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A review of Indomalayan *Lacconectus* Motschulsky, 1855 (Coleoptera: Dytiscidae: Copelatinae)

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Three new species of the *Lacconectus fulvescens* species group and two new species of the *L. pulcher* species group (Brancucci 1986) from Malaysia are described: *Lacconectus balkei* sp.n. (West Malaysia: Cameron Highlands, Genting Highlands), *L. kelantanensis* n. sp. (West Malaysia: Kelantan), *L. heubergeri* n. sp. and *L. rutilans* n. sp. (Sarawak), and *L. stastnyi* n. sp. (Sarawak, Sabah: Maliau Basin). Distributional and ecological notes are given on other species of the genus, namely *L. basalis* Sharp, 1882, *L. corayi* Brancucci, 1986, *L. javanicus* Brancucci, 1986, *L. krikkeni* Brancucci, 1986, *L. minutus* Brancucci, 1986, *L. muluensis* Brancucci, 1986, *L. oceanicus* Régimbart, 1899, *L. ponti* Brancucci, 1986, *L. pulcher* Brancucci, 1986, *L. punctipennis* Zimmermann, 1928, *L. ritsemae* Régimbart, 1883, *L. sabahensis* Brancucci, 1986 and *L. schoenmanni* Brancucci, 2002. *Lacconectus corayi* Brancucci, 1986 and *L. punctipennis* Zimmermann, 1928 are recorded for the first time from Borneo. The habitats and behaviour of the Indomalayan *Lacconectus* are briefly discussed and illustrated. A key is given for the 19 species described from or occurring in Malaysia and Indonesia. The total number of described species in the genus *Lacconectus* is now 68.

Key words: Dytiscidae, *Lacconectus*, Malaysia, Indonesia, new species, key, faunistics, ecology, zoogeography.

INTRODUCTION

The Oriental dytiscid genus *Lacconectus* (subfamily Copelatinae) was revised by Brancucci (1986). Additional publications by Brancucci (1987, 1989, 2002, 2003a, 2003b, 2004, in press), Hendrich (1998) and Brancucci & Gusich (2004) have increased knowledge of the genus, giving a total of 63 recognised species that are classified into three species groups. New data on the distribution and ecology of some Indomalayan species were published by Hendrich (1995), Hendrich & Balke (1995), Hendrich & Yang (1999), Hendrich *et al.* (2004), and Balke *et al.* (2004). For many of the Indomalayan species, only the type specimens from a single locality were previously known, and almost nothing was known about their ecology and habitat selection.

The material dealt with in this paper was collected during several field trips between the years 1994 and 2001 by Michael Balke and Lars Hendrich to Singapore and West Malaysia; by Manfred Jäch, (†) Stefan Schödl, Rudi Schuh and Harald Schillhammer (Vienna, Austria) to Sumatra, Java and Sarawak; by the staff of the Zoological Reference Collection in Singapore (e.g. Yang Chan Man), by Jan Kodada (Bratislava, Slovakia), Jaroslav Štastný (Liberec, Czech Republic), Robert

Bouwer (Frankfurt a. Main, Germany) and Ashley Kirk-Spriggs (formerly of Cardiff, Wales) to the Malaysian part of Borneo (Sabah and Sarawak) and Brunei.

Here we give an overview of the species recorded from Malaysia and Indonesia and describe three new species in the *L. fulvescens* species group and two new species in the *L. pulcher* species group sensu Brancucci (1986) from West Malaysia, Sarawak and Sabah, thereby raising the number of known *Lacconectus* species to 68. Furthermore, distributional and ecological notes on a number of Indomalayan species are presented.

MATERIAL AND METHODS

Most of the specimens obtained by the authors were collected using different kinds of aquatic dip nets and metal kitchen strainers. Leaf litter in small water-bodies was collected up; the material obtained was then placed on a white nylon sheet, 1 m x 1 m, or on a white plastic box. The highly mobile *Lacconectus* were sorted with forceps and/or an aspirator. Some specimens were obtained by operating pitfall traps and a flight interception trap (FIT). All specimens were either preserved in 75 % alcohol or pinned dry.

The specimens mentioned in this work are deposited in several private and institutional collections which are abbreviated in the text as follows:

BPBM	=	Bernice P. Bishop Museum, Honolulu, Hawaii
CAN	=	Collection Dr. Anders Nilsson, Umeå, Sweden
CHB	=	Collection Dr. Lars Hendrich, Berlin, Germany
CJS	=	Collection Jaroslav Štastný, Liberec, Czech Republic
CM	=	Collection Paolo Mazzoldi, Brescia, Italy
CP	=	Collection Fernando Pederzani, Ravenna, Italy
CW	=	Collection Prof. Dr. Günther Wewalka, Vienna, Austria
TDMB	=	Természettudományi Múzeum, Budapest, Hungary
MHNG	=	Muséum d'Histoire Naturelle, Geneva, Switzerland
NMB	=	Naturhistorisches Museum Basel, Schweiz
NMW	=	Naturhistorisches Museum Wien, Vienna, Austria
NMWC	=	National Museum of Wales, Cardiff, England
SMNS	=	Staatliches Museum für Naturkunde, Stuttgart, Germany
UMS	=	University Malaysia Sabah, Kota Kinabalu, Malaysia
ZRC	=	Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore, Singapore

This study is based on the examination of about 3000 specimens, most of them deposited in NMB, NMW and CHB. Type specimens were re-examined for all problematic species. The style of the descriptive notes follows Brancucci (1986, 2002).

Abbreviations: TL = Total length, TL-h = Total length without head, TW = Total width.

Checklist of *Lacconectus* species from Malaysia and Indonesia

<i>L. balkei</i> n. sp.	West Malaysia: Cameron and Genting Highlands
<i>L. basalis</i> Sharp, 1882	Myanmar, Thailand, West Malaysia, Vietnam, Cambodia, Laos, S China
<i>L. corayi</i> Brancucci, 1986	Malaysia: West Malaysia, Borneo: Sabah
<i>L. heubergeri</i> n. sp.	Malaysia: Sarawak
<i>L. jaechi</i> Brancucci, 2002	Indonesia: Sumatra
<i>L. javanicus</i> Brancucci, 1986	Indonesia: Java

<i>L. kelantanensis</i> n. sp.	West Malaysia: Kelantan
<i>L. krikkeni</i> Brancucci, 1986	Malaysia: West Malaysia, Sabah, Sarawak; Brunei; Indonesia: Java
<i>L. minutus</i> Brancucci, 1986	Indonesia: Sumatra
<i>L. muluensis</i> Brancucci, 1986	Borneo: Sarawak, Sabah
<i>L. oceanicus</i> Régimbart, 1899	Indonesia: Sumatra, Mentawai
<i>L. ponti</i> Brancucci, 1986	West Malaysia: Cameron Highlands
<i>L. pulcher</i> Brancucci, 1986	Borneo: Brunei, Sabah, Sarawak
<i>L. punctipennis</i> Zimmermann, 1928	Indonesia: Sumatra, Java, Bali; Brunei; Malaysia: Sabah
<i>L. ritsemae</i> Régimbart, 1883	Indonesia: Java
<i>L. rutilans</i> n. sp.	Borneo: Sarawak
<i>L. sabahensis</i> Brancucci, 1986	Borneo: Sabah
<i>L. schoedli</i> Brancucci, 2002	Indonesia: Sumatra
<i>L. schoenmanni</i> Brancucci, 2002	Indonesia: Sumatra
<i>L. stastnyi</i> n. sp.	Borneo: Sabah, Sarawak

TAXONOMY

Lacconnectus fulvescens species group Brancucci (1986)*Lacconnectus balkei* n. sp.

Figs 19, 20, 40, 41

Type locality: Isolated, small residual pools in an intermittent spring, Tanah Rata, Cameron Highlands, West Malaysia.

Type material: **Holotype** ♂: «West Malaysia, Provinz Perak, Cameron Highlands, Tanah Rata, Gunung Jasar (track 11), 1500 m, 13. & 15.6.1994 (MA 3), Hendrich leg.» (NMW). **Paratypes**: 209 ex.: 55 ex. with the same data as holotype; 154 ex.: «West Malaysia/Cameron Highlands, Tanah Rata, MA 3, Gunung Jasar, track 11, 1500 m, 16.12.1996, Hendrich leg.» (CHB, CM, CP, CW, NMB, NMW).

Additional material studied: 17 ex.: «West Malaysia, Province Perak, Genting Highlands Jungle track near Awana Resort, 1200 m, 28.6.1994 (MA 9), Hendrich leg.» (CHB).

Description: Body small, oval, shining, head and pronotum testaceous, elytra brown with dark brown markings. Lateral margins of elytra darker towards apex.

Head testaceous, dark brown on vertex and alongside eyes. Reticulation consisting of small well-impressed polygonal meshes with small but distinctly visible punctures particularly numerous on disc. Clypeal grooves, punctures alongside eyes and transverse depression alongside eyes distinctly impressed. Antennae testaceous, fifth joint 1.6 times as long as broad.

Pronotum testaceous, slightly darkened on disc. Microsculpture consisting of small rounded meshes and of numerous evenly distributed minute punctures. Median suture distinctly visible. Anterior and lateral rows of punctures and punctures at middle of each latero-basal quarter coarse; punctures not coalescent even if close and deeply impressed. Lateral sides finely bordered; furrow fine, distinctly interrupted before reaching anterior edge.

Elytra brown, base and lateral margins dark brown, shining and with a shaft-greened lustre. In some well-coloured specimens a basal band is discernible. Microsculpture consisting of superficially impressed elongate meshes even at base, soon giving way to a fine striolation and disappearing after basal third. Very small punctures evenly distributed on the whole surface. Sutural row of punctures with few punctures on apical third. Discal and sublateral rows largely interrupted before

anterior margin, in a straight line but not complete, punctures more or less grouped. Interspace between discal and sublateral rows with large punctures on the middle.

Underside ferruginous-brown. Legs ferruginous-brown. Prosternal process short, ovoid, 1.3 times as long as broad, bordered at sides, broadly rounded at apex. Metacoxal lines represented only by a deep and short striae at their mid-length. Sternites 3, 4 and 5 each with sparse and irregularly distributed medium-sized punctures at middle. Anal sternite microstriolate with a group of coalescent punctures on each side of the middle. Posterior margin finely bordered and broadly rounded.

Measurements: Holotype: TL = 5.25 mm, TL-h = 4.75 mm; TW = 2.85 mm. Paratypes: TL = 4.70–5.25 mm (4.98 mm, n = 10), TL-h = 4.30–4.75 mm (4.54 mm); TW = 2.60–2.90 mm (2.79 mm).

♂. Aedeagus, in lateral view, evenly tapered and narrowly pointed at apex (Fig. 19). Specimen from the Genting Highlands (Fig. 20). Parameres very short and very broad (Fig. 40). Specimen from the Genting Highlands (Fig. 41).

♀. Similar to male; elytral striolation slightly more impressed at base. Valvae long and slender, flattened and narrow apically, seta ventral and subapical.

Etymology: Dedicated to our friend and colleague Dr. Michael Balke (Munich).

Affinities: The species is very similar to *L. schoenmanni* Brancucci, 2002. It can however be easily distinguished by its larger size and by the strongly shining elytra. In addition, the aedeagus, which in lateral view is strongly narrowed at apex, is characteristic for only this species.

Habitat: In the Cameron Highlands in small (20 to 40 cm²), shaded and shallow (1 to 4 cm depth) residual pools of an intermittent spring in mountain rain forest; sandy bottom with few rotten leaves (Fig. 58). Here, *L. balkei* co-occurs with *L. ponti* Brancucci, 1986 and an undescribed *Copelatus* species. The specimens in the Genting Highlands were collected in small, shaded and shallow (4 cm depth) residual pools at the edge of a fast-flowing stream with a sandy and gravelly bottom and a thin layer of rotten leaves. At this locality *L. balkei* co-occurs with *L. krikkeni* Brancucci, 1986.

Distribution: Cameron Highlands and Genting Highlands in West Malaysia, at an altitude between 1200 and 1500 m.

Lacconectus kelantanensis n. sp.

