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Jurassic fossil Insects from Turkestan.

7. Some *Odonata, Neuroptera, Thysanoptera.*

By A. Martynov.

(Présenté par P. Suškin, membre de l'Académie des Sciences, le 4 Mai 1927).

Order **Odonata.**

I give below the description of three species of *Odonata*, two of which belong to the suborder *Archizygoptera.*

In the present paper I adopt the interpretation of the wing-nervation which I proposed yet in 1922[1] and which I introduced in 1925 in the description of *Karatawia turanica* from the same beds.[2]

This interpretation is very similar to that of Tillyard, 1925,[3] except the denomination of branches of RS. Some considerations about this denomination will be given below.

Suborder **Anisozygoptera** Handl.

Fam. **Tarsophlebiidae** Handl.

Tarsophlebia nečkini, n. sp.

One specimen. Karabas-tau, East Kara-tau. VI. 1925. A. Martynov.

Only the basal portion of an anterior wing preserved; distal portion broken, and its nervuration is not discernible; in the basal portion C and SC partly displaced.

Between C and SC a row of regularly disposed cross-veins; the third cross-vein is strong and forms as it were a continuation of the arculus. Basal

[1] Martynov. Revue Russe d'Entomol., 1924, XVIII.
[2] Bull. Acad. Sci. de Russie, 1925, pp. 587—590, Fig. 9.
[3] Amer. Journ. Sci., X, 1925, July.

portion of M runs close to RS. Discoidal cell small and open into the basal cell; between M and Cu there are, from their issuing, two rows of cells (3 in the upper, 4 in the lower one), then follows one row of cross-veins as in *Tarsophlebia eximia* Hagen. Cu forms, at the origin, a knee-shaped projection into the basal cell; A is also curved, but not so strongly; between Cu and A there is one row of regular cross-veins. A long and in its greatest part subparallel to Cu; in the basal portion, between A and the hind margin of the wing, there are three cells, then follow two rows of angulate cells, about eight in each row; beyond these the cells between A and the hind margin become more numerous, and are disposed in oblique transverse rows, containing each about 4—6 cells.

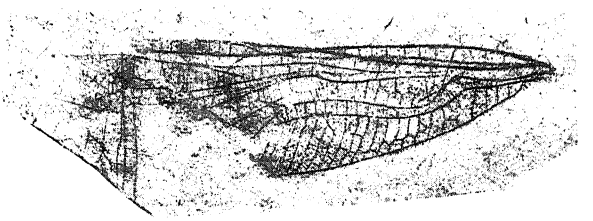

Fig. 1. *Tarsophlebia nečkini*, n. sp. Photograph of the specimen.

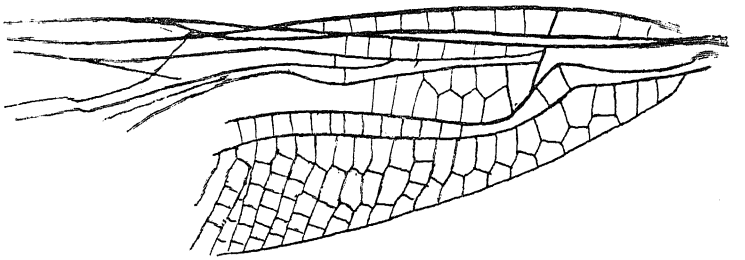

Fig. 2. *Tarsophlebia nečkini*, n. sp. Nervuration of the preserved portion of the wing.

Length of the preserved portion, up to the fracture, 25 *mm*; total length of the wing must have been about 35 *mm*.

This wing represents probably a hind wing; it resembles much the hind wings in *Tarsophlebia eximia* Hagen, from Upper Jura of Bavaria.

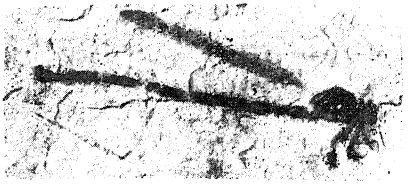

Fig. 3. *Gen. sp.?* Photograph of the whole body.

Gen. sp.?

One specimen. Galkino, East Kara-tau. VII. 1925. A. Martynov.

The specimen represents the whole body with legs and indistinct remains of wings.

Abdomen cylindrical, slender, not dilated in its hind portion. Legs rather short.

