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On the subfamily Scaritinae BONELLI, 1810 from Sri Lanka, with the description of a new species (Coleoptera, Carabidae, Scaritinae)

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A b s t r a c t : The catalogues of the Scaritinae from Sri Lanka are updated increasing the number to 39 known taxa. The new species *Dyschirius rekawaianus* nov.sp. is described, illustrated and compared to the related taxa.

K e y w o r d s : Sri Lanka, catalogue, taxonomy, new species, new records.

Introduction

Sri Lanka is known to be a biodiversity hotspot, and efforts have been done in recent years to collate the current knowledge of the beetle fauna and to increase the awareness thereof. Among the over 3'000 beetle species listed for Sri Lanka, around 530 belong to the family of Carabidae (WIJESEKARA & WIJESINGHE 2003, BAMBARADENIYA 2006). One of the subfamilies of the Carabidae, the Scaritinae BONELLI, 1810, seem to be underrepresented. In fact, Scaritinae from Sri Lanka are commonly not well represented in many museums and collections.

ANDREWES (1928) provided a catalogue of the Carabidae of Sri Lanka, treated the species also in the catalogue of Indian insects (ANDREWES 1930), and a determination key (ANDREWES 1929). Moreover, a modern catalogue is available (JAYAWEERA 2019). In addition, recent revisions of some Oriental Scaritinae groups cleared the taxonomic status of some species and their occurrence, and new species were described (BALKENOHL 2001, 2020, 2021).

Working on undetermined Scaritinae material in the Naturhistorisches Museum Basel (NHMB), my attention was focussed on Sri Lanka due to the relatively well representation of material from that island. This contribution has the goal to summarize the Scaritinae species recorded and not yet published so far for Sri Lanka, and to describe a new *Dyschirius* species.

Material and methods

In the NHMB, there are two big collections deposited, the main collection and the collection Georg Frey. The over six million beetle specimens curated there are registered electronically. So, searching for specific references and data sets is not as labour intensive as it is usually. Both of the collections were screened systematically for Scaritinae records

of Sri Lanka. In addition, the author's collection has been used. All specimens were redetermined.

The available catalogues of Sri Lanka (Tab. 1) have been reviewed with the most recent taxonomic catalogue (LORENZ 2005, 2019).

For all records, label information is given as they appear without shortenings. The intention is to provide concrete data for future faunistic surveys.

For the description of the new species, terms, descriptions of characters and methods were based on BALKENOHL (2001). Specimens were examined with a Leica M205-C stereomicroscope and a Reichert-Jung Polyvar compound microscope. Measurements were taken electronically using the integrated and automatically calibrating measurement system of the IMAGIC Client software.

The dissected genitalia were treated and investigated as described in BALKENOHL (2020) and photographs were taken as described there in detail.

The following acronyms are used: NHMB: Naturhistorisches Museum Basel, Switzerland; NHMB-Frey: Collection Georg Frey in Naturhistorisches Museum Basel, Switzerland; OLML: Oberösterreichisches Landesmuseum, Linz, Austria; CBB: Collection M. Balkenohl (incl. collection Jochen-P. Saltin), Bonstetten near Zürich, Switzerland; L/W: ratio of length divided by width (used for the pronotum and elytra); $\bar{\mathbf{X}}$: arithmetic means, used in the description of the new species; [...] comments by the author in brackets.

Results

Taxonomic status of the Scaritinae species

The Scaritinae species listed in the catalogues for Sri Lanka (CSIKI 1927, 1933, ANDREWES 1928, 1930, JAYAWEERA 2019) were compared with the systematic list provided in LORENZ (2005, 2019). An up to date list is provided containing the changes according to the actual taxonomic status. Records not published until today have been added to the list. The unpublished records are listed in detail. In addition, species described recently are added and the outcomes of recent revisions were considered (i.e., BALKENOHL 1997, 1999, 2020). The result is displayed in Tab. 1.

Tab. 1: Scaritinae species published for Sri Lanka. x¹: Clivina castanea occurs on the Philippine Islands, only. The Clivina castanea-species group has been revised recently (BALKENOHL, 2021); x²: If Clivina (Dacca) forcipata occurs in Sri Lanka cannot be decided at present (revision in BALKENOHL 2020). The material mentioned in ANDREWES (1928, 1929) from Kotte was not examined; according to ANDREWES (1928: 150) it should be deposited in the Colombo Museum; x³: Trilophidius impunctatus PUTZEYS, 1868 does not occur in Sri Lanka (see revision in Balkenohl 2001). x⁴: For Syleter validus ANDREWES, 1936 the taxonomical status is unclear. The species is actually under revision. Variations are not listed although mentioned in some catalogues (e.g. Dyschirius mahratta var. paucipunctatus ANDREWES, 1929). FBI: ANDREWES (1929).

