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# New Fossil Elaterids (Coleoptera: Polyphaga: Elateridae) From the Jehol Biota in China

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**ABSTRACT** Three new genera and six new species of fossil elaterids of the tribe Desmatini Dolin, 1975 from second Bed of the Upper Jurassic–Lower Cretaceous Yixian Formation in Huangbanjigou, Liaoning Province, China are described: *Paradesmatus dilatatus* sp. nov., *Desmatinus cognatus* gen. et sp. nov., *Apoclion clavatus* gen. et sp. nov., *A. dolini* gen. et sp. nov., *A. antennatus* gen. et sp. nov. and *Anoixis complanus*, gen. et sp. nov. This tribe demonstrates some characters similar to those in Throscidae and Eucnemidae, elucidating the evolutionary process of the Elateroidea. New materials make clear the distinctness of the genera related to *Desmatus* Dolin, 1975 (tribe Desmatini) from all other Elateridae. *Tetraraphes ebersini* Iablokoff-Khnzorian, 1961 could be regarded somewhat nearby the subfamily Protagrypninae; however, this species seems to be similar to some Cenozoic groups rather than any of Mesozoic groups.

**KEY WORDS** Elateridae, new genera and species, Upper Jurassic–Lower Cretaceous, Yixian Formation, China

More than 100 fossil Mesozoic species of the family Elateridae have been reported worldwide (Dolin in Dolin 1980, Chang et al. 2009). The detailed information on fossil Elateridae is in the catalog by Ponomarenko and Kirejtshuk (2010). Elaterids seem to have originated no later than the Early Jurassic. Nevertheless, the diversity of Mesozoic Elateridae, taking into consideration fossil Elateridae available and remaining undescribed, is so great that at the present it is impossible to make any clear systematic construction for the Mesozoic representatives of this family. Even the positions of many described genera and species need to be revised. The Late Jurassic–Early Cretaceous fossil elaterids of the Yixian Formation from Liaoning, China, can give some data for a next step in the understanding of the composition of Elateridae in Mesozoic, and they can shed new light on the origin and evolution of this group.

Recently, we collected several well-preserved, peculiar fossil elaterids from the second Bed of the Yixian Formation in Huangbanjigou, near Chaomidian Village, Shangyuan County, Beipiao City, Liaoning Province, China. Based on these specimens, we erected three new genera, one genera with three new species and two other genera with one new

species in each, and also one new species assigned to *Paradesmatus* Chang, Kirejtshuk & Ren, 2009.

## Materials and Methods

This study is based on seven specimens from Liaoning that are housed in the fossil insect collection of the Key Laboratory of Insect Evolution and Environmental Changes, College of Life Science, Capital Normal University, Beijing, China. The specimens were examined using an MZ12.5 dissecting microscope (Leica), and new paragraphs were drawn with CorelDRAW 12.0 (Corel Taipei, Taipei, Taiwan) and Adobe Photoshop CS (Adobe Systems, Mountain View, CA). Photographs were acquired with a DXM1200C digital camera (Nikon, Tokyo, Japan).

Body length was measured along the midline from the anterior edge of the frons to the apex of the abdomen, and the width was measured across the broadest part of the elytra. The length of the pronotum was measured along the midline; the width was measured across the broadest part at its posterior angles.

All studied specimens have been collected from the Yixian Formation at Huangbanjigou Village, Beipiao City, Liaoning Province, China. The age of Yixian Formation is still contentious, but it is here provisionally considered it as Upper Jurassic–Lower Cretaceous (Ren et al. 1997).

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## Systematic Palaeontology

### Order Coleoptera Linnaeus, 1758

### Family Elateridae Leach, 1815

### Subfamily Protagrrypinae Dolin, 1973

### Tribe Desmatini Dolin, 1975

**Notes.** The family system was taken from Dolin (1980). Dolin proposed the subfamily Protagrrypinae (Dolin 1973), and he later added the tribes Hypnomorphini and Desmatini (Dolin 1975), with additional longitudinal furrows (sutures) on prosternum, a transverse suture on mesoventrite and the radial cell of posterior wing secondarily divided. In his monograph publication devoted to the fauna of Upper Jurassic Karatau (Kazakhstan) many genera and species were put in this subfamily (Dolin in Dolin 1980), but some of them have been transferred to family Cerophytidae because of their characteristic structure on the head and thorax, particularly the very narrowly separated antennal insertions (H.L.C., unpublished data).

Other families, members of which could be mixed in compression fossils with Elateridae, are Eucnemidae and Throscidae. Rather characteristic members of the latter families and of the Cerophytidae were recorded among inclusions from the Lower Cretaceous Lebanese amber (Kirejtshuk and Azar 2008). The compression fossil Eucnemidae could be distinguished from Elateridae by the following peculiarities: labrum fused to frons (or completely concealed beneath the latter) and reduced anterior part of prothoracic lateral carina, whereas the compression fossil Throscidae, in contrast to Elateridae, have grooves on the thorax to receive the antennae and tarsi, particularly grooves on the metaventricle, and usually their antennae are clubbed. New members of the fossil tribe Desmatini are characterized by the metafemoral plates about as large as those in many Eucnemidae, but their heads is not so curved ventrally. Antennal insertions are not narrowly separated, and the terminal antennomeres of some of them are club-like.

