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Notes on the tiger beetles (Coleoptera: Carabidae: Cicindelinae) of Brunei Darussalam. 137. Contribution towards the knowledge of Cicindelinae

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Abstract. Distributional records of the 30 tiger beetle species and subspecies (Coleoptera: Carabidae: Cicindelinae) known for Brunei Darussalam are given together with habitus photos for 21 species. *Neocollyris* (*Neocollyris*) *labiomaculata* (Horn, 1892), *Neocollyris* (*Neocollyris*) *emarginata* (Dejean, 1825), *Therates spectabilis flavissimus* Brouerius van Nidek, 1957, *Heptodonta analis* s. str. (Fabricius, 1801), *Cosmodela velata* (Bates, 1872), *Lophyra* (s. str.) *fuliginosa* (Dejean, 1826), *Cylindera* (*Leptinomera*) *filigera* (Bates, 1878), *Myriochila* (s. str.) *specularis brevipennis* (Horn, 1897), *Abroscelis tenuipes araneipes* (Schaum, 1863) and *Callytron doriai* (Horn, 1897) are reported for the first time for the Sultanate.

Key Words. Borneo, faunistic data, checklist

Introduction

The small Islamic Sultanate Brunei Darussalam is located on the northwest coast of Borneo, surrounded by the State of Sarawak, Malaysia. It is divided into four administrative districts: Belait (2,724 km^2), Tutong (1,166 km^2) and Brunei-Muara (571 km^2), which are situated in the western enclave and, separated by the Malaysian district of Limbang, Temburong (1,304 km^2) in the eastern enclave. Situated between latitudes 4°00' and 5°05' north, the country is characterized by a distinct tropical climate, with high year-round temperatures, high humidity and an average annual rainfall from 2,500 mm along the coast to over 4,000 mm in the montane hinterland. Although Brunei Darussalam occupies less than 1% of the third largest island of the world, it plays an important part in the conservation of tropical rainforests in South-East Asia, as it is not been affected by the large-scale conversion of forest into palm oil plantations as seen in Malaysia and Indonesia.

As part of the Institute for Biodiversity and Environmental Research at the Universiti Brunei Darussalam, the Kuala Belalong Field Studies Centre located in the Temburong National Park offers the opportunity to study near-pristine mixed Dipterocarp forest with an extremely diverse invertebrate fauna. In recent years researchers reported 20 tiger beetle species from Brunei (Stork 1986; Wiesner 1988, 1992, 1998; Naviaux 1994/1995, 2002; Cassola and Probst 1995; Votruba 2009). Here we report new observations of 21 species of tiger beetles including ten species previously not collected in the Sultanate, increasing the total number of Cicindelinae recorded in Brunei Darussalam to 30 species.

Materials and Methods

All newly reported specimens listed in this publication were collected during an extensive entomological survey of the true bug (Heteroptera) fauna of Brunei Darussalam between October 2013 and April 2015, conducted by the first author as part of a postdoctoral fellowship at the Institute for Biodiversity and Environmental Research (IBER), Universiti Brunei Darussalam. A number of major forest types (mixed Dipterocarp forest, Kerrangas heath forest, peat forest, mangroves, secondary forest) as well as non-forest habitats (grassland, swamps, and open scrubland such as the so-called White Sands) were sampled at each of several sites across the country. A range of collecting methods were used including light trapping (a 125W Mercury Vapor bulb hanging inside a semi-transparent white collapsible mesh cage, BioQuip Products, CA 90220, USA), pitfall traps, litter sifting, vegetation beating/sweeping and searching by hand. Additional specimens were collected by the first author during another expedition in 2012, organized by the Universiti Brunei Darussalam in cooperation with iCUBE (International Consortium of Universities for the Study of Biodiversity and the Environment). An individual-based extrapolation based on the entire material collected by the first author (78 specimens, 21 species) was performed using the software iNEXT Online (Chao et al. 2016; Hsieh et al. 2016) to compare the observed and estimated species richness of Brunei and the adjunct regions.

Habitus images (Fig. 1–21) were taken with a Canon Eos 6D attached to a Leica M80 binocular microscope, and stacked with the software Helicon Focus Pro (Version 6.7.1). Stacked images were processed with Adobe Photoshop CS2. All specimens are card-mounted and will be deposited in the entomological collection of the University of Brunei Darussalam and in the first author's research collection.

List of abbreviations: **FR** = forest reserve, **KBFSC** = Kuala Belalong Field Studies Centre, **MV** = mercury vapor (light bulb), **UBD** = Universiti Brunei Darussalam

Faunistic Survey

The system used in the section "Faunistic Survey" is an updated version of the checklist by Wiesner (1992).

Subfamily Cicindelinae Latreille, 1802

Tribe Collyridini Brullé, 1834

Subtribe Tricondylina Naviaux, 1991

Genus *Tricondyla* Latreille, 1822

Subgenus *Tricondyla* s. str.

Tricondyla (s. str.) ***wallacei*** Thomson, 1857
Published data. Belait, Panaga (Stork 1986: 7).
Distribution. Borneo [Brunei (Belait), Sarawak], Malacca, Sumatra.

Tricondyla (s. str.) ***beccarii*** s. str. Gestro, 1874 (Fig. 1)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 372).
New records. Belait, Badas Forest Reserve (FR), Kerrangas heath forest with *Agathis borneensis*, forest path, sweep net, 0:00–03:00am, N4°33'55.8" E114°25'3.7", 1 female; Belait, Badas FR, Kerrangas heath forest with *Agathis borneensis*, forest path, hand coll., 16.ii.2014, 0:00–3:00am, N4°34'0.78" E114°25'4.20", 1 male; Belait, Labi, cut over Kerrangas heath forest, powerline track, forest edge, MV light, no rain, 6:00–11:30pm, 26.ix.2014, N4°34'58.74" E114°30'16.98", 1 male; **Temburong**, Mount

Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt. Pagon expedition, logging road, hand coll., no rain, daytime, 3.vii.2012, N4°20'36" E115°15'40", 1 male.
Distribution. Borneo [Brunei (Belait, Temburong), Kalimantan, Sabah, Sarawak], Palawan, Sumatra.
Remarks. New district record for Belait. The record of *T. cyanipes brunnipes* Motschulsky, 1861 (Wiesner 1998: 372) was in error (Naviaux 2002: 71), and these specimens belong to *T. beccarii*.

