

A taxonomic review of the Oriental *Laccophilus javanicus* species group (Coleoptera: Dytiscidae)

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Abstract. The *Laccophilus javanicus* species group in Southeast Asia is reviewed. Eight new species are described: *Laccophilus hendrichi*, new species (Laos, Myanmar, Thailand), *L. jaechi*, new species (Cambodia, Thailand), *L. kalimantanensis*, new species (Indonesia: Kalimantan), *L. komareki*, new species (China: Guangdong, Guangxi), *L. mazzoldii*, new species (Laos, Thailand), *L. nusatenggaraensis*, new species (Indonesia: Flores, Sumbawa, Sumba, Timor), *L. schillhammeri*, new species (Myanmar), and *L. stastnyi*, new species (Malaysia: Sarawak). Habitus and male genitalia are illustrated for all group members, and a key to species is provided. In addition, new records are presented for all previously known species of the group.

Key words. Coleoptera, Dytiscidae, *Laccophilus*, new species, new records, Oriental region

INTRODUCTION

The genus *Laccophilus* Leach, 1815, with 263 species worldwide, is the biggest genus of the subfamily Laccophilinae (Nilsson, 2014). The subfamily is characterised by the presence of pentamerous tarsi, and a concealed scutellum; *Laccophilus* differs from other genera of the subfamily mainly in the presence of a bifid longer spur of the metatibia (cf. Pederzani, 1995). *Laccophilus* occur in all zoogeographic regions, but prevail in tropical areas. For better orientation within the genus and easier identification, informal species groups were established to include most taxa. There are comprehensive revisions for the Palaearctic, Oriental and Australian taxa (Brancucci, 1983), the Afrotropical taxa (Guignot, 1959; Biström, in prep.) and the Nearctic species (Zimmerman, 1970). There is still no revision of the Neotropical fauna. For more information about all taxa, see the World catalogue (Nilsson, 2014).

Although the species associated with stagnant water can be quite widespread, and in extreme cases may occur in several zoogeographical regions (e.g., *Laccophilus sharpi* Régimbart, 1889 occurring from the Arabian Peninsula, through tropical Asia to Australia), some species are associated with running water, and their area of distribution is limited, sometimes even to a single island, river basin or mountain range. That is the case with the *Laccophilus javanicus* species group – a small, well defined group of Oriental species occurring from India and southern China, through continental Southeast Asia

to the Sunda Islands. Study of extensive material from recent collecting efforts in forest streams of tropical Asia revealed eight new species and numerous new records of already known taxa of the group, which we present in this paper.

MATERIAL AND METHODS

We have studied the type material of all described species as well as extensive material published by Brancucci (1983). However, in the present paper, we mention only additional, unpublished data, supplemented by drawings of habitus and male genitalia, and general distribution for already known species. As the beetles are quite uniform, the diagnosis of new taxa is usually based on a combination of colour pattern, sculpture of the elytra and most importantly, the shape of the median lobe of the aedeagus. Specimen were examined using an Olympus SZX16 stereomicroscope, measurements were taken with an ocular graticule. The terminology to denote the orientation of the genitalia follows Miller & Nilsson (2003).

Exact label data are cited for the type specimens. A forward slash (/) separates different lines and a double slash (//) different labels of data. Authors' remarks are placed in square brackets. Holotypes of newly described species are provided with one red label with printed text:

“HOLOTYPE / *LACCOPHILUS* / “name of the species” sp. nov. / J.Hájek & M.Brancucci det. 2012”. Each paratype is provided with a red label similar to that of the holotype, except “PARATYPE” instead of “HOLOTYPE”.

The material studied is deposited in the following institutional and private collections: BMNH – Natural History Museum [formerly British Museum (Natural History)], London, Great Britain (Christine Taylor); CASS – Chinese Academy of Sciences, Institute of Applied Ecology, Shenyang, China (Lhanzu Ji); EUMJ – Ehime University Museum, Matsuyama,

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Japan (Hiroyuki Yoshitomi); GWCV – Günther Wewalka collection, Vienna, Austria; IRSNB – Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (Jerome Constant); JSCL – Jaroslav Štátný collection, Liberec, Czech Republic; LHCM – Lars Hendrich collection, Munich, Germany (property of NHMW); MZBC – LIPI Division of Zoology, Museum Zoologicum Bogoriense, Cibinong, Indonesia (Hari Sutrisno); NBCL – Naturalis Biodiversity Center, Leiden, The Netherlands [former Nationaal Natuurhistorische Museum (“Naturalis”) (Fred van Assen) and Zoologisch Museum Amsterdam, (Ben Brugge)]; NHMB – Naturhistorisches Museum Basel, Switzerland (Matthias Borer); NMPC – Národní Muzeum, Praha, Czech Republic (Jiří Hájek); NHMW – Naturhistorisches Museum Wien, Austria (Manfred A. Jäch); PMCB – Paolo Mazzoldi collection, Brescia, Italy; SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany (Wolfgang Schawaller); ZSMG – Zoologischen Staatssammlung München, Germany (Michael Balke).

TAXONOMY

The *Laccophilus javanicus* species group was erected by Guignot (1959) for a single African species *L. flavopictus* Régimbart, 1889. Although Guignot was apparently aware of Oriental species, he never listed them. Consequently, the group was adopted and modified by Brancucci (1983), who defined this species group as follows: Surface of pronotum and elytra with simple reticulation, composed entirely of large polygonal meshes. Very large species (body length 3.4–5.1 mm), of very broad and depressed shape. Elytra brown to black, with pale bands and other markings. Another characteristic of the group is: Prosternal apophysis relatively short and lanceolate; posterior margin of apical ventrite rounded in both sexes.

Brancucci (1983) assigned nine Oriental species distributed from India, through continental Southeast Asia, east to the Sunda Islands, to the *L. javanicus*-group. More recently, Balke et al. (1998) described a tenth species from Kalimantan. In the present work, we adopt the concept of the group from Brancucci (1983) and consider it to be exclusively Oriental; Afrotropical *Laccophilus flavopictus* is removed from the *L. javanicus* group, as it does not seem to be closely related to Oriental species (O. Biström, pers. comm.).

At present, the *Laccophilus javanicus* species group comprises 18 species:

- Laccophilus aurofasciatus* Vazirani, 1972 – India (Kerala, Tamil Nadu)
Laccophilus auropictus Régimbart, 1899 – India (Karnataka, Tamil Nadu), Myanmar (Tenasserim)
Laccophilus ceylonicus Zimmermann, 1919 – India (Maharashtra, Orissa), Sri Lanka
Laccophilus elegans Sharp, 1882 – India (Andaman and Nicobar Islands, Andhra Pradesh, Karnataka, Kerala, Nagaland, Orissa, West Bengal)
Laccophilus girardi Brancucci, 1983 – Malaysia (Sabah)
Laccophilus hendrichi, new species – Myanmar, Thailand, Laos
Laccophilus jaechi, new species – Cambodia, Thailand

- Laccophilus javanicus* Régimbart, 1899 – Indonesia (Java, Bali, Lombok)
Laccophilus kalimantanensis, new species – Indonesia (Kalimantan)
Laccophilus komareki, new species – China (Guangdong, Guangxi)
Laccophilus mahakamensis Balke, Mazzoldi & Hendrich, 1998 – Thailand, Malaysia (Sarawak), Indonesia (Kalimantan)
Laccophilus mazzoldii, new species – Laos, Thailand
Laccophilus nusatenggaraensis, new species – Indonesia (Flores, Sumba, Sumbawa, Timor)
Laccophilus schillhammeri, new species – Myanmar
Laccophilus stastnyi, new species – Malaysia (Sarawak)
Laccophilus tobaensis Brancucci, 1983 – Indonesia (Sumatra)
Laccophilus tonkinensis Brancucci, 1983 – China (Hainan), Laos, Vietnam
Laccophilus wittmeri Brancucci, 1983 – China (Yunnan), Myanmar, Thailand, Laos, Vietnam

A key to species of the *Laccophilus javanicus* group (males only)

1. Smaller species (body length 3.5–4.5 mm), elongate oval (Figs. 3–8, 10, 12–16) 2
 - Large species (body length 4.5–5.0 mm), broadly oval (Figs. 1, 2, 9, 11, 17) 14
2. Small species (body length 3.4–3.8 mm); Borneo (*L. mahakamensis* also known from southern Thailand) 3
 - Medium sized species (body length 3.8–4.5 mm); so far unknown from Borneo 6
3. Subbasal testaceous band very broad, covering at least basal third of elytra; or elytra almost uniformly testaceous (Fig. 5) 4
 - Subbasal testaceous band sinuous, narrower, usually well separated from elytral base (Figs. 10, 14) 5
4. Apical part of median lobe in lateral view almost straight, narrowing to apex which is bent dorsally (Fig. 22); body length 3.5–3.7 mm; Sabah *L. girardi*
 - Apical part of median lobe in lateral view almost regularly curved to apex (Fig. 26); body length 3.6–3.8 mm; Kalimantan *L. kalimantanensis*, new species
5. Apical part of median lobe in lateral view distinctly sinuous with elongate pointed tip (Fig. 28); body length 3.4–3.7 mm; Sarawak, Kalimantan; southern Thailand *L. mahakamensis*
 - Apical part of median lobe in lateral view less sinuous with shortly pointed tip (Fig. 32); body length 3.5–3.6 mm; Sarawak: Bako NP *L. stastnyi*, new species
6. Apical part of median lobe in lateral view with distinct bulge on dorsal side (cf. Figs. 20, 21, 30, 34) 7
 - Apical part of median lobe in lateral view with dorsal side almost straight or very slightly curved (cf. Figs. 23–25, 30, 33) 10
7. Subbasal testaceous band sinuous, narrow, well separated from elytral base (Figs. 3, 13) 8
 - Subbasal testaceous band broad, more or less connected with elytral base (Figs. 4, 16) 9
8. Apical part of median lobe narrow with pointed tip (Fig. 20); body length 3.8–4.1 mm; Sri Lanka, India *L. ceylonicus*
 - Apical part of median lobe broad with blunt tip (Fig. 31); body length 3.8–4.3 mm; Myanmar *L. schillhammeri*, new species
9. Apex of median lobe short, blunt (Fig. 21); body length 3.8–4.0 mm; Andaman and Nicobar Islands, India *L. elegans*
 - Apex of median lobe elongate with pointed tip (Fig. 34); body length 3.8–4.1 mm; China (Hainan), Laos, Vietnam *L. tonkinensis*
10. Broadly oval species; elytral subbasal testaceous band divided longitudinally into separate spots (Fig. 15); apical part of median

- lobe shorter, almost subparallel (Fig. 33); body length 4.4–4.5 mm; Sumatra *L. tobaensis*
- Elongate oval species; elytral subbasal testaceous band complete; apical part of median lobe longer 11
11. Anterior margin of elytral subbasal testaceous band almost rectilinear (Fig. 8); body length 4.0–4.4 mm; Java, Bali, Lombok *L. javanicus*
- Anterior margin of elytral subbasal testaceous band sinuous (Fig. 6), or band very broad connected with elytral base (Figs. 7, 12) 12
12. Ground colour of elytra usually pale brown, thus testaceous pattern not well recognisable (Fig. 12), if elytra dark, then subbasal testaceous band very broad but well separated from elytral base; body length 4.0–4.5 mm; Flores, Sumba, Sumbawa, Timor *L. nusatenggaraensis*, new species
- Elytra dark, subbasal testaceous band differently shaped; continental SE Asia 13
13. Subbasal testaceous band sinuous, narrow, well separated from elytral base (Fig. 6); apex of median lobe nearly straight (Fig. 23); body length 3.8–4.4 mm; Laos, Myanmar, Thailand *L. hendrichi*, new species
- Subbasal testaceous band broad, more or less connected with elytral base (Fig. 7); apex of median lobe bent (Fig. 24); body length 4.1–4.4 mm; SW Cambodia, SE Thailand *L. jaechi*, new species
14. Reticulation of elytra composed of well impressed comparatively smaller sized meshes; apical part of median lobe in lateral view slightly curved on dorsal side, apex blunt (Fig. 29); body length 4.6–4.7 mm; C Laos, E Thailand ... *L. mazzoldii*, new species
- Reticulation of elytra composed of shallowly impressed very large meshes; apex of median lobe acute (Figs. 18, 19, 27, 35) 15
15. Elytra without mediolateral spot (Figs. 1, 2); apical part of median lobe in lateral view with distinct bulge on dorsal side (Figs. 18, 19); S India 16
- Elytra either with mediolateral spot (Fig. 17), or ground colour of elytra pale (Fig. 9); apical part of median lobe in lateral view with dorsal side almost straight (Figs. 27, 35); continental SE Asia 17
16. Subbasal testaceous band broad, straight, not separated from elytral base (Fig. 1); body length 4.6–4.9 mm; S India *L. aurofasciatus*
- Subbasal testaceous band narrow, sinuous, well separated from elytral base (Fig. 2); body length 4.5–4.7 mm; S India *L. auropictus*
17. Ground colour of elytra pale, testaceous pattern bordered with narrow black rim (Fig. 9); apical part of median lobe relatively longer, with dorsal side almost straight, and long pointed apex (Fig. 27); body length 4.5–4.9 mm; China (Guangdong, Guangxi) *L. komareki*, new species
- Ground colour of elytra dark, brown-blackish (Fig. 17); apical part of median lobe relatively shorter, with dorsal side lightly curved, and short and hooked apex (Fig. 35); body length 4.5–5.1 mm China (Yunnan), Laos, Myanmar, Thailand, Vietnam *L. wittmeri*

***Laccophilus aurofasciatus* Vazirani, 1972**

(Figs. 1, 18)

Laccophilus aurofasciatus Vazirani, 1972: 118 (original description); Brancucci, 1983: 261 (description, new records).

