

PARANDREXIDAE FAM. NOV., JURASSIC BEETLES OF THE INFRAORDER CUCUJIFORMIA (COLEOPTERA, POLYPHAGA)

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Abstract: The systematic position of the genus *Parandrexia* for which a new family is proposed, is discussed. Two new species, *P. rotundicollis* and *P. subtilis*, are described, the type species *P. parvula* Martynov is redescribed, and an identification table of the species of this genus is presented.

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The genus *Parandrexia* is known only from the Jurassic. The only species previously described were one from Karatau [2] and one from China [7]. The collections of the Paleontological Institute, Russian Academy of Sciences, include 12 specimens of beetles that can without any doubt be assigned to this genus. To all appearances, the species of *Parandrexia* show sexual dimorphism in the size and form of their mandibles and antennae, and also in the size of their heads and, perhaps, pronotum. It is not known, however, how the secondary sexual characteristics may be correlated with the other structural features used in the identification and separation of the species under study. The combination of two forms as male and female proposed in the original description [2] is probably correct; this precedent is followed here, although one cannot, of course, be fully confident that all the impressions assigned to *P. parvula* Martynov actually belong to this species.

Martynov [2] assigned *Parandrexia* to the subfamily Prioninae (fam. Cerambycidae). The error of this interpretation was, to be sure, understood by many researchers, but with the exception of some cursory remarks by Crowson [4, 5], the taxonomic position of this genus has virtually never been considered. The aim of this article is to fill this gap.

I am deeply grateful to the staff of the Arthropod Laboratory of the Paleontological Institute, Russian Academy of Sciences, for preparing the materials for this article, and especially to A. G. Ponomarenko and V. V. Zherikhin, who greatly aroused my interest in this group of fossil beetles and helped to prepare the illustrations. All the type specimens are housed in the

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collections of the above institute, except for one of the syntypes of *P. parvula*, which is in the Russian Geological Institute (RGI) in St. Petersburg, and was studied with the kind cooperation of Ye. K. Trusova. This last specimen is designated as the lectotype.

FAMILY PARANDREXIDAE KIREJTSHUK, FAM. NOV.

Diagnosis. Body elongated and somewhat flat both above and below, with thin and apparently evenly scattered punctation. Head very large, transverse, with large eyes, and with quite long antennae of 11 segments attached between mandibles and eyes and showing no clear tendency to form clavate ends with long and narrow mandibles, long segments of maxillary and labial palps, and with wide mentum whose sides almost reach edges of eyes. Prothorax narrowing toward base (thus evidently increasing mobility of combined head and prothorax). Anterior coxae transverse, with trochanter projecting and narrowly closed posteriorly; all coxae flat. Process of prothorax with its apex projecting, if only slightly, beyond level of posterior margin of hind coxal cavities. Coxae of each thoracic segment converging in pairs. Middle coxal cavities transversely oval; fore coxae with outward projecting trochanter. Metathorax comparatively long, without noticeable femoral lines of midcoxal cavities and without traces of paracoxal and medial sutures. Hind coxae strongly transverse, with outward projecting trochanters slanting somewhat rearward in medial part. Abdomen including five visible sternites of approximately equal length. Elytra full or slightly shortened, with well-developed epipleura, forming distinct bend in plane of elytra.

Generic composition. *Parandrexia* Martynov, 1926; Middle Jurassic of North China and Upper Jurassic of Southern Kazakhstan.

Systematic position. The combination of the above features indicates the new family belongs to the infraorder of cucujiform beetles. The nonprojecting transverse fore coxa differentiate it readily from the families making up the superfamilies Dermestoides, Bostrichoides and Limexyloidea. The body configuration and form of the coxal cavities (especially the media slanted hind cavities) of *Parandrexia* resemble those of certain Trogossitidae, but the head appendages in the new family differ sharply in form from those of the cleroid beetles as a whole. The group under consideration is characterized by features in which it resembles the cucujoids, tenebrionoids and chrysomeloids, although among the Mesozoic beetles of these superfamilies the Parandrexidae fam. nov., can be easily recognized by the combination of their following features: flattish and elongate body; quite large head with very long palps, mandibles and almost filamentous antennae; head and pronotum integrated functionally into a single unit; and transverse coxae of fore and hind legs, whereas midcoxae are transversely oval. Moreover although according to the formalized criteria it is hard to assign the Parandrexidae fam. nov. to any one superfamily, in view of the habitual resemblance of its representatives to the species of certain Recent groups, it must be considered most clearly similar to the cucujoids.

