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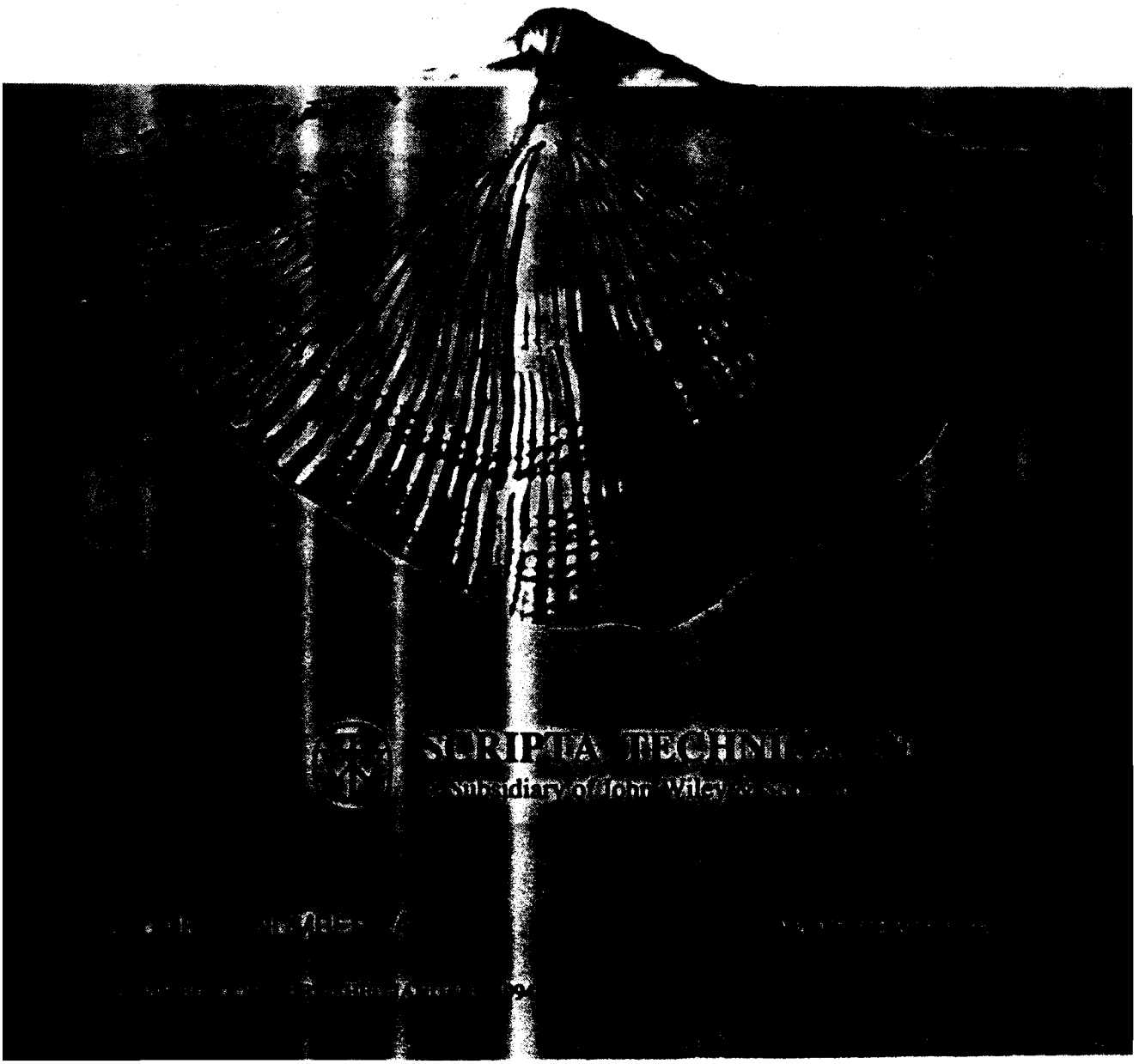

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OBRIENIIDAE, FAM. NOV., THE OLDEST MESOZOIC WEEVILS (COLEOPTERA, CURCULIONOIDEA)

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Abstract: The new family Obrieniidae is described: new subfamilies Obrieniinae and Kararhynchinae; new genera *Obrienia* (with three new species from Middle or Upper Triassic, Krygyzstan), and *Guillermia* (monobasic, from the same horizon) both in Obrieniinae; *Madygenorhynchus* (monotypic, from the same horizon), *Kenderlyka* (monotypic, Upper Triassic, Kazakhstan), and *Kararhynchus* (monotypic, Upper Jurassic, Kazakhstan). Additional unidentified Triassic finds from the Russian Far East are mentioned. Phylogenetic relations, distribution, and supposed biology of the family are discussed.

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Except for several *incertae sedis* taxa established on the basis of isolated elytra and arbitrarily placed in Curculionoidea solely because of a very superficial similarity in elytral sculpture [6-9], no Triassic representatives of this enormous superfamily of beetles have been described until now. However, some Triassic Curculionoidea have been mentioned without descriptions as members of the extinct family Eobelidae (which is now synonymized with Nemonychidae [11, 19]) or a related group [1, 13, 17, 18]. These records, used later in some general papers on beetle phylogeny [10, 11], had been based on three specimens from the well-known Middle or Late Triassic Madygen locality in Kyrgyzstan, and are described below as *Obrienia kuscheli*, *O. ingurgata*, and *Madygenorhynchus multifidus*. More detailed study has shown that these specimens represent a new family which is probably not directly related to nemonychids. Additional materials were found in the collections of Triassic and Jurassic beetles in the Paleontological Institute of the Russian Academy of Sciences, Moscow (PIN). Several different taxa have been recognized and are described and discussed below.

We are greatly indebted to Dr. M. A. Alonso Zarazaga (Malaga, Spain), Dr. B. A. Korotyaev (St. Petersburg, Russia), Dr. G. Kuschel (Auckland, New Zealand), and Dr. C. O'Brien (Tallahassee, U.S.A.) for important comparative materials on living primitive families of weevils.

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SUPERFAMILY CURCULIONOIDEA LATREILLE, 1802

FAMILY OBRIENIIDAE ZHERIKHIN & GRATSHEV, FAM. NOV.