Type locality. India, Tamil Nadu, Ootacamund District, Ootacamund.

Material examined. 93 specimens. **INDIA: Tamil Nadu:** 24 ex., Nilgiri Hills, Road Ootacamund – Masnigudi, 1450 m, 27 December 1994, coll. P. Mazzoldi (PMCB); 4 ex., Road Palni – Kodaikanal, 800–900 m, stream, 30 December 1994, coll. P. Mazzoldi (PMCB); 10 ex., Kodaikanal, 1250 m, stream, 31 December 1994, coll. P. Mazzoldi (PMCB); 1 female, Road Salem – Yercaud, 12 km from Yercaud, 800–900 m, 4 January 1995, coll. P. Mazzoldi (PMCB); 2 females, Palani Hills, Kodaikanal env., Vellagavi, 10.11N, 77.29E, 900 m, 13 January 1999, coll. D. Boukal (NMPC, NHMW); 2 males 1 female, Nilgiris, 15 km SE Kotagiri, Kunchappanai, 11.22N 76.56E, 900 m, 7–22 May 2000, coll. J. Rolčík (NMPC); 49 ex., same label data, but coll. D. Hauck (NHMB, NMPC).

Diagnosis. Large, broadly oval species (body length 4.6–4.9 mm). Elytra with subbasal testaceous band broad, straight, not separated from elytral base; elytra without mediolateral spot (Fig. 1). Apical part of median lobe in lateral view with distinct bulge on dorsal side (Fig. 18).

Distribution. A species endemic to southern India (Kerala and Tamil Nadu) (Fig. 40).

***Laccophilus auropictus* Régimbart, 1899**

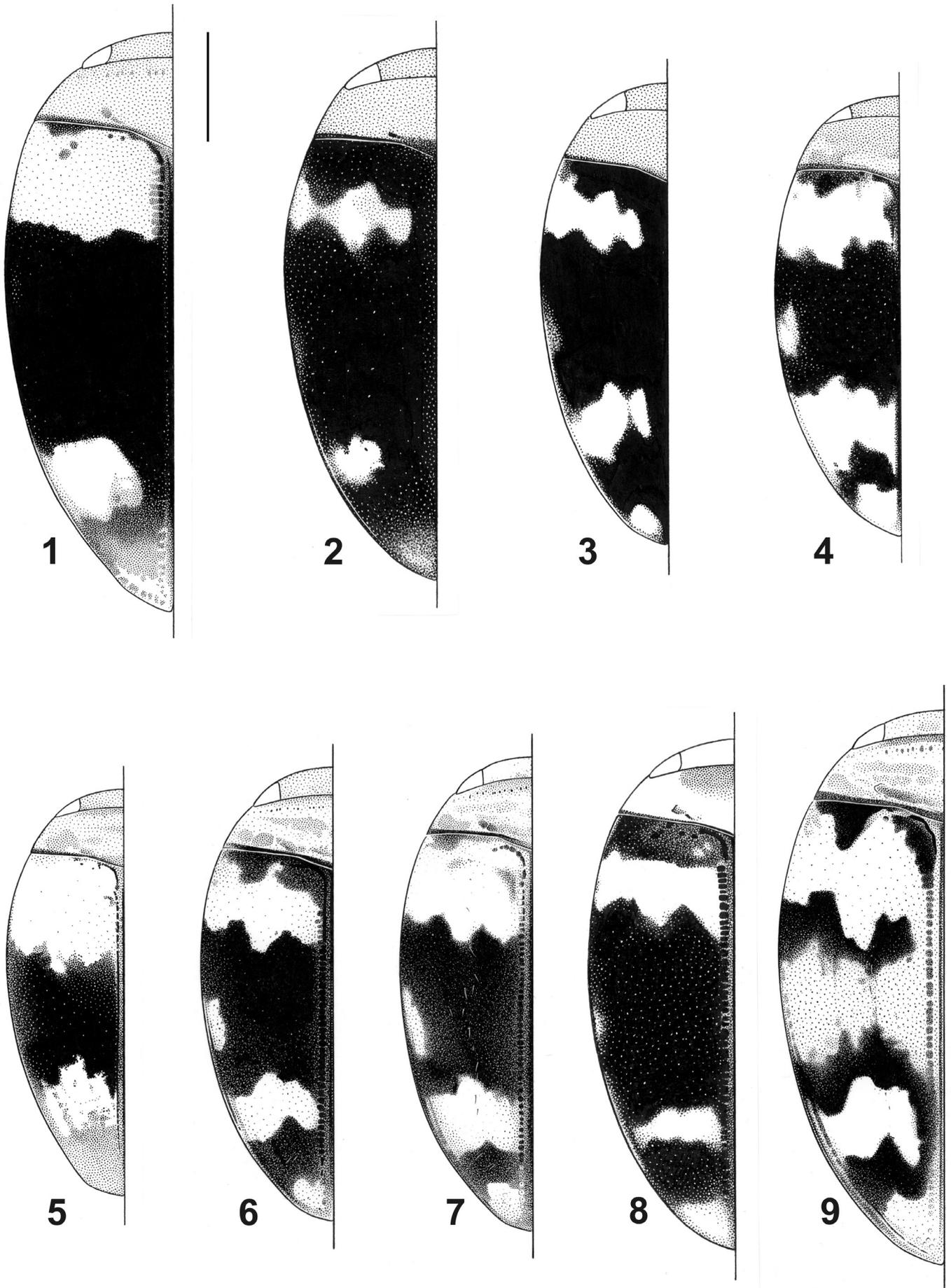
(Figs. 2, 19)

Laccophilus auropictus Régimbart, 1899: 253 (original description); Vazirani, 1969: 241 (description, new records); 1972: 120 (lectotype designation); Brancucci, 1983: 259 (description, new records).

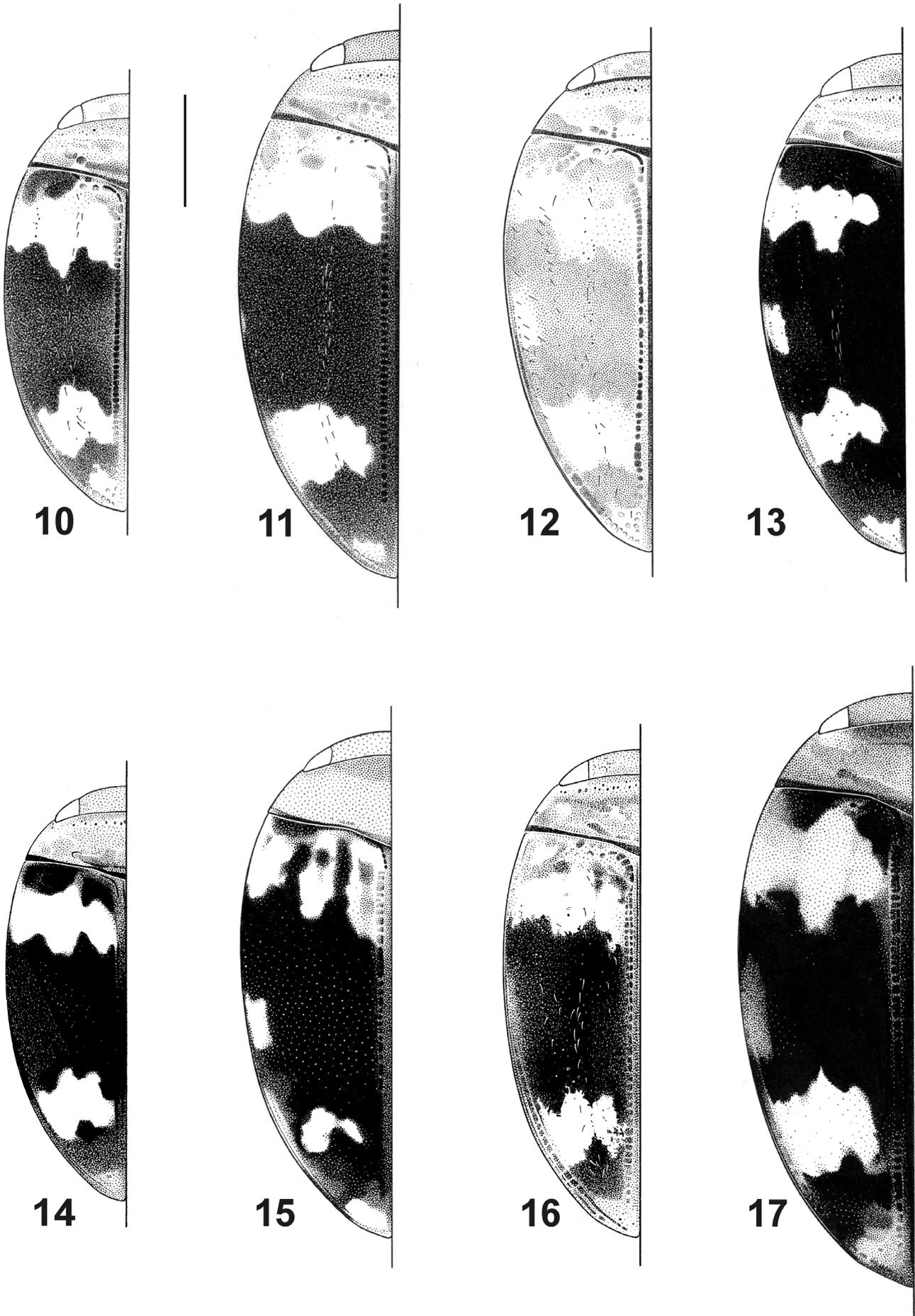
Type locality. Indes orientales: mont Kodeikanel, aux environs de Madras [= India, Tamil Nadu State, Kodaikanal].