Finally, the representatives of the paleoendemic Mesozoic family Praelateridae are thought to be distinct from Elateridae by the lack of clear cavity in the middle of mesoventrite. Nevertheless, the position of the tribe Desmatini among Elateridae remains questionable, and it needs to be reconsidered after study of further specimens. This group could have some relation to Eucnemidae rather than Elateridae, or at least its rank seems to be necessary to change after a more detailed comparative study.

*Tetraraphes ebersini* proposed by Iablokoff-Khnzorian (1961) as "subfamilia incertae sedis" is characterized by the metacoxal femoral plates rather similar to those in members of Desmatini; however, it has an elongate scutellum, a gently emarginated anterior

edge of prosternum, and closed inner edges of the metafemoral plates. This genus has an unclear position, although it could be close to the tribe Desmatini because the shape of metacoxal femoral plates are somewhat similar to those in *Desmatus* Dolin, 1975 and of *Plesioraphes* Dolin in Dolin et al., 1980 (with apices of the metacoxal femoral plates comparatively narrowly separated). Besides, *T. ebersini*, in contrast to the Mesozoic members of the tribe Desmatini and the subfamily Protagrrypinae in general, is characterized by the unraised chin piece (collar) and by the shallowly imarginated anterior edge of prosternum. The holotype of this species does not show any trace of a median longitudinal suture on the metaventricle. Both these peculiarities occur in different recent groups of Elateridae.

The attribution of all the species here described to Elateridae should be regarded as preliminary. Nevertheless, tribe Desmatini together with the new members could be temporally kept in composition of the subfamily Protagrrypinae (despite of some contradictions in the diagnostic characters of the subfamily and tribe) until further wider revision of the Mesozoic Elateridae and clarification of relation of the latter to Mesozoic Throscidae and Eucnemidae available from Lebanese amber and other outcrops, but waiting for a detailed study and description. It could be expected that the prothoracic structure (including the median plate) of Protagrrypinae considered by Dolin as bearing reliable diagnostic features of the subfamily was not so stable and also needs to be revised.

### Genus *Paradesmatus* Chang, Kirejtshuk & Ren, 2009

**Type Species.** *P. baiae* Chang, Kirejtshuk & Ren, 2009.

**Included Species.** *P. baiae*, *P. ponomarenkoi* Chang, Kirejtshuk & Ren, 2009, and *P. dilatatus* sp. nov.

**Notes.** This genus shows a great similarity to the genus *Desmatus* (Dolin 1975, 1980) in having the large and triangular metacoxal femoral plates but differs from the latter in the following characters: 1) much larger body, 2) pronotum without median plate, 3) mesocoxae much closer to each other, and 4) metacoxal femoral plates larger and obtusely triangular.

### *Paradesmatus dilatatus* sp. nov. (Fig. 1)

**Diagnosis.** This new species demonstrates a great similarity to *P. ponomarenkoi*, but differs from it in the somewhat larger eyes, different shape and ratio of antennomeres, more transverse pronotum, less projecting posterior angles of pronotum, and subpentagonal mesoventral cavity. It differs also from *P. baiae* in the comparatively smaller body, subtriangular head, much larger eyes, more transverse

