

# Taxonomic revision of *Agraphydrus* RÉGIMBART, 1903

## III. Southeast Asia (except Philippines) and Australian Region

### (Coleoptera: Hydrophilidae: Acidocerinae)

A. KOMAREK

#### Abstract

The species of *Agraphydrus* RÉGIMBART, 1903 from Australia, Brunei, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Thailand, and Vietnam are revised. *Agraphydrus biprojectus* MINOSHIMA, KOMAREK & ÔHARA, 2015, *A. coronarius* MINOSHIMA, KOMAREK & ÔHARA, 2015, *A. geminus* (ORCHYMONT, 1932), *A. jaechi* (HANSEN, 1999), *A. malayanus* (HEBAUER, 2000), *A. orientalis* (ORCHYMONT, 1932), *A. regularis* (HANSEN, 1999), *A. siamensis* (HANSEN, 1999), and *A. thaiensis* MINOSHIMA, KOMAREK & ÔHARA, 2015 are redescribed. Sixty new species are described: *A. anacaenoides*, *A. angulatus*, *A. bacchusi*, *A. balkeorum*, *A. borneensis*, *A. brevipenis*, *A. burmensis*, *A. carinatus*, *A. cervus*, *A. clarus*, *A. delineatus*, *A. engkari*, *A. excisus*, *A. exiguus*, *A. floresinus*, *A. hamatus*, *A. helicopter*, *A. hendrichi*, *A. heterochromatus*, *A. hortensis*, *A. imitans*, *A. infuscatus*, *A. jankodadai*, *A. kathapa*, *A. laocaiensis*, *A. latus*, *A. lunaris*, *A. maehongsonensis*, *A. manfredjaechi*, *A. mazzoldii*, *A. microphthalmus*, *A. mirabilis*, *A. muluensis*, *A. musculus*, *A. namthaensis*, *A. nemosus*, *A. nigroflavus*, *A. obesus*, *A. orbicularis*, *A. pallidus*, *A. papuanus*, *A. penangensis*, *A. piceus*, *A. raucus*, *A. reticulatus*, *A. rhomboideus*, *A. sarawakensis*, *A. schoedli*, *A. scintillans*, *A. shaverdoae*, *A. skalei*, *A. spadix*, *A. spinosus*, *A. stramineus*, *A. sucineus*, *A. sundaicus*, *A. tamdao*, *A. tristis*, *A. tulipa*, *A. vietnamensis*. *Agraphydrus superans* (HEBAUER, 2000) is synonymized with *A. jaechi*.

The genus *Agraphydrus* is recorded from Brunei for the first time. *Agraphydrus activus* KOMAREK & HEBAUER, 2018 is recorded from Thailand for the first time, *A. coomani* (ORCHYMONT, 1927) is recorded from Brunei, Indonesia, Laos, Myanmar, and Thailand for the first time, *A. arduus* KOMAREK & HEBAUER, 2018, *A. biprojectus* MINOSHIMA, KOMAREK & ÔHARA, 2015, *A. confusus* KOMAREK & HEBAUER, 2018 from Laos, *A. masatakai* MINOSHIMA, KOMAREK & ÔHARA, 2015 from Myanmar and Vietnam. *Agraphydrus anhuianus* (HEBAUER, 2000) and *A. malayanus* were erroneously recorded from Thailand by MINOSHIMA, KOMAREK & ÔHARA (2015), resp. by HEBAUER (2000). *Agraphydrus anhuianus* is so far confirmed only for China (Anhui), and therefore it is here excluded from the fauna of Southeast Asia.

A total of eighty described species is now known from Southeast Asia and the Australian Region. *Agraphydrus coomani* is widespread in the Oriental and Australian regions, while most of the other species are restricted to one or two countries. Thirty-one species were collected in Malaysia, 17 in Thailand as well as in Indonesia, 16 in Vietnam, and only one species is known from Australia. Eleven of the species were collected also in China, *A. connexus* and *A. coomani* also on the Indian Subcontinent.

The habitat of six species is unknown, all other species were collected in aquatic habitats. Fifteen species were collected at light, at least some species were found in hygropetric habitats.

Habitus, male genitalia and other morphological details are illustrated, distribution maps are presented, and a key to the species is added.

**Key words:** Coleoptera, Hydrophilidae, *Agraphydrus*, revision, taxonomy, new species, key to species, Oriental Region, Australian Region, Australia, Brunei, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Thailand, Vietnam.

## Introduction

The area considered in this study comprises the eastern Oriental Region (except the Philippines) and the Australian Region. Australia, Brunei, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Thailand, and Vietnam cover together an area of more than 12 million km<sup>2</sup> with more than 18,000 islands.

As far as known, William Doherty (1857–1901) was the first entomologist, who collected *Agraphydrus* specimens in Southeast Asia, but they remained undescribed until today. The first species described from Southeast Asia were collected by Albert de Cooman (1880–1967) in Vietnam and by August Thienemann (1882–1960) in Indonesia (Sumatra, Java and Bali) in the early 20<sup>th</sup> century: *Agraphydrus coomani* (ORCHYMONT, 1937), *A. geminus* (ORCHYMONT, 1932) and *A. orientalis* (ORCHYMONT, 1932). They were originally assigned to the genus *Helochares* MULSANT, 1844. SATŌ (1965) re-established the genus *Agraphydrus* RÉGIMBART, 1903 and transferred *Helochares orientalis* to *Agraphydrus*. Subsequently, *H. coomani* and *H. geminus* were transferred to *Agraphydrus* by WATTS (1995) resp. HANSEN (1991).

In Australia, specimens of *Agraphydrus* were collected by about 25 collectors in almost all states and territories between 1965 and 2000. In Southeast Asia and Papua New Guinea numerous journeys by more than 70 collectors yielded thousands of specimens since 1964. Among the first travels were those of M.E. Bacchus to Papua New Guinea in 1964 and 1965, and to Borneo in 1977. In the last three decades, collecting activities were most productive, notably those of M.A. Jäch (27 spp.), J. Kodada (13 spp.), P. Mazzoldi (13 spp.), H. Schillhammer (11 spp.), H. Zettel (11 spp.), F. Čiampor (9 spp.), S. Schödl (8 spp.), M. Satō (8 spp.), P. Pacholátko & L. Dembický (8 spp.), as well as M. Balke, D. Boukal, D. Burckhardt, D. Dudgeon, H. Forster, L. Hendrich, J. Horák, E. Jendek, I. Löbl, M. Madl, H. Malicky, Y. Minoshima, R. Schuh, H. Shaverdo, W.D. Shepard, R.W. Sites, A. Skale, A. Weigel, and others.

HANSEN (1999a) erected the genus *Megagrphydrus*, to which the following species were assigned: *M. attenuatus* HANSEN, 1999, *M. jaechi* HANSEN, 1999, *M. regularis* HANSEN, 1999, *M. siamensis* HANSEN, 1999, *M. anhuianus* HEBAUER, 2000, *M. malayanus* HEBAUER, 2000, and *M. superans* HEBAUER, 2000. MINOSHIMA, KOMAREK & ÔHARA (2015) synonymized *Megagrphydrus* with *Agraphydrus*, transferred these seven species to *Agraphydrus* and described four new species: *A. biprojectus* MINOSHIMA et al., 2015, *A. coronarius* MINOSHIMA et al., 2015, *A. masatakai* MINOSHIMA et al., 2015, and *A. thaiensis* MINOSHIMA et al., 2015.

Recently, eight species were described from China, which occur also in some countries considered here: *Agraphydrus activus* KOMAREK & HEBAUER, 2018, *A. agilis* KOMAREK & HEBAUER, 2018, *A. arduus* KOMAREK & HEBAUER, 2018, *A. confusus* KOMAREK & HEBAUER, 2018, *A. connexus* KOMAREK & HEBAUER, 2018, *A. igneus* KOMAREK & HEBAUER, 2018, *A. longipennis* KOMAREK & HEBAUER, 2018, and *A. setifer* KOMAREK & HEBAUER, 2018.

Sixty new species are described in this contribution.

## Material and methods

More than 3,600 specimens of *Agraphydrus*, collected in Australia, Brunei, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Thailand, and Vietnam, were examined. No properly identified species of the genus *Agraphydrus* has ever been recorded from the Philippines so far. However, at least ten unidentified species from several Philippine islands are deposited in various collections (see FREITAG et al. 2016). They shall be treated in a forthcoming contribution.

For methods concerning illustrations see KOMAREK (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/or ecological details are based on personal information by the collectors.

Morphological terms used in this contribution are explained in KOMAREK & HEBAUER (2018).

### 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
ANIC	Australian National Insect Collection (CSIRO), Canberra, Australia (A. Slipinsky, C. Lemann)
CAS	California Academy of Sciences, San Francisco, USA (D. Kavanaugh, N.D. Penny, C. Grinter)
CHB	Coll. Lars Hendrich, München, Germany
CSH	Coll. Andre Skale, Hof, Germany
EEM	Enns Entomology Museum, Missouri, USA (R.W. Sites)
EUM	Ehime University, Matsuyama, Japan (H. Yoshitomi)
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)
KMNH	Entomological Laboratory, Kyushu University, Fukuoka, Japan (Y. Minoshima)
MHNG	Muséum d’histoire naturelle, Genève, Switzerland (G. Cuccodoro)
MNS	Museum für Naturkunde, Stuttgart, Germany (A. Faille, C. König, W. Schawaller)
MTD	Senckenberg Naturhistorische Sammlungen Dresden (Museum für Tierkunde), Germany (O. Jäger)
MZB	Museum Zoologicum Bogoriense, Cibinong, Indonesia (D. Peggie)
NHM	Natural History Museum, London, U.K. (C. Taylor)
NME	Naturkundemuseum Erfurt, Germany (A. Weigel, A. Skale)
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)
ZSM	Zoologische Staatssammlung München, Germany (M. Balke)

### Checklist of the *Agraphydrus* species of Southeast Asia and the Australian Region

1. *A. activus* KOMAREK & HEBAUER, 2018  
CHINA, THAILAND
2. *A. agilis* KOMAREK & HEBAUER, 2018  
CHINA, VIETNAM
3. *A. anacaenoides* sp.n.  
MALAYSIA
4. *A. angulatus* sp.n.  
LAOS
5. *A. arduus* KOMAREK & HEBAUER, 2018  
CHINA, LAOS
6. *A. attenuatus* (HANSEN, 1999)  
CHINA, LAOS, VIETNAM

7. *A. bacchusi* sp.n.  
PAPUA NEW GUINEA
8. *A. balkeorum* sp.n.  
INDONESIA
9. *A. biprojectus* MINOSHIMA, KOMAREK & ÔHARA, 2015  
LAOS, VIETNAM
10. *A. borneensis* sp.n.  
MALAYSIA
11. *A. brevipenis* sp.n.  
MALAYSIA
12. *A. burmensis* sp.n.  
MYANMAR
13. *A. carinatulus* sp.n.  
INDONESIA
14. *A. cervus* sp.n.  
MALAYSIA
15. *A. clarus* sp.n.  
MALAYSIA
16. *A. confusus* KOMAREK & HEBAUER, 2018  
CHINA, LAOS, VIETNAM
17. *A. connexus* KOMAREK & HEBAUER, 2018  
BHUTAN, CHINA, INDIA, LAOS, MALAYSIA, MYANMAR, NEPAL, THAILAND, VIETNAM
18. *A. coomani* (ORCHYMONT, 1927)  
AUSTRALIA, BRUNEI, CHINA, INDONESIA, JAPAN, LAOS, MALAYSIA, MYANMAR,  
PAPUA NEW GUINEA, SRI LANKA, TAIWAN, THAILAND, VIETNAM
19. *A. coronarius* MINOSHIMA, KOMAREK & ÔHARA, 2015  
LAOS
20. *A. delineatus* sp.n.  
INDONESIA, MALAYSIA
21. *A. engkari* sp.n.  
MALAYSIA
22. *A. excisus* sp.n.  
MALAYSIA
23. *A. exiguus* sp.n.  
MALAYSIA
24. *A. floresinus* sp.n.  
INDONESIA
25. *A. geminus* (ORCHYMONT, 1932)  
INDONESIA
26. *A. hamatus* sp.n.  
VIETNAM
27. *A. helicopter* sp.n.  
MALAYSIA

28. *A. hendrichi* sp.n.  
MALAYSIA
29. *A. heterochromatus* sp.n.  
MALAYSIA, THAILAND
30. *A. hortensis* sp.n.  
MALAYSIA
31. *A. igneus* KOMAREK & HEBAUER, 2018  
CHINA, LAOS
32. *A. imitans* sp.n.  
LAOS, MYANMAR, THAILAND, VIETNAM
33. *A. infuscatus* sp.n.  
THAILAND
34. *A. jaechi* (HANSEN, 1999)  
MALAYSIA
35. *A. jankodadai* sp.n.  
INDONESIA, MALAYSIA
36. *A. kathapa* sp.n.  
MYANMAR
37. *A. laocaiensis* sp.n.  
VIETNAM
38. *A. latus* sp.n.  
MALAYSIA
39. *A. longipenis* KOMAREK & HEBAUER, 2018  
CHINA, LAOS
40. *A. lunaris* sp.n.  
LAOS
41. *A. maehongsonensis* sp.n.  
THAILAND
42. *A. malayanus* (HEBAUER, 2000)  
MALAYSIA
43. *A. manfredjaechi* sp.n.  
INDONESIA
44. *A. masatakai* MINOSHIMA, KOMAREK & ÔHARA, 2015  
CHINA, LAOS, MALAYSIA, MYANMAR, THAILAND, VIETNAM
45. *A. mazzoldii* sp.n.  
THAILAND
46. *A. microphthalmus* sp.n.  
MALAYSIA
47. *A. mirabilis* sp.n.  
THAILAND
48. *A. muluensis* sp.n.  
MALAYSIA
49. *A. musculus* sp.n.  
INDONESIA, MALAYSIA

50. *A. namthaensis* sp.n.  
LAOS
51. *A. nemorosus* sp.n.  
LAOS
52. *A. nigroflavus* sp.n.  
INDONESIA
53. *A. obesus* sp.n.  
VIETNAM
54. *A. orbicularis* sp.n.  
MALAYSIA
55. *A. orientalis* (ORCHYMONT, 1932)  
INDONESIA
56. *A. pallidus* sp.n.  
VIETNAM
58. *A. papuanus* sp.n.  
INDONESIA, PAPUA NEW GUINEA
57. *A. penangensis* sp.n.  
MALAYSIA
59. *A. piceus* sp.n.  
MALAYSIA
60. *A. raucus* sp.n.  
INDONESIA
61. *A. regularis* (HANSEN, 1999)  
THAILAND
62. *A. reticulatus* sp.n.  
THAILAND
63. *A. rhomboideus* sp.n.  
BRUNEI, INDONESIA, MALAYSIA
64. *A. sarawakensis* sp.n.  
MALAYSIA
65. *A. schoedli* sp.n.  
INDONESIA
66. *A. scintillans* sp.n.  
VIETNAM
67. *A. setifer* KOMAREK & HEBAUER, 2018  
CHINA, VIETNAM
68. *A. shaverdoae* sp.n.  
MYANMAR, THAILAND
69. *A. siamensis* (HANSEN, 1999)  
THAILAND
70. *A. skalei* sp.n.  
INDONESIA
71. *A. spadix* sp.n.  
THAILAND

72. *A. spinosus* sp.n.  
MALAYSIA
73. *A. stramineus* sp.n.  
MALAYSIA
74. *A. sucineus* sp.n.  
MALAYSIA
75. *A. sundaicus* sp.n.  
INDONESIA
76. *A. tamdao* sp.n.  
VIETNAM
77. *A. thaiensis* MINOSHIMA, KOMAREK & ÔHARA, 2015  
THAILAND
78. *A. tristis* sp.n.  
MYANMAR
79. *A. tulipa* sp.n.  
THAILAND
80. *A. vietnamensis* sp.n.  
VIETNAM

***Agraphydrus activus* KOMAREK & HEBAUER, 2018**

*Megagrphydrus activus* KOMAREK & HEBAUER 2018:18; PRZEWOŻNY 2019: 26.

TYPE LOCALITY: China, Hong Kong, New Territories, Tai Mo Shan Country Park, SW Tai Po New Town, Lam Tsuen River.

TYPE MATERIAL: See KOMAREK & HEBAUER (2018).

**ADDITIONAL MATERIAL EXAMINED:**

T H A I L A N D: 1 ♂ (SEMC): Kamphaeng Phet Province, Khlong Lan National Park, Khlong Lan Waterfall, 310 m a.s.l., ca. 16°07'N 99°16'E, 6.IV.2003, leg. R.W. Sites, T. Prommi & Setaphan, "L449 | 294 | *Agraphydrus* \ *anhuianus* \ (Hebauer, 2000) \ Y. Minoshima det., 2012"; 1 ♂ (SEMC): same locality data, but "19.vii.2002, CMU Team | 295 | *Agraphydrus* \ *anhuianus* \ (Hebauer, 2000) \ Y. Minoshima det., 2012".

**DIFFERENTIAL DIAGNOSIS:** Shares four rows of very coarse, distinct systematic elytral punctures reaching anterior margin, with few coarser punctures in serial interspaces, and absence of microsculpture on clypeus with *A. anhuianus*, *A. decipiens* MINOSHIMA et al., 2015, *A. fika-ceki* KOMAREK & HEBAUER, 2018, *A. luteilateralis* (MINOSHIMA & FUJIWARA, 2009), *A. malayanus*, and *A. thaiensis*. Shares angularly excised clypeus and similar aedeagus (Fig. 184) with *A. anhuianus*, differs from the latter in absence of subapical bulge on lateral margin of parameres. Differs from *A. decipiens* (Taiwan) and *A. luteilateralis* (Japan) in presence of nine antennomeres, larger body size, larger extension of femoral pubescence, phallobase shorter than parameres, median lobe with apical incision, and corona situated slightly distal to mid-length. Differs from *A. malayanus* and *A. thaiensis* in stouter maxillary palpomeres (Fig. 144), parameres reaching mid-length of basal lobe, and corona distal to mid-length of median lobe. Very coarse, distinct systematic elytral punctures in anterior half (but not reaching anterior elytral margin) are present in *A. coronarius*.

**DESCRIPTION:** See KOMAREK & HEBAUER (2018). Maxillary palpi and aedeagus as in Figs. 144, 184.

**ECOLOGY:** In China collected at light and in various kinds of aquatic habitats including hygropteretic ones (KOMAREK & HEBAUER 2018).

DISTRIBUTION (Fig. 265): China (Anhui, Fujian, Guangdong, Hong Kong, Jiangxi), Thailand. First record for Thailand.

***Agraphydrus agilis* KOMAREK & HEBAUER, 2018**

*Agraphydrus agilis* KOMAREK & HEBAUER 2018: 19; PRZEWOŹNY 2019: 26.

TYPE LOCALITY: China, Guangxi Prov., Liuzhou Prefecture, 10 km N Liuzhou City, ca. 2 km E Shanmenjiang Forest Station.

TYPE MATERIAL: See KOMAREK & HEBAUER (2018). **Paratypes from VIETNAM examined: Hòa Bình Prov.:** 6 ♂♂, 7 ♀♀ (ISNB); leg. A. de Cooman; **Cao Bằng Prov.:** 1 ♂ (EUM); Ban Khuoi Han, 230 m a.s.l., 30.IX.1994, leg. M. Sató.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with clypeal microreticulation (“shagreenation” in KOMAREK & HEBAUER 2018 and KOMAREK 2018) and apically infuscated maxillary palpomere 4, together with *A. andamanicus* KOMAREK, 2018, *A. maehongsonensis*, *A. umbrosus* KOMAREK & HEBAUER, 2018, and *A. variabilis* KOMAREK & HEBAUER, 2018. Differs in distinctly larger extension of clypeal microsculpture, broader habitus, lighter coloration of pronotum and elytra, and wider median lobe from *A. maehongsonensis*. For differences to *A. andamanicus*, *A. umbrosus* and *A. variabilis* see KOMAREK (2018) and KOMAREK & HEBAUER (2018).

DESCRIPTION: See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 185.

ECOLOGY: In China collected in streams (KOMAREK & HEBAUER 2018).

DISTRIBUTION (Fig. 265): China (Guangxi, Yunnan), Vietnam.

***Agraphydrus anacaenoides* sp.n.**

TYPE LOCALITY: Malaysia, Penang, Southwest Penang Island District, Pantai Aceh Forest Reserve (= Penang N.P.).

TYPE MATERIAL: **Holotype** ♂ (NMW): “MALAYSIA 28.1.1992 \ PENANG: Pantai Aceh \ Forest Reserve \ leg. Jäch (10)”. **Paratypes: MALAYSIA: Penang:** 9 exs. (NMW): same sampling data; 1 ♀ (NMW): Batu Ferringhi (suburb and beach NW Georgetown), 17.I.1981, leg. T.-E. Leiler; 1 ♀ (NMW): Southwest Penang Distr., Teluk Bahang (town), streams in Forestry Museum at Teluk Pahang, 26.I.1992, leg. M. Jäch “8”; 1 ♀ (NMW): Botanic Gardens, stream above waterfall, huge boulders, 27.I.1992, leg. M. Jäch “9”; 5 exs. (NMW): Southwest Penang Distr., below Titi Kerawang Waterfalls, 28.I.1992, leg. M. Jäch “11”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with strongly reduced metafemoral pubescence and absence of clypeal microsculpture, together with *A. tulipa*, *A. geminus*, and *A. infuscatus*. These species also share dark dorsal coloration, broad body, short maxillary palpi, and absence of emargination on abdominal ventrite 5. Differs in absence of apically infuscated palpomere 4, and presence of eight antennomeres from *A. infuscatus*; in smaller average body size and absence of micropunctures from *A. geminus*; in larger eyes and stouter palpomeres from *A. tulipa*. Shares strongly convex habitus, black dorsal coloration, absence of clypeal microsculpture, eight antennomeres, absence of apically infuscated palpomere 4, reduced metafemoral pubescence, and absence of apical emargination on abdominal ventrite 5 with *A. indicus* (ORCHYMONT, 1932), *A. calvus* KOMAREK & HEBAUER, 2018, *A. reductus* KOMAREK & HEBAUER, 2018, and *A. decipiens*; differs in smaller size and less distinct systematic punctures from *A. decipiens*. Differs in metafemoral pubescence present on proximal fourth, and in features of aedeagus (e.g., corona in basal position) from all these species.

DESCRIPTION: Total length: 1.5–1.7 mm; elytral width: 0.8–0.9 mm; E.I.: 1.2–1.3, P.I.: 2.2–2.3, elytra 2.7–2.9 times as long as pronotum. Habitus (Fig. 1) broad, evenly oval, strongly convex.

Coloration: Labrum rufous, clypeus and frons black; maxillary palpi unicolored yellow; pronotum black with very narrow, undefined, dark rufous margins; elytra black; ventrites black; legs light to dark brown.

Head (Fig. 157): Clypeus with indistinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 2.3–2.4; microsculpture absent; ground punctation fine, interspaces 2–3 times as wide as punctures; systematic punctures indistinct. Eyes small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi (Fig. 145) moderately stout, 0.9–1.0 times as long as pronotum in midline, 0.7–0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3–1.4, palpomere 4 symmetrical. Mentum with obsolete punctation, microsculpture absent.

Thorax: Pronotal ground punctation slightly coarser than on head, interspaces 1–2 times as wide as punctures; systematic punctures indistinct. Elytral ground punctation coarser than on pronotum, interspaces as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with indistinct, crescent-shaped, horizontal, mesal ridge.

Femora (Fig. 71): Pubescence present on proximal 1/3 of pro- and mesofemur, on proximal 1/4 of metafemur, hairlines straight on pro- and mesofemur, slightly concave on metafemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 186): Length: 0.25–0.27 mm. Phallobase half as long as parameres, bending rectangularly to distinct, moderately wide manubrium; border between pigmented and unpigmented portion of ventral face reaching proximal third of phallobase. Parameres slender, almost straight, apex narrowly rounded; basal portion slightly extending into phallobase. Median lobe slender, very slightly arcuate, dorsal face completely divided into two parts, apex bluntly rounded, almost reaching apex of parameres; corona situated in distal third; basal apophyses moderately long, strongly bending laterad.

ECOLOGY: Collected in streams; found together with *A. helicopter*, *A. hendrichi*, *A. heterochromatus*, *A. hortensis*, *A. jaechi*, and *A. penangensis*.

DISTRIBUTION (Fig. 265): Malaysia (Penang).

ETYMOLOGY: The name (an adjective) refers to the stout and short-legged appearance, resembling the genus *Anacaena* THOMSON, 1859.

### *Agraphydrus angulatus* sp.n.

TYPE LOCALITY: Laos, Khammouan Province, Nakai District, Nakai, 17°43'N 105°09'E.

TYPE MATERIAL: **Holotype** ♂ (NMW): “Laos C. Khammouan prov. \ Nakai env., 17°43'N 105°09'E \ 22.5.–8.6.2001, alt. 500–600 m \ leg. E.Jendek & O. Sausa”. **Paratypes**: **LAOS: Khammouan Prov.**: 3 ♂♂, 2 ♀♀; (NMW): same sampling data; **Vientiane Prov.**: 12 exs. (KMNH, NMW): 25 km N Vientiane, Dongmakkhai, 18°4.75'N 102°40.59'E, 170 m a.s.l., 29.V.2008, leg. Y. Minoshima “L-08-042”; 6 exs. (KMNH, NMW): 25 km N Vientiane, Dongmakkhai, 18°4.38'N 102°40.74'E, 170 m a.s.l., pools along road, 9.V.2008, leg. Y. Minoshima “L-08-002”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with four rows of indistinct elytral systematic punctures, absence of clypeal microsculpture, unicolored maxillary palpi, metafemoral pubescence present on at least proximal 2/3, yellow clypeus, finely punctate pronotum, and absence of mesoventral carina, together with *A. hamatus*, *A. muluensis*, *A. orbicularis*, *A. pallidus*, and *A. spadix*. Differs in angularly excised anterior clypeal margin without mesal notch, almost entirely pubescent meso- and metafemora, and features of aedeagus (e.g., bottle-shaped median lobe with very short, widely separated basal apophyses) from all species.

Shares angulate anterior margin of clypeus with *A. activus* and *A. anhuianus*; differs from these species in indistinct elytral systematic punctures.

DESCRIPTION: Total length: 2.1–3.0 mm (holotype 2.7 mm); elytral width: 0.9–1.3 mm (holotype 1.3 mm); E.I.: 1.4–1.5, P.I.: 2.0–2.1, elytra 3.2–3.4 times as long as pronotum. Habitus (Fig. 2) slender, elytra slightly widening posterior to mid-length, moderately convex.

Coloration: Labrum yellow to dark brown; clypeus dark yellow, unicolored or with undefined mesal infuscation; frons black; maxillary palpi unicolored yellow; pronotum yellow to dark brown; elytra yellow, or dark brown with narrow yellow lateral margins; ventrites dark brown; legs light or dark brown.

Head (Fig. 158): Clypeus with angularly excised anterior margin, C.I.: 4.2, lateral length ratio clypeus/eyes = 1.7; microsculpture absent; ground punctation moderately fine, interspaces as wide as punctures; systematic punctures indistinct. Eyes large, not protruding, oblong. 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 = 1.3, palpomere 4 almost symmetrical. Mentum with moderately fine punctures laterally.

Thorax: Pronotal ground punctation slightly finer than on head, strongly impressed, interspaces about 1–2 times as wide as punctures; systematic punctures moderately distinct. Elytral ground punctation slightly coarser than on pronotum with interspaces about as wide as punctures; four rows of indistinct systematic punctures present. Mesoventrite with mesal bulge.

Femora (Fig. 72): Pubescence present on proximal 4/5 of all femora; hairlines straight to slightly rounded.

Abdomen: Ventrite 5 very shallowly emarginated apically, or emargination absent.

Aedeagus (Fig. 187): Length: 0.33–0.37 mm. Phallobase less than half as long as parameres, as long as wide, evenly bending to indistinctly defined broad manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres very slender, with indistinctly sigmoid margins; apex evenly rounded, slightly inclining mesad; basal portion of dorsal face indistinctly extending into phallobase. Median lobe wider than one paramere at base, slightly bottle-shaped; apex bluntly rounded, not reaching apex of parameres; corona distal to half-length; basal apophyses short, widely separated, indistinctly extending into phallobase.

ECOLOGY: Collected in pools.

DISTRIBUTION (Fig. 265): Laos.

ETYMOLOGY: The name *angulatus* (Latin adjective) (= angular) refers to the angularly excised clypeus.

### *Agraphydrus arduus* KOMAREK & HEBAUER, 2018

*Agraphydrus arduus* KOMAREK & HEBAUER 2018: 22; PRZEWOŻNY 2019: 26.

TYPE LOCALITY: China, Yunnan Prov., Xishuangbanna Dai Autonomous Prefecture, Mengla County, Wushiwu He River, ca. 10 km NW Menglun Town.

TYPE MATERIAL: See KOMAREK & HEBAUER (2018).

ADDITIONAL MATERIAL EXAMINED:

L A O S: **Khammouan Prov.**: 15 exs. (NMW): Ban Khoun Ngeun, 18°7'N 104°29'E, 250 m a.s.l., 4.–30.XI.2000, leg. E. Jendek & P. Pacholátko.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with totally microreticulate clypeus and loosely microsculptured lateral portion of pronotum, together with *A. igneus* and *A. tamdao*.

Shares very similar aedeagus (apex of parameres distinctly inflated, median lobe deeply split into two parts, Fig. 188) with these species; differs in distinct yellow preocular patches, very fine ground punctation of pronotum and elytra, and elytral coloration from these, moreover in minor size from *A. tamdao*. Similar elytral coloration with sublateral dark band present in *A. connexus*, *A. schoenmanni* KOMAREK & HEBAUER, 2018 and *A. umbrosus*; deeply split median lobe also present in *A. schoenmanni* and *A. umbrosus*; differs in features of aedeagus (strongly inflated apex of parameres) and presence of pronotal microsculpture from these two species. Similar aedeagus present in *A. communis* KOMAREK, 2018 and *A. kempfi* (ORCHYMONT, 1922) from the Indian Subcontinent; clypeal microreticulation restricted to anterior margin in *A. communis* in contrast to *A. arduus*; deeply black coloration present in *A. kempfi*.

**DESCRIPTION:** See KOMAREK & HEBAUER (2018). Habitus and aedeagus as in Figs. 3, 188. Specimens from Laos are 2.0–2.1 mm long and 1.0–1.1 mm wide; the elytra have a light brown central area, yellow lateral margins, dark sublateral band and sutural area widening in mid-length; the reticulate microsculpture along the lateral pronotal margin is distinct and reaches the posterior margin.

**ECOLOGY:** In China collected in rivers, streams and pools (KOMAREK & HEBAUER 2018); in Laos found together with *A. confusus*, *A. connexus*, *A. coomani*, *A. imitans*, *A. lunaris*, and *A. masatakai*.

**DISTRIBUTION** (Fig. 266): China (Guangdong, Hubei, Yunnan), Laos. First record for Laos.

### *Agraphydrus attenuatus* HANSEN, 1999

*Megagrphydrus attenuatus* HANSEN 1999a: 141; PRZEWOŹNY 2019: 26.

*Agraphydrus attenuatus* (HANSEN): MINOSHIMA, KOMAREK & ÔHARA 2015: 15; KOMAREK & HEBAUER 2018: 23.

**TYPE LOCALITY:** Vietnam, Vĩnh Phúc Province, Tam Đảo.

**TYPE MATERIAL EXAMINED:** **Holotype** ♂ (NMW): “N Vietnam, Tam Dao (2) \ 1.-8.6.1996 \ leg. Dembicky \ & Pacholatko | Holotype \ Megagrphydrus \ attenuatus \ M. Hansen [handwritten red label]”. **Paratypes:** **VIETNAM:** 24 exs. (NMW, ZMUC): same sampling data; **LAOS: Laos: Houa Phan Prov.:** 1 ♂ (EUM): Xam Neua, Ban Saleui, 3.V.2007, leg. Y. Katayama.

For paratypes from China (Yunnan) see KOMAREK & HEBAUER (2018).

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with nine to ten rows of coarse elytral punctures and nine antennomeres, together with *A. jaechi*, *A. regularis* and *A. siamensis*. Differs in irregular arrangement of systematic pronotal punctures from these species; in maxillary palpi (palpomere 2 strongly club-shaped, palpomere 4 shorter than palpomere 3) and acuminate apex of parameres from *A. jaechi*; in habitus (elytra attenuating posterior to mid-length in dorsal view, evenly convex in lateral view) from *A. regularis* and *A. siamensis*; in corona in basal position from *A. regularis*; in parameres without incisions and shorter median lobe from *A. siamensis*. Ten rows of coarse elytral punctures also present in *A. insidiator* MINOSHIMA et al., 2015 and *A. politus* (HANSEN, 1999), both from Taiwan; these species differ in presence of eight antennomeres, punctures arranged in primary and secondary rows, and metafemoral pubescence restricted to proximal half.

**DESCRIPTION:** See KOMAREK & HEBAUER (2018). Maxillary palpi and aedeagus as in Figs. 140, 189.

**ECOLOGY:** In China collected in rivers, streams, and stagnant water (KOMAREK & HEBAUER 2018); in Laos found together with *A. biprojectus*, in Vietnam together with *A. pallidus*, *A. scintillans*, and *A. tamdao*.

**DISTRIBUTION** (Fig. 265): China (Yunnan), Laos, Vietnam.

*Agraphydrus bacchusi* sp.n.

TYPE LOCALITY: Papua New Guinea, Central Province, road between Port Moresby and Brown River.

TYPE MATERIAL: **Holotype** ♂ (NHM): “Stn. No. \ 198. | PAPUA: \ Pt. Moresby - \ Brown R. Rd., \ 15.iii.1965 | M.E. Bacchus, \ B.M. 1965-120 | Agraphydrus \ coomani Orch. \ det. F. Hebauer”; collected on the gravel banks of a large slow muddy river. **Paratypes**: **PAPUA NEW GUINEA: Central Prov.:** 42 exs. (NHM, NMW): same collecting data; 32 exs. (NHM): same locality data, but collected on the gravel banks of a small, fast running stream, “Stn. No. 199A”; 3 exs. (NHM): Musgrave River, Sogeri Plateau, near Port Moresby, 16.III.1965, leg. M.E. Bacchus “Stn. No. 200 B”.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. borneensis*, *A. confusus*, *A. coomani*, *A. imitans*, *A. manfredjaechi*, *A. papuanus*, and *A. sarawakensis*. These species also share slender habitus, slightly widening posterior to mid-length, black head with distinct yellow clypeal margins, absence of mesoventral carina, and very indistinct, undefined manubrium of basal lobe. Other representatives of this group present on Indian Subcontinent, in China and Japan: *A. ater* KOMAREK, 2018, *A. cinnamum* KOMAREK, 2018, *A. comes* KOMAREK & HEBAUER, 2018, *A. constrictus* KOMAREK, 2018, *A. heinrichi* KOMAREK, 2018, *A. ishiharai* (MATSUI, 1994), *A. jilanzhui* KOMAREK & HEBAUER, 2018, and *A. robustus* KOMAREK & HEBAUER, 2018. Shares infuscated elytra with *A. papuanus*. Differs in presence of nine antennomeres from *A. manfredjaechi*, in shorter maxillary palpi in relation to median pronotal length from *A. borneensis* and *A. sarawakensis*. Differs in unequal ground punctation of pronotum and elytra and in features of aedeagus (parameres indistinctly inclining mesad, abruptly narrowing to narrowly rounded apex) from all these species.

**DESCRIPTION:** Total length: 1.9–2.2 mm; elytral width: 0.9–1.1 mm; E.I.: 1.2, P.I.: 2.0, elytra 2.7 times as long as pronotum. Habitus (Fig. 4) slender, elytra indistinctly widening posterior to mid-length, moderately convex.

**Coloration:** Labrum, clypeus and frons black; clypeus with distinct yellow lateral margins, less wide than width of eye; maxillary palpi yellow, palpomere 4 with distinct apical infuscation; pronotum dark brown or black with narrow yellow margins; elytra dark yellowish brown, lateral margins brighter in some individuals; ventrites dark brown or black; legs yellow.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.2, lateral length ratio clypeus/eyes = 1.5; microsculpture absent; ground punctation fine, interspaces twice as wide as punctures; systematic punctures moderately distinct. Eyes large, slightly protruding, oval. Antennae with nine 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 = 1.2, palpomere 4 slightly asymmetrical. Mentum with fine, widely spaced punctures, microsculpture absent.

**Thorax:** Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation slightly finer than 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 distinct mesal bulge.

**Femora** (Fig. 73): Pubescence present on more than proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairline oblique on profemur, slightly oblique on mesofemur, almost straight on metafemur.

**Abdomen:** Ventrite 5 with apical emargination.

**Aedeagus** (Fig. 190): Length: 0.33 mm. Phallobase about as long as parameres, about as long as wide, or slightly longer than wide, evenly narrowing proximad, distinct manubrium absent;

border between pigmented and unpigmented portion of ventral face indistinct. Parameres with very slightly arcuate margins, lateral margins abruptly bending to pointed apex, indistinctly inclining mesad; basal portion of dorsal face slightly extending into phallobase. Median lobe slender, narrowing in mid-length; apex not reaching apex of parameres; corona situated subapically; basal apophyses moderately long, slightly extending into phallobase; styli present, not reaching apex of median lobe.

ECOLOGY: Collected in streams and rivers.

DISTRIBUTION (Fig. 277): Papua New Guinea.

ETYMOLOGY: This species is dedicated to M.E. Bacchus (U.K.), collector of the type specimens.

*Agraphydrus balkeorum* sp.n.

TYPE LOCALITY: Indonesia, West Sumatra Province, Solok Regency, Solok – Alahan Panjang road, ca. 0°56'20"S 100°46'24"E.

TYPE MATERIAL: **Holotype** ♂ (MZB): "INDONESIA: Sumatra [Sumatera] Barat, Solok \ Alahan Panjank [= Panjang] Road, 1190m, \ 24.ix.2009, 0[°] 56.345[']S 100[°] 46.411[']E, \ [leg. D.] Amran, (SUM003)"; collected in a stream. **Paratypes**: **INDONESIA: Sumatera Barat Prov.:** 2 ♂♂, 3 ♀♀ (MZB, ZSM): same sampling data; 1 ♂ (MZB): Sawahlunto, Puncak Cemara, 200 m a.s.l., streams, 21.IX.2009, leg. D. Amran "SUM 002".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extended clypeal microreticulation, unicolored yellow maxillary palpi, and eight antennomeres, together with *A. gilvus* KOMAREK, 2018, *A. orientalis*, *A. reticulatus*, and *A. sundaicus*. Differs in habitus (elytra widest anteriorly, narrowing apicad) from these species, moreover in wide apex of parameres from *A. gilvus*, in unicolored yellow clypeus, smaller eyes, and widely separated basal apophyses of median lobe from *A. orientalis*, and in yellowish pronotum and elytra from *A. sundaicus*. Aedeagus similar to aedeagus of *A. raucus* and *A. schoedli* (wide and straight parameres with broadly rounded apex); differs in large extension of clypeal microsculpture and absence of apical incision of median lobe from both species, moreover in yellow pronotum from *A. schoedli*, and in presence of eight antennomeres from *A. raucus*.

DESCRIPTION: Total length: 1.8–2.2 mm, elytral width: 1.0 mm; E.I.: 1.3, P.I.: 2.4, elytra 2.8 times as long as pronotum. Habitus (Fig. 5) broad, elytra slightly attenuating apicad, moderately convex.

Coloration: Labrum and clypeus yellow; frons yellow anteriorly, dark brown posteriorly; maxillary palpi unicolored yellow; pronotum yellowish brown with darker brown, undefined mesal portion; elytra yellowish brown, darker than pronotum; ventrites and legs yellowish brown.

Head (Fig. 172): Clypeus with distinctly concave anterior margin, C.I.: 3.6, lateral length ratio clypeus/eyes = 2.6; microreticulation present on almost entire clypeus; ground punctation very fine; systematic punctation indistinct. Eyes small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi slender, 0.9 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.5–1.6, palpomere 4 symmetrical. Mentum with fine punctures laterally, and very fine wrinkles present at lateral portions.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation slightly coarser than 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 mesal bulge.

Femora (Fig. 74): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with almost semicircular apical emargination, about 15 µm deep.

Aedeagus (Fig. 191): Length: 0.30–0.32 mm. Phallobase about as long as parameres, abruptly bending to wide, distinctly defined manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Margins of parameres indistinctly curving; apex wide, with indistinct subapical constriction; dorsal face wide at base, distinctly extending into phallobase. Median lobe wide; apex bluntly rounded, reaching apex of parameres; corona situated subapically; basal apophyses moderately long, widely separated, distinctly extending into phallobase.

ECOLOGY: Collected in streams.

DISTRIBUTION (Fig. 274): Indonesia (Sumatra).

ETYMOLOGY: The species is dedicated to the collector of the type specimens Ditta Amran Balke (now Munich, Germany) and to her husband Michael.

### *Agraphydrus biprojectus* MINOSHIMA, KOMAREK & ÔHARA 2015

*Agraphydrus biprojectus* MINOSHIMA, KOMAREK & ÔHARA 2015: 15.

TYPE LOCALITY: Vietnam, Lào Cai Province, Sa Pa District, Ô Quy Hồ.

TYPE MATERIAL: See MINOSHIMA, KOMAREK & ÔHARA (2015). **Paratypes examined:** VIETNAM: Lào Cai Prov.: 10 exs. (KMNH, NMW): Sa Pa Distr., Ô Quy Hồ, 26.XI.1971, leg. Gy. Topál "121".

#### ADDITIONAL MATERIAL EXAMINED:

L A O S: **Houa Phan Prov.:** 2 exs. (EUM): Xam Neua (City), Ban Saleui, 22.VI.2003, leg. M. Satô; 4 exs. (EUM): Xam Neua, Ban Saleui, 3.V.2007, leg. Y. Katayama; 6 exs. (EUM): Xam Neua, Mt. Phou Pan, 1,750 m a.s.l., 28.IV.–2.V.2002, leg. M. Satô; 1 ♂ (EUM): Xam Neua, Mt. Phou Pan, 16.–19.V.2004, leg. M. Satô.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, dark colored clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence present on more than proximal half, and presence of apical emargination of abdominal ventrite 5, together with *Agraphydrus coronarius*, *A. helicopter*, *A. latus*, and some specimens of *A. masatakai*. Differs in larger size from *A. helicopter* and in distinct elytral systematic punctures from *A. masatakai*. For differences to other species with distinct elytral systematic punctures see *A. coronarius*. Differs in stouter maxillary palpi from *A. coronarius*, in black clypeus from *A. clarus* and *A. spadix*, in presence of apical emargination on ventrite 5 from *A. spinosus*. Differs in parameres with two lateral projections from all species mentioned.

DESCRIPTION: Total length: 2.5–3.0 mm; elytral width: 1.3–1.5 mm; E.I.: 1.3–1.4, P.I.: 2.2, elytra 3.0 times as long as pronotum. Habitus (Fig. 6) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black, clypeus with undefined dark yellow margins; maxillary palpi unicolored yellow; pronotum and elytra dark brown to black with undefined, dark yellow margins; ventrites and legs dark brown to black; femora with brighter distal portions.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.2, lateral length ratio clypeus/eyes = 2.2; microsculpture very narrowly present along lateral margins, confined to yellow areas, absent from disc and anterior margin; ground punctation fine, interspaces twice as wide as punctures or slightly wider; systematic punctures moderately distinct. Eyes large, not protruding,

slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 146) stout, 0.8–0.9 times as long as pronotum in midline, 0.7–0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 0.9–1.0, palpomere 4 almost symmetrical. Mentum with some moderately coarse punctures, absent mesally.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation slightly coarser than on head and pronotum, interspaces 1–2 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 low mesal bulge abruptly declining posteriorly, forming a triangle.

Femora (Fig. 75): Pubescence present on proximal 3/4; hairlines straight.

Abdomen: Ventrite 5 with very shallow apical emargination, ca. 6  $\mu$ m deep.

Aedeagus (Fig. 192): Length: 0.47–0.51 mm. Phallobase as long as wide, almost rectangularly bending to moderately long, narrow manubrium; border between pigmented and unpigmented portion of ventral face indistinct, reaching mid-length. Parameres with strong subapical and apical projection laterally; dorsal face broad, reaching mid-length of phallobase. Median lobe narrow, widening subapically; apex abruptly constricted, almost reaching apex of parameres; corona large, situated subapically; basal apophyses long, distinctly extending to phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that in Laos the specimens were collected together with *A. attenuatus* and *A. masatakai*.

DISTRIBUTION (Fig. 268): Laos, Vietnam. First record for Laos.

### *Agraphydrus borneensis* sp.n.

TYPE LOCALITY: Malaysia, Sabah, West Coast Division, Kota Kinabalu District, Crocker Range, km 56 of road Kota Kinabalu – Tambunan, near Sunsuron Waterfall.

TYPE MATERIAL: **Holotype**  $\sigma$  (NMW): “Malaysia, Sabah, Crocker \ Range, around km 56 of road \ Kota Kinabalu Tambunan Sun- \ suron Waterfall env.[ironment], 1100-1200 m \ a.s.l. 8.VI.1996, 5 b”; collected upstream of Sunsuron, Tambunan, ca. 200 m downstream of the waterfall in a shallow river, ca. 6–10 m wide, 10–70 cm deep, completely shaded by primary forest canopy, substrate consisting of large rocks and smaller stones, with accumulated leaf packs around rocks. **Paratypes**: **MALAYSIA: Sabah, West Coast Division**: 47 exs. (NMW); same sampling data; 1  $\varphi$  (NMW): Kota Kinabalu Distr., Crocker Range, Mt. Emas, 1,500–1,700 m a.s.l., around km 52 of road Kota Kinabalu – Tambunan, 6.–18.VI.1996, “2a”; 11 exs. (NMW): Crocker Range, Longkogungan (village), ca. 750–850 m a.s.l., 19.–21.VI.1996, “7c”; 9 exs. (KMNH): Kinabalu N.P., HQ, Silau Silau trail, 6°00.40'N 116°32.65'E, 1,500 m a.s.l., at margin of stream, 28.IV.2010, leg. Y. Minoshima “L101”; 5 exs. (KMNH): Kinabalu N.P., HQ, Liwagu River, 6°0.51'N 116°32.90'E, 1,510 m a.s.l., margin of stream, 28.IV.2010, leg. Y. Minoshima “L 102”; 1 ex. (KMNH): Kinabalu N.P., HQ, Poring, 6°3.21'N 116°41.88'E, 670 m a.s.l., stream, 4.V.2010, leg. Y. Minoshima “L 116”; 5 exs. (KMNH): Kinabalu N.P., HQ, Poring, 6°3.76'N 116°41.48'E, 900 m a.s.l., stream, 4.V.2010, leg. Y. Minoshima “L 117”; **Sabah, Interior Division**: 2 exs. (NHM): Keningau Distr., Sook (village), 1,500 ft a.s.l., 17 miles SW Keningau, collected from gravel, 15.VIII.1977, leg. M.E. Bacchus; 1  $\varphi$  (NMW): Nabawan Distr., Batu Punggul Resort, light trap, 24.VI.–1.VII.1996, “11g”; 1  $\varphi$  (NMW): Nabawan Distr., Batu Punggul, ca. 25 km SE Sapulut, small stream near Batu Tinahas, 23.V.2001, leg. “J.F. Kočiam”; 1  $\sigma$  (NMW): Nabawan Distr., Batu Punggul, ca. 25 km S Sapulut, Sapulut River, flowing through primary forest, 24.V.2001, leg. “J.F. Kočiam”; 1  $\varphi$  (NMW): Nabawan Distr., ca. 7 km S Sapulut, Saupi River, ca. 500 m a.s.l., primary forest, 17.V.2001, leg. “J.F. Kočiam”; 8 exs. (NMW): Tambunan Distr., Crocker Range, Rafflesia Information Centre, around km 61 of road Kota Kinabalu – Tambunan, 13.–14.VI.1996, “6b”; 1  $\varphi$  (NMW): Tambunan Distr., Crocker Range, river (near Mawar Waterfall), about 4–6 m wide, flowing through primary forest, shaded, 17.VI.1996, “9a”; 49 exs. (NMW): Tambunan Distr., Crocker Range, small pools (Mawar Waterfall) with sand in primary forest, 17.VI.1996, “9b”; 2  $\varphi$  (NMW): Tambunan Distr., Crocker Range, Mawar Waterfall, 17.VI.1996, “9c”; 23 exs. (NMW): Tenom Distr., Crocker Range, Tenom, Sinagang River, ca. 1,000 m a.s.l., 27.V.2001, leg. “J.F. Kočiam”; **Sabah, Tawau Division**: 23 exs. (NMW): Labad Datu Distr., Pisang (village), tributary to Kuamut River,

29.VI.1998, leg. J. Kodada & F. Čiampor; 10 exs. (NMW): Tawau Distr., Tawau Hills, Tawau River, 7.–10.VI.1998, leg. J. Kodada & F. Čiampor; **Sarawak**: 1 ♂, 1 ♀ (NMW): Miri Division, Mt. Mulu N.P., river near Deer Cave, ca. 5 m wide, 3.III.1993, leg. M. Jäch “19”; 3 exs. (NMW): Kapit Division, 25 km E Kapit (town), small shallow stream (left tributary of Balleh River), ca. 3 m wide, 10–50 cm deep, completely shaded by the canopy of degraded primary forest, flowing near the “Rumah Kabau” (= house of Mr. Kabau, a wooden house in the forest); substrate consisting of small stones, gravel and some accumulated leaf packs among submerged wood, III.1994, leg. J. Kodada.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. bacchusi*, *A. confusus*, *A. coomani*, *A. imitans*, *A. manfredjaechi*, *A. papuanus*, *A. sarawakensis* and several species from China, Japan and the Indian Subcontinent (see Differential Diagnosis of *A. bacchusi*). Differs in presence of nine antennomeres from *A. manfredjaechi*, in lighter elytral coloration from *A. bacchusi* and *A. papuanus*, in coarser pronotal and elytral ground punctation from *A. coomani*. Shares long maxillary palpomeres in relation to median pronotal length with *A. sarawakensis*. Differs in sickle-shaped parameres from all species.

**DESCRIPTION:** Total length: 1.7–2.4 mm; elytral width: 0.8–1.0 mm; E.I.: 1.4, P.I.: 2.1, elytra 3.2 times as long as pronotum. Habitus (Fig. 7) slender, elytra slightly widening posterior to mid-length, moderately convex.

**Coloration:** Labrum, clypeus and frons black; clypeus with distinctly defined, triangular preocular patches, larger than horizontal diameter of eye; maxillary palpi yellow, palpomere 4 with infuscation apically, distinct in most cases; pronotum yellow, undefined dark brown to black central patch of variable size present in many cases; elytra yellow, unicolorated or with variably sized undefined infuscations; ventrites and legs yellow.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.8, lateral length ratio clypeus/eyes = 1.4–1.5; microsculpture absent; ground punctation fine, interspaces 1–2 times as wide as punctures; systematic punctures indistinct. Eyes large, slightly protruding, oval. Antennae with nine antennomeres. Maxillary palpi slender, 1.5 times as long as pronotum in midline, 1.3 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3, palpomere 4 slightly asymmetrical. Mentum with moderately coarse 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 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

**Femora (Fig. 76):** Pubescence present on more than proximal half of profemur, on proximal 2/3–3/4 of meso- and metafemur; hairline slightly oblique on pro- and mesofemur, almost straight on metafemur.

**Abdomen:** Ventrite 5 with flat apical emargination, ca. 8 µm deep.

**Aedeagus (Fig. 193):** Length: 0.31–0.35 mm. Phallobase about as long as parameres or slightly longer, longer than wide, evenly narrowing proximad to small, indistinct manubrium; border between pigmented and unpigmented portion of ventral face distinct, almost reaching manubrium. Parameres sickle-shaped with strongly curving lateral margins in distal third, apex weakly sclerotized; basal portion of dorsal face distinctly extending into phallobase. Median lobe with dorsal face narrowing in mid-length, ventral face widening in mid-length; apex reaching apex of parameres; corona situated subapically; styli absent; basal apophyses moderately long, distinctly extending into phallobase, narrowly separated.

ECOLOGY: Collected in rivers, streams and pools and at light; found together with *A. cervus*, *A. clarus*, *A. coomani*, *A. excisus*, *A. jankodadai*, *A. musculus*, *A. rhomboideus*, and *A. sarawakensis*.

DISTRIBUTION (Fig. 272): Malaysia (Sabah, Sarawak).

ETYMOLOGY: The name refers to the island of Borneo where the type specimens were collected.

*Agraphydrus brevipenis* sp.n.

TYPE LOCALITY: Malaysia, Pahang, Cameron Highlands District, Mt. Jasar.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MALAYSIA: Pahang \ Cameron Highlands \ Gn. [= Gunung = mountain] Jasar 1500-1700 m \ 30.7.1993 leg. Schuh".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margin of clypeus, unicolored maxillary palpomeres, and body length of more than 1.9 mm, together with *A. floresinus*, *A. jankodadai*, *A. mirabilis*, *A. nigroflavus*, *A. raucus*, *A. schoedli*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Differs in presence of nine antennomeres from *A. mirabilis*, *A. nigroflavus* and *A. schoedli*. Differs moreover in smaller size, broader habitus, larger eyes, and yellow pronotum from *A. schoedli* and in yellow clypeus from *A. nigroflavus*. Differs in presence of distinct, fine, pronotal ground punctures from *A. jankodadai* and *A. sucineus*. Shares yellow pronotum with *A. nigroflavus* and *A. raucus*; differs in yellow clypeus and in elytra without darkened lateral band from *A. nigroflavus*; in very indistinct, mesally interrupted microsculpture of anterior clypeal margin, larger eyes, stout maxillary palpomeres, and less wide extension of metafemoral pubescence from *A. raucus*. Differs in absence of apical emargination of abdominal ventrite 5 and in very short median lobe from all species mentioned.

DESCRIPTION: Total length: 2.4 mm; elytral width: 1.3 mm; E.I.: 1.2, P.I.: 2.5, elytra 3.0 times as long as pronotum. Habitus (Fig. 8) broad, evenly oval, strongly convex.

Coloration: Labrum and clypeus yellow, clypeus darkened postero-mesally, frons dark brown to black; maxillary palpi unicolored yellow; pronotum yellow, darkened mesally; elytra dark yellowish brown with slightly brighter lateral margins; ventrites dark brown; legs lighter colored.

Head (Fig. 173): Clypeus with distinctly concave anterior margin, C.I.: 4.5, lateral length ratio clypeus/eyes = 1.5; microsculpture present at lateral margins and very narrowly at lateral parts of anterior margin, absent mesally; ground punctation moderately fine, strongly impressed, interspaces 2–3 times as wide as punctures; systematic punctures moderately distinct. Eyes large, not protruding, oval. Antennae with nine antennomeres. Maxillary palpi (Fig. 147) stout, 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 asymmetrical. Mentum with few very fine punctures, microsculpture absent.

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

Femora (Fig. 77): Pubescence present on proximal 2/3; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 weakly sclerotized, some stronger setae present, emargination absent.

Aedeagus (Fig. 194): Length: 0.36 mm. Phallobase longer than parameres, slightly longer than wide, bending in blunt angle to large, triangular manubrium; border between pigmented and

unpigmented portion of ventral face almost reaching manubrium in midline. Parameres wide; apex truncate with large, sharply pointed, beak-like lateral extension; basal portion not extending into phallobase. Median lobe short, widening to truncate apex; corona situated in mid-length; basal apophyses short, slightly extending into phallobase, narrowly separated.

ECOLOGY: Aquatic, no other details known.

DISTRIBUTION (Fig. 269): Malaysia (Peninsula).

ETYMOLOGY: The name is derived from brevis (Latin adjective) (= short) and refers to the short median lobe of the aedeagus.

***Agraphydrus burmensis* sp.n.**

TYPE LOCALITY: Myanmar, Mandalay Region, Pyin Oo Lwin District, Mogok Township, NW Mogok, S Panlin village, west slope of Mt. Taung Mae, 22°57'57"N 96°27'29"E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MYANMAR, Mandalay Reg. \ Mogok Township, NW Mogok \ S Panlin vill. \ Mt. Taung Mae, west slope | 22°57'57"N 96°27'29"E \ ca. 1800 m, 27.III.2015 \ leg. Schillhammer (MBS 208)"; collected in a small forest stream with moss-covered rocks, in primary forest, crystalline and marble, ca. 6.5 km NW Mogok (in direct line), above road Mogok – Bernardmyo, above a hydropower station. **Paratypes**: 6 exs. (NMW): same sampling data.

DIFFERENTIAL DIAGNOSIS: Shares body length of more than 1.8 mm, dark coloration of clypeus, absence of clypeal microsculpture, eight antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of apical emargination on ventrite 5 with *A. longipenis*; differs in broader habitus, stouter maxillary palpi, presence of horizontal mesoventral ridge, and in short median lobe.

DESCRIPTION: Total length: 1.9–2.2 mm; elytral width: 1.0–1.1 mm; E.I.: 1.2, P.I.: 2.2, elytra 2.9 times as long as pronotum. Habitus (Fig. 9) broad, evenly oval, strongly convex.

Coloration: Labrum, clypeus and frons black, clypeus with indistinctly defined yellow preocular patches; maxillary palpomeres unicolored yellow; pronotum unicolored yellowish brown, or dark brown mesally with undefined yellow lateral areas and narrow yellow anterior margin; elytra dark brown with indistinct, undefined, brighter brown lateral rim and posterior area; ventrites black; legs black, femora slightly lighter colored distally.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.7, lateral length ratio clypeus/eyes = 1.9–2.0; microsculpture absent; ground punctation moderately coarse, interspaces 1–2 times as wide as punctures; systematic punctures indistinct. Eyes moderately large, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi stout, 0.9 times as long as pronotum in midline, 0.7–0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3, palpomere 4 almost symmetrical. Mentum very sparsely punctate, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation as on head and pronotum or slightly coarser, interspaces about as wide as puncture; four rows of very indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low, horizontal, arrow-shaped ridge.

Femora (Fig. 78): Pubescence present on proximal 2/3; hairlines straight.

Abdomen: Ventrite 5 with flat apical emargination.

Aedeagus (Fig. 195): Length: 0.25 mm. Phallobase about as long as parameres, as long as wide, abruptly narrowing proximad to distinct manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres wide; lateral margins

indistinctly curving, mesal margins distinctly excised in apical half, apex bluntly rounded, not inclining; basal portion of dorsal face deeply extending into phallobase mesally. Median lobe narrow, much shorter than parameres, apical portion with bluntly rounded dorsal face; ventral face very short, wide; corona situated in basal position; basal apophyses moderately long, strongly bending laterad.

ECOLOGY: Collected in a stream.

DISTRIBUTION (Fig. 265): Myanmar.

ETYMOLOGY: The name refers to Myanmar, also known as Burma, where the type specimens were collected.

### *Agraphydrus carinatus* sp.n.

TYPE LOCALITY: Indonesia, East Kalimantan Province, Kutai Kartanegara Regency, Tabang District, ca. 200 km NW of Samarinda City near Ritan Baru village.

TYPE MATERIAL: **Holotype** ♂ (NMW): "INDONESIA: E-Kalimantan \ ca. 200km NW Samarinda \ nr. Ritan Baru \ small spring, 30.7.1995 \ leg. Mazzoldi".

DIFFERENTIAL DIAGNOSIS: Belongs to group of very small species (body length less than 1.8 mm), absence of clypeal microsculpture, unicolored maxillary palpomeres, and metafemoral pubescence present on at least proximal 2/3, together with *A. lunaris*, *A. mazzoldii*, *A. microphthalmus*, and *A. penangensis*. Shares yellow clypeus with *A. penangensis*, differs in presence of eight antennomeres from this species. Differs in larger eyes from *A. penangensis* and *A. microphthalmus*. Shares moderately broad body with *A. mazzoldii*. Differs in presence of mesoventral carina from all species mentioned. Eight antennomeres and carinate mesoventrite also present in *A. delineatus*, *A. exiguus*, *A. hortensis*, *A. rhomboideus*, and *A. tristis*; differs in smaller size and features of aedeagus (parameres abruptly narrowing in mid-length, corona in subapical position) from these species.

DESCRIPTION: Total length: 1.8 mm; elytral width: 0.9 mm; E.I.: 1.3, P.I.: 2.0, elytra 2.8 times as long as pronotum. Habitus (Fig. 10) moderately wide, evenly oval, moderately convex.

Coloration: Labrum and clypeus unicolored yellow; frons yellow anteriorly, dark brown in posterior portion; maxillary palpi unicolored yellow; pronotum, elytra, ventrites and legs unicolored yellow.

Head (Fig. 159): Clypeus with distinctly concave anterior margin, C.I.: 3.9, lateral length ratio clypeus/eyes = 2.1; microsculpture absent; ground punctation fine, weakly impressed, interspaces about twice as wide as punctures; systematic punctures indistinct. Eyes small, not protruding, slightly oblong. Antennae with eight 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 = 1.3, palpomere 4 symmetrical. Mentum with very fine, widely spaced punctures, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation very slightly coarser than on pronotum; four rows of indistinct systematic punctures present, rows 1–3 not reaching anterior margin. Mesoventrite with low median carina.

Femora (Fig. 79): Pubescence present on proximal 2/3; hairlines oblique on pro- and mesofemur, straight to slightly convex on metafemur.

Abdomen: Ventrite 5 with flat apical emargination, ca. 10  $\mu$ m deep.

Aedeagus (Fig. 196): Length: 0.25 mm. Phallobase about as long as parameres, as long as wide, abruptly narrowing to triangular manubrium; border between pigmented and unpigmented

portion of ventral face reaching manubrium. Parameres with slightly sigmoid lateral margins; mesal margins abruptly narrowing in mid-length; apex very narrowly rounded; basal portion of dorsal face broad, extending into phallobase mesally. Median lobe narrow, finger-shaped; apex not reaching apex of parameres; corona in subapical position; basal apophyses moderately long, distinctly extending into phallobase.

ECOLOGY: Collected in a spring together with *A. delineatus*.

DISTRIBUTION (Fig. 272): Indonesia (Kalimantan).

ETYMOLOGY: The name *carinatus* (Latin adjective, diminutive of *carinatus* = carinate) refers to the low carina of the mesoventrite.

### *Agraphydrus cervus* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kapit Division, Kapit District, ca. 25 km E of Kapit.

TYPE MATERIAL: **Holotype** ♂ (NMW): “MALAYSIA: Sarawak \ 25km E KAPIT, III. 1994, Kodada leg.”; collected in a small shallow stream (left tributary of Balleh River), ca. 3 m wide, 10–50 cm deep, completely shaded by the canopy of a degraded primary forest, near the “Rumah Kabau” (= house of Mr. Kabau, a wooden house in the forest), substrate consisting of small stones, gravel and some accumulated leaf packs among submerged wood; the locality was repeatedly sampled within several days along a ca. 700 m long section. **Paratypes**: **MALAYSIA: Sarawak**: 7 exs. (NMW): same sampling data; 1 ex. (NMW): Kapit Division, ca. 40 km SE Kapit (town), III. 1994, leg. J. Kodada; 1 ♂ (NMW): Kapit Division, Kapit Distr., Rumah Tuan, Balleh River, 2.–3.III.1994, leg. J. Horák.

DIFFERENTIAL DIAGNOSIS: Shares very long, slender, maxillary palpomeres, 1.5–1.6 times as long as pronotum in median length, wide preocular patches, microsculpture present on lateral margin and antero-lateral corner of clypeus, but absent from anterior clypeal margin, and very similar aedeagus with broad apical projections of parameres with *A. piceus*; differs in smaller size, slightly finer dorsal ground punctation, and in pronotal and elytral coloration (black in *A. piceus*). Long palpomeres also present in *A. borneensis* and *A. sarawakensis* (length ratio pronotum/palpomeres = 1.4–1.5) which differ in apical infuscation of palpomere 4, and in *A. maehongsonensis*, *A. nemorosus* (length ratio pronotum/palpomeres = 1.3–1.4). *Agraphydrus agilis* and *A. floresinus* (length ratio pronotum/palpomeres = 1.2–1.3) differ in clypeal microsculpture present on anterior margin or on almost entire disc; *A. rhomboideus* (length ratio = 1.3) differs in presence of eight antennomeres and different elytral coloration; *A. sucineus* (length ratio = 1.1–1.3) differs in amber coloration of pronotum, and *A. angulatus* (length ratio = 1.2–1.3) differs in angularly excised clypeus.

DESCRIPTION: Total length: 2.3–2.4 mm; elytral width: 1.0–1.1 mm; E.I.: 1.4, P.I.: 1.8–2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 11) slender, elytra parallel-sided, indistinctly convex.

Coloration: Labrum, clypeus and frons black, clypeus with yellow preocular patches, approximately as wide as diameter of eye; maxillary palpi unicolored yellow; pronotum with undefined, oval, dark brown, central coloration, not reaching anterior margin in most cases, about as wide as distance between eyes or wider, with wide yellowish lateral margins and narrow yellow anterior rim; elytra light brown on disc, with yellow lateral margins, dark brown sublateral stripe, about 2–3 times as wide as yellow margin and widening in mid-length of elytra in most specimens, and dark brown sutural area; ventrites dark brown to black; legs light to dark brown.

Head (Fig. 174): Clypeus with distinctly concave anterior margin, C.I.: 3.5, lateral length ratio clypeus/eyes = 2.2, microsculpture present along lateral margin and at antero-lateral corner, microreticulation absent from anterior margin and disc; ground punctation very fine, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes small, very slightly

protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.5–1.6 times as long as pronotum in midline, 1.4 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2, palpomere 4 slightly asymmetrical. Mentum with fine, evenly distributed punctures, microsculpture present on lateral third.

Thorax: Pronotal ground punctation very fine, as on head or slightly finer, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Elytral ground punctation as fine as on pronotum, interspaces 1–2 times as wide as punctures; four rows of distinct, but few, systematic punctures present, mesal rows not reaching anterior margin; additional subserial row present along lateral margins. Mesoventrite with low mesal bulge.

Femora (Fig. 80): Pubescence present on proximal 2/3 of profemur with oblique hairline, on proximal 3/4 of meso- and metafemur with straight hairline.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 197): Length: 0.29 mm. Phallobase about as long as parameres, slightly longer than wide, narrowing in basal third to distinct, wide manubrium; border between pigmented and unpigmented portion of ventral face reaching half-length of phallobase. Parameres with very strong subapical incision laterally, apex with strong, broad, unevenly shaped, lateral projection; basal portion of dorsal face extending into phallobase mesally. Median lobe wide, with almost parallel-sided margins; weakly sclerotized; apex flat or slightly impressed, not reaching apex of parameres; dorsal face slightly shorter than ventral face; corona small, in subapical position; basal apophyses short, wide.

ECOLOGY: Collected in a stream and in a river; found together with *A. borneensis*, *A. excisus*, *A. microphthalmus*, and *A. sarawakensis*.

DISTRIBUTION (Fig. 275): Malaysia (Sarawak).

ETYMOLOGY: The name *cervus* (Latin) (= stag) refers to the long maxillary palpi alluding to the large horns of a stag. Noun in apposition.

### *Agropydrus clarus* sp.n.

TYPE LOCALITY: Malaysia, Sabah, West Coast Division, Kota Kinabalu District, Crocker Range, km 56 of road between Kota Kinabalu and Tambunan, near Sunsuron Waterfall.

TYPE MATERIAL: **Holotype** ♂ (NMW): “Malaysia, Sabah, Crocker \ Range, around km 56 of road \ Kota Kinabalu Tambunan, Sun- \ suron Waterfall env.[ironment], 1100–1200m \ a.s.l. 8.VI.1996, 5 a”; collected in a shallow river, ca. 6–10 m wide, 10–70 cm deep, completely shaded by the primary forest canopy, upstream of Sunsuron, Tambunan, close to waterfall, substrate consisting of large rocks and smaller stones, with accumulated leaf packs around rocks. **Paratypes: MALAYSIA: Sabah, West Coast Division:** 11 exs. (NMW): same sampling data; 3 exs. (NMW): same sampling data, but ca. 200 m downstream of the waterfall “5 b”; 1 ♀ (NMW): Crocker Range, Longkogungan (village), ca. 750–850 m a.s.l., 19.–21.VI.1996, “7 c”; 4 exs. (KMNH): Kinabalu N.P., HQ, Silau Silau trail, 6°0.40'N 116°32.65'E, 1,500 m a.s.l., at margin of stream, 28.IV.2010, leg. Y. Minoshima “L101”; 13 exs. (KMNH): Kinabalu N.P., HQ, Silau Silau trail, 6°0.38'N 116°32.80'E, 1,520 m a.s.l., small pool on trail, 2.V.2010, leg. Y. Minoshima “L 111”; 1 ex. (KMNH): Kinabalu N.P., HQ, Liwagu River, 6°0.51'N 116°32.90'E, 1,510 m a.s.l., margin of stream, 28.IV.2010, leg. Y. Minoshima “L 102”; 11 exs. (KMNH): Kinabalu N.P., HQ, Poring, 6°3.21'N 116°41.88'E, 670 m a.s.l., stream, 4.V.2010, leg. Y. Minoshima “L 116”; 2 exs. (KMNH): Kinabalu N.P., HQ, Poring, 6°3.76'N 116°41.48'E, 900 m a.s.l., stream, 4.V.2010, leg. Y. Minoshima “L 117”; 5 exs. (NMW): Kota Kinabalu Distr., Crocker Range, Moyog River, around km 20 of road Kota Kinabalu – Tambunan, 15.VI.1996, “1b”; **Sabah, Interior Division:** 1 ♀ (NMW): Nabawan Distr., Batu Punggul Resort, river about 10–15 m wide, ca. 0.5–3.0 m deep, flowing through primary forest, partly shaded by the forest canopy, the substrate consisting of large limestone rocks and smaller stones, some sections near the river banks with accumulated leaf packs around rocks and submerged wood, 24.VI.–1.VII.1996, “11a”; 1 ♂ (NMW): Nabawan Distr., Batu Punggul Resort, light trap, 24.VI.–1.VII.1996, “11g”; 1 ♂ (NMW): Tambunan Distr., Crocker Range, Rafflesia Information Centre, around km 61 of road Kota Kinabalu – Tambunan, 13.–14.VI.1996, “6b”; 4 exs.

(NMW): same sampling data, but "6c"; 14 exs. (NMW): Tambunan Distr., Crocker Range, small pools (near Mawar Waterfall) with sand in primary forest, 17.VI.1996, "9b"; 5 exs. (NMW): Tenom Distr., Tenom (town), Kalang Waterfall, 16.–18.V.1998 and 28.V.2001, leg. J. Kodada & F. Čiampor; 9 exs. (NMW): Tenom Distr., Tenom (town), Sinagang River, ca. 1,000 m a.s.l., 27.V.2001, leg. "J.F. Kočiam"; **Sabah, Sandakan Division**: 16 exs. (NHM, ZMUC): Telupid Distr., Karamuak River, 7 miles SSE Telupid, 200 ft a.s.l., collected from gravel, 1.–7.IX.1977, leg. M.E. Bacchus; **Sabah, Tawau Division**: 2 ♂♂ (NMW): Labad Datu Distr., tributary to Kuamut River, ca. 10 m wide, flowing through primary forest, near Pisang (village), 3.–4.VII.1996, "14b"; 6 exs. (NMW): Tawau Distr., Tawau Hills, Tawau River, 7.–10.VI.1998, leg. J. Kodada & F. Čiampor; **Sarawak**: 3 ♂♂, 2 ♀♀ (NMW): Miri Division, Kelabit Highlands, Bario (village community), 1,000–1,200 m a.s.l., forest stream, 1 m wide, 28.II.1993, leg. M. Jäch "16"; 1 ♂, 1 ♀ (NMW): Kuching Division, Mt. Serapi, ca. 19 km W Kuching, primary forest, III.1994, leg. J. Kodada.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with body length more than 2.0 mm, yellow clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of apical emargination of abdominal ventrite 5, together with *A. engkari*, *A. hamatus*, *A. muluensis*, *A. orbicularis*, and *A. spadix*. Shares obsolete pronotal ground punctation with *A. engkari*; differs in distinct elytral systematic punctures (obsolete in *A. engkari*) and slender maxillary palpi from this species. Differs in features of aedeagus (e.g., elongated median lobe with apical notch and corona in basal position) from all species.

**DESCRIPTION:** Total length: 2.4–2.7 mm; elytral width: 1.1–1.4 mm; E.I.: 1.3–1.4, P.I.: 2.4–2.5, elytra 3.2 times as long as pronotum. Habitus (Fig. 12) broad, evenly oval, elytra widest at anterior edge, moderately convex.

**Coloration:** Labrum and clypeus yellow, clypeus with mesal infuscation in few specimens; frons black, or dark yellowish brown, or with yellow anterior and dark brown posterior portion; maxillary palpi unicolored yellow; pronotum unicolored yellow or dark yellowish brown mesally with decreasing intensity of coloration to yellow lateral margins, or completely black; elytra unicolored yellow or black or light brown, with or without dark brown to black margins; ventrites and legs rufous brown.

**Head:** Clypeus with indistinctly concave anterior margin, C.I.: 4.5, lateral length ratio clypeus/eyes = 1.6; microsculpture absent; ground punctation obsolete; systematic punctures distinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 148) 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 = 1.0–1.1, palpomere 4 almost symmetrical. Mentum with fine punctures on lateral portion, microsculpture absent.

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

**Femora (Fig. 81):** Pubescence present on proximal 2/3 of femora; hairlines slightly oblique on profemur, straight on meso- and metafemur.

**Abdomen:** Ventrite 5 with almost semicircular apical emargination.

**Aedeagus (Fig. 198):** Length: 0.34–0.41 mm. Phallobase slightly shorter than parameres, about as long as wide or slightly longer than wide, abruptly bending to triangular manubrium; border between pigmented and unpigmented portion very indistinct, reaching basal half of phallobase. Parameres with slightly curving lateral margins and almost straight mesal margins evenly narrowing to bluntly rounded apex; basal portion of dorsal face indistinctly extending into phallobase mesally. Median lobe narrow; dorsal face deeply split into two parts; apex of ventral

face distinctly indented, reaching or exceeding apex of parameres; corona in basal position; basal apophyses moderately long, slightly extending into phallobase.

ECOLOGY: Collected in rivers, streams, pools, and at light; found together with *A. borneensis*, *A. delineatus*, *A. excisus*, *A. jankodadai*, *A. microphthalmus*, *A. musculus*, *A. piceus*, *A. rhomboideus*, and *A. sarawakensis*.

DISTRIBUTION (Fig. 275): Malaysia (Sabah, Sarawak).

ETYMOLOGY: The name *clarus* (Latin adjective) (= bright) refers the bright color of the clypeus.

### *Agraphydrus confusus* KOMAREK & HEBAUER, 2018

*Agraphydrus confusus* KOMAREK & HEBAUER 2018: 29; PRZEWOŹNY 2019: 26.

TYPE LOCALITY: China, Hong Kong, Tai Po Kau Nature Reserve.

TYPE MATERIAL: See KOMAREK & HEBAUER (2018). **Paratypes from VIETNAM examined:** **Lào Cai Prov.:** 6 exs. (NME, NMW): Sa Pa Distr., Sa Pa village, Hoang Lian Son Nat. Res., 21.–23.VI.1998, 1,250 m a.s.l., leg. A. Napolov; 1 ex. (NMW): Sa Pa Distr., Hoang Lien Son (Mountain Range), 1,600 m a.s.l., 11.–16.V.1990, leg. J. Horák.

ADDITIONAL MATERIAL EXAMINED:

L A O S: **Khammouan Prov.:** 1 ♂ (NMW): Ban Khoun Ngeun, 18°7'N 104°29'E, 250 m a.s.l., 4.–30.XI.2000, leg. E. Jendek & P. Pacholátko.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4 together with *A. bacchusi*, *A. borneensis*, *A. coomani*, *A. imitans*, *A. manfredjaechi*, *A. papuanus*, *A. sarawakensis*, and several species from China, Japan and the Indian Subcontinent (see under *A. bacchusi*). Shares moderately coarse pronotal and elytral ground punctation with *A. sarawakensis*. Differs in presence of nine antennomeres from *A. manfredjaechi*, in light colored elytra from *A. bacchusi* and *A. papuanus*. Differs in shorter maxillary palpi in relation to median pronotal length from *A. borneensis* and *A. sarawakensis*. Differs in features of aedeagus (apex of parameres strongly bending mesad) from all species.

DESCRIPTION: See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 199.

ECOLOGY: Collected in rivers and pools (KOMAREK & HEBAUER 2018); in Laos found together with *A. arduus*, *A. connexus*, *A. coomani*, *A. imitans*, *A. lunaris*, and *A. masatakai*.