Material examined. 229 specimens. **INDIA: Tamil Nadu:** 1 ex., Madura: Shembaganur, coll. R. de Buck (IRSNB); 2 males 1 female, Maruthamalai, 23 October 1913, 1600 ft (ZSMG); 2 ex., Shembaganur, 1929–30, coll. R.P. Manuel (IRSNB); 30 exs., Salem Dt., Shevaroy Hills, 3000–4000 ft, September 1934, coll. P.S. Nathan (IRSNB); 2 exs., Coimbatore, January 1938, coll. P.S. Nathan (IRSNB); 13 ex., Anamalai Hills, Cinchona, 3500 ft, May 1968, coll. P.S. Nathan (NBCL); 2 ex., Nilgiri Hills, Road Ootacamund – Masnigudi, 1450 m, 27 December 1994, coll. P. Mazzoldi (PMCB); 51 ex., Road Palni – Kodaikanal, 800–900 m, stream, 30 December 1994, coll. P. Mazzoldi (PMCB); 102 ex., Road Salem – Yercaud, 12 km from Yercaud, 800–900 m, 4 January 1995, coll. P. Mazzoldi (PMCB); 3 ex., Palani Hills, Poolathur Jn, Kodaikanal – Batlagundu rd., 10°14'N 77°39'E, ca. 900 m, 15 January 1999, coll. D. Boukal (NHMW); 6 ex., Shevaroy Hills, Yercaud, Kiliur Falls env., 11°47'N 78°12'E, 1400 m, 25 January 1999, coll. D. Boukal (NHMW); 2 males 2 females, Nilgiris, 15 km SE Kotagiri, Kunchappanai, 11.22N 76.56E, 900 m, 7–22 May 2000, coll. J. Rolčík (NMPC); 10 ex., same label data, but coll. D. Hauck (NHMB, NMPC).

Diagnosis. Large, broadly oval species (body length 4.5–4.7 mm). Elytra with subbasal testaceous band narrow, sinuous,



Figs. 1–9. Habitus of *Laccophilus*: 1, *L. aurofasciatus*; 2, *L. auropictus*; 3, *L. ceylonicus*; 4, *L. elegans*; 5, *L. girardi*; 6, *L. hendrichi*, new species; 7, *L. jaechi*, new species; 8, *L. javanicus*; 9, *L. komareki*, new species. Scale bar = 1 mm.



Figs. 10–17. Habitus of *Laccophilus*: 10, *L. mahakamensis*; 11, *L. mazzoldii*, new species; 12, *L. nusatenggaraensis*, new species; 13, *L. schillhammeri*, new species; 14, *L. stastnyi*, new species; 15, *L. tobaensis*; 16, *L. tonkinensis*; 17, *L. wittmeri*. Scale bar = 1 mm.

well separated from elytral base; elytra without mediolateral spot (Fig. 2). Apical part of median lobe in lateral view with distinct bulge on dorsal side (Fig. 19).

Distribution. A species occurring in southern India (Karnataka and Tamil Nadu states) (Fig. 41), the single record from southern Myanmar (Guignot, 1954) most probably belongs to another species, e.g., *Laccophilus hendrichi*.

***Laccophilus ceylonicus* Zimmermann, 1919**

(Figs. 3, 20)

Laccophilus horni Régimbart, 1902: 468 (original description); preoccupied by Branden, 1885: 21.

Laccophilus ceylonicus Zimmermann, 1919: 123 (replacement name); Vazirani, 1972: 119: (lectotype designation); Brancucci, 1983: 253 (description, new records).

Type locality. Nalanda [= Sri Lanka, Central Province, Nalanda].

Material examined. 28 specimens. **INDIA: Maharashtra:** 1 male 6 females, 100 km SW Poona, Mahabaleshwar, 1300 m, 16 September 1991, coll. R. Schuh (GWCV, NHMW); 12 ex., same locality, but 1400 m, 30 September–2 October 2005, coll. J. Bezděk (NMPC, PMCB); 2 females, 120 km NE Mumbai, Igatpuri env., 19.42, 17N 73.33, 06E, 1–12 August 2002, coll. P. Šípek & M. Fikáček (NMPC). **Orissa:** 1 male, Daitari Distr., Jajpur – Keonjhar [Keonjhargarh], trapped during monsoon 1967, coll. G. Topál (NHMB). **SRI LANKA:** 1 female, Nalanda, 1899, coll. W. Horn (ZSMG); 1 male, Puwakpitya, hiver [winter] 1906–1907, coll. E. Bugnion (GWCV); 1 female, Veli Oya Belihuoya [most probably Belihul Oya], 8 December 1970, coll. Starmüllner (GWCV); 2 males 1 female, Dambulla env., 300 m, 19 April–9 May 1991, coll. J. Kolibáč (NMPC, NHMB).

Diagnosis. Medium sized, elongate oval species (body length 3.8–4.1 mm). Elytra with subbasal testaceous band sinuous, narrow, well separated from elytral base (Fig. 3). Apical part of median lobe in lateral view with distinct bulge on dorsal side; apex with pointed tip (Fig. 20).

Distribution. The species was described and known previously only from Sri Lanka (Brancucci, 1983). The present records from Maharashtra and Orissa allowed us to expect that it is widely distributed also in the Indian subcontinent (Fig. 40).

***Laccophilus elegans* Sharp, 1882**

(Figs. 4, 21)

Laccophilus elegans Sharp, 1882: 302 (original description); Régimbart, 1899: 266 (description); Vazirani, 1969: 241 (description, new records); Brancucci, 1983: 257 (description, new records).

Type locality. Andaman Islands.

Material examined. 10 specimens. **INDIA: Karnataka:** 1 female, 18 km E Shiradi, Gundia, 12.47N 75.43E, W.

[Western] Ghats [Mts.], 200–500 m, 16–21 May 2002; coll. P. Pacholátko. **Kerala:** 6 ex., Road Moolamattam – Idukki, near Panavu stream, 600–700 m, coll. P. Mazzoldi (NMPC, PMCB); 2 females, 15 km SW Munnar, Kallar valley, 10.02N 76.58E, 1000 m, 6–18 December 1993, coll. D. Boukal & Z. Kejval (NHMW); 1 female, 10 km WSW Munnar, Kallar valley, 1100 m, 10°03'N 76°58'E, 9 January 1999, coll. D. Boukal (NHMW).

Diagnosis. Medium sized, elongate oval species (body length 3.8–4.0 mm). Elytra with subbasal testaceous band broad, more or less connected with elytral base (Fig. 4). Apical part of median lobe in lateral view with distinct bulge on dorsal side; apex short, blunt (Fig. 21).

Distribution. Widespread in southern and eastern India. Vazirani (1969) and Brancucci (1983) published data from Andaman and Nicobar Islands, Andhra Pradesh, Nagaland, Orissa and West Bengal. We add records from Karnataka and Kerala (Fig. 41).

***Laccophilus girardi* Brancucci, 1983**

(Figs. 5, 22)

Laccophilus girardi Brancucci, 1983: 256 (original description).

Type locality. N Borneo, Kudat [= Malaysia, Sabah State, Kudat].

Material examined. 15 specimens. **MALAYSIA: Sabah:** 14 ex., Batu Punggul Resort env., 24 June–1 July 1996 (NHMW, NMPC); 1 female, Kinabalu National Park, Sayap, 1000 m, 27 September 1996, coll. D. Grimm (SMNS).

Diagnosis. Small, elongate oval species (body length 3.5–3.7 mm). Elytra with subbasal testaceous band very broad, covering at least basal third of elytra; or elytra almost uniformly testaceous (Fig. 5). Apical part of median lobe in lateral view almost straight, narrowing to apex which is bent dorsally (Fig. 22).

Variability. A species rather variable in elytral colouration: specimens from Batu Punggul are almost completely testaceous with only indistinct infuscation posteriorly to elytral midlength.

Distribution. *Laccophilus girardi* is so far known only from Sabah state, Malaysia (Fig. 40).

***Laccophilus hendrichi*, new species**

(Figs. 6, 23)

Type locality. Laos, Bolikhamsay province, Nam Kading NBCA [= National Biodiversity Conservation Area], Tad Paloy campsite.

Material examined. Holotype male, labelled: LAOS, Bolikhamsay Prov., / 18°23.17 N 104°09.65 E / NAM KADING NBCA, / Tad Paloy campsite, 300 m, / 8.-11. VII.2010, forest stream / Brancucci & Geiser leg. (NHMB).

Paratypes: 12 males, 10 females: same label data as holotype (NHMB, NMPC); 77 males, 82 females: LAOS, Bolikhamsay prov., / Nam Kading NPA, Tad Paloy / campsite, 18°21'–23'N, 104°09'E/, 250–400 m, 24.–28. V. 2011 // NHMB Basel, / Laos 2011 Expedition, / M. Geiser, D. Hauck, / A. Phantala & E. Vongphachan (NHMB, NMPC); 1 male: LAOS: N-Vientiane Prov. / Vang-Vieng, 300 m / N 18°55'33", E 102°26'55" / 10-15.v. & 01-06.vi.2001 / Jiří KOLIBÁČ leg. (NHMB); 1 male: LAOS, Houa Phan Prov. / Ban Meuang Van Nera Muang Et, / 20°49'–50'N, 103°59'–104°01'–02'E, / 2.–5.vi.2009, 300–800 m, / Michael Geiser leg. // NHMB Basel, NMPC Prague / Laos 2009 Expedition: / M. Brancucci, M. Geiser, / Z. Kraus, D. Hauck, V. Kubán (NHMB); 66 males, 75 females: LAOS, Savannakhet prov., / Phou Xang He NBCA, ca. 5km / SW Ban Pa Phaknau, 250–400 m / 17°00' N, 105°38' E / 31.V.–6.VI. 2011 // NHMB Basel, / Laos 2011 Expedition, / M. Geiser, D. Hauck, / A. Phantala & E. Vongphachan (NHMB, NMPC); 12 males, 11 females: N Thailand-Road Mae Chem - / Mae Hong Son 4 km after Ban / Huai Boing, evergreen forest m / 1000 (m) 29.XII.1999 Mazzoldi (NMPC, NHMW, PMCB); 2 females: Thailand: Mae Hong Son, Mae / Surin NP, , 2.ii.2012, , R. Müller / () // DNA / M. Balke / 5594 [respectively 5595] (ZSMG); 1 male: Thai [Thailand], 10-16.5.1991 / CHIANG DAO [Chiang Mai Prov., Doi Chiang Dao, wildlife reserve], 600m / 19°24'N 98°55'E / David Král lgt. // Thailand'91 / "Thanon Thong Chai" / D. Král & V. Kubán (NMPC); 10 males, 8 females: Thailand bor. / Chiang Dao env. / 21.5.–4.6.1995 / Snížek leg. (JSCL, LHCM, NMPC); 1 female: THAILAND: 2.11.1995 / Chiang Mai Prov. / Doi Suthep, 750–800m / leg. Zettel (4) (ZSMG); 1 female: THAILAND: 30.–31.11. / Chiang Mai Prov., 1995 / W Mae Rim, Mae Sa NP / leg. Zettel (2) (NHMW); 2 males, 2 females: THAILAND: 16.11.1995 / Phrae Prov., Mae Khaem / 15km E Phrae, ca. 350 m / leg. Zettel (16b) (NMPC, NHMW); 1 male: THAILAND: 24.11.1995 / Phetchanbun Prov. / Nam Nao NP / leg. Zettel (22) (NHMW); 2 males: W – THAILAND 1990 / Tham Tharn Lot NP / N Kanchanaburi (3) / leg. Jäch 28.–29.11 (NHMW); 1 male: W THAILAND: 300 m., / Thung Yai Wildlife / Sanctuary. / 15°28'N - 98°48'E. // Tak Province / Umphang District / Song Bae Stream. / 18-27.iv.1988. // Evergreen / rain forest. / M.J.D.Brendell. / B.M.1988–183. (BMNH); 2 males, 4 females: MYANMAR: Shan State / road Kalaw - Thazi, km 23 / 20°42.378'N 96°30.218'E / 720m, 24.10.1998 / leg. Schillhammer (30) (NMPC, NHMW); 4 males: Myanmar (43) Shan State / NW Kalaw, km 23 on rd Kalaw- / Thazi, 20°42.378'N 96°30.218'E / rockpools, ca. 720 m, 16.5.1999 / leg. H. Schillhammer & R. Schuh (NHMW); 3 males: Myanmar (136A) Shan State / Main Thouk Forest Monastery / 20°34.617'N 96°57.851'E / ca. 1160m, pools, 4.06.2004 / leg. Shaverdo & Schillhammer (NHMW).

Additional non-type material. THAILAND: 1 male, Koh Samui, Hinta Hiu Yai, 8 January 1988, coll. Madl (NHMW); 1 female, Sekhon Nakhon Province, Phu Pan NP, 490–520 m, 7–8 December 1995, coll. P. Schwendinger (NHMW). **VIETNAM:** 1 male, 12 km N Dalat, Lang Bian, 28–30 April 1994, coll. P. Pacholátko & L. Dembický (NHMW).

