

New and Little-Known Permian Insects (Insecta: Grylloblattida; Orthoptera) from the Chekarda Locality, Central Ural Mountains

V. G. Novokshonov and D. S. Aristov

Perm State University, ul. Bukireva 15, Perm, 614600 Russia

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Abstract—A new family, Tshekardominidae, of the order Grylloblattida (Insecta) is described from the Kungurian of the Central Ural Mountains. The body structure of an oedischiid male is studied (Orthoptera: Oedischiidae).

INTRODUCTION

This paper continues the series of papers in which the authors study insects of the well-known Chekarda locality (Perm Region, Suksun District, outcrop along the left bank of the Sylva River at the mouth of the Chekarda River; Lower Permian, Kungurian, Koshelevka Formation). This locality was discovered by G.T. Mauer in 1928 and was subsequently repeatedly visited by M.D. Zalessky, Yu.M. Zalessky, E.V. Permyakova, and Z.I. Dzyu. However, the richest collections were made during the expeditions headed by A.G. Sharov during 1959–1961. Since 1989, this locality has been studied by researchers from Perm State University. Some geological, paleontomological, and paleobotanical characteristics of this locality were given by Naugolnykh (1999), Ponomareva *et al.* (1998), and Sharov (1999). The total number of insects collected at Chekarda is currently above 8000, the number of insect species is approaching 200, and the material still contains many

undescribed species. For example, there are several new taxa of grylloblattids in the collection (one of them will be described below). In addition, a uniquely preserved orthopteran specimen is described, thus demonstrating the body structure of a male of the family Oedischiidae. The paper is based on the collections of the Paleontological Institute of the Russian Academy of Sciences (PIN) and Perm State University (PGU). The paratypes from the second collection are currently deposited at PIN.

SYSTEMATIC PALEONTOLOGY

Order Grylloblattida

Suborder Protoperlina

Family Tshekardominidae Novokshonov
et Aristov, fam. nov.

Type genus. *Tshekardomina* gen. nov.

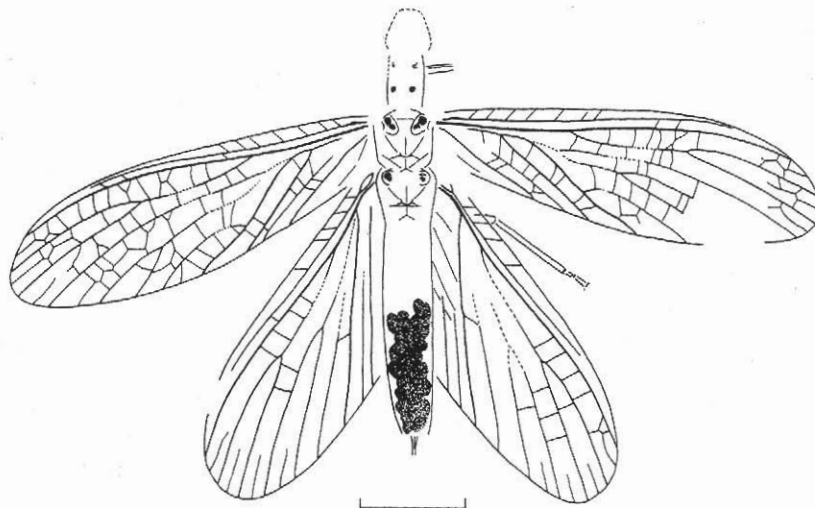


Fig. 1. *Tshekardomina maculosa* sp. nov., holotype PIN, no. 1700/1188, habitus. Scale bar 5 mm.