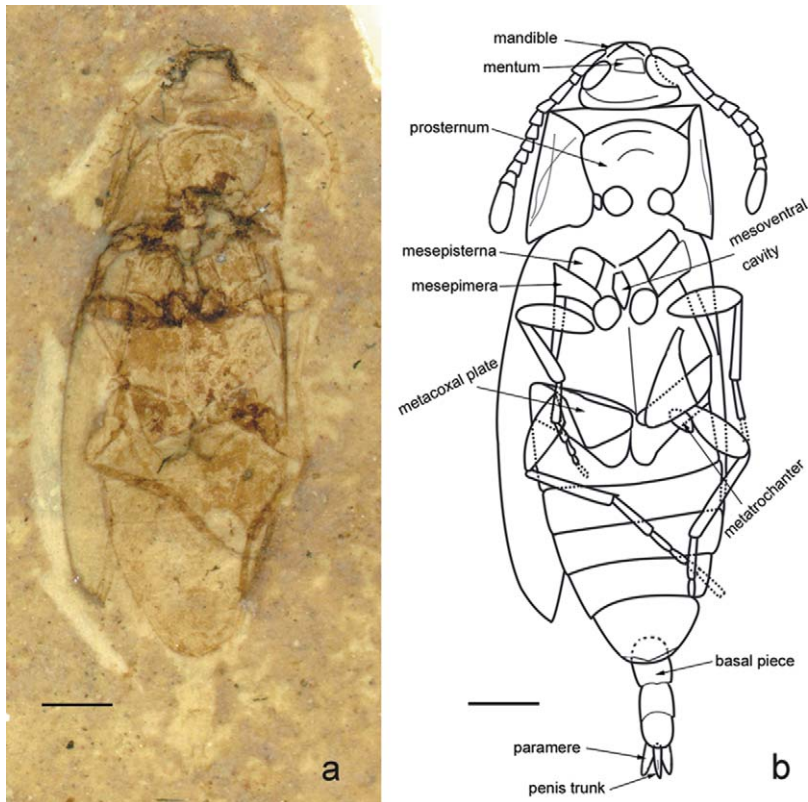


Fig. 1. *P. dilatatus* sp. nov., holotype, CNU-COL-LB2006862. (a) Photograph of ventral view, scale bar = 1 mm. (b) Line drawing of reconstruction, ventral view, scale bar = 1 mm. (Online figure in color.)

pronotum, less projecting posterior angles of pronotum, and peculiar shape and ratio of antennomeres.

**Holotype. Male.** Body slender.

Head subtriangular, about half as long as wide, with small mandibles. Eyes large and apparently oval. Antennae with ultimate segment clubbed; scape thin; pedicel very short (approximately one fourth as long as scape and approximately one fourth to one third as long as antennomere 3); antennomeres 4–8 subequal in size and shape, somewhat subconical; antennomeres 8–11 dilated apically; antennomere 11 elongate and oval, somewhat enlarged and about as long as three previous antennomeres (antennomeres 8–10). Pronotum transverse, with anterior edge nearly straight, lateral edges very slightly curved, posterior edge without basal furrow, a clear carina along the lateral edges. Elytra slightly wider than prothorax, about twice as long as wide combined, acute at apices.

Surface of underside apparently smooth. Procoxal cavities apparently oval and small. Mesoventral cavity subpentagonal; mesocoxal cavities suboval, open to mesepimera, closed to mesepisterna. Mesepimera subtriangular. Metaventrete slightly flattened, with a longitudinal median suture. Metacoxal femoral plates large and subtriangular.

Mesotibia approximately one half as narrow as mesofemur, mesotarsomere 1 much longer than others

taken separately, tarsomeres 2–4 progressively shortening distally. Metatarsomere 1 much longer than others combined, tarsomeres 2–4 progressively shortening distally.

Aedeagus trilobate type, moderately sclerotized, with penis gradually narrowing apically; parameres larger than penis.

**Measurements (millimeters).** Body length 8.7, head length 1.0, head width 1.6, pronotum length 1.9, width of anterior edge of pronotum 2.1, width of posterior edge of pronotum 2.7, elytral length 5.5 and combined width 2.7.

**Material.** Holotype: CNU-COL-LB2006862, imprints of underside, with completely preserved antennae, almost complete genitalia, and contour of elytra visible.

**Etymology.** The Latin “*dilatatus*” means “inflated”, “dilated.”

**Genus *Desmatinus* gen. nov.**

**Type Species.** *Desmatinus cognatus* sp. nov.

**Diagnosis.** Body moderately slender, head moderately short, pronotum arcuate at sides and rather narrowing to posterior angles, scutellum strongly transverse, prosternum with pronotosternal sutures apparently not open and rather wide intercoxal pro-



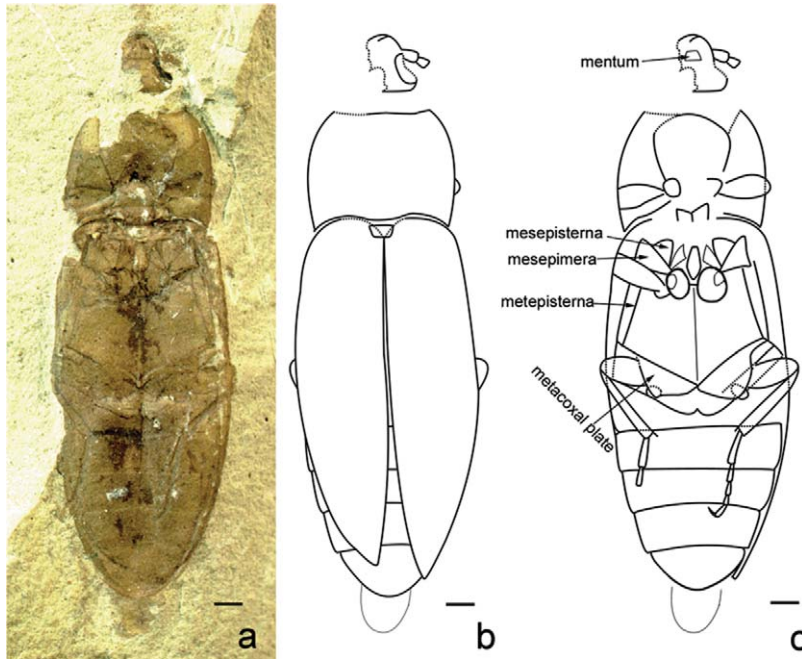


Fig. 2. *D. cognatus* gen. et sp. nov., holotype, CNU-COL-LB2008836. (a) Photograph, dorsal view, scale bar = 1 mm. (b) Line drawing of reconstruction, dorsal view, scale bar = 1 mm. (c) Line drawing of reconstruction, ventral view, scale bar = 1 mm. (Online figure in color.)

cess, metacoxae strongly oblique and with subtriangular femoral plates.

