

Jurassic fossil Insects from Turkestan.

6. *Homoptera* and *Psocoptera*.¹

By A. Martynov.

(Présenté par A. Fersman, membre de l'Académie des Sciences, le 26 Mai 1926).

In the collection of Jurassic insects, found in East Kara-tau, I noticed about 20 species of *Hemiptera* — *Homoptera* as well as *Heteroptera*. In this article I describe only 7 species of *Homoptera* and two species of *Psocoptera*, — the last order hitherto being unknown from Mesozoic beds, though found in Kansas-Permian beds.

My interpretation of the nervuration of wings in *Homoptera* somewhat differs from that accepted by Handlirsch. That nervure, which Handlirsch calls (in *Fulgoridium*, *Procercopis*, *Archijassus*, etc.²) SC, I consider as being R, and that nervure, which Handlirsch in the same genera estimates as C, I consider as being SC. Then, it seems to me to be useful to discriminate the branches of R from those of RS. In *Homoptera* R branches not rarely more abundantly, than RS, and it is expedient to treat the branches of R and RS separately. Vena dividens I denominate, as in my preceding articles, as A_1 , the two following veins as A_2 and A_3 .³

Order **Homoptera**.

Fam. **Scytinopteridae** Handl.?

Gen. **Cycloscytina**, n. gen.

Mesonotum elliptical, transverse, mesoscutellum triangular. Tegmina elongated, dark brown; basal half of tough consistency, covered with circular pale pits all over, except the part of anal region between A_2 and proximal margin; distal portion also brown, but somewhat more delicate; pale pits or

¹ № 5 published in Ann. de la Société Paléontol. de Russie, vol. V. 1925.

² «Paléontologie» in Schröder's Handbuch der Entomologie, Bd. III, pp. 212—213, fig. 192—195.

³ The question of the interpretation of A_1 (A_1 or Cu_2) I shall consider in another article.

spots are here very sparse. Apparently, there is no separate SC; the vein, which I consider as R, arises separately and at one-fourth from the base adjoins to M, then deviates, but becomes very indistinct; in the apical portion¹ it forms about three distinct longitudinal veins. M straight; after junction with R it becomes somewhat indistinct; in the apical portion it forms, probably, 3—4 nervures, the anterior of which is rather thick and dilated at the end. Cu very indistinct and connected with M, apparently, at or near the point of junction of M with R. Vena dividers (A_1) straight, slender, but distinct, united with the base of M; A_2 slightly sinuous; A_3 strongly curved and at the end, apparently, united with A_2 .

Hind wings much shorter, but broad. R simple. RS three-branched, M simple, Cu with a long fork, A_2 sinuate.

Size medium.

One species — *C. delutinervis* Mart.

Cycloscytina delutinervis, n. sp.

Mesonotum transverse, elliptical, about 4.5 mm in breadth; scutellum triangularly produced hindwards. Tegmina elongated, of uniform breadth, about three times as long as broad, anterior margin gently convex, posterior margin straight, apical one rounded; length of each tegmen 14.5 mm, breadth about 4.7 mm; consistency in the basal half tough, becoming somewhat more delicate in the apical part; coloration dark brown, with circular pale pits of unequal size; these pits are placed in 2—3 rows in the areas between A_2 , A_1 , Cu and M, and in one row behind the basal part of R; in the preradial area these pits are placed more densely, in oblique rows from R to the costal margin, and the dividing brown stripes become very narrow and somewhat irregular. The region between A_2 and the proximal margin is blackish, almost without tubercles, but with a transverse, finely striped sculpture. In the apical portion only few pale spots can be perceived. M straight and in the basal portion, probably, fused with R; Cu indistinct, united with M near the point of its fusion with R; A_1 straight, A_2 gently curved, A_3 sinuate; apical nervures few, distinct and, partly, rather thick (middle part of the wing damaged). Hind wings much shorter than the anterior ones, — their length being about 11.5 mm, — broad, with rounded hindapical margin; RS dividing into three branches, two anterior ones directed somewhat forwards; M simple,

¹ The greater portion of the distal half is damaged, and only a small apical portion is well preserved.

Cu forking a little earlier than RS; A gently curved, A₂ sinuous (A₃ invisible in our specimen); neala long, in our specimen bent under the anal region.

One specimen. Galkino, Kara-tau, 1924. From Coll. of the Geol. Committee.

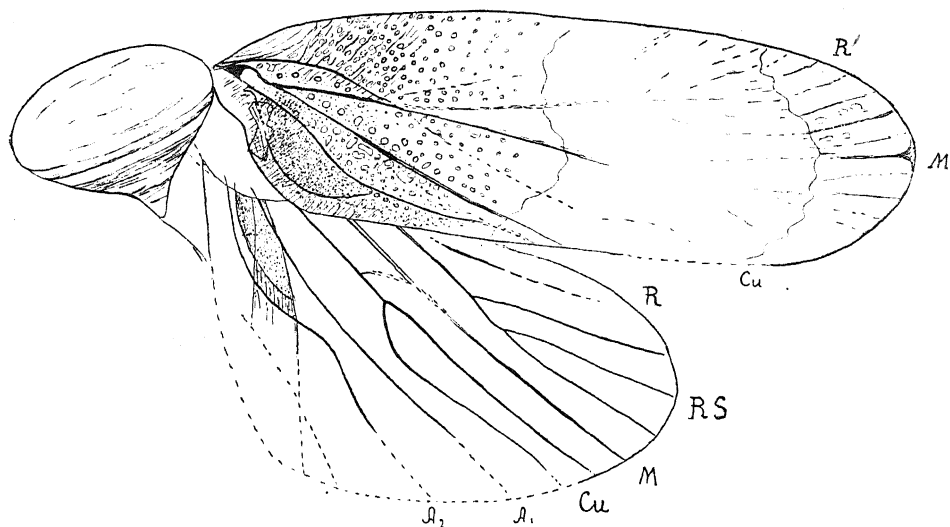


Fig. 1. *Cycloscytina delutinervis*, n. g., n. sp.