Yet the Recent fauna includes forms like the Jurassic *Parandrexia* in all three of the above superfamilies (the cucujoids, tenebrionoids, and chrysomeloids). In particular, Martynov defended [2] his assignment of *Parandrexia* to the subfamily Prioninae of the family Cerambycidae by its many "external" similarities to the genus *Parandra* Latreille, 1804, although, with distinct features in which "this genus went farther than the Recent beetles," particularly: the large size of the anterior part of the body (head and pronotum), and some degree of shortening of the posterior part of the thorax and abdomen. However, the Recent anthophilous Chrysomeloidea which retain some primitive features, do not have a fairly flat body with a combination of

allometric transformations, including shortening of the head, elongation of the mouth parts and the antennae, as in the species of the subfamily Palophaginae (Megalopodidae), which lived in the male cones of araucarias [8]. The same can be said of the Jurassic forms like *Cerambyomima longicornis* L. Medvedev [3].

The most important differences of *Parandrexia* from the Recent families of the Chrysomeloidea are the character of the attachment of the antennae, the medially slanted hind coxae, and the comparatively wide prominent epipleura of the elytra. However, in the Jurassic chrysomeloids, the antennae seem to be spaced apart on the sides of the epicranium, with no discernible tubercles for their attachment (a similar type of attachment of the antennae can be found in the Recent family Megalopodidae: for example, in *Pseudomegamerus* L. Medvedev of the family Chrysomelidae [3] they are more prominent than is usual in their Recent representatives). Some leaf-eaters, including Recent ones, have very wide epipleura (especially among the Cassidinae), but as a rule the leaf-eaters, including extinct ones, differ from the Parandrexidae fam. nov. in their upward-bulging body and widely spaced hind coxae that are not slanted rearward in the medial part.

Crowson [5] believed *Parandrexia* to be related to the family Boganiidae because of their similarity of habit, but in the latter the consolidation of the head and prothoracic segment are not as prominently manifested as in *Parandrexia*, and the midcoxae are transverse, with outward projecting trochanter. In addition, long antennae without clavate ends are, with a few exceptions (*Uleiota* Latreille, 1796, *Dendrophagus* Schonher, 1809, of the family Cucujidae or some representatives of *Laemophlaeus* Castelnau, 1840, and *Placonotus* Macleay, 1871, of the family Laemophlacidae) not typical of the cucujoids as a whole. Slanted hind coxae are more often found in groups of the superfamily Cleroidea than in other superfamilies of the Cucujiformia. Finally, is the considerable habitual resemblance of *Parandrexia* to *Prostomis* Latreille, 1825 (Prostomidae, Tenebrionoidea), the differences between them being discernible only in the head appendages. But of all the above groups (except for the Prostomidae) only *Parandrexia* has a distinctly mobile head and prothorax as an integral whole and shows features of imaginal anthophagy in the structure of its mouth organs. Some similarity can also be seen between *Parandrexia* and *Trictenotoma* Thomas, 1860 (Trictenotomidae, Tenebrionoidea), including the narrow legs and segments of the tarsi. However, the proportions of the various body parts in *Trictenotoma* are more like those in most of the Cerambycidae family than those in *Parandrexia*, and the mid- and hind coxae of *Trictenotoma* are as widely separated as the fore coxae; the mandibles are quite thick, with developed incisors and cleft surfaces, as in the Prioninae and Cerambycinae. Moreover, the comparatively slight mobility of the head and the prothoracic segment of *Trictenotoma* hardly differs from that in many Cerambycidae. Thus, at present it is impossible to ascertain the systematic position of *Parandrexia* with any degree of reliability, although there can be no doubt of its separate status among the presently known Mesozoic beetles. A separate taxon of familial rank, with indefinite systematic position, is, therefore, proposed for this group.