Diagnosis. Small weevils (less than 4 mm long). Body flattened, rather weakly sclerotized, weakly sculptured, without distinct pubescence. Rostrum moderately long, usually more or less distinctly differentiated into pro-, meso- and metarostrum; mesorostrum usually with two somewhat developed caplike structures (probably for antennal insertion); ventral longitudinal sutures obliterated. Mandibles small, not exodent. Antennae 11-jointed, moderately long, not geniculate, inserted laterally or ventrally near midlength of rostrum, with distinct, more-or-less compact three-jointed club. Head not elongated or just slightly, rather deeply retracted into prothorax, often with inflated ventral part; gular suture probably unpaired; frons broad; eyes large, convex, lateral. Prothorax with distinct lateral ridge, with long antecoxal and very short postcoxal part; coxal cavities closed; coxae contiguous, subglobular; sternellum probably small; notosternal sutures long, reaching anterior margin of prothorax; pronotum with sublateral longitudinal carinae. Elytra elongate, with nine or possibly ten regular punctate striae[1]; striae fine, impressed, apically clearly curved outwards forming characteristic subapical pattern (see figs. 1*c*, *d*; 3); scutellar stria absent; sutural-locking lamellae distinct, moderately wide, parallel-sided, apically abruptly truncate, symmetrical; epipleura distinct, narrow, shortened. Mesothorax short, without ventral longitudinal and transverse sutures; coxal cavities closed outwards by mesepisterna and mesepimera; trochantin indistinguishable; coxae moderately large, subglobular. Metathorax long, flat, ledged before hind coxae; longitudinal as well as transverse sutures absent; metepisterna very wide in anterior part, impinging on mesocoxal cavities, with subelytral and exposed parts subequal in width; metepimeron very small; hind coxae strongly transverse, subcontiguous or narrowly separated, reaching elytral margin or nearly so. Legs slender, rather short; trochanters not enlarged; femora and tibiae simple, without armament; tibiae without bristles or other specialized structures, apical setose fringe absent; tarsi probably short and broad. Abdomen with five freely articulated visible sternites, slightly different in length; all intersegmental sutures distinct, straight; pygidium covered by elytra, its tip visible from below.

Composition. Two subfamilies from Triassic and Jurassic of Asia.

Comparison. Differs from other weevil families in metepisterna impinging on midcoxal cavities and characteristically curved elytral striae.

KEY TO THE SUBFAMILIES AND GENERA OF OBRIENIIDAE

1(4) Rostrum more or less cylindrical, without widened dorsal plate; antennae inserted laterally ..... Obrieniinae subfam. nov.

2(3) Body elongate; pronotum about as long as wide; elytra more than twice longer than wide, subacuminate ..... *Obrienia* gen. nov.

[1]Though only nine striae may be seen on our specimens, the presence of usual marginal striae along the outer elytral edge may be supposed.

3(2) Body oval, rather broad; pronotum wider than long; elytra less than twice longer than wide, widely rounded at apex ..... *Guillermia* gen. nov.

4(1) Rostrum with widened dorsal plate and narrower ventral part, apparently T-shaped in transverse section; antennae inserted under dorsal plate .... Kararhynchinae subfam. nov.

5(6) Hind coxae distinctly separated; first abdominal sternite behind coxae distinctly longer than second ..... *Kararhynchus* gen. nov.

6(5) Hind coxae subcontiguous; first abdominal sternite behind coxae shorter than second.

7(8) Ventral part of rostrum nearly twice narrower than dorsal plate; antennae with narrow fusiform club, eighth antennal joint not enlarged ..... *Madygenorhynchus* gen. nov.

8(7) Ventral part of rostrum only slightly narrower than dorsal plate; antennae with broadly ovate club and distinctly enlarged eighth joint ..... *Kenderlyka* gen. nov.

SUBFAMILY OBRIENIINAE ZHERIKHIN & GRATSHEV, SUBFAM. NOV.

Diagnosis. Rostrum somewhat cylindrical, its dorsal part not forming widened plate, pro-, meso- and metarostrum distinctly differentiated, mesorostral caplike structures large and very distinct; antennae inserted laterally. Head with inflated ventral part.

Composition. Two genera from Triassic of Kyrgyzstan.

Genus *Obrienia* Zherikhin & Gratshev, gen. nov.

Generic name. In honor of Dr. Charles O'Brien.

Type species. *O. kuscheli* sp. nov.

Diagnosis. Body elongate. Rostrum narrow, prorostrum short and narrow, subcylindrical. Antennae inserted medially or submedially, with first joint incrassate, second shorter than third, fourth to eighth short, club very compact. Inflated ventral part of head rounded. Prothorax about as long wide, at base wider than at apex, without constrictions, widest behind midlength; pronotum with longitudinal median sulcus; hind margin arcuate, not sinuate, hind angles slightly or not rounded, obtuse. Scutellum distinct. Elytra more than twice longer than wide, at base broader than prothorax, with distinct shoulders, with scutellar emargination, subacuminate at apex, finely striate, subapical junction of striae displaced to lateral elytral surface; intervals rather broad, flat. Hind coxae subcontiguous. First abdominal sternite behind coxae slightly shorter than second; the latter 4.3 to 5 times broader than long; last sternite 2 times or more longer than preceding one, narrowly rounded at apex.

Composition. Three species from Middle or Upper Triassic of Kyrgyzstan.

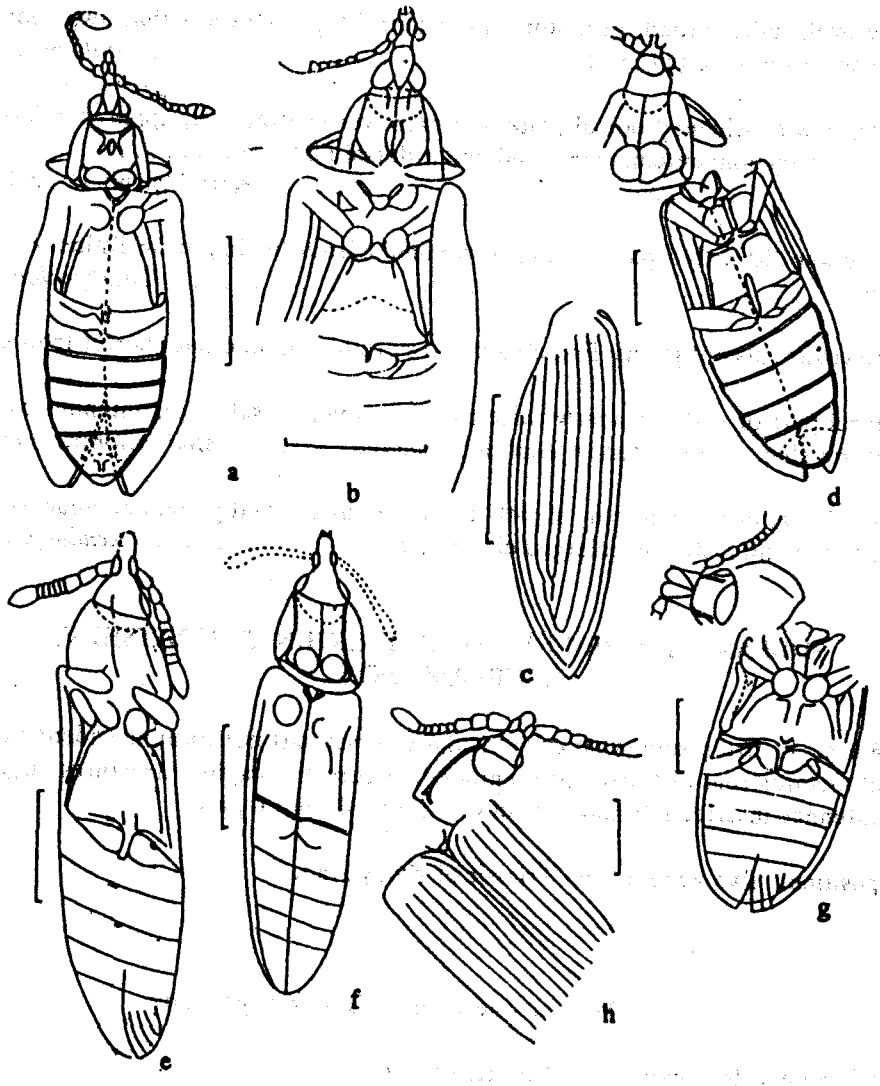

Fig. 1. Weevils of the subfamily Obrieniinae: *a-c - Obrienia kuscheli* sp. nov., holotype No. 2971/435(445): *a*, *b* - general view, *c* - elytron; *d* - *O. ingurgata* sp. nov., holotype No. 2971/612; *e*, *f* - *O. illaetabilis* sp. nov.: *e* - holotype No. 2785/3725, *f* - paratype No. 2069/3550; *g*, *h* - *Guillermia lecticula* sp. nov., holotype No. 3288/159(163). Scale length = 0.5 mm.

