of indistinct systematic punctures present, mesal rows 1-3 with reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 36): Pubescence present on proximal 2/3; hairlines straight.

Abdomen: Ventrite 5 with apical emargination, ca. 15 µm deep.

Aedeagus (Fig. 5): Length: 0.37–0.39 mm. Phallobase distinctly shorter than parameres, evenly curving to narrow, moderately long manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres moderately wide; margins weakly sigmoid; apex asymmetrical, bluntly rounded; basal portion of dorsal face weakly extending into phallobase; ventral face excised mesally. Median lobe rather narrow; dorsal face evenly narrowing to blunt apex, almost reaching apex of parameres; reinforcing structures absent; ventral face distinctly shorter than dorsal face; corona situated at distal third; basal apophyses moderately long, not reaching mid-length of phallobase.

ECOLOGY: Collected in a seepage spring together with A. scutifer.

DISTRIBUTION (Fig. 95): Madagascar.

ETYMOLOGY: The epithet refers to the Andringitra National Park (Madagascar), the type locality. Noun in apposition.

Agraphydrus angustatus sp.n.

TYPE LOCALITY: Namibia, Kunene Region, Uniab River, Palmwag N.P., near Palmwag Lodge, 19°53'S 13°50'W.

TYPE MATERIAL: **Holotype** σ (NMW): "NW-Namibia, Uniab \ nr Palmwag Lodge \ 13°50'W-19°53'S | PQ II (14) ["(14)" handwritten] \ 16.II.1997 (1) ["16" and "(1)" handwritten] \ leg.C.Mentzel". **Paratypes: NAMIBIA**: same sampling data as holotype, but "(17)" instead of "(14)", and "(4)" instead of "(1)". **ANGOLA: Namibe Province:** 12 $\sigma \sigma$, 3 $\varphi \varphi$ (NHM, NMW): Pediva, ca. 30 miles east of Porto Alexandre (= Tômbua), 400 ft., wet sand on edge of water, 27.VI.1954, leg. J. Balfour-Browne, Stn. 303; **Huila Province:** 1 φ (NHM): Joâo de Almeida (= Chibia), at light, 29.III.1992, Southern African Expedition "A41".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and apically infuscated maxillary palpomere 4, together with *A. albescens*, *A. biltoni*, *A. elongatus*, *A. minutissimus*, and *A. matoposensis*. Differs in yellow pronotum and nine antennomeres from

A. biltoni and A. elongatus; in black clypeus and nine antennomeres from A. matoposensis; in presence of apical emargination on abdominal ventrite 5 from A. minutissimus; in shorter maxillary palpomeres, broader habitus, more extended femoral pubescence, and features of aedeagus (parameres with apical extension) from A. elongatus. Differs in smaller lateral extension on apex of parameres from A. albescens, A. biltoni, A. minutissimus, and A. matoposensis.

DESCRIPTION: Total length: 2.0–2.4 mm; elytral width: 0.9–1.1 mm; E.I.: 1.3–1.5, P.I.: 1.8–2.0, elytra 2.9–3.4 times as long as pronotum. Habitus (Fig. 68) slender, elytra widening posterior to mid-length, moderately convex.

Coloration: Labrum, clypeus, and frons black with defined yellow preocular patches, as large as eyes or slightly larger; maxillary palpi pale yellow, palpomere 4 with apical infuscation; pronotum and elytra unicolored yellow; ventrites and proximal (pubescent) portion of legs black, distal (glabrous) portion of legs yellowish.

Clypeus with distinctly concave anterior margin, C.I. = 3.2-3.3, lateral length ratio clypeus/eyes = 1.7-1.9; microreticulation absent; ground punctation fine, weakly impressed, interspaces 2-3 times as wide as punctures; systematic punctures indistinct. Eyes large, not protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 1.1-1.2 times as long as pronotum in midline, 1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0; palpomere 4 almost symmetrical. Mentum with few indistinct punctures; micro-sculpture absent.

Thorax: Pronotal ground punctation fine, weakly impressed, interspaces twice as wide as punctures; systematic punctures very indistinct. Elytral ground punctation as on pronotum; four rows of distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with very indistinct bulge.

Femora (Fig. 37): Pubescence present on proximal 2/3 with straight hairlines.

Abdomen: Ventrite 5 with shallow apical emargination, 10 µm deep.

Aedeagus (Fig. 6): Length: 0.30–0.43 mm. Phallobase about as long as parameres, slightly longer than wide, sac-shaped, evenly curving to minute manubrium; borderline between pigmented and unpigmented part indistinct. Parameres narrow with weakly curving mesal margin, with sigmoid lateral margin, constricted subapically; apex narrow with small lateral apical extension; basal portion of dorsal face slightly reaching into phallobase. Median lobe reaching or projecting above apex of parameres; dorsal face narrow; ventral face very wide with bluntly rounded apex; corona situated subapically; basal apophyses not deeply extending into phallobase.

ECOLOGY: Collected in a river and in wet sand; at light; found together with *A. acutus* in Namibia.

DISTRIBUTION (Fig. 96): Angola, Namibia.

ETYMOLOGY: The name angustatus (Latin adjective) (= narrowed) refers to the narrowed apex of the parameres.

Agraphydrus atripalpis sp.n.

TYPE LOCALITY: RSA, KwaZulu-Natal Province, Port Shepstone, Oribi Gorge.

TYPE MATERIAL: Holotype σ (NMW): "RSA: Eastern Cape [= KwaZulu-Natal] 12.3.1997 \ 20km W Port Shepstone Oribi Gorge nr. Paddock \ 30°45'S 30°15'E \ leg. M. Hess & U. Heckes (30)"; collected in a tributary of Umzimkulwane River at Samango Falls, sandy banks with leaves and detritus. Paratypes: RSA: KwaZulu-Natal

Province: 5 exs. (NHM, NMW): Port Shepstone, Oribi Gorge, 1200 ft., 30.III.1954, leg. J. Balfour-Browne, Stn. 121; 1 d (NHM): Plains, Otterburn, 1500 ft a.s.l., on wet rock faces, 29.III.1954, leg. J. Balfour-Browne, Stn. 119; 1 ex. (NMW): 35 km N Estcourt, 29°17'S 29°30'E, 1510 m a.s.l., 5.VI.2001, leg. C.-F. Lee & T.K. Philips; Eastern Cape Province: 1 ex. (CBP): Katberge, at Road 67, 55 km NNE Fort Beaufort, wet rock face, 32°27'46.37"S 26°39'32.91"E, ca. 1430 m a.s.l., 30.XII.2013, leg. D.T. Bilton; Limpopo Province: 1 ex. (NHM): Soutpansberg Distr., Vhembe Municipality, Khalavha, Mutale River, ca. 3000 ft a.s.l., in side gravels and muddy pools. 24.IV.1954, leg. J. Balfour-Browne, Stn. 191; 4 exs. (NHM): Soutpansberg Distr., Mutshindudi River, ca. 3500 ft a.s.l., in silty edges at drift, 25.IV.1954, leg. J. Balfour-Browne, Stn. 195. TANZANIA: Morogoro Region: 15 exs. (NMW, ZMUC): Uluguru Mts., Lupanga West, 1400 m a.s.l., 1.VII.1981, leg. M. Stoltze & N. Scharff; 9 exs. (ZMUC): Uluguru Mts., Lupanga East, 1100 m a.s.l., 10.VII.1981, leg. M. Stoltze & N. Scharff; 8 exs. (ZMUC): Uzungwe (= Udzungwa) Mts., Mwanihana Forest above Sanje, 1000 m a.s.l., 1.VIII.1981, leg. M. Stoltze & N. Scharff; 11 exs. (ZMUC): same data, but 1.VIII.1982, 7 exs. additionally "loc.2", 1 ex. additionally "loc.3"; 12 exs. (ZMUC): same data, but 1100 m a.s.l., 1.VIII.1982; 2 exs. (ZMUC): same data, but 800 m a.s.l., 10.VIII.1982; 2 exs. (ZMUC): same data, but 1700 m.a.s.l., 10.VIII.1982, "loc. 11"; 1 ex. (ZMUC): same data, but 1400 m a.s.l., 16.VIII.1982, "loc. 13"; Tanga Region: 1 ex. (ZMUC): East Usambara Mts., Amani, Sigi River, 500 m a.s.l., 15.VII.1980, M. Stoltze & N. Scharff; 1 ex. (ZMUC): same data, but 750 m a.s.l. ZIMBABWE: Manicaland Province: 2 & d, 1 9 (NMW): Nyanga Distr., Mt. Nyangani, Nyanga N.P., 2230–2300 m a.s.l., on bolders under algal mat, 27.VII.1994, leg. P. Mazzoldi.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and largely infuscated maxillary palpomere 4, together with *A. acutus* and *A. malkini*. Differs in minor size, broader habitus, elytra not widening behind mid-length, and shorter maxillary palpi from *A. acutus*; in larger size, finer elytral ground punctation, more extended femoral pubescence, and presence of apical emargination on abdominal ventrite 5 from *A. malkini*. Differs in features of aedeagus (e.g., basal lobe very short, parameres with sigmoid margins and bluntly rounded apex) from both species. Shares similar aedeagus with *A. punctatellus*, a species with larger average body size, unicolored yellow maxillary palpomeres, nine antennomeres, very fine ground punctation and more extended femoral pubescence.

DESCRIPTION: Total length: 2.1–2.4 mm; elytral width: 1.1–1.3 mm; E.I.: 1.2–1.4, P.I.: 2.0–2.2, elytra 2.8–3.0 times as long as pronotum. Habitus (Fig. 69) moderately broad, widest in mid-length, moderately convex.

Coloration: Labrum, clypeus, and frons black, clypeus with narrow, indistinct, yellow lateral margins; maxillary palpomeres 1–3 yellow, palpomere 4 infuscated, entirely or at least in apical half; pronotum black with undefined, very narrow, yellow lateral margins, or dark brown mesally with decreasing intensity of coloration to yellow margins (some specimens from Tanzania); elytra dark brown to black with yellow lateral margins and posterior area; ventrites and legs black, distal portion of femora dark brown.

Head: Clypeus with weakly concave anterior margin, C.I. = 3.5, lateral length ratio clypeus/eyes = 1.6-1.7; microreticulation absent; ground punctation fine, interspaces 2-3 times as wide as punctures; systematic punctures distinct. Eyes large, slightly protruding, oval. Antennae with eight antennomeres. Maxillary palpi moderately stout, 0.9 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1-1.2; palpomere 4 slightly asymmetrical. Mentum with fine, evenly distributed punctures; micro-sculpture absent.

Thorax: Pronotal ground punctation as on head, systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of systematic punctures distinct, series 1 and to lesser degree series 2 with reduced number of punctures, not reaching anterior margin, additional row of punctures present along lateral margin. Mesoventrite with mesal bulge.

Femora (Fig. 38): Pubescence present on more than proximal half; hairlines straight on pro- and mesofemur, slightly oblique on metafemur.

Abdomen: Ventrite 5 with almost semicircular apical emargination.

Aedeagus (Fig. 7): Length: 0.33–0.37 mm. Phallobase about three times shorter than parameres, distinctly wider than long, abruptly narrowing to very short, distinctly demarcated, triangular manubrium; borderline between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres moderately wide, with sigmoid margins; apex bluntly rounded, asymmetrical; basal portion of dorsal face slightly reaching into phallobase. Median lobe rather narrow, evenly narrowing to bluntly rounded apex, not reaching apex of parameres; ventral face slightly shorter and wider than dorsal face; corona situated subapically; basal apophyses moderately short, reaching mid-length of phallobase.

ECOLOGY: Collected in pools, rivers, and in hygropetric habitats; found together with *A. punc-tatellus* in RSA, together with *A. usambaraensis* in Tanzania.

DISTRIBUTION (Fig. 97): RSA, Tanzania, Zimbabwe.

ETYMOLOGY: The name atripalpis is composed of ater (Latin adjective) (= black) and palpis (Latin adjective derived from palpus) and refers to the infuscated maxillary palpomere 4.

Agraphydrus bicoloratus sp.n.

TYPE LOCALITY: Gabon, Estuaire Province, near Kinguélé Waterfall.

TYPE MATERIAL: Holotype σ (NMW): Estuaire Province: "G A B O N \ Kinguèlè [Kinguélé] \ 6.VIII.1973 \ Bilardo & Pederzani". Paratypes: GABON: 1 σ , 2 $\circ \phi$ (NMW): same sampling data as holotype; collected in small streams and/or in pools separated from the streams; 1 \circ (MLSF): Monts de Cristal N.P., 13 km on road Kinguélé – Tchimbélé Waterfalls, 2.VI.2012, leg. A. Bilardo.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended metafemoral pubescence, unicolored yellow maxillary palpomeres, and yellow pronotum, together with *A. bilardoi*, *A. flavescens* and *A. vadoni*. Differs in eight antennomeres and features of aedeagus (parameres with weakly curving margins, basal portion moderately sized) from *A. flavescens* and *A. vadoni*; in eight antennomeres and narrow median lobe from sympatric *A. bilardoi*. Differs in black head, dark brown elytra, and finer dorsal ground punctation of head, pronotum and elytra from *A. vadoni*; in dark brown elytra and smaller eyes from *A. bilardoi* and *A. flavescens*.

DESCRIPTION: Total length: 2.0–2.2 mm; elytral width: 1.0–1.1 mm; E.I.: 1.2, P.I.: 2.0, elytra 2.6 times as long as pronotum:. Habitus (Fig. 70) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black; clypeus with narrow, very indistinct, preocular patches, absent in one female paratype; maxillary palpi unicolored yellow; pronotum unicolored yellow; elytra dark brown, unicolored or with light brown area in posterior half; ventrites and legs dark brown.

Head: Clypeus with distinct concave anterior margin, C.I. = 4.1, lateral length ratio clypeus/eyes = 1.6, microreticulation absent; ground punctation very fine, interspaces 3-4 times as wide as punctures; systematic punctures moderately distinct. Eyes small to moderately sized, not protruding, oval in dorsal view. Antennae with eight antennomeres. Maxillary palpi slender, as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.4; palpomere 4 almost symmetrical. Mentum with very fine punctures, widely separated; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head, interspaces about 2–3 times as wide as punctures; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 39): Pubescence present on proximal 2/3; hairlines slightly oblique on profemur, straight on mesofemur, rounded on metafemur.

Abdomen: Ventrite 5 with apical emargination.

Aedeagus (Fig. 8): Length: 0.31–0.32 mm. Phallobase distinctly shorter than parameres, about as long as wide, bending obtuse angled to long manubrium; borderline between pigmented and unpigmented portion of ventral face reaching mid-length of phallobase. Parameres moderately slender, with weakly curving margins, inclining mesad in apical third; apex narrowly rounded; basal portion of dorsal face reaching distal third of phallobase. Median lobe narrow, evenly attenuating to narrowly rounded apex, by far not reaching apex of parameres; ventral face distinctly shorter and wider than dorsal face; corona situated at distal third; basal apophyses moderately long, reaching mid-length of phallobase.

ECOLOGY: Collected in streams or pools nearby.

DISTRIBUTION (Fig. 95): Gabon.

ETYMOLOGY: The name bicoloratus is composed of bi- (Latin) (= twice) and coloratus (Latin adjective) (= coloured) and refers to the colour pattern of pronotum and elytra.

Agraphydrus bilardoi sp.n.

TYPE LOCALITY: Gabon, Ngounié Province, Ndolou Distr., near Mandji, Pény Village, 2°1.804'S 10°29.372'E.

TYPE MATERIAL: Holotype σ (NMW): "GABON, Mandji [capital of Ndolou Distr.] \ vill. Pény \ grande riv. – 11.8.'14 [2014] \ A. Bilardo & P. Nguema | grande riv. – 11.8.'14 [2014] \ Alt 109 m \ S -02° 01.804' \ E 010° 29.327'''; collected in the small stream or in a pool near the river. Paratype σ (MLSF): GABON: Estuaire Province: Monts de Cristal N.P., Avébé River, 90 m a.s.l., 0°32.956'N 10°13.834'E, collected in small stream or pool near the river, 10.VI.2012, leg. A. Bilardo.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended metafemoral pubescence and unicolored maxillary palpi; shares number of nine antennomeres with *A. flavescens*, *A. praecipuus* and *A. punctatellus*; shares yellow preocular patches with *A. flavescens*, differs in coloration of pronotum and elytra from *A. flavescens* (yellowish), *A. praecipuus* (dark brown), and *A. punctatellus* (black). Differs in apical emargination of median lobe from all species mentioned.

DESCRIPTION: Total length: 2.6–2.7 mm; elytral width: 1.3 mm; E.I.: 1.3, P.I.: 2.0, elytra 2.6 times as long as pronotum. Habitus (Fig. 71) moderately broad, elytra parallel-sided in midlength, moderately convex.

