

A new genus of Ptilodactylidae (Coleoptera: Byrrhoidea) in mid-Cretaceous amber from Myanmar (Burma)

Stylios CHATZIMANOLIS
Molly E. CASHION

Department of Biological and Environmental Sciences,
The University of Tennessee at Chattanooga,
615 McCallie Ave. Dept 2653, Chattanooga, TN 37403 (USA)
stylios-chatzimanolis@utc.edu
molly-cashion@utc.edu

Michael S. ENGEL
Zachary H. FALIN

Division of Entomology,
Natural History Museum and Department of Ecology & Evolutionary Biology,
1501 Crestline Drive – Suite 140, University of Kansas,
Lawrence, KS 66045 (USA)
msengel@ku.edu
ksem@ku.edu

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ABSTRACT

KEY WORDS

Polyphaga,
Elateriformia,
Albian,
Mesozoic,
Burma,
taxonomy,
new genus,
new species.

The first Mesozoic fossil of the beetle family Ptilodactylidae Laporte, 1836 (Byrrhoidea) is formally described and figured from a male preserved in latest Albian amber from Myanmar. *Aphebodactyla rhetine* n. gen., n. sp., is distinguished from its modern relatives and is only the second fossil species yet formally described in the family. The fossil intermingles putatively derived features of various ptilodactylid subfamilies, suggesting that the current circumscription of these lineages is in dire need of revision.

RÉSUMÉ

Nouveau genre de Ptilodactylidae (Coleoptera: Byrrhoidea) de l'ambre albien terminal du Myanmar (Birmanie).

MOTS CLÉS

Polyphaga,
Elateriformia,
Albien,
Mésozoïque,
Birmanie,
taxonomie,
genre nouveau,
espèce nouvelle.

Le premier fossile mésozoïque de la famille Ptilodactylidae Laporte, 1836 (Coleoptera: Byrrhoidea) est formellement décrit et illustré à partir d'un mâle de l'ambre albien terminal du Myanmar. *Aphebodactyla rhetine* n. gen., n. sp., est la deuxième espèce fossile formellement décrite de cette famille. Le fossile possède des caractères considérés comme dérivés des différentes sous-familles de Ptilodactylidae, suggérant que la définition actuelle de ces lignées nécessite une révision.

TABLE 1.— Current hierarchical classification of Ptilodactylidae (Byrrhoidea). Stribling (1986) listed four additional genera in Ptilodactylinae, but these remain undescribed and the supraspecific classification is in need of significant revision.