**Comparison.** This new genus is very similar to *Paradesmatus* in having small procoxae, arrangement of mesoventrite and the contour of the abdomen, but distinct from it in the shape of pronotum (arcuate sides and somewhat shorter posterior angles) and strongly transverse scutellum. See also the Comparison of both following new genera.

**Included Species.** The type species only.

**Etymology.** The name of this new genus is formed from the name *Desmatus*. Gender masculine.

*Desmatinus cognatus* sp. nov.  
(Fig. 2)

**Holotype.** Sex unknown. Body subcylindrical, large.

Head subtriangular and rather short behind eyes, apparently slightly convex; eyes comparatively large. Pronotum transverse, with lateral edges slightly arcuate, anterior edge shallowly emarginate, posterior edge trisinate and without basal furrows, posterior angles comparatively short, without carinae. Scutellum strongly transverse ( $\approx 1.5$  times as wide as long) and subtrapezoidal. Elytra somewhat wider than prothorax, approximately twice as long as wide combined, subacuminate at apex.

Underside with uniform, rather sparse and moderately small punctures. Mentum subtrapezoidal. Procoxal cavities oval and small. Mesocoxal cavities suboval and open to mesepimera, closed to mesepisterna, Mesepimera subtriangular. Metaventricle ap-

parently subflattened, with a longitudinal median suture. Metacoxae strongly oblique and with femoral plates demonstrating contiguous inner edges and strongly arcuate outer edges with a deep sinuation at outer end.

Metatibia with an apical spur, tarsomere 1 much longer than others, tarsomeres 2–4 progressively shortening distally, claws moderately long and simple.

**Measurements (millimeters).** Body length 20.2, head length 2.0, head width 2.7, pronotum length 4.0, width of anterior edge of pronotum 3.7, width of posterior edge of pronotum 5.5, elytral length 12.9 and combined width 6.6.

**Material.** Holotype: CNU-COL-LB2008836. Imprint of underside of body, with visible contour of elytra, pronotum and scutellum.

**Etymology.** The Latin “*cognatus*” means “related”, “relevant.”

**Genus *Apoclion* gen. nov.**

**Type Species.** *Apoclion clavatus* sp. nov.

**Diagnosis.** Small beetles with body moderately slender, head subtriangular, antennae with ultimate segment somewhat enlarged, pronotum subtrapeziform and with clear lateral carina, posterior angles of pronotum rather long projecting and sharply acute, scutellum somewhat elongate to slightly transverse, prosternum with moderately wide process, metacoxae strongly oblique and with femoral plates subtriangular and very larger, demonstrating subrectilinear inner edge or with a weak curve at

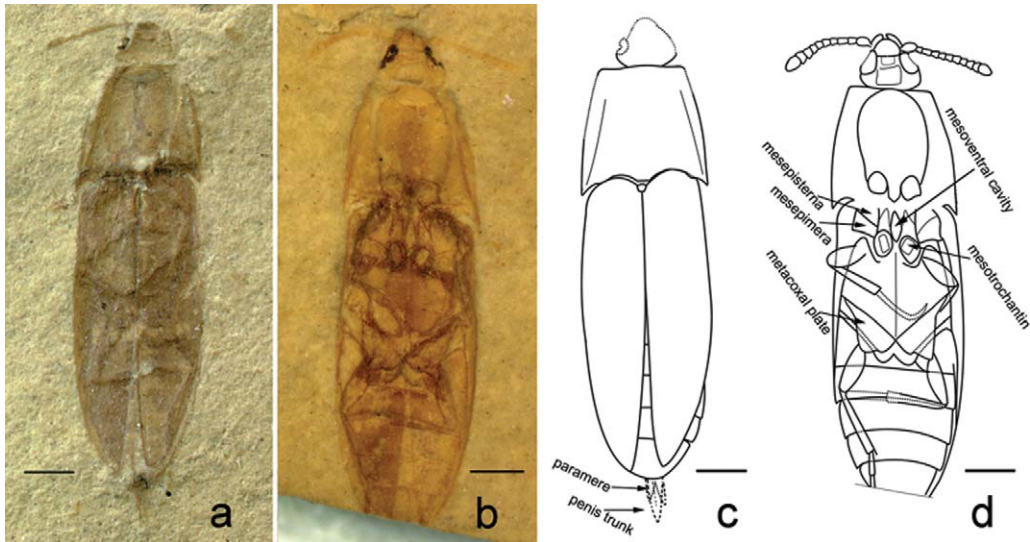


Fig. 3. *A. clavatus* gen. et sp. nov., holotype, CNU-COL-LB2008828-PC. (a) Photograph of dorsal view, scale bar = 1 mm. (b) Photograph of ventral view, scale bar = 1 mm. (c) Line drawing of reconstruction, dorsal view, scale bar = 1 mm. (d) Line drawing of reconstruction, ventral view, scale bar = 1 mm. (Online figure in color.)