Obrienia kuscheli Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 1

Specific name. In honor of Dr. Guillermo Kuschel.

Holotype. PIN, Nos. 2971/435 and 445; finely preserved cast and partially damaged mold of

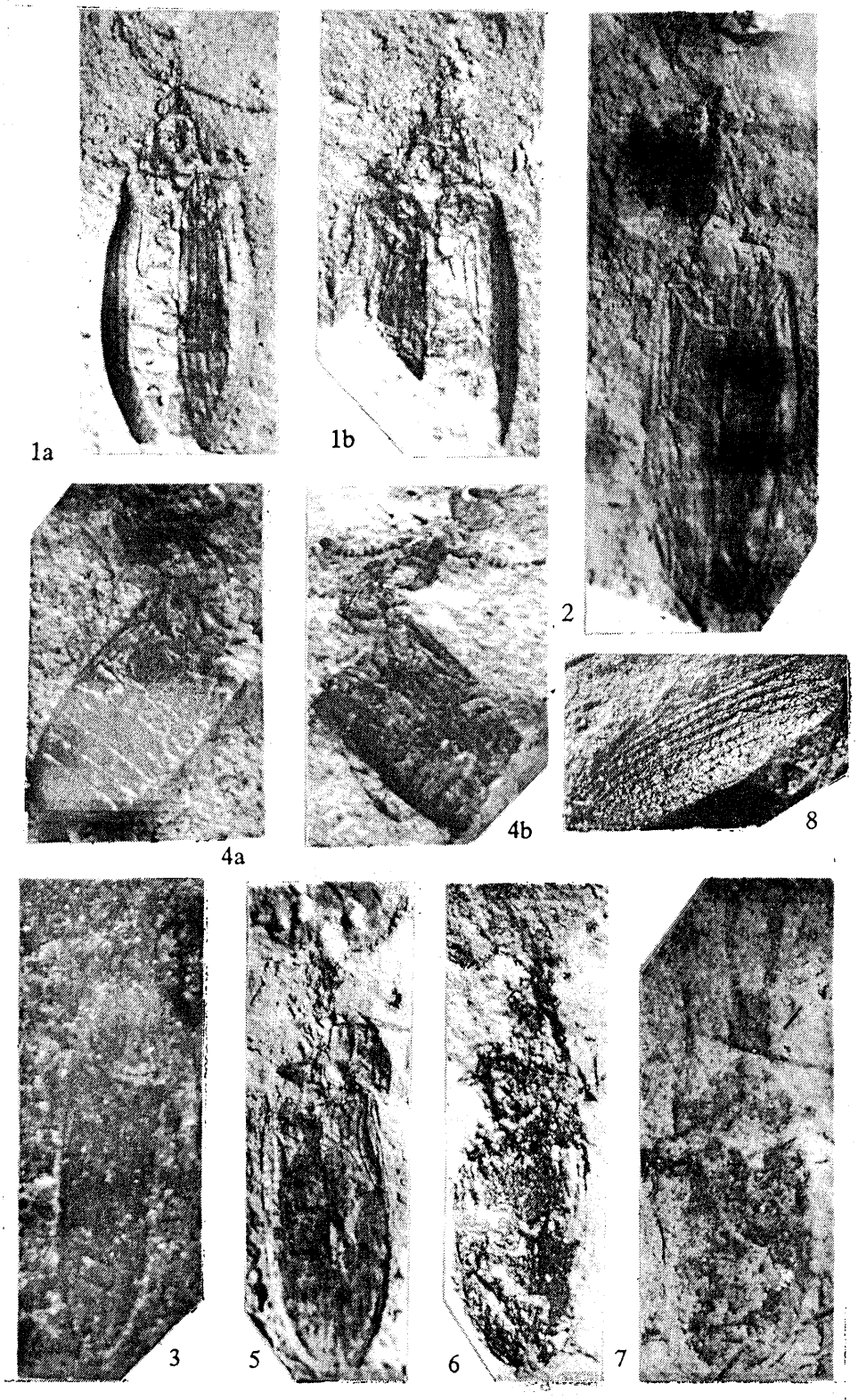

PLATE II

complete beetle body with appendages, sex unknown; Kyrgyzstan, Osh Region, Lyaylyak District, southwestern area of the Madygen Triassic field (Madygen locality); Middle or Upper Triassic, Ladinian-Carnian, Madygen Formation.

Description (fig. 1*a*; *c*). Body and appendages are rather pale and unicolorous. Rostrum is as long as head; prorostrum is probably curved downwards, 1.5 times shorter and almost twice narrower than metarostrum; mesorostral "caps" contiguous ventrally and are narrowly separated dorsally; metarostrum is as long as wide. Antennae are moderately slender, inserted a little before middle of rostrum; first joint is subtriangular, nearly as long as wide; second is slender, 2 times longer than wide; third is longest, 3 times longer than wide, subcylindrical; fourth to eighth short, subtriangular, about as long as wide, widening gradually toward club; the latter is scarcely longer than three last funicular joints together, elongately ovate, 2.3 times longer than wide, subacuminate, its terminal joint longer than others. Ventral swollen part of head is oblong, oviform. Prothorax is widest at base, almost trapeziform, with rounded anterior and posterior edges and almost straight lateral sides, at base twice as broad as at apex; pronotum lacks distinct punctation; median sulcus is shortened, deep; sublateral carinae are sinuate; ventral surface of lateral ridge is longitudinally rugose. Scutellum is narrow. Elytra are 2.3 times longer than their combined width, at base almost twice broader than prothorax, suboval with distinct subhumeral constriction, widest near midlength; intervals are without distinct sculpture. Last abdominal sternite is 2 times longer than preceding one and 1.3 times shorter than broad. Underside is not sculptured.

Dimensions, in mm. Body length - 1.8 (rostrum excluded).

Material. Holotype.

Obrienia ingurgata Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 2

Specific name. Latin *ingurgatum* (drowned).