Family Ptilodactylidae Laporte, 1836
Genus † <i>Aphebodactyla</i> n. gen.
Genus † <i>Ptilodactyloides</i> Motschulsky, 1856
<i>Incertae sedis</i> (<i>sensu</i> Stribling 1986)
Genus <i>Therius</i> Guérin-Méneville, 1849
Genus <i>Falsoptilodactyla</i> Pic, 1958
Genus <i>Valoka</i> Delève, 1872
Genus <i>Podabrocephalus</i> Pic, 1913
Subfamily Anchytersinae Champion, 1897
Genus <i>Anchytersus</i> Guérin-Méneville, 1843
= <i>Tetrarglossa</i> Champion, 1897
Genus <i>Epilichas</i> White, 1859
Genus <i>Anchycteis</i> Horn, 1880
Genus <i>Byrrocryptus</i> Broun, 1893
Genus <i>Pseudoepilichas</i> Armstrong & Nakane, 1956
Subfamily Cladotominae Pic, 1914
Genus <i>Cladotoma</i> Westwood, 1837
= <i>Telon</i> Champion, 1897
Genus <i>Paralichas</i> White, 1859
= <i>Eucteis</i> Guérin-Méneville, 1861
= <i>Odontonyx</i> Guérin-Méneville, 1843
Genus <i>Drupeus</i> Lewis, 1895
Genus <i>Hovactyla</i> Fairmaire, 1901
Genus <i>Pseudocladotoma</i> Pic, 1918
Genus <i>Austrolichas</i> Lawrence & Stribling, 1992
Subfamily (Unnamed [Stribling 1986])
Genus <i>Octoglossa</i> Guérin-Méneville, 1843
= <i>Astyloglossa</i> Pic, 1919
Subfamily Aploglossinae Champion, 1897
Genus <i>Bradytoma</i> Guérin-Méneville, 1843
= <i>Brithycera</i> Erichson, 1847
Genus <i>Aploglossa</i> Guérin-Méneville, 1849
Subfamily Araeopidiinae Lawrence, 1991
Genus <i>Araeopidius</i> Cockerell, 1906
Subfamily Ptilodactylinae Laporte, 1836
Genus <i>Ptilodactyla</i> Illiger, 1807
= <i>Hypselothorax</i> Kirsch, 1866
= <i>Stenactyla</i> Fairmaire, 1896
= <i>Falsodaemon</i> Pic, 1913
= <i>Theriomorphus</i> Pic, 1913
Genus <i>Daemon</i> Laporte, 1836
= <i>Colobodera</i> Klug, 1838
Genus <i>Pherocladus</i> Fairmaire, 1881
Genus <i>Lachnodactyla</i> Champion, 1897
Genus <i>Stirophora</i> Champion, 1897
= <i>Chaetodactyla</i> Champion, 1897
Genus <i>Falsotherius</i> Pic, 1913
Genus <i>Chelonariomorphus</i> Pic, 1916
Genus <i>Microdrupeus</i> Nakane, 1993

INTRODUCTION

The Ptilodactylidae (sometimes referred to as “toe-winged beetles”) comprise a moderately diverse lineage of Byrrhoidea (Polyphaga: Elateriformia), with around 500 species documented worldwide. The family is generally recognized by the cordiform mesoscutellum, pseudotetramerous tarsi, and serrate to pectinate, 11-segmented antennae in males (filiform or serrate in females). Larvae ptilodactylids live in rotten logs, moist litter, or semiaquatic habitats (e.g., stream borders, submerged logs), and feed on decaying wood, vegetation, or perhaps microscopic fungi. Adults are terrestrial and many have mouthparts modified for feeding on molds (Stribling & Seymour 1988). The current diversity and supraspecific classification (summarized in Table 1) has been treated by Stribling (1986), Lawrence & Stribling (1992) and Ivie (2002), though is in need of significant revisionary work.

Hitherto now the only described fossil species attributed to Ptilodactylidae is *Ptilodactyloides stipulicornis* Motschulsky, 1856 in middle Eocene Baltic amber. Klebs (1910) and Larsson (1978) listed undescribed *Pseudodactylus* species in Baltic amber, a genus that has been subsequently transferred to Armatopodidae (as Euryopogonidae: Stribling 1986). Assuming the identifications are accurate, then these no longer constitute additional records of Baltic amber ptilodactylids (indeed, Spahr [1981] did not include them among her records of amber Ptilodactylidae). Alternatively, these may have been ptilodactylids but incorrectly ascribed to *Pseudodactylus*. Regardless, herein we provide the first detailed description of a ptilodactylid from the Mesozoic, extending the geological range of the family by approximately 55 million years. Given the sometimes dubious familial attributions of Motschulsky, this species should perhaps be considered the only definitive fossil record for the family.

MATERIAL AND METHODS

Measurements were made using an ocular micrometer on an Olympus SZX-12 stereomicroscope and microphotography using a Visionary Digital Passport