Diagnosis. Medium sized, oval oblong species (body length 3.8–4.4 mm). In habitus and shape of median lobe, the new species is similar to *L. javanicus* or *L. tobaensis*. However, *L. javanicus* has always reduced elytral colouration with anterior margin of the testaceous subbasal band straight, and apical part of median lobe in lateral view with slightly curved dorsal side. *L. tobaensis* is somewhat bigger (4.3–4.5 mm) and distinctly broader, with weakly impressed elytral sculpture.

Description. Colouration: Head and pronotum testaceous, elytra brownish-black with testaceous pattern consisting of sinuous subbasal transverse band well separated from base of elytra and interrupted on suture, indistinct mediolateral spot, sinuous preapical transverse band interrupted on suture, and a small indistinct apical spot (Fig. 6) Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are moderately deeply impressed. Frons between eyes, and clypeus with several large punctures. Reticulation of pronotum same as that of head. Pronotum along margins and in posterior angles with numerous large setigerous punctures. Reticulation of elytra simple composed of large irregular polygonal meshes similar to that of head or pronotum, but slightly more impressed. Meshes mostly complete, inner space often with several (1–3) small punctures. Each elytron with indistinct, sutural, discal and lateral row of large serial setigerous punctures. Ventral part reticulated with fine elongate meshes. Prosternal apophysis short and lanceolate, narrowly bordered. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered. Apical ventrite rounded posteriorly, with numerous large setigerous punctures and transverse grooves on disc. Male pro- and mesotarsomeres 1–3 weakly dilated with bundle of adhesive setae on ventral side. Claws of protarsi and mesotarsi simple and equal.

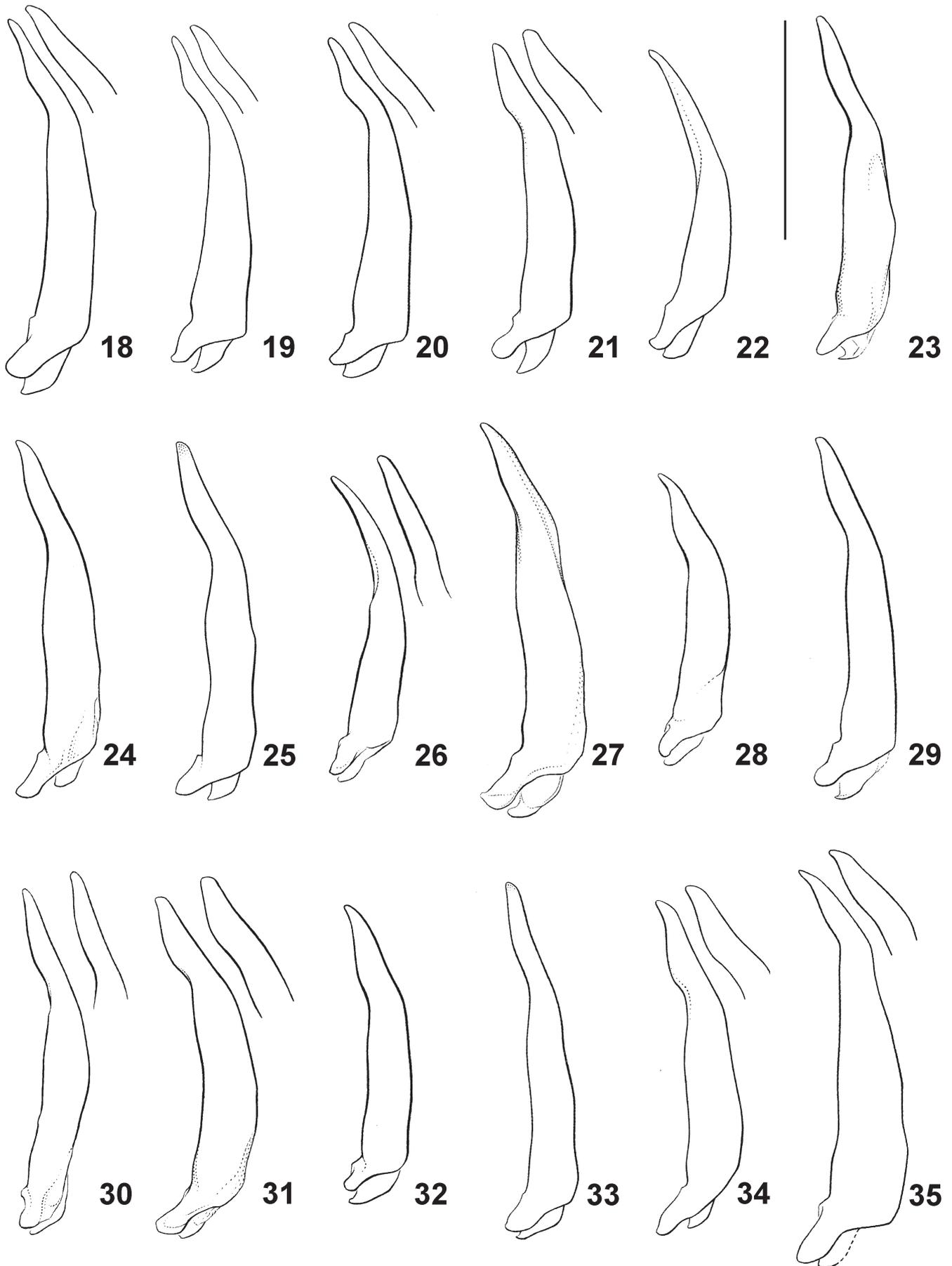
Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 23.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

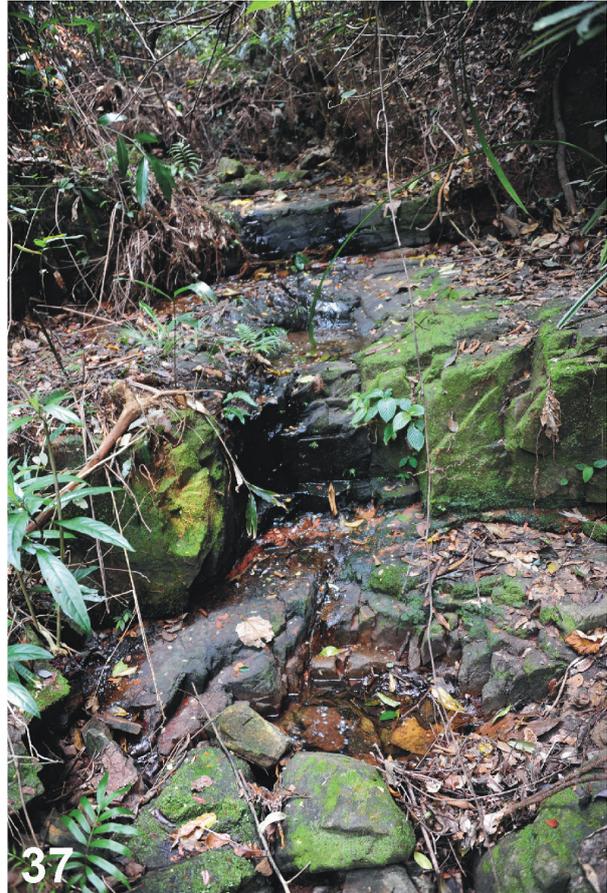
Variability. Specimens of the type series vary considerably in extent and shape of the elytral colour pattern, especially those from Vietnam and Thailand (Koh Samui), which we therefore remove from the type series.

Measurements (N= 40): Body length 3.8–4.4 mm (mean value 4.2 mm, holotype 3.9 mm); width 2.2–2.5 mm (mean value 2.3 mm, holotype 2.2 mm).

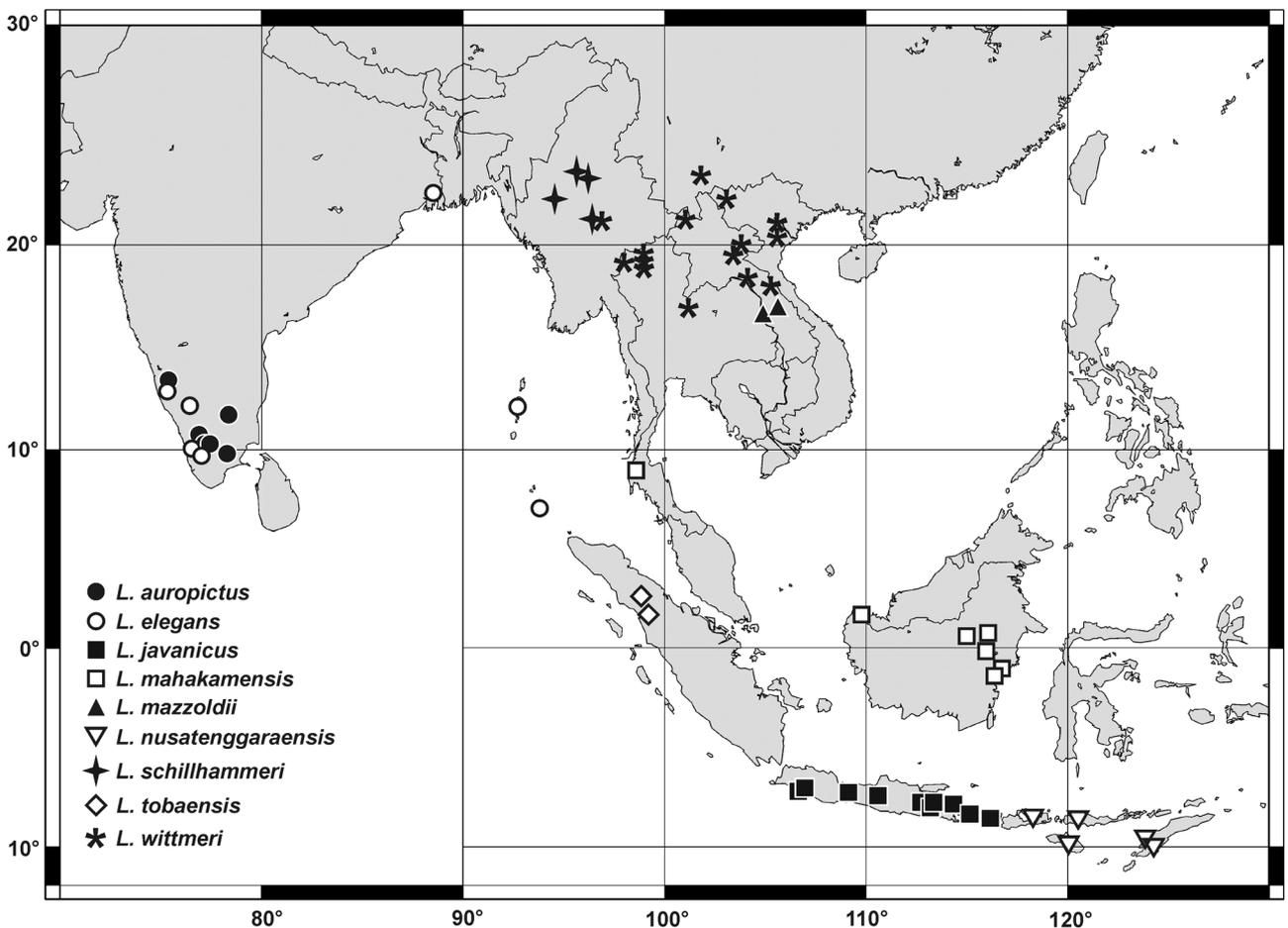
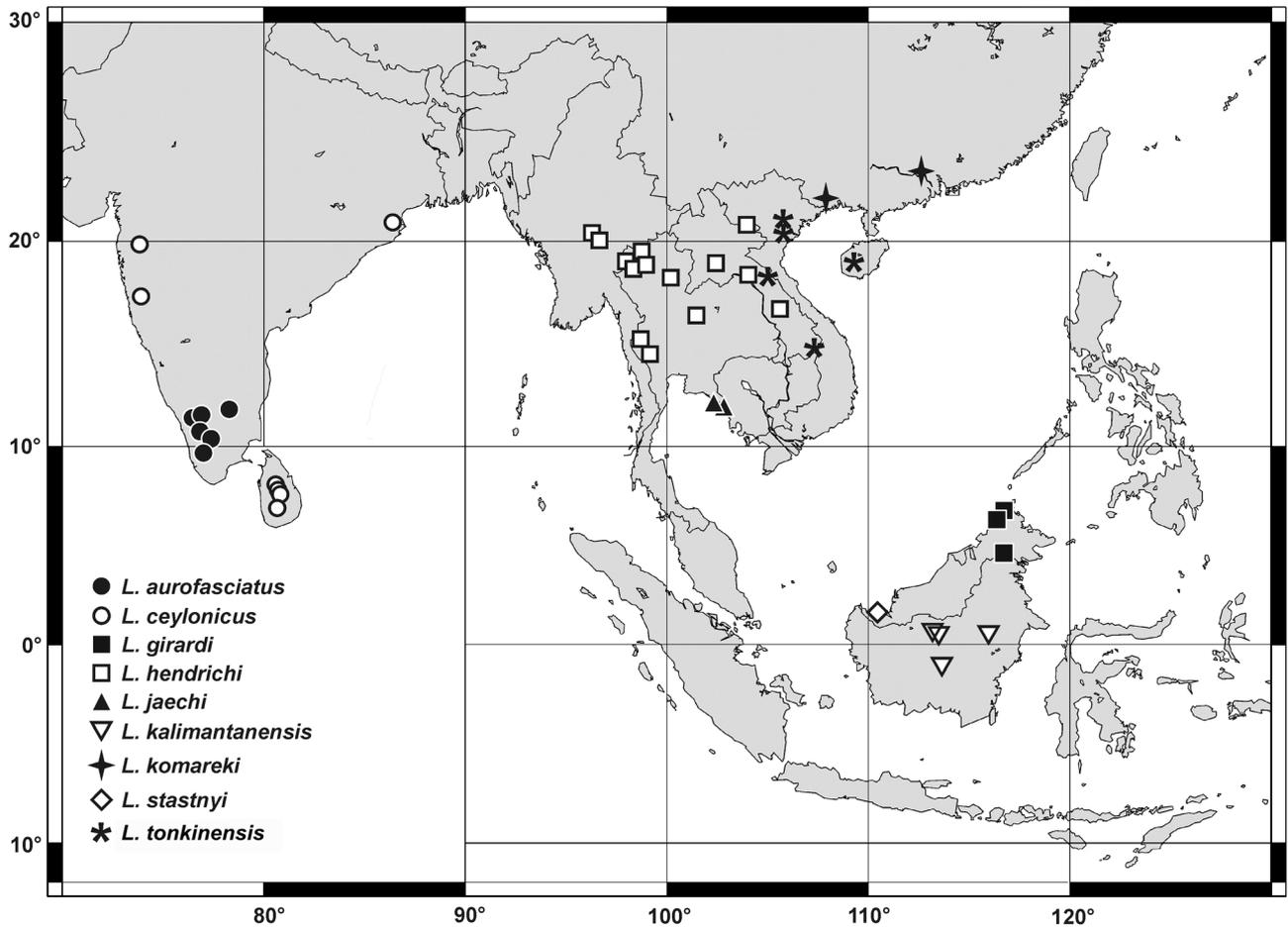
Etymology. The new species is dedicated to our friend and colleague Lars Hendrich (Munich, Germany), a specialist on Dytiscidae.