Holotype. PIN, No. 2971/612; cast of damaged beetle body, with rostral tip and most of

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KEY TO PLATE II

Fig. 1. *Obrienia kuscheli* sp. nov., holotype No. 2971/435 (445): 1*a* - mold (×29), 1*b* - cast (×31).
Fig. 2. *Obrienia ingurgata* sp. nov., holotype No. 2971/612 (×23).
Fig. 3. *Obrienia illaetabilis* sp. nov., holotype No. 2785/3725 (×28).
Fig. 4. *Guillermia lecticula* sp. nov., holotype No. 3288/159 (163) (×16): 4*a* - mold, 4*b* - cast.
Fig. 5. *Madygenorhynchus multifidus* sp. nov., holotype No. 3288/56 (×25).
Fig. 6. *Kenderlyka consobrina* sp. nov., holotype No. 2487/45 (×30).
Fig. 7. *Kararhynchus occiduus* sp. nov., holotype No. 2997/2118 (×23).
Fig. 8. Elytron of Obrieniidae gen. sp., spec. No. 4497/1 (×22).

appendages missing, sex unknown; Kyrgyzstan, Ost Region, Lyaylyak District, southwestern area of Madygen Triassic field (Madygen locality); Middle or Upper Triassic, Ladinian-Carnian, Madygen Formation.

Description (fig. 1*d*). Body and appendages are rather pale and unicolorous. Structure of prorostrum is unknown; mesorostral "caps" are narrowly separated dorsally; metarostrum is broader than long. Antennae are rather thick, at least basally; first joint is subtriangular, about as long as broad, second a little less thick, as long as broad, subcylindrical, and third is slightly narrower than second, distinctly longer than broad. Ventral inflated part of head is transversally elliptical. Prothorax is widest slightly before base, gently narrowing to apex, with slightly rounded lateral sides; pronotum is densely, coarsely and deeply punctate, punctation oblong, at lateral ridge longitudinally rugose; median sulcus is complete, strong and deep; sublateral carinae are sinuate, strongly diverging backwards. Scutellum is triangular, as long as broad. Elytra are 2.4 times longer than wide and 3.4 times longer than prothorax, at base only slightly wider than prothorax, elongately oval, without subhumeral constriction, with very slightly rounded, nearly parallel lateral sides, widest about midlength; intervals impunctate. Last abdominal sternite is two times longer than preceding one and 1.5 times broader than long. Underside is not sculptured.

Dimensions, in mm. Body length - 3.4 (rostrum excluded).

Comparison. Differs from *O. kuscheli* in larger body size, shorter second antennal joint, transverse inflated part of head, wider and coarsely punctate pronotum, and narrower elytra lacking subhumeral constriction.

Material. Holotype, and possibly spec. PIN, No. 2971/617 (incomplete cast of hind part of body, without legs) from the same locality.

Obrienia illaetabilis Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 3

Specific name. Latin, *illaetabilis* (sad).

Holotype. PIN, No. 2785/3725; longitudinally distorted mold of nearly complete beetle, legs missing, sex unknown; Kyrgyzstan, Osh Region, Batken District, northern area of the Madygen Triassic field (locality Dzhaylyaucho); Middle or Upper Triassic, Ladinian-Carnian, Madygen Formation.

Description (fig. 1*e*, *f*). Body and antennae are rather pale and unicolorous. Rostrum is scarcely longer than head; prorostrum is about as long as broad as metarostrum, parallel-sided; mesorostral "caps" are relatively small, widely separated ventrally; metarostrum is broader than long. Antennae are very thick, inserted medially; first joint is subtriangular, broad; second scarcely less thick, a little longer than broad; third is longest, much longer than broad, as broad as second; fourth to eighth have similar shapes, transverse, as broad as third; club is only slightly broader than funicle, elongately oval, about as long as last four funicular joints combined, rounded apically. Prothorax is widest slightly before base, gently and almost rectilinearly narrowing to apex; pronotum is finely punctate, median sulcus is not shortened, sublateral carinae

diverge backwards, are not sinuate. Scutellum is small. Elytra is slightly broader and 3.5 times longer than prothorax, parallel-sided, without subhumeral constriction; intervals are impunctate. Last abdominal sternite is more than twice longer than preceding one. Underside is not sculptured.

Dimensions, in mm: Body length - 2.1 (rostrum excluded).

Comparison. Differs from *O. ingurgata* in smaller body size, and from *O. kuscheli* in thick antennae and narrrower parallel-sided elytra lacking subhumeral constriction.

Remark. Because both specimens are affected by distortion of clay matrix, some proportions may be only estimated.

Material. Holotype, and paratype PIN, No. 2069/3550; cast of complete beetle body without legs, strongly distorted longitudinally, from the same locality.

Genus *Guillermia* Zherikhin & Gratshev, gen. nov.

Generic name. In honor of Dr. Guillermo Kuschel.

Diagnosis. Body rather broad, oval. Rostrum thick, prorostrum short, subtriangular. Antennae inserted submedially; first joint incrassate, second as long as third, fourth to eighth short, club very compact. Inflated ventral part of head transverse, subquadrate. Prothorax wider than long, at base wider than at apex, widest before midlength, without constrictions; pronotum probably without median sulcus; its hind margin slightly arcuate, sinuate near rectangular hind angles. Scutellum distinct. Elytra less than twice longer than broad, at base wider than prothorax, with distinct shoulders, with scutellar emargination, broadly rounded at apex, finely striate, subapical junction of striae dorsal, well observable from above; intervals broad and flat. First abdominal sternite behind coxae about as long as second, the latter seven times broader than long; last sternite two times longer than preceding one, widely rounded at apex.

Composition. Monotypic.

Guillermia lecticula Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 4

Specific name. Latin *lecticula* (funeral stretcher).

Holotype. PIN, Nos. 3288/159 and 163; mold and cast of somewhat damaged beetle, most legs missing, sex unknown; Kyrgyzstan, Osh Region, Lyaylyak District, southwestern area of the Madygen Triassic field (Madygen locality); Middle or Upper Triassic, Ladinian-Carnian, Madygen Formation.

Description (fig. 1*g*, *h*). Rostrum is longer than exposed part of head; prorostrum probably curved downwards, is shorter than metarostrum, about as long as broad; mesorostral "caps" are relatively small and narrowly separated dorsally, large and contiguous ventrally; metarostrum is

wider than long, parallel-sided, separated from head by dorsal transverse impression. Antennae are thick, with first joint strongly incrassate, subtriangular, longer than broad; second and third are slightly less thick, subequal, 2 times longer than broad; fourth is less thick than third; fourth to eighth are transverse, gradually widening toward club; the latter is only slightly wider than funicle, a little shorter than last four funicular joints together, acuminate. Prothorax is almost 1.3 times broader than long, with gently and regularly rounded lateral sides; pronotum is densely and coarsely punctate and transversely rugose, punctation round; sublateral carinae are almost straight, slightly diverging behind, forked before hind pronotal margin. Scutellum is semicircular, slightly transverse. Elytra are 1.8 times longer than broad and 3.2 times longer than prothorax, at base 1.3 times wider than prothorax, almost parallel-sided in basal two-thirds, then regularly narrowing to apex, scarcely constricted behind shoulders; intervals are impunctate. Last abdominal sternite is two times broader than long. Underside is not sculptured.

Dimensions, in mm: Body length - 2.4 (rostrum excluded).

Material. Holotype.

SUBFAMILY KARARHYNCHINAE ZHERIKHIN & GRATSHEV, SUBFAM. NOV.

