DESCRIPTION OF THE NEW GENUS *DEDALOPTERUS* AND NOTES ON GENUS *MALAISIUS* ARROW AND *CYPHOCHILUS* WATERHOUSE (Coleoptera, Scarabaeoidea, Melolonthidae)

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Résumé. Dans le présent travail le genre *Malaisius* Arrow, 1941 est revisé. Quatre taxa qui ont été attribués par le passé, à ce genre, sont maintenant transférés dans le nouveau genre *Dedalopterus* décrit dans le présent travail. Une analyse des affinités morphologiques entre les genres *Malaisius*, *Dedalopterus* et *Cyphochilus* Waterhouse a été effectuée. Le genre *Dedalopterus* comprend actuellement six espèces: *D. signatus* (Moser, 1908) comb. nova, *D. intermedius* (Zhang, 1990) comb. nova, *D. melanodiscus* (Zhang, 1990) comb. nova, *D. fujianensis* (Zhang, 1990) comb. nova, *D. pulchellus* n. sp. (du Laos) et *D. itohi* n. sp. (du Szechwan, China). Les espèces du genre sont distribuées dans la partie septentrionale de la Région Orientale, avec quelques taxa à la limite de la Région Paléarctique. Les différences entre les espèces du genre sont analysées en détail. Une clé d'identification des genres *Malaisius*, *Dedalopterus* et *Cyphochilus* par rapport aux 57 plus importants genres paléarctiques des Melolonthidae, ainsi qu'une clé d'identification des six espèces appartenant au genre *Dedalopterus*, sont également présentées.

Summary. In the present work we revised the genus *Malaisius* Arrow, 1941. Four taxa attributed, in the past, to this genus are transferred to the new genus *Dedalopterus* here described. An analysis of the morphological affinities of the genere *Malaisius*, *Dedalopterus* and *Cyphochilus* Waterhouse is performed. The genus *Dedalopterus* actually includes six species *D. signatus* (Moser, 1908) comb. nova, *D. intermedius* (Zhang, 1990) comb. nova, *D. melanodiscus* (Zhang, 1990) comb. nova, *D. fujianensis* (Zhang, 1990) comb. nova, *D. pulchellus* n. sp. (from Laos) et *D. itohi* n. sp. (from Szechwan, China). The species of the new genus are distributed in the North of Oriental Region with some taxa that cross the border of the Palaearctic Region (China). Identification keys to the genera *Malaisius*, *Dedalopterus* and *Cyphochilus* among the 57 main genera of palaearctic Melolonthidae, and to the six species of the genus *Dedalopterus* are provided.

ARROW (1941) described the genus *Malaisius* from specimens collected in Burma, during a Swedish expedition, by R. Malaise. Up to 1990 the one and only species of this genus was *M. mollis* Arrow, 1941. Recently, Zhang (1991), described for the genus *Malaisius*, four new species from Sud-West China (Yunnan, Shuicheng and Fujian): *M. pinae*, *M. intermedius*, *M. melanodiscus* and *M. fujianensis*. On the framework of a revision of the genus *Cyphochilus* Waterhouse, 1867, we could study many specimens that are as in different European Museums as sent us from Italian and Japanese colleagues. In this stock are present specimens of *Malaisius* sensu Zhang. Since Zhang didn't transferred, in his work, the edeagus of *M. mollis* we suppose that he didn't examined any specimen of this species. For a better knowledge of the morphological affinities with *M. mollis*, we examined the typical series of this species, preserved in the "Naturhistoriska Riksmuseet" of Stockholm (Sweden). The study shows that *M. mollis* is very differentiated both from the species of genus *Cyphochilus* and from the species described by Zhang in the *Malaisius* genus. Obviously we are in presence of three phyletic genus-groups. In this work we describe a new genus to which belong 6 species of which 2 new for the science.

The morphological differences between genus *Malaisius* and *Cyphochilus* are analysed and a key is provided for identification of genus *Malaisius*, *Dedalopterus* and *Cyphochilus* as regards as the following main genera of palaearctic Melolonthidae: *Achranoxia* Kraatz, 1888, *Adoretops* Kraatz, 1883, *Amphimallina* Reitter, 1905, *Amphimallon* Berthold, 1827, *Anoxia* Castelnau, 1832, *Apogonia* Kirby, 1818,

Brachyllus Brenske, 1896, *Brahmina* Blanchard, 1850, *Butozania* Miksic, 1955, *Chilotrogus* Reitter, 1905, *Chioneosoma* Kraatz, 1891, *Chryphaeobius* Kraatz, 1882, *Cryptotrogus* Kraatz, 1888, *Cyphonotus* Ficher, 1823-24, *Cyphonoxia* Reitter, 1869, *Dasylepida* Moser, 1913, *Dasytrogus* Reitter, 1902, *Eriotrogus* Reitter, 1902, *Euranoxia* Semenov, 1890, *Exolontha* Reitter, 1902, *Geotrogus* Guerin, 1842, *Gnaphalostetha* Reiche, 1856, *Haplidia* Hope, 1837, *Heptophylla* Motschulsky, 1857, *Hexataenius* Fairmaire, 1891, *Hilyotrogus* Fairmaire, 1886, *Holochelus* Reitter, 1889, *Holotrichia* Hope, 1837, *Hoplosternus* Guérin, 1838, *Lachnota* Reitter, 1889, *Lasiexis* Semenov & Medvedev, 1936 *Lasiopsis* Erichson, 1847, *Madotrogus* Reitter, 1902, *Melolontha* Fabricius, 1775, *Metabolus* Fairmaire, 1887, *Microphylla* Kraatz, 1890, *Miltotrogus* Reitter, 1902, *Miridiba* Reitter, 1902, *Monotropus* Erichson, 1848, *Ochranoxia* Kraatz, 1888, *Oligophylla* Kraatz, 1894, *Onychosophrops* Frey, 1972, *Panotrogus* Reitter, 1902, *Pectinichelus* Ballion, 1871, *Pollaplonyx* Waterhouse, 1875, *Polyphylla* Harris, 1842, *Pseudoapterogyna* Escalera, 1914, *Pseudolontha* Fairmaire, 1897, *Pseudotrematodes* du Val, 1860, *Rhizotrogus* Berthold, 1827, *Schismatocera* des Cottes, 1872, *Schizonycha* Blanchard, 1845, *Sophrops* Fairmaire, 1887, *Sphodroxia* Kraatz, 1890, *Stenosophrops* Nomura, 1977, *Toxospathius* Fairmaire, 1878, *Trematodes* Faldermann, 1835.

Malaisius Arrow, 1941

Type species: *Malaisius mollis* Arrow.

Derivatio nominis. The genus was dedicated to R. Malaise who collected the specimens of *M. mollis* during a Swedish expedition to Burma.

Diagnosis

The diagnostic characters of the genus *Malaisius* getting a difference of 70% with the genera *Dedalopterus* and *Cyphochilus* are the following: upper surface of the body with short hairs and teguments of the elytra dark-brown (fig. 20); elytra enlarged distally; eyes very large and prominent; apical segment of maxillary palps narrow and long, without any callus or excavation on its outer surface; prothorax short and very transverse with lateral margin regularly curved; pygidium transverse and with large ventral surface; base of claws large; paramera almost symmetric and bilobate (figs 1, 8).

Description

The original description is the following: "Corpus molle, supra squamis setiformibus minutis parce inspersum. Pedes graciles, tibiis posterioribus postice parum dilatatis, unguibus ante medium breviter dentatis. Antennae 10-articulatae, clava triphylla. Oculi magni, clypeus parvus, rotundatui. Labrum symmetricum, medio impressum. Mandibula brevis, apice haud producta. Maxilla brevissima, acute dentata, palpis gracilibus. Prothorax brevis, angulis omnibus rotundatis. Mesosternum haud productum."