This specimen is represented by mesonotum, right and left tegmina and right hind wing, but the left tegmen is in very bad preservation and is omitted in our fig. 1.

The genus just described is very interesting, but the interpretation of its relations is very difficult. Tegmina, by their tough consistency with rows of distinct circular pits and, especially, by the peculiar disposition of nervures R, M and Cu in the basal part, evidently, resemble those of some *Scytinopteridae*, for instance, of *Apheloscyta* Till., *Chiliocycla* Till., *Mesoscytina* Till., and even of *Scytinoptera* Handl.; they somewhat resemble also the fam. *Ipsviciidae* Till., allied to *Scytinopteridae*. On the other hand, by the position and union of A₃ with A₂ *Cycloscytina* differs strongly from most of the *Scytinopteridae* and even *Ipsviciidae*, and approaches *Fulgoridae*, *Tropiduchinae* (or *Tropiduchidae*) especially. In this structure *Cycloscytina* is more specialised than other *Scytinopteridae*, and on this base we ought formally separate our genus from the fam. *Scytinopteridae* and to rank it with the fam. *Fulgoridae*, but this proceeding appears to me to be incorrect, as in other features, especially in the consistency and sculpture, as well as in the

disposition of R, M and Cu in the basal portion, the tegmina of *Cycloscytina* differ perceptibly from those of *Fulgoridae* and resemble more those of *Scytinopteridae*. Besides, recent *Tropiduchidae* are allied to more archaic *Scytinopteridae*, and in some cases it is not easy to decide, with which family must be ranked any given genus. Thus, *Mesodiphthera* Till. at first was considered by Tillyard as a *Scytinopterid*¹, then it was ranked by this author with the fam. *Tropiduchidae*.² However, *Cycloscytina*, with the exception of its anal area, appears to me to be more clearly a *Scytinopterid*, than *Mesodiphthera*. Perhaps, it would be more convenient to separate our genus into a distinct subfamily, but for this new materials are necessary. As regards the anal region, there is some tendency to the formation of a Y-shaped condition of $A_2 + A_3$ in *Apheloscyta mesocampta* Till.³ and still more in *Ipsvioidae* Till. By the difference between the tough basal and more delicate apical portion of the tegmina the gen. *Cycloscytina* reminds us somewhat of many *Heteroptera* and also of Permian *Prosbolidae* Handl., which Muir (teste Tillyard's) considers as beeing *Homoptera*, namely, an archaic group of *Tropiduchidae*. All these relations with archaic groups confirm my supposition concerning the systematical position of *Cycloscytina*.

Fam. Jassidae.

Gen. Karajassus, n. gen.

Anterior wings in the basal half not very broad, nearly as broad as the distal half, elliptical; R, M and Cu unite in the basal half of wing, but become here weaker and more indistinct; SC apparently absent; R thick, gradually attenuating to the end; between R and costal margin there are, in the distal portion of the wing, three oblique nervules and, after some interval, yet one such nervule; RS thick, simple; M with two main branches, the anterior one being simple and thick, the posterior somewhat bent or fractured and then giving successively three parallel branches; Cu simple, thick; A_1 also thick enough; clavus elongated (analia invisible).

In the posterior wings R two-branched (R and RS), M also with two simple branches, Cu — one-branched; between Cu and M_p , M_a and RS, RS and R exist three short transverse nervules placed at various levels; M_p gradually diverging from Cu, thus reiterating the course of the main branch of M_p in the anterior wings.

¹ Proc. Linn. Soc. N. S. Wales, vol. XLIV, 4, 1919, p. 873.

² Proc. Linn. Soc. N. S. Wales, vol. XLVII, 4, 1922, p. 461.

³ Loc. cit., 1922, p. 458.

Legs robust, posterior tibiae appear to be somewhat longer than the other; proboscis distinct; anteriorly there are two long bristles; head oval (from beneath). Allied to *Archijassus* Handl. (Upper Lias of Mecklenburg) and *Triassojassus* Till. (Upper Trias of Queensland, Australia).

Karajassus crassinervis, n. sp.

Tegmina elliptical, of uniform breadth; their length — 3,7 mm; anterior margin convex, posterior one almost straight, apical margin rounded; R, M and Cu thick, but becoming weak and indistinct in the basal half; R united with costal margin by three and, after an interval, by yet one

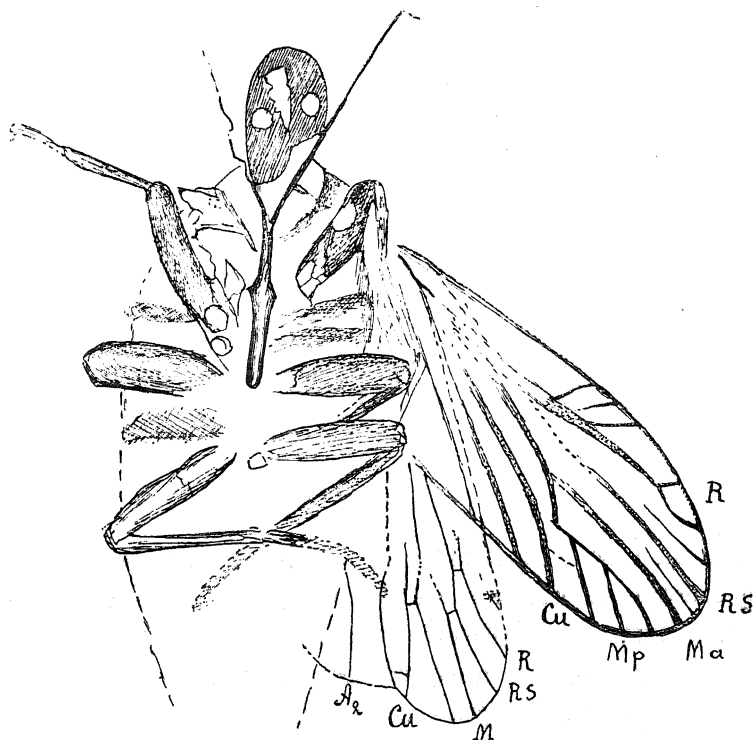


Fig. 2. *Karajassus crassinervis*, n. g., n. sp.