Remarks. The structure of the mouth organs, which was studied in impressions of *Parandrexia* adults, shows a tendency toward considerable elongation of the mandibles without intensification of their incisorial function, and very long maxillary and labial palps. These features, like the extremely large prognathous head with quite large eyes, suggest an open way of life (at least for the imago) on the surface of the strobiles of Mesozoic gymnosperms. A large head with such tendencies in the modification of its appendages is characteristic of most anthophilous groups of the family Nitidulidae (Cucujoidea) of various subfamilies: the

Epuraeinae, Meligethinae and Nitidulinae. These features are, moreover, most clearly manifested in the groups of sap-feeding beetles confined to palm racemes (*Cornutopria* Endrödy-Younga [7], *Palmopria* Endrödy-Younga [7], *Cryptarchopria* Jelinek and *Mystrops* Erichson, 1843), which also show a tendency toward sharp sexual dimorphism and, with the elongation of their antennae, a proportional reduction of their clavate ends. Perhaps *Parandrexia* (like some anthophilous sap-feeding beetles) was adapted to some specific conditions of life and development in gymnosperm strobiles. This suggestion can be supported by the consideration that the species of the subfamily Paracucujinae (Boganiidae) developed in the cones of the fern palms [6] and the sap-feeding beetles of the genera *Perilopsis* Reitter, 1875 (Nitidulinae) and *Conotelus* Erichson, 1843 (Cillarinae), which lived in the male cones of araucarias, are characterized by an elongated and somewhat flat body with a prognathous head, like *Parandrexia*. It is very likely that the *Parandrexia* were full "anthophages," in my classification [1], and most likely developed, in the opinion of A. G. Ponomarenko (pers. comm.), in the microstrobiles of such Mesozoic gymnosperms as the cheirolepids, bennettitales, or sago palms.

Genus *Parandrexia* Martynov, 1926

Identification table for species of genus *Parandrexia*:

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|---|-------|-----------------------------------|
| 1. Body length 18, width 5 mm | | <i>P. beipiaoensis</i> Hong, 1983 |
| - Body length no more than 11 mm, width no more than 3.3 mm | | 2 |
| 2. Pronotum narrows sharply toward base, with no pronounced posterior corners | | <i>P. rotundicollis</i> sp. nov. |
| - Pronotum has distinct posterior corners and its sides a smoother outline | | 3 |
| 3. Body elongated; length of elytra almost twice width of both elytra together; pronotum widens slightly forward | | <i>P. subtilis</i> sp. nov. |
| - Body slightly oval; length of elytra about 1.5 times their combined width; pronotum widens strongly from base forward | | <i>P. parvula</i> Martynov, 1926 |

KEY TO PLATE VII

All specimens illustrated are from Upper Jurassic Karabastau Formation, Karatau Range (Southern Kazakhstan).

Figs. 1-5. *Parandrexia parvula* Martynov: 1 - Spec. PIN No. 2452/248, female (×6); 2 - Spec. PIN No. 965/34, female (×7.4); Galkino locality; 3 - Spec. PIN No. 2997/438, male (×6.9); 4 - Spec. PIN No. 2997/440, female (×8.3); Auliye-Mikhaylovka locality; 5 - Spec. No. 965/31, female (×7.3); Galkino locality.

Fig. 6. *Parandrexia rotundicollis* Kirejtshuk, sp. nov., Holotype PIN No. 2904/929, male (×7.5); Galkino locality.

Fig. 7. *Parandrexia subtilis* Kirejtshuk, sp. nov., Holotype PIN No. 2904/927, female (×8.2); Galkino locality.

Fig. 8. *Parandrexia* sp. aff. *P. subtilis* Kirejtshuk sp. nov., Spec. PIN No. 2997/439 (×6.9); Auliye-Mikhaylovka locality.