Figs. 18–35. Median lobe in lateral view: 18, *Laccophilus aurofasciatus*; 19, *L. auropictus*; 20, *L. ceylonicus*; 21, *L. elegans*; 22, *L. girardi*; 23, *L. hendrichi*, new species; 24, *L. jaechi*, new species; 25, *L. javanicus*; 26, *L. kalimantanensis*, new species; 27, *L. komareki*, new species; 28, *L. mahakamensis*; 29, *L. mazzoldii*, new species; 30, *L. nusatenggaraensis*, new species; 31, *L. schillhammeri*, new species; 32, *L. stastnyi*, new species; 33, *L. tobaensis*; 34, *L. tonkinensis*; 35, *L. wittmeri*. Scale bar = 0.5 mm.



Figs. 36–39. Habitats: 36, E Kalimantan, Muara Ritan (type locality of *Laccophilus kalimantanensis*, new species); 37, China, Guangxi, Shiwandashan (locality of *L. komareki*, new species); 38, E Kalimantan, Sungai Wain (locality of *L. mahakamensis*); 39, Laos, Attapeu (locality of *L. tonkinensis*).



Figs. 40–41. Distribution of the species of the *Laccophilus javanicus* group

Habitat. At the type locality, *Laccophilus hendrichi* was collected in small remnant pools of a drying up forest stream in rocky area (M. Geiser, pers. comm.).

Distribution. *Laccophilus hendrichi* occurs in (sub) mountainous areas of eastern Myanmar, northern Thailand and northern and central Laos (Fig. 40).

***Laccophilus jaechi*, new species**
(Figs. 7, 24)

Type locality. Thailand, Trat Province, Ko Chang Island.

Material examined. Holotype male, labelled: O [eastern] – THAILAND 1990 / Ko Chang [Island] (12) / White Sands Beach / leg. Jäch 10.12. (NHMW). Paratypes: 1 male, 2 females: same label data as holotype (NMPC, NHMW); 1 male: Khao Seap / THAILANDE / XI. 1981 / Coll. T. Lander (NHMB); 4 males, 4 females: CAMBODIA SW, 20kmSE / KOH KONG: Tatai riv. / 11°34', N103°07'E / 3.-19.v.2005, 50-300 m, / E.Jendek & O.Šauša leg. (NHMB, NMPC).

Diagnosis. Medium sized, oval oblong species (body length 4.1–4.4 mm). It is very similar to *L. tonkinensis* in habitus and elytral colouration, and to *L. hendrichi* and *L. javanicus* in general shape of penis. The new species differs from all three mentioned species by the distinct shape of the median lobe distal part, which is ventrally very weakly sinuate, apically with small inflexed point. *Laccophilus jaechi* differs from *L. hendrichi* and *L. javanicus* also in the constant very broad testaceous elytral subbasal band not separated from the elytral base.

Description. Colouration: Head and pronotum testaceous, elytra brownish-black with testaceous pattern consisting of broad sinuous subbasal transverse band not separated from base of elytra, indistinct latero-medial spot, narrow preapical transverse band interrupted on suture, and a small indistinct apical spot (Fig. 7). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are moderately deeply impressed. Frons between eyes, and clypeus with several large punctures. Reticulation of pronotum same as that of head. Pronotum along fore and basal margins and in posterior angles with numerous large setigerous punctures. Reticulation of elytra simple, composed of large irregular polygonal meshes similar to that of head or pronotum, but slightly more impressed. Meshes mostly complete, inner space often with several (1–3) small punctures. Each elytron with indistinct, sutural, discal and lateral row of large serial setigerous punctures. Ventral part reticulated with fine elongated meshes. Prosternal apophysis lanceolate. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered. Apical ventrite rounded posteriorly, with large setigerous punctures and transverse grooves on disc. Male pro- and mesotarsomeres 1–3 weakly dilated with bundle of adhesive setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 24.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. Specimens of the type series vary in extent of elytral colour pattern, especially of the subbasal testaceous band, the major part of which is separated in some specimens from the elytral base.

Measurements (N= 13). Body length 4.1–4.4 mm (mean value = 4.3 mm, holotype 4.1 mm); width 2.3–2.5 mm (mean value = 2.4 mm, holotype 2.3 mm).

Etymology. The new species is dedicated to its collector, our colleague Manfred A. Jäch (NHMW), a specialist on Hydraenidae and Dryopoidea.

Distribution. So far known only from a small area of south-eastern Thailand and south-western Cambodia (Fig. 40).

***Laccophilus javanicus* Régimbart, 1899**
(Figs. 8, 25)

Laccophilus javanicus Régimbart, 1899: 266 (original description); Brancucci, 1983: 252 (description, new records).

Type locality. Java, monts Tengger, dans la région orientale, à 2000 metres d'altitude [= Indonesia, East Java, Tengger Mts.].

Material examined. 61 specimens. **INDONESIA: Bali:** 23 ex., Telaga forest, 23 April 2011 (MZBC, NMPC, ZSMG); 2 ex., Buleleng Reg., 5 SW Busungbiu, Telaga protected forest, rock pool with leaves, ca. 700 m, 22 October 2013, coll. G. Wewalka (ZSMG). **Java:** 1 male, G. Slamet [Gunung Slamet volcano], April 1917, coll. F.C. Drescher (NMPC); 1 ex., Wynkoopsbay, February 1937 (IRSNB); 1 female, Baturaden, 1 August 1983, coll. N. Nieser (NBCL); 2 ex., Baluran National Park, 600 m, 16–19 April 1996, coll. R. Zajíček (NHMB); 1 female, Tretes, 6. August 1983, coll. N. Nieser (NBCL); 1 female, 50 km S Surabaya, Tretes, Kekek Bodo WF, 800 m, 20 September 1995, coll. H. Schillhammer (NHMW); 2 females, Baluran Nat. Park, Bilik env., 0–200 m, 12–18 April 1996, coll. S. Jákl (NMPC); 3 ex., Java Barat, Gunung Salak–Halimun, 06°42.272S, 106°41.157E, 980 m, 20 October 2009 (MZBC, ZSMG). **Lombok:** 7 ex., Tetebatu, 7. February 1988, coll. M.A. Jäch (NHMW); 1 female, Senaro, N slope of [Gunung] Rinjani, 1100 m, 2–5 February 1994, coll. Bolm (SMNS); 12 ex., Senaru area, 08°19.326S, 116°24.989E, 834 m, 23 April 2011 (MZBC, NMPC, ZSMG). **INDONESIA or MALAYSIA:** 1 ex., Borneo (ZSMG).

Diagnosis. Medium sized, elongate oval species (body length 4.0–4.4 mm). Elytra with elytral subbasal testaceous band complete, its anterior margin almost rectilinear (Fig. 8). Apical part of median lobe rather long, in lateral view with dorsal side only very slightly curved (Fig. 25).

Distribution. *Laccophilus javanicus* is recorded from the Indonesian Islands of Java, Bali and Sumbawa (Brancucci, 1983; Hendrich & Balke, 1995). We here add records from Lombok Island (Fig. 41). However we question the occurrence of *L. javanicus* on Sumbawa. The known specimen, a female in NHMB, differs in elytral sculpture and colouration; it probably represents another species, but a single female cannot be reliably identified.

***Laccophilus kalimantanensis*, new species**

(Fig. 26)

Type locality. Indonesia, East Kalimantan, 8 km N of Muara Ritan village, 00°28.4'N, 116°02.7'E, 95 m.

Material examined. Holotype male, labelled: INDONESIA, E KALIMANTAN / ca. 8 km N of Muara Ritan vill. / 00°28.4'N, 116°02.7'E, 95 m / J. Hájek, J. Schneider & / P. Votruba leg. 6.xii.2011 // border of secondary forest / and clearing-field; individual / collecting in stream (NMPC). Paratypes: 1 female: same label data as holotype (NMPC); 1 male: same label data as holotype, and an additional label: DNA / M. Balke / 5647 [green typing] (ZSMG); 1 male: Indonesia: E Kalimantan, ca. 8 / km N of Muara Ritan vill., 95m, / 6.xii.2011, 00°28.4'N / 116°02.7'E, J. Hájek, J. / Schneider & P. Votruba / (KAL-Jiri08) // DNA / M. Balke / 5648 [green typing] (ZSMG); 14 males, 13 females: Central Kalimantan, 24.VII.2004 / Kahayan basin. Upstream River / Rowo Series of small ponds in / primary forest P. Mazzoldi (16) (NHMB, NHMW, NMPC, PMCB); 7 males, 4 females: West Kalimantan, Melawi basin / upstream Sungai Embalau, small / left tributary (13) 1.I.2005 / P.Mazzoldi leg. (PMCB); 1 female: West Kalimantan, Melawi / basin, Sungai Beluaq and small / tributary 29.XII.2004 (5) / P.Mazzoldi leg. (PMCB).