oblique nervule; RS thickening to the apical margin; M_a thick, M_p somewhat more slender; marginal nervule also thick. In posterior wings transverse nervule between RS and M_a placed more distally than the two other ones; length of posterior wings about 3 mm.

Legs strong with rather thick femora; head oval, proboscis thick and distinct.

One specimen. Galkino, 1925. A. Martynov. Coll. of the Geol. Museum Ac. Sci.

Nervuration of anterior wings in our genus resembles that in *Archijassus* Handl.,¹ *Arch. vicinus* Handl., especially, then that in *Triassojassus* Till.,² (*Tr. proavitus* Till.). There can be no doubt, that our genus is related to both these genera.

Gen. *Archijassus* Handl.

Archijassus minimus, n. sp.

Length of the preserved portion of tegmen — 1,3 mm, total length of tegmen must be about 3 mm, and thus the size is very small. Anterior branch of M forming a conspicuous fork, both branches of which are directed somewhat forwards; between M_2 and M_3 there is a transverse nervule; R forming, apparently, two short branches, RS simple; RS united with R_2 by a transverse

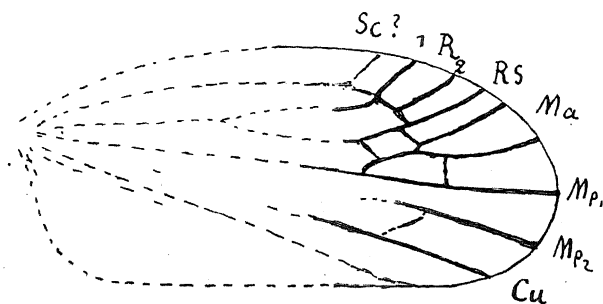


Fig. 3. *Archijassus minimus*, n. sp.

nervule, and the base of R_2 forming as a continuation of it; R_1 is then connected by a cross-vein with a trace of another short nervule, directed nearly forwards and representing, probably, the end-portion of SC; RS connected with M_2 by two transverse nervules; posterior branch of M, apparently, is also forked, but the base of (presumable) M_4 (or M_{p2}) is not preserved; M_3 straight; Cu simple, straight. Apical margin rounded (outlines of the whole wing are hypothetic).

One specimen. Galkino, 1925. A. Martynov.

The tegmen represented only by its distal portion, nevertheless the nervuration of this portion reminds me somewhat of that in *A. geinitzi* Handl., and therefore I suppose that this wing belongs to the gen. *Archijassus* Handl.

¹ Schröder's Handbuch d. Entomologie, III, p. 213, fig. 195.

² Proc. Linn. Soc. N. S. Wales, vol. XLIV, 4, 1919, p. 887, fig. 18.

Fam. Fulgoridae.

Gen. *Elasmoscelidium*, n. gen.

Tegmina short and very broad, more than half as broad as long, with arcuate anterior and round apical margin. Sc present, almost parallel to the costal margin; the area between C and SC being dark, without perceptible nervules; all longitudinal nervules in the apical portion become somewhat diffuse and not very distinct; distal portion of R indistinct (and its branching remains unknown); RS arising from R at about $\frac{1}{3}$ from the base of wing and giving two branches; M straight, distinct, before its branching connected with fore branch of Cu by a short, but distinct transverse nervule; outwards from this nervule M divides successively into three branches, both posterior ones directed somewhat hindwards, and somewhat diffuse; posterior branch of Cu (Cup) simple, anterior one dividing into two branches, Cua₁ and Cua₂, somewhat converging, diffuse and indistinctly perceptible. A₁ — slender, A₂ running parallel and near to A₁, A₃ — near to the hind margin.

Size medium.

Elasmoscelidium rotundatum, n. sp.

Tegmina short and very broadened in the apical part, their length 7 mm, maximal breadth about 3,8 mm; coloration uniformly coffee-brownish, except the area between C and SC, which is dark brown; nervules distinct, except their apical portion, and bearing sparse pits or tubercles; RS furcating at about $\frac{3}{4}$ from the base of tegmen, and RS₂ connected with M by an

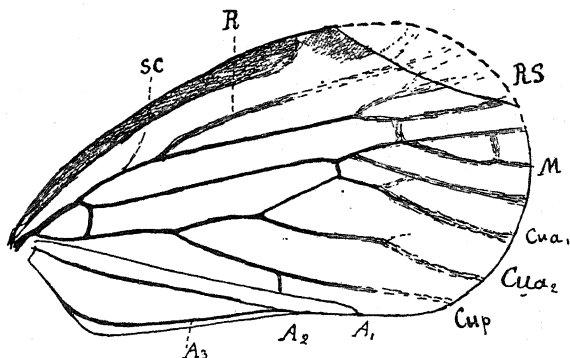


Fig. 4. *Elasmoscelidium rotundatum*, n. g., n. sp.

indistinct transverse nervule; M furcating at the same level, as RS, but all its branches diffuse; M₁ and M₂ appear to be connected by a transverse nervule; distal portions of branches of Cu also diffuse and indistinct; basal portion

of Cu connected with the base of M by a distinct cross-nervule; A_1 very slender, though distinct; A_2 running near to the posterior margin.

