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Source: Revue suisse de Zoologie, 127(1) : 157-181

Published By: Muséum d'histoire naturelle, Genève

URL: <https://doi.org/10.35929/RSZ.0014>

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Taxonomic notes on the genus *Cyphochilus* Waterhouse, 1867 (Coleoptera, Scarabaeoidea, Melolonthinae) with description of 10 new species

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Abstract: This work presents a revision of *Cyphochilus* species characterized by smooth elytra and mesocoxae separated by armed mesosternum. The type material was examined and compared to more than 500 specimens from historical collections as well as recently collected ones. Lectotypes are designated for *Melolontha candida* Olivier, 1789, *Cyphochilus cylindricus* Brenske, 1903, *C. flavomarginatus* Frey, 1971, *C. peninsularis* Arrow, 1938, *C. pygidialis* Nonfried, 1893, *C. pygidialis* v. *angeri* Nonfried, 1893, *C. septentrionalis* Waterhouse, 1867, *C. testaceipes* Fairmaire, 1902, *C. tricolor* Waterhouse, 1867, and *C. vestitus* Sharp, 1876. *Cyphochilus septentrionalis* is resurrected from synonymy (**name rest.**) and the following synonymies are established: *C. pygidialis* Nonfried, 1893 = *C. septentrionalis* **syn. nov.**, *C. cylindricus* = *C. proximus* Sharp, 1876 **syn. nov.**, *C. vestitus* = *C. tricolor* **syn. nov.** *Cyphochilus testaceipes* is transferred to *Dasylepida* Moser, 1913 as *Dasylepida testaceipes* (Fairmaire, 1902) **comb. nov.** *Cyphochilus candidus*, *C. carinchebanus* Brenske, 1903, *C. feae* Brenske, 1903, *C. flavomarginatus*, *C. obscurus* Sharp, 1876, and *C. peninsularis* are confirmed valid species, redescribed, and their distribution updated. Ten new species are described: *Cyphochilus gandhii* **n. sp.**, from NE India, *C. hmong* **n. sp.**, from Laos, *C. leducthoi* **n. sp.**, from Vietnam, *C. orbachi* **n. sp.**, from Vietnam, *C. reichenbachii* **n. sp.**, from Vietnam, *C. rohingyae* **n. sp.**, from West Malaysia, *C. sansuukyii* **n. sp.**, from Myanmar, *C. satyarthii* **n. sp.**, from Sikkim and West Bengal, *C. tenzingyatsoi* **n. sp.**, from Tibet, and *C. zuercheri* **n. sp.**, from Thailand and Myanmar. The parameres of the 19 species treated are illustrated in three projections. A checklist of the resulting 38 valid species of *Cyphochilus* is provided with their distribution.

Keywords: Morphology - Systematics - Taxonomy - Geographic distribution - India - Nepal - China - Asia - Himalaya - Thailand - Laos - Cambodia - Vietnam - Arthropoda - Insecta - Scarabaeidae.

INTRODUCTION

The improved political and social situation in the South East Asia greatly contributed to improve the knowledge of its fauna and to focus on conservation problems and on the development of national scientific Institutions. Several collaborative programs have been established with foreign Institutions and scientists for the systematic sampling of the northern areas of Vietnam, Laos, and Myanmar. This has resulted in a large number of insect specimens, including Melolonthine Scarabaeidae, becoming available for study in museums and private collections.

The genus *Cyphochilus* Waterhouse, 1867, which has only been treated superficially until now, is in need of a revision to accommodate new species and for a comprehensive assessment of the phylogenetic relationships of the taxa. To that end, I began in 2000 gathering available

specimens of *Cyphochilus* species, including type specimens, for a comprehensive morphological analysis. The primary focus of the analysis was on the aedeagus due to its paramount importance for a reliable species identification.

This work presents the results of the study and revision of a “Section” of the genus defined by Waterhouse (1867) as “the species having the mesosternum armed by a spur”. Other “Section” will be treated subsequently in order to complete the revision of the genus *Cyphochilus*, and only then I will provide an identification key to all the species. I also plan to investigate the phylogenetic relationships within the genus as well as with the related genera *Dedalopectus* Sabatinelli & Pontuale, 1998 and *Malaisius* Arrow, 1941, although revised by Li & Yang (1999).

MATERIAL AND METHODS

Specimens: Material for this study was borrowed from, or deposited in the institutions listed below with acronyms as given in Evenhuis (2007):

BMNH	Natural History Museum, London, Great Britain.
HNHM	Hungarian Natural History Museum, Budapest, Hungary.
ISNB	Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium,
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland.
NHMB	Naturhistorisches Museum, Basel, Switzerland.
MNHN	Muséum national d'Histoire naturelle, Paris, France.
MSNG	Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy.
MTD	Museum für Tierkunde, Dresden, Germany.
MZUF	Museo Zoologico «La Specola», Florence, Italy.
NHRS	Naturhistoriska Riksmuset, Stockholm, Sweden.
NMW	Naturhistorisches Museum Wien, Wien, Austria.
NMPC	National Museum (Natural History), Prague, Czech Republic.
PCAR	private collection Andreas Reichenbach, Leipzig, Germany.
PCDK	private collection Denis Keith, Chartres, France.
PCMN	private collection Milan Nikodým, Prague, Czech Republic.
PCAB	private collection Ales Bezděk, Branisovska, Czech Republic
ZMAN	Universiteit van Amsterdam, Instituut voor Taxonomische Zoologie, Zoologisch Museum, Amsterdam, Netherlands.
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

All specimens in the collection of the author were donated to the MHNG and integrated in the general collection, but their origin is given on the labels.

The institution holding the type specimens is always given by the museum acronym at the begin of the text in the sections "Material examined", followed by the catalogue number in brackets if available, then followed by the label information. Type specimens held by the MHNG and registered in their collection database have a catalog number with the format MHNG-ENTO-#####. Information of type series specimens given on the specimen labels is reported *verbatim* and the used signs indicate:

- // separates data on different labels; if not indicated otherwise, they are on rectangular white labels;
- / line separation on same label;

[...] square brackets contain comments of the author relating to *verbatim* data;

[sic] indicates a mistake in the original data label;

(H) indicates handwritten;

(P) indicates printed.

All other specimen information follows the standards of the journal, with specimen lots separated by the character combination ". –".

For some species, specimens labeled as "type" and even belonging to the same sampling event, are sometimes distributed in different Museums; this is particularly evident for the species described by Brenske, Sharp and Nonfried present in the BMNH, ISNB, MNHN and MTD; therefore lectotypes were designated whenever necessary.

Male genitalia: Aedeagi were dissected and cleaned manually without any chemical treatment, then glued to a cardboard pinned under each specimen from which they were removed.

Morphological terminology: Follows Torre-Bueno *et al.* (1989).

Images and measurements: A Leica DFC425 camera in conjunction with a Leica M205C stereo microscope was used to produce source images, which were subsequently stacked using the software Zerene Stacker, and adjusted and grouped in plates using Adobe Photoshop.

Descriptions: Due the relative uniformity of the general morphology of *Cyphochilus* in contrast with the extreme diversification of the parameres, only the characters useful for the identification and for the differential diagnosis are considered. The common characters for the species of *Cyphochilus* are listed in the generic diagnosis.

Distribution data: Label data of the examined specimens was used to infer the geographical distribution. Due to the high number of sibling species and the splitting into new species, I consider most previously published distributions as likely inaccurate. In the historical collections, there are a large number of specimens with very imprecise collection data (*i.e.* Himalaya, Bengal, Hindukush, Oriental India, Siam, and Indochina). In some cases, the data appear to be evidently unreliable; these data are therefore excluded in defining the distribution of the species. The presence of sibling species in *Cyphochilus* makes identification reliable only for male specimens; therefore, single female specimens received a tentative identification and were not taken into consideration in defining the distribution of species.

Abbreviations: Characters, measurements, mensural procedures, and ratios are as follows:

BL: Body length, measured from anterior margin of clypeus to apex of elytra, in dorsal view.

BW:	Body width, measured across the elytral humeri, in dorsal view.
BWX:	Greatest body width, measured across the elytral maximal width, in dorsal view.
CW/L:	Clypeal ratio, derived from width measured along clypeo-frontal suture divided by greatest length of clypeus.
F/O:	Interocular ratio, derived from minimum frons width across eyes divided by transverse compound eye diameter in dorsal view.
A2-7L/CL:	Antennal ratio, derived from length of basal segments 2-7 divided by antennal club length.
PnW/L:	Pronotal ratio, derived from pronotal greatest width divided pronotal length along midline, in dorsal view.
MstL:	Mesosternal process length, in lateral view.

TAXONOMY

Genus *Cyphochilus* Waterhouse, 1867

Synthetic history of the genus: Waterhouse (1867: description of the genus and of 5 species); Sharp (1876: description of 3 species); Nonfried (1893: description of one species); Fairmaire (1902: description of 2 species); Brenske (1903: description of 8 species); Dalla Torre (1912: catalogue of 26 species); Moser (1915: description of one species and syn. *ventritectus* Brenske, 1903 = *ochraceosquamosus*); Arrow (1938: description of one species); Medvedev [1951: designation of the type species = *C. candidus* (Olivier, 1789)]; Frey (1971: description of one species); Sabatinelli & Pontuale (1998: description of *Dedalopterus* with redefinition of *Malaisius* Arrow, 1941 and *Cyphochilus*); Li & Yang (1999: revision of *Malaisius* and notes on *Cyphochilus*); Krajčik (2012: catalogue of 32 species); Bezdek (2016: catalogue 12 Palaearctic species).

Type species: *Melolontha candida* Olivier, 1789 by subsequent designation (Medvedev, 1951: 231).

Etymology: The name is derived from the Greek words $\chi\iota\phi\omicron$ =divided, $\chi\epsilon\iota\lambda\omicron$ = labrum.

Diagnosis: The following combination of characters distinguishes *Cyphochilus* from the other related genera of Melolonthinae: elytra with scales uniformly distributed; apical segment of maxillary palps narrow and long, without any callus or excavation on its outer surface; labrum strongly asymmetric; lateral margin of prothorax regularly curved; claws long and with large base; parameres strongly asymmetric.

Description: The genus *Cyphochilus* is defined by the following characters: body with integument brown to entirely black; upper surface of body covered with scales not forming white spots nor stripes; pygidium and abdomen without metallic reflex; antenna

10-segmented; antennal club in males and females 3-segmented; antennal club in males large, generally longer than footstalk (Fig. 21) more rarely as long as footstalk, or even shorter (Fig. 22); footstalk in males with third and fourth segments subequal; claws large at base, not cleft at apex with basal tooth beneath, lower margin simple; outer and inner teeth subequal; dorsal margin of claws uniformly curved; apical segment of maxillary palp narrow not excavated; labrum not transverse, deeply sinuate, strongly asymmetric; mentum transverse, with Y-shaped carina; clypeus semi-circular, not very large, laterally continuous with canthus, flat or concave and separated from front by suture; front flat, with lateral margin near eyes not elevated; eyes not prominent; vertex concave; prothorax transverse with lateral margin regularly curved, simple, not serrated, without erect setae, anterior and posterior margin not margined, posterior margin without erect setae; elytra with four elevated costae in addition to sutural one (Fig. 20) or completely without costae (Fig. 19); pygidium rounded or triangular, in males without any tubercle; mesosternum not produced (Fig. 16) or produced between mesocoxae (Figs 17-18); metasternum with long hairs, shining; metepisternum narrow, more than three times as long as its breadth with metepimera small; abdominal sternites with scales, laterally without white spots; abdominal sternites connate with sutures absent in middle; sixth abdominal sternite not retracting under the fifth sternite; last spiracle located on suture between fifth visible abdominal sternite and propygidium; anterior coxae transverse, not prominent; mesofemur in males not enlarged; not projecting out laterally from body very much; anterior tibiae in males 1-3-toothed, in females 3-toothed; in males and females with spurs, located in front of hollow between basal and median tooth; external margin of protibiae not transparent; hind and middle tibiae in both sexes without complete transverse carina (a tubercle is present externally); dorsal margin of hind tibiae without teeth or spines; tarsomeres thick and short, sparsely pilose beneath; first segment of hind tarsi subequal or shorter than second; wings and humeral callus developed in males and females; posterior coxae not close to the median coxae in both sexes; parameres fused basally, generally strongly asymmetric bilobate or simple; endophallus membranous.

Remarks: The genera closest to *Cyphochilus* are *Malaisius* Arrow, 1941 and *Dedalopterus* Sabatinelli & Pontuale, 1998, from which it is distinguishable by the characters already indicated in the diagnosis.

