ISSN 0031-0301, Paleontological Journal, 2011, Vol. 45, No. 4, pp. 414–422. © Pleiades Publishing, Ltd., 2011.
Original Russian Text © A.G. Ponomarenko, 2011, published in Paleontologicheskii Zhurnal, 2011, No. 4, pp. 55–63.

New Beetles (Insecta, Coleoptera) from Vyazniki Locality, Terminal Permian of European Russia

A. G. Ponomarenko

Borissiak Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997 Russia
e-mail: aponom@paleo.ru

Received October 10, 2010

Abstract—Recently collected fossil beetles from the families Asiocoleidae, Rhombocoleidae, Schizocoleidae, and Permosynidae are described from the locality Vyazniki, terminal for the Permian of European Russia. The findings are represented by isolated elytra, the position of which in the natural system it is often impossible to establish; they are, therefore, described in a formal system. The oryctocenosis is dominated by schizocoleids and permosynids, which start to play an important role at the very end of the Permian. They probably include members of Adephaga and Polyphaga, the principal groups of Mesozoic–Cenozoic beetles. Each of the other two families is represented by a single specimen.

Keywords: Coleoptera, Permian, European Russia, Permian–Triassic crisis.

DOI: 10.1134/S0031030111040095

INTRODUCTION

The locality of Vyazniki has recently attracted special attention, because it is terminal among the Perimian fossil insect localities of European Russia, and because not only insects and other aquatic invertebrates were found in this locality, but also vertebrate fossils, including the earliest known Pseudosuchia. The first beetle fossils found in this locality proved to belong to the formal family Permosynidae, which is distinguished from all other Permian beetles by elytra with narrow grooves. This type of elytra is found in most recent beetles. In European Russia, these beetles are known only from the Upper Vyatkian locality of Aristovo (Ponomarenko, 2003). They do not occur in known Lower Triassic localities, and re-emerge as rare forms starting with the Anisian, becoming common in the Carnian and Norian. Such elytra were first described from the Belmont locality (Newcastle Group, terminal for the Australian Permian: Tillyard, 1924), where they are dominant among beetles. They are especially abundant in the Babii Kamen' locality (Maltseva Formation, Kuznetsk Basin). The age of this locality is determined by some authors as Early Triassic, by some as Late Permian, and some draw the line between Triassic and Permian within the profile of this locality. Since permosynids are absent in the Early Triassic, the Permian age appears to be preferable. They are less abundant in Erunakovian deposits of the Kuznetsk Basin (Rohdendorf, 1961). The earliest known member of Permosynidae was found in the Yiping Formation of southern China. These deposits were formerly considered Wuchiapingian; currently they are viewed as Middle Permian (Lin et al., 2010). Permosynids quickly dispersed over all territories of the end of the Permian where beetles have been found. In addition to the listed localities, they are also found in the Normandien Formation, South Africa, and in the Yamaan Us, southern Mongolia. The formal family Schizocoleidae was proposed for Permian beetle elytra with smooth surface and a characteristic short longitudinal impression along the external margin (from *schiza*, fissure). In some recent water beetles, this place is occupied by an internal protrusion linking the elytron with the lateral margin of the abdomen, locking the air supply under the elytron when the beetle is underwater. This structure is not always visible on the external surface of the elytron, and therefore smooth elytra without it are also placed in this family. The schizocoleids of Vyazniki are extremely diverse. They include *Uscatocoleus*, a typical Permian genus, *Pseudohydrophilites*, characteristic of low-diversity localities of the Lower Triassic, and *Metrorhinchus*, previously unknown from anywhere earlier than the Middle Triassic.

The presence of rhombocoleids is rather unexpected: they are typical of Urzhumian and Severodvinian localities, and were not found in other Vyatkian localities earlier. The asiocoleid, on the other hand, could well be expected. The genus that was found, *Tetracoleus*, was described from the Anisian of the Northern Urals, but an undescribed species is also present in Aristovo, and a similar elytron was found in Belmont.

The Vyazniki locality consists of several isolated outcrops. Insects, including beetles, were found only

in two of these, Sokovka and Balymotikha; the overwhelming majority of the beetles were collected in the latter outcrop, but they are more poorly preserved. Since all the materials described stem from the same locality, most of its full address is omitted in descriptions: central European Russia, Vladimir Region, Vyazniki City; Upper Permian, Vyatkian Stage, Vyazniki Horizon, *Archosaurus rossicus* zone; and only particular collecting sites are indicated. The locality was described earlier by Newell et al. (2010) and by Sennikov and Golubev (2010). The ostracods collected here include typical Triassic forms (Lozovskii and Kukhtinov, 2007); the earliest known Pseudosuchia fossils were found in this locality, although the general aspect of the complex still remains Permian.

SYSTEMATIC PALEONTOLOGY

Family Permosynidae Tillyard, 1924

Formal family, comprising isolated fossil beetle elytra that comply with the following diagnosis: Elytron with 11–14 longitudinal puncture grooves, including short scutellar groove and grooves bordering elytral margins. Groove 1, counting from sutural margin,[1] composite, consisting of scutellar groove and next groove with base preserved as short groove flowing into composite groove or ending blindly in basal part of elytron; this composite groove reaching elytral apex. One to three grooves, following that shortened groove, flowing into groove that bypasses sutural margin, or ending blindly in fields between grooves. Other grooves flowing into elytral apex or into groove that bypasses anteroapical margin.