Coloration: Labrum, clypeus, and frons rufous; clypeus with undefined large yellow preocular patches, about as large as eye; frons darker than clypeus; maxillary palpi unicolored yellow; pronotum unicolored yellow (holotype) or darker brown (paratype); elytra with banded pattern: dark brown in mid-length, yellowish brown in anterior and posterior third; ventrites and legs rufous.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.6, lateral length ratio clypeus/eyes = 2.3; microreticulation absent; ground punctation moderately fine, distinctly impressed, interspaces 1–2 times as wide as punctures; systematic punctures moderately distinct. Eyes moderately sized, not protruding, oval in dorsal view. Antennae with nine antennomeres, second intermediate segment minute, hardly visible below $100 \times$ magnification. Maxillary palpi slender, as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 almost symmetrical. Mentum indistinctly punctate; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with distinct mesal bulge.

Femora (Fig. 40): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of mesoand metafemur; hairlines oblique.

Abdomen: Ventrite 5 with apical emargination.

Aedeagus (Fig. 9): Length: 0.31 mm. Phallobase shorter than parameres, bending obtuse angled to moderately sized manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres widest proximal to mid-length, with arcuate margins, inclining in apical third; apex bluntly rounded, asymmetrical; dorsal face of apical region with small notch mesally; basal portion extending to distal third of phallobase. Median lobe wide; margins of dorsal face almost parallel-sided; apex with weak indentation, by far not reaching apex of parameres; ventral face distinctly shorter and wider than dorsal face; corona situated at mid-length; basal apophyses long, reaching distal third of phallobase.

ECOLOGY: Collected in running water (or nearby pools).

DISTRIBUTION (Fig. 95): Gabon.

ETYMOLOGY: The species is dedicated to the coleopterist Armando Bilardo (Cassano Magnago, Italy), who collected the type specimens.

Agraphydrus biltoni sp.n.

TYPE LOCALITY (Fig. 103): RSA, Northern Cape Province, Kamiesberg, 30°23'43.0"S 18°8'8.4"E.

TYPE MATERIAL: Holotype σ (CBP): "19/ix/2010 South Africa NC \ Kamiesberg Stream on Witwater- \ Langkloof road ca. 1 km S. of \ junction D.T. Bilton leg."; collected in a pool, 30°23'43.0"S 18°8'8.4"E, at ca. 1100 m a.s.l. Paratypes: RSA: 1 σ , 1 ex. (CBP, NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and infuscated maxillary palpomere 4, together with *A. albescens, A. angustatus, A. elongatus, A. minutissimus*, and *A. matoposensis*. Shares dark brown pronotum with *A. elongatus*, eight antennomeres with *A. matoposensis* and *A. elongatus*. Differs in black clypeus from *A. matoposensis*. Differs in presence of apical excision on ventrite 5 from *A. minutissimus*, in large extension on apex of palpomeres from *A. angustatus*. Differs in less slender habitus, elytra widening posterior to mid-length, shorter maxillary palpi, more extended femoral pubescence and presence of lateral extension on apex of parameres from *A. elongatus*.

DESCRIPTION: Total length: 2.1 mm, elytral width: 1.0–1.1 mm. E.I.: 1.3, P.I.: 1.9, elytra 3.2 times as long as pronotum. Habitus (Fig. 72) slender, elytra widening behind mid-length, weakly to moderately convex.

Coloration: Labrum, clypeus and frons black; clypeus with indistinct yellow lateral border (very indistinct in the holotype); maxillary palpi yellow, palpomere 4 infuscated in apical half or slightly more; pronotum black with narrow yellow margins; scutellum black; elytra yellow; ventrites dark brown to black; legs yellow.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.1, lateral length ratio clypeus/ eyes = 1.9; microreticulation absent; ground punctation moderately fine, interspaces 1-2 times as wide as punctures; systematic punctures distinct. Eyes moderately sized, not protruding, oval in dorsal view. Antennae with eight antennomeres. Maxillary palpi slender, 1.1 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3; palpomere 4 slightly asymmetrical. Mentum with very few, fine punctures laterally; very fine wrinkles present at border of antero-mesal emargination.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation finer than on pronotum; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 41): Pubescence present on more than proximal half of pro- and metafemur, on proximal 2/3 of mesofemur; hairlines straight.

Abdomen: Ventrite 5 with very small apical emargination.

Aedeagus (Fig. 10): Length: 0.39 mm. Phallobase about as long as parameres, evenly curving to very short manubrium. Parameres moderately wide, with subapical constriction; apex with strong, narrowly rounded lateral projection; basal portion of dorsal face not deeply reaching into phallobase. Median lobe with narrow dorsal face; apex slightly attenuating, not reaching apex of parameres; ventral face wide; corona situated subapically; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in a pool at a stream.

DISTRIBUTION (Fig. 96): RSA.

ETYMOLOGY: The species is dedicated to the entomologist David T. Bilton (Plymouth, UK), who collected the type specimens.

Agraphydrus camerunensis sp.n.

TYPE LOCALITY: Cameroon, Southwest Region, 25 km west of Limbe (City), Bakingili.

TYPE MATERIAL: Holotype & (NMW): "CAMEROON:Southwest \ Prov.,25km W Limbe \ Bakingili, 10m \ 1-10 June 1984 \ James A. DiGiulio".

DIFFERENTIAL DIAGNOSIS: Shares absence of metafemoral pubescence with *A. villiersi*, differs in minor size, broader habitus, eight antennomeres, unicolored maxillary palpomeres, more extended pubescence on pro- and mesofemora, and features of aedeagus (apex of palpomeres narrowly rounded, basal lobe distinctly longer) from this species.

DESCRIPTION: Total length: 1.6 mm; elytral width: 1.0 mm; E.I.: 1.2, P.I.: 2.2, elytra 2.7 times as long as pronotum. Habitus (Fig. 73) broadly oval, elytra widest near anterior margin, strongly convex.

Coloration: Labrum, clypeus and frons black; lateral margins of clypeus dark rufous; maxillary palpi unicolored yellow; pronotum and elytra black; ventrites black; legs dark brown.

Head: Clypeus with weakly concave anterior margin, C.I. = 4.5, lateral length ratio clypeus/eyes = 2.2; microreticulation absent; ground punctation coarse, interspaces about as wide as punctures; systematic punctures very indistinct. Eyes rather small, not protruding, oblong-oval in dorsal view. Antennae with eight antennomeres. Maxillary palpi moderately stout, as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.5; palpomere 4 almost symmetrical. Mentum with fine, evenly distributed punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation as on head and pronotum; four rows of very indistinct systematic punctures present,

mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with very low, horizontal, crescent-shaped ridge.

Femora (Fig. 42): Pubescence present on more than proximal half of profemur, on proximal half of mesofemur, restricted to small rim on mesal half of anterior margin and to small area adjacent to trochanter on metafemur; hairlines oblique on profemur, straight on mesofemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 11): Length: 0.27 mm. Phallobase shorter than parameres, about as long as wide, not abruptly bending to short, triangular manubrium; borderline between pigmented and unpigmented portion of ventral face very indistinct. Parameres widest in basal half; margins evenly curving; apex bluntly rounded; basal portion of dorsal face slightly reaching into phallobase; ventral face indistinct, wider than dorsal face, right and left parts almost meeting in midline. Median lobe bottle-shaped; dorsal face parallel-sided in basal two thirds, strongly narrowing in distal third to bluntly rounded apex, reaching apex of parameres; ventral face distinctly shorter and wider than dorsal face; corona situated at mid-length; basal apophyses long, straight, reaching distal third of phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 98): Cameroon.

ETYMOLOGY: The name camerunensis (adjective) refers to Cameroon, where this species has been collected.

Agraphydrus congolensis sp.n.

TYPE LOCALITY: D.R. Congo, Ituri (former Orientale) Province, Ituri Rainforest, Epulu River.

TYPE MATERIAL: Holotype & (CAS): "B.CONGO [Belgian Congo]: \ Epulu.950m. \ X-2-1957 | E.S.Ross \ R.E.Leech \ collectors". Paratypes: D.R. CONGO: 14 exs. (CAS, NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, maxillary palpi unicolored yellow, clypeus dark brown or black, pronotum dark brown, unicolored or with undefined darker brown mesal area, and body length less than 2.9 mm, together with *A. aethiopicus*, *A. rivalis*, and *A. usambaraensis*. Differs in larger size, nine antennomeres, and absence of mesoventral carina from *A. rivalis*, in larger size from *A. aethiopicus*. Differs in features of aedeagus (e.g., parameres without subapical incision, apex of median lobe shorter than parameres) from all species mentioned.

DESCRIPTION: Total length: 2.4–2.7 mm; elytral width: 1.3 mm; E.I.: 1.4, P.I.: 2.0, elytra 2.9 times as long as pronotum. Habitus (Fig. 74) broad, evenly oval, moderately convex.

Coloration: Labrum black, clypeus dark blackish brown with indistinct yellowish preocular patches; frons black; maxillary palpi unicolored yellow; pronotum dark brown with narrow yellowish margins; elytra dark brown; ventrites black; legs brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.1, lateral length ratio clypeus/eyes = 1.6; microreticulation absent; ground punctation fine, weakly impressed, interspaces about twice as wide as punctures; systematic punctures moderately distinct. Eyes moderately sized, very slightly protruding, slightly oblong oval. Antennae with nine antennomeres. Maxillary palpi slender, as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 almost symmetrical. Mentum with very few punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of distinct systematic punctures present, mesal rows 1-3 with reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge, ridge absent.

Femora (Fig. 43): Pubescence present on proximal 3/4; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with minute apical emargination, ca. 5–6 µm deep.

Aedeagus (Fig. 12): Length: 0.35–0.37 mm. Phallobase wide, wider than long, distinctly shorter than parameres, bending obtuse angled to rounded base; manubrium distinctly defined, small, narrow; borderline between pigmented and unpigmented portion of ventral face indistinct, reaching manubrium; dorsal face distinct, right and left parts almost meeting in midline. Parameres rather wide with weakly rounded margins, weakly narrowing to broadly rounded apex, very slightly inclining mesad; basal portion of dorsal face extending to mid-length of phallobase mesally. Median lobe moderately narrow; dorsal face widest distal to mid-length; apex narrowly rounded, not reaching apex of parameres; corona situated at distal third; indistinct ventral plate present, deeply split mesally; basal apophyses moderately long, extending almost to mid-length of phallobase.

ECOLOGY: Collected in a river.

DISTRIBUTION (Fig. 96): D.R. Congo.

ETYMOLOGY: The name congolensis (adjective) refers to the type locality.

Agraphydrus elongatus RIBERA, HERNANDO & CIESLAK, 2019

Agraphydrus elongatus RIBERA, HERNANDO & CIESLAK 2019: 264.

TYPE LOCALITY: Oman, Al Batinah South Governorate, Wadi Bani Ghafir, Murri, 23°29'46.2"N 56°53'34.8"E (see RIBERA et al. 2019: fig. 8).

TYPE MATERIAL (examined): Holotype ♂ (NMW): "8 Oman 7.4.2010 Murri env. \ wadi Bani Ghafir, stream with pools \ N23 29 46.2 E56 53 34.8 759m \ Ribera, Cieslak & Hernando leg.". Paratypes: OMAN: Ad Dakhiliyah Governorate: 2 exs. (NMW): Mt. Al-Akhdar, Bahla, wadi in city, residual pools, 22°57'42.1"N 57°17'47.5"E, ca. 560 m a.s.l., 5.IV.2010, leg. I. Ribera, A. Cieslak & C. Hernando "2"; 1 ex. (NMW): Mt. Al-Akhdar, Wadi bani Awf, residual pools, in city, 23°17'23.8"N 57°28'3.9"E, ca. 490 m a.s.l., 7.IV.2010, leg. I. Ribera, A. Cieslak & C. Hernando "2"; 1 ex. (NMW): Mt. Al-Akhdar, Wadi bani Awf, residual pools, in city, 23°17'23.8"N 57°28'3.9"E, ca. 490 m a.s.l., 7.IV.2010, leg. I. Ribera, A. Cieslak & C. Hernando "7"; Ash Sharqiyah North Governorate: 2 exs. (NMW): Said Bin Sahran environment, Wadi Indam, Road 33, residual pools, 22°45'15.2"N 58°0'56.9"E, ca. 460 m a.s.l., 8.IV.2010, leg. I. Ribera, A. Cieslak & C. Hernando "9". UAE: Fujairah Emirate: 19 exs. (NMW): Wadi Maidaq, Hajar Mountains, ca. 8 km NW Masafi, ca. 75 km E Dubai, 25°20'48.7"N 56°5'28"E, ca. 390 m a.s.l., springfed streamlet in canyon, residual pools, 26.I.2010, leg. M.A. Jäch "UAE 12"; 16 exs. (NMW): same data, but leg. K. Mahmoud; Ras Al Khaimah Emirate, south: 3 exs. (NMW): Wadi Shawkah, Hajar Mountains, ca. 80 km ESE Dubai, 25°6'6.1"N 56°3'26.4"E, ca. 320 m a.s.l., upper course, residual pools, 23.I.2010, leg. M.A. Jäch "UAE 3"; 1 ♂ (NMW): Hajar Mountains, ca. 80 km SE Dubai, 25°3'25."N 56°3'40.7"E, small stream, with mud and gravel, ca. 1–2 m wide, 26.I.2010, leg. M.A. Jäch "UAE 10".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and infuscated maxillary palpomere 4, together with *A. albescens*, *A. angustatus*, *A. biltoni*, *A. minu-tissimus*, and *A. matoposensis*. Some specimens share absence of emargination on abdominal ventrite 5 with *A. minutissimus*. Differs in very slender habitus with parallel-sided elytra, longer maxillary palpi, reduced femoral pubescence and absence of lateral extension on apex of parameres from all these species. Shares eight antennomeres with *A. matoposensis* and *A. biltoni*; moreover dark brown pronotum with *A. biltoni*. Differs in black clypeus from *A. matoposensis*.

DESCRIPTION: RIBERA, HERNANDO & CIESLAK (2019); Figs. 13 (aedeagus), 44 (femora), 75 (habitus).

ECOLOGY: Collected in streams, streamlets and pools, found together with *A. minutissimus* in residual pools.

DISTRIBUTION (Fig. 96): Oman, UAE.

Agraphydrus flavescens sp.n.

TYPE LOCALITY: Ghana, Ashanti Region, Bobiri Forest Reserve.

TYPE MATERIAL: Holotype σ (NHM): "GHANA: nr. Kumasi \ Bobiri Forest Res. \ 5.ix.[handwritten]1957 | 2°53'W.,6°29'N. [coordinates do not agree with the Bobiri Forest Reserve],900ft. \ R.Wana,in gravel \ in running water. | Imp. College Ghana Exp. \ B.M.1959-265 | HOLOTYPUS \ Agraphydrus \ ghanensis sp.n. \ des.F.Hebauer [red label]". Paratypes: GHANA: 79 exs. (NHM, NMW, ZMUC): same sampling data as holotype; 14 exs. (NHM, NMW): Ashanti Region, Bobiri Forest Reserve, near Kumasi, 450 ft a.s.l., Sre River, in gravel in running water, 6.IX.1957, leg. Imp. College Ghana Expedition. CAMEROON: Southwest Province: 1 σ , 2 $\varphi \varphi$ (CGF, NMW): Korup Rainforest, pool, 2.XII.1988, leg. D. Counsell.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended metafemoral pubescence, unicolored yellow maxillary palpomeres, and yellow pronotum, together with *A. bicoloratus*, *A. bilardoi*, and *A. vadoni*. Differs in black coloration of head and larger eyes from *A. vadoni*, in yellow (versus dark brown) elytra, larger eyes, and nine antennomeres from *A. bicoloratus*; differs in smaller size and yellow elytra from *A. bilardoi*. Differs in features of aedeagus (e.g., basal portion of parameres very large, deeply reaching into phallobase mesally) from all Afrotropical species.

DESCRIPTION: Total length: 2.0–2.3 mm; elytral width: 1.1–1.3 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 76) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black; clypeus with distinct yellow preocular patches, about as large as eyes; maxillary palpi unicolored yellow; pronotum yellow with variably sized darker mesal area; elytra yellow with undefined, wide, dark brown sublateral band; ventrites black; legs largely black, femora light brown distally.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.5, lateral length ratio clypeus/eyes = 1.7-2.1; microreticulation absent; ground punctation fine, weakly impressed, interspaces twice as wide as punctures; systematic punctures moderately distinct. Eyes large, not protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 0.9 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2-1.3; palpomere 4 slightly asymmetrical. Mentum indistinctly punctate; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation as on head and pronotum; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with very low mesal bulge.

Femora (Fig. 45): Pubescence present on proximal 2/3; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with almost semicircular apical emargination.

Aedeagus (Fig. 14): Length: 0.35–0.43 mm. Phallobase much shorter than parameres, curving evenly to defined, moderately sized manubrium; borderline between pigmented and unpigmented

portion of ventral face indistinct, almost reaching manubrium. Parameres with arcuate margins; apex narrow, bluntly rounded, asymmetrical; basal portion very large, deeply reaching into phallobase mesally. Dorsal face of median lobe narrow; apex bluntly rounded, not reaching apex of parameres; ventral face much shorter and wider than dorsal face; corona situated distal to mid-length; basal apophyses very long, reaching mid-length of phallobase.