Length of the body 42 *mm.*

This specimen belongs doubtless to *Anisozygoptera*, but it is impossible to determine its systematical position. Probably it does not belong to *Tarsophlebiidae*, as in this family the legs are long, whereas in our form they are rather short.

Suborder **Archizygoptera** Handl.

Fam. **Protomyrmeleontidae** Handl.

Gen. **Protomyrmeleon** Geinitz.

Both specimens found in Galkino belong doubtless to this genus; one form is represented by both pairs of wings.

P. handlirschi, n. sp.[1]

One specimen. Galkino. 1925. A. Martynov.

On this specimen we perceive indistinct remains of the thorax and of two pairs of wings, each anterior and posterior wing placed one upon the other. Nervuration is not very distinct, but still discernible in the greater portion of the anterior wing. Allied to *P. brunonis* Geinitz, from Upper Lias of Mecklenburg. Anterior wings narrow, petiolate. SC short, ending on C at the base of the second fourth of the wing; no definite nodus. Pterostigma as in *P. brunonis*, but somewhat longer, not convex backward; beyond it there are 3—4 cross-veins. RS resembling that in *P. brunonis*, but the division of RS_{2+3} proceeds much

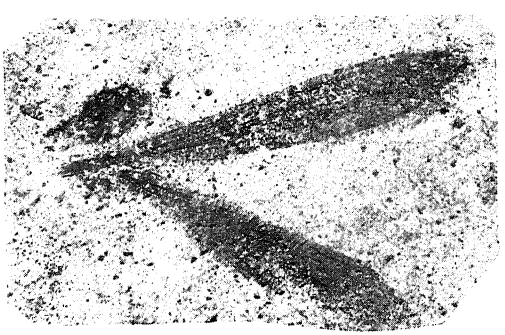

Fig. 4. *Protomyrmeleon handlirschi*, n sp. Photograph of the specimen (× 2,4).

[1] I have the pleasure of naming this species after Dr. Handlirsch who ranked the genus *Protomyrmeleon* into a separate suborder

earlier than in this species, much before the end of RS_5; the cells between RS_2 and RS_3 more numerous than in *P. brunonis*, their number along the

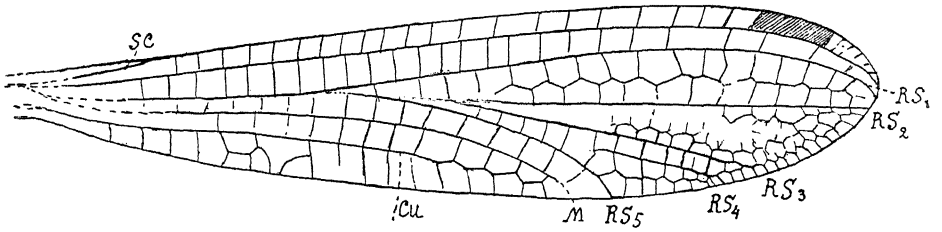

Fig. 5. *Protomyrmeleon handlirschi*, n. sp. Nervuration of the anterior wing.

margin is about 10—11. RS_4 reduced as in that species; between RS_4 and RS_3 only one row of cells. RS_5 arcuate and ending much beyond the dividing point of RS_{2+3}; along the margin, between RS_4 and RS_5, there are about 6 cells. M simple, as is also Cu; between Cu and the hind margin there is one row of cells, and only in the middle of this area three cells are subdivided into two rows of irregular cells.

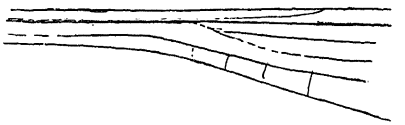

Fig. 6. *P. handlirschi*, n. sp. Basal portion of the anterior wing.

Length of the anterior wing 23,5 *mm*.