DISTRIBUTION (Fig. 269): China (Guizhou, Hong Kong, Yunnan), Laos, Vietnam. First record for Laos.

### *Agraphydrus connexus* KOMAREK & HEBAUER, 2018

*Agraphydrus connexus* KOMAREK & HEBAUER 2018: 31; KOMAREK 2018: 120; PRZEWOŹNY 2019: 26.

TYPE LOCALITY: Malaysia, Pahang, near Kuala Lipis (town).

TYPE MATERIAL EXAMINED: **Holotype** ♂ (NMW): “West Malaysia, Pahang \ Kuala Lipis surr.[oundings], small \ stream, 12.4.1997, 60 m \ Balke & Hendrich leg.”. **Paratypes:** **MALAYSIA: Pahang:** 1 ♂ (NMW): same sampling data; **Johor:** 1 ♂ (NMW): Segamat Distr., Bekok, path to waterfall, 50–150 m a.s.l., in very small muddy pool filled with leaves, 10.IV.1997, leg. M. Balke & L. Hendrich; **LAOS: Champasak Prov.:** 1 ♂ (NMW): ca. 50 km E Muang Paksong City, 700 m a.s.l., 27.V.1996, leg. H. Schillhammer “9”; **MYANMAR: Shan State:** 13 exs. (NMW): road Kalaw – Thazi, km 26, 20°43.8'N 96°29.47'E, ca. 550 m a.s.l., 16.V.1999, leg. H. Schillhammer & R. Schuh “44”; **THAILAND: Chiang Mai Prov.:** 2 ♀♀ (NMW): Chiang Mai City Zoo, at light, 23.V.–1.VI.1988, leg. H. Malicky; **Mae Hong Son Prov.:** 1 ♂, 1 ♀ (NMW): ca. 12 km S Mae Hong Son, Pha Bong (village), small river, ca. 2–5 m wide, 12.XI.1995, leg. H. Zettl “13a”; **Petchabun Prov.:** 1 ♂, 1 ♀ (NMW): Nam Nao N.P., Huai

Phrom Laeng, stream, 2–3 m wide, 24.XI.1995, leg. H. Zettel “22”; 1 ♀ (NMW): Nam Nao N.P., Huai Ya Krua, 14.III.1994, leg. W. Shepard; **Phrae Prov.:** 1 ♀ (NMW): 50 km NE Phrae, ca. 5 km SE Ban Huai Kaet, stream, ca. 4–6 m wide, rather fast flowing, almost without pools, in dense forest, 18.XI.1995, leg. H. Zettel “18a”; **VIETNAM: Hòa Bình Prov.:** 2 ♂♂, 4 ♀♀ (ISNB): Lac Tho, leg. A. de Cooman; **Cao Bằng Prov.:** 1 ♂ (EUM): Ban Khuoi Han, 230 m a.s.l., 30.IX.1994, leg. M. Satô.

For paratypes from China (Hainan) and Nepal see KOMAREK & HEBAUER (2018) and KOMAREK (2018).

#### ADDITIONAL MATERIAL EXAMINED:

**T H A I L A N D:** **Phang Nga Prov.:** 13 exs. (CSH): Thai Mueang Distr., Lam Ru N.P., 6 km NE Lam Kaen, White Banana Waterfall, 8°37.324'N 98°18.362'E, 75 m a.s.l., river in dense secondary bamboo forest, 13.VIII.2012, leg. A. Skale; 4 exs. (CSH): same sampling data, but leg. A. Weigel “PL”; **Phetchabun Prov.:** 1 ♀ (NMW): near Nam Nao N.P., Route 2216, Khlong Choen, 16°40'29"N 101°44'01"E, residual pools in bed of dried up river, 21.III.2017, leg. H. Shaverdo “2017–Th–05C”.

**M Y A N M A R:** **Sagaing Region:** 6 ♂♂, 1 ♀ (NMW): Alaungdaw Kathapa N.P., Pagoda Stream near Log Cabin Camp, 7.V.2003, leg. D. Boukal “MBS 112”.

**L A O S:** **Khammouan Prov.:** 4 ♂♂, 4 ♀♀ (NMW): Ban Khoun Ngeun, 18°7'N 104°29'E, 250 m a.s.l., 4.–30.XI.2000, leg. E. Jendek & P. Pacholátko.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with widely extended clypeal microreticulation, unicolorous yellow maxillary palpomeres, absence of microsculpture on lateral margin of clypeus, nine antennomeres, and dark brown to black clypeus, together with *A. kathapa*, *A. laocaiensis*, *A. namthaensis*, *A. schoenmanni*, *A. shaverdoae*, and *A. umbrosus*. Differs in absence of trapezoidal mesal infuscation on pronotum from *A. laocaiensis*. Very variable regarding size and coloration, can be separated with certainty in presence of median connecting band between basis of parameres and median lobe from all other species of *Agraphydrus*.

**DESCRIPTION:** See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 200.

The specimens from Laos, Malaysia, Myanmar, Thailand, and Vietnam are 2.0–2.2 mm long, except one dwarfish male from Malaysia with a total body length of 1.8 mm. Most specimens from Myanmar are very dark colored with indistinctly brightened lateral clypeal margins, almost black pronotum with narrow yellow margins, and dark brown to black elytra; specimens from Laos are in most cases very light colored with distinct preocular patches, light to dark brown pronotum and elytra. The coloration of most specimens from Malaysia, Thailand and Vietnam is intermediate, the microreticulation is present on at least half of the clypeal surface with an unsculptured postero-mesal area.

**ECOLOGY:** Collected in rivers, streams and pools, and at light (see also KOMAREK & HEBAUER 2018); in Laos found together with *A. arduus*, *A. confusus*, *A. coomani*, *A. imitans*, *A. lunaris*, and *A. masatakai*; in Malaysia together with *A. coomani*, *A. hortensis*, and *A. succineus*; in Thailand together with *A. coomani*, *A. heterochromatus*, *A. imitans*, *A. masatakai*, and *A. siamensis*.

**DISTRIBUTION** (Fig. 266): Bhutan, India (Madhya Pradesh), Nepal, China (Hainan), Laos, Malaysia (Peninsula), Myanmar, Thailand, Vietnam.

#### *Agraphydrus coomani* (ORCHYMONT, 1927)

*Helochares* (*Agraphydrus*) *coomani* ORCHYMONT 1927: 248.

*Agraphydrus coomani* (ORCHYMONT): WATTS 1995: 115; KOMAREK & HEBAUER 2018: 34; KOMAREK 2018: 122; PRZEWOŹNY 2019: 26.

*Agraphydrus* (s.str.) *coomani* (ORCHYMONT): HANSEN 1999b: 156.

*Enochrus ryukyensis* MATSUI 1994: 217; KOMAREK & HEBAUER 2018: 34 (syn.).

*Agraphydrus ryukyensis* (MATSUI): GENTILI, HEBAUER, JÄCH, JI & SCHÖDL 1995: 208; PRZEWOŹNY 2019: 26.

*Agraphydrus* (s.str.) *ryukyensis* (MATSUI): HANSEN 1999b: 157.

**TYPE LOCALITY:** Vietnam, Hòa Bình Province, Lac Tho.

TYPE MATERIAL EXAMINED: *H. coomani* **Holotype** ♂ (ISNB): “Hoa Binh \ Tonkin \ de Cooman [glued on a yellow card:] Coll. R. I. Sc. N. B. \ Nord Vietnam | A. d’Orchymont det. \ *Helochares* (*Agraphydrus*) \ *Coomani* m. Type | TYPE [red label]”. **Paratypes**: VIETNAM: 23 exs. (ISNB): same sampling data.

#### ADDITIONAL MATERIAL EXAMINED:

A U S T R A L I A: **New South Wales**: 2 exs. (ANIC): Cabbage Tree Creek, “Canberra-Coast road”, 21.II.1969, leg. E. Britton & S. Misko; 1 ex. (ANIC): Moruya River, Araluen (town), 27.XII.1965, leg. E. Britton; 1 ex. (ANIC): Blue Mountains, 8.I.1927, leg. W. Cox; 1 ex. (ANIC): Shoalhaven River, Ballalaba Bridge, 2.II.1991, leg. P.M. Hammond; 1 ex. (ANIC): 13 km NW Braidwood (town), 35°20’S 149°44’E, in sand and gravel along river, 21.XII.1991, leg. T. Gush “Tom Gush Collection #3251”; 2 exs. (ZMUC): Khancoban (town), 1,000 ft a.s.l., 1.IV.1965, leg. M.E. Bacchus “Stn. 230”; **Northern Territory**: 1 ex. (NMW): Kakadu N.P., Arnhem Highway, 12 km WNW Jabiru, ca. 50 m a.s.l., 12°37.937’S 132°38.134’E, 29.X.1996, leg. L. Hendrich “5”; 1 ex. (CHB): Kakadu N.P., Gunlom Camp Area, pools in monsoon forest, ca. 50 m a.s.l., 13°26.082’S 132°24.929’E, 3.XI.1996, leg. L. Hendrich “15”; 1 ex. (ANIC): Cooper Creek, 19 km E by S of Mt. Borradaile, 5.VI.1973, leg. M.S. Upton; 2 exs. (ANIC): 14 km NW of Cape Crawford, 16.34°S 135.41°E, 6.XI.1975, leg. M.S. Upton; 1 ex. (ANIC): 14 km S by W of Cape Crawford, 16.47°S 135.45°E, 25.X.1975, leg. M.S. Upton; 2 exs. (ANIC): Butterfly Gorge N.P., Douglas River, 13.45°S 131.34°E, at light, 19.VII.1994, leg. T. Weir, A. Roach; 1 ex. (ANIC): Nourlangie Creek, 8 km E of Cahill, 12.52°S 132.47°E, at light, 27.X.1972, leg. E.B. Britton; 2 exs. (ANIC): Adelside River at Daly River Road Crossing, 13.29°S 131.06°E, 9.XI.1972, leg. E.B. Britton; 2 exs. (ANIC, ZMUC): Simpson Gap, West Macdonnells N.P., 20.40°S 133.43°E, 6.III.1995, leg. T. Weir; 1 ex. (ANIC): 31 km WSW of Borroloola (town), 16.10°S 136.03°E, at light, 15.IV.1976, leg. J.E. Feehan; 1 ex. (ANIC): Ormiston Creek above Ormiston pond, West Macdonnells N.P., 10.III.1995; **Queensland**: 1 ex. (NMW): Hidden Valley, 80 km NW Townsville, 900 m a.s.l., 17.I.1993 leg. Wewalka “6”; 19 exs. (NMW): Gympie (town), Brooyar State Forest, 1.1979, leg. F. Wachtel; 6 ♂♂, 4 ♀♀ (NHM): Gooligan Creek, Palmerston Highway, 18 miles SW Inisfail (town), leg. J. Balfour-Browne; 6 exs. (ANIC): 70 km SW Greenvale (mining settlement), at light, 14.–24.III.1995, leg. A.J. Watts; 1 ex. (ANIC): St. George River (= Kennedy River), 16.28°S 144.46°E, 22.V.1976, leg. E.B. Britton; 2 exs. (ANIC): Bushy Creek, Julatten (town), 16.37°S 145.21°E, from gravel at water’s edge, 30.XII.1968; 2 exs. (ANIC): Bushy Creek, Mossman – Mt. Lewis Road, 1,200 ft a.s.l., 30.X.1966; 1 ex. (ANIC): same sampling data, but 31.X.1966; 2 exs. (ANIC): Bushy Creek, Mossman – Mt. Lewis road near Julatten (town), 1,200 ft a.s.l., 30.X.1968; 2 exs. (ANIC): Boggy Creek, 75 km from Cooktown, 26.IV.1966, leg. E.B. Britton; 2 exs. (ANIC): Mary Creek, 22 km N Mt. Molloy, 14.III.1970, at light, leg. J.G. Brooks; 2 exs. (ANIC): Mulgrave River, Goldsborough Road Crossing, 17.13°S 145.45°E, 20.V.1976, leg. E.B. Britton; 1 ♂ (ANIC): Emu Creek, 13.43°S 142.55°E, 24.VI.1993, leg. P. Zborowski & I. Naumann; 1 ex. (ANIC): 16 km SSE of “Musselbrook Mining Camp”, 18.44°S 138.12°E, at light, 18.V.1995, leg. T. Weir; 2 exs. (ANIC): Musselbrook Creek, 15 km W by S “Musselbrook Mining Camp”, 18.37°S 137.59°E, at light, 14.V.1995, leg. T. Weir; 1 ex. (ANIC): ca. 17 km N Mt. Molloy Station, at light, 28.VI.1970, leg. J.G. Brooks; 1 ♂ (ANIC): Broken River, W of Mackay, 30.XI.1968, leg. S. Misko; 8 exs. (ANIC): Cardstone, 29.–31. XII.1965, 2.XI., 20.XI., 26.XI.1966, leg. K. Hyde; 1 ex. (ANIC): Cardstone, 14. II.1966, leg. K. Hyde; 1 ex. (ANIC): Green Hill, 19.XII.1967, leg. J.G. Brooks; 2 exs. (ANIC): Running River, 24 km W Paluma (town), 19.10°S 145.47°E, 2,310 ft a.s.l., pools in sandy river bed, 13.I.1970, leg. E. Britton & S. Misko; 1 ex. (ANIC): 21 miles S of Miriam Vale, 24.38°S 151.34°E, 14.XII.1968, leg. E. Britton & S. Misko; 2 exs. (ANIC): 3 km ENE Mt. Tozer, Iron Range N.P., 12.44°S 143.14°E, 28.VI.–4.VII.1986, leg. T. Weir & A. Calder; 1 ex. (ANIC): 11 km ENE Mt. Tozer, 12.43°S 143.14°E, 11.–16.VII.1986, leg. T. Weir & A. Calder; 1 ♂ (ANIC): 9 km ENE Mt. Tozer, 12.43°S 143.17°E, 5.–10.VII.1986, leg. T. Weir & A. Calder; 1 ex. (ANIC): Annan River, 3 km W by S of Black Mountain, 27.IX.1980, leg. D.H. Colless; 2 exs. (ANIC): Murray’s Creek, “Musselbrook Mining Camp”, 18.36°S 138.08°E, 10.V.1995, leg. T. Weir; 2 exs. (ANIC): Heathlands, near gravel pit, 11.45°S 142.35°E, at light, 9.XII.1992, leg. W. Dressier & P. Zborowski; 2 exs. (ANIC): Saltwater Creek, 14.47°S 143.30°E, 26.VI.1993, leg. P. Zborowski & I. Naumann; 3 exs. (ANIC, ZMUC): Duckhole Creek, 14.25°S 143.22°E, 25.VI.1993, leg. P. Zborowski & I. Naumann; 1 ♂ (ANIC): Wishaw Station near White Mountains N.P., 20.30°S 144.50°E, at light, 6.IV.2000, leg. T. Weir; 2 exs. (ANIC): White Mountains N.P., Rugged Gorge, camp, 20.23°S 144.47°E, 31.III.–3.IV.2000, leg. T. Weir; **Western Australia**: 2 exs. (ANIC): 0.5 km WNW of Millstream “HS”, 21.35°S 117.04°E, 2.IV.1971, leg. M.S. Upton & F.J. Mitchell; 2 exs. (ANIC): same sampling data, but 14.IV.1971; 2 exs. (ANIC): 3 km NW by W of Millstream “HS”, 21.34°S 117.03°E, 11.IV.1971, M.S. Upton & F.J. Mitchell; 1 ex. (ANIC): 5 km SE of Millstream “HS”, 21.37°S 117.06°E, 17.IV.1971, leg. M.S. Upton & F.J. Mitchell; 2 exs. (ANIC): Millstream, 21.35°S 117.04°E, in “gravel at margins of crossing pool”, 1.XI.1970, leg. M.S. Upton & F.J. Mitchell; 1 ex. (ANIC): same locality data, but “from gravel at edge of pool at pipe crossing”, 2.XI.1970, leg. M.S. Upton & F.J. Mitchell; 1 ex. (ANIC): same sampling data, but “gravel at water’s edge in pipe crossing pool”; 2 exs. (ANIC): same locality

data, but “waterside gravel in pipe crossing pool”, 5.XI.1970, leg. M.S. Upton & F.J. Mitchell; 1 ex. (ANIC): Mitchell Plateau, 10 km NW by N of Mining Camp, 11.V.1983, at light, leg. I. Naumann & J. Cardale.

**B R U N E I**: 5 exs. (NMW): Temburong Distr., Ulu Temburong N.P., Sungai (= River) Belalong, Belalong Field Research Center, 60 m a.s.l., 2.–8.V.1995, leg. E. Heiss.

**I N D O N E S I A**: **Bali Prov.**: 2 exs. (NMW): Gianyar Regency, Ubud Distr., deep ravine in “monkey forest”, stream, ca. 2 m wide, shaded, deeply carved in rock gorge, 23.I.1988, leg. M. Jäch “2”; 2 exs. (NMW): Gianyar Regency, Ubud Distr., river S of Ubud, ca. 10 m wide, tributary of Uos River, 23.I.1988, leg. M. Jäch “3”; 1 ex. (NMW): Gianyar Regency, Ubud Distr., small ravine at Penestanan (village), ca. 1–2 m wide, rocks, 15.II.1988, leg. M. Jäch “30”; 1 ♀ (CHB): Gianyar Regency, Ubud Distr., Monkey Forest, 300 m a.s.l., 10.–11.X.1990, leg. M. Balke & L. Hendrich “BA7”; 7 exs. (NMW): Karangasem Regency, Candi Dasa, puddles and river, ca. 10 m wide, 12.II.1988, leg. M. Jäch “27”; **Jawa Barat Prov.**: 1 ♀ (NMW): Pangandaran Regency, Pangandaran Nature Reserve, small stream, waterfall, ca. 50 m a.s.l., 21.I.1987, leg. M. Jäch “J13”; 7 ♂♂, 7 ♀♀ (NMW): Pangandaran Regency, near Pangandaran (town), large river with gravel bank, 23.I.1987, leg. M. Jäch “J16”; **Kalimantan Barat Prov.**: 1 ex. (NMW): Melawi (former Sintang) Regency, Nanga Ela, Nanga Nyuruh (town), 700 m a.s.l., 4.–10.VIII.1993, leg. J. Schneider; **Kalimantan Tengah Prov.**: 4 exs. (NMW): Katingan Basin, Tumbang Kaburai, Potai River, left tributary of Katingan, 16.VII.2005, leg. P. Mazzoldi; 1 ♂ (NMW): Kahayan Basin, Rowo River, sandy shore, primary forest, 23.VII.2004, leg. P. Mazzoldi; **Kalimantan Utara Prov.**: 1 ♂ (immature) (NMW): Malinau Regency, Kayan Selatan Distr., Apokayan Highlands, Sungai Barang (village), Lalut Wai, 850 m a.s.l., 1.I.1998, leg. P. Mazzoldi “17”; **Nusa Tenggara Barat Prov.**: 1 ex. (NMW): Lombok Island, Suranadi (Park), river, ca. 6–7 m wide, flowing over basalt, Sesaot, near Suranadi 6.II.1988, leg. M. Jäch “19”; 3 exs. (NMW): Lombok Island, Mt. Pusuk, S Pemenang, ca. 600 m a.s.l., 19.–25.XI.1999, leg. E. Heiss; 1 ♂ (ZSM): Sumbawa Island, Dompu – Huu, restwater pools, 8°37.724'S 118°29.624'E, 70 m a.s.l., 14.IX.2011; **Maluku Prov.**: 3 ♂♂ (NMW): Ambon Island, Natsepa, river with gravel, 26.II.1989, leg. M. Jäch “20”; 7 ♂♂, 4 ♀♀ (NMW): same sampling data, but leg. S. Schödl “20”; 1 ♂, 1 ♀ (NMW): Ambon, Waai (village), river on upper part of Mt. Salahutu, ca. 5–10 m wide, flowing through dense primary forest, 300–600 m a.s.l., 4.II.1989, leg. M. Jäch “8”; 3 ♂♂, 2 ♀♀ (NMW): Seram, Central Maluku Regency, North Seram Distr., Manusela N.P., path between Kaloa and Elemata/Makalaina, 300–600 m a.s.l., 14.II.1989, leg. M. Jäch “13”; **Maluku Utara Prov.**: 1 ex. (CSH): Bacan Island, 3 km S Labuha, river valley, 12.I.2006, leg. A. Skale “plantage + UWS”; 8 exs. (CSH): Bacan Island, ca. 3 km S Labuha, river valley, 0°40'28"N 127°28'44"E, 40 m a.s.l., 13.I.2006, leg. A. Skale “UWS”; 5 exs. (CSH): same locality, small river, ca. 2–3 m wide, flowing through secondary forest and plantations, 13.I.2006, leg. A. Weigel; 2 exs. (CSH): Bacan Island, Gorogoro, 0°23'27"N 127°36'33"E, riverside, 16.I.2006, leg. A. Skale; 5 exs. (CSH): Halmahera Island, 2–3 km N Dolik, Dolik River, 18.–20.I.2006, leg. A. Skale; 5 exs. (CSH): Halmahera Island, 7 km S Jailolo, 1°1'18"N 127°31'39"E, 200 m a.s.l., 26.–27.I.2006, leg. A. Skale “UWP + clearing”; **Papua Prov.**: 2 ♂♂ (HUB): Kali Utowa, trek Nabire – Ilaga, km 65, ca. 250 m a.s.l., 18.&19.VII.1991, leg. M. Balke & L. Hendrich “IR 91#21”; 2 exs. (NME): Jayapura Regency, Genyem, 50 m a.s.l., IV.–V. 1999, leg. M. Balke; 27 exs. (HUB, ZMUC): Nabire Regency, Kali Sanoba, E of Nabire, 2 m a.s.l., 4.X.1990, leg. M. Balke “IR 15”; 1 ex. (ZMUC): Nabire Regency, river near Nabire, 2 m a.s.l., 15.VII.1991, leg. M. Balke & L. Hendrich “IR 11”; 13 exs. (NMW): Nabire Regency, Siriwini River, 10 m a.s.l., 25.VIII.1996, leg. M. Balke “96#1”; 6 exs. (MZB, ZSM): Nabire Regency, road Nabire – Enarotlai, km 62, 3°31.684'S 135°42.802'E, 340 m a.s.l., 22.X.2011, UNCEN course; 1 ♂ (NME): Nabire Regency, road Nabire – Ilaga, 3°29.51'S 135°43.91'E, 750 m a.s.l., X.1997, 450 m a.s.l., leg. M. Balke “LEK”; 1 ♀ (NMW): Paniai Regency, road Nabire – Ilaga, km 62, 300 m a.s.l., 28.VIII.1996, leg. M. Balke “96#5”; 12 exs. (NMW): Paniai Regency, road Nabire – Ilaga, km 80, 200 m a.s.l., 12.IX.1996, leg. M. Balke “96#22”; 1 ♂, 2 ♀♀ (HUB): Paniai Regency, N of Nabire (town), river, 2 m a.s.l., 15.VII.1991, leg. M. Balke & L. Hendrich “IR 18”; 16 exs. (MZB, ZSM): Puncak Regency, S Iratoi forest, 3°36'S 137°30.1'E, 170 m a.s.l., 24.V.2015; **Papua Barat Prov.**: 3 exs. (CSH): Manokwari Regency, 13 km NE Ransiki, Kali Warbumi, 1°23.56'S 134°12.54', riverside, 6.III.2007, leg. A. Skale; 1 ♀ (CSH): Manokwari Selantan Regency, 14 km NE Ransiki (town), Oransbari Distr., Warbiati, 1°18.41'S 134°14.24'E, light trap, clear cutting area in secondary forest, 2.III.2007, leg. A. Weigel; 2 exs. (CSH): Raja Ampat Regency, Batanta Island, Arefi (village), 0°47'24.5"S 130°42'10"E, spring used by village, deep hole, ca. 2 m wide, with clear cool water and some vegetation, 16.I.2004, leg. A. Weigel; 3 exs. (NMW): Raja Ampat Regency, Batanta Island, 11 km W Yensawai, Marwey River, 17.I.2004, leg. A. Skale; 1 ♂ (NME): same sampling data, 0°49'53"S 130°34'55"E; 1 ♀ (NMW): Raja Ampat Regency, Batanta Island, 8 km S Waywasar, Rony River, 0°48'52"S 130°48'57"E, 14.I.2004, leg. A. Skale; 20 exs. (MZB, ZSM): Raja Ampat Regency, Batanta Island, Selatan, Wailebet, 16.II.2006; 14 exs. (NMW): Raja Ampat Regency, Salawati Island, Kalam, 0°57'11"S 130°40'11"E, 21.–24.I.2004, leg. A. Skale; 3 exs. (NMW): Raja Ampat Regency, Waigeo Island, Lopintol, 0°07'54"S 130°53'45"E, 11.I.2004, leg. A. Skale “UWP”; **Sulawesi Utara Prov.**: 1 ♀ (CSH): 1 km W Torout, Dumoga Bone N.P., 200–300 m a.s.l., 0°34'17"N 123°54'19"E, 1.–2.II.2006, leg. A. Skale; 5 exs. (CSH): 5 km S Lolak, Bolili village, Lombogon River, 40 m a.s.l., 0°49'89"N 124°1'89"E, 27.II.2009, leg. A. Skale “010”; 2 exs. (CSH): 5 km NE Tabulo, Bendungan village, 0°31'57"N 122°09'32"E, 15 m a.s.l.,

- 27.II.2009, leg. A. Skale "014"; **Sumatera Barat Prov.:** 3 ♂♂, 2 ♀♀ (NMW): Agam Regency, Bukittinggi (town), river in Sianok Canyon, 10.II.1991, leg. M. Jäch "11"; 4 ♂♂, 3 ♀♀ (NMW): same sampling data, but leg. Schödl; 2 ♀♀ (NMW): Agam Regency, Maninjau Lake, small pools in abandoned paddy fields, 8.II.1991, leg. M. Jäch "9"; 1 ♂, 1 ♀ (NMW): Agam Regency, Maninjau Lake, shore, 9.II.1991, leg. H. Schillhammer; 1 ♂ (NMW): Lima Puluh Kota Regency, Lembah Harau Nature Reserve, 15 km NE Payakumbu, 30 km E Bukittinggi, river, ca. 5–8 m wide, 11.II.1991, leg. M. Jäch "12b"; 1 ♀ (NMW): Pasaman Regency, Panti Nature Reserve, 300 m a.s.l., 5.II.1991, leg. S. Schödl "4"; 1 ex. (MZB): above Padang, Bukit Barisan N.P., 0°56.386'S 100°32.485'E, 930 m a.s.l., stream, 8.XI.2011, leg. M. Balke "UN2"; 1 ♂ (NMW): Mentawai Islands, Siberut, Toteburu – Bakeuluk, 17.II.1991, leg. M. Jäch "22"; **Sumatera Utara Prov.:** 11 exs. (NMW): Nias Island, South Nias Regency, Lahusa Distr., rivers, pools, and streams between Lahusa and Gomo, from the coast up to 300 m a.s.l., 9.–11.II.1990, leg. M. Jäch & S. Schödl "6"; 1 ♂ (NMW): Samsir Regency, Lake Toba, Samsir Island, 1,550 m a.s.l., 2.II.1991, leg. S. Schödl "1"; 1 ♂ (NMW): Langkat Regency, Medan – Bohorok, 28.II.1990, leg. H. Schillhammer.
- L A O S:** **Champsak Prov.:** 20 exs. (NMW): ca. 60 km S Pakse (City), 8 km S Ban Patoumphone, 24.V.1996, 80 m a.s.l., leg. H. Schillhammer "2"; **Houa Phan Prov.:** 1 ♀ (NMP): 25 km SE (by road) Vieng Xai (City), Kangpabong (village), 20°19'N 104°25'E, 14.–18.V.2001, leg. J. Bezděk; **Khammouan Prov.:** 7 exs. (NME): Ban Nasa, Boneng, 18°01.166'N 104°32.322'E, 180 m a.s.l., 22.XI.2010, leg. T. Ihle; 3 ♂♂ (NMW): Ban Khoun Ngeun, 18°07'N 104°29'E, 250 m a.s.l., 4.–30.XI.2000, leg. E. Jendek & P. Pacholátko.
- M A L A Y S I A:** **Johor:** 7 exs. (CHB, NMW): Sagamat Distr., Bekok, path to waterfall, 50–150 m a.s.l., in very small muddy pools filled with leaves, 10.IV.1997, leg. M. Balke & L. Hendrich; **Kedah:** 1 ♂, 1 ♀ (NMW): Langkawi Island, stream between Pantai Kok – Pantai Lalang, 5.II.1988, leg. M. Madl; 2 ♀♀ (NMW): Langkawi Island, river between Pantai Lalang and Ulu Melaka, 13.II.1988, leg. M. Madl; **Pahang:** 2 exs. (CHB): Lipis Distr., Kuala Lipis, 60 m a.s.l., small stream, 12.IV.1997, leg. M. Balke & L. Hendrich; 1 ♂ (CHB): Lipis Distr., Kuala Lipis, 60 m a.s.l., small pools in secondary forest, 13.IV.1997 leg. M. Balke & L. Hendrich; 1 ♀ (NMW): Raub Distr., 1 km W of Gap (town), 750–850 m a.s.l., 8.II.1992, leg. H. Schillhammer "18a"; **Perak:** 3 ♂♂ (NMW): Manjung Distr., Pangkor Island, west coast, Teluk Nipah (village), small pool, 25.I.1992, leg. M. Jäch "5"; **Sabah, Interior Division:** 22 exs. (NHM): Keningau Distr., Sook (village), 1,500 ft a.s.l., 17 miles SW Keningau, collected from gravel, 15.VIII.1977, leg. M.E. Bacchus; 1 ♀ (NHM): Keningau Distr., 5 miles S Mt. Trus Madi, 1,800 ft a.s.l., 18.–28.VIII.1977, collected from gravel, leg. M.E. Bacchus; **Sabah, Sandakan Division:** 20 exs. (NHM, ZMUC): Telupid Distr., Karamuak River, 7 miles SSE Telupid, 200 ft a.s.l., at light, 1.–7.IX.1977, leg. M.E. Bacchus; 1 ♂ (ZMUC): same sampling data, but "ex gravel"; **Selangor:** 1 ♀ (NMW): Gombak Distr., N Kuala Lumpur, stream, tributary of Gombak River, above jungle lodge 16.II.1993, leg. M. Jäch "1".
- M Y A N M A R:** **Sagaing Region:** 18 exs. (NMW): Kanbalu Distr., Kanbalu Township, Chatthin Wildlife Sanctuary, 23°31.481'N 95°38.804'E, ca. 260 m a.s.l., 9.X.1998, leg. H. Schillhammer "9"; 1 ♂ (NMW): Kanbalu Distr., Kanbalu Township, Chatthin Wildlife Sanctuary, 23°31.339'N 95°38.473'E, 230–245 m a.s.l., 9.X.1998, leg. H. Schillhammer "10"; 14 exs. (NMW): Kanbalu Distr., Kanbalu Township, Chatthin Wildlife Sanctuary, 23°31.324'N 95°38.417'E, ca. 210 m a.s.l., 9.X.1998, leg. H. Schillhammer "11".
- P A P U A N E W G U I N E A:** **Central Prov.:** 11 exs. (ZSM): Kokoda Trek, 14.339°S 147.36290°E, 590 m a.s.l., 1.2006, leg. Posma "PNG 170"; **East Sepik Prov.:** 1 ex. (NMW): Sepik-Ramu Basin, VII.–VIII.1988, leg. D. Dudgeon "6"; 6 exs. (ZSM): Prince Alexander Mts., Wewak – Angoram, 300 m a.s.l., 21.IV.2006, leg. M. Balke "PNG 46"; 16 exs. (ZSM): Lembena, 4°57.043'S 143°56.663'E, 180 m a.s.l., 2.IX.2009, leg. S. Ibalim & Pius "PNG 242"; 19 exs. (ZSM): Lembena, 4°46.974'S 143°56.995'E, 200 m a.s.l., 3.IX.2009, leg. S. Ibalim & Pius "PNG 243"; 1 ex. (ZSM): Lembena, 4°56.921'S 143°57.478'E, 335 m a.s.l., 10.IX.2009, leg. S. Ibalim & Pius "PNG 252"; **Madang Prov.:** 14 exs. (ZSM): Ohu Village, 5°13.923'S 145°40.763'E, 160 m a.s.l., 30.IV.2006, leg. M. Balke & M. Manaono "49"; 1 ex. (ZSM): Adelbert Mts., below Keki Lodge, 4°42.500'S 145°25.089'E, 790 m a.s.l., 5.V.2006, leg. M. Balke & M. Manaono "53"; 11 exs. (ZSM): Brahmin, 150 m a.s.l., 26.IX.2002, leg. M. Balke & K. Sagata "24"; 5 exs. (ZSM): Adelbert Mts., Keki Lodge, 4°43.058'S 145°24.437'E, 400 m a.s.l., 29.XI.2006, leg. Binatang Research Center staff "119"; **Morobe Prov.:** 1 ♂ (NHM): Lae – Bulolo road, 30.XII.1964, mud and muddy gravel by small shaded stream, leg. M.E. Bacchus "Stn. No. 135"; 1 ♀ (NHM): Lae – Bulolo road ca. 9 miles, mud and debris in small, clear stream, 30.XII.1964, leg. M.E. Bacchus "Stn. No. 130"; 12 exs. (NHM): Lae – Busu road, ca. 3 miles from Lae, gravel banks of small swift river, 21.I.1965, leg. M.E. Bacchus "Stn. No. 155a"; 1 ♂, 1 ♀ (NHM): Herzog Mts., Vagau, 4,100 ft a.s.l., muddy gravel banks of shallow clear swift river, 9.I.1965, leg. M.E. Bacchus "Stn. No. 147 B"; 32 exs. (NHM): Herzog Mts., Vagau, ca. 4,000 ft a.s.l., gravel banks of swift shallow clear river, 4.–17.I.1965, leg. M.E. Bacchus "Stn. No. 145A"; 1 ♂ (NHM): Herzog Mts., Vagau, ca. 4,000 ft a.s.l., 4.–17.I.1965, leg. M.E. Bacchus "Stn. No. 152"; 10 exs. (NHM): Herzog Mts., Vagau, ca. 4,000 ft a.s.l., 4.–17.I.1965, muddy gravel banks of large slow river, leg. M.E. Bacchus "Stn. No. 152A"; 2 exs. (NHM): Herzog Mts., Vagau, ca. 4,000 ft a.s.l., deep shaded pool of slow running river, 4.–17.I.1965, leg. M.E. Bacchus "Stn. No. 148A"; 33 exs. (NHM): Herzog Mts.,

Vagau, ca. 4,000 ft a.s.l., 4.–17.I.1965, gravel banks of slowly running river, leg. M.E. Bacchus “Stn. No. 148B”; **Oro Prov.:** 8 exs. (NHM): Sohe Distr., Kokoda, 1,200 ft a.s.l., VIII.1933, leg. L.E. Cheesman; **Sandaun Prov.:** 2 exs. (ZSM): Mianmin area, above 1,000 m a.s.l., 26.XII.2009, leg. S. Ibalim & Pius “PNG 233”; 2 exs. (ZSM): same locality and collectors, but 23.XII.2009, “PNG 240”.

**T H A I L A N D:** **Chiang Mai Prov.:** 2 ♂♂ (NMW): Chiang Mai Zoo, 18°49'N 98°57'E, at light, 18.–26.IV.1988, leg. P. Chantaramongkol & H. Malicky; 1 ♀ (NMW): same locality data, at light, 23.V.–1.VI.1988, leg. H. Malicky & P. Chantaramongkol; 2 exs. (NMW): same locality data, at light, 24.–31.X.1988, leg. H. Malicky & P. Chantaramongkol; 1 ex. (NMW): same locality data, at light, 10.–17.IV.1989, leg. P. Chantaramongkol & H. Malicky; 1 ♀ (NMW): Doi Inthanon N.P., Mae Klang Falls, 4.XI.1995, leg. H. Zettel “6”; 1 ex. (NMW): Mae Ping N.P., at light, 24.–25.VI.1991, leg. H. Malicky; **Chonburi Prov.:** 2 exs. (NME): Bang Lamung Distr., South Pattaya, 30.I.1995, leg. Wolf; **Loei Prov.:** 4 exs. (NMW): Tha Li Distr., Nam Khaem, 17°37.91'N 101°25.74'E, ca. 914 ft a.s.l., clear water, substrate of sand and gravel with emergent vegetation, intermittent stream with isolated pools, 8.III.1994, leg. W. Shepard “WDS A 1032”; **Mae Hong Son Prov.:** 1 ♀ (NMW): Huai Sua Tao (village), 11.–17.V.1992, leg. J. Strnad; **Mukdahan Prov.:** 1 ♀ (NMW): Phu Pha Thoep N.P., 1.I.2000, small pools on dry stream bed in shaded situation (gallery forest), leg. P. Mazzoldi “23”; **Nakhon Nayok Prov.:** 2 exs. (NMW): Khlong Maduea, 14°21'17"N 101°16'22"E, sunlit puddles in bed of dried up river, 16.III.2017, leg. H. Shaverdo “2017–Th–01A”; **Nakhon Ratchasima Prov.:** 1 ♂ (NMW): Khao Yai N.P., 14.XI.1988, leg. M. Jäch “2”; 1 ex. (EEM): Khao Yai N.P., Namtok Haeo Narok (= Heaw Narok Waterfall), 14°17'N 101°23'E, 400 m a.s.l., 5.IV.2004, leg. R.W. Sites & A. Vitheepadit “L–601”; **Phang Nga Prov.:** 2 exs. (CSH): Thai Mueang Distr., Lam Ru N.P., 6 km NE Lam Kaen, White Banana Waterfall, 8°37.324'N 98°18.362'E, 75 m a.s.l., river in dense secondary bamboo forest, 13.VIII.2012, leg. A. Skale; 2 exs. (CSH): same sampling data, but leg. A. Weigel; 1 ♂ (NMW): Mt. Khao Lak surround, 10.I.2003, leg. H. Forster; **Phetchabun Prov.:** 2 ♀♀ (NMW): Nam Nao N.P., Heo Sai, almost dried out stream with residual pools, partly deep, 25.XI.1995, leg. H. Zettel “24”; 3 exs. (NMW): near Nam Nao N.P., Route 2216, Khlong Choen, 16°40'29"N 101°44'1"E, puddles in bed of dried up river, 21.III.2017, leg. H. Shaverdo “2017–Th–05A”; 2 exs. (NMW): same sampling data, but “2017–Th–05C”; **Phrae Prov.:** 1 ♀ (NMW): 50 km NE Phrae, ca. 5 km SE Ban Huai Kaet, stream, ca. 4–6 m wide, rather fast flowing, almost without pools, in dense forest, 18.XI.1995, leg. H. Zettel “18a”; **Phuket Prov.:** 2 exs. (EEM): Thalang Distr., Thung Tien peat swamp, 8°7.256'N 98°18.165'E, 20 m a.s.l., 6.I.2006, leg. A. Vitheepadit, R.W. Sites & T. Prommi “L–893”; 3 exs. (EEM): Thalang Distr., Thung Tien peat swamp, ca. 8°7'N 98°18'E, 20 m a.s.l., 29.V.2006, leg. R.W.Sites, A. Vitheepadit & T. Prommi “L–811”; 1 ex. (EEM): Thalang Distr., 8°7'N 98°18'E, 20 m a.s.l., Jud peat swamp, 5.VIII.2005, leg. A. Vitheepadit, T. Prommi & K.B. Simpson “L–857”; **Surat Thani Prov.:** 7 ♂♂, 1 ♀ (NMW): Samui Island, Hin Ta and Hin Yai rocks, Lamai River, slow current, gravel, aquatic plants, 8.I.1988, leg. M. Madl; 2 exs. (NMW): Khao Sok N.P., 15.I.2003, leg. H. Forster; **Trat Prov.:** 1 ♂, 1 ♀ (NMW): Ko Chang Distr., Than Mayom, stream, 8.XII.1990, leg. M. Jäch “10”; 1 ♂, 1 ♀ (NMW): Ko Chang Distr., Klong Prao, roadside ditch, 11.XII.1990, leg. M. Jäch “13,1”.

**V I E T N A M:** **Gia Lai Prov.:** 12 exs. (NMW): An Khê Distr., 40 km NW An Khê, Buon Luoi, 620–750 m a.s.l., 14°10'N 108°30'E, 28.III.–12.IV.1995, leg. P. Pacholátko & L. Dembický.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. bacchusi*, *A. borneensis*, *A. confusus*, *A. imitans*, *A. manfredjaechi*, *A. papuanus*, *A. sarawakensis* and several species from China, Japan and the Indian Subcontinent (see under *A. bacchusi*). Differs in presence of nine antennomeres from *A. manfredjaechi*, in finer pronotal and elytral ground punctation from *A. confusus* and *A. sarawakensis*, in lighter coloration of elytra from *A. bacchusi* and *A. papuanus*, and in shorter maxillary palpi in relation to median pronotal length from *A. borneensis* and *A. sarawakensis*. Differs in features of aedeagus (parameres very slender with evenly rounded, slightly inclining apex, median lobe distinctly shorter than parameres) from all species.

**DESCRIPTION:** See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 201.

**ECOLOGY:** Collected in rivers, streams, pools (see also KOMAREK & HEBAUER 2018), in swamps, puddles, roadside ditches, lakes, and at light. In Indonesia found together with *A. geminus*, *A. jankodadai*, *A. musculus*, *A. nigroflavus*, *A. orientalis*, *A. papuanus*, *A. rhomboideus*, *A. skalei*, *A. sundaicus*; in Laos together with *A. arduus*, *A. confusus*, *A. connexus*, *A. imitans*, *A. lunaris*, and *A. masatakai*; in Malaysia together with *A. borneensis*, *A. connexus*,

*A. excisus*, *A. hortensis*, and *A. sucineus*; in Myanmar together with *A. masatakai*; in Papua New Guinea together with *A. papuanus*; in Thailand together with *A. connexus*, *A. heterochromatus*, *A. imitans*, *A. infuscatus*, *A. masatakai*, *A. mazzoldii*, *A. reticulatus*, and *A. siamensis*.

DISTRIBUTION (Fig. 276): Australia, Brunei, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Papua New Guinea, Sri Lanka, Taiwan, Thailand, and Vietnam. First record for Brunei, Indonesia, Laos, Myanmar, and Thailand.

*Agraphydrus coronarius* MINOSHIMA, KOMAREK & ÔHARA, 2015

*Agraphydrus coronarius* MINOSHIMA, KOMAREK & ÔHARA 2015: 41.

TYPE LOCALITY: Laos, Bolikhamxai Province, Khamkeut Distr., Lak Sao.

TYPE MATERIAL: See MINOSHIMA, KOMAREK & ÔHARA (2015). **Paratypes examined:** LAOS: **Bolikhamxai Prov.:** 7 exs. (KMNH, NMW): Khamkeut Distr., Lak Sao, 4.-6.XI.2004, leg. M. Satô.

ADDITIONAL MATERIAL EXAMINED:

L A O S: **Houa Phan Prov.:** 1 ♂ (NMP): Mt. Phou Pane, 20°13'09"-19°N 103°59'54"-104°0'3"E, 1,480-1,510 m a.s.l., 22.IV.-14.V.2008, leg. V. Kubán.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length of more than 2.0 mm, dark coloration of clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. biprojectus*, *A. helicopter*, *A. latus*, and some specimens of *A. masatakai*. Differs in larger size from *A. helicopter*; in distinct elytral systematic punctures from *A. masatakai*; in less broad body from *A. latus*. Coarse, but less distinct elytral systematic punctures with mesal punctures reaching anterior half of elytra but not reaching anterior margin are also present in *A. biprojectus*, *A. clarus*, *A. spadix*, and *A. spinosus*. Differs in slender maxillary palpi from *A. biprojectus*, in black clypeus from *A. clarus* and *A. spadix*, in presence of apical emargination on ventrite 5 from *A. spinosus*. Differs in features of aedeagus (e.g., parameres strongly narrowing apicad, apex with small hook-like extension) from all species mentioned.

DESCRIPTION: Total length: 2.5-2.8 mm; elytral width: 1.3-1.5 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 13) broad, elytra parallel-sided in anterior half, moderately convex.

Coloration: Labrum, clypeus, and frons black, clypeus with indistinctly defined yellow margins, maxillary palpi unicolored yellow; pronotum black with undefined, narrow, yellow margins; elytra black with dark brown, undefined lateral margins and posterior portion; ventrites and legs dark rufous.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 1.9; microsculpture absent, some wrinkles present along lateral margin; ground punctation fine, distinctly impressed, interspaces about 2-3 times as wide as punctures; systematic punctures distinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 149) moderately slender, 0.8-0.9 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0-1.1, palpomere 4 almost symmetrical. Mentum with moderately coarse, evenly distributed punctures.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation fine, as on pronotum or slightly coarser; with four rows of very distinct systematic punctures, mesal rows 1-3 with slightly reduced number of punctures, present in anterior half, but not reaching anterior margin. Mesoventrite with strong mesal bulge and low median carina posterior to bulge, terminating in triangularly shaped slope.

Femora (Fig. 82): Pubescence present on proximal 3/4 of profemur, slightly more extended on meso- and metafemur; hairlines slightly oblique.

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

Aedeagus (Fig. 202): Length: 0.44–0.45 mm. Phallobase about as long as wide, rectangularly bending to very narrow, long manubrium; border between pigmented and unpigmented portion of ventral face reaching mid-length; dorsal face very large, right and left parts meeting in midline. Parameres with almost evenly curving margins in proximal two thirds; apex strongly narrowed, with small hook-like lateral extension; basal portion of dorsal face slightly extending into phallobase. Median lobe small, narrow; dorsal face finger-shaped with bluntly rounded apex, distinctly shorter than parameres; ventral face wide, short; corona large, situated in mid-length; basal apophyses long, distinctly extending into phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. igneus*.

DISTRIBUTION (Fig. 270): Laos.

### *Agraphydrus delineatus* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kuching Division, Mt. Serapi, ca. 19 km W Kuching.

TYPE MATERIAL: **Holotype** ♂ (NMW): “SARAWAK (Borneo), \ Gunung (= Mount) Serapi, \ ca 19 km W Kuching | primary forest, \ III. 1994 \ J. Kodada leg.”. **Paratypes**: **INDONESIA: Kalimantan Timur Prov.**: 2 ♀♀ (NMW): Kutai Kartanegara Regency, Tabang Distr., ca. 200 km NW Samarinda (City), near Ritan Baru (village), small spring, 30.VII.1995, leg. P. Mazzoldi.

DIFFERENTIAL DIAGNOSIS: Shares mesoventral carina, absence of clypeal microsculpture, unicolored maxillary palpomeres and metafemoral pubescence on at least proximal 2/3 with *A. carinatus*, *A. exiguus*, *A. fasciatus* KOMAREK & HEBAUER, 2018, *A. fujianensis* KOMAREK & HEBAUER, 2018, *A. hortensis*, *A. niger* KOMAREK & HEBAUER, 2018, *A. rhomboideus*, and *A. tristis*. Differs in larger size from *A. carinatus*, in smaller size from *A. exiguus*, *A. rhomboideus*, and *A. tristis*, and in less broad body from *A. fasciatus*, *A. fujianensis*, *A. niger*, and *A. rhomboideus*. Shares absence of apical emargination of abdominal ventrite 5 with *A. fujianensis*. Differs in absence of rhombic macula on elytra from *A. rhomboideus*. Shares infuscated area in middle of elytral disc and pointed apex of parameres with *A. fasciatus*; differs in yellow clypeus from this species.

DESCRIPTION: Total length: 2.1–2.3 mm; elytral width: 1.0–1.1 mm; E.I.: 1.2–1.3, P.I.: 2.1–2.2, elytra 2.6–2.8 times as long as pronotum. Habitus (Fig. 14) moderately broad, widest in mid-length, moderately convex.

Coloration: Labrum and clypeus unicolored dark yellow; frons dark brown; maxillary palpi unicolored yellow; pronotum and elytra yellow; elytra with undefined, infuscated area in middle of elytral disc; ventrites rufous and legs dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 2.2–2.3; microsculpture absent; ground punctation fine, interspaces twice as wide as punctures; systematic punctures indistinct. Eyes small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi slender, as long as pronotum in midline, 0.9–1.0 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3–1.4, palpomere 4 almost symmetrical. Mentum with very fine, evenly distributed 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, with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low mesal carina in posterior third.

Femora (Fig. 83): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 203): Length: 0.30 mm. Phallobase almost as long as parameres, about as long as wide, abruptly narrowing to short manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with slightly curving margins, narrowing to pointed apex; basal portion of dorsal face distinctly extending into phallobase. Median lobe narrow, indistinctly narrowing to apex, not reaching apex of parameres; corona situated subapically; basal apophyses moderately long, distinctly extending into phallobase.

ECOLOGY: Collected in Indonesia in a spring together with *A. carinatus*, in Malaysia found together with *A. clarus*.

DISTRIBUTION (Fig. 273): Indonesia (Kalimantan), Malaysia (Sarawak).

ETYMOLOGY: The name *delineatus* (Latin adjective) (= drawn) refers to the conspicuous coloration of the elytra.

### *Agraphydrus engkari* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Sri Aman Division, Lubok Antu District, Batang Ai N.P., E of Bandar Sri Aman, Engkari River.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MALAYSIA: Sarawak 1993 \ Batang Ai NP, Engkari rv. [River] \ E Bandar Sri Aman [= Aman] \ 19.-20.2., leg. Zettel (7)". **Paratypes**: 3 ♂♂ (NMW): same sampling data; 1 ♀ (NMW): same locality data, but small stream, ca. 1 m wide, partly shaded, upstream of Sepaya, 20.II.1993, leg. M. Jäch "9".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, yellow clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. clarus*, *A. hamatus*, *A. muluensis*, *A. orbicularis*, and *A. spadix*. Shares obsolete pronotal ground punctation with *A. clarus*, differs in obsolete elytral systematic punctures (distinct in *A. clarus*) and stout maxillary palpi from this species. Differs in features of aedeagus (e.g., basal lobe more than 1.5 times as long as parameres) from all species.

DESCRIPTION: Total length: 2.1–2.5 mm; elytral width: 1.2–1.3 mm; E.I.: 1.2–1.3, P.I.: 2.3, elytra 2.9–3.1 times as long as pronotum. Habitus (Fig. 15) broad, evenly oval, elytra widest at anterior edge, moderately convex.

Coloration: Labrum and clypeus dark yellow, postero-mesal portion of clypeus infuscated in some individuals; frons black; maxillary palpi unicolored yellow; pronotum dark yellowish brown to black with narrow, undefined, yellow margins; elytra black; ventrites and legs rufous brown.

Head: Clypeus with straight anterior margin, C.I.: 4.4, lateral length ratio clypeus/eyes = 1.4; microsculpture absent; ground punctation obsolete; systematic punctures indistinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 150) 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 slightly asymmetrical. Mentum with very fine, very widely spaced, punctures, microsculpture absent.

Thorax: Pronotal ground punctation obsolete; systematic punctures very indistinct. Elytral ground punctation moderately fine, interspaces about 1–2 times as wide as punctures; systematic punctures obsolete. Mesoventrite with low mesal bulge.

Femora (Fig. 84): Pubescence present on proximal 2/3; hairlines oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 with flat apical emargination, ca. 15–20 µm deep.

Aedeagus (Fig. 204): Length: 0.34–0.39 mm. Phallobase distinctly longer than parameres, longer than wide, with large, indistinctly defined, broad, triangular manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres with semicircular lateral margins; apex bluntly rounded; basal portion of dorsal face very slightly extending into phallobase mesally. Median lobe abruptly narrowing in mid-length; apex bluntly rounded, exceeding apex of parameres; corona situated proximal to mid-length; basal apophyses moderately long, indistinctly extending into phallobase.

ECOLOGY: Collected in a river and in a stream.

DISTRIBUTION (Fig. 272): Malaysia (Sarawak).

ETYMOLOGY: The name refers to the Engkari River, where this species was collected. Noun in apposition.

### *Agraphydrus excisus* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kapit Division, Kapit District, ca. 25 km of E Kapit.

TYPE MATERIAL: **Holotype** ♂ (NMW): “SARAWAK (Borneo), \ ca 25 km E KAPIT \ III.1994, Kodada leg.”; collected in a small shallow stream (left tributary of Balleh River), ca. 3 m wide, 10–50 cm deep, completely shaded by the canopy of a degraded primary forest, near the “Rumah Kabau” (= house of Mr. Kabau, a wooden house in the forest), substrate consisting of small stones, gravel and some accumulated leaf packs among submerged wood; the locality was repeatedly sampled within several days along a ca. 700 m long section. **Paratypes: MALAYSIA: Sarawak:** 15 exs. (NMW): same sampling data; 1 ♀ (NMW): Kuching Division, Kubah N.P., Mt. Serapi, 20 km W Kuching, near Matang Wildlife Center, Sungai (= river) Cina, ca. 15 m wide, with large boulders, 6.–7.III.1993, leg. M. Jäch “23”; 1 ♀ (NMW): Miri Division, Kelabit Highlands, 5 km E Bario (village community), Pa’Ukat (village), 1,000 m a.s.l., 27.II.1993, leg. M. Jäch “15”; 1 ♀ (NMW): Miri Division, Kelabit Highlands, Bario (village community), 1,000–1,200 m a.s.l., forest stream, 1 m wide, 28.II.1993, leg. M. Jäch “16”; 1 ♀ (NMW): Miri Division, Kelabit Highlands, 1,000–1,200 m a.s.l., Bario (village community), Arur Dalam, stream flowing through rain forest, 26.II.–1.III.1993, leg. H. Zettel “11”; **Sabah, Interior Division:** 3 exs. (NMW): ca. 25 km SE Sapulut, Sabalangang River, in primary forest, 21.V.2001, leg. “J.F. Kočiam”; 12 exs. (NHM, NMW): Keningau Distr., 5 miles S Mt. Trus Madi, 1,800 ft a.s.l., 18.–28.VIII.1977, collected from gravel, leg. M.E. Bacchus; 1 ♀ (NMW): Keningau Distr., Crocker Range, Taman (= garden) Bandukan, small stream in primary forest, 24.V.1998, leg. J. Kodada & F. Čiampor; 2 exs. (NMW): Nabawan Distr., ca. 25 km S Sapulut, Batu Punggul, Sapulut River, flowing through primary forest, 24.V.2001, leg. “J.F. Kočiam”; 2 ♂♂ (NMW): Nabawan Distr., ca. 7 km S Sapulut, Saupi River, flowing through primary forest, ca. 500 m a.s.l., 17.V.2001, leg. “J.F. Kočiam”; 1 ♂ (NMW): Nabawan Distr., ca. 25 km SE Sapulut, Sabalangang River, in primary forest, 21.V.2001, leg. “J.F. Kočiam”; 1 ♀ (NMW): Nabawan Distr., Batu Punggul Resort, light trap, 24.VI.–1.VII.1996, “11g”; 2 ♂♂, 2 ♀♀ (NMW): Crocker Range, Tenom Distr., Tenom (town), Kalang Waterfall, 16.–18.V.1998, leg. J. Kodada & F. Čiampor; 2 exs. (NMW): Crocker Range, Tenom Distr., Tenom (town), Sinagang River, ca. 1,000 m a.s.l., 27.V.2001, leg. “J.F. Kočiam”; **Sabah, Sandakan Division:** 2 ♀♀ (NHM): Telupid Distr., Karamuak River, 7 miles SSE Telupid, 200 ft a.s.l., 1.–7.IX.1977, leg. M.E. Bacchus; **Sabah, Tawau Division:** 2 exs. (NMW): Labad Datu Distr., Pisang (village), tributary to Kuamut River, 29.VI.1998, leg. J. Kodada & F. Čiampor; 1 ex. (NMW): Labad Datu Distr., Danum Valley, Sapat Kalisan, 12.II.1997, leg. H. Zettel “15”; 10 exs. (NMW): Tawau Distr., Tawau Hills, Tawau River, 7.–10.VI.1998, leg. J. Kodada & F. Čiampor.

DIFFERENTIAL DIAGNOSIS: Shares narrowly microsculptured anterior clypeal margin, eight antennomeres, and small size (body length less than 2.0 mm) with *A. cantonensis* KOMAREK & HEBAUER, 2018, *A. musculus*, and *A. stramineus*. Shares apical incision of median lobe with

*A. nigroflavus* and *A. stramineus*; differs in inflated apex of parameres from both species. Differs moreover in equal ground punctation of pronotum and elytra, presence of dark lateral elytral band, and in large eyes from *A. stramineus*, in broader habitus from *A. musculus*, and in smaller size from *A. nigroflavus*.

DESCRIPTION: Total length: 1.8–1.9 mm; elytral width: 0.9–1.0 mm; E.I.:1.4, P.I.: 2.3, elytra 3.1 times as long as pronotum. Habitus (Fig. 16) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black, clypeus with yellow preocular patches, as wide as diameter of eye or smaller; maxillary palpi unicolored yellow; pronotum yellow, unicolored or with variably sized, oval, indistinctly defined, central infuscation not reaching anterior margin, about as wide as distance between eyes; elytra yellow to light brown with wide, dark brown to black lateral band, sutural region infuscated; ventrites black; proximal portion of femora dark brown, distal portion of femora and tibia yellowish brown.

Head (Fig. 175): Clypeus with distinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 1.9; microsculpture present at lateral and anterior clypeal margins, very narrowly mesally; ground punctures very fine, interspaces more than  $3 \times$  as wide as punctures; systematic punctures distinct. Eyes large, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.0–1.1 times as long as pronotum in midline, 0.8–0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3–1.5, palpomere 4 slightly asymmetrical. Mentum with few, very fine, punctures on lateral portions, 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, some additional subserial punctures present along lateral margins. Mesoventrite with mesal bulge.

Femora (Fig. 85): Pubescence present on proximal 2/3 of pro- and mesofemur with oblique hairline, on more than proximal half of metafemur with straight hairline.

Abdomen: Ventrite 5 with almost semicircular apical emargination, ca. 15–20  $\mu$ m deep.

Aedeagus (Fig. 205): Length: 0.25–0.28 mm. Phallobase as long as parameres, as wide as long, abruptly narrowing to moderately wide manubrium; border between pigmented and unpigmented portion of ventral face distinct, almost reaching manubrium; dorsal face large, lobes of both sides meeting in midline. Parameres with indistinctly curving margins and subapical constriction; apex broadly rounded; basal portion of dorsal face extending into distal third of phallobase. Median lobe wide; apex of dorsal face slightly shorter than ventral face, with crescent-shaped apical emargination, almost reaching apex of parameres; corona in subapical position; basal apophyses short, wide, narrowly separated, almost reaching mid-length of phallobase.

ECOLOGY: Collected in rivers, pools, streams, and at light; found together with *A. borneensis*, *A. cervus*, *A. clarus*, *A. coomani*, *A. jankodadai*, *A. musculus*, *A. nigroflavus*, *A. piceus*, *A. rhomboideus*, *A. sarawakensis*, and *A. stramineus*.

DISTRIBUTION (Fig. 274): Malaysia (Sabah, Sarawak).

ETYMOLOGY: The name excisus (Latin adjective) (= excised) refers to the excision of the apex of the median lobe.

### *Agraphydrus exiguus* sp.n.

TYPE LOCALITY: Malaysia, Pahang, Cameron Highlands District, Tanah Rata (town), Sungai Ruil near village of Orang Asli (= indigenous people).

TYPE MATERIAL: **Holotype** ♂ (NMW): “W.Malaysia / Cameron \ Highl., Tanah Rata, MA6 \ Sungai Rul n. [near] Orang Asli \ VIII. 1400m, 16.12. 1996, \ Hendrich leg.et Coll.”.

**DIFFERENTIAL DIAGNOSIS:** Shares mesoventral carina, absence of clypeal microsculpture, unicolorated maxillary palpomeres and metafemoral pubescence on at least proximal 2/3 with *A. carinatus*, *A. delineatus*, *A. fasciatus* KOMAREK & HEBAUER, 2018, *A. fujianensis* KOMAREK & HEBAUER, 2018, *A. hortensis*, *A. niger*, *A. rhomboideus*, and *A. tristis*. Shares moderately broad body with *A. carinatus* and *A. delineatus*. Differs in larger size from *A. carinatus*, *A. fujianensis*, and *A. niger*; in yellow clypeus from *A. fasciatus*, *A. fujianensis*, *A. niger*, and *A. tristis*; in absence of mesal notch on clypeal margin from *A. tristis*; in absence of rhombic elytral macula from *A. rhomboideus*; in presence of apical emargination of abdominal ventrite 5 from *A. delineatus* and *A. fujianensis*; in finer ground punctation from *A. hortensis*.

**DESCRIPTION:** Total length: 2.4 mm; elytral width: 1.3 mm; E.I.: 1.3, P.I.: 2.0, elytra 2.8 times as long as pronotum. Habitus (Fig. 17) moderately broad, evenly oval, moderately convex.

**Coloration:** Labrum yellowish brown, clypeus dark yellowish brown mesally with undefined brighter yellow lateral areas as wide as eye; frons black; maxillary palpi unicolorated yellow; pronotum yellow; elytra yellow with indistinct, undefined, darker brown area on disc and along lateral margins; ventrites dark brown to black; legs largely lighter brown.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.6, lateral length ratio clypeus/eyes = 2.5; microsculpture absent; ground punctation fine, distinctly impressed, interspaces about twice as wide as punctures; systematic punctures distinct. Eyes small, not protruding, slightly oblong. Antennae with eight 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 = 1.1, palpomere 4 slightly asymmetrical. Mentum with fine, evenly distributed punctures, microsculpture absent.

**Thorax:** Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low, fine, median carina in posterior third.

**Femora (Fig. 86):** Pubescence present on proximal 2/3 of pro- and mesofemur with oblique hairline, on proximal 3/4 of metafemur with straight hairline.

**Abdomen:** Ventrite 5 with almost semicircular apical emargination, ca. 25 µm deep.

**Aedeagus (Fig. 206):** Length: 0.39 mm. Phallobase as long as parameres, about as long as wide, abruptly narrowing to long, narrow manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with sigmoid margins, apex very narrowly rounded, inclining mesad, basal portion of dorsal face almost reaching mid-length of phallobase. Median lobe evenly narrowing to bluntly rounded apex, not reaching apex of parameres; corona situated slightly distal to mid-length; basal apophyses moderately long, extending to half-length of phallobase.

**ECOLOGY:** Collected in a very small muddy pool filled with leaves.

**DISTRIBUTION (Fig. 266):** Malaysia (Peninsula).

**ETYMOLOGY:** The name *exiguus* (Latin adjective) (= insignificant) refers to the insignificant and unspectacular appearance of the species.

*Agraphydrus floresinus* sp.n.

TYPE LOCALITY: Indonesia, East Nusa Tenggara Province, East Manggarai Regency, Borong District, Flores Island, Lake Ranamese, between Ruteng and Borong.

TYPE MATERIAL: **Holotype** ♂ (NMW): "FL 3- Flores, Danau [= Lake] Ranamese \ betw.[een] Ruteng and Mborong [= Borong] \ 1200m, 28.viii.1991".

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margins of clypeus, unicolored maxillary palpomeres, and body length of more than 1.9 mm, together with *A. brevipenis*, *A. jankodadai*, *A. mirabilis*, *A. nigroflavus*, *A. raucus*, *A. schoedli*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Differs in distinct, moderately coarse pronotal ground punctation from *A. jankodadai* and *A. sucineus*; in apical emargination of abdominal ventrite 5 from *A. brevipenis*. Differs in presence of nine antennomeres from *A. mirabilis*, *A. nigroflavus*, and *A. schoedli*. Shares dark brown pronotum with *A. schoedli*, *A. scintillans*, and *A. setifer*. Differs in smaller size and less broad habitus from *A. schoedli*, and in slightly smaller size and finer ground punctation from *A. scintillans* and *A. setifer*. Differs in features of aedeagus (e.g., parameres distinctly widening apicad) from all species.

DESCRIPTION: Total length: 2.2 mm; elytral width: 1.1 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 18) slender, evenly oval, moderately convex.

Coloration: Labrum and clypeus dark brown, clypeus with triangular, yellowish preocular patches as large as diameter of eye; frons black; maxillary palpi unicolored yellow; pronotum dark brown mesally, with narrow, indistinctly defined, yellow margins; elytra dark brown with indistinct dark lateral band; ventrites dark brown; legs largely lighter brown.

Head (Fig. 160): Clypeus with distinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 2.0; microsculpture present along anterior and lateral margins; ground punctation very fine, weakly impressed, interspaces 2–3 times as wide as punctures; systematic punctures moderately distinct. Eyes small, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.3 times as long as pronotum in midline, 1.2 times as long as maximum width of clypeus, palpomere 2 slightly curving mesad, length ratio palpomeres 4:3 = 1.4, palpomere 4 distinctly asymmetrical. Mentum with very fine, very widely spaced punctures on lateral portions, microsculpture absent.

Thorax: Pronotal ground punctation fine, slightly coarser than on frons and elytra, interspaces twice as wide as punctures; systematic punctures indistinct. Elytral ground punctation very fine, very indistinctly impressed; four rows of indistinct systematic punctures present, mesal rows 1–3 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low mesal bulge.

Femora (Fig. 87): Pubescence present on proximal 3/4; hairlines oblique.

Abdomen: Ventrite 5 with semicircular apical emargination.

Aedeagus (Fig. 207): Length: 0.33 mm. Phallobase longer than parameres, longer than wide, narrowing in basal fourth to wide manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres hatchet-shaped, evenly widening to truncate, very broad apex; basal portion of dorsal face distinctly extending into phallobase. Median lobe narrow, evenly converging to bluntly rounded apex, not reaching apex of parameres; corona situated subapically; basal apophyses short, narrowly separated, almost reaching mid-length of phallobase.

ECOLOGY: Collected in a stream.

DISTRIBUTION (Fig. 275): Indonesia (Flores).

ETYMOLOGY: The name refers to Flores (Indonesia), where this species was collected.

*Agraphydrus geminus* (ORCHYMONT, 1932)

*Helochares* (*Gymnhelochares*) *geminus* ORCHYMONT 1932: 694.

*Agraphydrus* (*Gymnhelochares*) *geminus* (ORCHYMONT): HANSEN 1991: 292, 1999b: 157.

*Agraphydrus geminus* (ORCHYMONT): KOMAREK & HEBAUER 2018: 17; PRZEWOŻNY 2019: 25.

TYPE LOCALITY: Indonesia, West Java Province, Subang Regency, Tjibodas Stream.

TYPE MATERIAL: **Holotype** ♂ (ISNB): “♂ | JAVA Tjibodas \ Bach unterhalb des Gart. [stream below garden; handwritten] \ 15 7 29 [handwritten] Exp. Thienemann | Gymnhelochares \ geminus \ nov. sp. \ TYPE [handwritten white label] | TYPE [red label]”; collected in a stream in ca. 1,400 m a.s.l., sampling locality “F y 14c” (ORCHYMONT 1932: 634, 537, 694). **Paratype** ♀ (ISNB): same sampling data.

ADDITIONAL MATERIAL EXAMINED:

INDONESIA: **Jawa Barat Prov.**: 9 exs. (NMW): Bogor Regency, Mt. Salak, 8 km S Bogor, Ciapus River, ca. 800 m a.s.l., river bed ca. 20 m wide, running water ca. 2 m wide, very shallow, gravel, boulders, 17.VIII.1994, leg. R. Schuh; 2 exs. (NMW): same sampling data, but 31.VII.1994; 1 ♀ (NMW): Pangandaran Regency & Distr., Pangandaran Nature Reserve, small stream, waterfall, ca. 50 m a.s.l., 21.I.1987, leg. M. Jäch “J13”; **Sumatera Barat Prov.**: 4 ♂♂ (NMW): Padang City, Bungus Beach, 14.II.1991, leg. M. Jäch “17”; 3 ♀♀ (NMW): same sampling data, but leg. S. Schödl; 1 ♂, 2 ♀♀ (NMW): Padang City, Bungus Beach, waterfall river at Bungus Beach, volcanic, 10 m a.s.l., 14. & 23.II.1991, leg. M. Jäch “18”; 2 ♂♂ (NMW): same label data, but leg. S. Schödl; 1 ♀ (NMW): Lima Puluh Kota Regency, Lembah Harau Nature Reserve, 15 km NE Payakumbu, 31 km E Bukittinggi, small stream in primary forest through deep gorge, 11.II.1991, leg. M. Jäch “12c”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with strongly reduced metafemoral pubescence and absence of clypeal microsculpture, together with *A. anacaenoides*, *A. infuscatus*, and *A. tulipa*. These species also share dark dorsal coloration, broad habitus, short maxillary palpi, and absence of emargination of abdominal ventrite 5. Differs in absence of apical infuscation on palpomere 4, and presence of eight antennomeres from *A. infuscatus*, and in larger average body size from *A. tulipa* and *A. anacaenoides*. Shares small eyes with *A. anacaenoides*, stout palpi with *A. infuscatus*. Shares strongly convex habitus, black coloration, absence of clypeal microsculpture, eight antennomeres, reduced metafemoral pubescence, and absence of apical emargination on ventrite 5, also with *A. calvus* and *A. indicus*. Differs in presence of micropunctures surrounding ground punctures, in metafemoral pubescence present on basal fifth, and in features of aedeagus (parameres with strongly sigmoid margins and slightly inflated apex, dorsal face of median lobe leaf-shaped) from all species.

DESCRIPTION: Total length: 2.0–2.3 mm; elytral width: 1.1–1.3 mm; E.I.: 1.1–1.2, P.I.: 2.3–2.4, elytra 2.5–2.9 times as long as pronotum. Habitus (Fig. 19) broad, evenly oval, strongly convex.

Coloration: Labrum, clypeus and frons black, clypeus with narrow, indistinct, undefined bright lateral margins in some individuals; maxillary palpi unicolored yellow; pronotum black with very narrow, undefined, rufous margins; elytra black with narrow, undefined light brown lateral margins; ventrites black; legs dark brown to black.

Head (Fig. 161): Clypeus with indistinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 2.2–2.3; microsculpture absent; ground punctation fine, interspaces 1–2 times as wide as punctures; each puncture surrounded by 4–6 micropunctures; systematic punctures indistinct. Eyes small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi (Fig. 151) stout, 0.7–0.9 times as long as pronotum in midline, 0.6–0.7 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1–1.2, palpomere 4 almost symmetrical. Mentum with obsolete punctation, microsculpture absent.

Thorax: Pronotal ground punctation as on head, surrounded by 4–6 micropunctures; systematic punctures moderately distinct. Elytral ground punctation coarser than on head and pronotum, surrounded by 2–4 micropunctures, situated at border of cavity of punctures or in interspaces. Four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with indistinct crescent-shaped mesal elevation.

Femora (Fig. 88): Short, stout. Pubescence present on less than proximal half of pro- and mesofemur, on proximal 1/5 of metafemur; hairlines slightly oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 208): Length: 0.23–0.27 mm. Phallobase about as long as parameres, bending rectangularly to distinct, moderately wide manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with distinctly sigmoid margins, with constriction distal to mid-length; apex wide, bluntly rounded, slightly inflated, slightly inclining mesad; basal portion almost reaching mid-length of phallobase mesally. Median lobe with ventral face narrowing in mid-length, with bluntly rounded apex, almost reaching apex of parameres; dorsal face much shorter and wider, leaf-shaped, with distinctly arcuate lateral margins and strong apical incision; corona situated in basal third; basal apophyses moderately long, widely separated, indistinctly extending into phallobase.

ECOLOGY: Collected in streams and rivers, and possibly in a hygropetric habitat; found together with *A. coomani*, *A. orientalis*, *A. raucus*, and *A. sundaicus*.

DISTRIBUTION (Fig. 273): Indonesia (Java, Sumatra).

### *Agraphydrus hamatus* sp.n.

TYPE LOCALITY: Vietnam, Hòa Bình Province, Lạc Tho.

TYPE MATERIAL: **Holotype** ♂ (ISNB): “Lac Tho \ de Cooman [handwritten, glued on a yellow card:] Coll. R. I. Sc. N. B. \ Nord Vietnam”. **Paratypes**: **VIETNAM: Hòa Bình Prov.:** 1 ♀ (ISNB): same sampling data; **Lào Cai Prov.:** 1 ♂, 2 ♀ (EUM): Pass north of Mt. Phang Si Pang (= Fansipan), 1,700–1,850 m a.s.l., 9.X.1994, leg. M. Sató.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, yellow clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. clarus*, *A. engkari*, *A. muluensis*, *A. orbicularis*, and *A. spadix*. Differs in fine pronotal ground punctation from *A. clarus* and *A. engkari* and in features of aedeagus (e.g., apex of parameres with hook-shaped lateral extension) from all species.

DESCRIPTION: Total length: 2.4–2.5 mm; elytral width: 1.3 mm; E.I.: 1.2–1.3, P.I.: 2.2, elytra 2.8–3.0 times as long as pronotum. Habitus (Fig. 20) broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and antero-lateral portion of frons yellowish brown, posterior portion of frons dark brown (holotype), or clypeus and frons dark brown with indistinctly defined yellow preocular patches (paratypes); maxillary palpi unicolored yellow; pronotum yellowish brown with dark brown mesal infuscation; elytra yellowish to dark brown; ventrites and legs dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.3, lateral length ratio clypeus/eyes = 1.5–1.6; microsculpture absent; punctures moderately fine, distinctly impressed, interspaces 1–2 times as wide as punctures; systematic punctures indistinct. Eyes large, not protruding,

slightly oblong. 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 = 1.2, palpomere 4 almost symmetrical. Mentum with very fine, evenly distributed punctures, microsculpture absent.

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

Femora (Fig. 89): Pubescence present on proximal 3/4, slightly more extended on metafemur than on pro- and mesofemur; hairlines straight.

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

Aedeagus (Fig. 209): Length: 0.51 mm. Phallobase slightly longer than wide, shorter than parameres; border between pigmented and unpigmented portion of ventral face reaching mid-length. Parameres moderately wide, margins almost parallel-sided in basal two thirds, with strong subapical constriction; apex obliquely truncate, with hook-shaped subapical lateral extension; basal portion of dorsal face reaching distal third of phallobase. Median lobe narrow, with almost parallel-sided margins; apex with shallow indentation, not reaching apex of parameres; ventral face slightly wider and shorter than dorsal face; corona situated in proximal third; basal apophyses moderately long, almost reaching mid-length of phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 270): Vietnam.

ETYMOLOGY: The name *hamatus* (Latin adjective) (= hook-shaped) refers to the shape of the apex of the parameres.

### *Agraphydrus helicopter* sp.n.

TYPE LOCALITY: Malaysia, Johor, Gunung Ledang N.P., Gunung Ledang (= Mt. Ophir), Hutan (= forest) Lipur.

TYPE MATERIAL: **Holotype** ♂ (NMW): “MALAYSIA 1992 \ leg. Schillhammer | Prov. JOHOR 4.2. \ Gg.Ledang (14) \ Hutan Lipur 200m”. **Paratypes**: **MALAYSIA**: **Johor**: 4 ♀♀ (NMW): same sampling data; **Penang**: 2 ♀♀ (NMW): Southwest Penang Distr., Pantai Aceh Forest Reserve (= Penang N.P.), 28.I.1992, leg. M. Jäch “10”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 1.8 mm, dark coloration of clypeus, absence of clypeal microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. biprojectus*, *A. coronarius*, *A. latus*, and some specimens of *A. masatakai*. Differs in indistinct elytral systematic punctures from *A. biprojectus* and *A. coronarius*, in black (in contrast to brown) coloration of pronotum and elytra from *A. masatakai*. Differs in smaller size and features of aedeagus (e.g., parameres with large apical hook) from all species mentioned.

DESCRIPTION: Total length: 1.9–2.1 mm; elytral width: 1.0–1.3 mm; E.I.: 1.1–1.2, P.I.: 2.2–2.3, elytra 2.7–2.8 times as long as pronotum. Habitus (Fig. 21) broad, evenly oval, moderately convex, margins of elytra very weakly explanate apically.

Coloration: Labrum dark red, clypeus black with undefined orange lateral margins; frons black; palpomeres unicolored yellow; pronotum black with undefined yellow margins; elytra black; ventrites ferruginous; legs lighter colored.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 2.5; very indistinct, narrow microsculpture present along lateral margins, absent from anterior margin and from disc; ground punctation fine, weakly impressed, interspaces 3–5 times as wide as punctures; systematic punctures moderately distinct. Eyes moderately small, not protruding, slightly oblong. 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 = 1.1–1.3, palpomere 4 almost symmetrical. Mentum with very fine punctures, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation coarser than on head and pronotum, interspaces about twice as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low horizontal crescent-shaped mesal ridge.

Femora (Fig. 90): Pubescence present on proximal 2/3; hairlines straight to slightly oblique.

Abdomen: Ventrite 5 with very shallow indistinct apical emargination.