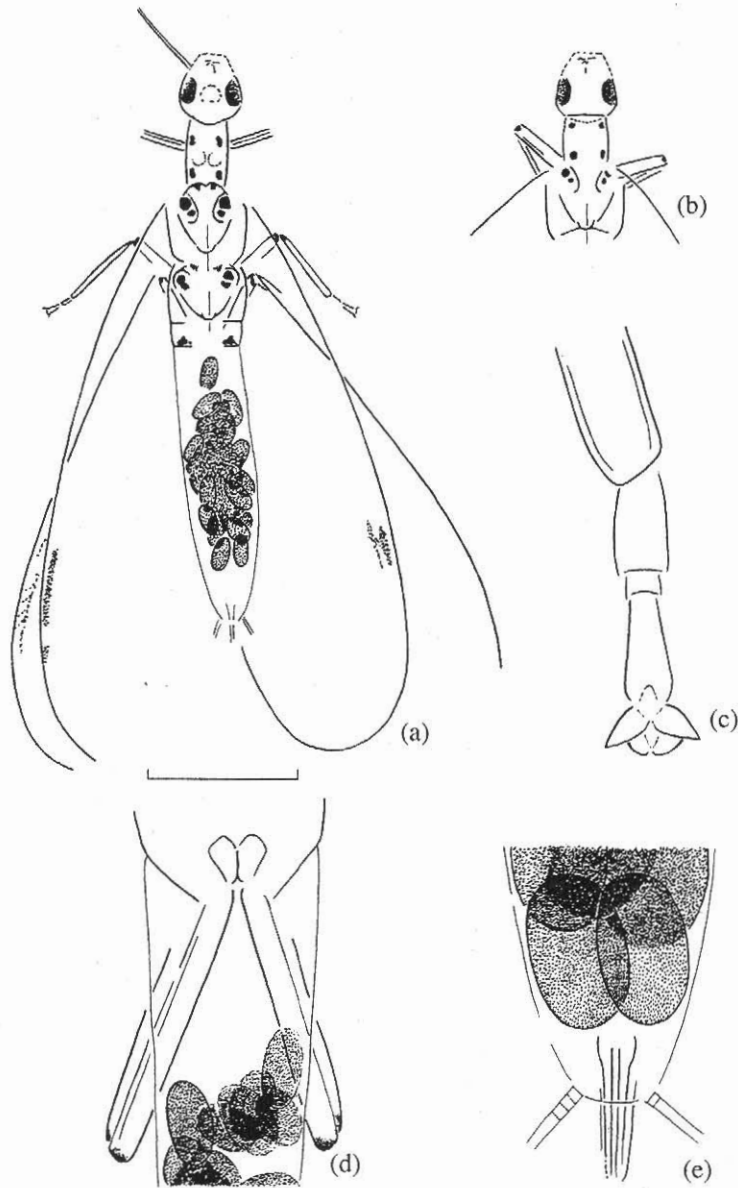


Fig. 2. Structure of *Tshekardomina maculosa* sp. nov.: (a) paratype PIN, no. 1700/3714, habitus (wing venation not shown); (b) paratype PIN, no. 1700/3460, anterior body; (c) paratype PGU, no. 2/245, distal part of tibia and tarsus; (d) paratype PIN, no. 1700/4017, hind legs and base of abdomen; (e) paratype PIN, no. 1700/4017, apex of abdomen. Scale bar 5 mm for Figs. 2a and 2b; other figures without fixed scale.

Diagnosis. Midsize insects. At least in females, wings normally developed (not shortened), SC long, longitudinal veins not polymerized. In forewings, RS with two terminations, M with two or three, and CuA with three terminations; A₁ simple; crossveins usually simple, straight or weakly curved, more rarely some cells between longitudinal veins biserial. RS originating at just beyond one-third of wing length. RS stems (excluding base), M, and anterior CuA₁ branch concave. RS stem, both M stems, and anterior CuA₁ branch with desclerotized patches marking flexion line along which distal part of wing is bent down in flight. CuA at base completely fused with M; M stem after leaving

CuA and up to divergence of MA and MP considerably desclerotized; CuA₁ and CuA₂ leaving common medio-cubital stem separately. Hind wings with broad anal fan bent under in repose; SC forming distinctive oval cell at base of hind wings. Body slender; pronotum elongate, without paranota. Median line of sternal invagination clearly visible in meso- and metathorax. Bases of leg pairs closely set; femurs and tibiae slender, lacking spines and denticles. Tarsi three-segmented (middle segment very short); claws small, paired; arolium slightly projecting beyond claw apices, bilobate. Cerci and ovipositor short. Eggs large, oval, and hard; in abdomen, oriented more or less longitudinally, their