Due to the 3-segmented antennal club, that differentiates *Cyphochilus* from all other Melolonthinae, this genus has been included in the tribes Rhizotrogini (Medvedev, 1951) or Leucopholini (Bezdek, 2016), with a prevalence for the latter. Matsumoto (2010) has rightly questioned

the validity of the tribe Leucopholini as natural group. In a recent molecular phylogenetical analysis (Eberle *et al.*, 2019), two genera of Leucopholini, namely *Dedaloapterus* and *Psilopholis* Brenske, 1892, tested with other few genera of Melolonthini, showed affinities to two different lineages. However, the phylogenetic relationships of Melolonthinae are far from being fully understood and therefore I prefer to treat, for the time being, *Cyphochilus* at the level of the subfamily Melolonthinae *incerta sedis*. The different species of the genus *Cyphochilus* stand out among the Melolonthinae for the extraordinary parameres that evolved, like in the Sericini, in diverse forms and thus making it easy to differentiate the species. Both the shape of the aedeagus and the external morphology allow a certain grouping of the species, at least for some of them. Waterhouse (1867) recognized that it was possible to distinguish species having a “mesosternum armed with a spur” which he grouped in Sect. 1 and species having a “mesosternum unarmed” which he grouped in Section 2. This work examines the species of the Section 1, in which the species have also as another shared trait, the elytra are smooth and lack elevated striae. Formal names are not proposed for these “Sections”, as their purpose is to facilitate treating and identifying the species. They are not intended to represent phylogenetic clades.

Section 1a

Species with mesosternum armed with a long spur: length in lateral view 1-2 mm (Fig. 18).

Cyphochilus candidus (Olivier, 1789)

Figs 8, 18, 23-25, 80-81

Melolontha candida A.G. Olivier, 1789: Vol. 1, g. 5, p. 15, pl. VIII, fig. 98.

Type material examined: Lectotype, by present designation: MNHN; 1 ♂; INDIA OR: // *candidus* Ol / India or. (H) // Co-Type (H on red) // Muséum Paris / 1952 / coll. R. Oberthur //. (Figs 8, 80).

Additional material examined: 118 specimens.

NEPAL: MTD; 1 ♂, 2 ♀; Syangia distr., 2-10 km East Sangya, 1200-1600 m; 22-26.VII.1995; No. 112, leg. G. Csorba. – HNHN; 1 ♂; same data as previous. – NHMB; 2 ♂, 1 ♀; Kathmandu valley, Godavari, 1500 m; 19.V.1989; leg. M. Brancucci. – NHMB; 1 ♂, 6 ♀; Bagmati, Umg Kathmandu; 28-30.VI.1989; leg. M. Brancucci.

SIKKIM: NHMB; 1 ♂ 3 ♀; Rangopo, 680 m; 3.VIII.1981, leg. B. Bhakta. – NHMB; 1 ♀; Mirik Top, 1260 m; 14.IX.1980; leg. B. Bhakta. – NHMB; 2 ♀; Tengling-Yoksam, 1200-1700 m; leg. B. Bhakta. – NHMB; 1 ♀; Sakyong, 1140 m; 15.IX.1981; leg. B. Bhakta. – NHMB; 1 ♂; Jadung, 800 m; 7.VII.1895; leg. Ch. J. Rai. – NHMB; 2 ♂; Rangali, 1500 m; 9.VII.1985; leg.

Ch. J. Rai. – ISNB; 1 ♂; R. Ley coll. & det. – MTD 2 ♂; *sub sylhetinus* Brsk [unpublished, unavailable name]. **ASSAM:** BMNH; 1 ♂; leg. W.F. Badgley 1906-185. – PCMN; 1 ♂; Kaziranga, Pan Bari, Wild life Res. Forest; leg. S. Murzin. – HNHN; 1 ♂; ex coll. Felsche 1918. – MTD; 2 ♂; Kohima, V.M. Duchon. – NMW; 1 ♂; same data as previous. – ZMAN; 1 ♂, Assam. – MTD; 1 ♂; W.H. Muche, Redeberg, Ankauf. – ISNB; 1 ♂; ex coll. Ogier de Baulny. – MHNG; 2 ♂; PCMN; 3 ♂; Nambor Res. For. Garampani, 100 m; 25-29.XI.1997; leg. V. Siniaev & V. & S. & M. Murzin.

WEST BENGAL: NHMB; 2 ♀; Jalpaiguri distr., Bagra Kote, 250 m; 16-22.XII.1985; leg. B. Bhakta. – MHNG; 6 ♂; Darjeeling, ex coll. Petrovitz. – ISNB; 1 ♂; leg. R.P. Verschraeghen 1908. – NHMB; 1 ♂; Kalimpong, Pedong; leg. Bhakta Bahadur 1978. – NHMB; 1 ♂; 700 m, 6.VIII.1981. – NHMB; 1 ♂; Tista, 230 m; 10.VII.1981; leg. B. Bhakta. – MHNG; 1 ♂; Gorubathan, 185 m; 2.VIII.1985; leg. B. Bhakta. – NMPC; 1 ♂; same data as previous. – NHMB; 1 ♂; same data as previous. – NHMB; 5 ♀; Kalimpong, Pankha Banglo; 9.VIII.1978. – NHMB; 1 ♂, 2 ♀; Kalimpong; 5-24.VII.1961; leg. B. Bhakta. – NHMB; 1 ♂, 3 ♀; Kalimpong, 9th mile, 1500 m; 14.VII.1984; leg. Ch. J. Rai. – MHNG; 1 ♀; Pedong, 700 m; 6-14.VIII.1981; leg. B. Bhakta. – NHMB; 1 ♂, 1 ♀; Pankha Sari, 8.VIII.1978; leg. B. Ch. Bhakta. – NHMB; 1 ♂, 4 ♀; Nowri Khola, 2200 m; 12.VIII.1978; leg. B. Bhakta. – NHMB; 1 ♂, 1 ♀; Gurubathan, 350 m; 15-19.V.1986; leg. B. Bhakta. – NHMB; 5 ♂, 3 ♀; Dek; 22.VII.1985; leg. B. Bhakta.

MEGHALAYA: MTD; 2 ♂; Khasi Hills; ex coll. Felsche – MHNG; 1 ♂; Shillong.

MANIPUR: BMNH; 1 ♂; Doherty, ex coll. Boucard – ISNB; 2 ♂; ex coll. J. Muller.

MYANMAR: NMPC; 1 ♂ 1CMARoll. Nonfried.

INDIA (generic): MHNG; 3 ♂; ex coll. J. Thomson. – ISNB; 2 ♂; ex coll. P. de Moffarts. – ISNB; 1 ♂, 3 ♀; ex coll. Madon. – ISNB; 1 ♂; ex coll. J. Muller. – INDES: MHNG; 1 ♀; Bengale, Chassot, VIII.1903.

HIMALAYA (generic): NMPC; 3 ♂, 2 ♀; ex coll. Kallert, Amburg. – MNHN; 1 ♂; ex coll. Nonfried. **HINDUSTAN (generic):** ISNB; 1 ♂; E. Deyrolle 1869, ex coll. de Borre. **BENGAL:** ISNB; 1 ♂; Bengal. – MNHN; 1 ♂; same data as previous.

Description of the lectotype male: *Size* – BL: 23 mm, BW: 10 mm, BWX: 12.5 mm, situated in the distal third of elytra. *Color* – Integument dark brown including antennal clubs and legs; dorsal surface with scales uniformly white cream, more dense along sides of pronotum and margins of elytra. *Head* – CW/L: 2.9; anterolateral edges of clypeus slightly angulate, lateral edges of clypeus gradually rounded posteriad; frons large, making eyes not prominent (F/O: 6); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2), strongly convex, slightly concave just behind eyes; apical angles flattened, right, not protuberant; basal lateral margins

gently curved, basal angles obtuse and smooth. *Elytra* – Without any stria visible. *Thoracic sterna* – With long, yellowish-brown pubescence and scales; mesosternum well developed anteriorly between the mesocoxae (MstL: 2 mm), pointed and curved dorsally (Fig. 18). *Abdomen* – Sternites with sparse scales except median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate, smallest tooth at base; slender apical tooth subequal to middle tooth. *Aedeagus* – Parameres slightly asymmetric both curved dorsally; left paramere with flat spur (Figs 23-25).

Variability: BL: 20.5-26 mm ($x = 23.5$, $n = 66$); vestiture of scales may be of any intermediate color between white (Fig. 80) and yellow (Fig. 81).

Females: Antennal club ovoid much shorter than in the males and preceding antennomeres A2-7/CL: 1.4).

Type locality: The type locality is generically “Indes Orientales” or East Indies that referred in colonial time to the lands of South (Indian subcontinent) and Southeast Asia thus making very difficult to define an exact location. Burmeister (1855) indicates as additional information for the species origin Malabar, situated on the West coast of India and outside of the geographical distribution area of the genus *Cyphochilus*; therefore, this information is not considered valid.

Distribution: The confirmed records for this species show a quite large distribution from Nepal to North Myanmar including Sikkim, Darjeeling, Assam, Meghalaya, West Bengal, and Manipur.

Remarks: The specimen marked as “Co-typus” might be of doubtful authenticity as the specific epithet on the label should be *candida* and not as given *candidus* because the original combination was *Melolontha candida*. However, this is the closest specimen to this species we could find in the Olivier collection (MNHN) and therefore it is designated here as lectotype in order to stabilize the nomenclature. *Cyphochilus candidus*, *C. septentrionalis*, *C. gandhii*, *C. satyarthii* and *C. tenzingyatsoi* are very close in the external morphology and they inhabit the same geographical area in the north East of Himalaya. Therefore, they were often confused in the past, as it is evident from the misidentifications in the old collections. They may be considered a group of species with parameres generally only slightly asymmetric and curved dorsally; they remain easily distinguishable from the characters of the parameres and *C. candidus* left paramere bears a flat spur absent in all other species of this group. In some old collections, there are a few specimens of *C. candidus* identified as *C. sylhetinus* Brenske, however, this name has never been published.

Cyphochilus flavomarginatus Frey, 1971

Figs 6, 41-43

Cyphochilus flavomarginatus Frey, 1971: 122, figs 11-13.

Type material examined: Lectotype by present designation: NHMB; 1 ♂; LAOS: // Typus (P on red) // Laos, 1967 / Vientiane / leg. Ardoïn (P) // *Cyphochilus / flavomarginatus* / det. G. Frey, 1970 n. sp. (P&H) //. – Paralectotypes by present designation: NHMB; 4 ♀; // LAOS, 1967 / Vientiane / leg. Ardoïn (P) // Paratype (P on red) // *Cyphochilus / flavomarginatus* / det. G. Frey, 1970 (P&H) //. – Paralectotypes by present designation: NHMB; 1 ♂; // Paratype (P on red) // Sud Laos [South LAOS] / 1967 / Paksé / leg. Ardoïn (P) // *Cyphochilus / flavomarginatus* / det. G. Frey, 1970 (P&H) //. (Fig. 6).

Description of the lectotype male: *Size* – BL: 23 mm, BW: 11 mm, BWX: 13.5 mm, situated in the third distal of elytra. *Color* – Integument dark brown including antennal clubs and legs; dorsal surface with scales more dense along sides of pronotum and margins, white cream on discal part of pronotum, discal part of elytra and margins of elytra, yellow on the head, lateral part of pronotum and pre-marginal sides of elytra. *Head* – CW/L: 2.9; anterolateral edges of clypeus rounded, lateral edges of clypeus straight and divergent posteriorly; frons large, making eyes not prominent (F/O: 6); antennal club only slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex, slightly concave just behind eyes; apical angles flattened, right, not protuberant; basal lateral margins gently curved, basal angles obtuse and smooth. *Elytra* – Without any visible stria. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum well developed anteriorly between the mesocoxae (MstL: 2.2 mm), pointed and curved dorsally. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate; slender apical tooth bigger than the middle tooth. *Aedeagus* – Parameres slightly asymmetric both curved dorsally; apex of both parameres prolonged in a spike (Figs 41-43).

Female: BW: 14.2 mm; BL: 25 mm; antennal club ovoid, shorter than preceding antennomeres (A2-7/CL: 2.4).

Type locality: Vientiane, capital of Laos.

Distribution: The species is known only from two localities in Laos: Vientiane (Lectotype) and Paksé. Paksé, or Pakxe, is the capital of the southern Laotian Province of Champasak (15°7'0"N, 105°47'0"E; 120 m alt.), located at the confluence of the Xe Don and Mekong Rivers.

Remarks: *Cyphochilus flavomarginatus* is a large species easy to recognize by the smooth aspect of elytra having their maximum width distally and by yellowish

band around the sides of the body from the head to the apex of elytra. *Cyphochilus flavomarginatus* is close to *C. sansuukyii* from which is easily recognizable by the shape of parameres (Figs 41-43 and 44-46).

In the original description, Frey (1971) mentioned 6 specimens, all from Vientiane. However in six specimens labeled as types in his collection one male is from Paksé, what was apparently overlooked by him; so despite this is in contradiction with the description, it is also designated as paralectotype. The drawing of parameres showed by Frey in the description refers to the lectotype that unfortunately has damaged parameres; the Figs 42-43 present the real shape of parameres from the paralectotype from Paksé.

***Cyphochilus septentrionalis* Waterhouse, 1867
restored name**

Figs 1-3, 9, 19, 22, 26-28, 86

Cyphochilus septentrionalis Waterhouse, 1867: 141.

Cyphochilus pygidialis Nonfried, 1893: 332. **new synonym**

Cyphochilus pygidialis v. *angeri* Nonfried, 1893: 333.