Subgenus *Stenotricondyla* Naviaux, 2002

***Tricondyla* (*Stenotricondyla*) doriai** Gestro, 1874 (Fig. 2)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 372).
New records. Temburong, Outward Bound Brunei Darussalam Batang Duri Camp, secondary mixed Dipterocarp forest, forest edge, on forest floor, hand coll., daytime, 1.vii.2012, N4°34'26" E115°7'18", 1 female.
Distribution. Borneo [Brunei (Temburong), Sarawak], Palawan.
Remarks. Wiesner (1998: 372) recorded *T. cavifrons* Schaum, 1862 from Brunei. These specimens represented ssp. *doriai*, later elevated to species rank by Naviaux (2002: 79).

Subtribe Collyrina Naviaux, 1991

Genus *Protocollyris* Mandl, 1975

Protocollyris bryanti Mandl, 1975
Published data. Brunei (Naviaux 1994: 163).
Distribution. Borneo [Brunei, Sabah, Sarawak].

Genus *Neocollyris* Horn, 1901

Subgenus *Neocollyris* s. str.

Neocollyris (s. str.) ***labiomaculata*** (Horn, 1892) (Fig. 3)
New records. Belait, Teraja, lowland mixed Dipterocarp forest, dung-baited pitfall trap (trap no. 4), 18.iii.2014, N4°17'17.3" E114°25'49.8", 1 male.
Distribution. Borneo [Brunei (Belait), Sarawak].
Remarks. New country record for Brunei and new district record for Belait.

Neocollyris (s. str.) ***emarginata*** (Dejean, 1825) (Fig. 4)
New records. Brunei-Muara, Universiti Brunei Darussalam (UBD) campus, secondary forest edge, on understorey vegetation, sweep net, 8–10pm, 12.x.2013, N4°58'48" E114°53'44", 1 male, 1 female; Brunei-Muara, UDB campus, secondary forest edge, on understorey vegetation, sweep net, 27.x.2013, 9-10pm, N4°58'47" E114°53'42", 1 female; Brunei-Muara, UDB campus, secondary forest along highway, gas pipeline track, MV light, windy, clouds, no rain, 6:45–10:15pm, 28.ii.2015, N4°58'59" E114°54'1", 1 male.
Distribution. Borneo [Brunei (Brunei-Muara), Sarawak, Kalimantan], Jawa, Malacca, Mindanao, Palawan, Sumatra.
Remarks. New record for Brunei and new district record for Brunei-Muara.

Subgenus *Stenocollyris* Naviaux, 1995

Neocollyris* (*Stenocollyris*) *leucodactyla (Chaudoir, 1860)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 372).
Distribution. Borneo [Brunei (Temburong), Sarawak], Malacca, Singapore, Sumatra.

Neocollyris* (*Stenocollyris*) *constricticollis (Horn, 1909)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
Distribution. Borneo [Brunei (Temburong), Kalimantan, Sarawak].

Tribe Cicindelini Latreille, 1802

Subtribe Theratina Horn, 1910

Genus *Therates* Latreille, 1817

Therates batesii s. str. Thomson, 1857 (Fig. 5)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
New records. Temburong, mixed Dipterocarp forest, Ashton trail, on vegetation at stream, hand coll., 9–11am, 7.i.2014, N4°32'50.9" E115°9'22,8", 1 female; Temburong, mixed Dipterocarp forest, Ashton trail, on understorey near stream, hand coll., 9–11am, 8.i.2014, N4°32'53" E115°9'4", 1 male.
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak, Kalimantan], Malacca, Sumatra.

Therates bryanti Horn, 1922
Published data. Tutong, Lamunin, Bukit Sulang (Wiesner 1988: 39).
Distribution. Borneo [Brunei (Tutong), Kalimantan, Sarawak].

Therates bruneiensis Votruba, 2009 (Fig. 6)
Published data. Temburong, Kuala Belalong (Votruba 2009: 325, 326).
New records. Temburong, Labu FR, peat forest, trail on highway transect, flying in open understorey, hand coll., 1–3pm, 1.ii.2015, N4°46'3.3" E115°9'53.5", 1 male.
Distribution. Borneo [Brunei (Temburong)].

Therates dimidiatus wallacei Thomson, 1857
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
Distribution. Borneo [Brunei (Temburong), Kalimantan, Sabah, Sarawak], Malacca, Singapore, Sumatra, Thailand.

Therates spectabilis flavissimus Brouerius van Nidek, 1957 (Fig. 7)
New records. Temburong, Temburong river, near Apan waterfall, on vegetation at small stream, hand coll., 12–1pm, 28.viii.2014, N4°33'9.19" E115°10'22.20", 1 female.
Distribution. Borneo [Brunei (Temburong), Kalimantan, Sarawak].
Remarks. New record for Brunei and new district record for Temburong.

Subtribe Dromicina Thomson, 1859

Genus Heptodonta Hope, 1838

Heptodonta analis s. str. (Fabricius, 1801) (Fig. 8)
New records. Temburong, Mount Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt. Pagon expedition, helipad, MV light, 3.vii.2012, N4°20'36" E115°15'40", 1 female; Temburong, Mt. Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt Pagon expedition, forest road, on ground, hand coll., after rain, 7.vii.2012, N4°20'13.0" E115°15'42.3", 1 male; Temburong, Mt. Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt Pagon expedition, logging road, hand coll., 9.vii.2012, N4°20'36" E115°15'40", 2 males, 2 females.
Distribution. Borneo [Brunei (Temburong), Kalimantan, Sarawak, Sabah], Jawa, Luzon, Malacca, Sulawesi, Sumatra, Thailand.
Remarks. New record for Brunei and new district record for Temburong.

Subtribe Cicindelina Latreille, 1802

Genus *Calomera* Motschulsky, 1862

Calomera crespignyi (Bates, 1871) (Fig. 9)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
New records. Temburong, Temburong, Kuala Belalong Field Studies Centre, at light, on wall, before rain, 6–10pm, 7.i.2014, N4°32'49" E115°9'28", 1 female.
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak].