PLATE VII

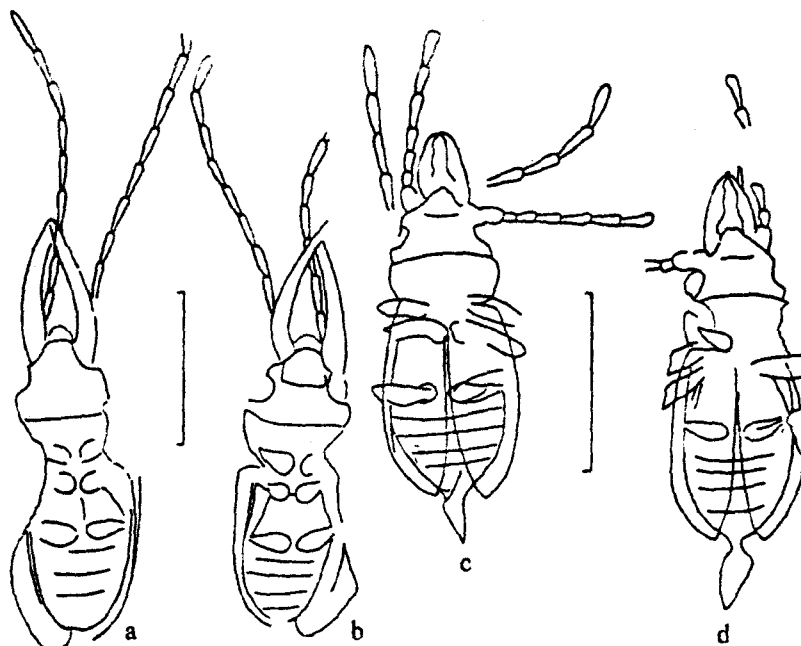


Fig. 1. Males of *Parandrexia parvula* Martynov: *a, b* - Spec. PIN No. 2997/438: *a* - impression, *b* - cast; *c, d* - Spec. PIN No. 2384/701: *c* - impression, *d* - cast: Auliye-Mikhaylovka locality. All scale lines in figures. 1-4 = 2 mm.

Parandrexia parvula Martynov, 1926

Pl. VII, figs. 1-5

Parandrexia parvula: Martynov, 1926, p. 20, pl. 1, fig. 4, figs. 10-12.

Lectotype. RGI No. 5017-1, male impression of beetle lacking part of legs; So. Kazakhstan, Dzhambul region, Dzhuvalinskiy district, Galkino settlement; Upper Jurassic, Karabastau Formation [designated here].

Description (figs. 1-3*a, b*). Elongated beetle has body fairly flat on both top and bottom. Head is almost twice as long as pronotum, about equal to it in width, with wide forward projection, its apex bearing small notch. Mandibles are narrow and long, with evenly contoured outer edge (especially in females), in males being longer than head and in females twice shorter. Antennae are thin and long, their length no less than length of body without head and mandibles. Prothorax is transverse, widening roundly forward, and widest at anterior corners; posterior margin of prothorax is $2/3$ to $3/4$ of anterior margin. Posterior corners of pronotum are obtuse but distinct. Fore coxae are transverse and evidently open along sides; prothoracic process extends beyond midcoxae and widens at apex. Mesothorax is short, midcoxae are large and round. Elytra are widest in middle, their length 1.5 times width of both elytra together. Legs project somewhat beyond lateral contours of body; femora are slightly thicker, tibiae slightly

curved and widen toward apex, hind tarsi consist of four segments, middle segments being twice smaller than end ones.

Dimensions in mm:

Spec. No.	Sex	Body length (without mandibles)	Total length (with mandibles)	Length of antennae	Length of elytra	Body width
2384/701	Male	5.5	6.7	5.8	3.9	2.4
2997/438	"	6.0	9.1	7.0	4.2	2.8
2997/4507	"	6.6			4.1	2.4
965/31	Female	7.3	8.3	5.3	4.0	
965/34	"	5.7	6.3	> 4	3.5	2.0
1789/48	"	7.0	7.7	5.0	4.5	2.6
2066/2878	"	6.4	7.3	4.8	3.7	2.6
2452/248	"	7.2	8.3	4.7	4.2	2.6
2997/40	"	6.7	7.4		3.7	2.5

Remarks. The lectotype—the only specimen of the type of *P. parvula* — was found in the collections of the Russian Geological Institute [2, fig. 12]. Its features generally correspond to all those indicated in the original description, except that the base of the pronotum narrows more sharply and the inner edge of the mandibles is not smoothly curved but has the same outline as in the other specimens of this same series, illustrated in figs. 1-3a, b.