Aedeagus (Fig. 210): Length unknown, phallobase of holotype lost. Parameres wide, with very large subapical incision laterally; apex with long, narrow, hook-shaped extension; mesal margins almost straight, basal portion reaching deep into phallobase. Median lobe with distinctly separated ventral and dorsal face; lateral margins evenly converging to narrowly rounded apex, not reaching apex of parameres; ventral face wider than dorsal face; corona situated in mid-length; basal apophyses short.

ECOLOGY: In Penang collected together with *A. anacaenoides*, and *A. penangensis*; in Johor found together with *A. sucineus*.

DISTRIBUTION (Fig. 266): Malaysia (Peninsula, Penang).

ETYMOLOGY: The name refers to the fact that specimens of *Agraphydrus* can fly off very quickly, especially when caught in a net, thereby resembling tiny helicopters. Noun in apposition.

### *Agraphydrus hendrichi* sp.n.

TYPE LOCALITY: Malaysia, Pahang, Taman Negara N.P., surroundings of Nusa Camp.

TYPE MATERIAL: **Holotype** ♂ (NMW): “W.Malaysia / Pahang /Taman \ Negara N.P., Surr.[oundings of] Nusa Camp, \ 100m, 18.-24.6.1994, small \ pools in temp. foreststr.. [forest stream] MA 5, \ Hendrich leg.”; collected in very a small muddy pool filled with leaves. **Paratypes**: **MALAYSIA: Pahang**: 39 exs. (CHB, NMW): same sampling data; 31 exs. (NMW): Lipis Distr., Kuala Lipis, Kenong Rimba Park, Kenong River, 5.VI.2001, leg. J. Kodada & F. Čiampor; 25 exs. (NMW): Lipis Distr., Kuala Lipis, Hutan Lipur Terenggun, 4.VI.2001, small, 1–2 m wide, shaded, slowly flowing stream in primary forest, margins with decaying leaves; 33 exs. (NMW): same locality data, but, lake in secondary forest, shallow, warm, with little subaquatic vegetation; 1 ♂ (NMW): Lipis Distr., Kuala Lipis, Malaka (village), in shallow, cold, fast flowing stream, 2–3 m wide, 0.2–0.5 m deep, in dense secondary forest, substrate: sand and stones, 6.VI.2001; 1 ♂ (NMW): Lipis Distr., Kuala Lipis, Kenong Rimba Park, Kenong River, 5.VI.2001, leg. “J.F. Kočiam”; 1 ♀ (CHB): Genting Highlands, Awana Resort, jungle track, 1,200 m a.s.l., 28.VI.1994, leg. L. Hendrich “MA 9”; **Perak**: 1 ♂ (NMW): Hulu Perak Distr., Belum N.P., ca. 5°30'7"N 101°26'21"E, 250 m a.s.l., 21.III.–14.IV.1994, light trap, leg. I. Sivec.

DIFFERENTIAL DIAGNOSIS: Shares entirely microreticulate yellow clypeus, unicolored maxillary palpomeres, nine antennomeres, absence of pronotal microsculpture, and yellow pronotum with *A. heterochromatus*, *A. nemorosus*, and *A. vietnamensis*. Differs in smaller body size, maxillary palpi slightly longer than median length of pronotum, finer, weakly impressed, pronotal ground punctation, and indistinct elytral systematic punctures from *A. vietnamensis*.

Differs in minor extension of profemoral pubescence from *A. nemorosus*, in less broad body and equal coloration of pronotum and elytra from *A. heterochromatus*. Differs in features of aedeagus (parameres with strong beak-shaped lateral extension, median lobe narrowed in mid-length) from all species mentioned.

DESCRIPTION: Total length: 2.2–2.6 mm; elytral width: 1.1–1.2 mm; E.I.: 1.3–1.4, P.I.: 2.2, elytra 2.8 times as long as pronotum. Habitus (Fig. 22) moderately broad, evenly oval, moderately convex.

Coloration: Labrum and clypeus yellow; frons yellow anteriorly, dark brown posteriorly; maxillary palpi unicolored yellow; pronotum unicolored yellowish brown; elytra yellowish brown with darker brown lateral margins; ventrites dark brown; legs light brown.

Head: Clypeus with indistinctly concave anterior margin, C.I.: 3.9, lateral length ratio clypeus/eyes = 1.5; entirely microreticulate; ground punctation very fine, very weakly impressed, widely spaced; systematic punctures indistinct. Eyes large, slightly protruding, oval. 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 = 1.2, palpomere 4 slightly asymmetrical. Mentum with coarse, confluent punctures in lateral thirds, 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 slight mesal bulge.

Femora (Fig. 91): Pubescence present on proximal 2/3; hairlines slightly oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 with semicircular apical emargination.

Aedeagus (Fig. 211): Length: 0.31–0.35 mm. Phallobase shorter than parameres, about as long as wide, bending in blunt angle to triangular manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres with distinctly sigmoid margins, with distinct subapical constriction; apex truncate, with strong lateral extension; basal portion of dorsal face almost reaching mid-length of phallobase. Median lobe narrowed in mid-length; distinctly bending dorsad; apex blunt, wide, reaching apex of parameres; corona situated slightly distal to mid-length; basal apophyses very short, stout, reaching basal third of phallobase.

ECOLOGY: Collected in rivers, streams, small pools, in a lake, and at light; found together with *A. jaechi*, *A. heterochromatus*, and *A. sucineus*.

DISTRIBUTION (Fig. 267): Malaysia (Peninsula).

ETYMOLOGY: The species is dedicated to the collector Lars Hendrich (Berlin, Germany).

### *Agraphydrus heterochromatus* sp.n.

TYPE LOCALITY: Malaysia Penang, George Town City, Botanic Gardens (= Waterfall Gardens).

TYPE MATERIAL: **Holotype** ♂ (NMW): “MALAYSIA 28 . 1 . 1988 \ Penang Bot . Garden \ leg . Madl”; collected in a stream with slow current, little water, substrate of gravel. **Paratypes**: **MALAYSIA: Penang**: 1 ♂ (NMW): same sampling data; 1 ♀ (NMW): Southwest Penang Distr., Teluk Bahang (town), streams in Forestry Museum at Teluk Pahang, 26.I.1992, leg. M. Jäch “8”; 1 ♀ (NMW): Georgetown Distr., Forest Recreation Park, next to Butterfly Farm, stream, 25.–28.I.1988, leg. M. Madl; 1 ♂ (NMW): Southwest Penang Distr., Titi Kerawang Waterfalls, below waterfall, 28.I.1992, leg. M. Jäch “11”; **Pahang**: 2 exs. (CHB): Taman Negara N.P., Nusa Camp,

100 m a.s.l., 18.–24.VI.1994, temporary forest stream with small muddy pools filled with leaves, leg. L. Hendrich “MA 5”; 1 ♀ (CHB): Genting Highlands, Awana Resort, jungle track, 1,200 m a.s.l., in a very small muddy pool filled with leaves, 28.VI.1994, leg. L. Hendrich “MA 9”; **THAILAND: Phang Nga Prov.:** 1 ♂ (CSH): Thai Mueang Distr., Lam Ru N.P., 6 km NE Lam Kaen, White Banana Waterfall, 8°37.324'N 98°18.362'E, 75 m a.s.l., river in dense secondary bamboo forest, 13.VIII.2012, leg. A. Skale; 3 exs. (NMW): E of Lam Pi N.P., Ton Prai Waterfall, 28.XI.2006, leg. H. Zettel “42”.

**DIFFERENTIAL DIAGNOSIS:** Shares entirely microreticulate, yellow clypeus, unicolored maxillary palpomeres, nine antennomeres, absence of pronotal lateral microsculpture and yellow pronotum with *A. hendrichi*, *A. nemorosus*, and *A. vietnamensis*. Differs in smaller size, maxillary palpi slightly longer than pronotum in midline, very fine pronotal ground punctation, finer than elytral ground punctures, and indistinct elytral systematic punctures from *A. vietnamensis*. Differs in larger extension of profemoral pubescence from *A. nemorosus*, in broader habitus and yellow pronotum contrasting with dark brown elytra from *A. hendrichi*. Differs in features of aedeagus (e.g., parameres almost parallel-sided, widening at apex, and dorsal face of median lobe with long, narrow styli) from all species.

**DESCRIPTION:** Total length: 2.1–2.3 mm; elytral width: 1.1–1.2 mm; E.I.: 1.2–1.3, P.I.: 2.2, elytra 2.8–2.9 times as long as pronotum. Habitus (Fig. 23) broad, evenly oval, moderately convex.

**Coloration:** Labrum yellow; clypeus yellow, unicolored or infuscated mesally; frons dark brown to black; maxillary palpi unicolored yellow; pronotum unicolored yellow; elytra dark brown; ventrites and legs dark brown.

**Head:** Clypeus with indistinctly concave anterior margin, C.I.: 3.8, lateral length ratio clypeus/eyes = 1.7–1.8; entirely microreticulate; ground punctation very fine, widely spaced; systematic punctures indistinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres, palpomere 4 minute. Maxillary palpi slender, 1.1–1.2 times as long as pronotum in midline, 1.0–1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2–1.3, palpomere 4 almost symmetrical. Mentum with fine punctures laterally, microsculpture absent.

**Thorax:** Pronotal ground punctation very fine, very weakly impressed; systematic punctures indistinct. Elytral ground punctation coarser than on head and pronotum, interspaces 2–3 times as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

**Femora (Fig. 92):** Pubescence present on proximal 2/3; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

**Abdomen:** Ventrite 5 with shallow apical emargination.

**Aedeagus (Fig. 212):** Length: 0.26–0.31 mm. Phallobase longer than parameres, longer than wide, abruptly bending to triangular manubrium; border between pigmented and unpigmented portion of ventral face very indistinct. Parameres with almost parallel-sided margins; apex truncate, widening laterad and mesad; basal portion not extending into phallobase. Median lobe broad, about as wide as parameres; dorsal face with pair of long, narrow, styli; apex wide, bluntly rounded, reaching apex of parameres; ventral face distinctly shorter than dorsal face; corona situated slightly distal to mid-length; basal apophyses short, widely separated, slightly extending into phallobase.

**ECOLOGY:** Collected in streams, and pools; in Malaysia found together with *A. anacaenoides*, *A. hendrichi*, *A. jaechi*, *A. penangensis*, and *A. sucineus*; in Thailand together with *A. connexus*, *A. coomani*, and *A. imitans*.

DISTRIBUTION (Fig. 271): Malaysia (Peninsula, Penang), Thailand.

ETYMOLOGY: The name is derived from *héteros* (Greek adjective) (= different) and *chróma* (Greek noun) (= color), and refers to the differently colored pronotum and elytra. Used as an adjective.

*Agraphydrus hortensis* sp.n.

TYPE LOCALITY: Malaysia, Penang, George Town City, Botanic Garden.

TYPE MATERIAL: **Holotype** ♂ (NMW): “MALAYSIA 27.1.1992 \ PENANG: \ Botan. Garten [Botanic Garden] \ leg. Jäch (9)”; collected in a stream with huge boulders. **Paratypes**: **MALAYSIA: Penang**: 2 ♂♂, 1 ♀ (NMW): same sampling data; **Johor**: 1 ex. (NMW): Johor, Sagamat Distr., Bekok, path to waterfall, 50–150 m a.s.l., in a very small muddy pool filled with leaves, 10.IV.1997, leg. M. Balke & L. Hendrich.

DIFFERENTIAL DIAGNOSIS: Shares mesoventral carina, absence of clypeal microsculpture, unicolored maxillary palpomeres and metafemoral pubescence on at least proximal 2/3 with *A. carinatus*, *A. delineatus*, *A. exiguus*, *A. fasciatus* KOMAREK & HEBAUER, 2018, *A. fujianensis* KOMAREK & HEBAUER, 2018, *A. niger*, *A. rhomboideus*, and *A. tristis*. Differs in larger size from *A. exiguus*, in yellow clypeus from *A. fasciatus*, *A. fujianensis*, *A. niger*, and *A. tristis*, in absence of rhombic elytral macula from *A. rhomboideus*, in presence of emargination of abdominal ventrite 5 from *A. delineatus* and *A. fujianensis*. Differs in coarser ground punctation and features of aedeagus (e.g., pyramid-shaped median lobe) from all species mentioned.

DESCRIPTION: Total length: 2.1–2.6 mm; elytral width: 1.1–1.7 mm; E.I.: 1.2–1.4, P.I.: 1.9–2.0, elytra 2.8–2.9 times as long as pronotum. Habitus (Fig. 24) moderately broad, elytra widest in mid-length, moderately convex.

Coloration: Labrum and clypeus yellow, slightly darkened mesally; frons dark brown to black; maxillary palpi unicolored yellow; pronotum and elytra unicolored dark yellow; ventrites and legs dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 3.8; microsculpture absent; ground punctation moderately fine, distinctly impressed, interspaces 1–2 times as wide as punctures; systematic punctures distinct. Eyes small, not protruding, oblique. Antennae with eight antennomeres. Maxillary palpi slender, 1.1–1.2 times as long as pronotum in midline, 1.1–1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1, palpomere 4 almost symmetrical. Mentum with fine punctures, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum, with subserial arrangement on some places, interspaces 1–2 times as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low median carina in posterior half.

Femora (Fig. 93): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines slightly oblique on pro- and mesofemur, slightly convex on metafemur.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 213): Length: 0.33–0.36 mm. Phallobase shorter than parameres, about as long as wide, abruptly bending to triangular manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with indistinctly curving margins; apex narrowly rounded, slightly inclining mesad; basal portion of dorsal face reaching distal third of phallobase. Median lobe with pyramid-shaped dorsal face; apex narrowly rounded, not reaching apex of parameres; pair of short styli present; ventral face distinctly shorter and wider than dorsal

face; corona situated distal to mid-length; basal apophyses broad, reaching mid-length of phallobase.

ECOLOGY: Collected in a stream and in small pools; found together with *A. anacaenoides*, *A. connexus*, *A. coomani*, *A. penangensis*, and *A. sucineus*.

DISTRIBUTION (Fig. 269): Malaysia (Peninsula, Penang).

ETYMOLOGY: The name *hortensis* (Latin adjective) (= belonging to garden) refers to the botanical garden of Penang (Malaysia) where the holotype was collected.

### *Agraphydrus igneus* KOMAREK & HEBAUER, 2018

*Agraphydrus igneus* KOMAREK & HEBAUER 2018: 43; PRZEWOŹNY 2019: 26.

TYPE LOCALITY: China, Hong Kong, Lantau Island, Ngong Ping village, near Po Lin Monastery.

TYPE MATERIAL: See KOMAREK & HEBAUER (2018). **Paratypes from LAOS examined:** Houa Phan Prov.: 1 ♂ (NMP): Mt. Phou Pane, 20°13'1"-2°N 103°59'5"-104°0'3"E, 1,480–1,510 m a.s.l., 22.IV.–14.V.2008, leg. V. Kubáň; **Bolikhambxai Prov.:** 1 ♂, 1 ♀ (KMNH): National Road 8, 2 km SSW of Nam Phao border, near Houay Boddod Bridge, 18°22.3'N 105°9.1'E, 670 m a.s.l., roadside ditch, 24.V.2008, leg. Y. Minoshima "MiYu-L-08-035".

DIFFERENTIAL DIAGNOSIS: Shares entirely microreticulate clypeus, unicolored yellow maxillary palpomeres, nine antennomeres, lateral clypeal microsculpture, and similar aedeagus (apex of parameres strongly inflated, median lobe deeply split) with *A. arduus* and *A. tamdao*. Differs in ferruginous elytral coloration and coarser punctation of head, pronotum and elytra from *A. arduus* and *A. tamdao*, in absence of preocular patches and in pronotal microsculpture (densely microsculptured in antero-lateral pronotal corner and very finely microsculptured in postero-lateral pronotal area) from *A. arduus*. For differences to *A. communis* and *A. kempfi* see under *A. arduus*.

DESCRIPTION: See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 214.

DISTRIBUTION (Fig. 267): China (Guangdong, Hong Kong), Laos.

ECOLOGY: In China collected in springs, streams, and roadside ditches (KOMAREK & HEBAUER 2018); in Laos found together with *A. coronarius*.

### *Agraphydrus imitans* sp.n.

TYPE LOCALITY: Myanmar, Mandalay Region, ca. 50 km NW Kalaw, Myitsone River, 20°48'27.42"N 96°21'36.6"E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MYANMAR Mandalay Division \ ca. 50km NW Kalaw, 450m \ 20°48.457'N 96°21.610'E \ Myitsone riv., 25.10.1998 \ leg. Schillhammer (32)"; collected in a river, 10 m wide, shallow, unshaded, very warm (35° C), with crystalline sand and metamorphic rocks. **Paratypes:** MYANMAR: **Mandalay Division:** 28 exs. (NMW): same sampling data; Sagaing Division: 1 ♂ (NMW): Alaungdaw Kathapa N.P., Khaung Din Stream, between 22°18.360'N 94°25.937'E and 22°19.650'N 94°25.768'E, ca. 450 m a.s.l., 11.V.2003, leg. D. Boukal "MBS 119"; **LAOS: Khammouan Prov.:** 4 ♂ ♂ (NMW): Ban Khoun Ngeun, 18°7'N 104°29'E, 250 m a.s.l., 4.–30.XI.2000, leg. E. Jendek & P. Pacholátko; **THAILAND: Lamphun Prov., Chiang Mai Prov., or Tak Prov.:** 1 ♂, 1 ♀ (NMW): Mae Ping N.P., at light, 24.–25.VI.1991, leg. H. Malicky; **Mae Hong Son Prov.:** 33 exs. (EEM): Pang Mapha Distr., Soppong River behind resort, 19°31.159'N 98°14.844'E, 648 m a.s.l., UV pan trap, 18.IV.2009, leg. R.W. Sites, A. Vitheepradit & T. Prommi "L-1047"; **Nakhon Si Thammarat Prov.:** 1 ♀ (EEM): Khao Luang N.P., "Namtok Ka Rome", 8°22.428'N 99°44.155'E, 157 m a.s.l., UV pan trap, 6.VI.2004, leg. A. Vitheepradit & T. Prommi "L-746"; **Nan Prov.:** 1 ♀ (EEM): Bo Kluea Distr., Ban Bo Kluea Tai, Nam Mang, 19°9.141'N 101°9.277'E, 660 m a.s.l., 17.IV.2009, leg. A. Vitheepradit, R.W. Sites & T. Prommi "L-1044"; **Phang Nga Prov.:** 23 exs. (EEM): Sri Phang Nga N.P., 8°58.890'N 98°27.521'E, 70 m a.s.l., UV pan trap behind guest house, 8.VI.2006, leg. R.W. Sites, A. Vitheepradit & T. Prommi "L-925"; 1 ♂ (CSH): Thai Mueang Distr.,

Lam Ru N.P., 6 km NE Lam Kaen, White Banana Waterfall, 8°37.324'N 98°18.362'E, 75 m a.s.l., river in dense secondary bamboo forest, 13.VIII.2012, leg. A. Skale; **Surat Thani Prov.**: 51 exs. (EEM): Phanom Distr., Khao Sok N.P., stream below Namtok Sip Et Chan Waterfall in front of Khao Sok Rain Forest, 8°54'N 98°31'E, 40 m a.s.l., UV pan trap, 25.V.2005, leg. A. Vithepradit, R.W. Sites & T. Prommi "L-96"; **VIETNAM: Hòa Binh Prov.**: 8 exs. (ISNB): leg. A. de Cooman.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. bacchusi*, *A. borneensis*, *A. confusus*, *A. coomani*, *A. manfredjaechi*, *A. papuanus*, *A. sarawakensis* and several species from China, Japan and the Indian Subcontinent (see under *A. bacchusi*). Differs in presence of nine antennomeres from *A. manfredjaechi*. Shares similar aedeagus with lateral extensions of parameres with *A. constrictus*, *A. ishiharai*, *A. jilanzhui*, and *A. robustus*. Differs in less strong subapical constriction of parameres from *A. constrictus* and *A. ishiharai*, in yellow (versus black) elytra and absence of mesal projection of parameres from *A. jilanzhui*; in smaller average size and finer ground punctation from *A. robustus*.

**DESCRIPTION:** Total length: 1.8–2.1 mm; elytral width: 0.9–1.0 mm; E.I.: 1.3–1.4, P.I.: 2.0, elytra 2.8–3.1 times as long as pronotum. Habitus (Fig. 25) slender, elytra slightly widening posterior to mid-length, moderately convex.

**Coloration:** Labrum largely black; clypeus black with yellow preocular patches, as large as eye or larger; frons black; maxillary palpi yellow, palpomere 4 distinctly infuscated apically; pronotum yellow, unicolorated or infuscated mesally in some specimens; elytra yellow; ventrites black, legs yellow.

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

**Thorax:** Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation as fine as on head and pronotum, interspaces about 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. 94):** Pubescence present on proximal 2/3; hairlines straight.

**Abdomen:** Ventrite 5 with shallow to almost semicircular apical emargination.

**Aedeagus (Fig. 215):** Length: 0.29 mm. Phallobase about as long as parameres or slightly shorter, slightly longer than wide, bluntly bending to short, indistinctly defined manubrium; border between pigmented and unpigmented portion of ventral face almost reaching proximal manubrium. Parameres moderately wide, with curving margins, with strong lateral constriction subapically; apex obliquely truncate, with blunt lateral extension; basal portion of dorsal face reaching distal fourth of phallobase. Median lobe slender; dorsal face narrowed in mid-length, apex bluntly rounded, reaching apex of parameres; styli present, long; corona in apical position; basal apophyses moderately long, distinctly extending into phallobase.

**ECOLOGY:** Collected in rivers and streams, and at light; in Laos found together with *A. arduus*, *A. confusus*, *A. lunaris*, and *A. masatakai*, in Thailand together with *A. connexus*, *A. coomani*, and *A. heterochromatus*.

**DISTRIBUTION (Fig. 268):** Laos, Myanmar, Thailand, Vietnam.

ETYMOLOGY: The name *imitans* (Latin adjective) (= imitating) refers to the similarity with *A. coomani*.

*Agraphydrus infuscatus* sp.n.

TYPE LOCALITY: Thailand, Phang Nga Province, Khuraburi District, Baan Tumnang, west of Si Phang Nga N.P.

TYPE MATERIAL: **Holotype** ♂ (NMW): “Thailand: Khuraburi distr. \ Baan Tumnang, W of Si \ Phang Nga NP, 29.11. \ 2006, leg. H. Zettel (48)”. **Paratypes: THAILAND: Phang Nga Prov.:** 1 ♀ (NMW): Mt. Khao Lak, 10.I.2003, leg. H. Forster; **Surat Thani Prov.:** 3 ♀♀ (NMW): Khao Sok N.P., 15.I.2003, leg. H. Forster.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with strongly reduced metafemoral pubescence and absence of clypeal microsculpture, together with *A. anacaenoides*, *A. tulipa*, and *A. geminus*. These species share dark dorsal coloration, broad body, short maxillary palpi, and absence of emargination of abdominal ventrite 5. Shares stout maxillary palpi with *A. geminus* and large eyes with *A. tulipa*. Differs in presence of nine antennomeres, apically infuscated palpomere 4, and metafemoral pubescence restricted to anterior margin from all species mentioned. Shares broad, strongly convex habitus, black dorsal coloration, absence of clypeal microsculpture, apically infuscated palpomere 4, strongly reduced metafemoral pubescence, and absence of apically emarginated ventrite 5 also with *A. indicus* (ORCHYMONT, 1932) and *A. nepalensis* KOMAREK, 2018. Differs in absence of styli and shield-shaped structure of median lobe from these species.

DESCRIPTION: Total length: 1.9 mm; elytral width: 0.8–0.9 mm; E.I.: 1.2, P.I.: 2.1, elytra 2.6 times as long as pronotum. Habitus (Fig. 26) moderately broad, elytra evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black, clypeus with very indistinct, very narrow yellow lateral margins; maxillary palpomere 4 indistinctly infuscated apically; pronotum black with narrow yellow lateral margins; elytra black; ventrites and legs black.

Head (Fig. 162): Clypeus with distinctly concave anterior margin, C.I.: 3.5, lateral length ratio clypeus/eyes = 1.8; microsculpture absent; ground punctation fine, distinctly impressed, interspaces twice as wide as punctures; systematic punctures distinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 152) stout, 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 symmetrical. Mentum with very fine, widely separated punctures, microsculpture absent.

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

Femora (Fig. 95): Pubescence present on proximal half of pro- and mesofemur, reduced to narrow seem on basal margin of metafemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 216): Length: 0.25 mm. Phallobase about as long as parameres, as long as wide, abruptly narrowing rectangularly to narrow, long manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres moderately wide, evenly narrowing to bluntly rounded apex, slightly inclining mesad; basal portion of dorsal face almost reaching mid-length of phallobase mesally. Median lobe at base as wide as parameres, with parallel-sided margins in basal two thirds, evenly narrowing in apical third to bluntly rounded apex, almost

reaching apex of parameres; corona in subapical position; basal apophyses moderately long, widely separated, almost reaching mid-length of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. coomani*, *A. masatakai*, and *A. reticulatus*.

DISTRIBUTION (Fig. 270): Thailand.

ETYMOLOGY: The name *infuscatus* (Latin adjective) (= infuscated) refers to the infuscated apex of the maxillary palpomere 4.

### *Agraphydrus jaechi* (HANSEN, 1999)

*Megagraphydrus jaechi* HANSEN 1999a: 140.

*Agraphydrus jaechi* (HANSEN): MINOSHIMA, KOMAREK & ÔHARA 2015: 12.

*Megagraphydrus superans* HEBAUER 2000: 16. **syn.n.**

*Agraphydrus superans* (HEBAUER): MINOSHIMA, KOMAREK & ÔHARA 2015: 35.

TYPE LOCALITY: Malaysia, Penang, Southwest Penang Island District, George Town City, Aceh Forest Reserve (= Penang N.P.), 2 km W Teluk Bahang.

TYPE MATERIAL EXAMINED:

*Agraphydrus jaechi*: **Holotype** ♂ (NMW): "MALAYSIA: Penang \ Aceh Forest Reserve \ 2 km W Teluk [= Teluk] Bahang \ 5.-6.8.1993 lg. Schuh | HOLOTYPE \ *Megagraphydrus jaechi* \ M. Hansen [handwritten red label]".

**Paratypes**: MALAYSIA: Penang: 2 exs. (NMW, ZMUC): same sampling data; 1 ♂ (NMW): Georgetown, 23.VIII.1988, leg. S. Schödl "11"; 2 exs. (NMW, ZMUC): Southwest Penang Distr., Teluk Bahang (town), streams in Forestry Museum, 26.I.1992, leg. M. Jäch "8".

*Agraphydrus superans*: **Holotype** ♀ (NMW): "W.Malaysia / Pahang / Taman \ Negara N.P., Surr.[oundings of] Nusa Camp \ 100m, 18-24.6.1994, small \ pools in temp. foreststr.. [forest stream] MA 5, \ Hendrich leg. | HOLOTYPE \ *Megagraphydrus \ superans* sp. n. \ des F. Hebauer"; collected in a very small muddy pool filled with leaves.

HEBAUER (2000) justified the specific status of the single female of *Agraphydrus superans* with the presence of "six elytral series" of punctures. He compared his specimen with specimens of *A. malayanus* and *A. siamensis* but did not consider *A. jaechi*. The re-examination revealed that the specimen actually has ten rows of punctures, the medial five rows more regularly ordered, the lateral five distinctly more irregular. I was unable to observe any difference between the type specimens of *A. jaechi* and *A. superans*, and therefore *A. superans* is here synonymized with *A. jaechi*.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with 9–10 rows of coarse elytral punctures and nine antennomeres, together with *A. attenuatus*, *A. regularis*, and *A. siamensis*. Differs in maxillary palpi (slender, palpomere 2 evenly enlarging apicad, palpomeres 3 and 4 equally long) and in features of aedeagus (e.g., apex of parameres inflated) from these species. For differences to *A. insidiator* and *A. politus* see *A. attenuatus*.

DESCRIPTION: Total length: 3.5–4.0 mm, elytral width: 1.8–2.1 mm; mm; E.I.: 1.3–1.4, P.I.: 2.1–2.2, elytra 2.7–3.0 times as long as pronotum. Habitus (Fig. 27) broad, evenly oval, elytra moderately convex, margins very weakly explanate posteriorly.

Coloration: Labrum and clypeus dark rufous; frons black; maxillary palpi unicolored yellow; pronotum dark rufous with narrow, undefined, slightly brighter margins; elytra black; ventrites and legs rufous or black.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 2.4; microsculpture absent, ground punctures moderately coarse, distinctly impressed, interspaces about as wide as punctures, or wider on some places; systematic punctures distinct, loosely arranged, with interspersed punctures on clypeal disc. Eyes small, anterior margin slightly excised by posterior projection of clypeus, very slightly protruding, distinctly oblong, ventral

portion larger than dorsal part. Antennae with nine antennomeres. Maxillary palpi (Fig. 141) slender, palpomere 2 evenly enlarging to apex, 1.0–1.1 times as long as pronotum in midline, 1.0–1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0–1.1, palpomere 4 slightly asymmetrical. Mentum with some very fine punctures and distinct oblique wrinkles laterally.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct, semi-circularly arranged with transverse oblique anterior segment, subserial lateral row, loose posterior cluster, and few punctures within center of semicircle. Elytral ground punctation as on head and pronotum; nine to ten subserial rows of very coarse punctures present, mesal rows abbreviated anteriorly, lateral rows reaching anterior elytral margin, less regular, punctures coarser than in mesal rows, some punctures interspersed in serial intervals. Mesoventrite with a pair of crescent-shaped horizontal postero-median ridges, visible in SEM (KOMAREK & ÔHARA 2015: fig. 9E), but appearing as single ridge at 100 × magnification.

Femora (Fig. 96): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemora; hairlines straight.

Abdomen: Ventricle 5 with very shallow apical emargination, ca. 7 µm deep.

Aedeagus (Fig. 217): Length: 0.49 mm. Phallobase shorter than parameres, as long as wide, abruptly bending to very large, knob-like manubrium; border between pigmented and unpigmented portion of ventral face indistinct, reaching manubrium. Parameres narrow, bottle-shaped, with sigmoid margins; apex slightly inflated, not inclining; basal portion of dorsal face very indistinctly extending into phallobase. Median lobe very wide basally, strongly narrowing to bluntly rounded apex, not reaching apex of parameres; corona large, situated basally; basal apophyses very long, not extending into phallobase, widely separated, bending laterad.

ECOLOGY: Collected in streams and pools; found together with *A. anacaenoides*, *A. hendrichi*, *A. heterochromatus*, and *A. sucineus*.

DISTRIBUTION (Fig. 268): Malaysia (Peninsula, Penang).

### *Agraphydrus jankodadai* sp.n.

TYPE LOCALITY: Malaysia, Sabah, Interior Division, Nabawan District, near Batu Punggul Resort.

TYPE MATERIAL: **Holotype** ♂ (NMW): “Malaysia, Sabah, Batu \ Punggul Resort env.[ironment], 24.VI.- \ 1.VII.1996, 11a, river about 10m \ wide, flowing in primary forest \ partly shaded”; collected in a river, ca. 10–15 m wide, ca. 0.5–3.0 m deep; partly shaded by the primary forest canopy, substrate consisting of large limestone rocks and smaller stones, some sections near the river banks with accumulated leaf packs around rocks and submerged wood. **Paratypes**: **MALAYSIA: Sabah, Tawau Division**: 2 ♂♂ (NMW): Tawau Distr., Tawau Hills, Tawau River, 7.–10.VI.1998, leg. J. Kodada & F. Ciampor; **Sabah, Interior Division**: 3 ♀♀ (NMW): Crocker Range, Tenom Distr., Tenom (town), Sinagang River, ca. 1,000 m a.s.l., 27.V.2001, leg. “J.F. Kočiam”; **INDONESIA: Kalimantan Utara Prov.**: 13 exs. (NMW): Malinau Regency, Kayan Selatan Distr., Apokayan Highlands, Sungai Barang (village), Lalut Wai, 850 m a.s.l., 1.I.1998, leg. P. Mazzoldi “17”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margin of the clypeus and unicolored maxillary palpomeres. Shares body length of more than 1.9 mm and nine-segmented antennae with *A. brevipennis*, *A. floresinus*, *A. raucus*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Shares very fine to obsoletely punctate pronotum with *A. sucineus*, differs in dark colored elytra from this species. Differs in larger eyes from *A. raucus*; in presence of apical emargination on ventrite 5 from *A. brevipennis*; in yellow coloration of clypeus and pronotum from *A. floresinus*, *A. scintillans* and *A. setifer*. Differs in features of

aedeagus (median lobe long, narrow; parameres with distinct lateral projection and strong subapical constriction) from all species.

DESCRIPTION: Total length: 2.0–2.2 mm; elytral width: 0.9–1.1 mm; E.I.: 1.3–1.4, P.I.: 2.2–2.4, elytra 2.9 times as long as pronotum. Habitus (Fig. 28) broad, elytra parallel-sided, moderately convex.

Coloration: Labrum and clypeus unicolored yellow; frons black; maxillary palpi unicolored yellow; pronotum unicolored dark yellow, or with infuscated mesal portion reaching level of eyes; elytra light to dark brown with darkened lateral band; ventrites dark brown; legs lighter brown. Totally black individuals occur.

Head (Fig. 176): Clypeus with indistinctly concave anterior margin, C.I.: 4.5, lateral length ratio clypeus/eyes = 1.4–1.5; microsculpture present along lateral and anterior margins, indistinct in many individuals; ground punctation very fine to obsolete; systematic punctures indistinct. Eyes large, slightly protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi moderately slender, 1.0–1.1 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1–1.3, palpomere 4 slightly asymmetrical. Mentum with fine punctures laterally, microsculpture absent.

Thorax: Pronotal ground punctation obsolete, few very fine punctures present; systematic punctures very indistinct. Elytral ground punctation very fine, widely spaced; 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. 97): Pubescence present on proximal 2/3; hairlines straight.

Abdomen: Ventrite 5 with very shallow apical emargination.

Aedeagus (Fig. 218): Length: 0.23–0.26 mm. Phallobase as long as parameres, about as long as wide, rectangularly bending to distinct, small manubrium; border between pigmented and unpigmented portion almost reaching manubrium. Parameres with almost straight mesal margins; lateral margins curving, with distinct subapical constriction; apex subtruncate, with acute large lateral extension; basal portion of dorsal face reaching half-length of phallobase mesally. Median lobe with narrow dorsal face with blunt, slightly indented apex, reaching apex of parameres; ventral face wide, sac-shaped; corona situated in basal half; basal apophyses very short, reaching mid-length of phallobase.

ECOLOGY: Collected in rivers; in Indonesia found together with *A. coomani*, *A. nigroflavus*, and *A. rhomboideus*; in Malaysia together with *A. borneensis*, *A. clarus*, *A. excisus*, *A. microphthalmus*, *A. musculus*, and *A. rhomboideus*.

DISTRIBUTION (Fig. 275): Indonesia (Kalimantan), Malaysia (Sabah).

ETYMOLOGY: The species is dedicated to the collector Jan Kodada (Bratislava, Slovakia).

### *Agraphydrus kathapa* sp.n.

TYPE LOCALITY: Myanmar, Sagaing Region, Alaungdaw Kathapa N.P., 22°19'5.64"N 94°28'49.38"E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MYANMAR: Sagaing Division \ Alaungdaw Katthapa [= Kathapa] NP \ 22°19.094'N 94°28.823'E \ 9./10.5.2003, ca. 350 m \ leg. Boukal et al. (118)". **Paratypes: MYANMAR: Sagaing Region:** 1 ♂, 2 ♀♀ (NMW): same sampling data (1 ex. with additional note: "Pagoda stream below Log Cabin Camp"); 4 ♂♂, 6 ♀♀ (NMW): Alaungdaw Kathapa N.P., Pagoda Stream near Log Cabin Camp, 22°19.094'N 94°28.823'E, ca. 350 m a.s.l., 6.V.2003, leg. D. Boukal "MBS 110"; 4 ♂♂, 1 ♀ (NMW): Alaungdaw Kathapa N.P., Pagoda Stream upstream of Log Cabin Camp, 22°19.084'N 94°28.744'E, ca. 350 m a.s.l., 7.V.2003, leg. D. Boukal "MBS 113".

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with almost completely microreticulate clypeus, unicolored yellow maxillary palpomeres, absence of lateral pronotal microsculpture, nine antennomeres, and dark brown to black clypeus, together with *A. connexus*, *A. laocaiensis*, *A. namthaensis*, *A. schoenmanni*, *A. shaverdoae*, and *A. umbrosus*. Differs in absence of connecting band between median lobe and parameres from *A. connexus*; in absence of trapezoidal pronotal patch from *A. laocaiensis*; in dark brown elytral coloration and absence of distinct dark sublateral band from *A. laocaiensis* and *A. shaverdoae*; in slightly broader body and slightly darker dorsal coloration from *A. namthaensis*. Differs in features of aedeagus (e.g., apex of parameres strongly bending laterad, apex of median lobe not reaching apex of parameres) from all species.

**DESCRIPTION:** Total length: 2.2–2.3 mm; elytral width: 1.1–1.2 mm; E.I.: 1.2, P.I.: 2.3, elytra 2.8 times as long as pronotum. Habitus (Fig. 29) broad, elytra almost parallel-sided in mid-length, moderately convex.

**Coloration:** Labrum and clypeus dark brown, clypeus with yellowish preocular patches, about as wide as diameter of eye; frons black; maxillary palpi unicolored yellow; pronotum dark brown with indistinctly brighter margins; elytra dark brown; ventrites and legs dark brown, distal portions of femora light brown. One paratype has completely black coloration of head, pronotum, and elytra.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.8, lateral length ratio clypeus/eyes = 1.5; microreticulation present on almost entire clypeus, absent from postero-mesal portion; ground punctures very fine; systematic punctures indistinct. Eyes moderately large, very slightly protruding, oblong. Antennae with nine 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 = 1.1, palpomere 4 almost symmetrical. Mentum with distinct punctures, evenly distributed, absent mesally, microsculpture absent.

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

**Femora (Fig. 98):** Pubescence present on proximal 2/3 of profemur, on 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, straight on metafemur.

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

**Aedeagus (Fig. 219):** Length: 0.23–0.26 mm. Phallobase shorter than parameres, about as long as wide, bending in proximal fourth to narrow manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres moderately wide in basal three fourths, with indistinct subapical constriction; apex abruptly narrowing, strongly bending laterad; basal portion of dorsal face almost reaching half-length of phallobase mesally. Median lobe slender, moderately wide at base, narrowing to mid-length, with distinctly concave margins; apex distinctly indented, reaching 2/3 of length of parameres, corona situated in basal half; basal apophyses very short, reaching mid-length of phallobase.

**ECOLOGY:** Collected in streams together with *A. masatakai*.

**DISTRIBUTION (Fig. 266):** Myanmar.

**ETYMOLOGY:** The name refers to Maha Kathapa, one of Buddha's saintly disciples, after which the Alaungdaw Kathapa National Park is named where the type specimens were collected.

*Agraphydrus laocaiensis* sp.n.

TYPE LOCALITY: Vietnam, Lào Cai Province, Sa Pa District, near Sa Pa (District capital), Cát Cát (village), 22°19'N 103°50'E.

TYPE MATERIAL: **Holotype** ♂ (MTD): “N-VIETNAM, Prov. Lao Cai, \ Cat Cat, nr. Sa Pa; 1300-1400m, N22°19'43'' \ E103°50' [seconds missing];25./26.V.1999 \ leg. [D.] Ahrens, [O.] Jäger [S.] Fabrizi”. **Paratypes**: 4 ♂♂, 3 ♀♀ (MTD, NMW): same sampling data.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with almost completely microreticulate clypeus, unicolored yellow maxillary palpomeres, absence of lateral pronotal microsculpture, nine antennomeres, and dark brown to black clypeus, together with *A. connexus*, *A. kathapa*, *A. namthaensis*, *A. schoenmanni*, *A. shaverdoae*, and *A. umbrosus*. Differs in absence of connecting band between median lobe and parameres from *A. connexus*, in presence of dark sublateral elytral band from *A. kathapa* and *A. namthaensis*. Shares similar aedeagus with *A. schoenmanni* and *A. shaverdoae*. Differs from *A. shaverdoae* in presence of trapezoidal pronotal patch, less fine pronotal ground punctation and larger size; in less curved parameres from *A. schoenmanni*. Differs in features of aedeagus from all other species mentioned: in longer, parallel-sided median lobe from *A. kathapa*, in wider median lobe with longer basal apophyses from *A. namthaensis*, in position of corona in mid-length from *A. umbrosus*.

**DESCRIPTION:** Total length: 2.2–2.5 mm; elytral width: 1.0–1.3 mm; E.I.: 1.3, P.I.: 2.2, elytra 3.0 times as long as pronotum. Habitus (Fig. 30) moderately broad, elytra parallel-sided in mid-length, moderately convex.

**Coloration:** Labrum and clypeus dark brown to black, with variably sized and variably distinct yellow preocular patches, about as wide as diameter of eye or smaller; frons black; maxillary palpomeres unicolored yellow; pronotum with large, dark brown, approximately trapezoidal patch mesally, including anterior margin, with distinct, large yellow margins lateral extending to level of eyes; elytra light brown on disc, with narrow yellow lateral margins and wider dark brown to black sublateral band; ventrites dark brown to black; legs light brown.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.8, lateral length ratio clypeus/eyes = 1.8; microreticulation present on almost entire clypeus, indistinct or absent from narrow postero-mesal area in some individuals; ground punctures fine, distinctly impressed, interspaces about twice as wide as punctures; systematic punctures moderately distinct. Eyes large, very slightly protruding, very slightly oblong. 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 = 1.4, palpomere 4 almost symmetrical. Mentum with coarse punctures laterally, microsculpture absent.

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

**Femora (Fig. 99):** Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, straight on metafemur.

**Abdomen:** Ventrite 5 with semicircular apical emargination.

**Aedeagus (Fig. 220):** Length: 0.29–0.30 mm. Phallobase shorter than parameres, as long as wide or slightly longer, rather abruptly narrowing to triangular manubrium; border between pigmented and unpigmented portion of ventral face reaching mid-length. Parameres with slightly curving margins, with slight subapical constriction; apex truncate with short lateral projection; basal portion of dorsal face almost reaching mid-length of phallobase. Median lobe with ventral face

reaching apex of parameres, dorsal face shorter, deeply split; corona situated slightly distal to mid-length; basal apophyses moderately long, almost reaching mid-length of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. setifer*.

DISTRIBUTION (Fig. 266): Vietnam.

ETYMOLOGY: The name refers to the Province Lao Cai (Vietnam), where this species was collected.

### *Agraphydrus latus* sp.n.

TYPE LOCALITY: Malaysia, Perak, Manjung District, Pangkor Island, Teluk Nipah (village).

TYPE MATERIAL: **Holotype** ♂ (NMW): "MALAYSIA 25.1.1992 \ PERAK: Pangkor Isl. \ Teluk Nipah \ leg. Jäch (6)"; collected in a shallow, strongly shaded stream with large boulders. **Paratypes**: **MALAYSIA: Perak**: 3 exs. (NMW): same sampling data. **Pahang**: 1 ♀ (MNS): Cameron Highlands Distr., Mt. Jasar, 4.IV.1990, leg. A. Riedel.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 1.8 mm, dark coloration of clypeus, absence of clypeal microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence present on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. biprojectus*, *A. coronarius*, *A. helicopter*, and some specimens of *A. masatakai*. Differs in larger size from *A. helicopter*; in distinct elytral systematic punctures from *A. masatakai*; in broader body from *A. biprojectus*, *A. coronarius*, and *A. masatakai*. Differs in features of aedeagus (e.g., very broad basal lobe, parameres widest subapically, with semicircular subapical emargination) from all species mentioned.

DESCRIPTION: Total length: 2.5–2.9 mm; elytral width: 1.5 mm; E.I.: 1.3, P.I.: 2.3, elytra 3.0–3.2 times as long as pronotum. Habitus (Fig. 31) broad, evenly oval, moderately convex.

Coloration: Labrum and lateral portions of clypeus yellow, mesal half of clypeus and frons dark brown to black; maxillary palpi unicolored yellow; pronotum with narrow dark brown mesal portion and wide yellow lateral parts; elytra dark brown with lighter brown undefined areas laterally and posteriorly; ventrites and legs dark brown, apical portions of femora light brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.9, lateral length ratio clypeus/eyes = 1.6–1.7; microsculpture absent; ground punctation very fine, interspaces 3 times as wide as punctures; systematic punctures indistinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 0.9–1.0 times as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2–1.4, palpomere 4 almost symmetrical. Mentum with very fine punctures, microsculpture absent.

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

Femora (Fig. 100): Pubescence present on proximal 2/3 of pro- and metafemur, on proximal 3/4 of mesofemur; hairlines slightly oblique.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 221): Length: 0.40 mm. Phallobase as long as parameres, about as long as wide, with slightly sigmoid lateral margins and strongly sigmoid basal portion; manubrium small, short; ventral face distinctly pigmented with deep mesal incision almost reaching manubrium.

Parameres very wide, widest subapically, with curving lateral margins, with semicircular subapical excision; mesal margins almost straight; apex narrowly rounded, with sharply pointed lateral extension; basal portion of dorsal face broad, reaching proximal fourth of phallobase. Median lobe with slender dorsal face; apex bluntly, narrowly rounded, reaching apex of parameres; ventral face wide, sac-shaped in basal half; corona situated in basal fourth; basal apophyses long, almost reaching manubrium.

ECOLOGY: Collected in a stream together with *A. malayanus*.

DISTRIBUTION (Fig. 270): Malaysia (Peninsula, Pangkor).

ETYMOLOGY: The name *latus* (Latin adjective) (= broad, wide) refers to the broad habitus and broad aedeagus.

### *Agraphydrus longipenis* KOMAREK & HEBAUER, 2018

*Agraphydrus longipenis* KOMAREK & HEBAUER 2018: 47; PRZEWOŻNY 2019: 26.

TYPE LOCALITY: Laos, Luang Nam Tha Province, near Luang Nam Tha City.

TYPE MATERIAL: **Holotype**: ♂ (NMW): “N-LAOS \ Luang Namtha env.[ironment] \ 800 - 1200 m \ May 1997 [collector not mentioned] | ♂ | *Agraphydrus \ pygmaeus* Kn[isch] \ HEBAUER d[et.]”.

For paratypes from China (Yunnan) see KOMAREK & HEBAUER (2018).

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 1.8 mm, dark colored clypeus without microsculpture, eight antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence present on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. burmensis*. Differs in less broad habitus, slender maxillary palpi, and absence of horizontal mesoventral ridge from this species. Shares reduced femoral pubescence with *A. wangmiao* KOMAREK & HEBAUER, 2018; differs in distinctly broader body from this species. Differs in long, narrow, median lobe from all species mentioned.

DESCRIPTION: See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 222.

ECOLOGY: In China collected next to a stream and a river, and at light (KOMAREK & HEBAUER 2018); sampling circumstances are not reported for the type locality in Laos.

DISTRIBUTION (Fig. 270): China (Yunnan), Laos.

### *Agraphydrus lunaris* sp.n.

TYPE LOCALITY: Laos, Khammouan Province, Khoun Ngeun (village), 18°07'N 104°29'E.

TYPE MATERIAL: **Holotype** ♂ (NMW): “LAOS centr., Khammouan prov. \ 4.-16.XI., 25-30.XI.2000 \ BAN KHOUN NGEUN env.[ironment] \ N 18°07' E 104°29', alt. 250 m \ E. Jendek & P. Pacholátko leg.”. **Paratypes**: **LAOS: Khammouan Prov.**: 20 exs. (NMW): same sampling data; **Bolikhaxai Prov.**: 1 ♂ (NMW): Pakkading Distr., Pakkading village, 18°19'N 103°59'E, 20.-24.VI.2000, leg. E. Jendek & P. Pacholátko.

DIFFERENTIAL DIAGNOSIS: Belongs to group of very small species (body length less than 1.8 mm) lacking clypeal microsculpture, with unicolored maxillary palpomeres, and with metafemoral pubescence present on at least proximal 2/3, together with *A. carinatus*, *A. mazzoldii*, *A. microphthalmus*, and *A. penangensis*. Shares black clypeus and moderately sized eyes with *A. mazzoldii*; differs in rufous to dark brown (in contrast to black) pronotum and elytra, and in broader habitus from this species. Differs in presence of eight antennomeres from *A. penangensis*, in absence of mesoventral carina from *A. carinatus*, in larger average size, black elytra and larger eyes from *A. microphthalmus*. Differs in parameres with crescent-shaped mesal excision from all species.

DESCRIPTION: Total length: 1.6–1.8 mm; elytral width: 0.9–1.0 mm; E.I.: 1.1, P.I.: 2.2, elytra 2.5 times as long as pronotum. Habitus (Fig. 32) broad, evenly oval, strongly convex.

Coloration: Labrum, clypeus and frons unicolored black; palpomeres unicolored yellow; pronotum black with undefined, very narrow yellow lateral margins; elytra black, undefined, very narrow dark brown margins present in some individuals; ventrites black; legs black, femora slightly lighter colored distally.

Head (Fig. 163): Clypeus with distinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 1.9; microsculpture absent; ground punctation fine, distinctly impressed, interspaces 1–2 times as wide as punctures; systematic punctures indistinct. Eyes moderately large, not protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi slender, as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2, palpomere 4 almost symmetrical. Mentum very finely punctate, microsculpture absent.

Thorax: Pronotal ground punctation as on head, interspaces about twice as wide as punctures; systematic punctures distinct. Elytral ground punctation slightly coarser than on head and pronotum, interspaces 1–2 times as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with very low horizontal ridge.

Femora (Fig. 101): Pubescence present on proximal 2/3; hairlines slightly oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 223): Length: 0.25–0.27 mm. Phallobase about as long as parameres, as long as wide, abruptly bending to narrow manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres moderately wide basally, with indistinctly curving lateral margins; mesal margins abruptly narrowing to bluntly rounded apex, with strong, crescent-shaped excision in apical half; basal portion of dorsal face reaching half-length of phallobase mesally. Median lobe with moderately wide dorsal face; apex bluntly rounded, not reaching apex of parameres; ventral face very short, wide; corona situated in basal position; basal apophyses moderately long, strongly bending laterad, reaching distal fourth of parameres.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. arduus*, *A. confusus*, *A. connexus*, *A. coomani*, *A. imitans*, and *A. masatakai*.

DISTRIBUTION (Fig. 267): Laos.

ETYMOLOGY: The name *lunaris* (Latin adjective) (= crescent-shaped) refers to the crescent-shaped excision of the parameres.

### *Agraphydrus maehongsonensis* sp.n.

TYPE LOCALITY: Thailand, Mae Hong Son Province.

TYPE MATERIAL: **Holotype** ♂ (NMW): “N - THAILAND 1993 \ Mae Hong Son \ 1000m, 16.-23.VI. \ leg. [J.] Schneider”.

DIFFERENTIAL DIAGNOSIS: Shares combination of apical infuscation of maxillary palpomere 4 and clypeal microsculpture with *A. andamanicus*, *A. agilis*, *A. umbrosus* and *A. variabilis*; differs in stronger infuscation of palpomere 4 and in shorter median lobe from *A. andamanicus*. Differs in strongly reduced clypeal microsculpture from *A. agilis*, *A. umbrosus*

and *A. variabilis* (see also KOMAREK & HEBAUER 2018). Differs moreover in less broad habitus, darker coloration of pronotum and elytra, and very narrow median lobe from *A. agilis*.

**DESCRIPTION:** Total length: 2.4 mm; elytral width: 1.0 mm; E.I.: 1.5, P.I.: 2.1, elytra 3.3 times as long as pronotum. Habitus (Fig. 33) slender, elytra almost parallel-sided, very slightly widening posterior to mid-length, indistinctly convex.

**Coloration:** Labrum, clypeus and frons black, clypeus with very narrow, undefined, yellowish lateral margins, preocular patches absent; maxillary palpi yellow, palpomere 4 with distinctly black apex; pronotum and elytra black, elytra with undefined, dark brown area posteriorly; ventrites black; distal part of femora and tibiae light brown.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.5, lateral length ratio clypeus/eyes = 1.9; microsculpture present along lateral margins and very narrowly on anterior margin, absent from antero-mesal area; ground punctures very fine, interspaces 2–5 times as wide as punctures; systematic punctures distinct. Eyes large, very slightly protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.4 times as long as pronotum in midline, 1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3, palpomere 4 slightly asymmetrical. Mentum with very fine, widely spaced punctures on lateral portions, microsculpture present on anterior and lateral parts.

**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, few additional punctures present along lateral margins. Mesoventrite with mesal bulge.

**Femora (Fig. 102):** Pubescence present on more than proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairlines oblique on pro- and mesofemur, convex on metafemur.

**Abdomen:** Ventrite 5 with very flat apical emargination, ca. 10 µm deep.

**Aedeagus (Fig. 224):** Length unknown, phallobase of holotype missing. Parameres distinctly wider than median lobe, with almost straight margins; apex not inflated, slightly inclining laterad. Median lobe very narrow, with knob-like apical widening, apex reaching apex of parameres; corona small, situated in mid-length; basal apophyses short.

**ECOLOGY:** Unknown.

**DISTRIBUTION (Fig. 269):** Thailand.

**ETYMOLOGY:** The name refers to Mae Hong Son (Thailand), where this species was collected.

### *Agraphydrus malayanus* (HEBAUER, 2000)

*Megagraphydrus malayanus* HEBAUER 2000: 15.

*Agraphydrus malayanus* (HEBAUER): MINOSHIMA, KOMAREK & ÔHARA 2015: 22.

**TYPE LOCALITY:** Malaysia, Kedah State, Langkawi Island, Telaga Tujuh Waterfalls.

**TYPE MATERIAL EXAMINED:** **Holotype** ♂ (NMW): “MALAYSIA 29.I.1992 \ KEDAH: SW-Langkawi \ Telaga Tujuh \ leg. Jäch (12) | HOLOTYPUS \ Megagraphydrus \ malayanus sp.n. \ des. F. Hebauer”. **Paratypes:** **MALAYSIA: Kedah:** 18 exs. (NMW): same sampling data; 1 ♀ (NMW): Langkawi Island, 30.I.1992, leg. M. Jäch “16”; **Perak:** 1 ♂ (NMW): Manjung Distr., Pangkor Island, Teluk Nipah (village), shallow, strongly shaded streams with large boulders, 25.I.1992, leg. M. Jäch “6”; the second specimen from this locality mentioned by HEBAUER (2000) belongs to *A. latus* (see above).

**NOTE:** One female paratype (NMW), labelled “N-THAILAND: Nan, 2.I.1999 \ Doi Phu Ka NP, 1400 m \ 1 km after Park HQ \ leg. P. Mazzoldi (24)” does not belong to *A. malayanus*. It might belong to *A. thaiensis*, but it is distinctly lighter colored than the type of *A. thaiensis*, and therefore its identity remains unclear.

A female paratype labelled "MALAYSIA 21.I.1992 \ SELANGOR: Templer \ Park, NK.L. [north of Kuala Lumpur] \ leg. Jäch (1)" could not be located in the collection of F. Hebauer (MNS), where it should be deposited.

#### ADDITIONAL MATERIAL EXAMINED:

M A L A Y S I A: **Pahang**: 1 ♂ (NMW): Raub Distr., 20 km NE Raub (town), Lata Jarom Waterfalls, Mt. Benom, 350–550 m a.s.l., 19.–22.II.1995, leg. M. Štrba & R. Hergovits.

**DIFFERENTIAL DIAGNOSIS:** Shares four rows of very coarse, distinct elytral systematic punctures reaching anterior margin, with few coarser punctures within serial interspaces, and absence of microsculpture on clypeus with *A. activus*, *A. anhuianus*, *A. decipiens*, *A. luteilateralis*, and *A. thaiensis*. Differs in presence of nine antennomeres, larger extension of femoral pubescence, larger body size, short basal lobe, parameres with subapical excision, and corona in basal position, from *A. luteilateralis* and *A. decipiens*. Differs in slender maxillary palpomeres, very short basal lobe, parameres reaching manubrium, and corona in basal position from *A. activus* and *A. anhuianus*. Differs in larger subapical excision of parameres and longer median lobe from *A. thaiensis*. Very coarse, distinct systematic elytral punctures in anterior half (but not reaching anterior margin) are present in *A. coronarius*.

**DESCRIPTION:** Total length: 2.8–3.1 mm, elytral width: 1.5–1.8; E.I.: 1.1–1.3, P.I.: 2.2–2.4, elytra 3.2 times as long as pronotum. Habitus (Fig. 34) broad, evenly oval, moderately convex.

**Coloration:** Labrum, clypeus and frons black, clypeus with undefined, indistinct, yellowish margins; maxillary palpi unicolored yellow; pronotum with dark brown to black mesal area, with decreasing intensity of coloration laterad to widely extended rufous lateral portions; elytra largely dark rufous to black with undefined lighter lateral margins and posterior region; ventrites and legs dark brown, femora with brighter distal portions.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 4.5, lateral length ratio clypeus/eyes = 1.5; microsculpture absent; ground punctation very fine, distinctly impressed, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes large, very slightly protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 153) slender, as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2–1.4, palpomere 4 almost symmetrical. Mentum with some fine punctures laterally, microsculpture largely absent.

**Thorax:** Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as fine as on head and pronotum with very slightly denser distribution; four rows of distinct systematic punctures present, reaching anterior margin, small gap between foremost puncture and following punctures present in most individuals. Mesoventrite with abruptly declining mesal bulge and very indistinct longitudinal ridge posterior to bulge.

**Femora** (Fig. 103): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemora, hairlines straight.

**Abdomen:** Ventrite 5 with almost semicircular apical emargination, about 20 µm deep.

**Aedeagus** (Fig. 225): Length: 0.42–0.46 mm. Phallobase as long as wide, rectangularly bending to very short, indistinct, spine-like manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres very large; lateral margins sigmoid with bulge in distal third and distinct subapical excision; apex narrowly rounded, with small beak-shaped lateral projection; dorsal face with very broad basal portion reaching manubrium; ventral face distinctly shorter than dorsal face. Median lobe narrow, finger-shaped, apex bluntly rounded, not reaching apex of parameres; corona large, situated subbasally; basal apophyses long, extending to manubrium.

ECOLOGY: Collected in streams, and possibly in a hygropetric habitat; found together with *A. latus* and *A. masatakai*.

DISTRIBUTION (Fig. 268): Malaysia (Peninsula, Langkawi, Pangkor). Erroneously recorded from Thailand by HEBAUER (2000).

*Agraphydrus manfredjaechi* sp.n.

TYPE LOCALITY: Indonesia, North Sulawesi Province, Dua Saudara N.P., E of Manado (capital city).

TYPE MATERIAL: **Holotype** ♂ (NMW) “N - SULAWESI 1992 \ Dua Saudara NP \ Ö [= east] Manado (7) \ leg. Schödl 14.IV.”. **Paratypes**: **INDONESIA: Sulawesi Utara Prov.**: 26 exs. (NMW): same sampling data; 1 ex. (NMW): W Manado, Tasik Ria Resort, 13.IV.1992, leg. S. Schödl “6”; 1 ♀ (NMW): Torout, NE Kotamobagu (City), NE Kotamobagu, 300 m a.s.l., 18.IV.1992, leg. M. Jäch “11”; 1 ♀ (NMW): Bogani Nani Wartabone N.P. (= former Dumoga Bone N.P.), 0°34.098'N 123°54.713'E, 2.II.1997, leg. J. Haft “DO 2”; **Maluku Prov.** (Seram): 3 ♂♂, 5 ♀♀ (NMW): Central Maluku Regency, North Seram Distr., Manusela, 700–900 m a.s.l., 16.–18.II.1989 leg. S. Schödl “15”; 9 exs. (NMW): same sampling data, but leg. M. Jäch “16”; 1 ♀ (NMW): same sampling data, but leg. H. Schillhammer; 1 ♂ (NMW): Merkele Ridge, 500–1,700 m a.s.l., 19.–20.II.1989, leg. M. Jäch “17”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. bacchusi*, *A. borneensis*, *A. confusus*, *A. coomani*, *A. imitans*, *A. papuanus*, *A. sarawakensis* and several species from China, Japan and the Indian Subcontinent (see under *A. bacchusi*). Shares similar aedeagus (evenly rounded apex of parameres, slightly inclining mesad) with *A. coomani*; differs in darker elytral coloration and subapical position of corona from this species. Differs in presence of eight antennomeres and larger average size from all species mentioned.

DESCRIPTION: Total length: 2.0–2.4 mm; elytral width: 1.0–1.1 mm; E.I.: 1.4, P.I.: 2.0–2.2, elytra 3.2 times as long as pronotum. Habitus (Fig. 35) moderately slender, evenly oval, moderately convex.

Coloration: Labrum brown or black; clypeus and frons black, clypeus with narrow, yellow lateral margins or with distinct preocular patches about as wide as eye; maxillary palpi yellow, palpomere 4 with distinct infuscation apically; pronotum largely dark brown to black, or yellow with variably sized dark brown central portion, usually extending to level of lateral margin of eyes, wider at posterior margin than anteriorly, or with evenly decreasing intensity of coloration laterad; elytra unicolored brown similar to central portion of pronotum or slightly paler; ventrites and legs dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.1, lateral length ratio clypeus/eyes = 1.7–1.9; microsculpture absent; ground punctation fine, interspaces 1–2 times as wide as punctures; systematic punctures distinct. Eyes large, slightly protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi moderately 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 = 1.4–1.5, palpomere 4 slightly asymmetrical. Mentum with some coarse punctures, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately 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 distinct mesal bulge.

Femora (Fig. 104): Pubescence present on more than proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairline slightly oblique on pro- and mesofemur, straight on meta-femur.

Abdomen: Ventrite 5 with almost semicircular apical emargination.

Aedeagus (Fig. 226): Length: 0.37–0.39 mm. Phallobase about as long as parameres or slightly shorter, slightly longer than wide, evenly narrowing proximad; distinct manubrium absent; border between pigmented and unpigmented portion of ventral face indistinct, reaching almost proximal end of phallobase. Parameres with slightly curving margins; apex broadly rounded, inclining mesad; basal portion of dorsal face slightly reaching into phallobase, ventral face slightly shorter than dorsal face. Median lobe slender, finger-shaped; apex bluntly rounded, not reaching apex of parameres; corona situated subapically; long styli present, not reaching apex of median lobe; basal apophyses moderately long, extending to distal fourth of phallobase.

COMMENT: Specimens from Sulawesi differ slightly in dorsal coloration from specimens from Seram. Specimens from Sulawesi are darker colored, clypeus narrowly yellow laterally, pronotum with narrow yellow margins; specimens from Seram have larger yellow preocular patches, intensity of pronotal coloration decreasing to lateral margins, in some individuals an undefined dark brown, small mesal patch, and wide yellow lateral margins present on pronotum.

ECOLOGY: Collected at running water.

DISTRIBUTION (Fig. 273): Indonesia (Seram, Sulawesi).

ETYMOLOGY: The species is dedicated to the collector Manfred A. Jäch (NMW).

*Agraphydrus masatakai* MINOSHIMA, KOMAREK & ÔHARA, 2015

*Agraphydrus masatakai* MINOSHIMA, KOMAREK & ÔHARA 2015: 49; KOMAREK & HEBAUER 2018: 49; PRZEWOŹNY 2019: 26.

TYPE LOCALITY: Laos, Houaphanh Province, Xam Neua, Ban Saleui.

TYPE MATERIAL: See MINOSHIMA KOMAREK & ÔHARA (2015). **Paratypes examined:** **LAOS:** **Houaphanh Prov.:** 2 exs. (KMNH): Xam Neua City, Ban Saleui, 3.V.2007, leg. Y. Katayama; 10 exs. (EUM, NMW): Xam Neua City, Ban Saleui, 22.VI.2003, leg. M. Satô; **Vientiane Prov.:** 17 exs. (NMW): Phou Khao Khouay N.P., Nam Leuk, Tad Leuk Waterfall, 210 m a.s.l., flight intercept trap, 1.–8.VI.1996, leg. Schillhammer “15c”; **MALAYSIA:** **Kedah:** 4 ♂♂, 2 ♀♀ (NMW): Langkawi Island, Lubuk Sembilang, on foot of Mt. Raya, river, ca. 5–7 m wide, 31.I.1992, leg. M. Jäch “17”; 10 exs. (NMW): Langkawi Island, Telaga Tujuh waterfalls, 29.I.1992, leg. M. Jäch “12”; 5 ♂♂, 2 ♀♀ (NMW): Langkawi Island, NW Langkawi, E Datai, stream, 30.I.1992, leg. M. Jäch “15”, “16”; **THAILAND:** **Chanthaburi Prov.:** 92 exs. (MHNG, NMW): Khao Sabap N.P., 150–300 m a.s.l., sifting of leaves and moss near stream, 23.–24.XI.85, leg. D. Burckhardt & I. Löbl; **Chiang Mai Prov.:** 18 exs. (MHNG): Doi Inthanon, 1,650 m a.s.l., 7.XI.1985, leg. D. Burckhardt & I. Löbl; 1 ♀ (NMW): Doi Suthep N.P., Montatharn Falls, 750–800 m a.s.l., 2.XI.1995, leg. H. Zettel “4”; 3 exs. (NMW): Doi Suthep N.P., Montatharn Falls, 700–750 m a.s.l., 6.XI.1995, leg. H. Zettel “8”; 6 exs. (NMW): Doi Inthanon, Bang Khun Klang, 18°32'N 98°32'E, 1,200 m a.s.l., 3.–10.X.1989, leg. H. Malicky & P. Chantaramongkol; 1 ex. (NMW): Chiang Mai Zoo, 18°49'N 98°57'E, at light, 18.–26.IV.1988, leg. P. Chantaramongkol & H. Malicky; 1 ♂ (NMW): same sampling data, but 23.V.–1.VI.1988; 3 exs. (NMW): same sampling data, but 24.–31.X.1988; 1 ex. (NMW): same sampling data, but 14.–21.XI.1988; 1 ex. (NMW): same sampling data, but 1.–8.V.1989; 12 exs. (NMW): same sampling data, but 10.–17.4.1989; 45 exs. (NMW): W Mae Rim, Mae Sa N.P., Mae Sa Falls, 30.–31.XI.1995, leg. H. Zettel “2”; **Kanchanaburi Prov.:** 1 ♂ (NMW): Tham Than Lot N.P., 28.XI.1990, leg. H. Forster; 10 exs. (NMW): Tham Than Lot N.P., N Kanchanaburi, upper course of stream near flowstone cave, ca. 5 m wide, large stones, lots of fine sand, and stream near Than Thong Waterfall, 28.–29.XI.1990, leg. M. Jäch “3”; 4 ♂♂, 2 ♀♀ (NMW): Sai Yok Yai N.P., 3.XII.1990, leg. M. Jäch “8”; 1 ♂ (NMW): Sangkhla Buri Distr., Thung Yai Naresuan Wildlife Sanctuary, small pool near stream on road from Park entrance to Takiem Thong Waterfall, pool in forest with clear water, sandy bottom and dead leaves, 27.XII.1996, leg. P. Mazzoldi; **Khon Kaen Prov.:** 8 exs. (KMNH, NMW): Khon Kaen City, “Lam Chi Yai”, 13.III.2000, leg. M. Satô; 2 exs. (NMW): Phu Phan Kham N.P., Ban Noon Hua Chang, Huai Sam Caen, stream, 2–4 m wide, almost stagnant at collecting site, many algae, 21.XI.1995, leg. H. Zettel “20a”;

4 exs. (NMW): same locality data, but in degraded forest, with many pools or almost stagnant sections, above loc. "20a", 1.XI.1995, leg. H. Zettel "20b"; **Loei Prov.:** 3 exs. (NMW): Phu Ruea N.P., 1,000 m a.s.l., mountain stream (upstream of Huai Phai Waterfall) in evergreen forest, 26.XII.1999, leg. P. Mazzoldi "8"; 34 exs. (NMW): Phu Kra dueng N.P., Ano Dard Pond, 1,250 m a.s.l., small tributary flowing slowly, with *Sphagnum* at the sides, partially shaded by pine trees, 28.XII.1999, leg. P. Mazzoldi "13"; 1 ex. (NMW): Phu Kra dueng N.P., 1,250 m a.s.l., small stream between Ano Dard Pond and Tham Sor Noe Waterfall with clear water, slowly flowing through evergreen forest, shaded, 28.XII.1999, leg. P. Mazzoldi "15"; 20 exs. (NMW): Phu Kra dueng N.P., 1,150 m a.s.l., stream upstream of Pen Pob Waterfall, in evergreen forest, partially shaded, 29.XII.1999, leg. P. Mazzoldi "17"; 1 ex. (NMW): same sampling data, but small rock pools in evergreen forest, partially shaded "18"; 7 exs. (NMW): same sampling data, but small pool with moss in evergreen forest, partially shaded "19"; **Mae Hong Son Prov.:** 1 ♂ (MHNG): Tham Lod, 8 km N Ban Nam Lang, leg. D. Burckhardt & I. Löbl; 1 ♂, 1 ♀ (NMW): ca. 12 km S Mae Hong Son, Pha Bong (village), small river, ca. 2–5 m wide, 12.XI.1995, leg. H. Zettel "13a"; 1 ♂, 1 ♀ (NMW): Pha Sua N.P., Pha Sua Waterfalls, stream in evergreen forest, 30.XII.1998, leg. P. Mazzoldi "18"; **Mukdahan Prov.:** 2 ♀ ♀ (NMW): Phu Pha Thoe P.N.P., small stream with standing water flanked by trees, shaded, 31.XII.1999, leg. P. Mazzoldi "21"; **Nakhon Ratchasima Prov.:** 5 exs. (NMW): Khao Yai N.P., small stream with basalt boulders at SW end of N.P., warm water, ca. 1–2 m wide, 16.XI.1988, leg. M. Jäch "8"; 2 ♂ ♂, 1 ♀ (NMW): Khao Yai N.P., small streams E Headquarter, slowly running, shaded, sandy, ca. 1–2 m wide, 14.XI.1988, leg. M. Jäch "3"; 6 exs. (NMW): Khao Yai N.P., 14.XI.1988, leg. M. Jäch "2"; 1 ex. (NMW): Khao Yai N.P., ca. 8 km SW of Tourist Office, 16.XI.1988, leg. M. Jäch "7"; **Phetchabun Prov.:** 2 ♂ ♂, 2 ♀ ♀ (NMW): Nam Nao N.P., Huai Phrom Laeng, stream, 2–3 m wide, 24.XI.1995, leg. H. Zettel "22"; 2 ♀ ♀ (NMW): Nam Nao N.P., Heo Sai, stream, almost dried out with residual pools, partly deep, 5.XI.1995, leg. H. Zettel "24"; 4 exs. (NMW): Nam Nao N.P., 1,100 m a.s.l., 3.I.1997, leg. P. Mazzoldi; **Phitsanulok Prov.:** 1 ♀ (NMW): Tung Salaeng Luang N.P., pond, 4.I.1997, leg. P. Mazzoldi; 5 exs. (NMW): E Phitsanulok, Phu Hin Rong Kla N.P., 1,200 m a.s.l., small stream immediately downstream of Huai Khamunoi Waterfall, shaded, beetles collected in rock pool, 25.XII.1999, leg. P. Mazzoldi "7"; 1 ex. (NMW): same locality and day, but 1,250 m a.s.l., small stream, with turbid, almost stagnant water, in disturbed forest; shaded, leg. P. Mazzoldi "4"; **Phrae Prov.:** 3 ♀ ♀ (NMW): Huai Kaet, 50 km NE Phrae, Kaet River, ca. 5–6 m wide, partly interrupted by rocks, detritus between stones, stony sediment, partly algae, warm water, 17.–18.XI.1995, leg. H. Zettel "17b"; 1 ♀ (NMW): Mae Khaem, 15 km E Phrae, ca. 350 m a.s.l., small tributary, 20–40 cm wide, very shallow, with roots, 16.XI.1995, leg. H. Zettel "16b"; **Phuket Prov.:** 2 exs. (NMW): Thalang Distr., Khao Phra Thaeo N.P., Bang Pae Waterfall, small rock pools near stream in primary forest, 18.VII.1999, leg. P. Mazzoldi "2"; **Rayong Prov.:** 7 ♂ ♂, 9 ♀ ♀ (NMW): Khao Chamao N.P., near Klaeng, stream, ca. 5–10 m wide, granite, large boulders 12.–13.XII.1990, leg. M. Jäch "14"; **Songkhla Prov.:** 1 ♂ (NMW): Boripat Waterfall, 6°59'N 100°9'E, 27.–8.IV.1993, leg. H. Malicky; **Tak Prov.:** 4 ♂ ♂, 2 ♀ ♀ (NMW): Umphang Distr., road Umphang – Mae Chan, 650–700 m a.s.l., 30.XII.1990, leg. P. Mazzoldi; **Trat Prov.:** 3 ♂ ♂, 5 ♀ ♀ (NMW): Chang Island, small primary forest stream near White Sands Beach, 10.XII.1990, leg. M. Jäch "12"; 3 ♂ ♂, 5 ♀ ♀ (NMW): Chang Island, Than Mayom Waterfall, 8.XII.1990 leg. M. Jäch "10"; 10 exs. (NMW): Chang Island, Klong Prao, roadside ditch, 11.XII.1990, leg. M. Jäch "13,1".

#### ADDITIONAL MATERIAL EXAMINED:

- L A O S: **Khammouan Prov.:** 21 exs. (NMW): Ban Khoun Ngeun, 18°7'N 104°29'E, 250 m a.s.l., 4.–30.XI.2000, leg. E. Jendek & P. Pacholátko; **Vientiane Prov.:** 15 exs. (KMNH, 5 NMW): Vang Vieng (town), 8.V.2002, leg. H. Yoshitomi; 2 exs. (EUM): same sampling data, but leg. M. Satô.
- M Y A N M A R: **Sagaing Region:** 2 ♂ ♂, 2 ♀ ♀ (NMW): Kanbalu Distr., Kanbalu Township, Chatthin Wildlife Sanctuary, 23°31.481'N 95°38.804'E, ca. 260 m a.s.l., 9.X.1998, leg. H. Schillhammer "9"; 26 exs. (NMW): Alaungdaw Kathapa N.P., Khaung Din Stream, 22°18.360'N 94°25.937'E–22°19.650'N 94°25.768'E, ca. 450 m a.s.l., 11.V.2003, leg. D. Boukal "MBS 119"; 12 exs. (NMW): Alaungdaw Kathapa N.P., Pagoda Stream near Log Cabin Camp, 22°19.094'N 94°28.823'E, ca. 350 m a.s.l., 9.–10.V.2003, leg. D. Boukal et al. "118"; 1 ♂ (NMW): Alaungdaw Kathapa N.P., Pagoda Stream near Log Cabin Camp, 22°19.094'N 94°28.823'E, ca. 350 m a.s.l., 6.V.2003, leg. D. Boukal "MBS 110"; **Shan State:** 1 ♂ (NMW): Taunggyi Distr., NW Kalaw (town), km 23 on road Kalaw – Thazi, 20°42.378'N 96°30.218'E, ca. 720 m a.s.l., dried stream, flowing through forest and to road, very small puddles, 25.–26.VI.2004, leg. H. Schillhammer, H. Shaverdo & U Myin Hlaing "154A"; 1 ♂ (NMW): same sampling data, but rock pools, leg. H. Shaverdo.
- T H A I L A N D: **Chiang Mai Prov.:** 1 ♀ (MNS): Doi Suthep, 1,000 m a.s.l., 24.XII.1988, leg. J. Trautner & K. Geigenmüller; 2 ♂ ♂ (NMW): Doi Suthep N.P., Montatharn Falls, 750–800 m a.s.l., 2.XI.1995, leg. H. Zettel "4"; 2 ♂ ♂ (NMW): Doi Suthep, Huai Palad, stream falls, 660 m a.s.l., 15.I.2009, leg. H. Zettel & S. Silalom "60"; 12 exs. (MHNG): Doi Suthep, north slope, sifting in very humid gorge, 1,050 m a.s.l., 5.XI.1985, leg. D. Burckhardt & I. Löbl; 15 exs. (MHNG): Doi Suthep, south slope, sifting in humid gorge, 1,450 m a.s.l., 4.XI.1985, leg. D. Burckhardt & I. Löbl; 1 ex. (NMW): Chiang Mai Zoo, at light, 23.V.–1.VI.1988, leg. H. Malicky; 1 ♀ (NMW): Chiang Mai Zoo, at light, 9.–16.V.1988, leg. H. Malicky & P. Chantaramongkol; 2 ♂ ♂,

2 ♀♀ (NMW): Chiang Mai Zoo, at light, 10.–17.IV.1989, leg. H. Malicky; 1 ♂ (NMW): Chiang Mai Zoo, at light 14.–21.XI.1988, leg. H. Malicky & P. Chantaramongkol; 1 ♂ (CAS): tributary to Nam Chai River, Fang Horticultural Station, 15.XI.1985, J.T. & D.A. Polhemus “CI. 2202”; 1 ex. (NMW): Doi Inthanon, Bang Khun Klang, 18°32'N 98°32'E, 1,200 m a.s.l., 1989, leg. H. Malicky & P. Chantaramongkol; **Krabi Prov.**: 1 ♂ (NMW): Khao Phanom Bencha N.P., Huay To, at foot of waterfall, 19.III.1992, leg. M. Madl; **Nakhon Nayok Prov.**: 1 ex. (EEM): Khao Yai N.P., Salika Waterfall, 14°18.594'N 101°15.324'E, 70 m a.s.l., gravel, 7.IV.2004, leg. R.W. Sites & A. Vitheepradit “L–606”; **Phang Nga Prov.**: 1 ex. (CSH): Thai Mueang Distr., Thimung, 5 km S Khao Lak, 8°36'N 98°15'E, 10–50 m a.s.l., 3.–16.VIII.2012, leg. A. Skale; 4 exs. (NMW): Mt. Khao Lak, 10.I.2003, leg. H. Forster; **Phetchabun Prov.**: 1 ♂ (NMW): near Nam Nao N.P., Route 2216, Khlong Choen, 16°40'29"N 101°44'1"E, puddles in bed of dried up river, 21.III.2017, leg. H. Shaverdo “2017–Th–05C”; **Songkla Prov.**: 24 exs. (EEM): Ton Nga Chang Wildlife Sanctuary, black light in deep jungle, 8.VI.2001 R.W. Sites “L–242”; **Surat Thani Prov.**: 6 exs. (NMP): Khao Sok N.P., Sok River, Wing Hin Waterfall, 8°54'36"N 98°30'21"E, 150 m a.s.l., primary forest, individual collecting from mosses on rocks of waterfall, 13.II.2013, leg. M. Tkoč, M. Mikát & A. Damaška; 2 exs. (CSH): Khao Sok N.P., ca. 1 km N Khlong Sok, 8°54'55"N 98°31'40"E, 80 m a.s.l., primary forest, 15.VIII.2012, leg. A. Weigel “UWP”; 11 exs. (NMW): Khao Sok N.P., 15.I.2003, leg. H. Forster; **Ubon Ratchathani Prov.**: 6 exs. (EEM): Phu Chong Na Yoi N.P., Huay Laung, 14°26.513'N 105°16.449'E, 170 m a.s.l., 11.IV.2004, leg. R.W. Sites & A. Vitheepradit “L–616”.