Until today only male specimen are known. Among palaearctic Melolonthidae the genus *Malaisius* can be defined by the following characters. Teguments dark-brown; upper surface of body hairy, not pruinose neither sericeus neither dull; pygidium and abdomen without metallic shine. Antenna 10-segmented; antennal club 3-segmented (male), more than twice as long as footstalk; footstalk with third and fourth segment subequal. Claws in males large at base (fig. 14), not clef at apex, with median tooth beneath and lower margin simple; outer and inner teeth subequal. Apical segment of maxillary palps narrow, not excavated. Labrum symmetric, sinuate. Mentum narrow, with a Y-shaped carina (fig. 16). Clypeus semi-circular not very large, laterally continuous with canthus, concave and separated from the front by a suture. Front flat, with lateral margin near the eyes not elevated; vertex flat. Eyes large and very prominent. Anterior and posterior margins of pronotum not margined; posterior margin

without erect setae; lateral margins simple, not serrated; lateral and anterior margin glabrous. Elytrae with 4 elevated costae in addition to the sutural one; elytrae sparsely pilose. Pygidium rounded with large ventral surface. Mesosternum not produced between the middle coxae. Metasternum densely covered with long hairs; shining; metepisternum narrow, more than three times as long as its breadth, metepimera small. Abdominal sternites not densely clothed (the teguments are visible); laterally without white spots; connate with sutures absent in middle; 6th abdominal sternite not retracting under the 5th sternite; last spiracle site on suture between fifth visible abdominal sternite and the propygidium. Anterior coxae transverse, not prominent. Median femurs in males not enlarged neither sticking out laterally from the body very much. Anterior tibiae in males 3-dentate, with spurs located in front of hollow between basal and median tooth; external margin of protibiae not transparent. Hind and middle tibiae without a complete carina across each tibia (only a tubercle is present); dorsal margin of hind tibiae without teeth or spines, with a fine carina longitudinal. Tarsomera slender and long, sparsely pilose beneath; first segment of hind tarsi subequal to the second; wings in males developed as well omeral callus. Posterior coxae not close to the median coxae. Paramera nearly symmetric bilobate at apex, endophallus membranous.

Remarks

Zhang (1990) described 4 species under the genus *Malaisius*: *M. pinae*, *M. intermedius*, *M. melanodiscus* and *M. fujianensis*. The study of the type series of the type species of this genus (*M. mollis*) shows that the four species described by Zhang belong to a different genus here described. Presently only one species belongs to the genus *Malaisius*.

Distribution

The distribution of this monospecific genus is presently restricted to North-East of Burma.

Malaisius mollis Arrow, 1941

Arkiv för zoologi. 33 A: 5.

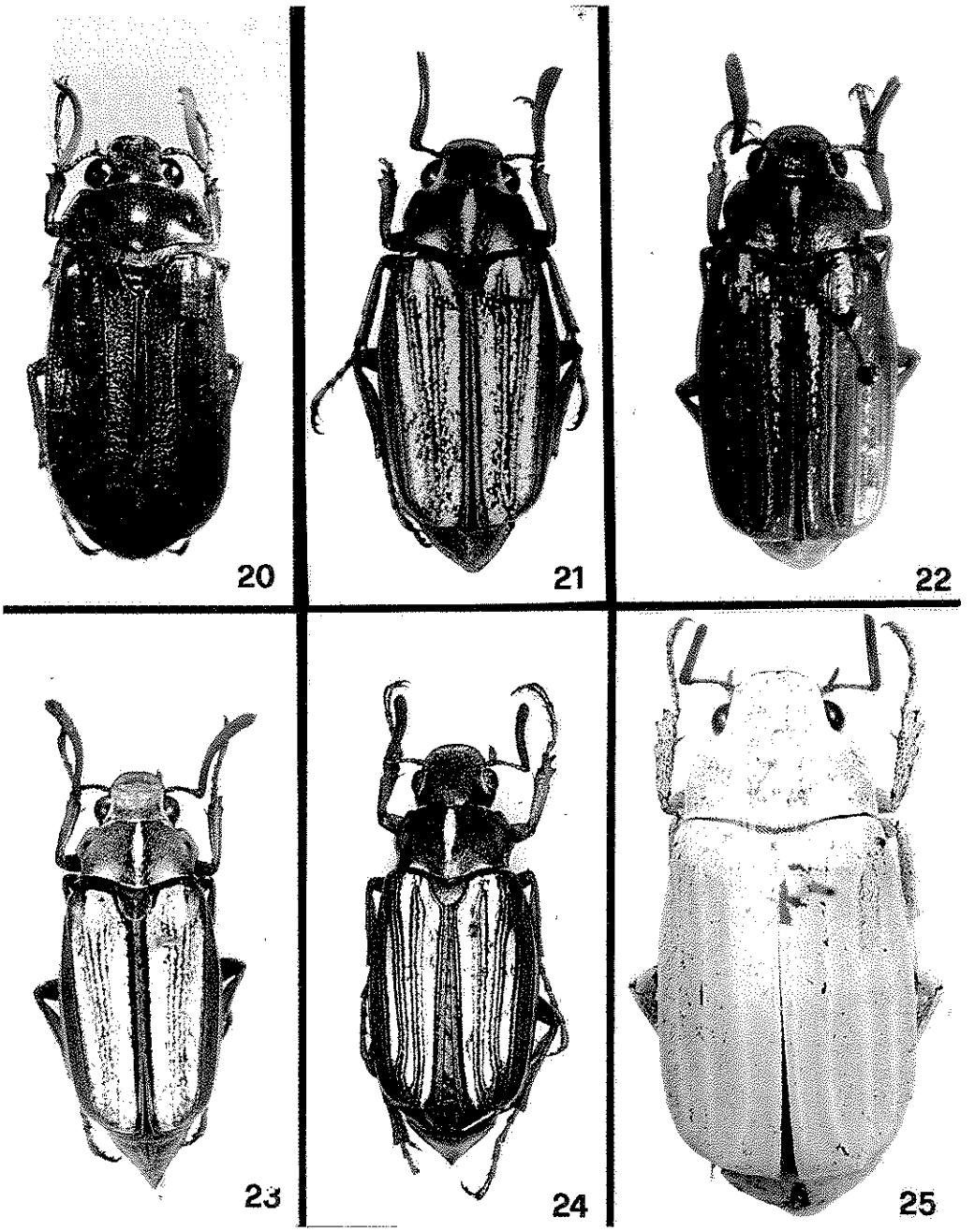
Material examined: NE Burma, Kambaiti, 7000 ft, 2.VI.1934, R.Malaise, 1 Paratypus; N.E.Burma, Kambaiti, 7000 ft, 4-8.VI.1934, R.Malaise 1 Paratypus; without labels with collecting records, 1 Paratypus. The typical series is preserved in the "Naturhistioriska Riksmuseet" in Stockholm, Sweden.

Diagnosis

With the respect to the *Dedalopterus* and *Cyphochilus* species, the diagnostic description of *Malaisius mollis* getting a difference of 70% for the characters considered is the following: upper surface of the body with short hairs (fig. 20); teguments of the elytra dark-brown; elytra enlarged distally; eyes very large and prominent; apical segment of maxillary palp narrow and long, without any callus or excavation on its outer surface; labrum weakly sinuate with central part scarcely narrowed; prothorax short and very transverse with lateral margin regularly curved; pygidium transverse and with large ventral surface; claws long with a large base; paramera almost symmetric and bilobate (figs. 1, 8).