their middle, elytra with a characteristic thickening in shape of the Y-network.

**Comparison.** This new genus differs from all other genera of the tribe with more clearly subtriangular metacoxal femoral plates in the strongly oblique metacoxal femoral plates. It differs also from:

- *Paradesmatus* in the more slender body, pronotum with narrower anterior edge and somewhat more arcuate sides, anterior edge of prosternum at the same level with posterior edge of pronotum;

- *Desmatinus* gen. nov. in the much smaller body size, pronotum with less arcuate sides and more longer posterior angles and elongate scutellum;

- *Anoixis* gen. nov. in the more slender body, more elongate pronotum with very long projecting posterior angles;

- *Desmatus* in the absence of median plate on prosternum, shorter prosternal process and shape of larger metacoxal femoral plates;

- *Plesiorhaphes* in the more slender body, more trapeziform pronotum with slightly arcuate sides, lack of median plate on prosternum and shape of larger metacoxal femoral plates.

**Included Species.** Three new species here described.

**Etymology.** The Greek “ἀπόκλιση” meaning “declination” and refers to the strongly oblique metacoxal femoral plates. Gender masculine.

*Apoclion clavatus* gen. et sp. nov.  
(Fig. 3)

**Diagnosis.** This new species differs from both other new species in the outlines of lateral and posterior edges of pronotum, shortly projecting posterior angles of pronotum and a small sinuation along the inner edge of metacoxal femoral plates; and also from *A. dolini* sp.

nov. in the narrower body, longer head and longer prothoracic segment, particularly prosternum with arcuate anterior edge; and from *A. antennatus* sp. nov. in the much shorter antennae with especially shorter scape and ultimate antennomere, and also markedly shorter legs.

**Holotype. Male.** Body slender, medium sized, dorsum with sparse setae.

Head subtriangular, about as long as wide, with small mandibles, a transverse depression, subquadrangular mentum. Eyes comparatively large. Antennae 11-segmented, scape oval (slightly longer than antennomere 3), pedicel somewhat shorter than scape and antennomere 3, antennomeres 4–8 nearly comparable in size and shape, subconical, antennomeres 8–11 progressively becoming more dilated, antennomere 11 oval, club-like, small. Pronotum trapeziform, anterior edge subrectilinear, lateral edges very slightly arcuate, posterior edge trisinate and with a curve at posterior angle, apparently with a carina along lateral edges. Elytra slightly longer than wide combined.

Surface of underside apparently smooth. Procoxal cavities oval and moderately small. Prosternal process comparatively wide, subparallel-sided and subacute at apex. Mesoventral cavities subrhombic. Mesocoxal cavities somewhat larger than procoxal cavities, open to mesepimera and closed to mesepisterna. Mesepimera subtriangular. Metaventrite apparently flattened, with a longitudinal median suture, metacoxal femoral plates large and subtriangular, longest at inner part of them and approximately one third as long as wide.

Mesotibia approximately half as wide as mesofemur. Metafemur distinctly shorter than anterior edge of single metacoxa. Metatibia very narrow and with apical spur.