Diagnosis. Rostrum with widened dorsal plate and narrower ventral part, probably T-shaped in transverse section, pro-, meso- and metarostrum slightly or not differentiated, mesorostral caplike structures somewhat reduced or even absent; antennae inserted beneath dorsal plate. Ventral part of head not or only slightly inflated.

Composition. Three genera from Triassic and Jurassic of Central Asia and Kazakhstan.

Genus *Madygenorhynchus* Zherikhin & Gratshev, gen. nov.

Generic name. From Madygen locality and Greek *rhynchos* (beak).

Type species. *M. multifidus* sp. nov.

Diagnosis. Rostrum with dorsal plate about as wide as head, ventral part much narrower, with prorostrum acuminate and much shorter than metarostrum; mesorostral "caps" small but distinct. Antennae inserted antemedially, with first joint slender, second short, third long, fourth to eighth short, eighth not enlarged; club moderately compact, very narrow, fusiform, subacuminate. Structure of head and eyes unknown. Prothorax about as long as broad, at base wider than at apex, subapically constricted at sides; pronotum with median sulcus; hind angles rounded. Scutellum distinct. Elytra at base wider than prothorax, with distinct rectangular shoulders, with scutellar emargination, finely striate; subapical junction of striae displaced to lateral elytral surface; intervals rather wide, flat. Hind coxae subcontiguous. First abdominal sternite slightly shorter than second; last sternite slightly longer than preceding one.

Composition. Monotypic.

Madygenorhynchus multifidus Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 5

Specific name. Latin *multifidus* (divided into many parts).

Holotype. PIN, Nos. 3288/56 and 91; mold and cast of almost complete but damaged beetle body with partly preserved appendages, sex unknown; Kyrgyzstan, Osh Region, Lyaylyak District, southwestern area of the Madygen Triassic field (Madygen locality); Middle or Upper Triassic, Ladinian-Carnian, Madygen Formation.

Description (fig. 2*a*, *b*). Body and appendages are rather pale and unicolorous. Rostrum is probably longer than head; dorsal plate is nearly parallel-sided, narrowed and truncate at apex, slightly less than two times longer than broad; ventral part is about three times narrower with prorostrum shorter than mesorostral "caps" and narrow; "caps" are contiguous; metarostrum is parallel-sided, slightly wider and five times longer than mesorostrum including "caps." Antennae are inserted into apical third of rostrum, very slender; first joint is long, slightly clavate; second is short, subglobular, as broad as first; third is slightly wider, a little shorter than first, conically widened to apex; fourth is less broad than third at apex; fourth to eighth are subglobular, about as long as broad, slightly and gradually widening toward club; the latter is almost as long as five last funicular joints combined, more than four times longer than wide, with first joint the shortest, subglobular, last the longest, about as long as two preceding combined, two times longer than broad. Prothorax in basal three-fourths is nearly parallel-sided, only slightly rounded at lateral sides, subapical constriction rather weak; pronotum is finely punctate, with complete median sulcus; sublateral carinae diverge backwards, are distinctly sinuate, forked before hind angles, their inner branches prolonged along hind margin of pronotum and jointed medially; lateral ridge is longitudinally rugose. Scutellum is rather large, longer than broad. Elytra are 1.25 times wider and 3.25 times longer than prothorax, 2.25 times longer than broad, parallel-sided in basal two-thirds, not constricted behind shoulders, rounded at apex; intervals are impunctate. Fore tibiae are very slightly sinuate internally.

Dimensions, in mm: Body length - 2.1 (rostrum excluded).

Material. Holotype.

Genus ***Kenderlyka*** Zherikhin & Gratshev, gen. nov.

Generic name. From Kenderlyk locality.

Type species. *K. consobrina* sp. nov.

Diagnosis. Rostrum with dorsal plate almost as wide as head excluding eyes, ventral part only slightly narrower, with prorostum acuminate and longer than metarostrum, mesorostral "caps" small and indistinct. Antennae inserted postmedially, with first joint slender, second and third short, fourth long, as wide as third, fifth to seventh short, eighth strongly enlarged and fused with club; latter very compact, broad, oval, rounded apically. Head slightly constricted behind very large eyes, as long as metarostrum width. Prothorax as long as broad, at base broader than at apex, without constrictions; pronotum probably lacking median sulcus; basal and apical edges

almost straight; hind angles rounded. Elytra at base wider than prothorax, with slightly rounded shoulders, with scutellar emargination, finely striate; subapical junction of striae displaced to lateral elytral surface; intervals rather wide, flat. Hind coxae subcontiguous. First abdominal sternite distinctly shorter than second; last sternite about as long as preceding one. Tarsal joints probably very short.

Composition. Monotypic.

Kenderlyka consobrina Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 6

Specific name. Latin *consobrinus* (cousin).

Holotype. PIN, No. 2487/45, cast of complete beetle body with appendages, sex unknown; Kazakhstan, East Kazakhstan Region, Zaysan District, left bank of Akkolka Creek in Kenderlyk River Basin (Kenderlyk locality); Upper Triassic, Norian-Rhaetian, Tologoy Formation.

Description (fig. 2*c*). Body and appendages are dark and unicolorous. Rostrum is almost three times longer than exposed part of head, dorsal plate is almost parallel-sided, apically narrowed and rounded, three times longer than broad; ventral part is slightly narrower, almost parallel-sided, with prorostrum 1.8 times longer than metarostrum and 1.5 times longer than broad, with shallow median sulcus, mesorostral "caps" widely separated, metarostrum parallel-sided, scarcely wider than long. Antennae are inserted into second fourth of rostrum, are moderately slender and rather short; first joint is almost clavate, two times longer than broad, second and third are short, equal, as broad as first and barely longer than wide; fourth is as long and scarcely less wide than first, fifth to seventh about as long as broad, rounded; eighth twice wider than seventh, as long as broad, rounded; club two times longer than broad, as long as last three funicular joints combined, with all three joints subequal in length and transverse. Ventral part of head is not swollen. Prothorax has rather strongly and regularly rounded lateral sides, widest behind midlength; pronotum has dense, large, shallow round points, almost straight sublateral carinae, diverging backwards. Scutellum is small, longer than broad. Elytra are 1.25 times broader and 3.25 times longer than prothorax, 2.25 times longer than wide, not constricted behind shoulders, in basal two-thirds parallel-sided, then gently narrowing to rounded apex; intervals are impunctate. Underside is sparsely punctate. Fore tibiae are almost straight, about as long as femora; hind tibiae are straight, longer than femora.

Dimensions, in mm: Body length - 1.7 (rostrum excluded).

Material. Holotype.

Genus *Kararhynchus* Zherikhin & Gratshev, gen. nov.

Generic name. From Karatau Range and Greek *rhynchos* (beak).

Type species. *Kararhynchus occiduus* sp. nov.