Genus *Cosmodela* Rivalier, 1961

Cosmodela aurulenta (Fabricius, 1801) (Fig. 10)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
New records. Belait, Labi, Labi road, *Shorea albida* peat forest, sawmill area, forest edge, MP light, no rain, 31.x.2014, 6–10pm, N4°33'33.61" E114°29'23.142", 1 female; **Temburong**, Mount Pagon, Mixed Dipterocarp forest, old forest road, MV light, no rain, 8pm–1am, 23.viii.2014, N4°16' 38.1" E115°17'26.2", 1 female; Temburong, Kuala Belalong Field Studies Centre, at light on wall, 8–10pm, 8.iii.2015, N4°32'49.1" E115°9'27.9", 1 male.
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak], Bali, China, Jawa, Malacca, Singapore, Sulawesi, Sumatra.
Remarks. New district record for Belait.

Cosmodela velata (Bates, 1872) (Fig. 11)
New records. Belait, Teraja, mixed Dipterocarp forest, MV light, sandy river bank, no rain, 6–11pm, 1.ii.2014, N4°16'59.58" E114°25'38.16", 1 male; **Temburong**, Kuala Belalong Field Studies Centre, MV light, at concrete jetty, clouds, 7–0:30am, 16.iii.2015, N4°32'49.1" E115°9'27.9", 1 female.
Distribution. Borneo [Brunei (Belait, Temburong), Sarawak].
Remarks. New record for Brunei and new district records for Belait and Temburong.

Genus *Lophyra* Motschulsky, 1859

Subgenus *Lophyra* s. str.

Lophyra (s. str.) ***fuliginosa*** (Dejean, 1826) (Fig. 12)
New records. Belait, Badas FR, exploited Kerrangas heath forest, forest clearing, MV light, 50% clouds, 0–3am, 16.ii.2014, N4°33'54.96" E114°25'3.43", 1 male, 3 females; **Brunei-Muara**, UDB Campus, secondary forest, secondary bush land, sandy forest track, hand coll., daytime, 29.vi.2012, N4°58' 53", E114°53' 39", 1 female; Brunei-Muara, UDB Campus, secondary forest, secondary bush land, forest edge, hand coll., daytime, 30.vi.2012, N4°58' 53", E114°53' 39", 1 female; Brunei-Muara, UDB Campus, secondary forest edge, lawn, short sparse grasses, sweep net, 27.x.2013, 9-10pm, N4°58'47" E114°53'44", 1 male, 2 females; **Tutong**, Kerrangas heath forest, White Sands, MV light, 10.viii.2014, 1 female; Tutong, Kerrangas heath forest, White Sands, forest edge, MV light, very light rain, 6:30–9:30pm, 16.ix.2014, N4°45'19.13" E114°37'50.35", 1 male; Tutong, Kerrangas heath forest, White Sands, MV light, sand quarry, before rain, 6–8pm, 21.x.2014, N4°45'23.14" E114°37'25.82", 1 female; Tutong, Kerrangas heath forest, White Sands, MV light, sandy quarry, few clouds, 6–10pm, 27.ii.2015, N4°45'19" E114°37'25", 1 male.
Distribution. Borneo [Brunei (Belait, Brunei-Muara, Tutong)], Bali, Cambodia, China, Jawa, Laos, Malacca, Myanmar, Sri Lanka, Thailand, Vietnam.
Remarks. New record for Brunei and new district records for Belait, Brunei-Muara and Tutong.

Genus *Cylindera* Westwood, 1831

Subgenus *Verticina* Rivalier, 1961

Cylindera (***Verticina***) ***versicolor*** (McLeay, 1825)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).

Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak], Jawa, Malacca, Singapore, Sumatra, Thailand.

Subgenus *Leptinomera* Rivalier, 1961

Cylindera* (*Leptinomera*) *filigera (Bates, 1878) (Fig. 16)
New records. Temburong, Kuala Belalong Field Studies Centre, at light, on wall, no rain, 8–9pm, 5.iii.2014, N4°32'49.17" E115°9'27.93", 1 female.
Distribution. Borneo [Brunei (Temburong), Kalimantan, Sabah, Sarawak].
Remarks. New record for Brunei and new district record for Temburong. The specimen on hand, has yellow tibiae and the brownish mandibular teeth, usual *C. filigera* have black tibiae and black mandibular teeth.

Cylindera* (*Leptinomera*) *catoptroides (Horn, 1892)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak], Malacca, Sumatra.

Cylindera* (*Leptinomera*) *plasoni (Horn, 1903) (Fig. 17)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 373).
New records. Temburong, Mount Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt Pagon expedition, helipad, MV light, 7–10pm, 2.vii.2012, N4°20'36" E115°15'40", 1 female; Temburong, Mount Pagon, mixed Dipterocarp forest, forest road, MV light, no rain, 8pm–1am, 23.viii.2014, N4°16'38.1" E115°17'26.2", 1 female.
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak].

Cylindera* (*Leptinomera*) *hammondi Cassola, 1983 (Fig. 18)
Published data. Tutong, Lamunin, Bukit Sulang (Stork 1986: 9).
New records. Temburong, mixed Dipterocarp forest, Belalong river, open gravel bank, 8–9pm, no clouds, MV light, 5.iii.2014, N4°32'45.25" E115°9'31.06", 1 female.
Distribution. Borneo [Brunei (Temburong, Tutong), Sarawak].
Remarks. New district record for Temburong.

Cylindera* (*Leptinomera*) *kibbyana Cassola, 1983 (Fig. 19)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 376).
New records. Temburong, Mount Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt Pagon expedition, helipad, MV light, 7–10pm, 2.vii.2012, N4°20'36" E115°15'40", 1 male, 4 females; Temburong, Mount Pagon, montane Kerrangas heath forest, base camp of University of Brunei and iCUBE 2012 Mt Pagon expedition, logging road, hand coll., daytime, 3.vii.2012, N4°20'36" E115°15'40", 2 females; Temburong, Kuala Belalong Field Studies Centre, MV light, 7–10pm, 5.i.2014, N4°32'49" E115°9'28", 1 male, 2 females; Kuala Belalong Field Studies Centre, at light, on wall, before rain, 6–10pm, 7.i.2014, N4°32'49" E115°9'28", 1 female; mixed Dipterocarp forest, Belalong river, gravel bank, MV light, no clouds, 8–9pm, 5.iii.2014, N4°32'45.25" E115°9'31.06", 1 male, 1 female.
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak].