Diagnosis. Smaller, oblong oval species (body length 3.6–3.8 mm). Due to light brown body colouration with extended pale colouration of elytra, *Laccophilus kalimantanensis* is very similar to *L. girardi*, from which it can only be reliably distinguished based on the shape of the male genitalia. In the new species, the apical part of the median lobe in lateral view is almost regularly curved to apex.

Description. Colouration: Head and pronotum testaceous, elytra brown with extensive testaceous pattern consisting of broad basal band reaching nearly midlength of elytra, and broad preapical band often continuing to elytral apex (cf. Fig. 5). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are very superficially impressed. Frons between eyes, and clypeus with several large punctures. Reticulation of pronotum similar to that of head, but meshes somewhat larger. Pronotum along margins and in posterior angles with numerous large setigerous punctures. Reticulation of elytra simple, consists of large polygonal meshes similar to that of pronotum, but even more superficially impressed and

barely perceptible; meshes often incomplete. Sutural row of punctures reduced to few punctures preserved mostly near base; discal and lateral rows of punctures present, but lateral discal row and lateral row barely perceptible. Ventral part reticulated with fine meshes. Prosternal apophysis short and lanceolate. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered; apical ventrite rounded posteriorly, on disc with several medium sized setigerous punctures. Male pro- and mesotarsomeres 1–3 very weakly dilated with bundle of adhesive setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 26.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. The specimens of the type series vary in colouration of elytra: the ground colour of some specimens is light brown, making the testaceous pattern almost imperceptible and the elytra appear unicolourous.

Measurements (N= 20): Body length 3.6–3.8 mm (mean value 3.7 mm, holotype 3.6 mm); width 2.1–2.2 mm (mean value 2.2 mm, holotype 2.1 mm).

Etymology. The new species is named after Kalimantan Island, its area of distribution.

Habitat. At the type locality, *Laccophilus kalimantanensis* was collected in a shaded remnant pool of a drying up forest stream; diameter of pool ca. 1 m, clay bottom with several larger stones, without vegetation or fallen leaves (Fig. 36).

Distribution. The species is confined to several localities in the central part of Kalimantan Island, Indonesia (Fig. 40).

***Laccophilus komareki*, new species**

(Figs. 9, 27)

Laccophilus wittmeri: Hájek, 2003: 120 (in part).

Type locality. China, Guangdong Province, Dinghu Mountain National Nature Reserve, ca. 23°10'N, 112°32'E, ca. 250 m.

Material examined. Holotype male, labelled: CHINA: Guangdong Prov. / Dinghu Nat. Res. / 28.10.2001, ca. 250 m / Jäch & Komarek (CWBS 449) (CASS). Paratypes: 8 males, 5 females: same label data as holotype (NHMB, NMPC, NHMW); 8 males, 7 females: CHINA, Guangxi A.R., 5-9.iv.2013 / Shiwandashan National Forest Park / (small pools in drying-up stream) / 21°54.4'N, 107°54.2'E, 300 m / M.Fikáček, J.Hájek & J.Růžička leg. (NMPC, PMCB, ZSMG). 2 males, 1 female: CHINA, Guangxi A.R., 7-8.iv.2013 / stream valley ca. 2 NE north gate of / Shiwandashan National Forest Park / 21°55.1'N, 107°54.9'E, 280 m / M.Fikáček, J.Hájek & J.Růžička leg. (NMPC).

Diagnosis. Large, broadly oval species (body length 4.5–4.9 mm). A species closely related to *L. wittmeri*, from which it can be distinguished by constantly testaceous colouration of medial part of elytra, yellowish subbasal and preapical elytral band bordered with thin blackish stripes, and by different shape of the apical part of the median lobe, which is straighter than in *L. wittmeri*.

Description. Colouration: Head and pronotum testaceous. Elytra largely testaceous, sinuous transverse subbasal and preapical bands only slightly paler than ground colour of elytra, but well recognisable because of their distinct blackish bordering (Fig. 9). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are moderately deeply impressed. Frons between eyes, and clypeus with several large punctures. Reticulation of pronotum like that of head. Pronotum along margins with numerous large setigerous punctures. Reticulation of elytra simple, composed of large irregular polygonal meshes similar to those of head or pronotum. Meshes mostly complete, inner space often with several small punctures. Each elytron with indistinct, sutural, discal and lateral row of large serial setigerous punctures. Ventral part reticulated with fine elongate meshes. Prosternal apophysis lanceolate. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered. Apical ventrite rounded posteriorly, with large setigerous punctures and transverse grooves on disc. Male pro- and mesotarsomeres 1–3 weakly dilated with bundle of setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 27.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. Specimens of type series varying considerably in body colouration, in some specimens, longitudinal blackish stripe divides the subbasal band into two separate yellowish spots.

Measurements (N= 18): Body length 4.5–4.9 mm (mean value 4.7 mm, holotype 4.8 mm); width 2.5–2.8 mm (mean value 2.7 mm, holotype 2.8 mm).

Etymology. The new species is dedicated to one of its collectors, Albrecht Komarek (Mödling, Austria), a specialist on Hydrophilidae.

Habitat. At the type locality, *Laccophilus komareki* was collected in a stream, ca. 1.5–2 m wide, flowing through dense primary forest, geology: sandstone (Jäch & Ji, 2003). In Guangxi, the new species was collected in a shaded deep remnant pool (diameter ca. 1 m) of a drying up forest stream, the bottom with a thick layer of decaying leaves; and in small rocky pools (diameter ca. 30 cm) in a forest streamlet (Fig. 37).

Distribution. So far known only from two localities in southern China (Guangdong and Guangxi provinces) (Fig. 40).

***Laccophilus mahakamensis* Balke, Mazzoldi & Hendrich, 1998**
(Figs. 10, 28)

Laccophilus mahakamensis Balke, Mazzoldi & Hendrich, 1998: 74 (original description).

Type locality. Indonesia, East Kalimantan, district barong Tongkok, Juhan Asa, Aput stream in primary forest.

Material examined. 35 specimens. **INDONESIA: E Kalimantan:** 5 ex., ca. 50 km W of Balikpapan, PT Fajar Surya Swadaya [area], 01°13.4'S, 116°22.6'E, 66 m, 27+30 November 2011, coll. J. Hájek, J. Schneider & P. Votruba (NMPC); 22 ex., ca. 15 km N of Balikpapan, Sungai Wain Protection Forest, 01°08.1'S, 116°49.9'E, 35 m, 8–11 December 2011, coll. J. Hájek, J. Schneider & P. Votruba (NMPC, ZSMG). **MALAYSIA: Sarawak:** 1 female, E Bandar Sri Ammen [Sri Aman], Batang Ai National Park, 20 February 1993, coll. M.A. Jäch (NHMW); 2 males, 1 female, G. [Gunung] Gading National Park, 30 May 2003, coll. J. Štápný (JSCL). **THAILAND:** 2 males, 2 females, Surat Thani Province, Khao Sok National Park, pools on road from Park Hq to Bang Leap Nam waterfall, 26 July 1996, coll. P. Mazzoldi (PMCB).

Diagnosis. Small, elongate oval species (body length 3.4–3.7 mm). Elytra with subbasal testaceous band sinuous, narrower, usually well separated from elytral base (Fig. 10). Apical part of median lobe in lateral view distinctly sinuous with elongate pointed tip (Fig. 28).

Habitat. In East Kalimantan, *Laccophilus mahakamensis* was collected in remnant pools of small stream in remains of lowland primary forest; pools were usually with clay bottom and a thick layer of decaying leaves (Fig. 38), some pools were very small (diameter less than 20 cm) with almost no visible water.

Distribution. The species was described and is so far only known from Indonesian East Kalimantan (Balke et al., 1998). The Thai specimens correspond well with the type material stored in NHMW. The present new records markedly extend the distributional area of *Laccophilus mahakamensis* suggest the likelihood of more records from the Malay Peninsula and the Greater Sunda Islands (Fig. 41).

***Laccophilus mazzoldii*, new species**
(Figs. 11, 29)

Type locality. Thailand, Mukdahan Province, Phu Pha Thoep National Park, ca. 16°26'N, 104°48'E.

Material examined. Holotype male, labelled: LAOS, Savannakhet Prov., / Phou Xang He NBCA, ca. 5km / SW Ban Pa Phaknau, 250–400 m, / 17°00' N, 105°38' E, / 31.V.

– 6.VI. 2011 // NHMB Basel / Laos 2011 Expedition, / M. Brancucci, M. Geiser, / D. Hauck, Z. Kraus, / A. Phantala & E. Vongphachan (NHMB). Paratypes: 7 females, same label data as holotype (NHMB, NMPC); 1 male, 1 female: Thailand, Mukdahan [Prov.] 1.I. / 2000, Phu Pha Thoep N.P. / Small pools on dry stream / bed, Mazzoldi P. leg. (23) (PCMB).

Diagnosis. Large, oblong oval species (body length 4.6–4.7 mm). The new species is characteristic, with elytral colouration that resembles *L. aurofasciatus*. *Laccophilus mazzoldii* differs from that species by narrower body shape, elytral sculpture moderately impressed with meshes complete, and by distinct shape of median lobe, resembling that of *L. javanicus*.

Description. Colouration: Head and pronotum testaceous. Elytra blackish with broad testaceous subbasal band not separated from elytral base but interrupted on suture, mediolateral spot very small, preapical spot large (preapical transverse band broadly interrupted in sutural area), and small apical spot (Fig. 11). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of medium sized irregular polygonal meshes, which are moderately deeply impressed. Frons between eyes, and clypeus with several large punctures. Reticulation of pronotum same as that of head. Pronotum along margins with numerous large setigerous punctures. Reticulation of elytra simple, composed of well impressed medium sized irregular polygonal meshes similar to that of head or pronotum. Meshes mostly complete, their inner space usually with several (1–3) small punctures; in some parts secondary microreticulation indicated. Each elytron with indistinct sutural, discal and lateral rows of large serial setigerous punctures. Ventral side reticulated with fine elongate meshes. Prosternal apophysis lanceolate. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered. Apical ventrite rounded posteriorly, with only few large setigerous punctures and transverse grooves on disc. Male pro- and mesotarsomeres 1–3 weakly dilated with bundle of adhesive setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 29.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. Measurements (N= 10): Body length 4.5–4.7 mm (mean value 4.5 mm, holotype 4.5 mm); width 2.5–2.6 mm (mean value 2.5 mm, holotype 2.5 mm).

Etymology. The new species is dedicated to its collector, Paolo Mazzoldi (Brescia, Italy), a specialist on Dytiscidae.

Distribution. So far known only from two close localities on both sides of the Thai-Laotian border (Fig. 41).

Laccophilus nusatenggaraensis, new species

(Figs. 12, 30)

Type locality. Indonesia, Sumbawa Island, Dompu District, near road from Dompu to Empang, ca. 10 km SW of Dompu, 8°35'33.78"S, 118°17'27.24"E, 90 m.

Material examined. Holotype male, labelled: Indonesia: Sumbawa, Dompu- / Empang, restpools, 90 m / 15.ix.2011, 08 35.563S 118 / 17.454E, Balke (SUMB06) (MZBC). Paratypes: 287 ex.: same label data as holotype (GWCV, JSCL, LHCM, MZBC, NHMB, NHMW, NMPC, PCMB, ZSMG); 1 male, 1 female: Indonesia: Sumbawa, Batu / Dulang, 10 mins to Tepai, forest / stream, 860 m, 16.ix.2011, 08 / 35.865S 117 16.675E, Balke / (SUMB08) (ZSMG); 1 female: FL 1- Flores, near Ruteng, 900 m / 26.viii.1991, Balke leg. (NHMW); 29 ex.: FL 3- Flores, Danau Ranamese / betw. Ruteng and Mborong, / 1200 m, 28.viii.1991, Balke leg. (MZBC, NHMW, NMPC, ZSMG); 1 male, 4 females: Indonesia: Timor, Soe-Kaplan, / stream, 785 m, 1.X.2011, / 09 50.466S 124 17.144E, / Balke (TIM01) (MZBC, NMPC, ZSMG); 5 males, 2 females: Indonesia: Timor, Soe-Niki, / creek, 760 m, 2.x.2011, 09 52.841S / 124 19.244E, Balke (TIM05) (ZSMG); 3 males; 11 females: Indonesia: Timor, Naikliu Area, / restpools in dry forest, 180 m, / 3.x.2011, 09 58.425S 123 / 41.439E, Balke (TIM11) (MZBC, NMPC, ZSMG).