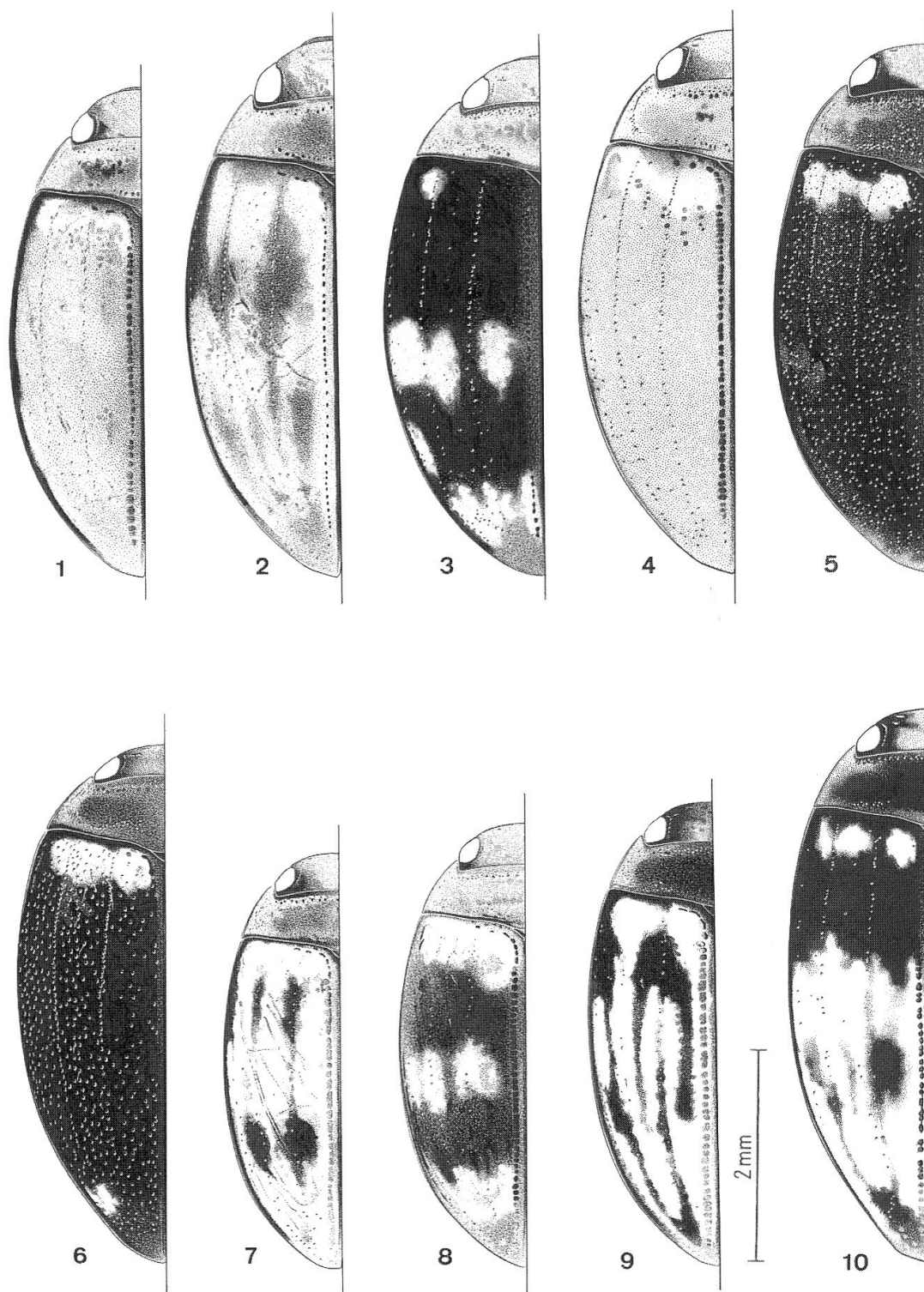
Figs 26, 47

Type locality: Gerik, Kelantan Province, West Malaysia.

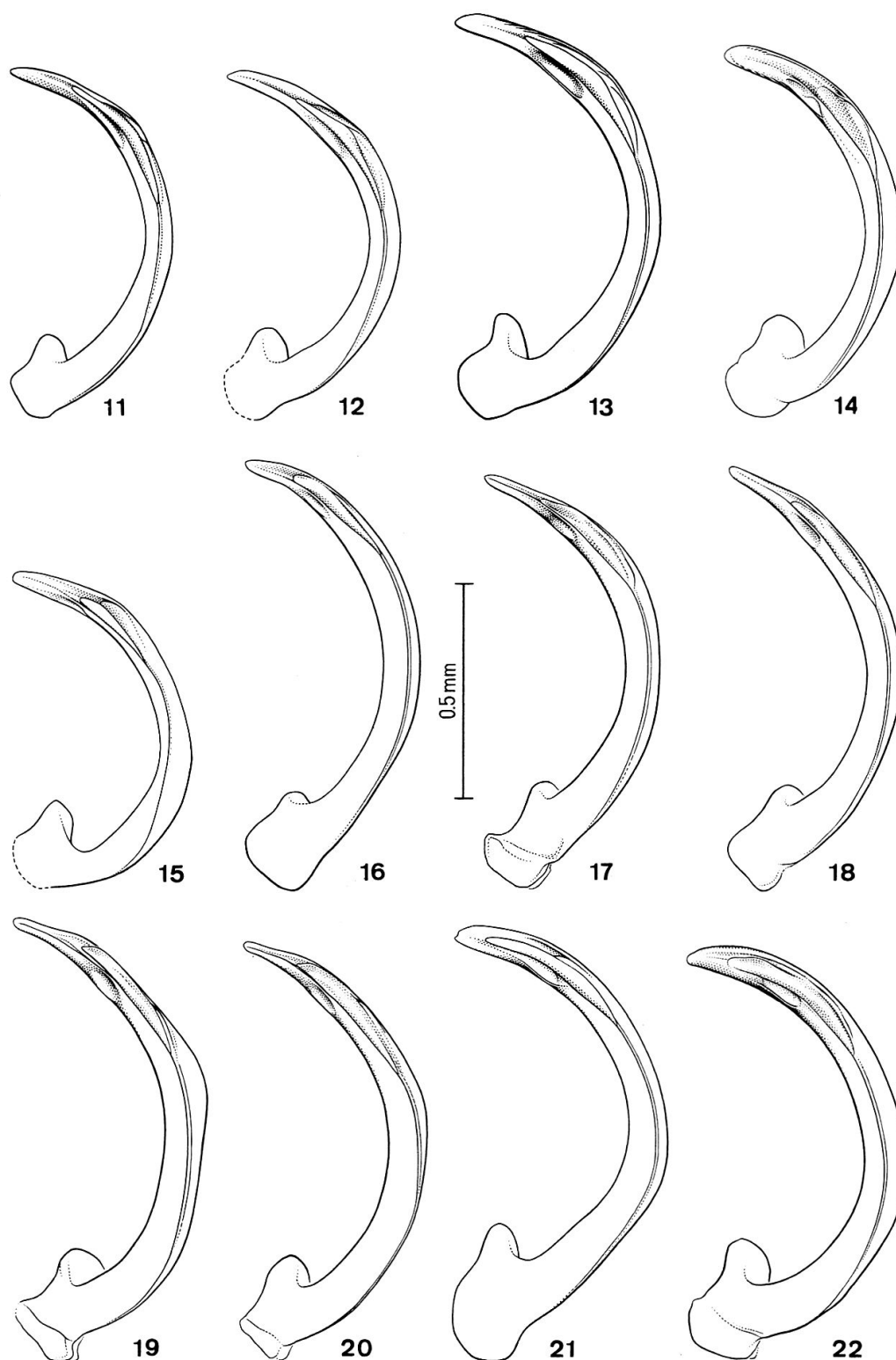
Type material: **Holotype** ♂: «Malaysia, Kelantan, 3.II.1992, 100 km Ö Gerik, leg. Jäch (21)» (NMW). **Paratypes**: 1 ♂, same locality (NMB); 1 ♂, «Malaysia, Kelantan Jelawang Jungle Dabong, (WGS 84) 05°20'27"N, 101°58'49"E 21.–22.7.2001, lgt. R. Fouqué & H. Barlova» (CJS).

Description: Body small, oval, shining, brown, slightly paler on front, on anterior part of head and sides of pronotum, distinctly so on base of elytra. Lateral margins of elytra darker almost as far as apex.

Head ferruginous-brown, darker alongside eyes. Surface sculpture consisting of small, almost rounded, slightly impressed meshes and of minute punctures, particularly numerous on disc. Clypeal grooves, punctures alongside eyes and transverse depression beside eyes weakly impressed. Antennae testaceous; joints slender, fifth 1.7 times as long as broad.



Figs 1–10: Habitus of: 1, *Lacconnectus jaechi* Brancucci. 2, *L. schoenmanni* Brancucci. 3, *L. schoedli* Brancucci. 4, *L. basalis* Sharp. 5, *L. punctipennis* Zimmermann. 6, *L. stastnyi* n. sp. 7, *L. heubergeri* n. sp. 8, *L. rutilans* n. sp. 9, *L. pulcher* Brancucci. 10, *L. sabahensis* Brancucci.



Figs 11–22: Aedeagus of: 11, *Lacconectus minutus* Brancucci. 12, *L. oceanicus* Régimbart. 13, *L. ritsemæ* Régimbart. 14, *L. jaechi* Brancucci. 15, *L. muluensis* Brancucci. 16, *L. krikkeni* Brancucci. 17, *L. corayi* Brancucci. 18, *L. ponti* Brancucci. 19, *L. balkei* n. sp., specimen from Cameron Highlands. 20, *L. balkei* n. sp., specimen from Genting Highlands. 21, *L. javanicus* Brancucci. 22, *L. schoenmanni* Brancucci.

Pronotum ferruginous-brown, distinctly darker on disc. Microsculpture consisting of small, almost rounded, well-impressed meshes, particularly at sides, and of minute but deep punctures; the latter dense at sides. Longitudinal median suture very distinct. Anterior and lateral rows of punctures and punctures at middle of each latero-basal quarter coarse; punctures not really coalescent but deeply impressed. Lateral sides finely bordered; furrow fine, becoming obsolete anteriorly and interrupted before reaching anterior edge.

Elytra brown, with a distinct testaceous subbasal band, shining. Lateral margins darkened at middle, briefly interrupted anteriorly and posteriorly before apex. Epipleura dark brown. Reticulation consisting of small rounded and weakly impressed meshes which disappear completely behind middle. Apical half smooth. Puncturation consisting of very small and evenly distributed punctures. Sutural row of punctures with several large punctures on apical third and some smaller ones on rest of surface. Discal and sublateral rows of punctures arranged in a row but irregularly distributed and often widely spaced along entire length. Some large punctures visible on the interspaces between discal and sublateral rows, and between sublateral and lateral rows.

Underside testaceous-brown. Legs testaceous-brown. Prosternal process short, ovoid, 1.4 times as long as broad, distinct at sides, broadly rounded at apex. Metacoxal lines represented only by a few punctures at middle of their length. Sternites 3, 4 and 5 each with few medium-sized punctures at middle. Anal sternite almost smooth on anterior half, finely striolate on posterior half, with an oblique depression formed by 5–6 coalescent punctures. Posterior margin broadly rounded and very finely bordered.

Measurements: Holotype: TL = 4.50 mm, TL-h = 4.10 mm; TW = 2.55 mm. Paratype: TL = 4.80 mm, TL-h = 4.50 mm; TW = 2.76 mm.

♂. Aedeagus, in lateral view, broad, somewhat tapered on apical part and broadly rounded at apex (Fig. 26). In dorsal view, strongly broadened by middle and tapered as far as apex; apex narrowly rounded. Base of paramere elongate, apical part long (Fig. 47).

♀. Unknown.

Etymology: Named after the Province Kelantan in West Malaysia where this species was collected.

Affinities: *L. kelantanensis* comes near to *L. krikkeni*, but is somewhat more broadly oval. Furthermore, the aedeagus in lateral view is broadly rounded at apex.

Habitat: Both specimens were collected in small and shaded forest streams (Jäch, pers. comm.)

Distribution: West Malaysia, Province Kelantan.

Lacconnectus stastnyi n. sp.

Figs 6, 27, 48

Type locality: Forest pool, Pa Umor, Bario, Sarawak, Borneo, Malaysia.

Type material: **Holotype** ♂: «Malaysia, Sarawak Bario env. Pa Umor 23.6.2003 J. Štastný lgt.» (NMB). **Paratypes**: 35 ex. with the same data as holotype (CJS); 2 ex.: «Malaysia, Sarawak Kelabit Bario env., 21.–25.6.2003 J. Štastný lgt.» (CJS); 14 ex.: «MB3; MAL, Sabah, Maliau Basin, Sg. Maliau, upstream, n. Camp 96, 14–May–96, TB Lim & Yeo KL» (CHB, NMB, UMS, ZRC).

Additional material studied: 1 ♀: «Borneo, Sabah, Kinabalu N.P., Sayap, 1000 m, 27.XI.1996, D. Grimm» (SMNS).

Description: Body broad oval, dark brown to black with testaceous markings on elytra. Femora testaceous. Epipleura dark brown, base testaceous brown (Fig. 6).

Head brown, narrowly but distinctly darkened along eyes, microsculpture consisting of small polygonal, very well-impressed meshes and of small and distinctly impressed meshes, particularly numerous on disc. Clypeal grooves and transverse depression beside eyes well-impressed, partly coalescent. Furrow deep. Antennae brown-testaceous; joints slender, fifth 1.8 times as long as broad.

Pronotum dark brown to black, narrowly testaceous-brown laterally. Microsculpture consisting of small polygonal meshes and of numerous, evenly distributed small punctures. Longitudinal median suture short and obsolete. Anterior row of punctures very narrow; the punctures medium-sized, deeply impressed and close together. Punctures of lateral row and the middle of each latero-basal quarter large, partly coalescent at sides, forming wrinkles in front of posterior angles. Lateral margins distinctly bordered, furrow briefly interrupted before anterior edge.

Elytra dark brown to black, with a narrow subbasal band and an apical spot testaceous. Entire surface smooth with a shagreened lustre, except base around scutellum which has a fine reticulation/striolation. Puncturation consisting of dense minute punctures distributed over the whole surface and of larger punctures, less dense in 1st interspace, particularly dense in 2nd and 3rd interspaces. Sutural row of punctures with medium-sized punctures along suture. Discal and sublateral row of punctures in a very slightly interrupted straight line, ending shortly before anterior margin; punctures medium-sized and close together.

Underside brown to dark brown. Legs brown, femora testaceous. Prosternal process oval-elongate, distinctly bordered at sides and broadly rounded posteriorly, 1.5 times as long as broad. Metacoxal lines long with several punctures at middle of their length. Sternites 3, 4 and 5 finely striolate with a row of punctures along middle. Anal sternite microstriolate anteriorly, microreticulate posteriorly, with an oblique and long row of deeply impressed punctures on both sides of middle. Posterior margin very finely bordered and broadly rounded.