Beetles the elytra of which are described within this formal taxon may belong to any of the suborders. Elytra of many thousand species of recent beetles comply with this diagnosis. It appears that the genus *Permosyne* should be divided into several formal genera, though this would require reviewing the systematic position of the other forms placed in this family. The position of this family was discussed by the author in more detail earlier (Ponomarenko, 2003).

Genus *Hydrobiites* Heer, 1865

Into this genus, viewed as formal, isolated fossil beetle elytra are placed if they comply with the following diagnosis: Elytron with 9–11 puncture groove; in sutural area blindly ending grooves absent, except short scutellar groove. Scutellar groove blind or ending on sutural groove. Most grooves curving along sutural margin and flowing into external margin in front of apex.

[1] Contrary to Tillyard's (1924) opinion, it is better to number grooves counting from the sutural margin, since some fields of the external margin may be crumpled into folds, and the number of the same groove would vary depending on preservation quality.

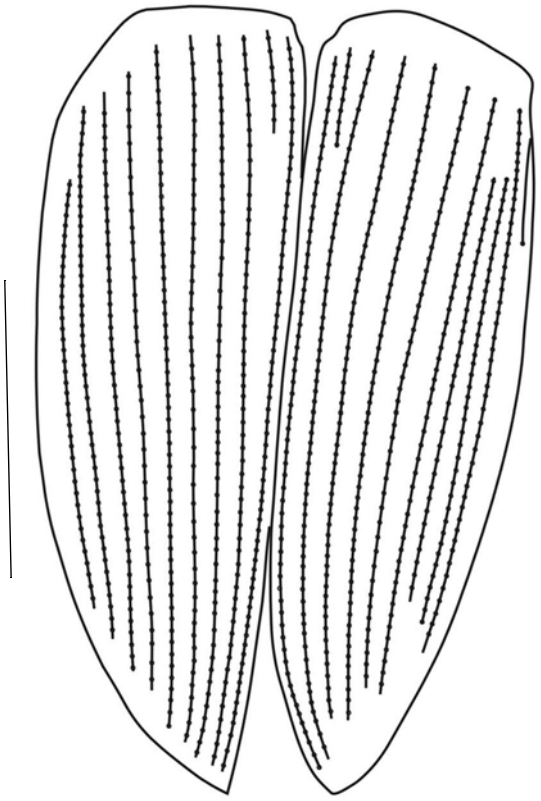


Fig. 1. *Hydrobiites tillyardi*, sp. nov., holotype, PIN, no. 5103/265, Balymotikha. Scale bars in all figures, 1 mm.

The earliest elytra of this type were recorded from the Permian; they are rather common in the Mesozoic, and found in most Mesozoic water scavenger beetles.

Hydrobiites tillyardi Ponomarenko sp. nov.

Plate 9, figs. 1, 2

Etymology. In honor of the distinguished paleoentomologist R. Tillyard, who was the first to describe Permian beetles.

Holotype. PIN, no. 5103/265, direct impression of both elytra; Balymotikha; Upper Permian.

Description (Fig. 1). The elytron is convex, 2.7 times as long as wide, roundly narrowing behind the middle; elytral apex is obliquely truncate, this area occupies less than one tenth of elytral length, elytral margin in this area is smooth; sutural margin is curved in the apical third, bordered. The epipleural border is absent; epipleuron is not wide. The puncture grooves are narrow; fields between the grooves are broad, flat, with large punctures at least as dense as punctures in the grooves, 3–4 punctures across the field. All grooves independently reach the truncate external margin of the elytron in its apical part.

Measurements, mm. Elytral length, 2.4–2.7; elytral width, about 0.8.

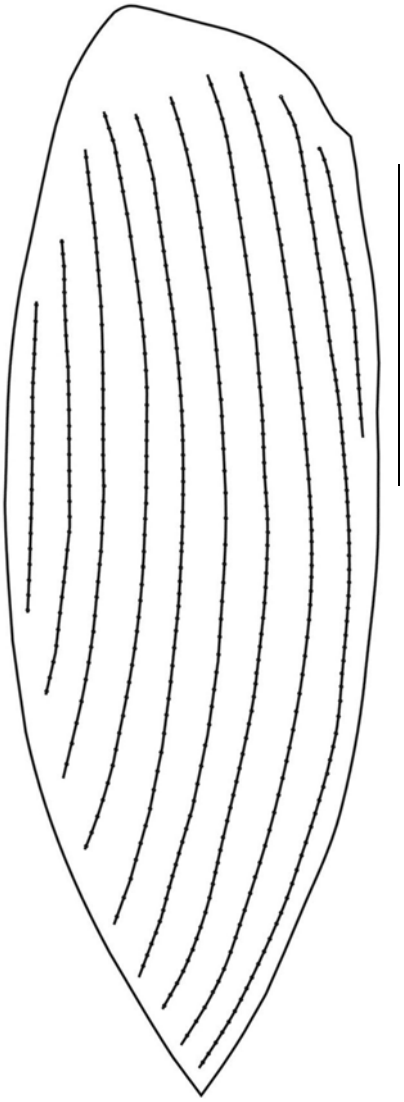


Fig. 2. *Hydrobiites vladimiri*, sp. nov., holotype, PIN, no. 5103/266, Balymotikha.