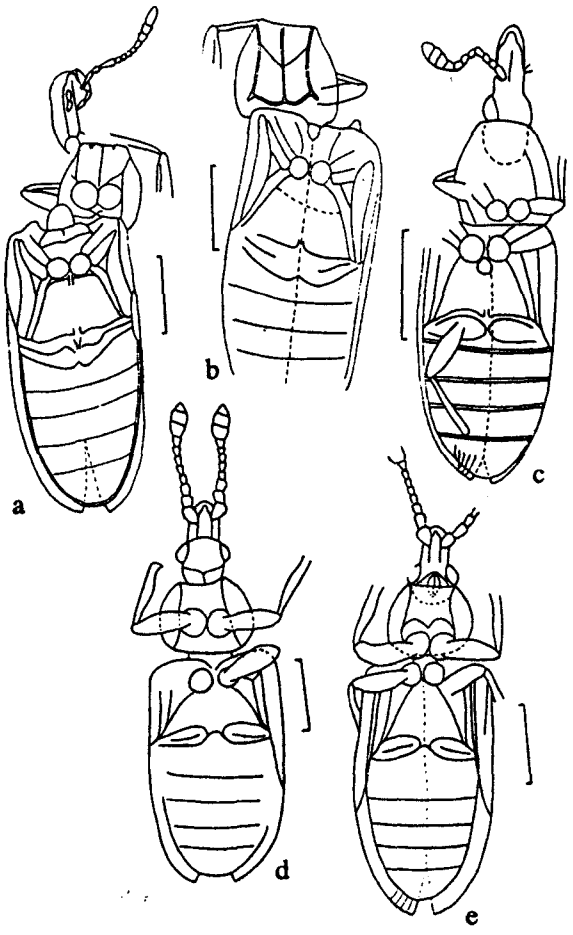

Fig. 2. Weevils of the subfamily Kararhynchinae: *a, b* - *Madygenorhynchus multifidus* sp. nov., holotype No. 3288/56 (91); *c* -*Kenderlyka consobrina* sp. nov., holotype No. 2487/45; *d, e* - *Kararhyncus occiduus* sp. nov.: *d* - holotype No. 2997/2118, *e* - paratype No. 2234/1540. Scale length = 0.5 mm.

Diagnosis. Rostrum with dorsal plate less wide than head; ventral part moderately narrow, acuminate, not divided into pro-, meso- and metarostrum, caplike structures missing. Antennae inserted antemedially, with first joint incrassate, second slightly oblong, third to eighth short, eighth not enlarged; club moderately compact, rather broad, suboval, subacuminate. Head not constricted behind relatively small eyes, much shorter than width of rostrum at base. Prothorax broader than long, at base wider than at apex, without constrictions; pronotum apparently lacking median sulcus; hind angles rounded. Scutellum probably present. Elytra at base wider than prothorax, with almost rectangular shoulders, with scutellar emargination, finely striate; subapical junction of striae displaced to lateral surface; intervals wide, flat. Hind coxae narrowly but distinctly separated. First abdominal sternite distinctly longer than second; last sternite scarcely longer than preceding one.

Composition. Monotypic.

Kararhynchus occiduus Zherikhin & Gratshev, sp. nov.

Pl. II, fig. 7

Specific name. Latin *occiduus* (dying).

Holotype. PIN, No. 2997/2118; cast of complete beetle (probably female) body with appendages; Kazakhstan, Chimkent Region, Chayan District, Karatau Range, Auliye Creek near Mikhaylovka village (Karatau-Mikhaylovka locality); Upper Jurassic, supposedly Oxfordian-Kimmeridgian, Karabastau Formation.

Description (fig. 2*d*, *e*). Rostrum is about 2 times longer than head, in male slightly wider than in female; dorsal plate is parallel-sided up to level of antennal insertion, then slightly narrowing to widely rounded apex in both sexes; ventral part in male slightly narrows from base toward apex, at base is about half as broad as dorsal plate, in female is almost parallel-sided and a little narrower, in both sexes has short and narrow subacuminate tip. Antennae in both sexes are inserted into apical third of rostrum, thick; first joint is subtriangular, about as long as broad; second is slightly narrower and somewhat longer, in male barely, in female about 1.5 times longer than broad; third to seventh are similar in shape, subtriangular, about as long as broad, slightly less wide than second; eighth in female is similar to seventh, in male is slightly oblong; club is as long as four last funicular joints combined, 2.1 times longer than broad, its joints of almost equal length, first two slightly transverse, third as long as broad. Head in female probably has somewhat inflated ventral part; frons in female is as wide as length of eye, in male wider; eyes are highest behind middle. Prothorax is similar in shape in both sexes, 1.3 times broader than long, widest a little behind midlength, with strongly and regularly rounded lateral sides; pronotum is probably impunctate; sublateral carinae are slightly sinuate anteriorly, diverging behind. Elytra in both sexes are almost parallel-sided and widely rounded apically; in male 1.9 times longer than broad, 3.6 times longer and 1.4 times broader than prothorax; in female 1.7 times longer than broad, 3.4 times longer and 1.4 times broader than prothorax; intervals are probably impunctate. Underside is probably not sculptured. Metathorax in female is shorter and intercoxal abdominal process wider than in male. Fore legs in both sexes are similar, tibiae are as long as femora, distinctly bisinuate at interior edge, with small tooth at its apex.

Dimensions, in mm: Body length - 2.2 (rostrum excluded).

Material. Holotype, and paratype PIN, No. 2234/1540, cast of complete beetle (probably male) body with appendages, from the same locality.

OBRIENIIDAE INCERTAE SEDIS

Because of the characteristic pattern of striae, Obrieniidae may be easily recognized even from in isolated elytra which are the most common fossil beetle remains. Confusion is possible between obrieniids with laterally displaced junction of striae (i.e., all genera but *Guillermia*) and some members of the form genus *Hydrobiites* Genitz. The latter is restricted now for isolated

elytra which have striae impinging separately on outer edge, and is believed to belong to Hydrophilidae [12]. When lateral side is not seen on a fossil elytron, both types of striation appear identical; most *Hydrobiites* also lack sutural striae, although some have it [12]. Fortunately, lateral surface usually may be seen easily on isolated elytra; sutural-locking laminae of Obrieniidae provide another important diagnostic feature, although they are clearly visible only when preservation is good. Additionally, *Hydrobiites* elytra are usually much more convex and less elongate, with less impressed and often impunctate striae. Thus, the probability of confusion seems to be low.

Three pairs of elytra (fig. 3*a-c*) (PIN, Nos. 1723/591, 2070/1501, and 2785/2360) from Madygen Formation of Dzhaylyaucho, and Madygen, Madygen Triassic field, Kyrgyzstan, demonstrate the pattern of striae characteristic of Obrieniidae. Closer identification is impossible.

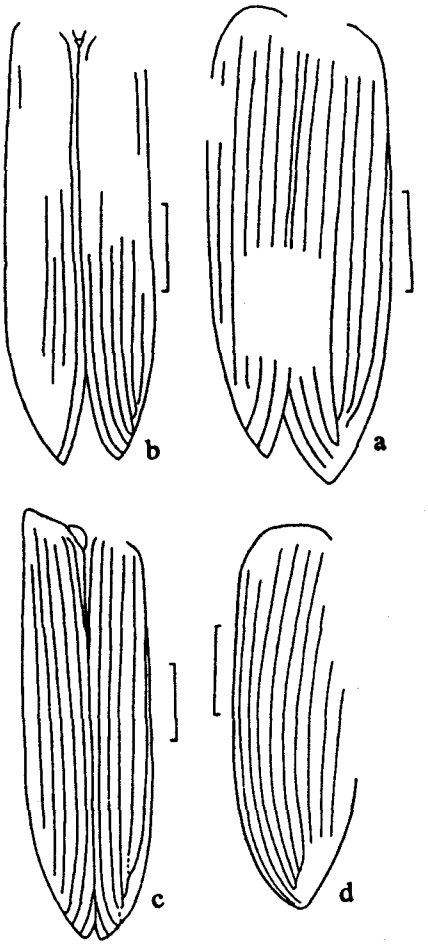

Fig. 3. Elytra of Obrieniidae incert. sedis: *a-c* - from Madygen Formation, Kyrgyzstan: *a* - spec. No. 1723/591, *b* - spec. No. 2070/1501, *c* - spec. No. 2785/2360; *d* - from Amba Formation, Primorye, spec. No. 4497/1. Scale length = 0.5 mm.