ECOLOGY: Collected in running water and a forest pool.

DISTRIBUTION (Fig. 96): Cameroon, Ghana.

ETYMOLOGY: The name flavescens (Latin adjective) (= getting yellow) refers to the yellowish pronotum.

Agraphydrus flavipes sp.n.

TYPE LOCALITY: Madagascar, Fianarantsoa Province, Vatovavy-Fitovinany Region, Ionilahy (village), Ionilahy River.

TYPE MATERIAL: Holotype σ (NMW): "Madagascar (21): 12.08.2001 \ Ionilahy (Fianarantsoa), spring \ in area Marosaro, S from River \ Ionilahy, 330 m asl., \ Gerecke & Goldschmidt coll."; collected at the right bank of Ionilahy River at level with the large village of the same name, in a weakly flowing rheocrene within completely shading secondary forest, with decaying plant material on gravel and stones, submerged little moss and algal mats, with Coleoptera as dominant organisms; temperature 20.4°C. The area is called "Marosaro" by the locals. Paratypes: MADAGASCAR: $3 \sigma \sigma$, $1 \circ$ (NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, dark coloration of head, pronotum, and elytra, unicolored maxillary palpi, and small size between 2.0 and 2.3 mm body length, together with *A. aethiopicus, A. fontis*, and *A. rivalis*; differs in less extended metafemoral pubescence from these species. Shares black pronotum, black elytra and small eyes with *A. fontis*, differs in less broad habitus, eight antennomeres, and features of aedeagus (e.g., distinctly narrower median lobe) from *A. fontis*. Shares small eyes and eight antennomeres with *A. rivalis*, differs in black head, pronotum and elytra without wide brighter lateral portions, slightly less fine ground punctation of head and pronotum, less distinct systematic punctures on head, pronotum and elytra, absence of mesoventral carina, and features of aedeagus (e.g., parameres with slightly curving margins, not inclining mesad, median lobe widest at mid-length, apex broadly rounded) from this species.

DESCRIPTION: Total length: 2.1–2.3 mm; elytral width: 1.1 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 77) moderately broad, elytra evenly oval, moderately convex.

Coloration: Labrum, clypeus, and frons black; maxillary palpi unicolored yellow; pronotum and elytra black with indistinct, narrow, undefined, yellow lateral margins; ventrites black; legs yellowish.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.3, lateral length ratio clypeus/eyes = 2.1; microreticulation absent; ground punctation moderately fine, interspaces 2-3 times as wide as punctures; systematic punctures indistinct. Eyes small, not protruding, oblong oval in dorsal view. Antennae with eight antennomeres. Maxillary palpi moderately slender, 1.1 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3; palpomere 4 almost symmetrical. Mentum with fine, sparse, punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation as on head and pronotum; four rows of indistinct systematic punctures

present, mesal rows 1–3 with reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 46): Pubescence present on proximal 2/3 of femora; hairlines straight.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 15): Length: 0.34–0.36 mm. Phallobase distinctly shorter than parameres, about as wide as long, evenly curving to long, narrow manubrium; borderline between pigmented and unpigmented portion of ventral face very indistinct. Parameres moderately narrow; margins weakly sigmoid; apex bluntly rounded, not inclining; basal portion of dorsal face extending to mid-length of phallobase mesally. Median lobe less wide than parameres, widest at mid-length; apex bluntly rounded, almost reaching apex of parameres; corona situated subapically; ventral face slightly shorter than dorsal face; basal apophyses moderately long, reaching mid-length of phallobase.

ECOLOGY: Collected in a weakly flowing spring.

DISTRIBUTION (Fig. 95): Madagascar.

ETYMOLOGY: The name flavipes (adjective) is derived from flavus (Latin adjective) (= yellow) and pes (Latin noun) (= leg) and refers to the yellow legs, contrasting the black dorsal coloration of head, pronotum and elytra.

Agraphydrus fontis sp.n.

TYPE LOCALITY (Fig. 101): Madagascar, Fianarantsoa Province, Atsimo-Atsinanana Region, Ranomena (town), 21°29'45.9"S 47°24'7.5"E.

TYPE MATERIAL: **Holotype** σ (NMW): "Ranomena \ (Fianarantsoa) \ spring area of the stream \ 26.04.2011 \ leg. R. Gerecke (MD 234) | NW from the 1.07 km-railway- \ tunnel (same site: MD 043) \ right affluent of MD 034) \ S21°29'45.9"/E47°24'07.5" \ 1017 m, 18.6°C"; collected in primary forest, in an extensive area of fully shaded, small sandy flowing springs forming a rapidly increasing sandy brook, situated on the shoulder of a tableland from which the stream falls down through a steep slope with boulders. **Paratypes: MADAGASCAR:** 3 $\sigma \sigma$, 4 $\varsigma \varphi$ (NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, dark coloration of head, pronotum, and elytra, unicolored maxillary palpi, and small size between 2.0 and 2.3 mm body length, together with *A. aethiopicus*, *A. flavipes*, and *A. rivalis*. Differs in broader habitus and features of aedeagus (e.g., parameres without indentation) from *A. aethiopicus*. Shares black pronotum, black elytra and small eyes with *A. flavipes*, differs in broad habitus, nine antennomeres, and features of aedeagus (e.g., wide median lobe) from this species. Shares small eyes with *A. rivalis*, differs in black head, pronotum and elytra without wide brighter lateral portions, nine antennomeres, absence of mesoventral carina, and features of aedeagus (e.g., parameres with slightly curving margins, not inclining mesad, median lobe widest at mid-length, apex broadly rounded) from *A. rivalis*.

DESCRIPTION: Total length: 2.0–2.2 mm; elytral width: 1.0–1.1 mm; E.I.: 1.3, P.I.: 2.3, elytra 3.3 times as long as pronotum. Habitus (Fig. 78) broad, evenly oval, moderately to strongly convex.

Coloration: Labrum dark yellowish brown; clypeus black with indistinct, undefined, yellowish lateral margins; frons black; maxillary palpi unicolored yellow; pronotum black with undefined, narrow, yellowish lateral and anterior margins; elytra black with narrow yellowish lateral margins; ventrites black; legs yellowish brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.8, lateral length ratio clypeus/eyes = 2.7; indistinct microreticulation present at lateral margins, absent from anterior margin and from disc; ground punctation moderately coarse, strongly impressed, interspaces 1-2 times as wide as punctures; systematic punctures distinct. Eyes small, not protruding, slightly oblong oval. Antennae with nine antennomeres. Maxillary palpi moderately slender, 1.1 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.4; palpomere 4 almost symmetrical. Mentum with moderately fine punctures, grouped laterally; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows 1–3 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 47): Pubescence present on proximal 2/3 of femora; hairlines slightly oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 16): Length: 0.29–0.31 mm. Phallobase distinctly shorter than parameres, about as wide as long, not abruptly curving to narrow manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres moderately wide; margins weakly sigmoid; apex bluntly rounded; basal portion extending to distal third of phallobase. Median lobe wide, widening distal to mid-length; apex bluntly rounded, not reaching apex of parameres; corona situated distal to mid-length; reinforcing structures absent; basal apophyses moderately long, reaching mid-length of phallobase.

ECOLOGY: Collected in a flowing spring.

DISTRIBUTION (Fig. 97): Madagascar.

ETYMOLOGY: The name fontis (Latin noun, genitive of fons) (= spring) refers to the habitat of the type specimens.

Agraphydrus gereckei sp.n.

TYPE LOCALITY: Madagascar, Antsiranana Province, Sava Region, Antalaha District, Maromandia (town), above Marofinatra (village), Ankavia River.

TYPE MATERIAL: Holotype σ (NMW): "Madagascar (129a) 3.11.2001 \ Maromandia (Antalaha, Antsirana- \ na), riparian spring seep, left bor- \ der Riv. Ankavia, upstr. vill., 40 m \ asl., Gerecke & Goldschmidt coll."; collected above the village Marofinaritra on a hygropetric site of a riparian spring near a large river, ca. 2 m deep, with aquatic ferns and algae, surrounded by forest remnants and fields; temperature 27.7°C. Paratypes: MADAGASCAR: 1 σ , 1 φ (NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum with defined, dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. goldschmidti*, *A. madagascarensis*, *A. punc-tatellus*, *A. rhodesiensis*, *A. scutifer*, and *A. tumidus*. Shares mesoventral carina with *A. rivalis*, differs in larger size, defined mesal pronotal patch, yellowish brown elytra, and nine antennomeres from this species. Differs in finer pronotal and elytral ground punctation from *A. scutifer* and *A. tumidus*; differs in larger eyes from *A. goldschmidti*. Differs in mesoventral carina and features of aedeagus (manubrium very small, parameres with sigmoid margins, median lobe pencil-shaped) from all species of this group.

DESCRIPTION: Total length: 2.6 mm; elytral width: 1.3 mm; E.I.: 1.4, P.I.: 1.9, elytra 3.0 times as long as pronotum. Habitus (Fig. 79) moderately slender, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black; clypeus with yellow preocular patches; maxillary palpi unicolored yellow; pronotum with defined, large, dark brown mesal patch, broadly contacting posterior margin, narrowing anteriorly, yellow lateral thirds and yellow narrow strip along anterior margin; elytra unicolored yellowish brown; ventrites black; legs yellowish brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.5, lateral length ratio clypeus/eyes = 1.6; microreticulation absent; ground punctation fine, distinctly impressed, interspaces 2-3 times as wide as punctures; systematic punctures moderately distinct. Eyes large, not protruding, slightly oblong oval. Antennae with nine antennomeres. Maxillary palpi slender, 1.2 times as long as pronotum in midline, 1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0; palpomere 4 almost symmetrical. Mentum with moderately fine punctures, grouped laterally; faint wrinkles present.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows 1–3 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge and short, low, longitudinal ridge in posterior half.

Femora (Fig. 48): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of mesoand metafemur; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with apical emargination, ca. 20 µm deep.

Aedeagus (Fig. 17): Length: 0.35–0.37 mm. Phallobase distinctly shorter than parameres, about as wide as long; abruptly narrowing to very small, narrow, manubrium, strongly bending dorsad; borderline between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres moderately wide; margins sigmoid; apex narrowly rounded, slightly inclining mesad; basal portion of dorsal face extending to distal third of phallobase. Median lobe very narrow, pencil-shaped; apex very narrowly rounded, almost reaching apex of parameres; corona not visible; basal apophyses moderately long, reaching mid-length of phallobase.

ECOLOGY: Collected at the hygropetric site of a spring.

DISTRIBUTION (Fig. 96): Madagascar.

ETYMOLOGY: The species is dedicated to the biologist Reinhard Gerecke (Tübingen, Germany), who collected (often together with T. Goldschmidt) several new species of *Agraphydrus* in Madagascar, including this one.

Agraphydrus goldschmidti sp.n.

TYPE LOCALITY: Madagascar, Toliara Province, Anosy Region, Tsimelahy, Antarantsa River.

TYPE MATERIAL: Holotype σ (NMW): "Madagascar (60c) 05.09.2001 \ Tsimelahy (Tulear), River \ Antarantsa, downstream 'piscine \ naturelle', pool, 200m asl. \ Gerecke & Goldschmidt coll."; collected in a pool of a medium sized watercourse, up to 1 m deep, below a large natural water storage area, for which the term "piscine naturelle" is commonly used by the local people; temperature 21.5–22.4°C. Paratype σ (MHNP): MADAGASCAR: Antananarivo Province: "Inst. Scient. Madagascar \ Ambatoloana [handwritten] \ XI-50 RP [XI.1950, leg. R. Paulian] [handwritten]".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum with defined, dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. gereckei*, *A. madagascarensis*, *A. punctatellus*,

A. rhodesiensis, A. scutifer, and *A. tumidus.* Differs in absence of mesoventral carina from *A. gereckei.* Differs in finer pronotal and elytral ground punctation and in absence of plate-like structures of median lobe from *A. scutifer* and *A. tumidus.* Shares wide manubrium and narrow median lobe with *A. madagascarensis*, differs in smaller eyes, wider parameters and very narrow, pencil-shaped median lobe from this species. Differs in wide manubrium and narrow median lobe from *A. punctatellus* and *A. rhodesiensis.*

DESCRIPTION: Total length: 2.4–2.5 mm; elytral width: 1.2 mm; E.I.: 1.3, P.I.: 1.8, elytra 2.8 times as long as pronotum. Habitus (Fig. 80) moderately slender, evenly oval, moderately convex.

Coloration: Labrum black; clypeus black with yellow preocular patches; frons black; maxillary palpomeres 1–3 unicolored yellow; pronotum dark yellowish brown with darker brown, undefined, mesal patch; elytra unicolored light brown; ventrites and legs dark brown to black.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.9, lateral length ratio clypeus/eyes = 2.5; microreticulation absent; ground punctation fine, moderately impressed, interspaces 2-3 times as wide as punctures; systematic punctures distinct. Eyes small, not protruding, slightly oblong oval. Antennae with nine antennomeres. Maxillary palpi slender, 1.2 times as long as pronotum in midline, 1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 slightly asymmetrical. Mentum with very few punctures; microsculpture absent.

Thorax: Pronotal ground punctation slightly finer than on head; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of indistinct systematic punctures present, mesal rows 1–3 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge, ridge absent.

Femora (Fig. 49): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of mesoand metafemur; hairlines slightly oblique.

Abdomen: Ventrite 5 with apical emargination, ca. 30 µm deep.

Aedeagus (Fig. 18): Length: 0.36–0.38 mm. Phallobase slightly shorter than parameres, about as wide as long, bending to broad, defined, manubrium; borderline between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres wide, widest in midlength; margins rounded; apex very weakly inclining mesad, broadly rounded; basal portion of dorsal face extending to distal third of phallobase. Median lobe very slender; apex very narrowly rounded, almost reaching apex of parameres; corona not visible; basal apophyses moderately long, extending to distal third of phallobase.

ECOLOGY: Collected in a pool of a medium sized watercourse.

DISTRIBUTION (Fig. 97): Madagascar. So far known from the type locality in Toliara Province and from Ambatoloana (Antananarivo Province, Anamalanga Region).

ETYMOLOGY: The species is dedicated to Tom Goldschmidt (Vienna, Austria), who collected (together with R. Gerecke) several new species of *Agraphydrus* in Madagascar, including this one.

Agraphydrus madagascarensis sp.n.

TYPE LOCALITY: Madagascar, Toamasina Province, Atsinanana Region, Toamasina (town), Parc Ivoloina.

TYPE MATERIAL: Holotype & (NMW): "MADAGASCAR (Md-2) \ Tamatave (Toamasina) \ Park Ivoloina \ Pfütze auf Straße in Wald [= puddle on road in forest] \ 21.11.2000, leg. W. Dolin". Paratypes: MADAGASCAR:

Toamasina Province: 11 exs. (NMW): same sampling data as holotype; **Antsiranana Province**: 1 of (MHNP): Diana Reg., Nosy Bé (Island), Forêt de Lokobé, banks of Lac Djabalbé, 9.IX.1947, leg. R. Paulian; 1 & (NMW): Sava Reg., Andapa (Distr., town), W pass, R.N. 3b, km 3-4, 600 m a.s.l., seepage spring with organic detritus and sand in unshadowed degraded pasture land with hummocks and hollows, 10.XI.2001, leg. R. Gerecke & T. Goldschmidt "145"; Fianarantsoa Province: 1 & (SEMC): Atsimo-Atsinanana Reg., Farafangana Distr., along road near Anaviary, 21°58.728'S 46°27.899'E, 14.XI.2008, leg. K. Miller "KBM14110800"; 1 & (NMW): Ihorombe Reg., Ranohira, Isalo N.P., NW from Isalo Ranch, 760 m a.s.l., in sustained ditch with almost stagnant water, seepage spring, quaking bog, 10% shaded, 80% fine sediment, roots (Pandanus), Utricularia, exp. SW, temperature 20.5°C, 26.IX.2001, leg. R. Gerecke & T. Goldschmidt "96"; 4 3 3 (NMW): Vatovavy-Fitovinany Reg., Ionilahy, Mahavavona, slowly running flowing spring with organic material, gravel, and sand, in recently deforested area, exposed to sun, in rice field, hygropetric on rocks, 21°42'28.9"S 47°38'6.0"E, ca. 280 m a.s.l., 20.IV.2001, leg. R. Gerecke "MD 218"; 1 & (NMW): Vatovavy-Fitovinany Reg., Ionilahy, Ankaramainy River, 21°44'10.7"S 47°37'28.5"E, ca. 150 m a.s.l., temperature 24.3°C, lower course of small stream, partly shaded, mildly sloping, with organic material, gravel, and sand, with vast pool areas, in degraded primary forest with scrubs, above rice fields, 22.IV.2011, leg. R. Gerecke "MD 224"; Mahajanga Province: 3 3 3 (NMW): Boeny Reg., Andjamangirana, road to Tsaratanana Village, 220 m a.s.l., slowly running small stream with gravel and sand, in dry deciduous primary forest, partially shaded, shrubs and macrophytes in gravel bed, submerged algae, rootage of riparian trees, upstream rice field area, temperature 30.8°C, 19.X.2001, leg. R. Gerecke & T. Goldschmidt "115"; 2 ♂♂ (MHNP): Boeny Reg., Namoroka N.P., IX.1952, leg. R. Paulian.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum with defined, dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. gereckei*, *A. goldschmidti*, *A. punctatellus*, *A. rhodesiensis*, *A. scutifer*, and *A. tumidus*. Differs in absence of mesoventral carina from *A. gereckei*. Differs in finer pronotal and elytral ground punctation and in absence of plate-like structures of median lobe from *A. scutifer* and *A. tumidus*. Shares wide manubrium and narrow median lobe with *A. goldschmidti*, differs in larger eyes, narrower parameres and wider median lobe from this species. Differs in wide manubrium and narrow parameres from *A. punctatellus* and *A. rhodesiensis*. Differs in mesal margin of parameres semicircularly excised in basal half from all species of this group.