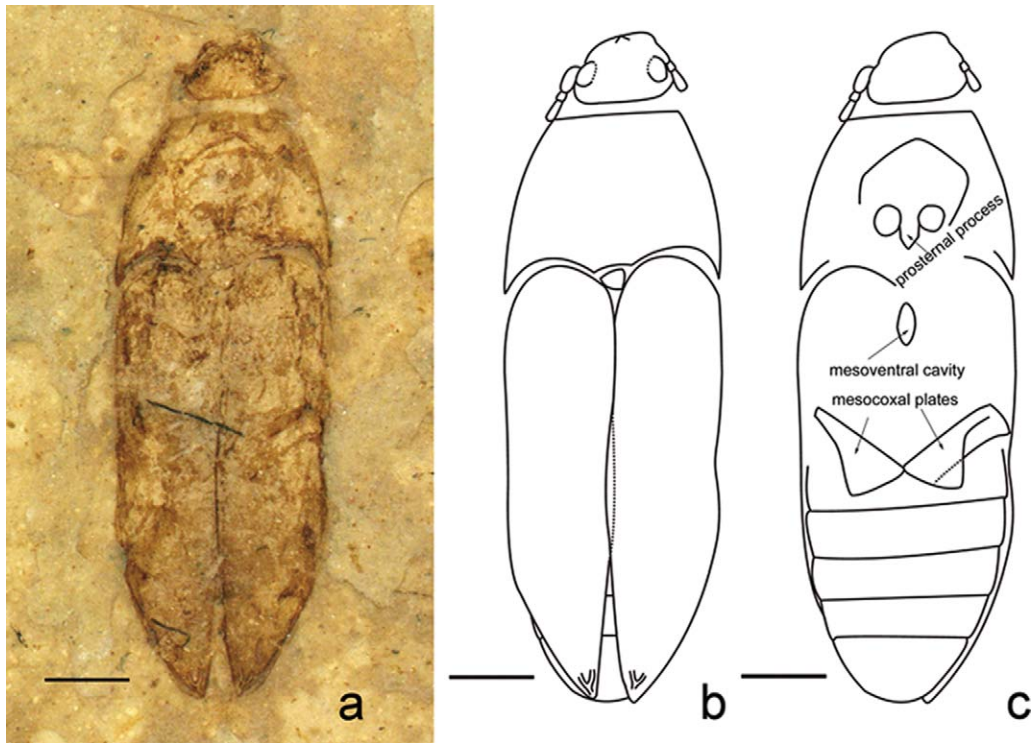


Fig. 4. *A. dolini* gen. et sp. nov., holotype, CNU-COL-LB2008862. (a) Photograph of dorsal view, scale bar = 1 mm. (b) Line drawing of reconstruction, dorsal view, scale bar = 1 mm. (c) Line drawing of reconstruction, ventral view, scale bar = 1 mm. (Online figure in color.)

Aedeagus, moderately sclerotized, with penis trunk gradually narrowing apically and comparatively short parameras.

**Measurements (millimeters).** Holotype, body length 9.3, head length 1.2, head width 1.3, pronotum length 2.4, width of anterior edge of pronotum 1.3, width of posterior edge of pronotum 2.6, elytral length 6.0 and combined width 2.6.

**Material.** Holotype: CNU-COL-LB2008828PC, male. Imprint of part and counterpart, with nearly completely preserved dorsal and ventral sides.

**Etymology.** The Latin “*clavatus*” means “clubbed” and refers to the clubbed antennae in this new species.

*Apoclion dolini* sp. nov.  
(Fig. 4)

**Diagnosis.** This new species differs from *A. clavatus* sp. nov. in the wider body, shorter head and shorter prothoracic segment, particularly in the prosternum with subangular anterior edge, outline of lateral and posterior edges of pronotum, long projecting posterior angles of pronotum and subrectilinear inner edge of metacoxal femoral plates. It differs from *A. antennatus* sp. nov. in the wider body, shorter head, outline of posterior edge of pronotum.

**Note.** This new species is similar to the previous species, and many shared characters are not repeated below.

**Holotype.** Sex unknown. Body medium sized, dorsum with sparse setae.

Head subtrapeziform, length 0.8 times as long as wide. Antennae with three visible segments, scape large, pedicel much shorter than scape and antennomere 3. Pronotum subtrapeziform, anterior edge subrectilinear, lateral edges gently arcuate, posterior edge trisinate. Elytra  $\approx 2.0$  times as long as the combined width.

Procoxal cavities oval and moderately small. Prosternum short and with subangular anterior edge, its process subparallel-sided and subacute at apex. Mesoventral cavities subrhombic to suboval. Mesepimera subtriangular. Metaventricle with a longitudinal median suture, metacoxal femoral plates large and subtriangular.

**Measurements (millimeters).** Holotype, body length 8.0, head length 0.8, head width 1.4, pronotum length 1.9, width of anterior edge of pronotum 1.7, width of posterior edge of pronotum 2.7, elytral length 5.5 and combined width 2.7.

**Material.** Holotype: CNU-COL-LB2008862. Positive imprint of dorsum and contour of prosternal process, mesoventral cavity, metacoxae, metacoxal femoral plates. Elytra overlapping, apices of elytra with Y-shaped sculpture.

**Etymology.** The name of this new species is devoted to Vladimir G. Dolin, outstanding specialist on fossil and recent Elateridae in the twentieth century.