Posterior wings somewhat broader, but also petiolate. Postnodals more dense; pterostigma similar to that of the anterior wings; beyond it

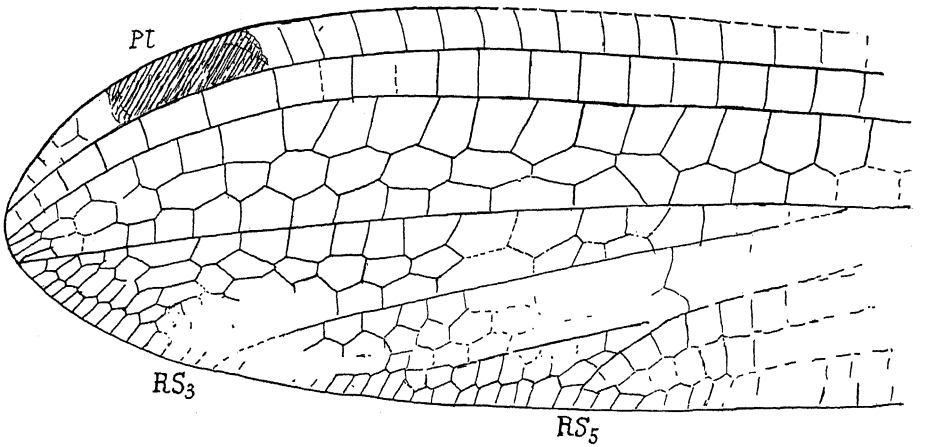

Fig. 7. *P. handlirschi*, n. sp. Nervuration of the distal portion of the posterior wing.

there are about 4 cross-veins, two of which are apparently united by a longitudinal vein. Between RS_1 and RS_2 not two, but three rows of cells.

RS_{2+3} divides also far before the end of RS_5; at the margin, between RS_2 and RS_3, there are about 14 marginal cells. RS_4 separated from RS_3 by two or three rows of cells; between RS_4 and RS_5 there are, at the margin, 8 cells; between Cu and the hind margin apparently two rows of cells.

Length of the posterior wing 22,5 *mm*.

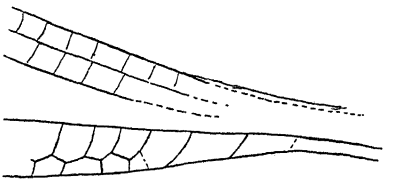

Fig. 8. *P. handlirschi*, n. sp. Basal portion of the posterior wing.

Judging by the position of RS_4 separated from $RS_3 (= M_3)$ by two rows of cells, and by the presence of two rows of cells between Cu and the hind margin, the wing described by Handlirsch (Foss. Insect., p. 471, Pl. 42, Fig. 14) is a posterior wing. A comparison of this wing with the wings in *P. handlirschi* shows that their nervuration is similar, and thus *P. handlirschi* must be placed near *P. brunonis*.

P. angustovenosus, n. sp.

One specimen. Galkino, East Kara-tau. 1925. A. Martynov.

The specimen represents indistinct remains of the posterior wing; nervuration may be discerned only in the distal portion of the latter.

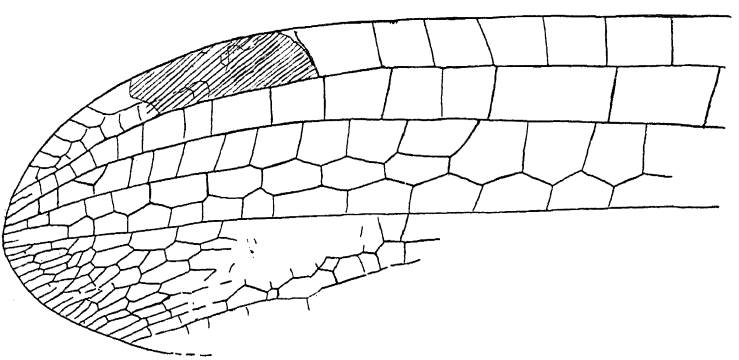

Fig. 9. *Photomyrmeleon angustovenosus*, n. sp. Nervuration of the distal portion of the posterior wing.

Closely allied to *P. handlirschi*. Nervuration of the posterior wing similar to that in this species, with only few perceptible differences. Pterostigma as in *P. handlirschi*, but in the small area beyond it there are two rows of cells, about 5 cells in each row. Between RS_1 and RS_2 there are also three rows of cells, but the cells of the median row are more elongate.

The cells between RS_2 and RS_3 are more numerous, elongated; on the margin there are about 18 narrow cells.

Length of the wing apparently same as in *P. handlirschi*.

