

First Mesozoic Representative of the Subfamily Tenebrioninae (Coleoptera, Tenebrionidae) from the Lower Cretaceous of Yixian (China, Liaoning)

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Abstract—A new genus and a new species of the tenebrionine tribe Alphotibiini, *Alphotopsis initialis* gen. et sp. nov. is described from Yixian (Liaoning Province, China). The new genus is the oldest member of the subfamily Tenebrioninae and it is most similar to *Metaclisa* Jacquelin du Val, 1861, but differs from all the genera of the tribe Alphotibiini in the structure of elytral epipleura and antennae.

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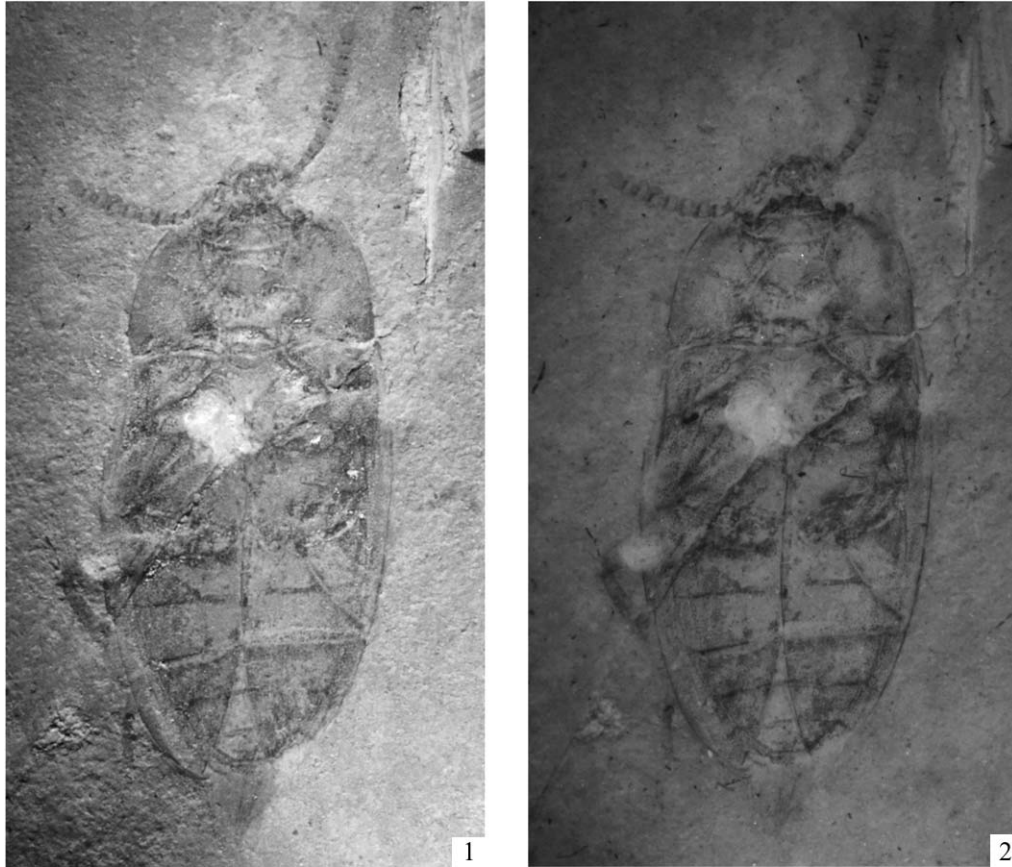
The Yixian Beds have been long known for the richness and diversity of well preserved fossils from different groups of animals and plants. The age of these localities is defined by some researchers as Jurassic and others as Jurassic-Cretaceous or Cretaceous. The deposits included in the Yixian Formation seem to be heterochronous or taphonomically greatly various, since in the Chinese Provinces Liaoning and Hebei they have completely different complexes of fossil insects. In most publications the Lower Cretaceous age is mentioned, however both radiological methods (Wang et al. 2005 etc.) and biostratigraphical comparisons of beetles and other insects (Kirejtshuk et al. 2010 etc.) more probably testify to the boundary between the Jurassic and the Cretaceous. In the latter of the above publications the finding in this site of darkling beetles from the subfamilies Alleculinae Laporte, 1840 and Diaperinae Latreille, 1802 were mentioned and a species with the pectinate tarsal claws was described (Wang & Zhang, 2011) from the Middle Jurassic of Daohugou (Inner Mongolia, China) which should be attributed to the superfamily Tenebrionoidea. L.N. Medvedev (1969) described *Jurallecula grossa* Medvedev, 1969 in the subfamily Alleculinae from the Lower Jurassic of Karatau. A.G. Kirejtshuk et al. (2008) published a review of all the names proposed for fossil darkling beetles and a more detailed overlook of them is given in the catalogue by Ponomarenko and Kirejtshuk (2011).