V I E T N A M: **Lâm Đông Prov.**: 17 exs. (NMW): 15 km SW Bảo Lộc, 11°27'N 107°43'E, 900 m a.s.l., 22.–24.IV.1995, leg. P. Pacholátko & L. Dembický; 21 exs. (NMW): 14 km SW Bảo Lộc, 16.–9.V.1994, leg. P. Pacholátko & L. Dembický; **Vĩnh Phúc Prov.**: 1 ♀ (MNS): Tam Đảo, 800–1,200 m a.s.l., 12.–22.IV.1986, leg. Medvedev, Golovatch et al.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with body length more than 2.0 mm, dark coloration of clypeus, absence of clypeal microsculpture, nine antennomeres, unicolor maxillary palpi, absence of metaventral carina, metafemoral pubescence present on at least proximal 2/3. Specimens lacking apical emargination on ventrite 5 share these features with *A. obesus* and *A. spinosus*, differ in indistinct elytral systematic punctures from both species, in wider extension of femoral pubescence from *A. spinosus*, in brown (in contrast to black) pronotum and elytra from *A. obesus*. Specimens with apically emarginated abdominal ventrite 5 share above mentioned characters with *A. biprojectus*, *A. coronarius*, *A. helicopter*, and *A. latus*; differ in larger size from *A. helicopter*, in less broad body from *A. latus*, in indistinct elytral systematic punctures from *A. biprojectus* and *A. coronarius*. Differs in features of aedeagus (e.g., parameres narrowing to apex, with two distinct lateral extensions) from all species mentioned.

**DESCRIPTION:** See KOMAREK & HEBAUER (2018). Aedeagus as in Fig. 227.

**ECOLOGY:** Collected in rivers, streams, rock pools, puddles, roadside ditches, and possibly in hygropetric habitats; some were collected by sifting and at light; in Laos found together with *A. arduus*, *A. biprojectus*, *A. confusus*, *A. connexus*, *A. coomani*, *A. imitans*, and *A. lunaris*; in Malaysia together with *A. malayanus*; in Myanmar together with *A. coomani*, *A. kathapa*, and *A. malayanus*; in Thailand together with *A. connexus*, *A. coomani*, *A. infuscatus*, *A. reticulatus*, *A. shaverdoae*, *A. siamensis*, *A. spadix*, *A. thaiensis*, and *A. tulipa*; in Vietnam together with *A. vietnamensis*.

**DISTRIBUTION** (Fig. 264): China (Guangdong, Hainan, Hong Kong, Yunnan), Laos, Malaysia (Langkawi), Myanmar, Thailand, Vietnam. First record for Myanmar and Vietnam.

### *Agraphydrus mazzoldii* sp.n.

**TYPE LOCALITY:** Thailand, Mukdahan Province, Phu Pha Thoep N.P.

**TYPE MATERIAL:** **Holotype** ♂ (NMW): “E-THAILAND: Mukdahan \ Phu Pha Thoep NP \ 1.1.2000 \ leg. P. Mazzoldi (23)”; collected in small residual pools of a stream bed shaded by gallery forest. **Paratypes:** 9 exs.: (NMW): same sampling data.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of very small species (body length less than 1.8 mm) without clypeal microsculpture, unicolor maxillary palpomere 4 and with

metafemoral pubescence present on at least proximal 2/3, together with *A. carinatus*, *A. lunaris*, *A. microphthalmus*, and *A. penangensis*. Shares moderately broad body with *A. carinatus*. Shares black clypeus and moderately sized eyes with *A. lunaris*; differs in rufous to dark brown (in contrast to black) pronotum and elytra from this species. Differs in larger eyes and larger average size from *A. microphthalmus*, in presence of eight antennomeres from *A. penangensis*, in absence of mesoventral carina from *A. carinatus*. Differs in features of aedeagus (e.g., apex of parameres inflated) from all species mentioned.

DESCRIPTION: Total length: 1.6–1.8 mm; elytral width: 0.8–0.9 mm; E.I.: 1.2–1.3, P.I.: 2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 36) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus, and frons black, clypeus with indistinct, undefined, narrow yellowish lateral margins; maxillary palpomeres unicolored yellow; pronotum and elytra rufous to dark brown; elytra darker than pronotum; ventrites black; legs dark brown.

Head (Fig. 164): Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 1.9; microsculpture absent; ground punctures fine, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes moderately large, not protruding, slightly oblong. Antennae with eight antennomeres, intermediate segments indistinctly separated. Maxillary palpi slender, as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1–1.2, palpomere 4 slightly asymmetrical. Mentum with very fine, sparsely distributed punctures, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation fine, slightly coarser than on pronotum; four rows of indistinct systematic punctures present, mesal rows 1 and 2 consisting of few widely spaced punctures, not reaching anterior margin. Mesoventrite with indistinct mesal bulge.

Femora (Fig. 105): Pubescence present on proximal 2/3; hairlines straight.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 228): Length: 0.19 mm. Phallobase distinctly shorter than parameres, about as wide as long, abruptly narrowing to triangular manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres with sigmoid margins; apex asymmetrical, slightly inflated, bluntly rounded, very indistinctly inclining mesad; basal portion of dorsal face reaching distal third of phallobase, ventral face shorter and wider than dorsal face, with large, tooth-like projection mesally. Median lobe evenly converging to bluntly rounded apex, not reaching apex of parameres, corona situated in mid-length; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in residual pools of a stream bed, together with *A. coomani*.

DISTRIBUTION (Fig. 266): Thailand.

ETYMOLOGY: The species is dedicated to the collector Paolo Mazzoldi (Brescia, Italy).

### *Agraphydrus microphthalmus* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kapit Division, Kapit District, ca. 25 km E of Kapit.

TYPE MATERIAL: **Holotype** ♂ (NMW): “SARAWAK (Borneo), \ ca 25 km E KAPIT \ III.1994, Kodada leg.”; collected in a small shallow stream (left tributary of Balleh River), ca. 3 m wide, 10–50 cm deep, completely shaded by the canopy of a degraded primary forest, near the “Rumah Kabau” (= house of Mr. Kabau, a wooden house in the forest), substrate of small stones, gravel and some accumulated leaf packs among submerged wood; the locality was repeatedly sampled within several days along a ca. 700 m long section. **Paratypes**: MALAYSIA: Sarawak: 1 ♂, 2 ♀♀ (NMW); same sampling data; 11 ♂♂, 2 ♀♀ (NMW): Kapit Division, ca. 40 km SE Kapit (town), III.1994,

leg. J. Kodada; **Sabah, Interior Division:** 1 ♂, 2 ♀♀ (NMW): Nabawan Distr., Batu Punggul Resort, shaded stream, 1.5–2.0 m wide, flowing through dense primary forest, 24.VI.–1.VII.1996, “11b”; 2 ♀♀ (NMW): same locality and day, but in river, about 10–15 m wide, ca. 0.5–3.0 m deep, flowing through primary forest, partly shaded by the forest canopy, substrate consisting of large limestone rocks and smaller stones, some sections near the river banks with accumulated leaf packs around rocks and submerged wood, “11a”.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of very small species (less than 1.8 mm long) with broad body, lacking clypeal microsculpture, with unicolored maxillary palpomeres and with metafemoral pubescence present on at least proximal 2/3, together with *A. carinatus*, *A. lunaris*, *A. mazzoldii*, and *A. penangensis*. Among this group *A. microphthalmus* is the species with smallest eyes and shortest body length. Shares small eyes and light colored clypeus with *A. carinatus* and *A. penangensis*. Differs in light coloration of pronotum from *A. lunaris* in light coloration of elytra from *A. lunaris* and *A. penangensis*, from the latter also in presence of eight antennomeres. Differs in absence of mesoventral carina from *A. carinatus*. Differs in features of aedeagus (e.g., long basal apophyses of median lobe and absence of spine in mid-length of parameres) from all species mentioned.

**DESCRIPTION:** Total length: 1.4–1.6 mm; elytral width: 0.8 mm; E.I.: 1.2, P.I.: 2.1–2.2, elytra 2.7–2.8 times as long as pronotum. Habitus (Fig. 37) broad, evenly oval, moderately convex.

**Coloration:** Labrum, clypeus and frons rufous, posterior portion of clypeus and frons darker than anterior portion of clypeus in some individuals; maxillary palpi unicolored yellow; pronotum and elytra unicolored rufous; elytra slightly darker than pronotum in most individuals; ventrites and legs rufous.

**Head** (Fig. 165): Clypeus with distinctly concave anterior margin, C.I.: 4.3, lateral length ratio clypeus/eyes = 3.1.; microsculpture absent, some indistinct wrinkles present at very narrow lateral rim in some individuals; ground punctation fine, distinctly impressed, interspaces about 1–2 times as wide as punctures; systematic punctures indistinct. Eyes very small, not protruding, transverse. Antennae with eight antennomeres. Maxillary palpi 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 = 1.4–1.5, palpomere 4 almost symmetrical. Mentum obsoletely punctate, microsculpture absent.

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

**Femora** (Fig. 106): Pubescence present on proximal 2/3; hairlines oblique on profemur, straight on meso- and metafemur.

**Abdomen:** Ventrite 5 with very flat apical emargination, ca. 2–4 μm deep, visible at more than 80 × magnification, or emargination absent.

**Aedeagus** (Fig. 229): Length: 0.20–0.23 mm. Phallobase shorter than parameres, about as long as wide, abruptly bending to short manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres with very slightly curving margins; apex wide, bluntly rounded, not inflated; basal portion of dorsal face extending into distal third of phallobase mesally, ventral face distinctly wider than dorsal face. Median lobe wide basally, narrowing to bluntly rounded apex, not reaching apex of parameres; ventral face with triangular lateral wing-shaped appendage; corona situated in distal third; basal apophyses long, very wide in distal half.

**ECOLOGY:** Collected in rivers and streams; found together with *A. cervus*, *A. clarus*, *A. jankodadai*, and *A. musculus*.

**DISTRIBUTION** (Fig. 273): Malaysia (Sabah, Sarawak).

ETYMOLOGY: The name is derived from mikrós (Greek adjective) (= small) and ophthalmós (Greek noun) (= eye), and refers to the small eyes. Noun in apposition.

*Agraphydrus mirabilis* sp.n.

TYPE LOCALITY: Thailand, Chiang Mai Province, Doi (= mountain) Suthep N.P., Huai Sa Lad, 18°48'18.6"N 98°54'31.2"E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "THAILAND: Chiang Mai \ Doi Suthep NP, 24.3. \ Huai Sa Lad, 1994 \ leg. Shepard (WDS A 1043)"; road up to the mountain with the coordinates 18°48.31'N 98°54.52'E, ca. 3,394 ft a.s.l., streams going down steep slopes in dense forest with clear water, substrate of sand, gravel on bedrock with leaves and moss.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margins of clypeus, unicolored maxillary palpomeres, and a body length of more than 1.9 mm, together with *A. brevipennis*, *A. floresinus*, *A. jankodadai*, *A. nigroflavus*, *A. raucus*, *A. schoedli*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Shares eight antennomeres with *A. nigroflavus* und *A. schoedli* (in contrast to nine antennomeres in all other species). Differs in smaller size, slender habitus, larger eyes, and yellow pronotum from *A. schoedli*. Differs in presence of distinct, fine, pronotal ground punctures from *A. jankodadai* and *A. sucineus*. Shares yellow pronotum with *A. nigroflavus*, *A. brevipennis*, and *A. raucus*. Differs in yellow clypeus and yellow elytra without darkened lateral band from *A. nigroflavus*. Differs in very large, pear-shaped median lobe from all species mentioned.

DESCRIPTION: Total length: 2.2 mm; elytral width: 1.1 mm; E.I.: 1.3, P.I.: 2.1, elytra 3.0 times as long as pronotum. Habitus (Fig. 38) slender, evenly oval, moderately convex.

Coloration: Labrum light brown; clypeus yellow with indistinctly defined mesal infuscation; frons black; maxillary palpi unicolored yellow; pronotum and elytra yellow; ventrites and legs dark brown.

Head (Fig. 177): Clypeus with distinctly concave anterior margin, C.I.: 3.9, lateral length ratio clypeus/eyes = 1.9; microsculpture present in anterior third and in lateral fourth; ground punctuation fine, shallow, interspaces about twice as wide as punctures; systematic punctures indistinct. Eyes large, not protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.0–1.1 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.4, palpomere 4 almost symmetrical. Mentum with fine punctures.

Thorax: Pronotal ground punctuation as on head; systematic punctures distinct. Elytral ground punctuation 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 mesal bulge.

Femora (Fig. 107): Pubescence present on more than proximal half of profemur with slightly oblique hairline, on meso- and metafemur on proximal 2/3 with straight hairlines.

Abdomen: Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 230): Length: 0.32 mm. Phallobase about as long as parameres, about as long as wide, almost rectangularly bending to narrow manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres with indistinctly curving margins, slightly constricted subapically; apex narrowly rounded, inclining mesad; basal portion of dorsal face reaching mid-length of phallobase; ventral face slightly wider than dorsal face. Median lobe very wide, widest in mid-length, pear-shaped, apex rounded, reaching apex of parameres; corona

situated subapically; basal apophyses moderately long, narrowly separated, almost reaching manubrium.

ECOLOGY: Collected in streams together with *A. siamensis*.

DISTRIBUTION (Fig. 268): Thailand.

ETYMOLOGY: The name *mirabilis* (Latin adjective) (= extraordinary, unusual) refers to the unique shape of the median lobe of the aedeagus.

*Agraphydrus muluensis* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Miri Division, Gunung Mulu N.P.

TYPE MATERIAL: **Holotype** ♂ (ZMUC): "SARAWAK: \ 4 th Division \ Gn. Mulu NP. | nr. Camp 4 \ c. 1800m. | P.M. Hammond & \ J.E. Marshall \ v.-viii. 1978 \ B.M.1978-49 | Agraphydrus [handwritten] \ (Gymnelochares) [handwritten] \ M. Hansen det."

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, yellow clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence present on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. clarus*, *A. engkari*, *A. hamatus*, *A. orbicularis*, and *A. spadix*. Differs in fine pronotal ground punctation from *A. clarus* and *A. engkari*, in features of aedeagus (e.g., parameres evenly narrowing to broadly rounded apex, without excision or extension) from all species.

DESCRIPTION: Total length: 2.3 mm; elytral width: 1.3 mm; E.I.: 1.0, P.I.: 2.5, elytra 2.7 times as long as pronotum. Habitus (Fig. 39) very broad, evenly oval, moderately convex.

Coloration: Labrum yellow; maxillary palpi unicolored yellow; head, pronotum, elytra, ventrites, and legs unicolored yellow to yellowish brown.

Head: Clypeus with indistinctly concave anterior margin, C.I.: 4.3, lateral length ratio clypeus/eyes = 1.6; microsculpture absent; ground punctures very fine, indistinctly impressed, interspaces 2–3 times as wide as punctures; systematic punctures indistinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi stout, as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1, palpomere 4 symmetrical. Mentum not punctate.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. Elytral ground punctation fine, slightly coarser than pronotum; systematic punctures obsolete. Mesoventrite with very low mesal bulge.

Femora (Fig. 108): Pubescence present on proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairlines straight.

Abdomen: Ventrite 5 with very flat apical emargination.

Aedeagus (Fig. 231): Length: 0.23–0.25 mm. Phallobase slightly shorter than parameres, as long as wide, narrowing in basal fourth to triangular manubrium; border between pigmented and unpigmented portion of ventral face indistinct, reaching mid-length. Parameres moderately wide; margins evenly curving; apex bluntly rounded; basal portion of dorsal face reaching distal third of phallobase. Median lobe evenly narrowing to bluntly rounded apex, reaching apex of parameres; corona situated subapically; basal apophyses moderately long, indistinctly extending into phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 275): Malaysia (Sarawak).

ETYMOLOGY: The name refers to the Gunung Mulu National Park (Malaysia), where this species was collected.

*Agraphydrus musculus* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kapit Division, Kapit District, ca. 25 km E of Kapit.

TYPE MATERIAL: **Holotype** ♂ (NMW): "SARAWAK (Borneo), \ ca 25 km E KAPIT \ III.1994, Kodada leg."; collected in a small shallow stream (left tributary of Balleh River), ca. 3 m wide, 10–50 cm deep, completely shaded by the canopy of a degraded primary forest, near the "Rumah Kabau" (= house of Mr. Kabau, a wooden house in the forest), substrate consisting of small stones, gravel and some accumulated leaf packs among submerged wood; the locality was repeatedly sampled within several days along a ca. 700 m long section. **Paratypes**: **MALAYSIA: Sarawak**: 15 exs. (NMW) same sampling data; 1 ♂ (NMW): Kuching Division, 80 km S Kuching, Annah Rais (village), at foot of Mt. Penrissen, 18.II.1993, leg. M. Jäch "4"; **Sabah, Tawau Division**: 2 ♂♂ (NMW): Tawau Distr., Tawau Hills, Tawau River, 7.–10.VI.1998, leg. J. Kodada & F. Čiampor; **INDONESIA: Kalimantan Tengah Prov.**: 1 ♂ (NMW): Kahayan Basin, upper course of Rowo River, sandy shore, in primary forest, 23.VII.2004, leg. P. Mazzoldi; **Kalimantan Barat Prov.**: 2 ♂♂, 10 ♀♀ (ZSM): Bengkayang Regency, Mt. Bawang, 250 m a.s.l., 0°53.498'N 109°22.252'E, 11.–12.IV.2011, "KAL004".

DIFFERENTIAL DIAGNOSIS: Shares narrowly microsculptured anterior clypeal margin, eight antennomeres, and small size (body length less than 2.0 mm) with *A. cantonensis*, *A. excisus*, and *A. stramineus*. Differs in equal ground punctation of pronotum and elytra, presence of dark lateral elytral band, and larger eyes from *A. stramineus*; in slender body and lighter coloration of clypeus without defined preocular patches from *A. excisus*. Differs in features of aedeagus (e.g., apex of median lobe without incision, apex of parameres not inflated, basal lobe as long as parameres) from all species mentioned.

DESCRIPTION: Total length: 1.6–1.8 mm, elytral width: 0.6 – 0.8 mm; E.I.: 1.3–1.4; P.I.: 2.0–2.2, elytra 2.9–3.2 times as long as pronotum. Habitus (Fig. 40) slender, elytra parallel-sided, moderately convex.

Coloration: Labrum light brown; clypeus dark yellow to dark brown with indistinct, undefined, brighter yellow preocular areas about as wide as eye; frons black; maxillary palpi unicolor yellow; pronotum and elytra yellow; elytra slightly darker than pronotum in most individuals or with undefined darker brown areas, with dark brown or black lateral band present in most individuals; ventrites and legs light brown.

Head (Fig. 178): Clypeus with distinctly concave anterior margin, C.I.: 3.4, lateral length ratio clypeus/eyes = 2.9; microsculpture present along lateral and anterior margin of clypeus; ground punctation very fine, very widely spaced; systematic punctation distinct. Eyes small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.2–1.5 times as long as pronotum in midline, 1.0–1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3–1.4, palpomere 4 symmetrical. Mentum with scattered fine punctures, very fine microsculpture present at lateral portions.

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 mesal bulge.

Femora (Fig. 109): Pubescence present on proximal 2/3 of pro- and mesofemur with oblique hairlines, on more than proximal half of metafemur with straight hairline.

Abdomen: Ventrite 5 with almost semicircular apical emargination.

Aedeagus (Fig. 232): Length: 0.19–0.21 mm. Phallobase about as long as parameres, abruptly bending to wide manubrium; border between pigmented and unpigmented portion of ventral face

indistinct, almost reaching manubrium. Parameres moderately wide, margins indistinctly sigmoid, with slight supapical constriction; apex broadly rounded, not inflated, slightly inclining mesad; basal portion of dorsal face almost reaching mid-length of phallobase mesally. Median lobe narrow, finger-shaped; apex bluntly rounded, almost reaching apex of parameres; corona situated in distal third; basal apophyses short, narrowly separated, reaching mid-length of phallobase.

ECOLOGY: Collected in running water; in Indonesia found together with *A. coomani*; in Malaysia together with *A. borneensis*, *A. clarus*, *A. excisus*, *A. jankodadai*, *A. microphthalmus*, *A. rhomboideus*, and *A. stramineus*.

DISTRIBUTION (Fig. 274): Indonesia (Kalimantan), Malaysia (Sabah, Sarawak).

ETYMOLOGY: The name *musculus* (Latin) (= little mouse) refers to the small body size. Noun in apposition.

### *Agraphydrus namthaensis* sp.n.

TYPE LOCALITY: Laos, Luang Nam Tha Province, Muang Sing District, ca. 20 km SE Muang Sing (town).

TYPE MATERIAL: **Holotype** ♂ (NMW): "N-LAOS: Prov. Lg. [= Luang] Nam Tha \ ca. 20km SE Muang Sing \ 12./13.6.1996, 950m \ leg. Schillhammer (25)". **Paratypes**: 5 ♀ ♀ (NMW): same sampling data as holotype.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with almost completely microreticulate clypeus, unicolored yellow maxillary palpomeres, absence of lateral pronotal microsculpture, nine antennomeres, and dark brown to black clypeus, together with *A. connexus*, *A. kathapa*, *A. laocaiensis*, *A. schoenmanni*, *A. shaverdoae* and *A. umbrosus*. Differs in absence of connecting band between median lobe and parameres from *A. connexus*, in absence of trapezoidal pronotal patch from *A. laocaiensis*, in dark brown elytral coloration (absence of distinct dark sublateral band) from *A. laocaiensis* and *A. shaverdoae*, in slightly less broad body and slightly brighter dorsal coloration from *A. kathapa*. Differs in features of aedeagus (wide parameres, narrow median lobe, very short basal apophyses) from all species mentioned.

DESCRIPTION: Total length: 2.2–2.4 mm; elytral width: 1.0–1.2 mm; E.I.: 1.4, P.I.: 2.1, elytra 3.0 times as long as pronotum. Habitus (Fig. 41) moderately wide, elytra almost parallel-sided, moderately convex.

Coloration: Labrum, clypeus and frons dark brown to black, clypeus with narrow yellow preocular patches, as wide as diameter of eye or smaller; maxillary palpi unicolored yellow; pronotum dark brown with narrow lateral margins; elytra dark brown to black, with slightly brighter areas at disc and narrow yellow lateral margins present in most individuals; ventrites dark brown; legs slightly lighter brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.6, lateral length ratio clypeus/eyes = 1.5; microreticulation present on almost entire clypeus, absent from postero-mesal portion; ground punctation fine, shallow, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes large, not protruding, very slightly oblong. Antennae with nine antennomeres. Maxillary palpi moderately slender, 1.1 times as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2–1.3, palpomere 4 almost symmetrical. Mentum with moderately coarse punctures.

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 mesal bulge.

Femora (Fig. 110): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with almost semicircular apical emargination.

Aedeagus (Fig. 233): Length: 0.50 mm. Phallobase about as long as parameres, as long as wide, manubrium small; border between pigmented and unpigmented portion of ventral face indistinct. Parameres wide, slightly widening to apex; margins slightly curving; apex truncate; basal portion of dorsal face not distinctly extending into phallobase; ventral face shorter and wider than dorsal lobe. Median lobe very narrow, club-shaped, widening to broadly rounded apex, reaching or exceeding apex of parameres; corona situated subapically; basal apophyses very short, very narrowly separated, extending to distal third of phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 271): Laos.

ETYMOLOGY: The name refers to the Nam Tha District (Laos), where this species was collected.

### *Agraphydrus nemorosus* sp.n.

TYPE LOCALITY: Laos, Houaphan Province, 25 km SE (by road) of Vieng Xai City, Kangpabong (village), 20°19'N 104°25'E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Laos-NE; HuaPhan prov. \ 25km SE Vieng Xai (by \ road)Ban Kangpabong env. \ 20°19'N 104°25'E \ 14.-18.5.2001, D.Hauck leg.". **Paratypes**: 1 ♂, 1 ♀ (NMW): same sampling data.

DIFFERENTIAL DIAGNOSIS: Shares entirely microreticulate yellow clypeus, unicolored maxillary palpomeres, nine antennomeres, absence of pronotal lateral microsculpture, and yellow pronotum with *A. hendrichi*, *A. heterochromatus*, and *A. vietnamensis*. Differs in smaller size, maxillary palpi 1.3–1.4 times as long as median length of pronotum, almost obsolete pronotal ground punctation, in contrast to fine elytral ground punctation, and indistinct elytral systematic punctures from *A. vietnamensis*. Differs in less extended profemoral pubescence from *A. hendrichi* and *A. heterochromatus*. Differs in features of aedeagus (large leaf-shaped lobes arising from basis of median lobe, very wide phallobasis, manubrium absent) from all species of *Agraphydrus*.

DESCRIPTION: Total length: 2.0–2.1 mm; elytral width: 0.9–1.0 mm; E.I.: 1.4, P.I.: 2.2–2.3, elytra 3.1–3.3 times as long as pronotum. Habitus (Fig. 42) evenly oval, moderately wide, moderately convex.

Coloration: Labrum and clypeus dark yellow; frons black; maxillary palpi unicolored yellow; pronotum dark yellowish brown with decreasing intensity of coloration to yellow margins; elytra dark brown with very narrow, undefined, yellow lateral margins; ventrites black; legs light to dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 1.5; weakly impressed microreticulation present on almost entire clypeus, absent from postero-mesal portion; ground punctation almost obsolete; systematic punctures indistinct. Eyes large, very slightly protruding, very slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.3–1.4 times as long as pronotum in midline, 1.1–1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1–1.2, palpomere 4 almost symmetrical. Mentum with very fine, widely spaced punctures, microsculpture absent.

Thorax: Pronotal ground punctation very fine, widely spaced, almost obsolete; systematic punctures distinct. Elytral ground punctation fine, coarser than on pronotum, interspaces 2–3 times as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin, few additional punctures present along lateral margins. Mesoventrite with mesal bulge.

Femora (Fig. 111): Pubescence present on proximal half of profemur, on proximal 2/3–3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with apical emargination.

Aedeagus (Fig. 234): Length: 0.37 mm. Phallobase wider than parameres, widest at base; manubrium absent; border between pigmented and unpigmented portion of ventral face indistinct. Parameres smaller than median lobe, lateral margins distinctly sinuate, with subapical constriction; basal portion of dorsal face reaching distal third of phallobase; apex slightly inflated. Median lobe wide, widest in mid-length, apex bluntly rounded, exceeding apex of parameres; corona small, in subapical position; pair of large, delicate, leaf-shaped lobes present, arising from basis of median lobe; basal apophyses very short, very narrowly separated, reaching half-length of phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 271): Laos.

ETYMOLOGY: The name *nemorosus* (Lat.) (= forested) refers to the fact that forest streams are typical habitats of numerous species of *Agraphydrus*.

### *Agraphydrus nigroflavus* sp.n.

TYPE LOCALITY: Indonesia, North Kalimantan Province (formerly part of East Kalimantan Province), Malinau Regency, Kayan Selatan District, Apokayan Highlands, Sungai Barang (village), Lalut Wai.

TYPE MATERIAL: **Holotype** ♂ (NMW): “INDONESIA: E - Kalimantan \ Apokayan, Sungai Barang \ Lalut Wai, 850m \ 1.1.1998, P. Mazzoldi (17)”. **Paratypes**: 2 ♂♂, 1 ♀ (NMW): same sampling data.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margins of clypeus, unicolored maxillary palpomeres, and body length more than 1.9 mm, together with *A. brevipenis*, *A. floresinus*, *A. jankodadai*, *A. mirabilis*, *A. raucus*, *A. schoedli*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Shares eight antennomeres with *A. mirabilis* and *A. schoedli* (in contrast to nine antennomeres in all other species). Differs in smaller size, less broad habitus, larger eyes, yellow pronotum, and less extended metafemoral pubescence from *A. schoedli*. Differs in distinct, fine, pronotal ground punctures from *A. jankodadai* and *A. sucineus*. Shares yellow pronotum with *A. brevipenis*, *A. mirabilis*, and *A. raucus*; differs in black clypeus with yellow preocular patches and in elytra with darkened lateral band from these species. Differs in crescent-shaped excision of apex of median lobe from all species mentioned; shares this feature with *A. excisus*, differs in distinctly larger size from this species.

DESCRIPTION: Total length: 2.1 mm; elytral width: 1.0 mm; E.I.: 1.3–1.4, P.I.: 2.2, elytra 3.0–3.2 times as long as pronotum. Habitus (Fig. 43) moderately broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons black, clypeus with yellow preocular patches, about as wide as diameter of eye; maxillary palpi unicolored yellow; pronotum unicolored yellow; elytra light brown with wide, dark brown to black, lateral band, widening anteriorly, sutural region and

scutellum black; ventrites black, proximal portion of femora dark brown, distal portion of femora and tibia yellow.

Head (Fig. 179): Clypeus with distinctly concave anterior margin, C.L.: 4.3, lateral length ratio clypeus/eyes = 1.5–1.6; microsculpture present along lateral and anterior margins; ground punctures very fine, widely spaced; systematic punctures distinct. Eyes large, indistinctly protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.1–1.2 times 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 few, very fine punctures on lateral portions, microsculpture absent.

Thorax: Pronotal ground punctation fine, widely spaced, weakly impressed; 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, additional subserial punctures present along lateral margins. Mesoventrite with mesal bulge.

Femora (Fig. 112): Pubescence present on proximal 2/3 of pro- and mesofemur with oblique hairline, on proximal half of metafemur with straight hairline.

Abdomen: Ventrite 5 with almost semicircular apical emargination.

Aedeagus (Fig. 235): Length: 0.25 mm. Phallobase as long as parameres, as wide as long, abruptly narrowing to small manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres with sigmoid lateral margins, with wide subapical constriction; apex truncate, with distinct lateral extension; basal portion of dorsal face reaching half-length of phallobase mesally. Median lobe moderately wide, ventral face with blunt, slightly indented apex, almost reaching apex of parameres; dorsal face slightly shorter, with semicircular apical excision; corona large, in subapical position; basal apophyses short, wide, narrowly separated, almost reaching mid-length of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. coomani*, *A. jankodadai*, and *A. rhomboideus*.

DISTRIBUTION (Fig. 272): Indonesia (Kalimantan).

ETYMOLOGY: The name is composed of *niger* (Latin adjective) (= black) and *flavus* (Latin adjective) (= yellow) and refers to the pattern of black head and yellow pronotum.

### *Agraphydrus obesus* sp.n.

TYPE LOCALITY: Vietnam, Central Highlands, Lâm Đồng Province, 12 km N Đà Lạt, Lang Bian.

TYPE MATERIAL: **Holotype** ♂ (NMW): “S-VIETNAM 28.-30.4. \ 12km N Dalat, 1994 \ Lang Bian \ Pacholatko & Dembicky”. **Paratypes**: 33 exs. (NMW): same sampling data.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, dark colored clypeus without microsculpture, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence present on at least proximal 2/3, and absence of apical emargination of abdominal ventrite 5, together with *A. spinosus* and some specimens of *A. masatakai*. Shares distinct elytral systematic punctures with *A. spinosus*, differs in wider extension of femoral pubescence from this species. Differs in black (in contrast to brown) pronotum and elytra from *A. masatakai*. Differs in features of aedeagus (e.g. parameres broad with broadly rounded apex, inclining laterad) from all species.

DESCRIPTION: Total length: 2.4–2.8 mm; elytral width: 1.2–1.4 mm; E.I.: 1.3–1.4, P.I.: 2.1–2.2, elytra 3.1–3.2 times as long as pronotum. Habitus (Fig. 44) broad, evenly oval, strongly convex.

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

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 1.6–1.8; microsculpture absent, some indistinct wrinkles present on very narrow lateral rim within area of systematic punctures; ground punctation moderately fine, strongly impressed, interspaces 1–2 times as wide as punctures; systematic punctures distinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi moderately stout, 0.9–1.0 times as long as pronotum in midline, 0.7–0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1, palpomere 4 symmetrical. Mentum with fine punctures, indistinct mesally, distinct 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, additional subserial punctures present along lateral margins. Mesoventrite with very strong mesal bulge.

Femora (Fig. 113): Pubescence present on proximal 2/3; hairlines straight.

Abdomen: Ventrite 5 weakly sclerotized in most specimens, emargination absent, but very shallow emargination present in one of the female paratypes.

Aedeagus (Fig. 236): Length: 0.50–0.53. Phallobase about as long as parameres, as wide as long, abruptly narrowing to moderately long, narrow manubrium; border between pigmented and unpigmented portion of ventral face very indistinct, not reaching mid-length of basal lobe. Parameres with strongly sigmoid lateral margins, distinctly constricted in apical half; apex wide, broadly rounded, inclining laterad; mesal margins almost straight; basal portion of dorsal face broad, almost reaching half-length of phallobase; ventral face much shorter than dorsal face. Median lobe moderately slender, parallel-sided; apex bluntly rounded, not reaching apex of parameres; corona situated slightly distal to mid-length; basal apophyses moderately long, distinctly bending laterad, extending to half-length of phallobase.

ECOLOGY: Unknown.

DISTRIBUTION (Fig. 269): Vietnam.

ETYMOLOGY: The name *obesus* (Latin adjective) (= fat, thick) refers to the broad habitus.

### *Agraphydrus orbicularis* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kuching Division, Semengoh, 30 km S Kuching, Semengoh Nature Reserve.

TYPE MATERIAL: **Holotype** ♂ (NMW): “MAL., Sarawak 1993 \ 30km S Kuching \ Semengoh, 17.2. \ leg. M. Jäch (2)”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, yellow clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence on more than proximal half, and presence of an apical emargination on the ventrite 5, together with *A. clarus*, *A. engkari*, *A. hamatus*, *A. muluensis*, and *A. spadix*. Differs in fine pronotal ground punctation from *A. clarus*

and *A. engkari*, in features of aedeagus (e.g., parameres widening to broadly rounded apex, with slight subapical excision) from all other species of the genus.

**DESCRIPTION:** Total length: 2.1 mm; elytral width: 1.1 mm; E.I.: 1.3, P.I.: 2.2, elytra 2.9 times as long as pronotum. Habitus (Fig. 45) moderately broad, evenly oval, strongly convex.

**Coloration:** Labrum, clypeus, and frons yellow, posterior portion of frons slightly darker than anterior part; maxillary palpi unicolored yellow; pronotum and elytra yellow; elytra slightly darker than pronotum; ventrites and legs ferruginous.

**Head:** Clypeus with indistinctly concave anterior margin, C.I.: 4.2, lateral length ratio clypeus/eyes = 1.4–1.6; microsculpture absent, except on very narrow rim at lateral margins; ground punctation very fine, weakly impressed, widely spaced; systematic punctures indistinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.0–1.2 times as long as pronotum in midline, 0.9–1.0 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 fine, coarser than on pronotum, distinctly impressed, interspaces twice as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with very low mesal bulge.

**Femora (Fig. 114):** Pubescence present on proximal 2/3 of pro- and metafemora, on proximal 3/4 of mesofemur, hairlines straight.

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

**Aedeagus (Fig. 237):** Length: 0.32 mm. Phallobase shorter than parameres, as long as wide, evenly curving to short, wide, manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres with almost straight margins, evenly widening to broadly rounded apex, with slight supapical constriction; basal portion of dorsal face extending to mid-length of phallobase mesally. Median lobe moderately wide, lateral margins almost straight; apex bluntly rounded, slightly indented, reaching apex of parameres; styli absent; corona situated in mid-length; basal apophyses long, almost reaching mid-length of phallobase.

**ECOLOGY:** Aquatic.

**ETYMOLOGY:** The name *orbicularis* (Latin adjective) (= circled) refers to the broadly rounded habitus.

### *Agraphydrus orientalis* (ORCHYMONT, 1932)

*Helochares (Agraphydrus) orientalis* ORCHYMONT 1932: 690.

*Agraphydrus (Agraphydrus) orientalis* (ORCHYMONT): HANSEN 1999b.

*Agraphydrus orientalis* (ORCHYMONT): SATŌ 1965: 128; KOMAREK & HEBAUER 2018: 65.

**TYPE LOCALITY:** Indonesia, East Java Province, Lumajang Regency, Ranu Bedali Lake.

**TYPE MATERIAL EXAMINED:** **Holotype** ♂ (ISBN): “♂ | JAVA Ranoe Bedali \ 10 10 28 [handwritten on left side of label] \ Badequelle [spring-fed swimming pool; handwritten] \ Exp. Thienemann [glued on a yellow card:] Coll. R. I. Sc. N. B. \ Java | A.d’Orchymont det. \ Helochares (Agraphydrus) \ orientalis m. | TYPE [red label]”.

**Paratypes:** **INDONESIA: Bali Prov.:** 1 ex. (ISBN): Tabanan Regency, Baturiti Distr., Padegombo stream, 14.VI.1929, Thienemann exp.; **Jawa Tengah Prov.:** 1 ♂ (ISBN): Sarangan above “Telaga Woeroeng Wasserfall” (= Wurung Waterfall), ca. 1,200 m a.s.l., 11. XII.1928, Thienemann exp.; **Sumatera Utara Prov.:** 1 ex. (ISBN): Toba Samosir Regency, Toba Lake, Balige (town), stream, 1,100 m a.s.l., 5.IV.1929, Thienemann exp.

Note: Three paratypes from Sumatra (ISNB) belong to *A. schoedli* (see below).

#### ADDITIONAL MATERIAL EXAMINED:

**I N D O N E S I A:** **Aceh Prov.** (Sumatra): 1 ♂, 1 ♀ (NMW): Gunung Leuser N.P., 30 km NW Kutacane, Ketambe, primary forest streams, 23.II.1990, leg. M. Jäch "18"; **Bali Prov.**: 2 ♀♀ (NMW): Ubud Distr., 180 m a.s.l., 25.–26.VIII.1990, leg. M. Balke "BA 1 & 2"; 3 exs. (ZSM): Ubud Distr., 170 m a.s.l., 8°30.5635'S 115°15.1765'E, 29.IV.–6.V.2011, "BLI 013"; 1 ♂ (NMW): Ubud Distr., deep ravine in "monkey forest", stream, ca. 2 m wide, shaded, deeply carved in rock gorge, 23.I.1988, leg. M. Jäch "2"; 3 ♀♀ (NMW): Baturiti Distr., Baturiti Stream, ca. 800 m a.s.l., ca. 1 m wide, mostly shaded, deep ravine, 1.II.1988, leg. M. Jäch "10"; **Lampung Prov.** (Sumatra): 1 ♂ (NMW): West Lampung Regency, Bukit Barisan Selatan N.P., 5 km SW Liwa (town), 5°4'S 104°4'E, 600 m a.s.l., 7.–17.II.2000, leg. D. Hauck; **Nusa Tenggara Barat Prov.:** 1 ♂, 2 ♀♀ (NMW): Lombok Island, between Pemenang and Mataram, small stream, ca. 1 m wide, ca. 800 m a.s.l., 10.II.1988, leg. M. Jäch "25"; **Sumatera Barat Prov.:** 1 ♂, 2 ♀♀ (NMW): Mentawai Islands, Siberut, Toteburu – Bakeuluk, streams and pools, 17.II.1991, leg. M. Jäch "22"; 3 ♀♀ (NMW): same sampling data, but leg. S. Schödl "22"; 1 ♀ (NMW): Mentawai Islands, Siberut, between Bakeuluk and Ugai Madobak, 18.II.1991, leg. M. Jäch "23"; 1 ♀ (NMW): Mentawai Islands, Siberut, Toteburu, W Muarasiberut, small stream, ca. 2 m wide, strongly meandering, potamal, 16.II.1991, leg. M. Jäch "21"; 1 ♀ (NMW): same sampling data, but leg. S. Schödl "21"; 3 ♂♂, 1 ♀ (NMW): Padang City, Bungus Beach, waterfall river at Bungus Beach, volcanic, 10 m a.s.l., 14.II. and 23.II.1991, leg. M. Jäch "18"; 1 ♀ (NMW): Padang City, Bungus Beach, 14.II.1991, leg. S. Schödl "18"; 1 ♀ (NMW): Tanah Datar Regency, Lembah Anai Nature Reserve, W Padangpanjang, SE Bukittinggi, small stream in primary forest, 12.II.1991, leg. M. Jäch "14"; 1 ♀ (NMW): 30 km E Padang, large river, 15–20 m wide, with huge basalt boulders, 1,050 m a.s.l., 25.II.1991, leg. M. Jäch "30"; 1 ♀ (NMW): Agam Regency, at Maninjau (lake), stream, 2–3 m wide, 550 m a.s.l., 8.II.1991, leg. M. Jäch "8"; 2 ♂♂ (NMW): Padang City, 25 km E Padang, Taman Raya Bung Hatta Nature Reserve, 400 m a.s.l., 14.II.1991, leg. M. Jäch "16"; 1 ♂ (MZB): near Padang, stream, mountain behind Andalas University, 0°54'25"S 100°28'36"E, 400 m a.s.l., 17.VI.2012, leg. E.F.A. Toussaint "IND01"; 8 exs. (MZB, ZSM): Bukit Barisan (mountain range), above Padang, 0°56.386'S 100°32.485'E, 930 m a.s.l., 5.IV.2011.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with extended clypeal microreticulation, unicolored maxillary palpi, and eight antennomeres, together with *A. balkeorum*, *A. gilvus*, *A. reticulatus*, and *A. sundaicus*. Differs in less broad habitus, larger eyes, darker coloration of clypeus, presence of yellow preocular patches, and less widely separated basal apophyses of median lobe from *A. balkeorum*; in less widely extended clypeal microsculpture, and wide apex of parameres from *A. gilvus*; in broader habitus, largely yellow pronotum and yellowish elytra, larger eyes, and finer punctation of elytra from *A. reticulatus* and *A. sundaicus*. Aedeagus similar to aedeagus of *A. raucus* and *A. schoedli* (with wide, straight parameres with broadly rounded apex). Differs in larger extension of clypeal microreticulation and narrower median lobe from both species; differs in distinctly smaller size and smaller manubrium of basal lobe from *A. schoedli*, and in presence of eight antennomeres from *A. raucus*.

**DESCRIPTION:** Total length: 1.9–2.2 mm; elytral width: 1.0–1.1 mm; E.I.: 1.2–1.3, P.I.: 2.2–2.3, elytra 2.9–3.2 times as long as pronotum. Habitus (Fig. 46) moderately broad, moderately convex.

**Coloration:** Labrum and clypeus dark brown to black in most individuals, rarely brighter; frons black; clypeus with yellow preocular patches about as wide as diameter of eyes or slightly wider; maxillary palpi unicolored yellow; pronotum yellow, darker mesally, with decreasing intensity of coloration laterad, or with dark brown mesal third and yellow lateral thirds; elytra yellowish brown, some individuals with indistinctly defined dark brown sublateral band; ventrites and proximal portion of femora dark brown to black, distal portion of femora and tibia light brown.

**Head (Fig. 180):** Clypeus with distinctly concave anterior margin, C.I.: 4.3, lateral length ratio clypeus/eyes = 1.6–1.8; microreticulation present on more than anterior half, or covering almost entire clypeus in some specimens, strongly impressed on anterior third, weakly impressed on posterior portion; ground punctation very fine, interspaces 2–3 times as large as punctures; systematic punctures moderately distinct. Eyes large, not protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.1–1.2 times as long as pronotum in midline,

0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3–1.5, palpomere 4 almost symmetrical. Mentum with few coarse punctures on lateral thirds, microsculpture absent.

Thorax: Pronotal ground punctation as on head or very slightly coarser in some individuals; 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, additional subserial row present along lateral margins. Mesoventrite with mesal bulge.

Femora (Fig. 115): Pubescence present on proximal 2/3 of pro- and mesofemora, on proximal 3/4 of metafemur; hairlines oblique on pro- and mesofemur, straight to slightly convex on metafemur.

Abdomen: Ventrite 5 with flat to almost semicircular apical emargination, ca. 13 µm deep.

Aedeagus (Fig. 238): Length: 0.26–0.29 mm. Phallobase about as long as parameres, slightly longer than wide, evenly curving to wide manubrium; border between pigmented and unpigmented portion of ventral face very indistinct. Parameres basally about as wide as apically, with indistinctly rounded lateral and almost straight mesal margins; apex wide, bluntly rounded, not inclining, basal portion of dorsal face reaching distal third of phallobase. Median lobe moderately slender, as wide as one paramere; margins slightly narrowing apicad; apex bluntly rounded, without incision, reaching apex of parameres; styli absent; corona large, in apical position; basal apophyses moderately long, widely separated, distinctly extending into phallobase.

ECOLOGY: Collected in pools and running water; found together with *A. coomani*, *A. geminus*, *A. schoedli*, and *A. sundaicus*.

DISTRIBUTION (Fig. 275): Indonesia (Bali, Java, Lombok, Siberut, and Sumatra).

### *Agraphydrus pallidus* sp.n.

TYPE LOCALITY: Vietnam, Vĩnh Phúc Province, Tam Đảo.

TYPE MATERIAL: **Holotype** ♂ (NMW): “N-Vietnam: Tam Dao (2) \ 1.-8.6.1996 \ leg. Dembicky \ & Pacholatko”. **Paratype** ♀ (NMW): same sampling data.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, yellow clypeus, absence of clypeal microsculpture, eight antennomeres, unicolored maxillary palpi, metafemoral pubescence present on more than proximal half, together with *A. delineatus* and *A. hortensis*; differs in absence of mesoventral carina from both species, and in presence of excision of abdominal ventrite 5 from *A. delineatus*. Differs in features of aedeagus (apex of parameres truncate with very indistinct lateral and mesal projections) from all species of the group.

DESCRIPTION: Total length: 2.2 mm (holotype) to 2.4 mm; elytral width: 1.1 mm (holotype) to 1.2 mm; E.I.: 1.3–1.4, P.I.: 2.3, elytra 3.1 times as long as pronotum. Habitus (Fig. 47) moderately broad, widest in mid-length, moderately convex.

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

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.3, lateral length ratio clypeus/eyes = 2.3; microsculpture absent; ground punctation moderately fine, distinctly impressed, interspaces 1–2 times as large as punctures; systematic punctures indistinct. Eyes large, not

protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.1–1.2 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3–1.4, palpomere 4 slightly asymmetrical. Mentum with few coarse punctures, distinct wrinkles present anteriorly.

Thorax: Pronotal ground punctation as on head; systematic punctures indistinct. 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 mesal bulge.

Femora (Fig. 116): Pubescence present on proximal 2/3 of pro- and metafemora, on proximal 3/4 of mesofemora; hairlines oblique on pro- and mesofemur, straight on metafemur.

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

Aedeagus (Fig. 239): Length: 0.36 mm. Phallobase shorter than parameres, as long as wide, almost rectangularly bending to short manubrium; border between pigmented and unpigmented portion of ventral face very indistinct, reaching mid-length. Parameres with almost straight, parallel-sided margins; apex indistinctly widening, truncate; basal portion of dorsal face indistinctly extending into phallobase. Median lobe narrow; margins evenly converging to bluntly rounded apex, reaching apex of parameres; dorsal face deeply split; styli absent; corona small, situated in mid-length; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. attenuatus*, *A. scintillans*, and *A. tamdao*.

DISTRIBUTION (Fig. 270): Vietnam.

ETYMOLOGY: The name pallidus (Latin adjective) (= pale) refers to the pale pronotum and elytra.

### *Agraphydrus papuanus* sp.n.

TYPE LOCALITY: Indonesia, West Papua, Pegunungan Bintang Regency, Central Range, Kali Takime, 4°24'S 140°25'E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "IRIAN JAYA \ Zentralmassiv [Central Range] \ 140°25'E 04°24'S | Kali Takime, 900m \ 18.8.1992 \ leg. Balke (17)"; collected in a stream. **Paratypes**: 18 exs. (NMW): **INDONESIA: Papua Prov.**: same sampling data; 10 exs. (NMW): Nabire Regency, Kali Sanoba, Kimi, 200 m a.s.l., 28.X.1997, leg. M. Balke "15"; 2 ♂♂ (NMW): Nabire Regency, Kali Utowa, trek Nabire – Ilaga, km 65, ca. 250 m a.s.l., 18.–19.VII.1991, leg. M. Balke "IR 91#21"; 3 ♀♀ (NMW): Nabire Regency, Nabire Distr., Nabire, Kali Bobo, 5 m a.s.l., IV.1998, leg. M. Balke; 2 ♂♂ (NMW): km 140 on Nabire – Ilaga road, 450 m a.s.l., 4.IX.1996, leg. M. Balke "96#13"; 13 exs. (NMW): Nabire – Ilaga road, km 80, 200 m a.s.l., 12.IX.1996, leg. M. Balke "96#22"; 15 exs. (NMW): Nabire – Ilaga road, km 62, 300 m a.s.l., 28.VIII.1996, leg. M. Balke "96#5"; 5 exs. (NMW): Nabire – Ilaga road, km 65, 250 m a.s.l., 29.VIII.1996, leg. M. Balke "96#6"; 1 ♂ (NMW): km 165 on Nabire – Ilaga road, 650 m a.s.l., 4.IX.1996, leg. M. Balke "96#15"; 1 ♂, 1 ♀ (NMW): km 38 on Nabire – Ilaga road, 200 m a.s.l., 18.IX.1996, leg. M. Balke "96#25"; 1 ex. (NMW): km 38 on Nabire – Ilaga road, 23.X.1997, leg. M. Balke "12"; 70 exs. (NMW): Jayapura Regency, surroundings of Sentani (lake), ca. 200 m a.s.l., 10.VIII.1992, leg. M. Balke "6"; 1 ♂ (NMW): Pegunungan Bintang Regency, Borne Distr., ca. 4°24'S 140°25'E, 950 m a.s.l., 3.IX.1993, leg. M. Balke "2"; 5 exs. (NMW): Waropan Regency, Asori N Somyanoga, 2°37'S 136°13'E, small temporary pool close to coast, 7.I.1999, leg. A Weigel; 2 ♀♀ (NMW): Yahukimo Regency, Eme Region, Emdoman, ca. 4°14'S 139°55'E, 800 m a.s.l., 29.IX.1993, leg. M. Balke "24"; **West Papua Prov.**: 14 exs. (NMW): Fak Fak Regency, Lake Yamur area, IV.1998, ca. 50–100 m a.s.l., forest stream, leg. M. Balke; 47 exs. (MZB, NMW): Manokwari Regency, on road Manokwari – Kebar Valley, river, 10–20 m wide, stones, 6.V.2015, UNIPA course "2015–WP31"; 1 ex. (NMW): Manokwari Regency, road Manokwari – Kebar Valley, near Waramui village, 0°48'44"S 133°33'41"E, below 100 m a.s.l., large river, 8.V.2015, "2015 WP37"; **PAPUA NEW GUINEA: ? East Sepik Prov.**: 10 exs.

(NMW): Sepik Ramu Basin, VII.–VIII.1988, leg. D. Dudgeon “Hydrophilidae #6”; 1 ♂ (NMW): Sepik Ramu Basin, Kamasau River, VII.–VIII.1988, leg. D. Dudgeon; **Eastern Highlands Prov.**: 4 exs. (NHM): Purosa Valley, near Okapa, in muddy gravel banks of a river, 8.II.1965. M.E. Bacchus “Stn. No. 182”; **Madang Prov.**: 1 ♀ (NHM): Finisterre Mts., Damanti, 3,550 ft a.s.l., gravel banks of fast-running clear stream, 2–11.X.1964, leg. M.E. Bacchus “Stn. No. 47”; **Morobe Prov.**: 39 exs. (NHM): Lae City, muddy banks of large slow river, 28.XII.1964, leg. M.E. Bacchus “Stn. No. 122”; 18 exs. (NHM): Lae City, sand and gravel banks of clear, fast flowing river, 28.XII.1964, leg. M.E. Bacchus “Stn. No. 121”; 7 exs. (NHM): Lae City, muddy gravel banks of small shaded stream, 28.XII.1964, leg. M.E. Bacchus “Stn. No. 125”; 2 exs. (NHM): Lae City, gravel banks of large, fast flowing river, 28.XII.1964, leg. M.E. Bacchus “Stn. No. 126”; 1 ♂ (NHM): Lae – Bulolo road, ca. 3 miles from Lae, 30.XII.1964, “Stn. No. 128”; 8 exs. (NHM): Lae – Bulolo road, gravel banks of small clear stream with much algae, 30.XII.1964, leg. M.E. Bacchus “Stn. No. 131”; 4 exs. (NHM): Lae – Bulolo road, ca. 7 miles, gravel and grass roots on bank of small stream, 30.XII.1964, leg. M.E. Bacchus “Stn. No. 120”; 1 ♀ (NHM): Gusap, Markham Valley, ca. 90 miles W of Lae, 1,000 ft a.s.l., small muddy pool in almost dry stream bed with many dead leaves, 27.–30.I.1965, leg. M.E. Bacchus “Stn. No.157”; 13 exs. (NHM): Lae – Busu road, ca. 3 miles from Lae, gravel banks of small swift river, 21.I.1965, leg. M.E. Bacchus “Stn. No. 155a”; 13 exs. (NHM): Herzog Mts., Vagau, ca. 4,000 ft a.s.l., 4.–17.I.1965, leg. M.E. Bacchus “Stn. No. 152a”; 1 ♂ (ZMUC): Kassam Pass, Yung Creek, 14.VI.1979, leg. W.G. Ulrich; 1 ♂ (ZMUC): Kassam Pass, Sing Sing Creek, 14.VI.1979, leg. W.G. Ulrich.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. bacchusi*, *A. borneensis*, *A. confusus*, *A. coomani*, *A. imitans*, *A. manfredjaechi*, *A. sarawakensis* and several species from China, Japan and the Indian Subcontinent (see under *A. bacchusi*). Shares infuscated elytra with *A. bacchusi*. Differs in presence of nine antennomeres from *A. manfredjaechi*, in shorter maxillary palpomeres in relation to median pronotal length from *A. borneensis* and *A. sarawakensis*, in finer pronotal and elytral ground punctation from *A. confusus* and *A. sarawakensis*. Differs in features of aedeagus (apex of parameres distinctly pointed near mesal margin) from all species.

**DESCRIPTION:** Total length: 1.8–2.1 mm; elytral width: 0.9–1.0 mm; E.I.: 1.3, P.I.: 2.1, elytra 3.1 times as long as pronotum. Habitus (Fig. 48) moderately wide, elytra slightly widening posterior to mid-length, moderately convex.

**Coloration:** Labrum, clypeus and frons black, clypeus with distinct yellow preocular patches as wide as eye, or with narrow, yellow lateral rim; maxillary palpi yellow, palpomere 4 with apical infuscation; pronotum black with narrow yellow lateral rim, present also at lateral portion of anterior margin; elytra dark brown with very narrow yellow lateral rim, indistinct black sublateral band present in some cases; ventrites dark brown; legs yellow.

**Head:** Clypeus with distinctly concave anterior margin; microsculpture absent, C.I.: 3.1, lateral length ratio clypeus/eyes = 1.7; ground punctures fine, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes large, very slightly protruding, slightly oblong. Antennae with nine 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 asymmetrical. Mentum with very fine, very widely spaced punctures grouped laterally, 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 strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

**Femora (Fig. 117):** Pubescence present on more than proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairline slightly oblique on profemur, almost straight on meso- and metafemur.

**Abdomen:** Ventrite 5 with shallow apical emargination.

Aedeagus (Fig. 240): 0.33–0.35 mm. Phallobase about as long as parameres, about as long as wide, evenly narrowing proximad; distinct manubrium absent; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching proximal end. Parameres with indistinctly curving margins; apex pointed near mesal margin; basal portion of dorsal face slightly extending into phallobase. Median lobe moderately slender, finger-shaped; apex bluntly rounded, reaching or almost reaching apex of parameres; corona situated subapically; long styli present, not reaching apex; basal apophyses moderately long, indistinctly extending to phallobase.

ECOLOGY: Collected in rivers, streams, pools; found together with *A. coomani*.

DISTRIBUTION (Fig. 277): Indonesia (New Guinea), Papua New Guinea.

ETYMOLOGY: The name refers to the West Papua Province (Indonesia), where the holotype was collected.

### *Agraphydrus penangensis* sp.n.

TYPE LOCALITY: Malaysia, Penang, Southwest Penang Island, Pantai Aceh Forest Reserve (= Penang N.P.).

TYPE MATERIAL: **Holotype** ♂ (NMW): "MALAYSIA 28.1.1992 \ PENANG: Pantai Aceh \ Forest Reserve \ leg. Jäch (10)". **Paratypes**: **MALAYSIA: Penang**: 2 ♂♂, 1 ♀ (NMW): same sampling data (one male with handwritten label); 2 ♂♂ (NMW): Southwest Penang Distr., Titi Kerawang Waterfalls, below waterfall, 28.I.1992, leg. M. Jäch "11"; 4 ♀♀ (NMW): Botanic Gardens, stream above waterfall, huge boulders, 27.I.1992, leg. M. Jäch "9".

DIFFERENTIAL DIAGNOSIS: Belongs to group of very small species, less than 2.0 mm long, with broad body, absence of clypeal microsculpture, unicolorous maxillary palpomeres, absence of mesoventral carina, dark brown to black elytra, and with metafemoral pubescence present on at least proximal 2/3, together with *A. burmensis*, *A. lunaris*, *A. mazzoldii*, and *A. microphthalmus*. Differs in larger eyes from *A. burmensis*, *A. lunaris*, and *A. mazzoldii*. Differs in presence of nine antennomeres and presence of thorn-like process in mid-length of parameres from all species mentioned.

DESCRIPTION: Total length: 1.7–1.9 mm; elytral width: 0.9–1.0 mm; E.I.: 1.3, P.I.: 2.1–2.2, elytra 2.9 times as long as pronotum. Habitus (Fig. 49) broad, evenly oval, moderately to strongly convex.

Coloration: Labrum yellow; clypeus dark yellowish brown mesally with decreasing intensity of coloration to brighter margins; frons dark brown to black; maxillary palpi unicolorous yellow; pronotum dark yellowish brown to black with narrow brighter margins; elytra dark brown to black; ventrites dark brown; legs lighter brown.

Head (Fig. 166): Clypeus with distinctly concave anterior margin, C.I.: 4.2, lateral length ratio clypeus/eyes = 2.1–2.2; with very narrow microsculpture on antero-lateral corner in some individuals, absent from anterior margin; ground punctation fine, shallow, interspaces 2–3 times as wide as punctures; systematic punctures moderately distinct. Eyes small, not protruding, very slightly constricted anteriorly, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 0.9–1.0 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 without microsculpture, with very fine, widely spaced punctures.

Thorax: Pronotal ground punctation as on frons; systematic punctures moderately distinct. Elytral ground punctation distinctly coarser than on pronotum, interspaces 1–2 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. 118): Pubescence present on proximal 2/3 of profemur, slightly more extended on meso- and metafemur; hairlines slightly oblique on profemur, straight on meso- and metafemur.

Abdomen: Ventrite 5 without apical emargination.

Aedeagus (Fig. 241): Length: 0.31–0.32 mm. Phallobase shorter than parameres, about as long as wide, abruptly converging to wide, indistinctly defined manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with sigmoidal lateral margins and evenly rounded mesal margins; apex narrowly rounded; basal portion of dorsal face very wide, reaching half-length of phallobase; distinct, thorn-like sublateral process present in mid-length of parameres, arising from dorsal face. Median lobe moderately slender; apex bluntly rounded with very indistinct indentation, reaching apex of parameres; corona large, in distal third; basal apophyses long, reaching proximal third of phallobase.

ECOLOGY: Collected in streams together with *A. anacaenoides* and *A. helicopter*, *A. heterochromatus* and *A. hortensis*.

DISTRIBUTION (Fig. 269): Malaysia (Penang).

ETYMOLOGY: The name refers to the Malaysian island of Penang, where this species was collected.

### *Agraphydrus piceus* sp.n.

TYPE LOCALITY: Malaysia, Sabah, West Coast Division, Ranau District, Ranau (town), Liwagu River.

TYPE MATERIAL: **Holotype** ♂ (NMW): “Malaysia, Sabah, Ranau env.[ironment] \ Liwagu river, 1.06.1998, \ J. Kodada & F. Ćiampor Lgt.”. **Paratypes**: **MALAYSIA: Sabah, West Coast Division**: 3 exs. (NMW): same sampling data; **Sabah, Interior Division**: 2 exs. (NMW): Tenom Distr., Crocker Range, Tenom (town), Kalang Waterfall, 16.–18.V.1998, leg. J. Kodada & F. Ćiampor.

DIFFERENTIAL DIAGNOSIS: Shares very long, slender, maxillary palpomeres, 1.5 times as long as pronotum in midline, narrow preocular patches, microsculpture present along lateral margin and on antero-lateral corner of clypeus, and very similar aedeagus with broad apical extension of apex of parameres with *A. cervus*. Differs in larger size (body length *A. cervus*: 2.3–2.4 mm), slightly coarser dorsal ground punctation, and in pronotal and elytral coloration (*A. cervus*: light brown with dark sublateral band and yellow lateral rim). For differences to other species with very long maxillary palpi see under *A. cervus*.

DESCRIPTION: Total length: 2.6–2.9 mm elytral width: 1.1–1.3 mm; E.I.: 1.4, P.I.: 2.0–2.1, elytra 3.0–3.1 as long as pronotum. Habitus (Fig. 50) slender, elytra parallel-sided, indistinctly convex.

Coloration: Labrum, clypeus and frons black, clypeus with narrow orange preocular patches, smaller than diameter of eye; maxillary palpi unicolored yellow; pronotum and elytra black with very narrow yellow lateral margins; ventrites black; legs dark brown to black.

Head (Fig. 181): Clypeus with distinctly concave anterior margin, C.I.: 3.3, lateral length ratio clypeus/eyes = 1.8–1.9, indistinct microsculpture present along lateral margins and on antero-lateral corner, absent from anterior margin; ground punctation fine, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes small, very slightly protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.5 times as long as

pronotum in midline, 1.5 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2–1.3, palpomere 4 slightly asymmetrical. Mentum with distinct microsculpture present on lateral third.

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

Femora (Fig. 119): Pubescence present on proximal 2/3 of profemur, of proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, convex on metafemur.

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

Aedeagus (Fig. 242): Length: 0.29–0.31 mm. Phallobase about as long as parameres, as long as wide, evenly converging to wide, short manubrium, bending dorsad; border between pigmented and unpigmented portion of ventral face reaching half-length of phallobase. Parameres with very strong subapical excision laterally; apex with very strong, wide, unevenly shaped, lateral projection; basal portion reaching distal third of phallobase. Median lobe moderately wide, delicate; apex bluntly rounded, not reaching apex of parameres; corona small, in subapical position; basal apophyses very short, wide, indistinctly separated, reaching distal third of phallobase.

ECOLOGY: Collected in running water; found together with *A. clarus* and *A. excisus*.

DISTRIBUTION (Fig. 274): Malaysia (Sabah).

ETYMOLOGY: The name piceus (Latin adjective) (= pitch-black) refers to the black pronotum and elytra.

### *Agraphydrus raucus* sp.n.

TYPE LOCALITY: Indonesia, West Sumatra Province, Lima Puluh Kota Regency, Lembah Harau Nature Reserve, 15 km NE of Payakumbu City.

TYPE MATERIAL: **Holotype** ♂ (NMW): “INDONESIEN 1991 (12c) \ W–Sumatra, NSG Lemba [= Lembah] Harau \ 15km NE Payakumbu \ leg. Jäch 11.2.”; collected in a small stream in a primary forest flowing through a deep gorge. **Paratypes**: 7 ♀♀ (NMW): same sampling data; 3 ♀♀ (NMW): same sampling data, but “leg. S. Schödl”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margins of clypeus, unicolor maxillary palpomeres, and body length more than 1.9 mm, together with *A. brevipenis*, *A. floresinus*, *A. jankodadai*, *A. mirabilis*, *A. nigroflavus*, *A. schoedli*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Differs in presence of nine antennomeres from *A. mirabilis*, *A. nigroflavus* und *A. schoedli*. Differs in smaller size, broader habitus, and yellow pronotum from *A. schoedli*, in yellow clypeus from *A. nigroflavus*. Differs in presence of distinct, moderately coarse pronotal ground punctures from *A. jankodadai* and *A. sucineus*. Shares yellow pronotum with *A. brevipenis*, *A. mirabilis*, and *A. nigroflavus*; differs in yellow clypeus and in elytra without darkened lateral band from *A. nigroflavus*; in distinctly microsculptured anterior clypeal margin, smaller eyes, slender maxillary palpomeres, wider extension of metafemoral pubescence, and apical emargination of abdominal ventrite 5 from *A. brevipenis*. Shares similar aedeagus with *A. schoedli*, *A. orientalis*, and *A. balkeorum*. Differs in narrow manubrium from *A. schoedli*. *Agraphydrus orientalis* and *A. balkeorum* possess a completely microreticulate clypeus.

DESCRIPTION: Total length: 2.2–2.4 mm; elytral width: 1.2 mm; E.I.: 1.3, P.I.: 2.3, elytra 3.0 times as long as pronotum. Habitus (Fig. 51) broad, evenly oval, moderately to strongly convex.

Coloration: Labrum and clypeus dark yellow, clypeus infuscated in postero-mesal area, frons dark brown to black; maxillary palpi unicolored yellow; pronotum and elytra dark yellowish brown; ventrites and legs dark brown, distal portion of femora lighter brown.

Head (Fig. 182): Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 2.7; microsculpture present at lateral margins and on anterior third to half; ground punctures moderately coarse, strongly impressed, interspaces 1–2 times as wide as punctures; systematic punctures moderately distinct. Eyes moderately small, not protruding, oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 154) 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 some coarse punctures grouped on lateral portions, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct, some punctures present along lateral margin. Elytral ground punctation moderately coarse, strongly impressed, interspaces as wide as punctures; four rows of moderately distinct systematic punctures present, mesal rows with reduced number of punctures, present also in anterior half, but not reaching anterior margin, with additional subserial row along lateral margin. Mesoventrite with strong mesal bulge.

Femora (Fig. 120): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, more or less straight on metafemur.

Abdomen: Ventrite 5 with flat apical emargination, 16 µm deep.

Aedeagus (Fig. 243): Length: 0.30 mm. Phallobase as long as parameres or slightly longer, longer than wide, not abruptly bending to wide, long manubrium; border between pigmented and unpigmented portion of ventral face very indistinct, almost reaching manubrium. Parameres with almost straight, parallel-sided margins; apex moderately wide, bluntly rounded, not inclining; basal portion of dorsal face slightly extending into phallobase. Median lobe very wide, distinctly wider than one paramere; margins evenly converging apicad; apex bluntly rounded, dorsal face with apical incision, reaching apex of parameres; styli absent; corona large, in apical position; basal apophyses short, widely separated, reaching distal third of phallobase.

ECOLOGY: Collected in a stream together with *A. geminus*.

DISTRIBUTION (Fig. 272): Indonesia (Sumatra).

ETYMOLOGY: The name *raucus* (Latin adjective) (= rough) refers to the strongly impressed, dense, punctation of head, pronotum and elytra.

### *Agraphydrus regularis* (HANSEN, 1999)

*Megagraphydrus regularis* HANSEN 1999a: 140.

*Agraphydrus regularis* (HANSEN): MINOSHIMA, KOMAREK & ÔHARA 2015: 30.

TYPE LOCALITY: Thailand, Phetchabun Province, 36 km SE of Sila, N of Ban Nam Nao, Ban Pala Yai.

TYPE MATERIAL EXAMINED: **Holotype** ♂ (NMW): “THAILAND: Phetchabun \ 36km SE Sila 25.11. \ Ban Pala Yai 1995 \ leg. Zettel (27) | HOLOTYPE \ Megagraphydrus \ regularis \ M. Hansen [handwritten red label]”; collected in a small stream, 0.5–1.5 m wide, flowing partly through cultivated area, with pools and a small waterfall. **Paratype** ♀ (ZMUC): **THAILAND: Phetchabun Prov.:** Huai Nam Phang, 36 km SE Sila, at km 52 on Highway 2216, river with slow current, 8 m wide, 1–2 m deep, mud with iron deposits and leaf detritus, in a shaded ravine high on a hillside, heavily overgrown with vines and bushes, 2.III.1994, leg. W. Shepard “WDS A 1024”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with nine to ten rows of coarse elytral punctures and nine antennomeres, together with *A. attenuatus*, *A. jaechi*, and *A. siam-*

*ensis*. Differs in strongly club-shaped maxillary palpomere 2, palpomere 4 shorter than palpomere 3, and acuminate apex of parameres from *A. jaechi*; in smaller size from *A. attenuatus* and *A. jaechi*. Differs moreover in habitus (elytra evenly oval, not attenuating posterior to mid-length in dorsal view, abruptly declining apically in lateral view), and regular arrangement of pronotal systematic punctures from *A. attenuatus*; in regularly distributed serial punctures on elytra and in parameres without mesal incisions from *A. siamensis*. Differs in corona situated in mid-length of median lobe from all species mentioned. For differences to *A. insidiator* and *A. politus* see under *A. attenuatus*.

**DESCRIPTION:** Total length: 2.9 mm; elytral width: 1.5 mm; E.I.: 1.3, P.I.: 2.2, elytra 3.1 times as long as pronotum. Habitus (Fig. 52) broad, widest in mid-length, evenly oval, elytra not attenuating apicad, moderately convex, abruptly declining apically in lateral view.

**Coloration:** Labrum and clypeus dark rufous, clypeus with indistinctly brighter lateral margins; frons black; maxillary palpi unicolored yellow; pronotum dark rufous with narrow, undefined brighter margins; elytra black; ventrites and legs dark brown to black, femora with rufous distal portions.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 3.5, lateral length ratio clypeus/eyes = 2.6; microsculpture absent; ground punctures moderately coarse, distinctly impressed, interspaces about as wide as punctures; systematic punctures moderately distinct. Eyes small, not protruding, slightly oblong, anterior margin slightly excised by posterior projection of clypeus, ventral portion of eye larger than dorsal part. Antennae with nine antennomeres. Maxillary palpi (Fig. 142) moderately slender, palpomere 2 strongly club-shaped, 1.1 times as long as pronotum in midline, as long as maximum width of clypeus, length ratio palpomeres 4:3 = 0.9, palpomere 4 almost symmetrical. Mentum with some moderately coarse punctures, absent mesally, some oblique wrinkles present between antero-mesal impression and lateral portions.

**Thorax:** Pronotal ground punctation as on head; systematic punctures coarse, distinct, semi-circularly arranged with transverse oblique anterior segment, subserial lateral row, loose posterior cluster, and few punctures within semicircle. Elytral ground punctation moderately coarse, slightly finer than on pronotum, interspaces 1–2 times as wide as punctures. Ten rows of very distinct coarse punctures present, regularly arranged mesally, more unordered in lateral rows, mesal two rows weakly impressed, all rows reaching anterior margin, some additional coarse punctures loosely distributed within serial interspaces. Mesoventrite with low mesal bulge abruptly declining posteriorly with two very narrowly separated transverse ridges, visible in SEM (MINOSHIMA, KOMAREK & ÔHARA 2015: fig. 9E), appearing as single ridge at 100 × magnification.

**Femora (Fig. 121):** Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines straight.

**Abdomen:** Ventrite 5 truncate apically, emargination absent.

**Aedeagus (Fig. 244):** Length: 0.47 mm. Phallobase distinctly shorter than parameres, as long as wide, converging to large, knob-like manubrium; border between pigmented and unpigmented portion of ventral face reaching mid-length of phallobase. Parameres very slender, converging in almost straight margins to narrowly rounded apex, not inclining; basal portion of dorsal face slightly extending into phallobase. Median lobe narrow, wider and longer than parameres, margins evenly converging to acuminate apex; corona large, situated in mid-length; basal apophyses long, reaching mid-length of phallobase.

**ECOLOGY:** Collected in streams.

**DISTRIBUTION (Fig. 267):** Thailand.

*Agraphydrus reticulatus* sp.n.

TYPE LOCALITY: Thailand, Surat Thani Province, Khao Sok N.P.

TYPE MATERIAL: **Holotype** ♂ (NMW): "THAILAND 2003 \ PROV. SURATTHANI \ KHAO SOK N.P. 15.1. \ leg.: Horst FORSTER". **Paratype** ♂ (NMW): same sampling data.

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with extensive clypeal microreticulation, unicolored maxillary palpi, and eight antennomeres, together with *A. balkeorum*, *A. gilvus*, *A. orientalis*, and *A. sundaicus*. The only species of the region with microreticulate clypeus and metafemoral pubescence on less than proximal half. Differs in less broad body, black pronotum and elytra, and coarser elytral ground punctation from *A. balkeorum* and *A. orientalis*; in shape of parameres (apex wide, mesal margins abruptly narrowing in mid-length) from *A. gilvus*; in smaller size and minor extension of metafemoral pubescence from *A. sundaicus*. Very similar to *A. tulipa* regarding size, coloration, eight-segmented antennae, reduced metafemoral pubescence, absence of apical emargination on ventrite 5, and features of aedeagus (parameres abruptly narrowing in mid-length, corona in basal position); differs in presence of clypeal microreticulation and less strongly convex habitus from this species.

**DESCRIPTION:** Total length: 1.7 mm; elytral width: 0.8 mm; E.I.: 1.2, P.I.: 2.2, elytra 2.7 times as long as pronotum. Habitus (Fig. 53) moderately broad, elytra evenly oval, moderately convex.

**Coloration:** Labrum, clypeus and frons black, clypeus with narrow, very indistinct, yellow lateral margins; maxillary palpi unicolored yellow; pronotum black, with narrow, undefined, yellowish margins; elytra black with dark brown areas on posterior half; ventrites dark brown, distal portion of femora light brown.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 4.6, lateral length ratio clypeus/eyes = 2.5; microreticulation present on entire clypeus extending to anterior portion of frons; ground punctation and systematic punctures very indistinct. Eyes small, not protruding, distinctly oblong. Antennae with eight antennomeres. Maxillary palpi slender, as long as pronotum in midline, 0.8 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2, palpomere 4 slightly asymmetrical. Mentum with obsolete punctation, microsculpture absent.

**Thorax:** Pronotal ground punctation very fine, coarser than on head; systematic punctures moderately distinct. Elytral ground punctation moderately coarse, strongly impressed, distinctly coarser than on pronotum; four rows of indistinct systematic punctures present, with reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge and small postero-mesal tubercle.

**Femora** (Fig. 122): Pubescence present on more than proximal half of pro- and mesofemur, on less than proximal half of metafemur; hairlines slightly oblique on profemur, straight on mesofemur, concave on metafemur.