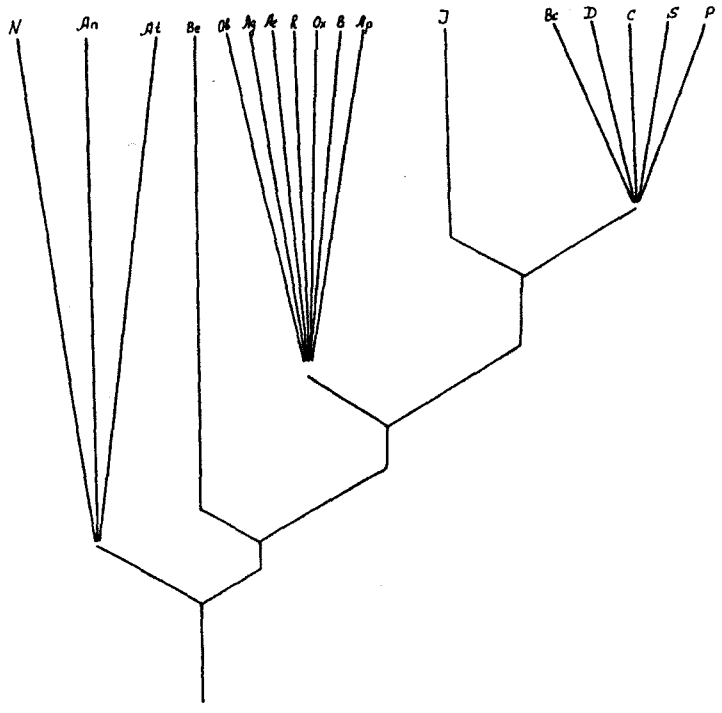

Fig. 4. Supposed phylogenetic relationships of the main lines within the superfamily Curculionoidea: N - Nemonychidae, An - Anthribidae, At - Attelabidae, Be - Belidae, Ob - Obrieniidae, Ag - Aglycyderidae, Ar - Antliarhinus, R - Rhopalotria, Ox - Oxycorynidae, B - Brentidae, Ap - Apionidae, I - Ithyceridae, Bc - Brachyceridae, D - Dryophthoridae, C - Curculionidae, S - Scolytidae, P - Platypodidae.

There are also three isolated elytra (Pl. II, fig. 8; fig. 3*d*) (PIN, Nos. 4497/1-3) from Provalovo on the Amba River (Khasan District, Primorye Province, Russian Far East) Upper Triassic (Middle Norian) Amba Formation, more precisely, from its lower (cyclothem IV, member 12, after S. A. Shorokhova [15]). All specimens from Provalovo seem to be conspecific; their position within the family is uncertain because structure and shape of elytra are very similar in both subfamilies.

PHYLOGENETIC AFFINITIES

The family is clearly holophyletic because of its unique apomorphous features such as elytral striae forming the unusual characteristic pattern in the Curculionoidea and peculiar caplike mesorostral structures. The latter character seems to be secondarily lost in the youngest genus *Kararhynchus*, which is, however, undoubtedly a member of Obrieniidae as indicated by its rostrum (synapomorphic with *Madygenorhynchus* and *Kenderlyka* in having widened dorsal plate) and elytral striae.

In other respects, the members of Obrieniidae demonstrate a mixture of advanced characters common with living Brentidae, Oxycorynidae, Aglycyderidae, and some genera of disputed familial placement such as *Rhopalotria* Desbr. and *Antliarhinus* Schoenh. Unfortunately, some important structures are not observable or are unclear on available specimens, especially the mouth parts, tibial spurs, tarsal joints (at least *Kenderlyka* probably had very short basal tarsomeres, like Oxycorynidae and *Rhopalotria*), claws, wings and genitalia. The rostrum is differentiated more or less clearly into three parts as in brentids; the pronotum with strong notopleural ridge and peculiar sublateral carinae resembles those of Aglycyderidae and especially Oxycorynidae, while the inflated ventral part of the head may be compared with a similar state in oxycorynids and especially in *Rhopalotria*. In the absence of scutellar striae and, probably, also confluent gular sutures, Obrieniidae are synapotypic with *Rhopalotria*, *Antliarhinus*, Apionidae, Brentidae and the more advanced curculionid branch; the obsolete ventral sutures of the rostrum are common with the same groups plus Oxycorynidae. Superficially, Obrieniidae are rather similar to Aglycyderidae, and the shape of rostrum in Kararhynchinae somewhat resembles those in some aglycyderids and in the male *Antliarhinus*. Also, the first three antennal joints in *Antliarhinus* are wider than following ones, as in many obrieniids. However, in some other respects obrieniids seem to be less advanced than the other groups, especially in having unmodified tibiae lacking setose bristles, furrows, or any other similar specialized structures. The abdominal structure with almost homonomous freely articulated sternites, is symplesiomorphic with those in *Rhopalotria*, Oxycorynidae and more primitive families such as Belidae, Anthribidae or Nemonychidae; the weakly sclerotized body also seems to be plesiomorphic in Curculionoidea.

The phylogeny of curculionoid families is not well studied and presents many unresolved problems. For the above reasons it may be supposed that Obrieniidae, Oxycorynidae, Brentidae, Aglycyderidae, *Antliarhinus* and *Rhopalotria* (as well as Apionidae which are synapotypic with brentids in many important characters) constitute a holophyletic unit, although relationships within this unit still remain unclear. Possibly together they form the sister-group to the higher curculionoid branch (including Curculionidae, Dryophthoridae, Scolytidae and Platypodidae), whereas Belidae, Attelabidae, Anthribidae and Nemonychidae (*sensu lato*) represent earlier branching. This phylogenetic hypothesis will be substantiated and discussed in more detail elsewhere.

However, one character provides more difficulties for interpretation. Obrieniidae are unique among Curculionoidea in having metepisterna impinging on mesocoxal cavities as in Cupedina (= Archostemata). If one supposes this state as inherited, the family should be considered as a sister-group to all other known weevils, synapotypic in mesocoxal cavities closed by metasternum, and such a supposition is also in accordance with the antiquity of Obrieniidae. Nevertheless, it seems to be too unlikely that this type of thoracic structure in obrieniids is really an archaic one: if so, an independent origin of the metasternum type usual for Scarabaeina (= Polyphaga) should be postulated for all or at least most superfamilies of the suborder. Then, all similarities between Obrieniidae and the brentid-oxycorynid-aglycyderid branch should be regarded as homoplasies, or, alternatively, the "polyphagan" metepisternal type as originating independently several times even within Curculionoidea. These hypotheses appear much less believable than secondary restoration of a "cupedine"-type metasternum in Obrieniidae as well as in Derodontidae, the only other polyphagan family showing the same feature. Thus, the structure of metasternum in Obrieniidae should be treated as one more apomorphy of the family rather than as a plesiomorphy.