***C. septentrionalis* type material examined:** Lectotype by present designation: BMNH; 1 ♂; HIMALAYA: // *C. septentrionale* / Waterh. Type (H) // Type (P round label with red border// n / Ind (H black on blue, round label) // (Figs 3, 86). – Paralectotype, by present designation; BMNH; 1 ♂; // *Cyphochilus* / *septentrionalis* / co-type Wat. (H) //.

***C. pygidialis* type material examined:** Lectotype by present designation: ZMHB; 1 ♂; // Coll. Nonfried / Hymalaya [sic] (P black on white, black line border) // *pygidialis* / type ♂ Brsk (H on red) // (Fig. 1). – Paralectotypes by present designation, with identical label than lectotype as follows: ZMHB; 1 ♂; // Coll. Nonfried / Hymalaya [sic] (P black on white, black line border) // *pygidialis* / type ♂ Brsk (H on red) // (Fig. 1). – ZMHB; 1 ♂; // Coll. Nonfried / Hymalaya (P) // *Cyphochilus* / *pygidialis* / type Nonfried (H, black on white) // . – Paralectotype by present designation: ISNB; 1 ♂ // Coll. Nonfried / Hymalaya [sic] (P, black line border) // *Cyphochilus* / *pygidialis* / Nonfried ex typ. (H) // . – Paralectotypes, by present designation: ISNB; 8 ♂, 6 ♀; pinned on row being the first specimen the sole with an identification label // Coll. Nonfried / Hymalaya (P, black line border) // Type (P red on white, black line border) // . – Paralectotype by present designation: ISNB; 1 ♀; // Darjeeling / coll. Nonfried (H) // COTYPE (P on red, black border) // . – Paralectotype by present designation: NMPC; 1 ♂; // Coll. Nonfried / Hymalaya (P black line border) / TYPUS (P on red, black line border // *C.* / *pygidialis* / Nonfried (H red line border) // . – Paralectotype by present designation: NMPC; 1 ♀; // Coll. Nonfried / Hymalaya (P black line border) // TYPUS (P black on red, black line border

// . – Paralectotype by present designation: NMPC; 5 ♀; // Coll. Nonfried / Hymalaya (P black line border) / TYPUS (P on red, black line border) // *pygidialis* / Nonfried typ Hymal (H on yellow, black line border) //.

***C. pygidialis angeri* type material examined:** Lectotype by present designation: ZMHB; ♂; // Coll. Nonfried / Hymalaya (P black line border) // *Cyphochilus pyg.* / v. *angeri* Nfr (H on green, black line border // (Fig. 9).

Additional material examined: 54 specimens.

UTTAR PRADESH: MTD; 1 ♂; Saharanpur.

NEPAL: MTD; 3 ♂, 2 ♀.

SIKKIM: MTD; 1 ♂; Sikkim.

ASSAM: ZMHB; 1 ♂; Assam; sub *Cyphochilus assamensis* Brenske, Type [unpublished name]. – MNW; 1 ♂; same data as previous. – MTD; 3 ♂; same data as previous.

BANGLADESH: MHNG; 1 ♂; Silhet, ex Museo Sharp.

MEGHALAYA: BMNH; 1 ♂, ISNB; 2 ♂, NMPC 1 ♀; Shillong. – ISNB; 1 ♂; MTD 1 ♀; Khasi Hills.

NAGALAND: ISNB; 1 ♂, 3 ♀; MTD; 1 ♂; Naga Hills; Kohima, leg. V. M. Duchon, ex coll. P. de Moffarts.

WEST BENGAL: MHNG; 1 ♂, 1 ♀; ISNB; 1 ♂; Kalimpong, Pedong.

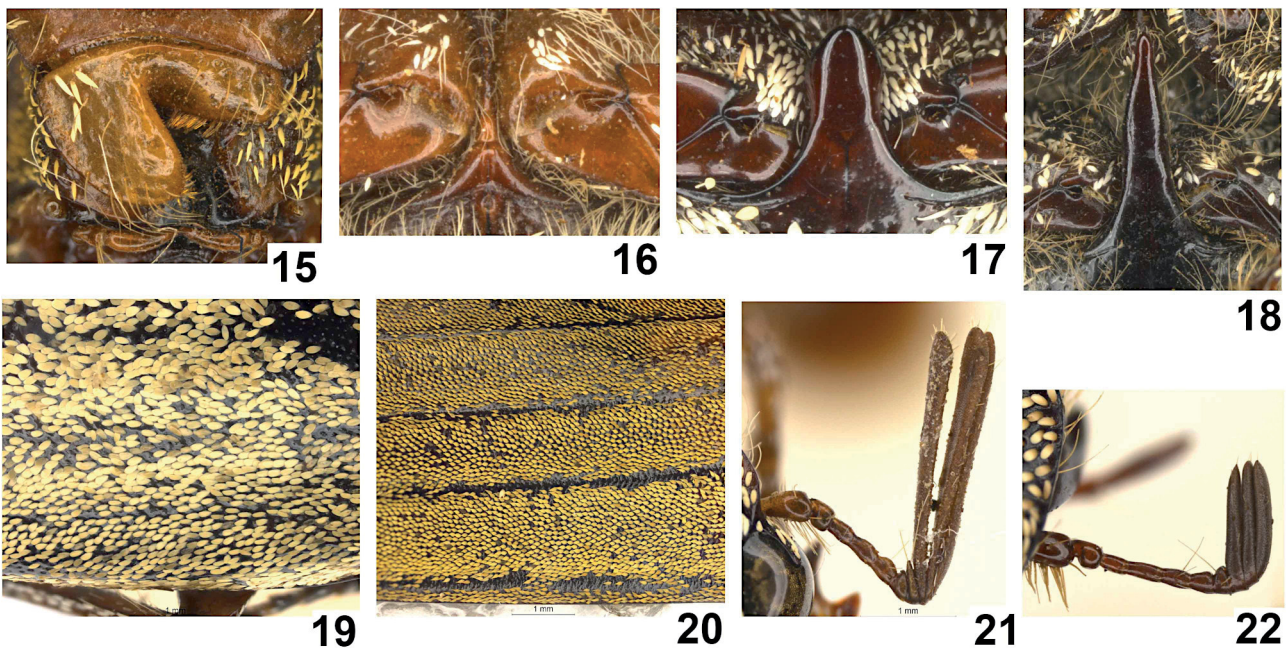
INDIA (generic): NHRS; 1 ♂; India.

HIMALAYA: ISNB; 4 ♂. – ZMHB; 2 ♀, 4 ♂. – MNW; 2 ♂, 1 ♀. – NMPC; 3 ♂, 4 ♀. – MHNG; 1 ♂. – MTD; 3 ♂, 3 ♀; (all specimens ex coll. Nonfried).

Description of the lectotype male (BMNH): *Size* – BL: 19.2 mm, BW: 8 mm, BWX: 10.4 mm, situated at midpoint of elytra. *Color* – Integument dark brown including antennal clubs and legs; dorsal surface with scales uniformly white cream more dense and whitish along sides of pronotum and margins of elytra. *Head* – CW/L: 2.9; anterolateral edges of clypeus slightly angulate, lateral edges of clypeus straight posteriad; frons large, making eyes not prominent (F/O: 6.8); clypeofrontal suture faint; antennal club slightly shorter than antennomeres 2-7 (A2-7/CL: 1.1) (Fig. 22). *Pronotum* – Transverse (PnW/L: 2.1), strongly convex, slightly concave just behind eyes; apical angles flattened, acute, slightly protuberant; basal lateral margins straight, basal angles obtuse and smooth. *Elytra* – Without any elevated visible stria (Fig. 19). *Thoracic sterna* – Surface with short, yellowish-brown pubescence and scales; mesosternum well developed anteriorly between the mesocoxae (MstL: 1.3 mm), pointed and curved dorsally. *Abdomen* – Sternites with sparse scales except median part of the eight sternite; pygidium convex with apical margin largely reflected. *Legs* – Protibia tridentate, smallest tooth at base; slender apical tooth bigger than the middle tooth. *Aedeagus* – Parameres slightly asymmetric both curved dorsally; left paramere in its ventral portion with a spur directed frontally, another smaller spur is present in the ventral



Figs 1-14. Original labels of type material. (1) *Cyphochilus pygidialis* Nonfried, 1893. (2) *C. pygidialis* Brenske [sic]. (3) *C. septentrionalis* Waterhouse, 1867. (4) *C. obscurus* Sharp, 1876. (5) *C. proximus* Sharp, 1876. (6) *C. flavomarginatus* Frey, 1971. (7) *C. cylindricus* Brenske, 1903. (8) *Melolontha candida* (Olivier, 1789). (9) *Cyphochilus pygidialis* v. *angeri* Nonfried, 1893. (10) *C. feae* Brenske, 1903. (11) *C. vestitus* Sharp, 1876. (12) *C. tricolor* Waterhouse, 1867. (13) *C. testaceipes* Fairmaire, 1902. (14) *C. peninsularis* Arrow, 1938.



Figs 15-22. General morphology of *Cyphochilus*. (15) Labrum, in frontal view of *Cyphochilus farinosus* Waterhouse, 1867. (16) Mesosternum, in ventral view of *C. farinosus*. (17) *C. proximus* Sharp, 1867. (18) *C. candidus* (Olivier, 1789). (19) Lateral side of right elytra of *C. septentrionalis* Waterhouse, 1867. (20) *C. farinosus*. (21) Antennal club ♂ of *C. hmong* n. sp. (22) *C. septentrionalis* ♂.

distal part of the right paramere, apical part of the right paramere with a deep hollow (Figs 26-28).

Variability: BL: 18-20 mm ($x = 19.4$, $n = 48$); vestiture of scales may be of any intermediate color between white and cream.

Females: Antennal club length much shorter than on the males (A2-7/CL: 1.4).

Type locality: The type locality for *C. septentrionalis* is generically “India” and for its synonym *pygidialis* is vaguely “Himalaya”. The type specimens were collected in the late 1800’s probably in the northeastern territories of India while it was under the rule of the British Crown.

Distribution: The confirmed records for this species indicate a presence from Uttar Pradesh to Nagaland including Nepal (however, no more precise records are available for this country and need to be confirmed), West Bengal Sikkim, Assam, Meghalaya, and Bangladesh.

Remarks: *Cyphochilus septentrionalis*, was considered until now (Dalla Torre, 1912; Bezdek, 2016) as a smaller form and synonym of *C. candidus*. The study of the types reveals that *C. septentrionalis* is in reality well distinct from *C. candidus*, and that *C. pygidialis* and *C. pygidialis* v. *angeri* are junior synonyms. The particular form of the parameres with two ventral spikes (Fig. 26) is sufficient to easily distinguish this species from the closest species *C. candidus*, *C. gandhii*, and *C. tenzingyatsoi*. In some old collections, there are few specimens of *C. septentrionalis* identified as *C. assamensis* Brenske, a name that has, however, never been published and is thus unavailable.

Cyphochilus gandhii n. sp.

Figs 32-34, 84

Holotype: MHNG (MHNG-ENTO-81686); 1 ♂; WEST BENGAL: // INDIA / [West Bengal, Darjeeling] Kurseong / V.1975 (H) // HOLOTYPE ♂ / *Cyphochilus* / *gandhii* mihi / G. Sabatinelli, 2020 (T on red) // (Fig. 84).

Paratypes: 78 specimens.

UTTAR PRADESH: BMNH; 1 ♂; Allahabad (sub. *C. candidus* det. Waterhouse).

WEST BENGAL: ISNB; 8 ♂, 8 ♀; Kurseong (sub *C. pygidialis* det. Moser). – MHNG; 4 ♂, 6 ♀; same data as previous. – BMNH; 1 ♂; same data as previous (sub *C. candidus* det. Arrow). – HNHM; 1 ♂; same data as previous. – NMPC; 1 ♂; same data as previous (sub. *C. candidus* det. Frey). – MHNG; 2 ♂, 6 ♀; Maria Basti [Christian church near Pedong]. – MHNG; 2 ♂, 3 ♀; Pedong. – MSNG; 1 ♂; same data as previous. – ISNB; 2 ♀; Darjeeling. – ISNB; 2 ♂, 1 ♀; Kolkata.

SIKKIM: ISNB; 2 ♂; Sikkim. – MTD; 3 ♂, 3 ♀; same data as previous.

ASSAM: MTD, 1 ♂; Assam. – MHNG 1 ♂; same data as previous.

ARUNACHAL PRADESH: NHMB; 8 ♂, 8 ♀; btw. Dirang & Bomdila pass., 27°19' N 92°22' E, 2200 m; 15.VI.2004; leg. L. Dembický.

INDIA (generically): ISNB 6 ♂.