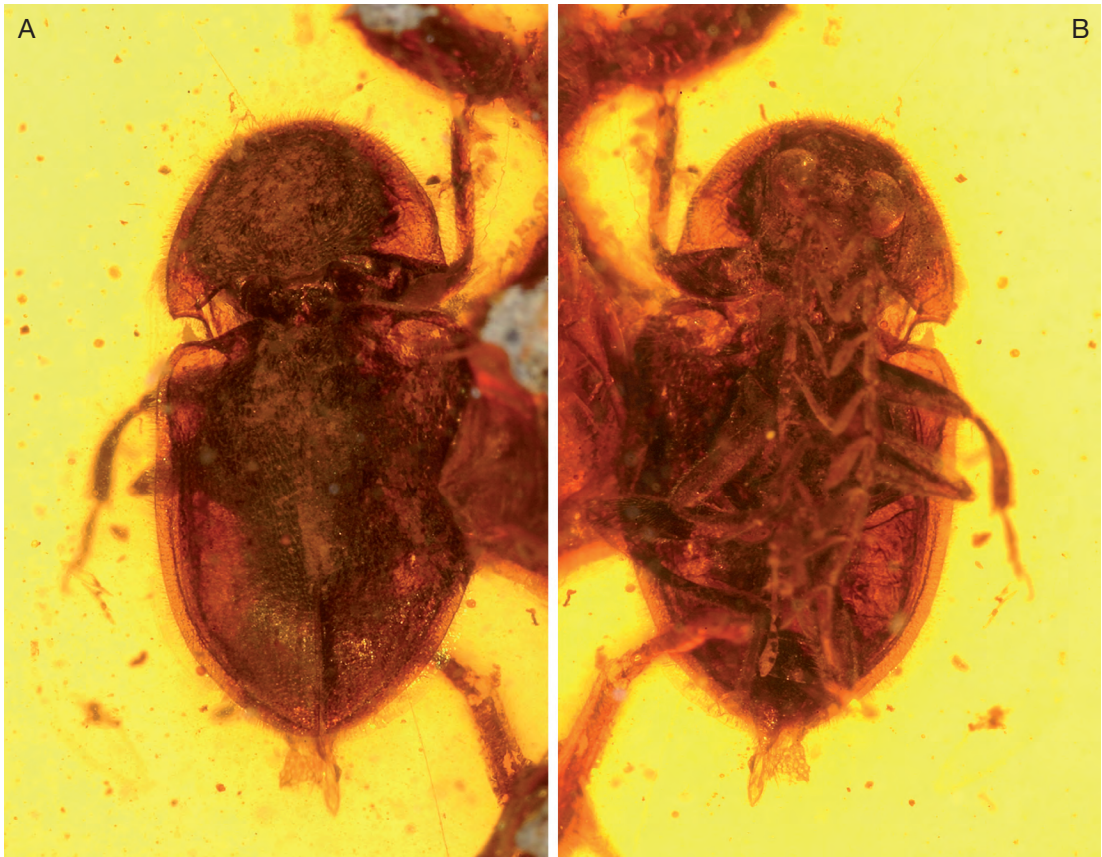


FIG. 1. — Photomicrographs of holotype male of *Aphebodactyla rhetine* n. gen., n. sp. (SEMC Bu-006): **A**, dorsal habitus; **B**, ventral habitus. Total length of specimen: 3.25 mm, excluding the aedeagus.

system. Final photographic images were created using the auto-montage software Helicon Focus 4.1.1 (<http://www.heliconsoft.com/heliconfocus.html>). The age, origin and locality of the Burmese amber deposits have been summarized by Zherikhin & Ross (2000), Grimaldi *et al.* (2002), Cruickshank & Ko (2003) and Ross *et al.* (2010).

SYSTEMATIC PALEONTOLOGY

Family PTILODACTYLIDAE Laporte, 1836

Genus *Aphebodactyla* n. gen.

TYPE SPECIES. — *Aphebodactyla rhetine* n. sp.

ETYMOLOGY. — The new genus-group name is a combination of “*aphebos*” (Greek, meaning “past one’s youth”) and “*dactylos*” (Greek, meaning “finger”), suffix of the type genus for the family. The name is feminine.

