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A New Species of the Oriental Abacetine Genus *Metabacetus* Bates, 1892 (Coleoptera: Carabidae) and a Key to the Species of the Genus

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Abstract

Metabacetus hermani **new species** with type locality Vietnam, Hatinh Pr. is added to the six previously described in the rarely collected genus *Metabacetus* Bates (Carabidae: Abacetini (contained in Pterostichini auct.)). A key to adults, incorporating all species and subspecies of the genus is provided. Characteristics of the members of this genus and species of other genera, *e.g.*, *Tiferonia* Darlington, *Mateuellus* Deuve, and *Cosmodiscus* Sloane and *Abacetus* Dejean, suggest that *Metabacetus* is a taxon in the basal grade of a clade including all of these genera. *Metabacetus vandoesburgi* Straneo is newly recorded from Sabah, Malaysia making it the only species in the genus known from outside its type locality.

After Bates' (1892) original description of *Metabacetus immarginatus* the genus remained monotypic until Straneo (1938) added four species and presented a key to species. In a second paper an additional species and a subspecies of *M. immarginatus* were described (Straneo 1948).

Our knowledge of the genus is based on a very small sample of specimens from a rather large range (Fig. 1) that extends from eastern India to the Philippines, south to Java. The subtle, but likely specific-level differences between the geographically separate samples of *Metabacetus* is comparable to what is found in phenetically similar, but more speciose genera such as *Abacetus* Dejean and *Loxandrus* LeConte. This suggests that many undescribed forms await discovery. However, specimens are very rare in collections making it impossible to develop a full understanding of the inter- and intra-specific variation. This paper will hopefully stimulate interest in the group and provide tools for identification to collectors and collections managers.

The genus has been classified with or near *Abacetus* or other abacetine-like genera (Bates 1892; Csiki 1930; Lorenz 1998). The most obvious characteristic, and a likely synapomorphy for Abacetini s.str., is the eccentrically inserted second antennomere and, perhaps, the strongly transverse mentum. However, *Metabacetus* and a number of similar genera have the second antennomere more or less centrically inserted. This broader set of taxa has been informally as Abacetini s.l. based on the combination of having a single pair of deeply impressed, linear basal impressions of the pronotum; angular base of stria 1 (''scutellar striae'' auct.)

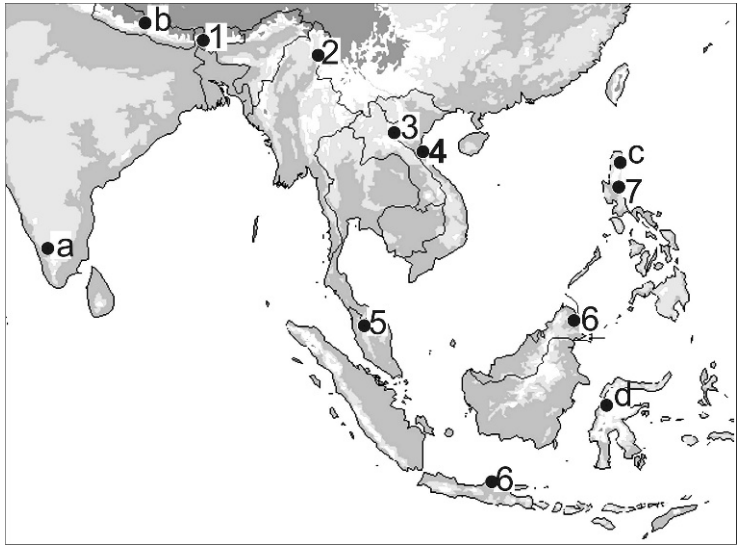

Fig. 1. Distribution of *Metabacetus* species. **1** *M. immarginatus crassulus*, **2** *M. immarginatus* s.str., **3** *M. loatinus*, **4** *M. hermani*, **5** *M. perakianus*, **6** *M. vandoesburgi*, **7** *M. arrowi*; a,b,c, & d are localities of putative undescribed species represented as single specimens in the material examined.

