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Two new species of *Laccophilus* Leach, 1815 (Coleoptera: Dytiscidae) from India and Borneo with notes on other species of the genus

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Abstract. *Laccophilus boukali* sp. nov. (*L. chinensis*-group) from Karnataka, India, and *L. uncletan* (*L. siamensis*-group) from Sabah, Malaysia are described, illustrated and compared with related species. New distributional data are published for the following species: *L. chinensis* Boheman, 1858 from Cambodia and Malaysia; *L. chini* Balke, Mazzoldi & Hendrich, 1998 from Laos; *L. flexuosus* Aubé, 1838 from Laos; *L. punctatissimus* Brancucci, 1983 from Myanmar; *L. ritsemae* Régimbart, 1880 from Lombok; *L. t. transversalis* Régimbart, 1877 from Sulawesi; *L. t. leptogonus* Brancucci, 1983 from Laos, Thailand and Malaysia; and *L. t. lituratus* Sharp, 1882 from Sumatra.

Key words. Dytiscidae, *Laccophilus*, new species, new records, Oriental Region

Introduction

The cosmopolitan genus *Laccophilus* Leach, 1815 comprises 256 species; 50 of them are recorded from the Oriental Region (Nilsson 2001, 2004). The taxonomy of Oriental *Laccophilus* is comparatively well known – mainly due to the excellent revision of Palaearctic, Oriental and Australian species by Brancucci (1983), who redescribed all the known species and added several new ones. More recently, single descriptions of new species were published by Balke & Hendrich (1997), Balke et al. (1998), Hendrich & Balke (1995, 1998), Rocchi (1986) and Toledo et al. (2002).

The extensive study of *Laccophilus* material housed predominately in the Naturhistorisches Museum Wien, as well as recent fieldwork in Sabah revealed two new species, which we describe below, and yielded several new distributional records of other species.

Material and methods

Male genitalia were studied and illustrated in temporary glycerine mounts under a Leica transmitted light microscope; they were subsequently washed in 10% solution of KOH and distilled water and mounted in DMHF on the same card as the beetle.

Exact label data are cited for the type material. A forward slash (/) separates different lines and a double slash (//) different labels of data. Additional remarks are found in square brackets.

All studied material is deposited in the following institutional and private collections:

JSCL coll. Jaroslav Šťastný, Liberec, Czech Republic;
NMPC Národní Muzeum, Praha, Czech Republic (Jiří Hájek);
NMW Naturhistorisches Museum Wien, Austria (Manfred A. Jäch).

Taxonomy

Laccophilus boukali sp. nov.

(Figs. 1, 3)

Type locality. India, Karnataka, Coorg, Kakkabe env.
Type material. HOLOTYPE: ♂, 'INDIA: Karnataka, Coorg / Kakkabe env., 21.12.1998 / 12°15′N 75°35′E, 900 - 1200m / leg. D. Boukal (12) [printed] // HOLOTYPE / LACCOPHILUS / boukali sp. nov. / J. Hájek & J. Šťastný det. 2005' [printed, red label] (NMW). PARATYPES: 2 ♀♀, same label data as holotype (NMW). 1 ♂, 'INDIA: Karnataka, Coorg / Madikeri env., 19.12.1998 / 1300m, Talakaveri / 12°23′N 75°30′E / leg. D. Boukal (5)' (NMPC). Each paratype is provided with a red label similar to that of the holotype, except 'PARATYPE' instead of 'HOLOTYPE', the respective sex symbol and collection number.

Description. Oval and oblong; head and pronotum testaceous, larger part of elytra brown with testaceous pattern as depicted in Fig. 1. Ventral parts and appendages testaceous.

Measurements. Body length 3.20-3.35 mm (mean value = 3.26 mm, holotype 3.20 mm), width 1.80-1.85 mm (mean value = 1.81 mm, holotype 1.80 mm).

Head. Coloration testaceous, in some specimens with indistinct light brown markings. Reticulation double, composed of moderately deeply impressed transverse polygonal meshes on anterior part and irregular meshes on posterior part, and microreticulation of very fine round meshes. Mouthparts testaceous.

Pronotum. Coloration testaceous, with two small brown spots at basal margin, and with anterior margin slightly darkened. Reticulation double, similar to that of head, but meshes larger. Anterior margin and posterior angles with numerous punctures.

