

The First Record of the Family Cleridae (Coleoptera): *Shartegopsis miranda* gen. et sp. nov. in the Mesozoic (Shar-Teg, Upper Jurassic, Southwestern Mongolia)

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Abstract—A new genus and species of the family Cleridae, *Shartegopsis miranda* gen. et sp. nov., is described from Shar-Teg (southwestern Mongolia, Upper Jurassic). Judging by the characters that can be examined, it can probably belong to the subfamily Tillinae, and it is the earliest known member of the family. *Mathesius liaoningensis* Kolibac et Huang, 2011 is considered closely related to species of the paleoendemic family Parandrexidae.

Keywords: Coleoptera, Cleridae, new genus, new species, fossil, Upper Jurassic, Mongolia

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INTRODUCTION

The superfamily Cleroidea is the earliest group of cucujiform beetles known from the Lower Jurassic (Ponomarenko and Kirejtshuk, 2012), where it is represented by the archaic family Peltidae (Kirejtshuk and Ponomarenko, 1990), recorded earlier in the Lower, Middle, and Upper Jurassic as species of the genus *Thoracotes* Handlirsch, 1906 from Dobbartin (Germany: Handlirsch, 1906), Kubekovo (Krasnoyarsk Region, Russia: Ponomarenko, 1985), and Daya (Transbaikalia, Russia: Ponomarenko and Ryvkin, 1990). The following Mesozoic species have already been described in the same family: *Lithostoma expansum* Martynov, 1926, *Juralithinus gracilidorsum* Kirejtshuk et Ponomarenko, 1990, *Meligethiella kovalevi* Kirejtshuk et Ponomarenko, 1990 from the Upper Jurassic locality of Karatau (Kazakhstan); *M. glabra* Kirejtshuk et Ponomarenko, 1990 from the Lower Cretaceous Turga (Transbaikalia, Russia); *M. soronii-formis* Medvedev, 1969 from the Lower Cretaceous Baisa (Transbaikalia, Russia); *Ostomalinus ovalis* Kirejtshuk et Ponomarenko, 1990 from the Lower Cretaceous of Pavlovka (Transbaikalia, Russia); *Cretocateres mongolicus* Ponomarenko, 1986 from the Lower Cretaceous of Myangad (Khovd Province, Mongolia); *Peltocoleops onokhojensis* Ponomarenko, 1990 from the Lower Cretaceous of Onokhovo (Transbaikalia, Russia); *Sinosoronia longiantenna* Zhang, 1992 and *Palaeoendomychus gymnis* Zhang, 1992 from the Lower Cretaceous of Laiyang (Shandong, China); Cenozoic beetles described in this family include several species of the genus *Peltis* Geoffroy, 1762 from the

Upper Eocene Baltic amber (Klebs, 1910; Larsson, 1978) and from the Lower Oligocene of Florissant (Wickham, 1910) and species of other genera from the Baltic amber (*Calitys* Thomson, 1859; *Lophocateres* Olliff, 1883, and *Grynocharis* Thomson, 1859; Klebs, 1910; Larsson, 1978; Kubisz, 2000). At the same time, already in the Jurassic this superfamily was diversified enough for recognizing among its members the families *Parandrexidae* Kirejtshuk, 1994 and *Cleridae* Latreille, 1802. Members of Cleroidea have been recorded in the Middle Jurassic of Daohugou (Inner Mongolia, China: Peltidae and Parandrexidae) and Upper Jurassic–Lower Cretaceous of Yixian (Liaoning Province, China: Peltidae, Parandrexidae, Cleridae, Trogossitidae Latreille, 1802, Melyridae Leach, 1815, and Dasytidae Laporte de Castelnau, 1840; Kirejtshuk et al., 2010). An especially interesting description is that of *Mathesius liaoningensis* Kolibac et Huang, 2011 from Yixian, close to other species of the family Parandrexidae and similar in the structure of the main sclerites of the body and appendages, but placed by the authors of the description in the superfamily Cleroidea without specifying the family. Beetles found in the Upper Cretaceous amber include also the family Acanthocnemidae Crowson, 1969: *Acanthocnemoides sukatshevae* Zherichin, 1977. Almost all listed families are represented in Cenozoic deposits, although their proportions are different, and the family Parandrexidae is recorded no later than the Barremian, Lower Cretaceous (Soriano, Kirejtshuk, and Delclòs, 2006). More detailed information on the fossil record of the superfamily Cleroidea can be found in

the catalogue of fossil Coleoptera (Ponomarenko and Kirejtshuk, 2012). In addition, rather many Mesozoic members of this superfamily are stored in collections of different countries, waiting for the attention of investigators.