Description

The original description is the following: "Fusco-brunneus, capite pronotoque plerumque fere nigris, corpore supra squamis minutis albidis sparsuto, pectore sat longe rufo-villoso; elongata, parum convexa, capite et pronoto aequaliter sat fortiter punctatis, punctis squamiferis, clypeo brevi, margine antico reflexo, medio vix exciso; pronoto brevi, lateribus valde arcuatis, angulis anticii et posticis fere obsoletis, basi leviter trisinuato; scutello brevi, rotundato, minute punctato, punctis setiferis; elytris alutaceis, singulo anguste 5-costatis, setis brevibus raris, postice longioribus et magis numerosis; pygidio parce villoso, postice rotundato, paulo inflexo: [male] clava antennali longissima. Long. 19-22 mm.; lat. max. 9-10 mm." Seven examples all males examined.



Figs. 20-25. *Malaisius mollis* Arrow (22 mm) (20), *Dedalopterus signatus* ssp.2 (20 mm) (21), *D. signatus* Moser (Type; 18.5 mm) (22), *D. pulchellus* n. sp. (23 mm) (23), *D. itohi* n. sp. (22.5mm) (24), *Cyphochilus niveosquamosus* Olivier (26.5 mm) (25).

Arrow included also the following remarks: "The peculiarities of this insect are so many that the institution for it of a new genus appears to be inevitable. The most obvious characteristic is the softness of the exterior, which has produced, not only more or less collapse of the abdomen in all specimens, but some loss of shape in the elytra of most. As the 7 specimens were not all taken together this can not be regarded as accidental. The exiguous clothing of the upper surface is also very exceptional in the group to which she insect belongs. The fairly large punctures each contain a scale, but the scales are so minute as to become apparent only when magnified, the surface appearing smooth and shining to the eye. The enlargement of the eyes and consequent reduction of the clypeus and mouth may perhaps be distinctive of the male. The female is unknown. The 3-jointed club of the male antenna is very long, nearly twice as long as the footstalk, of which joints 3 to 5 are nearly equal and 6 and 7 very short. The organs of the mouth are not unlike those of *Cyphochilus*, with the important exception that the labrum is symmetrical and not very deeply impressed in the middle. They are more feebly chitinised, the mandible is not produced at the tip, the molar surface is small and weakly ridged, the maxillae are short, sharply but not stoutly toothed, with the palpi very slender. The legs are very slender, the front tibia tridentate, the middle and hind tibiae very slightly dilated at the end, with slender spurs, the hind metatarsus not longer than the succeeding joint, the claws dilated at the base, with a short sharp vertical tooth behind the middle. The mesosternum forms a thin lamina between the middle coxae and there is no trace of sternal process. The pronotum is very short and both front and hind angles are very blunt and rounded. The elytra are moderately long and each bears 5 sharply-elevated narrow costae, the first at the sutural margin. The pygidium is transverse, rounded at the posterior end with a short ventral surface. The metasternum is rather closely clothed with long reddish hairs and the femora, and hind coxae have a similar clothing."

Distribution

The species is known only from the type series collected in the North-East of Burma near the border with Yunnan a locality (Kambaiti) located at 2,300 m of altitude, The specimens were collected at the beginning of June.

Cyphochilus Waterhouse, 1867

Type species: *Cyphochilus candidus* (Olivier, 1789, *Melolontha*).

Derivatio nominis. The name is derived from the following greek words: χιφο =devided; χειλο = lip.

Diagnosis

With the respect to the *Dedalopterus* and *Malaisius* genera, the diagnostic description of genus *Cyphochilus* getting a difference of 70% for the characters considered, is the following: elytra with scales uniformly distributed (fig. 25); apical segment of maxillary palps narrow and long, without any callus or excavation on its outer surface; labrum asymmetric; lateral margin of the prothorax regularly curved; claws long and with large base; paramera strongly asymmetric, bilobate or simple.

Description

The original description is the following: "Mentum broader than long, very little contracted in front, bitruncate at the apex, the truncatures being unequal, and forming a very obtuse angle on the margin, which is nearer to the left than the right side of the mentum; the two ridges rising near the insertion of the palpi, meeting near the front margin, form an obtuse angle. Maxille short, truncate at the apex, and divided into three unequal lobes. Mandibles very short, curved, and acuminated. Labrum divided by a notch into two unequal lobes; one being dentiform, projecting and bending towards the

other, which is rounded. Clypeus rounded in front, or truncate, with the angles rounded, distinctly separated from the head by a transverse line. Eyes prominent. Antennae 10-jointed. Anterior tibiae bi- or tri-dentate; the four posterior without any evident notch or tooth. Claws strongly toothed. The upper surface of the insect densely covered with scales. The species of this genus have hitherto been confounded with *Leucopholis*."

Among palaearctic Melolonthidae the genus *Cyphochilus* is defined by the following characters. Teguments brown to entirely black; upper surface of body clothed with scales not forming white spots neither stripes; pygidium and abdomen without metallic reflex. Antenna 10-segmented; antennal club in males and females 3-segmented; antennal club in males large, longer than footstalk but not more than twice as long as footstalk; footstalk in males with third and fourth segments subequal. Claws large at base (fig. 14), not clef at apex with a basal tooth beneath, lower margin simple; outer and inner teeth subequal. Dorsal margin of the claws uniformely curved. Apical segment of maxillary palp narrow, not excavated. Labrum not transverse, deeply sinuate, strongly asymmetric. Mentum transverse, with a Y-shaped carina (fig. 18). Clypeus semi-circular, not very large, laterally continous with the canthus, flat or concave and separated from the front by a suture. Front flat, with lateral margin near the eyes not elevated. Vertex flat. Prothorax transverse with lateral margin regularly curved, simple, not serrated, without erect setae; anterior and posterior margin not margined; posterior margin without erect setae. Elytrae with 4 elevated costae in addition to the sutural one or completely without costae. Pygidium rouded or triangular, in the males without any tubercle. Mesosternum not produced or produced between the middle coxae; metasternum densely covered with long hairs, shining; metepisternum narrow, more than three times as long as its breadth with metepimera small. Abdominal sternites clothed with scales, laterally without white spots; abdominal sternites connate with sutures absent in middle; 6th abdominal sternite not retracting under the 5th sternite; last spiracle site on suture between fifth visible abdominal sternite and propygidium. Anterior coxae transverse, not prominent; median femurs in males not enlarged; neither sticking out laterally from the 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 a complete carina across each tibia (a tubercle is present externally); dorsal margin of hind tibiae without teeth or spines. Tarsomera thick and short, sparsely pilose beneath; first segment of hind tarsi subequal or shorter than the second. Wings in males and females developed as well omeral callus. Posterior coxae not close to the median coxae in both sexes. Paramera strongly asymmetric bilobate or simple; endophallus membranous.

Remarks

Presently 35 species belong to this the genus. A revision of the genus was recently undertaken by the Authors.

Distribution

The species of the genus *Cyphochilus* are distributed in Hindo and Oriental regions with extension to Himalayan sub-region.

Dedalopterus n. gen.

Type species: *Dedalopterus signatus* (Moser, 1908, *Cyphochilus*)
Derivatio nominis. The name derives from the following greek words:δαιδαλεος = elegant; πτερον = wing.