Description of the holotype male: *Size* – BL: 21 mm, BW: 8.8 mm, BWX: 11.4 mm, situated at midpoint of elytra. *Color* – Integument dark shiny brown except for brown-reddish clypeus, antennal clubs, other appendices and legs; dorsal surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.5; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 5.4); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.88). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical angles and lateral margins flattened, apical angles acute protuberant; basal lateral margins curved, basal angles obtuse and largely rounded. *Elytra* – Smooth, without any elevated stria. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum strongly developed anteriorly (MstL: 1.8 mm) between mesocoxae. *Abdomen* – Sternites with sparse scales except median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate with basal tooth well developed; slender apical tooth as long as middle tooth. *Aedeagus* – Parameres strongly asymmetric (Figs 32-34); left paramere with a long ventral process that wrap the right one like in *C. tenzingyatsoi*; apical part of right paramere convex and pointed.

Variability: BL: 20-22.5 mm ($x = 21.5$, $n = 72$).

Females: BL: 22 mm; antennal club ovate, shorter than preceding antennomeres 2-7 (A2-7/CL: 1.8).

Etymology: Mohandas Karamchand Gandhi was an Indian lawyer and political ethicist who employed nonviolent resistance to lead the successful campaign for India’s independence from British Rule and in turn inspired movements for civil rights and freedom across the World.

Type locality: Kurseong is a city and municipality in Darjeeling District in the Indian state of West Bengal.

Distribution: This species, quite abundant in the collections, shows a distribution concentrated in the Darjeeling municipality of West Bengal, with a few specimens also known from Sikkim, Assam and Arunachal Pradesh. Other old record localities are generic and may be unreliable.

Remarks: *Cyphochilus gandhii* can be readily separated from all other congeners by its: large body size, elytral



Figs 23-34. Parameres in right, dorsal, and left view. (23-25) *Cyphochilus candidus* (Olivier, 1789), lectotype. (26-28) *C. septentrionalis* Waterhouse, 1867, lectotype. (29-31) *C. tenzingyatsoi* n. sp., holotype. (32-34) *C. gandhii* n. sp., holotype. – Scale bars = 1 mm.

striae not elevated, mesosternum armed with a long spur and for the unique shape of the parameres. The morphological closest species is *C. tenzinyatsoi* from which it is easily distinguishable having antennal club longer than antennomeres 2-7 and the apex of the right paramere convex and pointed (Figs 29 vs. 32). In the collections, this new species was identified by Moser as *C. pygidialis* and by Arrow as *C. candidus*.

***Cyphochilus sansuukyii* n. sp.**

Figs 44-46, 88

Holotype: MHNG (MHNG-ENTO-81690); 1 ♂; MYANMAR: // Carin Chebà [Karen Hills] / 900-1100 m / L. Fea V XII-88 [1888] (P) // HOLOTYPE ♂ / *Cyphochilus / sansuukyii mihi* / G. Sabatinelli, 2020 (T on red) // (Fig. 88).

Paratypes: 2 specimens.

MYANMAR: MHNG (MHNG-ENTO-81691 and 81692); 2 ♀; same collection data as the holotype, labeled as PARATYPE ♀.

Description of the holotype male: *Size* – BL: 22 mm, BW: 8.8 mm, BWX: 12.3 mm, situated in the third distal of elytra. *Color* – Integument brown including antennal clubs and legs; dorsal surface with yellowish scales, more dense white scales along sides of pronotum and margins. *Head* – CW/L: 2.9; anterolateral edges of clypeus rounded in very obtuse angle, lateral edges of clypeus straight and divergent posteriad; frons large, making eyes not prominent (F/O: 5.7); antennal club of same length as antennomeres 2-7 (A2-7/CL: 1). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical angles not flattened, right, not protuberant; basal lateral margins almost straight, basal angles obtuse and rounded. *Elytra* – Without elevated striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum well developed anteriorly (MstL: 1.1 mm) between mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin reflected. *Legs* – Protibia bidentate as third tooth at the base is obsolete; slender apical tooth bigger than the other tooth. *Aedeagus* – Parameres very asymmetric; apex of both parameres prolonged in a spike (Figs 44-46).

Females: BL: 23.5 mm; antennal club shorter than preceding antennomeres (A2-7/CL: 1.7).

Etymology: Aung San Suu Kyi is a Burmese politician, diplomat, author, and recipient of 1991 Nobel Peace Prize for her democratic activities in Myanmar, from where the new species of *Cyphochilus* is described.

Type locality: The type locality, Carin Chebà on the original labels, corresponds nowadays to Karen Hills (750 m), in Myanmar. Leonardo Fea (Turin 24 July 1852 – 27 April 1903), who in 1872 was an assistant at the Museum of Natural History in Genoa, collected

the three specimens here described. He undertook several scientific expeditions including to Burma where he spent four years (1885-1889) accumulating large collections of insects and birds most of which are in the MSNG but also present in MNHN, ISNB, and MHNG.

Distribution: The species is known only from Karen Hills in Myanmar, one of the main hill ranges in eastern Burma located across the SW corner of Shan State and Kayah State.

Remarks: *Cyphochilus sansuukyii* is morphologically close to *C. flavomarginatus*: they are large species having smooth elytra which have with their maximum width distally and a yellowish or white band of scales around the sides of the body from the head to the apex of elytra. *Cyphochilus sansuukyii* is easily recognizable from *C. flavomarginatus* by having the antennal club of male of the same length as antennomeres 2-7 and by the different shape of parameres (Figs 44-46 vs. 41-43).

***Cyphochilus satyarthii* n. sp.**

Figs 35-37

Holotype: MHNG (MHNG-ENTO-81689); 1 ♂; SIKKIM: // Himalaja [sic] / Sikkim // HOLOTYPE ♂ / *Cyphochilus / satyarthii mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 3 specimens.

SIKKIM: ISNB; 1 ♂; Sikkim; ex coll. Ley. – PCMN; 1 ♂; India, Sikkim east, Gantok, env. 2000-2500 m, Fambong-Lo forest; 8-15.VII.1997; Jan Schneider lgt.

WEST BENGAL: MNHN; 1 ♂; Pedong [Kalimpong]; A. Desgodins; ex coll. R. Oberthur.

Description of the holotype male: *Size* – BL: 18.5 mm, BW: 7.6 mm, BWX: 9.8 mm, situated in the distal third of elytra. *Color* – Integument dark brown while legs and appendices reddish brown; dorsal surface with scales uniformly white cream, more dense along sides of pronotum and margins of elytra. *Head* – CW/L: 2.8; anterolateral edges of clypeus slightly angulate, lateral edges of clypeus gradually rounded posteriad; frons large, making eyes not prominent (F/O: 7.7); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2.1), strongly convex, slightly concave just behind eyes; apical angles flattened, right, not protuberant; basal lateral margins gently curved, basal angles obtuse and smooth. *Elytra* – Without any stria visible. *Thoracic sterna* – Surface with long, yellowish-brown pubescence and scattered scales; mesosternum well developed anteriorly (MstL: 1.39 mm) between the mesocoxae, pointed and curved dorsally. *Abdomen* – Sternites with sparse scales (the eight sternite is absent in the holotype specimen); pygidium convex with apical margin reflected. *Legs* – Protibia tridentate, smallest tooth at base; slender apical tooth subequal to middle tooth. *Aedeagus* – Parameres



Figs 35-46. Parameres in right, dorsal, and left view. (35-37) *Cyphochilus satyarthii* n. sp., holotype. (38-40) *C. peninsularis* Arrow, 1938, lectotype. (41-43) *C. flavomarginatus* Frey, 1971, lectotype. (44-46) *C. sansuikyii* n. sp., holotype. – Scale bars = 1 mm.

slightly asymmetric, both curved dorsally (Figs 35, 37; external margin of right paramere with a spur in the distal third (Fig. 35).

Variability: BL: 18-20 mm.

Female: Unknown.

Etymology: Kailash Satyarthi was recipient of the 2014 Nobel Peace Prize, founder of multiple social organizations in favor of children's rights in India, from where the new species of *Cyphochilus* is described.

Type locality: The type specimen was collected in Sikkim, a small state (about 7,000 km²) in northeastern India bordering Tibet, Bhutan, Nepal, and West Bengal. Sikkim is notable for its biodiversity, including alpine and subtropical climates. Several species of Scarabaeoidea are described from material collected in its national park that covers 35% of the state.

Distribution: The species is also known from a locality in West Bengal state of India.

Remarks: *Cyphochilus satyarthii*, *C. candidus*, *C. septentrionalis*, *C. gandhii*, and *C. tenzingyatsoi*, all inhabiting the north East of India, are very close in the external morphology. Consequently, the five species were often confused in the past. *Cyphochilus satyarthii* is recognizable by the shape of parameres: the left paramere unarmed and the right one with an externally directed spur (Fig. 36).

Cyphochilus tenzingyatsoi n. sp.

Figs 29-31

Holotype: MHNG (MHNG-ENTO-81687); 1 ♂; TIBET: // CHINA, E. Tibet, 2050-2400 m / N of Brahmaputra great bend / 30°00'-07° - 94°22'-95°09' [sic] / 16-20.VII.1992, L. & R. Businsky leg. // HOLOTYPE ♂ / *Cyphochilus* / *tenzingyatsoi* mihi / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 8 specimens.

CHINA, TIBET: MHNG; 1 ♂, 1 ♀; same data as holotype. – NMPC; 1 ♂, 1 ♀; same data as holotype; ex coll. D. Král. – PCMN; 2 ♀; CHINA, SE Tibet, Tome-Bomê, 3600 m; 3.VII.1996, leg. V. Paulus. – PCAB; 1 ♂; East Tibet, Tomi (Tangmai), 30 km W. of Donjung, 16.V.2005; 2075 m; leg. A. Wrzecionko. – PCAB; 1 ♂; same data as previous.

Description of the holotype male: *Size* – BL: 24.3 mm, BW: 10 mm, BWX: 13 mm, situated at midpoint of elytra. *Color* – Integument dark shiny brown except for brown-reddish antennal clubs, other appendices and legs; dorsal surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.1; anterolateral edges of clypeus rounded, lateral edges of clypeus straight and subparallel; frons large, making eyes relatively

small, not prominent (F/O: 3.1); antennal club shorter than antennomeres 2-7 (A2-7/CL: 1.1). *Pronotum* – Transverse (PnW/L: 2.1), strongly convex; apical angles and lateral margins flattened, slightly acute and not protuberant; basal lateral margins convex, basal angles largely rounded. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scattered scales; mesosternum strongly developed anteriorly (MstL: 1.65 mm) between the mesocoxae. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate with the basal tooth small; slender apical tooth much longer than the middle tooth. *Aedeagus* – Parameres strongly asymmetric; left paramere with a long ventral process that wrap the right one, like in *C. gandhii*; apex of the right paramere concave and with a straight margin (Figs 29-31).

Variability: BL: 23.5-25 mm.

Females: BL: 25 mm; antennal club ovate, shorter than preceding antennomeres 2-7 (A2-7/CL: 1.9).

Etymology: Jetsun Jamphel Ngawang Lobsang Yeshe Tenzin Gyatso, formally recognized as the 14th Dalai Lama, was the recipient of the 1989 Nobel Peace Prize for his activity in Tibet, from where the new species is described.

Type locality: The specimens were collected during two Czech expeditions in the Bomê County of Nyingchi City in the southeastern part of the Tibet Autonomous Region of China.

Distribution: *Cyphochilus tenzingyatsoi* is at present known only from two collection sites in the montane areas of southeastern Tibet.

Remarks: This species can be readily separated from all other congeners by its: large body size, elytral striae not elevated, mesosternum armed with a long spur and for the unique shape of the parameres. The morphologically closest species is *C. gandhii* from which it is easily distinguishable by having antennal club shorter than antennomeres 2-7 and the apex of the right paramere concave and with straight apical margin (Figs 29 vs. 23).