Comparison. The new species is especially similar to *Permosyne dentate* Ponomarenko, 2003, from which it differs in the absence of denticles on the external margin of the elytron in its posterior part.

Material. Holotype; paratype, PIN, no. 5103/277: slightly smaller left elytron, poorly preserved, from Balymotikha outcrop; paratype, PIN, no. 5102/12, base of left elytron from Sokovka outcrop.

***Hydrobiites vladimiri* Ponomarenko sp. nov.**

Plate 9, fig. 3

Etymology. From the name Vladimir.

Holotype. PIN, no. 5103/266, part and counterpart of left elytron; Balymotikha; Upper Permian.

Description (Fig. 2). The elytron is convex, 2.8 times as long as wide, widening from the base and narrowing behind the middle, obliquely truncate in apical quarter, elytral margin in this area is smooth; sutural margin is convex, bordered. The epipleural border is absent; epipleuron is not wide. The puncture grooves are narrow; fields between the grooves are broad, flat, with large punctures at least as dense as punctures in the grooves. All veins independently reach the truncate external margin of the elytron in its apical part.

Measurements, mm. Elytral length, 3.3–3.5; elytral width, 1.2–1.3.

Comparison. The new species is similar to the above-described one, from which it differs in the larger size and external margin of elytron truncate in the apical quarter.

Material. Holotype and paratype, PIN, no. 5103/1, somewhat larger left elytron, poorly preserved, with weakly discernible grooves, from the same outcrop.