This publication provides a description of a new genus and species from the Upper Jurassic locality of Shar-Teg, where a lot of insect fossils have been found, including some well-preserved beetles (Kirejtshuk and Ponomarenko, 2010). The material was examined with ordinary optics equipment, such as MBS-9 and Leica MZ 16.0 microscopes. In addition, A.G. Ponomarenko and R.A. Rakitov kindly provided photographs of the holotype of the species described here, made with the TESCAN/Vega/XMU scanning electron microscope in PIN, which allowed finding a number of peculiar features that could not be examined with ordinary optics. The specimen studied (the holotype) is stored in the collection of Borissiak Paleontological Institute, Russian Academy of Sciences, Moscow (PIN).

Shartegopsis gen. nov. has to be placed in the family Cleridae, because it is clearly visible that the impression studied has the characteristic clerid head with elongate palpi and pronotum, which is distinctly transversely impressed anteriorly and positioned somewhat apart from the elytra (a character often found in clerids). In addition, the specimen studied has triangular mandibles with a weakly curved external margin and protruding oval pro- and mesocoxae, especially similar to those of Cleridae. The new genus displays some similarities with genera of other families of the superfamily Cleroidea (Parandrexidae Kirejtshuk, 1994, Chaetosomatidae Crowson, 1955, and Acanthocnemidae Crowson, 1969), but, in contrast to genera of Parandrexidae, the new genus is characterized by the non-oval head, which is only slightly longer than the pronotum, triangular, weakly elongate mandibles (with not very narrow and strongly arcuate apices), barely protruding or non-protruding labrum, and longer pronotum with a transverse impression in the anterior third; in contrast to genera of Chaetosomatidae, the new genus has a non-flattened body, barely protruding or non-protruding labrum, pronotum with a transverse impression in the anterior third, and, probably, absence of long strong setae on the dorsal surface; finally, in contrast to genera of Acanthocnemidae, the new genus has a considerably larger body, distinctly moniliform antennae, comparably large eyes, almost square pronotum with a transverse impression in the anterior third, barely protruding or non-protruding labrum, and, probably, absence of long strong setae on the dorsal surface.

Shartegopsis gen. nov. has a certain similarity with genera of some families of the superfamilies Lymexyloidea, Cucujoidea, and Tenebrionoidea. However, it is clearly distinguished from genera of Lymexylidae Fleming, 1821 by the long and thin maxillary palpi, almost flattened head without a pronounced neck

constriction, relatively long mandibles, pronotum with a transverse impression in the anterior third, absence of distinct punctation, and finely rugose microsculpture, which makes the integument almost shagreen. All known genera of the superfamilies Cucujoidea and Tenebrionoidea have less similarity in characters with the genus described below, and the combination of characters found in the impression complies best with the group characters precisely of the family Cleridae, rather than those of any other family.

SYSTEMATIC PALEONTOLOGY

Superfamily Cleroidea Latreille, 1802

Family Cleridae Latreille, 1802

Subfamily (?) Tillinae Leach, 1815

Genus *Shartegopsis* Kirejtshuk, gen. nov.

E t y m o l o g y. From the Shar-Teg locality and the Latinized Greek *opsis* (view, sight, appearance). Gender feminine.

T y p e s p e c i e s. *S. miranda*, sp. nov.

D i a g n o s i s. Body medium-sized, rather narrow, rather convex ventrally and dorsally; integument moderately sclerotized, softly and finely microsculptured (alutaceous), with barely pronounced diffuse punctation; head prognathous, probably barely elongate, no wider than pronotum, with relatively large and narrow mandibles with weakly curved external margin, long maxillary palpi, and labrum barely protruding or not protruding from below anterior margin of frons; antennae 11-segmented, moniliform, without pronounced club and with apical antennomere pointed; pronotum probably almost square, with transverse impression in anterior third, and probably almost parallel sides; scutellum probably relatively large and triangular; elytra complete and slightly rounded laterally, probably with apices jointly rounded; pro- and mesocoxae more or less protruding; metacoxae transverse and slightly slanting medially; abdomen apparently with five visible ventrites.

S p e c i e s c o m p o s i t i o n. Type species.