Elytra. Elytral disc brown with testaceous markings, lateral parts testaceous. Subbasal testaceous band with anterior border almost straight, posterior border with distinct elongation near elytral suture and in most specimens also with smaller discal elongation. Subapical band divided into five longitudinal stripes. Remaining elytral surface with sinuous stripes, often indistinct in middle third of elytra, but widening apically, with elytral apex nearly testaceous in some specimens. Reticulation on whole elytra distinctly double, composed of irregular

polygonal meshes and microreticulation, which is moderately deeply impressed and more distinct than on head or pronotum. Each elytron with sutural, discal and lateral row of large serial setigerous punctures.

Ventral side. Testaceous and microreticulated. Prosternal process long and acute. Abdominal sternites laterally with oblique grooves. Anal sternite tectiform, its surface with large punctures, setae and transverse grooves.

Legs. Completely testaceous. Male tarsomeres 1-3 of fore and middle legs weakly dilated with microtrichia on ventral side. Claws of fore tarsi simple and equal, as well as those of mid tarsi.

Male genitalia. Shape of median lobe as in Fig. 3.

Female. Similar to male; tarsomeres of fore and middle legs not dilated.

Differential diagnosis. Based on the double reticulation of pronotum and elytra and the elytral pattern (brown sinuous stripes), the new species belongs to the *Laccophilus chinensis*-group as defined by BRANCUCCI (1983). Among the Oriental species of this group, the new species is similar to *L. ritsemae* Régimbart, 1880, which it resembles in the habitus, body length and coloration. Both species can only be distinguished by the male genitalia. The median lobe of *L. boukali* sp. nov. is short and broad with a distinct ventral angle in the middle third of its length, while the median lobe of *L. ritsemae* is long and slender with its ventral edge sinuous. From other sympatrically occurring species, *L. inefficiens* (Walker, 1859) and *L. kaszabi* Brancucci, 1983, the new species differs by the generally smaller size and the different shape of the median lobe.

Distribution. So far known only from two close localities in Karnataka state in south-western India.

Bionomy. The specimens from Kakkabe were collected in a larger stream with the main channel ca 5 m wide, with large boulders, a rocky bed with some stones and gravel in riffles and silt in pools. The specimen from Madikeri was collected in an artificial reservoir at a hilltop; the examined site had a dense shore vegetation, muddy bed, and was little shaded (D. S. BOUKAL in litt.).

Etymology. The new species is dedicated to its collector David S. Boukal (České Budějovice, Czech Republic), our friend, theoretical mathematician, photographer, and specialist on the Dryopoidea.

Laccophilus uncletan sp. nov.

(Figs. 2, 4)

?*Laccophilus chini* Balke, Mazzoldi & Hendrich, 1998: 72 (partim).

Type locality. Malaysia, Sabah, Kinabatangan river, Uncle Tan's camp.

Type material. HOLOTYPE: ♂, 'Malaysia, Sabah / Kinabatangan riv.[er] / 8.-15.6.[20]03, Uncle Tan's / camp, J. Šťastný lgt. [printed] // HOLOTYPE / LACCOPHILUS / uncletan sp. nov. / J. Hájek & J. Šťastný det. 2005' [printed, red label] (NMPC). PARATYPES: 2♂♂ 5♀♀, same label data as holotype (JSCL, NMPC, NMW). Each paratype is provided with a red label similar to that of the holotype, except 'PARATYPE' instead of 'HOLOTYPE', the respective sex symbol and collection number.

Description. Oval and oblong; head testaceous, pronotum testaceous with blackish basal band and two subbasal spots, elytra blackish with testaceous pattern as depicted in Fig. 2. Ventral parts and appendages testaceous.

Measurements. Body length 3.50-3.80 mm (mean value = 3.62 mm, holotype 3.65 mm), width 1.83-1.95 mm (mean value = 1.88 mm, holotype 1.85 mm).

Head. Coloration testaceous with indistinct darker spots. Reticulation double, composed of almost imperceptible polygonal meshes, and microreticulation of fine isodiametric meshes. Frons between eyes and clypeus with several large punctures. Mouthparts testaceous.

Pronotum. Coloration testaceous with thin basal blackish band and two subbasal blackish spots. Reticulation double, composed of slightly impressed large polygonal meshes and microreticulation of fine isodiametric meshes similar to that of head. Anterior margin, basal margin and posterior angles with numerous setigerous punctures.