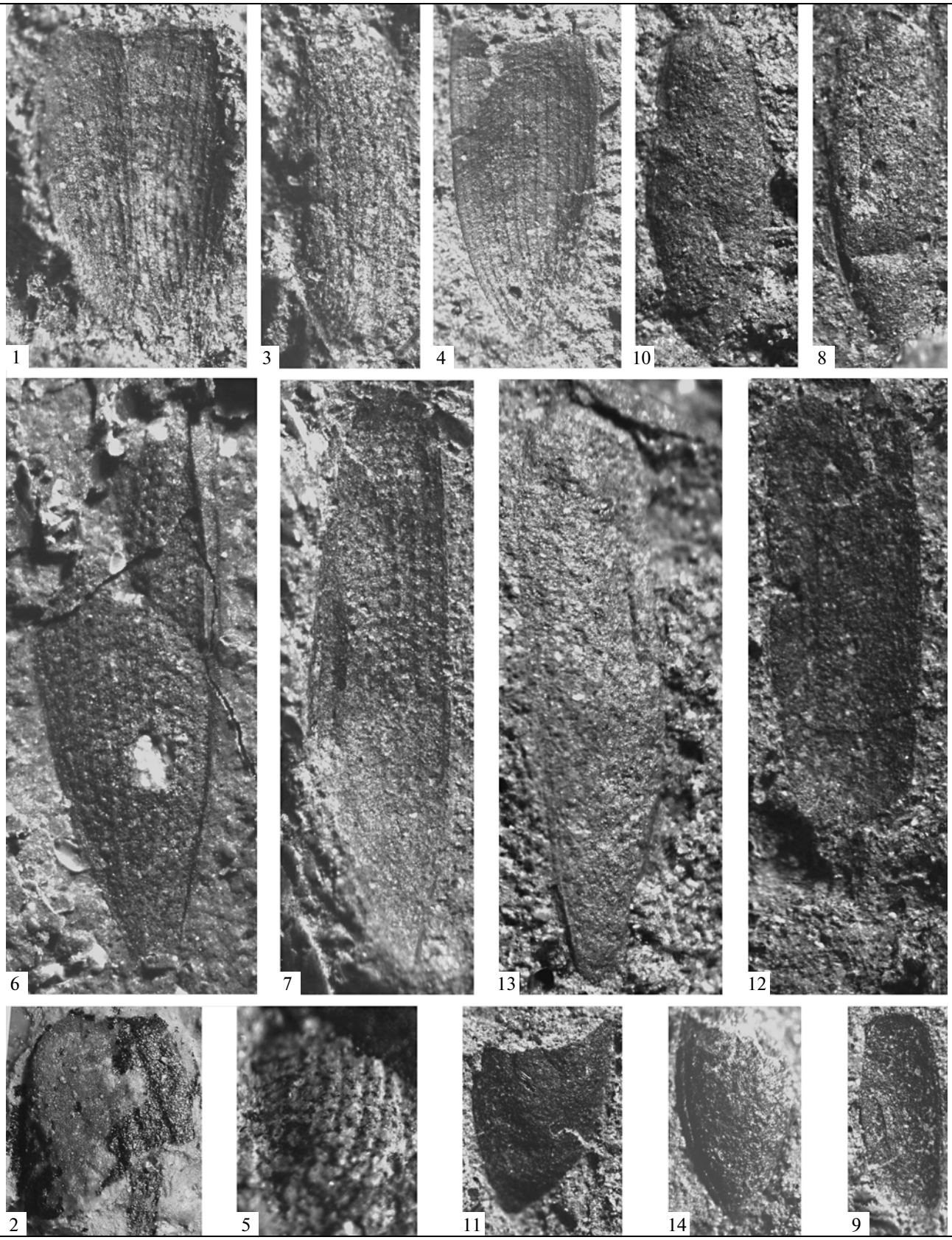
Genus *Permosyne* Tillyard, 1924

Describing this genus Tillyard (1924) placed four species in it; only one of those, the type species, should remain in the genus, which includes also two species described from the locality Aristovo (Ponomarenko, 2003). A modified diagnosis is proposed for the genus: Elytron with 9–13 grooves, with short scutellar groove and shortened groove next to sutural groove; this shortened groove ending blindly or flowing into groove closest to sutural margin. Part of grooves curving along

Explanation of Plate 9

Figs. 1 and 2. *Hydrobiites tillyardi*, sp. nov.: (1) holotype, PIN, no. 5103/265, ×25.7, Balymotikha; (2) paratype, PIN, no. 5102/12, ×50, Sokovka.
Fig. 3. *Hydrobiites vladimiri*, sp. nov., holotype, PIN, no. 5103/266, ×60, Balymotikha.
Figs. 4 and 5. *Permosyne rasnitsyni*, sp. nov., (4) holotype, PIN, no. 5103/264, ×27; (5) paratype, PIN, no. 5103/267, ×52, Balymotikha.
Fig. 6. *Tetracoleus sennikovi*, sp. nov., holotype, PIN, no. 5102/6, ×18.6, Sokovka.
Fig. 7. *Erunakicupes angustus*, sp. nov., holotype, PIN, no. 5103/268, ×17.5, Balymotikha.
Figs. 8 and 9. *Uskatocoleus rhynchophorus*, sp. nov.: (8) holotype, PIN, no. 5103/271, ×16.6; (9) paratype, PIN, no. 5103/272 ×13.6), Balymotikha.
Fig. 10. *Uskatocoleus eurypygus*, sp. nov., holotype, PIN, no. 5103/270, ×16.5, Balymotikha
Fig. 11. *Pseudochrysomelites major*, sp. nov. holotype, PIN, no. 5103/276, ×20, Balymotikha.
Fig. 12. *Metrorhynchites baculum*, sp. nov. holotype, PIN, no. 5103/269, ×19.1, Balymotikha.
Fig. 13. *Metrorhynchites elongatus*, sp. nov. holotype, PIN, no. 5103/274, ×29.4, Balymotikha.
Fig. 14. Schizocoleidae incertae generis, specimen, PIN, no. 5103/273, ×13.3, Balymotikha.

Plate 9



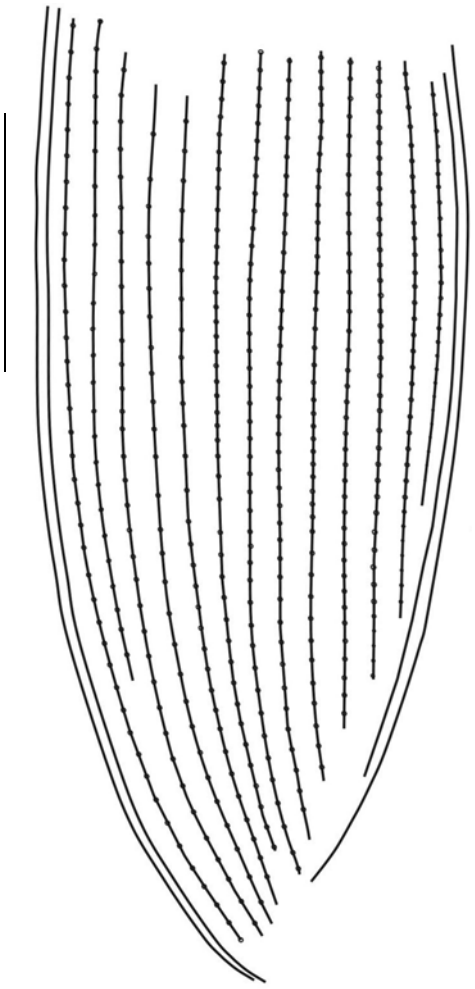


Fig. 3. *Permosyne rasnitsyni*, sp. nov., holotype, PIN, no. 5103/264, Balymotikha.

sutural margin and flowing into external margin in front of apex.

***Permosyne rasnitsyni* Ponomarenko, sp. nov.**

Plate 9, figs. 4, 5

Etymology. In honor of the paleoentomologist A.P. Rasnitsyn.

Holotype. PIN, no. 5103/264, right elytron without base; Balymotikha; Upper Permian.

Description (Fig. 3). The elytron is weakly convex, wide, 2.6 times as long as wide, widening from the base in the basal fifth, distally narrowing; sutural margin is bordered. The epipleural border is absent; epipleuron is not wide. Elytron has 13 puncture grooves, which are narrow; fields between the grooves are flat. The shortened groove does not reach the apical third of the elytron, ends blindly. The punctures are large; distances between punctures are visibly larger than the punctures. Most of the grooves reach the external margin of the elytron in its apical part.