**Abdomen:** Ventrite 5 without apical emargination.

**Aedeagus** (Fig. 245): Length: 0.22–0.23 mm. Phallobase as long as parameres or slightly shorter, about as long as wide, abruptly converging to narrow manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres broad at base, with almost parallel-sided margins in basal half; mesal margins abruptly narrowing in mid-length, apex bluntly rounded, basal portion of dorsal face reaching mid-length of phallobase mesally. Median lobe wide at base, evenly converging to bluntly, narrowly rounded apex, not reaching apex of parameres; corona situated near base; basal apophyses moderately long, indistinctly extending to phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. coomani*, *A. infuscatus*, and *A. masatakai*.

DISTRIBUTION (Fig. 265): Thailand.

ETYMOLOGY: The name *reticulatus* (Latin adjective) (= reticulate) refers to the microreticulate clypeus.

***Agraphydrus rhomboideus* sp.n.**

TYPE LOCALITY: Malaysia, Sarawak, Miri Division, Kelabit Highlands, 5 km E Bario (village community), Pa'Ukat (village).

TYPE MATERIAL: **Holotype** ♂ (NMW): "MAL., Sarawak 1993 \ Kelabit HL, 5km E Bario \ Pa Ukat, 27.2., 1000m \ leg. M. Jäch (15)". **Paratypes**: **MALAYSIA: Sarawak**: 1 ♀ (NMW): same sampling data; 1 ♂, 2 ♀♀ (NMW): same locality data, river, rapidly flowing, large boulders, densely shaded, 1.III.1993, leg. M. Jäch "17"; **Sabah, Interior Division**: 1 ♀ (NMW): Nabawan Distr., Batu Punggul Resort, light trap, 24.VI.–1.VII.1996, "11g"; 7 exs. (NMW): Tenom Distr., Crocker Range, Tenom, Sinagang River, 27.V.2001, leg. "J.F. Kočiam"; **Sabah, Tawau Division**: 8 exs. (NMW): Labad Datu Distr., Pisang (village), tributary to Kuamut River, 29.VI.1998, leg. J. Kodada & F. Čiampor; 1 ♂ (NMW): Tawau Distr., Tawau Hills, Tawau River, 7.–10.VI.1998, leg. J. Kodada & F. Čiampor; **BRUNEI**: 2 exs. (NMW): Sungai Belait Area, Sungai Ratan, 15.VI.2007, 4°25'N 114°27'E, leg. H. Zettl "8"; **INDONESIA: Kalimantan Utara Prov.** (Malinau Regency, Kayan Selatan Distr., Apokayan Highlands): 1 ♂ (NMW): Sungai Barang (village), Lalut Wai, 850 m a.s.l., 1.I.1998, leg. P. Mazzoldi "17"; 1 ♀ (NMW): Lidung Payau (village), 720 m a.s.l., 30.XII.1998, leg. P. Mazzoldi "12".

DIFFERENTIAL DIAGNOSIS: Shares mesoventral carina, absence of clypeal microsculpture, unicolored maxillary palpomeres and metafemoral pubescence on at least proximal 2/3 with *A. carinatulus*, *A. delineatus*, *A. exiguus*, *A. fasciatus* KOMAREK & HEBAUER, 2018, *A. fujianensis* KOMAREK & HEBAUER, 2018, *A. hortensis*, *A. niger*, and *A. tristis*. Shares small mesal notch on anterior clypeal margin with *A. activus*, *A. anhuianus* (HEBAUER, 2000) and *A. tristis*. Differs in yellow (in contrast to black) clypeus from *A. niger* and *A. tristis*, in larger size from *A. carinatulus*, *A. delineatus*, *A. fujianensis*, and *A. niger*; in less distinct elytral systematic punctures from *A. activus* and *A. anhuianus*. Differs from all these species in presence of apical emargination of abdominal ventrite 5 from *A. delineatus* and *A. fujianensis*, in larger eyes and rhombiform elytral patch.

DESCRIPTION: Total length: 2.4–3.0 mm; elytral width: 1.2–1.5 mm; E.I.: 1.3, P.I.: 2.1–2.3, elytra 2.9–3.2 times as long as pronotum. Habitus (Fig. 54) broad, evenly oval, moderately convex.

Coloration: Labrum and clypeus unicolored black, or yellow with dark brown to black mesal area; frons black; maxillary palpi unicolored yellow; pronotum yellow; elytra yellowish, or light brown with large, rhombiform, dark brown patch and broad, dark brown stripe along lateral margins; ventrites and legs lighter dark brown.

Head (Fig. 167): Clypeus with distinctly concave anterior margin, with minute median notch, C.I.: 4.1, lateral length ratio clypeus/eyes = 2.1–2.3; microsculpture absent, but some indistinct wrinkles present along lateral margins in some individuals; ground punctation fine, moderately impressed, interspaces 1–2 times as wide as punctures; systematic punctures distinct. Eyes moderately small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.3 times as long as pronotum in midline, 1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0–1.3, palpomere 4 slightly asymmetrical. Mentum with some fine punctures on lateral portions.

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

present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low, longitudinal, sharply edged, mesal carina in posterior half.

Femora (Fig. 123): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, convex on metafemur.

Abdomen: Ventrite 5 with semicircular apical emargination, ca. 25 µm deep.

Aedeagus (Fig. 246): Length: 0.30–0.40 mm. Phallobase as long as parameres, about as long as wide, almost rectangularly bending to narrow, short manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with indistinctly curving margins; apex asymmetrical, tapering, pointed near mesal margin; basal portion of dorsal face extending to distal third of phallobase. Median lobe narrow, lateral margins converging to narrow, bluntly rounded apex, not reaching apex of parameres; corona small, situated apically; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in rivers, and at light. In Indonesia found together with *A. coomani*, *A. jankodadai*, and *A. nigroflavus*; in Malaysia together with *A. borneensis*, *A. clarus*, *A. excisus*, *A. jankodadai*, and *A. musculus*.

DISTRIBUTION (Fig. 273): Brunei, Indonesia (Kalimantan), Malaysia (Sabah, Sarawak).

ETYMOLOGY: The name rhomboideus (Latin adjective) (= rhombic) refers to the rhombic elytral patch.

### *Agraphydrus sarawakensis* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Kapit Division, Kapit District, 25 km E of Kapit.

TYPE MATERIAL: **Holotype** ♂ (NMW): “SARAWAK (Borneo), \ ca 25 km E KAPIT \ III.1994, Kodada leg.”; collected in a small shallow stream (left tributary of Balleh River), ca. 3 m wide, 10–50 cm deep, completely shaded by the canopy of a degraded primary forest, near the “Rumah Kabau” (= house of Mr. Kabau, a wooden house in the forest), substrate consisting of small stones, gravel and some accumulated leaf packs among submerged wood; the locality was repeatedly sampled within several days along a ca. 700 m long section. **Paratypes: MALAYSIA: Sarawak** (Miri Division): 19 exs. (NMW): same sampling data; 3 exs. (NMW): Mt. Mulu N.P., Long Iman (settlement), right tributary of Tutoh River, ca. 8 m wide, above Long Iman, 4.III.1993, leg. M. Jäch “20”; 1 ♂ (NHM): Mt. Mulu N.P., Melinau River, river bank, III., leg. J.D. Holloway et al. “Site 17, R.G.S. Exped. 1977–8”; 3 exs. (NHM): Mt. Mulu N.P., near Base Camp, 50–100 m a.s.l., at light, V.–VIII.1978, leg. P.M. Hammond & J.E. Marshall; 1 ♂ (NMW): Kelabit Highlands, Bario (village community), 1,000–1,200 m a.s.l., forest stream, 1 m wide, 28.II.1993, leg. M. Jäch “16”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with apically infuscated maxillary palpomere 4, absence of clypeal microsculpture, and metafemoral pubescence present on proximal 2/3 or 3/4, together with *A. bacchusi*, *A. borneensis*, *A. confusus*, *A. coomani*, *A. imitans*, *A. manfredjaechi*, *A. papuanus*, and several species from China, Japan and the Indian Subcontinent (see under *A. bacchusi*). Shares long maxillary palpi in relation to pronotal length with *A. borneensis* and moderately coarse pronotal and elytral ground punctures with *A. confusus*. Differs in presence of nine antennomeres from *A. manfredjaechi*, in lighter coloration of elytra from *A. bacchusi* and *A. papuanus*. Differs in very delicate styli of median lobe from *A. coomani*. Differs in features of aedeagus (apex of parameres distinctly inclining mesad, median lobe club-shaped, apex with small cap, exceeding apex of parameres) from all species.

DESCRIPTION: Total length: 1.7–2.0 mm; elytral width: 0.8–0.9 mm; E.I.: 1.3–1.4, P.I.: 1.9–2.0, elytra 3.0 times as long as pronotum. Habitus (Fig. 55) slender, elytra slightly widening posterior to mid-length, moderately convex.

Coloration: Labrum black, rarely dark brown; clypeus and frons black, clypeus with distinct yellow preocular patches, as large as diameter of eyes or larger; maxillary palpi yellow, palpomere 4 with distinct apical infuscation; pronotum dark yellow, unicolored or with indistinct, undefined, small, infuscation in center; elytra unicolored yellow; ventrites brown; legs yellow.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.4, lateral length ratio clypeus/eyes = 1.3–1.4; microsculpture absent; ground punctation moderately fine, interspaces 1–2 times as wide as punctures; systematic punctures moderately distinct. Eyes large, very slightly protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, 1.4–1.5 times as long as pronotum in midline, 1.3 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3, palpomere 4 slightly asymmetrical. Mentum with some moderately coarse punctures, microsculpture absent.

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

Femora (Fig. 124): Pubescence present on more than proximal half of profemur, on proximal 3/4 of meso- and metafemur; hairline oblique on pro- and mesofemur, convex on metafemur.

Abdomen: Ventrite 5 with flat apical emargination, ca. 14 µm deep.

Aedeagus (Fig. 247): Length: 0.30–0.38 mm. Phallobase about as long as parameres, slightly longer than wide, evenly narrowing to moderately wide manubrium; border between pigmented and unpigmented portion of ventral face distinct, almost reaching manubrium. Parameres with almost straight margins in basal half, distinctly bending mesad in apical third, tapering to narrowly rounded apex; basal portion of dorsal face reaching distal fourth of phallobase; ventral face slightly wider than dorsal face. Median lobe slender, club-shaped with narrow basal half, narrowing to mid-length, and wide distal part; apex bluntly rounded with small, stepped cap on top, exceeding apex of parameres; ventral face wider than dorsal face in basal half; corona situated subapically; styli absent; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in rivers and streams, and at light; found together with *A. borneensis*, *A. cervus*, *A. clarus*, and *A. excisus*.

DISTRIBUTION (Fig. 274): Malaysia (Sarawak).

ETYMOLOGY: The name refers to the Malaysian state of Sarawak, where all specimens were collected.

### *Agraphydrus schoedli* sp.n.

TYPE LOCALITY: Indonesia, North Sumatra Province, Toba Samosir Regency, Lumban Julu.

TYPE MATERIAL: **Holotype** ♂ (NMW): “N-SUMATRA, 1990 (14) \ Lumban Julu, ca. 1200m \ leg. Schödl, 18.2.”. **Paratypes**: **INDONESIA: Sumatera Utara Prov.**: 24 exs. (MNS, NMW): same sampling data; 1 ex. (ISNB; paratype of *A. orientalis*): Toba Samosir Regency, Lake Toba, Balige, spring, 1,200 m a.s.l., 5.IV.1929, Thienemann exp.: 2 ♂♂ (ISNB; paratypes of *A. orientalis*): same sampling data, but 1,100 m a.s.l.; 4 exs. (NMW): Simalungun Regency, Girsang Sipangan Bolon Distr., near Prapat (town), ca. 1,000 m a.s.l., 17.II.1990, leg. S. Schödl “13”; 5 exs. (NMW): Simalungun Regency, Girsang Sipangan Bolon Distr., Prapat – Lumban Julu, stream in primary forest, ca. 3–5 m wide, 17.II.1990, leg. M. Jäch “13”; 1 ♀ (NMW): South Tapanuli Regency, Padangsidempuan (City) – Sipirok (town), 1,000 m a.s.l., 4.II.1991, leg. S. Schödl “2”; **Sumatera Barat Prov.**: 1 ♀ (NMW): Solok Regency, 70 km SE Padang, Mt. Talang, Bukit Gombak, W of Danau di Atas, S of main road, 1,500 m a.s.l., small stream in primary forest, ca. 50 cm wide, 24.II.1991, leg. M. Jäch “29”; 1 ♂, 3 ♀♀ (NMW): Padang City, 25 km E Padang,

Taman Raya Bung Hatta Nature Reserve, 400 m a.s.l., 14.II.1991, leg. M. Jäch "16"; 2 ♂♂, 2 ♀♀ (NMW): 30 km E Padang, 1,050 m a.s.l., large river, 15–20 m wide, with huge basalt boulders, 25.II.1991, leg. M. Jäch "30".

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with narrowly microsculptured anterior clypeal margin, unicolored maxillary palpomeres, and body length more than 1.9 mm, together with *A. brevipennis*, *A. floresinus*, *A. jankodadai*, *A. mirabilis*, *A. nigroflavus*, *A. raucus*, *A. scintillans*, *A. setifer*, and *A. sucineus*. Shares eight antennomeres with *A. mirabilis* and *A. nigroflavus*. Differs in larger size, broader body, smaller eyes, brown coloration of pronotum, and less extended metafemoral pubescence from these species. Differs in distinct, moderately coarse pronotal ground punctation from *A. jankodadai* and *A. sucineus*. Shares dark brown pronotum with *A. floresinus*, *A. scintillans*, and *A. setifer* (all species with nine-segmented antennae). Shares similar aedeagus with *A. balkeorum*, *A. orientalis*, and *A. raucus*. Differs in wide manubrium from these species. *Agraphydrus balkeorum* and *A. orientalis* possess a completely microreticulate clypeus.

**DESCRIPTION:** Total length: 2.4–2.8 mm; elytral width: 1.2–1.4 mm; E.I.: 1.3–1.4, P.I.: 2.3–2.4, elytra 3.3–3.4 times as long as pronotum. Habitus (Fig. 56) moderately broad, evenly oval, moderately convex.

**Coloration:** Labrum, clypeus and frons dark brown to black, clypeus with yellow preocular patches about as wide as diameter of eyes; maxillary palpi unicolored yellow; pronotum dark brown with variably wide yellow margins; elytra light brown, or dark brown with undefined lighter brown areas mainly at center of disc and along lateral margins, with wide, darkened sublateral band and narrowly yellow lateral margins; ventrites black; legs largely dark brown.

**Head (Fig. 168):** Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 2.6; microsculpture present along anterior margin and on lateral thirds of disc, ground punctation moderately coarse, strongly impressed, interspaces 1–2 times as large as punctures; systematic punctures distinct. Eyes small, slightly protruding, slightly oblong. 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 = 1.6, palpomere 4 almost symmetrical. Mentum with few coarse punctures on lateral thirds, 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 with strongly reduced number of punctures, not reaching anterior margin, additional subserial row present along lateral margins. Mesoventrite with strong mesal bulge.

**Femora (Fig. 125):** Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemora; hairlines oblique on pro- and mesofemur, straight on metafemur.

**Abdomen:** Ventrite 5 with semicircular apical emargination, ca. 25 µm deep.

**Aedeagus (Fig. 248):** Length: 0.33–0.36 mm. Phallobase as long as parameres or slightly longer, longer than wide, abruptly bending to very wide and long manubrium; border between pigmented and unpigmented portion of ventral face very indistinct, almost reaching manubrium. Parameres with very indistinctly curving margins; apex wide, bluntly rounded, not inclining mesad; basal portion of dorsal face distinctly extending into phallobase. Median lobe very wide, wider than one paramere, margins indistinctly rounded; apex bluntly rounded, almost reaching apex of parameres; dorsal face with apical incision; styli absent; corona large, in apical position; basal apophyses short, widely separated, reaching distal third of phallobase.

**ECOLOGY:** Collected in rivers, streams and springs; found together with *A. orientalis* and *A. sundaicus*.

**DISTRIBUTION (Fig. 273):** Indonesia (Sumatra).

ETYMOLOGY: The species is dedicated to the late Stefan Schödl (NMW), who collected the holotype and several paratypes.

*Agraphydrus scintillans* sp.n.

TYPE LOCALITY: Vietnam, Vĩnh Phúc Province, Tam Đảo.

TYPE MATERIAL: **Holotype** ♂ (NMW): “N-VIETNAM: Tam Dao (2) \ 1.-8.6.1996 \ leg. Dembicky \ & Pacholatko”. **Paratypes**: VIETNAM: **Vĩnh Phúc Prov.**: 3 ♂♂, 2 ♀♀ (NMW): same sampling data; 1 ♀ (NMW): Tam Dao, 29.V.1995, leg. C.F. Lee; **Cao Bằng Prov.**: 1 ♂, 1 ♀ (EUM): Ban Than Trang, 320 m a.s.l., 30.IX.1994, leg. M. Sató.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with narrowly microsculptured anterior clypeal margin, unicolored maxillary palpomeres, and body length more than 1.9 mm, together with *A. brevipennis*, *A. floresinus*, *A. jankodadai*, *A. mirabilis*, *A. nigroflavus*, *A. raucus*, *A. schoedli*, *A. setifer*, and *A. succineus*. Differs in distinct, fine, pronotal ground punctation from *A. jankodadai* and *A. succineus*; in apical emargination of abdominal ventrite 5 from *A. brevipennis*. Differs in presence of nine antennomeres from *A. mirabilis*, *A. nigroflavus*, and *A. schoedli*. Shares dark brown pronotum with *A. floresinus*, *A. schoedli*, and *A. setifer*. Differs in larger size from *A. floresinus*; in larger eyes from *A. schoedli*; in slightly broader body and evenly oval habitus from *A. setifer*. Differs in features of aedeagus (margins of parameres strongly sigmoid, apex inflated, absence of large setae, short median lobe, not reaching apex of parameres) from all species of the region considered. Aedeagus very similar to aedeagus of *A. audax* KOMAREK & HEBAUER, 2018, a species with darker dorsal coloration and coarser elytral ground punctation.

DESCRIPTION: Total length: 2.4–2.8 mm; elytral width: 1.2–1.5 mm; E.I.: 1.3–1.4, P.I.: 2.4, elytra 3.4 times as long as pronotum. Habitus (Fig. 57) broad, evenly oval, moderately to strongly convex.

Coloration: Labrum light to dark brown; clypeus dark brown to black with indistinct, undefined, yellow preocular areas; frons black; maxillary palpi unicolored yellow; pronotum dark brown or shiny black with variably wide yellow margins; elytra shiny dark brown with undefined lighter colored posterior portion and with indistinctly defined darker sublateral band, enlarging anteriorly, present in most individuals; ventrites dark brown to black; legs lighter brown.

Head (Fig. 169): Clypeus with distinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 1.7; microsculpture present on lateral and anterior margins; ground punctation fine, weakly impressed, interspaces 2–4 times as wide as punctures; systematic punctures distinct. Eyes large, not protruding, slightly oblong. Antennae with nine 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 = 1.3, palpomere 4 asymmetrical. Mentum with coarse wrinkles and distinct punctures on lateral portions.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation fine, slightly coarser than on head and pronotum, interspaces twice as wide as punctures; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin, with some additional punctures along lateral margins. Mesoventrite with strong mesal bulge.

Femora (Fig. 126): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, straight on metafemur.

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

Aedeagus (Fig. 249): Length: 0.31–0.36 mm. Phallobase about as long as parameres, abruptly narrowing to triangular manubrium. Parameres moderately wide; margins distinctly sigmoid; apex delicate, slightly inflated (collapsed in dried specimens); basal portion of dorsal face reaching distal third of phallobase; ventral face delicate, almost meeting in mid-length, shorter than dorsal face. Median lobe moderately wide at base, converging in apical third, not reaching apex of parameres; dorsal face completely divided into two parts, slightly surmounted in ventral face with blunt apex; corona situated slightly distally to mid-length; basal apophyses short, narrowly separated, extending to half-length of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. attenuatus*, *A. pallidus*, and *A. tamdao*.

DISTRIBUTION (Fig. 267): Vietnam.

ETYMOLOGY: The name *scintillans* (Latin adjective) (= sparkling, shiny) refers to the shiny pronotum and elytra.

### *Agraphydrus setifer* KOMAREK & HEBAUER, 2018

*Agraphydrus setifer* KOMAREK & HEBAUER 2018: 57; PRZEWOŻNY 2019: 26.

TYPE LOCALITY: Vietnam, Lào Cai Province, Sa Pa District, near Sa Pa (District capital), Cát Cát (village), 22°19'N 103°50'E.

TYPE MATERIAL EXAMINED: **Holotype** ♂ (MTD): “N-VIETNAM, Prov. Lao Cai, \ Cat Cat, nr. Sa Pa; 1300-1400m, N22°19'43" \ E103°50' [seconds missing];25./26.V.1999 \ leg. [D.] Ahrens, [O.] Jäger [S.] Fabrizi”. **Paratypes**: VIETNAM: 20 exs. (MTD, NMW): same sampling data.

For paratypes from China (Yunnan) see KOMAREK & HEBAUER (2018).

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with narrowly microsculptured anterior clypeal margin, unicolored maxillary palpomeres, and body length more than 1.9 mm, together with *A. brevipennis*, *A. floresinus*, *A. jankodadai*, *A. mirabilis*, *A. nigroflavus*, *A. raucus*, *A. schoedli*, *A. scintillans*, and *A. sucineus*. Differs in distinct, fine, pronotal ground punctation from *A. jankodadai* and *A. sucineus*; in apical emargination of abdominal ventrite 5 from *A. brevipennis*. Differs in presence of nine antennomeres from *A. mirabilis*, *A. nigroflavus*, and *A. schoedli*. Shares dark brown pronotum with *A. floresinus*, *A. schoedli*, and *A. scintillans*. Differs in larger size from *A. floresinus*; in slender habitus and larger eyes from *A. schoedli*; in slender habitus and parallel-sided elytra from *A. scintillans*. Differs in presence of very large setae on parameres from all species.

DESCRIPTION: See KOMAREK & HEBAUER (2018). Head and aedeagus as in Figs. 170, 250.

ECOLOGY: In China collected in rivers, streams, and pools (KOMAREK & HEBAUER 2018); in Vietnam found together with *A. laocaiensis*.

DISTRIBUTION (Fig. 267): China (Yunnan), Vietnam.

### *Agraphydrus shaverdoae* sp.n.

TYPE LOCALITY: Myanmar, Shan State, Taunggyi District, NW Kalaw (town), km 23 on road between Kalaw and Thazi, 20°42'22.68"N 96°30'13.08"E.

TYPE MATERIAL: **Holotype** ♂ (NMW): “MYANMAR: Shan State \ km 23 on rd [road] Kalaw-Thazi \ NW Kalaw, 25.-26.6.[20]04 \ leg. H. Schillhammer, H. \ Shaverdo, U Myint [U Myin] Hlaing \ (MBS 154a) | dried str. flowing through \ forest and to road, very \ small puddles ca. 720 m \ 20°42.378'N 96°30.218'E”. **Paratypes**: **MYANMAR**: **Sagaing Region**: 1 ♂ (NMW): Alaungdaw Kathapa N.P., Pagoda Stream near Log Cabin Camp, 22°19.094'N 94°28.823'E, ca. 350 m a.s.l., 9.-10.V.2003, leg. D. Boukal “MBS 118”; **THAILAND**: **Surat Thani**

**Prov.:** 1 ♂ (CSH): Khao Sok N.P., ca. 1 km N Khlong Sok, 8°54'55"N 98°31'40"E, 80 m a.s.l., primary forest, 15.VIII.2012, leg. A. Weigel "UWP"; **Nakhon Nayok Prov.:** 1 ♂ (EEM): Khao Yai N.P., Salika Waterfall, 14°18.594'N 101°15.324'E, 70 m a.s.l., gravel, 7.IV.2004, leg. R.W. Sites & A. Vithepradit "L-606".

**DIFFERENTIAL DIAGNOSIS:** Belongs to group of species with completely microreticulate clypeus, unicolored yellow maxillary palpomeres, absence of microsculpture on lateral pronotal margin, nine antennomeres, and dark brown to black clypeus, together with *A. connexus*, *A. kathapa*, *A. laocaiensis*, *A. namthaensis*, *A. schoenmanni* and *A. umbrosus*. Differs from *A. kathapa* and *A. namthaensis* in absence of dark sublateral elytral band. Similar aedeagus is present in *A. laocaiensis* and *A. schoenmanni*. Differs from *A. laocaiensis* in absence of trapezoidal pronotal patch, in distinctly finer pronotal ground punctation and minor size (*A. laocaiensis*: 2.2–2.5 mm body length). Shares very fine ground punctation with *A. schoenmanni*; Differs in less strongly curved parameres from this species. Differs in absence of connecting band between parameres and median lobe from *A. connexus*, in longer median lobe and distal position of corona from *A. kathapa*, in wider median lobe with longer basal apophyses from *A. namthaensis*; in distal position of corona from *A. umbrosus*.

**DESCRIPTION:** Total length: 1.9–2.2 mm; elytral width: 1.0–1.1 mm; E.I.: 1.4, P.I.: 2.2, elytra 3.0 times as long as pronotum. Habitus (Fig. 58) moderately broad, elytra almost parallel-sided, moderately convex.

**Coloration:** Labrum and clypeus dark brown to black, clypeus with yellow preocular patches, about as wide as eye; frons black; maxillary palpi unicolored yellow; pronotum dark brown with large, undefined, yellow margins, broadly contacting posterior margin, variably extending laterad; elytra brown, with darker sublateral band and yellow lateral margins in most individuals; ventrites black, legs dark brown to black, femora yellowish brown distally.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 1.6; distinct microreticulation present on entire clypeus; ground punctures obsolete on clypeus, very fine to fine on frons, weakly impressed, interspaces 3–5 times as wide as punctures; systematic punctures distinct. Eyes large, slightly protruding, slightly oblong. 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 = 1.3, palpomere 4 almost symmetrical. Mentum with distinctly impressed punctures, absent from mesal portion, fine wrinkles present antero-laterally.

**Thorax:** Pronotal ground punctures as on frons, microsculpture absent; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of moderately distinct systematic punctures present, rows 1–3 with reduced number of punctures. Mesoventrite with distinct mesal bulge.

**Femora (Fig. 127):** Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines oblique on pro- and mesofemur, straight to slightly convex on metafemur.

**Abdomen:** Ventrite 5 with apical emargination.

**Aedeagus (Fig. 251):** Length: 0.24–0.29 mm. Phallobase shorter than parameres, about as long as wide, abruptly narrowing to triangular manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres with curving margins, with subapical constriction; apex delicate, subtruncate or very slightly impressed, with lateral blunt extension; basal portion of dorsal face reaching distal third of phallobase mesally. Median lobe narrow with almost parallel-sided margins; ventral face delicate, apex slightly impressed, reaching apex of parameres; dorsal face deeply split into two

narrow parts, shorter than ventral face; corona situated between mid-length and distal third; basal apophyses short, narrowly separated, reaching mid-length of phallobase.

ECOLOGY: Collected in streams and puddles; in Myanmar found together with *A. masatakai*; in Thailand together with *A. masatakai* and *A. spadix*.

DISTRIBUTION (Fig. 267): Myanmar, Thailand.

ETYMOLOGY: The species is dedicated to the collector Helena Shaverdo (NMW).

### *Agraphydrus siamensis* (HANSEN, 1999)

*Megagrphydrus siamensis* HANSEN 1999a: 140.

*Agraphydrus siamensis* (HANSEN): MINOSHIMA, KOMAREK & ÔHARA 2015: 33; PRZEWOŹNY 2019: 25.

TYPE LOCALITY: Thailand, “Prae” (may refer to Phrae Province or to the province capital Phrae).

TYPE MATERIAL EXAMINED: **Holotype** ♂ (ZMUC): “Prae Siam [handwritten] \ 1929–33 [handwritten] \ Poul Fogh [handwritten] | Coll. Rosenberg | HOLOTYPE \ Megagrphydrus siamensis \ M. Hansen | zmuc00020099”. Aedeagus mounted on separate card below beetle. **Paratypes**: **THAILAND**: **Chiang Mai Prov.**: 1 ex. (ZMUC): Doi Inthanon N.P., Mae Ya, 600–700 m a.s.l., 11.X.1981, Zool. Museum Copenhagen exp.; 1 ♂ (NMW): Doi Chiang Dao, 500 m a.s.l., near entrance Chiang Dao Cave, rain forest, 7.XI.1995, leg. H. Zettel “9a”; 1 ♀ (NMW): “Chiang Mai”, 10.–17.IV.1989, leg. H. Malicky; 3 exs. (NMW, ZMUC): Chiang Mai Zoo, 18°49'N 98°57'E, at light, 10.–17.IV.1989, leg. P. Chantaramongkol & H. Malicky; 3 ♀ ♀ (NMW): Doi Suthep N.P., Montatharn Falls, 750–800 m a.s.l., 2.XI.1995, leg. H. Zettel “4”; 1 ♂, 1 ♀ (NMW, ZMUC): same sampling data, but 700–750 m a.s.l., 6.XI.1995, leg. H. Zettel “8”; 1 ♀ (NMW): Chiang Dao, Ban Yang Thung Pong, 500 m a.s.l., 8.XI.1995, leg. H. Zettel “10”; 1 ♂ (NMW): “Hui Koo Kao”, 18°48'N 98°56'E, 800 m a.s.l., 14.II.1992, leg. H. Malicky “MS1”; **Mae Hong Son Prov.**: 7 exs. (NMW, ZMUC): Pha Bong (village), ca. 12 km S Mae Hong Son, small river, ca. 2–5 m wide, 12.XI.1995, leg. H. Zettel “13a”; **Nakhon Ratchasima Prov.**: 1 ♀ (NMW): Khao Yai N.P., 14.XI.1988, leg. M. Jäch “2”; **Phetchabun Prov.**: 1 ♀ (NMW): Nam Nao N.P., Huai Ya Krua, 14.III.1994, leg. W. Shepard; **Phrae Prov.**: 1 ♀ (NMW): 50 km NE Phrae, ca. 5 km SE Ban Huai Kaet, stream, ca. 4–6 m wide, rather fast flowing, almost without pools, in dense forest, 18.XI.1995, leg. H. Zettel “18a”.

#### ADDITIONAL MATERIAL EXAMINED:

**THAILAND**: **Chiang Mai Prov.**: 1 ♀ (NMW): Doi Suthep N.P., Huai Sa Lad, 18°48.31'N 98°54.52'E, on road up mountain, ca. 3,394 ft a.s.l., streams going down steep slopes in dense forest, clear water, substrate of sand, gravel on bedrock with leaves, 24.III.1994, leg. W. Shepard “WDS A 1043”; **Mae Hong Son Prov.**: 1 ♂ (MHNG): Tham Lod, 8 km N Ban Nam Lang, Nam Lang River, 700 m a.s.l., river shore, 14.XI.1985, leg. D. Burckhardt & I. Löbl; **Phetchabun Prov.**: 1 ♀ (NMW): Nam Nao N.P., 1,100 m a.s.l., 3.I.1997, leg. P. Mazzoldi; **Tak Prov.**: 4 exs. (NMW): Umphang Distr., road Umphang – Mae Chan, 650–700 m a.s.l., 30.XII.1990, leg. P. Mazzoldi.

**DIFFERENTIAL DIAGNOSIS**: Belongs to group of species with nine to ten rows of coarse elytral punctures and nine antennomeres, together with *A. attenuatus*, *A. jaechi*, and *A. regularis*. Differs in strongly club-shaped maxillary palpomere 2, and palpomere 4 shorter than palpomere 3 from *A. jaechi*; in evenly oval elytra, not attenuating posterior to mid-length in dorsal view, but abruptly declining apically in lateral view, and in regular arrangement of pronotal systematic punctures from *A. attenuatus*; in less regularly distributed elytral serial punctures and in basal position of corona from *A. regularis*; differs in distinct mesal incisions on parameres from all species mentioned. For differences to *A. insidiator* and *A. politus* see under *A. attenuatus*.

**DESCRIPTION**: Total length: 2.7–3.7 mm; elytral width: 1.7–2.0 mm; E.I.: 1.3, P.I.: 2.1, elytra 2.9 times as long as pronotum. Habitus (Fig. 59) broad, evenly oval, elytra not attenuating apicad, moderately convex, abruptly declining apically in lateral view.

**Coloration**: Labrum and clypeus dark rufous, clypeus with undefined brighter margins; frons black; maxillary palpi unicolored yellow; pronotum dark rufous with undefined yellow lateral

margins; elytra black with slightly brighter margins in some individuals; ventrites and legs rufous to black.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.3, lateral length ratio clypeus/eyes = 3.3, microsculpture absent, ground punctures moderately coarse, distinctly impressed, interspaces 1–2 times as wide as punctures; systematic punctures distinct, loosely arranged in antero-lateral clypeal corner and on disc. Eyes small, not protruding, oblong, anterior margin slightly excised by posterior projection of clypeus, ventral portion larger than dorsal part. Antennae with nine antennomeres. Maxillary palpi (Fig. 143) moderately slender, palpomere 2 strongly club-shaped, 0.9 times as long as pronotum in midline, 0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 0.9, palpomere 4 almost symmetrical. Mentum with some very fine punctures and some longitudinal wrinkles mesally.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct, semi-circularly arranged with transverse oblique anterior segment, subserial lateral row, loose posterior cluster, and few punctures within center of semicircle. Mesoventrite with crescent-shaped horizontal postero-median ridge. Elytral ground punctation very slightly finer than on head and pronotum, interspaces 2–3 times as wide as punctures. Ten rows of very distinct subserially arranged coarse punctures present, reaching anterior elytral margin, lateral rows less regular, punctures in mesal rows 1–2 smaller and less distinctly impressed than in lateral rows. Mesoventrite with two narrowly separated transverse ridges, visible in SEM (MINOSHIMA, KOMAREK & ÔHARA 2015: fig. 9E), appearing as single ridge at 100 × magnification.

Femora (Fig. 128): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemora; hairlines straight.

Abdomen: Ventrite 5 with very shallow apical emargination, 8–10 µm deep, or emargination absent.

Aedeagus (Fig. 252): Length: 0.53–0.57 mm. Phallobase as long as wide, abruptly bending to long, sharply pointed manubrium; border between pigmented and unpigmented portion of ventral face reaching manubrium. Parameres with wide basal portion, mesal margin deeply excised in basal fourth, narrow in distal two thirds, converging to sharply pointed apex; mesal margin with strong incision; basal portion of dorsal face extending to mid-length of phallobase; ventral face much wider than dorsal face. Median lobe evenly converging to bluntly rounded apex, not reaching apex of parameres; corona large, situated basally; basal apophyses very long and wide, reaching manubrium.

ECOLOGY: Collected in rivers, streams, and at light. Found together with *A. connexus*, *A. coomani*, *A. masatakai*, *A. mirabilis*, and *A. tulipa*.

DISTRIBUTION (Fig. 269): Thailand.

### *Agraphydrus skalei* sp.n.

TYPE LOCALITY: Indonesia, West Papua Province, Raja Ampat Regency, Waigeo Island, Lopintol, Rowery River, ca. 0°7'S 130°53'E.

TYPE MATERIAL: **Holotype** ♂ (NMW): “W-PAPUA Raja Ampat Prov. \ Waigeo Isl, Lopintol, Rowery \ River 0°7'S, 130°53'E \ 11.I.2004 leg. A.Skale”.

DIFFERENTIAL DIAGNOSIS: Shares slender habitus with posteriorly widening elytra with *A. coomani* and similar species (see under *A. bacchusi*); differs in absence of apical infuscation of maxillary palpomere 4 from these species. Differs in elytral ground punctures arranged in regular rows and in features of aedeagus (median lobe with a leaf-shaped dorsal lobes, parameres elongated with apex bending mesad, embracing median lobe) from all species of *Agraphydrus*.

DESCRIPTION: Total length: 2.3 mm; elytral width: 1.1 mm; E.I.: 1.2, P.I.: 1.8, elytra 2.5 times as long as pronotum. Habitus (Fig. 60) slender, elytra indistinctly widening posterior to mid-length, moderately convex.

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

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.3, lateral length ratio clypeus/eyes = 2.5; microreticulation absent, but indistinct wrinkles present on lateral parts; ground punctation very fine, interspaces 2–3 times as wide as punctures; systematic punctures indistinct. Eyes small, not protruding, oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.3 times as long as pronotum in midline, 1.2 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.0, palpomere 4 almost symmetrical. Mentum with fine, widely spaced punctures, microsculpture absent.

Thorax: Pronotal ground punctation very fine; systematic punctures moderately distinct. Elytral ground punctation slightly coarser than on pronotum, ordered in regular rows; series with larger, densely arranged punctures alternating with series of smaller, less densely arranged punctures. Four rows of very indistinct systematic punctures present, with strongly reduced number of punctures. Mesoventrite with slight mesal bulge.

Femora (Fig. 129): Pubescence present on proximal 2/3 of profemur, on proximal 3/4 of meso- and metafemur; hairlines slightly oblique.

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

Aedeagus (Fig. 253): Length: 0.39 mm. Phallobase distinctly shorter than parameres, about as long as wide, evenly narrowing to distinct manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres with indistinctly sigmoidal margins; apex broadly rounded, strongly inclining mesad, embracing apex of median lobe; basal portion of dorsal face slightly extending into phallobase. Median lobe slender, finger-shaped, with almost parallel margins; apex narrowly rounded, not reaching apex of parameres; corona situated basally; leaf-shaped lobes present dorsally, half as long as main part of median lobe, with apical impression; basal apophyses moderately long, slightly extending into phallobase.

ECOLOGY: Collected in a river together with *A. coomani*.

DISTRIBUTION (Fig. 277): Indonesia (Waigeo Island).

ETYMOLOGY: The species is dedicated to the collector Andre Skale (Erfurt, Germany).

### *Agraphydrus spadix* sp.n.

TYPE LOCALITY: Thailand, Kanchanaburi Province, Sangkhla Buri District, Thung Yai Naresuan Wildlife Sanctuary.

TYPE MATERIAL: **Holotype** ♂ (NMW): “THAILAND: 27.12.1996 \ Sankhaburi \ Thung Yai Naresuan NP \ leg. Mazzoldi”. **Paratypes**: **THAILAND: Kanchanaburi Prov.**: 1 ♂, 2 ♀♀ (NMW); same sampling data; **Surat Thani Prov.**: 1 ♂ (CSH): Khao Sok N.P., ca. 1 km N Khlong Sok, 8°54'55"N 98°31'40"E, 80 m a.s.l., primary forest, 15.VIII.2012, leg. A. Weigel “UWP”.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, yellow clypeus without microsculpture, nine antennomeres, unicolored maxillary palpi, absence of metaventral carina, metafemoral pubescence present on more than proximal half, and presence of apical emargination on ventrite 5, together with *A. clarus*, *A. engkari*, *A. hamatus*, *A. muluensis*, and *A. orbicularis*. Differs in fine pronotal ground punctation from *A. clarus* and

*A. engkari*, in features of aedeagus (e.g., parameres with wide subapical excision, median lobe narrow with very long basal apophyses, corona in basal position) from all species.

DESCRIPTION: Total length: 2.5–2.6 mm; elytral width: 1.3 mm; E.I.: 1.3–1.4, P.I.: 2.1–2.2, elytra 2.8–2.9 times as long as pronotum. Habitus (Fig. 61) moderately broad, evenly oval, moderately convex.

Coloration: Labrum and clypeus yellow, mesal portion of clypeus darkened in some individuals; frons yellow anteriorly, black posteriorly; maxillary palpi unicolored yellow; pronotum and elytra yellow; ventrites and legs light brown.

Head: Clypeus with distinctly concave anterior margin C.I.: 4.0, lateral length ratio clypeus/eyes = 2.2; microsculpture absent; ground punctation fine, weakly impressed, interspaces 2–3 times as wide as punctures; systematic punctures distinct. Eyes moderately large, not protruding, oblong. 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 = 1.0–1.1, palpomere 4 slightly asymmetrical. Mentum with fine, evenly distributed 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 with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge, abruptly sloping posteriorly.

Femora (Fig. 130): Pubescence present on proximal 3/4; hairline straight to slightly rounded.

Abdomen: Ventrite 5 with very shallow apical emargination.

Aedeagus (Fig. 254): Length: 0.41 mm. Phallobase sac-shaped, distinctly longer than parameres, longer than wide; lateral margins almost parallel-sided, basal portion strongly curving; manubrium short, sharply pointed, sharply flexing dorsad, situated within basal excision of phallobase. Parameres wide in basal half, strongly narrowing in mid-length to distal half with almost semicircular excision subapically; mesal margin almost straight, with anteriorly directed knob-like extensions at level of corona; apex with beak-shaped lateral extension; basal portion of dorsal face reaching distal third of phallobase, forming hook-shaped extensions, concealed by basal apophyses of median lobe. Median lobe narrow; apex not reaching apex of parameres; corona small, indistinct, in basal position; basal apophyses straight, very long, reaching proximal portion of phallobase, terminating in shoe-shaped extensions.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. masatakai*, *A. shaverdoae*, and *A. tulipa*.

DISTRIBUTION (Fig. 271): Thailand.

ETYMOLOGY: The name spadix (Latin adjective) (= brown) refers to the brown color of pronotum and elytra.

### *Agraphydrus spinosus* sp.n.

TYPE LOCALITY: Malaysia, Selangor, Gombak District, Rawang Subdistrict, Templer Park.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MALAYSIA 21.I.1992 \ SELANGOR: Templer \ Park, NK.L. [north of Kuala Lumpur] \ leg. Jäch (1)"; collected in the upper course of a stream, ca. 2–3 m wide, granite, shaded, with much sand among stones, flowing through primary forest, ca. 200 m a.s.l.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with body length more than 2.0 mm, dark colored clypeus without microsculpture, unicolored maxillary palpi, absence of meta-

ventral carina, metafemoral pubescence present on at least proximal 2/3, and absence of apical emargination of abdominal ventrite 5, together with *A. obesus* and some specimens of *A. masatakai*. Differs in less extended femoral pubescence from both species; in distinct elytral systematic punctures from *A. masatakai*, in brown (in contrast to black) pronotum and elytra from *A. obesus*. Differs in parameres with spine-like apical extensions from all species.

DESCRIPTION: Total length: 2.5 mm; elytral width: 1.3 mm; E.I.: 1.3, P.I.: 2.3, elytra 3.0 times as long as pronotum. Habitus (Fig. 62) broad, evenly oval, elytra widest at anterior edge, moderately convex.

Coloration: Labrum and clypeus dark brown, clypeus with undefined yellow preocular area; frons black; maxillary palpi unicolored yellow; pronotum dark brown to black with decreasing intensity of coloration to yellow lateral margins; elytra dark brown to black with yellowish brown lateral margins; ventrites and legs black.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.9, lateral length ratio clypeus/eyes = 1.6; microsculpture absent, some indistinct wrinkles present on very narrow lateral rim within area of systematic punctures; ground punctation fine, weakly impressed, interspaces 2–3 times as wide as punctures; systematic punctures moderately distinct. Eyes moderately large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi slender, as long as pronotum in midline, 0.8–0.9 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2, palpomere 4 symmetrical. Mentum with fine punctures, absent mesally, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation coarser than on head and pronotum, interspaces 1–2 times as wide as punctures; four rows of distinct systematic punctures present, mesal rows with reduced number of punctures, present in anterior and posterior half, not reaching anterior margin, additional subserial punctures present along lateral margins. Mesoventrite with very strong mesal bulge.

Femora (Fig. 131): Pubescence present on slightly less than proximal 2/3; hairlines straight.

Abdomen: Ventrite 5 with weakly sclerotized apical margin, emargination absent.

Aedeagus (Fig. 255): Length: 0.45. Phallobase as long as parameres, as wide as long, with almost parallel-sided lateral margins, abruptly bending to strongly curving basal portion; manubrium short, wide, indistinctly defined; border between pigmented and unpigmented portion of ventral face very distinct, pigmented, reaching manubrium. Parameres wide, with large subapical bulge; apex with strong, sharp, thorn-like projection; ventral face much shorter than dorsal face; basal portion of dorsal face reaching mid-length of phallobase. Median lobe moderately slender, much smaller than parameres, slightly narrowing to bluntly rounded apex, distinctly shorter than parameres; corona situated slightly proximal to mid-length; basal apophyses long, strongly bending laterad, reaching mid-length of phallobase.

ECOLOGY: Collected in a stream.

DISTRIBUTION (Fig. 268): Malaysia (Peninsula).

ETYMOLOGY: The name spinosus (Latin adjective) (= spiny, thorny) refers to the thorn-like projection of the parameres.

### *Agraphydrus stramineus* sp.n.

TYPE LOCALITY: Malaysia, Sarawak, Miri Division, 30 km S Miri, Lambir Hills N.P.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MAL., Sarawak 1993 \ 30km S Miri \ Lambir Hills, 24.2. \ leg. M. Jäch (12)"; collected in a small stream. **Paratypes**: **MALAYSIA: Sarawak**: 6 ♂♂ (NMW): same sampling data; 1 ♂

(NMW): Kuching Division, 80 km S Kuching, Annah Rais (village), river, ca. 10 m wide, and tributary, ca. 3 m wide, on foot of Mt. Penrissen, 18.II.1993, leg. M. Jäch "4"; 1 ♀ (NMW): Kuching Division, Kubah N.P., Mt. Serapi, 20 km W Kuching, near Matang Wildlife Center, Sungai (= river) Cina, ca. 15 m wide, with large boulders, 6.–7.III.1993, leg. M. Jäch "23".

**DIFFERENTIAL DIAGNOSIS:** Shares narrowly microsculptured anterior margin of clypeus, eight antennomeres, and small size (body length less than 2.0 mm) with *A. cantonensis*, *A. excisus*, and *A. musculus*. Shares apical incision on median lobe with *A. excisus* and *A. nigroflavus*. Differs in unequal ground punctation of pronotum and elytra, absence of dark lateral elytral band, and very small eyes from *A. excisus*, *A. musculus* and *A. nigroflavus*, in broader body from *A. musculus*, in smaller size from *A. nigroflavus*. Differs in very wide, globular ventral sac of median lobe from all species of the group.

**DESCRIPTION:** Total length: 1.5–1.6 mm; elytral width: 0.7–0.8 mm; E.I.: 1.2, P.I.: 2.2, elytra 2.8–2.9 times as long as pronotum. Habitus (Fig. 63) broad, evenly oval, moderately convex.

**Coloration:** Labrum yellow; clypeus and frons dark brown or black, clypeus with indistinctly defined yellow preocular patches about as wide as diameter of eye, indistinct in most cases; maxillary palpi unicolored yellow; pronotum unicolored dark yellow; elytra dark yellowish brown, darker than pronotum in most individuals; ventrites and legs yellowish or rufous.

**Head:** Clypeus with distinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 3.2; microsculpture present along lateral and anterior margins; ground punctation fine, distinctly impressed, interspaces three times as wide as punctures; systematic punctures indistinct. Eyes very small, not protruding, oblique. Antennae with eight antennomeres. Maxillary palpi slender, 0.9 times as long as pronotum in midline, 0.7 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.3, palpomere 4 almost symmetrical. Mentum with very fine, widely spaced punctures, microsculpture absent.

**Thorax:** Pronotal ground punctures slightly finer than on head; systematic punctures distinct. Elytral ground punctation coarser than on pronotum, interspaces about twice as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low mesal bulge.

**Femora (Fig. 132):** Pubescence present on proximal 2/3 of profemur, on more than proximal half of mesofemur, on proximal half of metafemur; hairlines oblique on pro- and mesofemur, straight on metafemur.

**Abdomen:** Ventrite 5 with almost semicircular apical emargination, ca. 10–20 µm deep.

**Aedeagus (Fig. 256):** Length: 0.21–0.22 mm, delicate. Phallobase shorter than parameres, about as long as wide, evenly narrowing to wide manubrium; border between pigmented and unpigmented portion of ventral face indistinct, almost reaching manubrium. Parameres moderately wide basally, margins slightly curving, narrowing distad, with indistinct subapical constriction; apex narrow, blunt, not inflated; basal portion of dorsal face reaching distal third of phallobase mesally. Median lobe widest in mid-length; apex broad with distinct notch, almost reaching apex of parameres; dorsal face moderately wide; ventral face very wide, globular with large apical incision; corona situated in distal third; basal apophyses very short, narrowly separated, reaching half-length of phallobase.

**ECOLOGY:** Collected in streams and rivers; found together with *A. excisus* and *A. musculus*.

**DISTRIBUTION (Fig. 273):** Malaysia (Sarawak).

**ETYMOLOGY:** The name stramineus (Latin adjective) (= straw-colored) refers to the yellow pronotum.

*Agraphydrus sucineus* sp.n.

TYPE LOCALITY: Malaysia, Pahang, Taman Negara N.P., surroundings of Nusa Camp.

TYPE MATERIAL: **Holotype** ♂ (NMW): “W.Malaysia / Pahang /Taman \ Negara N.P., Surr. Nusa Camp, \ 100 m, 18.-24.6.1994, small \ pools in temp. foreststr.. [forest stream] MA 5, \ Hendrich leg.”; collected in a very small muddy pool filled with leaves. **Paratypes: MALAYSIA: Pahang:** 8 exs. (CHB, NMW): same sampling data; 3 exs. (NMW): Cameron Highlands Distr., Tanah Rata (town), in submersed, partly decaying logs on small and very shallow, shaded stream crossing path (number 9) in dense primary forest, 9.VI.2001, leg. J. Kodada & F. Čiampor; **Johor:** 2 ♂♂, 2 ♀♀ (NMW): Gunung Ledang N.P., Gunung Ledang (= Mt. Ophir), Hutan Lipur, 200 m a.s.l., 4.II.1992, leg. H. Schillhammer “14”; 2 exs. (CHB, NMW): Sagamat Distr., Bekok, path to waterfall, 50–150 m a.s.l., 10.IV.1997, leg. M. Balke & L. Hendrich; **Perak:** 3 exs. (NHM): “Perak”, leg. W. Doherty.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with very narrowly microsculptured anterior margin of clypeus, unicolored maxillary palpomeres, body length more than 1.9 mm and nine-segmented antennae together with *A. brevipenis*, *A. floresinus*, *A. jankodadai*, *A. raucus*, *A. scintillans*, *A. setifer*. Shares very fine to obsoletely punctate pronotum with *A. jankodadai*, differs in amber coloration of elytra (dark brown or black in *A. jankodadai*) from this species. Differs from *A. raucus* also in larger eyes; from *A. brevipenis* in presence of apical emargination on ventrite 5. Differs from *A. floresinus*, *A. scintillans* and *A. setifer* in light coloration of clypeus and pronotum, and in features of aedeagus (e.g., parameres inflated apically with indistinct subapical constriction) from all species.

DESCRIPTION: Total length: 2.0–2.2 mm; elytral width: 1.0–1.2 mm; E.I.: 1.2–1.3, P.I.: 2.2–2.3, elytra 3.0–3.1 times as long as pronotum. Habitus (Fig. 64) broad, evenly oval, moderately convex.

Coloration: Labrum, clypeus and frons amber colored, maxillary palpi unicolored yellow; pronotum and elytra amber colored, with indistinct, undefined, mesal infuscations; ventrites and legs amber colored to darker brown.

Head (Fig. 183): Clypeus with distinctly concave anterior margin, C.I.: 2.9, lateral length ratio clypeus/eyes = 1.2–1.4; indistinct microsculpture present along lateral margins and on anterior margin; ground punctation obsolete; systematic punctures indistinct. Eyes large, slightly protruding, oblong. Antennae with nine antennomeres, intermediate segment 2 minute. Maxillary palpi slender, 1.1–1.3 times as long as pronotum in midline, 1.1 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.1–1.2, palpomere 4 slightly asymmetrical. Mentum glabrous, punctures obsolete, microsculpture absent.

Thorax: Pronotal ground punctation obsolete, some very fine, very widely spaced punctures present in some individuals; systematic punctures indistinct. Elytral ground punctation fine, more distinct than on head and pronotum, interspaces 2–3 times as wide as punctures; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with mesal bulge.

Femora (Fig. 133): Pubescence present on proximal 2/3; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with distinct, semicircular apical emargination.

Aedeagus (Fig. 257): Length: 0.36–0.45 mm. Phallobase as long as parameres or slightly shorter, about as wide as long, margins abruptly converging to narrow manubrium; border between pigmented and unpigmented portion of ventral face indistinct, reaching basis of phallobase. Parameres with sigmoid margins, with subapical constriction; apex bluntly rounded, asymmetrical; basal portion of dorsal face extending indistinctly into phallobase. Median lobe as wide as one paramere; dorsal face with almost parallel-sided margins; apex bluntly rounded with

very indistinct notch, not reaching apex of parameres; two delicate leaf-shaped lobes present; corona situated in mid-length; basal apophyses very short, reaching distal third of phallobase.

ECOLOGY: Collected in pools and streams; found together with *A. connexus*, *A. coomani*, *A. helicopter*, *A. hendrichi*, *A. heterochromatus*, *A. hortensis*, and *A. jaechi*.

DISTRIBUTION (Fig. 271): Malaysia (Peninsula).

ETYMOLOGY: The name *sucineus* (Latin adjective) (= of amber) refers to the amber colored pronotum and elytra.

### *Agraphydrus sundaicus* sp.n.

TYPE LOCALITY: Indonesia, West Sumatra Province, Padang City, 25 km E Padang, Taman Raya Bung Hatta Nature Reserve.

TYPE MATERIAL: **Holotype** ♂ (NMW): "INDONESIEN 1991 (16) \ W-Sumatra, 25km E Padang \ NSG Taman Raya Bung Hatta \ 400m, leg. Jäch 14.2." **Paratypes**: **INDONESIA**: **Sumatera Barat Prov.**: 2 ♀♀ (NMW): same sampling data, but leg. Schödl "16"; 2 ♂♂, 8 ♀♀ (NMW): Padang City, road Padang – Bungus Beach, 14.II.1991, leg. S. Schödl "17"; 1 ♂, 4 ♀♀ (NMW): same sampling data, but leg. M. Jäch "17"; 2 ♀♀ (NMW): same sampling data, but leg. S. Schödl "18"; 1 ♂, 3 ♀♀ (NMW): Padang City, Bungus Beach, 10 m a.s.l., waterfall river at Bungus Beach, volcanic, 14. & 23.II.1991, leg. S. Schödl "18"; 1 ♀ (NMW): same sampling data, but leg. M. Jäch "18"; 4 ♀♀ (NMW): Padang Pariaman Regency, 50 km NW Padang, Sicincin, river, ca. 20 m wide, 13.II.1991, leg. M. Jäch "15"; 2 ♀♀ (NMW): Pasaman Regency, Rimbo Panti Nature Reserve, 300 m a.s.l., 5.II.1991, leg. S. Schödl "4"; 1 ♀ (NMW): Pasaman Regency, Rimbo Panti Nature Reserve, near Panti, 100 km NW Bukittinggi, 100 m a.s.l., stream, ca. 2–3 m wide, leg. M. Jäch "4"; 1 ♀ (NMW): Agam Regency, Lake Maninjau, 450 m a.s.l., 9.II.1991, leg. S. Schödl "10"; 1 ♀ (NMW): Agam Regency, Lake Maninjau, 550 m a.s.l., stream, 2–3 m wide, 8.II.1991, leg. M. Jäch "8"; 1 ♂ (NMW): Solok Regency, 70 km SE Padang, Mt. Talang, Bukit Gombak, W of Danau di Atas, S of main road, small stream in primary forest, ca. 50 cm wide, 1,500 m a.s.l., 24.II.1991, leg. M. Jäch "29"; **Sumatera Utara Prov.**: 1 ♂, 3 ♀♀ (NMW): Deli Serdang Regency, Sibolangit Distr., between Brastagi (or Berastagi) and Medan, primary forest at Sibolangit, 25.II.1990, leg. M. Jäch "19"; **Jawa Barat Prov.**: 2 ♀♀ (NMW): Pangandaran Regency & Distr., near Pangandaran, large river with gravel bank, 23.I.1987, leg. M. Jäch "J16"; 1 ♀ (NMW): Bogor Regency, W of Cisarua, Cisarua River, ca. 5 m wide, slightly polluted, 14.I.1987, leg. M. Jäch "J4"; 4 ♂♂, 1 ♀ (NMW): Bogor Regency, Mt. Salak, 8 km S Bogor, Ciapus River, ca. 2 m wide, very shallow, gravel, boulders, ca. 800 m a.s.l., 31.VII.1994, leg. R. Schuh; 3 ♂♂, 3 ♀♀ (NMW): same sampling data, but 17.VIII.1994.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with extensive clypeal microreticulation, unicolored maxillary palpi, and eight antennomeres, together with *A. balkeorum*, *A. gilvus*, *A. orientalis*, and *A. reticulatus*. Differs mainly in dark coloration of clypeus and pronotum and less widely separated basal apophyses of median lobe from *A. balkeorum*; in wide apex of parameres from *A. gilvus*; in less broad body, dark brown to black pronotum and dark brown elytra, larger length ratio clypeus/eyes, and coarser ground punctation of pronotum and elytra from *A. orientalis*. Aedeagus similar to aedeagus of *A. schoedli* and of *A. raucus*, with wide and straight parameres and broadly rounded apex; differs in larger extension of clypeal microreticulation and in narrower median lobe from both species; differs moreover in smaller manubrium from *A. schoedli* and in presence of eight antennomeres from *A. raucus*.

DESCRIPTION: Total length: 2.0–2.4 mm; elytral width: 1.0–1.1 mm; E.I.: 1.2, P.I.: 2.1, elytra 2.6 times as long as pronotum. Habitus (Fig. 65) moderately broad, elytra almost parallel-sided, moderately convex.

Coloration: Labrum, clypeus and frons black; clypeus with variably wide yellow lateral margins, smaller than diameter of eyes or as wide as eyes, indistinctly demarcated or forming preocular patches; maxillary palpi unicolored yellow; pronotum dark brown to black, with narrow, undefined, yellowish lateral margins in most individuals, and yellow lateral parts of anterior and posterior margins in some cases; elytra dark brown with indistinctly brighter brown areas on anterior on posterior half of elytral disc; ventrites dark brown to black; legs light to dark brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.0, lateral length ratio clypeus/eyes = 2.1; almost entirely microreticulate, microsculpture absent from small postero-mesal area, punctures on clypeus almost obsolete, on frons fine, interspaces 1–2 times as wide as punctures; systematic punctures distinct. Eyes moderately large, slightly protruding, slightly oblong. Antennae with eight 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 = 1.5, palpomere 4 slightly asymmetrical. Mentum with indistinct, widely spaced punctures, microsculpture absent.

Thorax: Pronotal ground punctation fine, as on head or slightly coarser, interspaces 1–2 times as wide as punctures; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of distinct systematic punctures present, mesal rows with strongly reduced number of punctures, present at posterior and anterior half, not reaching anterior margin, few additional subserial punctures present along lateral margins. Mesoventrite with strong mesal bulge.

Femora (Fig. 134): Pubescence present on proximal 2/3–3/4; hairlines oblique on pro- and mesofemur, almost straight on metafemur.

Abdomen: Ventrite 5 with apical emargination, almost semicircular in most cases, rarely flat, 15–20 µm deep, absent in one male specimen from Sumatra.

Aedeagus (Fig. 258): Length: 0.27–0.31 mm. Phallobase as long as parameres, slightly longer than wide, evenly converging to indistinctly defined manubrium; border between pigmented and unpigmented portion of ventral face indistinct. Parameres with almost parallel-sided margins, very slightly constricted subapically; apex broad, bluntly rounded; basal portion of dorsal face wide, extending into distal third of phallobase. Median lobe wide in basal half; margins evenly converging to bluntly rounded apex, reaching apex of parameres; corona in subapical position; basal apophyses moderately long, reaching distal third of phallobase.

ECOLOGY: Collected in rivers, streams, and possibly in hygropteretic habitats; found together with *A. coomani*, *A. geminus*, *A. orientalis*, and *A. schoedli*.

DISTRIBUTION (Fig. 274): Indonesia (Java, Sumatra).

ETYMOLOGY: The name refers to the Sunda Islands, where this species was collected.

### *Agraphydrus tamdao* sp.n.

TYPE LOCALITY: Vietnam, Vĩnh Phúc Province, Tam Đảo.

TYPE MATERIAL: **Holotype** ♂ (NMW): “N-VIETNAM: Tam Dao (2) \ 1.-8.6.1996 \ leg. Dembicky \ & Pacholatko”. **Paratype** ♂ (EUM): VIETNAM: Lào Cai Prov.: Sa Pa, 1,500 m a.s.l., 10.X.1994, leg. M. Satô.

DIFFERENTIAL DIAGNOSIS: Shares entirely microreticulate clypeus, unicolored yellow maxillary palpomeres, nine antennomeres, presence of microsculpture on lateral margins of pronotum, and similar aedeagus (apex of parameres strongly inflated, median lobe deeply split) with *A. arduus* and *A. igneus*. Differs in larger size and broader body from both species; in darker dorsal coloration and distinctly finer ground punctation of pronotum and elytra from *A. igneus*; in larger size, absence of preocular patches, coarser elytral ground punctation, and absence of dark sublateral band on elytra from *A. arduus*. For differences to *A. communis* and *A. kempii* see under *A. arduus*.

DESCRIPTION: Total length: 2.4 mm; elytral width: 1.2 mm; E.I.: 1.4, P.I.: 2.3, elytra 3.3 times as long as pronotum. Habitus (Fig. 66) broad, evenly oval, moderately convex.

Coloration: Labrum yellow, clypeus dark brown mesally with undefined, wide, yellow lateral margins; frons black; maxillary palpi unicolored yellow; pronotum dark yellow with undefined

dark brown mesal area; elytra unicolored brown; ventrites and proximal portions of femora dark brown to black, distal portions of femora and tibiae light brown.

Head: Clypeus with distinctly concave anterior margin, C.I.: 3.7, lateral length ratio clypeus/eyes = 1.8; almost entirely microreticulate, ground punctures fine, distinctly impressed, interspaces twice as wide as punctures; systematic punctures distinct. Eyes large, not protruding, slightly oblong. 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 = 1.4, palpomere 4 symmetrical. Mentum with densely distributed, partially confluent punctures, wrinkles present in lateral thirds.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Indistinct, weakly impressed, reticulate microsculpture present in antero-lateral corner of clypeus. Elytral ground punctation very slightly coarser than on head and pronotum, interspaces as wide as punctures; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin, additional loose subserial row present along lateral margins. Mesoventrite with distinct mesal bulge.

Femora (Fig. 135): Pubescence present on more than proximal half of profemur, on proximal 2/3 of meso- and metafemur; hairlines slightly oblique on pro- and mesofemur, straight on metafemur.

Abdomen: Ventrite 5 with shallow apical emargination, ca. 18  $\mu$ m deep.

Aedeagus (Fig. 259): Length: 0.31 mm. Phallobase about as long as parameres, as long as wide, abruptly bending to triangular manubrium; border between pigmented and unpigmented portion of ventral face indistinct, reaching more than mid-length. Parameres wide, with strongly sigmoid lateral and indistinctly curving mesal margin; dorsal face with distinct, subapical constriction; apex strongly inflated; basal portion of dorsal face reaching almost half-length of phallobase. Median lobe wide; apex of ventral face bluntly rounded, not reaching apex of parameres; dorsal face deeply split into two parts; corona situated in distal third; basal apophyses very short, narrowly separated, reaching proximal third of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. attenuatus*, *A. pallidus*, and *A. scintillans*.

DISTRIBUTION (Fig. 271): Vietnam.

ETYMOLOGY: The name refers to Tam Đảo (Vietnam), where the holotype was collected.

### *Agraphydrus thaiensis* MINOSHIMA, KOMAREK & ÔHARA 2015

*Agraphydrus thaiensis* MINOSHIMA, KOMAREK & ÔHARA 2015: 56.

TYPE LOCALITY: Thailand, Songkhla Province, Ton Nga Chang Wildlife Sanctuary.

TYPE MATERIAL EXAMINED: **Holotype** ♂ (SEMC): "THAILAND: Songkhla Prov. \ Ton Nga Chang Wildlife \ Sanctuary ; 9 June 2001 \ coll: R.W. Sites ; L-244 \ black light in stream | 268 | HOLOTYPE \ Agraphydrus \ thaiensis sp. nov. \ Minoshima Y. des. 2014". Aedeagus mounted on separate card below beetle. **Paratype** ♂ (SEMC): **THAILAND: Satun Prov.:** Boripat Waterfall, 30.I.1995, "L-82, coll: B.J. Nichols | 296".

ADDITIONAL MATERIAL EXAMINED:

T H A I L A N D: **Songkhla Prov.:** 26 exs. (EEM, NMW): Ton Nga Chang Wildlife Sanctuary, black light in deep jungle, 8.VI.2001, leg. R.W. Sites "L-242".

DIFFERENTIAL DIAGNOSIS: Shares four rows of very coarse, distinct elytral systematic punctures reaching anterior margin, and absence of clypeal microsculpture with *A. activus*,

*A. anhuianus*, *A. decipiens*, *A. luteilateralis*, and *A. malayanus*. Differs in presence of nine antennomeres, larger body size, larger extension of femoral pubescence, very short basal lobe, parameres with subapical excision from *A. decipiens* and *A. luteilateralis*, in slender maxillary palpomeres, short basal lobe, and basal position of corona from *A. activus* and *A. anhuianus*. Most similar to *A. malayanus* including features of aedeagus (very short basal lobe, narrow median lobe, corona in basal position), differs distinctly in shape of parameres with smaller subapical excision from this species. Very coarse, distinct systematic elytral punctures in anterior half, but not reaching anterior margin, are present in *A. coronarius*.

DESCRIPTION: Total length: 2.5–3.0 mm; elytral width: 1.3 mm; E.I.: 1.3, P.I.: 2.2–2.4, elytra 3.1 times as long as pronotum. Habitus (Fig. 67) broad, parallel-sided in mid-length, moderately convex.

Coloration: Labrum, clypeus, and frons dark brown, clypeus with undefined, indistinct yellowish preocular areas; maxillary palpi unicolored yellow; pronotum dark brown with decreasing intensity of coloration laterad to undefined, wide yellowish lateral margins; elytra dark brown with undefined, narrow, yellow lateral margins and posterior area; ventrites and proximal parts of femora dark brown, distal parts of femora lighter brown.

Head: Anterior margin of clypeus distinctly concave, C.I.: 4.5, lateral length ratio clypeus/eyes = 1.5; microsculpture absent; ground punctation very fine, interspaces 3–5 times as wide as punctures; systematic punctures moderately distinct. Eyes large, not protruding, slightly oblong. Antennae with nine antennomeres. Maxillary palpi (Fig. 155) 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 symmetrical. Mentum with widely spaced fine punctures, absent from narrow mesal area.

Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation slightly coarser than on head and pronotum, interspaces 3 times as wide as punctures; four rows of distinct systematic punctures present, all rows reaching anterior margin. Mesoventrite with distinct mesal bulge abruptly declining posteriorly, forming indistinct, very low horizontal ridge.

Femora (Fig. 136): Pubescence present on proximal 2/3–3/4; slightly more extended on mesofemur than on pro- and metafemur; hairlines almost straight.

Abdomen: Ventrite 5 with very flat apical emargination.

Aedeagus (Fig. 260): Length: 0.36. Phallobase very short, distinctly shorter than parameres, wider than long, almost rectangularly bending to undefined manubrium; border between pigmented and unpigmented portion of ventral face very indistinct. Parameres with almost straight margins, with distinct, but small, subapical notch laterally; apex asymmetrical, very narrowly rounded, slightly inclining mesad; dorsal face with large basal portion reaching mid-length of phallobase. Median lobe narrow, margins parallel-sided; apex bluntly rounded; corona in basal position; basal apophyses moderately long, reaching mid-length of phallobase.

ECOLOGY: Collected in running water, and at light together with *A. masatakai*.

DISTRIBUTION (Fig. 270): Thailand.

### *Agraphydrus tristis* sp.n.

TYPE LOCALITY: Myanmar, Mandalay Region, Pyin Oo Lwin District, Mogok Township, S Panlin village, west slope of Mt. Taung Mae, ca. 22°58'9"N 96°27'11"E.

TYPE MATERIAL: **Holotype** ♂ (NMW): "MYANMAR: Mandalay Reg. \ Mogok Township, S Panlin vill. \ Mt. Taung Mae, west slope, \ ca. 22°58'09.7"N 96°27'11"E [without decimal place] \ 1710 m, 12.VI.2014 \ leg.

Schillhammer (MBS 204)"; collected in a small seepage area along road side, fully exposed to sun. **Paratypes:** 22 exs. (NMW): same sampling data.

**DIFFERENTIAL DIAGNOSIS:** Shares mesoventral carina, absence of clypeal microsculpture, unicolorous maxillary palpomeres and metafemoral pubescence on at least proximal 2/3 with *A. carinatus*, *A. delineatus*, *A. exiguus*, *A. fasciatus* KOMAREK & HEBAUER, 2018, *A. fujianensis* KOMAREK & HEBAUER, 2018, *A. hortensis*, *A. niger*, and *A. rhomboideus*. Shares black clypeus without yellow preocular patches and black pronotum with *A. niger*; shares mesal notch on anterior clypeal margin with *A. rhomboideus*. Differs in larger size from *A. carinatus*, in slightly less broad body from *A. fasciatus*, *A. fujianensis*, *A. niger*, and *A. rhomboideus*, in absence of rhombic elytral macula from *A. rhomboideus*, by presence of apical emargination of abdominal ventrite 5 from *A. delineatus* and *A. fujianensis*.

**DESCRIPTION:** Total length: 2.2–2.4 mm; elytral width: 1.1 mm; E.I.: 1.4, P.I.: 2.2, elytra 3.2 times as long as pronotum. Habitus (Fig. 68) moderately broad, evenly oval, moderately to strongly convex.

**Coloration:** Labrum, clypeus, and frons shiny black; maxillary palpi unicolorous yellow; pronotum shiny black with narrow, undefined, yellow margins; elytra shiny black with undefined brown apical region and lateral margins; ventrites and legs black.

**Head:** Clypeus with distinctly, evenly excised anterior margin with small mesal notch, C.I.: 3.7–4.0, lateral length ratio clypeus/eyes = 2.0; microsculpture absent; ground punctation very fine, distinctly impressed, widely spaced; systematic punctures distinct. Eyes small, not protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi slender, 1.1–1.2 times as long as pronotum in midline, 0.9–1.0 times as long as maximum width of clypeus, length ratio palpomeres 4:3 = 1.2, palpomere 4 slightly asymmetrical. Mentum obsolete punctate, microsculpture absent.

**Thorax:** Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on pronotum; four rows of moderately distinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with low, fine median carina in posterior third.

**Femora (Fig. 137):** Pubescence present on proximal 2/3; hairline oblique on profemur, very slightly convex on meso- and metafemur.

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

**Aedeagus (Fig. 261):** Length: 0.30 mm. Phallobase as long as parameres, about as long as wide, abruptly narrowing to triangular manubrium; border between pigmented and unpigmented portion of ventral face very distinct, extending to manubrium. Parameres broad, with sigmoid margins; mesal margin abruptly narrowing in mid-length; apex bluntly, narrowly rounded, distinctly inclining mesad; basal portion of dorsal face indistinctly extending into phallobase. Median lobe narrow, finger-shaped, evenly narrowing apicad; apex bluntly rounded, not reaching apex of parameres, corona situated distal to mid-length; basal apophyses long, reaching distal third of phallobase.

**ECOLOGY:** Hygropetric.

**DISTRIBUTION (Fig. 271):** Myanmar.

**ETYMOLOGY:** The name *tristis* (Latin adjective) (= sad) alludes to the black elytra.

***Agraphydrus tulipa* sp.n.**

**TYPE LOCALITY:** Thailand, Chiang Mai Province, Chiang Dao District, Doi (Luang) Chiang Dao (mountain).

TYPE MATERIAL: **Holotype** ♂ (NMW): “THAILAND: 7.11.1995 \ Chiang Mai Prov. \ Doi Chiang Dao, 500m \ leg. Zettel (9a)”; the sampling locality lies near the entrance of Chiang Dao Cave, within tropical rain forest. **Paratypes: THAILAND: Chiang Mai Prov.:** 2 ♂♂, 1 ♀ (NMW): same sampling data; 2 ♀♀ (NMW): Doi Suthep, 900 m a.s.l., 1.XI.1995, leg. H. Zettel “3”; **Kanchanaburi Prov.:** 35 exs. (NMW): Sangkhla Buri Distr., Thung Yai Naresuan Wildlife Sanctuary, 27.XII.1996, leg. P. Mazzoldi; **Loei Prov.:** 1 ♂ (NMW): Phu Kradueng N.P., 1,150 m a.s.l., stream (upstream of Pen Pob Waterfall), in evergreen forest, partially shaded, 29.XII.1999, leg. P. Mazzoldi “17”; **Nakhon Nayok Prov.:** 1 ♀ (EEM): Khao Yai N.P., Pha Ta Baag Waterfall, 14°21.682'N 101°20.540'E, 400 m a.s.l., rock face, 6.IV.2004, leg. R.W. Sites & A. Vitheepradit “L-604”; **Phitsanulok Prov.:** 3 ♂♂, 1 ♀ (NMW): E Phitsanulok, Phu Hin Rong Kla N.P., 1,200 m a.s.l., small stream immediately downstream of Huai Khamunoi Waterfall, shaded, collected in rock pool, 25.XII.1999, leg. P. Mazzoldi “7”; 1 ex. (NMW): same sampling data, but leg. P. Mazzoldi “5”; 1 ♂ (NMW): Phu Hin Rong Kla N.P., Mhun Daeng Noi, 16°57'N 101°03'E, 1,340 m a.s.l., 11.III.2003, leg. R.W. Sites, A. Vitheepradit & Kirawanich “L-287”; **Tak Prov.:** 3 ♂♂, 3 ♀♀ (NMW): Umphang Distr., road Umphang – Mae Chan, 650–700 m a.s.l., small clear stream, with pools and waterfall, seepages, in partially destroyed forest, 30.XII.1990, leg. P. Mazzoldi.

DIFFERENTIAL DIAGNOSIS: Belongs to group of species with strongly reduced metafemoral pubescence and absence of microsculpture on clypeus, together with *A. anacaenoides*, *A. geminus*, and *A. infuscatus*. These species also share dark dorsal coloration, broad body, short maxillary palpi, and absence of emargination of abdominal ventrite 5. Differs in absence of apical infuscation on maxillary palpomere 4, and presence of eight antennomeres from *A. infuscatus*; by smaller average body size from *A. geminus*. Shares large eyes with *A. infuscatus*. Differs in slender maxillary palpi and metafemoral pubescence present on almost proximal half from all species mentioned. Shares strongly convex habitus, black dorsal coloration, absence of clypeal microsculpture, eight antennomeres, absence of apically infuscated palpomere 4, reduced metafemoral pubescence, and absence of apical emargination on ventrite 5, also with *A. calvus*, *A. decipiens*, *A. indicus*, and *A. reductus*; shares presence of metafemoral pubescence on less than proximal half with *A. reductus*. Differs in smaller size and less distinct systematic punctures from *A. decipiens*. Differs in features of aedeagus (e.g., corona in basal position) from all species. Similar aedeagus present in *A. reticulatus*, a species with microreticulate clypeus.

DESCRIPTION: Total length: 1.6–2.0 mm; elytral width: 0.9–1.0 mm; E.I.: 1.2, P.I.: 2.2, elytra 2.8 times as long as pronotum. Habitus (Fig. 69) broad, evenly oval, strongly convex.

Coloration: Labrum, clypeus and frons black, clypeus very indistinctly yellow at lateral margins; maxillary palpi unicolored yellow; pronotum dark brown to black, with indistinct, undefined, narrow, brighter margins; elytra dark brown to black; ventrites dark brown; legs lighter brown.

Head (Fig. 171): Clypeus with distinctly concave anterior margin, C.I.: 4.1, lateral length ratio clypeus/eyes = 2.2; microsculpture absent; ground punctation fine, distinctly impressed, interspaces 1–2 times as wide as punctures; systematic punctures moderately distinct. Eyes large, not protruding, slightly oblong. Antennae with eight antennomeres. Maxillary palpi (Fig. 156) slender, 0.8 times as long as pronotum in midline, 0.7 times as long as maximum width of clypeus; length ratio palpomeres 4:3 = 1.3, palpomere 4 symmetrical. Mentum with very fine, widely separated punctures, microsculpture absent.

Thorax: Pronotal ground punctation as on head; systematic punctures moderately distinct. Elytral ground punctation slightly coarser than on pronotum, interspaces about as wide as punctures or slightly larger; four rows of indistinct systematic punctures present, mesal rows with strongly reduced number of punctures, not reaching anterior margin. Mesoventrite with very low horizontal ridge postero-mesally.

Femora (Fig. 138): Pubescence present on proximal half of pro- and mesofemur, on less than proximal half of metafemur; hairlines straight.

Abdomen: Ventrite 5 without apical emargination in most cases; very shallow notch, 2–4 µm deep, present in some individuals.