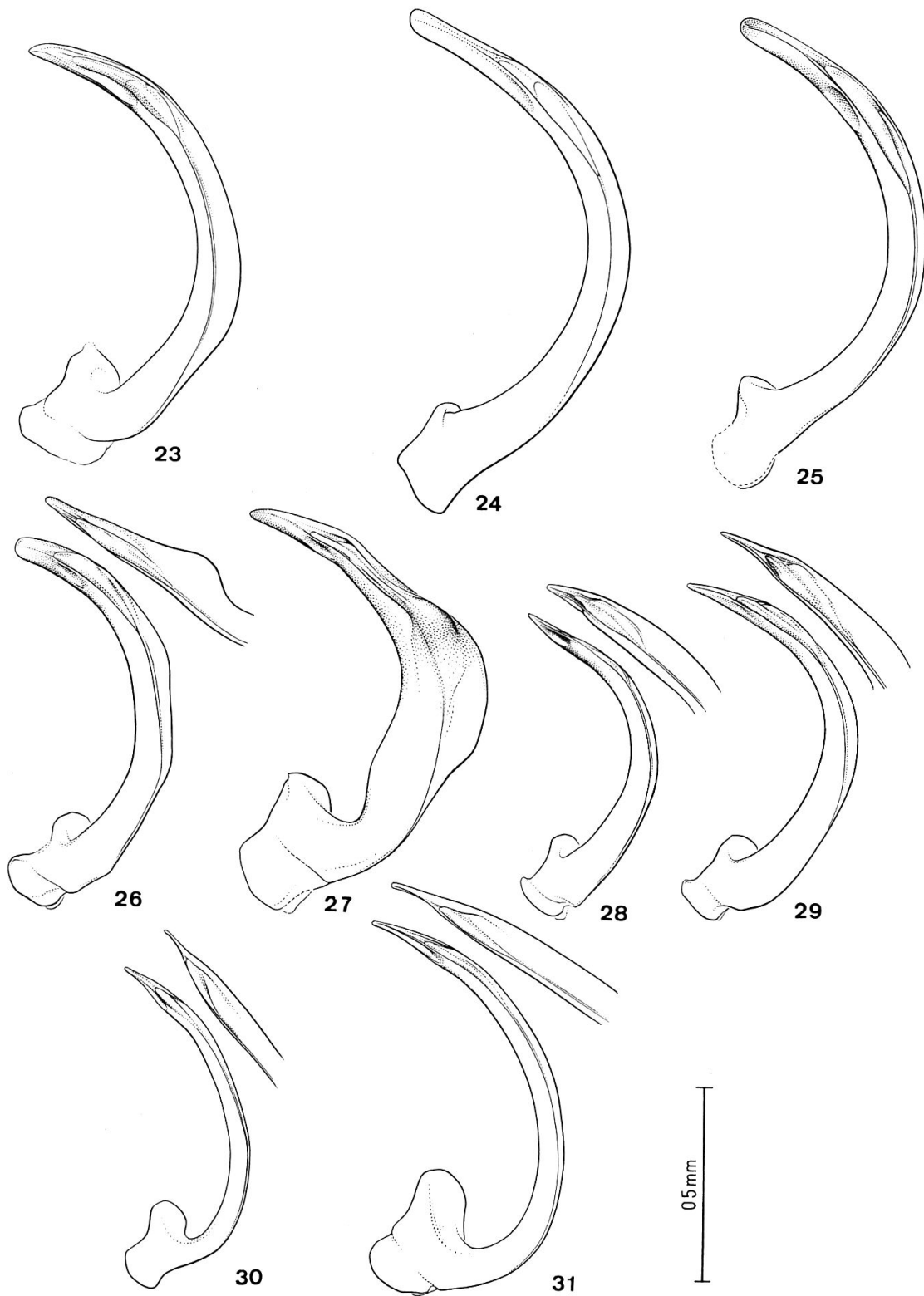
Measurements: Holotype: TL = 5.00 mm, TL-h = 4.20 mm; TW = 2.80 mm. Paratypes: TL = 4.60–4.90 mm (4.78 mm, n = 4), TL-h = 3.80–4.05 mm (3.95 mm); TW = 2.60–2.80 mm (2.70 mm).

♂. Aedeagus, in lateral view, strongly enlarged on basal $\frac{2}{3}$, suddenly tapered posteriorly and ending in a narrowly rounded point (Fig. 27). Parameres broad (Fig. 48).

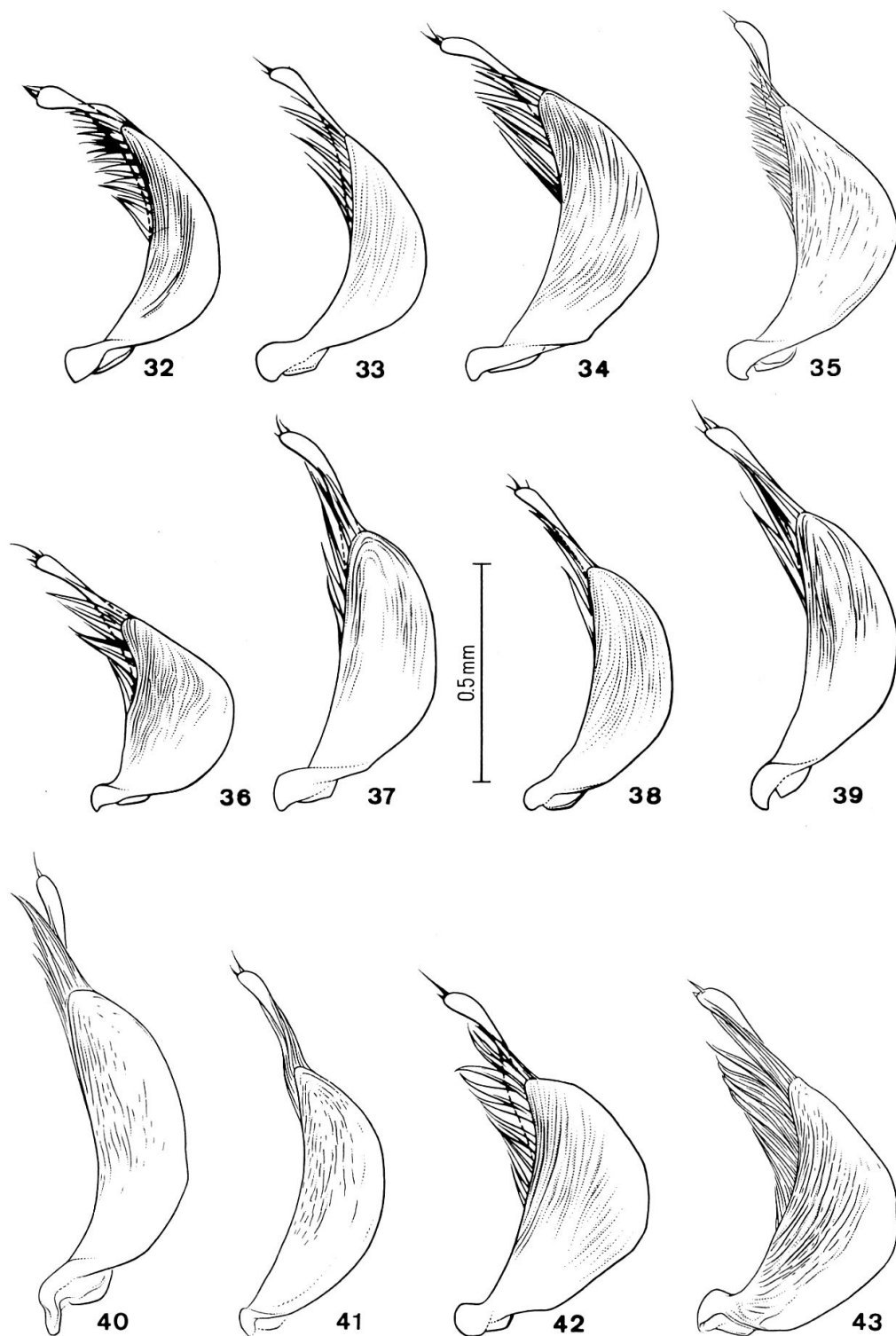
♀. Similar to ♂. Valvae elongate, cylindrical; seta ventral and subapical.

Etymology: Dedicated to our friend and colleague Jaroslav Štastný (Liberec, Czech Republic) who collected the main part of the type material.

Affinities: Because of the larger and numerous punctures on the elytra, this species is to be placed near *L. punctipennis* Zimmermann, 1928. However, it can be easily distinguished by the larger and distinctly more numerous punctures, particularly in the 2nd interspaces, and by the aedeagus, which in lateral view is strongly broadened on basal part. This form of the aedeagus is so far unique in the genus *Lacconectus*.



Figs 23–31: Aedeagus of: 23, *Lacconnectus schoedli* Brancucci. 24, *L. basalis* Sharp. 25, *L. punctipennis* Zimmermann. 26, *L. kelantanensis* n. sp. 27, *L. stastnyi* n. sp. 28, *L. heubergeri* n. sp. 29, *L. rutilans* n. sp. 30, *L. pulcher* Brancucci. 31, *L. sabahensis* Brancucci.



Figs 32–43: Left paramere (in the sense of Miller & Nilsson 2003) of: 32, *Lacconectus minutus* Brancucci. 33, *L. oceanicus* Régimbart. 34, *L. ritsemae* Régimbart. 35, *L. jaechi* Brancucci. 36, *L. muluensis* Brancucci. 37, *L. krikkeni* Brancucci. 38, *L. corayi* Brancucci. 39, *L. ponti* Brancucci. 40, *L. balkei* n. sp., specimen from Cameron Highlands. 41, *L. balkei* n. sp., specimen from Genting Highlands. 42, *L. javanicus* Brancucci. 43, *L. schoenmanni* Brancucci.

Habitat: Most of the specimens in Sarawak were collected in a pool (3 m², 0.5 m depth) with a muddy bottom and a layer of decomposed foliage in primary rain forest (Fig. 61). Two specimens in a small shallow puddle (20 cm², 5 cm depth) in a dry creek bed with a clay bottom in secondary forest (J. Štastný, pers. comm.). In Sabah, all specimens were collected in small puddles, rich in rotten leaves, in a primary rain forest. At the type locality the species is syntopic with *L. pulcher* Brancucci, 1986.

Distribution: Malaysia: Sarawak and Sabah.

Lacconnectus pulcher species group, Brancucci (1986)

***Lacconnectus heubergeri* n. sp.**

Figs 7, 28, 49

Type locality: Gunung Serapu, Kubah National Park, Sarawak, Malaysia.

Type material: **Holotype** ♂: «Mal., Sarawak, 1993, 20 km W Kuching, 6./7.3. Kubah NP, Gg. Serapu, leg. M. Jäch (23)» (NMW). **Paratype**: 1 ♀: same locality as holotype (CHB).

Description: Body oval somewhat elongate, ferruginous to testaceous brown with black markings on elytra (Fig. 7).

Head ferruginous-brown, darker alongside eyes, slightly lighter on clypeus. Reticulation consisting of small, polygonal, slightly impressed meshes. Punctures small and sparsely distributed on intersections of meshes. Clypeal grooves, punctures alongside eyes and transverse depression beside eyes medium-sized and slightly impressed; punctures not coalescing but closer together alongside eyes. Antennae testaceous; joints slender, fifth 2 times as long as broad.

Pronotum brown, somewhat darker on disc. Microsculpture consisting of small, polygonal and distinctly impressed meshes and of small and even punctures at the intersection of some meshes. Longitudinal median suture short. Anterior and lateral rows of punctures and punctures at middle of each latero-basal quarter large; punctures not coalescent but somewhat coarse at sides, forming some wrinkles in front of posterior angles. Lateral sides finely bordered; furrow fine, largely interrupted before reaching anterior edge.

Elytra testaceous-brown with distinct dark brown to black markings consisting of longitudinal bands, which are interrupted at base, on postmedian part and on apex of elytra. Lateral margins dark brown almost as far as apex. Epipleura ferruginous-brown. Microsculpture consisting of small, polygonal, slightly impressed meshes as far as apical third, then becoming somewhat elongate but distinctly visible as far as apex. Punctures very minute, hardly visible and widely distributed at the intersection of some meshes. Sutural row of punctures limited to a few larger punctures along entire length. Sutural and discal rows of punctures not complete: punctures more grouped, particularly on basal half. Some larger punctures in the interspace between sutural and sublateral rows.

Underside brown, legs testaceous. Prosternal process ovoid elongate, 1.4 times as long as broad, broadly bordered at sides. Metacoxal lines represented by a few punctures at the middle of their length. Sternites 3, 4 and 5 microstriolate with a few larger punctures on their middle. Anal sternite striolate on anterior half, reticulate on posterior half with a short row of punctures both sides of middle. Posterior margin broadly rounded and finely bordered.

Measurements: Holotype: TL = 3.90 mm, TL-h = 3.20 mm; TW = 2.20 mm. Paratype: TL = 4.15 mm, TL-h = 3.35 mm; TW = 2.30 mm.

♂. Aedeagus, in lateral view, strongly curved, tapered behind middle and strongly so at apex; apex narrowly rounded. In dorsal view, strongly tapered before apex and narrowly rounded at apex (Fig. 28). Base of paramere elongate, apical part long (Fig. 49).

♀. Valvae slender, carinate at base and very narrow in apical part. Seta ventral and subapical.

Etymology: Named after Max Heuberger (Basel), the well-known artist, who dedicated a great part of his life to painting insects.

Affinities: Closely related to *L. pulcher* Brancucci, 1986. It can be distinguished by its smaller size and by the aedeagus, which in lateral view is strongly bent just after mid length.

Habitat: Unknown.

Distribution: So far only known from the type locality in Sarawak, Malaysia.

***Lacconectus rutilans* n. sp.**

Figs 8, 29, 50

Type locality: Bako, Kuching, Sarawak, Malaysia.

Type material: **Holotype** ♂: «Mal., Sarawak, 1993, Umg. Kuching, Bako NP, 21.2., leg. M. Jäch (10)» (NMW). **Paratypes**: 8 ♂♂ and 11 ♀♀: same locality as holotype (1 ♂ and 1 ♀ CHB, 2 ♂♂ and 1 ♀ NMB, 5 ♂♂ and 9 ♀♀ NMW).