C o m p a r i s o n. The new genus is clearly distinguished from all other extinct and extant genera of the family in the combination of relatively long moniliform antennae (without a pronounced club), labrum slightly protruding or not protruding from below the anterior margin of the frons, and sides of the pronotum almost parallel. The new genus cannot be considered certainly close to any of the recognized subfamilies, since the impressions of the species for which this genus is erected have no pronounced characters accepted for diagnostics of the groups of a high taxonomic rank (such as characters of tarsi, outline of eyes, open or closed procoxal cavities, presence of metallic sheens in the coloration of the integument, etc.). Almost parallel-sided pronotum is found in species of genera belonging to the subfamilies Clerinae, Enopli-

inae Gistel, 1856, Korynetinae Laporte, 1836, and Tillinae. For instance, from *Orthrius* Gorham, 1876 (Clerinae), represented in the recent fauna and having the parallel-sided pronotum and relatively long antennae without a pronounced club, *Shartegopsis* gen. nov. differs in the smaller eyes, not protruding beyond the width of the pronotum, very narrow maxillary palpi, and pronotum not distinctly longitudinal, with distinct angles and without basal impression, and approximately equal in width to the elytra. From the extant *Neorthopleura* Barr, 1976 (Enopliinae), which has a parallel-sided pronotum, relatively long antennae, and softly microsculptured integument, the new genus differs in the distinct transverse impression in the anterior third of the pronotum, longer head, shorter and narrower mandibles, and almost regularly moniliform antennae. It differs from *Tarsostenus* Spinola, 1844 (Korynetinae), which has relatively long antennae, in the parallel-sided pronotum (not narrowed at the base) with a distinct impression in the anterior third, regular moniliform antennae, and softly microsculptured integument. It differs from *Monophylla* Spinola, 1841 (Tillinae), which has a narrow, almost parallel-sided pronotum and relatively long antennae, in the moniliform shape of the antennae, considerably shorter pronotum with a transverse impression in the anterior third, and abdomen not protruding beyond the elytral apices.

The whole set of structural characters of the relatively long head with eyes not protruding laterally and of the head's appendages, the relatively short pronotum, and the smoothed-out integument display the greatest number of parallel similarities with groups of extant members of the subfamily Tillinae, although there is no certainty that the abdomen of the fossil species has six ventrites. Therefore, the new genus should probably be tentatively placed in this subfamily. It can be considered close to the genera *Cylidrus* Latreille, 1825, *Denops* Fischer von Waldheim, 1829, and *Tillodenops* Hintz, 1905, due to similarities in the relatively long head with eyes shifted anteriorly, maxillary palpi elongate, mandibles with anterior margin weakly curved, antennae long and having no pronounced club, and pronotum relatively short (as in some extant species of *Cylidrus*, *Denops*, and *Tillodenops*), as well as reduced punctation (without longitudinal rows of punctures on the elytra) and smoothed-out sculpture of the integument. Moreover, species of the said three genera sometimes have additional weak transverse rugae on the pronotum, relatively long and almost moniliform antennae, or rather wide femora. At the same time, *Shartegopsis miranda* gen. et sp. nov. differs from the said three genera in the almost parallel-sided pronotum and head distinctly narrowed anteriorly from the eyes. The new genus has the same similarities with *Elasmocylidrus* Corporaal, 1939, although the latter, in addition to the same differences, has strongly transverse eyes and a distinct large antennal club. In addition, the new genus displays the same similarities also

with *Nodepus* Gorham, 1892, which also has the head narrowed anteriorly, although in the new species the pronotum is distinctly shorter than the head and almost parallel-sided. A number of extant species of the genera *Pallenis* Laporte de Castelnau, 1836 and *Pseudopallenis* Kuwert, 1893 are characterized by the longitudinal or somewhat slanting striation of the pronotum, which, in contrast to that of *Shartegopsis miranda* gen. et sp. nov., is found usually on the disc or over much of the pronotum, not only along its anterior margin. *Shartegopsis* gen. nov. differs from these two genera in the prognathous and long head with eyes shifted anteriorly, pronotum rounded (not strongly transverse) and almost parallel-sided, wide femora, and diffuse punctation of the elytra, which have no additional granular sculpture.