absent; a single, or more rarely no dorsal puncture on the third elytral interval; the basal elytral puncture at or near stria two; and males with symmetrically expanded protarsomeres. Additionally, nearly all of these taxa have deeply impressed, elongate frontal impressions on the head; sinuate anterior coxal sulcus; and a coiled spermatheca. Although none of these characteristics represent unique synapomorphies, *i.e.*, all are found in other pterostichine-grade taxa (Will 2002), and several are certainly plesiomorphic, in combination they define a cluster of taxa including some members of Jeannel's (1948) Celioschesini, Moore's(1965) abacetine series and various taxa classified in Pterostichini from Asia and Africa. The exact composition of this set of taxa is still unclear; however, current studies of both morphological and molecular characters (KWW unpubl.) suggest that there is a monophyletic group that includes taxa such as *Metabacetus*, *Cosmodiscus* Sloane, *Aristopus* LaFerté-Sénectère, *Tiferonia* Darlington, and *Mateuellus* Deuve. It is outside of the scope of this paper to address the higher classification of these pterostichine-like taxa beyond placing *Metabacetus* as a member of a grade of taxa basal to Abacetini s.str. The entire complex is herein referred to as Abacetini. A full list of generic names associated with this tribe can be found on the internet at http://ToLWeb.org/Abacetini.

Materials and Methods

All methods and terms follow procedures outlined by Will (2002). Abbreviations used are as follows: L: body length, W: body widest width, LP: length of pronotum, WP: width of pronotum, LE: length of elytra and, WE: width of elytra. We have studied in detail including dissection and/or detailed examination of exemplars, most genera of Abacetini as part of an ongoing project (KWW) on

the tribe as a whole and its possible relationships to Loxandrini and Drimostomatini. Study material of *Metabacetus* includes the holotypes of *M. arrowi* Straneo, *M. immarginatus* s.str. Bates, *M. immarginatus crassulus* Straneo, *M. laotinus* Straneo, *M. perakianus* Straneo and five specimens of *M. vansdoesburgi* Straneo. An additional six specimens were studied that, based on proportions of the body tagma, pronotal forms and distribution (Fig. 1.), probably consist of five undescribed species including the presently descibed *M. hermani*. With the exception of *M. hermani* these few additional specimens, were in poor condition and/or were female specimens making it impossible to describe them properly or to assess variation within and between species. For this reason we will not describe these additional putative species at this time. The key presented herein is modified from Straneo's (1938) key. We have not comparatively studied *Metabacetus jeanneli* Straneo and base our differentiation from that species on Straneo's (1948) description and illustrations.

Specimens studied are deposited in the following collections: The American Museum of Natural History, New York (AMNH); The Natural History Museum, London (BMNH); Museo de Civico di Storia Naturale, Milano (including S.L. Straneo collection) (MCHN); Swedish Museum of Natural History, Stockholm (NHRS).

Metabacetus Bates 1892

Type species *Metabacetus immarginatus* Bates 1892:364

Generic diagnosis.—A combination of characters is needed to recognize member taxa. Individuals are *Abacetus*-like as they have deeply impressed linear basolateral pronotal impressions; clearly defined frontal impression on the head; lack the angular base of stria 1 basal puncture at base of stria 2; abdominal sterna without transverse sulci; male protarsomeres symmetrically expanded; and male median lobe oriented to the left in repose. Additionally *Metabacetus* species have the second antenomere more or less centrically inserted in first; elytra without discal puncture on interval 3; mentum with epilobes distinct and as or more prominent than the median tooth and; metacoxal anterior sulcus sinuate. This set of characteristics separates *Metabacetus* from all other sympatric Abacetini and other pterostichine-grade taxa except for *Tiferonia*, *Mateuellus* and *Cosmodiscus*. *Metabacetus* species can be separated from *Tiferonia* by their much larger size (5.2–8.0 mm vs. 4.5 mm), and from *Mateuellus* by their fully developed eyes, which are reduced in the troglobitic *Mateuellus*. *Metabacetus* species are of a relatively elongate form, especially the head and mandibles and are much more elongate than the very compact, almost rounded shape seen in *Cosmodiscus* species.