Elytra. Coloration blackish with testaceous markings comprising subbasal transverse sinuous band, mediolateral spot, subapical transverse sinuous band and apical spot. Sutural part of elytra blackish; in some specimens all testaceous markings connected in epipleural part. Reticulation on whole elytra distinctly double, similar to that of pronotum. Each elytron with sutural, discal and lateral row of large serial setigerous punctures.

Ventral side. Testaceous and microreticulated. Prosternal process long and acute. Abdominal sternites laterally with oblique grooves and several large punctures. Posterior margin of anal sternite prominent medially with cluster of setigerous punctures, and moderately incised laterally.

Legs. Completely testaceous. Male tarsomeres 1-3 of fore and middle legs only weakly dilated with microtrichia on ventral side. Claws of fore as well as middle tarsi simple and equal.

Male genitalia. Shape of median lobe and parameres as in Fig. 4.

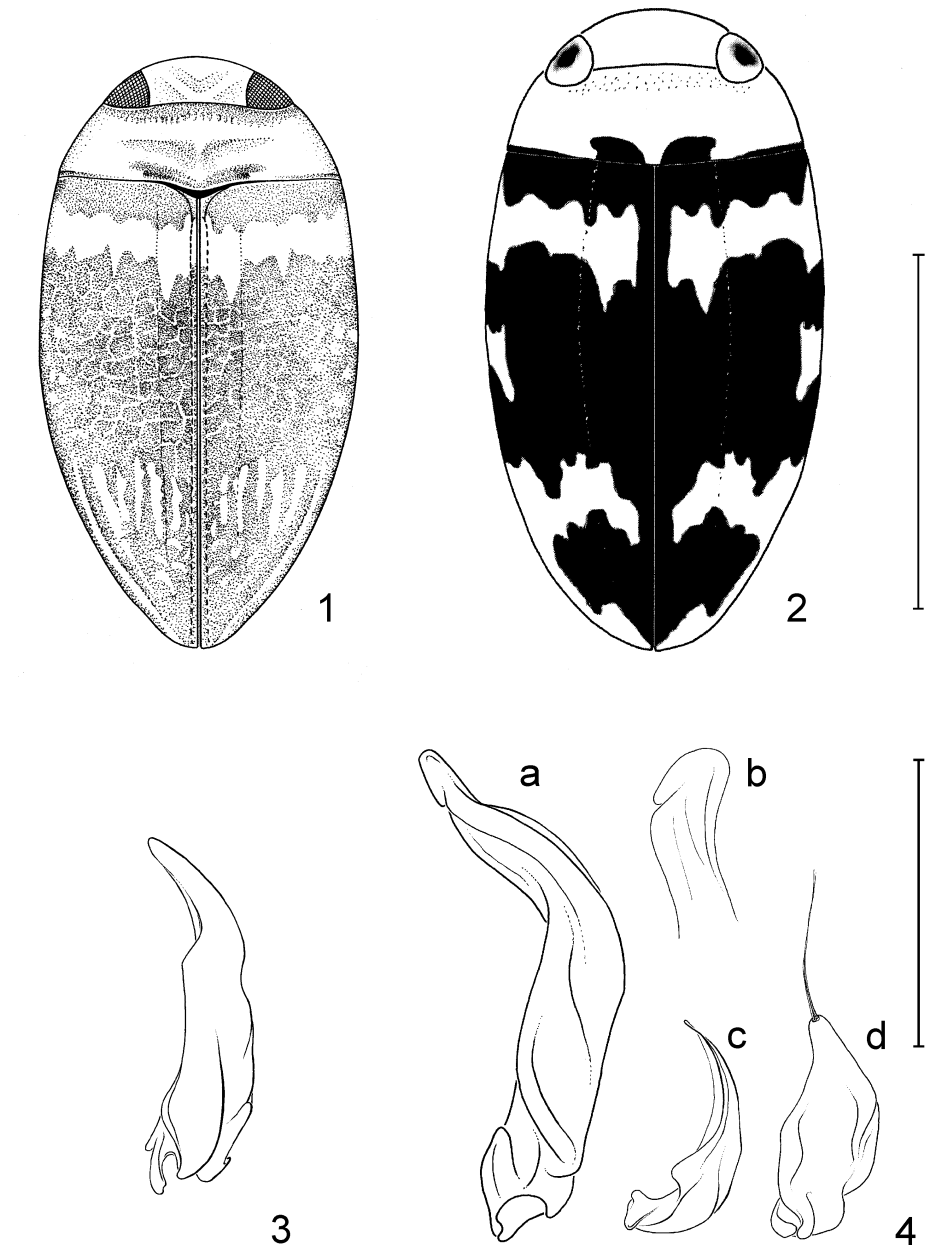
Female. Generally similar to male. Posterior margin of anal sternite laterally only slightly incised, medially more prominent than in male, with truncate apex. Tarsomeres of fore and middle tarsi not dilated.