One specimen. Galkino, 1925. A. Martynov. Coll. of the Geol. Museum Ac. Sci.

Only one left tegmen preserved, seen from the under side (SC convex, tubercles of nervures have an aspect of pits).

The form just described in the nervuration of its tegmina somewhat resembles gen. *Fulgoridium* Handl. (Upper Lias of Mecklenburg), but this resemblance is not close: the shape of tegmen, the position of the point of furcation of R and the configuration of Cu are very different, and therefore I cannot rank our form with the gen. *Fulgoridium*. Comparison with recent *Fulgoridae* brings me to the conclusion, that it somewhat reminds of the subfam. *Lophopinae* Dist., for instance, such genera as *Elasmoscelis* Spin., *Zamila* Walk., but differs, chiefly, by the great simplification of its nervuration in the distal half of tegmen, i. e. by the lacking of numerous longitudinal branches of R, M and Cu, as well as of numerous transverse nervules between C and SC, which exist in *Elasmoscelis*. On that account our genus cannot be included in this recent subfamily (or tribus) and, probably, must be separated into a distinct subfamily (or tribus), though allied distantly to *Lophopinae*. The gen. *Fulgoridium* appears to me to exhibit some analogous relations to subfam. *Dictiopharinae* Dist.

Gen. *Karabasia*, n. gen.

Tegmina oval; subcosta present; RS arising from R in the middle of tegmen and forming with R an elliptical cell; from R arise three nervures, both proximal ones being nearly transverse, RS—simple; M, apparently, fused in its middle portion with RS, then separating; disposition of Cu and anals is not clear.

Karabasia paucinervis, n. sp.

Mesonotum rather transverse. Tegmina elliptical, with rounded apical margin; the cell between basal halves of R and RS elliptical, and from its anterior margin arise two nearly transverse nervures. Length of each tegmen — 2,75 mm; length of the whole preserved specimen (tegmina with thorax) about 3,8 mm.

One specimen. Karabas-tau, 1923. Wl. Muchin. Coll. of the Geol. Museum Ac. Sci.

The specimen represented by two incomplete impressions of tegmina and by somewhat indistinct impression of meso- (and 'pro-?) notum. As the nervuration of the tegmina is badly preserved, it is difficult to elucidate the systematical position of our form. I consider it provisionally as an aberrant *Fulgorid*, the relations of which are unknown.

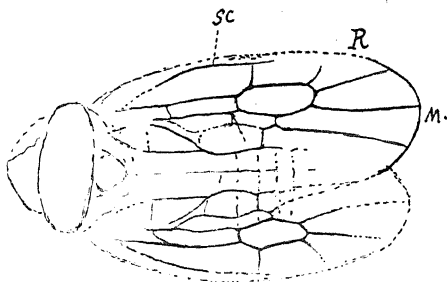


Fig. 5. *Karabasia paucinervis*, n. g., n. sp.

Fam. Palaeontinidae Handl.

Gen. *Cicadomorpha*, n. gen.

Mesonotum large, rounded, truncated anteriorly; pronotum transverse. Abdomen very broad and rather short; chitinous wall of its tergites covered all over with numerous minute pits. Anterior wings broad, with convex anterior margin; R fusing at the end with costal margin; RS parallel to R, simple, without any branches. M fused at the base with R, then dividing into four branches, M_4 being not connected with Cu_1 by any transverse nervule; Cu with two branches, Cu_1 and Cu_2 ; the basal portion of Cu is not connected by a transverse nervule with M (analia indistinct). Size rather large.

Allied to *Phragmatoecites* Opp. and *Palaeocossus* Opp., from which it differs, chiefly, by the lacking of connections between M_4 and Cu_1 and between Cu and R + M, by the configuration of Cu. The presence of small pits on the dorsal chitinous wall is interesting, proving once more the homopteran nature of all these genera.

Type of the genus — *C. punctulata* Mart.

Cicadomorpha punctulata, n. sp.

Mesonotum large, rounded, truncated anteriorly; pronotum, apparently, transverse; head indistinct. Abdomen very broad; only five dorsal segments preserved; they are rather narrow and covered all over with numerous minute pits of rounded-triangular shape. Anterior wings very broad with convex costal margin; nervures thick, distinct; C thick and in the apical portion extending into a marginal border; R parallel to C and fusing at the end

with C (its basal portion destroyed and indistinct); Rs thick, distinct, simple, somewhat attenuating to the end; M fused in its basal portion with R, then separating and soon dividing into two and, then, into four long branches, running parallel and also somewhat attenuating to the end; M_1 connected,