The new genus differs from genera of the family Cleridae known in the fossil state from the Cenozoic deposits (mostly from Baltic amber) in the following characters:

(subfamily Tillinae)

—from *Cymatodera* Grey, 1832, *Tillus* Olivier, 1790, *Pseudopallenis* Kuwert, 1893, *Balbotillus* Kolíbac, 1997, and *Smudlotillus* Kolíbac, 1997, in the shorter elytra (which are probably not dilating towards their apices), considerably larger and longer head, and larger mandibles; from *Tillus* and *Balbotillus* also in the absence of a sharp constriction at the base of the shorter pronotum and in the moniliform antennae; from *Pseudopallenis*, also in the absence of a sharp constriction at the base of the shorter pronotum and in the short antennae; from *Smudlotillus*, in the shorter pronotum and short antennae;

(subfamily Hydnocerinae Spinola, 1844)

—from *Miohydnocera* Mamsley, 1992, *Euryneptopum* Kolíbac, 1997, and *Phyllobaenus* Kolíbac, 1997, in the large and not ant-like body with moniliform antennae; from *Miohydnocera*, also in the elytra fully covering the abdomen;

(subfamilies Clerinae and Korynetinae)

—from all fossil species of the subfamilies, in the large head with relatively large mandibles and large eyes and in the short elytra; in addition, from fossil members of the genus *Clerus* Geoffroy, 1762, also in the larger body and absence of a distinct constriction at the base of the pronotum; from *Opilo* Latreille, 1802, *Orthrius*, *Mitrandiria* Kolíbac, 1997, *Thanasimus* Latreille, 1806, *Tanasimoides* Murray, 1867, *Zahradnikius* Winkler, 1992, and *Tarsostenus* Spinola, 1844, also in the moniliform antennae, almost parallel-sided pronotum, and often larger body; from *Pyrrhoclerus* Zhang, 1989, also in the almost parallel-sided pronotum and shorter elytra; from *Titanoclerus* J. Zhang, Sun et X. Zhang, 1994, also in the considerably smaller body and relatively shorter elytra;

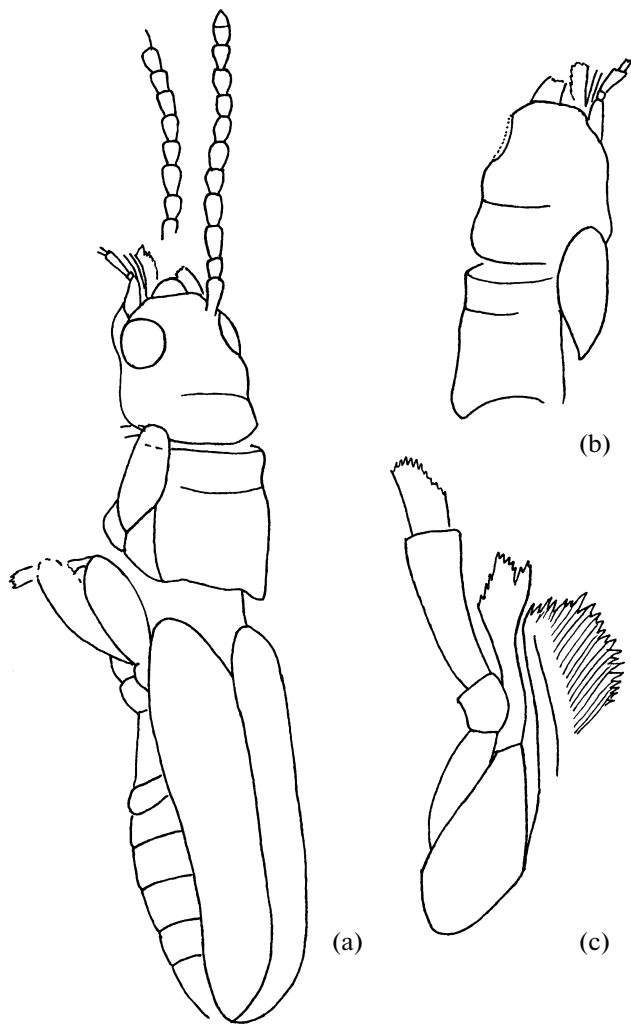


Fig. 1. *Shartegopsis miranda* gen. et sp. nov., holotype PIN, no. 4270/1116: (a) body in lateral view; (b) head and pronotum in lateral view; (c) maxilla. Scales varying.

(subfamily Epiphloeinae Kuwert, 1893)

—from *Epiphloeus* Dejean, 1833, in the large and long head with large mandibles, almost parallel-sided pronotum, and short elytra fully covering the abdomen;

(subfamily Korynetinae)

—from *Prosymnus* Laporte, 1836, *Aberrocorynetes* Winkler, 1990, and *Necrobia* Olivier, 1795, in the slender body, large head with large mandibles, and almost parallel-sided pronotum with an impression along the anterior margin.