Cylindera* (*Leptinomera*) *macrodonta Cassola and Probst, 1995 (Fig. 20)
Published data. Temburong, Kuala Belalong (Cassola and Probst 1995: 13; Wiesner 1998: 376).
New records. Temburong, Kuala Belalong Field Studies Centre, MV light, after rain, 7–10pm, 4.i.2014, N4°32'49" E115°9'28", 1 male.
Distribution. Borneo [Brunei (Temburong)].

Subgenus *Ifasina* Jeannel, 1946

Cylindera* (*Ifasina*) *discreta s. str. (Schaum, 1863) (Fig. 21)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 376).
New records. Belait, Labi, Labi road, exploded Kerrangas Heath forest, power line track, forest clearing, MV light, before rain, 6–11.30pm, 26.ix.2014, N4°34.979' E114°30.283', 1 male, 1 female;, Labi, Labi Road, *Shorea albida* peat forest, sawmill area, forest edge, MV light, no rain, 6–10pm, 31.x.2014, N4°33'33.61" E114°29'23.142", 2 females; **Temburong**, Belalong, mixed Dipterocarp forest, Outward Bound Brunei Darussalam Batang Duri Camp, at light, no rain, 6–10pm, 1.vii.2012, N4°34'25" E115°7'14", 1 female; Temburong, Ulu Ulu Resort, large riverbank, MV light, before rain, 7–8pm, 14.i.2014, N4°33'10" E115°9'22", 1 male.
Distribution. Borneo [Brunei (Belait, Temburong), Sabah, Sarawak], Australia, Buru, Flores, Jawa, Malacca, Moluccas, Sebesi, Singapore, Sumatra, Sulawesi, Toekang Besi Isl.
Remarks. New district record for Belait.

Subgenus *Eugrapha* Rivalier, 1950

Cylindera* (*Eugrapha*) *minuta (Olivier, 1790)
Published data. Temburong, Kuala Belalong (Wiesner 1998: 376).
Distribution. Borneo [Brunei (Temburong), Sabah, Sarawak], Bangladesh, Cambodia, China, India, Jawa, Laos, Malacca, Myanmar, Nepal, Philippines, Sumbawa, Sumatra, Thailand, Vietnam.

Genus *Myriochila* Motschulsky, 1857

Subgenus *Myriochila* s. str.

Myriochila (s. str.) ***specularis brevipennis*** (Horn, 1897) (Fig. 13)
Published data. Brunei-Muara, UDB Campus, former married quarters, behind building, secondary heath forest, MV light, 11.ii.2014, 9–11pm, rain, N4°58'30.60" E114° 53'28.10", 1 male; **Temburong**, Pulau Selirong FR, mangrove forest, boardwalk, MV light, after 20 min of heavy rain, 6:15–8:15pm, 31.iii.2015, N4°53'6.3" E115°8'5.6", 1 male.
Distribution. Borneo [Brunei (Brunei-Muara, Temburong), Sarawak], Bali, Jawa, Selei Isl., Sulawesi, Sumatra, Sumbawa.
Remarks. New state record for Brunei and new district records for Brunei-Muara and Temburong.

Genus *Abroscelis* Hope, 1838

Abroscelis tenuipes araneipes (Schaum, 1863) (Fig. 14)
Published data. Tutong, Tutong, Kerrangas heath forest, White Sands, forest edge, MV light, very light rain, 8:30–9:30pm, 18.ix.2014, N4°45'19.13" E114°37'50.35", 1 female; Tutong, Kerrangas heath forest, White Sands, sand quarry, MV light, before rain, 21.x.2014, 6–8pm, N4°45'23" E114°37'26", 1 female; Tutong, Kerrangas heath forest, White Sands, sand quarry, MV light, few clouds, 6–10pm, 27.ii.2015, N4°45'19" E114°37'25", 1 female.
Distribution. Borneo [Brunei (Tutong), Sabah, Sarawak], Cambodia, Palawan, Vietnam.
Remarks. New state record for Brunei and new district record for Tutong.

Genus *Callytron* Gistl, 1848

Callytron doriai (Horn, 1897) (Fig. 15)
New records. Brunei-Muara, Berambang, mangroves, Malaise trap (trap ID6), 4.ix.2014, N4°54'7.44", E115°1'17.94", 5 males; Brunei-Muara, Berambang, mangroves, Malaise trap(trap ID6), 16.ix.2014, N4°54'7.44", E115°1'17.94, 2 males; **Temburong**, Pulau Selirong FR, mangrove forest, bridge over creek, MV light, no rain, 6pm–4am, 22.vii.2014, N4°52'57.42" E115°8'13.80", 1 female; Temburong, Labu FR, mangroves, Malaise trap (trap ID4), 6.viii.2014, N4°50'53.11" E115°7'45.65", 1 male; Temburong, Pulau Selirong FR, mangroves, forest gap near board walk, MV light, rain 7–8pm, full moon, 6–9pm, 7.i.2015, N4°53'21.26" E115°7'59.33", 1 female.

Distribution. Borneo [Brunei (Brunei-Muara, Temburong), Sarawak], Malacca, Singapore, Sumatra.
Remarks. New state record for Brunei and new district records for Brunei-Muara and Temburong.

Discussion

A total of 21 tiger beetle species were collected by the first author during an extensive entomological survey of the Heteroptera fauna of Brunei Darussalam during 2012 to 2015, including 10 species reported for the first time from the Bornean Sultanate. We conducted an individual-based extrapolation using the newly collected material (78 specimens, 21 species) and found that the estimated species richness reaches an asymptote of around 30 species (Fig. 22), which corresponds well with the new updated total number of 30 species. However, it is likely that future field surveys will yield additional species. For example, during this survey alone, 11 species were collected from only the vicinity of the Kuala Belalong Field Studies Centre (Fig. 23), and three species were found opportunistically near ceiling lights at the field station. Although most of the active light trapping was at the nearby canopy walkway *ca*. 35 meters above the forest floor on a ridgeline, not a single tiger beetle was found among the many insects attracted to this light trap from the surrounding two valleys.

There are now 30 Cicindelinae (Table 1) reported from Brunei Darussalam, nearly as many species as known from entire Indonesian Borneo (Kalimantan) (31 species, 11 of them shared with Brunei). As most areas of Kalimantan have not been surveyed as intensively as the forest around KBFSC in Temburong, the species lists for Sabah (47 including 14 shared species) and neighboring Sarawak (79 including 27 shared species) offer a more appropriate indication of the potential tiger beetle community of Brunei Darussalam.