Diagnosis

With the respect to the *Cyphochilus* and *Malaisius* genera, the diagnostic description of genus *Dedalopterus* getting a difference of 70% for the characters

considered, is the following: elytra with scales forming stripes or white spots (figs. 21-24); eyes large but not very prominent; mentum large, flat, without any carina; apical segment of maxillary palp oval-shaped with pointed apex; lateral margin of the prothorax deeply sinuate near the posterior angles; pygidium not transverse, with narrow ventral surface; paramera asymmetric; claws long and with narrow base; paramera asymmetric and simple, not bilobate (figs. 2-7, 9-12).

Description

Teguments light-brown to dark-brown; upper surface of body with scales forming stripes or white spots on the elytra; pygidium and abdomen without metallic shine. Antenna 10-segmented; antennal club in males and female 3-segmented; antennal club in males large, longer than footstalk, not more than twice as long as footstalk or more than twice as long as footstalk; footstalk in males with third and fourth segments subequal. Claws narrow at base (fig. 14), in females and males not clef at apex, with a median vertical tooth beneath, lower margin simple; outer and inner teeth subequal. Apical segment of maxillary palp oval, not excavated but in some species with large callus. Labrum not transverse, sinuate, symmetric. Mentum large, flat, without any carina (fig. 17). Clypeus semi-circular or bubtrapezious, not very large, laterally continous with the canthus, flat, without a carina before front suture and separated from the front by a suture. Front flat or depressed, without transverse carina. Vertex flat, not carinate. Eyes large but not very prominent. Anterior and posterior margins of pronotum not margined, without erect setae; anterior margin of pronotum glabrous; lateral margin of the pronotum deeply sinuate near the posterior angles, simple, not serrated. Elytrae with 4 elevated costae in addition to the sutural one, bearing scales grouped in longitudinal stripes. Pygidium triangular with tip more or less tipped. Mesosternum not produced between the middle coxae; metasternum densely covered with long hairs; metasternum shining; metepisternum narrow, more than three times as long as its breadth, metepimera small; metepisternum surface at the same level that the surface of the metepimera. Abdominal sternites not densely clothed without white spots on each side; connate with sutures fine or absent in middle; 6th abdominal sternite not retracting under the 5th sternite; last spiracle site on suture between 5th visible abdominal sternite and propygidium. Anterior coxae transverse, not prominent; posterior coxae not close to the median coxae in both sexes. Median femurs in males not enlarged neither sticking out laterally from the body very much. Anterior tibiae in males 2-3-dentate, with spurs located proximad of basal tooth or located in front of hollow between basal and median tooth; anterior tibiae in females 3-dentate with spurs; apical spurs of hind tibiae spine-like, not enlarged. External margin of protibiae not transparent; hind and middle tibiae in both sexes without a complete carina across each tibia (with a lateral tubercle); dorsal margin of hind tibiae without teeth or spines. Tarsomera thick and short, sparsely pilose beneath; first segment of hind tarsi subequal or shorter than second. Wings in males and females developed as well omeral callus. Paramera long, simple, asymmetric with left paramere bigger than the right (figs. 2-7, 9-12).

Remarks

This genus includes one species described by Moser (1908) in *Cyphochilus*, four described by Zhang (1990) in the genus *Malaisius* and two new species here described. The lack of specimens in the old collection or collected in recent researches is astonishing. This rarety of species is, probably, for their short phenology or for an extremely trophic specialization. Except *D. signatus*, likely the most primitive taxon, the other species have a spot distribution. Further, *D. signatus* shows morphological differences in the populations that are very difficult to interpret because of scarcety of material.

Distribution

The distribution of the genus is composed by a cluster of species present in Yunnan (China) and Northern parts of Thailand and Laos, and by two isolated spots of species from Szechwan (China) and Fujian (China).

Dedalopterus signatus (Moser, 1908) combinatio nova

Cyphochilus signatus Moser, 1908, Ann. Soc. ent. Belgique, 52: 356.
Malaisius pinae Zhang, 1990, Acta zootaxonomica sinica, 15: 189. **Syn. nova**

Material examined: Typus, China, Yunnan ("Museum fur Naturkunde der Humboldt-Universität", Berlin, Germany); China, Yunnan, 1 ex. *Cyphochilus signatus* det. Moser ("Museum fur Naturkunde der Humboldt-Universität", Berlin, Germany); North Thailand, Doi Pah Hom Poke, 1200 m, Mae Eye, North Chiang Mai. 3.V.1991, P. Ek-Amnuay, 1 ex. (collection T. Itoh, Hyôgo, Japan); North Thailand, Doi Pah Hom Poke, 1200 m, Mae Eye, North Chiang Mai. 23.V.1991, P. Ek-Amnuay, 1 ex. (collection T. Itoh, Hyôgo, Japan); North Thailand, Chiang Mai, Samoeng, 23.VI.1991, F. Ferrero leg., 1 ex. (collection G. Sabatinelli, Rome, Italy).

Diagnosis

Body length of male: 18-20 mm. Teguments of the elytra light-brown to yellow (fig. 22). Elytra with narrow white scales outlining stripes, space between elytral costae with few scales; first and second costae of the elytra each with 2 lateral stripes of narrow yellowish scales jointed at the apex. Head densely punctured. Frontal depression shallowly. Antennal club more than twice as long as footstalk. Footstalk with 3rd-5th segment shorter than wide. Apical segment of maxillary palps with a small callus on its outer surface. Labrum weakly sinuate with central part scarcely narrow. Front tibiae 3-toothed; claws with vertical tooth site nearly the middle. Paramera curved and small, without strong longitudinal carina in the basal half (figs. 2, 9).

Remarks

The above diagnosis is referred to the typus of *D. signatus* (fig. 22) preserved into "Museum fur Naturkunde der Humboldt-Universität" of Berlin (Germany). We could not study the holotype of *Malaisius pinae* Zhang, 1990, nevertheless the edeagus shape of this species illustrated in the description is almost identical to the edeagus of *D. signatus* type specimen. Since Zhang did not mentioned *D. signatus* in his work, the two species could be synonyms. In any case the taxon described by Zhang belong to the *Dedalopterus* genus. Zhang indicated *Pinus yunnanensis* as host plant for *D. pinae*.

We could study three specimens collected from North Thailand and they appear quite different from typical series of *D. singatus* as well from *D. intermedius*. In the *D. signatus* and *intermedius* group there are the following common characters: space between elytral costae with few scales, head densely punctured, footstalk with 3rd-5th segment shorter than wide; labrum weakly sinuate with central part scarcely narrow; first and second costae of the elytra each with 2 lateral stripes of narrow yellowish scales; protibiae 3-toothed. In the specimens from Thailand we observed these alternative characters: space between elytral costae with many scales, head sparsely punctured, footstalk with 3rd-5th segments longer than wide; labrum deeply sinuate with central part very narrow; first and second costae of the elytra each with 2 lateral stripes of large yellowish scales; protibiae 2-toothed.

The specimens, collected from two localities from Thailand, show also some morphological differences both in the exoskeleton and in the aedeagus. In the two specimens from Doi Pah Hom Poke, the frontal depression is shallowly, the first and second costae of the elytra are jointed at the apex and the paramera are rather curved, while in the single specimen from Samoeng (fig. 21), the frontal depression is absent, the first and second costae of the elytra are jointed about at the middle length of the elytra and the paramera are rather straight.

Probably we are facing to a complex of species to which also *D. intermedius* belongs. At this stage, on the base of the scarce material available, it seems not possible to interpretate the differences observed. In the key to the species of *Dedalopterus* genus, the specimens from Thailand were temporarily indicated as *D. signatus* ssp.1 and ssp. 2.