DESCRIPTION: Total length: 2.5–2.8 mm (one dwarf specimen from Atsimo-Atsinanana Region with 2.2 mm body length); elytral width: 1.1–1.2 mm; E.I.: 1.3, P.I.: 2.0, elytra 2.8 times as long as pronotum. Habitus (Fig. 81) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus, and frons black, yellow preocular patches present, as large as diameter of eye or smaller, indistinct in some specimens; maxillary palpomeres 1–3 unicolored yellow; pronotum yellow with dark brown or black mesal patch wider posteriorly than anteriorly, or almost entirely dark brown to black with narrow yellow margins; elytra light to dark brown, with undefined brighter margins in some specimens; ventrites and legs black, distal portion of femora and tibiae brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.9, lateral length ratio clypeus/eyes = 1.4; microreticulation absent; ground punctation very fine, interspaces 3-4 times as wide as punctures; systematic punctures distinct. Eyes large, slightly protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 1.1 times as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 almost symmetrical. Mentum with sparse, moderately fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows 1–3 with reduced number of punctures, not reaching anterior margin; additional row of punctures present along lateral margin. Mesoventrite with distinct mesal bulge.

Femora (Fig. 50): Pubescence present on proximal 3/4 of femora; hairlines straight to slightly oblique.

Abdomen: Ventrite 5 with apical emargination.

Aedeagus (Fig. 19): Length: 0.41–0.44 mm. Phallobase slightly shorter than parameres, bending obtuse angled to broad, defined, manubrium; borderline between pigmented and unpigmented portion of ventral face reaching mid-length of manubrium. Parameres slender, ventral face with semicircularly excised mesal margin distal to base; apical portion weakly inclining mesad; apex narrowly rounded; basal portion weakly extending into phallobase. Median lobe very slender, evenly narrowing to acuminated apex, not reaching apex of parameres; corona very indistinct, in basal position; basal apophyses short, reaching distal third of phallobase.

ECOLOGY: Collected in pools, lakes, streams, seepage springs.

DISTRIBUTION (Fig. 96): Madagascar.

ETYMOLOGY: The name madagascarensis (adjective) refers to Madagascar, where the new species has been collected.

Agraphydrus malkini sp.n.

TYPE LOCALITY: Cameroon, Southwest Region, Manyu Division, Mamfe.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and largely infuscated maxillary palpomere 4, together with *A. acutus* and *A. atripalpis*. Differs in less fine elytral ground punctation, obsolete or very indistinct systematic punctures on elytra, less extended femoral pubescence, and absence of apical emargination on abdominal ventrite 5 from both species. Differs in minor size, broader habitus, elytra not widening behind mid-length, shorter maxillary palpi from *A. acutus*; differs in slightly broader habitus from *A. atripalpis*. Differs in features of aedeagus (manubrium moderately long and wide, parameres with evenly curving margins and bluntly rounded apex) from all species. Shares femoral pubescence present on less than proximal half and similar habitus with *A. pauper*; differs in smaller size, dark brown (in contrast to black) dorsal coloration, eight antennomeres, absence of apical emargination on abdominal ventrite 5, and very different aedeagus from this species.

DESCRIPTION: Total length: 1.7 mm; elytral width: 0.9 mm; E.I.: 1.2, P.I.: 2.0, elytra 2.6 times as long as pronotum. Habitus (Fig. 82) broad, evenly oval, widest in mid-length, strongly convex.

Coloration: Labrum, clypeus and frons unicolored black; maxillary palpomeres 1–3 dark yellow, palpomere 4 entirely dark yellow to brown in proximal portion, black at apex; pronotum and elytra unicolored dark brown; ventrites dark brown; legs lighter brown.

Head: Clypeus with weakly concave anterior margin, C.I. = 3.9, lateral length ratio clypeus/eyes = 1.4, microreticulation absent; ground punctation moderately coarse, distinctly impressed, interspaces about 2–3 times as wide as punctures; systematic punctures indistinct. Eyes large, not protruding, spherical in dorsal view. Antennae with eight antennomeres. Maxillary palpi moderately slender, as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 almost symmetrical. Mentum with very fine punctures, grouped laterally; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation as strong as on pronotum, interspaces about twice as wide as punctures; systematic punctures very indistinct, with few indistinctly stronger punctures among irregular punctation. Mesoventrite with low bulge and very low horizontal ridge.

Femora (Fig. 51): Pubescence present on less than proximal half of pro- and mesofemur, with straight hairlines; on less than proximal third of metafemur with concave hairlines.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 20): Length: 0.29 mm. Phallobase shorter than parameres, about as long as wide, not abruptly bending to moderately long and moderately wide manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct. Parameres widest in basal half, with evenly curving margins; apex bluntly rounded, not inclining mesad; basal portion of dorsal face reaching slightly into phallobase. Median lobe slender; dorsal face abruptly narrowing in apical fourth, bottle-shaped; apex narrowly rounded; corona in subapical position; basal apophyses short, slightly reaching into phallobase.

ECOLOGY: Collected in a stream.

DISTRIBUTION (Fig. 97): Cameroon.

ETYMOLOGY: The species is dedicated to the coleopterist Borys Malkin (1917–2009; Poland, USA), who collected the type specimens.

Agraphydrus matoposensis sp.n.

TYPE LOCALITY: Zimbabwe, Matabeleland South Province, Matopos N.P., 20°33'S 28°30'E.

TYPE MATERIAL: Holotype ♂ (HUB): "ZIMBABWE \ 28.xi.-1.xii. \ 20°33'S/28°30'E \ Matopos NP \ lux [at light], leg. M. Uhlig, 1993". Paratypes: ZIMBABWE: 2 ♀♀ (HUB, NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and infuscated maxillary palpomere 4, together with *A. albescens*, *A. angustatus*, *A. biltoni*, *A. elong-atus*, and *A. minutissimus*. Differs in yellow clypeus from all these species; in yellow pronotum from *A. biltoni* and *A. elongatus*. Differs in eight antennomeres from *A. albescens*, *A. angustatus*, and *A. minutissimus*; in emarginate apex of abdominal ventrite 5 from *A. minutissimus*; in larger extension at apex of parameres from *A. angustatus*; in broader habitus, elytra widening posterior to mid-length, shorter maxillary palpomeres, more extended femoral pubescence, and presence of apical extension on parameres from *A. elongatus*.

DESCRIPTION: Total length: 2.1–2.4 mm, elytral width: 0.9–1.1 mm; E.I.: 1.3, P.I.: 1.9, elytra 3.1 times as long as pronotum. Habitus (Fig. 83) slender, elytra widening posterior to mid-length, moderately convex.

Coloration: Labrum, clypeus and frons dark yellow with undefined, light yellow, preocular areas; maxillary palpi yellow, palpomere 4 infuscated apically; pronotum and elytra dark yellow with undefined infuscated areas; ventrites black; legs light brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 2.5, lateral length ratio clypeus/eyes = 2.0; microreticulation absent; ground punctation fine, weakly impressed, interspaces 2–4 times as wide as punctures; systematic punctures indistinct. Eyes large, slightly protruding, oval in dorsal view. Antennae with eight antennomeres. Maxillary palpi slender, 1.2 times as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0; palpomere 4 asymmetrical. Mentum with very fine widely spaced punctures.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation as on head and pronotum; four rows of moderately distinct systematic punctures present, mesal rows with reduced number of punctures, not reaching anterior margin. Mesoventrite with low mesal bulge.

Femora (Fig. 52): Pubescence present on proximal half of profemur, on proximal 2/3 of mesoand metafemur; hairlines straight.

Abdomen: Ventrite 5 with shallow apical emargination, ca. 13 µm deep.

Aedeagus (Fig. 21): Length unknown, phallobase destroyed in the holotype. Parameres moderately wide; margins weakly arcuate, lateral margins with strong beak-shaped subapical lateral extension; apex pointed; basal portion reaching into phallobase; ventral face slightly wider than dorsal face. Median lobe wide, apex not reaching apex of parameres; ventral face wider than dorsal face; corona situated subapically; basal apophyses moderately long.

ECOLOGY: Unknown; collected at light.

DISTRIBUTION (Fig. 98): Zimbabwe.

ETYMOLOGY: The name matoposensis (adjective) refers to the Matopos National Park (Zimbabwe), the type locality.

Agraphydrus minutissimus (KUWERT, 1890)

Helochares minutissimus KUWERT 1890a: 37; 1890b: 304.

Helochares (Agraphydrus) minutissimus KUWERT; ORCHYMONT 1939: 197.

Agraphydrus minutissimus (KUWERT); BALFOUR-BROWNE 1951: 213; HEBAUER 1995: 265; HANSEN 1999b: 156; HEBAUER 2006: 27; FIKÁČEK et al. 2010: 149; PRZEWOŹNY 2019: 26; RIBERA et al. 2019: 264, 268, 270.

TYPE LOCALITY: KUWERT (1890a) denotes northern Arabia ("... das folgende Thier [Tier] aus Nord-Arabien, welches vielleicht auch in Syrien gefunden werden dürfte" [= ... the following animal from northern Arabia, which may probably be found in Syria as well]). In a complementary description, however, KUWERT (1890b) mentions "Syria" as type locality. ORCHYMONT (1939) quotes the type label "Syria Typ." and notes an inscription on the bottom of the box "*minutissimus* Kuw. Aeg. Arab.". Subsequently, "Syria" was cited as type locality by HANSEN (1999b), PRZEWOŹNY (2019) and others.

TYPE MATERIAL: Lectotype o, designated by ORCHYMONT (1939: 196) (not examined): Type depository was not noted by KUWERT (1890a, b). ORCHYMONT (1939) examined and re-described the teneral female type specimen housed in the René Oberthür collection (MHNP). Despite considerable efforts, the specimen could not be traced. The number of specimens was not mentioned by KUWERT (1890a, b), and ORCHYMONT (1939) indicates: "... l'unique exemplaire de la collection Kuwert ...".

MATERIAL EXAMINED:

- D J I B O U T I: Arta Province: 1 ex. (NMW): Alloulli, Oued Kalou, ca. 90 km W Djibouti, 11°33'28.5"N 42°20'26.4"E, 75 m a.s.l., 30.–31.1.2016, leg. M.A. Jäch "DJI 8"; Tajourah Province: 8 exs. (NMW): Goda Mountains, ca. 20 km W Tajourah, ca. 1.5 km SW Campement Touristique Ditillou, 11°46'25.5"N 42°40'48.7"E to 11°46'23.5"N 42°41'5.5"E, 690–760 m a.s.l., stream, 28.1.2016, leg. M.A. Jäch "DJI 4"; 8 exs. (NMW): Goda Mountains, ca. 25 km WNW Tajourah, ca. 0.5 km SW Campement Touristique Bankoualé, 11°49'14.8"N 42°40'9.4"E, 680 m a.s.l., small stream, 29.I.2016, leg. M.A. Jäch "DJI 6"; 3 exs. (NMW): Goda Mountains, ca. 1.5 km E Randa, ca. 25 km NW Tajourah, below Campement Touristique Goda, 11°51'3.2"N 42°40'9.8"E, 700 m a.s.l., residual pools in small stream, 20.–30.I.2016, leg. M.A. Jäch "DJI 7".
- E R I T R E A: 2 ♂♂, 1 ♀ (NMW): Semienawi Kayih Bahri Reg., Shibah, ca. 50 km W Massaua, 15°38'16"N 39°0'28"E, 400 m a.s.l., pool in river bed, 18.XI.2017, leg. M. Madl.
- I R A N: Hormozgan Province: 1 ♂ (CSG): Gurband, mountain slopes and valley with water reservoir, 70 m a.s.l., 27°19'5"N 57°0'22"E, 4.III.2014, leg. D. Frenzel "96"; 2 ♂♂ (CSG, NMW): Gardaneh, "Bachlauf mit Palmenhain" (= stream course with palm grove), 320 m a.s.l., 27°38'1"N 56°48'35"E, 6.III.2014, leg. J. Weipert.

- O M A N: Al Batinah South Governorate: 1 ♀ (NMW): Wadi 30 km W Ar Rustaq, warm spring, 24.II.1998, leg. G. Wewalka "16"; Ash Sharqiyah North Governorate: 4 exs. (NHMB, NMW): Wadi Andam, 20 km N Samad, 22°58′N 58°5′E, 17.–18.IV.1985, leg. C. Holzschuh; 8 exs. (NMW): Wadi Bani Khalid, 40 km E Badiya, 19.II.1998, leg. G. Wewalka "7"; Muscat Governorate: 1 ex. (NHMB): Al Seeb Prov., Wadi Al Khawd, 23°33′N 58°7′E, 22.X.1988, leg. M.D. Gallagher.
- S A U D I A R A B I A: Jizan Region: 7 exs. (NHMB): "Gizan, am Roten Meer" (= Jizan City, at the Red Sea). 25.-26.III.1983, leg. C. Holzschuh; 13 exs. (NHMB, NMW): Fifa Mountains, 1240 m a.s.l., near Gizan (= Jizan City), 27.-31.III.1983, leg. C. Holzschuh; 2 exs. (NHMB): Wadi Damad, 800 m a.s.l., 24.IX.1981, leg. W. Büttiker; 1 ex. (NHMB): Wadi Shumran, 12.II.1980, leg. W. Büttiker; Makkah Region: 1 ex. (NHMB): Al Uqdah, 21°7'N 40°25'E, 1780 m a.s.l., 21.-22.VIII.1985, leg. W. Büttiker; 8 exs. (NHMB): Ash Sharayi, 23.IX.1978, leg. W. Büttiker; 3 exs. (NHMB, NMW): Wadi Karrar, 21°18'N 40°7'E, 10.II.1980, leg. W. Büttiker; 2 exs. (NHMB): Wadi Shuqub, Mt. Asir, 20°45'N 41°1'E, 1450 m a.s.l., 6.IV.1980, leg. W. Büttiker; 1 ex. (NHMB): Wadi Buwah, 1340 m a.s.l., 15.IX.1980, leg. W. Büttiker; 2 exs. (NHMB, NMP): Wadi Horash, 1600 m a.s.l., 21.V.1982, leg. W. Büttiker; 2 exs. (NHMB, NMW): Wadi Minsah, 20°41'N 40°40'E, 550 m a.s.l., 7.-8.IV.1983, leg. W. Büttiker; 3 exs. (NHMB): Wadi Nimar, 21°8'N 40°58'E, 1500 m a.s.l., 19.-20.V.1983, leg. W. Büttiker; 1 ex. (NHMB): Harithi, 21°18'N 40°18'E, 18.-19.IV.1985, leg. W. Büttiker; 1 ex. (NHMB): Bani Omar, 21°6'N 40°24'E, 1730 m a.s.l., 22.-24.VIII.1985, leg. W. Büttiker; Riyadh Region: 1 ex. (NHMB): Salbukh, 20.VIII.1976, leg. W. Büttiker; 1 ex. (NHMB): Wadi Hanifa, 610 m a.s.l., 30.VIII.1976, leg. W. Büttiker; 2 exs. (NHMB, NMW): Jal Khartam, 22.IV.1981, leg. W. Büttiker; 1 J (NMW): Naqben, 1050 m a.s.l., 27°41'N 41°38'E, 28.–30.IV.1985, leg. W. Büttiker; Tabuk Region: 1 ex. (NHMB): Wadi Maharish, 1000 m a.s.l., 11.I.1983, leg. W. Büttiker.
- S U D A N: West Darfur State: 1 ♂ (NMW): El Geneina, at light, 12.VIII.1977, leg. H.J. Bremer, "Agraphydrus albescens Reg. det.F.Hebauer"; 1 ♂ (NHM): Jebel Marra, 12°55'N 24°6'E, gallery forest, light trap, VII.1984, leg. P. Ruse.
- U A E: Fujairah Emirate: 1 ♂ (NMW): Wadi Wurayah, 25.24°N 56.17°E, collected in stream, 26.1.2010, leg. K. Mahmoud "1134B"; 1 ex. (NMP): same locality, 26.XI.2006, leg. J.-L. Gattolliat "UAE 5696"; Ras Al Khaimah Emirate, south: 2 ♂ ♂ (NMW): Wadi Shawkah, Hajar Mountains, ca. 80 km ESE Dubai, 25°6′6.1"N 56°3′26.4"E, ca. 320 m a.s.l., upper course, residual pools, 23.I.2010, leg. M.A. Jäch "UAE 3".
- Y E M E N: Dhale Governorate: 2 exs. (NHM): "Western Aden Protectorate", Dhale, 4800 ft a.s.l., "taken at moth-screen near rest-house", 14.IX.1937, leg. H. Scott & E.B. Britton; 1 ex. (NHM): Wadi Tiban, NW of Jebel Jihaf, ca. 3800 ft a.s.l., edge of Tiban River, 21.X.1937, leg. H. Scott & E.B. Britton; 1 ex. (NHM): same locality, Tiban River, 22.X.1937, leg. H. Scott & E.B. Britton; 1 ex. (NHM): Wadi Dareija, SW of Dhale, ca. 4200 ft a.s.l., 7.–8.XI.1937, leg. H. Scott & E.B. Britton; Sana'a Governorate: 1 ex. (NHM): "W.Aden Prot.", Wadi at foot of Jebel Harir, ca. 5000 ft a.s.l., 27.X.1937, leg. H. Scott & E.B. Britton; 39 exs. (NHM): same data, but 31.X.1937; 28 exs. (NHM): same data, but 1.–2.XI.1937.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence and infuscated maxillary palpomere 4, together with *A. albescens*, *A. angustatus*, *A. biltoni*, *A. elongatus*, and *A. matoposensis*. Shares nine antennomeres with *A. albescens* and *A. angustatus*. Differs in larger extension on parameral apex from *A. angustatus*. Differs in yellow pronotum from *A. biltoni* and *A. elongatus*. Shares absence of apical emargination on abdominal ventrite 5 with most specimens of *A. elongatus*; differs in broader habitus, elytra widening posterior to mid-length, lighter coloration of pronotum and elytra, nine antennomeres, shorter maxillary palpomeres, more extended femoral pubescence, and features of aedeagus (e.g., apex of parameres with lateral projection, corona situated subapically) from this sympatric species. Aedeagus very similar to aedeagus of *A. albescens*; differs mainly in absence of apical emargination on abdominal ventrite 5 from this species.