DIAGNOSIS. — **Male.** Body broadly elongate. Head hypognathous, not visible from above, quadrate, densely setose; compound eyes large, inner margin notched around antennal base; frons heavily setose. Antenna 11-segmented, pectinate, rami arising from near base of antennomeres III–X, rami not articulated. Frontoclypeal sulcus apparently present (difficult to discern); clypeus triangular, densely setose; labrum subquadrate, apical margin rounded, setose but without apicolateral tufts; mandible relatively flat, sheet-like, strongly and abruptly curved at apex, bidentate (with small, poorly-defined subapical tooth); maxillary palpi long, reaching to apex of antennomere V, apicalmost palpomere elongate, subtriangular, with acute apex; labial palpi short, with acute apex; ligula apparently

quadracuminate. Pronotum weakly convex dorsally, broad at base, narrowed anteriorly, projecting forward beyond head, anterior margin visible in dorsal aspect, densely punctured, punctures nearly confluent, posterior margin smooth (not crenulate), bisinuate with medial area projecting, apex of which bears a shallow emargination (i.e. bidentate, forming concavity which corresponds to rounded anterior border of mesoscutellum), lateral and anterior margins of pronotum strongly margined, margins roughly equiplanar, deflexed anteriorly into small “lip” (striking and uncommon, but not unique, for the family), posterolateral corners sharply orthogonal. Mesoscutellum setose, small, roughly cordiform, anterior margin rounded and smooth. Pronotal hypomera with posterior corners notched; ventral “flange” projecting much more posteriorly than dorsal surface, densely punctured; anterior surface projecting ventrally forming lateral part of capsule to receive head. Episternum heavily setose, broad, flattened, reaching elytral apices; pleurosternal suture strongly marked. Prosternum projecting anteriorly, rimmed to receive head; prosternal spine only reaching middle of procoxae; mesosternum short, reaching middle of mesocoxae, apex widely notched, meeting anterior border of metasternum, not excavated or depressed, with ventral, longitudinal carina or weak keel; metasternum long, transverse metasternal suture present near metacoxae. Legs setose; metathoracic legs longer than pro- or mesothoracic legs; procoxae conical, projecting; contiguous; protrochantin apparently concealed; mesocoxae medially close but separated by posterior projection of mesosternum, globular, projecting, cavities closed behind; metacoxae transverse, without coxal plates but distinctly concave for reception of metatibiae; trochanters triangular; femora clavate, not grooved to receive tibiae; metafemur extending beyond elytra; tibiae elongate, narrow, slightly curved, with two, well-developed (i.e. not reduced) apical spurs; tarsi pentamerous (i.e. five tarsomeres) but appearing tetramerous owing to reduction of fourth tarsomere (pseudotetramerous); basitarsus (= tarsomere I) elongate, apically lobed below tarsomere II; tarsomeres II and III short, with apex broad and lobed below subsequent corresponding tarsomere; tarsomere IV simple, very short and hidden by lobe of tarsomere III; distitarsus (= tarsomere V) elongate; pretarsus bearing two simple claws (ungues), without arolium or empodium (“onychium” of Stribling [1986]). Elytra heavily setose; convex in lateral view; parallel-sided, rounded posteriorly, umbos rounded; anterior margins smooth; lateral margins parallel sided, rounded posteriorly, moderately explanate (the sharpness of the elytral margins, as with the pronotal margins, is striking and unusual for the family); setose punctures in stria, deeper laterally; hind wings present; epipleural fold present, moderate. Abdomen with five visible sterna, densely setose; tergum VI without vertical flange. Aedeagus with short parameres (i.e. not reaching to apex of median lobe), with short, ventrally-curved, non-melanized projections at apices, each apically bearing

a few distinct setae (similar to *Bradytoma*); median lobe without accessory projections.

Aphebodactyla rhetine n. sp.
(Figs 1; 2)

HOLOTYPE. — KU-NHM-ENT Bu-006 labeled “Amber: Myanmar (Burma), Middle Cretaceous (Cenomanian) [actually latest Albian], Kachin: Tanai Village (on Ledo Rd. 105 km NW Myitkyna), coll. Leeward Capital Corp.” and “HOLOTYPE, *Aphebodactyla rhetine* Chatzimanolis, Cashion, Engel, & Falin”. Housed in the Fossil Insect Collection, Division of Entomology, University of Kansas Natural History Museum, Lawrence, Kansas.