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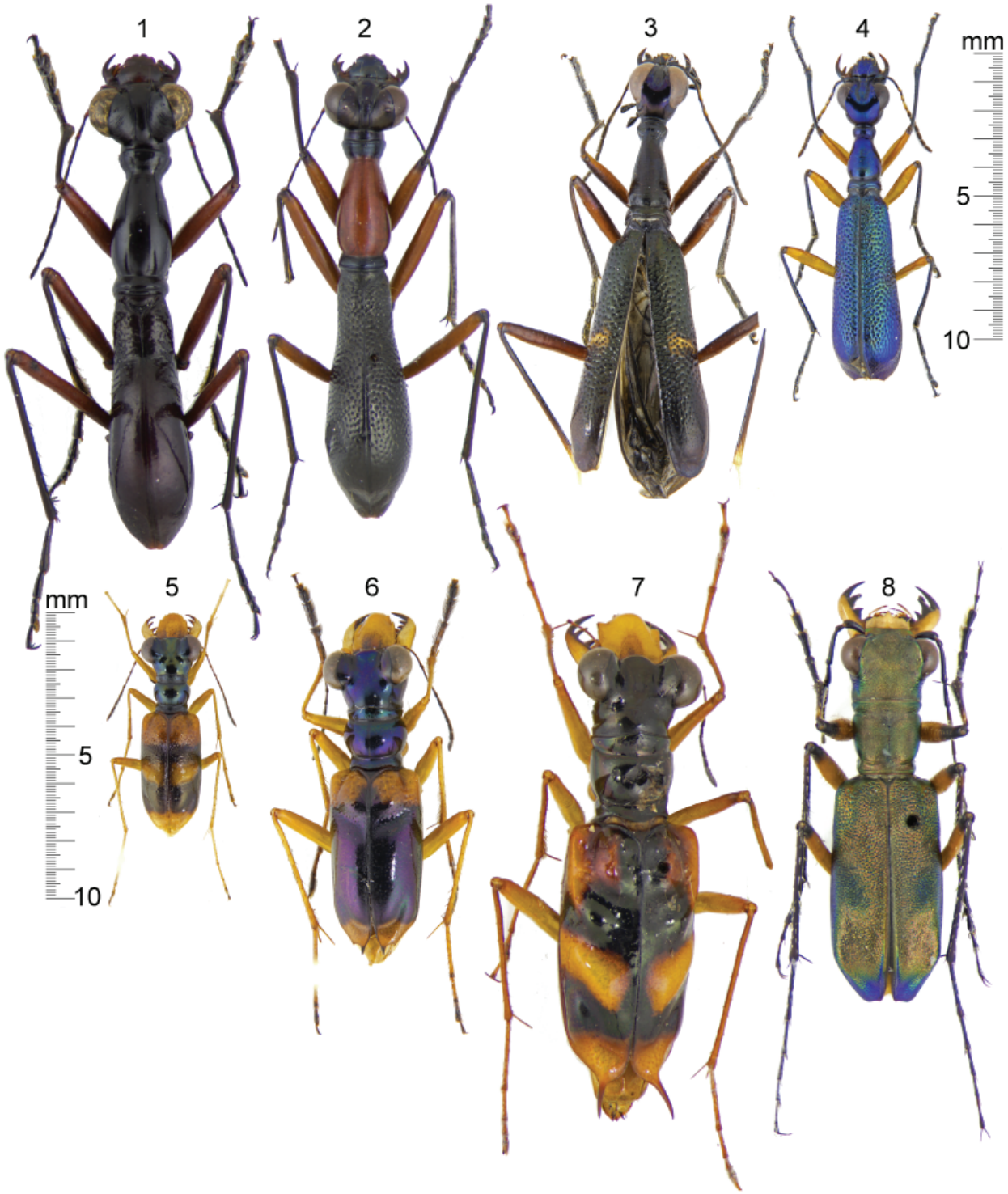
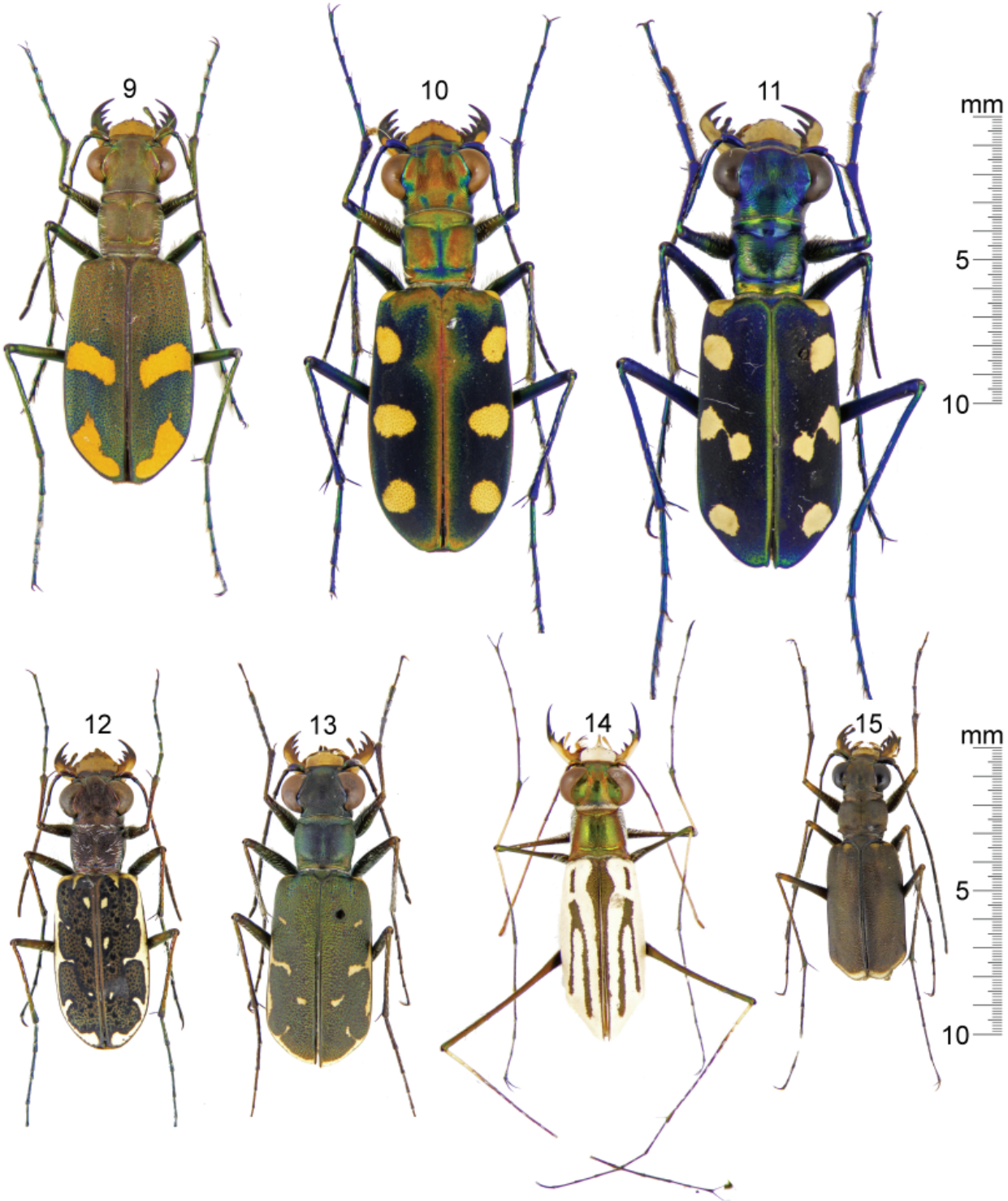
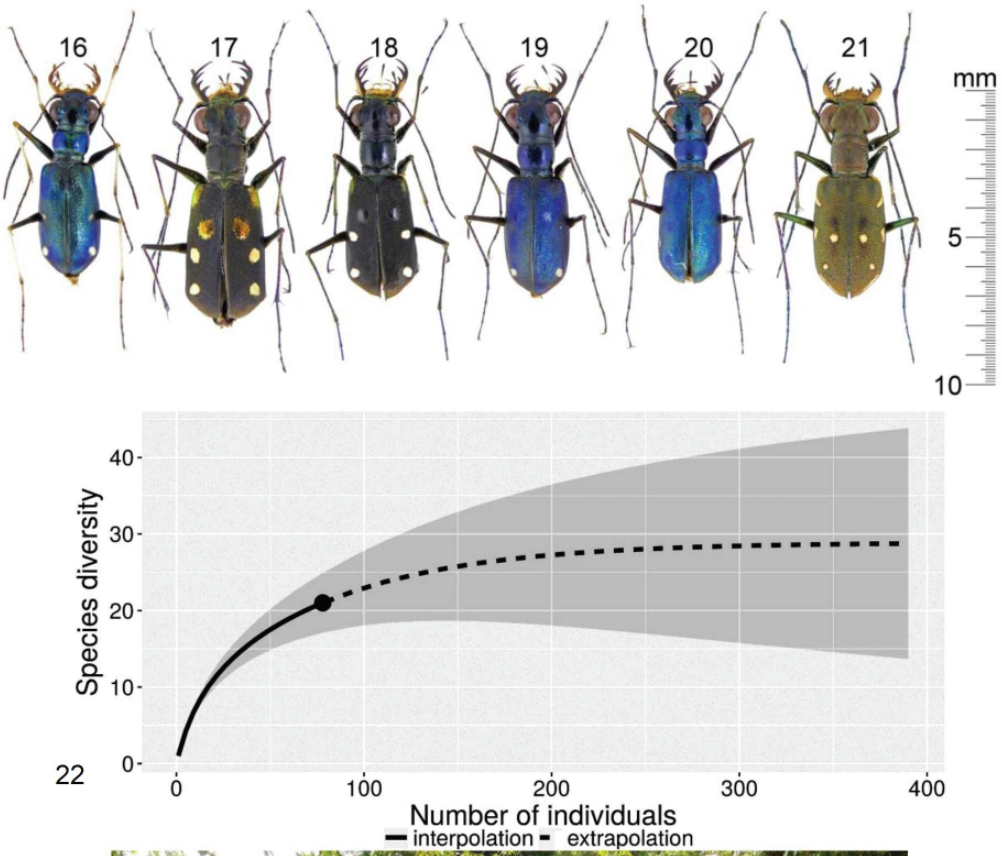