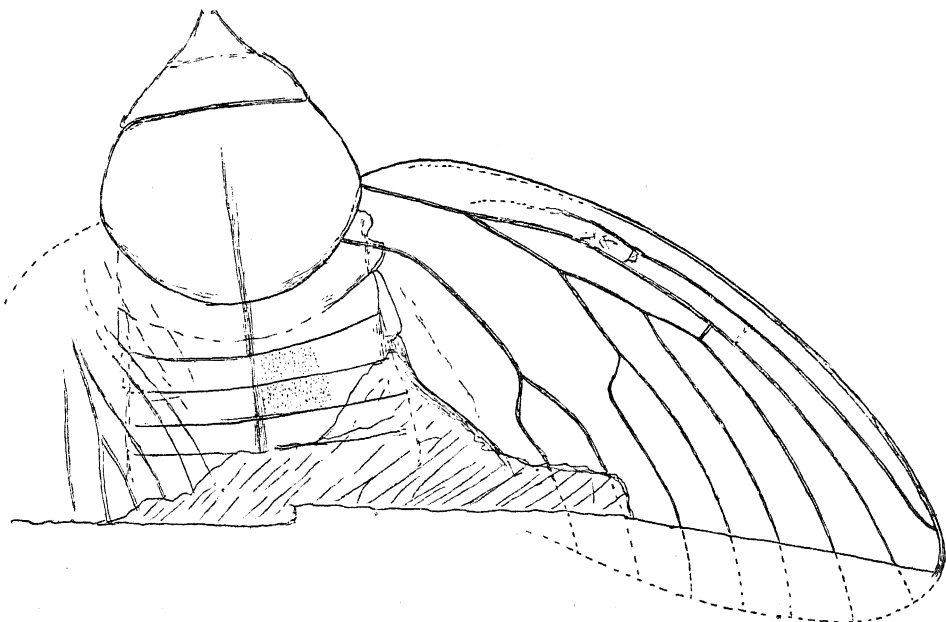


Fig. 6. *Cicadomorpha punctulata*, n. g., n. sp.

near its base, with R by a transverse nervule; M_4 forming a salience characteristic of this group of allied genera, but not connected by any perceptible nervule with Cu_1 ; Cu dividing at the same level as M_{3+4} ; its basal portion is somewhat curved and not connected with R + M by any transverse nervule; analis is, apparently, curved, and its basal part distant from Cu, its apical one running nearer to Cu_2 (other anals invisible). Posterior wings: only small portions of four nervures (Cu and anals) preserved.

Length of the anterior wing — 54 mm; the breadth from C to the end of A_1 — about 18 mm; breadth of mesonotum — 19 mm.

One specimen. Karabas-tau, 12—16, VI. 1925. A. Martynov. Coll. Geol. Mus. Ac. Sci.

In the nervuration of anterior wings the just described genus is more similar to *Phragmatoecites* Opp. and *Palaeocossus* Opp. I have seen the types of *Phr. damesi* Opp. and *Palaeocossus jurassicus* Opp.,¹ and I can notice

¹ In the Geol. Museum Acad. Sci., Leningrad.

here that in both these forms Rs is also simple, as it was figured by Brauer, Redtenbacher and Ganglbauer.¹

I have pointed out that the nervuration, as well as the presence of peculiar pits on the terga, show the homopteran nature of our genus very clearly. The whole question of the systematical position of the fam. *Palaeontinidae* was considered recently by Tillyard,² who came to the conclusion, that *Palaeontinidae* belong not to *Lepidoptera*, but to *Homoptera*. I concur with Tillyard in this opinion, and I have already indicated above some undoubtedly homopteran features of the just described genus.

Fam. Psyllidae (Latr.).

Subfam. Liadopsyllinae, n. subfam.

Resembling recent subfamilies *Liviinae* Löw and *Aphalarinae* Löw, but the anterior wings in *Liadopsyllinae* differ in that R_1 arises from the end of stem of R, and thus the area between R_1 and R_2 is extremely long; the area between R, R_1 and costal margin small.

Gen. *Liadopsylla* Handl.

Antennae shorter than the wings, slender, apparently, consisting of about 8 joints; basal joints shorter and more bulbous (body not preserved). Anterior wings oval, but somewhat more elongated than in most recent genera; SC invisible; the stem of R is rather short and at about $\frac{1}{4}$ from the base of wing dividing into R and RS, R dividing in the same point into a short, oblique R_1 and a long R_2 , running to the apical margin; the area between R_1 and R_2 extremely long; RS long, running nearly parallel to R_2 . M + Cu separating from the stem of R near its end; after some distance it divides into M, forming two branches and into Cu, also furcating. A_1 straight (remaining part of anal region not preserved).

Liadopsylla tenuicornis, n. sp.

Length of anterior wings — about 1,9 mm; R_1 slightly curved, thick; R_2 and the simple RS seem to form a very long fork. M + Cu slightly arcuate; median fork slightly longer than its pedicel (M); cubital fork is also some-

¹ Fr. Brauer, Jos. Redtenbacher u. L. Ganglbauer «Fossile Insecten aus d. Jura-formation Ost-Sibiriens». Mém. Acad. Imp. Sci. de St.-Petersbourg, VII sér., t. 36, № 15, 1889, p. 14—16, Taf. II.

² R. J. Tillyard «Mesozoic Insects of Queensland. № 8. Hemiptera-Homoptera. The genus *Mesogereon*, etc.». Proc. Linn. Soc. N. S. Wales, part. II, 1921, p. 270—284.

what longer than its pedicel (Cu). A_1 in our specimen very slender and indistinct.

Antennae slender, consisting of several elongated joints (the number of same is, probably, equal to that in other *Psyllidae*), basal ones being shorter and thicker (legs and posterior wings indistinct).

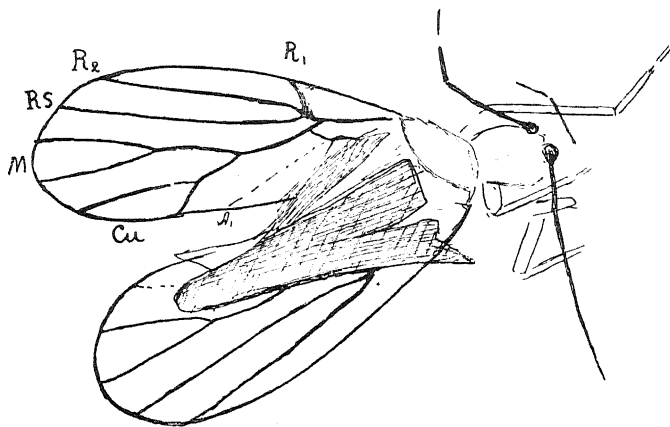


Fig. 7. *Liadopsylla tenuicornis*, n. sp.