Both species just described are doubtless more or less closely allied to *P. brunonis*, and thus must be considered as belonging to the same genus. On the contrary, *Protomyrmeleon anglicanus* Tillyard, from Lower Lias of England, newly described by this author[1] seems to me as more differing from these three species and representing rather a separate new genus. As we have seen, RS_4 (= MS of Tillyard) in all the three above mentioned species is perceptibly reduced, and preserves only its distal portion, whereas its basal portion disappeared. In *P. anglicanus* RS_4 (Ms of Tillyard) is not reduced, and runs as a distinct longitudinal vein resembling that in *Triassagrion australiense* Till., from Upper Trias of Australia. This only feature is sufficient for separating *P. anglicanus* from the gen. *Protomyrmeleon*, from which it differs also by the shape of the pterostigma and by more irregular cells in the area between RS_2 and RS_3 (= M_{2a} and M_{2b}). In these features, pterostigma excluding, this Lower Liassic genus *Tillyardagrion*,[2] n. gen., stands nearer to the Triassic genus *Triassagrion* Till. than to the Upper-Liassic *Protomyrmeleon*. If we shall agree that the gen. *Tillyardagrion* belongs to *Protomyrmeleontidae*, — and I think it must be really true — we inevitably arrive to the conclusion that the separation of the gen. *Triassagrion* into a distinct family *Triassagrionidae* is probably needless, or, in case this separation be correct, we must refer the gen. *Tillyardagrion* to *Triassagrionidae*. The first alternative seems to me to be more exact, as the great difference which, according to Tillyard's supposition,[3] exist between *Triassagrion* and *Protomyrmeleon* is not confirmed by the study of the remainder of both pairs of wings in *P. handlirschi*. After Tillyard, *Protomyrmeleon* «appears to differ in the base not being petiolate, M arising separate from R, so that no arculus is formed, separation of the base of MS from M_3, and entire absence of 1A». As it has been shown, the wings in *Protomyrmeleon* (*handlirschi*) were also petiolate as in *Triassagrion* (besides, the petiolation of the wings in *Protomyrmeleon* was presumed by Tillyard),

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[1] British Museum Nat. History. Fossil Insects, № 1. Liassic Dragonflies, by R. S. Tillyard. 1925.

[2] I take the liberty of devoting this genus to the distinguished entomologist and paleontologist Dr. R. S. Tillyard.

[3] R. S. Tillyard. Mesozoic Insects of Queensland. 9. Proc. Linn. Soc. New South Wales, XLVII, Part 4, 1922, pp. 454—458, Pl. Lii., Fig. 31, textfig. 77.

and the main feature discerning *Triassagrion* and *Tillyardagrion* from *Protomyrmeleon* is the preservation of entire RS_4 (=MS) and of 1A. However, in *Protomyrmeleon* 1A, though more or less reduced, did not disappear entirely, and its remains are represented in *P. brunonis* by a zygzaged longitudinal vein without base, in *P. handlirschi* by a longitudinal division of but 2 or 3 cells in the middle portion of the area between Cu and the hind margin. RS_4 is reduced in *Protomyrmeleon* only in its basal portion. In *Triassagrion* there are several rows of cells between RS_2 and RS_1; in *Protomyrmeleon* their number diminishes to 3 and 2; in *Tillyardagrion* there are also only two rows of cells.

Thus, the difference between *Triassagrion* and *Protomyrmeleon* is not very important, and rather of generic than of family's nature. *Triassagrion* is a more primitive genus.

As it has been mentioned above, the main and almost unique difference between my interpretation of the wing-nervation in *Odonata* and that of Tillyard, 1925,[1] consists in the denomination of the branches of RS. I must confess here that both denominations do not satisfy me. According to Tillyard's interpretation,[1] RS branches in *Odonata* (and *Agnatha*) by triades, and the middle branch of each triade is an «intercalary sector». RS forms in *Odonata* two triades which the author denominates as R_2 and R_3 respectively. I consider that this peculiar disposition into two groups, as well as the whole character and transformation of RS_4 (Tillyard's $1R_{2b}$) and RS_2 (Tillyard's $1R_{2a}$) into «intercalary sectors» are of quite secondary nature, and have been developed in connection with mechanical requests, as I argued in my Russian paper in (1923) 1924.[2] Formerly, all these nervures were but a more or less homonomous row of branches of RS which was therefore «pectinate», as in many *Palaeodictyoptera*, *Protorthoptera*, *Neuroptera*.

At present we perceive on the RS, as a rule, 4 branches or, together with the continuation of the stem of RS, in all 5 branches, but we have some indications that formerly the number of branches in the distal part (or distal «triade») of RS was indeed greater, and reached in all not 3, but 4 and even 5 branches as in some *Protodonata* (in *Protagriidae* the whole number of branches of RS was about 8—9).