Scaritinae species published for Sri Lanka	catalogue		status for Sri Lanka			
species	ANDREWES 1928	Andrewes 1930	Jayaweera 2019	actual	unclear	not in Sri Lanka
Gnaphon costatus Andrewes, 1929			X	X		
Coptolobus anodon Chaudoir, 1879	X	X	X	X		
Coptolobus ater Andrewes, 1936			X	X		
Coptolobus glabriculus Chaudoir, 1857	X	X	X	X		
Coptolobus latus Andrewes, 1923		X	X	X		
Coptolobus omodon Chaudoir, 1879		X	X	X		
Coptolobus lucens Bänninger, 1935			X	X		
Scarites ceylonicus Chaudoir, 1880	X	X	X	X		
Scarites indus OLIVIER, 1795	X	X	X	X		
Scarites selene Schmidt-Göbel, 1846	X	X	X	X		
Scarites semicircularis MACLEAY, 1825				X		
Distichus mahratta (Andrewes, 1929)		FBI 1929	X	X		
Distichus picicornis (Dejean, 1831)		X	X	X		
Distichus puncticollis (CHAUDOIR, 1855)		X	X	X		
Distichus uncinatus Andrewes, 1923		X	X	X		
Oxylobus asperulus Chaudoir, 1857	X	X		X		
Oxylobus lateralis designans (WALKER, 1858)	X	X	X	X		
Oxylobus ovalipennis Andrewes, 1924	X	X	X	X		
Oxylobus porcatus minor Tschitscherin, 1894	X	X	X	X		
Oxylobus alveolatus Chaudoir, 1879				X		
Clivina elongatula Nietner, 1856	X	X	X	X		
[Clivina castanea Westwood, 1837]	Х	X	X			\mathbf{x}^1
Clivina mustela Andrewes, 1923	Х	X	X	X		
Clivina obenbergeri KULT, 1951			X	X		

Scaritinae species published for Sri Lanka	e species published for Sri Lanka catalogue			status for Sri Lanka		
Clivina striata Putzeys, 1846	X	X	X	X		
Clivina tranquebarica Bonelli, 1813	X	X	X	X		
Clivina westwoodi Putzeys, 1867	X	X	X	X		
[Clivina (Dacca) forcipata (PUTZEYS, 1863)]		X	X		x ²	
Clivina (Dacca) ursulae BALKENOHL, 2020				х		
Pseudoclivina memnonia (DEJEAN, 1831)		X	X	х		
Coryza maculata (Nietner, 1856)	Х	X	X	х		
Syleter porphyreus (Andrewes, 1923)	X	X	X	X		
Syleter validus (Andrewes, 1936)			X	x ⁴		
Leleuporella sexangulata BALKENOHL, 1997				X		
[Trilophidius impunctatus (PUTZEYS, 1868)]		X	X			\mathbf{x}^3
Trilophidius endroedii BALKENOHL, 2001				х		
Trilophus arcuatus Balkenohl, 1999				X		
Dyschirius bengalensis Andrewes, 1929			X	X		
Dyschirius mahratta Andrewes,1929		FBI 1929	X	Х		
Dyschirius ordinatus BATES, 1873		FBI 1929	X	х		
Dyschirius tamil Andrewes, 1929				X		
Dyschirius rekawaianus nov.sp.				X		

Total number of Scaritinae species

33

25

Unpublished records

Coptolobus anodon CHAUDOIR, 1879

M a t e r i a l $\,$ e x a m i n e d : Two specs, Sri Lanka, Kandy I. 91, lg. Rautenstrauch (CBB). The record confirms previous data.

Coptolobus glabriusculus Chaudoir, 1857

M a t e r i a l e x a m i n e d : One spec., Ceylon / Sammlung G. Schneider Museumsverein / Coptolobus glabriusculus CHD. det. M. Balkenohl 1989 (NHMB); one spec., Ceylan W. Morton / Coptolobus glabriusculus Chd Bänninger det. 5.1925 (NHMB-Frey); one spec., Sri Lanka, Horton Plains – 7000 ft. Su., on rock, dead, leg. Kalika Perera, 5.2.93 / Coll. J. Saltin in CBB 1997.