One more possibility should be discussed, namely, that the family does not belong to

Curculionoidea at all. Indeed, one can consider this placement as not firmly based, because the presence of a rostrum is not a decisive argument, and the structures of mouth parts, tarsi, wings and genitalia are unknown. However, the metepisternal structure is the only feature of Obrieniidae which does not agree easily with their presumed curculionoid nature, while the combination of other characters (and especially very distinct sutural-locking lamellae and unpaired gular sutures, both of which rarely occurred in other superfamilies of beetles) seems to be quite appropriate; the similarity with the brentid-oxycorynid-aglycyderid complex is also important in this respect. In any case, Obrieniidae are clearly unrelated either to Cupedina or to Derodontidae, and their metasternal structures remain as enigmatic as before, even if they were excluded from Curculionoidea and placed elsewhere within Scarabaeina.

The find of Triassic weevils is significant for general beetle history, because it provides important (though indirect) evidence for extensive radiation of Scarabaeina in the Early Mesozoic. If generally accepted ideas about beetle phylogeny are correct, the superfamily Curculionoidea is phylogenetically one of the youngest, if not the youngest, within the suborder, because of its affinities to Cucujoidea and Chrysomeloidea. Thus, nearly all other superfamilies should already exist in the Middle Triassic. Indeed, Triassic beetle assemblages seem to be highly diverse in comparison with Permian ones which were composed only of various Cupedina. However, the systematic position of Triassic Scarabaeina is mostly unclear, although some members of the dascilloid, hydrophiloid and elateroid lines are probably represented in the Madygen Formation together with Obrieniidae (A. G. Ponomarenko [1], and pers. comm.).

Moreover, even Curculionoidea themselves should be rather diversified. If obrieniids really belong to the brentid-oxycorynid-aglycyderid complex, at least the existence of more generalized members of the same line must be postulated as well as the existence of ancestral nemonychid-like weevils. However, the oldest nemonychids are found in the Upper Jurassic, and other curculionoids are absent in the paleontological record until the Early Cretaceous; only future finds can clarify the early history of this superfamily.

Within the Obrieniidae, Obrieniinae are probably paraphyletic, while the genera of Kararhynchinae demonstrate a remarkable synapomorphy in rostral structure, doubtless being holophyletic. Probably, in Kararhynchinae the antennae were inserted into the space under the widened dorsal plate during hole-boring; thus, this structure should be functionally analogous with scrobes of more advanced Curculionoidea.

DISTRIBUTION AND SUPPOSED BIOLOGY

A fortunate possibility of recognition of obrieniids based on isolated elytra, which are the most common fossil beetle remains, allows tracing the distribution of the family both in space and time. Obrieniidae seem to be very rare fossils. We have failed to find any obrieniids among several hundreds of Triassic or Jurassic beetles described and figured previously. The rich Mesozoic insect collections deposited in the Paleontological Institute give, nevertheless, an idea of the distribution of the family, at least in Eurasia. All Triassic and the most representative Jurassic beetle collections have been searched for obrieniids; the results, excluding several small (less than 10 beetles each) Triassic collections which contain no Obrieniidae, are tabulated in Table 1. Several important points become evident at once from the table. First, the percentage of Obrieniidae is very low (less than 0.50%) in all but one site — Provalovo. Second, in the Jurassic they are at least one order of magnitude rarer than in most Triassic localities. Finally, Obrieniidae are entirely absent in European Triassic assemblages.

Table 1

The Distribution of Obrieniidae in Certain Triassic and Jurassic Beetle Assemblages

Locality	Age (after [3, 4])	Total number of beetle remains	Number of obrieniid remains	Percent
Nakaz, Bashkortostan, Russia	Ladinian	65	—	—
Pay-Khoy, Komi Rep., Russia	Ladinian	22	—	—
Madygen, Kyrgyzstan	Ladinian-Carnian	1177	5	0.42
Dzhaylyaucho, Kyrgyzstan	Ladinian-Carnian	3700	5	0,14
Garazhovka, Ukraine	Carnian-Norian	467	—	—
Malinovo, Russian Far East	Norian	20	—	—
Provalovo, Russian Far East	Norian	19	3	15.80
Kenderlyk, Kazakhstan	Norian-Rhaetian	207	1	0.48
Sogyuty, Kyrgyzstan	Earliest Jurassic	1481	—	—
Bakhar, Mongolia	Middle or Late Jurassic	1934	—	—
Karatau, Kazakhstan	Late Jurassic	5296	2	0.03

Although found in only a few localities, Obrieniidae were probably widespread in Asia, at least in the Triassic. According to paleofloristic evidences, the sites where obrieniids occur have been located both in the Euro-Riphean province with thermophilous flora and in a more temperate Siberian region [3, 4]. Moreover, Upper Triassic insect assemblages from the Russian Far East differ greatly from interior Asiatic ones, probably belonging to a distinct faunistic province ranging from northern Primorye through Japan up to Vietnam [18]; so, the existence of obrieniids in more southern Triassic faunas in Pacific Asia may be predicted with a good degree of assurance.

The geographic distribution of the family also gives some grounds for speculations about its biology. Modern weevils are, with very few exceptions, phytophagous, and the relatively long rostrum of obrieniids supposes oviposition into holes bored by the female in a plant tissue.

According to paleobotanical data summarized in [3, 4], the distributional patterns of Triassic cycadophytes and obrieniids seem to be remarkably similar. Cycadophytes are abundant in the Upper Triassic of Primorye, rarely but constantly occur in the Madygen and Tologoy formations, and are totally absent in Garazhovka flora. The absence of obrieniids in Malinovo may be explained by taphonomical reasons, because there are no small beetles in this site at all. In Ladinian floras of Bashkortostan and Komi Republic, cycadophytes are as rare as in Madygen or Kenderlyk, so the lack of obrieniids in our small collections may well be accidental. No other plant taxa show similar distributional patterns. Cycadophytes are also well represented in Jurassic floras of the Euro-Riphean province, including the Karatau flora [5].

Thus, cycadophytes seem to be the most probable host plants of Obrieniidae. It is noteworthy that modern *Rhopalotria* and *Antliarhinus* develop precisely in cycad cones, and generally weevils constitute the bulk of phytophagous beetles connected biologically with living Cycadales [2].

The absence of Obrieniidae among Australian and South African Triassic beetles [6, 14, 16] may be significant, because Triassic floras of southern continents are rather rich in cycadophytes; however, the total number of specimens described is less than a hundred, and more representative collections are needed to prove whether obrieniids were really absent in Triassic Gondwanaland.

A dramatic decline of the family seems to have occurred at about the Triassic/Jurassic boundary, as even the earliest Jurassic faunas do not contain obrieniids.

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