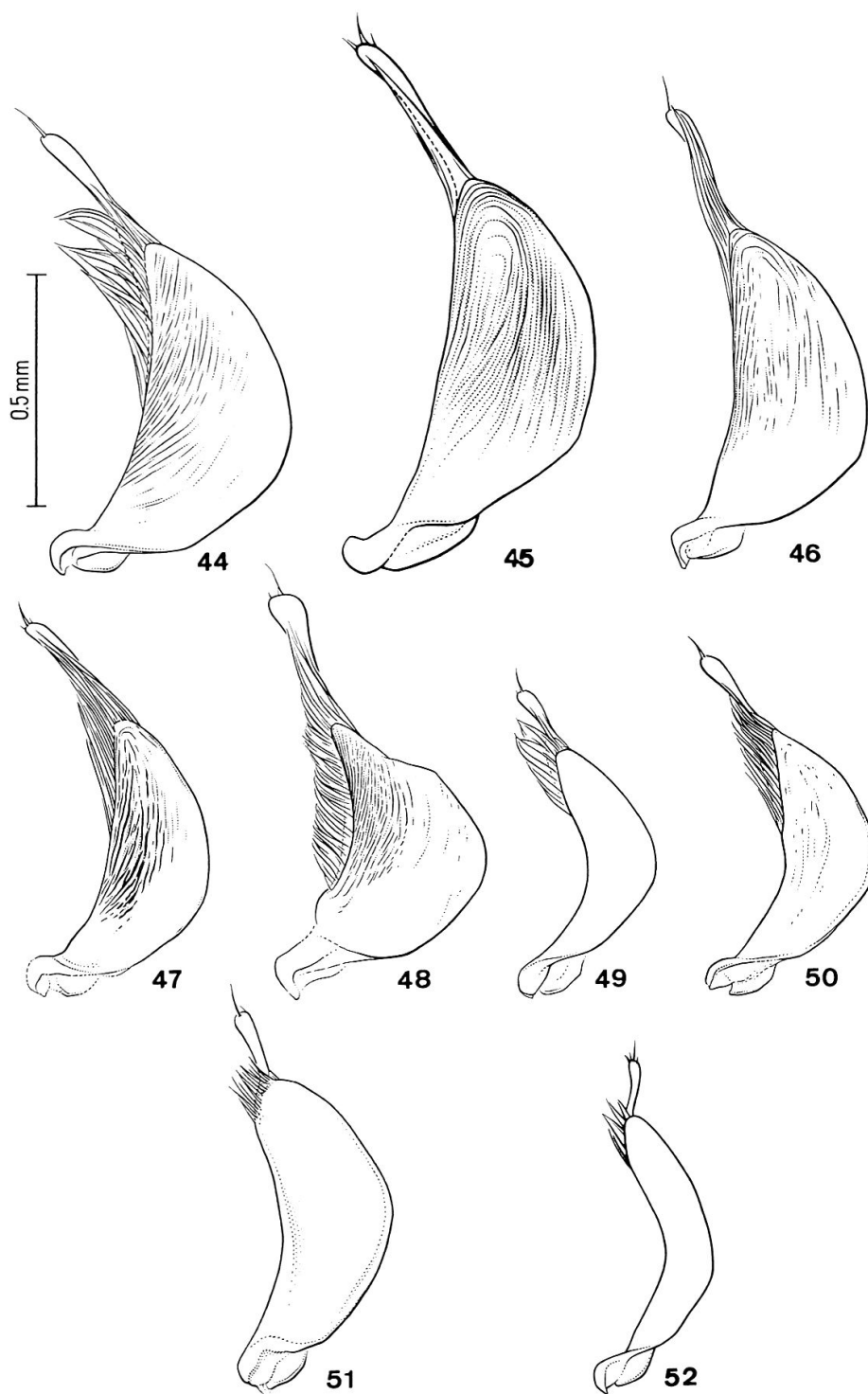
Description: Body broad oval, shining ferrugineous with dark brown to black markings on elytra (Fig. 8)

Head ferrugineous-brown. Microsculpture consisting of small polygonal meshes and with numerous small punctures at intersection of meshes. Clypeal grooves, punctures alongside eyes and transverse depression beside eyes distinctly impressed; punctures medium-sized, not coalescent. Antennae testaceous; joints slender, fifth 2 times as long as broad.

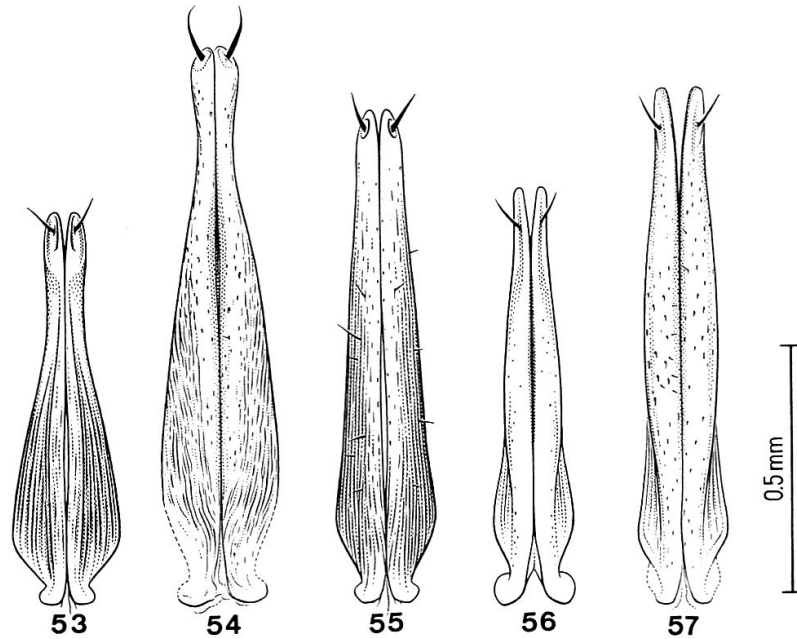
Pronotum ferrugineous-brown, indistinctly darker on disc. Microsculpture consisting of small polygonal and distinctly impressed meshes as well as numerous small punctures at intersection of meshes. Longitudinal median suture short and superficial. Anterior and lateral rows of punctures and punctures at middle of each latero-basal quarter coarse; punctures large and deeply impressed but not coalescing. Lateral sides finely bordered; furrow fine, already interrupted by anterior $\frac{3}{4}$.

Elytra dark brown with ferrugineous markings as follows: a broad basal band, 3 median elongate spots and an apical patch. Epipleura ferrugineous-brown. Microsculpture consisting of small polygonal meshes and of numerous minute punctures at their intersections. Reticulation becoming more and more elongate by mid-length and giving way to a striolation at apex. Sutural row of punctures with just a few punctures along suture. Discal and sublateral rows with medium-sized and distant punctures, but not grouped or coalescing. 2nd interspace with a few larger punctures.

Underside brown, legs testaceous. Prosternal process ovoid elongate, 1.4 times as long as broad, broadly bordered at sides. Metacoxal lines represented by a few punctures at middle of their length. Sternites 3, 4 and 5 microstriolate with a few larger punctures on their middle. Anal sternite striolate on anterior half, reticulate on posterior half with a short row of punctures on both sides of the middle. Posterior margin broadly rounded and strongly bordered.



Figs 44–52: Left paramere (in the sense of Miller & Nilsson 2003) of: 44, *Lacconectus schoedli* Brancucci. 45, *L. basalis* Sharp. 46, *L. punctipennis* Zimmermann. 47, *L. kelantanensis* n. sp. 48, *L. stastnyi* n. sp. 49, *L. heubergeri* n. sp. 50, *L. rutilans* n. sp. 51, *L. pulcher* Brancucci. 52, *L. sabahensis* Brancucci.



Figs 53–57: Valvae ♀ of: 53, *Lacconectus krikkeni* Brancucci. 54, *L. schoenmanni* Brancucci. 55, *L. basalis* Sharp. 56, *L. pulcher* Brancucci. 57, *L. sabahensis* Brancucci.

Measurements: Holotype: TL = 4.20 mm, TL-h = 3.30 mm; TW = 2.40 mm. Paratypes: TL = 3.70–4.40 mm (4.18 mm, n = 10), TL-h = 2.90–3.60 mm (3.33 mm, n = 10); TW = 2.10–2.50 mm (2.34 mm, n = 10).

♂. Aedeagus in lateral view (Fig. 29) strongly curved, rather constant in width and tapered on apical 1/5 and ending in a sharp point. Base of paramere elongate (Fig. 50).

♀. Similar to ♂. Valvae slender and very long, carinate at base, and narrow and flattened in apical part. Seta ventral and subapical.

Etymology: The dorsal surface of the body is characteristically ferruginous.

Affinities: The reddish colouration of head and pronotum, and the particular dark brown markings on elytra as well as the aedeagus, allow this species to be distinguished from all the others discussed in this paper.

Habitat: All specimens were collected in various small and shaded springs and streams (Jäch, pers. comm.).

Distribution: So far only known from the type locality in Sarawak.

FAUNISTICS

Lacconectus fulvescens species group

***Lacconectus basalis* Sharp, 1882**

Figs 4, 24, 45, 55, 63

Lacconectus basalis Sharp, 1882, Sci. Trans. R. Dublin Soc. 2: 598. – Brancucci 1986: 130. – Brancucci 2002: 31.

Material examined: **Laos**: 2 ex.: Laos, Lao Pako env., 55 km NE Vientiane, 200 m, 19.–22.V.2004, J. Bezdek leg. (CJS). **Myanmar**: 2 ex.: S-Myanmar, Pegu,

Palon, VII–IX. 1887, Fea leg. (ZMHB). **Thailand:** 10 ex.: Trat prov., Ko Chang Island, 6.–13.VII.2002, alt. 0–200 m, 12°05'N, 102°21'E, Fouqué R. & H. leg. (CJS); 1 ex.: Mae Hong Son prov., Kiwlong pass near Soppong, 23.VI.–2.VII.2002, alt. 1400 m, WGS 84, 19°26'N, 098°19'E, Fouqué R. & H. leg. (CJS); 4 ex.: Thailand SE, Ko Chang Island, 8.VII.–12.VII.1997, J. Rejsek leg. (CJS); 1 ex.: S-Thailand, Ko Samui, 8.I.1988, Hinta Hiu Yai, Madl leg. (NMW); 4 ex.: Chiang Mai prov., Samoeng, 29.VI.1995, W.G. Ullrich leg. (MHNG); 6 ex.: Chiang Mai prov., 25 km N of Chiang Dao, 28.–30.VI.2002, WGS 84, 19°40'N, 098°50'E, Fouqué R. & H. leg. (CJS). **West Malaysia:** 1 ex.: Malaysia, Kelantan Jelawang Jungle Dabong, (WGS 84) 05°20'27"N, 101°58'49"E 21.–22.VII.2001, lgt. R. Fouqué & H. Barlova (CJS); 1 ex.: Perak prov., 20 E Gerik, 3.II.1992, leg. Jäch (23) (NMW); 11 ex.: Kedah prov., Langkawi Lubuk Sembilang, 31.I.1992, leg. Jäch (17) (CHB, NMW); 1 ex.: Kedah prov., Langkawi, 30.I.1992, Jäch leg. (16) (NMW); 1 ex.: Kedah prov., NW-Langkawi E Datei, 30.I.1992, Jäch leg. (23) (NMW); 17 ex.: Kedah prov., SW-Langkawi Telaga Tujuh, 29.I.1992, Jäch leg. (12) (CHB, NMW); 2 ex.: Kedah prov., Langkawi island, 23.III.–14.IV.1992, leg. G. & M. Novak leg. (NMW).

♂. Aedeagus in lateral view (Fig. 24). Parameres broad (Fig. 45).

♀. Similar to ♂. Valvae elongate, cylindrical (Fig. 55).

Distribution: Widespread in southern China and South-East Asia: Laos, Myanmar, Thailand, Vietnam, Cambodia, northern part of West Malaysia and Taiwan (Brancucci 1986, 2003, 2004). The species occurs from 50 m to 1400 m.

***Lacconnectus corayi* Brancucci, 1986**

Figs 17, 38

Lacconnectus corayi Brancucci, 1986, Entomologica Basiliensia 11: 132. – Hendrich & Yang 1999: 257–258. – Hendrich *et al.* 2004: 111, 118–119. – Balke *et al.* 2004: 579.

Material examined: **West Malaysia:** 2 ex.: Selangor, north of Kuala Lipis, 16.II.1993, Gombak River, leg. M. Jäch (1) (NMW); 3 ex.: Pahang, Kuala Lipis, env. Hutan Lipur, Terenggun, 4.VI.2001 (NMW); 39 ex.: Prov. Johor, Bekok, path to waterfall, 50–150 m, 10.IV.1997, Balke & Hendrich leg. (CHB, ZRC); 3 ex.: Provinz Perak, Ulu Gombak, stream near Gombak field station, temp. puddles, 1.XI.1995, 1 ex., idem, decaying bamboo, 13.II.1995, leg. Y.C. Man (ZRC); 7 ex.: Kelantan Jelawang Jungle Dabong, (WGS 84) 05°20'27"N, 101°58'49"E 21.–22.VII.2001, lgt. R. Fouqué & H. Barlova (CJS); 2 ex.: Prov. Kelantan, 100 E Gerik, 3.II.1992, Jäch leg. (21) (NMB, NNW); 566 ex.: Provinz Pahang, Taman Negara, Nusa Camp surr., small pools in temp. forest streams, 50 m, 18–24.VI.1994, MA 5, Hendrich leg. (CHB, CM, CP, CW); 36 ex.: Prov. Pahang, Kuala Lipis, env., Kenong Rimba Park, Kesong River, 5.VI.2001, Kodada leg. (NMW); 81 ex.: Provinz Pahang, Tioman Island, track Tekek-Juara, 270–300 m, 10.–12.IX.1995, Hendrich leg. (NMB, CHB); 8 ex.: Provinz Pahang, Tioman Island, track Tekek-Juara, 270 m, 11.IX.1995, Hendrich leg. (CHB); 26 ex.: Tioman Island, track Tekek-Juara, waterfall pass, 330 m, 11. & 16.IX.1995, Hendrich leg. (CHB, ZRC); 2 ex.: Prov. Selangor, Templer Park N Kuala Lumpur, 21.I.1992, Jäch leg. (1) (NMW). **Sabah:** 18 ex.: Danum Valley, 5°01'N 117°47'E, 8.–17.IX.1987, 200 m, A.H. Kirk-Spriggs leg., white & yellow pan trap samples, primary forest, NMW.Z.1987.094. (CHB, NMWC); 1 ex.: Sabah, primary forest of Batu, Punggu Resort env., 24.VI.–1.VII.1996, 11 f. (NMW); 8 ex.: Sabah, Sepilok Reserve, receptacle in dry

leaf, 7.VI.2003, J. Štastný leg. (CJS).