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[1] R.S. Tillyard. Kansas Permian Insects. Part V. *Odonata* and *Protodonata*. Amer. Journ. Sci., X, July 1925. Lameere's interpretation is also very similar (Psyche, XXX, 1923, № 3—4).

[2] A. Martynov. Sur l'interprétation de la nervuration et de la trachéation des ailes des Odonates et des Agnathes. Revue Russe d'Entomol., XVIII (1923), 1924, pp. 145—174.

Only 3—4 basal branches are constant and always preserved, on the contrary, the distal branches show definite tendency towards reduction and disappearing everywhere, but their traces exist still yet in various recent[1] and fossil *Odonata*.[2] Probably the number of distal branches in pectinate RS primarily was variable and not equal in different groups. Thus, it appears that it would be more convenient to count the branches of RS from the base, i. e. to define our RS_5 as RS_1, our RS_4 (Tillyards $1R_{2b}$) as RS_2, and so forth. Likewise the continuation of RS would be perhaps more correctly denominated as RS_n, as we do not precisely know the number of vanished distal branches.

Order **Neuroptera.**

Fam. **Mesochrysopidae** Handl.

Gen. **Mesypochrysa**, n. gen.

Anterior wings broad, posterior ones somewhat narrower. SC runs near to R, slightly deviating from it in the basal portion; costal area not broad, rather narrow; pterostigma forms a convexity backward, and beyond it R is connected with the costal margin by numerous cross-veins. RS zygzag-shaped and connected with R by 7 cross-veins; it forms in all 7 branches connected by two rows of cross-veins and ending by small triangular end-forks. M divides into two branches near the origin of RS; Cu also two-branched; analia simple, regular, arcuate. All nervures densely clothed with short hairs. Antennae long, consisting of numerous (in *M. latippennis*, n. sp. about 63) short joints. Basal joint of tarsi elongate, the 2nd — 5th joints short; the 5th with two claws.

The genus *Mesypochrysa* is similar to the recent gen. *Hypochrysa* Hagen in the small number of branches of RS (in *Hypochrysa* 8, in *Mesypochrysa* only 7), as well as in the number and disposition of the cross-veins and in the ending of branches of RS by small forks. However, the disposition of the branches of M, Cu and of the analia is more primitive and regular, proving that this genus stands yet on the stadium of *Mesochrysopidae*. It is possible that the genus *Mesypochrysa*, probably some other species than *M. latipennis*, is ancestral to the recent *Hypochrysa* Hag.

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[1] Cf., for instance, *Diphlebia lestoides* Till., in Tillyard's Australian Insects, 1926, p. 79, Fig. 12.

[2] For instance, in *Stenophlebia latreilli* Germar, in *Karatawia turanica* Mart., l. cit., and in many others.

M. latipennis, n. sp.

Upper and under sides of one specimen, in which one may discern damaged remains of head, with antennae and palpi, of thorax, with three legs, indistinct traces of abdomen and of posterior wing, and well preserved remains of left anterior wing, only the basal part of which is indistinct. — Galkino in East Kara-tau. 1926. A. Martynov.

Eyes large. Antennae long, nearly as long as the body, consisting of about 63 short joints, each clothed with minute hairs. 5th joint of the palpi maxillares elongated, 4th and 3rd ones short. Pronotum with a

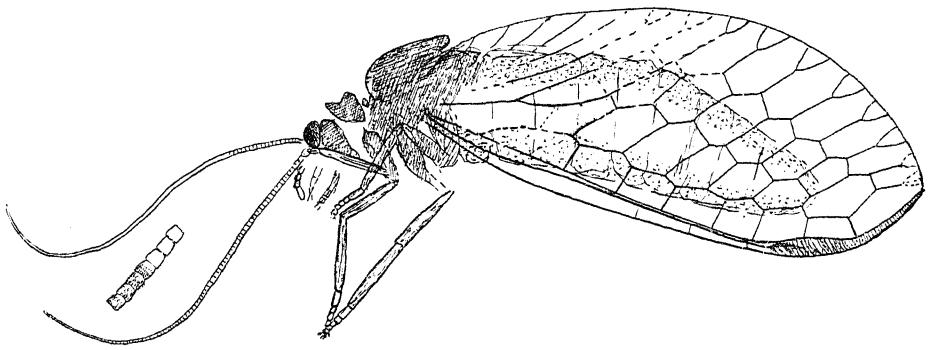

Fig. 10. *Mesypochrysa latipennis*, n. gen., n. sp. General aspect of the whole body with appendages.

concavity above; mesonotum large enough, but somewhat indistinct. Legs resembling those in the gen. *Chrysopa*, densely clothed with minute hairs; basal tarsal joint more than twice as long as the second one; 2nd—5th joints short, subequal.