Distribution

Typus and the other specimens we examined, identified by Moser as *Cyphochilus signatus*, were collected generically from Yunnan. The species seems quite widespread in Yunnan where it is recorded as *D. pinae* (Zhang 1990) from: Wuyi of

Mile County (type), Liude of Yongsheng County, Huaping County, Baishui of Zhanyi County, Yongreen County, Tangtang of Xuanwei County, Kunmin.

Three specimens collected from North Thailand were temporarily attributed to this species (fig. 19).

Dedalopterus intermedius (Zhang, 1990) **combinatio nova**

Malaisius intermedius Zhang 1990, Acta Zootaxonomica sinica, 15: 190.

Material examined: Yunnan, L.M. Comby 1913, 2 exx. ("Institut Royal des Sciences Naturelles de Belgique", Bruxelles, Belgium); Sud Yunnan, Tche-Ping-Tcheou, 1 ex. ("Institut Royal des Sciences Naturelles de Belgique", Bruxelles, Belgium).

Diagnosis

Body length of male: 20 mm. Teguments of the elytra light-brown to yellow. Elytra with narrow white scales outlining stripes, space between elytral costae with few scales; first and second costae of the elytra each with 2 lateral stripes of narrow yellowish scales jointed at the apex. Head densely punctured. Frontal depression shallowly. Footstalk with 3rd-5th segment shorter than wide. Apical segment of maxillary palps with a small callus on its outer surface. Labrum weakly sinuate with central part scarcely narrow. Front tibiae 3-toothed, the basal tooth small; claws with vertical tooth site nearly the middle. Paramera straight and large with strong longitudinal carina in the basal half (figs. 2, 12).

Remarks

This species is very close to *D. signatus* from which it can be differentiated by the different shape of paramera. The paramera *D. signatus* appears more straight and bigger (figs. 3, 9) than the paramera of *D. intermedius* (figs. 2, 12). Zhang differentiated *D. intermedius* from *D. pinae* having: "two dorsal costae of elytra sudbdivided into three respectively, clypeus longer and broad, parameres narrower and shorter obviousely [sic]".

Distribution

We studied only three specimens of this species collected from South Yunnan. The single specimen described by Zhang as *D. intermedius* was collected also from Yunnan (Caojian of Yunlong County).

Dedalopterus melanodiscus (Zhang, 1990) **combinatio nova**

Malaisius melanodiscus Zhang 1990, Acta Zootaxonomica sinica, 15: 191.

Diagnosis

We could not examine any specimen of this species. The diagnosis (in english) provided by Zhang (1990) for the holotype male is the following: "Body length: 20 mm; width: 8 5 mm. Resembles to [...] *Malaisius fujianensis*, but distinguished by the upper surface of head, elytron and 1-5 sterna of abdomen dark brown, ultimate segment of maxipalp with a large callus distinctely, and parameres of male genitalia long and rather straight (left front leg and right hind leg are incomplete)."

Using the diagnostic characters selected for the *Dedalopterus* species, the diagnosis can be the follow: teguments of the elytra dark-brown; elytra with white scales outlining stripes on the elytra; first and second costae of the elytra each with 2 lateral stripes of yellowish scales jointed at the apex; frontal depression shallowly; antennal club nearly twice as long as footstalk; apical segment of maxillary palp oval-shaped with pointed apex with a large callus on its outer surface; labrum deeply sinuate with central part very narrow; claws with vertical tooth situated in the distal third; paramera straight and long (fig. 5).

Remarks

The teguments of the elytra dark-brown, the apical segment of maxillary palp with a large callus on its outer surface and the claws with vertical tooth situated in the distal third, approaches *D. melanodiscus* to *D. ithoi*. The species is only known from the holotype male.

Distribution

The HT comes from South-West China, Guizhou province (Shuicheng County).

Dedalopterus fujianensis (Zhang, 1990) combinatio nova

Malaisius fujianensis Zhang 1990, Acta Zootaxonomica sinica, 15: 192.

Diagnosis

We could not examine any specimen of this species. The diagnosis (in english) provided by Zhang (1990) is the following: "Body length: [males] 17-19.5 mm, [female] 22 mm; width: [males] 7.4-8 mm, [female] 19.3 mm. This new species is allied to [...] *Malaisius melanodiscus* [...], but distinguishable from the latter by frontal depression deep and distinct, nearly chestnut in color, and parameres of male genitalia shorter and curved."

Using the diagnostic characters selected for the *Dedalopterus* species, the diagnosis can be the follow: teguments of the elytra chestnut color; elytra with white scales outlining stripes on the elytra; first and second costae of the elytra each with 2 lateral stripes of yellowish scales jointed at the apex; frontal depression deep and distinct; antennal club nearly twice as long as footstalk; footstalk with 3rd-5th segments longer than wide; labrum symmetric deeply sinuate with central part very narrow; claws with vertical tooth situated nearly the middle; paramera short and curved (fig. 7).

Remarks

The species is known only from 5 specimens constituting the typical series. *D. fujianensis* seems close to *D. melanodiscus* and *D. ithoi* from which it differs in the frontal depression deep and distinct and in the paramera short and curved.

Distribution

The species is known from South-East China, Fujian province: Guiling and Aotou of Jianyang County, Laizhou, Guadeng of Chongan County. The specimens were collected from 22 May to 4 July.

Dedalopterus pulchellus n. sp.

Material examined: Holotypus male, Laos, Kieng Kouang, 16.IV.1916, R.Vitalis de Salvaza leg., preserved in the "Institut Royal des Sciences Naturelles de Belgique".
Paratypus male, Laos, 59 km NE of Sing Khang, 1500m, 15-25.V.1996, 1 ex. preserved in "Muséum d'Histoire naturelle" of Geneva (Switzerland).

Diagnosis

The species differs from other *Dedalopterus* species having the following combination of characters: frontal depression absent, footstalk with 3rd-5th segment shorter than wide, apical segment of maxillary palp with a large callus on its outer surface and labrum with central part not very narrow. Moreover, *D. pulchellus* is the only species of the genus having the end of pygidium with a large triangular tip (fig.23).

Description of the Holotypus.

Body length: 19 mm, maximal breadth: 8 mm.

Teguments light-brown brown; upper surface of body largely covered by white large and narrow scales (fig. 23).

Clypeus sub-trapezious, large 2.9 mm, with anterior margin reflexed, separated from the front by a suture, bearing narrow scales. Front and vertex not carinate, flat, sparsely punctured, bearing narrow scales converging to the center of the vertex, the scales near the eyes larger than the scales on the rest of the head. Eyes large sticking out laterally and ventrally. Labrum symmetric, deeply sinuate with the middle of same thickness than the lateral parts.

Prothorax long 3.6 mm with maximal breadth of 6.3 mm. Longitudinal median part depressed. Anterior and posterior margin not margined; lateral margins deeply sinuated in front of the posterior angles, simple, not serrated. Median part less

punctured. Scales along the median part and near the eyes and the base of the pronotum larger than the scales on the rest of the pronotum.

Scutellum semi-circular with scattered large scales.

Elytrae narrowed distally each with 4 costae in addition to sutural one, first and second costae of the elytra jointed at the apex. Sutural costa only with small scales on the narrow inter-sutural border; interstriae 1-3 covered by large scales uniformly distributed, interstria 4 with narrow scales, epipleura bearing short and dense hairs.

Propygidium with short and ovale scales. Pygidium triangular with narrow ventral surface terminating in a large triangular tip curved dorsally. Surface with scales and hairs mixed.

Mesosternum not produced between the middle coxae; metasternum densely covered with long hairs; metasternum shining; metepisternum narrow, more than three times as long as its breadth, metepimera small; metepisternum at the same level that metepimera.