Measurements, mm. Length of preserved part of elytron, 3.7; elytral width, 1.6.

Comparison. The new species differs from the type species in the wider elytra and in the groove closest to the suture not reaching the posterior elytral margin.

Remarks. The base of elytron has not been preserved, so the scutellar groove is not visible, but judging by the second field from the suture widened towards the base of elytron, this groove was short and ended blindly.

Material. Holotype and paratype PIN, no. 5103/267, apex of left elytron from the same locality.

Family Asiocoleidae Rohdendorf, 1961
=Tricoleidae Ponomarenko, 1969, syn. nov.

The beetles described below demonstrated such a considerable diversity of venation that the hiatus between the families Asiocoleidae Rohdendorf, 1961 and Tricoleidae Ponomarenko, 1969 proved insufficient to consider them as two distinct families. The family Tricoleidae Ponomarenko, 1969 should be considered a junior subjective synonym of Asiocoleidae Rohdendorf, 1961.

Genus *Tetracoleus* Ponomarenko, 2009

The genus was described from the Triassic of northern Cisuralia. In the Upper Vyatkian locality Aristovo, an incomplete impression of elytron was found, the preserved features of which do not contradict placing it in this genus. Judging by the photograph sent by G. Beattie, a similar elytron was found in the Late Permian Newcastle Group of Australia. It probably belongs to another species than the fossils from Aristovo and Vyazniki. The species described below was placed in this genus because of its numerous series of cells (four in the larger part of the field and five closer to its middle).

***Tetracoleus sennikovi* Ponomarenko, sp. nov.**

Plate 9, fig. 6

Etymology. In honor of the paleontologist A.G. Sennikov, one of the organizers of the complex study of Vyazniki locality.

Holotype. PIN, no. 5102/6, right elytron without basal part; Sokovka; Upper Permian.

Description (Fig. 4). The elytron is elongate, more than three times longer than wide, narrowed in the apical half; its apex is symmetrical, rather weakly protruding as a broad "tail"; its sutural margin is convex, bordered. The epipleural border is narrow; epipleuron is widened in its anterior half. The anterior elytral margin has denticles and notches. One cell series includes about 50 cells, which are rounded. The tubercles surrounding the cells are distinct. All principal veins are free. There are four series of cells in the

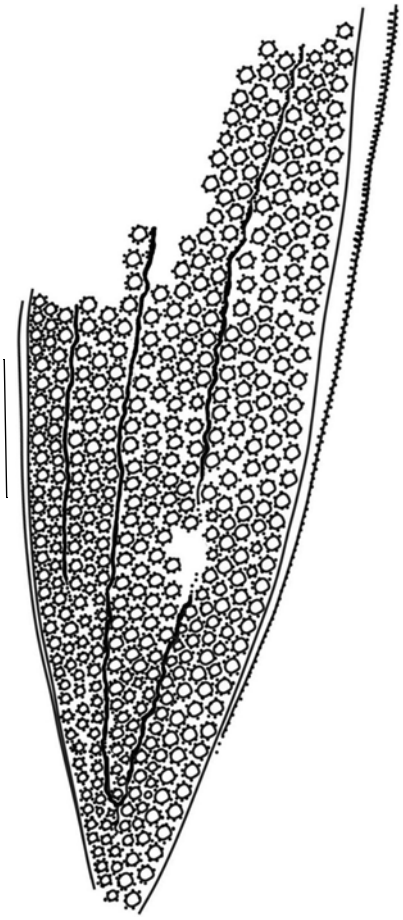


Fig. 4. *Tetracoleus sennikovi*, sp. nov., holotype, PIN, no. 5102/6, Sokovka.

external field, five in front of the apex, four in the next field, and three in all other fields. Elytral cells alternate, not forming regular transverse rows.

M e a s u r e m e n t s, mm. Length of preserved part of elytron, 6.5; elytral width, 2.2.

C o m p a r i s o n. The new species is distinguished from other species by 4–5 series of cells in the external field, both fields next to the suture with three series of cells, and anterior elytral margin with denticles.

M a t e r i a l. Holotype.

Family Rhombocoleidae Rohdendorf, 1961

Genus *Erunakicupes* Rohdendorf, 1961

The species described below is placed in this genus according to the presence of the "schiza," regular series of punctures, and short additional series of punctures near the elytral base.

Erunakicupes angustus Ponomarenko, sp. nov.

Plate 9, fig. 7

E t y m o l o g y. From the Latin *angustus* (narrow).

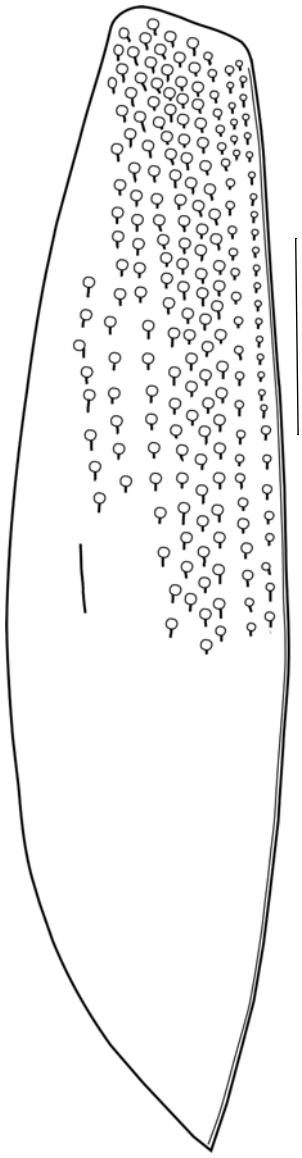


Fig. 5. *Erunakicupes angustus*, sp. nov., holotype, PIN, no. 5103/268, Balymotikha.