Material. Females PIN Nos. 965/31, 965/34, 2452/248, and 1789/48 from same outcrop as lectotype; males PIN Nos. 2384/701, 2997/438, 2997/4507 and females PIN Nos. 2066/2878 and 2997/440 from Auliye-Mikhaylovka locality (So. Kazakhstan, Chimkent region, Chayan district, Auliye Nature Preserve near Mikhaylovka settlement; Upper Jurassic, Karabastau Formation). Of these, Nos. 965/31, 2997/440, and 2997/4507 with comparatively large head, and No. 965/34 with quite short scutellum, are only tentatively assigned to this species.

Parandrexia rotundicollis Kirejtshuk, sp. nov.

Pl. VII, fig. 6

Specific name. Latin *rotundus* (round) and Latin *collum* (neck).

Holotype. PIN No. 2904/929, male, impression of beetle without fore legs; So. Kazakhstan, Kzhambul region, Dzhuvalinskiy district, Galkino settlement; Upper Jurassic, Karabastau Formation.

Description (fig. 3c). Elongated beetle is fairly flat above and below, without marked punc-

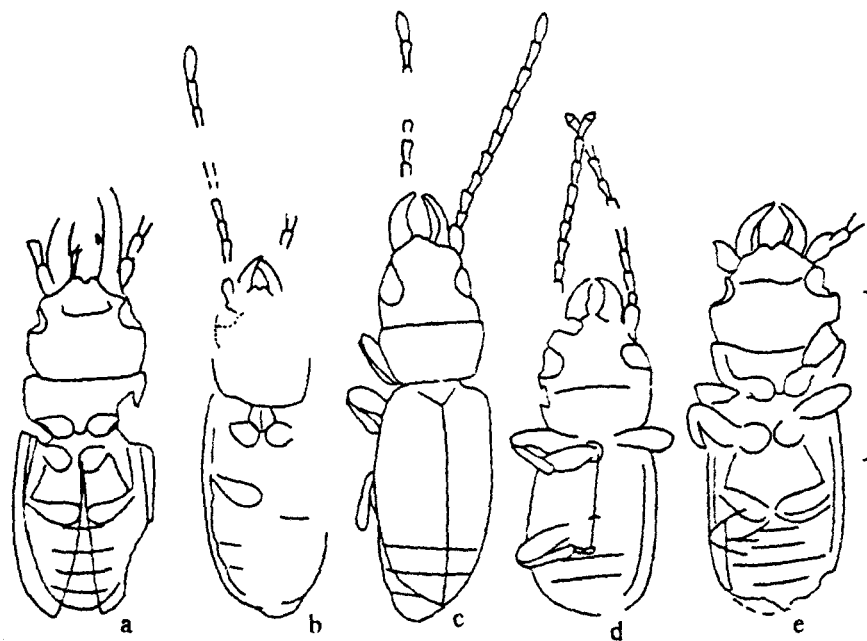


Fig. 2. *Parandrexia parvula* Martynov: a - Spec. PIN No. 2997/4507, male: Auliye-Mikhaylovka locality; b-e - females: b - Spec. PIN No. 1789/48, c - Spec. PIN No. 965/31: Galkino locality; d Spec. PIN No. 2066/2878, e - Spec. PIN No. 2997/440; Auliye-Mikhaylovka locality.

tation or sculpture on surface of sclerites. Head is twice larger than pronotum, with projecting medial process of frons. Mandibles are narrow and long, fairly straight in middle and sharply curved at base and in front of apex. Antennae are narrow, and as long as body without head and mandibles. Prothorax has short and comparatively narrow process and perhaps procoxae open posteriorly. Pronotum has rounded sides, without distinct posterior corners. Elytra are about 1.5 times as long as width of both elytra together, and have almost same outline as in *P. parvula*.

Dimensions in mm: length without mandibles - 9.2, with mandibles - 10.6, width 3.3, length of antennae - 6.5, length of elytra - 5.5.

Material. Holotype.

Parandrexia subtilis Kirejtshuk, sp. nov.

Pl. VII, fig. 7

Specific name. Latin *subtilis* (fine).

Holotype. PIN No. 2094/927, female impression of beetle without legs; Kazakhstan, Dzhambul region, Dzhuvalinskiy district, Galkino settlement; Upper Jurassic, Karabastau Formation.