Abdominal sternites with narrow scales but not densely clothed, connate with sutures fine or absent in middle; with deep hollow; last spiracle located on suture between 5th visible abdominal sternite and propygidium.

Anterior tibiae enlarged distally, 2-dentate, with spur located proximate of basal tooth; apical spurs of hind tibiae spine-like, not enlarged. Hind and middle tibiae with a small lateral tubercle at the middle of the length; dorsal margin of hind tibiae without teeth or spines.

Tarsomera thick and short, sparsely pilose beneath; first segment of hind tarsi subequal to the second. Claws not clef at apex, with a median vertical tooth beneath situated nearly the middle, outer and inner teeth subequal.

Antenna 10-segmented; antennal club 3-segmented (lenght 5.2 mm) more than twice as long as footstalk; footstalk with 3rd segment not very long, 3rd-5th segment shorter than wide.

Apical segment of maxillary palp oval-shaped with pointed apex and a large callus on its outer surface.

Paramera long, simple, asymmetric with left paramere bigger (lenght 2.8 mm) than the right, left paramere rather straight (figs. 4, 10).

Variability

The paratypus body lenght is 23 mm and the specimens does not show any significative morphological difference from the holotype.

Remarks

In the collection of the "Institut Royal des Sciences Naturelles de Belgique" we found one specimen labeled as *Cyphochilus pulchellus* Ley and with a type red label. Nevertheless we were unable to found in the literature the description of this species.

Distribution

The species is known only from two specimens collected in northen Laos.

Derivatio nominis

We choose for this nice species the name indicated in litteris by Ley.

Dedalopterus itohi n. sp.

Material examined: Holotypus male, China, Szechwan, Hong ya, Mt Wawu, VII.1995, preserved in "Muséum d'Histoire naturelle" of Geneva (Switzerland).

Diagnosis

The species differs from other *Dedalopterus* species having the following combination of characters: teguments of the elytra dark-brown, frontal depression deep and distinct, apical segment of maxillary palp with a large callus on its outer surface, claws with beneath tooth situated in the distal third. The species is related to *D. melanodiscus* from which can be easily distinguished by the different shape of paramera.

Description of the Holotypus.

Body length: 22,5 mm, breadth: 9 mm.

Teguments dark brown (fig. 24); upper surface of body with hairs yellow narrow scales and white large scales forming narrow stripes.

Clypeus semi-circular, large 3.3 mm with anterior margin reflexed separated from the front by a suture bearing narrow scales. Front and vertex not carinate, flat, densely and deeply punctured, bearing narrow scales converging to the center of the vertex, the scales near the eyes larger than the scales on the rest of the head. Frontal depression deep. Eyes very large sticking out laterally and ventrally. Labrum symmetric, large and sinuate.

Prothorax long 4 mm mm with maximal breadth of 6.4 mm. Longitudinal median part depressed. Anterior and posterior margin not margined; lateral margins deeply sinuate in front of the posterior angles, simple, not serrated. Discus of pronotum homogeneously punctured with a longitudinal stripe of white large scales, same large scales, are present also along the base of the pronotum.

Scutellum semi-circular with narrow yellow scales.

Elytrae narrowed distally each with 4 costae in addition to sutural one, first and second costae subdivided in three stripes and jointed at the apex. Sutural costa only with small scales on the narrow inter-sutural border; interstriae 1-3 bearing large scales uniformly distributed, interstria 4 with narrow scales, epipleura bearing short and dense hairs.

Propigidium with short hairs and narrow scales. Pygidium triangular with narrow ventral surface terminating in a small, triangular tip slightly curved ventrally. Surface with scales and hairs mixed.

Mesosternum not produced between the middle coxae; metasternum densely covered with long hairs; metasternum shining; metepisternum narrow, more than three times as long as its breadth, metepimera small; metepisternum at the same level that metepimera.

Abdominal sternites with narrow scales but not densely clothed, connate with sutures fine or absent in middle, with deep hollow; last spiracle located on suture between 5th visible abdominal sternite and propygidium.

Anterior tibiae not enlarged distally, 3-dentate, the basal tooth small, with spur located proximate of basal tooth; apical spurs of hind tibiae spine-like. Hind and middle tibiae with a very small lateral tubercle at the middle of the length; dorsal margin of hind tibiae simple, without teeth or spines.

Tarsomera thick and short, sparsely pilose beneath; first segment of hind tarsi subequal to the second. Claws with beneath tooth situated in the distal third, outer and inner teeth subequal.

Antenna 10-segmented; antennal club 3-segmented (lenght 3.8 mm) nearly twice as long as footstalk; footstalk with 3rd segment not very long, 3rd-5th segment longer than wide.

Apical segment of maxillary palp oval-shaped with pointed apex and a large callus on its outer surface.

Paramera long, simple, asymmetric with left paramere bigger (lenght 3.2 mm) than the right, paramera rather curve (fig. 6, 11).

Remarks

The species seems close to *D. melanodiscus* from which it can be distinguished easily by the different shape of paramera (figs. 5, 6).

Derivatio nominis

The species is dedicated to the Japanese colleague Takeshi Itoh (from Hyogo) who sent us the specimens among other interesting Melolonthidae from South-East Asia.

Distribution

Dedalopterus itohi is known only from Szechwan (middle of China) and is the most northen species of the genus.

Key to the *Dedalopterus* among the main palaearctic genera of Melolonthidae

1. Clypeus very large, laterally partially covering eyes like peak; abdominal sternites connate, but with distinct sutures ***Apogonia, Adoretops, Schismatocera***
- Clypeus not very large, laterally not covering eyes but continous with canthus; abdominal sternites connate with sutures fine or absent in middle ..... **2.**

2. Claws in males cleft at apex .....
Brachyllus, Brahmina, Chryphaeobius, Dasylepida, Gnaphalostetha, Heptophylla, Hexataenius, Hilyotrogus, Lachnota, Lasiexis, Lasiopsis, Metabolus, Onychosophrops, Pectinichelus, Pollaplonyx, Pseudolontha, Schizonycha, Sophrops, Stenosophrops, Toxospathius
- Claws in males not clef at apex ..... **3.**

3. Antennal club in males 7-segmented, in female 5-segmented; metepisternum wide, less than three times as long as its breadth; metepimera large .....
Achranoxia, Anoxia, Cryptotrogus, Cyphonotus, Cyphonoxia, Euranoxia, Exolontha, Hoplosternus, Melolontha, Microphylla, Ochranoxia, Oligophylla, Polyphylla, Sphodroxia
- Antennal club in males and females 3-segmented; metepisternum narrow, more than three times as long as its breadth; metepimera small ..... **4.**

4. Wings in females not developed as well omeral callus .....
Geotrogus, Pseudoapterogyna, Pseudotrematodes, Trematodes
- Wings in females developed as well omeral callus ..... **5.**

5. Antenna 8-segmented ..... ***Amphimallina, Monotropus***
- Antenna 9 or 10-segmented ..... **6.**

6. Claws in males with median tooth ..... **7.**
- Claws in males with basal tooth .....
Amphimallon, Butozania, Chilotrogus, Chioneosoma, Dasytrogus, Eriotrogus, Haplidia, Holochelus, Madotrogus, Miltotrogus, Panotrogus, Rhizotrogus

7. Upper surface of body scaly .....**8.**
- Upper surface of body glabrous, or hairy .....**9.**

8. Labrum symmetric; scales on the elytra forming stripes or white spots; claws at base narrow; apical segment of maxillary palp oval ..... ***Dedalopterus***
- Labrum asymmetric with right part large; scales on the elytra uniformly distributed; claws at base large; apical segment of maxillary palp narrow .....
..... ***Cyphochilus***