One specimen. Galkino, 1925. A. Martynov. Coll. of the Geol. Museum Ac. Sci.

This specimen is represented by two anterior wings, without anal regions, by some indistinct outlines of head, with antennae, and by very indistinct traces of legs.

I suppose that the oblique transverse nervule between the base of R_2 (+ RS) and costal margin is R_1 . If this my supposition is correct, the whole nervuration of the anterior wings of *Liadopsylla* obtains a close resemblance to such genera as the Australian *Oreüs*, *Lasiopsylla* (*Liviinae*), as well as some *Aphalarinae*, *Rhinocola* Först., *Cardiaspis* Schwarz, etc. However, an extremely long pterostigmal area, as well as the small size of the area between costal margin, R and R_1 , discriminate Jurassic fossil genus rather sharply from most of the recent ones, and on that account I consider it as representing a distinct subfamily. The species above described is closely allied to the European *Liadopsylla Geinitzi* Handl.¹ (Upper Lias of Mecklenburg). Our specimen appears to be in a better state of preservation and admits the elucidation of some additional traits of nervuration.

¹ A. Handlirsch «Palaeontologie» in Schröder's Handbuch der Entomologie, Bd. III, p. 213, fig. 197.

Order Psocoptera.

Suborder Permopsocida Till.

The form, here described, is represented by an anterior wing in good preservation. As can be seen in the fig. 7, the nervuration of this wing is very similar to that in *Archipsylla primitiva* Handl.¹ from the Upper Lias of Mecklenburg, and there can be no doubt that our species belongs to the same genus and is rather closely allied to the European *A. primitiva*. In *Arch. primitiva* the basal part of the anterior wing is not preserved, and this was the chief cause of difficulties in its interpretation, that brought about much disagreement between A. Handlirsch and G. Enderlein.^{1, 2} In our specimen the basal part of the wing is preserved, and this, as it seems to me, permits to resolve the question concerning the correct position (orientation) of the wing and the genetical relations of this genus. As is known, Handlirsch placed the anterior wing of *Archipsylla*³ in a reversed position to that represented in our fig. 8, i. e., he considered the posterior margin as being anterior, and vice versa. As regards the systematical position of this genus, it belongs, according to Handlirsch, to the order Homoptera and, namely, to the suborder Psyllodea (*Psylloidea* Handl.). G. Enderlein expressed the opinion² that Handlirsch's disposition of the anterior wing of *Archipsylla*, as well as his interpretation of its nervuration, was incorrect. Basing on his new interpretation of this wing, Enderlein considered this genus as belonging to *Copeognatha* (= *Psocoptera*) and, namely, to his family *Psyllipsocidae*, subfam. *Psyllipsocinae*, tribus *Archipsyllini* Enderl.²

To what conclusion does lead the examination of our Turkestanian wing?

Although I place the anterior wing of *Archipsylla* in the same manner as Enderlein does, I cannot agree with this author in that this is but a new genus in the subfam. *Psyllipsocinae*, fam. *Psyllipsocidae*. In many features, in the four-branched condition of M, especially, it differs sharply not only from this, but also from other families. Moreover, the base of M fuses with the basal portion of R and does not unite with Cu, as was figured by

¹ A. Handlirsch «Die fossilen Insecten», u. s. w., Leipzig, 1906—1908, p. 502, Taf. XLIII, fig. 45; «Zur Kenntnis frühjurassischer Copeognathen und Coniopterygiden und über das Schicksal der Archipsylliden. Zool. Anzeiger, Bd. XXXV, 1909, p. 233, fig. 1; «Palaeontologie» in Schröder's Handbuch der Entomologie, Bd. III, p. 213, fig. 196.

² G. Enderlein, Zool. Anzeiger, Bd. XXXIV, 1909, p. 773; «Die Fossilen Copeognathen und ihre Phylogenie». Palaeontographica, Bd. 58, 1911, p. 339—342, fig. Q.

³ In «Fossile Insecten» Handlirsch described from a hind wing (Upper Lias of Mecklenburg) a second species of *Archipsylla*,—*A. liasina* Handl., but the inclusion of this species into the genus *Archipsylla* is in no way demonstrated. Enderlein (Zool. Anz., Bd. 34) considers this hind wing to belong to *Coniopterygidae*, but this assertion is also hypothetical and doubtful.

Enderlein.¹ Thus, it is obvious, that if our form is a *Psocid*, it is a very peculiar, aberrant *Psocid*. All these questions became settled for me when I recently received № 64 of the American Journal of Science, 1926, containing the very valuable and interesting article of Tillyard «Kansas Permian Insects. 8. The order *Copeognatha*».² A comparison of our wing with Tillyard's figures (1—19) shows very clearly that *Archipsylla* represents a genus, closely allied to the Kansas Permian genera. According to Tillyard, these genera constitute two families, *Psocidiidae* Till. and *Permopsocidae* Till. *Archipsylla*, undoubtedly, approaches the fam. *Psocidiidae*, but differs therefrom by some peculiar characters and must therefore be separated into a distinct family—*Archipsyllidae* Handl. In any case we must give here a new description of the family and of the genus.

Fam. Archipsyllidae Handl. (s. emend.).

Archipsyllidae Handlirsch «Fossile Insecten», p. 502—503, Taf. XLIII, 45.

Archipsyllini Enderlein. Palaeontographica. Stuttgart, 1911, p. 339—341, fig. Q.

With characters as given for the genus *Archipsylla*, below.

Gen. Archipsylla Handl. (s. emend.).