Metabacetus hermani new species

Type Material. — HOLOTYPE. male. Verbatim label data: "Vietnam Hatinh Pr., Raò An, 13 km W Huang Son, rt 8, 7 km S Nuòc S∩t village, 18°21′N, 105°15E, 1,150 m, IV-28-1998, leaf litter nr. stream, L.Herman #2964"; deposited AMNH. PARATYPE. male. Same data as holotype.

Etymology. Noun in genitive case formed from the name of the collector and excellent coleopterist, Lee Herman (AMNH).

Type locality. — As given for holotype. Range— Vietnam (Fig. 1).

Table 1. Comparative measurements of *Metabacetus* adults (in mm) based on examined material and descriptions and illustrations in Straneo (1938) treatment.

Species	L	W	LP	WP	LE	WL
M. laotinus	7.1	2.6	1.6	2.1	4.2	2.6
M. vandoesburgi	7.3	3.0	1.5	2.0	4.5	3.0
M. arrowi	5.2	2.1	1.3	1.7	3.0	2.1
M. jeanneli	5.9	2.4	1.3	1.7	3.3	2.4
M. perakianus	5.8	2.4	1.2	1.7	3.3	2.4
M. immarginatus	7.2	3.1	1.6	2.2	4.4	3.1
M. hermani	8.2	3.3	1.9	2.4	4.9	3.3

Recognitory Diagnosis. — Of the large-sized species in the genus (Table 1.) with the prosternum not or only shallowly sulcate medially near apex, *M. hermani* is most similar to *M. immarginatus* from which it differs by being distinctly iridescent and having a more sinuate and reflexed pronotal base.

Description. — Large size for genus, overall body length 8.0–8.3 mm. Deep black color and shiny throughout body, dorsally and ventrally; elytra slightly duller, pronotum and elytra iridescent; antennae, mouthparts, legs, pronotal margins, and elytral epipleura paler rufo-piceus; coxae concolorous with ventral surface.

Head. Eyes very prominent, form hemiobovate, ocular ratio 0.62 (width between eyes/width over eyes at midpoint); two pairs of supraorbital setae; microsculpture on dorsum shallow, reticulate microlines and sculpticells scarcely visible (evident at 25×); frontal impressions deep, elongate divergent, ending near anterior supraorbital seta; clypeus very short, smooth, clypeo-frontal suture nearly effaced; mentum clearly broader than long, anterior margin shallowly emarginate; epilobes moderately prominent, short triangular; mentum tooth with simple rounded apex; mentum glabrous; paramedial pits distinct, deep, sharply defined; suture between mentum and submentum present; submentum with two pairs of lateral setae; maxillary stipes with seta near base, palpifer with setae near apex, palpomeres glabrous, fusiform, nearly equal in length; labial palpi fusiform; palpomere 2 longer than 3, with 2 large medial setae; 2 otherwise glabrous, 3 with small scattered setae; labrum with six setae on apical margin, margin slightly concave medially; mandibles with well defined and glabrous scrobe, form elongate, apex slightly hooked and sharply pointed; antennae long, reaching beyond base of pronotum; antennomeres 1–3 glabrous except for large seta on dorsum of 1 and 2, and ring of four to five at apex of 3; antennomere 4 densely pubescent from near base; antennomeres 5–11 with dense short pubescence throughout, four to six longer setae in ring around apices.