H o l o t y p e. PIN, no. 5103/268, right elytron; Balymotikha; Upper Permian.

D e s c r i p t i o n (Fig. 5). The elytron is convex, widening to almost twice its width from the base to the middle, widest at the distal third, roundly narrowed distally, more than four times longer than wide; elytral base is very narrow, oblique; elytral apex is pointed, slightly asymmetrical, shifted towards the sutural margin; sutural margin is almost straight, bordered. The epipleural border is narrow. The "schiza" is short, equal in length to one tenth of elytral length, positioned behind the middle of elytron close to the external margin. The surface of elytron in the basal half has large, rather shallow punctures in weak grooves. Additional puncture grooves in the basal part of elytron are very short, consist of only a few punctures, almost not

reaching the disc of elytron. Puncture grooves in the sutural area are parallel to the sutural margin.

Measurements, mm. Elytral length, 6.0; elytral width, 1.4.

Comparison. The new species is distinguished from all other species by the characteristic shape of elytron with very narrow base and by the widened apical third; it differs from most species also by the very short additional grooves in the basal part of the elytron.

Material. Holotype.

Family Schizocoleidae Rohdendorf, 1961

The family was proposed for isolated elytra without grooves or series of large punctures on disc. They almost invariably have a short impressed groove, termed "schiza" by the author of the taxon. R.A. Crowson indicated to me that in some water beetles this place is occupied on the internal surface of elytron by a protrusion linking the elytron with the lateral margin of the abdomen and preventing the raising of elytron by the air bubble when the beetle is underwater. This is how this structure was subsequently interpreted. Since it is rather strong, it is usually visible also on the external surface of the elytron, but sometimes it is lacking in fossils very similar in all other respects to elytra with the "shiza." It may be invisible simply because of fossilization conditions. The surface of the elytron can be smooth, transversely rugous, or punctate. Sometimes rather small ring-like structures are visible; these probably are sections of internal columns (columellae), joining the external and internal surface of the elytron. The habitus of fossilized elytra strongly depends on fossilization conditions.

Almost no characters remain for classifying such fossils, except external shape, which strongly depends on the position of the elytron at the time of fossilization. The same elytron fossilized in an oblique position will be shaped differently from an elytron lying parallel to the plane of stratification. Elytra preserved jointly or on remains of the body often display a shape different from those of isolated elytra. Thus, the system of Schizocoleidae, even understood as formal, proves to be extremely unreliable, and has to be used only in the absence of any other, since analysis of elytral changes over time proves to be quite informative. For instance, only schizocoleid fossils are known from the Lower Triassic.

Genus *Uskatocoleus* Rohdendorf, 1961

The species described below are placed in the genus *Uskatocoleus* due to their compliance with its diagnosis: Relatively wide convex elytron, visibly widened towards middle and evenly narrowed in apical half; less than four times longer than wide.

Uskatocoleus rhynchophorus Ponomarenko, sp. nov.

Plate 9, figs. 8, 9

Etymology. From tThe Greek *rhynchophorus* (beak-nosed).

Holotype. PIN, no. 5103/271, part and counterpart of right elytron; Balymotikha; Upper Permian.

Description. The elytron is elongate, widest near the middle, distally narrowed; its apex is protruding, beak-like, backwards; elytron is 3.3 times as long as wide; elytral base is rounded, oblique; sutural margin is almost straight in the basal half, weakly curved distally; external margin is curved almost from the base, so the elytron was strongly convex. The "schiza" is rather long, about as long as one quarter of elytron, positioned slightly proximal of the middle of elytron in its widest part near the external third. The surface of elytron is covered with dense small tubercles.

Measurements, mm. Elytral length, 3.3; elytral width, 1.0.

Comparison. The size and beak-like shape make the new species especially similar to *U. striatus* Rhodendorf, 1961, from which it differs in the total absence of longitudinal grooves and puncture series and in the sutural margin straight in the basal part.

Material. Holotype and paratype, PIN no. 5103/272.

Uskatocoleus eurypygus Ponomarenko, sp. nov.

Plate 9, fig. 10

Etymology. From the Latinized Greek *eurypygus* (broad-bottomed).

Holotype. PIN, no. 5103/270, part and counterpart of right elytron; Balymotikha; Upper Permian.

Description. The elytron is flattened and wide; widest in the apical third, where it is almost twice as wide as basally; distally roundly narrowed; apically symmetrical; 2.8 times as long as wide; basally straight; with external and sutural margins curved almost symmetrically, bordered. The "schiza" is poorly visible, rather short, positioned slightly distal of the middle of elytron in front of its widest point, close to external margin. The surface of elytron is covered with dense small tubercles.