Aedeagus (Fig. 262): Length: 0.24–0.28 mm. Phallobase about as long as parameres, as long as wide or slightly shorter, abruptly bending to narrow, triangular manubrium; border between pigmented and unpigmented portion of ventral face almost reaching manubrium. Parameres moderately slender, widest at base; mesal margin sharply narrowing in mid-length; lateral margins almost straight; apex bluntly rounded, slightly inclining mesad; basal portion of dorsal face reaching mid-length of phallobase mesally. Median lobe moderately wide; dorsal face bottle-shaped, apex rounded, not reaching apex of parameres; ventral face very short, spherical; corona large, in basal position; basal apophyses long, widely separated, distinctly inclining laterad, reaching distal third of phallobase.

ECOLOGY: Collected in streams, rock pools and possibly in hygropetric habitat; found together with *A. masatakai*, *A. siamensis*, and *A. spadix*.

DISTRIBUTION (Fig. 271): Thailand.

ETYMOLOGY: The name *tulipa* (Latin) (= tulip) refers to the shape of the aedeagus. Noun in apposition.

***Agraphydrus vietnamensis* sp.n.**

TYPE LOCALITY: Vietnam. Lâm Đồng Province, 14 km SW Bao Loc.

TYPE MATERIAL: **Holotype** ♂ (NMW): “S-VIETNAM \ 14km SW Bao Loc \ 16. - 29. 5. 1994 \ Pacholatko & Dembický”. **Paratypes: VIETNAM: Lâm Đồng Prov.:** 7 exs. (NMW): same sampling data; 2 ♂♂ (NMW): 15 km SW Bảo Lộc, 11°27'N 107°43'E, 900 m a.s.l., 22.–24.IV.1995, leg. P. Pacholatko & L. Dembický.

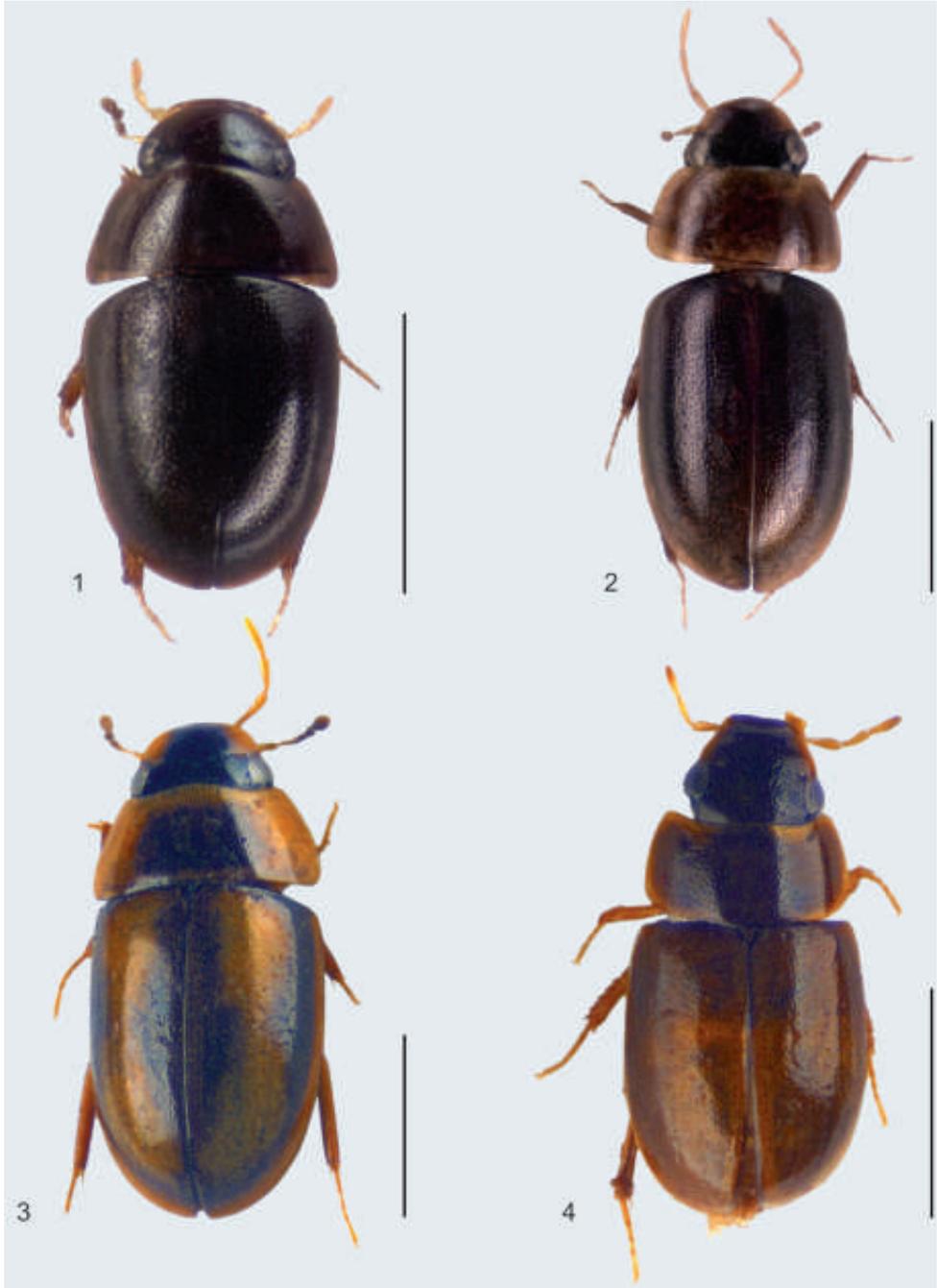
DIFFERENTIAL DIAGNOSIS: Shares entirely microreticulate clypeus, yellow coloration of clypeus, unicolored maxillary palpomeres, nine antennomeres, absence of pronotal lateral microsculpture, and yellow pronotum with *A. hendrichi*, *A. heterochromatus*, and *A. nemorosus*. Differs in distinctly larger size, maxillary palpi shorter than pronotum in midline, less fine ground punctation, distinct elytral systematic punctures, and features of aedeagus (narrow median lobe with apical notch and straight, narrow parameres with subapical indentation) from these species.

DESCRIPTION: Total length: 2.8–3.0 mm (one dwarf specimen 2.6 mm); elytral width: 1.3–1.5 mm; E.I.: 1.3, P.I.: 2.2, elytra 2.9 times as long as pronotum. Habitus (Fig. 70) broad, evenly oval, moderately convex.

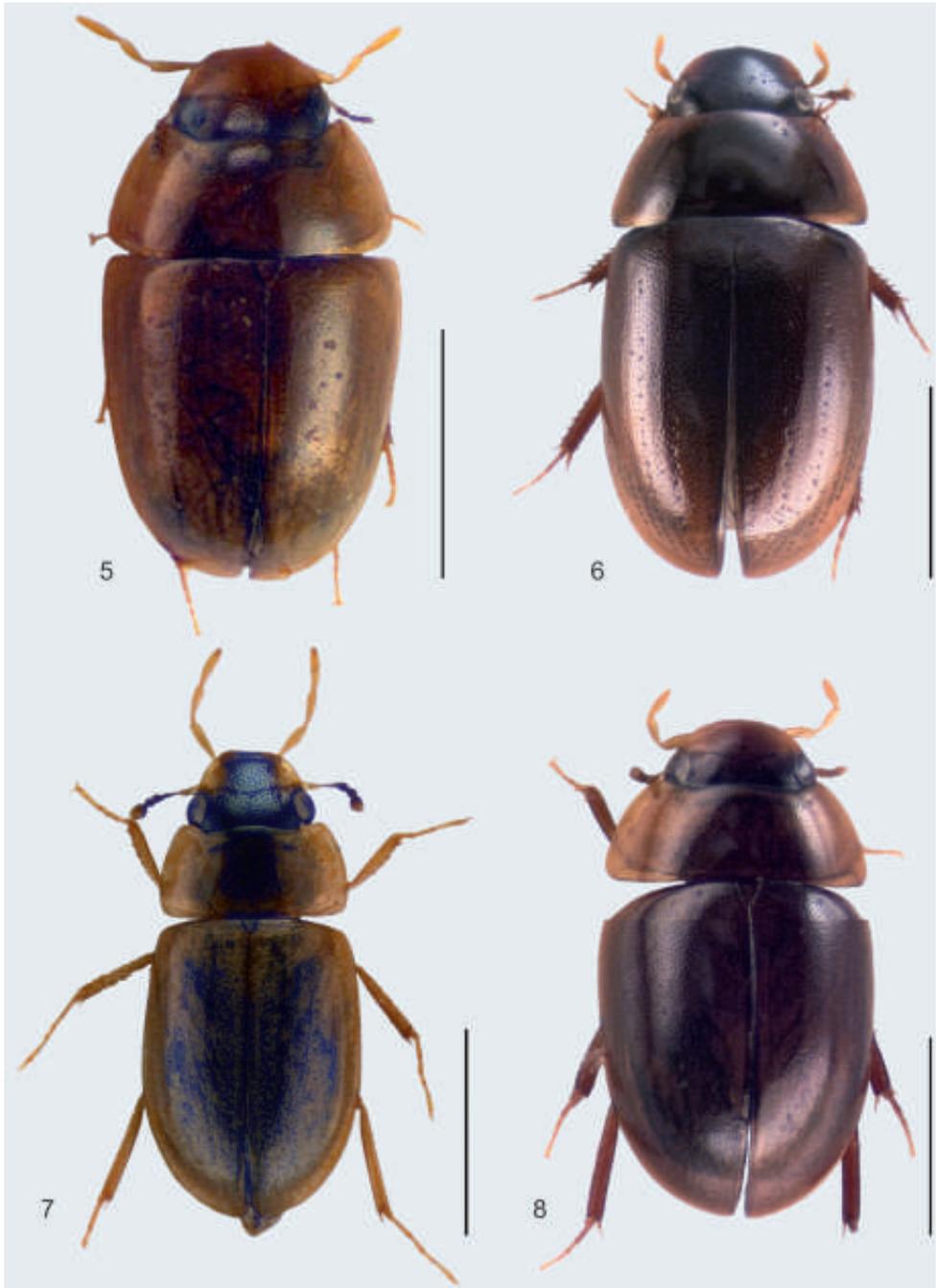
Coloration: Labrum yellow; clypeus yellow with indistinctly defined, small dark brown mesal area; frons black; maxillary palpi unicolored yellow; pronotum dark yellow, very slightly darkened mesally; elytra dark yellowish brown with undefined yellow lateral portions; ventrites black; legs black, femora with distal brighter portions.

Head: Clypeus with distinctly concave anterior margin, C.I.: 4.4, lateral length ratio clypeus/eyes = 1.5–1.7; entirely microreticulate; ground punctation on clypeus indistinct, concealed by microsculpture, on frons fine, moderately impressed, interspaces about 2–3 times as wide as punctures; systematic punctures distinct. Eyes large, slightly protruding, slightly oblong. 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, palpomere 4 almost symmetrical. Mentum with moderately fine punctures laterally, microsculpture absent.

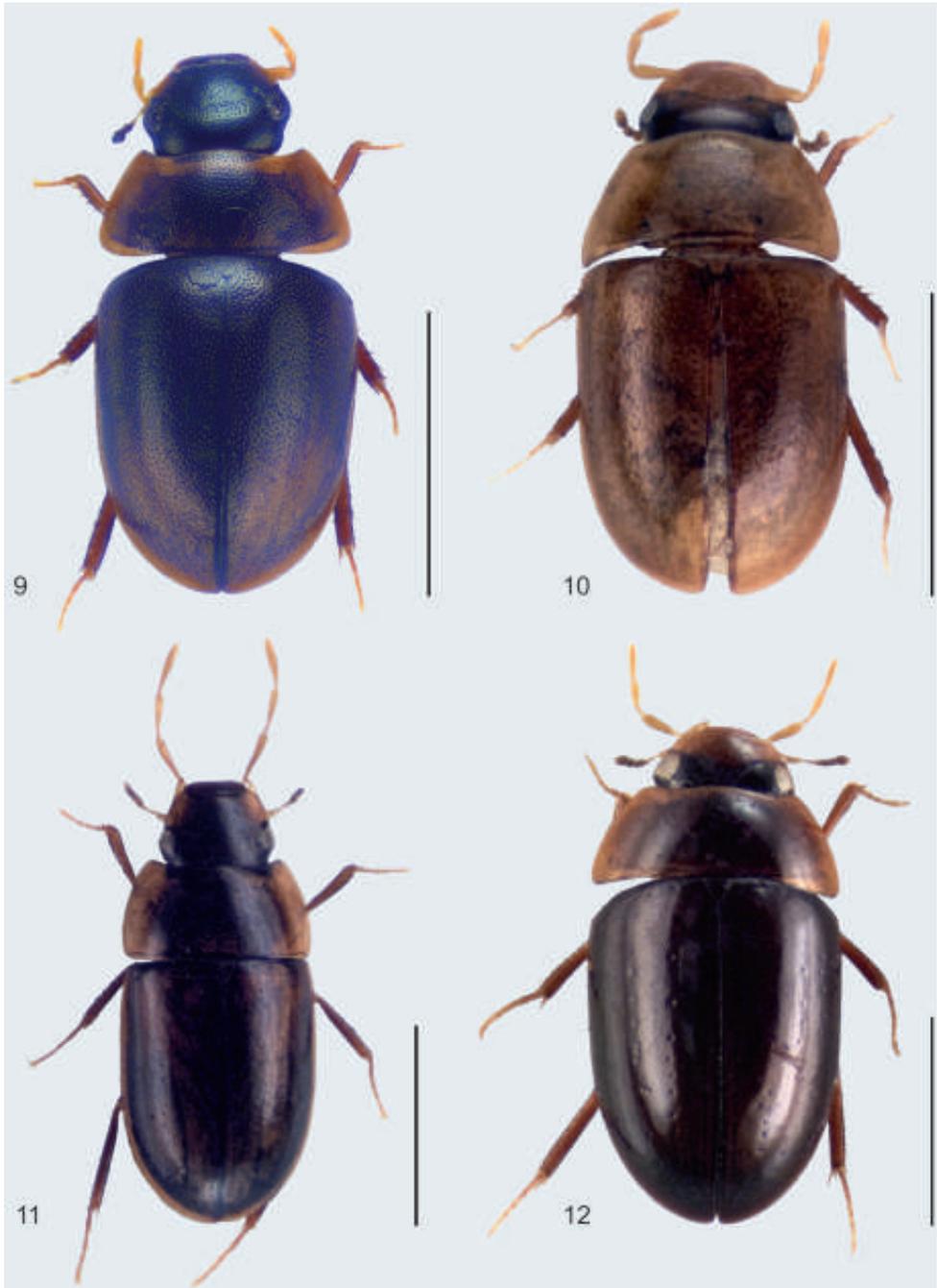
Thorax: Pronotal ground punctation as on head; systematic punctures distinct. Elytral ground punctation as on head and pronotum; four rows of distinct systematic punctures present, mesal rows with reduced number of punctures, present also in anterior half, but not reaching anterior margin. Mesoventrite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



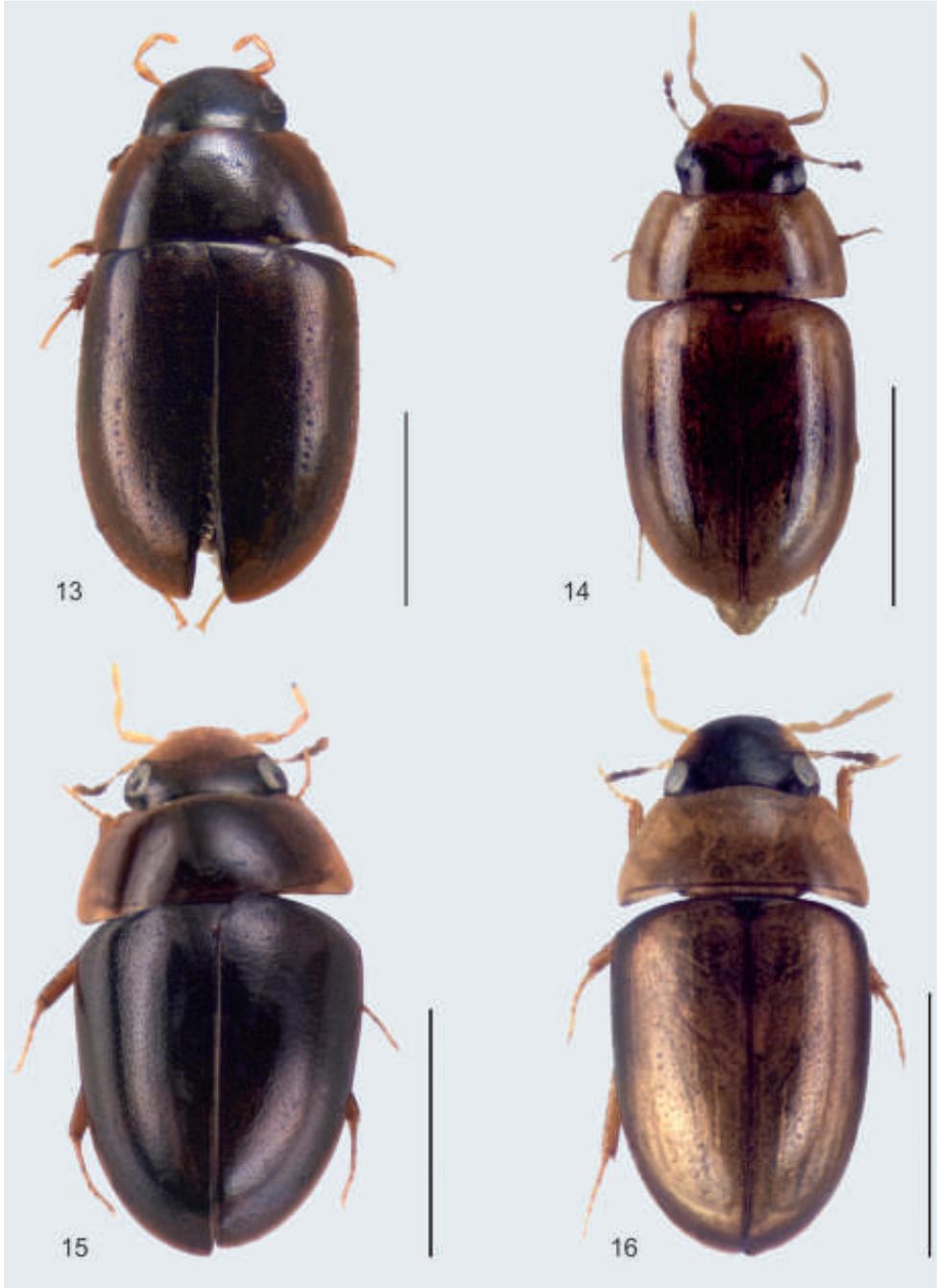
Figs. 1–4: Habitus: 1) *Agraphydrus anacaenoides* (holotype); 2) *A. angulatus* (paratype); 3) *A. arduus* (from Laos); 4) *A. bacchusi* (paratype). Scale = 1 mm.



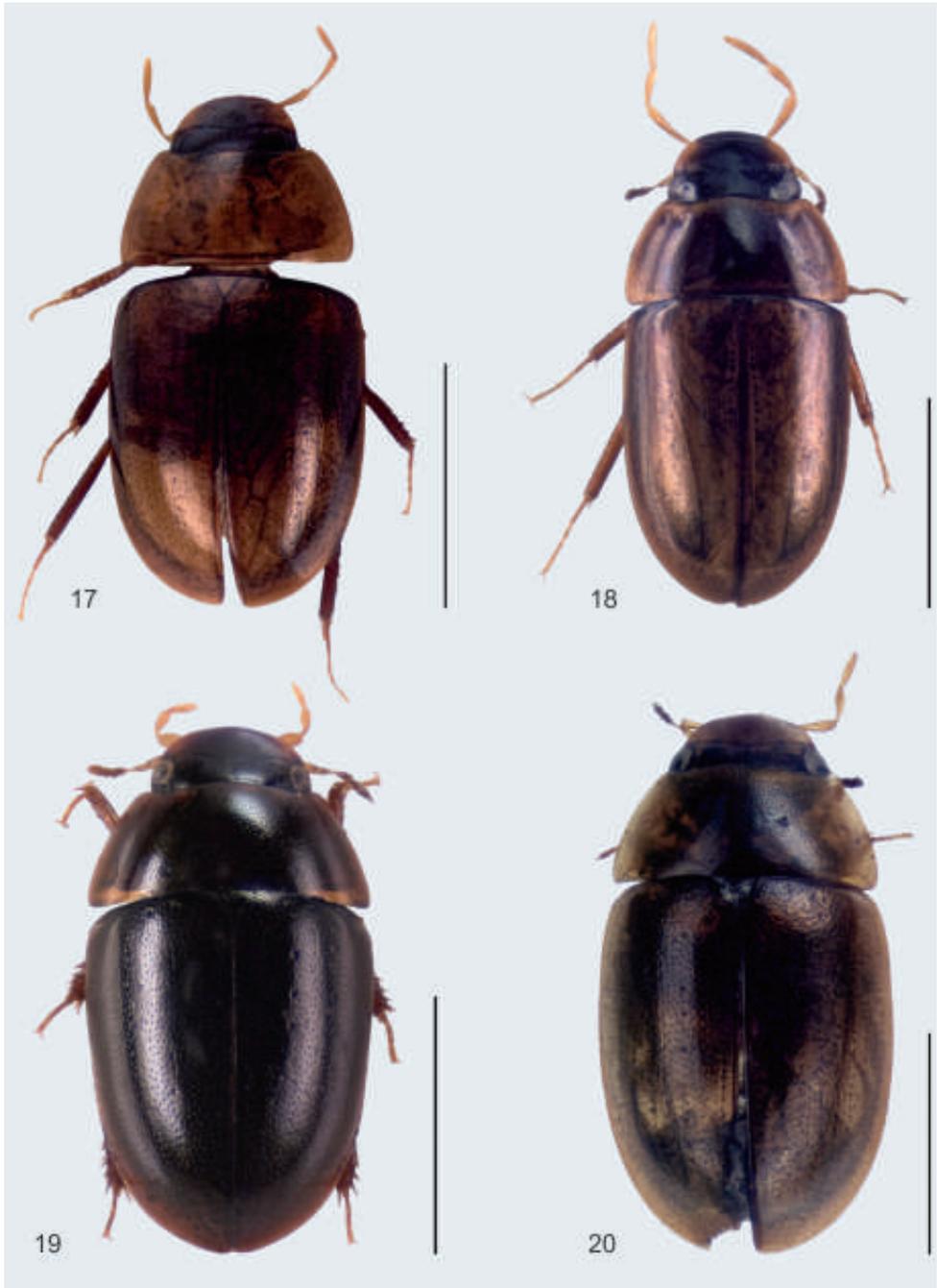
Figs. 5–8: Habitus: 5) *Agraphydrus balkeorum* (holotype); 6) *A. biprojectus* (paratype); 7) *A. borneensis* (paratype); 8) *A. brevipennis* (holotype). Scale = 1 mm.



Figs. 9–12: Habitus: 9) *Agraphydrus burmensis* (paratype); 10) *A. carinatus* (holotype); 11) *A. cervus* (holotype); 12) *A. clarus* (paratype). Scale = 1 mm.



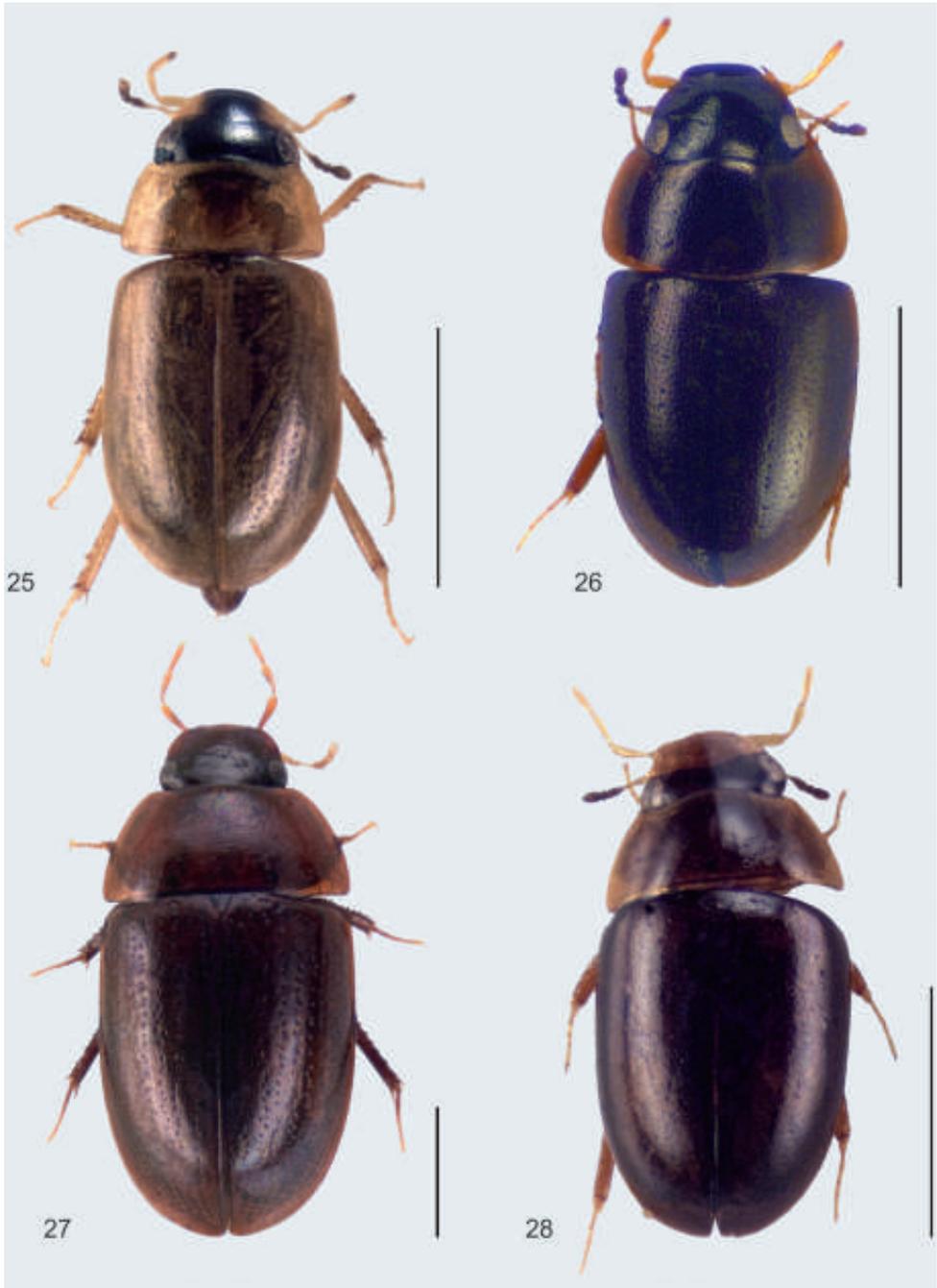
Figs. 13–16: Habitus: 13) *Agraphydrus coronarius* (paratype); 14) *A. delineatus* (paratype); 15) *A. engkari* (holotype); 16) *A. excisus* (holotype). Scale = 1 mm.



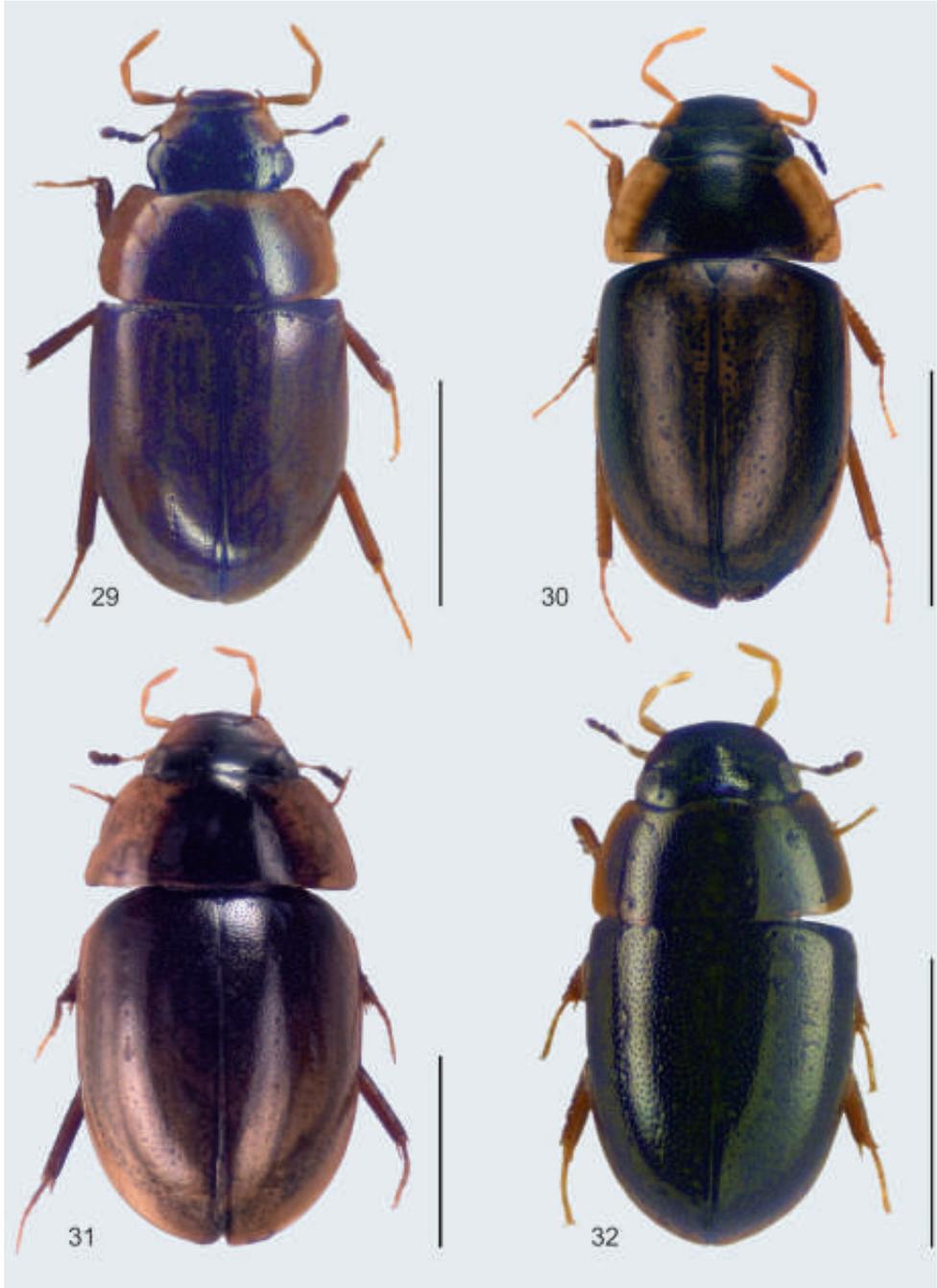
Figs. 17–20: Habitus: 17) *Agraphydrus exiguus* (holotype); 18) *A. floresinus* (holotype); 19) *A. geminus* (from Java); 20) *A. hamatus* (paratype). Scale = 1 mm.



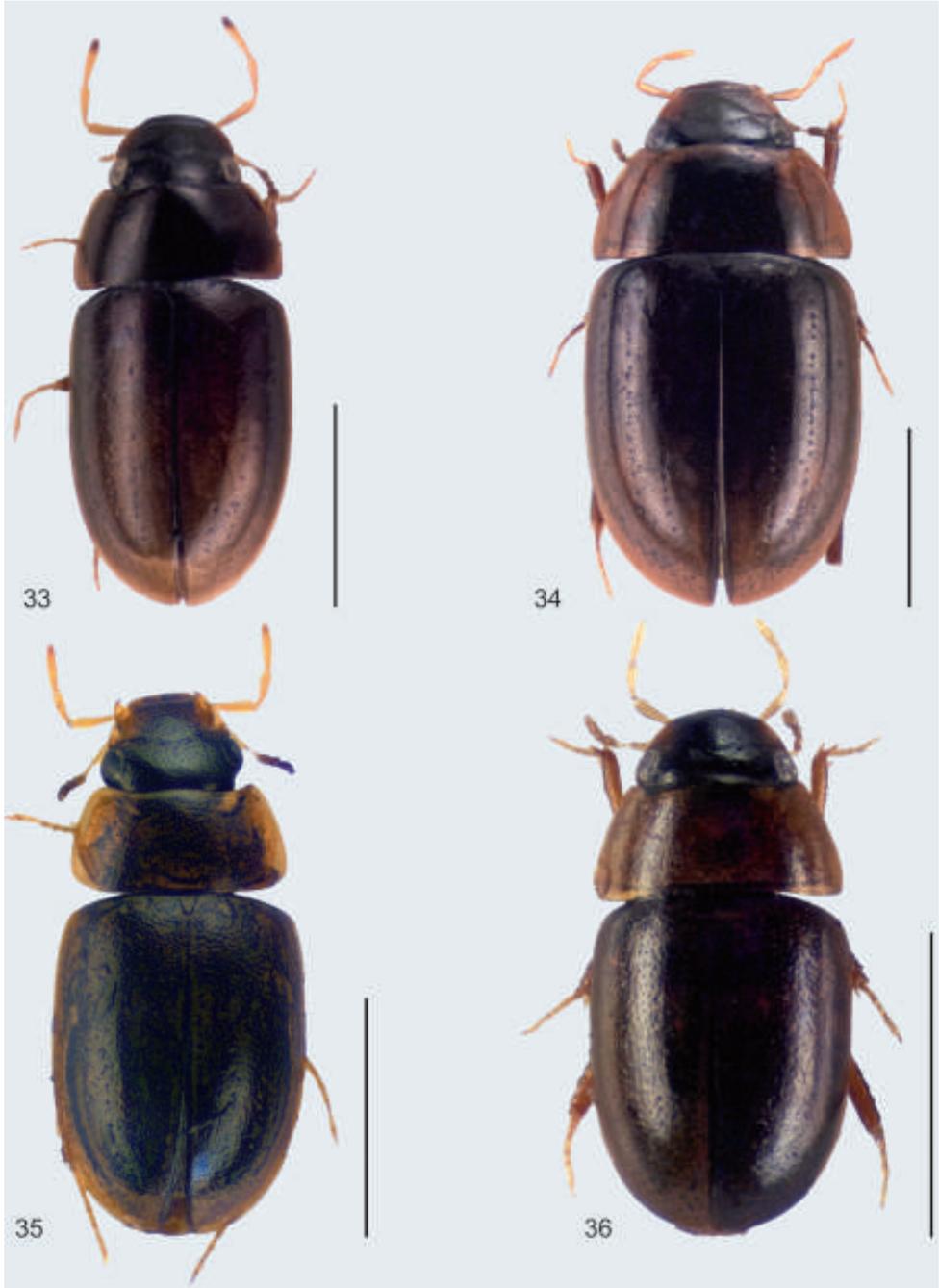
Figs. 21–24: Habitus: 21) *Agraphydrus helicopter* (holotype); 22) *A. hendrichi* (holotype); 23) *A. heterochromatus* (paratype); 24) *A. hortensis* (holotype). Scale = 1 mm.



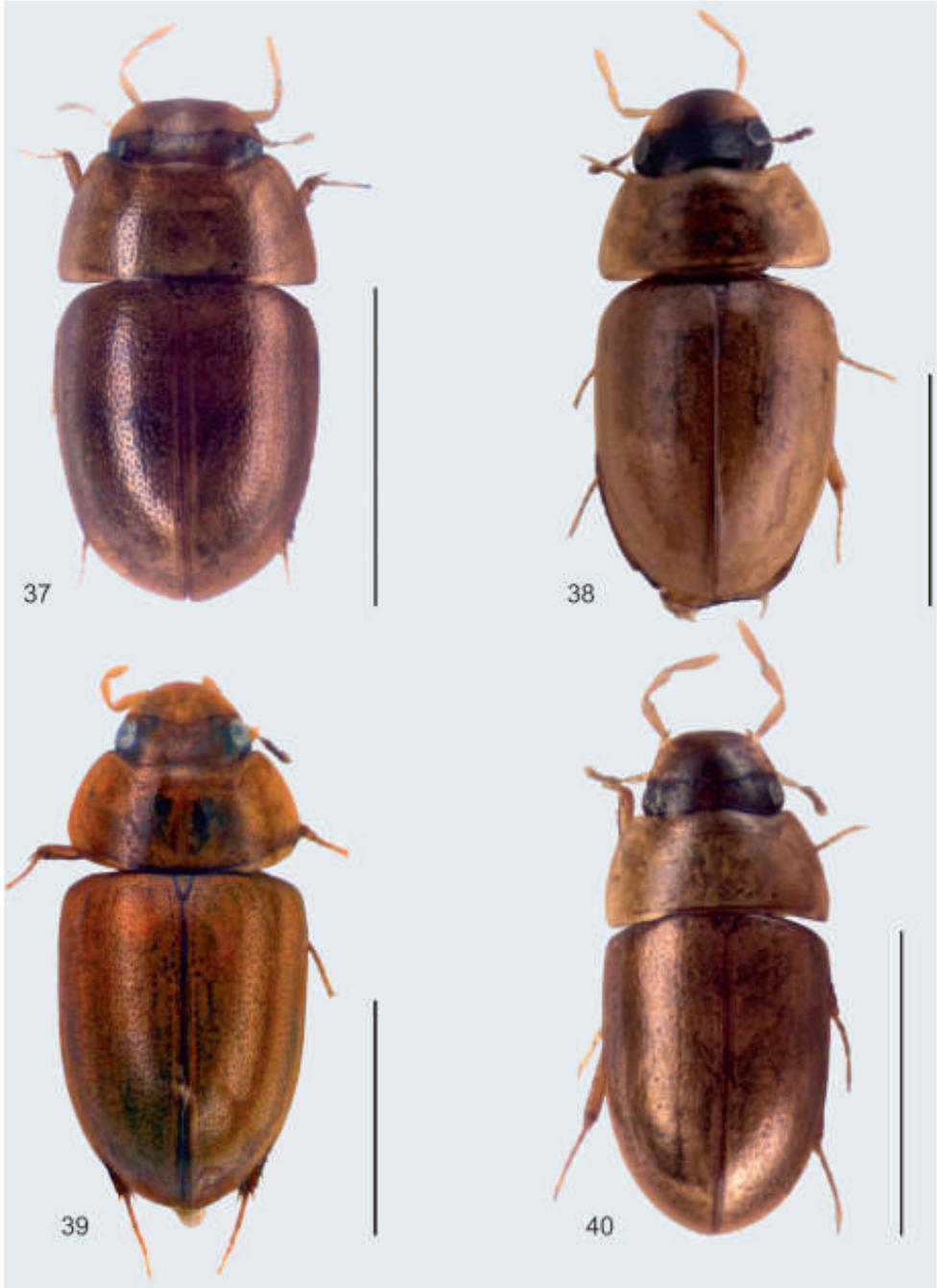
Figs. 25–28: Habitus: 25) *Agraphydrus imitans* (paratype); 26) *A. infuscatus* (paratype); 27) *A. jaechi* (holotype); 28) *A. jankodadai* (paratype). Scale = 1 mm.



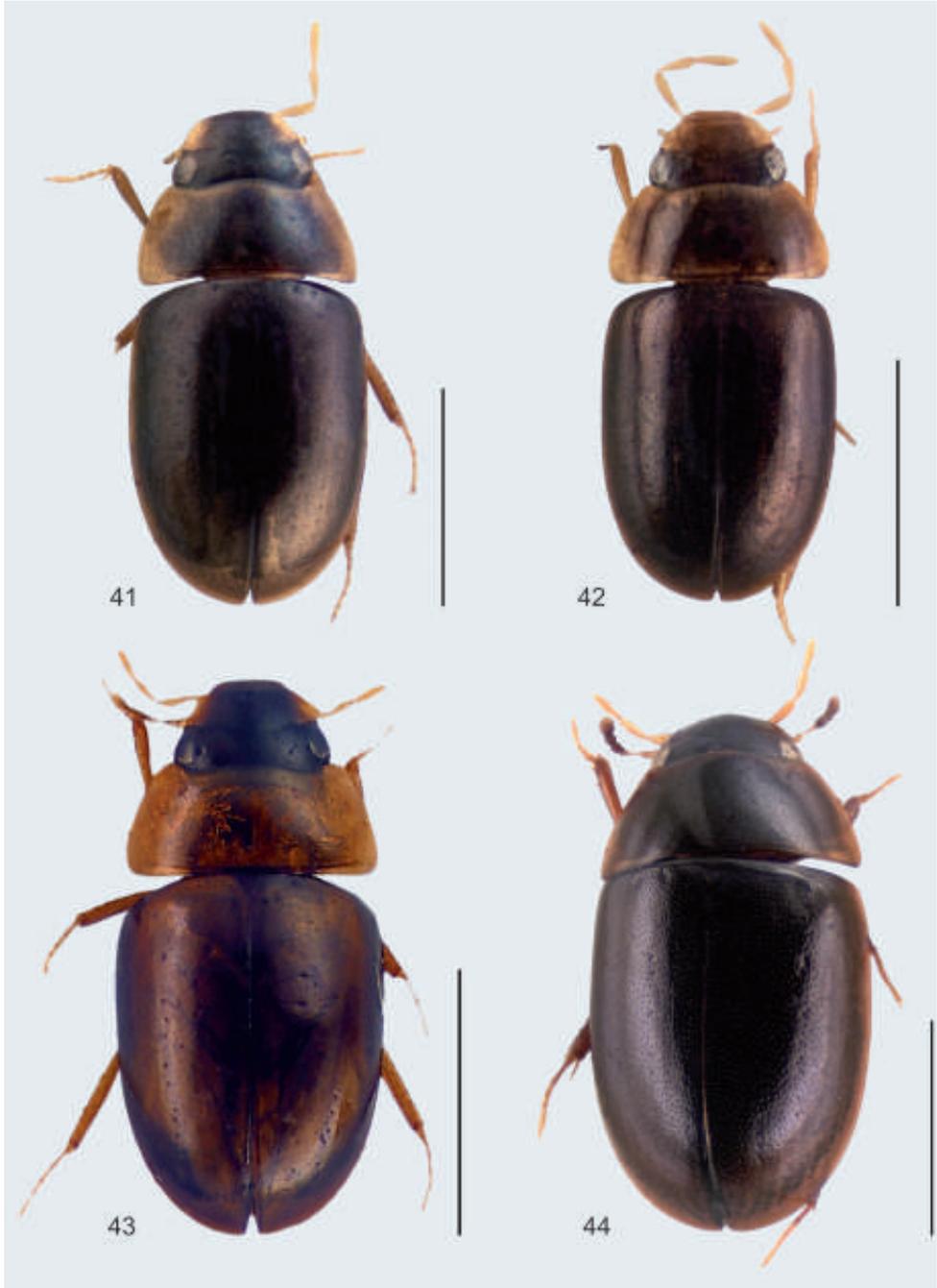
Figs. 29–32: Habitus: 29) *Agraphydrus kathapa* (holotype); 30) *A. laocaiensis* (holotype); 31) *A. latus* (paratype); 32) *A. lunaris* (paratype). Scale = 1 mm.



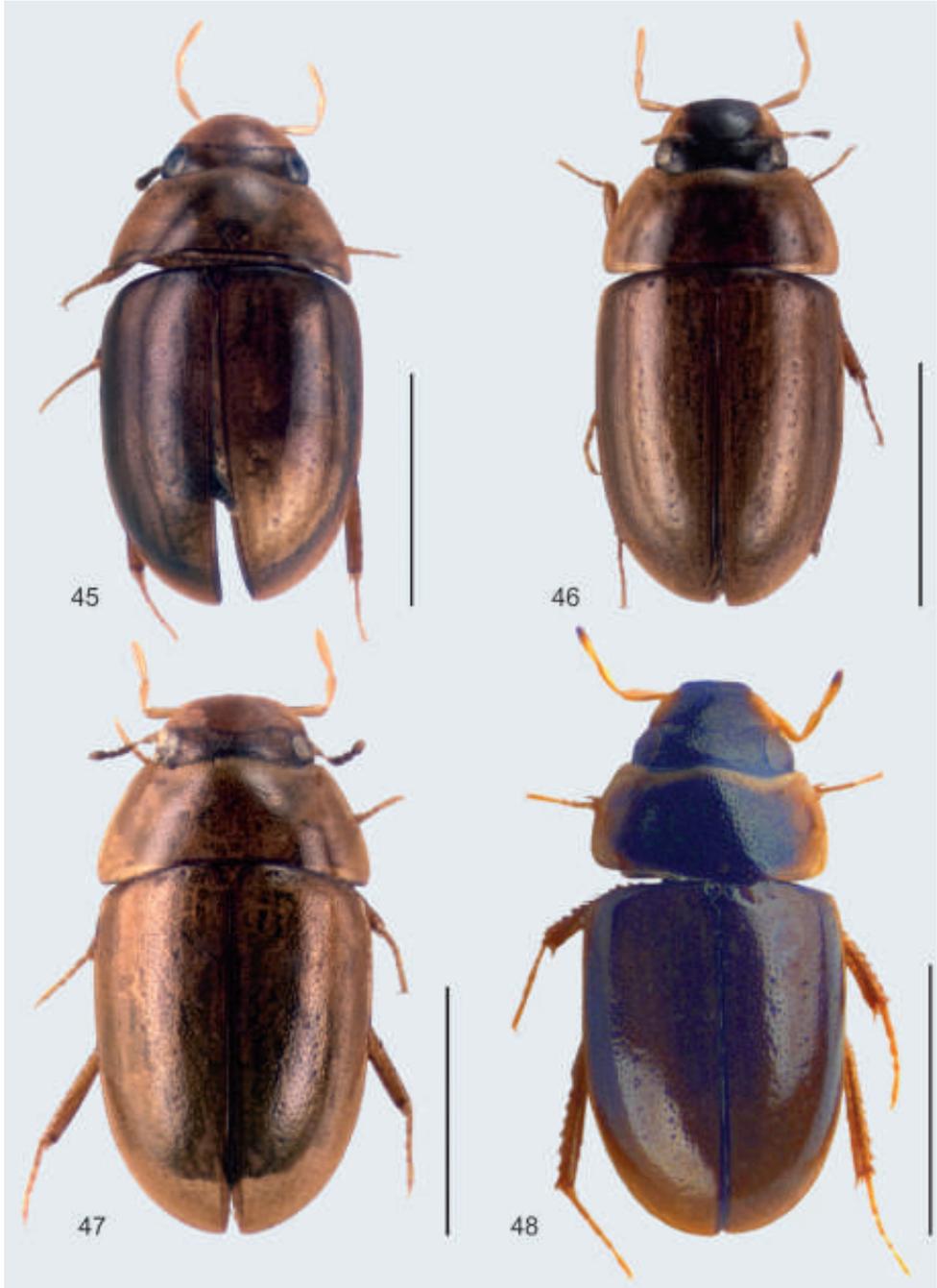
Figs. 33–36: Habitus: 33) *Agraphydrus maehongsonensis* (holotype); 34) *A. malayanus* (paratype); 35) *A. manfredjaechi* (paratype); 36) *A. mazzoldii* (paratype). Scale = 1 mm.



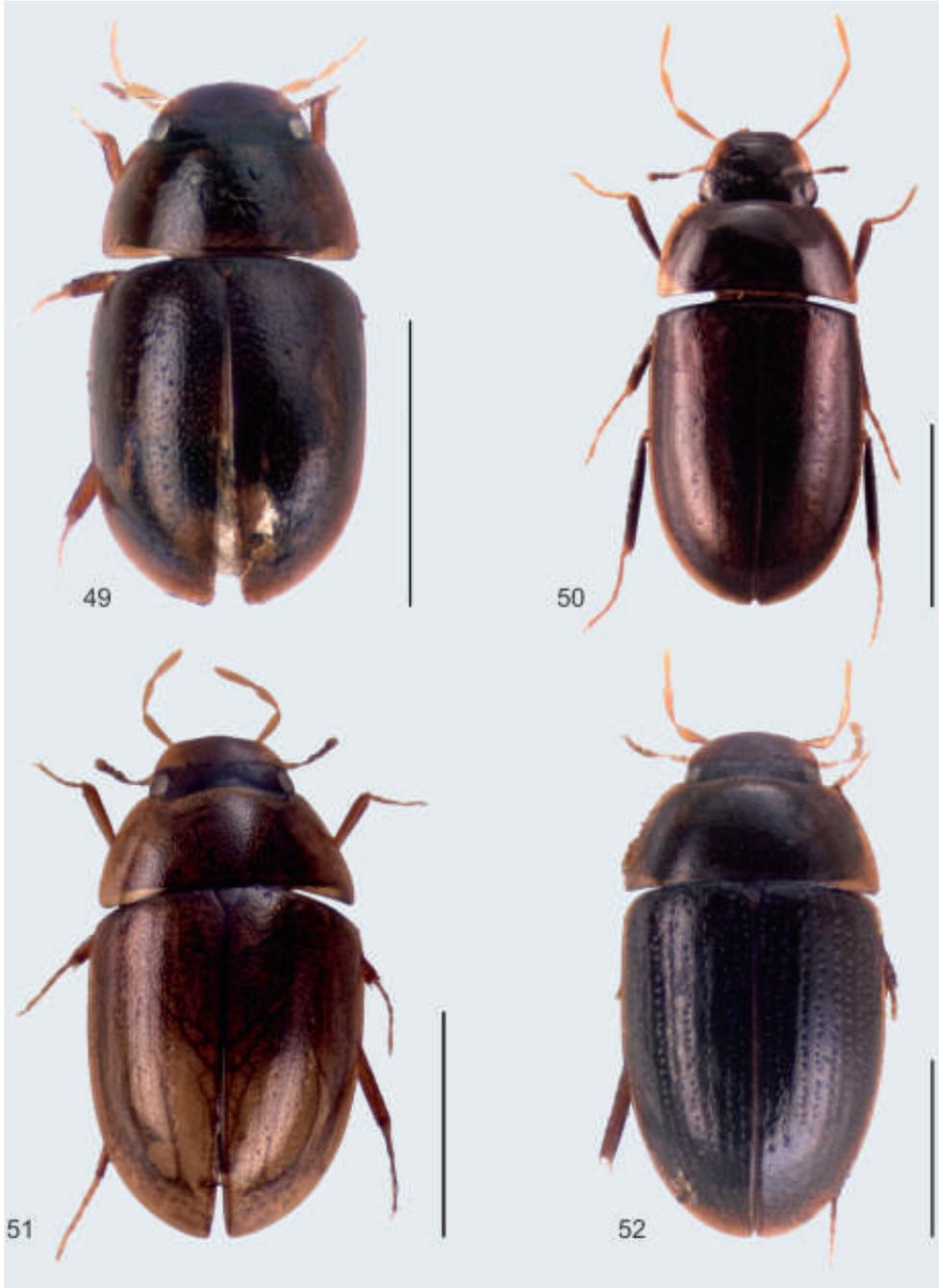
Figs. 37–40: Habitus: 37) *Agraphydrus microphthalmus* (paratype); 38) *A. mirabilis* (holotype); 39) *A. muluensis* (holotype); 40) *A. musculus* (holotype). Scale = 1 mm.



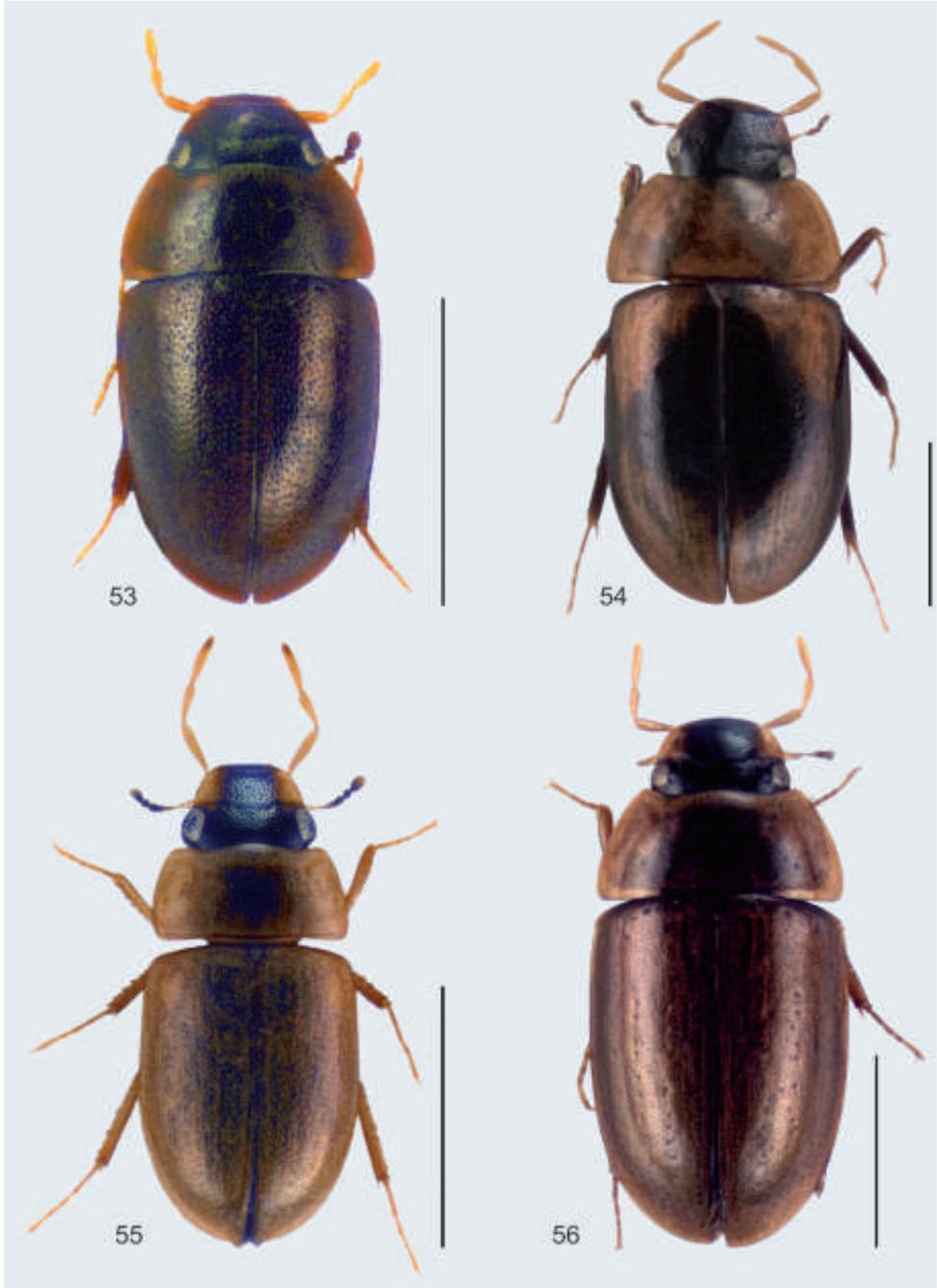
Figs. 41–44: Habitus: 41) *Agraphydrus namthaensis* (holotype); 42) *A. nemorosus* (holotype); 43) *A. nigroflavus* (paratype); 44) *A. obesus* (paratype). Scale = 1 mm.



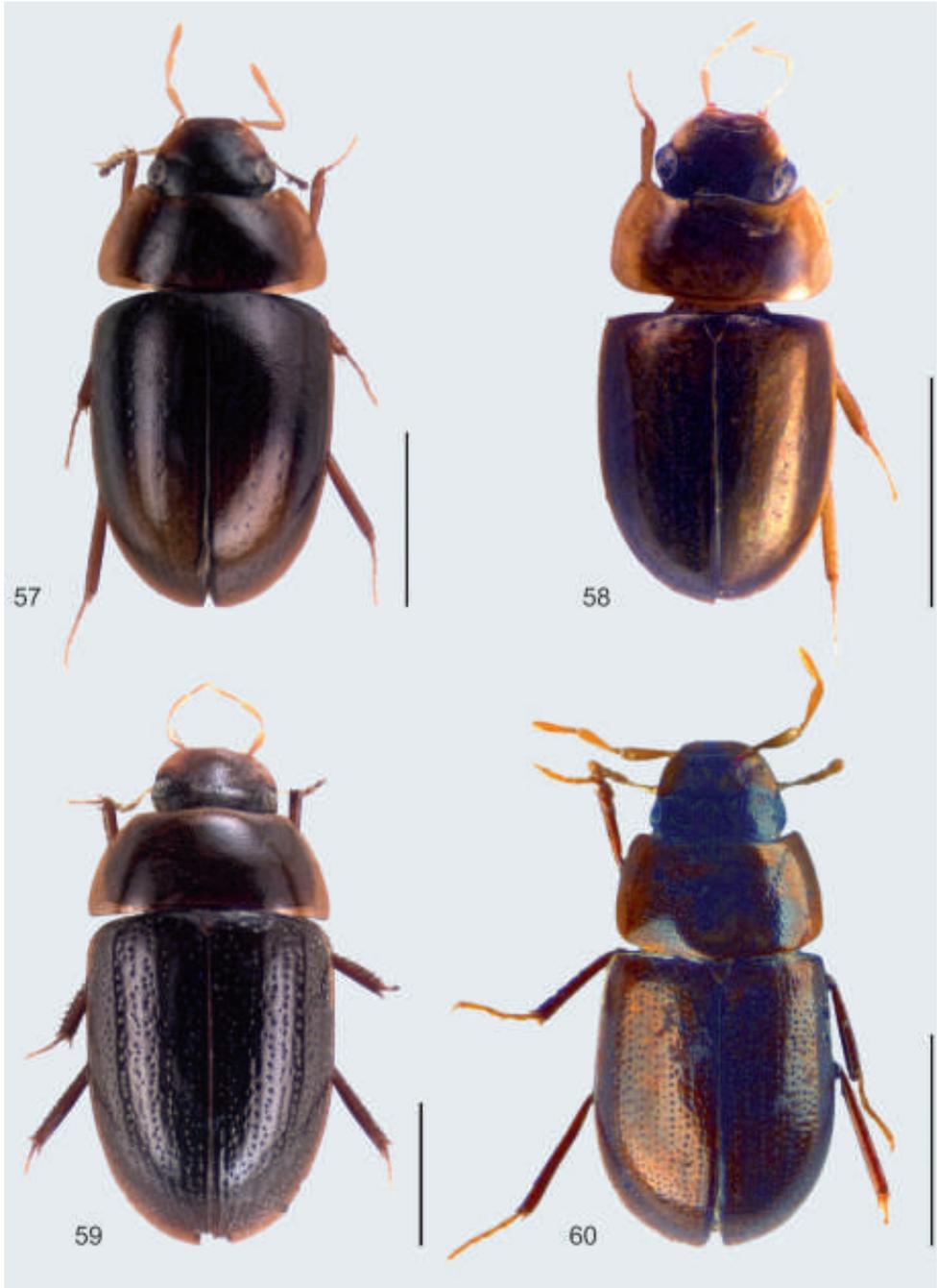
Figs. 45–48: Habitus: 45) *Agraphydrus orbicularis* (holotype); 46) *A. orientalis* (from Sumatra); 47) *A. pallidus* (holotype); 48) *A. papuanus* (holotype). Scale = 1 mm.



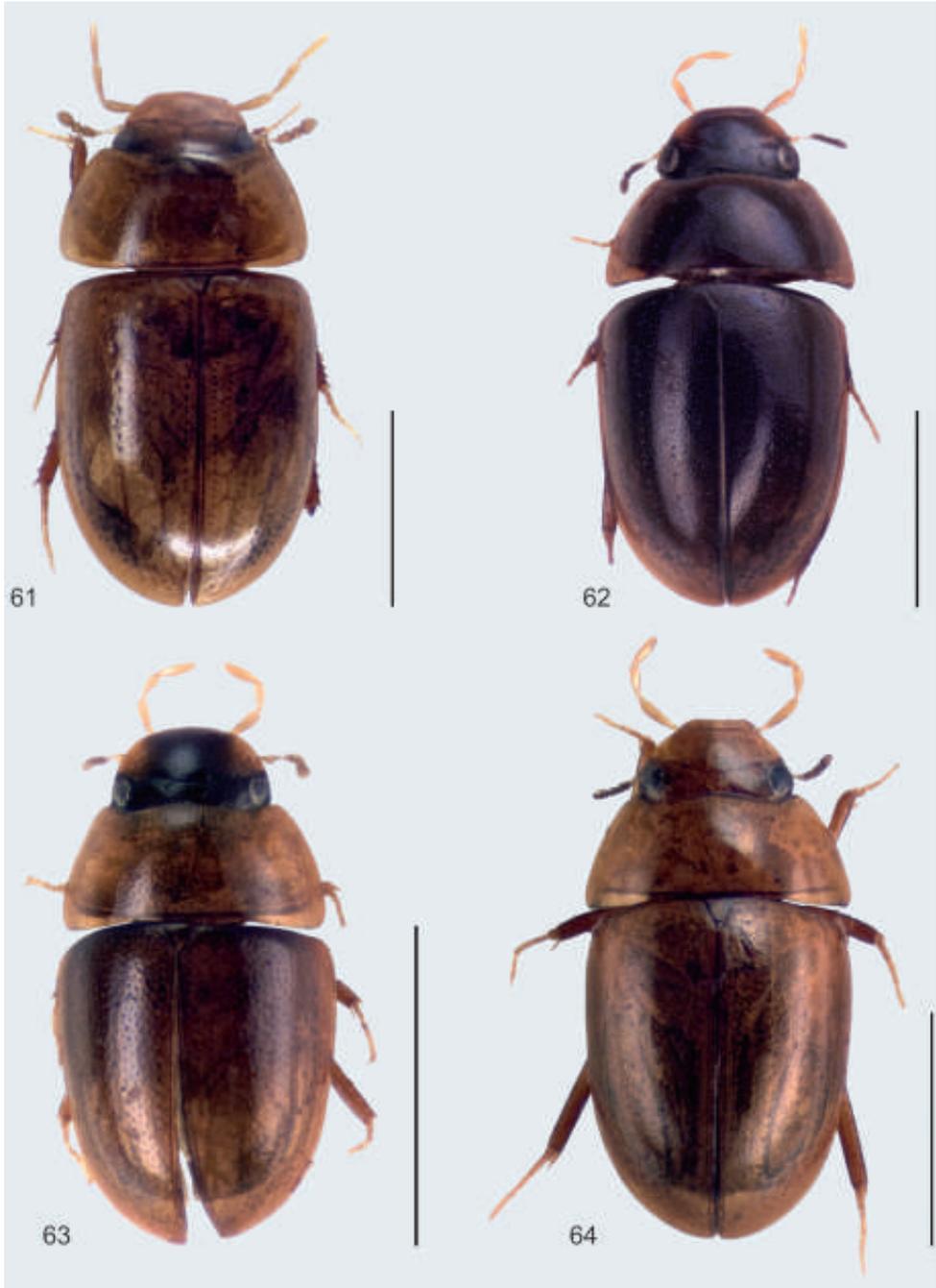
Figs. 49–52: Habitus: 49) *Agraphydrus penangensis* (holotype); 50) *A. piceus* (holotype); 51) *A. raucus* (paratype); 52) *A. regularis* (holotype). Scale = 1 mm.



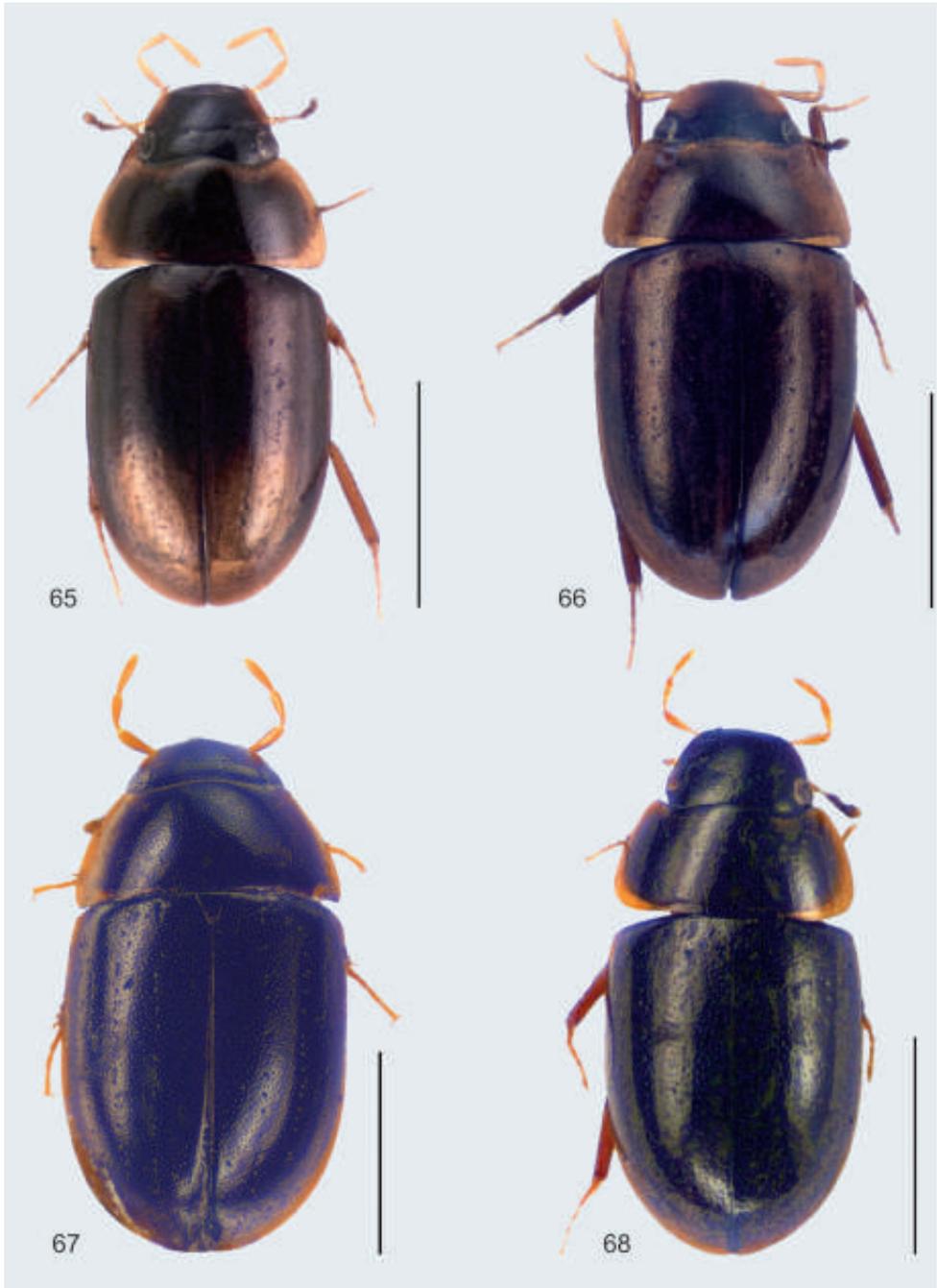
Figs. 53–56: Habitus: 53) *Agraphydrus reticulatus* (holotype); 54) *A. rhomboideus* (paratype); 55) *A. sarawakensis* (paratype); 56) *A. schoedli* (paratype). Scale = 1 mm.



Figs. 57–60: Habitus: 57) *Agraphydrus scintillans* (paratype); 58) *A. shaverdoae* (paratype); 59) *A. siamensis* (non-type); 60) *A. skalei* (holotype). Scale = 1 mm.



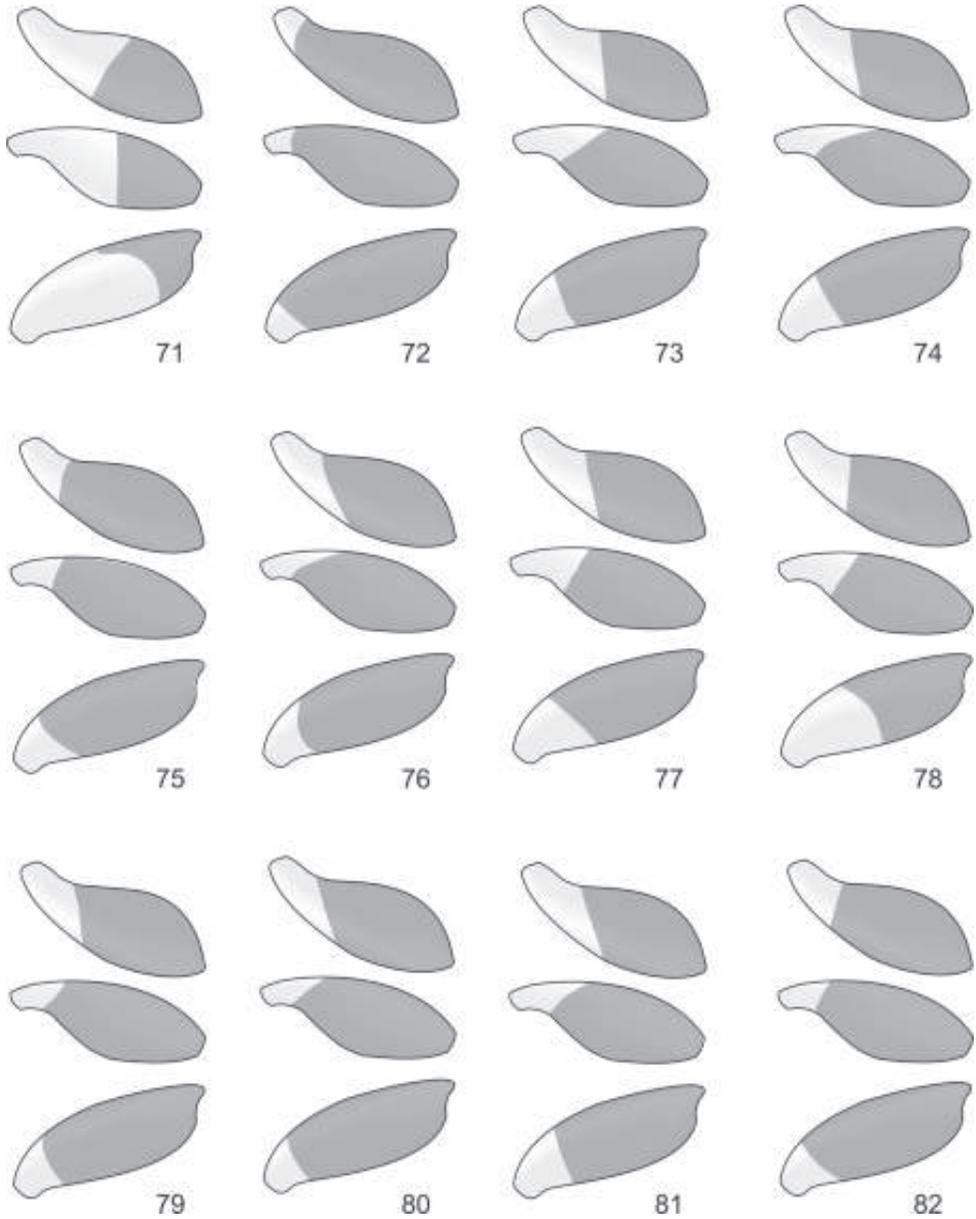
Figs. 61–64: Habitus: 61 *Agraphydrus spadix* (holotype); 62 *A. spinosus* (holotype); 63 *A. stramineus* (paratype); 64 *A. sucineus* (paratype). Scale = 1 mm.



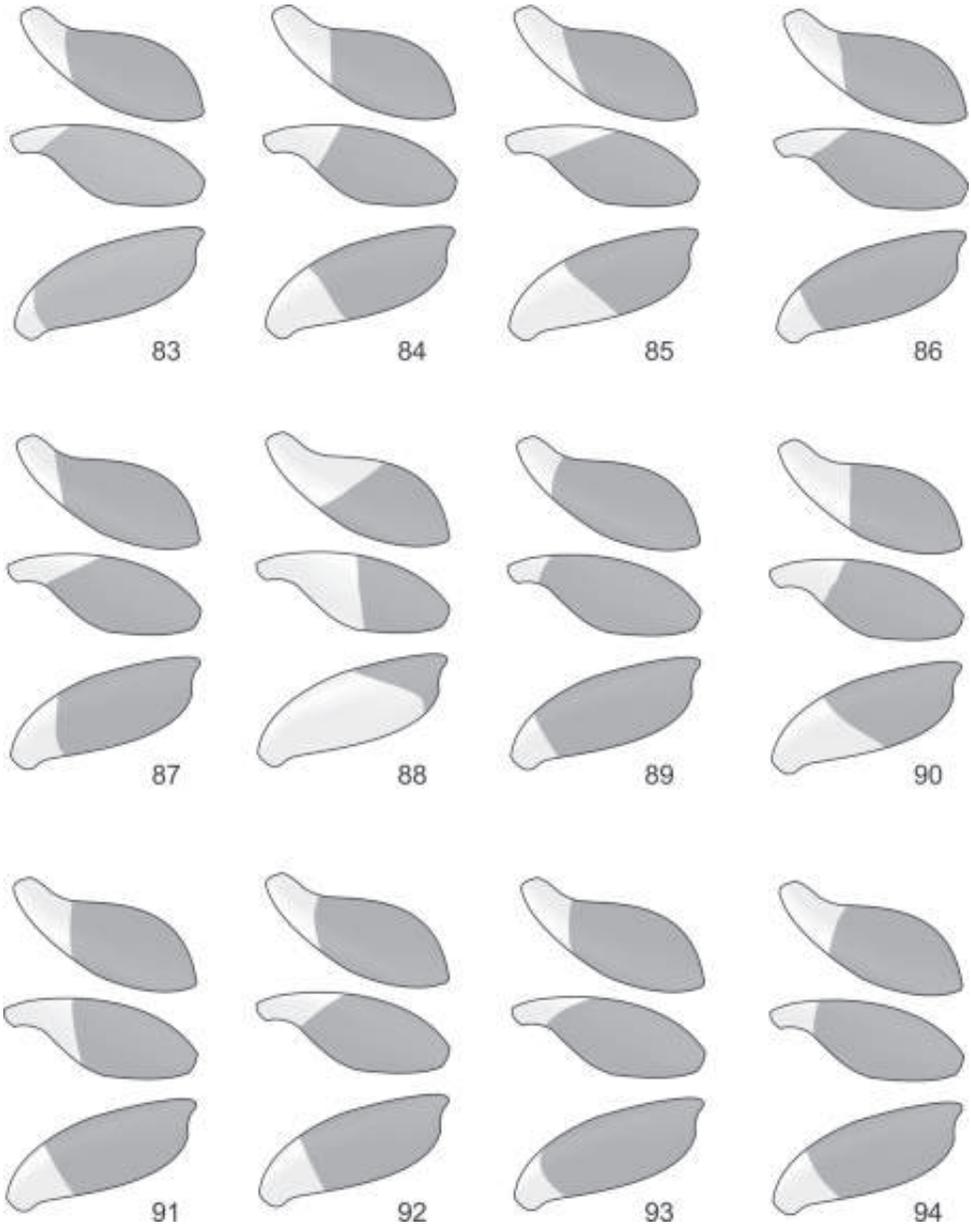
Figs. 65–68: Habitus: 65) *Agraphydrus sundaicus* (holotype); 66) *A. tamdao* (holotype); 67) *A. thaiensis* (holotype); 68) *A. tristis* (paratype). Scale = 1 mm.