Section 1b

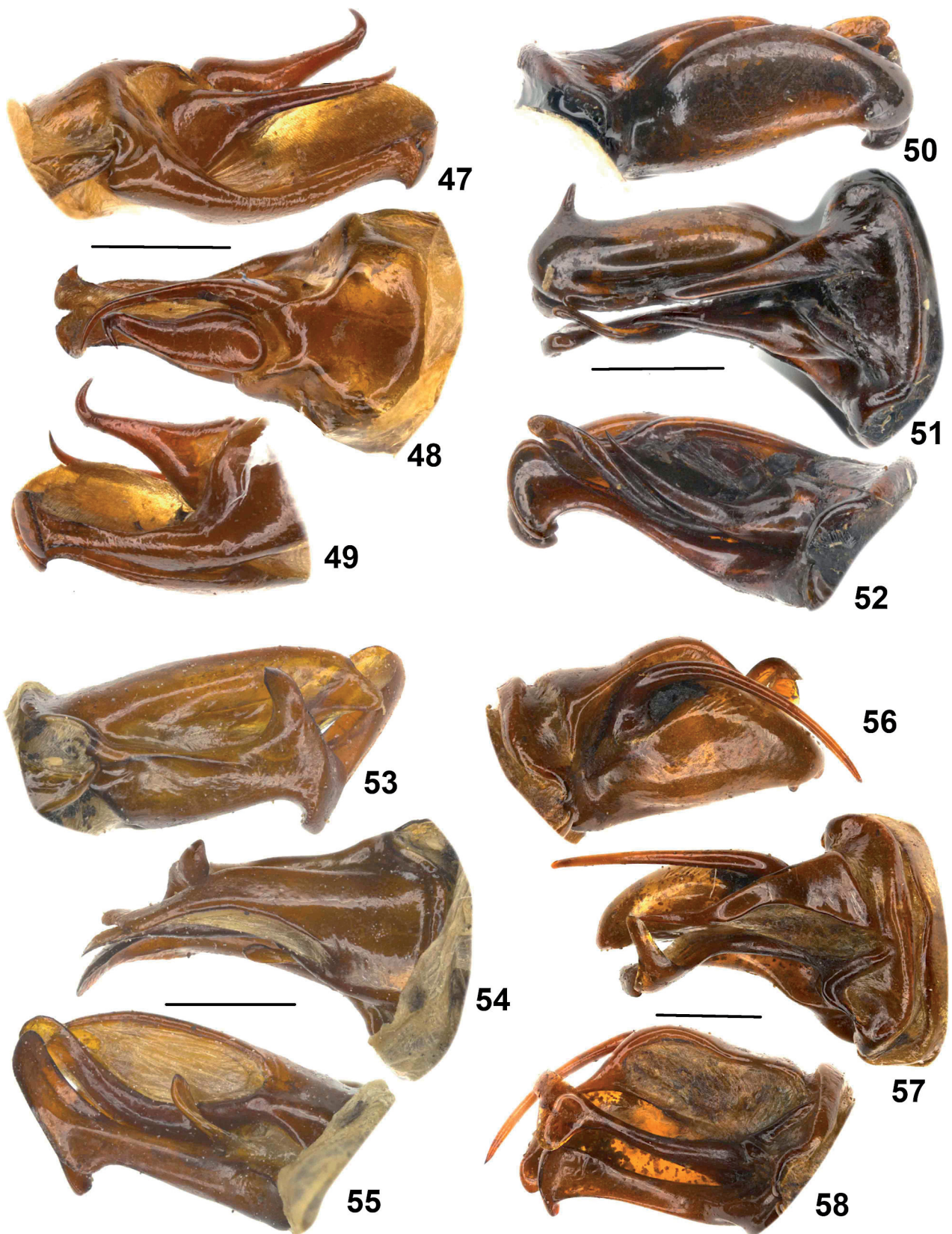
Species with mesosternum armed with a short spur, length in lateral view 0.2-0.6 mm (Fig. 17).

Cyphochilus carinchebanus Brenske, 1903

Figs 47-49, 82

Cyphochilus carinchebanus Brenske, 1903: 381

Type material examined: holotype: ZMHB; 1 ♀; Carin Cheba, 800-1100 m, L. Fea V XII-88.



Figs 47-58. Parameres in right, dorsal, and left view. (47-49) *Cyphochilus carinchebanus* Brenske, 1903. (50-52) *C. obscurus* Sharp, 1876, holotype. (53-55) *C. proximus* Sharp, 1876, holotype. (56-58) *C. tricolor* Waterhouse, 1867, lectotype. – Scale bars = 1 mm.

Material examined: 10 specimens.

MYANMAR: ZMHB; 1 ♂; Carin Cheba, 800-1100 m, L. Fea V XII-88; (Fig. 82).

THAILAND: MHNG; 2 ♂, 7 ♀; North Thailand, Chiang Rai, Wiang Pa Pao; 3.III.1988; leg. F. Ferrero.

Description of male specimen in ZMHB: *Size* – BL: 18.2 mm, BW: 7.1 mm, BWX: 9.3 mm, situated at midpoint of elytra. *Color* – Integument brown with legs, antenna and other appendices light brown; surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.2; clypeus largely rounded (F/O: 4.9) with lateral margins divergent posteriad; antennal club much longer than antennomeres 2-7 (A2-7/CL: 0.7). *Pronotum* – (PnW/L: 2.2); apical angles and lateral margins flattened; apical angles right and slightly protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum feebly developed (MstL: 0.35 mm) however visible in lateral view between the mesocoxae. *Abdomen* – Sternites with uniformly sparse scales; pygidium convex with the apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres slightly asymmetric with two long appendices in addition to the terminal part of parameres (Figs 47-49).

Variability: BL: 16.5-18.5 mm.

Females: Relatively larger than males (7.4-7.6 mm); antennal club ovate, much shorter than preceding antennomeres 2-7 (A2-7/CL: 2).

Type locality: The type locality Carin Cheba corresponds nowadays to Karen Hills (750 m altitude) in Myanmar.

Distribution: The species was described from Karen Hills in Myanmar, one of the main hill ranges in eastern Burma located across the SW corner of Shan State and Kayah State; is also known from the southwestern most district of Chiang Rai Province in northern Thailand.

Remarks: This is a small *Cyphochilus* species and can be readily separated from all other congeners by the unique form of the parameres. Unfortunately, Brenske described this species from a female specimen, however, comparison of recently collected specimens with the type, leave no doubt they are conspecific.

Cyphochilus feae Brenske, 1903

Figs 10, 65-67, 83

Cyphochilus feae Brenske, 1903: 380

Type material examined: Holotype: ZMHB; 1 ♂; MYANMAR: // *Feae* 1092 / Type Brsk (H) //

Carin Cheba / 900-1100 m / L. Fea V XII-88 (P) // coll. Brenske (P) //. (Figs 10, 83).

Addition material examined: 11 specimens.

MYANMAR: ZMHB; 1 ♂; same data as holotype. – MNHN; 1 ♂; same data as holotype. – MSNG; 4 ♂; same data as holotype. – MHNG; 2 ♂; same data as holotype. – PCMN; 3 ♂; SE Myanmar, Dawna; IX.1990.

Redescription of the holotype male: *Size* – BL: 14.5 mm; BW: 6 mm; BWX: 7.3 mm, situated at midpoint of elytra. *Color*. Integument dark shiny brown; dorsal surface with scattered yellow scales not aggregated along lateral part of the body. *Head* – CW/L: 3.6; anterolateral edges of clypeus rounded, lateral edges of clypeus curved and divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 3.9); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.89). *Pronotum* – Transverse (PnW/L: 2.3), strongly convex; apical angles and lateral margins flattened, apical angles right, not protuberant; basal lateral margins straight, basal angles obtuse and largely rounded. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.24 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth longer than the middle one. *Aedeagus* – Parameres strongly asymmetric with 5 appendices (Figs 65-67).

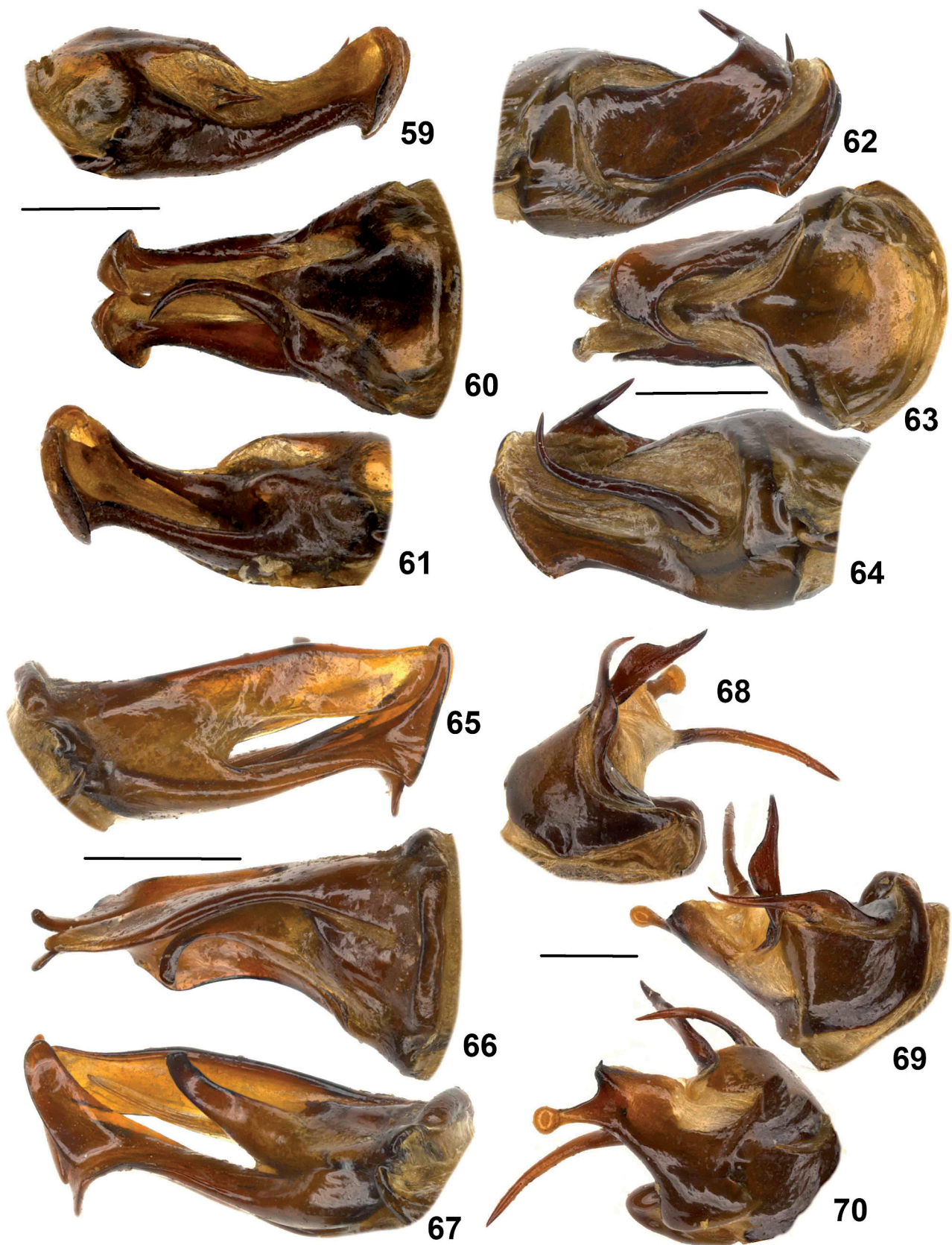
Variability: BL: 7-18 mm. It is possible that the scattered scales on the dorsal part of the body in the specimens examined are a consequence of mechanical wear and that fresh specimens may have a denser covering of scales.

Females: Unknown.

Type locality: The type locality Carin Cheba corresponds nowadays to Karen Hills (750 m altitude) in Myanmar.

Distribution: Apart from Karen Hill, this species is known to me only from one other locality (Dawna Range) also situated in the Kayah State of eastern Myanmar.

Remarks: *Cyphochilus feae*, *C. proximus* and *C. rohingya* have a similarly shaped parameres with five appendices and they are all known from Myanmar and the Malaysian Peninsula. They can be readily separated from each other mainly by the different conformation of the distal part of the right paramere (Figs 53, 65, 71).



Figs 59-70. Parameres in right, dorsal, and left view. (59-61) *Cyphochilus zuercheri* n. sp., holotype. (62-64) *C. reichenbachii* n. sp., holotype. (65-67) *C. feae* Brenske, 1903, holotype. (68-70) *C. leduthoi* n. sp., holotype. – Scale bars = 1 mm.

***Cyphochilus obscurus* Sharp, 1876**

Figs 4, 50-52, 87

Cyphochilus obscurus Sharp, 1876: 83.

Type material examined: Holotype: MNHN: 1 ♂; LAOS: // *Cyphochilus obscurus* / Laos. Type / D. S. (H) // Laos (H) / Mouhot (P) // Ex Musaeo / D. Sharp 1890 (P) // Muséum Paris / 1952 / Coll. R. Oberthur (P) // Typus (H on red) //. (Figs 4, 87).

Additional material examined: 8 specimens.

LAOS: ISNB; 1 ♂; Paklay; 15.VIII.1917; R. Vitalis de Salv[aza] – ISNB; 1 ♂; Luang Prabang; 27.VIII.1917; R. Vitalis de Salv[aza]. – ISNB; 2 ♂; Laos, Pak. [?]; 24.IX.1919; coll. R. Vitalis de Salv[aza].

THAILAND: PCMN; 2 ♂; Chiang Mai; X.1989. – MHNG; 3 ♂; Nan; VIII.1993. – MHNG; 3 ♂; Wiang Papao, 80 km NE Chiang Mai, 1992.

Redescription of the holotype male: *Size* – BL: 16.4 mm, BW: 7 mm, BWX: 8.7 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white scales densely aggregated on the sides of pronotum. *Head* – CW/L: 2.6; clypeus largely rounded; (F/O: 3.4); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.8). *Pronotum* – (PnW/L: 2); apical angles and lateral margins largely flattened, apical angles right, not protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum feebly developed (MstL: 0.47 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites only with scattered scales; pygidium convex with apical margin very narrowly reflected. *Legs* – Protibia tridentate with the basal tooth vestigial; slender apical tooth as long as the middle tooth; claws of all tarsi bifid at apex. *Aedeagus* – Parameres strongly asymmetric with 5 appendices 50-52; the right paramere in form of club with an apical spike directed externally (Fig. 51).