DESCRIPTION: Total length: 2.4–2.8 mm, elytral width: 1.0–1.3 mm. E.I.: 1.5–1.6, P.I.: 1.9–2.0, elytra 3.1–3.3 times as long as pronotum. Habitus (Fig. 84) slender, elytra widening posterior to mid-length, moderately convex.

Coloration: Labrum, clypeus and frons black, clypeus with distinct yellowish preocular patches, about as wide as diameter of eye; maxillary palpi yellow, palpomere 4 infuscated in apical third; pronotum yellow, unicolored, or with undefined darker brown mesal area, comprising almost entire pronotum in some specimens; elytra unicolored yellow, or light brown with brighter lateral margins in some specimens; ventrites black; legs light brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 2.9, lateral length ratio clypeus/eyes = 1.7; microreticulation absent; ground punctation fine, interspaces about twice as wide as punctures; systematic punctures distinct. Eyes large, slightly protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 1.2–1.3 times as long as pronotum in midline, 1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1-1.2; palpomere 4 slightly asymmetrical. Mentum with scattered fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of moderately distinct systematic punctures present, mesal rows 1–3 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 53): Pubescence present on more than proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairlines straight.

Abdomen: Ventrite 5 with uneven, roughly shaped apical margin, emargination absent.

Aedeagus (Fig. 22): Length: 0.38–0.50 mm. Phallobase about as long as parameres, evenly curving to very weakly defined manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres slender; lateral margins distinctly constricted subapically; apex narrow, with strong, bluntly rounded laterad projection; basal portion of dorsal face not deeply reaching into phallobase; ventral face slightly wider and shorter than dorsal face. Median lobe with narrow, finger-shaped, dorsal face; apex narrowly rounded, not reaching apex of parameres; ventral face very wide, sac-shaped; corona situated subapically; basal apophyses moderately sized, almost parallel-sided, reaching distal fourth of phallobase.

ECOLOGY: Collected in streams, pools, wadis, springs, and in a water reservoir; at light; found together with *A. elongatus* in residual pools. For habitat photographs see Fig. 99, and JÄCH & DELGADO (2017: figs. 21, 23, 24).

DISTRIBUTION (Fig. 97): Iran (first record), Saudi Arabia, UAE, Oman, Sudan, Yemen, Eritrea (first record), Djibouti (first record).

The occurrence in Syria remains doubtful and needs confirmation. Apart from a questionable record from "Ethiopia (?)" by HEBAUER (1997), this species could not be confirmed for Ethiopia so far, although its occurrence in the northern parts of the country is highly probable.

Agraphydrus minutissimus was erroneously recorded from Namibia by HEBAUER (1995) based on material collected by H. Roer in 1979 and 1988. These specimens actually belong to *A. albescens* (see above). The questionable record of *A. minutissimus* from "?South Africa" by HEBAUER (2006) is obviously based on *A. albescens* as well, because several specimens collected in the RSA (leg. Wewalka 1994; leg. M. Hess and U. Heckes 1997) were erroneously determined and labelled as *A. minutissimus* by F. Hebauer. Records (without detailed locality data) from Madagascar (HEBAUER 1995, 1997) and Kenya (HEBAUER 2006) could not be confirmed in the present study. *Agraphydrus minutissimus* should therefore be eliminated from the fauna of Kenya, Madagascar, Namibia, and RSA.

Moreover, this species does not occur in tropical Asia (HEBAUER 1995, 1997). Records from the Oriental Region (KNISCH 1924) have already been shown by ORCHYMONT (1939) and BALFOUR-BROWNE (1951) to be based on misidentification of *Helochares pallens* MACLEAY, 1825.

Agraphydrus pauper sp.n.

TYPE LOCALITY: Madagascar, Antsiranana Province, Sava Region, Andapa District, riparian springs at Masiaposa River, crossing Route National 3b at km 5–6.

TYPE MATERIAL: Holotype σ (NMW): "Madagascar (143) 10.11.2001 \ Andapa (Antsiranana), riparian \ springs at R. Masiaposa (crossing \ R. N. 3b at km 5-6), 700 m asl., \ Gerecke & Goldschmidt coll."; collected in a group of slowly running seepage springs on the right bank of a small stream surrounded by shrubs and ferns, with submerged macrophytes and peat bog, substrate essentially stones and gravel, dominant organisms beetles, Oligochaeta, and Turbellaria, temperature 20.8°C. Paratypes: MADAGASCAR: 4 $\sigma\sigma$, 2 $\varsigma \varphi$ (NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence, unicolored maxillary palpi, and largely dark brown or black head and pronotum. Differs in femoral pubescence restricted to less than basal half from all species of this group. Shares reduced femoral pubescence with *A. elongatus*, a species from the Arabian Peninsula with very different body shape, eight antennomeres, much longer maxillary palpi, apically infuscated palpomere 4, and with *A. malkini*, a species from Cameroon with similar habitus, but smaller size, darkened maxillary palpomere 4, eight antennomeres, and without apical emargination on abdominal ventrite 5.

DESCRIPTION: Total length: 2.0 mm; elytral width: 0.9–1.0 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.8 times as long as pronotum. Habitus (Fig. 85) broad, evenly oval, strongly convex.

Coloration: Labrum, clypeus, and frons black, preocular patches absent; maxillary palpomeres unicolored yellow; pronotum black with undefined, narrow, lateral margins; elytra black; ventrites black; legs brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.2, lateral length ratio clypeus/eyes = 1.8; microreticulation absent; ground punctation fine, interspaces 2–3 times as wide as punctures; systematic punctures indistinct. Eyes moderately sized, not protruding, slightly oblong oval in dorsal view. Antennae with nine antennomeres, with minute antennomere 4. Maxillary palpi slender, as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3; palpomere 4 almost symmetrical. Mentum with very fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation as fine as on head and pronotum, interspaces about twice as wide as punctures; four rows of moderately distinct systematic punctures present, mesal rows 1-3 with reduced number of punctures, some punctures present in anterior half, but not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 54): Pubescence present on less than proximal half; hairlines straight on pro- and mesofemur, slightly concave on metafemur.

Abdomen: Ventrite 5 with apical emargination, 8–20 µm deep.

Aedeagus (Fig. 23): Length: 0.27–0.34 mm. Phallobase distinctly shorter than parameres, slightly wider than long, not abruptly bending to short, defined manubrium; borderline between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres moderately wide; margins weakly sigmoid; apex asymmetrical, bluntly rounded; basal portion of dorsal face extending into distal third of phallobase. Median lobe moderately wide, widest at mid-length; apex bluntly rounded, almost reaching apex of parameres, very weakly sclerotized; reinforcing ventral plate present, widest in mid-length, with distinct apical emargination; corona situated in distal fourth; basal apophyses long, reaching mid-length of phallobase.

ECOLOGY: Collected in seepage springs.

DISTRIBUTION (Fig. 98): Madagascar.

ETYMOLOGY: The name pauper (Latin adjective) (= poor) refers to the reduced femoral pubescence.

Agraphydrus praecipuus (ORCHYMONT, 1937)

Helochares (Agraphydrus) praecipuus ORCHYMONT 1937: 252. Agraphydrus (s.str.) praecipuus (ORCHYMONT); HANSEN 1999b: 157.

TYPE LOCALITY: Madagascar, Toliara Province, Androy Region.

TYPE MATERIAL (examined): Holotype σ (MHNP): " σ | Madagascar (Sud) \ Pays Androy (Nord) \ Alluaud 1900 36 ["36" handwritten, framed] MUSEUM PARIS \ CH. ALLUAUD 1893 | TYPE | A. d'Orchymont det. \ Helochares (Agraphydrus) [handwritten] \ praecipuus m. [handwritten]". Paratypes: MADAGASCAR: 2 $\sigma \sigma$ (ISNB, MHNP): same sampling data as holotype.

ADDITIONAL MATERIAL EXAMINED:

M A D A G A S C A R: **Toliara Province**: 4 ♂♂, 4 ♀♀ (NMW): Anosy Reg., Ifotaka (town), Morafena, left affluent of Mandrare River, upstream village, in natural thornbush forest at cliffs of Mt. Vohimary, 250 m a.s.l., rest pools of dried out brook, up to 70 cm deep, unshadowed, with stones, sand, cattle excrements, algae blooms, dominant organisms Coleoptera and Heteroptera, temperature 26.8°C, 31.VIII.2001, leg. R. Gerecke & T. Goldschmidt "52".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended metafemoral pubescence, unicolored yellow maxillary palpi, dark brown or black clypeus, and with pronotum dark brown in mesal third. Differs in large size and features of aedeagus (basal lobe as long as parameres, manubrium very wide, apex of parameres very wide) from all species of this group.

DESCRIPTION: Total length: 3.0–3.1 mm; elytral width: 1.4–1.5 mm; E.I.: 1.4, P.I.: 1.9, elytra 2.9–3.0 times as long as pronotum. Habitus (Fig. 86) slender, widest slightly behind mid-length, moderately convex.

Coloration: Labrum, clypeus and frons black; clypeus with narrow, undefined, indistinct, lighter colored lateral margins or with distinct yellow preocular patches about as large as eyes; maxillary palpi unicolored yellow; pronotum with dark brown mesal patch, broadly contacting posterior margin, narrowed anteriorly, lateral portions yellow; elytra unicolored light or dark brown; ventrites black; legs dark brown to black.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.5-3.9, lateral length ratio clypeus/eyes = 1.6-1.7; microreticulation absent from disc and anterior margin, indistinctly present along lateral margins; ground punctation fine, interspaces about twice as wide as punctures; systematic punctures distinct. Eyes large, not protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 1.1-1.2 times as long as pronotum in midline, 1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1; palpomere 4 asymmetrical. Mentum with widely spaced punctures; wrinkles present laterally.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct, additional loose row present along lateral margins. Elytral ground punctation as fine as on head and pronotum, weakly impressed, with slightly wider interspaces than on pronotum; four rows of moderately distinct systematic punctures present, mesal rows 1-3 with reduced number of punctures, not reaching anterior margin. Mesoventrite with strong bulge.

Femora (Fig. 55): Pubescence present on proximal 2/3 on profemur, on proximal 3/4 of mesoand metafemur; hairlines oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 with apical emargination.

Aedeagus (Fig. 24): Length: 0.46–0.49 mm. Phallobase about as long as parameres, longer than wide; manubrium very wide, weakly demarcated; borderline between pigmented and unpigmented portion of ventral face very indistinct. Parameres moderately wide; margins straight, almost parallel-sided in basal three fourths; mesal margin slightly constricted subapically; apex broadly rounded, slightly inflated; basal portion hardly extending into phallobase. Median lobe wide basally, dorsal face evenly narrowing to narrowly rounded apex, not reaching apex of parameres; ventral face slightly shorter than dorsal face, subdivided in apical half; corona not visible; basal apophyses moderately short, slightly extending into phallobase.

ECOLOGY: Collected in residual pools, together with A. albescens.

DISTRIBUTION (Fig. 98): Madagascar.

Agraphydrus punctatellus RÉGIMBART, 1903

Agraphydrus punctatellus RÉGIMBART 1903: 34; SATÔ 1965: 128; HANSEN 1999b: 157; HEBAUER 2006: 27. Helochares (Agraphydrus) punctatellus (RÉGIMBART); ORCHYMONT 1937: 252. Enochrus (Agraphydrus) punctatellus RÉGIMBART; KNISCH 1924: 219.

TYPE LOCALITY: Madagascar, Antsiranana Province, Diana Region, Antsiranana City.

TYPE MATERIAL: Lectotype φ (MHNP), by ORCHYMONT (1937): " φ | Madagascar \ Diego-Suarez [= Antsiranana City] \ Ch. Alluaud 1893 | TYPE | Agraphydrus \ punctatellus Rég. n.sp.type [label handwritten] | MUSEUM PARIS \ MADAGASCAR \ COLL. CH. ALLUAUD 1904 | A.d'Orchymont vidi ["vidi" handwritten] \ Helochares (Agraphydrus) [handwritten] \ punctatellus Rég. type φ [handwritten]". Paralectotype φ (MHNP): "Madagascar \ Forêt Côte Est \ Alluaud 1901 92 ["92" handwritten within separate frame] | Co TYPE ["co" handwritten] | MUSEUM PARIS \ CH. ALLUAUD 1893 \ Agraphydrus \ punctatellus \ Rég. [label handwritten] | A. d'Orchymont vid. 1927 \ Helochares \ (Agraphydrus) \ punctatellus \ Rég. [label handwritten]". RÉGIMBART (1903) notes "Diego-Suarez, 2 exemplaires, forêt de la Côte Est de Madagascar, 1 exemplaire plus trapu (Alluaud)".

ORCHYMONT (1937) compares *A. praecipuus* with *A. punctatellus* and mentions in a footnote the existence of a unique male [!] "paratype" [= paralectotype] of *A. punctatellus*. This specimen could not be found in the MHNP.