Figures 1–8. Habitus images. All scales = 10mm. **1)** *Tricondyla* (*Tricondyla*) *beccarii* s.str. Gestro, 1874. **2)** *Tricondyla* (*Stenotricondyla*) *doriai* Gestro, 1874. **3)** *Neocollyris* (s. str.) *labiomaculata* (Horn, 1892). **4)** *Neocollyris* (s. str.) *emarginata* (Dejean, 1825). **5)** *Therates batesii* s. str. Thomson, 1857. **6)** *Therates bruneiensis* Votruba, 2009. **7)** *Therates spectabilis flavissimus* Brouerius van Nidek, 1957. **8)** *Heptodonta analis* s. str. (Fabricius, 1801).



Figures 9–15. Habitus images. All scales = 10mm. **9)** *Calomera crespignyi* (Bates, 1871). **10)** *Cosmodela aurulenta* (Fabricius, 1801). **11)** *Cosmodela velata* (Bates, 1872). **12)** *Lophyra* (s. str.) *fuliginosa* (Dejean, 1826). **13)** *Myriochila* (s. str.) *specularis brevipennis* (Horn, 1897). **14)** *Abroscelis tenuipes araneipes* (Schaum, 1863). **15)** *Callytron doriai* (Horn, 1897).



Figures 16–23. Habitus images, rarefaction curve, and habitat. All scales = 10mm. **16)** *Cylindera* (*Leptinomera*) *filigera* (Bates, 1878). **17)** *Cylindera* (*Leptinomera*) *plasoni* (Horn, 1903). **18)** *Cylindera* (*Leptinomera*) *hammondi* Cassola, 1983. **19)** *Cylindera* (*Leptinomera*) *kibbyana* Cassola, 1983. **20)** *Cylindera* (*Leptinomera*) *macrodonta* Cassola and Probst, 1995. **21)** *Cylindera* (*Ifasina*) *discreta* s. str. (Schaum, 1863). **22)** Individual-based rarefaction and extrapolation sampling curve of Cicindelinae in Brunei Darussalam, based on the material collected during this study (21 species, 78 specimens). Dark-grey shaded area indicates 95% confidence intervals. **23)** Kuala Belalong Field Studies Centre (Temburong National Park). Embedded in near natural mixed Dipterocarp forest, many Cicindelinae can be found along the Belalong river and its distributaries, including *Calomera crespignyi*, *Cosmodela velata*, *Cylindera* spp. and *Therates* spp.