Thorax. Pronotum (Fig. 2,3) very shiny and iridescent throughout; microsculpture not evident except at high magnification (50×), surface impunctate, form quadrate, broader than long, widest at or just before middle, side margins slightly and evenly rounded to just apicad basolateral setae and then nearly straight to hind angles, basal margin straight between basal impressions, anterior margin with front angles not protruding; hind angles about right angled and very slightly reflexed; two pairs of lateral setae, one pair anterad middle in lateral groove, one pair touching lateral bead near hind angles; lateral marginal bead continuous from front angles to hind angles, but sharply narrowed at hind setae, not prolonged along base; anterior submarginal sulcus absent; medial longitudinal sulcus fine, sharp ending well before apex and base.

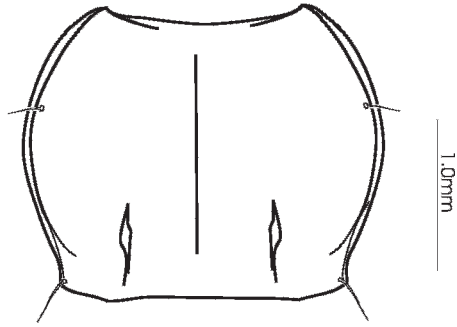

Fig. 2. *Metabacetus hermani*, pronotum.

Elytra (Fig. 3) parallel-sided, convex, broadly rounded at apex with external plicae; microsculpture scarcely evident, surface moderately shiny, iridescent; striae deeply impressed and minutely punctate throughout; parascutellar stria connected to stria 1; basal section of stria 1 absent; basal margin entire; intervals very slightly convex throughout; interval 9 with usual umbilicate row of 13 setae; two additional setae in striae 7 near apex of each elytron; flight wings full, folded at apex; prosternum and proepisternum glabrous, very shiny and iridescent; mesosternum with few shallow punctures; metepisternum form elongate, densely and shallowly punctate; metepimeron large, broadly rounded; metasternum laterally densely punctate; protrochanter with medial seta; profemur anterior face with two to three medial and one subapical setae; dorsal face with three setae; ventral face glabrous; posterior face with three setae; protibial antennal cleaning organ well developed, with two clip setae; cleaner setal row extending dorsally, ending at larger medial seta; ventral ctenidia prominent; both proximal and distal spurs long and sharply pointed; Pro-, meso-, and metatarsomeres symmetrical

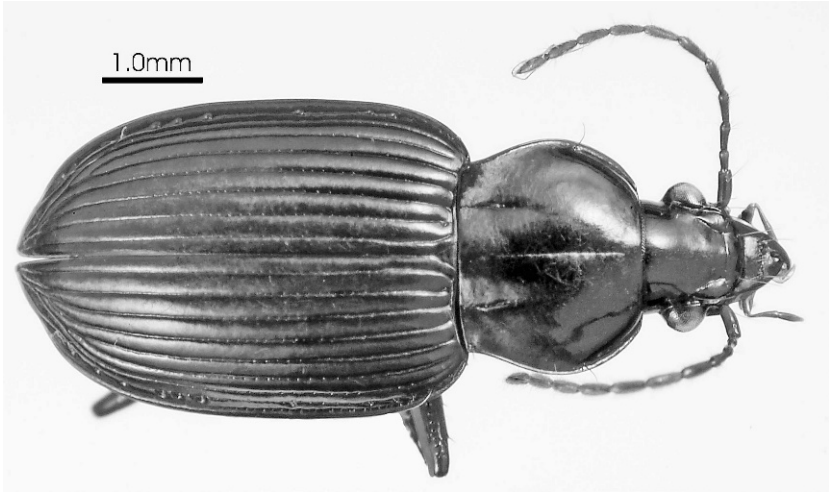

Fig. 3. *Metabacetus hermani*, habitus image.