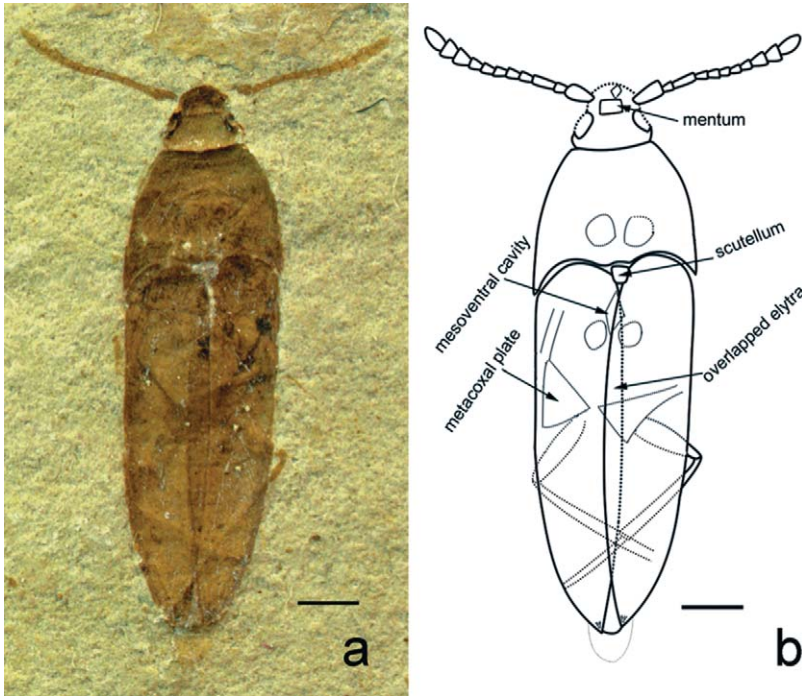


Fig. 5. *A. antennatus* gen. et sp. nov., holotype, CNU-COL-LB2006841. (a) Photograph of dorsal view, scale bar = 1 mm. (b) Line drawing of reconstruction, dorsal view, scale bar = 1 mm. (Online figure in color.)

*Apoclion antennatus* sp. nov.  
(Fig. 5)

**Diagnosis.** This new species differs from both other new species of the genus in the clearly emarginated anterior edge of pronotum and rather long legs. It also differs from *A. clavatus* sp. nov. in the outline of the lateral and posterior edges of pronotum, longer projecting posterior angles of pronotum, subrectilinear inner edge of metacoxal femoral plates, much longer antennae with especially long scape and ultimate antennomere. It also differs from *A. dolini* sp. nov. in the more slender body and longer head.

**Holotype. Male.** Body slender, medium sized.

Head subtriangular,  $\approx 0.9$  time as long as wide, with small mandibles, frons with transverse depression. Eyes oval. Antennae with scape comparatively large (slightly longer than antennomere 3), pedicel much shorter than scape and antennomere 3, antennomeres 4–8 nearly comparable in size and shape, subconical, antennomeres 9–11 progressively enlarging, ultimate antennomere club-shaped and elongate. Pronotum subtrapeziform, anterior edge slightly emarginate, lateral edges gently arcuate, posterior edge strongly trisinate and with very long projecting posterior angles. Elytra  $\approx 2.3$  times as long as wide combined.

Procoxal cavities oval. Mesoventral cavities subrhombic. Metacoxal femoral plates large and subtriangular. Mesocoxae oval. Metacoxae transverse, subtriangular. Legs apparently rather long. Metafemur slightly longer than anterior edge of metacoxae.

**Measurements (millimeters).** Body length 9.1, head length 1.0, head width 1.5, pronotum length 1.9, width

of anterior edge of pronotum 1.6, width of posterior edge of pronotum 2.7, elytral length 6.0 and combined width 2.8.

**Material.** Holotype: CNU-COL-LB2006841, positive imprint of dorsum and contour of metacoxal femoral plates. Body with long antennae, elytra overlapping, elytra with an unclear radiate sculpture at apices.

**Etymology.** The Latin “*antennatus*” is the adjective from “*antenna*” referring to the long antennae in this new species.

**Genus *Anoixis* gen. nov.**

**Type Species.** *Anoixis complanus* sp. nov.

**Diagnosis.** Body robust, head comparatively short, pronotum subtrapeziform and with comparatively shortly projecting posterior angles, scutellum slightly transverse, prosternum with partly and comparatively deeply open pronotosternal sutures, rather narrow and very long intercoxal process, apparently somewhat explanate pronotal sides, slightly emarginate sides of elytra, metacoxae strongly oblique and with large subtriangular femoral plates demonstrating a clear curve at the middle of their inner edge.

**Comparison.** This new genus differs from other genera of the tribe in the elytra slightly narrowed at the basal one fourth, the very narrow prosternal process, and also from the following genera:

– *Apoclion* gen. nov. in the clearly more robust body, shorter posterior angles of pronotum, much narrower prosternal process, rather open pronotosternal sutures