Additional non-type material. INDONESIA: Sumba: 68 ex., puddles in dry streambed, 09°38.569'S, 119°41.581'E, 570 m, 27 September 2011, coll. M. Balke (SUA08) (MZBC, NMPC, ZSMG); 36 ex., Tarimbang, stream, 09°57.355'S, 119°56.927'E, 50 m, October 2011, coll. Dika (SUA14) (NMPC, ZSMG).

Diagnosis. Medium sized, oval oblong species (body length 4.0–4.5 mm). The new species is in habitus and male genitalia similar to *Laccophilus javanicus* and *L. tobaensis*. It can be distinguished from those species mainly based on the brown colouration of elytra with extensive testaceous pattern.

Description. Colouration: Head and pronotum testaceous. Elytra brown with broad testaceous subbasal band not separated from elytral base, indistinct longitudinal mediolateral spot, large preapical spot (preapical transverse band interrupted in sutural area), and small apical spot (Fig. 12). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are moderately deeply impressed. Frons between eyes with clusters of punctures. Reticulation of pronotum same as that of head. Pronotum along margins with numerous setigerous punctures. Reticulation of elytra simple, composed of moderately impressed large irregular polygonal meshes similar to that of head or pronotum. Meshes mostly complete, their inner space sometimes with a small puncture. Each elytron with indistinct sutural, discal and lateral rows of large serial setigerous punctures. Ventral side reticulated with fine elongate meshes. Prosternal apophysis lanceolate.

Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered. Apical ventrite rounded posteriorly, with numerous large setigerous punctures and transverse grooves on disc. Male pro- and mesotarsomeres 1–3 weakly dilated with bundle of adhesive setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 30.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. Specimens of the new species vary considerably in body colouration; some specimens are almost uniformly yellowish with only indistinctly pale elytral pattern; on the other hand, some specimens especially those from Sumba are constantly dark, with brown-blackish elytra and a bright testaceous pattern of which the subbasal transverse band is usually separated from the elytral base – those specimens are from this reason excluded from the type series.

Measurements (N= 40): Body length 4.0–4.5 mm (mean value 4.3 mm, holotype 4.2 mm); width 2.3–2.6 mm (mean value 2.4 mm, holotype 2.4 mm).

Etymology. The specific epithet is derived from “Nusa Tenggara” – an Indonesian name for Lesser Sunda Islands, which refers to the area of distribution of the new species.

Distribution. *Laccophilus nusatenggaraensis* occurs in Flores, Sumba, Sumbawa and Timor Islands of the Lesser Sunda Islands, Indonesia (Fig. 41).

***Laccophilus schillhammeri*, new species**
(Figs. 13, 31)

Type locality. Myanmar, Sagaing Region, Chatthin Wildlife Sanctuary, above San Myaung camp, ca. 23°36'N, 95°31'E.

Material examined. Holotype male, labelled: Myanmar (90A) Sagaing Division / Chatthin Wildlife Sanctuary / above San Myaung Camp, spring / 18.6.2002, leg. Schillhammer et al. (NHMW). Paratypes: 8 males, 7 females: same label data as holotype (NHMB, NHMW, NMPC); 1 male: MYANMAR: Sagaing Division / Chatthin Wildlife Sanctuary / ca. 200m, 5.-17.10.1998 / leg. Schillhammer (4) (NHMW); 1 female: MYANMAR: Sagaing Division / Chatthin Wildlife Sanctuary / 23°31.481'N 95°38.804'E / ca. 260m, 9.10.1998 / leg. Schillhammer (9) (NHMW); 2 females: MYANMAR: Sagaing Division / Alaungdaw Katthapa NP / 22°19.094'N 94°28.823'E / 5.5.2003, ca. 350 m / leg. Boukal et al. (107) (NHMW); 8 males, 7 females: MYANMAR: Sagaing Division / Alaungdaw Katthapa NP / 22°19.094'N 94°28.823'E / 9.-10.5.2003, ca. 350 m / leg. Boukal et al. (118) (NHMW, NMPC); 1 female: MYANMAR: Sagaing Division / Alaungdaw Katthapa NP / Khaung Din stream / 11.5.2003, ca. 450 m / leg. Boukal et al. (119) // between 22°18.360'N 94°25.937'E / and /

22°19.650'N 94°25.768'E (NHMW); 11 males, 3 females: MYANMAR: Sagaing Division / Alaungdaw Katthapa NP / 22°19.113'N 94°28.518'E / 13.5.2003, ca. 350 m / leg. Schillhammer et al. (122) (LHCM, NHMW, NMPC, PMCB); 3 males, 3 females: MYANMAR (156A) Shan State / on rd Kalaw-Thazi, below (154) / 20°43.796'N 96°29.377'E / ca. 483 m, puddles, 25.06.2004 / leg. Shaverdo & Schillhammer (NHMW, NMPC); 15 males, 9 females: MYANMAR: Shan State (91b) / Shweudaung Wildlife Sanct. / 23°05.129'N 96°13.527'E / 19.7.2002, ca. 360 m / Myint Hlaing & Aung Moe (NHMW, NMPC).

Diagnosis. Medium sized, oval oblong species (body length 3.8–4.3 mm). Based on the shape of the median lobe of aedeagus, the new species is probably related to *Laccophilus elegans*, but differs from that species mainly by the elytral colouration: narrow sinuous transverse subbasal and preapical bands, and large, distinct mediolateral spot. This elytral pattern closely resembles *L. hendrichi*, but that species has different median lobe with long and narrow apical part.

Description. Colouration: Head and pronotum testaceous. Elytra brownish-black with testaceous pattern consisting of narrow sinuous (especially posteriorly) subbasal transverse band well separated from base of elytra and interrupted before suture, distinct mediolateral spot, sinuous preapical transverse band interrupted before suture, and small apical spot (Fig. 13). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are moderately impressed. Frons between eyes with several punctures. Reticulation of pronotum similar to that on head but meshes slightly larger. Pronotum along margins and in posterior angles with numerous setigerous punctures. Reticulation of elytra simple, composed of large irregular polygonal meshes similar to that on pronotum, but slightly more impressed. Meshes complete, with 1–3 clearly-distinct punctures inside of most meshes. Sutural row of punctures reduced to several punctures; discal and lateral rows of punctures present, but especially lateral one barely perceptible. Ventral side reticulated with fine elongate meshes. Prosternal apophysis short and lanceolate. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered. Apical ventrite rounded posteriorly, on disc with several large setigerous punctures and shallow grooves. Male pro- and mesotarsomeres 1–3 weakly dilated with bundle of adhesive setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 31.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. The specimens of the type series varies slightly in elytral pattern, predominantly in width and sinuosity of transverse bands.

Measurements (N= 40): Body length 3.8–4.3 mm (mean value 4.2 mm, holotype 4.2 mm); width 2.1–2.4 mm (mean value 2.3 mm, holotype 2.4 mm).

Etymology. The new species is dedicated to our colleague Harald Schillhammer (NHMW), a specialist on Staphylinidae, who collected the majority of specimens of this species.

Distribution. *Laccophilus schillhammeri* is known from several localities in northern Myanmar (Sagaing Region, Shan State) (Fig. 41).

***Laccophilus stastnyi*, new species**

(Figs. 14, 32)

Type locality. Malaysia, Sarawak, Bako National Park, ca. 01°43'N 110°27'E.

Material examined. Holotype male, labelled: Malaysia, Sarawak / BAKO NP / 27.-28.5.[20]03 / J. Štastný lgt. (NMPC). Paratypes: 1 male, 1 female, same label data as holotype (JSCL).

Additional non-type material. MALAYSIA: Sarawak: 4 females, Kuching env., Bako NP, 21 February 1993, coll. M. Jäch (NHMW, NMPC).

Diagnosis. Smaller, oblong oval species (body length 3.5–3.6 mm). The new species is very similar to *Laccophilus mahakamensis* and we cannot exclude the possibility that it represents only an aberrant population of this species. *Laccophilus stastnyi* differs from that species in the somewhat reduced testaceous pattern of elytra, but predominantly in the shape of the apical part of the median lobe, the ventral outline of which is in lateral view distinctly less sinuous with a shortly pointed tip.

Description. Colouration: Head and pronotum testaceous, elytra brownish black with testaceous pattern consisting of relatively narrow sinuous subbasal transverse band separated from base, large preapical spot (preapical transverse band interrupted in sutural area), and an indistinct apical spot (Fig. 14). Appendages and ventral part testaceous.

Surface structures and sculpture: Head reticulation simple, composed of large irregular polygonal meshes, which are superficially impressed. Frons between eyes, and clypeus with several large punctures. Reticulation of pronotum similar to that of head, but meshes somewhat larger. Pronotum along margins with numerous large setigerous punctures. Reticulation of elytra simple, consists of large polygonal meshes similar to that of pronotum; meshes mostly complete, sometimes with a puncture inside. Sutural row of punctures reduced to few punctures; discal and lateral rows of punctures present, but barely perceptible. Ventral part reticulated with fine meshes. Prosternal apophysis short and lanceolate. Abdominal ventrites with numerous oblique grooves and several large setigerous punctures, lateral margin bordered; apical ventrite rounded posteriorly, on disc with several setigerous punctures and grooves. Male pro- and

mesotarsomeres 1–3 weakly dilated with a bundle of adhesive setae on ventral side. Claws of pro- and mesotarsi simple and equal.

Male genitalia: Median lobe of aedeagus in lateral view as in Fig. 32.

Female genitalia: Similar to male; pro- and mesotarsomeres not dilated.

Variability. Measurements (N= 7): Body length 3.5–3.6 mm (mean value 3.5 mm, holotype 3.5 mm); width 2.0–2.1 mm (mean value 2.1 mm, holotype 2.0 mm).

Etymology. The new species is dedicated to its collector, Jaroslav Štastný (Liberec, Czech Republic), a specialist on Dytiscidae.

Distribution. So far known only from the type locality in Bako National park, Sarawak, Malaysia (Fig. 40).

***Laccophilus tobaensis* Brancucci, 1983**

(Figs. 15, 33)

Laccophilus tobaensis Brancucci, 1983: 255 (original description).

Type locality. Indonesia, Nord Sumatra, Samosir, Toba-See.

Material examined. 1 specimen. INDONESIA: Sumatra: 1 male, NW Sipirok, Hutaimbaru, 4 February 1991, coll. M.A. Jäch (NHMW).

Diagnosis. Medium sized, broadly oval species (body length 4.4–4.5 mm). Elytra with subbasal testaceous band divided longitudinally into separate spots (Fig. 15). Apical part of median lobe rather short, almost subparallel; in lateral view with dorsal side only very slightly curved (Fig. 33).

Distribution. The species was described and is so far known only from northern Sumatra (Brancucci, 1983) (Fig. 41).

***Laccophilus tonkinensis* Brancucci, 1983**

(Figs. 16, 34)

Laccophilus tonkinensis Brancucci, 1983: 258 (original description); Hájek, 2003: 120 (new records).

Type locality. Tonkin, Hoa Binh [= Vietnam, Hoa Binh Province].