Measurements, mm. Elytral length, 3.3; elytral width, 1.2.

Comparison. The new species differs from all other species of the genus in the shape of the wide elytron with its widest point strongly shifted distally.

Material. Holotype.

Genus *Pseudochrysomelites* Handlirsch, 1906

Pseudochrysomelites: Handlirsch, 1906, p. 400.

Type species. *Pseudochrysomelites rothenbachi* Handlirsch, 1906, Upper Triassic of Switzerland, by original monotypy.

Diagnosis. Isolated elytra of small beetles. Elytron wide, with external margin only slightly convex in apical third, usually straightly truncate. Elytral apex asymmetrical, sutural margin almost straight. Elytral surface smooth, without large punctures, only with small punctation. "Schiza" usually not visible.

Comparison. This genus is distinguished from other genera by the almost straight posterior margin, which makes the elytral apex seem asymmetrixcal.

Species composition. In addition to the type species, the genus should include described, but unnamed "species" 5, 23, 25 from the Anisian of northeastern France (Papier et al., 2005); "species" 2 has a similar shape of the elytron, but its description mentions fine grooves on the disc. The species *Palademosyne ovum* Ponomarenko, 2004, *P. elongatum* Ponomarenko, 2004, and *P. latum* Ponomarenko, 2004 should be transferred to the same genus. These forms were described earlier as members of the genus *Palademosyne* Rohdendorf, 1961, but they differ considerably from the type species of that genus in the almost straight sutural margin and apex shifted towards this margin. Elytra of this shape are especially characteristic of Early Triassic beetles.

***Pseudochrysomelites major* Ponomarenko, sp. nov.**

Plate 9, fig. 11

Etymology. From the Latin *major* (greater).

Holotype. PIN, no. 5103/276, apex of right elytron; Balymotikha; Upper Permian.

Description. The elytron is flattened apically, narrowed distally, narrowed visibly stronger in front of the apex, so that the external margin has a bend characteristic of the genus; elytral apex is pointed; sutural margin is broadly bordered. The surface of elytron is covered with coarse dense punctures; the intervals between these punctures form oblique rolls.

Measurements, mm. Length of apical portion of elytron, almost 4; elytral width, 2; total elytral length, over 10.

Comparison. It is impossible to compare this species properly, because its holotype is incompletely preserved, but the size of the elytron, several times greater than in any other species, shows that it doubtlessly belongs to a new species.

Material. Holotype.

Genus *Metrorhynchites* Tillyard, 1916

Metrorhynchites: Tillyard, 1916, p. 45.

Type species. *Metrorhynchites sydneiensis* Tillyard, 1916, Triassic of Australia, by original monotypy.

Diagnosis. Isolated elytra of elongated beetles. Elytron narrow, more than four times longer than wide; external margin convex; sutural margin less convex or almost straight. Elytral apex usually symmetrical. Elytral surface smooth, without large punctures, only with small punctation or three longitudinal ribs over areas where tracheae lie. Collumellae sometimes visible. "Schiza" usually visible.

Comparison. This genus differs from other genera in the strongly elongated shape of elytron, which is at least four times as long as wide.

Species composition. In addition to the type species, the author of the genus subsequently placed also *M. grandis* Tillyard, 1918 in this genus. The genus should also include *Elaterium angustum* Tillyard, 1918, described from the same Ashfield Formation. It should probably also include the beetle whose elytron was described from the Wianomatta Formation of Australia as *Mesorhynchophora dunstani* Tillyard, 1916. Among the beetles described from the Leninsk Formation of Kuznetsk Basin, *Uskatocoleus angustior* Rohdendorf, 1961, *U. angustus* Rohdendorf, 1961, and *U. longus* Rohdendorf, 1961 should be placed in this genus. Two other species are described below.

Remarks. All Triassic beetles of this genus have relatively large size: their elytra are longer than 10 mm. All its Permian members are much smaller than Triassic ones.

***Metrorhynchites baculum* Ponomarenko, sp. nov.**

Plate 9, fig. 12

Etymology. From the Latin *baculum* (stick).

Holotype. PIN, no. 5103/269, direct impression of left elytron; Balymotikha; Upper Permian.

Description. The elytron is elongate, almost not widened from its base to the middle, widest near the middle, distally roundly narrowed, with pointed symmetrical apex, 4.3 times as long as wide, with base straight, and with external and sutural margins almost symmetrical. The "schiza" is rather short, about as long as one tenth of the elytron, positioned in the middle of elytral length near its external quarter. The surface of elytron is covered with dense small tubercles.

Measurements, mm. Elytral length, 5.4; elytral width, 1.4.

Comparison. The new species is distinguished by its considerably smaller size from Mesozoic species and by its somewhat larger size and elytron weakly widened in basal half from Permian species; in addition, it differs from *M. angustior* (Rohdendorf, 1961) and *M. longus* (Rohdendorf, 1961) in the symmetrical elytral apex.

Material. Holotype.

***Metrorhynchites elongatus* Ponomarenko, sp. nov.**

Plate 9, fig. 13

Etymology. From the Latin *elongatus* (elongate).