In this paper a new genus and a new species of the subfamily Tenebrioninae Latreille, 1802, which was assigned to the tribe Alphotibiini Reitter, 1917 sensu Doyen, 1989 are described. In the darkling beetles of this tribe similar to the species described here the mentum does not fill up the whole hypostomal sinus (hypostomal area), i.e. the lateral sides of the mentum do not border on the outer edges of the hypostomal sinus leaving the base of the maxillae uncovered. Besides, the pseudoepipleura are absent in Tenebrioninae, their meso- and metatibiae are without spines and metaventrite is longer than the transverse diameter of the mesocoxae. The tribe Alphotibiini includes the genera *Alphotobius* Stephens 1829, *Diaclina* Jacquelin du Val, 1861, *Hoplopeltis* Fairmaire, 1894, *Metaclisa* Jacquelin du Val, 1861, and *Peltoides* Laporte, 1833 characterized by a deep V-shaped depression on the mesoventrite where the prosternal process projecting behind the procoxae is usually placed.

To study the specimen the traditional optics were used: the microscope Olympus SCX9 in Muséum National d'Histoire Naturelle, Paris and stereomicroscope Leica MZ 16.0 in the Zoological Institute of RAS. The specimen examined is deposited in the collection of Muséum National d'Histoire Naturelle, Paris.

Genus *ALPHITOPSIS* Kirejtshuk, Nabozhenko et Nel, gen. n.

Type species *Alphotopsis initialis* gen. et sp. nov. (Figs 1, 2, see the inset; Fig. 3)



Figs. 1–2. *Alphetopsis initialis* gen. et sp. nov., body, ventral view: (1) dry print, (2) print in alcohol. Body length 9.7 mm.

Diagnosis. Body comparatively large (about 10 mm). Head moderately transverse, with eyes rounded oval from below. Antennae, beginning with antennomere 6, moniliform; each antennomere with narrow stick-shaped base. Apex of ultimate antennomere acuminate. Apical maxillary palpomere narrow, obliquely truncate at apex, not dolabriform. Mentum comparatively narrow, not narrowing anteriorly. Penultimate maxillary palpomere markedly elongate (considerably longer than wide), slightly widening from base to apex. Pronotum transverse, its posterior edge slightly bi-emarginate and anterior edge widely emarginate. Sides of elytra regularly rounded, not parallel-sided. Epipleura of elytra gradually (not sharply) narrowed to apex, however, they not reaching sutural angle forming sharp edge at apex. Width of metacoxae about subequal to length of metaventricle.

Comparison. The new genus is most similar to the genus *Metaclisa*, but differs in the shape of the elytral epipleura which in *Metaclisa* sharply narrows at the level of the boundary of the abdominal ventrites 4 and 5 and further they form a sharp edge to the sutural angle (Fig. 4). Antennomeres 7–10 in the *Metaclisa*

are widened, moniliform (Fig. 7), while in the *Alphetopsis* gen. nov. antennomeres 6–10 possess a stick-shaped base. Antennomere 3 of the *Metaclisa* is distinctly longer than each of the rest of antennomeres, while in the *Alphetopsis* gen. nov. antennomeres 2–5 are similar to each other, and are subtriangular. The sides of the elytra of the *Metaclisa* are very slightly rounded, frequently subparallel-sided, while those in the new genus are evenly rounded. From the rest of the genera of the tribe Alphetobiini, including *Alphetobius* and *Diaclina*, the new genus differs in the shape of the epipleura of elytra which reach the sutural angle of the elytra in the above genera (Figs 5, 6). By the structure of the maxillary palpomeres, narrow and obliquely truncate at the apex, the new genus is similar to *Alphetobius*, while *Metaclisa* has slightly dolabriform palpomeres. From all the genera of the tribe Alphetobiini known before the new genus also differs in the structure of antennae, the antennomeres 6–11 of which are separated by the stick-shaped base, the shape of the apical antennomere which has an acuminate apex in *Alphetopsis* gen. nov., as well as in antennomeres 2–5 similar to each other. The antennae in the genera *Al-*