ADDITIONAL MATERIAL EXAMINED:

- E S W A T I N I: 1 ♂ (NMW): Mlilwane Wildlife Sanctuary, ca. 26°29'S 31°11'E, 17.–19.XI.1996, leg. M. Hartmann.
- M A D A G A S C A R: Antsiranana Province: 2 ♂ ♂, 1 ♀ (NMW): Diana Reg., Joffreville (= Ambohitra, town), Montagne d'Ambre N.P., "R. de Manques" in Reserve Fontenay, 550 m a.s.l., small brook in degraded primary forest with tea, manioc, and banana plantations, with submerged macrophytes and peat bog, ferns within cascades, substrate mostly stones and gravel, dominant organisms Heteroptera, temperature 21.9°C, 17.XI.2001, leg. R. Gerecke & T. Goldschmidt "154"; Fianarantsoa Province: 1 ♂ (MHNP): Ihorombe Reg., Pic d'Ivohibe Reserve, 2200 m a.s.l., 8.XI.1950, leg. A. Robinson.
- M O Z A M B I Q U E: **Manica Province**: 5 ♂ ♂, 1 ♀ (ISNB, MHNP): environment of Vila Pery (= Chimoio, city), at the border of Mzinga at foot of Cabeça do velho (hill), 20.–21.V.1929, leg. P. Lesne; 2 ♂ ♂, 1 ♀ (ISNB, MHNP): Vila Pery (= Chimoio), VI.1929, leg. P. Lesne; 1 ♀ (MHNP): Chemba Distr., Nhacatete, "Zembèze" (= Zambezi River), "Dango Nhamasi", 19.IV.1929, leg. P. Lesne; **Sofala Province**: 1 ♂ (MHNP): Chemba Distr., "Zembèze" (= Zambezi River), "moyen Sangadzé" (valley), near Moulima (village), 26.IV.1929, leg. P. Lesne.
- R S A: Kwa-Zulu Natal Province: 19 exs. (NMW): 20 km W Port Shepstone, Oribi Gorge near Paddock, 30°45'S 30°15'E, 12.III.1997, leg. M. Hess & U. Heckes "28"; Limpopo Province: 1 ♂ (NHM): Waterberg Distr., Kareefontein (farm), near Nylstroom (= Modimolle, town), ca. 4800 ft a.s.l., rapid stream over rock and gravel, 16.IV.1954, leg. J. Balfour-Browne, Stn. 164; 1 ♀ (NHM): Kafferboom, "unnamed spruit [small stream], gravel & sand", 17.IV.1954, leg. J. Balfour-Browne, Stn. 169a; 1 ♂, 4 ♀ ♀ (NHM, NMW): Soutpansberg Distr., Vhembe Municipality, Khalavha, Mutale River, ca. 3000 ft a.s.l., in side gravels and muddy pools, 24.IV.1954, leg. J. Balfour-Browne, Stn. 19; 9 exs. (NHM, NMW): Soutpansberg Distr., Mutshindudi River, ca. 3500 ft a.s.l., in silty edges at drift, 25.IV.1954, leg. J. Balfour-Browne, Stn. 19; 9 exs. (NHM, NMW): Soutpansberg Distr., Mutshindudi River, ca. 3000 ft a.s.l., in silty edges at drift, 25.IV.1954, leg. J. Balfour-Browne, Stn. 19; 9 exs. (NHM, NMW): Soutpansberg Distr., Mutshindudi River, ca. 3000 ft a.s.l., in silty edges at drift, 25.IV.1954, leg. J. Balfour-Browne, Stn. 19; 9 exs. (NHM, NMW): Soutpansberg Distr., Mutshindudi River, ca. 3000 ft a.s.l., in silty edges at drift, 25.IV.1954, leg. J. Balfour-Browne, Stn. 195; Mpumalanga Province: 3 exs. (CHM, NMW): Thaba Chweu Local Municipality, Leroro (village), Bourke's Luck Potholes, Blyde River, "Stillwasserzone" (= still water area), 29.V.2001, leg. A. Skale; 1 ♀ (NHM): White River (village), "hinter Staumauer, Quelle [= behind dam, spring]", 31.V.2001, leg. A. Skale "BMNH (E) \ 2002-95 \ A. Kopetz".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum with defined dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. gereckei*, *A. goldschmidti*, *A. madagascarensis*, *A. rho-desiensis*, *A. scutifer*, and *A. tumidus*. Differs in absence of mesoventral carina from *A. gereckei*. Differs in finer pronotal and elytral ground punctation from *A. scutifer* and *A. tumidus*. Shares short basal lobe with *A. gereckei*, *A. scutifer*, and *A. tumidus*. Differs in broader and shorter median lobe from *A. gereckei*, in finer pronotal and elytral ground punctation and in absence of plate-like structures on median lobe from *A. scutifer* and *A. tumidus*. Differs in narrow, small manubrium from *A. goldschmidti* and *A. madagascarensis*. Differs in shorter and wider basal lobe from *A. rhodesiensis*.

DESCRIPTION: Total length: 2.3–2.7 mm; elytral width: 1.2–1.4 mm; E.I.: 1.3–1.4, P.I.: 2.0–2.2, elytra 3.0 times as long as pronotum. Habitus (Fig. 87) moderately broad, elytra evenly oval to very weakly widening posterior to mid-length, moderately convex.

Coloration: Labrum, clypeus, and frons black, clypeus with indistinct yellow preocular patches, as large as diameter of eye or smaller; maxillary palpi unicolored yellow; pronotum dark brown mesally with wide, undefined, yellow lateral margins and narrowly yellow anterior margins; elytra largely light brown, or dark brown with undefined brighter brown margins and with black patch at shoulder region in most specimens; ventrites and legs black, distal portion of femora brown.

Head: Clypeus with weakly concave anterior margin, C.I. = 4.4, lateral length ratio clypeus/eyes = 1.3; microreticulation absent; ground punctation very fine, interspaces 3-4 times as wide as punctures; systematic punctures distinct. Eyes large, very slightly protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi moderately slender, 1.0-1.1 times as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1; palpomere 4 asymmetrical. Mentum with very fine punctures, grouped laterally; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows 1-3 with reduced number of punctures, not reaching anterior margin; additional row of punctures present along lateral margin. Mesoventrite with mesal bulge.

Femora (Fig. 56): Pubescence present on proximal 2/3 of femora; hairlines straight.

Abdomen: Ventrite 5 with shallow apical emargination, ca. 8–10 µm deep.

Aedeagus (Fig. 25): Length: 0.37–0.45 mm. Phallobase distinctly shorter than parameres, distinctly wider than long, abruptly bending to very short, defined, triangular manubrium; borderline between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres widest in basal half, margins weakly sigmoid; apex bluntly rounded, asymmetrical; basal portion of dorsal face distinctly extending into phallobase mesally, almost reaching mid-length; ventral face shorter and less wide than dorsal face. Median lobe moderately wide; margins evenly narrowing to bluntly rounded apex, not reaching apex of parameres; corona situated in distal third; basal apophyses long, almost reaching mid-length of phallobase.

ECOLOGY: Collected in rivers, streams, still water areas, and springs; found together with *A. scutifer* in Madagascar, with *A. albescens* and *A. atripalpis* in RSA.

DISTRIBUTION (Fig. 98): Madagascar, Mozambique, RSA, Eswatini (first record).

HEBAUER (2006) listed also Tanzania ["Tanzanina"] in the distribution of this species without further details. This record needs confirmation.
Agraphydrus rhodesiensis sp.n.

TYPE LOCALITY: Zimbabwe, Mashonaland East Province, Doboshava, 27 km N Harare.

TYPE MATERIAL: Holotype σ (NHM): "RHODESIA \ Salisbury [= Zimbabwe, Harare] \ Domboshawa [= Domboshava Village, 27 km N Harare] \ 23.III.[19]61. T.S. Weir [label handwritten] \ Agraphydrus \ punctatellus R. \ HEBAUER d.".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum with defined dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. gereckei*, *A. goldschmidti*, *A. madagascarensis*, *A. punctatellus*, *A. scutifer*, and *A. tumidus*. Differs in absence of mesoventral carina and distinctly wider median lobe from *A. gereckei*, in finer ground punctation of pronotum and elytra and absence of reinforcing plate of median lobe from *A. scutifer* and *A. tumidus*, in larger eyes from *A. goldschmidti*, and in distinctly longer basal lobe from *A. punctatellus*.

DESCRIPTION: Total length: 2.7 mm; elytral width: 1.3 mm; E.I.: 1.4, P.I.: 2.0, elytra 3.1 times as long as pronotum. Habitus (Fig. 88) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus, and frons black, clypeus with yellow preocular patches as large as diameter of eye; maxillary palpi unicolored yellow; pronotum dark brown in mesal third, widening posteriorly, lateral thirds yellow, anterior margin narrowly yellow; elytra largely yellowish brown with black patch at shoulder region; ventrites brown to black; legs light brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.3, lateral length ratio clypeus/eyes = 1.6; microreticulation absent; ground punctation fine, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes large, not protruding, oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 slightly asymmetrical. Mentum with very fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation very fine, weakly impressed; systematic punctures distinct. Elytral ground punctation very fine, weakly impressed; four rows of distinct systematic punctures present, mesal rows present in anterior half, but not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 57): Pubescence present on proximal 2/3 of pro- and mesofemur with oblique hairlines, on proximal 3/4 of metafemur with straight hairline.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 26): Length: 0.38 mm. Phallobase shorter than parameres, wider than long, bending obtuse angled to moderately sized, defined, manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct, extending to more than mid-length of manubrium. Parameres moderately slender, widest in basal half; margins slightly sigmoid; apex bluntly rounded, asymmetrical; basal portion of dorsal face extending into phallobase, almost reaching mid-length mesally; ventral face indistinct, shorter and less wide than dorsal face. Median lobe slender; margins of dorsal face evenly narrowing to bluntly rounded apex, not reaching apex of parameres; ventral face distinctly shorter than dorsal face; corona situated in distal third; reinforcing structures absent; basal apophyses moderately long, almost reaching mid-length of phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 95): Zimbabwe.

ETYMOLOGY: Rhodesia is a former name of Zimbabwe. The name rhodesiensis (adjective) refers to the type locality.

Agraphydrus rivalis sp.n.

TYPE LOCALITY: Madagascar, Fianarantsoa Province, Haute Matsiatra Region, Madiorano near Ranomena (villages), stream crossing the railroad at km 51.2.

TYPE MATERIAL: Holotype σ (NMW): "Madagascar (31) 18.08.2001 \ Madiorano (Fianarantsoa), stream \ crossing the railroad at km 51.2 \ (W tunnel 18), 650 m asl. \ Gerecke & Goldschmidt coll.". Specimens were collected in a mildly sloping, largely shaded stream with little moss, algae (incl. red algae) within degraded primary forest; substrate: macrolithal; dominant organisms Coleoptera and Diptera, temperature: 15.9°C. Paratype σ (NMW): MADAGASCAR: same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, dark coloration of head, pronotum, and elytra, unicolored maxillary palpi, small eyes, and small size of 2.0–2.3 mm body length, together with *A. aethiopicus*, *A. flavipes*, and *A. fontis*. Shares eight antennomeres with *A. flavipes*. Differs in broader habitus and features of aedeagus (e.g., parameres without indentation) from *A. aethiopicus*, in dark brown pronotum with wide rufous margins (versus black pronotum) from *A. flavipes* and *A. fontis*. Shares mesoventral carina with *A. gereckei*, differs in smaller size, broader habitus, undefined mesal pronotal dark brown coloration, dark brown elytra, and eight antennomeres from this species. Differs in features of aedeagus (e.g., median lobe widest at base, evenly narrowing apicad) from all species mentioned.

DESCRIPTION: Total length: 2.2–2.3 mm; elytral width: 1.1 mm; E.I.: 1.2, P.I.: 2.1, elytra 2.6 times as long as pronotum. Habitus (Fig. 89) moderately broad, elytra evenly oval, moderately convex.

Coloration: Labrum black; clypeus black mesally with undefined yellow lateral margins; frons black; maxillary palpi unicolored yellow; pronotum dark brown mesally with wide rufous lateral margins; elytra black mesally with yellowish brown lateral margins and apical region; ventrites and legs dark brown to black.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.6, lateral length ratio clypeus/eyes = 1.7; microreticulation absent; ground punctation very fine, interspaces three times as wide as punctures; systematic punctures distinct. Eyes rather small, not protruding, oblong oval in dorsal view. Antennae with eight antennomeres; antennomere 4 constricted basally. Maxillary palpi moderately slender, as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1; palpomere 4 almost symmetrical. Mentum with fine sparse punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation slightly coarser than on head and pronotum; four rows of indistinct systematic punctures present, mesal rows 1–3 with reduced number of punctures, not reaching anterior margin; some additional coarser punctures present along lateral margin. Mesoventrite with mesal bulge and short mesal carina.

Femora (Fig. 58): Pubescence present on proximal 2/3 of femora; hairlines straight.

Abdomen: Ventrite 5 with shallow apical emargination, ca. 10 µm deep.

Aedeagus (Fig. 27): Length: 0.35–0.36 mm. Phallobase distinctly shorter than parameres, about as wide as long, bending obtuse angled to defined, moderately long, narrow, manubrium; borderline between pigmented and unpigmented portion of ventral face very indistinct, reaching manubrium. Parameres sigmoid, apical portion inclining mesad; apex bluntly rounded, asymmet-

rical; basal portion of dorsal face weakly extending into phallobase. Median lobe widest at base; margins evenly converging to narrowly rounded apex, not reaching apex of parameres; corona situated subapically; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in a stream.

DISTRIBUTION (Fig. 97): Madagascar.

ETYMOLOGY: The name rivalis (Latin adjective) (= pertaining to a stream) refers to the fact that the type specimens were found in a stream.

Agraphydrus scutifer sp.n.

TYPE LOCALITY: Madagascar, Fianarantsoa Province, Haute Matsiatra Region, Andringitra N.P., Amboahisy River, 22°7'54"S 46°53'30"E.

TYPE MATERIAL: Holotype & (NMW): "MADAGASCAR: Andringitra NP \ (Fianarantsoa) \ R. Amboahisy \ 13.04.2011 \ leg. R. Gerecke (MD 205) | right riparian springs above \ bridge at lower campsite \ S22°07'54"/E46°53'30" \ 1571 m"; collected in a seepage spring in open landscape forming an extensive bog area, unshadowed, substrate mainly organic material and plant roots. Paratypes: MADAGASCAR: Fianarantsoa Province: 10 33, 9 99 (NMW): same sampling data as holotype; 1 3 (NMW): Haute Matsiatra Reg., Ambohimahaso, Route Nationale 7, km 376, 21°16'31.8"S 47°14'24.1"E, small spring stream in degraded open land with cattle pasture near remnants of denuded primary forest, partially shaded, substrate mainly organic material, gravel, sand, W exposed, 16.IV.2011, leg. R. Gerecke "MD 212"; 2 33, 3 99 (NMW): Haute Matsiatra Reg., Andringitra N.P., central affluent, Cascade du Roi, 22°9'S 46°53'E, ca. 2000 m a.s.l., swamp with seepage on solid rock, unshadowed, organic material, near small right affluent, temperature 15.4°C, 12.IV.2011, leg. R. Gerecke "MD 202"; 4 exs. (NMW): Haute Matsiatra Reg., Andringitra N.P., Mount Ambatoberger, 22°7'52.0"S 46°51'51.1"E, weakly flowing seepage spring, unshadowed, solid rock, organic material, plant roots, 12.IV.2011, leg. R. Gerecke "MD 203"; 1 & (NMW): Haute Matsiatra Reg., Andringitra N.P., 22°8'1.1"S 46°53'10.1"E, ca. 1650 m a.s.l., second stream crossing way to cascades, mountain stream on mildly sloping plateau, with extensive pool area, partially shaded, substrate solid rock and sand, temperature 16.6°C, 11.IV.2011, leg. R. Gerecke "MD 197"; 6 ♂ ♂ , 5 ♀♀ (MHNP): Ihorombe Reg., Pic d'Ivohibe Reserve, 2200 m a.s.l., 8.XI.1950, leg. A. Robinson; 2 ♂ ♂ (MHNP): Ihorombe Reg., Forêt Col d'Ivohibe, XI.1950, leg. A. Robinson; Toliara Province: 1 & (NMW): Anosy Reg., 3 km NW of Fort Dauphin (= Tolagnaro), Pic St. Louis, 25°0'S 46°58'E, 150-250 m a.s.l., 19.II.2004, leg. P. Bulirsch.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum with defined, dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. gereckei*, *A. goldschmidti*, *A. madagascarensis*, *A. punctatellus*, *A. rhodesiensis*, and *A. tumidus*. Differs in absence of mesoventral carina from *A. gereckei*. Shares distinctly impressed, dense, moderately fine pronotal and elytral ground punctation with *A. tumidus*, in contrast to weakly impressed, very fine punctures with larger interspaces in *A. goldschmidti*, *A. madagascarensis*, *A. punctatellus*, and *A. rhodesiensis*. Plate-like structure of median lobe also present in *A. tumidus*, but very differently shaped (broad, with large apical incision, distinctly shorter than dorsal face of median lobe) in *A. scutifer*.

DESCRIPTION: Total length: 2.3–2.8 mm; elytral width: 1.2–1.3 mm; E.I.: 1.1–1.3, P.I.: 2.1, elytra 2.5 times as long as pronotum. Habitus (Fig. 90) broad, evenly oval, elytra moderately to strongly convex.

Coloration: Labrum, clypeus, and frons black, indistinct yellow preocular patches present, as large as diameter of eye or smaller; maxillary palpi unicolored yellow; pronotum dark brown mesally with decreasing intensity of coloration laterad, with broad, undefined, yellow lateral margins, with narrow yellow anterior margins; elytra largely dark brown with undefined yellowish brown margins and posterior portion; ventrites and legs black, distal portion of femora brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.4, lateral length ratio clypeus/eyes = 1.9; microreticulation absent; ground punctation moderately fine, strongly impressed, interspaces about as wide as punctures or slightly larger; systematic punctures distinct. Eyes large, not protruding, oval in dorsal view. Antennae with nine antennomeres with minute, indistinctly defined, second intermediate segment. Maxillary palpi moderately slender, as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1; palpomere 4 almost symmetrical. Mentum with sparse punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows 1–3 with reduced number of punctures, not reaching anterior margin; mesoventrite with mesal bulge.

Femora (Fig. 59): Pubescence present on proximal 2/3 of femora, less wide on profemur than on meso- and metafemur; hairlines straight.