♂. Aedeagus in lateral view (Fig. 17). Parameres broad (Fig. 38).

Remarks: *L. corayi* and *L. krikkeni* are the most common and widespread species in the lowland and foothill rain forest areas in West Malaysia and in many parts of Borneo.

Habitat: *L. corayi* inhabits small, ephemeral and shaded water bodies in lowland rain forest areas (Fig. 59). In Taman Negara N.P., on Tioman island (Hendrich & Yang 1999) and in the Danum Valley, syntopic with *L. krikkeni*.

Distribution: West Malaysia and Singapore, Borneo (Sabah und Sarawak) (Brancucci 1986, Balke *et al.* 2004, Hendrich *et al.* 2004).

***Lacconectus javanicus* Brancucci, 1986**

Figs 21, 42

Lacconectus javanicus Brancucci, 1986, Entomologica Basiliensia 11: 139. – Brancucci 2002: 30.

Material examined: **Indonesia:** 1 ex: W-Java, Pangandaran, 21.I.1987, M. Jäch leg., J 13 (NMW).

♂. Aedeagus in lateral view (Fig. 21). Parameres broad (Fig. 42).

Remarks: This species is closely related to *L. schoenmanni* Brancucci, but is somewhat smaller. The aedeagus allows a sure and easy determination to be made; the tip of the aedeagus has a notch (Fig. 21) in *L. javanicus*, but is rounded in *L. schoenmanni*.

Distribution: Java (Brancucci 1986, 2002).

***Lacconectus krikkeni* Brancucci, 1986**

Figs 16, 37, 53

Lacconectus krikkeni Brancucci, 1986, Entomologica Basiliensia 11: 130. – Brancucci 1987: 95. – Balke *et al.* 1999: 325. – Hendrich & Yang 1999: 258. – Brancucci 2002: 31. – Hendrich *et al.* 2004: 119. – Balke *et al.* 2004: 597.

Material examined: **Singapore:** 34 ex: Bukit Timah N.R., 27.VIII.1993, Balke & Yang leg. (ZRC); 51 ex.: Singapore, NS 216, 14.XII.1995 (CHB, ZRC); 2 ex.: Bukit Timah N.R., NS 208A, 8.XII.1995, H.K. Lua leg. (ZRC); 13 ex.: Bukit Timah N.R., 9.IV.1997, Balke & Hendrich leg., 5 ex. (ZRC), Bukit Timah N.R., 9.IV.1997, Balke & Hendrich leg. (CHB); 1 ex.: Central Catchment Area, Nee Soon Swamp Forest, near pump house, 26.IV.1997, Balke & Hendrich leg. (CHB); 3 ex.: Central Catchment Area, Nee Soon Swamp Forest, Murphy's track, Flight Intercept Trap, 28.IV.1997, Balke & Hendrich leg. (CHB, ZRC). **West Malaysia:** 40 ex.: Prov. Johor, Bekok, path to waterfall, 50–150 m, 10.IV.1997, Balke & Hendrich leg. (CHB, ZRC); 7 ex.: Prov. Kedah, Gunung Jeari, N Sungai Petani, 700 m, 2.II.1992, Jäch leg. (18) (NMW); 24 ex.: Prov. Kedah, SW-Langkawi Telaga Tujuh, 29.I.1992, leg. Jäch (12) (CHB, NMW); 1 ex.: Prov. Kedah, NW-Langkawi Ö Datei, 30.I.1992, leg. Jäch (15) (NMW); 7 ex.: Prov. Kelantan, 100 Ö Gerik, 3.II.1992, Jäch leg. (21) (NMW, NMB); 20 ex.: Kelantan Jelawang Jungle Dabong, (WGS 84) 05°20'27"N, 101°58'49"E 21.–22.VII.2001, lgt. R. Fouqué & H. Barlova (CJS); 10 ex.: Prov. Kelantan, ca. 20 km Ö Gerik, 3.II.1992, Jäch leg. (23) (NMW); 1 ex.: Prov. Pahang, 20 km NE Raub, Lata Jarom, Gunung Benom, 350–550 m, 19.–22.II.1995, Strba & Hergovits leg. (NMW); 97 ex.: Prov. Pahang, Taman Negara, Nusa Camp surr., small pools in temporary forest streams, 50 m, MA 5, 18.–24.VI.1994, Hendrich leg. (CHB, CM, CP); 9 ex.: Pahang, Kuala Lipis, env., Kenong Rimba Park, Kesong



Fig. 58: Residual pool of an ephemeral stream in mountain rain forest below Gunung Jasar in the Cameron Highlands, 1500 m, West Malaysia. Type locality of *Lacconectus balkei* n. sp. and the habitat of *L. ponti* Brancucci, 1986.

River, 5.VI.2001, Kodada leg. (NMW); 79 ex.: Prov. Pahang, Tioman Island, track Tekek-Juara, 270–300 m, 10.–12.IX.1995, Hendrich leg. (CHB); 17 ex., idem, 270 m, waterfall, 11.IX.1995, Hendrich leg. (CHB); 74 ex.: Tioman Island, track Tekek-Juara, pass, 330 m, 11. & 16.IX.1995, Hendrich leg. (CHB); 140 ex.: Tioman Island, Tekek-Juara, rockpool, 25.VI.1996, H.K. Lua leg. (ZRC); 5 ex.: Pulau Tioman, Tekek Juara, 80 m, 28.I.1992, Schillhammer leg. (7) (NMW); 33 ex.: Prov. Pahang, Pulau Tioman, 2 km S Kampung Juara, small pools on rocks above river level, 15.III.1995, O. Merkl leg. (TDMB); 6 ex.: Tioman, Umg. Kampung Tekek, 15.–24.VII.1992, Schuh leg. (NMW); 30 ex.: Prov. Pahang, 20 km NE Raub, Lata Jarom, Gunung Benom, 350–550 m, 19.–22.II.1995, M. Strba & R. Hergovits leg. (NMW, CHB); 1 ex.: Prov. Pahang, Endau Rompin, pool between Car Park and Basecamp, 13.VI.1989, C.F. Lim leg. (ZRC); 1 ex.: Prov. Penang, Botanischer Garten, 27.I.1992, Jäch leg. (9) (NMW); 7 ex.: Prov. Penang, Pantai Aceh Forest Reserve, 28.I.1992, Jäch leg. (10) (NMW); 13 ex: Prov. Perak, Genting Highlands, jungle track near Awana Resort, 1200 m, 28.VI.1994, (MA 9), Hendrich leg. (CHB); 14 ex.: Provinz Perak, Ulu Gombak, stream near Gombak field station, temp. puddles, 13.XI.1995, Y.C. Man leg. (ZRC); 3 ex.: Provinz Perak, Ulu Gombak, decaying bamboo, 13.II.1995, Y.C. Man leg. (ZRC); 14 ex.: Prov. Selangor, Temple Park N Kuala Lumpur, 21.I.1992, Jäch leg. (1) (NMW); 3 ex.: Selangor, N Kuala Lipis, Gombak River, 16.II.1993, Jäch leg. (1) (NMW). **Sabah:** 2 ex.: Sabah, Sepilok Reserve, receptacle in dry leaf, 7.VI.2003, J. Štastný leg. (CJS); 4 ex.: Crocker Range, Mawar Waterfall env., small pool in primary forest, substrate: sand,

17.VI.1996, 9b (NMW); 15 ex.: Crocker Range, Rafflesia Centre around km 61 of road Kota Kinabalu Tambunan, 13.–14.VI.1996, 6c (NMB, NMW); 27 ex.: Ca. 7 km SE Sapulut, Saupi river, 17.V.2001 (CHB, NMB, NMW); 9 ex.: Sabah, Danum Valley, 5°01'N 117°47'E, 200 m, 8.–17.IX.1987, A.H. Kirk-Spriggs leg., white & yellow pan trap samples, primary forest, NMW Sabah (Borneo) Expedition, NMW.Z.1987.094. (CHB, NMWC); 2 ex.: Sabah, Sipitang, Mendolong, 20.III.1989, S. Adebratt (CAN); 5 ex.: Sabah, Kinabalu N.P., Sayap, 1000 m, 27.XI.1996, D. Grimm (SMNS); 2 ex.: Kampung Tekala, env., branch of Kinabatangan river, 5.VI.1998, J. Kodada & F. Ciampor leg. (NMW); 1 ex.: Sabah, Batu Punggul Resort env., 24.VI.–1.VII.1996, 11c (NMW); 14 ex.: Sabah, Batu Punggul Resort env., 24.VI.–1.VII.1996, light trap, 11g (NMW). **Sarawak:** 2 ex.: 80 km S Kuching, Mt. Penrissen, 1000 m, III.1994, J. Kodada leg. (NMW); 15 ex.: 80 S Kuching, Kampung Ana Rais, 18.II.1993, M. Jäch leg. (4) (NMW); 5 ex.: 80 S Kuching, Kampung Ana Rais, 18.II.1993, H. Zettel leg. (4) (NMW); 4 ex.: E Bandar Sri Amman, Batang Ai N.P., 20.II.1993, M. Jäch leg. (9) (NMW); 2 ex.: Sarawak, Kelabit Hills, surr. Bario, ca. 1000–1200 m, 28.II.1993, M. Jäch leg. (16) (NMW); 2 ex.: Sarawak, Kelabit Hills, 5 km E Bario Pa Ukat, ca. 1000 m, 1.III.1993, M. Jäch leg. (17) (NMW); 11 ex.: Sarawak, 20 km W Kuching, Kubah N.P., Gunung Serapu, 6.–7.III.1993, M. Jäch leg (23) (NMW); 1 ex.: Sarawak, Kuching District, Mt. Serapu, 27.–29.III.1994, J. Horák leg. (NMW); 1 ex.: Sarawak, confl. Sun Oyan and Mujong river, E. Kapit, 50 m, 18.V.1994, # 5a, Löbl and Burckhardt leg. (MHNG). **Brunei:** 11 ex.: Brunei, Temburong Distrikt, Kuala Belalong, 14.II.1995, Borchering leg. (CHB). **Indonesia:** 1 ex.: W Java, Tangkuban Prah, 1500–1700 m, 10 km N Bandung, 5.VIII.1994, Schuh leg. (NMW); 1 ex.: W Java, Telaga Patengan, 1400 m, 2 km SE Rancabali (40 km SSW Bandung), 6.VIII.1994, Schuh leg. (NMW).

♂. Aedeagus in lateral view (Fig. 16). Parameres broad (Fig. 37).

♀. Similar to male. Valvae elongate, cylindrical (Fig. 53).

Habitat: *Lacconectus krikkeni* inhabits small springs and ephemeral and shaded water bodies in rain forest areas, and is distributed from the lowlands (50 m) up to the mountain rain forest at 1400 m (Fig. 59). In Taman Negara N.P., on Tioman (Hendrich & Yang 1999) and in the Danum Valley, syntopic with *L. corayi*; in the Genting Highlands it co-occurs with *L. balkei* and in Brunei with *L. pulcher*.

Distribution: Singapore, West Malaysia, Borneo (Sarawak, Brunei and Sabah), Sumatra and Java (Brancucci 1986, 2002, Hendrich & Yang 1999, Balke *et al.* 2004, Hendrich *et al.* 2004).

***Lacconectus minutus* Brancucci, 1986**

Figs 11, 32

Lacconectus minutus Brancucci, 1986, Entomologica Basiliensia 11: 136. – Brancucci 2002: 30.

Material examined: **Indonesia:** W Sumatra: numerous ex.: Prov. Kerinci, Seblat N.P., 24 km NE Tapan, Muara Sako, E env., 2°05'S, 101°15'E, 400–550 m, 4.–18.III.2003, L. Dembický (CHB, NMB).

♂. Aedeagus in lateral view (Fig. 11). Parameres broad (Fig. 32).

Distribution: Indonesia: Sumatra.



Fig. 59: Water-filled root hollow of a tree trunk in the lowland rain forest of Taman Negara, near Nusa Camp, West Malaysia. Habitat of *Lacconectus corayi* Brancucci, 1986 and *L. krikkeni* Brancucci, 1986.

***Lacconectus muluensis* Brancucci, 1986**

Figs 15, 36

Lacconectus muluensis Brancucci, 1986, Entomologica Basiliensia 11: 137.

Material examined: Malaysia: 3 ex: Sabah, Sipitang, Mendolong, 20.III.1989, S. Adebratt (CAN).

♂. Aedeagus in lateral view (Fig. 15). Parameres broad (Fig. 36).

Remarks: A rarely collected species. This is the first record since the original description of the species in Brancucci (1986).

Distribution: Borneo: Sabah and Sarawak.