Size very small, anterior wings oval, elongate, about three times as long as broad. R arises nearly from the middle of base, and the base of M and, perhaps, of Cu are fused with it; not far from the base of M the stem of R divides into R and RS, R running obliquely forwards and near the end dividing into two branches, R₂ being somewhat angulate or convex hindwards, connected with RS by a distinct cross-vein and forming with R₁ an almost elliptical pterostigmatic space; between R and the costal margin there is an oblique nervule, representing, probably, the fused remainder of a true transverse nervule and some distal portion of vanished subcosta; RS separating from R at about one-fifth from the base, nearly straight and forking into two branches near the end of R₂; near the middle it is connected by a transverse nervule with the basal portion of M₁₊₂, and somewhat farther by another transverse and slightly oblique nervule with R₂. M arises from R a little before the origin of RS and runs behind it in a single concave curve, then forks, before the transverse nervule rs—m₁₊₂, into two branches, each forking again; both forks of M and the fork of RS being nearly equal in length; Cu runs also in a single concave curve and then forms a low fork, Cu₂ being very short and resembling a transverse nervule; basal portion of Cu approaches M and, perhaps, fuses with the base of common stem R+M; anal region (clavus) appears to be very

¹ G. Enderlein, loc. cit., 1909. ² Tillyard, p. 315—349, fig. 1—19.

narrow, without distinct nervules; only near the base of the preserved portion of hind margin one can perceive an indistinct trace of a vanished anal nervule.

Two species known, *A. primitiva* Handl. and *A. turanica*, n. sp.

Archipsylla turanica, n. sp.

Closely allied to *A. primitiva* Handl., differing by more rounded and broad pterostigmal region, by the transverse nervule r_2 —rs (= ir, Tillyard) placed nearer to the cross-vein rs—m, by Cu_2 being shorter and cubital fork narrower. Length of anterior wing 4,6 mm.

Onespecimen. Galkino, Kara-tau, 1924.
M. Brick. Coll. of the University, Tashkent.

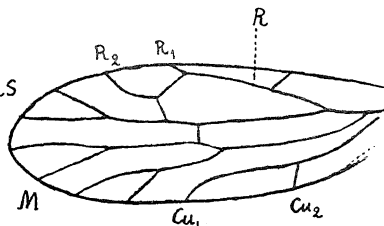


Fig. 8. *Archipsylla turanica*, n. sp.

Comparing the fore wing of *Archipsylla* with Tillyard's figures of the wings of *Permopsocida*, we notice at once that in the structure and in the whole configuration of R, M and Cu it is very similar to them. The low cubital fork and the absence of a transverse nervule between Cu_1 and M, as well as the general configuration of Cu, M and RS approximate the gen. *Archipsylla* to the fam. *Psocidiidae* Till., but by the character of R and by the presence of pterostigma it somewhat reminds of the fam. *Permopsocidae* Till. From both these families gen. *Archipsylla* differs 1) by the absence of free SC and 2) by the reduction of the anal region, where there is a feeble trace of only one nervule, — both differences being the traits of a rather great specialisation. Consequently, I consider that, although allied to *Psocidiidae*, the gen. *Archipsylla* represents a separate family, more specialised, than both *Psocidiidae* and *Permopsocidae*. Thus, *Archipsylla* is a retarded and altered Jurassic offshoot of the group (*Permopsocida*), which flourished in a much more remote age, namely in the Lower Permian (Kansas). In this respect the gen. *Archipsylla* reveals an analogy with the gen. *Cycloscytina*, which also represents, perhaps, a Jurassic relict of the fam. *Scytinopteridae*, rather abundant in Permian or Triassic beds of N. Russia, Australia and, even, of S. America.

Tillyard considers the suborder *Permopsocida* as an ancestral group, from which recent and Tertiary *Psocids* were derived. This opinion seems to me to be insufficiently founded. It is true that the wings of *Permopsocida* are in many features very primitive, nevertheless in many recent and Tertiary genera, especially in the fam. *Lepidopsocidae*, but, partly, in other families, too, occur some structures, which it is very difficult to derive from the state of

Permopsocida. Thus, RS in some recent (and Tertiary) *Copeognatha* is three-branched, whilst in *Permopsocida* it is already always two-branched. Farther, in some recent genera, for instance, in *Calopsocus* Hag., we meet in the middle portion of the fore wing with a whole row of nervures, not yet vanished. In *Neurosema apicalis* McLach. such «additional» nervures exist in both the middle and the apical portion, and in the middle portion we find even some remainders of a net. I consider that the three-branched RS³, as well as numerous «additional» nervures in *Calopsocus* and *Neurosema* — in which features these genera somewhat remind us of some *Homoptera* — represent preserved features of a primitive state, which, had they even existed in *Permopsocida* — and I believe that they have existed — afterwards disappeared. However, having once disappeared, these structures could hardly reappear. Thus, *Permopsocida* represent a separate blind side-branch of *Psocoptera*, which was well developed and differentiated already in Permian times, but was afterwards dying out, as in Jura beds we know only one genus of this suborder. In the same Jura times did already exist representatives of other *Psocoptera*, as we may judge from the finding in Kara-tau beds of the specialised genus *Lithentomum* m. (suborder *Parapsocida*).

As we have seen, in the gen. *Archipsylla* are well preserved nearly all the characteristic features of the nervuration of *Permopsocida*, but moreover appeared some other features of specialisation (reduction of anal region, reduction of SC), which not only do not lead to recent (or Tertiary) families of *Copeognatha*, but obviously make it generally impossible to derive them from *Archipsylla*, as well as, besides, from the remaining known *Permopsocida*. We suppose that Tertiary — recent *Psocoptera* are derived from another, hitherto unknown primitive root, and *Permopsocida* represent a side-branch of it. Analogous relations we meet with in some other groups.

Suborder **Parapsocida** Till.

Two wings of a very small insect, found by me in hard shale near the vill. Galkino, 1925, I consider to belong to this order. It represents a new family.