Trichodes stebingeri Cockerell, 1936, described in the subfamily Clerinae from one isolated elytron, can-

not be compared with *Shartegopsis miranda* sp. nov. The new genus differs from the genus *Tanocleria* Hong, 2002 described with unclear placement in the considerably larger body, wide and long pronotum, longer head with large mandibles, relatively short elytra, and five visible abdominal ventrites.

Shartegopsis miranda Kirejtshuk, sp. nov.

Plate 9, fig. 1

E t y m o l o g y. From the Latin *mirandus* (amazing).

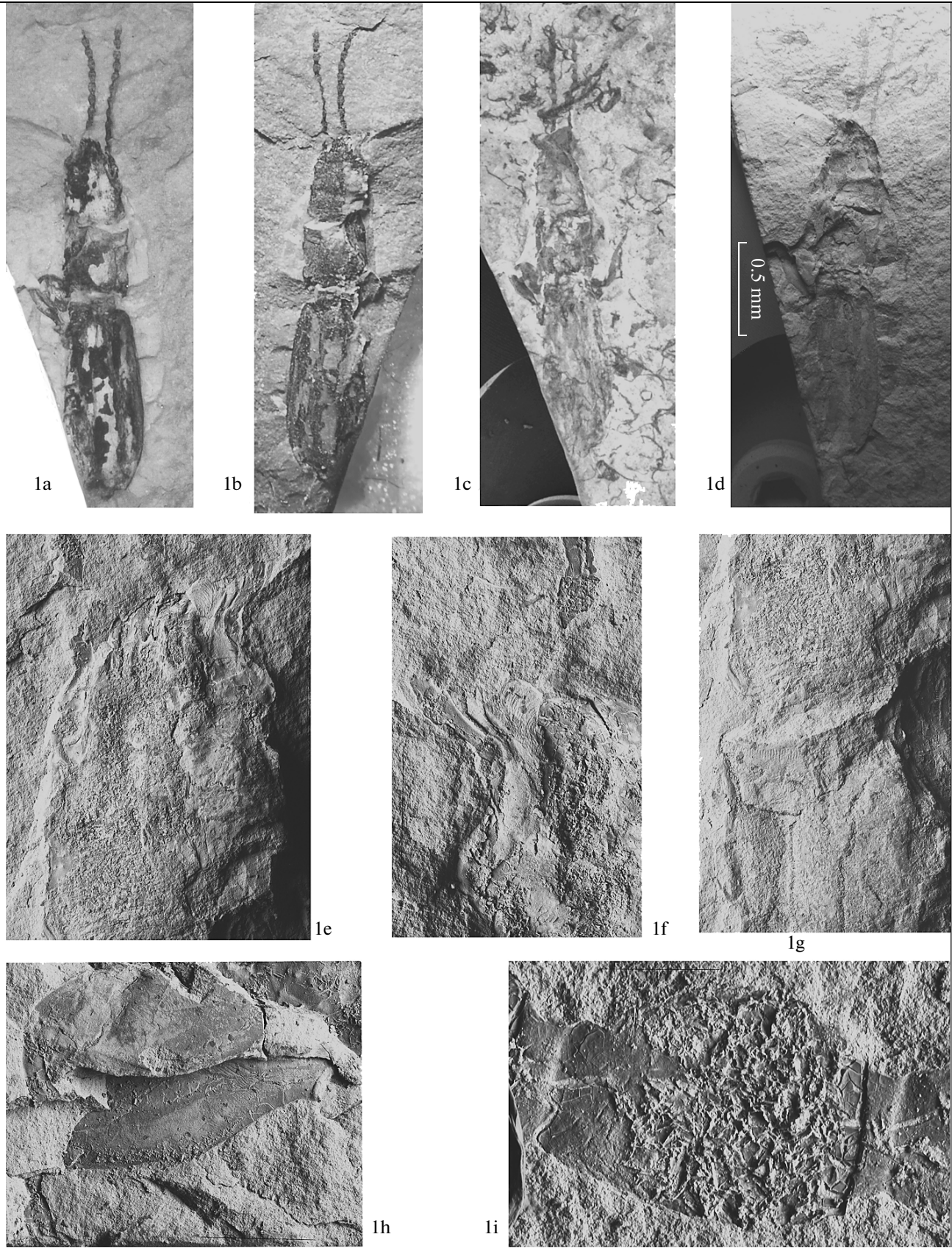
H o l o t y p e. PIN, no. 4270/1116, part and counterpart of the body of a beetle, well-preserved, but with segments of the appendages represented only by one profemur, the mesofemora, and bases of the mesotibiae; sex unknown; southwestern Gobi-Altai Province of Mongolia, southeastern extremity of the Aj Bogd Range, Shar-Teg locality; Upper Jurassic.