The records confirm previous data.

Coptolobus latus Andrewes, 1923

M a t e r i a l e x a m i n e d : One spec., Ceylon Z.M. Berlin 39528 / Coptolobus latus Andr. Bänninger det. 8.1934 (NHMB-Frey).

The record confirms previous data.

Scarites ceylonicus CHAUDOIR, 1880

M a t e r i a l e x a m i n e d : Forty-six specs, Sri Lanka 1976 Ziegler, Zöllig / Polonnaruwa 8.-10.3.1976; one spec. with additional label Scarites ceylonicus Chd. A. Casale det. '79 (NHMB); two specs, Sri-Lanka, Kandy 1.1.1990, Rautenstrauch (CBB); one spec., Sri Lanka, Kituyla, 02.1983 (CBB); two specs, Sri Lanka, S, Rekawa E of Tangalle, 4mNN, 6°03'43"N 80°52'24"E05.01.2018 local collector lgt. (CBB).

The records confirm previous data.

Scarites indus OLIVIER, 1795

M a t e r i a l e x a m i n e d : One spec., Ceylon N.P. Mannar 30.I.54 F. Keiser / a. Licht / Scarites indus Oliv det. C. J. Louwerens (NHMB); three specs, Ceylon, Anuradhapura distr. leg. Kandulawa 1970 (NHMB-Frey); two specs, Ceylon Umg. Anuradhapura G. Frey III.53 / Museum Frey München (NHMB-Frey); four specs, Ceylon, Marawila 50 km N Colombo P. Kandulawa, 1969 (NHMB-Frey); five specs, same data but 1970 (NHMB-Frey); one spec., Puttlam Ceylon 1971 Kandulawa (NHMB-Frey); seven specs, Ceylon [without further data] (NHMB-Frey); two specs, Sri Lanka, Trincomalee area, XI-'85-I'86, coll. B. Alexander / Coll. J. Saltin in Coll. CBB 1997; one spec., Ceylon, 6.6.1989 [without further data] (CBB).

The records confirm previous data.

Scarites semicircularis MACLEAY, 1825

M a t e r i a l e x a m i n e d : One spec., Sri Lanka, Trincomalee, leg. B. Alexander 1986, / Coll. J. Saltin in Coll. CBB 1997; one spec., Trincomalee, leg. Werner XI. 1985 (CBB). New records for Sri Lanka.

Scarites selene SCHMIDT-GÖBEL, 1846

M a t e r i a l e x a m i n e d: Nine specs, Sri Lanka 1976 Ziegler, Zöllig / Polonnaruwa 8.-11.3.1976 / Scarites selene SCHM.-GÖB. det. Balkenohl 1989 (NHMB); one spec. with additional label Scarites ceylonicus Chd. A. Casale det. '79 (NHMB); four specs, Sri Lanka, Polonnaruwa, 8.3. and 10.3.1976, Ziegler, Zöllig (CBB).

The records confirm previous data.

Distichus picicornis (DEJEAN, 1831)

M a t e r i a l e x a m i n e d : Five specs, Sri Lanka 1976 Ziegler, Zöllig / Polonnaruwa 8. and 10.3.1976 / one spec. with add. label Scarites picicornis Dej. A. Casale det. '79 (NHMB); one spec., Sri-Lanka, Kandy, 1.1.1990, leg. Rautenstrauch / Coll. J. Saltin in Coll. CBB 1997;

The records confirm previous data.

Distichus uncinatus Andrewes, 1923

M a t e r i a l e x a m i n e d : One spec., Sri Lanka 1976 Ziegler, Zöllig / Polonnaruwa 10.3.1976 (NHMB).

The record confirms previous data.

Oxylobus asperulus CHAUDOIR, 1857

M a t e r i a l e x a m i n e d : One spec., Umg. Colombo Ceylon III.53 leg G. Frey / Museum Frey München / Oxylobus asperulus Chd. Bänninger det. 1953 (NHMB-Frey); two specs, Sri-Lanka, Kandy, 1.1.1990, leg. Rautenstrauch (CBB); one spec., same data but 91 (CBB); two specs, Sri Lanka, Jan. 1993, Sinharaja, at light, rain forest near brook, leg. Rautenstrauch (CBB).