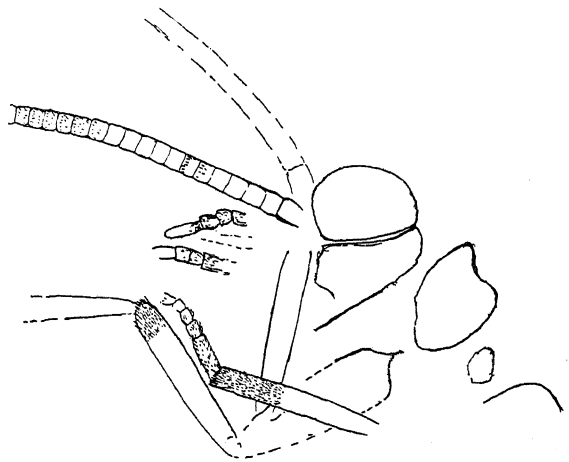

Fig. 11. *Mesypochrysa latipennis*, n. gen., n. sp. Head, protharax, basal portion of an antenna, palpi, tarsus (more magnified).

Anterior wings broad, apex forming an obtuse angle. SC running close to R, except its basal portion, and reaching the pterostigma; its end portion is feeble, not quite distinct, but apparently ending on C within the pterostigmal region (Fig. 12). Costal area rather narrow, crossveins indistinct, and one may perceive only about 3 such veins in the distal portion R reaching the apex

of the wing and, beginning with the pterostigma, connected with the costal margin by a dense row of numerous cross-veins. RS zygzag-shaped, connected with R by 7 distinct cross-veins as in *Hypochrysa*; it forms in all 7 branches connected by two zygzaged rows of cross-veins; the 7th (last) branch

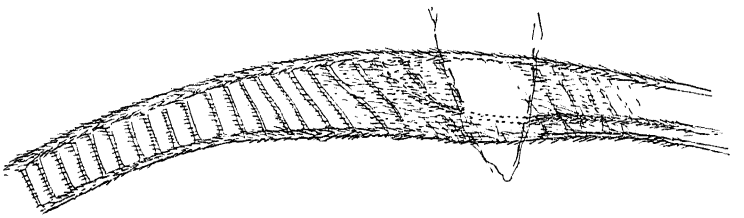

Fig. 12. *M. latipennis*. A portion of the anterior wing near pterostigma.

connected with the 6th branch by only one, second, cross-vein, this cell remaining individed between the 7th and 6th branches. M divides approximately near the level of the origin of RS; M_{1+2} is connected with the basal branch of RS by two cross-veins. Cu also two-branched. Analia somewhat arcuate, regular. All nervures clothed with minute hairs; in the pterostigma region the membrane bears similar short hairs. Posterior wings somewhat narrower (they are indistinct).

Length of the body 12 *mm*; that of the anterior wing 12 *mm*; maximal breadth of the wing 5,5 *mm*.

The form just described is of great interest. Standing yet on the stadium of *Mesochrysopidae* it resembles more the recent gen. *Hypochrysa* which is probably genetically allied to the gen. *Mesypochrysa*.

Fam. **Prohemerobiidae** Handl.

Gen. *Epactinophlebia*, n. gen.

Closely allied to *Actinophlebia* Handl. and *Kirgisella* Mart., but the number of branches of RS is greater, reaching 27; the size is greater too. In these features it rather approaches the Jurassic gen. *Mesopsychopsis* Handl.

Ep. karabasica, n. sp.

Upper and under sides of one specimen representing the greater part of the (anterior?) wing. Karabas-tau in East Kara-tau. 1925. A. Martynov.