Description (Fig. 1). The body is elongate, almost parallel-sided and narrow, rather convex dorsally and ventrally; the integument is moderately sclerotized, softly and finely microsculptured with irregular very fine rugosity on the head, in some areas with barely traceable shallow and dense punctation on the pronotum and elytra; the antennomeres and femora bear sparse diffuse hairs; a dense row of short longitudinal rugae runs along the anterior margin of the pronotum.

The part of the head protruding from the prothorax is clearly separated and has no pronounced neck constriction (no temples), somewhat shorter and probably not wider than the pronotum; its drawn-in part is about half as long as the protruding part; the eyes are relatively small and slightly protruding laterally, set closely to the antennal bases; the dorsal surface of the head is slightly longitudinally impressed along the middle and rather shallowly and widely notched behind the eyes; the mandibles probably make up about one third of the length of the protruding part of the head, have not very wide bases, and are weakly curved and evenly narrowing towards the pointed apices; the maxillary palpi are rather long and narrow (their apical palpomere is not visible, but taking into account its presumable length, it makes up about 0.75 of the total length of the protruding part of the head); the maxillary lobes (galea and lacinia) are well-developed and bear numerous setae along their inner margin (especially the laciniae). The antennae are distinctly moniliform; antennomere 2 is almost one third as long as one of antennomeres 1 (scape), 3, or 4; other antennomeres are subequal in length (somewhat

Explanation of Plate 9

Fig. 1. *Shartegopsis miranda* gen. et sp. nov., holotype PIN, no. 4270/1116: (a) body in alcohol in lateral view, $\times 6.6$; (b) dry body in lateral view; (c, d) head under scanning electron microscope in lateral view; (e) head under scanning electron microscope in lateral view; (f) maxilla and base of maxillary palpus under scanning electron microscope; (g) bases of head and pronotum under scanning electron microscope; (h) mesofemora and base of mesotibia under scanning electron microscope; (i) antennomere under scanning electron microscope.



longer than antennomere 2, but somewhat shorter than antennomeres 1, 3, or 4); apical antennomere is distinctly pointed. The pronotum is probably almost square and probably almost parallel-sided; transverse impression in its anterior third is rather distinct and crosses the entire width of the pronotum so that the sides of the pronotum are slightly narrowed; transverse impression at the pronotal base is not developed; anterior and posterior angles probably have distinct apices. The scutellum, judging by the outline of the elytra around it, is probably relatively large and triangular, probably with a somewhat rounded apex. The elytra fully cover the abdominal apex; they are widest at the base and almost three times as long as wide combined.

The procoxae are rounded and strongly protruding; the mesocoxae are weakly protruding; metacoxae are strongly transverse, probably running along the entire posterior margin of the metaventrite and slightly slanting medially. The metaventrite is subequal in length to the pronotum. The abdomen has ventrites 1–3 subequal in length; ventrite 4 is slightly shorter; and ventrite 5 is slightly longer; abdominal apex, where ventrite 6 can be, is not visible. The pro- and mesofemora are more or less dilated in the distal half; profemur is about 2.5 times as long as wide; mesofemur is almost twice as long as wide.

M e a s u r e m e n t s, mm. Body length (including mandibles), about 9.4; height, about 1.7.

M a t e r i a l. Holotype.

RESULTS

OF THE ELECTRON MICROSCOPY STUDY

Electron microscopy revealed a number of structural features, very expressive, but not quite distinct or not visible when examined with ordinary optics. The only right mandible visible in the holotype reveals its distinct outline only in pictures from the scanning electron microscope, as well as the left maxilla and the base of the left maxillary palpus. Other organs visible in impressions of the holotype (outlines of the femora, of antennomeres and the joints between them, and traces of pubescence on the antennae and segments of the legs, traces of sculpture on dorsal sclerites, etc.) also proved more distinct in pictures from the scanning electron microscope, in which, for instance, the shape of the maxillary lobes and their armor could be seen, as well as the rather pronounced longitudinal striation along the anterior margin of the pronotum.

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