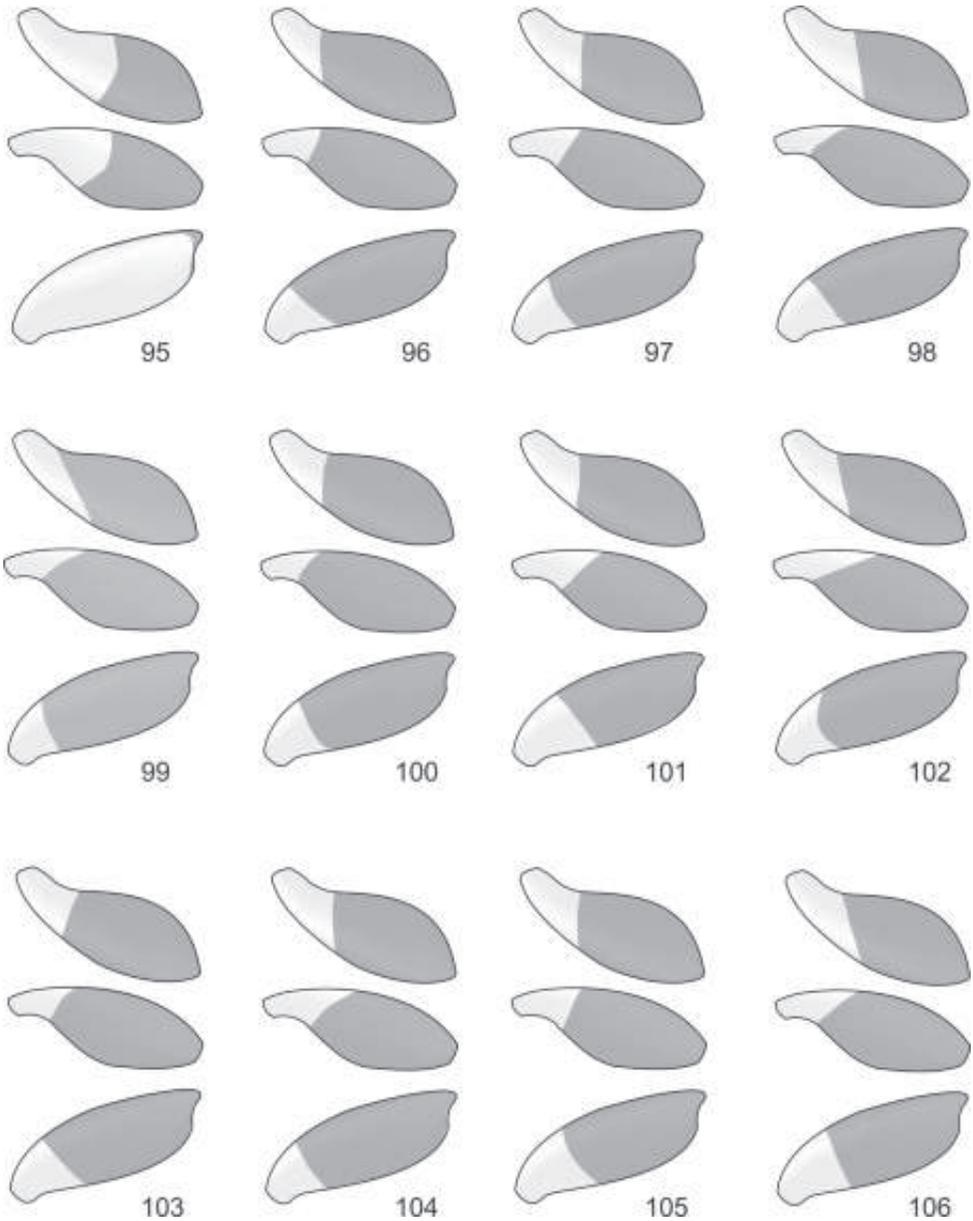
Figs. 69–70: Habitus: 69) *Agraphydrus tulipa* (paratype); 70) *A. vietnamensis* (paratype). Scale = 1 mm.



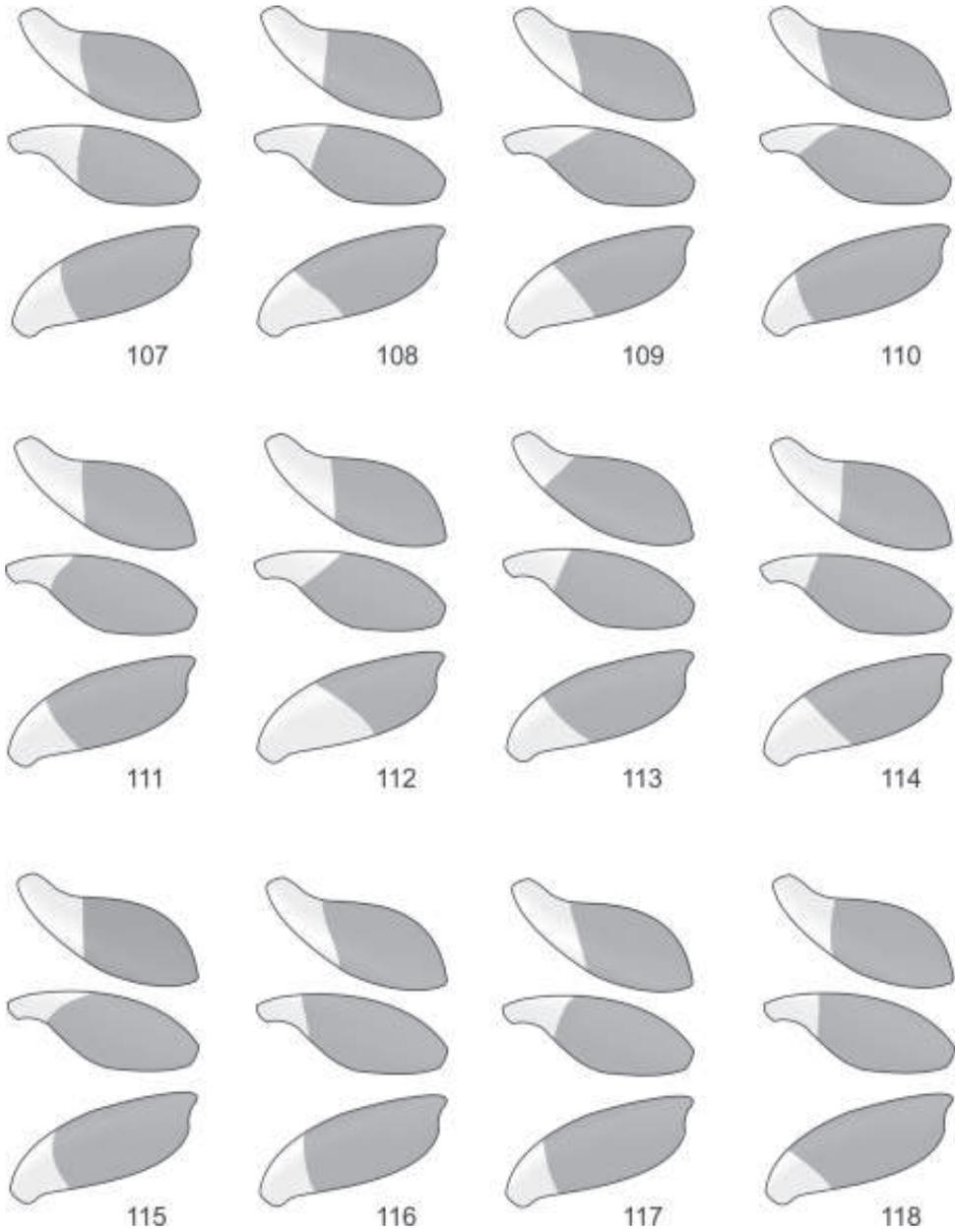
Figs. 71–82: Femora: 71) *Agraphydrus anacaenoides*; 72) *A. angulatus*; 73) *A. bacchusi*; 74) *A. balkeorum*; 75) *A. biprojectus*; 76) *A. borneensis*; 77) *A. brevipennis*; 78) *A. burmensis*; 79) *A. carinatus*; 80) *A. cervus*; 81) *A. clarus*; 82) *A. coronarius*.



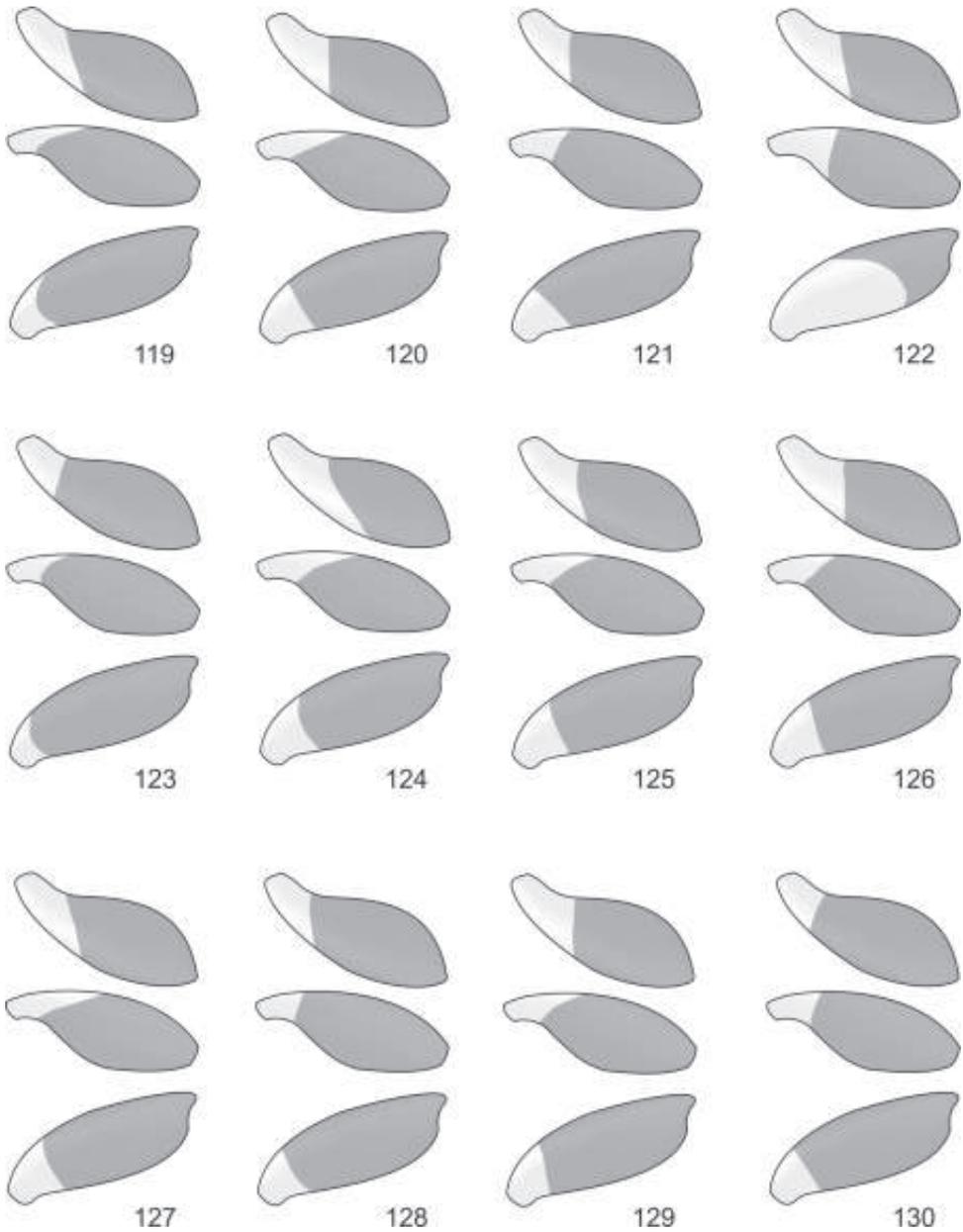
Figs. 83–94: Femora: 83) *Agraphydrus delineatus*; 84) *A. engkari*; 85) *A. excisus*; 86) *A. exiguus*; 87) *A. floresinus*; 88) *A. geminus*; 89) *A. hamatus*; 90) *A. helicopter*; 91) *A. hendrichi*; 92) *A. heterochromatus*; 93) *A. hortensis*; 94) *A. imitans*.



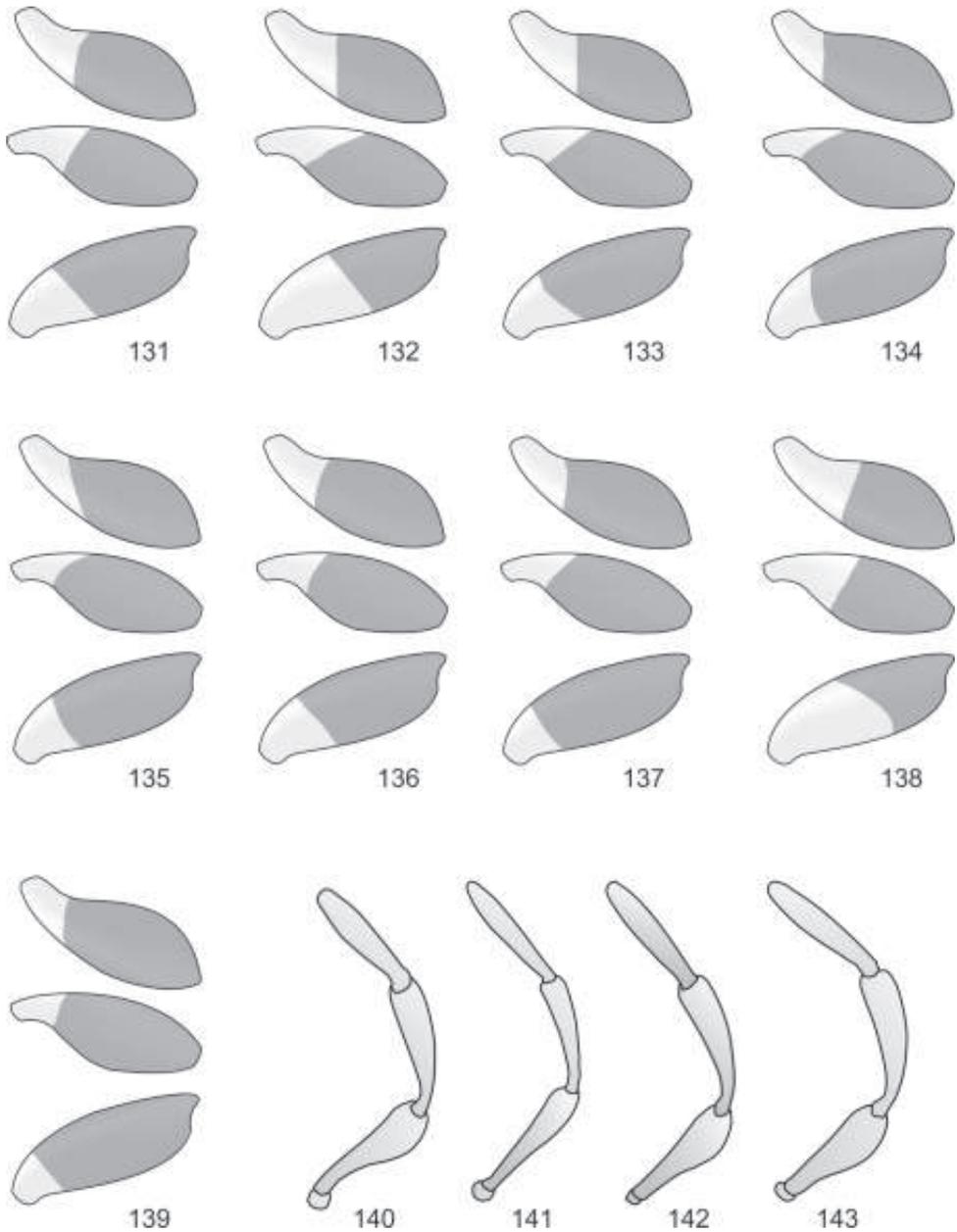
Figs. 95–106: Femora: 95) *Agraphydrus infuscatus*; 96) *A. jaechi*; 97) *A. jankodadai*; 98) *A. kathapa*; 99) *A. laocaiensis*; 100) *A. latus*; 101) *A. lunaris*; 102) *A. maehongsonensis*; 103) *A. malayanus*; 104) *A. manfredjaechi*; 105) *A. mazzoldii*; 106) *A. microphthalmus*.



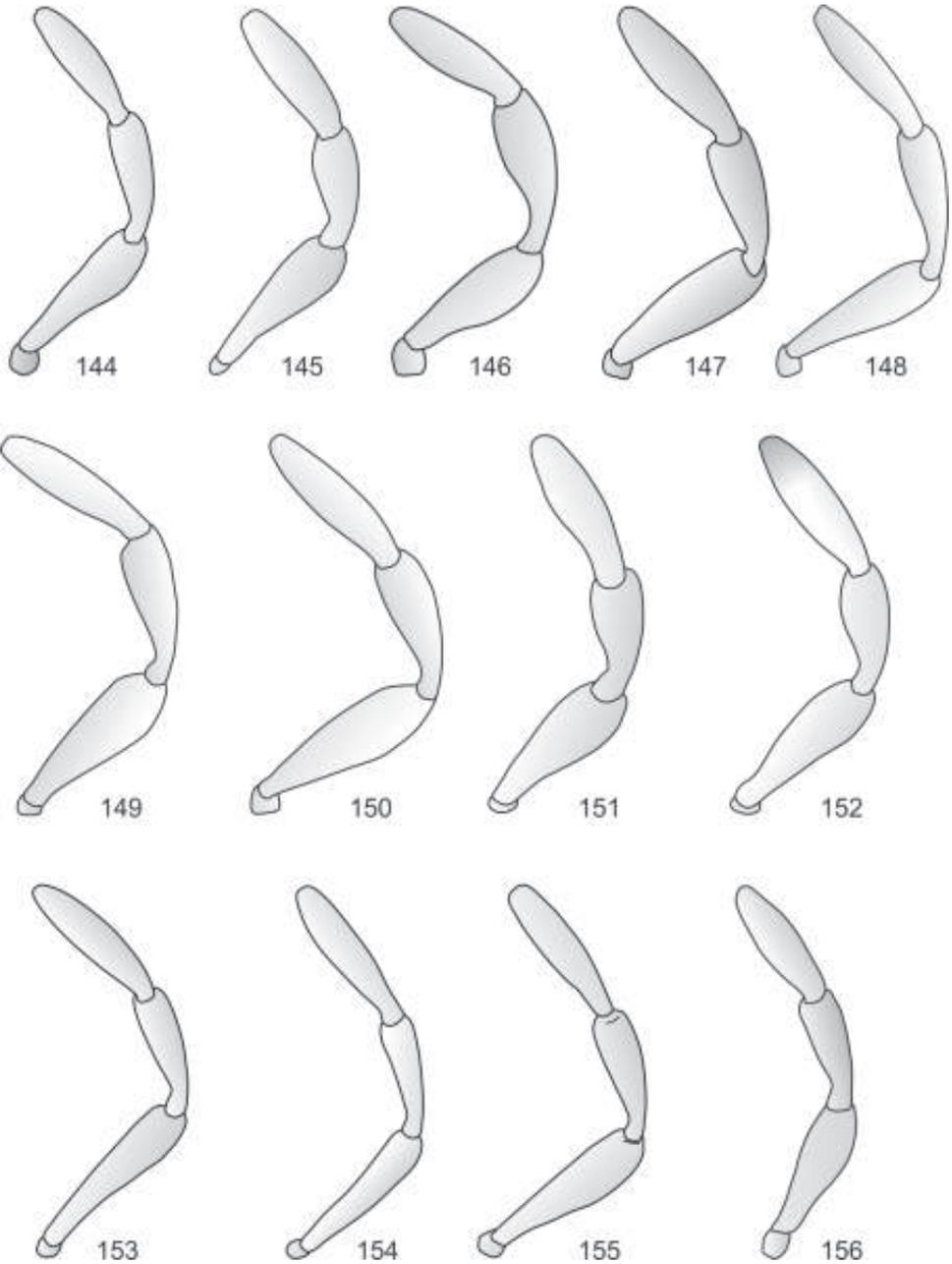
Figs. 107–118: Femora: 107) *Agraphydrus mirabilis*; 108) *A. muluensis*; 109) *A. musculus*; 110) *A. namthaensis*; 111) *A. nemorosus*; 112) *A. nigroflavus*; 113) *A. obesus*; 114) *A. orbicularis*; 115) *A. orientalis*; 116) *A. pallidus*; 117) *A. papuanus*; 118) *A. penangensis*.



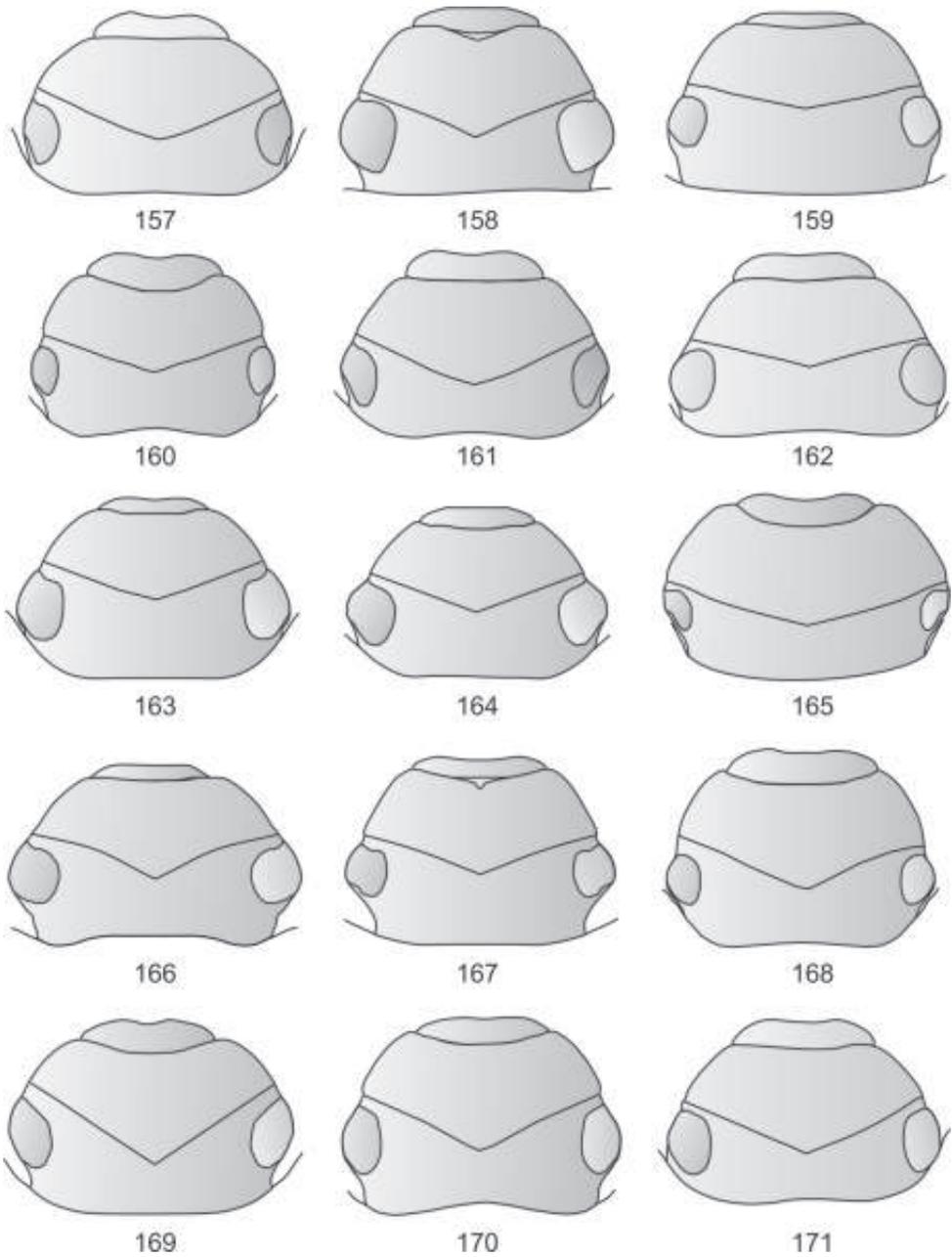
Figs. 119–130: Femora: 119) *Agraphydrus piceus*; 120) *A. raucus*; 121) *A. regularis*; 122) *A. reticulatus*; 123) *A. rhomboideus*; 124) *A. sarawakensis*; 125) *A. schoedli*; 126) *A. scintillans*; 127) *A. shaverdoae*; 128) *A. siamensis*; 129) *A. skalei*; 130) *A. spadix*.



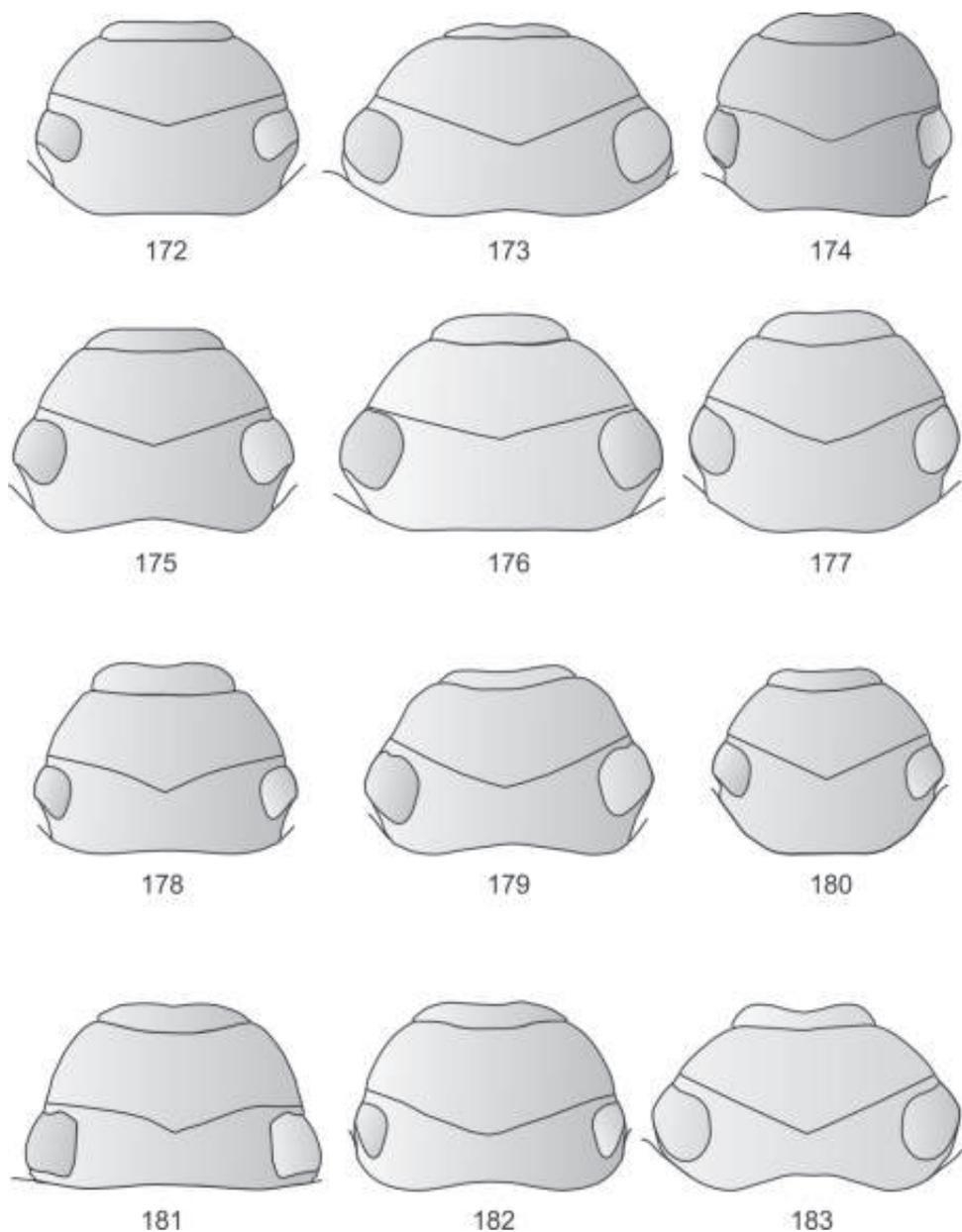
Figs. 131–143: 131–139) Femora; 140–143) maxillary palp: 131) *Agraphydrus spinosus*; 132) *A. stramineus*; 133) *A. sucineus*; 134) *A. sundaicus*; 135) *A. tamdao*; 136) *A. thaiensis*; 137) *A. tristis*; 138) *A. tulipa*; 139) *A. vietnamensis*; 140) *A. attenuatus*; 141) *A. jaechi*; 142) *A. regularis*; 143) *A. siamensis*.



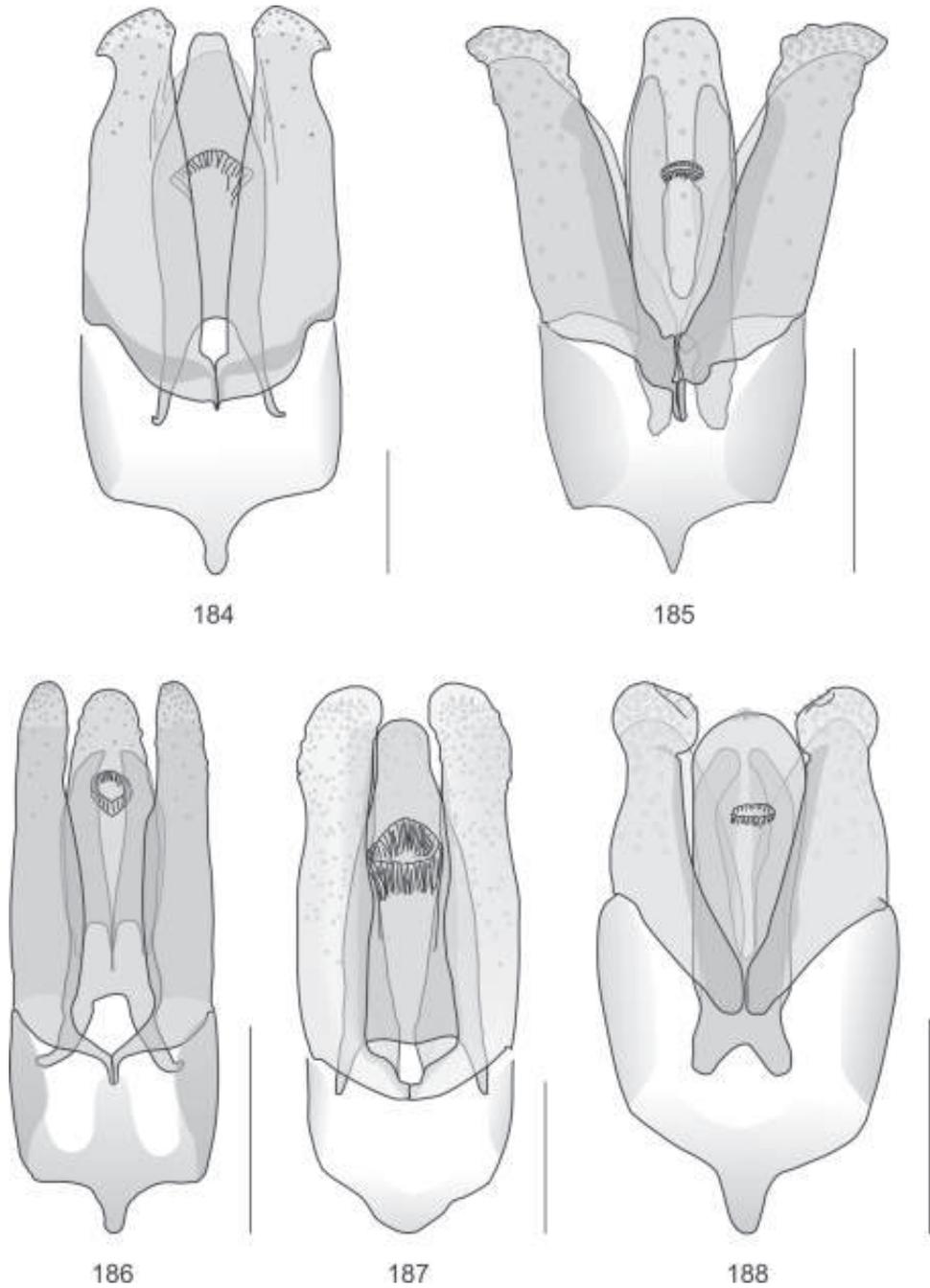
Figs. 144–156: Maxillary palp: 144) *Agraphydrus activus*; 145) *A. anacaenoides*; 146) *A. biprojectus*; 147) *A. brevipennis*; 148) *A. clarus*; 149) *A. coronarius*; 150) *A. engkari*; 151) *A. geminus*; 152) *A. infuscatus*; 153) *A. malayanus*; 154) *A. raucus*; 155) *A. thaiensis*; 156) *A. tulipa*.



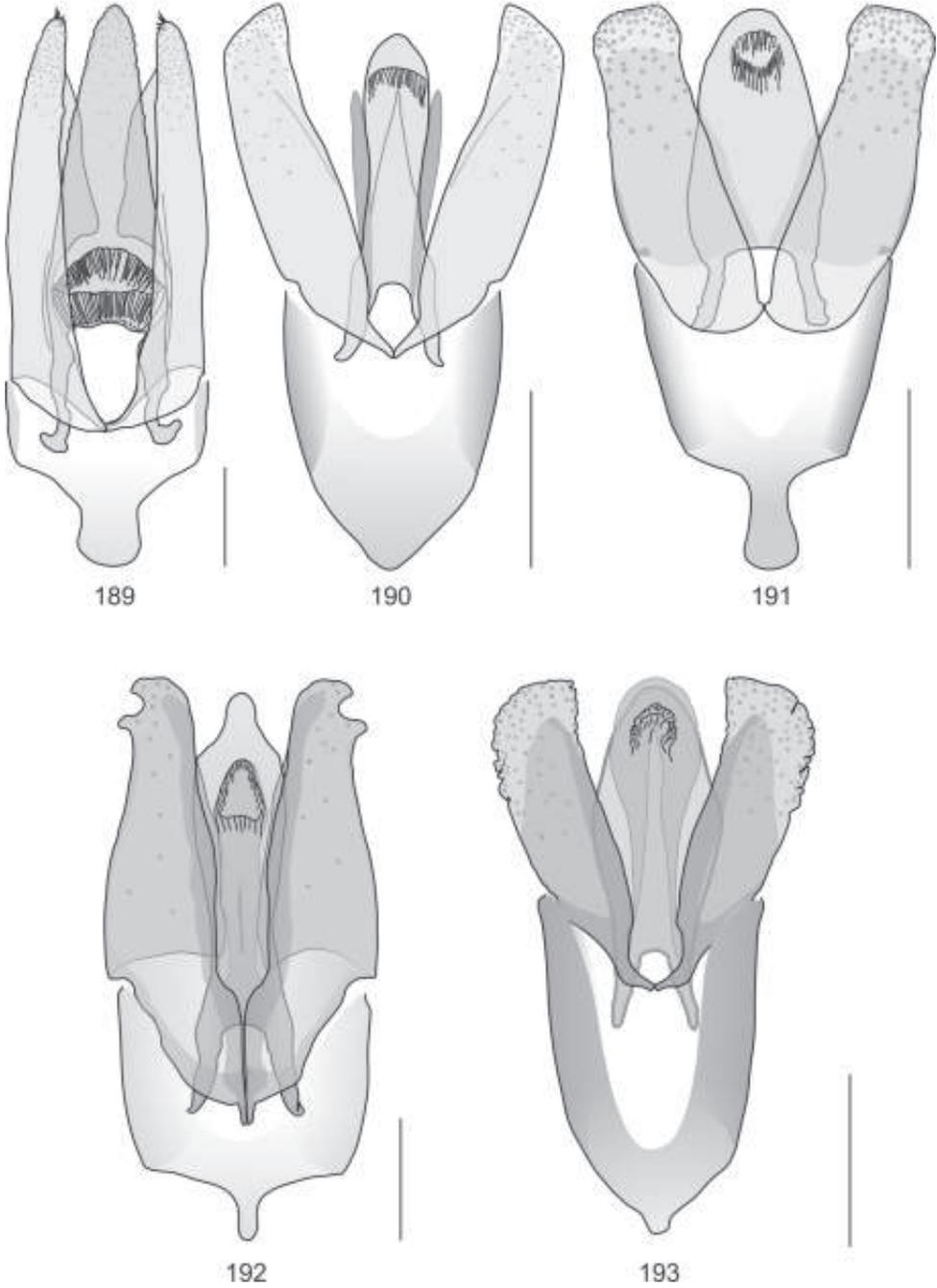
Figs. 157–171: Head: 157) *Agraphydrus. anacaenoides*; 158) *A. angulatus*; 159) *A. carinatus*; 160) *A. floresinus*; 161) *A. geminus*; 162) *A. infuscatus*; 163) *A. lunaris*; 164) *A. mazzoldii*; 165) *A. microphthalmus*; 166) *A. penangensis*; 167) *A. rhomboideus*; 168) *A. schoedli*; 169) *A. scintillans*; 170) *A. setifer*; 171) *A. tulipa*.



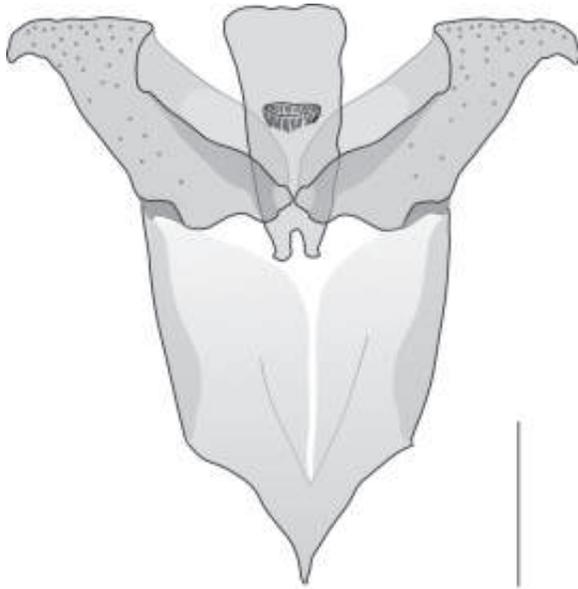
Figs. 172–183: Head: 172) *Agraphydrus balkeorum*; 173) *A. brevipenis*; 174) *A. cervus*; 175) *A. excisus*; 176) *A. jankodadai*; 177) *A. mirabilis*; 178) *A. musculus*; 179) *A. nigroflavus*; 180) *A. orientalis*; 181) *A. piceus*; 182) *A. raucus*; 183) *A. sucineus*.



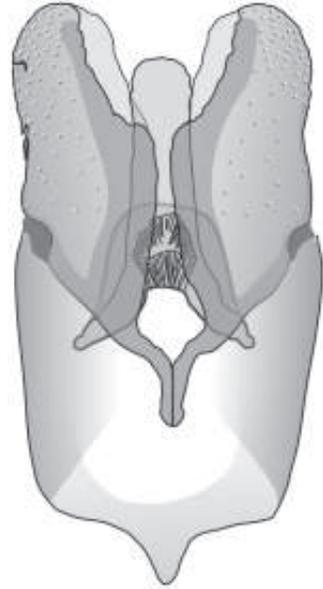
Figs. 184–188: Aedeagus: 184) *Agraphydrus activus*; 185) *A. agilis*; 186) *A. anacaenoides*; 187) *A. angulatus*; 188) *A. arduus*. Scale = 1 mm.



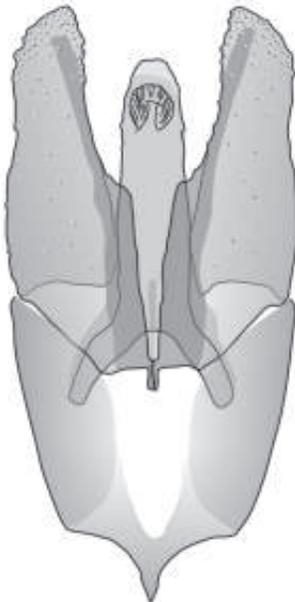
Figs. 189–193: Aedeagus: 189) *Agraphydrus attenuatus*; 190) *A. bacchusi*; 191) *A. balkeorum*; 192) *A. biprojectus*; 193) *A. borneensis*. Scale = 1 mm.



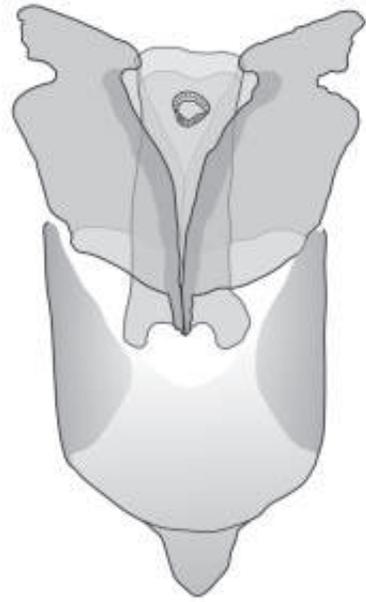
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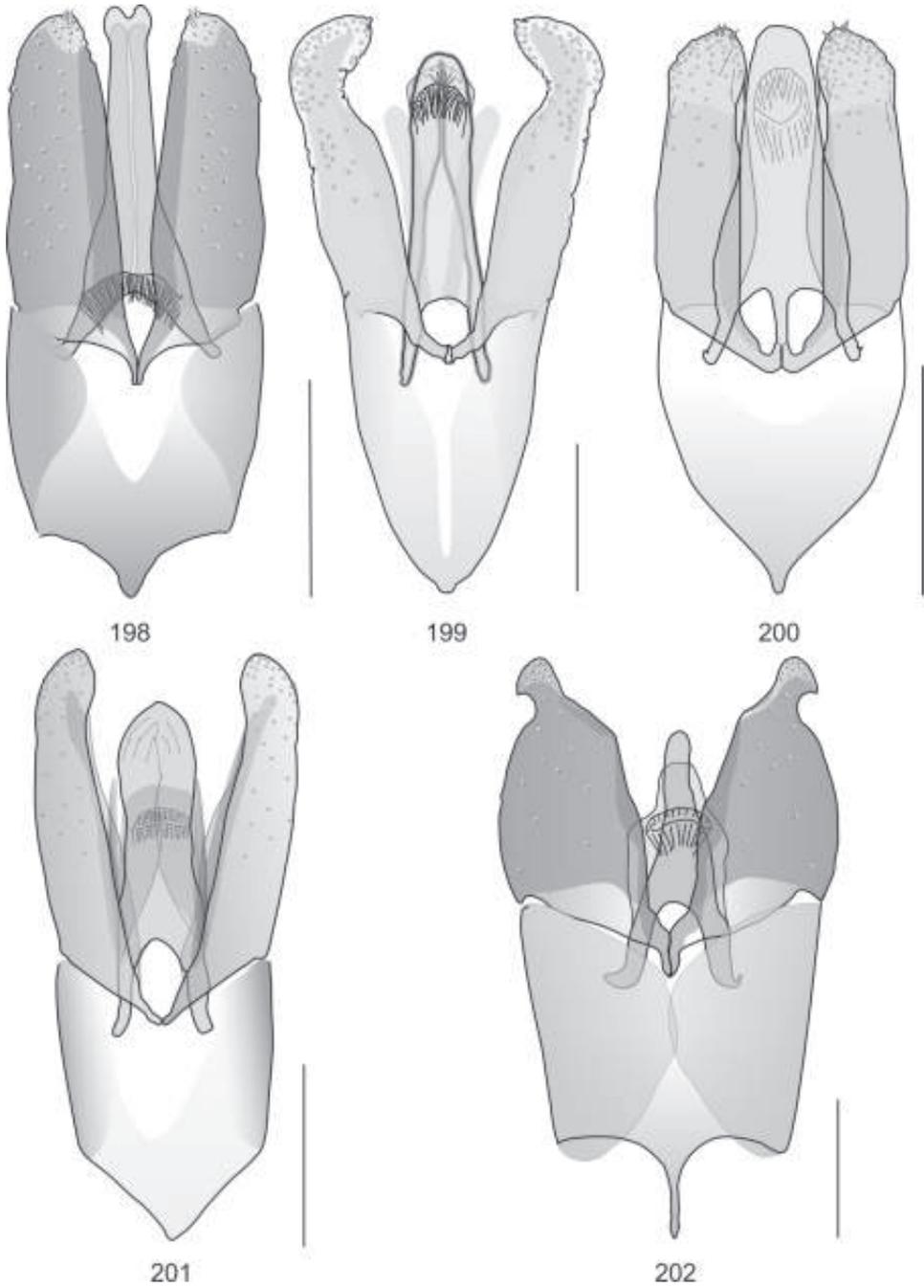


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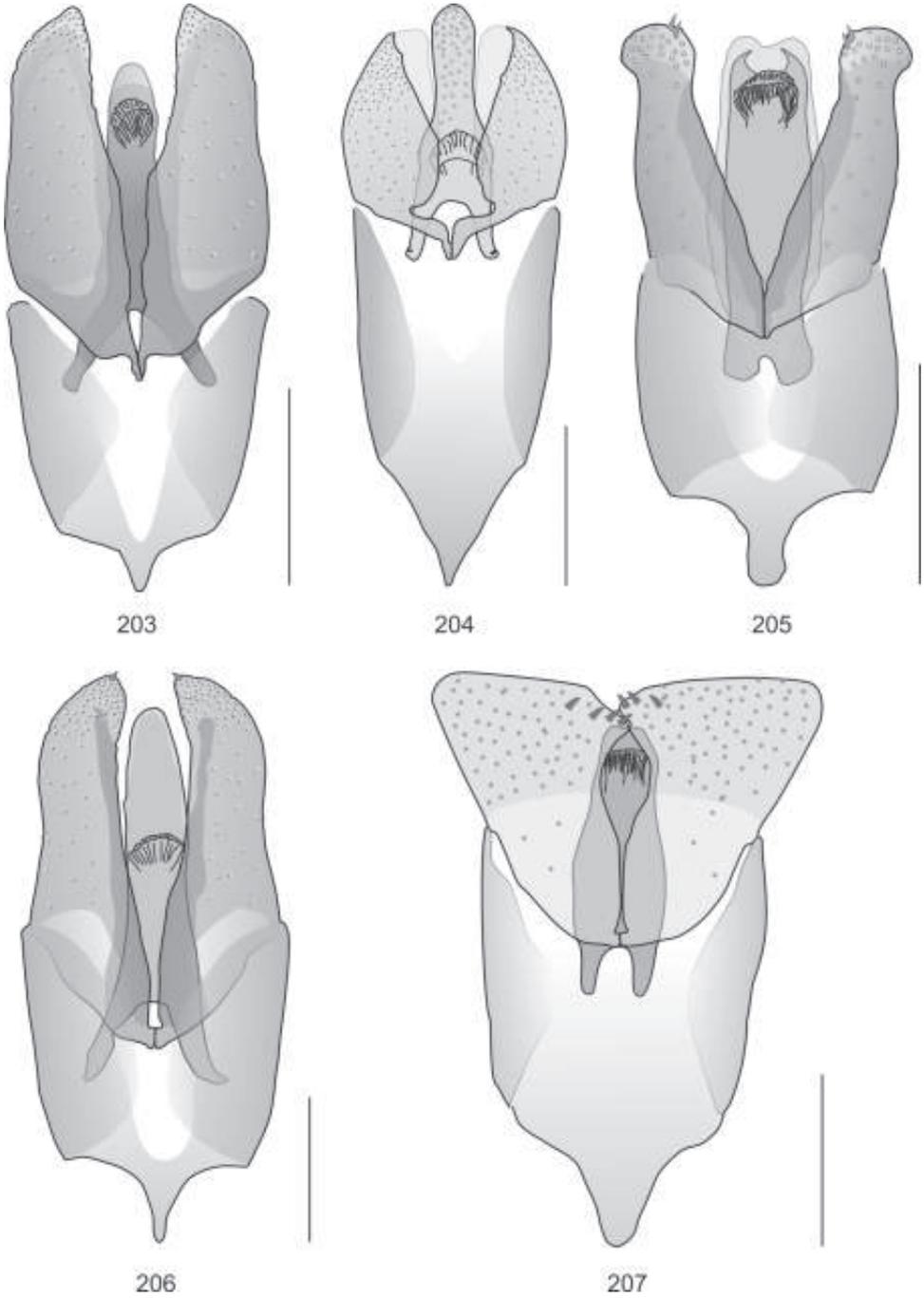


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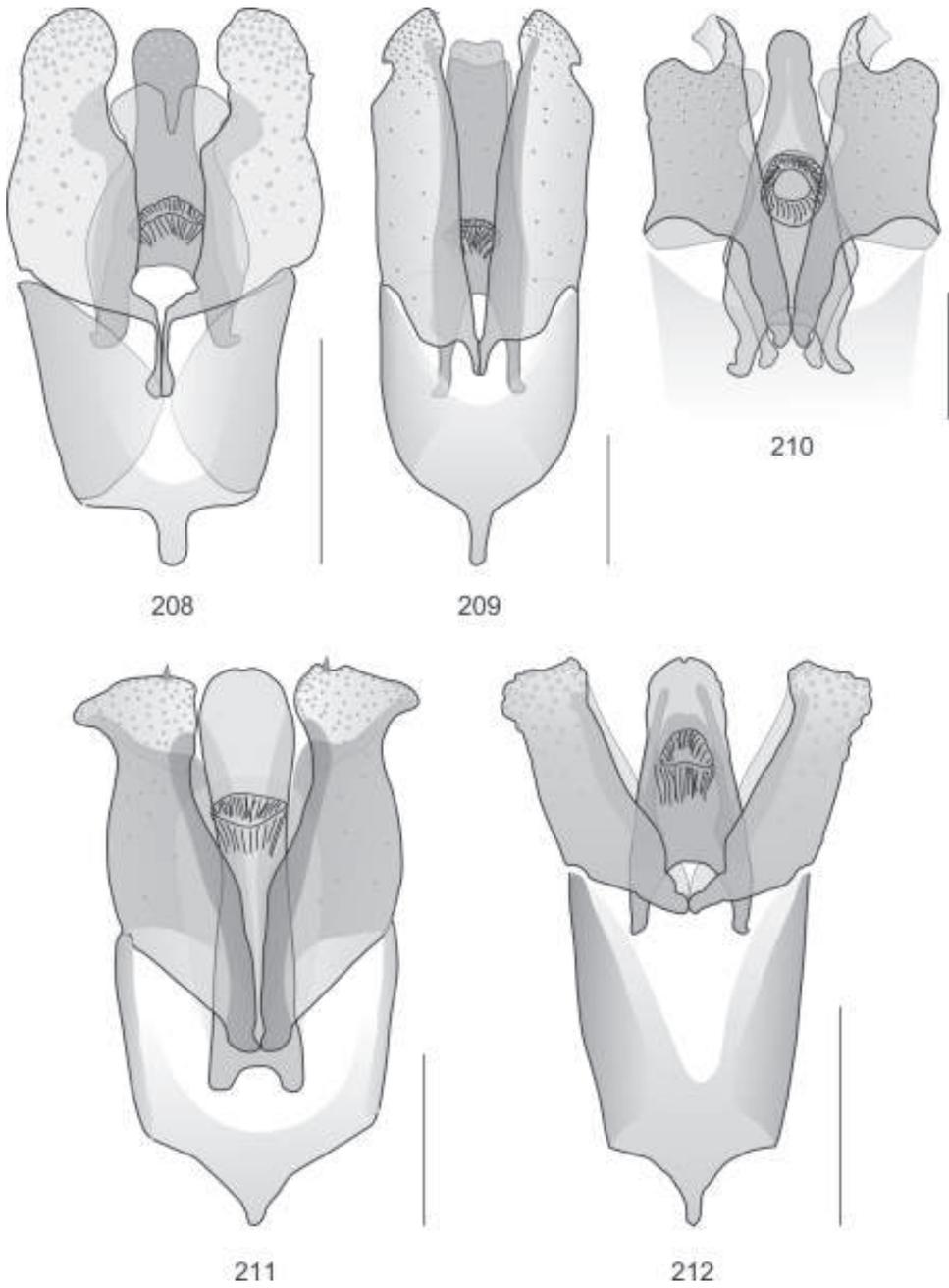
Figs. 194–197: Aedeagus: 194) *Agraphydrus brevipennis*; 195) *A. burmensis*; 196) *A. carinatus*; 197) *A. cervus*. Scale = 1 mm.



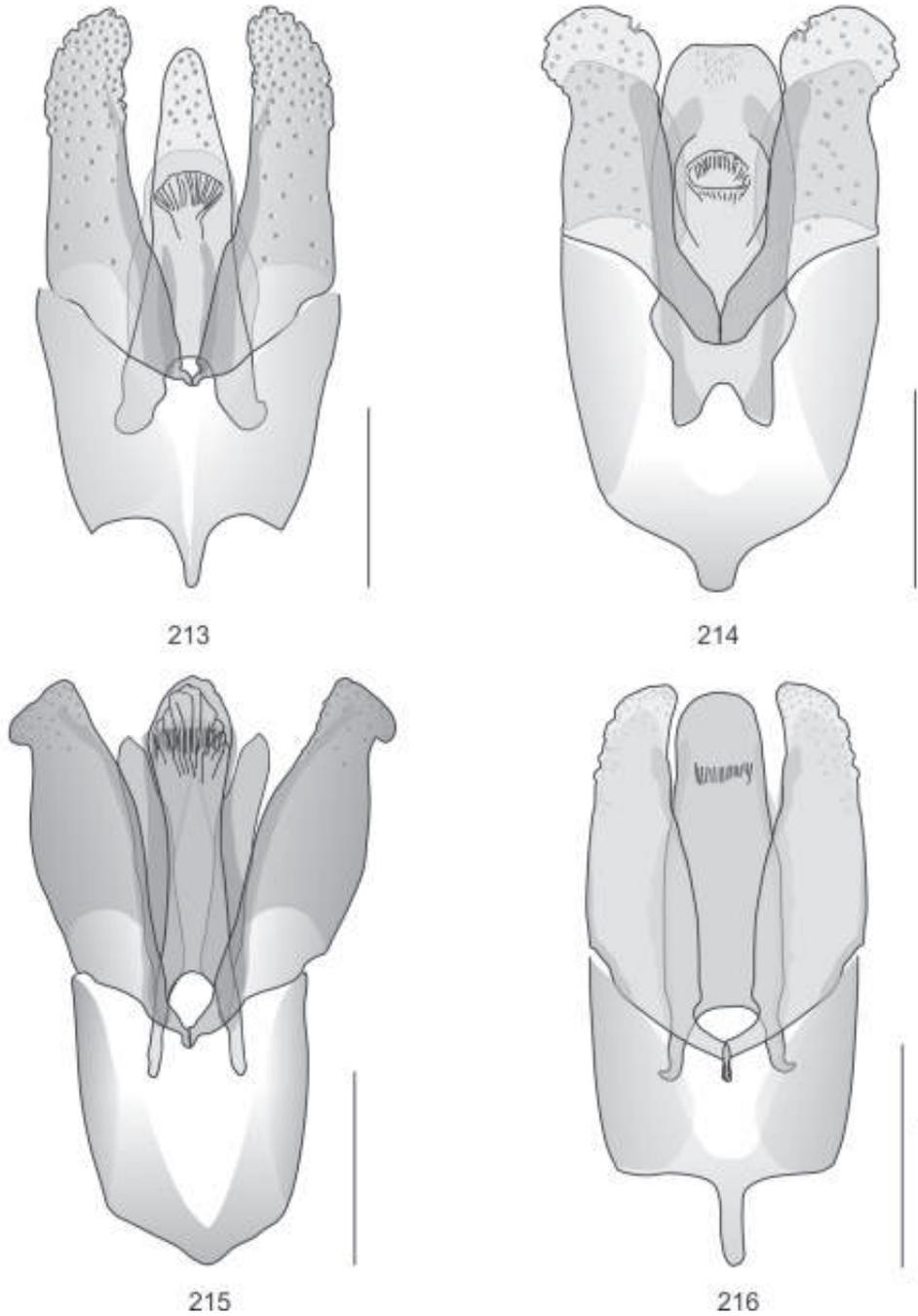
Figs. 198–202: Aedeagus: 198) *Agraphydrus clarus*; 199) *A. confusus*; 200) *A. connexus*; 201) *A. coomani*; 202) *A. coronarius*. Scale = 1 mm.



Figs. 203–207: Aedeagus: 203) *Agraphydrus delineatus*; 204) *A. engkari*; 205) *A. excisus*; 206) *A. exiguus*; 207) *A. floresinus*. Scale = 1 mm.



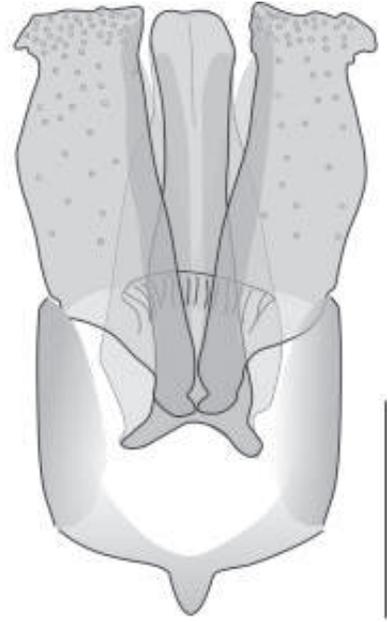
Figs. 208–212: Aedeagus: 208) *Agraphydrus geminus*; 209) *A. hamatus*; 210) *A. helicopter*; 211) *A. hendrichi*; 212) *A. heterochromatus*. Scale = 1 mm.



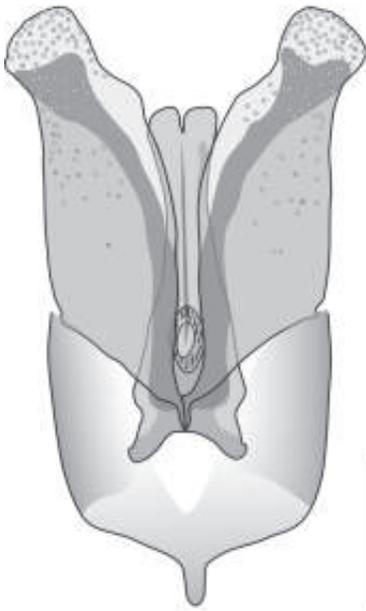
Figs. 213–216: Aedeagus: 213) *Agraphydrus hortensis*; 214) *A. igneus*; 215) *A. imitans*; 216) *A. infuscatus*. Scale = 1 mm.



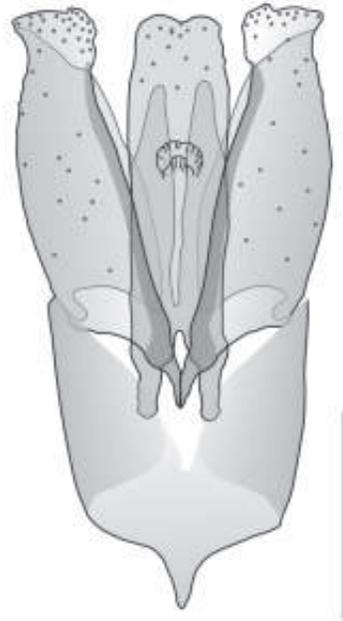
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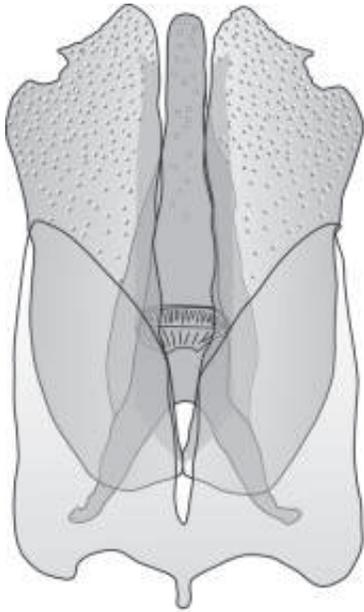


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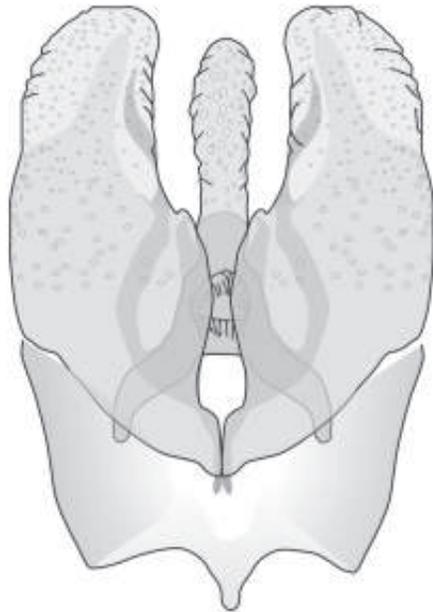


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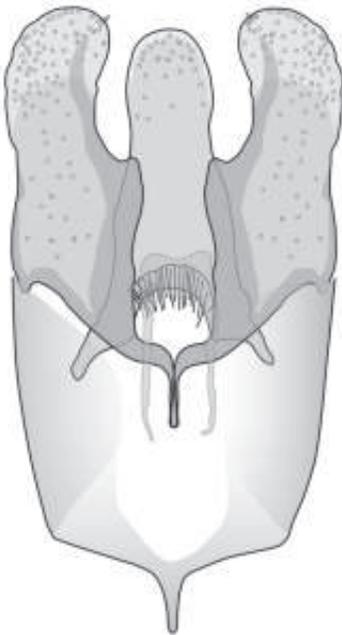
Figs. 217–220: Aedeagus: 217) *Agraphydrus jaechi*; 218) *A. jankodadai*; 219) *A. kathapa*; 220) *A. laocaiensis*. Scale = 1 mm.



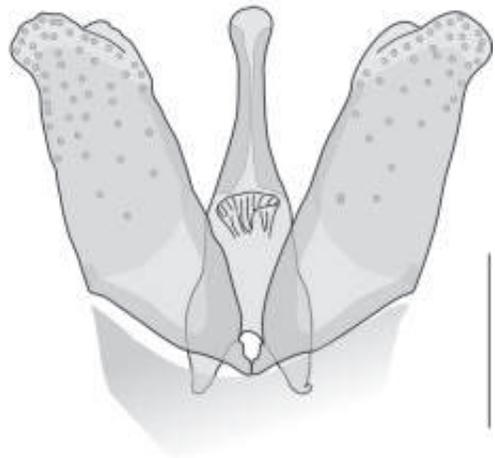
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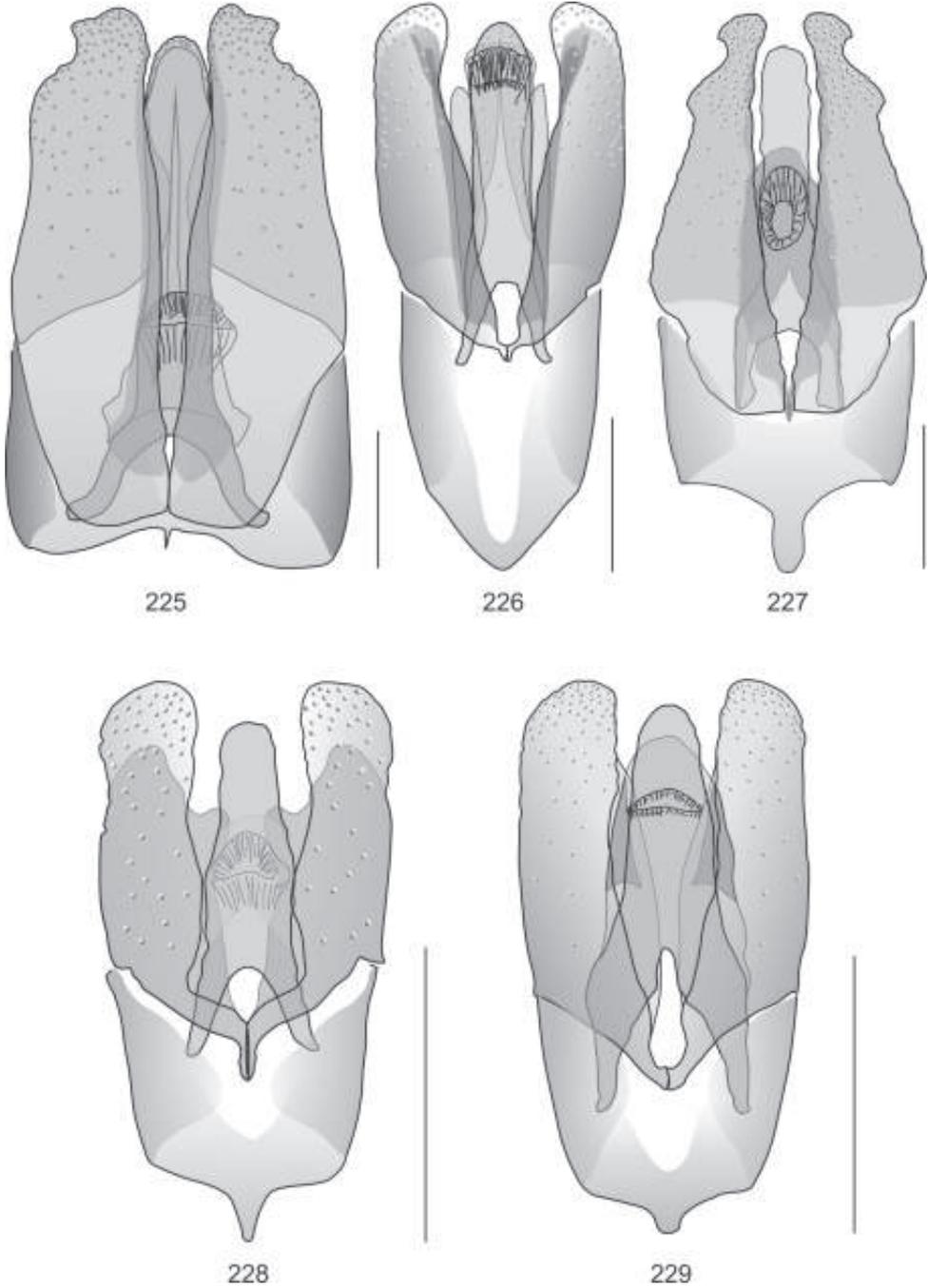


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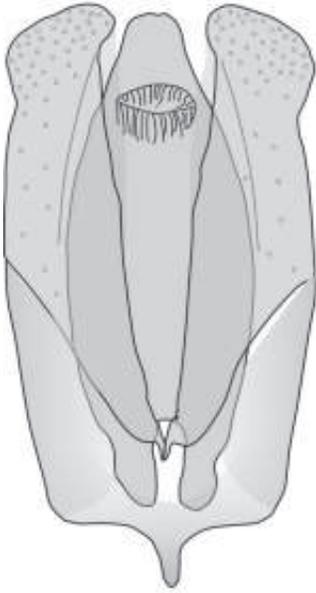


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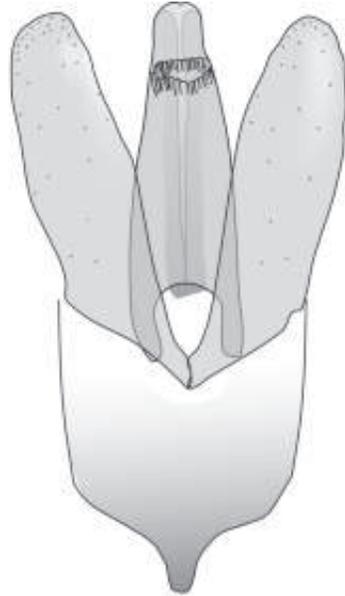
Figs. 221–224: Aedeagus: 221) *Agraphydrus latus*; 222) *A. longipenis*; 223) *A. lunaris*; 224) *A. mae-hongsonensis*. Scale = 1 mm.



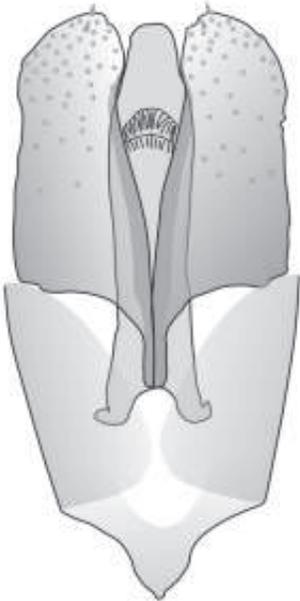
Figs. 225–229: Aedeagus: 225) *Agraphydrus malayanus*; 226) *A. manfredjaechi*; 227) *A. masatakai*; 228) *A. mazzoldii*; 229) *A. microphthalmus*. Scale = 1 mm.



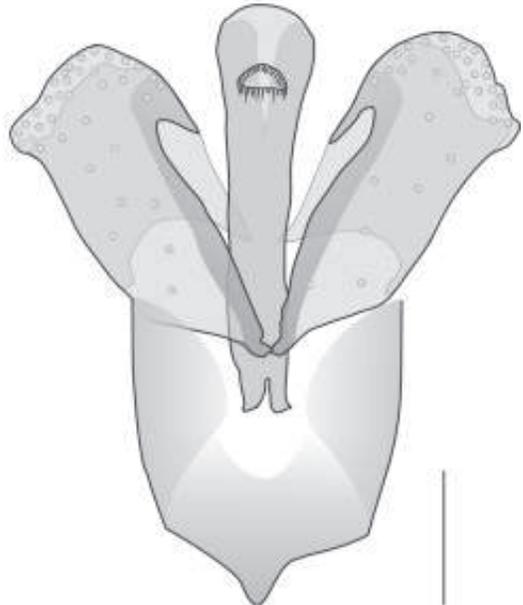
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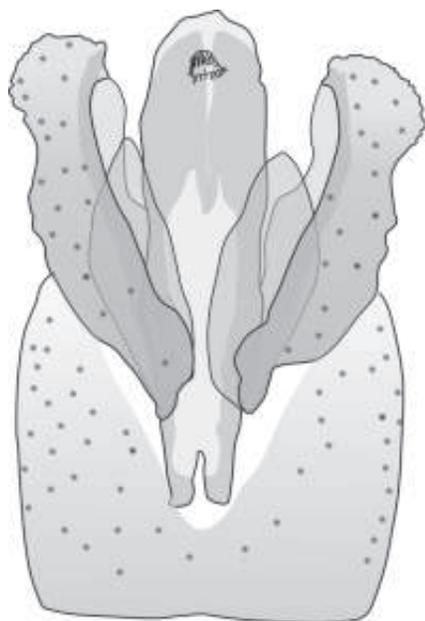


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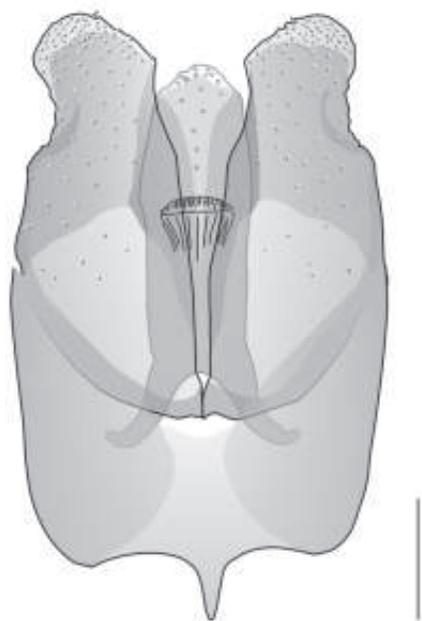
Figs. 230–233: Aedeagus: 230) *Agraphydrus mirabilis*; 231) *A. muluensis*; 232) *A. musculus*; 233) *A. namthaensis*. Scale = 1 mm.



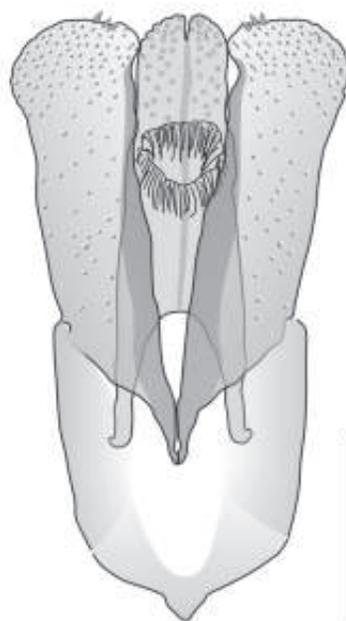
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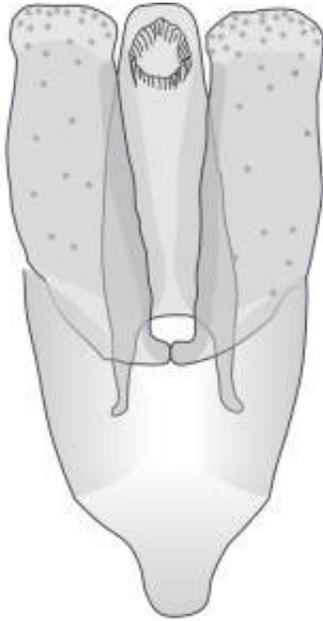


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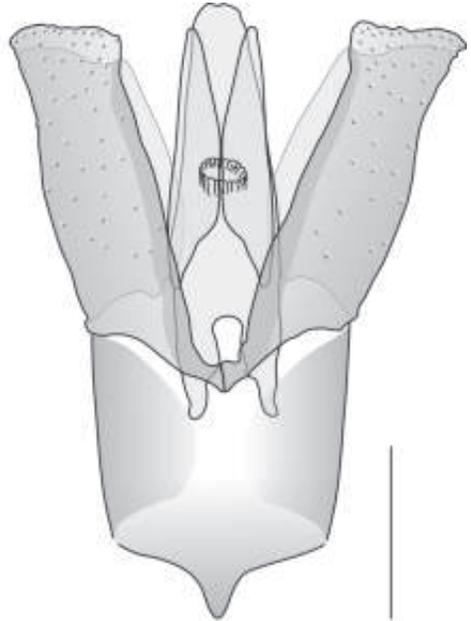


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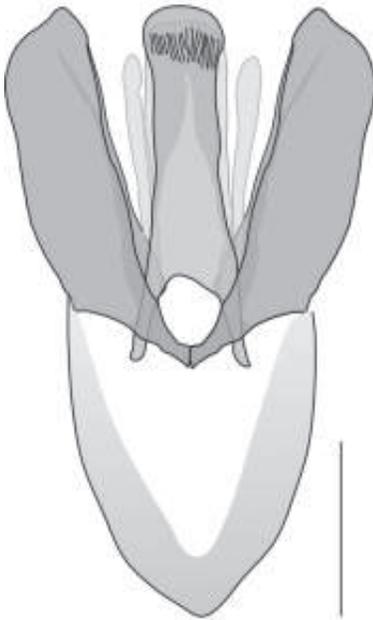
Figs. 234–237: Aedeagus: 234) *Agraphydrus nemorosus*; 235) *A. nigroflavus*; 236) *A. obesus*; 237) *A. orbicularis*. Scale = 1 mm.



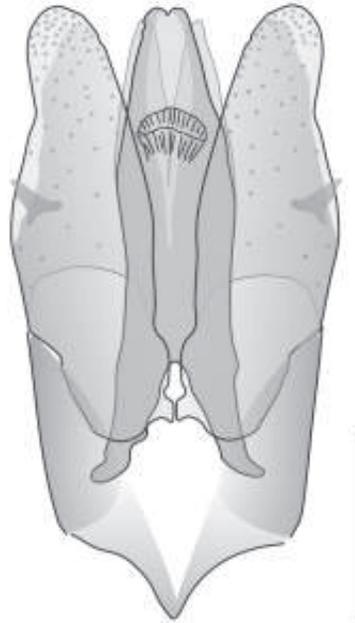
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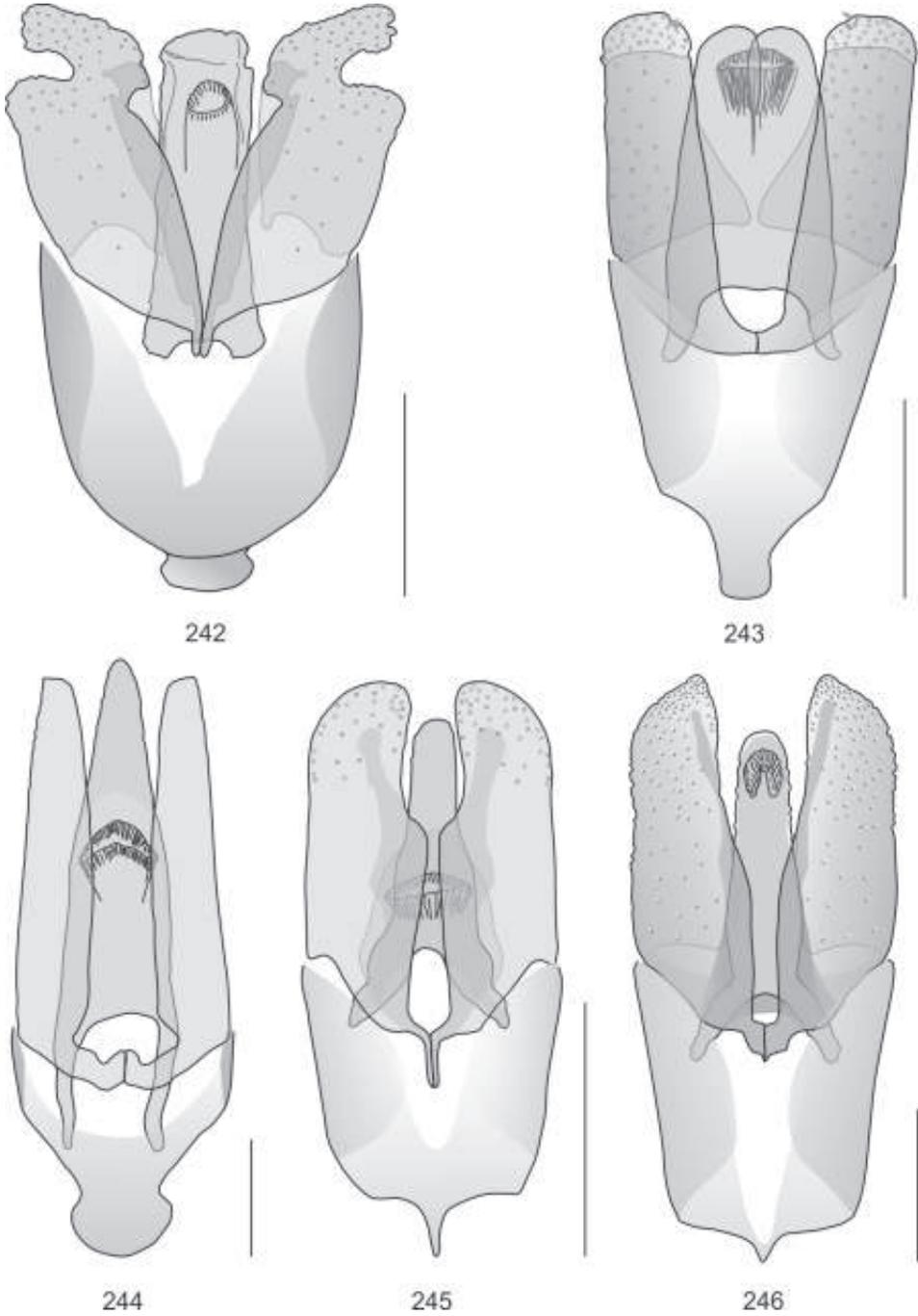


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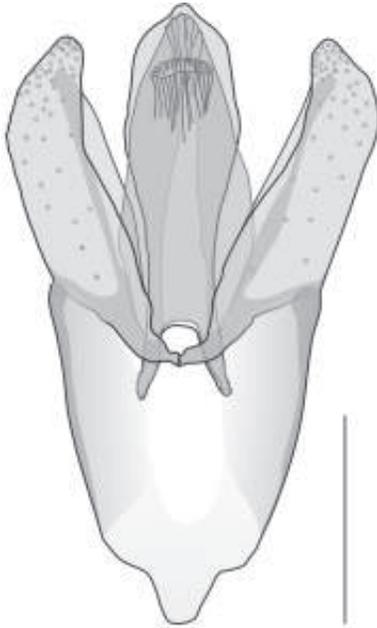


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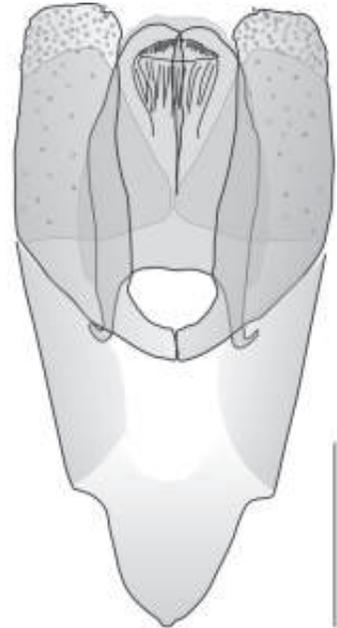
Figs. 238–241: Aedeagus: 238) *Agraphydrus orientalis*; 239) *A. pallidus*; 240) *A. papuanus*; 241) *A. penangensis*. Scale = 1 mm.