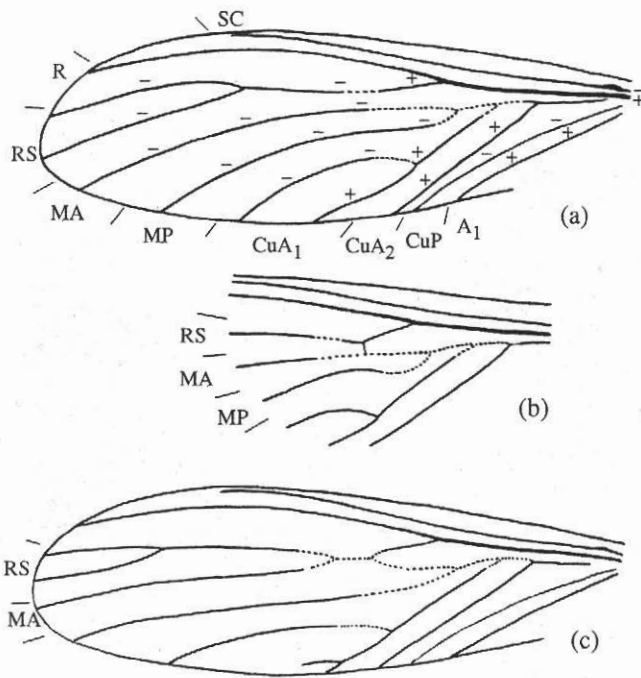


Fig. 3. Forewing venation and its variation in *Tshekardomina maculosa* sp. nov.: (a) paratype PGU, no. 2/244, (b) paratype PIN, no. 1700/4017, (c) paratype PGU, no. 2/245. Vein symbols standard.

number varying between 20 and 25 in different females. Body with characteristic dark spots dorsally.

Composition. Type genus.

Comparison. The slender body, absence of paranota and three-segmented tarsus allow tentative assignment of the new family to the suborder Protoperlina (in the sense of Storozhenko, 1998). The new family differs from most groups of this suborder in having M and CuA fused basally in the forewings and CuA branching into CuA₁ and CuA₂. In this character, the family Tshekardominidae is similar to the families Sojanoraphidiidae and Permibiidae (see the key in Storozhenko, 1998). From the latter family, tshekardominids differ in the shorter basal M+CuA anastomosis and forked CuA₁; from sojanoraphidiids, they differ in the free MP combined with the long SC, a peculiar cell at SC in the hind wings, the three-segmented tarsus, close-set coxae, and the much shorter ovipositor.

Remarks. Judging from the low number of eggs, grylloblattids of this family did not drop the eggs to the

ground, but placed them into fissures of bark or other sheltered crevices.

Genus *Tshekardomina* Novokshonov et Aristov, gen. nov.

Etymology. From the Chekarda locality and Latin *domina* (mistress of the house).

Type species. *T. maculosa* sp. nov.

Diagnosis. Costal area not wide, although nearly two times wider in basal wing half than subcostal area; SC branches simple and inclined. RS fork about as deep as stem length. M slightly forking before origin of RS. Cerci consisting of about ten short segments, with length of basal segments not surpassing their width.

Composition. Type species.

Tshekardomina maculosa Novokshonov et Aristov, sp. nov.

Plate, figs. 1–4

Etymology. Latin *maculosa* (spotted).

Holotype. PIN, no. 1700/1188, well-preserved female (head missing; part and counterpart); Chekarda locality; Koshelevka Formation.

Description (Figs. 1–3). The pronotum bears four small identical spots. The mesonotum bears six spots: two small spots on the prescutum and two spots (of which the anterior is greater) on each scutal lobe; the metanotum bears a similar pattern plus two widely separated spots on the postnotum. The number of MP branches varies in the forewings: MP is usually simple (Fig. 3) and more rarely (in larger specimens) with a fork, which is sometimes of unequal length in the right and left wings of the same specimen (Fig. 1). In addition, the degree of connection between RS and MA is variable: usually they are completely independent (Fig. 3a), but sometimes they are tied by a short cross-vein (Fig. 3b) or even anastomosed for a short distance (Fig. 3c). In all legs, the very apices of femurs and the bases of tibiae are infuscate. The pterostigmal area is slightly pigmented in both wing pairs.

Measurements (mm): forewing length, 15–19.