ETYMOLOGY. — The specific epithet is taken from the Greek term “*rhetine*”, meaning “resin”, and referring to preservation of this species in Burmese amber.

DIAGNOSIS. — As for the genus (*vide supra*).

DESCRIPTION

Male

As for the genus with the following additional attributes: integument rufo-testaceous. Head width 0.5 mm, deeply withdrawn into prothorax; distance between compound eyes slightly less than width of compound eye; compound eyes reaching pleurosternal suture. Antennal length 2.5 mm, scape longer than wide, pedicel shorter than scape, subquadrate; antennomeres III-X subequal in length, with rami originating from base, each slightly longer than previous antennomere; antennomere XI apically rounded; antennomeres heavily setose. Pronotal width at base 1.5 mm, pronotal length 0.75 mm, densely punctured, setae directed medio-posteriorly. Mesoscutellar length 0.15 mm. Elytra length 2.25 mm, width 1.7 mm, with apparently 11 striae on each side; distance between punctures equal to diameter of one puncture; setae along margin of elytra directed laterally, setae covering elytra directed medio-posteriorly. Legs densely setose; pro- and mesotibia with two large spines at distal margin; hind legs appearing longer than either mid- or forelegs. Aedeagus elongate, apically rounded; parameres lying close to median lobe, inner margins microdentate.

Female

Unknown.