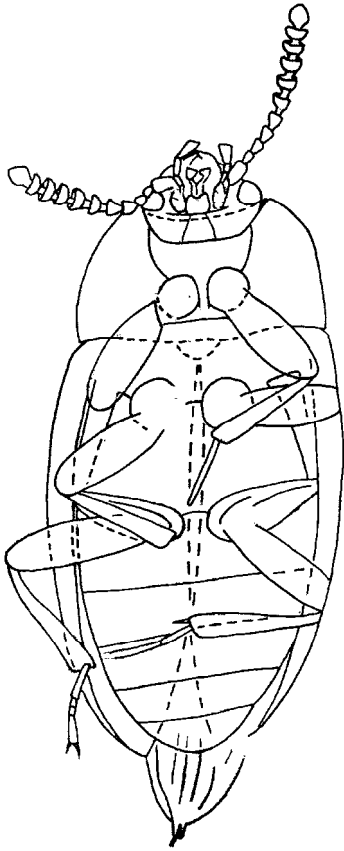


Fig. 3. *Alphitopsis initialis* gen. et sp. nov.. Body, ventral view (dotted lines show contours of dorsal sclerites). Body length is 9.7 mm.

phitobius and *Diaclina* are without stick-shaped bases in antennomeres 6–10 and the ultimate antennomere is rounded at the apex (Figs 8, 9).

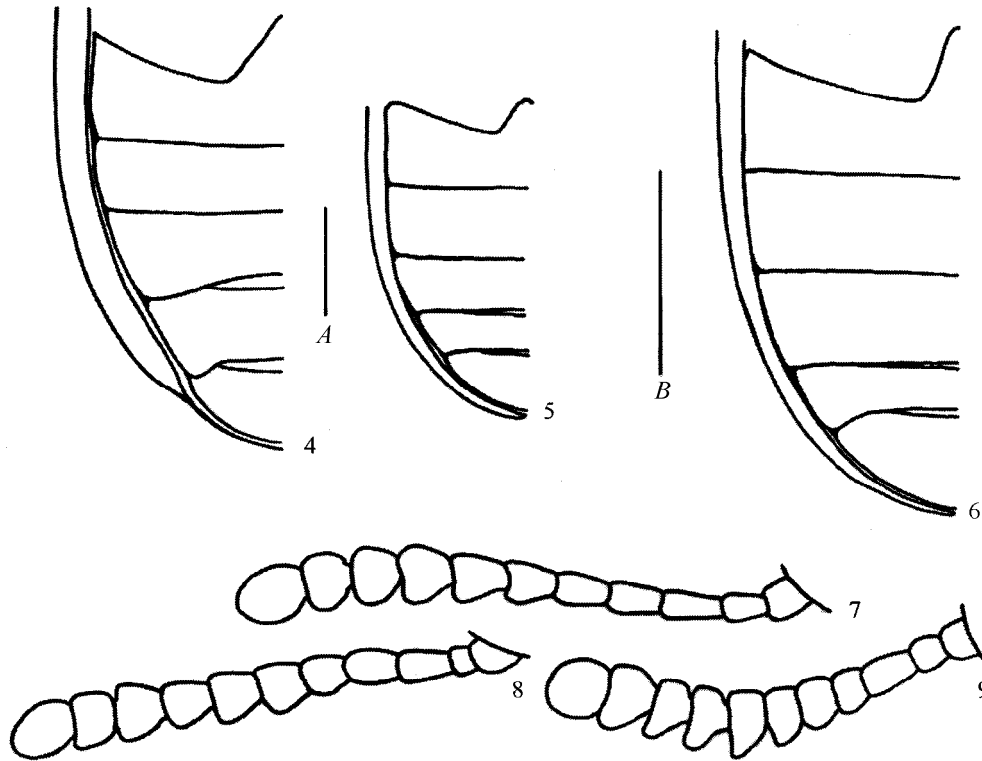
Etymology. The name of the new species is formed from the name *Alphitobius* and the Greek root “*opsis*” (appearance).