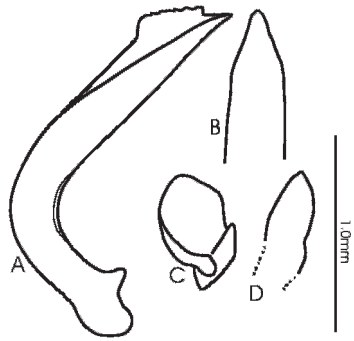

Fig. 4. *Metabacetus hermani*, male genitalia. **A)** median lobe, left lateral view. **B)** median lobe, tip ventral view, **C)** left paramere. **D)** right paramere.

shaped, meso- and metatarsomeres 1–4 ventrally with two rows of setae; 1–4 with two apical setae, 1–2 with additional apicomedial setae; protarsomeres 1–3 in male stout, broadly and symmetrically expanded with two rows of dense articulo setae ventrally, 4 very small and only slightly expanded with two rows of long setae; tarsomere 5 ventrally glabrous, dorsally with two setae; claws smooth; mesocoxa with one seta mesad, one laterad; mesotrochanter with one seta near base; mesofemur anterior face with basal and medial setae, dorsal face with 10–14 setae in row along length, posterior and ventral faces glabrous; mesotibia with four rows of stout spines and mesal row of finer, denser spines; two apical spurs; apical ctenidium well developed; mesotarsomeres more elongate than protarsomeres, tarsomere 1 slightly longer than length of 2 + 3, tarsomeres 1–2 with very shallow, incomplete external sulci; metacoxa with one medial and one lateral seta; anterior sulcus sinuate and complete, distant from anterior margin; metatrochanter with one basal seta, elongate, apex conical; metafemur anterior face with basal and medial (near ventral edge) setae, femur otherwise glabrous; metatibia with three rows of spines, medial row of finer thickness; two apical spurs; apical ctenidium well developed; metatarsomeres elongate, 1 equal to length of 2 + 3, 1–2 with external sulci.

Abdomen. Sterna shiny, glabrous except one pair paramedial setae on IV–VI; males with one pair at apex of VII. Sternum II with irregular cluster of punctures along base laterally; sternum VII apical margin smoothly rounded.

Male genitalia (Fig. 4). Very simple. Median lobe of aedeagus apex straight, tip acuminate to rounded point; ventral surface with fine, low medial carina from bend in median lobe to basal third of blade (Fig. 4A). Female unknown.

Key to adult *Metabacetus* species

1. Large species, 6.5 mm or longer; prosternum not or only shallowly sulcate medially near apex 2
1′. Smaller species, 5–6 mm; prosternum deeply sulcate medially 5
2. Pronotum with sides moderately rounded, hind angles not or slightly reflexed, lateral border narrow 3
2′. Pronotum with sides strongly rounded, hind angles distinctly reflexed, lateral border broad ..... ***Metabacetus laotinus*** **Straneo** [Laos]

Fig. 5. *Metabacetus vandoesburgi*, apex of elytra showing terminal spines.

3(2). Apex of elytra without evident spine 4
3. Apex of elytra with evident spine (Fig. 5) ..... ***Metabacetus vandoesburgi* Straneo** [Java]
4(3). Pronotum with lateral margins slightly convergent to hind angles, not reflexed at hind angles; dorsal surface not iridescent ..... ***Metabacetus immarginatus* Bates** [Burma]
4′. Pronotum with lateral margins sinuate just before the hind angles, slight reflex basolaterally to hind angles (Fig. 2); dorsal surface iridescent ..... ***Metabacetus hermani* n. sp.** [Vietnam]
5(1′). Elytral form rather short, parallel sided, broadly rounded at apex; intervals at most only slightly crenulate 6
5. Elytral form distinctly elongate, acuminate to apex; intervals distinctly crenulate ..... ***Metabacetus arrowi* Straneo** [Philippines]
6(5). Pronotum lateral margins subsinuate to base, not reflexed basolaterally ..... ***Metabacetus jeanneli* Straneo** [Sabah, Malaysia]
6′. Pronotal lateral margins rounded and convergent to base, reflexed basolaterally ..... ***Metabacetus perakianus* Straneo** [Perak, Malaysia]