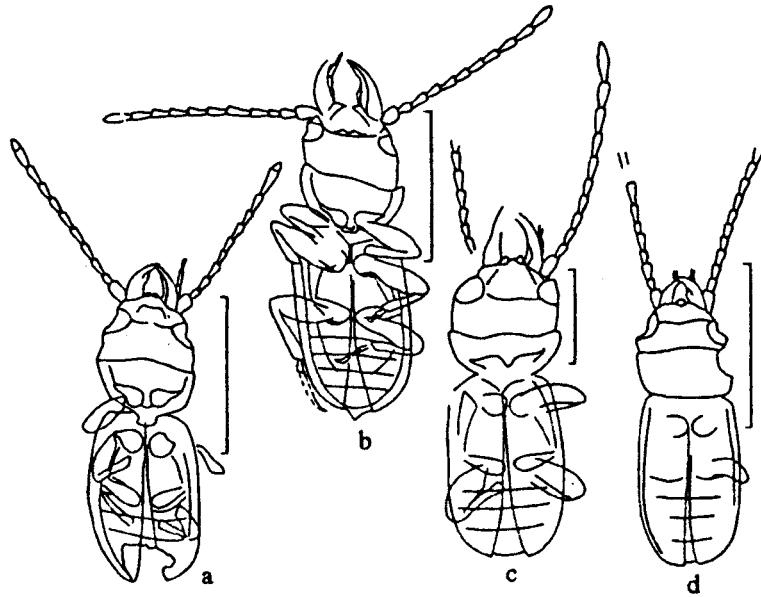


Fig. 3. Species of genus *Parandrexia*: *a, b* - *P. parvula* Martynov, females: *a* - Spec. PIN No. 965/34, *b* - Spec. PIN No. 2452/248; *c* - *P. rotundicollis* sp. nov., Holotype PIN No. 2904/92, male; *d* - *P. subtilis* sp. nov., Holotype PIN No. 2904/927, female; Galkino locality.

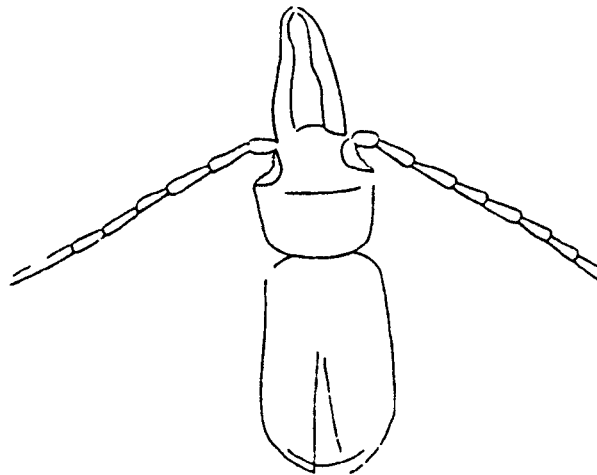


Fig. 4. *Parandrexia* sp. aff. *P. subtilis* sp. nov., Spec. PIN No. 2997/439, male; Auliye-Mikhaylovka locality.

Description (fig. 3d). Body is slender and very flat. Head is comparatively small, somewhat larger than prothoracic segment, its anterior edge roundly bulging in middle. Mandibles are fairly small, with evenly convex outer edge. Palps extend far forward from apices of mandibles. Antennae are considerably shorter than body. Prothorax is trapezial, with comparatively slightly rounded sides, widening forward. Elytra are almost twice as long as their combined width. Hind femora are long and narrow. Surface of sclerites shows no clear signs of punctation or sculpture.

Dimensions in mm: length without mandibles - 4.8, with mandibles - 5.3, width - 1.7, length of antennae - somewhat more than 3.5, length of elytra - 3.2.

Remarks. The studied collection includes Spec. PIN No. 2997/439, a male from the Auliye-Mikhaylovka locality (pl. VII, fig. 8; fig. 4) that in external appearance closely resembles the holotype of *P. subtilis*, but is much longer, its mandibles and antennae considerably longer, and the tips of its mandibles more strongly curved than, at least, in the males of *P. parvula*.

Material. Holotype.

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