Alphitopsis initialis Kirejtshuk, Nabozhenko et Nel, gen. et sp. nov.

Material. “A 31966”—a female with a membranous ovipositor exposed beyond the apex of the abdomen; the print is well preserved, on which there are clearly seen sclerites of the underside and the outlines of the anterior and posterior edges of the pronotum, scutellum and elytra can be traced; among the body appendages, antennae, maxillary and labial palpi, the right fore profemur, the left ore leg, mesofemora, the left mesotibia and tarsus are visible, and also the hind legs can be traced; China, Liaoning Province, Chaomidian Village, Huangbanjigou; Yixian Formation.

Description of holotype (female). Length 9.7, width 4.6 mm, length of elytra 6.5 mm. Body apparently slightly convex ventrally and moderately convex dorsally. Integument of underside uniformly covered with fine punctures (apparently about as large as eye facets), interspaces between which less than their diameter.

Head slightly transverse, with moderately large eyes. Mandibles moderately developed and moderately exposed before epicranium. Labial and maxillary palpi moderately developed, latter with ultimate palpomere widened to oblique (not dolabriform) apex, obliquely truncate at apex (about 2.5 times as long as thick), ultimate labial palpomere widened to apex. Antennae 11-segmented, nearly moniliform at base of flagellum, with apical antennomeres gradually widening and becoming transverse; scape largest; terminal antennomere with acuminate apex. Pronotum apparently evenly convex, with widely rounded anterior and distinct posterior angles, its anterior edge weakly and evenly emarginate, and posterior one bi-emarginate. Scutellum transverse and with widely rounded apex. Elytra about 1.5 times as long as wide, widely and evenly rounded at sides towards almost conjointly acuminate apices (apparently not forming a sutural angle). Prosternum transverse, nearly twice as wide as long, its anterior edge comparatively deeply trapezoidally excised, pronotosternal sutures distinct and divergent anteriorly. Procoxae oval and separated by narrow process of prosternum. Mesoventrite apparently as long as prosternum, with V-shaped depression. Mesocoxae oval, somewhat larger than procoxae and about twice more greatly separated than procoxae. Metaventrite somewhat shorter than pronotum, its posterior edge arcuately excised between coxae [last two words are omitted in the Russian version]. Anterior edge of metepisterna about twice wider than posterior one. Metacoxae transverse, somewhat oblique, about three times more widely separated than procoxae, which about 2.5 times as wide as metaventrite long [in the Russian version the length of metaventrite is erroneously compared with length of metacoxae instead of width of the latter]. Abdominal ventrites 2 and 3 apparently divided by membrane, as following ventrites; ventrite 1 longest, proceeding ventrites 2–5 nearly gradually diminishing in length, hypopygidium widely rounded at apex. Epipleura of elytra about 1.5 times as wide as apical segments of antennae, gradually narrowing apically.



Figs. 4–9. Tribe Alphitobiini: (4, 7) *Metaclisa viridis* Motschulsky, 1860; (5, 9) *Alphitobius diaperinus* Panzer, 1796; (6, 8) *Diaclina fagi* Panzer, 1799 [(4–6) epipleura; (7, 8, 9) antennae]. Scale 1 mm: (A) to Figs. 4, 5, (B) to Fig. 6.

Legs of medium size. Femora of all pairs subequal in width, hind femora about one and third as long as intermediate ones. Tibiae slightly widened towards apex and about 2/3 as wide as femora. Metatarsomeres 1–3 subcylindrical, metatarsomere 1 slightly longer than metatarsomeres 2 and 3 combined, apical metatarsomere comparable in length with first one.

Ovipositor apparently narrow and moderately long, weakly sclerotized and with moderately short and narrow 1-segmented styli.

Etymology. The name of the new species originated from the Latin “initialis” signifying initial or primary.

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