The records confirm previous data.

Oxylobus lateralis designans (WALKER, 1858)

M a t e r i a l e x a m i n e d : Six specs, Ceylon, Marawila 50 km N. Colombo P. Kandulawa, 1969 / lateralis Dej. det. G. Frey 1971 (NHMB-Frey); one spec., same data but leg. P. Schmitz (NHMB-Frey); two specs, Sri Lanka, Trincomalee area, XI-'85-1'86, coll. B. Alexander / Coll. J. Saltin in Coll. CBB 1997.

The records confirm previous data.

ANDREWES (1928, 1929, 1930) treats this form as variation, but LORENZ (2005, 2019) as accepted subspecies. The differences between the nominate subspecies and the subspecies *designatus* are very clear and evident, Therefore, I agree with LORENZ (2005, 2019) and JAYAWEERA (2019).

Oxylobus porcatus minor TSCHITSCHERIN, 1894

M a t e r i a l e x a m i n e d : One spec., Ceylon Umg. Anuradhapura G. Frey III. 53 / Oxylobus porcatus F. v. minor Tsch. Bänninger det. 1955 (NHMB-Frey).

The record confirms previous data.

ANDREWES (1928, 1929, 1930) treats this form as variation, and LORENZ (2005, 2019) as synonym to *procatus* (FABRICIUS, 1798). However, the differences between the nominate subspecies and the subspecies *minor* TSCHITSCHERIN are eye catching and conspicuously distinct. This is especially true for the punctuation on the venter. Therefore, I state this form as valid subspecies.

Oxylobus alveolatus CHAUDOIR, 1879

M a t e r i a l e x a m i n e d : One spec., Sri Lanka, Trincomalee area, lg. B. Alexander, 86 / Coll. J. Saltin in Coll. CBB 1997.

New record for Sri Lanka.

Clivina elongatula NIETNER, 1856

M a t e r i a l e x a m i n e d : One spec., Ceylon, Ratnaoura, 50-200 m, Richter (CBB); sixteen specs, Sri Lanka, S, West of Tangalle, 9mNN, 6°02.52",80°26.35", lg. J.S., 26.03.2017 (CBB); forty-four specs, SRI LANKA Sinharaja, rain forest near brook, at light, Jan. 1993, leg. Rautenstrauch (CBB).

The records confirm previous data.

Clivina tranquebarica BONELLI, 1813

Material examined: Ten specs, Sri Lanka, S, West of Tangalle, 9mNN, 6°02.52",80°26.35", lg. J.S., 26.03.2017 (CBB).

The record confirms previous data.

Dyschirius tamil ANDREWES, 1929

M a t e r i a l e x a m i n e d : One spec., Sri Lanka: Jaf. Dist., Chundikkulam Sanct., black light, 25 feet, 7 November 1976 / Collected by: G. F. Hevel, R. E. Dietz, S. Karunarant, D. W. Balasooriya (CBB).

New record for Sri Lanka.

Description of a new species

Dyschirius (Dyschiriodes) rekawaianus nov.sp. (Figs 1-5)

Type material: <u>Holotype</u>: \circlearrowleft , with labels and data: white, printed in black, "Sri Lanka, S, Rekawa E of Tangalle, 4mNN 6°03'43"N 80°52'24"E05.01.2018 local collector leg." (CBB). <u>Paratypes</u>: $4\circlearrowleft\circlearrowleft$, $7\circlearrowleft\circlearrowleft$, 16 specs, same data as holotype (OLML, CBB).

E t y m o l o g y : The name refers to the region in the very South of Sri Lanka East of Tangalle, where the species was found.

D i a g n o s i s: A medium sized species without a vertical transverse slot ventrally on the peduncle of the mesothorax, without a central tooth on the clypeus, and with a distinct keel on the frons of the head. The reflexed lateral margin of the pronotum reaches over the posterior setigerous puncture, on the elytron with three dorsal, three subhumeral, three umbilical and one subapical setigerous punctures, without a basal border and with a minute humeral tooth. Distinguished from the bengalensis-species group mostly by the single apical and three dorsal setigerous punctures. Different from D. tamil ANDREWES, 1929 by the stria seven which is not shorter than the inner striae, stria eight which is complete and distinctly punctured, the movable spur of the front tibia which is stronger and hook-like developed, the lobes of the mentum with the regularly convex median and lateral margins (in D. tamil the median margins are straight and parallel), the intervals of the elytron which are slightly convex and not as flattened as in D. tamil, and by the much darker color at the apex of the elytron. From the species with more or less similar ovate outline of the elytron D. nitens PUTZEYS, 1878 and D. hingstoni ANDREWES, 1929, the new species differs mainly in a different pattern of the setigerous punctures, the color of the antennae, and the missing keel on the frons of the head.