9(7). Antennal club in males large, longer than footstalk; anterior margin of pronotum in the middle not margined ..... ***Malaisius***
- Antennal club in males small, shorter than footstalk or equal to footstalk; anterior margin of pronotum in the middle margined ..... ***Holotrichia, Miridiba***

Key to the species of the genus *Dedalopterus* and of related genera

1. Labrum asymmetric ..... **genus *Cyphochilus***
- Labrum symmetric ..... **2.**
2. Eyes large and very prominent; mentum narrow, with a Y-shaped carina; apical segment of maxillary palp narrow and long; lateral margin of the prothorax regularly curved; pygidium transverse and with large ventral surface; paramera almost symmetric ..... ***Malaisius mollis***
- Eyes large but not very prominent; mentum large, flat, without any carina; apical segment of maxillary palp oval-shaped with pointed apex; lateral margin of the prothorax deeply sinuate near the posterior angles; pygidium not transverse, with narrow ventral surface; paramera asymmetric ..... **3.**
3. Antennal club nearly twice as long as footstalk ..... **4.**
- Antennal club more than twice as long as footstalk ..... **6.**
4. Teguments of the elytra light-brown to yellow; claws with beneath tooth situated nearly the middle ..... ***Dedalopterus fujianensis***
- Teguments of the elytra dark-brown, claws with beneath tooth situated in the distal third ..... **5.**
5. Frontal depression deep and distinct ..... ***D. ithoi***
- Frontal depression shallowly ..... ***D. melanodiscus***
6(3) Pygidium with triangular tip, apical segment of maxillary palp with a large callus on its outer surface ..... ***D. pulchellus***
- Pygidium rounded, apical segment of maxillary palp with a small callus on its outer surface ..... **7.**
7. Space between elytral costae with few scales, head densely punctured, footstalk with 3rd-5th segment shorter than wide; labrum weakly sinuate with central part scarcely narrow; first and second costae of the elytra each with 2 lateral stripes of narrow yellowish scales; protibiae 3-toothed ..... **8.**
- Space between elytral costae with many scales, head sparsely punctured, footstalk with 3rd-5th segments longer than wide; labrum deeply sinuate with central part very narrow; first and second costae of the elytra each with 2 lateral stripes of large yellowish scales; protibiae 2-toothed ..... **9.**
8. Paramera rather straight and large ..... ***D. signatus***
- Paramera rather curved and small ..... ***D. intermedius***
9(7). Frontal depression shallowly; first and second costae of the elytra jointed at the apex; paramera rather curved ..... ***D. signatus* ssp. 1.**
9. Frontal depression absent; first and second costae of the elytra jointed about at the middle length of the elytra; paramera rather straight ..... ***D. signatus* ssp. 2.**

Bibliografia

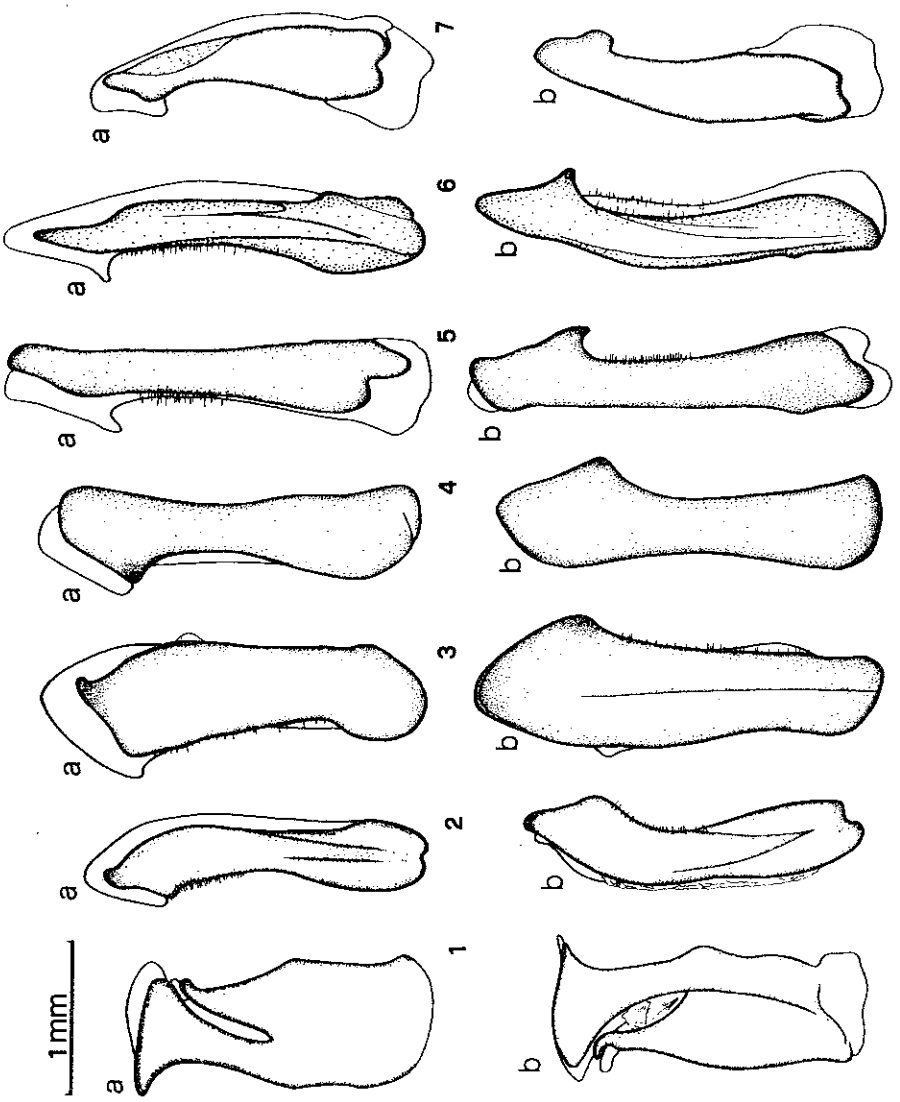
ARROW G.J. 1938. Entomological results from the Swedish Expedition 1934 to Burma and British India, Coleoptera Melolonthidae. *Arkiv för Zoologi*, 30: 1-4.

ARROW G.J. 1941. Entomological results from the Swedish Expedition 1934 to Burma and British India, Coleoptera Melolonthidae. *Arkiv för Zoologi*, 33: 1-8.