Remarks. The fore coxae were possibly rather movable in this species, since the bases of the fore femurs have been preserved in different positions in different specimens (Figs. 2a, 2b). The fact that the collection consists exclusively of females may be explained by the greater importance of flight in their life as compared with in the life of males (dispersal, search for oviposi-

Explanation of Plate 7

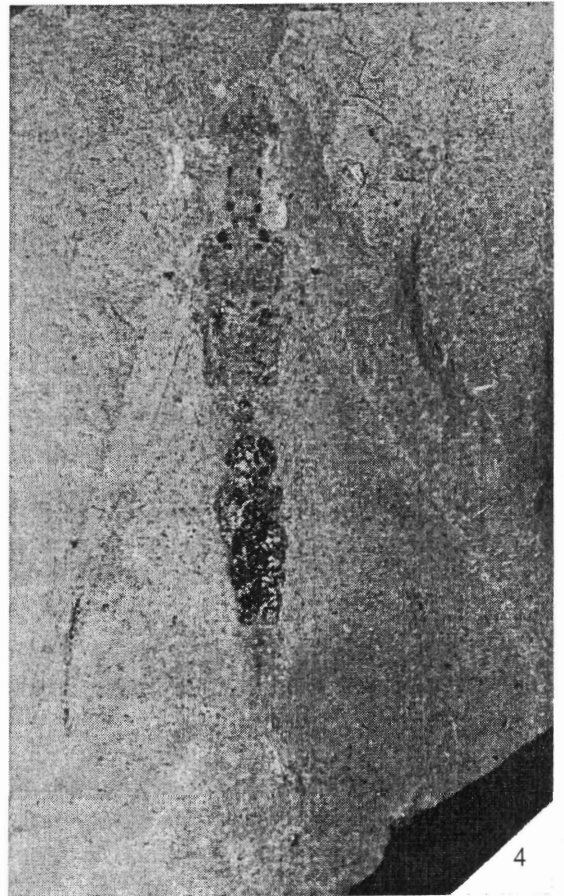
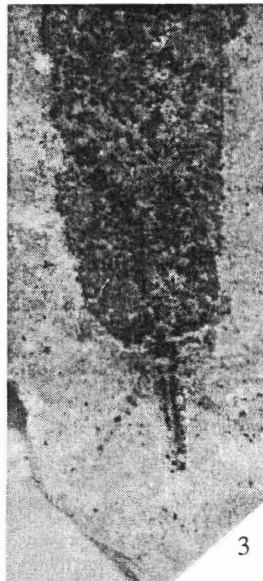
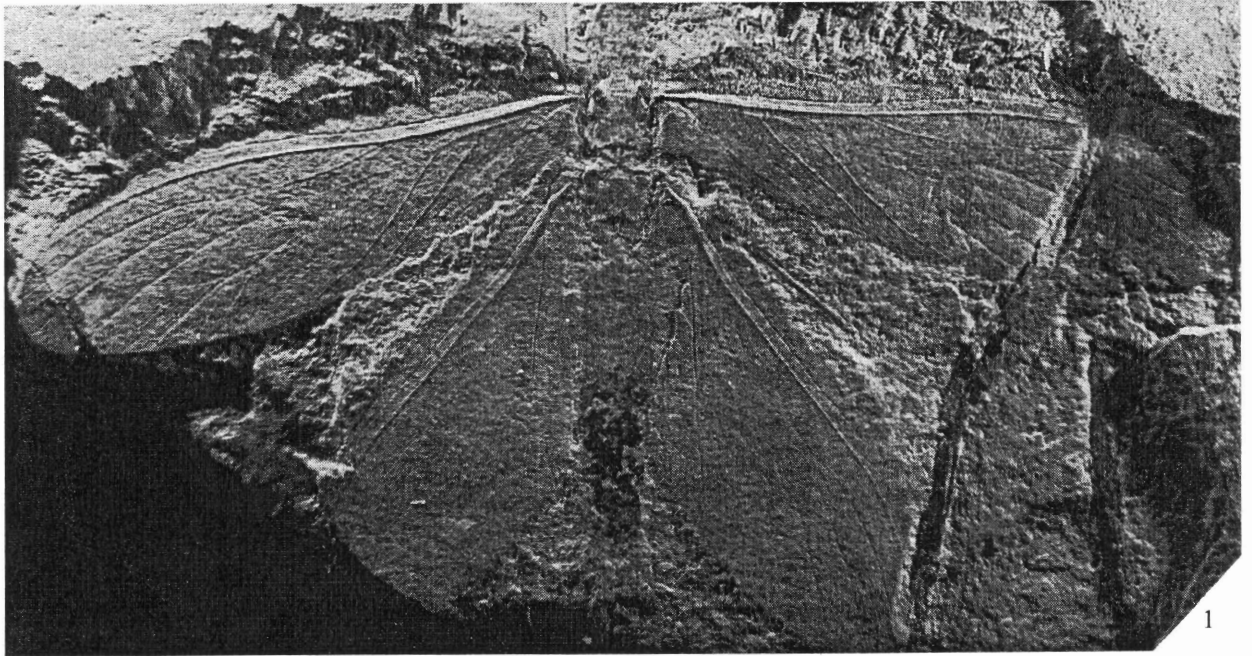
Fig. 1. *Tshekardomina maculosa* Novokshonov et Aristov, sp. nov., holotype PIN, no. 1700/1188, habitus.