Fam. **Lithentomidae**, n. fam.¹

Wings resembling partly those in subfam. *Perientominae* Enderlein, fam. *Lepidopsocidae* End., partly some *Empheriidae* End. Size very small. In anterior wings R running separately, at least, in the distal portion; anterior branch of RS simple, united with R near its end; R₂ disappeared or,

¹ As the name «*Lithentomum*» is a nomen praeoccupatum, it must be altered; I propose for the genus the name *Asienthomum*, n. gen., and for the family — the name *Asienthomidae*, n. fam. I make this proposition after the article was partly printed. — A. M.

perhaps, fused, with RS_{1+2} ; posterior branch of RS forming a rather large fork; M with two long subparallel branches; Cu simple, long. In the posterior wings R separate, R and M forming, each, a rather small fork; Cu, probably, one-branched.

Gen. *Lithentomum*, n. gen.

R separate, at least in the distal portion, ending (by R_1) on the costal margin at $\frac{3}{5}$ from the base of the wing; RS forking a little before the end of R_1 and its anterior branch (RS_{1+2}) united in one point with the end-portion of R, then running, as a simple gentle curve, to the apical margin; R_2 vanished or, perhaps, fused with RS_{1+2} ; posterior branch forming a rather large fork; RS rather long and united, near its base, with M by a short cross-vein; M forming a very long fork, both branches nearly straight and subparallel; Cu simple, very long, running obliquely to the hind margin and gradually approaching to M_{3+4} (analia invisible). Posterior wings shorter, more rounded at the apical margin; R separate and near its end united by a transverse nervule with RS, which is forked; M forms a similar fork; Cu, probably, simple, gently arcuate and at its base united with M by an oblique cross-vein. Size very small.

One species — *L. praecox* Mart.

Lithentomum praecox, n. sp.

Length of the anterior wing 2 mm; preserved portion of the hind wing — 1,3 mm, its total length — about 1,5 mm. In the anterior wings R_1 ending on the costal margin at $\frac{3}{5}$ from the base; anterior branch of RS united near its base with the end-portion of R, then running separately to the apical margin; pedicel of the second apical fork (between RS_3 and RS_4) is slightly shorter than its fork and nearly equal to the stem of RS up to its connection with M; both branches of M very long; common stem of M curved and then united with Cu, which is very long and gradually approaching M_{3+4} ; apical margin elliptical. In posterior wing R separate, apparently, thick, before its end united with RS by an oblique nervule; the forks of RS and of M are rather small; Cu slightly arcuate and connected, near its base, by an oblique nervule with M (cubital and anal region not preserved).

One specimen. Galkino, East. Karatau, 1925, Martynov. Coll. Geol. Mus.

Comparison with recent and fossil Tertiary *Psocoptera* shows, that in nervuration of anterior wings the just described fossil genus is more similar to subfam. *Perientominae* (genera *Perientomum*, *Soa* Ender.) fam. *Lepidopsocidae*, partly, to some *Empheriidae* Enderl., but in the twobranchied condi-

tion of M and in the simple Cu it differs conspicuously from these families, as also from the remaining *Copeognatha*. The disposition of R and RS

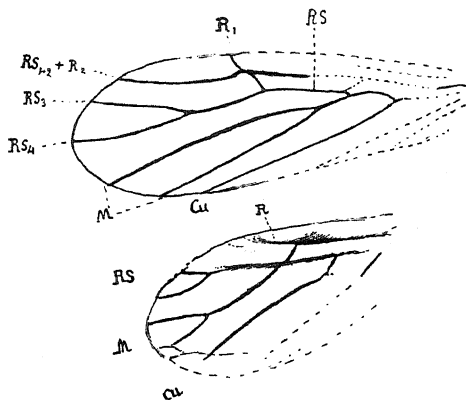


Fig. 9. *Lithentomum, praecox* n. sp.

resembles much that in some *Perientominae*, but the anterior branch of RS is here, probably, fused with R_1 , a condition that somewhat reminds of *Amphientomum* Hag. The conservation of a separate R is a primitive feature (as in *Perientominae*), but the diminution of the number of branches in M and in Cu is a feature of specialisation. The nervuration of the posterior wings appears to be very peculiar, but, unfortunately,

only a part of the wing is preserved. In any case it somewhat resembles (but not closely) that in *Psyllipsocus* (*Psyllipsocidae* Enderl.).

Thus the Jurassic genus *Lithentomum* is somewhat allied to *Perientominae*, — which represents one of the most archaic groups in the whole order, — but very distinct and in some features specialised in a direction different from that in the remaining genera of *Psocoptera*. On that account it must be separated into a distinct fam. *Lithentomidae*, which appears to me to be extinct, having no descendents in the recent psocopteran fauna.

As we noticed, *Archipsylla turanica*, *Liadopsylla tenuicornis*, *Karajassus crassinervis* and, perhaps, *Archijassus minimus* are rather closely allied to some forms of Upper Lias of Mecklenburg. I could add to this list some other species, also closely allied more to those of Lias of Mecklenburg. Such facts prove, that insectiferous beds of Karatau are, probably, of greater age, than I accepted earlier¹ (Lower Malm). It is true that in the Karatau fauna there are many modernized forms (from *Hymenoptera*, *Diptera*), but on the other hand, archaic types, such as, for instance, *Cycloscyrtina*, *Protomyrmeleon*, n. sp.² and some others — also are not absent. Thus I conclude that insectiferous beds of Karatau more or less correspond to the Upper Liassic beds of Mecklenburg and belong, probably, to Lower Dogger — Upper Lias.

¹ A. Martynov « Preliminary notice on fossil insects from Jura beds of Karatau ». Bull. Mid.-Asiatic Mus. in Tashkent. 1926 (russian).

² *Odonata* I will treat in another paper.