Table 1. Provincial records of the tiger beetles of Borneo.

Nr.	Species	Brunei (location not specified)	Belait	Tutong	Brunei-Muara	Temburong	**Brunei (total)**	Malaysia (Sarawak)	Malaysia (Sabah)	Indonesia (Kalimantan)	Borneo (location not specified)	Borneo (total) [E=endemic]
1	*Tricondyla* (s. str.) *brunnea* Dokhtouroff, 1883							×				×
2	*Tricondyla* (s. str.) *wallacei* Thomson, 1857		×				×	×				×
3	*Tricondyla* (s. str.) *werneri* Naviaux, 2002							×				×
4	*Tricondyla* (s. str.) *elenae* Werner, 1992								×			**E**
5	*Tricondyla* (s. str.) *reducta* Naviaux, 2002								×			**E**
6	*Tricondyla* (s. str.) *beccarii* s. str. Gestro, 1874		×			×	×	×	×	×		×
7	*Tricondyla* (*Stenotricondyla*) *doriai* Gestro, 1874					×	×	×				×
8	*Protocollyris bryanti* Mandl, 1975	×					×	×		×		**E**
9	*Protocollyris antennalis* s. str. (Horn, 1909)								×	×		×
10	*Neocollyris* (*Brachycollyris*) *brevithoracica* (Horn, 1913)								×			**E**
11	*Neocollyris* (s. str.) *bonellii* s. str. (Guérin-Méneville, 1834)							×		×		×
12	*Neocollyris* (s. str.) *goerni* Wiesner, 2017								×			**E**
13	*Neocollyris* (s. str.) *cruentata* (Schmidt-Goebel, 1846)										×	×
14	*Neocollyris* (s. str.) *batesi* (Horn, 1892)										×	×
15	*Neocollyris* (s. str.) *clavipalpis* (Horn, 1901)							×	×			×
16	*Neocollyris* (s. str.) *labiomaculata* (Horn, 1892)		×				×	×				**E**
17	*Neocollyris* (s. str.) *aeneicollis* Naviaux and Cassola, 2005								×			**E**
18	*Neocollyris* (s. str.) *diardi* (Latreille, 1822)							×	×			×
19	*Neocollyris* (s. str.) *nishikawai* Naviaux, 2004									×		**E**
20	*Neocollyris* (s. str.) *albitarsipennis* (Horn, 1925)							×				**E**
21	*Neocollyris* (s. str.) *chloroptera* (Chaudoir, 1860)							?				×
22	*Neocollyris* (s. str.) *dimidiata* s. str. (Chaudoir, 1864)							×	×			×
23	*Neocollyris* (s. str.) *dimidiata sabahensis* Naviaux, 2004								×			**E**
24	*Neocollyris* (s. str.) *emarginata* (Dejean, 1825)				×		×	×		×		×
25	*Neocollyris* (s. str.) *rufipalpis* (Chaudoir, 1864)							×				×
26	*Neocollyris* (Neocollyris) *diversa* Naviaux, 2010							×				**E**
27	*Neocollyris* (*Orthocollyris*) *bryanti* (Horn, 1922)							×				**E**
28	*Neocollyris* (*Leptocollyris*) *xanthoscelis* (Chaudoir, 1864)							×				×
29	*Neocollyris* (*Stenocollyris*) *leucodactyla* (Chaudoir, 1860)					×	×	×				×
30	*Neocollyris* (*Stenocollyris*) *dohertyi* (Horn, 1895)							×				×
31	*Neocollyris* (*Stenocollyris*) *sarawakensis* s.str. (Thomson, 1857)							×	×	×		×
32	*Neocollyris* (*Stenocollyris*) *werneri* Naviaux, 1991							×				**E**
33	*Neocollyris* (*Stenocollyris*) *oblita* Naviaux, 1995							×		×		×
34	*Neocollyris* (*Stenocollyris*) *constricticollis* (Horn, 1909)					×	×	×		×		**E**
35	*Neocollyris* (*Stenocollyris*) *constricticolloides* Dheurle, 2016							×				**E**
36	*Neocollyris* (*Stenocollyris*) *levigata* (Horn, 1894)										×	**E**
37	*Neocollyris* (*Stenocollyris*) *glabrogibbosa* (Horn, 1929)								×			**E**
38	*Neocollyris* (*Leiocollyris*) *lissodera* (Chaudoir, 1864)							×	×			**E**
39	*Neocollyris* (*Leiocollyris*) *richteri* (Horn, 1901)							×	×	×		×
40	*Neocollyris* (*Leiocollyris*) *ovata* Naviaux and Sawada, 1993								×			**E**
41	*Neocollyris* (*Pachycollyris*) *aptera* s. str. (Lund, 1790)							×				×
42	*Neocollyris* (*Pachycollyris*) *horni* Naviaux, 1995								×			**E**