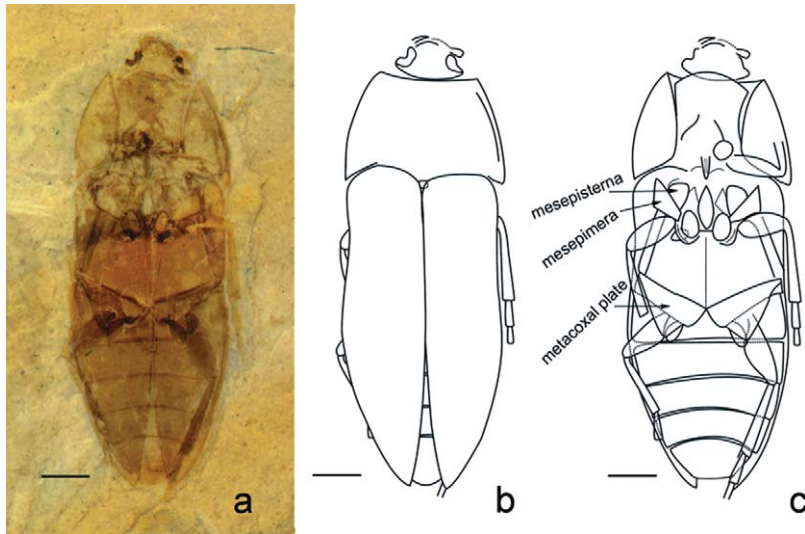


Fig. 6. *A. complanus* gen. et sp. nov., holotype, CNU-COL-LB2006863. (a) Photograph of ventral view, scale bar = 1 mm. (b) Line drawing of reconstruction, dorsal view, scale bar = 1 mm. (c) Line drawing of reconstruction, ventral view, scale bar = 1 mm. (Online figure in color.)

and comparatively not so strongly oblique metacoxal femoral plates;

- *Paradesmatus* in the clearly more robust body, somewhat more transverse pronotum with much more arcuate sides and shorter posterior angles, much narrower prosternal process and somewhat larger metacoxal femoral plates;

- *Desmatinus* gen. nov. in the much more robust body, pronotum with maximum width at base;

- *Desmatus* in the clearly more robust body, pronotum more narrowing anteriorly, absence of median plate on prosternum and larger metacoxal femoral plates with somewhat excised inner edge;

- *Plesiorhaphes* in the much longer elytra, shorter posterior angles of pronotum, lack of median plate on prosternum and shape of much larger metacoxal femoral plates with longer and less strongly oblique inner edge with a clear curve at its middle.

**Included Species.** The type species only.

**Etymology.** The Greek “άνοτις” means “opening” and refers to the open pronotosternal sutures; gender feminine.

*Anoixis complanus* gen. et sp. nov.  
(Fig. 6)

**Holotype.** Sex unknown. Body robust, medium sized.

Head subtriangular, with comparatively small mandibles. Eyes medium sized, suboval. Pronotum transverse, subtrapeziform, anterior edge distinctly emarginate, anterior angle with clear tops, lateral edges broadly arcuate from the base, basal edge trisinate with rather small median situation, lateral carina looking like clear along the whole length. Elytra: slightly longer than wide combined.

Ventral surface apparently smoothed. Prosternum with chin piece (collar) rounded anteriorly covering base of head, procoxal cavities rounded, small. Mesoventral cavities suboval to subrhombic, mesepimera subtriangular, mesepisterna fan-like, open to mesepimera, close to mesepisterna. Metaventricle nearly flattened, with a longitudinal median suture, metacoxal femoral plates subtriangular, strongly oblique and with a clear curve at the middle of inner edge.

Mesocoxae oval and apparently somewhat larger than procoxae. Mesotibiae about half as wide as mesofemur. Mesotarsi with tarsomere 2 and two thirds as long as tarsomere 1. Metacoxa strongly oblique. Metatibia with a comparatively short apical spur.

**Measurements (millimeters).** Body length 9.3, head length 1.0, head width 1.7, pronotum length 2.0, width of anterior edge of pronotum 2.0, width of posterior edge of pronotum 3.0, elytral length 6.8, combined elytral width 3.2.

**Material.** Holotype: No. CNU-COL-LB2006863. Imprint with nearly completely preserved underside of body, except antennae, with visible contour of dorsum; legs partly preserved.

**Etymology.** Epithet of the new species means “compressed, flat” and refers to the flat body of this new species.

### Discussion

Among >200 specimens of elaterids in the CNU collection from the Yixian Formation, all of the genera and species described here are quite rarely represented in comparison with the dominant species *Cryptocoelus major* Dolin and Nel, 2002. The new genera and new species described here bear some peculiar characters that show some similarity with Throscidae

and Eucnemidae, such as expanded last antennomeres, pronotal posterior angles strongly projecting posteriorly and strongly enlarged femoral plates of metacoxae. Relationships of Desmatini with groups of the mentioned families are still unclear and need some further study. The taxa here described in contrast to most formerly described Desmatini have not any clear median plate isolated along the prosternum. *D. cognatus* gen. et sp. nov. from the Late Jurassic to Early Cretaceous Yixian Formation of Northeastern China shows a rather great similarity to the species of *Paradesmatus* from the Middle Jurassic Daohugou beds, Jiulongshan Formation, Ningcheng County, Inner Mongolia in China (Chang et al. 2009).

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