D e s c r i p t i o n : Measurements: Body length 2.83-3.48 mm ($\bar{x} = 3.15$ mm*), width 0.91-1.12 mm ($\bar{x} = 1.02$ mm*), ratio L/W of pronotum 0.94-0.98 ($\bar{x} = 0.96$ *), ratio L/W of elytra 1.63-1.68 ($\bar{x} = 1.66$ *); (*n = 10).

Colour: Fuliginous with slight aeneous lustre; clypeal wings and margin of supraantennal plates translucent fuscous, reflexed lateral margin at apex of elytron fuscous; antennae, palpi, and legs fulvous; mandibles, labrum, and anterior legs distinctly darkened.

Head (Fig. 2): Anterior margin of clypeus straight to indistinctly convex (see variation), wings of clypeus moderately projecting, hollowed out dorsally; clypeus, wings of clypeus, and supraantennal plates reflexed margined; clypeal wings separated from supraantennal plates by distinct notch; clypeo-frontal field convex, posteriorly stretched out in a triangle like longitudinal keel, with irregular rugae laterally to keel; supraantennal plates slightly to moderately vaulted, with irregular rugae posteriorly; facial sulci deep and relatively narrow, distinctly divergent posteriorly; frons moderately convex, smooth, glossy, with sparse micro-punctures. Eyes large, nearly hemispherical. Neck with some punctures

laterally, punctures interrupted at middle. Labrum V-like incised, irregularly to isodiametrically reticulated. Antennae elongate (L/W around 1.25).

Mentum (Fig. 3): Surface with distinct oblique rugae, with lobe slightly concavely hollowed out, shape of lobe regularly semi-ovate with lateral and medial margins convex, median tooth much shorter than lobes, triangular, indistinctly hollowed out and reflexed margined.

Pronotum: Subglobose, slightly broader than long, two thirds as wide as head; disk in frontal view moderately and equally convex, in lateral view slightly convex in anterior two thirds, distinctly convex in posterior third; outline in dorsal view moderately and nearly equally convex, attenuated directly towards anterior angles, widest slightly behind middle; anterior angles rounded off; anterior transverse impression distinct, deep, consisting of irregular punctures of different size; median line fine, narrow, shallow anteriorly and at middle; somewhat deeper towards base; reflexed lateral margin reaching over posterior setigerous puncture by diameter of puncture; lateral channel moderately broad and of equal width. Surface glossy, sparsely scattered with minutely stinged punctures, with few fine and irregular transverse wrinkles laterally and at median line.

Elytron: Ovate, around 1.7 times as long as wide (see measurements); in frontal view distinctly and equally convex, in lateral view slightly but distinctly convex in anterior two thirds; outline moderately widened at sides, widest just behind end of first third; base slightly convex, humerus prominent but rounded, with a minute humeral tooth (lateral view), suture slightly impressed at base; no basal border, no basal tubercle, scutellar striole fine but visible. Striae moderately deep in anterior half, prominently punctate, punctures distinctly smaller than width of intervals, usually not connected in basal third, finer in apical third but visible up to apex, with fine and less punctures in apical third; stria seven not shortened but fine at apex, stria eight starting at end of first quarter, continuously punctured nearly up to apical fold, one running up to base and connected with the prominent basal setigerous puncture; intervals slightly convex, flattened apically. Three posthumeral and three umbilical setigerous punctures, interval three with three dorsal setigerous punctures situated in the middle of the interval, one apical setigerous puncture.

Hind wings: Fully developed.

Ventral surface: Peduncle of mesothorax without vertical slot.

Legs: Protibia. Apical spine moderately long, strongly and equally curved ventrally, movable apical spur slightly longer and stronger developed than apical spine, nearly straight in basal two thirds, hook-shaped in apical third; distal marginal tooth acute, proximal one small, blunt. Surface covered with longitudinal reticulation.