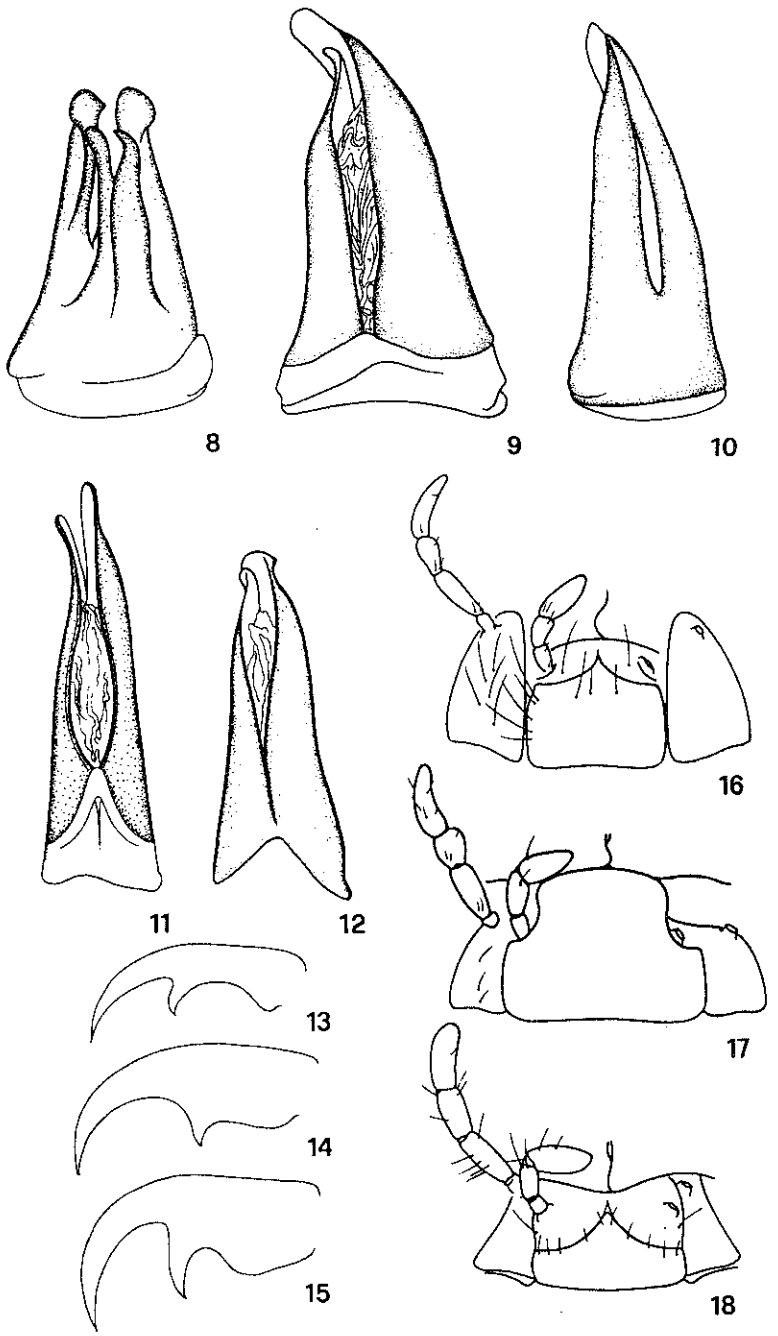
MOSER J. 1908. Neue Melolonthiden und Cetoniden. *Annales Societé entomologique Belgique*, 52: 353-367.

WATERHOUSE C.O. 1867. On some new lamellicorn beetles belonging to the family Melolonthidae. *The entomologists monthly magazine*, 4: 141-144.

ZHANG Y. 1990. Notes on the genus *Malaisius* Arrow with four new species from China (Coleoptera: Melolonthidae). *Acta zootaxonomica sinica*, 15: 188-195.



Figs. 1-7. Paramera lateral view (a=left, b=right) *Malaisius mollis* Arrow (1). Paramera lateral view *Dedalopterus* n.gen. (2-7), *D.intermedius* Zhang (2), *D.signatus* Moser (3), *D.pulchellus* n. sp. (4), *D.melanodiscus* Zhang (5), *D.itohi* n. sp. (6), *D.fujianensis* Zhang (7).



Figs. 8-18. Paramera dorsal view (8-12), *Malaisius mollis* Arrow (8), *Dedalopterus signatus* Moser (9), *D. pulchellus* n. sp. (10), *D. itohi* n. sp. (11), *D. intermedius* Zhang (12). Anterior claw (13-15), *D. signatus* (13), *M.mollis* (14), *Cyphochilus niveosquamosus* Olivier (15). Mentum (16-18), *M. mollis* (16), *D. itohi* (17), *C. niveosquamosus* (18).

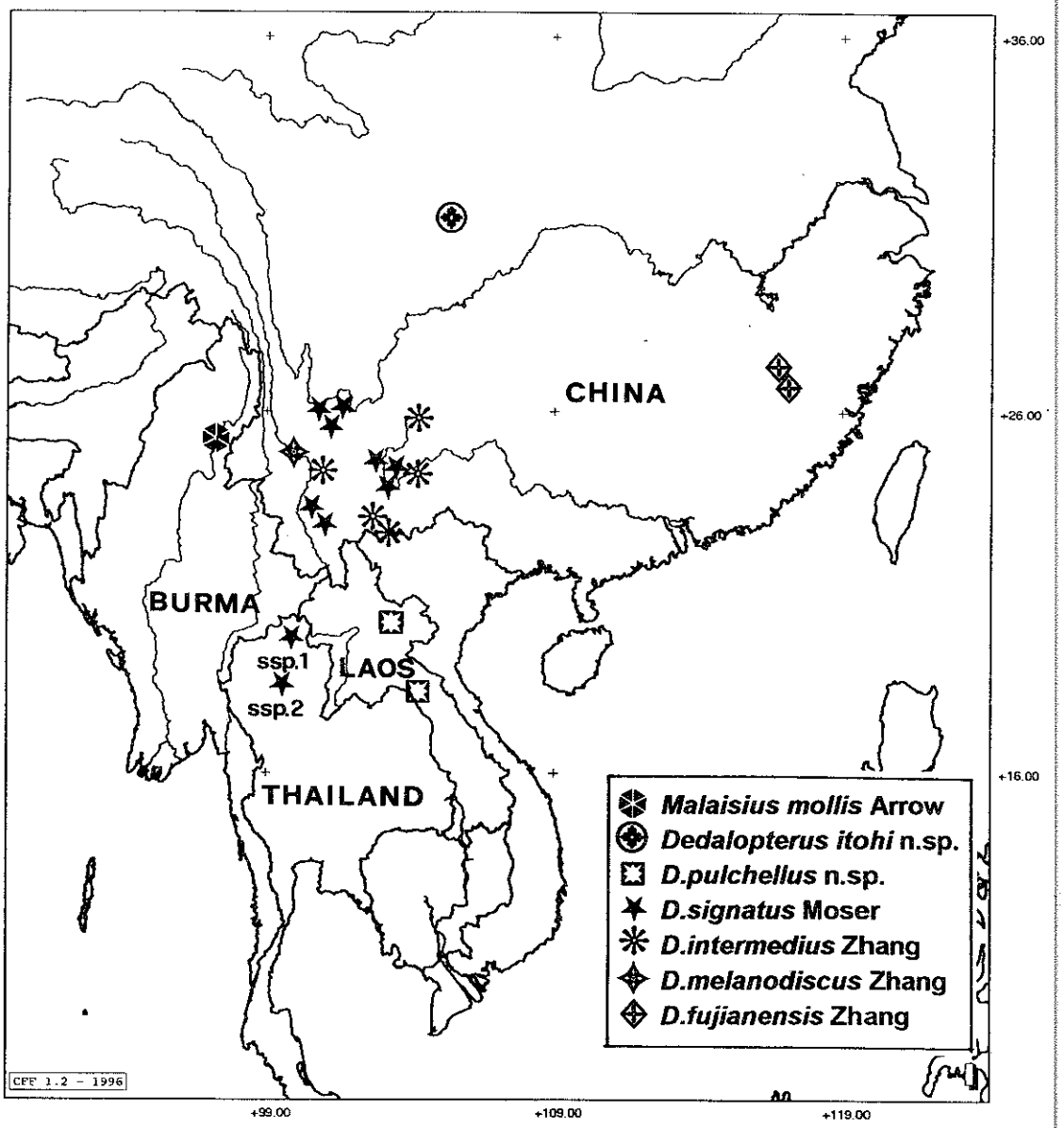


Fig. 19. Geographical distribution of *Dedalopterus* n.gen. and *Malaisius* Arrow genera.