Holotype. PIN, no. 5103/274, direct impression of right elytron; Balymotikha; Upper Permian.

D e s c r i p t i o n. The elytron is elongate, visibly widened from its base to the middle, widest in front of the middle, distally roundly narrowed, with blunt symmetrical apex, 4.5 times as long as wide, with base oblique, and with external and sutural margins bordered, almost symmetrical. The "schiza" is rather short, about as long as one tenth of the elytron, positioned in front of the middle of elytral length near its external quarter. The surface of elytron is covered with dense small tubercles.

M e a s u r e m e n t s, mm. Elytral length, 3.5; elytral width, 0.8.

C o m p a r i s o n. The new species is distinguished by its considerably smaller size from Mesozoic species and by the blunt elytral apex from Permian species; it is especially similar in elytral shape to *M. angustior* (Rohdendorf, 1961), from which it differs in the shorter "schiza."

M a t e r i a l. Holotype.

* * *

In addition to the above-described species, the collection includes two elytral apices, Schizocoleidae inc. sed., which cannot be placed in any particular species according to their size and proportions: PIN, nos. 5103/273 (Pl. 9, fig. 14) and 5103/275.

ACKNOWLEDGMENTS

This study was supported by the program "Origin of the Biosphere and Evolution of Geo-Biological Systems" of the Presidium, Russian Academy of Sciences, and by the Russian Foundation for Basic Research, project no. 09-04-01-241.

REFERENCES

Handlirsch, A., *Die fossilen Insekten und die Phylogenie der rezenten Formen. Ein Handbuch für Paläontologen und Zoologen*, Leipzig: Engelmann, 1906, pp. 1–800

Lin, Qi-bin, Nel, A., and Huang, Di-ying, The First Agetopanorpine Mecopteroid Insect from Middle Permian of China (Insecta: Mecoptera: Permochoristidae), *Ann. Soc. Entomol. France (N.S.)*, 2010, vol. 46, nos. 1–2, pp. 62–66.

Lozovskii, V.R. and Kukhtinov, D.A., The Vyaznikian Stage is the Youngest Division of the Upper Permian of European Russia, *Byull. Mosk. Ob-va Ispyt. Prir., Otd. Geol.*, 2007, vol. 82, no. 6, pp. 17–26.

Newell, A.J., Sennikov, A.G., Benton, M.J., Molostovskaya, I.I., Golubev, V.K., Minikh, A.V., and Minikh, M.G., Disruption of Playa–Lacustrine Depositional Systems at the Permo-Triassic Boundary: Evidence from Vyazniki and Gorokhovets on the Russian Platform, *J. Geol. Soc. London*, 2010, vol. 167, pp. 695–716.

Papier, F., Nel, A., Grauvogel-Stamm, L., and Gall, J.-C., La diversité des Coleoptera (Insecta) du Trias dans le nord-est de la France, *Geodiversitas,* 2005, vol. 27, pp. 181–199.

Ponomarenko, A.G., The First Beetles (Permosynidae, Coleoptera) from the Upper Tatarian of European Russia, *Paleontol. Zh.,* 2003, no. 2, pp. 65–68 [*Paleontol. J.*] (Engl. Transl.), vol. 37, no. 2, pp. 170–173.

Rohdendorf, B.B., Order Coleoptera. Coleopterans or Beetles, in *Paleozoiskie nasekomye Kuznetskogo basseina: Tr. Paleontol. Inst. Akad. Nauk SSSR. T. 85*, (Paleozoic Insects of the Kuznetsk Basin: Proceedings of the Paleontological Institute of the Academy of Sciences of the USSR, Vol. 85), Rohdendorf, B.B., Becker-Migdisova, E.E., Martynova, O.M., and Sharov, A.G., Eds., Moscow: Akad. Nauk SSSR, 1961, pp. 393–469.

Sennikov, A.G. and Golubev, V.K., Permian/Triassic Deposits of Gorokhovets–Vyazniki Area, Vladimir Region, in *Paleontologiya i stratigrafiya permi i triasa severnoi Evrazii. Materialy V Mezhdunarodnoi konferentsii, posvyashchennoi 150-letiyu so dnya rozhdeniya V.P. Amalitskogo (1860–1917), Paleontologicheskii institut im. A.A. Borisyaka RAN, Moskva, 22–23 noyabrya 2010 g.* (Permian and Triassic Paleontology and Stratigraphy of North Eurasia. Proceedings of 5th International Conference Devoted to the 150th Anniversary of Vladimir Prokhorovich Amalitzky (1860–1917), A.A. Borissiak Paleontological Institute of the Russian Academy of Sciences, Moscow, November 22–23, 2010), Golubev, V.K. and Sennikov, A.G., Eds., Moscow: Paleontol. Inst. Ross. Akad. Nauk, 2010, pp. 102–107.

Tillyard, R.J., Mesozoic and Tertiary Insects of Queensland and New South Wales, *Queensl. Geol. Surv. Publ.*, 1916, vol. 253, pp. 1–49.

Tillyard, R.J., Upper Permian Coleoptera and a new order from the Belmont beds, New South Wales, *Proc. Linn. Soc. N.S.W.*, 1924, vol. 49, pp. 429–435.