Nr.	Species	Brunei (location not specified)	Belait	Tutong	Brunei-Muara	Temburong	**Brunei (total)**	Malaysia (Sarawak)	Malaysia (Sabah)	Indonesia (Kalimantan)	Borneo (location not specified)	Borneo (total) [E=endemic]
43	*Neocollyris* (*Pachycollyris*) *acutilabris* Naviaux, 1995							×				**E**
44	*Neocollyris* (*Heterocollyris*) *rhodopus* (Bates, 1878)										×	×
45	*Neocollyris* (*Heterocollyris*) *conigera* Naviaux, 1996										×	**E**
46	*Neocollyris* (*Heterocollyris*) *sumatrensis* (Horn, 1896)										×	×
47	*Neocollyris* (*Heterocollyris*) *waterhousei* (Chaudoir, 1864)							×				×
48	*Neocollyris* (*Heterocollyris*) *fleutiauxi* (Horn, 1892)							×				**E**
49	*Collyris robusta* Dohrn, 1891							×				×
50	*Collyris colossea* Naviaux, 1995							×				×
51	*Therates erinnys* s. str. Bates, 1874							×	×	×		**E**
52	*Therates erinnys tepa* Moulton, 1910							×	×	×		**E**
53	*Therates batesii* s. str. Thomson, 1857					×	×	×	×	×		×
54	*Therates batesii testaceipennis* Horn, 1924								×			**E**
55	*Therates batesii cranstoni* Wiesner, 1988							×				**E**
56	*Therates naidenowi* Wiesner, 1996							×				**E**
57	*Therates maindroni* Horn, 1900							×		×		**E**
58	*Therates bryanti* Horn, 1922			×			×	×		×		**E**
59	*Therates spinipennis* s. str. Latreille, 1822							×				×
60	*Therates spinipennis versicolor* Bates, 1878							×		×		**E**
61	*Therates bruneiensis* Votruba, 2009					×	×					**E**
62	*Therates dimidiatus rubescens* Wiesner, 1988							×				**E**
63	*Therates dimidiatus punctipennis* Bates, 1878								×			**E**
64	*Therates dimidiatus wallacei* Thomson, 1857					×	×	×	×	×		×
65	*Therates dimidiatus brooksi* Brouerius van Nidek, 1977							×				**E**
66	*Therates schaumianus* s. str. Horn, 1905							×				**E**
67	*Therates schaumianus flavoornatus* Horn, 1931									×		**E**
68	*Therates spectabilis* s. str. Schaum, 1863							×				**E**
69	*Therates spectabilis flavissimus* Brouerius van Nidek, 1957					×	×	×		×		**E**
70	*Therates spectabilis whiteheadi* Bates, 1889								×			**E**
71	*Therates spectabilis inhumerosus* Horn, 1928									×		**E**
72	*Therates princeps* s. str. Bates, 1878							×		×		**E**
73	*Therates princeps angustonigrescens* Horn, 1928									×		**E**
74	*Therates princeps coeruleipennis* Brouerius van Nidek, 1960							×		×		**E**
75	*Therates flavispinus* Brouerius van Nidek, 1957									×		**E**
76	*Therates wegneri* Brouerius van Nidek, 1957									×		**E**
77	*Heptodonta analis* s.str. (Fabricius, 1801)					×	×	×	×	×		×
78	*Dilatotarsa tricondyloides* (Gestro, 1874)							×	×	×		**E**
79	*Dilatotarsa loeffleri* (Mandl, 1969)								×			**E**
80	*Dilatotarsa kinabaluensis* (Mandl, 1969)								×			**E**
81	*Calomera angulata* s. str. (Fabricius, 1798)										×	×
82	*Calomera funerea multinotata* (Schaum, 1861)										×	×
83	*Calomera opigrapha* (Dejean, 1831)							×				×
84	*Calomera crespignyi* (Bates, 1871)					×	×	×	×	×		**E**

Nr.	Species	Brunei (location not specified)	Belait	Tutong	Brunei-Muara	Temburong	**Brunei (total)**	Malaysia (Sarawak)	Malaysia (Sabah)	Indonesia (Kalimantan)	Borneo (location not specified)	Borneo (total) [E=endemic]
85	*Cosmodela aurulenta* (Fabricius, 1801)		×			×	×	×	×			×
86	*Cosmodela velata* (Bates, 1872)		×			×	×	×				**E**
87	*Lophyra* (s. str.) *fuliginosa* (Dejean, 1826)		×	×	×		×					×
88	*Lophyra* (*Spilodia*) *striolata* (s. str.) (Illiger, 1800)							×				×
89	*Cylindera* (*Verticina*) *versicolor* (Macleay, 1825)					×	×	×	×			×
90	*Cylindera* (*Verticina*) *dayaka* Matalin, 2002								×			**E**
91	*Cylindera* (*Leptinomera*) *filigera* (Bates, 1878)					×	×	×	×	×		**E**
92	*Cylindera* (*Leptinomera*) *catoptroides* (Horn, 1892)					×	×	×	×			×
93	*Cylindera* (*Leptinomera*) *sarawakensis* Wiesner, 1996							×				**E**
94	*Cylindera* (*Leptinomera*) *virgulifera* Cassola, 1995							×	×			**E**
95	*Cylindera* (*Leptinomera*) *longipalpis* (Horn, 1892)							×				×
96	*Cylindera* (*Leptinomera*) *plasoni* (Horn, 1903)					×	×	×	×			**E**
97	*Cylindera* (*Leptinomera*) *ibana* (Bogenberger, 1984)							×				**E**
98	*Cylindera* (*Leptinomera*) *discovelutinosa* (Horn, 1931)								×			**E**
99	*Cylindera* (*Leptinomera*) *bryanti* Cassola, 1983							×		×		**E**
100	*Cylindera* (*Leptinomera*) *perparva* Cassola, 1983								**O**			**E**
101	*Cylindera* (*Leptinomera*) *hammondi* Cassola, 1983			×		×	×	×				**E**
102	*Cylindera* (*Leptinomera*) *dieckmanni* Cassola, 1983							×	×			**E**
103	*Cylindera* (*Leptinomera*) *kibbyana* Cassola, 1983					×	×	×	×			**E**
104	*Cylindera* (*Leptinomera*) *pseudokibbyana* Cassola, 2009							×		×		**E**
105	*Cylindera* (*Leptinomera*) *duffelsiana* Cassola, 2006								×			**E**
106	*Cylindera* (*Leptinomera*) *macrodonta* Cassola and Probst, 1995					×	×					**E**
107	*Cylindera* (*Ifasina*) *viduata* (Fabricius, 1801)							×	×			×
108	*Cylindera* (*Ifasina*) *craspedota* (Schaum, 1863)										×	×
109	*Cylindera* (*Ifasina*) *discreta* s. str. (Schaum, 1863)		×			×	×	×	×			×
110	*Cylindera* (*Eugrapha*) *minuta* (Olivier, 1790)					×	×	×	×			×
111	*Myriochila* (s. str.) *specularis brevipennis* (Horn, 1897)				×	×	×	×				×
112	*Abroscelis tenuipes araneipes* (Schaum, 1863)			×			×	×	×			×
113	*Callytron alleni* (Horn, 1908)							×				**E**
114	*Callytron doriai* (Horn, 1897)				×	×	×	×				×
115	*Callytron terminatum completesignatum* (Horn, 1929)								×			**E**
116	*Enantiola hewittii* (Horn, 1908)							×				×
117	*Enantiola spinicollis* (Horn, 1908)							×	×			**E**
	total number of taxa	1	7	4	4	23	30	79	47	31	9	117
											endemic taxa	69