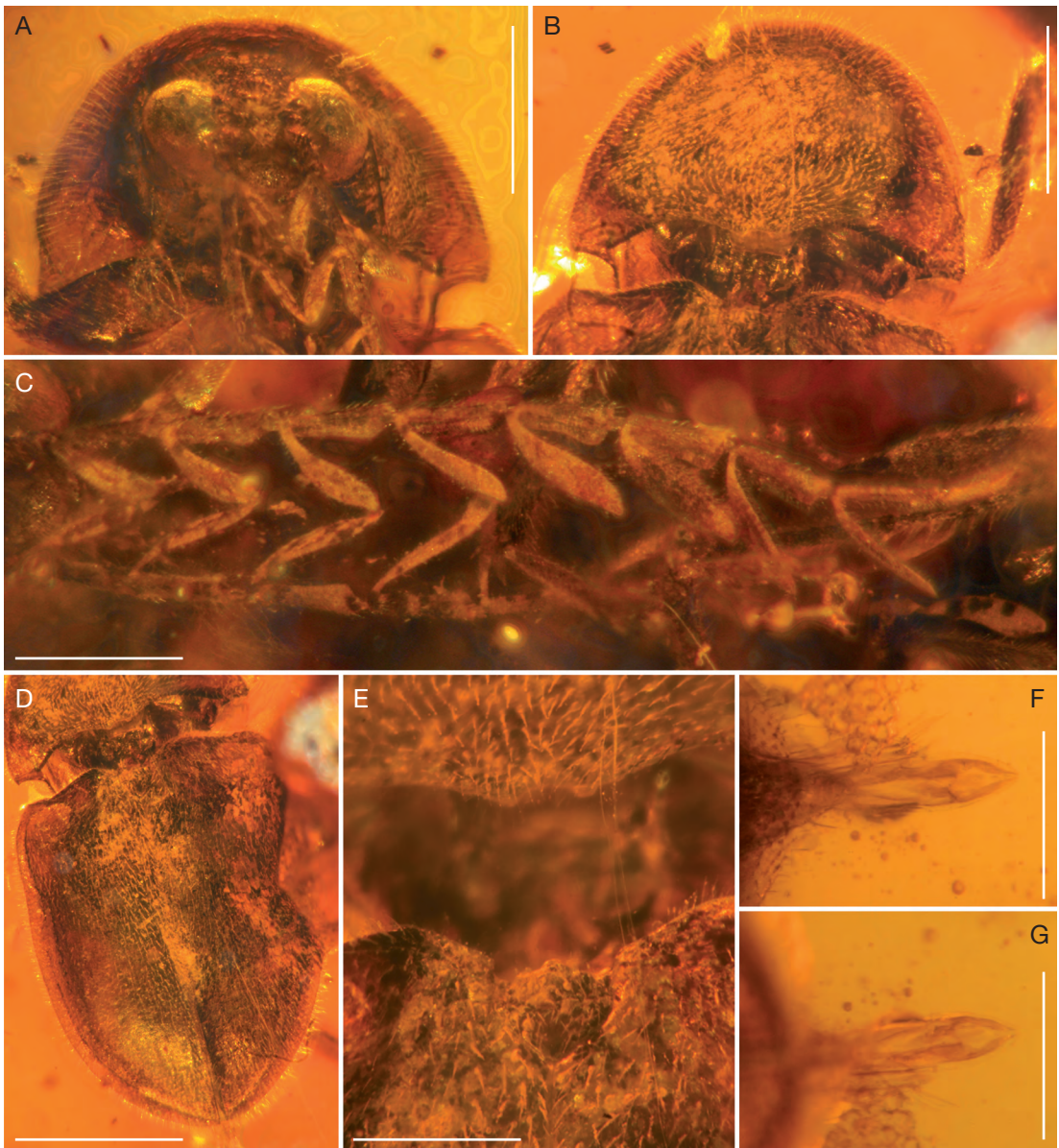


FIG. 2. — Photomicrographs of holotype male of *Aphebodactyla rhetine* n. gen., n. sp. (SEMC Bu-006): **A**, facial aspect; **B**, dorsal aspect of pronotum; **C**, detail of antennae (anterior to the left); **D**, detail of elytra; **E**, detail of mesoscutellum and medioposterior section of pronotum; **F**, detail of aedeagus, dorsal aspect; **G**, detail of aedeagus, ventral aspect. Scale bars: A, B, 0.6 mm; C, 0.4 mm; D, 1.1 mm; E, 0.56 mm; F, G, 0.5 mm.

DISCUSSION

The current classification of Ptilodactylidae recognizes 27 extant genera (Table 1) in six subfami-

lies, one of which has not formally been named (Stribling 1986). *Aphebodactyla* n. gen. cannot be assigned to any of these lineages as it intermingles putatively-derived features of several subfamilies.

In some respects the fossil has several presumably plesiomorphic characters, suggesting genera of the Aploglossinae (e.g., combination of a reduced fourth tarsomere, short parameres, parameres with apical projections [as in *Bradytoma*], transverse metasternal suture [as in *Aploglossa*]). At the same time the concealed protrochantins are indicative of Ptilodactylinae, although many genera in this subfamily, such as *Ptilodactyla* itself, have articulated rami on the antennomeres, a feature not present in the fossil. Indeed, it is possible that *Aphebodactyla* n. gen. is a stem-group ptilodactylinae. Rather than establish a monogeneric subfamily, or tribe if assignment to Ptilodactylinae could be confidently established, to accommodate the Burmese fossil species, the current circumscription of higher groups within Ptilodactylidae should be critically revised. Likely hundreds of new species are resident in collections and this diversity may considerably alter our concepts of the generic and higher groups. A new phylogenetic treatment of the genera of ptilodactylids is needed as the mosaic of characters embodied by *Aphebodactyla* n. gen. suggests that the subfamilies may not be entirely natural as currently defined. Larvae are known from only seven genera (Lawrence & Stribling 1992) but show considerable variation and so much might be ascertained from a concerted effort to more fully document immatures across the family.

It is interesting to note that there appear to be fungal hyphae preserved around the mouthparts of the holotype, suggesting that the individual may have been feeding on microfungi on decaying wood at the time of entrapment in the resin, a diet similar to many of its modern counterparts (Stribling & Seymour 1988).

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