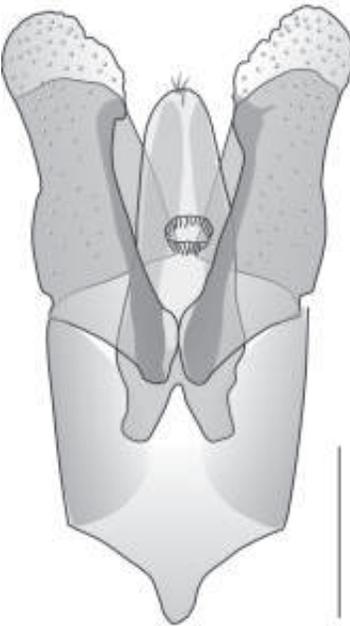
Figs. 242–246: Aedeagus: 242) *Agraphydrus piceus*; 243) *A. raucus*; 244) *A. regularis*; 245) *A. reticulatus*; 246) *A. rhomboideus*. Scale = 1 mm.



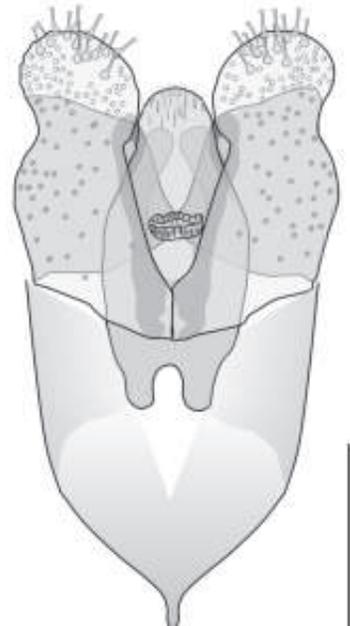
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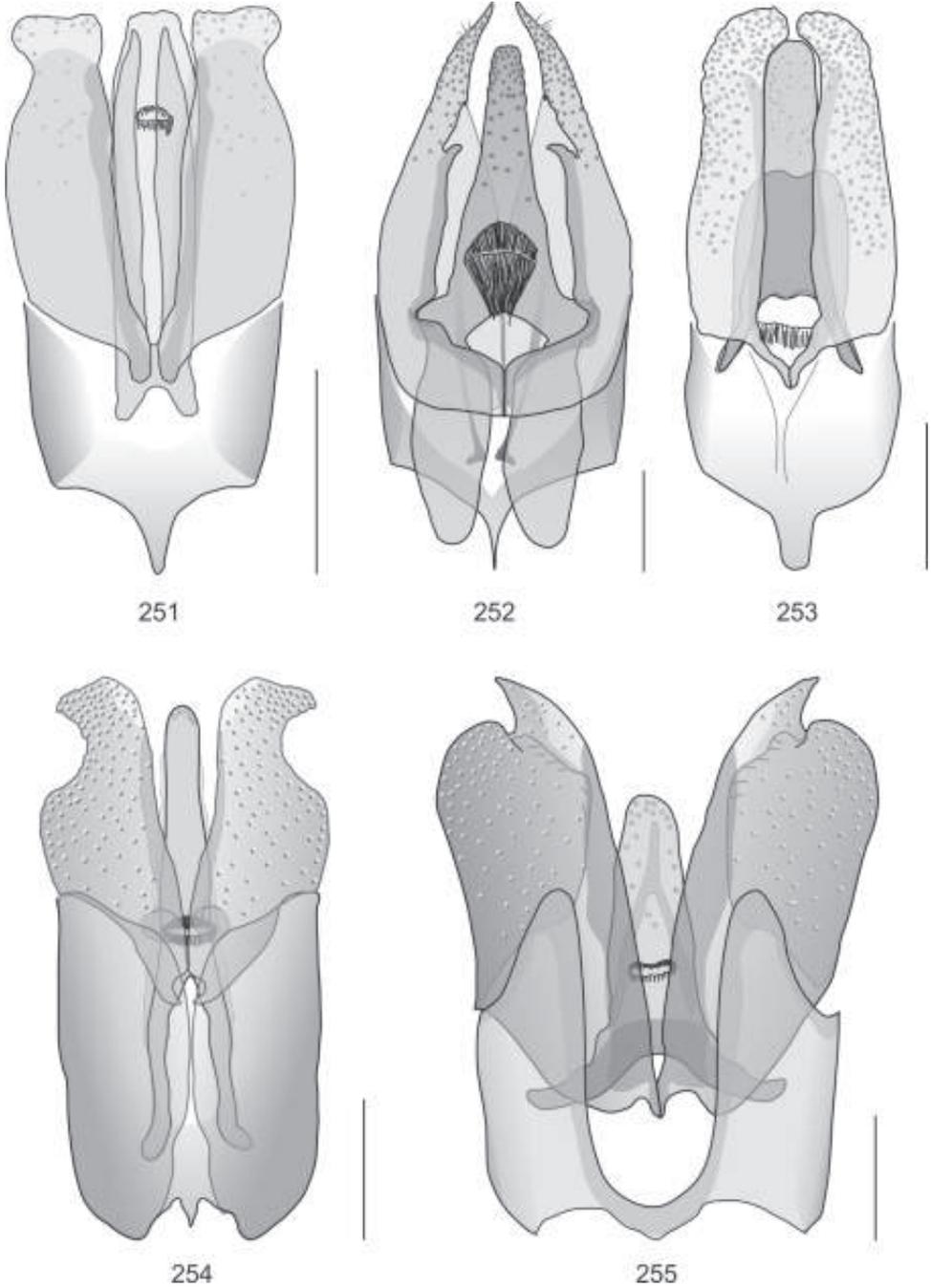


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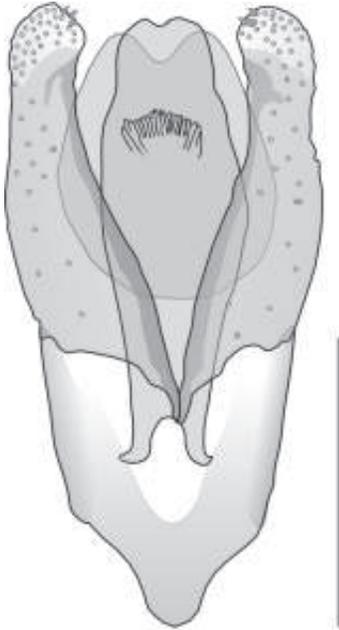


250

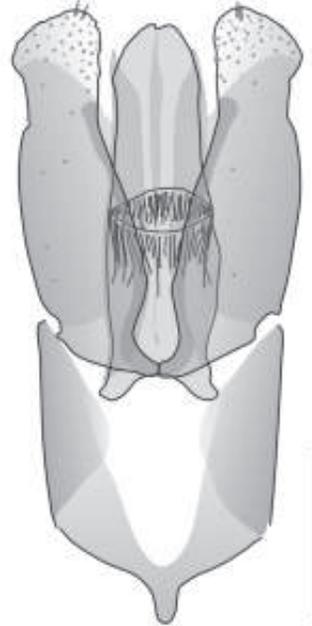
Figs. 247–250: Aedeagus: 247) *Agraphydrus sarawakensis*; 248) *A. schoedli*; 249) *A. scintillans*; 250) *A. setifer*. Scale = 1 mm.



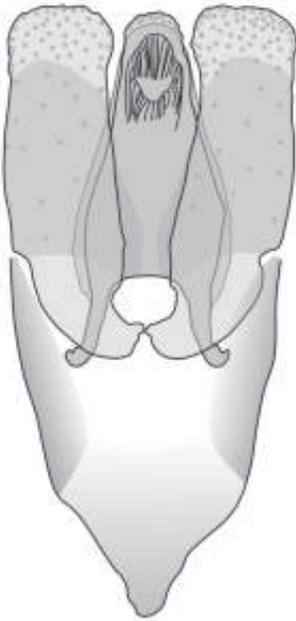
Figs. 251–255: Aedeagus: 251) *Agraphydrus shaverdoae*; 252) *A. siamensis*; 253) *A. skalei*; 254) *A. spadix*; 255) *A. spinosus*. Scale = 1 mm.



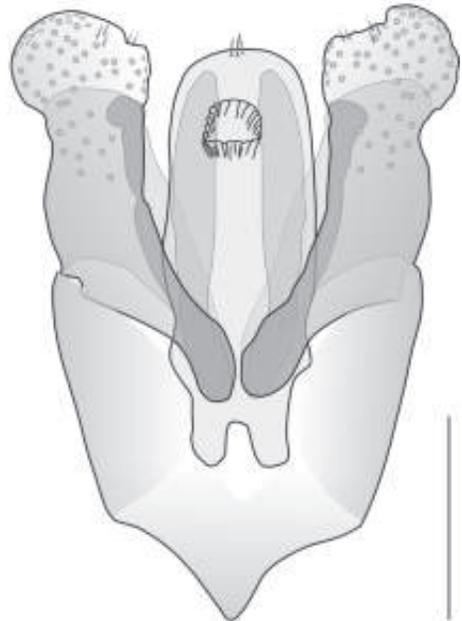
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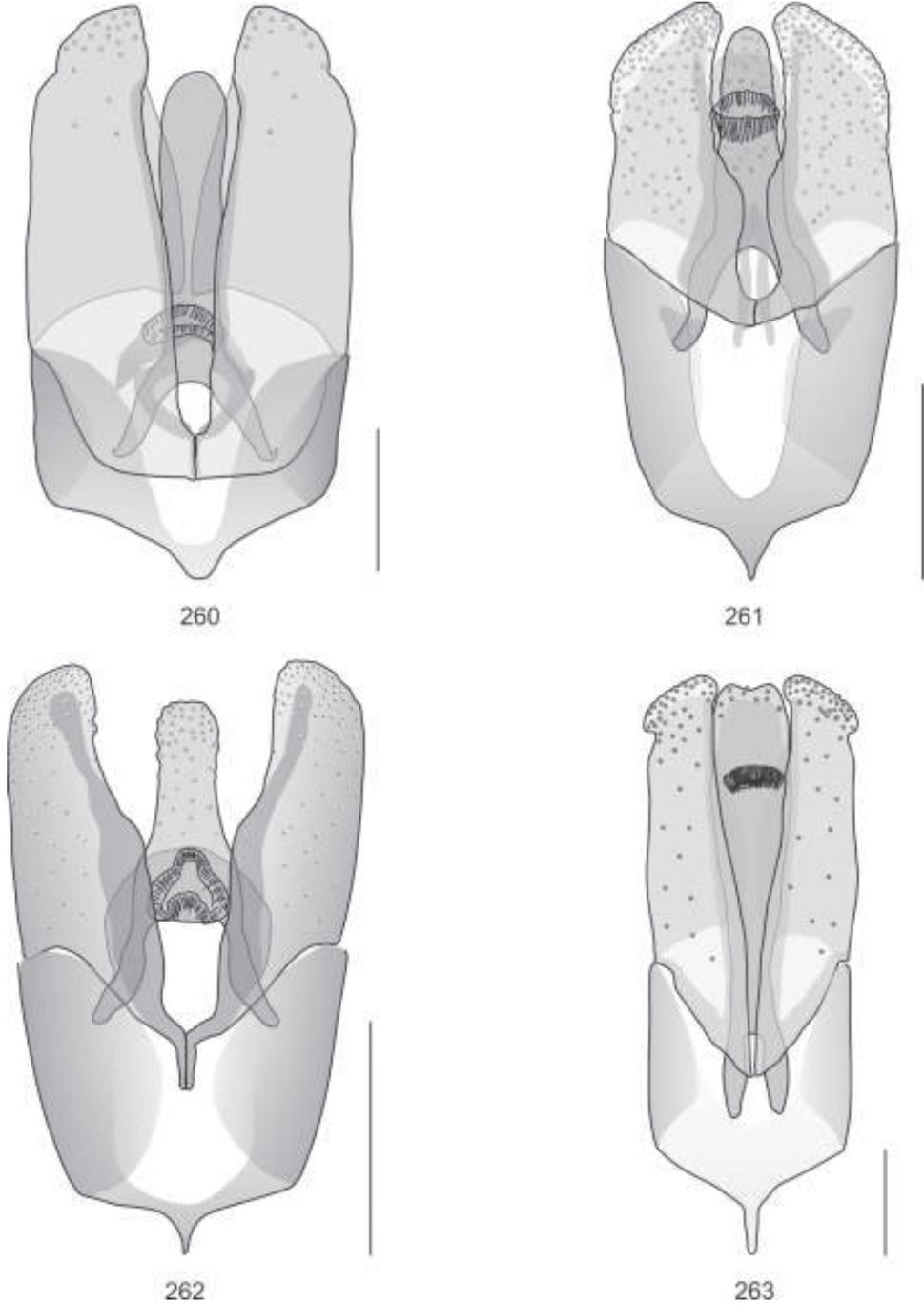


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Figs. 256–259: Aedeagus: 256) *Agraphydrus stramineus*; 257) *A. sucineus*; 258) *A. sundaicus*; 259) *A. tamdao*. Scale = 1 mm.



Figs. 260–263: Aedeagus: 260) *Agraphydrus thaiensis*; 261) *A. tristis*; 262) *A. tulipa*; 263) *A. vietnamensis*. Scale = 1 mm.



Fig. 264: Distribution of *Agraphydrus masatakai* in China, Laos, Malaysia, Myanmar, Thailand, and Vietnam.

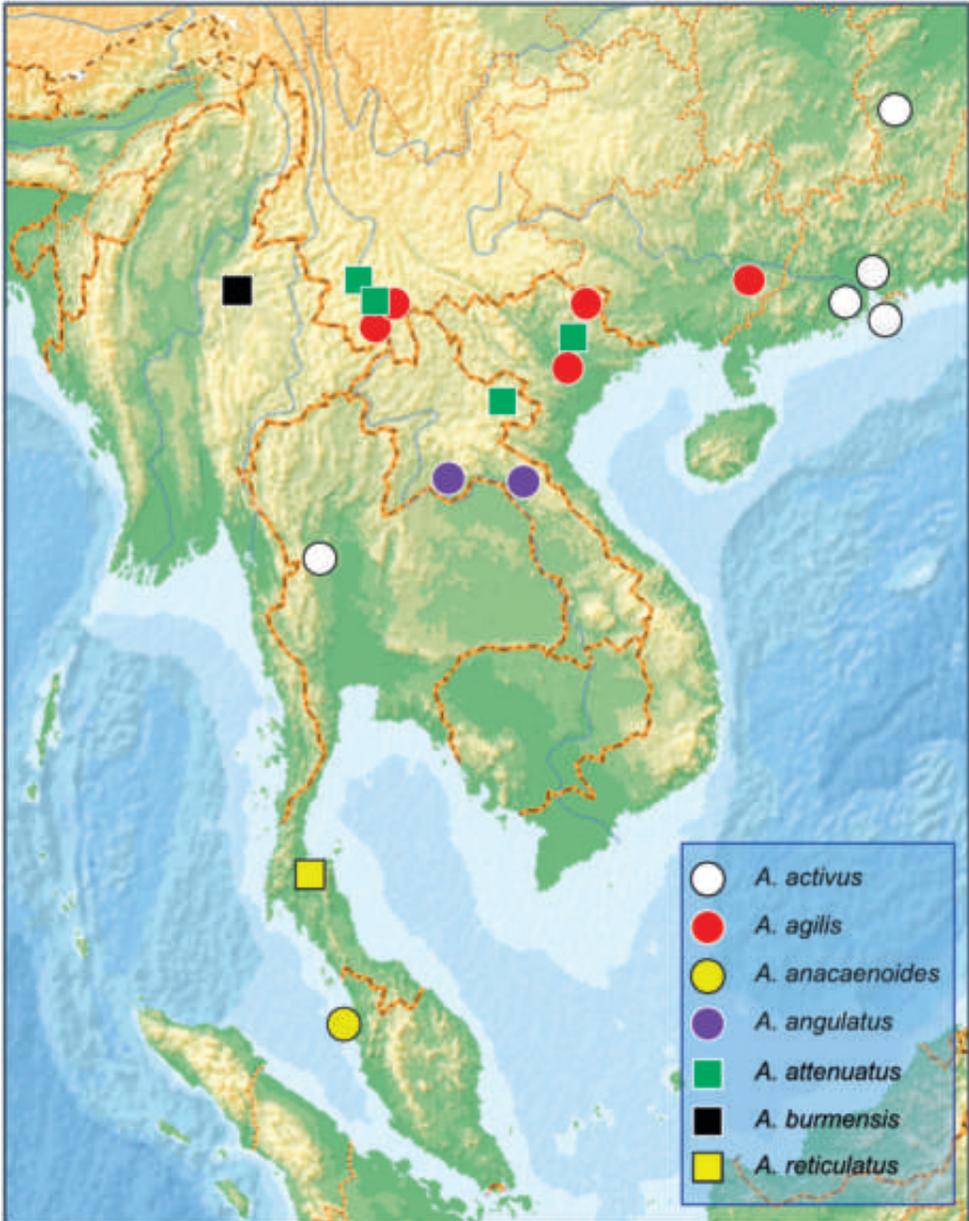


Fig. 265: Distribution of *Agraphydrus activus*, *A. agilis*, *A. anacaenoides*, *A. angulatus*, *A. attenuatus*, *A. burmensis*, and *A. reticulatus* in southern China (Guangdong, Hong Kong, Jiangxi, Yunnan), Laos, Malaysia, Myanmar, Thailand, and Vietnam.

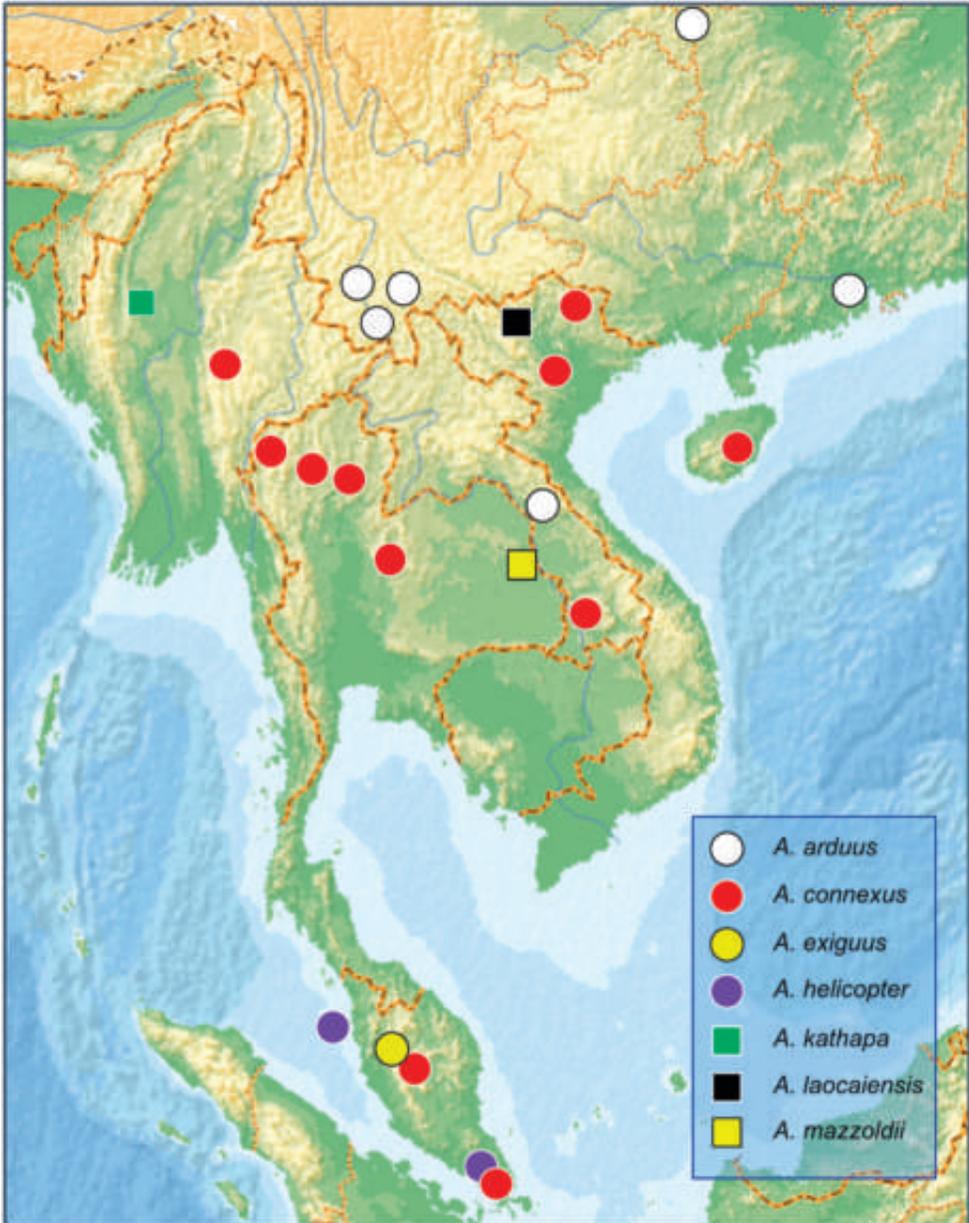


Fig. 266: Distribution of *Agraphydrus arduus*, *A. connexus*, *A. exiguus*, *A. helicopter*, *A. kathapa*, *A. laocaiensis*, and *A. mazzoldii* in China, Laos, Malaysia, Myanmar, Thailand, and Vietnam.

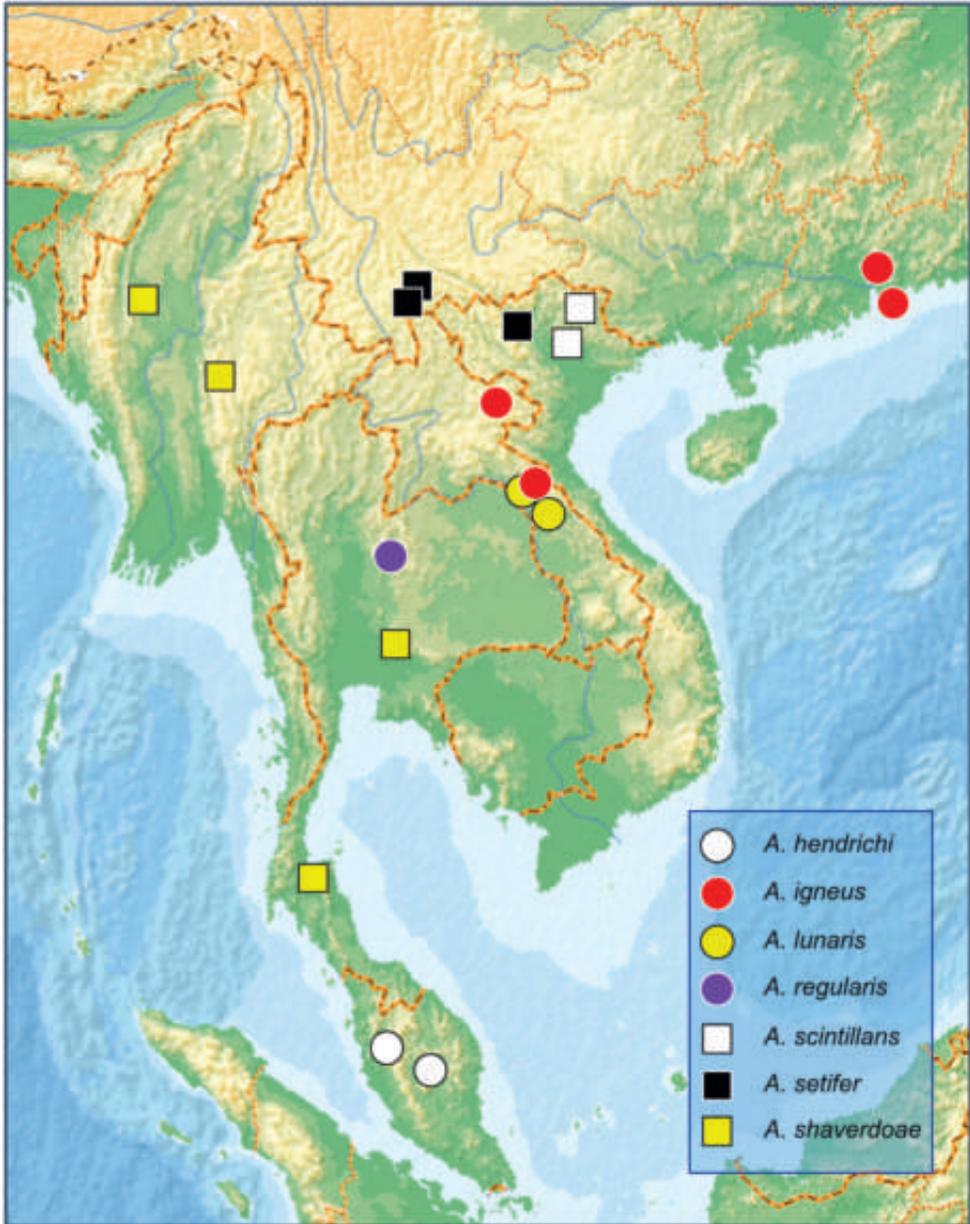


Fig. 267: Distribution of *Agraphydrus hendrichi*, *A. igneus*, *A. lunaris*, *A. regularis*, *A. scintillans*, *A. setifer*, and *A. shaverdoae* in China, Laos, Malaysia, Myanmar, Thailand, and Vietnam.

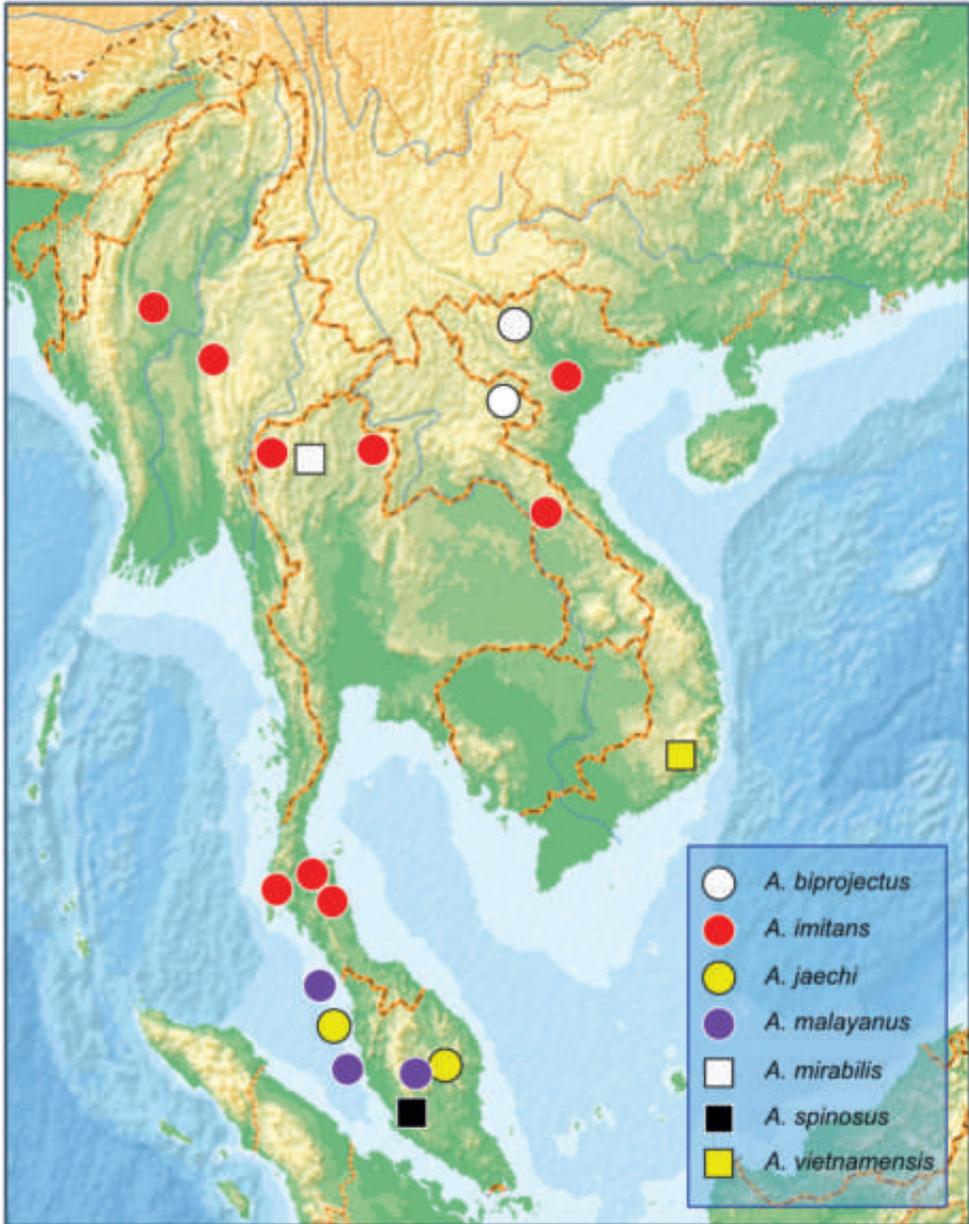


Fig. 268: Distribution of *Agraphydrus biprojectus*, *A. imitans*, *A. jaechi*, *A. malayanus*, *A. mirabilis*, *A. spinosus*, and *A. vietnamensis* in Laos, Malaysia, Myanmar, Thailand, and Vietnam.

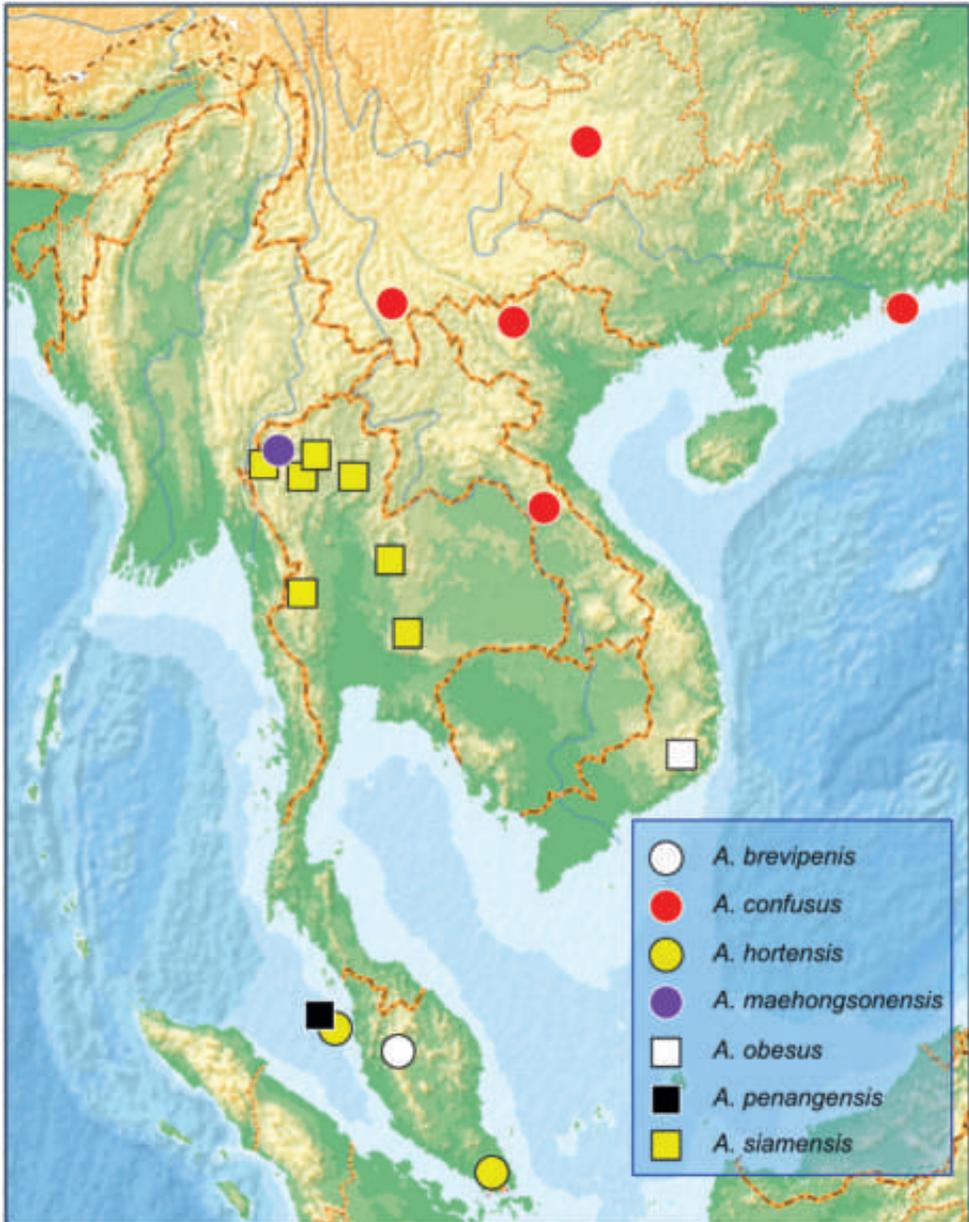


Fig. 269: Distribution of *Agraphydrus brevipennis*, *A. confusus*, *A. hortensis*, *A. maehongsonensis*, *A. obesus*, *A. penangensis*, and *A. siamensis* in China, Laos, Malaysia, Thailand, and Vietnam.

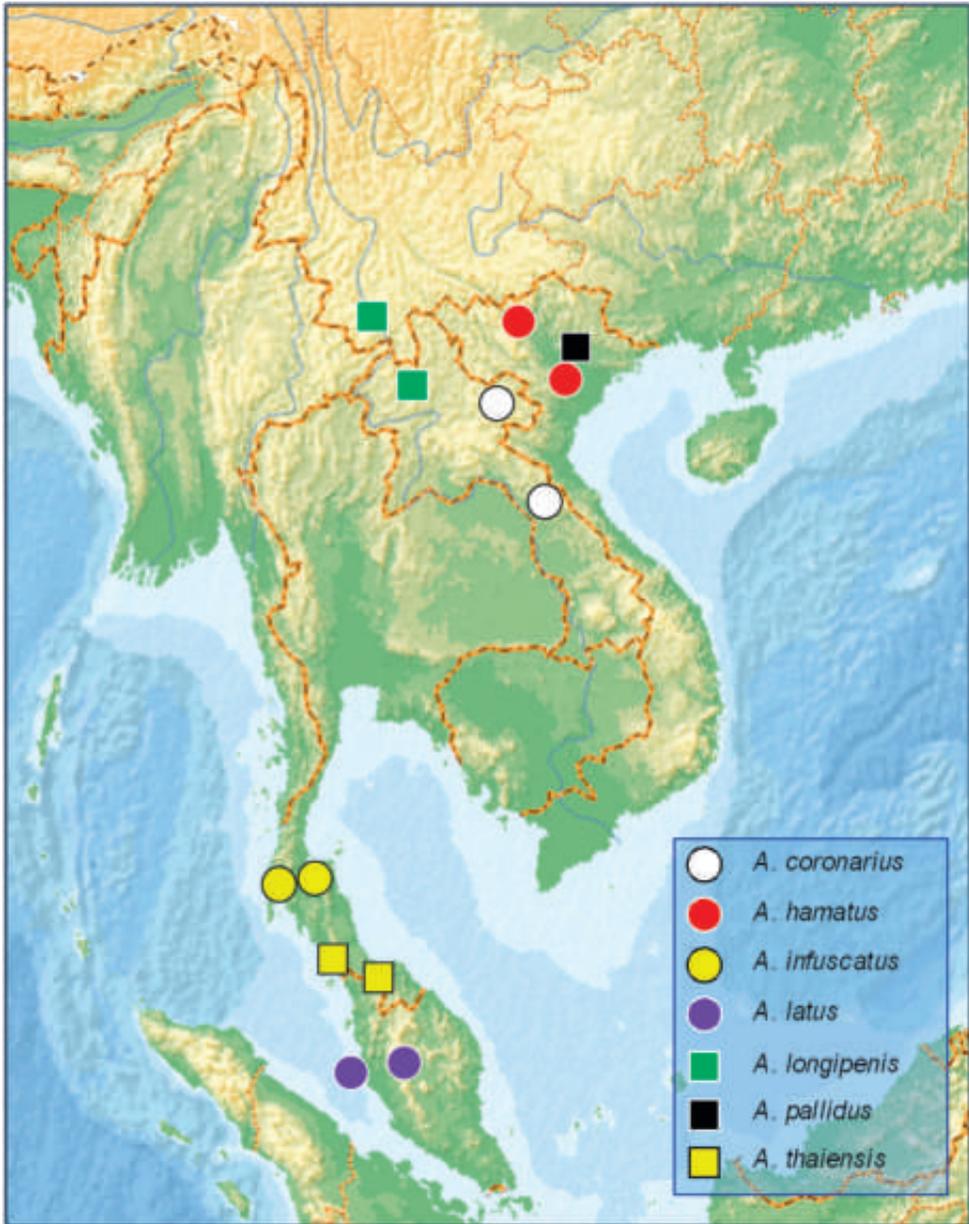


Fig. 270: Distribution of *Agraphydrus coronarius*, *A. hamatus*, *A. infuscatus*, *A. latus*, *A. longipennis*, *A. pallidus*, and *A. thaiensis* in China, Laos, Malaysia, and Vietnam.



Fig. 271: Distribution of *Agraphydrus heterochromatus*, *A. namthaensis*, *A. nemorosus*, *A. spadix*, *A. sucineus*, *A. tamdao*, *A. tristis*, and *A. tulipa* in Laos, Malaysia, Myanmar, Thailand, and Vietnam.

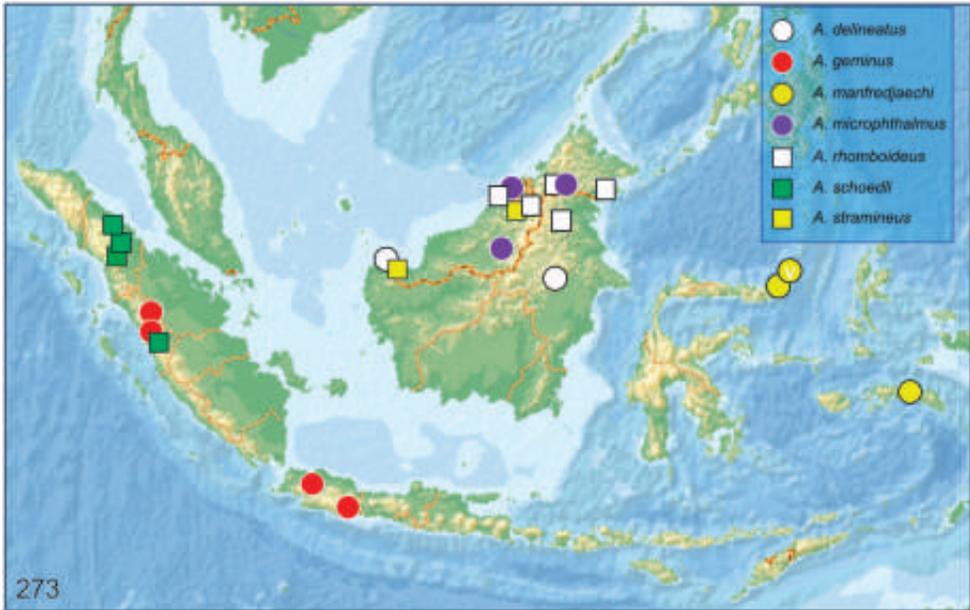


Fig. 272: Distribution of *Agraphydrus borneensis*, *A. carinatus*, *A. engkari*, *A. nigroflavus*, *A. orbicularis*, and *A. raucus* in Indonesia and Malaysia.

Fig. 273: Distribution of *Agraphydrus delineatus*, *A. geminus*, *A. manfredjaechi*, *A. microphthalmus*, *A. rhomboideus*, *A. schoedli*, and *A. stramineus* in Indonesia and Malaysia.

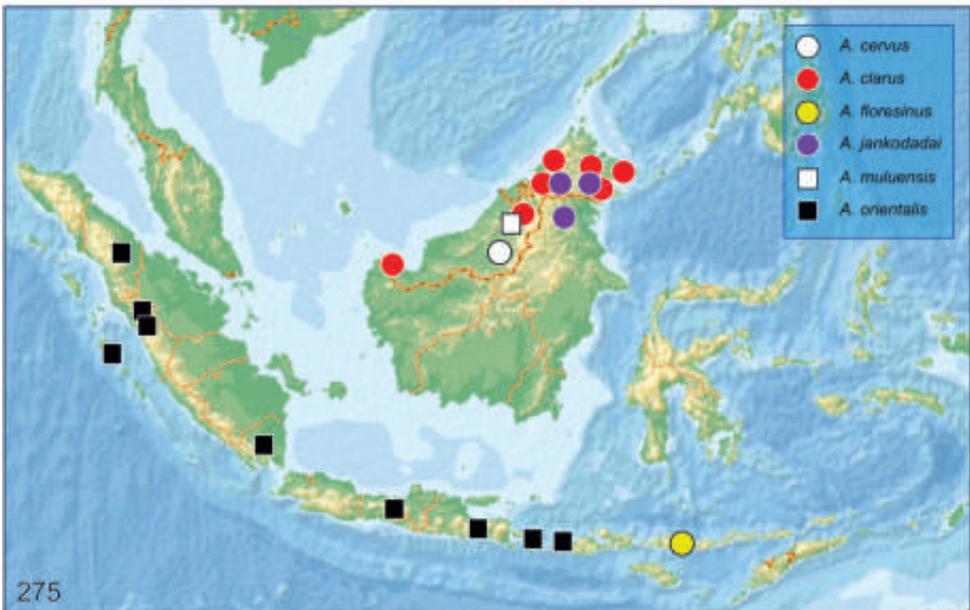
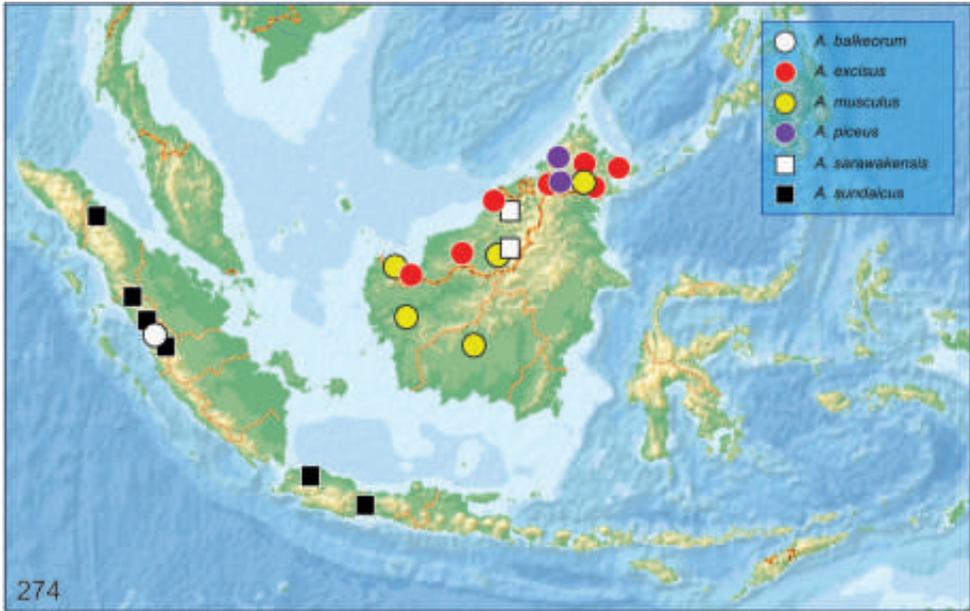


Fig. 274: Distribution of *Agraphydrus balkeorum*, *A. excisus*, *A. musculus*, *A. piceus*, *A. sarawakensis*, and *A. sundaiicus* in Indonesia and Malaysia.

Fig. 275: Distribution of *Agraphydrus cervus*, *A. clarus*, *A. floresinus*, *A. jankodadai*, *A. muluensis*, and *A. orientalis* in Indonesia and Malaysia.

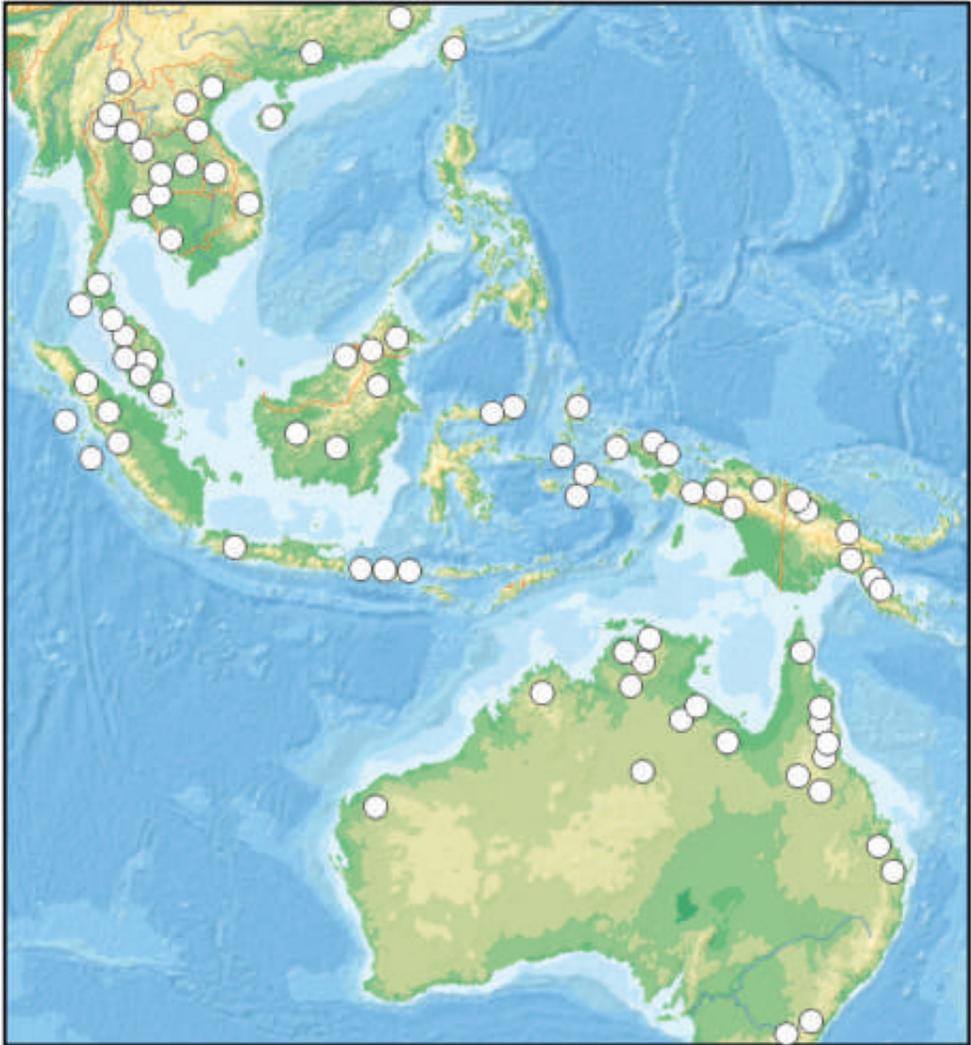


Fig. 276: Distribution of *Agraphydrus coomani* in Australia, China, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Taiwan, Thailand, and Vietnam.



Fig. 277: Distribution of *Agraphydrus bacchusi*, *A. papuanus*, and *A. skalei* in Indonesia (Papua, West Papua) and Papua New Guinea.

Femora (Fig. 139): Pubescence present on proximal 2/3–3/4; hairline slightly oblique on pro-femur, straight on meso- and metafemur.

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

Aedeagus (Fig. 263): Length: 0.54–0.56 mm. Phallobase shorter than parameres, about as long as wide, lateral margins parallel-sided, bending in proximal third to long narrow manubrium; border between pigmented and unpigmented portion of ventral face reaching mid-length. Parameres narrow with almost straight margins; lateral margin with subapical indentation; apex obliquely truncate, basal portion of dorsal face reaching almost mid-length of phallobase. Median lobe narrow at base, slightly widening apicad; apex flatly rounded or slightly indented, almost reaching apex of parameres; corona situated in apical fourth; basal apophyses moderately long, not inclining laterad, narrowly separated, reaching proximal third of phallobase.

ECOLOGY: Sampling circumstances are not reported, but an aquatic habitat can be inferred from the fact that the specimens were collected together with *A. masataikai*.

DISTRIBUTION (Fig. 268): Vietnam.

ETYMOLOGY: The name refers to Vietnam where the specimens were collected.

#### Key to the *Agraphydrus* species of Southeast Asia and the Australian Region

- |   |  |               |
|---|--|---------------|
| 1 | Elytra with 9–10 rows of very coarse punctures .....   | 2             |
| – | Elytra with four rows of distinct or indistinct systematic punctures, rarely obsolete .....  | 5             |
| 2 | Maxillary palpomere 2 slender, evenly enlarging apicad, palpomeres 3 and 4 equally long (Fig. 141); apex of parameres inflated; aedeagus: Fig. 217 ..... | <i>jaechi</i> |

- Maxillary palpomere 2 moderately stout, club-shaped, palpomere 3 longer than palpomere 4 (Figs. 140, 142–143); apex of parameres acuminate ..... 3
- 3 Pronotal systematic punctures irregularly arranged; elytra attenuating posterior to mid-length in dorsal view, evenly convex in lateral view; aedeagus: Fig. 189..... *attenuatus*
- Pronotal systematic punctures regularly arranged as semicircular arc; elytra not attenuating posterior to mid-length in dorsal view, abruptly declining posteriorly in lateral view; aedeagus: Figs. 244, 252..... 4
- 4 Elytral systematic punctures arranged in regular rows (Fig. 52); aedeagus: Fig. 244..... *regularis*
- Elytral systematic punctures subserially arranged (Fig. 59); aedeagus: Fig. 252..... *siamensis*
- 5 All rows of elytral systematic punctures reaching anterior margin ..... 6
- Mesal rows of elytral systematic punctures not reaching anterior margin ..... 8
- 6 Maxillary palpi stout (Fig. 144); basal lobe moderately short, corona situated distal to mid-length of median lobe; aedeagus: Fig. 184..... *activus*
- Maxillary palpi slender (Figs. 153, 155); basal lobe very short, corona in basal position of median lobe (Figs. 225, 260)..... 7
- 7 Parameres with large subapical excision, median lobe slightly shorter than parameres; aedeagus: Fig. 225 ..... *malayanus*
- Parameres with small subapical excision, median lobe distinctly shorter than parameres; aedeagus: Fig. 260 ..... *thaiensis*
- 8 Elytral ground punctures arranged in regular rows (Fig. 60); aedeagus: Fig. 253 ..... *skalei*
- Elytral ground punctures irregularly distributed..... 9
- 9 Maxillary palpomeres 1.5–1.6 times as long as pronotum in median length (Figs. 11, 50), palpomere 4 without apical infuscation; weak clypeal microsculpture present at lateral margin and on antero-lateral corner, absent from anterior margin; parameres with very strong, broad apical extension (Figs. 197, 242)..... 10
- Maxillary palpomeres shorter than 1.5 times the length of pronotum in median length; if palpomeres are 1.5 times as long as pronotum, then palpomere 4 is infuscated apically; clypeal microsculpture present or absent, apex of parameres not hammer-shaped ..... 11
- 10 Elytra light brown with dark sublateral band; body length 2.3–2.4 mm ..... *cervus*
- Elytra dark brown to black, body length 2.6–2.9 mm ..... *piceus*
- 11 Clypeus microsculptured, either on entire surface or on anterior parts of disc, or at anterior margin..... 12
- Clypeus without microsculpture, except on lateral margin and on small area at antero-lateral corner in some species..... 42
- 12 Maxillary palpomere 4 infuscated apically..... 13
- Maxillary palpomere 4 unicolored yellow..... 14
- 13 Clypeus with microsculpture (finely impressed parallel lines) laterally and very narrowly along anterior margin; aedeagus: Fig. 224 ..... *maehongsonensis*
- Clypeus totally or almost totally microreticulate; aedeagus: Fig. 185..... *agilis*
- 14 Clypeus with microreticulation at least on anterior half of disc ..... 15
- Clypeus microreticulate on less than anterior half, or with indistinctly impressed fine parallel lines on narrow rim at anterior margin ..... 30
- 15 Pronotum with weak antero-lateral microsculpture; apex of parameres strongly inflated, manubrium present, basis of parameres not visibly connected with median lobe..... 16
- Pronotum without antero-lateral microsculpture; apex of parameres not strongly inflated; if indistinctly inflated, manubrium absent or base of parameres distinctly connected with median lobe ..... 18

- 16 Clypeus with distinct yellow preocular patches; elytra light brown with dark sublateral and sutural stripe; pronotal and elytral ground punctation very fine; aedeagus Fig. 188..... **arduus**
- Clypeus without preocular patches, unicolored or with undefined yellow lateral margins; elytra unicolored; pronotal and elytral ground punctation fine to moderately coarse ..... 17
- 17 Habitus broad; clypeus, pronotum and elytra dark brown with yellow margins, clypeal ground punctures fine, interspaces wider than punctures, elytra slightly more strongly punctate than pronotum; aedeagus: Fig. 259..... **tamdao**
- Habitus moderately broad; clypeus, pronotum and elytra unicolored ferruginous, clypeus and elytra with equally distributed, moderately coarse ground punctation, interspaces about as wide as punctures; aedeagus: Fig. 214 ..... **igneus**
- 18 Antennae with eight antennomeres..... 19
- Antennae with nine antennomeres..... 22
- 19 Pronotum yellow, pronotal punctures very fine..... 20
- Pronotum dark brown or black, pronotal punctures moderately coarse ..... 21
- 20 Habitus moderately slender (Fig. 46); clypeus light brown to black with yellow preocular patches; eyes larger (Fig. 180); apophyses of median lobe not very widely separated (Fig. 238) ..... **orientalis**
- Habitus broad (Fig. 5); clypeus unicolored yellow; eyes smaller (Fig. 172); apophyses of median lobe very widely separated (Fig. 191)..... **balkeorum**
- 21 Body length 2.0–2.4 mm; metafemoral pubescence present on proximal 2/3–3/4 (Fig. 134); aedeagus: Fig. 258 ..... **sundaicus**
- Body length 1.7 mm; metafemoral pubescence present on less than proximal half (Fig. 122); aedeagus: Fig. 245 ..... **reticulatus**
- 22 Clypeus yellow, with or without narrow mesal infuscation, preocular patches absent; pronotum yellow..... 23
- Clypeus dark brown or black, with or without yellow preocular patches; pronotum dark brown, at least in mesal third..... 26
- 23 Body length 2.8–3.0 mm; maxillary palpi shorter than median pronotal length; pronotal ground punctation fine; elytral systematic punctures distinct, some punctures present in anterior half; aedeagus (Fig. 263); parameres and median lobe slender, parameres with almost straight margins, with subapical indentation ..... **vietnamensis**
- Body length 2.0–2.6 mm; maxillary palpi longer than median pronotal length; pronotal ground punctation very fine to obsolete; elytral systematic punctures indistinct, absent from anterior half; aedeagus (Figs. 211–212, 234); parameres and median lobe wider, parameres with sigmoid margins ..... 24
- 24 Profemur pubescent in slightly more than proximal half (Fig. 111); aedeagus (Fig. 234) with large leaf-shaped lobes arising from basis of median lobe, manubrium absent ..... **nemorosus**
- Profemur pubescent in proximal 2/3 (Figs. 91–92); aedeagus (Figs. 211–212) without leaf-shaped lobes, manubrium present..... 25
- 25 Habitus broad (Fig. 23); pronotum yellow, contrasting to dark brown elytra; parameres without lateral extensions, phallobase slightly longer than parameres (Fig. 212)... **heterochromatus**
- Habitus moderately wide (Fig. 22); pronotum and elytra equally dark yellowish brown; parameres with lateral extensions, phallobase shorter than parameres (Fig. 211)..... **hendrichi**
- 26 Parameres distinctly connected with base of median lobe by a distinct median extension (Fig. 200)..... **connexus**
- Parameres not distinctly connected with base of median lobe by a median band ..... 27
- 27 Elytra unicolored dark brown or black; median lobe very narrow (Figs. 219, 233)..... 28
- Elytra light brown at disc, with dark brown or black sublateral stripe; median lobe not very narrow (Figs. 220, 251) ..... 29

- 28 Apex of parameres wide (Fig. 233)..... *namthaensis*  
 – Apex of parameres narrow (Fig. 219)..... *kathapa*
- 29 Pronotum with dark brown trapezoidal mesal coloration (Fig. 30); pronotal ground punctation moderately fine; body length 2.2–2.5 mm; aedeagus: Fig. 220 ..... *laocaiensis*  
 – Pronotum with dark brown, not trapezoidal mesal infuscation (Fig. 58); pronotal ground punctation very fine to obsolete; body length 1.9–2.0 mm; pronotal ground punctures very fine to obsolete; aedeagus: Fig. 251 ..... *shaverdoae*
- 30 Body length 1.5–1.9 mm; eight antennomeres..... 31  
 – Body length 2.0–2.8 mm; eight or nine antennomeres..... 33
- 31 Elytra unicolored yellow without dark lateral band (Fig. 63); ground punctures fine, distinctly impressed, finer on pronotum than on elytra; eyes very small; body length: 1.5–1.6 mm; aedeagus: Fig. 256 ..... *stramineus*  
 – Elytra with dark brown to black lateral band; pronotal and elytral ground punctures very fine, equally and indistinctly impressed; eyes large or moderately sized; body length: 1.6–1.9 mm; aedeagus: Figs. 205, 232..... 32
- 32 Habitus moderately broad (Fig. 16); clypeus black with distinct yellow preocular patches; eyes large (Fig. 175); body length 1.8–1.9 mm; apex of median lobe with excision (Fig. 205)..... *excisus*  
 – Habitus slender (Fig. 40); clypeus dark yellow or brown with indistinct undefined preocular brighter spots; eyes small (Fig. 178); body length 1.6–1.8 mm; apex of median lobe without excision (Fig. 232)..... *musculus*
- 33 Pronotum with very fine to obsolete ground punctation..... 34  
 – Pronotum with fine or moderately coarse ground punctation..... 35
- 34 Elytra dark brown or black (Fig. 28); parameres with truncate apex and strong subapical constriction (Fig. 218) ..... *jankodadai*  
 – Elytra amber colored (Fig. 64); parameres with bluntly rounded apex and indistinct subapical constriction (Fig. 257) ..... *sucineus*
- 35 Pronotum yellow; clypeus yellow or black with yellow preocular patches..... 36  
 – Pronotum largely dark brown; clypeus dark brown with yellow preocular patches..... 39
- 36 Clypeus black with yellow preocular patches (Fig. 43); eight antennomeres; elytra with lateral darkened band; aedeagus: Fig. 235..... *nigroflavus*  
 – Clypeus yellow; eight or nine antennomeres; elytra without lateral darkened band ..... 37
- 37 Eight antennomeres; habitus slender (Fig. 38); ground punctation fine; median lobe pear-shaped, apex of parameres inclining mesad (Fig. 230)..... *mirabilis*  
 – Nine antennomeres; habitus broad (Figs. 8, 51); ground punctation moderately coarse; median lobe not pear-shaped, apex of parameres not inclining mesad (Figs. 194, 243)..... 38
- 38 Clypeus narrowly and indistinctly microsculptured on anterior margin; eyes large (Fig. 173); maxillary palpi stout (Fig. 147); metafemoral pubescence present on proximal 2/3 (Fig. 77); abdominal ventrite 5 without excision; median lobe short, widening apicad, parameres with lateral extensions (Fig. 194) ..... *brevipenis* (partim)  
 – Clypeus distinctly microsculpture along anterior margin; eyes small (Fig. 182); maxillary palpi slender (Fig. 154); metafemoral pubescence present on proximal 3/4 (Fig. 120); abdominal ventrite 5 with apical excision; median lobe moderately long, narrowing apicad, parameres without lateral extensions (Fig. 243)..... *raucus*
- 39 Eight antennomeres; eyes small (Fig. 168); manubrium of basal lobe wide; parameres not inflated, not widening apicad (Fig. 248)..... *schoedli*  
 – Nine antennomeres; eyes small or large; manubrium of basal lobe narrow, parameres widening apicad or apically inflated (Figs. 207, 249–250) ..... 40
- 40 Body length 2.2 mm; eyes small (Fig. 160); pronotal ground punctation very fine; aedeagus: Fig. 207..... *floresinus*

–	Body length 2.3–2.8 mm; eyes large (Fig. 169–170); pronotal ground punctation moderately fine.....	41
41	Habitus slender, E.I. = 1.5, elytra parallel-sided; apex of parameres with strong setae (Fig. 250).....	<i>setifer</i>
–	Habitus broadly oval; E.I. = 1.3, elytra evenly curving; parameres without strong setae (Fig. 249).....	<i>scintillans</i>
42	Metafemoral pubescence absent or restricted to less than proximal half.....	43
–	Metafemoral pubescence present on more than proximal half.....	46
43	Maxillary palpomere 4 apically infuscated (Fig. 152); nine antennomeres; metafemoral pubescence restricted to very narrow anterior seam (Fig. 95); aedeagus: Fig. 216.....	<i>infuscatus</i>
–	Maxillary palpomere 4 unicolored yellow; eight antennomeres; metafemoral pubescence present at least on basal fifth.....	44
44	Micropunctures present, surrounding ground punctures on head, pronotum and elytra; body length 2.0–2.3 mm; metafemoral pubescence present on basal fifth (Fig. 88); apex of parameres inflated (Fig. 208).....	<i>geminus</i>
–	Micropunctures absent; body length 1.5–2.0 mm; metafemoral pubescence on basal fourth or on slightly less than basal half (Figs. 71, 138); apex of parameres narrowing (Figs. 186, 262).....	45
45	Eyes large (Fig. 171); maxillary palpi slender (Fig. 156); metafemoral pubescence present on slightly less than basal half (Fig. 138); pronotum and elytra dark brown to almost black (Fig. 69); aedeagus: Fig. 262.....	<i>tulipa</i>
–	Eyes small (Fig. 157); maxillary palpi stout (Fig. 145); metafemoral pubescence present on basal fourth (Fig. 71), pronotum and elytra deep black (Fig. 1); aedeagus: Fig. 186....	<i>anacaenoides</i>
46	Maxillary palpomere 4 infuscated apically.....	47
–	Maxillary palpomere 4 without apical infuscation.....	54
47	Eight antennomeres; apex of parameres broadly rounded, indistinctly inclining mesad (Fig. 226).....	<i>manfredjaechi</i>
–	Nine antennomeres; apex of parameres differently shaped: narrowly rounded, acuminate, with lateral extensions, strongly bending mesad, sickle-shaped (Figs. 193, 199, 215, 247).....	48
48	Apex of parameres with lateral projections (Fig. 215).....	<i>imitans</i>
–	Apex of parameres without lateral projections.....	49
49	Apex of parameres strongly bending mesad; aedeagus: Fig. 199.....	<i>confusus</i>
–	Apex of parameres not or indistinctly bending mesad.....	50
50	Parameres sickle-shaped; aedeagus: Fig. 193.....	<i>borneensis</i>
–	Parameres not sickle-shaped.....	51
51	Median lobe longer than parameres (Fig. 247); maxillary palpomeres 1.4–1.5 times as long as pronotum in midline (Fig. 55).....	<i>sarawakensis</i>
–	Median lobe as long as parameres or shorter (Figs. 190, 201, 240); maxillary palpomeres 1.0–1.1 times as long as pronotum in midline (Figs. 4, 48).....	52
52	Apex of parameres broadly and evenly rounded, indistinctly inclining mesad (Fig. 201); elytra unicolored yellow.....	<i>coomani</i>
–	Apex of parameres very narrowly rounded or pointed, not or indistinctly inclining mesad (Figs. 190, 240); elytra dark yellowish brown with infuscations on disc, or black.....	53
53	Parameres not inclining mesad, apex pointed (Fig. 240); habitus (Fig. 48) slender (E.I.: 1.3)....	<i>papuanus</i>
–	Parameres slightly inclining mesad, apex narrowly rounded (Fig. 190); habitus (Fig. 4) moderately slender (E.I.: 1.2).....	<i>bacchusi</i>
54	Body length 1.4–1.8 mm.....	55

–	Body length 1.9–3.0 mm .....	59
55	Body length 1.4–1.6 mm; length ratio palpomeres 4:3 = 1.5; eyes very small (Fig. 165); aedeagus: Fig. 229 .....	<i>microphthalmus</i>
–	Body length 1.6–1.8 mm; length ratio palpomeres 4:3 = 1.2–1.4; eyes small or moderately sized (Figs. 159, 163–164, 166) .....	56
56	Clypeus yellow; eyes small (Figs. 159, 166) .....	57
–	Clypeus black; eyes larger (Figs. 163–164) .....	58
57	Nine antennomeres; mesoventrite not carinate; elytra dark brown to black; parameres with spine-like sublateral process in mid-length, not abruptly narrowing (Fig. 241) .....	<i>penangensis</i> (partim)
–	Eight antennomeres; mesoventrite carinate; elytra yellow; parameres without spine, abruptly narrowing in mid-length (Fig. 196) .....	<i>carinatus</i>
58	Habitus very broad (Fig. 32); pronotum and elytra black; ventrite 5 without apical excision; mesal margin of parameres distinctly excised in apical half, corona in basal position (Fig. 223) .....	<i>lunaris</i>
–	Habitus less broad (Fig. 36); pronotum and elytra rufous to dark brown; ventrite 5 with apical excision; parameres not excised, corona in mid-length of median lobe (Fig. 228) .....	<i>mazzoldii</i>
59	Elytra with large rhombiform, dark brown patch (Fig. 54); mesoventrite carinate; anterior clypeal margin with minute mesal notch (Fig. 167); aedeagus: Fig. 246 .....	<i>rhomboideus</i>
–	Elytra without rhombiform patch; mesoventrite with or without carina; anterior clypeal margin evenly or angularly excised, notch present or absent .....	60
60	Femora almost entirely pubescent (Fig. 72); anterior margin of clypeus angularly excised (Fig. 158); aedeagus: Fig. 187 .....	<i>angulatus</i>
–	Femora pubescent in proximal 2/3 or 3/4; clypeus with evenly curved excision .....	61
61	Clypeus dark brown or black, at least in mesal half .....	62
–	Clypeus yellow, with or without indistinct narrow mesal infuscation .....	74
62	Mesoventrite carinate .....	63
–	Mesoventrite without median carina .....	64
63	Anterior margin of clypeus with mesal notch, pronotum and elytra black; parameres wide (Fig. 261) .....	<i>tristis</i>
–	Anterior margin of clypeus without notch; pronotum and elytra yellow; parameres slender (Fig. 206) .....	<i>exiguus</i>
64	Ventrite 5 without apical excision .....	65
–	Ventrite 5 with apical excision .....	68
65	Body length less than 2.0 mm; eyes small (Fig. 166); parameres with thorn-like process in mid-length (Fig. 241) .....	<i>penangensis</i> (partim)
–	Body length more than 2.0 mm; eyes large; parameres without thorn-like process in mid-length .....	66
66	Femoral pubescence on less than proximal 2/3 (Fig. 131); parameres with spine-like apical extension (Fig. 255) .....	<i>spinus</i>
–	Femoral pubescence on proximal 2/3–3/4 (Fig. 113); parameres without spine-like apical extension (Figs. 227, 236) .....	67
67	Pronotum and elytra black; aedeagus 1.5 times as long as wide, parameres wide apically (Fig. 236) .....	<i>obesus</i>
–	Pronotum and elytra brown; aedeagus twice as long as wide, parameres narrow apically (Fig. 227) .....	<i>masatakai</i> (partim)

68	Eight antennomeres; mesal margin of parameres abruptly narrowing in mid-length (Figs. 195, 222).....	69
–	Nine antennomeres; mesal margin of parameres not abruptly narrowing in mid-length.....	70
69	Maxillary palpi stout; mesoventrite with low horizontal ridge; median lobe moderately wide, not reaching apex of parameres (Fig. 195).....	<i>burnsensis</i>
–	Maxillary palpi slender; mesoventrite without horizontal ridge; median lobe very narrow, almost reaching apex of parameres (Fig. 222).....	<i>longipenis</i>
70	Body length 1.9–2.1 mm; parameres with large subapical incision (Fig. 210).....	<i>helicopter</i>
–	Body length 2.2–3.0 mm; parameres without large subapical incision (Figs. 192, 202, 221, 227).....	71
71	Habitus very broad (Fig. 31); parameres widest subapically, corona situated in basal fourth (Fig. 221).....	<i>latus</i>
–	Habitus moderately broad (Figs. 6, 13); parameres narrowing apicad, corona situated in mid-length or subapically (Figs. 192, 202, 227).....	72
72	Elytral systematic punctures indistinct; parameres with broad subapical projection (Fig. 227).....	<i>masatakai</i> (partim)
–	Elytral systematic punctures distinct (Figs. 6, 13); parameres with broad subapical projection or with hook-like projection apically (Figs. 192, 202).....	73
73	Maxillary palpi moderately slender (Fig. 149); parameres without subapical projection; corona in mid-length of median lobe (Fig. 202).....	<i>coronarius</i>
–	Maxillary palpi stout (Fig. 146); parameres with subapical projection; corona in subapical position (Fig. 192).....	<i>biprojectus</i>
74	Pronotal ground punctation obsolete.....	75
–	Pronotal ground punctation fine.....	76
75	Body length 2.1–2.5 mm; elytral systematic punctures obsolete (Fig. 15); maxillary palpi moderately slender (Fig. 150); basal lobe longer than parameres, median lobe without apical notch (Fig. 204).....	<i>engkari</i>
–	Body length 2.4–2.7 mm; elytral systematic punctures distinct (Fig. 12); maxillary palpi slender (Fig. 148); parameres longer than basal lobe, median lobe with apical notch (Fig. 198).....	<i>clarus</i>
76	Mesoventrite carinate; eight antennomeres.....	77
–	Mesoventrite without median carina; eight or nine antennomeres.....	78
77	Abdominal ventrite 5 without apical incision; apex of parameres pointed, corona in subapical position (Fig. 203).....	<i>delineatus</i>
–	Abdominal ventrite 5 with apical incision; apex of parameres rounded, corona distal to mid-length (Fig. 213).....	<i>hortensis</i>
78	Eight antennomeres.....	<i>pallidus</i>
–	Nine antennomeres.....	79
79	Median lobe very short, widening apicad.....	<i>brevipenis</i> (partim)
–	Median lobe not very short, not widening apicad.....	80
80	Parameres evenly narrowing to apex, without excision or extension (Fig. 231).....	<i>muluensis</i>
–	Parameres widening to apex, or with subapical excision and apical extension (Figs. 209, 237, 254).....	81
81	Parameres widening apicad to broadly rounded apex (Fig. 237).....	<i>orbicularis</i>
–	Parameres not widening apicad, apex not broadly rounded (Figs. 209, 254).....	82
82	Basal lobe shorter than parameres, apex of median lobe indented, basal apophyses not very long (Fig. 209).....	<i>hamatus</i>

- Basal lobe longer than parameres, apex of median lobe not indented, basal apophyses very long (Fig. 254) ..... *spadix*

### Discussion

The record of *Agraphydrus anhuianus* from Thailand by MINOSHIMA, KOMAREK & ÔHARA (2015) is based on two males, which actually belong to *A. activus* (see above). Therefore, *A. anhuianus* is here excluded from the fauna of Southeast Asia.

Eighty described species of *Agraphydrus* are now known from Southeast Asia and the Australian Region: Australia (1 sp.), Brunei (2 spp.), Indonesia (17 spp.), Laos (15 spp.), Malaysia (31 spp.), Myanmar (8 spp.), Papua New Guinea (3 spp.), Thailand (17 spp.), Vietnam (16 spp.). No species are known from Cambodia, East Timor, and Singapore. Eleven species occur also in China (KOMAREK & HEBAUER 2018). *Agraphydrus* is by far the most speciose hydrophilid genus in Southeast Asia.

*Agraphydrus coomani* is very widespread in the Oriental and Australian regions, found in all nine countries listed above and in Sri Lanka, China and Taiwan. Sixty-six species are represented in only one of the countries, nine species in two, *A. rhomboideus* in three, *A. imitans* in four countries. *Agraphydrus connexus* and *A. masatakai* are each found in five Southeast Asian countries and are also known from China, *A. connexus* moreover from the Indian Subcontinent (KOMAREK 2018).

The highest diversity of *Agraphydrus* species is found in the southern part of the Malay Peninsula and on Borneo. In Laos, Myanmar, northern Thailand (south to Phetchabun Prov.), and Vietnam altogether 36 species are known; in the Malay Peninsula, including South Thailand (provinces of Phuket, Songkhla, Phang Nga, and Surat Thani), and the small islands of Langkawi, Pangkor, and Penang: 24 spp.; Borneo: 18 spp.; remaining Greater Sunda Islands (Sumatra, Java, Sulawesi): 8 spp.; Lesser Sunda Islands (Bali, Lombok, Sumbawa, Flores): 3 spp.; Moluccas (Ambon, Bacan, Halmahera, Seram): 2 spp.; New Guinea: 3 spp.; Waigeo: 2 spp.; Australia: 1 sp.

In most sampling localities only one or two species of *Agraphydrus* were collected, the maximum number found in the same locality, a small stream (left tributary of Balleh River) near a small wooden house in the forest (“Rumah Kabau”), ca. 25 km east of Kapit (Sarawak, Malaysia) was six. This small stream (coordinates not exactly known: approximately 2°01'10"N 113°10'20"E) is the type locality of five species of *Agraphydrus*; and all six species collected there are new to science and described herein.

Regarding the immensely large territory, the intensity of water beetle collecting in Southeast Asia is rather low. For instance, only very few of the thousands of islands are well explored. It is safe to say that the real diversity in the region is much higher than what is known today.

Although the collecting circumstances are unknown for six species, all species are likely aquatic. At least some species were collected in hygropetric habitats, 15 species were found at light.

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Dr. Albrecht KOMAREK

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