***Lacconectus oceanicus* Régimbart, 1899**

Figs 12, 33

Lacconectus oceanicus Régimbart, 1899, Ann. Soc. Ent. Fr. 68: 291. – Zimmermann 1919: 197. – Zimmermann 1920: 147. – Zimmermann 1928: 386. – Csiki 1937: 128 (partim). – Guéorguiev 1968: 40. – Vazirani 1970: 321. – Vazirani 1977: 59. – Brancucci 1986: 134. – Brancucci 2002: 30.

Material examined: Indonesia: W Sumatra: numerous ex.: Prov. Kerinci, Seblat N.P., 24 km NE Tapan, Muara Sako, E env., 2°05'S, 101°15'E, 400–550 m, 4.–18.III.2003, L. Dembický (CHB, NMB).

♂. Aedeagus in lateral view (Fig. 12). Parameres broad (Fig. 33).

Remarks: Previously known from Java and Mentawai Island (Brancucci 1986, 2002). First record for Sumatra.

Distribution: Indonesia: Java (Brancucci 1986, 2002) and West Sumatra.

***Lacconectus ritsemae* Régimbart, 1883**

Figs 13, 34

Lacconectus ritsemae Régimbart, 1883, Notes Leyden Mus. 5: 229. – Zimmermann 1920: 147. – Zimmermann 1928: 384. – Csiki 1937: 128 (partim). – Guéorguiev 1968: 40.

Lacconectus ritsemae Régimbart; Vazirani 1970: 322. – Vazirani 1977: 59. – Brancucci 1986: 134. – Brancucci 2002: 30.

Material examined: Indonesia: 3 ex.: W Java, Gn. Salak, 8 km S Bogor, Sungai Ciapus, ca. 800 m, 17.VIII.1994, R. Schuh leg. (NMW); 1 ex.: W Java, «Ranca Upas», ca. 1300 m, 10 km S Ciwidey, 9.VIII.1994, R. Schuh leg. (NMW); 4 ex.: W Java, Telaga Patengan, 1400 m, 2 km SE Rancabali (40 km SSW Bandung), 6.VIII.1994, R. Schuh leg. (CHB, NMW).

♂. Aedeagus in lateral view (Fig. 13). Parameres broad (Fig. 34).

Distribution: Indonesia: Java (Brancucci 1986, 2002).

***Lacconectus ponti* Brancucci, 1986**

Figs 18, 39

Lacconectus ponti Brancucci, 1986, Entomologica Basiliensia 11: 101. – Hendrich 1995: 47.

Material examined: West Malaysia: 55 ex.: Provinz Perak, Cameron Highlands, Tanah Rata, Gunung Jasar (track 11), 1500 m, 13. & 15.6.1994 (MA 3), Hendrich leg.; 48 ex.: Cameron Highlands, Tanah Rata, MA 3, Gunung Jasar, track 11, 1500 m, 16.12.1996, Hendrich leg.; 4 ex.: Cameron Highlands, Tanah Rata, MA 6, Sungai Ruil n. Orang Asli village, 1400 m, 16.12.1996, Hendrich leg. (CHB, CM, CP, CW, NMB, NMW, ZRC).

Measurements: TL = 4.00–4.25 mm (4.11 mm, n = 10), TL-h = 3.10–3.35 mm (3.20 mm); TW = 2.25–2.45 mm (2.34 mm).

♂. Aedeagus in lateral view (Fig. 18). Parameres broad (Fig. 39).

Remarks: *L. ponti* was previously known only from a single specimen collected at Tanah Rata in the Cameron Highlands.

Habitat: See *L. balkei* sp. n. (Fig. 58).

Distribution: West Malaysia, Cameron Highlands (Brancucci 1986, Hendrich 1995). According to Mazzoldi (pers. comm.), also known from the Fraser Hills, a mountain rain forest area south of the Cameron Highlands.

***Lacconectus punctipennis* Zimmermann, 1928**

Figs 5, 25, 46

Lacconectus punctipennis Zimmermann, 1928, Sarawak Mus. J. 3: 387. – Brancucci 1986: 145. – Hendrich & Balke 1995: 35. – Brancucci 2002: 29–30.

Material examined: Indonesia: 5 ex.: N-Sumatra, Sibolangit, 25.II.1995, Schillhammer leg. (NMW, CHB). Brunei: 1 ex., Belait District, Labi Hills Forest Reserve, Sungai Ingel, 4°10'N 114°44'E, 12.–16.IX.1992, 100 m, A.H. Kirk-Spriggs leg., Flight Interception Trap, Freshwater Swamp Forest (Empran) KS002, NMW Brunei Expedition 1992 (Raleigh International 92Y), NMW.Z. 92.082. (NMWC). **Sabah:** 1 ex.: Tawau Hills Park, in pond in forest, 15.IX.1991, F.L.Tan leg. (ZRC); 5 ex.: Sabah, Sepilok Reserve, receptacle in dry leaf, 7.VI.2003, J. Štastný leg. (CJS).

♂. Aedeagus in lateral view (Fig. 25). Parameres broad (Fig. 46).

Remarks: This is the first record of the species from Borneo.

Habitat: On Bali, the single specimen was collected in a spring-fed pool together with numerous *Copelatus javanus* Régimbart, 1883, *C. uludanuensis*



Fig. 60: Small pool, rich in rotten leaves and fed by a spring, in the mountains of Bedugul, Bali, 1300 m, Indonesia. Habitat of *Lacconnectus punctipennis* Sharp, 1882, *Copelatus uldanuensis* Hendrich & Balke, 1995, *Microdytes elgae* Hendrich, Balke & Wewalka, 1995 and *Platynectes octodecimmaculatus* (MacLeay, 1825).

Hendrich & Balke, 1995, *Microdytes elgae* Hendrich, Balke & Wewalka, 1995 and *Platynectes octodecimmaculatus* (MacLeay, 1825) (Hendrich & Balke 1995).

Distribution: Borneo: Brunei, Sabah; Indonesia: Sumatra, Java (Brancucci 1986, 2002) and Bali (Hendrich & Balke 1995).

***Lacconnectus schoenmanni* Brancucci, 2002**

Figs 2, 22, 43, 54

Lacconnectus schoenmanni Brancucci, 2002, Entomologica Basiliensia 24: 25.

Material examined: **Indonesia:** 171 ex.: W Sumatra, Prov. Kerinci, Seblat N.P., 24 km NE Tapan, Muara Sako, E env., 2°05'S, 101°15'E, 400–550 m, 4.–18.III.2003, L. Dembický (CHB, NMB).

♂. Aedeagus in lateral view (Fig. 22). Parameres broad (Fig. 43).

♀. Similar to ♂. Valvae elongate, cylindrical (Fig. 54).

Remarks: This species was described from a very few specimens from Sumatra. The material studied here shows that this species is common on Sumatra.

Distribution: N and W Sumatra (Brancucci 2002).

Lacconectus pulcher species group

***Lacconectus pulcher* Brancucci, 1986**

Figs 9, 30, 51, 56, 64

Lacconectus pulcher Brancucci, 1986, Entomologica Basiliensia 11: 164.

Material examined: **Brunei:** 2 ex.: Brunei, Temburong District, Kuala Belalong, 14.II.1995, Borchherding leg. (CHB). **Sabah:** 3 ex.: Batu Punggul Resort env., 24.VI.–1.VII.1996, 11b, shaded stream 1.5–2.0 m wide, flowing through dense primary forest (NMW); 1 ex.: Ca. 30 km SE Sapulut, Tatalikon river, 22.V.2001 (NMW); 2 ex.: Ca. 7 km SE Sapulut, Saupi river, 17.V.2001 (NMW); 1 ex.: Sabah, Sipitang, Mendolong, 20.III.1989, S. Adebratt leg. (CAN); 13 ex.: Maliau Basin, Sungai Maliau, upstream, n. camp 96, 18.V.1996, T.B. Lim & K.L. Yeo leg. (CLH, NMB, ZRC); 6 ex.: Maliau Basin, Sungai Maliau, 18.V.1996, T.B. Lim leg. (CLH, ZRC); 4 ex.: Kinabalu N.P., Sayap, 1000 m, 27.XI.1996, D. Grimm leg. (SMNS); 30 ex.: Sabah, Crocker Range, around km 56 of road Kota Kinabalu Tambuan Sansuron waterfall env., 1100–1200 m a.s.l., 8.VI.1996, 5b, Kodada leg. (CHB, NMB, NMW); 48 ex.: Mt. Kinabalu National Park, HQ at Liwagu River, Liwagu, 1505 m, 4.VIII.1988, A. Smetana (B 81) (CHB, MHNG). **Sarawak:** 1 ex.: Kuching District, Mt. Serapu, 27.–29.III.1994, J. Horák leg. (NMW); 21 ex.: Kelabit Hills, surr. Bario, 1000–1200 m, 28.II.1993, M. Jäch leg. (16) (CHB, NMB, NMW); 20 ex.: Kelabit Hills, 5 km E Bario Pa Ukat, ca. 1000 m, 1.III.1993, M. Jäch leg. (17) (CHB, NMB, NMW); 10 ex.: Sarawak, Gunung Gading N.P., 30.V.2003, J. Štastný leg. (CJS); 10 ex.: Sarawak, Bario env., Pa Umor, 23.VI.2003, J. Štastný leg. (CJS).

Measurements: TL = 4.10–5.10 mm (4.73 mm, n = 13), TL-h = 3.20–4.15 mm (3.83 mm); TW = 2.25–2.65 mm (2.53 mm).

♂. Aedeagus in lateral view (Fig. 30). Parameres (Fig. 51).

♀. Similar to ♂. Valvae elongate, cylindrical (Fig. 56).

Remarks: *L. pulcher* was described on the basis of two specimens from Gunung Mulu National Park in Sarawak. It is here recorded for the first time from Sabah and Brunei. The species varies greatly in size and colour, but this variation seems to be locally defined. Based on a long series of specimens from Sabah, the mean of the total length is 4.80 mm (TL-h: 3.95 mm), whereas the specimens collected in Sarawak and Brunei are much smaller (TL: 4.26 mm; TL-h: 3.43 mm). A detailed study of the morphology of numerous specimens did not provide further evidence. As we could not find any characters that would enable us to attribute the specimens to two distinct species, we consider *L. pulcher* to be a very variable species. It may be possible to resolve this problem in the future by the study of further specimens from more localities.

Habitat: In small shaded streams in primary rain forest. Also collected after heavy rainfall in small puddles without any vegetation, on the edge of a forest track (Borchherding, pers. comm.). The species co-occurs with *L. krikkeni* and *L. sabahensis*.

Distribution: Borneo, mainly at altitudes from 1000 to 1540 m.



Fig. 61: Small and shallow forest pool, rich in rotten leaves, in primary rain forest, Bario environs, Pa Umor, Sarawak, Borneo. Type locality of *Lacconnectus stastnyi* sp.n.

***Lacconnectus sabahensis* Brancucci, 1986** Figs 10, 31, 52, 57, 65

Lacconnectus sabahensis Brancucci, 1986, Entomologica Basiliensia 11: 166.

Material examined: **Malaysia: Sabah:** 3 ex.: Mt. Kinabalu NP, 06°0.701'N 116°32.352'E, 1550–1700 m, 7.–9.IV.2000, R. Gerstmeier leg. (CHB); 1 ex.: Mt. Kinabalu, 1550 m, 16.II.1997, H. Zettel leg. (17) (NMW); 10 ex.: Mt. Kinabalu, 1400 m, Sungai Silau-Silau, 20.IX.1990, Bouwer leg. (CHB); 48 ex.: Mt. Kinabalu National Park, HQ at Liwagu River, Liwagu, 1505 m, 4.VIII.1988, A. Smetana (B 81) (CHB, MHNG); 9 ex.: idem, 1500 m, 21.V.1987, A. Smetana leg. (MHNG); 4 ex.: idem, Silau Silau, 1540 m, 14.VIII.–1.IX.1988, A. Smetana (B167) (MHNG); 4 ex.: North Borneo (SE), Forest Camp, 9.8 km SW of Tenom, 18.XII.1962, Y. Hirashima leg. (BPBM); 1 ex.: Sabah, Crocker Mt. 500–1900 m, Gunung Emas, 6.–21.VI.1995, J. Stolarczyk leg. (CHB); 60 ex.: Sabah, Crocker Range, around km 56 of road Kota Kinabalu, Tambuan Sansuron waterfall env., 1100–1200 m a.s.l., 8.VI.1996, 5b, Kodada leg. (CHB, NMB, NMW); 1 ex.: Sabah, Gunung Kinabalu N.P., Liwagu trail, 1600 m, 16.–18.VI.2003, J. Štastný leg. (CJS).

Measurements: TL = 5.20–5.55 mm (5.35 mm, n = 10), TL-h = 4.20–4.60 mm (4.35 mm); TW = 2.60–2.85 mm (2.75 mm).

♂. Aedeagus in lateral view (Fig. 31). Parameres broad (Fig. 52).

♀. Valvae elongate, flattened and narrow apically. No setae (Fig. 57).

Affinities: *L. pulcher* and *L. sabahensis* are closely related and can be found in the same habitat. Furthermore, the elytral pattern of both species is often very similar, which makes identification more difficult. Fundamentally, *L. pulcher* varies

a great deal both in size and in colour, whereas *L. sabahensis* seems to be rather constant. In addition to the aedeagus, both species can be easily distinguished by their respective size. *L. sabahensis* is constantly larger (TL: 5.20–5.55 mm, TL: *L. pulcher* 4.10–5.10 mm) and the valvae of the ♀ are distinctly slender.

Remarks: Only the holotype from Mt. Kinabalu National Park was previously known. The large series recorded here shows that it is common and appears to be widespread, particularly at higher altitudes in Northern Borneo.