Male genitalia (Fig. 4): Median lobe slender and narrowed in apical quarter (ventral view), narrowed in apical fifth (lateral view). Tip of apex slightly asymmetric, ovate in cross section, rounded off. Oroficium of moderate size. Internal sac with group of short spines. Parameres asymmetric, distorted, the ventral one much longer and wider than the dorsal one, both of them asetose.

Female genitalia (Fig. 5): Coxostylus elongated, slender, slightly distorted at middle, with two long nematiform seta at tip of apex; laterotergite vaulted, mediotergite wide.

Variation: One of the paratypes shows two dorsal setigerous punctures at one side (middle one missing). The anterior margin of the clypeus varies from straight to indistinctly convex.

Distribution: The species was found in the very South of Sri Lanka East of Tangalle. Ecology: Nearly at sea level and in parallel to the sea shore, there are lagoons and ponds partly surrounded by meadows. They are used by farmers for cattle. The new species was found at the muddy banks of those ponds.

Discussion

Out of the 196 specimens listed as unpublished records, three species are reported for the first time for Sri Lanka. Together with the recently described species, the number of known Scaritinae for Sri Lanka has been increased to 39 species.

In general, the results confirm the mixed fauna of Sri Lanka. Most of the species occur also in India. But there are species found until today only in Sri Lanka. This is true for all members of the genus *Coptolobus*, *Syleter validus*, and *S. porphyreus*. Possibly, it is also true for the form *Oxylobus minor* TSCHITSCHERIN considered as a variety of *O. porcatus* (FABRICIUS) by ANDREWES (1929). So far, it has been reported from Sri Lanka, only. However, and based on the limited material on hand, the difference between *O. porcatus* and *O. minor* are such striking that the form deserves subspecies level at a minimum. All these species are considered to be endemic for Sri Lanka because they were not recorded for India since the catalogue of ANDREWES (1930). There is currently no evidence if the species *Leleuporella sexangulata* and *Clivina* (*Dacca*) *ursulae* occur as well outside Sri Lanka.

In summary, knowledge about the Scaritinae fauna of Sri Lanka is far away from being well known. Moreover, specific information about the occurrence and distribution of the known species is not known beside few and only general locality data listed in ANDREWES (1928, 1929, 1930). Due to this lack of faunistic evaluation it cannot be assessed at this point in time if species are common or might be endangered. For example, members of the genera *Dyschirius* und *Clivina* are known to populate unsteady habitats like river banks and ponds rapidly, but they also disappear and change locality when the conditions change their optima. Therefore, the species recorded might be much wider distributed over Sri Lanka as known today.

The updated catalogue also shows nearly all of the species recorded are epigeal in their way of life.

Exceptions are the *Trilophus*, *Trilophidius* and *Leleuporella* species that are also found somewhat deeper under the surface. The species known from Sri Lanka all have well developed eyes and do not show specific adaptations to a subterranean way of life. So, it is strongly assumed the missing records of the subterranean Scaritinae fauna just mirror a lack of exploration.

Zusammenfassung

Die Kataloge der Scaritinae-Arten Sri Lankas werden aktualisiert, wodurch sich die Anzahl der bekannten Taxa auf 39 erhöht. Die neue Art *Dyschirius rekawaianus* nov.sp. wird beschrieben, abgebildet und mit den verwandten Taxa verglichen.

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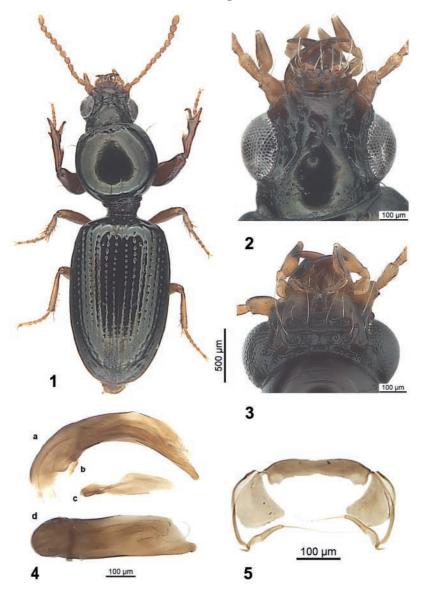
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Figs 1-5: Dyschirius (Dyschiriodes) rekawaianus nov.sp.; (1) habitus, holotype; (2) head, dorsal view; (3) head, ventral view; (4) male genitalia, holotype, ventral view of aedeagus (a) and parameres (b, c), lateral view of aedeagus (d); (5) female coxostyli, latero- and mediotergite.

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