Fig. 2. The abdomen of *Tshekardomina maculosa* Novokshonov et Aristov, sp. nov., with large oval eggs, paratype PIN, no. 1700/3714.

Fig. 3. Ovipositor and cerci of *Tshekardomina maculosa* Novokshonov et Aristov, sp. nov., paratype PIN, no. 1700/4017.

Fig. 4. *Tshekardomina maculosa* Novokshonov et Aristov, sp. nov., paratype PIN, no. 1700/3714, habitus.

Plate 7



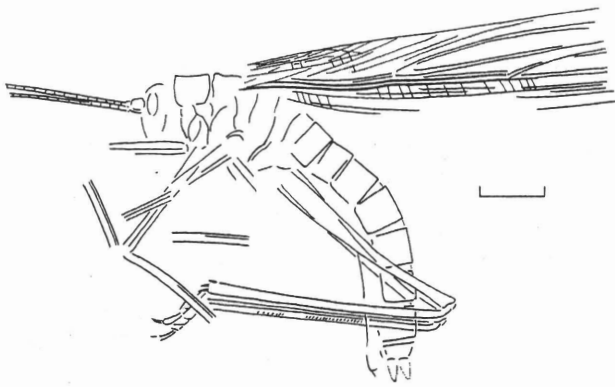


Fig. 4. *Macroedischia? elongata* Sharov, 1968, specimen PGU, no. 2/284, body structure. Scale bar 5 mm.

tion sites, etc.). It cannot be excluded that the males in this family were brachypterous and completely flightless (such a situation is not exceptional in the related order of stoneflies).

Material. In addition to the holotype, paratypes from same locality PIN, nos. 1700/3460, 1700/3714, and 1700/4017 and PGU, nos. 2/243, 2/244, 2/245, 2/263, and 2/265.

Order Orthoptera

Family Oedischiidae Handlirsch, 1906

Subfamily Tettoedischiinae Gorochov, 1987

Genus *Macroedischia?* Sharov, 1968

Macroedischia? elongata Sharov, 1968

Description (Figs. 4, 5). The males are light and slender. The antennae are very long and thin, more than four times as long as the body, with the scape and pedicel enlarged. In lateral view, the head is slightly narrower than the pronotum. The eyes are oval. The hind femurs are rather narrow, curved, and about as long as the abdomen. The hind tibiae are straight, with a longitudinal rib and a series of small denticles along their entire length; the tibial apex bears at least three