Discussion

The genus includes seven similar looking species, but recognition of the genus as agroup is based on a combination of features, though these characteristics are widespread and scattered in pterostichine-grade taxa and include what are probably plesiomorphies. As discussed above, *Metabacetus* is best place in Abacetini near similar looking taxa such as *Cosmodiscus*, *Tiferonia* and *Mateuellus*. DNA sequence data is known only from *M. vandoesburgi* and in preliminary analyses (KWW unpubl.) this species is found to be sister to *Cosmodiscus brunneus* Darlington. These two fall within a larger abacetine clade. This larger clade also contains *Pediomorphus* Chaudoir, which was suggested by Bates (1892) to be a close relative of *Metabacetus*, and *Holconotus* Schmidt-Goebel another abacetine that is similar in form to *Pediomorphus*. What morphological characters will prove to be synapomorphic for the tribe or its included genera is presently unclear. Monophyly of *Metabacetus* has not been tested and there are no obvious synapomorphies for the genus. Any or all of the other genera listed above could reasonably be derived from the *Metabacetus*-form.

Nothing has been published on the habitat or life history of *Metabacetus* except for the association of a new species of the fungus *Laboulbenia* Robin (Balazuc 1975) and little can be gleaned from the data labels on the few specimens available for study. The elevation range from those data is 500–1,700 m and three specimens have been collected at lights. We have several new records for *M. vandoesburgi* increasing its range to include Malaysia. Locality data: **Sabah**, Kinabalu N.P., Light trap, Poring Hot Springs, Staff quarters, 500 m, 30:vii–

6:ix:1995, Coll. Brühl. (1); inside light, 19:xi:2000, coll. K.W.Will/K.A.Ober (2); "Mt. Tibang 1,400 m. Borneo Mjöberg" (1) and "Pajau River Borneo Mjöberg" (1). These records make this the most commonly collected and widespread species in the genus and the only species known from locations outside its type locality.

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Literature Cited

Balazuc, J. 1975. Laboulbeniales nouvelles (ascomycetes), parasites de coleopteres exotique. Bulletin du Muséum national d'Histoire Naturelle Botanique 2:177–200.

Bates, H. W. 1892. Viaggio de Leonardo Fea in Birmania e regioni vicine. XLIV, List of the Carabidae. Annali del Museo Civico di Storia Naturale de Genova (2)(xii):267–428.

Csiki, E. 1930. Carabidae: Harpalinae IV (Pars 112). *In:* Coleopterorum Catalogus (W. Junk and S. Schenkling, editors). Junk, Berlin.

Jeannel, R. 1948. Coléoptères Carabiques de la Région Malgache (Deuxieme partie). Faune de l'Empire francais 10:373–766.

Lorenz, W. 1998. Nomina carabidarum - a directory of the scientific names of ground beetles. (Insecta, Coleoptera "Geadephaga": Trachypachidae and Carabidae incl. Paussinae, Cicindelinae, Rhysodinae)Published by the author, Tutzing, Germany. 993 pp.

Moore, B. P. 1965. Studies on Australian Carabidae (Coleoptera). 4.- The Pterostichinae. The Royal Entomological Society of London 117:1–32.

Straneo, S. L. 1938. Le genre *Metabacetus* Bates (Coleoptera, Harpalidae). Revue Francaise d'Entomologie, Paris 5:151–158.

Straneo, S. L. 1948. Quatre Pterostichides nouveaux des Indes orientales. Revue Francaise d'Entomologie, Paris 15:43–45.

Will, K. W. 2002. Revision of the new world abariform genera *Neotalus* n.gen. and Abaris Dejean (Coleoptera: Carabidae: Pterostichini (Auctorum)). Annals of the Carnegie Museum of Natural History 71(3):143–213.

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