Abdomen: Ventrite 5 with minute apical emargination, ca. 6–10 µm deep.

Aedeagus (Fig. 28): Length: 0.34–0.36 mm; 0.20 mm in specimen from Toliara Province. Phallobase distinctly shorter than parameres, wider than long, lateral margins distinctly curving, abruptly narrowing to short, defined, manubrium; borderline between pigmented and unpigmented portion of ventral face very indistinct; dorsal faces large. Parameres wide in basal half, very slender in apical half; margins sigmoid; apical portion inclining mesad; apex bluntly rounded, asymmetrical; basal portion of dorsal face distinctly extending into phallobase, almost reaching half-length. Median lobe with wide, pear shaped dorsal face; ventral face distinctly narrower, about as wide as parameres; apex broadly rounded, almost reaching apex of parameres; corona situated in distal third; large ventral reinforcing plate present, weakly sclerotized, deeply emarginate mesally; basal apophyses moderately long, narrow, almost reaching mid-length of phallobase.

ECOLOGY: Collected in streams, springs, and seepages on solid rock; found together with *A. punctatellus* and *A. andringitra*. For habitat photograph, see Fig. 100.

DISTRIBUTION (Fig. 95): Madagascar.

ETYMOLOGY: The name scutifer (adjective) is derived from scutum (Latin noun) (= shield), and ferre (Latin verb) (= to bear) and refers to the shield shaped structure on the median lobe.

Agraphydrus tumidus sp.n.

TYPE LOCALITY (Fig. 102): Madagascar, Toliara Province, Anosy Region, Tsimelahy, Antarantsa River, ca. 1 km upstream from village.

TYPE MATERIAL: **Holotype** σ (NMW): "Madagascar (58) 04.09.2001 \ Tsimelahy (Tulear), River \ Antarantsa, ca. 1 km upstream \ from village, 300 m asl., \ Gerecke & Goldschmidt coll."; collected in a small partially shaded stream, substrate mainly stones, rapidly flowing through degraded primary forest and cultivated land, and in hygropetric spring at right bank of stream, dominant organisms mayflies, caddisflies, Diptera, Mollusca, Oligochaeta, temperature 20.8°C. **Paratypes: MADAGASCAR: Toliara Province:** 4 $\sigma \sigma$, 7 $\varphi \varphi$ (NMW): same sampling data as holotype; **Antsiranana Province:** 2 $\sigma \sigma$, 1 φ (NMW): Diana Reg., Joffreville (= Ambohitra, town), Montagne d'Ambre, right affluent of Rivière de Manques in Reserve Fontenay, 550 m a.s.l., very weakly flowing riparian springs, 1 m distance to stream, on solid rock in primary forest, completely shaded, with little organic detritus and roots of trees, dominant organisms Mollusca, temperature 21.5°C, 18.XI.2001, leg. R. Gerecke & T. Goldschmidt "157".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black

clypeus, pronotum with defined, dark brown mesal patch and wide yellow lateral margins, and with 2.4–2.8 mm body length, together with *A. gereckei*, *A. goldschmidti*, *A. madagascarensis*, *A. punctatellus*, *A. rhodesiensis*, and *A. scutifer*. Differs in absence of mesoventral carina from *A. gereckei*. Shares distinctly impressed, dense, moderately fine pronotal and elytral ground punctation with *A. scutifer*, in contrast to weakly impressed, very fine punctures with larger interspaces in *A. goldschmidti*, *A. madagascarensis*, *A. punctatellus*, and *A. rhodesiensis*. Differs in long plate-like structure, about as long as dorsal face of median lobe, widening in mid-length, from all species mentioned. Differently shaped plate-like structure of median lobe present in *A. scutifer*.

DESCRIPTION: Total length: 2.4–2.6 mm; elytral width: 1.2–1.3 mm; E.I.: 1.3, P.I.: 2.1, elytra 3.0 times as long as pronotum. Habitus (Fig. 91) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus, and frons black; clypeus with yellow preocular patches about as large as diameter of eye; maxillary palpi unicolored yellow; pronotum with dark rufous patch in mesal third, widening posteriorly, with yellow lateral thirds; elytra rufous; ventrites black; legs yellowish brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.4, lateral length ratio clypeus/eyes = 1.5; microreticulation absent; ground punctation moderately fine, interspaces 1-2 times as wide as punctures; systematic punctures distinct. Eyes large, not protruding, slightly oblong oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi moderately slender, as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1; palpomere 4 almost symmetrical. Mentum with very fine punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows 1–3 with reduced number of punctures, not reaching anterior margin; additional coarse punctures present along lateral margin. Mesoventrite with mesal bulge.

Femora (Fig. 60): Pubescence present on proximal 2/3-3/4 of femora; hairlines slightly oblique.

Abdomen: Ventrite 5 with shallow apical emargination, ca. 10 µm deep.

Aedeagus (Fig. 29): Length: 0.35–0.38 mm. Phallobase distinctly shorter than parameres, wider than long; lateral margins distinctly curving, abruptly narrowing to short manubrium; borderline between pigmented and unpigmented portion of ventral face very indistinct, almost reaching manubrium. Parameres moderately wide; margins sigmoid, slightly constricted subapically; apex broadly rounded, slightly inflated; basal portion of dorsal face distinctly extending into phallobase, almost reaching mid-length mesally. Median lobe strongly bending dorsad; dorsal face very wide at base, evenly narrowing apicad; ventral face moderately wide, narrowing in mid-length; distinct reinforcing plate present, strongly widening in mid-length; apex reaching or exceeding apex of parameres; corona in apical position; basal apophyses long, extending into distal third of phallobase.

ECOLOGY: Collected in streams; probably hygropetric.

DISTRIBUTION (Fig. 97): Madagascar.

ETYMOLOGY: The name tumidus (Latin adjective) (= swollen) refers to the shape of the reinforcing plate of the median lobe.

Agraphydrus usambaraensis sp.n.

TYPE LOCALITY: Tanzania, Tanga Region, East Usambara Mountains, Amani, Sigi River.

TYPE MATERIAL: Holotypus & (ZMUC): "Tanzania, East Usambara Mts. \ Amani, Sigi River, 750 m \ 15.vii. 1980 \ M. Stoltze & N. Scharff leg.". Paratypes: TANZANIA: 2 & d, 1 ç (NMW, ZMUC): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with metafemoral pubescence present on more than proximal half, unicolored yellow maxillary palpi, dark brown or black clypeus, pronotum unicolored dark brown or with undefined darker brown mesal area, and body length less than 2.9 mm, together with *A. aethiopicus*, *A. congolensis*, and *A. rivalis*. Differs in larger size, nine antennomeres, and absence of mesoventral carina from *A. rivalis*, in larger size from *A. aethiopicus*. Differs in features of aedeagus (basal lobe bending at right angles to manubrium, parameres with distinct subapical incision laterally, apex of median lobe exceeding apex of parameres) from all species mentioned.

DESCRIPTION: Total length: 2.5–2.6 mm; elytral width: 1.4–1.6 mm; E.I.: 1.3, P.I.: 2.2, elytra 3.0 times as long as pronotum. Habitus (Fig. 92) moderately broad, elytra parallel-sided, moderately to strongly convex.

Coloration: Labrum, clypeus, and frons black, yellow preocular patches present, about as large as eye; maxillary palpi unicolored yellow; pronotum dark brown, lateral margins yellow; elytra dark brown; ventrites and legs dark brown to black.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.3, lateral length ratio clypeus/eyes = 1.4; microreticulation absent; ground punctation very fine, very weakly impressed; systematic punctures distinct. Eyes large, slightly protruding, oblong oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi moderately slender, 0.9 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3; palpomere 4 almost symmetrical. Mentum with very fine, sparse punctures; micro-sculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of very distinct systematic punctures present, mesal rows 1-3 with reduced number of punctures, present in anterior half, but not reaching anterior margin; additional row of coarse punctures present along lateral margin. Mesoventrite with mesal bulge.

Femora (Fig. 61): Pubescence present on proximal 2/3; hairlines slightly oblique.

Abdomen: Ventrite 5 with apical emargination, ca. 20–30 µm deep.

Aedeagus (Fig. 30): Length: 0.35–0.38 mm. Phallobase shorter than parameres, distinctly wider than long, bending at right angles to short, defined manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres wide, widest at base, margins distinctly curving, lateral margin with distinct subapical incision; apex bluntly rounded, asymmetrical, slightly inclining mesad; basal portion of dorsal face distinctly extending into phallobase, reaching mid-length. Median lobe moderately wide, less wide than parameres, widest in mid-length; apex narrowly rounded, exceeding apex of parameres; corona in subapical position; basal apophyses long, reaching mid-length of phallobase.

ECOLOGY: Collected in a river together with A. atripalpis.

DISTRIBUTION (Fig. 98): Tanzania.

ETYMOLOGY: The name usambaraensis (adjective) refers to the Usambara Mountains (Tanzania), where the type specimens have been collected.



Fig. 1: Agraphydrus variabilis KOMAREK & HEBAUER, 2018; habitus, ventral view, head and prothorax flexed dorsad.



Figs. 2–6: Aedeagus: 2) Agraphydrus acutus; 3) A. aethiopicus; 4) A. albescens; 5) A. andringitra; 6) A. angustatus. Scale = 0.1 mm.



Figs. 7–12: Aedeagus: 7) Agraphydrus atripalpis; 8) A. bicoloratus; 9) A. bilardoi; 10) A. biltoni; 11) A. camerunensis; 12) A. congolensis. Scale = 0.1 mm.





Figs. 13–18: Aedeagus: 13) *Agraphydrus elongatus*; 14) *A. flavescens*; 15) *A. flavipes*; 16) *A. fontis*; 17) *A. gereckei*; 18) *A. goldschmidti.* Scale = 0.1 mm.





Figs. 19–24: Aedeagus: 19) Agraphydrus madagascarensis; 20) A. malkini; 21) A. matoposensis; 22) A. minutissimus; 23) A. pauper; 24) A. praecipuus. Scale = 0.1 mm.



Figs. 25–28: Aedeagus: 25) *Agraphydrus punctatellus*; 26) *A. rhodesiensis*; 27) *A. rivalis*; 28) *A. scutifer*. Scale = 0.1 mm.



Figs. 29–32: Aedeagus: 29) Agraphydrus tumidus; 30) A. usambaraensis; 31) A. vadoni; 32) A. villiersi. Scale = 0.1 mm.



Figs. 33–48: Femora: 33) Agraphydrus acutus; 34) A. aethiopicus; 35) A. albescens; 36) A. andringitra; 37) A. angustatus; 38) A. atripalpis; 39) A. bicoloratus; 40) A. bilardoi; 41) A. biltoni; 42) A. camerunensis; 43) A. congolensis; 44) A. elongatus; 45) A. flavescens; 46) A. flavipes; 47) A. fontis; 48) A. gereckei.



Figs. 49–63: Femora: 49) Agraphydrus goldschmidti; 50) A. madagascarensis; 51) A. malkini; 52) A. matoposensis; 53) A. minutissimus; 54) A. pauper; 55) A. praecipuus; 56) A. punctatellus; 57) A. rhodesiensis; 58) A. rivalis; 59) A. scutifer; 60) A. tumidus; 61) A. usambaraensis; 62) A. vadoni; 63) A. villiersi.



Figs. 64–67: Habitus: 64) *Agraphydrus acutus* (paratype); 65) *A. aethiopicus* (holotype); 66) *A. albescens* (RSA); 67) *A. andringitra* (holotype). Scale = 1 mm.



Figs. 68–71: Habitus: 68) Agraphydrus angustatus (paratype); 69) A. atripalpis (paratype); 70) A. bicoloratus (holotype); 71) A. bilardoi (holotype). Scale = 1 mm.



Figs. 72–75: Habitus: 72) Agraphydrus biltoni (paratype); 73) A. camerunensis (holotype); 74) A. congolensis (holotype); 75) A. elongatus (paratype). Scale = 1 mm.



Figs. 76–79: Habitus: 76) *Agraphydrus flavescens* (paratype); 77) *A. flavipes* (holotype); 78) *A. fontis* (holotype); 79) *A. gereckei* (holotype). Scale = 1 mm.



Figs. 80–83: Habitus: 80) *Agraphydrus goldschmidti* (holotype); 81) *A. madagascarensis* (paratype); 82) *A. malkini* (holotype); 83) *A. matoposensis* (holotype). Scale = 1 mm.



Figs. 84–87: Habitus: 84) Agraphydrus minutissimus (Oman); 85) A. pauper (holotype); 86) A. praecipuus (paratype); 87) A. punctatellus (RSA). Scale = 1 mm.



Figs. 88–91: Habitus: 88) *Agraphydrus rhodesiensis* (holotype); 89) *A. rivalis* (holotype); 90) *A. scutifer* (holotype); 91) *A. tumidus* (holotype). Scale = 1 mm.



Figs. 92–94: Habitus: 92) Agraphydrus usambaraensis (holotype); 93) A. vadoni (holotype); 94) A. villiersi (paratype). Scale = 1 mm.



Fig. 95: Distribution of Agraphydrus acutus, A. andringitra, A. bicoloratus, A. bilardoi, A. flavipes, A. rhodesiensis, and A. scutifer.



Fig. 96: Distribution of Agraphydrus albescens, A. angustatus, A. biltoni, A. congolensis, A. elongatus, A. flavescens, A. gereckei, and A. madagascarensis.



Fig. 97: Distribution of Agraphydrus atripalpis, A. fontis, A. goldschmidti. A. malkini, A. minutissimus, A. rivalis, A. tumidus, and A. vadoni.



Fig. 98: Distribution of Agraphydrus aethiopicus, A. camerunensis, A. matoposensis, A. pauper, A. praecipuus, A. punctatellus, A. usambaraensis, and A. villiersi.



Figs. 99–100: Habitats of 99) Agraphydrus minutissimus, Eritrea, Shibah (photograph: M. Madl); 100) A. andringitra (type locality) and A. scutifer, Madagascar, Andringitra N.P. (photograph: R. Gerecke).



Figs. 101–102: Habitats of 101) *Agraphydrus fontis* (type locality), Madagascar, near Ranomena (photograph: R. Gerecke); 102) *A. tumidus* (type locality), Madagascar, Antarantsa River (photograph: T. Goldschmidt).



Fig. 103: Habitat of *Agraphydrus biltoni* (type locality), South Africa, Kamiesberg Stream, with D.T. Bilton (photograph: R. Bilton).

Agraphydrus vadoni sp.n.

TYPE LOCALITY: Madagascar, Analanjirofo Region, Toamasina Province, Maroantsetra (town).

 $\label{eq:type_state} TYPE \mbox{ MATERIAL: Holotype σ (MHNP): "σ | Maroantsetra \ Ambodivoangy \ endogée \ (J. Vadon) [label handwritten] | INSTITUT \ SCIENTIFIQUE \ MADAGASCAR".$

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended metafemoral pubescence and unicolored yellow maxillary palpi. Differs in unicolored yellow head, pronotum and elytra, and in features of aedeagus (phallobase wide, parameres sigmoid with strong subapical constriction and broad apex, median lobe wide, apex broadly rounded, notched) from all Afrotropical species.

DESCRIPTION: Total length: 2.1 mm; elytral width: 1.0 mm; E.I.: 1.3, P.I.: 1.9, elytra 2.8 times as long as pronotum. Habitus (Fig. 93) moderately slender, evenly oval, moderately convex.

Coloration: Labrum, clypeus, and frons unicolored yellow; maxillary palpi unicolored yellow; pronotum and elytra unicolored dark yellow; ventrites and legs yellow.

Head: Clypeus with distinctly concave anterior margin, C.I. = 3.6, lateral length ratio clypeus/eyes = 2.0; microreticulation absent; ground punctation moderately fine, moderately impressed, interspaces about twice as wide as punctures; systematic punctures indistinct. Eyes small, not protruding, slightly oblong oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi slender, 1.1 times as long as pronotum in midline, 1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3; palpomere 4 slightly asymmetrical. Mentum with very few punctures; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation as on pronotum; four rows of very indistinct systematic punctures present, mesal rows 1-3 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge, ridge absent.

Femora (Fig. 62): Pubescence present on less than proximal 2/3; hairlines slightly oblique.

Abdomen: Ventrite 5 with minute apical emargination, ca. 7 µm deep.

Aedeagus (Fig. 31): Length: 0.34 mm. Phallobase wide, shorter than parameres, about as wide as long; lateral margins sigmoid, abruptly narrowing basally to distinct, moderately wide manubrium; borderline between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres very wide at base; margins sigmoid, with strong subapical constriction, apex distinctly widening; basal portion of dorsal face extending to proximal third of phallobase. Median lobe wide, apex broadly rounded, dorsal face distinctly incised, not reaching apex of parameres; ventral face deeply split into right and left half; corona in subapical position; basal apophyses long, extending to mid-length of phallobase.

ECOLOGY: Probably terrestrial ("endogée").

DISTRIBUTION (Fig. 97): Madagascar.