Habitat: In very small rock pools, among rotten leaves and small stones at the edge of rain forest streams (Bouwer & Gerstmeier, pers. comm.). The species co-occurs with *L. krikkeni* and *L. pulcher*.

Distribution: Borneo: Sabah (Brancucci 1986), at altitudes from 1000 to 1600 m.

ECOLOGY

Until recently, almost nothing was known about the ecology and behaviour of the Indomalayan species of *Lacconectus*. Most of the species were known from single or a very few specimens, and were collected very often with pitfall or Flight Intercept Traps in the course of general tropical ecology research projects.

All the Indomalayan species inhabit ephemeral, shaded, small to very small puddles and pools, with diameters ranging from 20 cm (e.g. *L. corayi*, *L. krikkeni*) to 200 cm (e.g. *L. stastnyi*) and with depths of 2 to 50 cm. These habitats are fed or are re-filled by rain water, slow-flowing springs or small helocrenes. The bottom may be stony, if it is a residual pool on a rocky river bed, or sandy or gravelly, if it is a residual pool or a sheltered inlet in a small stream (Fig. 58), or woody, if it is a water-filled tree (Fig. 59) or bamboo hollow. In general the bottom is enriched with a fine detritus of rotten leaves and twigs (Figs 60, 61). Very large aggregations of beetles can be found among the packed leaves of such small water bodies. In Taman Negara and on the island of Tioman, up to 220 specimens (*L. corayi* and *L. krikkeni*) have been counted in a 500 ml mud and water mixture (Hendrich & Yang 1999). It is noteworthy that at many localities immature specimens were observed but no larvae. The larvae of all the species of the genus remain unknown.

During their dispersal flights, *Lacconectus* species are able to find even the smallest water bodies, even those with a diameter of less than 20 cm. Some hours after a heavy rainfall, single *L. corayi* and *L. krikkeni* have been observed in water-filled leaves lying on the forest floor (Hendrich 1995). Inside a hotel room of 20 sqm, some specimens of *L. krikkeni* were found in a teacup of water left standing on a table in the room overnight; they were collected but later escaped (Hendrich, pers. obs.). This might explain why *Lacconectus* were found regularly in pitfall traps (see Brancucci 1986: 132, 138, 166) and in yellow pan-traps (see *L. punctipennis*). Some species have occasionally been collected at light (e.g. *L. krikkeni*).

All Indomalayan *Lacconectus* are typical inhabitants of primary or very old secondary growth rain forests which are not or only slightly disturbed by human influences.

Up to three species may be sympatric and up to two species may be syntopic. In West Malaysia and Borneo, *L. corayi* and *L. krikkeni* often co-occur. In the Cameron Highlands, *L. balkei* sp. n. and *L. ponti* were collected in the same pool. On Borneo, *L. krikkeni* and *L. pulcher* share the same habitat. Kodada (pers. comm.) collected *L. krikkeni* together with *L. sabahensis* in several water bodies in the

Crocker Range (Sabah). In the Maliau Basin (Borneo), *L. stastnyi* and *L. pulcher* are syntopic.

Apart from the *Lacconnectus*, the water beetle coenosis of such biotopes included the following taxa: larvae of Scirtidae, adults of *Copelatus* and *Microdytes* species, and occasionally single specimens of *Platynectes* (all Dytiscidae), *Hydraena* (Hydraenidae) and some species of the hydrophilid genera *Agraphydrus*, *Oocyclus* and *Amphiops* (all Hydrophilidae). Furthermore, larval stages of the aquatic Heteroptera genera *Amemboa* and *Timasius* have also been observed (Tab. 1).

ZOOGEOGRAPHIC CONCLUSIONS

When the senior author wrote his revision of *Lacconnectus* (Brancucci 1986), only 38 species, distributed all over the Oriental region, were known. A total of only a few hundred specimens was studied for that revision, and that included all the available material from relevant museums. Since then, thousands of specimens have been collected in all parts of SE Asia and India. Thanks to this large amount of material, it is now possible to draw some zoogeographic conclusions.

The genus *Lacconnectus* is distributed all over the Oriental region, and occurs in the north from East Nepal, throughout South China, Hainan, Taiwan, the Philippines to Borneo, Java and Bali in the south. In the east, the distribution of the genus is strictly defined by the Wallace line as it is absent from Sulawesi and from the Sunda Islands east of Bali. Only one species, *L. basalis*, is very widespread in southern China and South-East Asia, from Myanmar, Thailand, Vietnam, Cambodia to the northern part of West Malaysia and Taiwan (Brancucci 1986, 2003, 2004). Furthermore, *L. corayi* and *L. krikkeni* also have a rather wide distribution, from Singapore, West Malaysia to Borneo (Sarawak, Brunei and Sabah). All the other species have a very restricted distribution. Six of the 9 species recorded from Borneo and 5 of the 7 species recorded from Sumatra are endemic. In Malaysia and Indonesia, the genus can be found at altitudes from 50 m (*L. corayi* and *L. krikkeni*) to 1600 m (*L. balkei*, *L. ponti*, *L. pulcher* and *L. sabahensis*).

The map (Fig. 62) shows that more than half of the species occur in the central part of the Oriental region, that is to say in Myanmar, Thailand, South China, Laos, Vietnam, West Malaysia, Borneo and Sumatra. This region can certainly be considered as a centre of speciation of the genus *Lacconnectus*. This has already been clearly shown by Brancucci (1986), although the number of species was just a little more than half of what it is today. New records of the genus *Lacconnectus* are so far lacking only from Cambodia. Only 10 species are recorded from the huge land mass represented by the tropical part of India; 8 from the Eastern Himalaya, 1 from the island of Hainan, 1 from Taiwan, and only 1 from the Philippines. All these areas have been more or less intensively and evenly surveyed over the past decade, so that the intensity of collecting activity, or lack of it, cannot be accepted as a possible explanation. Further new species can be expected from the Indomalayan region, from remote areas of Sumatra and especially from Kalimantan, the Indonesian part of Borneo.

Tab. 1: Aquatic Heteroptera and Coleoptera collected in selected *Lacconectus* habitats in West Malaysia and Borneo.

Coleoptera and Heteroptera species	Selected localities mentioned in the text										
	Singapore/Bukit Timah N.P.	Taman Negara, MA 7	Taman Negara, MA 5	Genting Highlands, MA 9	Cameron Highlands, MA 3	Tioman island "waterfall"	Tioman island "pass"	Sabah Mount Kinabalu	Sabah, Maliau Basin	Brunei, Temburong District	Brunei, Belait District
Coleoptera											
Dytiscidae											
<i>Lacconectus balkei</i> sp. n.	-	-	-	+	+	-	-	-	-	-	-
<i>Lacconectus corayi</i> BRANCUCCI, 1986	-	+	+	-	-	+	+	-	-	-	-
<i>Lacconectus krikkeni</i> BRANCUCCI, 1986	+	+	+	+	-	+	+	-	+	-	-
<i>Lacconectus stastnyi</i> sp.n.	-	-	-	-	-	-	-	+	-	-	-
<i>Lacconectus ponti</i> BRANCUCCI, 1986	-	-	-	-	+	-	-	-	-	-	-
<i>Lacconectus pulcher</i> BRANCUCCI, 1986	-	-	-	-	-	-	-	-	+	-	-
<i>Lacconectus sabahensis</i> BRANCUCCI, 1986	-	-	-	-	-	-	-	+	+	-	-
<i>Microdytes elgae</i> HENDRICH et al., 1995	+	-	+	-	-	-	-	-	-	-	-
<i>Microdytes pasiricus</i> CSIKI, 1937	+	-	-	-	-	-	-	-	-	-	-
<i>Copelatus</i> spec. (4 species)	-	-	-	-	+	-	-	-	+	-	-
<i>Platynectes javanus</i> NILSSON, 1998	-	-	-	+	+	-	-	-	-	-	-
Hydrophilidae											
<i>Oocyclus sumatrensis</i> D'ORCHYMONT, 1932	-	-	-	-	-	+	-	-	-	-	-
<i>Coelostoma</i> spec.	-	-	-	-	-	-	-	+	-	-	-
<i>Agraphydrus</i> spec. (4 species)	-	-	+	-	-	-	-	-	-	-	-
<i>Amphiops coomani</i> D'ORCHYMONT, 1926	-	-	+	-	-	+	-	-	-	-	-
<i>Helochares</i> spec.	-	-	-	-	-	+	-	-	-	-	-
Hydraenidae											
<i>Hydraena</i> spec.	+	-	+	-	-	+	+	-	+	-	-
Scirtidae											
<i>Prionocyphon</i> spec. (larvae)	-	+	+	-	+	+	-	-	-	-	-
Heteroptera											
Gerridae											
<i>Amemboa</i> spec.	-	-	-	-	+	-	-	-	-	-	-
Velidae											
<i>Peritoppus</i> spec.	-	-	-	+	+	-	-	-	-	-	-
Hebridae											
<i>Timasius</i> spec.	-	-	+	-	-	-	-	-	-	-	-

KEY TO THE INDOMALAYAN *LACCONNECTUS* SPECIES

1. Elytra testaceous, ferruginous-brown or brown, not or only partly with shallow dark markings, mostly not well-defined 2
- Elytra dark brown with distinct testaceous markings 14
2. Smaller species (3.6–4.9 mm). Elytra mostly testaceous or ferruginous-brown without markings 3

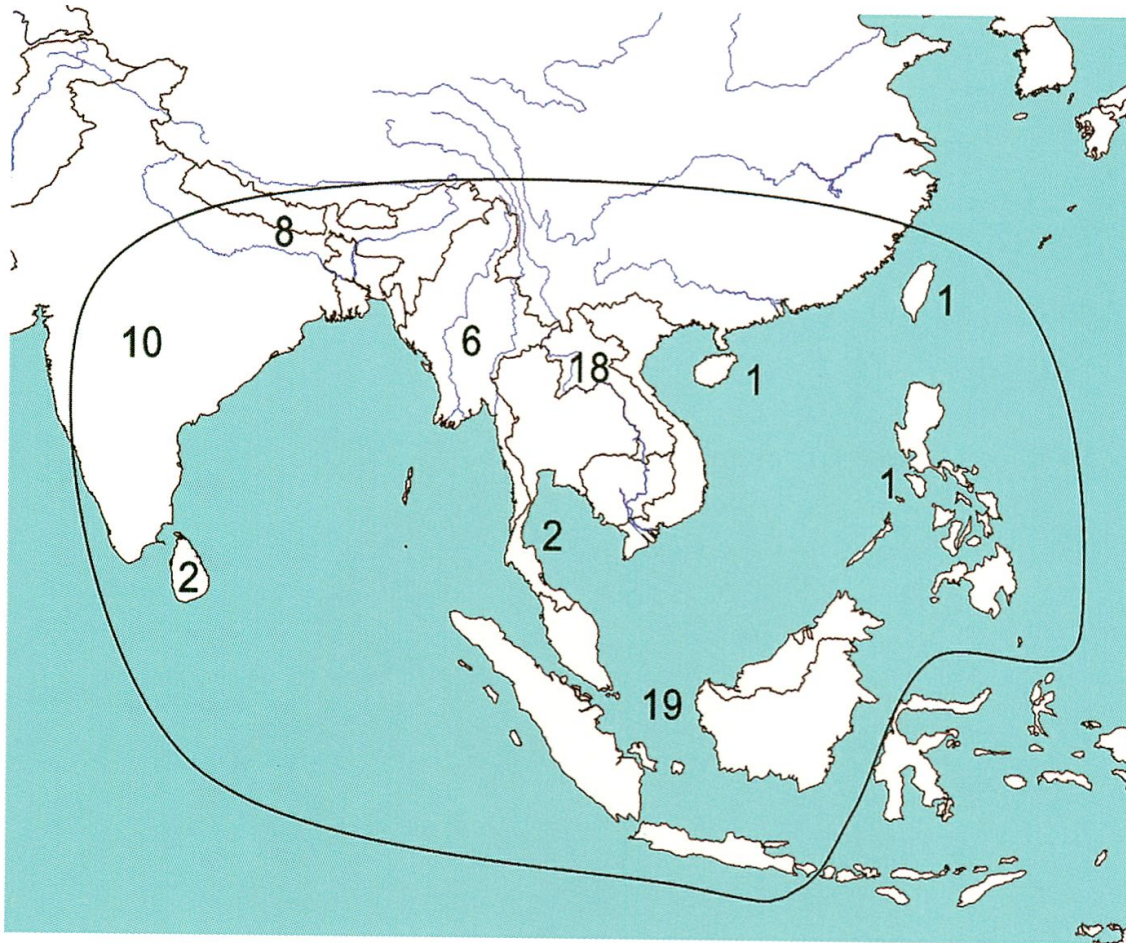


Fig. 62: Distribution map of the genus *Lacconnectus* with reference to the number of species in the various regions.

- Larger species (4.9–5.4 mm). Elytra brown, mostly with testaceous markings 12
- 3. Elytra distinctly microreticulate on basal $\frac{1}{5}$; meshes small polygonal or larger, almost rounded (in *L. krikkeni* reticulation of ♂ slightly impressed) 4
- Elytra almost smooth or at most slightly striolate even at base in both sexes 6
- 4. Larger species (4.0–4.7 mm). Aedeagus gently tapered on apical part 5
- Smaller species (3.7–3.8 mm). Aedeagus elongated on apical part (Fig. 11) *L. minutus* Brancucci
- 5. Elytral microreticulation with polygonal meshes which are still visible as far as apex; at apex the meshes are elongated. Micropunctures strongly impressed and very dense *L. ponti* Brancucci
- Elytral reticulation at most with polygonal meshes which disappear soon after elytral mid length. Micropunctures numerous but not strongly impressed *L. ritsemae* Régimbart
- 6. Elytra with a shagreened lustre from base to apex 7
- Elytra with a shagreened lustre limited to apical part 8



Fig. 63: Habitus of *Lacconectus basalis* Sharp.