Variability: BL: 16-17.5 mm. Specimens from Thailand have the vestiture with ochre scales instead of white, however, this is a variation observed also in other species of *Cyphochilus*.

Female: Unknown.

Type locality: The type locality is given as Laos.

Distribution: The species is known from only a few specimens, all from North Laos and North Thailand.

Remarks: Sharp (1876) thought that the holotype of *C. obscurus* was a female, however it is a male. *Cyphochilus obscurus* can be readily separated from all other congeners by the unique form of the parameres. Moreover, the bifid claws are an astonishing character since all other *Cyphochilus* have claws with a thorn in medial position, never bifid. Actually, this is a quite

strong character utilized to separate group of genera in the Rhizotrogini, however, all other characters attribute this species to genus *Cyphochilus* without any doubt.

***Cyphochilus peninsularis* Arrow, 1938**

Figs 14, 38-40, 89

Cyphochilus peninsularis Arrow, 1938: 268.

Type material examined: Lectotype by present designation: BMNH; 1 ♂; THAILAND: // 1937-647 (P) // Type (P circular label, red border) // Peninsular Siam [THAILAND]/ Nakon Sri Tamarat / Kao Luang / 5800 ft / March 30th 1922 / H.M. Pendlebury (P) // *Cyphochilus / peninsularis* / Type ♂ Arrow (H) //. (Fig. 14). – Paralectotype by present designation: BMNH; 1 ♀; //1937-647 // *Cyphochilus / peninsularis* / Co-type ♀ Arrow (H) // Peninsular Siam / Nakon Sri Tamarat / Kao Luang / 5800 ft / March 30th 1922 / H.M. Pendlebury (P) // 1937-647 (P) //. – Paralectotype by present designation: BMNH; 1 ♂; // Co-type (P circular label, yellow border // March 29th 1922 / H.M. Pendlebury (P) // Peninsular Siam / Nakon Sri Tamarat / Kao Luang / 5800 ft // March 24th 1922 / H.M. Pendlebury (P) // 1938-437 (P) //. – Paralectotype by present designation: MHNG; 1 ♂; // Peninsular Siam / Nakon Sri Tamarat / 9 m Kao Luang / 5800 ft / March 29th 1922 / H.M. Pendlebury (P) // 1937-437 (P) //. (Fig. 89).

Redescription of the lectotype male: *Size* – BL: 20.8 mm, BW: 8.7 mm, BWX: 11 mm, situated in the distal third of elytra. *Color* – Integument dark brown while legs and appendices light brown-reddish; dorsal surface with scales uniformly whitish, denser along sides of pronotum and margins of elytra where they are yellowish. *Head* – CW/L: 3.1; anterolateral edges of clypeus rounded, lateral edges of clypeus straight and subparallel; frons large, making eyes not prominent (F/O: 4.9); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.7). *Pronotum* – Transverse (PnW/L: 1.8), strongly convex, slightly concave just behind eyes; apical angles flattened, acute and protuberant; basal lateral margins sinuate, basal angles acute and sharp. *Elytra* – With four striae visible, not covered by scales but not elevated. *Thoracic sterna* – Surface with long, yellowish-brown pubescence and scales; mesosternum developed anteriorly (MstL: 0.65 mm) visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales including median part of the eight sternite; pygidium convex with apical margin largely reflected and with corresponding ventrite quite large. *Legs* – Protibia bidentate being the third basal tooth almost not visible; slender apical tooth much longer than the middle tooth. *Aedeagus* – Parameres strongly asymmetric (Figs 38-40).

Variability: BL: 20.5-22.7 mm.

Female: Antennal club ovate, much shorter than in the males and of preceding antennomeres (A2-7/CL: 1.5).

Type locality: Nakhon Sri Thammarat is a city in southern Thailand (8°26'11"N, 99°57'47"E), capital of the homonymous Province and District. The locality is about 610 km South of Bangkok, on the east coast of the Malay Peninsula.

Distribution: The species is known only from one locality in the Southern Thailand on the Malay Peninsula.

Remarks: Arrows (1938) described the species based on 8 specimens, of which only 5 could be found. *Cyphochilus peninsularis* is quite distinct morphologically from its congeners. It is easily recognizable by the long antennal club in the males, the mesosternum developed between mesocoxae and by the unique morphology of the parameres.

Cyphochilus proximus Sharp, 1876

Figs 5, 7, 17, 53-55

Cyphochilus proximus Sharp, 1876: 83.

Cyphochilus cylindricus Brenske, 1903: 381. **new synonym**

C. proximus type material examined: Holotype: MNHN: 1 ♂; MYANMAR: // *Cyphochilus proximus* / Burmah Type / D. S. (H) // Burmah (H) // Ex Musaeo / D. Sharp (P black border) // Muséum Paris / 1952 / Coll. R. Oberthur (P) // Typus (H on red) // (Fig. 5).

C. cylindricus type material examined: Lectotype by present designation: ZMHB: 1 ♀; // *Cyph. cylindricus* / Type Brsk / 1093 (H) // India or. / Speyer (H) // Coll. Brenske (P) //. (Fig. 7). – Paralectotype by present designation: ZMHB: ♂; // *Cyph. cylindricus* / Type Brsk / 1093 (H on white) // India or. / Speyer (H on white) // Coll. Brenske (P) //.

Additional material examined: 74 specimens.

MYANMAR: BMNH; 1 ♂; Burma. – BMNH; 3 ♂; Birmanie, Theinzeik; P. Lofzeau, 1913. – ISNB; 5 ♂, 10 ♀; same data as previous. – ZMHB; 4 ♂, 20 ♀; same data as previous. – MHNG; 3 ♂, 5 ♀; same data as previous. – HHM; 15 ♀; same data as previous. *EAST INDIES* (generic): MTD; 8 ♀; Ind. Or. [= Indes Orientales, East Indies].

Redescription of the holotype male: *Size* – BL: 17.4 mm, BW: 7.5 mm, BWX: 9 mm, situated at midpoint of elytra. *Color* – Integument light brown; dorsal surface with yellowish scales not aggregated along sides of pronotum and margins of elytra. *Head* – CW/L: 3.1; clypeus with frontal margin straight and lateral convergent; (F/O: 3.6); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.7). *Pronotum* – (PnW/L: 1.9); apical angles and lateral margins flattened, apical angles right and slightly protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without

any visible striae. *Thoracic sterna* – Surface with scales and sparse short white hairs; mesosternum feebly developed (MstL: 0.56 mm) however, visible in lateral view between the mesocoxae (Fig. 17). *Abdomen* – Sternites with uniformly sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with basal tooth vestigial; slender apical tooth as long as middle tooth. *Aedeagus* – Parameres strongly asymmetric with 5 appendices (Figs 53-55).

Variability: BL: 16.5-19 mm. All the males collected in Theinzeik have, in contrast to the type, the antennal club shorter than antennomeres 2-7; however, the parameres have same shape and I consider, for the time being, these specimens conspecific.

Females: BL: 16.5-21 mm; antennal club ovoid, shorter than preceding antennomeres (A2-7/CL: 1.7); generally in the females the scales are white while in males the scales are generally yellowish.

Type locality: The type locality is given as Burma, presently Myanmar.

Distribution: Apart from the type locality, a long series of specimens was collected in Theinzeik, situated (17°4'N, 97°18'E) in Thaton District of the Mon State in southern Myanmar Tenasserim plains.

Remarks: Sharp (1876) thought that the holotype of *Cyphochilus proximus* he described was a female, however it is a male. In the original description of *C. cylindricus* Brenske mentioned only a single female specimen, however, the ZMHB holds two specimens and both labeled as type. I therefore designated as lectotype the female specimen, and the male specimen, despite this is not mentioned in the description, as paralectotype. Moreover, the comparison of the type series shows that *C. cylindricus* is a junior synonym of *C. proximus* that can be readily separated from all other congeners by the unique form of the parameres (Figs 53-55).

Cyphochilus tricolor Waterhouse, 1867

Figs 11, 12, 56-58

Cyphochilus tricolor Waterhouse, 1867: 142.

Cyphochilus vestitus Sharp, 1876: 82. **new synonym**

C. tricolor type material examined: Lectotype by present designation: BMNH; 1 ♂; SIAM: // *C. tricolor*, Waterh. Type (H) // Siam (H) // Type (P on white with red border) // Bowring. 63°47' (P on white) //. (Fig. 12).

C. vestitus type material examined: Holotype: MNHN; 1 ♂; // *Cyphochilus vestitus* / Cambodia Type / D. S. (H on red) // Camb (H) / Mouhot (P) // Ex Musaeo / D. Sharp 1890 (P on white) // Muséum Paris / Coll. R. Oberthur (P on white) // Typus (H on red) //. (Fig. 11).

Additional material examined: 2 specimens.

CAMBODIA: MSNG; 1 ♂; Cambodia.

LAOS: ISNB; 1 ♂; Takek; ex coll. Le Moul.

Description of the lectotype male: *Size* – BL: 13.5 mm, BW: 5.8 mm, BWX: 7.5 mm, situated at midpoint of elytra. *Color* – Integument light brown; dorsal surface with scales densely aggregated along sides of pronotum and margins of elytra; scales are white on discus, ochre on head, sides of pronotum and of elytra and yellowish on the margins of elytra. *Head* – CW/L: 3.2; clypeus largely rounded; (F/O: 5.7); antennal club slightly shorter than antennomeres 2-7 (A2-7/CL: 1.1). *Pronotum* – (PnW/L: 2); apical angles and lateral margins flattened, apical angles right and protuberant; basal lateral margins straight, basal angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum feebly developed (MstL: 0.45 mm) however visible between mesocoxae in lateral view. *Abdomen* – Sternites with uniformly sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with basal tooth vestigial; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres strongly asymmetric with 5 appendices (Figs 56-58).

Variability: BL: 13-14.5 mm.

Females: Unknown.

Type locality: The type locality given on the labels of the lectotype is “Siam”, an old geographical name referable to the territories of Thailand and Cambodia.

Distribution: This species is known from three specimens with generic collection data: Thailand, Cambodia and Laos, the most precise locality being Thakhek in Laos at the border with Thailand (17°24'N 104°48'E).

Remarks: Although it seems that Waterhouse described *C. tricolor* on a single specimen this is unfortunately not explicitly stated. Therefore, I prefer to designate the only available type specimen as the lectotype. *Cyphochilus vestitus* Sharp was explicitly described based on a single specimen, which is hence the holotype. The comparison of these types shows that *C. vestitus* is a junior synonym of *C. tricolor*. The species can be readily separated from all other congeners by the unique conformation of the strongly asymmetric parameres with five appendices (Figs 56-58).

***Cyphochilus hmong* n. sp.**

Figs 21, 74-76

Holotype: MHNG (MHNG-ENTO-81700); 1 ♂; LAOS: // N. [North] Laos, 10.V.97, Louang /

Namtha, leg. M. Strba & / R. Hergovitz (P on yellow // // HOLOTYPUS ♂ / *Cyphochilus* / *hmong mihi* / G. Sabatinelli, 2020 (T on red) //.

Description of the holotype male: *Size* – BL: 18.4 mm, BW: 6.6 mm, BWX: 8.4 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white scales aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.4; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 5.3); frons concave; antennal club longer than antennomeres 2-7 (A2-7/CL: 0.7) (Fig. 21). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical angles and lateral margins largely flattened, apical angles right not protuberant; basal lateral margins straight, basal angles largely rounded. *Elytra* – Without visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales, mesosternum slightly developed anteriorly (MstL: 0.23 mm) however visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth vestigial; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres slightly asymmetric with two apical appendices in addition to the terminal parts of parameres (Figs 74-76).

Etymology: Dedicated to the Hmong people, one of the largest ethnic minority in Laos and presently living in the jungle to escape persecutions.

Type locality: Louang Namtha is the capital of the homonymous Province in northern Laos bordering with Yunnan to the north and Burma to the northwest.

Distribution: The species is known only from one locality in the extreme northwest portion of Laos.

Remarks: *Cyphochilus hmong* can be readily separated from all other congeners by the unique form of the parameres with two apical appendices in addition to the terminal parts.

***Cyphochilus leduthoi* n. sp.**

Figs 68-70, 85

Holotype: MHNG (MHNG-ENTO-81695); 1 ♂, VIETNAM: // North VIETNAM / Tam Dao / 10-20.V.1993 (P) // HOLOTYPUS ♂ / *Cyphochilus* / *leduthoi mihi* / G. Sabatinelli, 2020 (T on red) // (Fig. 85).

Paratype: 18 specimens.

VIETNAM: PCAR; 1 ♂; N. Vietnam, Tam Dao, 400-900 m; 18.IV.2012; leg. Hoa Binh. – MHNG; 8 ♂, 8 ♀; same locality than previous, 29.IV.1991; leg. M. Fujoka & R. Muramoto. – MHNB; 5 ♂; N. Vietnam, Tam Dao, Vinh Phu Prov., 20-28.VI.1990; leg. Jan Strnad.