Differential diagnosis. Based on the double elytral reticulation and the long and acute prosternal process, the new species is classified into the *Laccophilus siamensis*-group sensu BRANCUCCI (1983). Its sister species is *L. chini* Balke, Mazzoldi & Hendrich, 1998, from which *L. uncletan* sp. nov. can be reliably distinguished only by the male genitalia. In *L. uncletan* sp. nov. the median lobe is more slender, ventrally without a subbasal rectangular spur, and has an almost rounded apex.

Distribution. Known only from northern Sabah state (Malaysia).

Bionomy. The specimens were collected in primary lowland forest in a shallow oxbow of the river Kinabatangan together with *L. bacchusi* Brancucci, 1983, *L. ritsemae* Régimbart, 1880 and *L. s. siamensis* Sharp, 1882. They inhabited muddy water near the banks of small drains flowing to the oxbow. The substrate was silty with accumulated decaying leaves.

Etymology. This species is dedicated to Mr. Tan Su Lim known as 'Uncle Tan', an enthusiastic supporter of ecology popularisation and a leading environmentalist in Sabah. The noun is used in apposition.



Figs 1-4. 1, 3 – *Laccophilus boukali* sp. nov. 1 – habitus; 3 – median lobe in lateral view. 2, 4 – *L. uncletan* sp. nov. 2 – habitus; 4 – aedeagus (a – median lobe in lateral view; b – apex of median lobe in dorsal view; c – left paramere; d – right paramere). Scale bars: 2 mm (Figs 1-2); 0.5 mm (Figs 3-4).

New records

Laccophilus chinensis Boheman, 1858

Material studied. 1 ♀, **CAMBODIA**, Ban Lok, 14°05′N 106°52′E, 6.-15.iv.1999, J. Mlíkovský leg. (NMPC). 1 ♂, **THAILAND**, Taleban [= Thale Ban, SATUN Prov.] (See), 6°43′N 100°10′E, 80 m a.s.l., 7.-8.v.1993, Malicky leg. (NMPC). 1 ♂, **MALAYSIA**, KEDAH, Langkawi, Pantai Kok, 30.i.1992, M. A. Jäch leg. (14) (NMW).

Previously recorded from border area between the Palaearctic and Oriental Regions – Nepal, Bhutan, northern India, Bangladesh, Myanmar, southern China, Ryukyu Islands, northern Thailand, northern Laos and northern Vietnam (BRANCUCCI 1983, HÁJEK 2003). The present records extend the distribution area of *L. chinensis* southwards in continental Southeast Asia. First records from Cambodia and Malaysia.

Laccophilus chini Balke, Mazzoldi & Hendrich, 1998

Material studied. 3 ♂♂, **LAOS**, KHAMMOUAN Prov., Nakai env., 17°43′N 105°09′E, 500--600 m a.s.l., 22.v.-8.vi.2001, E. Jendek & O. Šauša leg. (NMPC). 1 ♂ 1 ♀, **LAOS**, VIENTIANNE Prov., 55 km NE Vientianne, Lao Pako env., 200 m a.s.l., 1.-4.v.2004, J. Bezděk leg. (NMPC).

The species was described from southern Vietnam and Malaysia (Pahang) by BALKE et al. (1998). We could not study the specimen they recorded from Sabah, but we expect that it represents *L. uncletan* sp. nov. First record of *L. chini* from Laos.

Laccophilus flexuosus Aubé, 1838

Material studied. 2 ♂♂ 1 ♀, **LAOS**, KHAMMOUAN Prov., Nakai env., 17°43′N 105°09′E, 500-600 m a.s.l., 22.v.-8.vi.2001, E. Jendek & O. Šauša leg. (NMPC).