Material examined. 17 specimens. CHINA: Hainan: 4 ex., Limushan Mts., exposed pools along road, partly connected with stream, 19°9.1–2'N, 109°45–46'E, 550–750 m, coll. M. Fikáček & S. Zhao (NMPC, ZSMG); 1 male, Jianfengling Mts., Tianchi Lake env., rd from Tianchi vill. To “sector 5”, pools in shaded drying-up stream in primary forest, 18°43.6–44.1'N, 108°52.1–5'E, 820–950 m, 10 May 2011, coll. M. Fikáček & S. Zhao (NMPC). LAOS: Attapeu Province: 3 males, road No. 18, km 80 E Attapeu, stream near the road, 17°48.6'N, 107°23.4'E, ca. 665 m, 29 April

2010, coll. J. Hájek (NMPC). **Khammouan Province:** 1 male 4 females, Nakai-Nam Theun NPA, Ban Navang env., 17°57–59'N, 105°13–16'E, 600–750 m, 18–21 May 2012, NHMB Basel Expedition Laos 2012, M. Brancucci, M. Geiser, K. Phanthavong, S. Xayalath (NHMB). **VIETNAM:** 4 ex., Tonkin, coll. de Cooman (IRSNB).

Diagnosis. Medium sized, elongate oval species (body length 3.8–4.1 mm). Elytra with subbasal testaceous band broad, more or less connected with elytral base (Fig. 16). Apical part of median lobe in lateral view with distinct bulge on dorsal side; apex elongate with pointed tip (Fig. 34).

Habitat. In Hainan, *Laccophilus tonkinensis* was collected in pools in shaded drying up stream in primary mountane forest. In southern Laos, it was collected in a pool in a small forest stream with a clay bottom and a layer of decaying leaves (Fig. 39).

Distribution. A species described from northern Vietnam and subsequently recorded from Hainan Island, China (Brancucci, 1983; Hájek, 2003). Here we present the first records from central and southern Laos (Fig. 40).

Laccophilus wittmeri Brancucci, 1983

(Figs. 17, 35)

Laccophilus wittmeri Brancucci, 1983: 260 (original description); Hájek, 2003: 120 (in part, new records).

Type locality. Tonkin, Hoa Binh [= Vietnam, Hoa Binh Province].

Material examined. 62 specimens. **MYANMAR:** 2 males 2 females, Shan state, road Kalaw – Thazi, km 23, 20°42.378'N 96°30.218'E, 720 m, 24 October 1998, coll. H. Schillhammer (NHMW, NMPC). **THAILAND: Chiang Mai Province:** 1 female, Doi Suthep, 950 m, 5 March 1987, coll. P. Schwendinger (LHCM); 1 female, Doi Suthep, 5 November 1995, coll. N. Nieser (NBCL); 2 males 1 female, Chiang Dao env., 21 May–4 June 1995, coll. M. Snižek (JSCL); 1 female, 50 km N Chiang Mai, 2 August 2000, coll. KROLL & L. Kratzerová (NMPC). **Loei Province:** 8 ex., Phu Hin Rongkla National Park, Huai Khamunoi waterfall, 1250 m, 25 December 1995, coll. P. Mazzoldi (PMCB). **Mae Hong Son Province:** 1 female, Ban Huei Po, 1600 m, 8–17 May 1992, coll. S. Bílý (NHMB); 17 ex., Road Mae Chem – Mae Hong Son, 4 km after Huai Boing, 1000 m, 29 December 1999, coll. P. Mazzoldi (NMPC, PMCB). **LAOS: Bolikhamsay Province:** 16 males, 9 females, Nam Kading NBCA, Tad Paloy campsite, forest stream, 18°23.17'N, 104°09.65'E, 300 m, 8–11 July 2010, coll. M. Brancucci & M. Geiser (NHMB); 3 males 1 female, Nam Kading NPA, Tad Paloy campsite, 18°21–23'N, 104°09'E, 250–400 m, 24–28 May 2011, coll. M. Geiser & D. Hauck (NHMB, NMPC). **Khammouan Province:** 1 male, Nakai-Nam Theun NPA, Ban Navang env., 17°57–59'N, 105°13–16'E, 600–750 m, 18–21 May 2012, NHMB Basel, Laos 2012 Expedition, M. Brancucci, M. Geiser, K. Phanthavong & S. Xayalath (NHMB). **Louang Namtha Province:** 2 ex., ca. 10 km E Muang Sing, Ban

Oudomsinh-B. Nam Det-B. Nam Mai env., 21°09–10'N, 101°13–15'E, 750–1400 m 14–20 May 2011, coll. D. Hauck & M. Geiser (NHMB). **Xieng Khouang Prov.:** 4 males 2 females, 30km NE Phonsavan: Ban Na Lam→ Phou Sane Mt., 19°37–8'N 103°20'E, 1300–1500 m, 10–30 May 2009, coll. M. Brancucci (NHMB). **VIETNAM:** 1 male, Deo Pha Din, 4 May 1995, coll. M. Sâto (EUMJ); 1 male 3 females, Lai Chau, 18 May 1995, coll. M. Sâto (EUMJ, NHMB).

Diagnosis. Large broadly oval species (body length 4.5–5.1 mm). Reticulation of elytra composed of shallowly impressed very large meshes. Ground colour of elytra dark, brown-blackish; mediolateral spot present (Fig. 17). Apical part of median lobe relatively shorter, with dorsal side lightly curved, and short and hooked apex; in lateral view with dorsal side almost straight (Fig. 35).

Distribution. Brancucci (1983) described the species from northern Laos and Vietnam. Later, Nilsson (1995) and Hájek (2003) published the species from southern China (Yunnan). The present records from Myanmar and northern Thailand extend the distributional area of *Laccophilus wittmeri* in the border area between the Palaearctic and Oriental zoogeographical regions (Fig. 41).

RESULTS AND DISCUSSION

Although the monophyly of *Laccophilus* and its species groups was recently questioned (Balke et al., 1997), the *L. javanicus* group seems to form a monophyletic group. Brancucci (1983) regarded *L. javanicus* as the most primitive group of Oriental *Laccophilus*, and considered its characteristics, i.e., simple shallow reticulation composed of irregular large polygonal meshes, short lanceolate prosternal apophysis, and rounded apical ventrite in both sexes, as plesiomorphic conditions. While this is very likely true for the latter two characters, a thorough study shows that the elytral reticulation typical for members of the *L. javanicus* species group does not occur in other laccophiline genera, and the primitive condition is more likely to be well impressed reticulation composed of regular small polygonal meshes (as in *Africophilus* Guignot, 1948, *Australphilus* Watts, 1978, *Laccodytes* Régimbart, 1895, *Neptosternus* Sharp, 1882, *Philaccolilus* Guignot, 1937, *Philaccolus* Guignot, 1937, or the *Laccophilus complicatus* species group). Therefore we suggest that the characteristic elytral reticulation is a potential apomorphy of the *Laccophilus javanicus* species group.

An additional characteristic of this group is, unlike the majority of Oriental species of the genus, an association with running water—especially remnant pools of small forest streams and rivers. Hence, species of the group are very responsive to habitat deforestation and water pollution, and can be used, together with other fluvial fauna, as biological indicators for water quality and habitat conservation.

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LITERATURE CITED

- Balke M., Larson DJ & Hendrich L (1997) A review of the New Guinea species of *Laccophilus* Leach 1815 with notes on regional melanism (Coleoptera Dytiscidae). *Tropical Zoology*, 10: 295–320.
- Balke M, Mazzoldi P & Hendrich L (1998) Two new *Laccophilus* species (Coleoptera: Dytiscidae) from Southeast Asia, and notes on other species of the genus. *The Raffles Bulletin of Zoology*, 46: 71–77.
- Brancucci M (1983) Révision des espèces est-paléarctiques, orientales et australiennes du genre *Laccophilus* (Col. Dytiscidae). *Entomologische Arbeiten aus dem Museum G. Frey*, 31/32: 241–426.
- Branden C van den (1885) Catalogue des coléoptères carnassiers aquatiques (Halipidae, Amphizoidae, Pelobiidae et Dytiscidae). *Annales de la Société Entomologique de Belgique*, 29(1): 5–116.
- Guignot F (1937) Contribution à l'étude des *Laccophilinae* (Col. Dytiscidae). *Bulletin de la Société Entomologique de France*, 42(9): 137–143.
- Guignot F (1948) Vingt-quatrième note sur les hydrocanthares. Dytiscides et gyrinides nouveaux ou peu connus de l'Afrique occidentale. *Bulletin de la Société Entomologique de France*, 52(1947)(10): 162–165.
- Guignot F (1954) Entomological results from the Swedish expedition 1934 to Burma and British India. *Arkiv för Zoologi*, 6(32): 563–567.
- Guignot F (1959) Revision des hydrocanthares d'Afrique (Coleoptera Dytiscoidea). *Annales du Musée Royal du Congo Belge, Série in 8°, Sciences Zoologiques*, 78: 323–648.
- Hájek J (2003) Dytiscidae: III. The genus *Laccophilus* Leach in China (Coleoptera). In: Jäch MA & Ji L (eds.) *Water Beetles of China, Volume III. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein*, Wien. Pp. 115–123.
- Hendrich L. & Balke M (1995) Die Schwimmkäfer der Sunda-Insel Bali: Faunistik, Taxonomie, Ökologie, Besiedlungsgeschichte und Beschreibung von vier neuer Arten (Insecta: Coleoptera: Dytiscidae). *Faunistische Abhandlungen, Staatliches Museum für Tierkunde Dresden*, 20: 29–56.
- Jäch MA & Ji L (2003) China water beetles survey (1999–2001). In: Jäch MA & Ji L (eds.) *Water Beetles of China, Volume III. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein*, Wien. Pp. 1–20.
- Leach WE (1815) *Entomology*. In: Brewster D (ed.) *The Edinburgh Encyclopaedia. Volume 9. Part 1. Baldwin, Edinburgh*. Pp. 57–172.
- Miller KB & Nilsson AN (2003) Homology and terminology: Communicating information about rotated structures in water beetles. *Latissimus*, 17: 1–4.
- Nilsson AN (1995) *Noteridae and Dytiscidae: Annotated check list of the Noteridae and Dytiscidae of China (Coleoptera)*. In: Jäch MA & Ji L (eds.) *Water Beetles of China, Volume I. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein*, Wien. Pp. 35–96.
- Nilsson AN (2014) *A world catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga)*. Version 1. January 2014. <http://www2.emg.umu.se/projects/biginst/andersn/> (Accessed 2 April 2014).
- Pederzani F. 1995: Keys to the identification of the genera and subgenera of adult Dytiscidae (sensu lato) of the world (Coleoptera Dytiscidae). *Atti dell'Accademia Roveretana degli Agiati, Contributi della Classe di Scienze Matematiche, Fisiche e Naturali, (7:4B) 244(1994)*: 5–83.
- Régimbart M. 1895: Dytiscides trouvés dans les tabacs par les soins de M. Antoine Grouvelle. *Annales de la Société Entomologique de France*, 64: 321–348 + pl. 8: figs. 3–18.
- Régimbart M (1899) Révision des Dytiscidae de la région Indo-Sino-Malaise. *Annales de la Société Entomologique de France*, 68: 186–367.
- Régimbart M (1902) Voyage du Dr W. Horn à Ceylan. Coléoptères aquatiques. *Annales de la Société Entomologique de France*, 71: 468–475.
- Sharp D (1882) On aquatic carnivorous Coleoptera or Dytiscidae. *Scientific Transactions of the Royal Dublin Society (2)* 2: 179–1003, pls. 7–18.
- Vazirani TG (1969) Contribution to the study of aquatic beetles (Coleoptera). 2. A Review of the subfamilies Noterinae, *Laccophilinae*, *Dytiscinae* and *Hydroporinae* (in part) from India. *Oriental Insects*, 2(1968): 221–341.
- Vazirani TG (1972) Contribution to the study of aquatic beetles. 13. A collection of Dytiscidae from Nilgiri Hills, South India, with the description of a new species. *Proceedings of the Zoological Society of Calcutta*, 25: 117–122.
- Watts CHS (1978) A revision of the Australian Dytiscidae (Coleoptera). *Australian Journal of Zoology, Supplementary Series*, 57: 1–166.
- Zimmerman JR (1970) A taxonomic revision of the aquatic beetle genus *Laccophilus* (Dytiscidae) of North America. *Memoirs of the American Entomological Society*, 26: 1–275.
- Zimmermann A (1919) Die Schwimmkäfer des Deutschen Entomologischen Museums in Berlin-Dahlem. *Archiv für Naturgeschichte*, 83(1917)(A 12): 68–249.