Description of the holotype male: *Size* – BL: 20 mm, BW: 8.3 mm, BWX: 11.2 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white scales aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 5.5); frons concave; antennal club slightly shorter than antennomeres 2-7 (A2-7/CL: 1.2). *Pronotum* – Transverse (PnW/L: 2.2), strongly

convex; apical angles and lateral margins narrowly flattened, apical angles right, not protuberant; basal lateral margins curved, basal angles largely rounded. *Elytra* – With striae slightly visible among the scales but not elevated. *Thoracic sterna* – Surface with short, white pubescence and scales, mesosternum slightly developed anteriorly (MstL: 0.35 mm) however, visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin



Figs 71-79. Parameres in right, dorsal, and left view. (71-73) *Cyphochilus rohingyae* n. sp., holotype. (74-76) *C. hmong* n. sp., holotype. (77-79) *C. orbachi* n. sp., holotype. – Scale bars = 1 mm.

narrowly reflected. *Legs* – Protibiae tridentate with the basal tooth well developed; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres strongly asymmetric with four appendices (Figs 68-70).

Variability: BL: 18-22.5 mm ($x = 19.8$, $n = 17$).

Females: BL: 19-22.5 mm, BW: 8.7 mm, BWX: 11.5 mm; antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5).

Etymology: Le Đức Thọ was a Vietnamese general, diplomat, politician, and awardee (but refused to accept) of the 1973 Nobel Peace Prize, for his efforts in negotiating between the U.S.A. and Vietnam, the country from where the new species of *Cyphochilus* is described.

Type locality: Tam Dao National Park is a protected area in North Vietnam, about 85 km northwest of Hanoi. Its exact location is at 21°21' to 21°42' North latitude, 105°23' to 105°44' East longitude.

Distribution: *Cyphochilus leduthoi* is known only from specimens collected in Tam Dao. The National Park is based in the Tam Dao range, which is one of the terminal spurs of a larger mountainous area in the Northwest region of Vietnam; it runs 80 km from northwest to south east with altitudes of over 1000 m.

Remarks: This species is morphologically close to *C. orbachi* n. sp. having small body size, elytral striae slightly visible, mesosternum slightly developed and parameres with four appendices. The two species can be readily separated from all other congeners and from each other by the unique form of the parameres strongly asymmetric with four appendices (Figs 68-70).

Cyphochilus orbachi n. sp.

Figs 77-79

Holotype: MHNG (MHNG-ENTO-81696); 1 ♂; VIETNAM: // N. Vietnam, Xuat Hoa / Bac Kan, 22°04.18' N, 105°52.51' E, 336 m / IV.2015; Hoa Binh leg. (P on yellow) // HOLOTYPE ♂ / *Cyphochilus / orbachi mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 16 specimens.

VIETNAM: MHNG; 1 ♂; Tonkin, Baokan; Lemee 1908. – PCAR; 2 ♂; N. Vietnam, Tam Dao, 950 m; 25-28.III.2004; leg. Hoa Binh & Th. Frederking. – MZUF; 1 ♂; Vietnam, Bac Kan prov., Ba Be distr., Ba Be nat. park, 350 m; 8.VI.2011; leg. E. Orbach. – MHNG; 1 ♂; same previous data. – MHNG; 1 ♀; N. Vietnam, Tai Nguyen Prov., Mo Ba, 450 m; 15.V.2012; leg. Hoa Binh. – MHNG; 1 ♂; N. Vietnam, Lao Cai, Taphin, Kreis Sapa; VII-VIII.2011; leg. Hoa Binh. – PCAR; 1 ♂; same data as previous. – MHNG; 1 ♂; N. Vietnam, Xuat Hoa, NE Tam Dao; VII.2012; leg. Hoa Binh. – MHNG; 3 ♂; N. Vietnam, Xuat Hoa, Bac Kan, 22°04.18' N 105°52.51' E,

336 m; IV.2015; leg. Hoa Binh. – PCAR; 4 ♂; same data as previous.

Description of the holotype male: *Size* – BL: 19.3 mm, BW: 8 mm, BWX: 11.2 mm, situated at midpoint of elytra. *Color* – Integument light brown; surface with white-cream scales not aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 3.7); antennal club slightly longer than antennomeres 2-7 (A2-7/CL: 0.9). *Pronotum* – Transverse (PnW/L: 2), strongly convex; apical angles and lateral margins narrowly flattened, apical angles right not protuberant; basal lateral margins curved, basal angles largely rounded. *Elytra* – With striae slightly visible among scales, not elevated. *Thoracic sterna* – Surface with short, white pubescence and scales, mesosternum slightly developed anteriorly (MstL: 0.23 mm) but visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres strongly asymmetric with 4 appendices (Figs 77-79).

Variability: BL: 18-20 mm ($x = 19.7$, $n = 16$).

Females: BL: 19.3 mm, BW: 8 mm, BWX: 11.2 mm, antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5)

Etymology: Eylon Orbach is an Israeli entomologist who collected this new species during some of the expeditions in Vietnam he took part.

Type locality: Bac Kan is a Province in the Northeast part of Vietnam about 240 kilometers northwest of the capital city Hanoi.

Distribution: *Cyphochilus orbachi* is known only from several localities all in the north portion of Vietnam. The holotype and one paratype were collected recently, during an expedition of the Natural History Museum of Florence (Italy), in the Ba Be National Park. The park (about 100 km²) is located in a hilly and mountainous area, surrounded with rivers, set up to protect the Ba Be Lake along with surrounding limestone and lowland evergreen forests.

Remarks: This species is close morphologically to *C. leduthoi* n. sp., having small body size, elytral striae slightly visible, mesosternum slightly developed and parameres with four appendices. The two species can be readily separated from all other congeners and from each other by the unique form of the parameres.

***Cyphochilus reichenbachii* n. sp.**

Figs 62-64

Holotype: MHNG (MHNG-ENTO-81701); 1 ♂; VIETNAM: // North Vietnam, Tam Dao / Vinh huc prov. 1010 m / 21°27.588' N, 105°38.475 E / IV.2014, leg. Hoa Binh (P) // HOLOTYPUS ♂ / *Cyphochilus / reichenbachii mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 32 specimens.

VIETNAM: MHNG; 1 ♂; Tonkin; ach. Baudet. – PCAR; 1 ♂; same data as holotype. – PCAR; 1 ♂; North Vietnam, Tam Dao, 400-900 m; VI-VII.2012; leg. Hoa Binh Nguyen. – PCAR; 2 ♂; North Vietnam, Tam Dao, 400-900 m; 18.VI.2012; leg. Hoa Binh Nguyen. – MHNG; 10 ♂, 1 ♀; North Vietnam, Ta Phin 10 km NNW Sapa, ca. 1700 m; III.2012; leg. Binh Nguen. – PCAR; 15 ♂; same data as previous. – PCDK, 1 ♂, Ha Giang.

Description of the holotype male: *Size* – BL: 19.6 mm, BW: 8.3 mm, BWX: 10.9 mm, situated at midpoint of elytra. *Color.* Integument dark shiny brown; dorsal surface with scattered yellow scales aggregated along lateral part of the body. *Head* – CW/L: 3; anterolateral edges of clypeus rounded, lateral edges of clypeus curved and divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 4.7); antennal club longer than antennomeres 2-7 (A2-7/CL: 0.86). *Pronotum* – Transverse (PnW/L: 2), strongly convex; apical angles and lateral margins flattened, apical angles right, not protuberant; basal lateral margins straight, basal angles obtuse and largely rounded. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.64 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin narrowly reflected. *Legs* – Protibia tridentate with the basal tooth well developed; slender apical tooth longer than the middle one. *Aedeagus* – Parameres strongly asymmetric with four appendices (Figs 62-64).

Variability: BL: 18.5-20.5 mm ($x = 19.5$, $n = 30$).

Females: BL: 18 mm, BW: 7.5 mm, BWX: 10.5 mm; antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5).

Etymology: Andreas Reichenbach (Leipzig, Germany) is a scarabeologist and he provided me with several *Cyphochilus* specimens for study, among them the new species here described.

Distribution: This species is known from several localities in northern part of Vietnam.

Remarks: *Cyphochilus reichenbachii* can be readily separated from all other congeners by the unique shape of the parameres strongly asymmetric with four appendices.

***Cyphochilus rohingyae* n. sp.**

Figs 71-73, 90-91

Holotype: MHNG (MHNG-ENTO-81702); 1 ♂; MALAYASIA: // W. Malaysia, Pahang / Frasier's Hill, ca 1300 m / 17-21.III.1993, light trap / Löbl & Calame, #14 (P) // HOLOTYPUS ♂ / *Cyphochilus / rohingyae mihi* / G. Sabatinelli, 2020 (T on red) // (Fig. 90).

Paratypes: 57 specimens.

MALAYSIA: MHNG; 27 ♂, 16 ♀; Malaysia, Perak State, Taiping; II.1982. – MHNG; 2 ♂, 2 ♀; Malaysia Peninsula, Pahang, Frasier's Hill, 1300 m; 22.III.-1.IV.2013; leg. Azarov. – MHNG; 2 ♂; West Malaysia, Perak, Taiping, Buki Larut (Maxwell Hill); 14.IV.1996; leg. S. Becwar. – ISNB (Fig. 91); 4 ♀; Malaysia, Perak, Taiping; IV.1981. – ZMHB; 3 ♂, 1 ♀; Malaysia, Tenasserim; III.1995; leg. S. Steinke. – PCMN; 3 ♂; Malaysia, Bukit Fraser, 1-5.V.2003; leg. B. Mkovský. – PCDK; 1 ♂, Cameron Highlands.

Description of the holotype male: *Size* – BL: 17.8 mm, BW: 6.9 mm, BWX: 9.24 mm, situated at midpoint of elytra. *Color* – Integument dark shiny brown; dorsal surface with white-silver scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.2; anterolateral edges of clypeus rounded, lateral edges of clypeus curved divergent posteriad; frons large, making eyes relatively small, not prominent (F/O: 4.9); antennal club longer than antennomeres 2-7 (A2-7/CL: 1.7). *Pronotum* – Transverse (PnW/L: 1.9), strongly convex; apical angles and lateral margins flattened, apical angles acute and protuberant; basal lateral margins straight, basal angles obtuse and smooth. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.27 mm) however, visible in lateral view between the mesocoxae. *Abdomen* – Sternites with sparse scales; pygidium convex with apical margin reflected. *Legs* – Protibia bidentate; slender apical tooth longer than the basal tooth. *Aedeagus* – Parameres strongly asymmetric with four appendices (Figs 71-73); the two appendices on the right paramere merged for most of their length.

Variability: BL in males: 15.8-19.2 mm ($x = 17.7$, $n = 34$). *Cyphochilus rohingyae* shows a great variability in the color of scales in males and a strong sexual dimorphism (see below). While the holotype and 52% of male specimens have the integument with white-silver scales (Fig. 90), in the other 48% of specimens the scales are yellow-ochre. Some of specimens with yellow-ochre scales have humeri and scutellum with patches of white scales (Fig. 91).

Females: The females are substantially larger than the males: BL: 19-21.5 mm ($x = 19.5$, $n = 23$); antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.6). All female specimens have dorsal cover of uniform white-silver scales.

Etymology: Dedicated to the Rohingya people, an indigenous ethnic group of western Myanmar who were forced to flee in the recent years to Bangladesh, Malaysia, and Thailand.

Type locality: Fraser's Hill (in Malay: Bukit Fraser) is a hill resort located on the Titiwangsa Ridge in Raub District of Pahang State in West Malaysia; the resort is situated 64.6 miles (104 km) from the national capital city Kuala Lumpur.

Distribution: *Cyphochilus rohingyae* is known from the Pahang and Perak States of Western Malaysia on the west coast of the Malay Peninsula. A large series of specimens was collected in Taiping, the wettest location in Peninsular Malaysia where the high rainfall (ca 4000 mm) has led to a profuse flora and century-old rainforest trees.

Remarks: *Cyphochilus rohingyae*, *C. feae* and *C. proximus* have similar conformation of parameres and they are present in Myanmar and Malaysian Peninsula. They can be readily separated mainly by the different shape of the apical part of the right paramere (Figs 65, 53, 71)

***Cyphochilus zuercheri* n. sp.**

Figs 59-61

Holotype: MHNG (MHNG-ENTO-81699); 1 ♂; THAILAND: // North Thailand / Doi Pui, Chiang Mai / 8.V.1988, leg. F. Ferrero (P) // HOLOTYPE ♂ / *Cyphochilus* / *zuercheri mihi* / G. Sabatinelli, 2020 (T on red) //.

Paratypes: 42 specimens.