ETYMOLOGY: The species is dedicated to the naturalist and member of the Académie malgache, Jean Vadon (1904–1970), collector of the holotype.

Agraphydrus villiersi (BALFOUR-BROWNE, 1958)

Helochares (Gymnhelochares) villiersi BALFOUR-BROWNE 1958: 184. Agraphydrus (Gymnhelochares) villiersi BALFOUR-BROWNE; HANSEN 1999b: 157; HEBAUER 2006: 27.

TYPE LOCALITY: Ivory Coast, Montagnes District, Tonkpi Region, Mont Tonkoui.

TYPE MATERIAL: **Holotype** (not examined, depository not explicitly noted in original description): " σ , IVORY COAST, Tonkoui, 900-1 200 m, 20-30-IX-1946. (A. Villiers leg.)" (BALFOUR-BROWNE 1958). The specimen could not be traced in the MHNP, where it should be deposited (I vainly tried to trace it personally in the MHNP for five days in March 2017); and it could not be found in any of the collections listed above. **Paratypes: IVORY COAST** (examined): 1 ex. (NHM): "Para- \ type [yellow bordered round label] \ IFAN - 1946 \ TONKOUI C.I. \ 900-1200 m \ A.VILLIERS [label handwritten] | FORET PRIM \ 20-30-IX [label handwritten] | Brit. Mus. \ 1949-68 ["68" handwritten] | H.(Gymnhelochares) [handwritten] \ villiersi Paratype [handwritten] \ J.Balfour-Browne det. [label marked with red at right border] \ Agraphydrus \ villiersi BBr. [handwritten] \ HEBAUER det." (BALFOUR-BROWNE (1958) mentions 26 specimens with these sampling data); 4 exs. (NHM): same data, but 500-800 m a.s.l., with the handwritten addition "culture" (BALFOUR-BROWNE (1958) mentions 18 specimens with these sampling data). **GUINEA** (not examined): "FRENCH GUINEA: Mont Nimba, près camp I, 25 septembre 1951 (62 Ee), 1 σ , 1 φ ; près camp I, 1 600 m, 7 août 1951 (14 Em), 1 φ (Lamotte and Roy leg.)" (BALFOUR-BROWNE 1958). The specimens from Guinea could not be traced in the MHNP or in any of the collections listed above.

ADDITIONAL MATERIAL EXAMINED:

N I G E R I A: 1 \$\sigma\$, 1 \$\overline\$ (ZMUC): NW Zone, Kaduna State, Anara, near Kaduna, in rockpools, 5.–12.VII.1962, leg. M.W. Service.

Specimens of unknown provenance: 1 &, 1 \circ (MHNP): "Helochares \ Gymnhelochares) \ villiersi JBB [hand-written] \ J.Balfour-Browne det. \ IV. 1958 ["IV." and "8" handwritten]".

DIFFERENTIAL DIAGNOSIS: Shares absence of metafemoral pubescence with *A. camerunensis*, differs in larger size, less broad habitus, nine antennomeres, infuscated maxillary palpomere 4, less extended pubescence on pro- and mesofemora, and features of aedeagus (apex of palpomeres broadly rounded, basal lobe distinctly shorter) from this species.

DESCRIPTION: Total length: 1.9–2.2 mm; elytral width: 1.0 mm; E.I.: 1.3, P.I.: 2.0–2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 94) moderately broad, elytra evenly oval, strongly convex.

Coloration: Labrum, clypeus and frons unicolored black; maxillary palpomeres 1–3 yellow, palpomere 4 entirely infuscated or with distinctly darkened apex; pronotum black with very narrow, indistinct, yellow lateral margins; elytra black with brightened posterior area; ventrites and femora black; tibiae light brown.

Head: Clypeus with distinctly concave anterior margin, C.I. = 4.1-4.3, lateral length ratio clypeus/eyes = 1.8; microreticulation absent; ground punctation moderately coarse, distinctly impressed, interspaces about as wide as punctures, systematic punctures indistinct. Eyes large, not protruding, slightly oblong oval in dorsal view. Antennae with nine antennomeres. Maxillary palpi moderately stout, 0.9 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2; palpomere 4 slightly asymmetrical. Mentum with fine punctures, grouped laterally; microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation as on pronotum; systematic punctures indistinct, few indistinctly coarser punctures visible among irregular ground punctation. Mesoventrite with weak bulge.

Femora (Fig. 63): Pubescence present on less than proximal half of profemur, on proximal third of mesofemur with straight to concave hairlines; restricted to proximal half of anterior margin and on a narrow portion adjacent to trochanter on metafemur.

Abdomen: Ventrite 5 weakly sclerotized apically with very shallow emargination, ca. 7 μ m deep, emargination absent in specimens from Nigeria.

Aedeagus (Fig. 32): Length: 0.29–0.40 mm. Phallobase about half as long as parameres, about as long as wide; lateral margins weakly curving, not abruptly narrowing to short manubrium; borderline between pigmented and unpigmented portion of ventral face indistinct. Parameres moderately wide; lateral margins slightly curving, slightly constricted subapically; apex bluntly rounded, not inflated, very slightly inclining mesad; basal portion of dorsal face extending into

phallobase, reaching distal third. Median lobe slender; apex bluntly rounded, reaching or almost reaching apex of parameres; corona in subapical position; short, plate-like structure present in basal half; basal apophyses moderately sized, extending to mid-length of phallobase.

COMMENT: The specimens from Nigeria differ from individuals from Ivory Coast by larger body size, larger aedeagus, and slightly more extended femoral pubescence.

ECOLOGY: Collected in rockpools.

DISTRIBUTION (Fig. 98): Guinea, Ivory Coast, Nigeria (first record).

The only record from Cameroon (HEBAUER 2006) is based on a misidentified specimen of *A. malkini* (see above). HEBAUER (2006) listed also "Gabon", obviously due to confusion with Guinea, which is missing in his list.

Key to the species of Agraphydrus of Africa and Western Asia

1	Metafemoral pubescence absent
_	Metafemoral pubescence present
2	Eight antennomeres; maxillary palpomere 4 yellow; pubescence on profemur present on more than proximal half, on mesofemur on proximal half (Fig. 42); habitus (Fig. 73) very broad; body length: 1.6 mm; aedeagus: basal lobe more than half as long as parameres (Fig. 11)
	camerunensis
_	Nine antennomeres; maxillary palpomere 4 infuscated; pubescence on pro- and mesofemur present on less than proximal half (Fig. 63); habitus moderately broad (Fig. 94); body length: 1.9–2.2 mm; aedeagus: basal lobe less than half as long as parameres (Fig. 32) <i>villiersi</i>
3	Maxillary palpomere 2 slightly infuscated in proximal half; aedeagus: Fig. 5 andringitra
_	Maxillary palpomere 2 yellow, infuscation absent
4	Maxillary palpomere 4 infuscated at apex
_	Maxillary palpomere 4 unicolored yellow or darkened on more than distal half 10
5	Pronotum yellow
_	Pronotum dark brown
6	Abdominal ventrite 5 without apical emargination; aedeagus: Fig. 22 minutissimus
-	Abdominal ventrite 5 with apical emargination 7
7	Clypeus yellow; eight antennomeres; aedeagus: Fig. 21 matoposensis
_	Clypeus black; nine antennomeres
8	Aedeagus: apex of parameres with large lateral extension (Fig. 4) albescens
_	Aedeagus: apex of parameres with small lateral extension (Fig. 6) angustatus
9	Habitus very slender, elytra parallel-sided (Fig. 75); mesofemur pubescent in less than proximal half, metafemur pubescent on basal third (Fig. 44); aedeagus: parameres without apical extension (Fig. 13); Arabian Peninsula
_	Habitus moderately slender, elytra widening posterior to mid-length (Fig. 72); mesofemur pubescent in more than proximal half; metafemur pubescent on basal half (Fig. 41); aedeagus: parameres with apical extension (Fig. 10); RSA
10	Maxillary palpomere 4 darkened on more than distal half 11
_	Maxillary palpomere 4 unicolored yellow

11	Body length 2.5–3.2 mm; habitus very slender, elytra widening behind mid-length (Fig. 64); maxillary palpi 1.3 times as long as pronotum in midline; aedeagus: apex of parameres acuminate (Fig. 2)
_	Body length 1.7–2.4 mm, habitus broad, elytra not widening behind mid-length (Figs. 69, 82); maxillary palpi shorter than pronotum in midline; aedeagus: apex of parameres rounded (Figs. 7, 20)
12	Body length 2.1–2,4 mm; metafemur pubescent on more than proximal half (Fig. 38); abdominal ventrite 5 with apical emargination; basal lobe distinctly shorter than parameres (Fig. 7)
-	Body length 1.7 mm; metafemur pubescent on less than proximal third (Fig. 51); abdominal ventrite 5 without apical emargination; aedeagus: basal lobe slightly shorter than parameres (Fig. 20)
13	Elytra with banded color pattern: yellowish in anterior and posterior third and dark brown in middle (Fig. 71); aedeagus: Fig. 9; Gabon <i>bilardoi</i>
_	Elytra yellow, brown or black, without banded pattern
14	Clypeus and frons unicolored yellow; aedeagus: Fig. 31 vadoni
_	Clypeus dark brown, rufous or black, frons black
15	Pronotum yellow 16
_	Pronotum dark brown, at least in mesal third, or black
16	Elytra yellow (Fig. 76); nine antennomeres; basal portion of parameres very large, reaching proximal third of phallobase (Fig. 14); Ghana, Cameroon
-	Elytra dark brown (Fig. 70); eight antennomeres; basal portion of parameres moderately sized, reaching distal third of phallobase (Fig. 8); Gabon <i>bicoloratus</i>
17	Metafemoral pubescence on less than proximal half (Fig. 54); aedeagus: Fig. 23 pauper
_	Metafemoral pubescence on more than proximal half 18
18	Body length more than 2.9 mm; aedeagus: Fig. 24 praecipuus
_	Body length less than 3.0 mm
19	Species occurring in Madagascar, Mozambique, RSA 20
_	Species occurring in D.R. Congo, Gabon, Ethiopia, Tanzania, Zimbabwe
20	Pronotum and elytra black 21
_	Pronotum dark brown mesally, with widely brightened, yellow or rufous lateral margins, elytra brown
21	Habitus broad (Fig. 78); nine antennomeres; median lobe wide, widening distal to mid-length (Fig. 16)
-	Habitus moderately broad (Fig. 77); eight antennomeres; median lobe narrow, widest at mid- length (Fig. 15) <i>flavipes</i>
22	Mesoventrite carinate; aedeagus: Figs. 17, 27
_	Mesoventrite not carinate; aedeagus: Figs. 18–19, 25, 28–29 24
23	Body length 2.6 mm; pronotum with defined dark brown mesal patch; elytra light brown; nine antennomeres; manubrium very small, median lobe very narrow, pencil-shaped (Fig. 17) <i>gereckei</i>
_	Body length 2.1–2.3 mm; pronotum with undefined dark brown mesal coloration, with decreasing in intensity toward lateral margins, elytra dark brown; eight antennomeres; manubrium moderately sized, median lobe wide basally, evenly narrowing apicad (Fig. 27) <i>rivalis</i>
24	Pronotal and elytral ground punctation very fine; median lobe without reinforcing plate (Figs. 18–19, 25)

_	Pronotal and elytral ground punctation moderately coarse; median lobe with reinforcing plate (Figs. 28–29)
25	Aedeagus: phallobase distinctly shorter than parameres, manubrium narrow, median lobe moderately wide (Fig. 25) punctatellus
-	Aedeagus: phallobase only slightly shorter than parameres, manubrium wide, median lobe very narrow (Figs. 18–19)
26	Aedeagus: parameres slender, mesal margin semicircularly excised in basal half (Fig. 19) madagascarensis
_	Aedeagus: parameres wide, mesal margin not excised (Fig. 18) goldschmidti
27	Aedeagus: reinforcing plate of median lobe not widening in mid-length, with strong apical incision, corona situated subapically (Fig. 28)
-	Aedeagus: reinforcing plate of median lobe distinctly widening in mid-length, without in- cision, corona situated in distal third (Fig. 29) <i>tumidus</i>
28	Pronotum with wide yellow margins; aedeagus: Fig. 26; Zimbabwe rhodesiensis
_	Pronotum dark brown, without wide yellow margins
29	Body length 2.2 mm; aedeagus: Fig. 3; Ethiopia aethiopicus
_	Body length 2.4-2.7 mm; aedeagus: Figs. 12, 30; D.R. Congo, Tanzania
30	Aedeagus: basal lobe bending rectangularly to manubrium, parameres with subapical indentation, median lobe longer than parameres (Fig. 30); Tanzania usambaraensis
_	Aedeagus: hasal lobe bending in obtuse angle to manubrium parameres without subanical

 Acceagus: basal lobe bending in obtuse angle to manubrium, parameres without subapical indentation, median lobe shorter than parameres (Fig. 12); D.R. Congo congolensis

Discussion

A total of 199 species of *Agraphydrus* is now described. These species occur mainly in the tropical and subtropical regions of the Old World, only few are known from temperate zones. The highest diversity is found in the Oriental and adjacent Eastern Palearctic regions (165 spp.), far less are known from the Afrotropical Region (31 spp.), and only four species are known from the Australian Region. *Agraphydrus minutissimus* is the only species known to occur in the western part of the Palearctic Region (sensu HANSEN 1999b).

Fourteen of the Afrotropical species (almost 50%) occur in Madagascar, 12 of these are regarded as endemic. A similarly high Madagascan diversity is also encountered in the hydrophilid genus *Anacaena* THOMSON, 1859 (KOMAREK 2004, KOMAREK & BEUTEL 2007, BILTON & KOMAREK 2016), which cannot be explained solely by more intense sampling activities, but rather by adaptive radiation.

In Africa, water beetles are still rarely sampled: specimens of *Agraphydrus* have been collected in 21 countries, in most of them by only 1–2 collectors/collecting teams in 1–4 sampling localities, apart from Madagascar (9 colls., 35 locs.), RSA (7 colls., 28 locs.), Namibia (6 colls., 13 locs.), Tanzania (3 colls., 11 locs.), Zimbabwe (7 colls., 10 locs.), and Cameroon (4 colls., 4 locs.). It can be assumed that the actual diversity of *Agraphydrus* species in the Afrotropical Region is much higher than what is known by now. Nevertheless, a lower abundance and diversity than in the Oriental Region can be inferred from the fact that very rarely a maximum of two species could be found in one locality, in contrast to a maximum of seven species in the Oriental Region (KOMAREK 2018).

Morphologically, the Afrotropical species are similar to the species from the Oriental and Australian Regions. *Agraphydrus albescens*, *A. angustatus* and *A. minutissimus* share very similar features (habitus slender, elytra widening posterior to mid-length, clypeus black with

yellow preocular patches, pronotum and elytra largely yellow, maxillary palpomere 4 infuscated apically, aedeagus slender, manubrium very indistinct) with *A. coomani* (ORCHYMONT, 1927), a species widespread in the Oriental and Australian regions, and with the other species of the *A. coomani* group (KOMAREK & FREITAG 2020).

The shape of the maxillary palpomere 2 (straight or very slightly curving mesad, club-shaped, widening apicad) is not found in any other genus of Hydrophilidae and can probably be regarded as autapomorphy.

Agraphydrus vadoni is probably terrestrial. For A. camerunensis, A. matoposensis, and A. rhodesiensis the sampling circumstances are not known, the other species are aquatic. Agraphydrus atripalpis and A. gereckei were found in hygropetric habitats, for A. andringitra, A. madagascarensis, A. pauper, A. scutifer, and A. tumidus a hygropetric habitat can be suspected. Agraphydrus albescens, A. angustatus, A. matoposensis, and A. minutissimus were caught at light.

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Zusammenfassung

Die Arten der Gattung Agraphydrus RÉGIMBART, 1903 Afrikas und Südwestasiens werden revidiert und eine Redeskription der Gattung wird präsentiert. Insgesamt werden 25 neue Arten beschrieben. Agraphydrus minutissimus kommt auch in der Westpaläarktis (Nordarabien, Südiran) vor; das Vorkommen dieser Art im heutigen Syrien ist nicht bestätigt. Der afrikanische Kontinent ist äußerst schwach untersucht; dennoch ist anzunehmen, dass Häufigkeit und Vielfalt der Arten insgesamt geringer sind als in der Orientalischen Region.

Agraphydrus vadoni ist möglicherweise terrestrisch, für drei Arten sind die näheren Fangumstände nicht bekannt, die übrigen Arten sind aquatisch. Mehrere Arten sind anscheinend hygropetrisch, vier wurden am Licht gesammelt.

Habitusaufnahmen, Abbildungen der Aedeagi und Femora aller Arten, sowie Verbreitungskarten und ein Artenschlüssel sind angefügt.

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Dr. Albrecht KOMAREK

Naturhistorisches Museum Wien, Burgring 7, A - 1010 Wien, Austria (albrecht.komarek@aon.at)