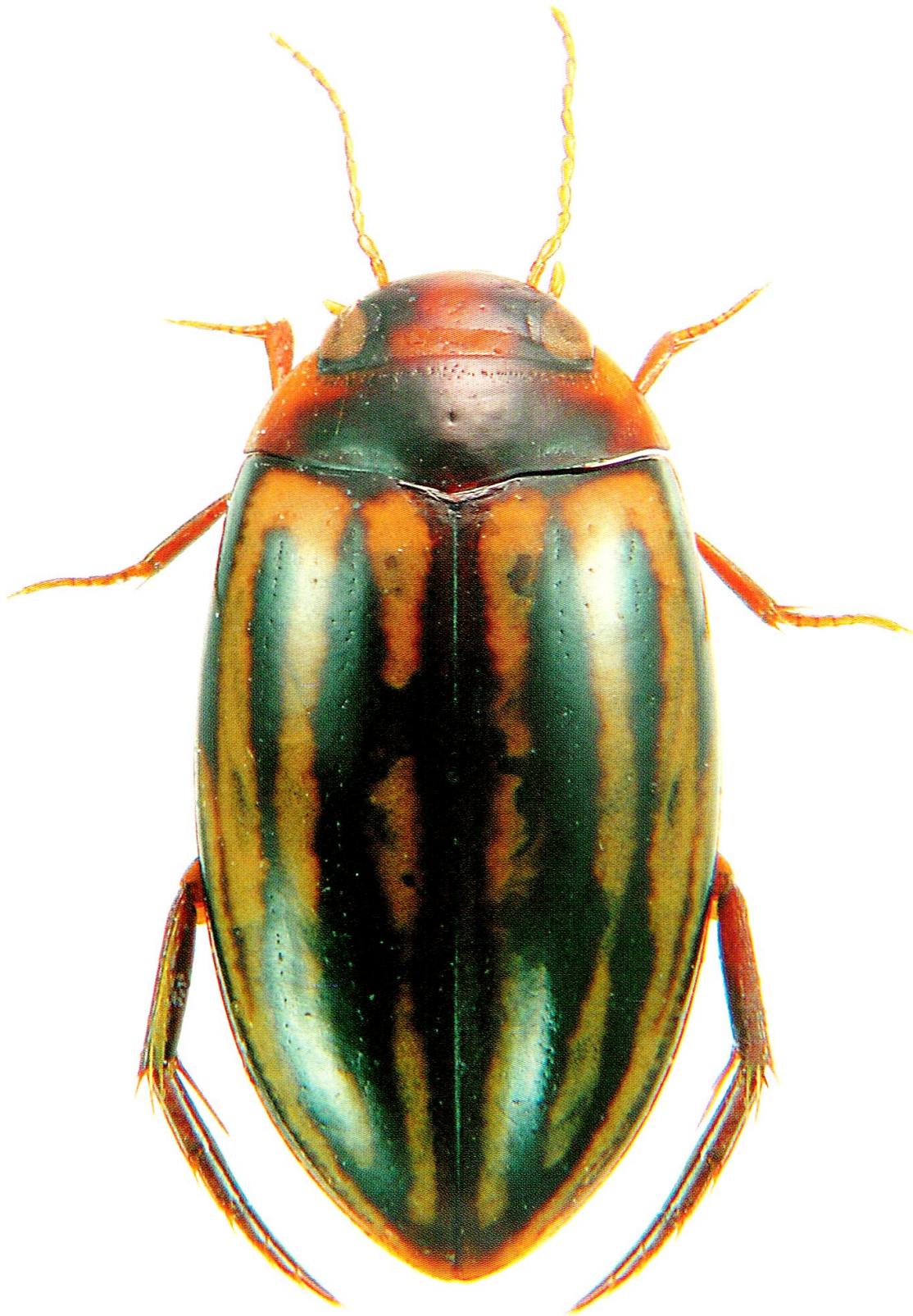


Fig. 64: Habitus of *Lacconectus pulcher* Brancucci.



Fig. 65: Habitus of *Lacconectus sabahensis* Brancucci.

7. Discal and sublateral rows of punctures on elytra in a straight line; punctures close together on the whole basal half. Rows deeply impressed. Apex of aedeagus rounded (Fig. 15) *L. muluensis* Brancucci
 – Discal and sublateral rows of punctures on elytra interrupted here and there on basal half. Rows superficially impressed. Apex of aedeagus long, evenly tapered and ending in a point (Fig. 17) *L. corayi* Brancucci
8. 2nd interspace with several punctures, distributed on the whole surface. Apex of aedeagus with a notch (Fig. 21) *L. javanicus* Brancucci
 – 2nd interspace with only a few punctures aligned along middle. Apex of aedeagus without a notch at apex, just rounded 9
9. Larger species (4.4–4.9 mm). ♂. Aedeagus, in lateral view, rounded at apex 10
 – Smaller species (3.6–3.9 mm). ♂. Aedeagus, in lateral view, narrowly rounded at apex (Fig. 12) *L. oceanicus* Régimbart
10. Elytral microreticulation very obsolescent and slightly impressed 11
 – Elytral microreticulation distinctly impressed at least on anterior half. ♂. Aedeagus, in lateral view, not broadened behind mid length (Fig. 14); parameres (Fig. 35) and habitus (Fig. 1) *L. jaechi* Brancucci
11. Body broadly oval. ♂. Aedeagus, in lateral view, constant in width on basal $\frac{2}{3}$ (Fig. 16) *L. krikkeni* Brancucci
 – Body oval. ♂. Aedeagus, in dorsal view, strongly bordered behind mid length (Fig. 26) *L. kelantanensis* n. sp.
12. Basal $\frac{1}{4}$ of elytra just finely microstriolate 13
 – Basal $\frac{1}{4}$ of elytra distinctly microreticulate; meshes well impressed at base *L. basalis* Sharp
13. Elytral microreticulation distinct, disappearing by mid length. Punctures small and well impressed *L. schoenmanni* Brancucci
 – Elytral microreticulation very obsolescent, practically disappearing by basal $\frac{1}{5}$. Aedeagus (Fig. 19) *L. balkei* n. sp.
14. Body broadly oval. Elytral microreticulation with small elongate meshes. Micropuncturation distinctly visible 15
 – Body oval elongate. Elytral microreticulation with broad polygonal, almost rounded meshes. Micropuncturation absent or obsolescent 18
15. Elytral interspaces with a few sparse larger punctures. Elytra microreticulate or at least microstriolate. Body, head and pronotum ferruginous, elytra with broad testaceous markings on a dark brown ground 16
 – Elytral interspaces with numerous large punctures. Elytra smooth and just with a double puncturation; ground surface smooth 17
16. Smaller species (3.7–4.5 mm). Elytra obsolescently microstriolate
 *L. rutilans* n. sp.
 – Larger species (4.9–5.1 mm). Elytra distinctly microreticulate. Habitus (Fig. 3), median lobe and parameres (Figs 23, 44) *L. schoedli* Brancucci
17. Larger species (5.0–5.2 mm). Body flattened. Basal band of elytra narrow. Underside completely dark brown *L. stastnyi* n. sp.
 – Smaller species (4.6–4.9 mm). Body broad oval, convex. Basal band of elytra mostly broader. Underside just ferruginous-brown
 *L. punctipennis* Zimmermann
18. Smaller species (3.9–5.1 mm). Elytra smooth, microsculpture obsolescently

- impressed; meshes broadly polygonal 19
- Larger species (5.2–5.5 mm). Elytra matt, microsculpture rough; meshes polygonal, deeply impressed *L. sabahensis* Brancucci
19. Smaller species (3.9–4.2 mm). Elytra mostly with complete stripes
..... *L. heubergeri* n. sp.
- Larger species (4.8–5.1 mm). Elytra with interrupted stripes
..... *L. pulcher* Brancucci

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REFERENCES

- Balke, M., Hendrich, L. & C.M. Yang 1999. Water beetles (Insecta: Coleoptera) in the Nature Reserves of Singapore. – Proceedings of the Nature Reserves Survey Seminar. Gardens' Bulletin Singapore 49 (2) (1997): 321–331.
- Balke, M., Jäch, M. & L. Hendrich 2004. Insecta: Coleoptera, pp. 555–609. – In: Yule, C. & Yong, L. (eds.): Freshwater Invertebrates of the Malaysian Region. – Academy of Sciences Malaysia, Kuala Lumpur, 868 pp.
- Brancucci, M. 1986. Revision of the genus *Lacconectus* Motschulsky (Coleoptera, Dytiscidae). – Entomologica Basiliensia 11:81–202.
- Brancucci, M. 1987. A New *Lacconectus* from Thailand (Coleoptera, Dytiscidae). – Aquatic Insects 9(2): 93–95.
- Brancucci, M. 1989. Notes on the genus *Lacconectus* with the description of two new species (Col., Dytiscidae). – Mitteilungen der Schweizerischen Entomologischen Gesellschaft 62: 107–111.
- Brancucci, M. 2002. New *Lacconectus* Motschulsky, 1855 from Indonesia, with notes on several poorly-known species (Coleoptera, Dytiscidae). – Entomologica Basiliensia 24: 23–32.
- Brancucci, M. 2003a. II. Faunistic notes on *Lacconectus* Motschulsky from China and neighbouring countries, and descriptions of new species. Pp. 95–113. – In: Jäch, M.A. & Ji, L. (eds): Water Beetles of China, Vol. III. – Wien: Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, VI + 572 pp.
- Brancucci, M. 2003b. A review of the genus *Lacconectus* Motschulsky, 1855 from the Indian Subcontinent (Coleoptera, Dytiscidae). – Entomologica Basiliensia 25: 23–39.
- Brancucci, M. 2004. Two new *Lacconectus* species from Vietnam (Coleoptera; Dytiscidae). – Aquatic Insects 26(3/4): 175–181.
- Brancucci, M. in press. Review of the *Lacconectus*-species from Myanmar, with the description of one new species (Coleoptera; Dytiscidae). – Aquatic Insects.
- Brancucci, M. & V. Gusich, 2004. The genus *Lacconectus* Motschulsky, 1855, in Thailand with a description of two new species (Coleoptera, Dytiscidae). – Entomologica Basiliensia 26: 105–112.
- Csiki, E. 1937. Die Schwimmkäfer (Haliplidae und Dytiscidae) von Sumatra, Java und Bali der Deutschen Limnologischen Sunda-Expedition. – Archiv für Hydrobiologie, Suppl.-Bd. 15. Tropische Binnengewässer, 7: 121–130.
- Guéorguiev, V. 1968. Essai de classification des Coléoptères Dytiscidae, Tribus Copelatini (Colymbetinae). – Izvestija na Zoologitjeskija Institut s Musei Sofia 28: 5–45.
- Hendrich, L. 1995. Malaysia's predaceous water beetles. – Nature Malaysiana 20 (2): 46–50.
- Hendrich, L. 1998. Dytiscidae: IV. Notes on Chinese *Lacconectus* Motschulsky, 1855 with description of a new species from Hainan (Coleoptera: Dytiscidae: Copelatinae), pp. 101–105. – In: Jäch, M.A. & Ji, L. (eds): Water Beetles of China. – Wien: Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, 1–371.
- Hendrich, L. & M. Balke 1995. Die Schwimmkäfer der Sundainsel Bali. Faunistik, Taxonomie, Ökologie, Besiedlungsgeschichte und Beschreibung von vier neuen Arten (Coleoptera: Dytiscidae). – Faunistische Abhandlungen des Museums für Tierkunde in Dresden 20 (5): 29–56.
- Hendrich, L., Balke, M. & C.M. Yang 2004. Aquatic Coleoptera of Singapore - Species Richness, Ecology and Conservation. – The Raffles Bulletin of Zoology 52 (1): 97–141.

- Hendrich, L. & C.M. Yang 1999. A Contribution to the Knowledge of the Water Beetle Fauna of Pulau Tioman, Peninsula Malaysia (Coleoptera: Noteridae, Dytiscidae, Hydrophilidae, Hydraenidae, Scirtidae, Limnichidae). – *The Raffles Bulletin of Zoology, Supplement* 6: 253–262.
- Miller, K.B. & A.N. Nilsson, 2003. Homology and terminology: communicating information about rotated structures in water beetles. – *Latissimus* 17: 1–4.
- Régimbart, M. 1883. Dytiscides nouveaux de la collection du Musée Royal de Leyde. – *Notes from the Leyden Museum* 5: 225–234.
- Régimbart, M. 1899. Révision des Dytiscidae de la région indo-sino-malaise. – *Annales de la Société Entomologique de France* 68: 186–367.
- Sharp, D. 1882. On aquatic carnivorous Coleoptera or Dytiscidae. – *Transactions of the Royal Dublin Society* (2) 2: 179–1003 + pl. 6–18.
- Vazirani, T.G. 1970. Contribution to the study of aquatic beetles (Coleoptera).VII. A revision of Indian Colymbetinae (Dytiscidae). – *Oriental Insects* 4 (3): 303–362.
- Vazirani, T.G. 1977. Catalogue of Oriental Dytiscidae. – *Records of the zoological Survey of India, Miscellaneous Publication Occasional Paper* 6: 1–111.
- Zimmermann, A. 1919. Die Schwimmkäfer des Deutschen Entomologischen Museums in Berlin-Dahlem. – *Archiv für Naturgeschichte* 83 (1917) (A 12): 69–249.
- Zimmermann, A. 1920. Dytiscidae. – *In: Junk, W. & Schenkling, S. (eds): Coleopterorum Catalogus* 4, pars 71, 1–326. Berlin.
- Zimmermann, A. 1928. A revision of the Dytiscid-genus *Lacconnectus* (Motsch.). – *Sarawak Museum Journal* 3: 383–388.

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