Widely distributed Oriental species, known from Nepal, India, Sri Lanka, Myanmar, China, Japan, Vietnam and Cambodia (BRANCUCCI 1983). First record from Laos.

Laccophilus punctatissimus Brancucci, 1983

Material studied. 2 ♂♂ 2 ♀♀, **MYANMAR**, SAGAING Division, Chatthin Wildlife Sanctuary, Kinsan Camp, 23°33.017′N 95°34.851′E, 210 m a.s.l., 13.x.1998, H. Schillhammer leg. (14) (NMPC, NMW).

Described from Pakistan, India, Nepal and Bangladesh (BRANCUCCI 1983). First record from Myanmar.

Laccophilus ritsemae Régimbart, 1880

Material studied. 1 ♂, **INDONESIA**, LOMBOK, Ampenan [8°33′S 116°05′E], at light, 15.vi.1984, G. De Rougemont leg. (NMW).

Distributed in the Malayan Peninsula and the western part of Indonesian Archipelago – Sumatra, Java, Borneo and Bali (BRANCUCCI 1983, HENDRICH & BALKE 1995). First record from Lombok.

Laccophilus transversalis transversalis Régimbart, 1877

Material studied. 1 ♂, **INDONESIA**, SULAWESI [Sulawesi Tenggara], Rawa Aopa Nat. Park, Aopa vill., 8.-10.ii.1994, M. Štrba & I. Jeniš leg. (NMW).

Widely distributed in the Oriental and Australian Region. The nominotypical subspecies was recorded from Philippines, New Guinea and northern Australia (BRANCUCCI 1983, BALKE et al. 1997). First record from Sulawesi.

Laccophilus transversalis leptogonus Brancucci, 1983

Material studied. 1 ♂, **THAILAND**, 13 km W Hat Yai [SONGKHLA Prov.], 06°59'N 100°22'E, 50 m a.s.l., 10.v.1993, Ban Ko Muang & H. Malicky leg. (NMW). 1 ♂, **LAOS**, VIENTIANE Prov., Vang-Vieng, 18°55′23″N 102°26′55″E, 300 m a.s.l., 10.-15.v. & 01.-06.vi.2001, Jiří Kolibáč leg. (NMPC). 2 ♂♂ 2 ♀♀, **MALAYSIA**, PAHANG, Kuala Lipis surr. [04°11′N 102°02′E], 60 m a.s.l., small pools in secondary forest, 13.iv.1997, Balke & Hendrich leg. (NMPC, further specimens in coll. Hendrich, Berlin).

This taxon was described from eastern Sumatra. Although BRANCUCCI (1983) considered it as a subspecies and presented specimens from Vietnam with median lobe intermediate to *L. t. lituratus*, its status remains unresolved. The currently known distribution of *L. t. leptogonus* and *L. t. lituratus* does not support the hypothesis of geographical subspecies (see also under *L. t. lituratus*). We believe that *L. t. leptogonus* represents a separate species, but more material is desirable to answer the question. First records from Thailand, Laos and Malaysia.

Laccophilus transversalis lituratus Sharp, 1882

Material studied. 1 ♂, **INDONESIA**, SUMATRA, Dolok Merangir, 03°07′N 99°11′E, 21.ii.1991, Malicky leg. (NMW).

This subspecies was recorded from continental Southeast Asia – China, Thailand, Vietnam and Cambodia (BRANCUCCI 1983, HÁJEK 2003). The present finding from Sumatra represents the first record from Indonesia and the Sunda Islands.

Discussion

Although the monophyly of species groups used by GUIGNOT (1959) and BRANCUCCI (1983) was recently questioned by BALKE et al. (1997), we used the Brancucci's species group criteria as a reference system for taxonomic purposes. Both newly described species are externally very similar to previously known and widely distributed species (*L. boukali* sp. nov. to *L. ritsemae*; *L. uncletan* sp. nov. to *L. chini*) and should represent vicariant species (continental vs. island taxa). Their reliable identification requires the study of male genitalia.

Both species are so far only known from their type localities. However, only few *Laccophilus* are narrowly endemic, and one might expect a wider distribution also for *L. boukali* and *L. uncletan* as more extensive collections become available.

Acknowledgements

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