THAILAND: NHMB; 14 ♂, 15 ♀; NE Thailand, Mae Hong Son, Ban Huai Po, 800-1600 m; 1-15.[?].1991; leg. S. Bily. – PCMN; 1 ♂, 1 ♀; N Thailand, Chiang Mai Prov., Ban Sampakia, 1400 m; 1-19.V.1998; leg. Ivo Martinů. – MHNG; 1 ♂, 1 ♀; North Thailand, Chiang Mai, 1985; leg. N. Koyama. – MHNG, 2 ♂, 1 ♀; Doi Suthep, V.1985, leg. N. Koyama. – NMPC; 1 ♂, 1 ♀; NW Thailand; Mae Hong Son env., Ban Huai Po, 1800 m; 30.IV.-14.V.1991; leg. Frank Farkač. – NHMB; 1 ♂; same data as previous. – NMPC; 1 ♂, 3 ♀; NW Thailand; Mae Hong Son env., Ban Huai Po, 1600-2000 m; 30.IV.-4.V.1991; leg. J. Horác. – NMPC; 2 ♂, 1 ♀; N Thailand, Chiang Dao, Ban San Pakia, 1200 m; 5-10.V.2004; leg. Sv. Bily. – NMPC; 1 ♂; Central Thailand, PKK Prov., Hua Hin; 13-15.V.2004; leg. Sv. Bily. MYANMAR: BMNH; 1 ♂; Maymyo [Mandalay: Pyin Oo Lwin]; leg. H. L. Andrewes.

Description of the holotype male: *Size* – BL: 18.6 mm, BW: 7.2 mm, BWX: 9.6 mm, situated at midpoint of elytra. *Color.* Integument dark shiny brown; dorsal surface with white scales densely aggregated along the sides of pronotum and margins of elytra. *Head* – CW/L: 3.1; anterolateral edges of clypeus rounded, lateral

edges of clypeus curved divergent posteriad; frons large, making eyes relatively small (F/O: 4.3); antennal club, slightly longer than antennomeres 2-7 (A2-7/CL: 0.6). *Pronotum* – Transverse (PnW/L: 2.2), strongly convex; apical and lateral angles obtuse. *Elytra* – Without any visible striae. *Thoracic sterna* – Surface with short, white pubescence and scales; mesosternum slightly developed anteriorly (MstL: 0.65 mm) however visible between the mesocoxae in lateral view. *Abdomen* – Sternites with sparse scales except the median part of the eight sternite; pygidium convex with apical margin reflected. *Legs* – Protibia tridentate with the basal tooth vestigial; slender apical tooth as long as the middle tooth. *Aedeagus* – Parameres slightly asymmetric, relatively simple in the morphology compared to other *Cyphochilus* (Figs 59-61); the left paramere with a short dorsal process.

Variability: BL: 17-20.5 mm ($x = 19.5$, $n = 35$).

Females: BL: 17.5-19 mm; BW: 7.5; BWX: 10.5; antennal club ovate, shorter than preceding antennomeres (A2-7/CL: 1.5).

Etymology: Isabelle Zürcher-Pfander is the Collection Manager of the NHMB who provided some of the specimens of the new species.

Type locality: Doi Pui hill or Doi Suthep (18°48' N, 98°53' E, 800-1000 m) is part of the Thanon Thong Chai Range, the southernmost subrange of the Shan Highland system in northern Thailand, the hill is located 7 km NNW of Chiang Mai, capital of the homonymous province.

Distribution: Thailand and Myanmar. Most of the specimens of *C. zuercheri* were collected in northeast Thailand in the mountain part of the Doi Suthep-Pui National Park (261 km²). The vegetation below 1000 m of altitude is mostly deciduous forest, with evergreen forest above this elevation. However, the distribution of this species, according to available data, spans from Myanmar in the north to Thai part of Malayan Peninsula (Mandalay Region, Hua Hin District of Prachuap Khiri Khan Province) in the south.

Remarks: *Cyphochilus zuercheri* can be readily separated from all other congeners by the unique shape of the parameres relatively simple and without appendices (Figs 59-61).

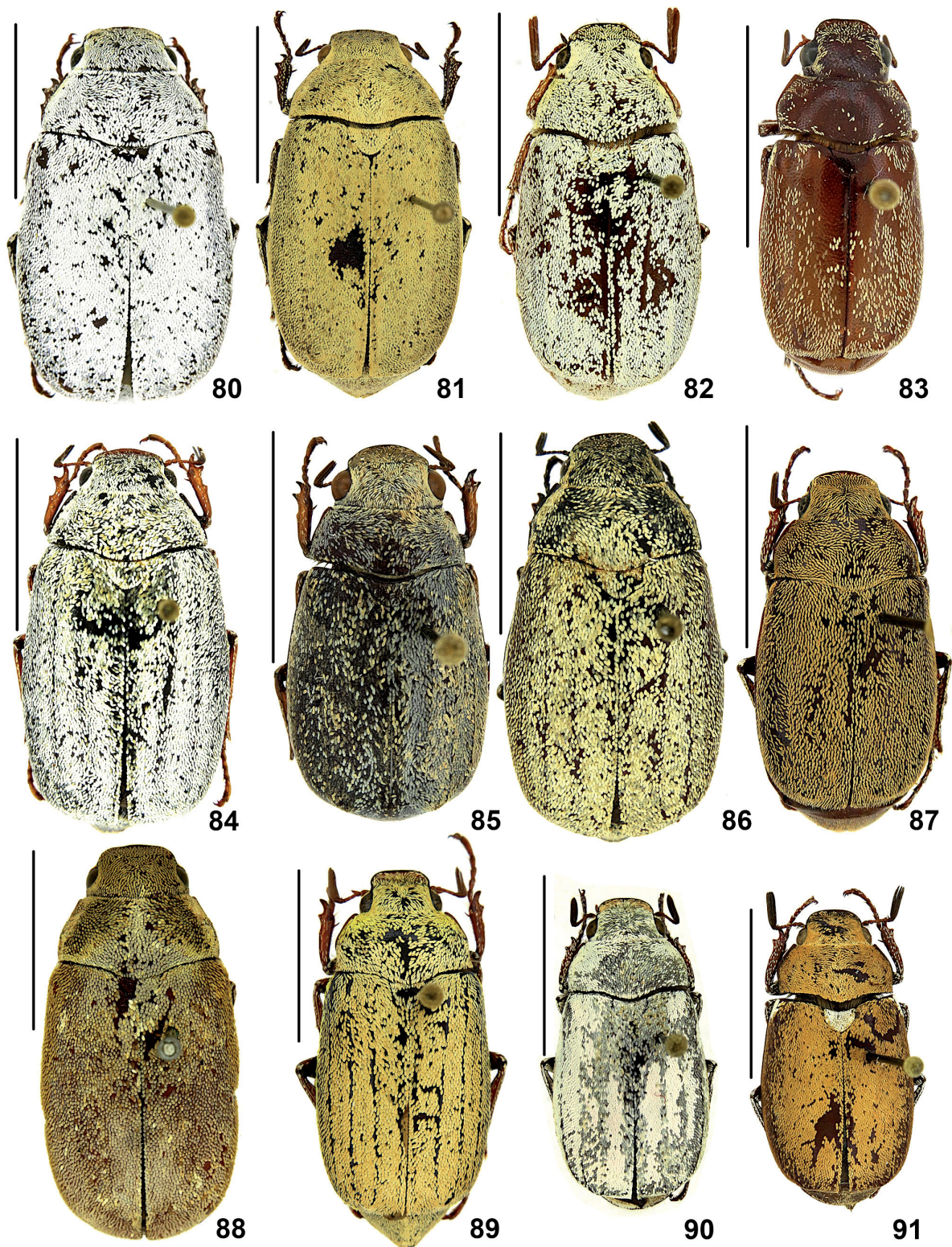
***Cyphochilus* species referable to other genera**

***Dasylepida testaceipes* (Fairmaire, 1902) n. comb.**

Fig. 13

Cyphochilus testaceipes Fairmaire, 1902: 316.

Type material examined: Lectotype by present designation: MNHN; 1 ♀; CHINA: // *Cyphochilus* / *testaceipes* / Fairm China (H) // Foucheou [Fujan: Fou-



Figs 80-91. Habitus. (80) *Cyphochilus candidus* (Olivier, 1789), lectotype ♂ MNHN. (81) *C. candidus* (Olivier, 1789), Nepal: Godavari, ♂ MHNG, yellow scales aberration. (82) *C. carinchebanus* Brenske, 1903, Myanmar: Carin Cheba, ♂ ZMHB. (83) *C. feae* Brenske, 1903, holotype ZMHB. (84) *C. gandhii* n. sp., holotype MHNG. (85) *C. leducthoi* n. sp., holotype MHNG. (86) *C. septentrionalis* Waterhouse, 1867, lectotype BMNH. (87) *C. obscurus* Sharp, 1876, holotype MNHN. (88) *C. sansuukyii* n. sp., paratype ♀ MHNG. (89) *C. peninsularis* Arrow, 1938, paralectotype ♂ MHNG. (90) *C. rohingyae* n. sp., holotype MHNG. (91) *C. rohingyae* n. sp., paratype ♂ MHNG, Malaysia: Perak, bicolor aberration. – Scale bars = 5 mm.

Tcheou] (H) // Type (P on red) // Muséum Paris / 1906 / coll. Leon Fairmaire // (Fig. 13).

Remarks: The type specimen has a symmetrically bilobed clypeus and the body has very few scales and several setae. Therefore, it does not belong to genus *Cyphochilus* but to genus *Dasylepida* Moser, 1913. *Dasylepida testaceipes* is probably a synonym of one of the species described from east China but this needs to be further investigated.

Updated checklist of all known *Cyphochilus* species

apicalis Waterhouse, 1867 – China
candidus (Olivier, 1789, sub *Melolontha*) – “India or.”; Nepal; India: Sikkim, West Bengal, Assam, Meghalaya, Manipur; Myanmar
carinchebanus Brenske, 1903 – Myanmar
costulatus Bates, 1891 – China: Sichuan
crataceus crataceus (Nijima & Matsumura, 1923, sub *Lepidiota*) in Nijima & Kinoshita, 1923 – Taiwan; syn. *C. miwai* Nakabayashi, 1939
crataceus taipeiensis Kobayashi & Yu, 1993 – Taiwan
elongatus Brenske, 1894 – China: Jiujiang
farinosus Waterhouse, 1867 – “North China”
feae Brenske, 1903 – Myanmar
flavomarginatus Frey, 1971 – Laos
gandhii n. sp. – India: West Bengal, Sikkim, Assam, Arunachal Pradesh
hmong n. sp. – Laos
insulanus Moser, 1918 – Taiwan
latus Arrow, 1941 – Myanmar
leducthoi n. sp. – Vietnam
manipurensis Nonfried, 1893 – India: Manipur
marginalis Fairmaire, 1902 – China: Jiangxi
niveosquamosus (Blanchard, 1850) – India: Karnataka
oberthueri Brenske, 1903 – India: Tamil Nadu
obscurus Sharp, 1876 – Thailand, Laos
ochraceus Moser, 1915 – China: Shandong
orbachi n. sp. – Vietnam
peninsularis Arrow, 1938 – Thailand
podicalis Moser, 1908 – Vietnam
proximus Sharp, 1876 – Myanmar, syn. *C. cylindricus* Brenske, 1903
reichenbachi n. sp. – Vietnam
rohingyae n. sp. – Malaysia
sansuukyii n. sp. – Myanmar
satyarthii n. sp. – India: Sikkim, West Bengal
septentrionalis Waterhouse, 1867 – India: Uttar Pradesh, Sikkim, Assam; Meghalaya, West Bengal, Nagaland; Bangladesh; Nepal (?); syn. *pygidialis* Nonfried, 1893
tenzingyatsoi n. sp. – China: Tibet
tonkinensis Brenske, 1903 – Vietnam
tricolor Waterhouse, 1867 – Thailand, Laos; Cambodia syn. *C. vestitus* Sharp, 1876
unidentatus Nomura, 1977 – Taiwan

ventriglaber Brenske, 1903 – Vietnam
ventrictus Brenske, 1903 – Vietnam;
 syn. *C. ochraceosquamosus* Moser, 1908
waterhousei Brenske, 1903 – “South India”
zuercheri n. sp. – Thailand; Myanmar

ACKNOWLEDGMENTS

I would like to thank the following curators of the Museums and Colleagues for the loan of the specimens and for their patience with my requests: Maxwell V.L. Barclay and Dmitry Telnov (BMNH), Luca Bartolozzi (MZUF), Ales Bezděk (Branisovska, Czech Republic), Ben Brugge and Wendy Bohemen (ZMAN), Konjev Desender, Marcel Cludts and Alain Drumont (ISNB), Jiří Hájek (NMPC), Per Lindskog (NHRS), Ottó Merkl (HNHM), Olivier Montreuil (MNHN), Milan Nikodým (Prague, Czech Republic), Roberto Poggi (MSNG), Andreas Reichenbach (Leipzig, Germany), Harald Schillhammer and the late Heinrich Schönmann (NHMW), Manfred Uhlig, Joachim Schulze, Johannes Frisch and Bernd Jaeger (ZMHB), Isabelle Zuercher and Christoph Germann (NHMB). Special thanks to Giulio Cuccodoro for the use of the technical equipment of MHNG and for his advices on taxonomical issues, to Peter Schuchert (MHNG), David Carlson (U.S.A.), Denis Keith (Chartres, France) and Stefano Ziani (Geol@b, Faenza, Italy) for reviewing the text.

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