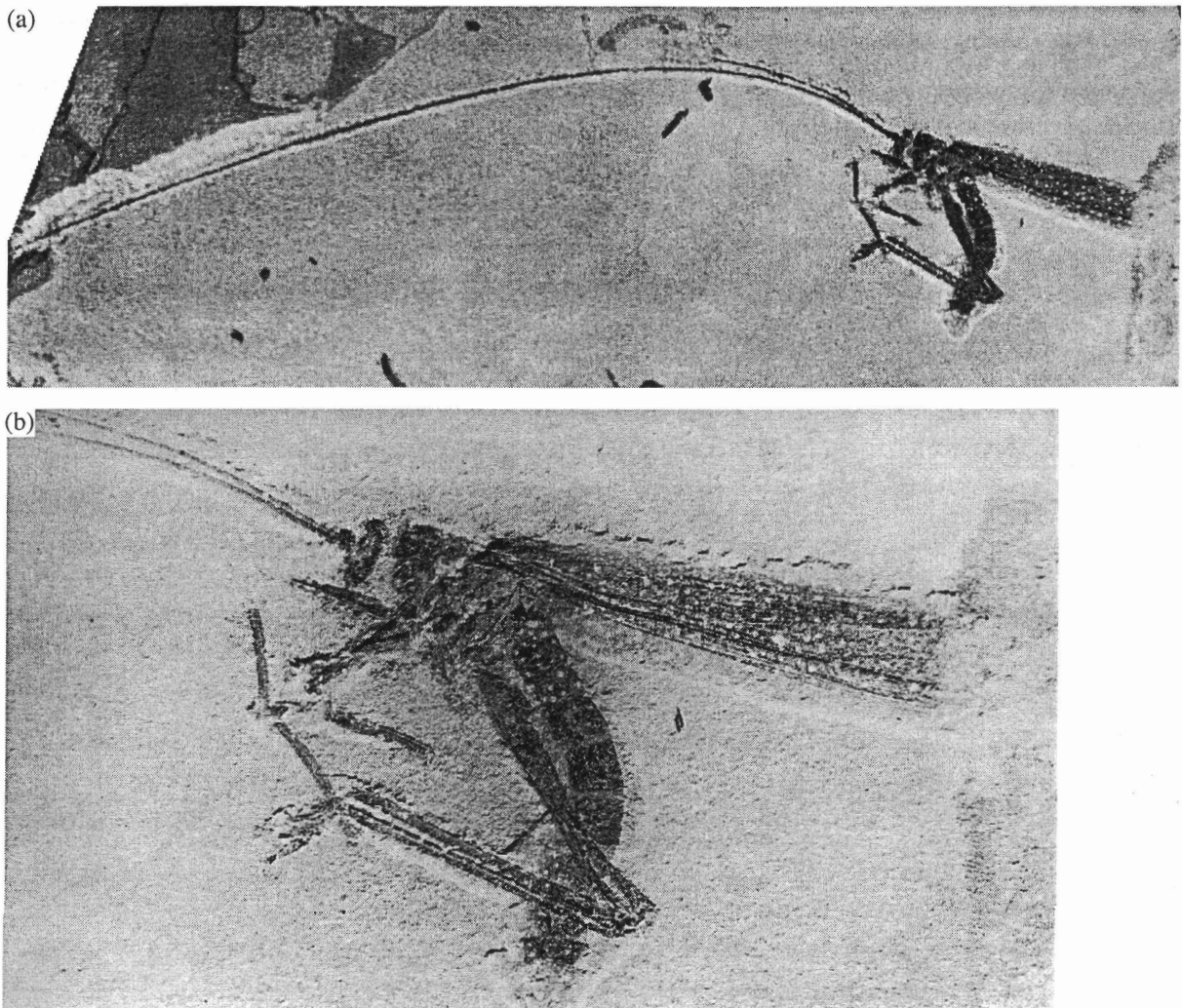


Fig. 5. *Macroedischia? elongata* Sharov, 1968, specimen PGU, no. 2/284: (a, b) habitus.

small spurs. The tarsi are apparently five-segmented, with well-developed claws. The abdominal tergites are more sclerotized than the sternites. The apex of the male abdomen bears two short, weakly sclerotized processes. The RS base is smoothly curved.

M e a s u r e m e n t s (mm): forewing length (as preserved), 33 (total length 45–50 as estimated from the RS base position); body length, 35; antenna length (as preserved), 145 (total length unknown, since the antennae extended beyond the area of the rock slab); length of hind femur, 22; and length of hind tibia, 22.

R e m a r k s. The specimen is tentatively identified as *M. elongata* according to the shape and size of the forewings (forewing length in *M. elongata* is 55 mm). However, it cannot be excluded that it belongs to a still undescribed species, because the RS base is smoothly curved in our specimen and straight in *M. elongata* (Sharov, 1968, text-fig. 8e). There are other narrow-winged orthopterans of similar size described from Chekarda: *Uraloedischia permiensis* Sharov, 1968 (Mezenoedischiinae) and *Tettoedischia minuta* Sharov, 1968 (Tettoedischiinae) (Sharov, 1968; Gorokhov, 1987). The insect in question differs from the former species in a more smoothly curved RS stem and much longer hind legs (Sharov, 1968, p. 23, text-figs. 7c, 7d; pl. 1, figs. 1, 2) and from the latter species in a much larger size (the forewing is 30 mm long in *T. minuta*). Nevertheless, at present, it seems premature to establish a new taxon for this fossil.

M a t e r i a l. One male, specimen PGU, no. 2/284.

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