The shape of the wing is somewhat triangular; costal area apparently not very broad, resembling that in *Prohemerobius geinitzi* Handl. and in *Actinophlebia megapolitana* Geinitz. Radius slightly bent at its apex and forms 6 branches partly dividing again. RS forms in all 27 branches, many

of which divide again, partly repeatedly. M forms two parallel branches. Cu_1 with 12, Cu_2 with 6—7 branches; A_1 also with several branches. Cross-veins between SC, R and RS apparently lacking.

Length of the wing 21,5 *mm.*

This species resembles doubtless also *Mesopsychopsis hospes* Germar, but is more primitive, in which character it is more closely allied to the Liassic *Actinophlebia.*

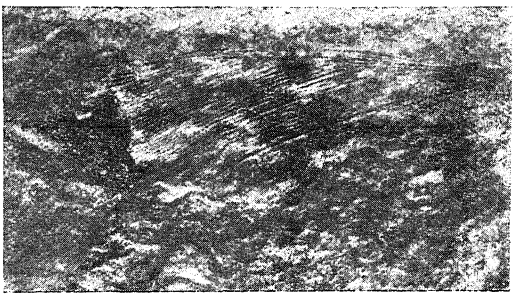

Fig. 13. *Epactinophlebia karabasica*, n. gen., n. sp. Photograph of the specimen.

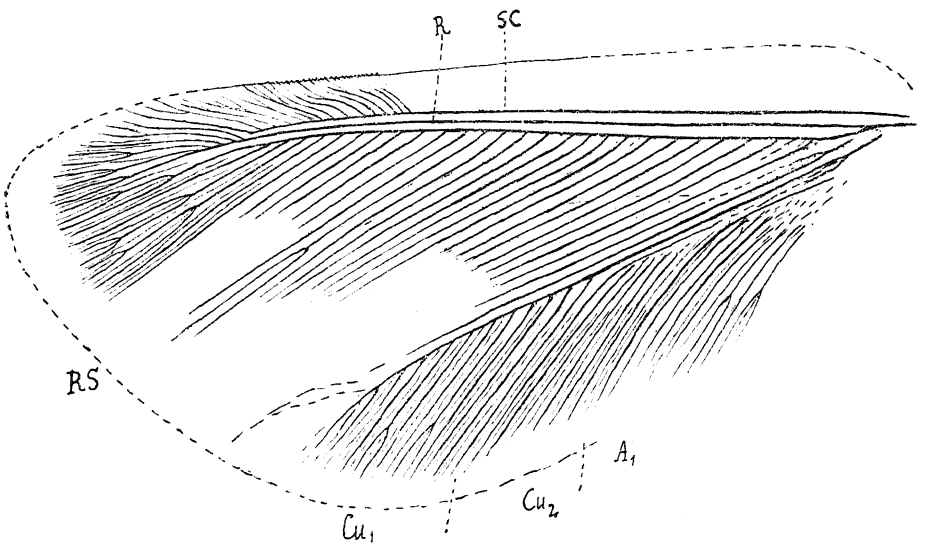

Fig. 14. *Epactinophlebia karabasica*, n. gen., n. sp. Nervuration of the wing.

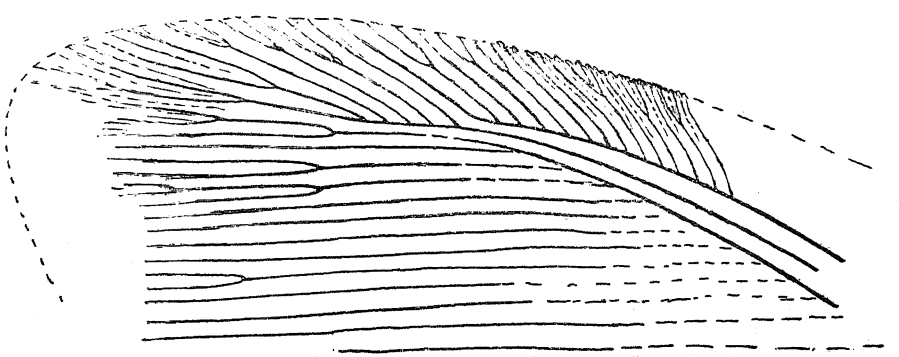

Fig. 15. *Ep. karabasica*, n. gen., n. sp. Nervuration of the apical portion of the wing (more magnified).

Order **Thysanoptera.**

Mesothripidae, n. fam.

Antennae thin, composed of not less than 7—8 joints. Head narrow. Anterior legs with very thick femora. Abdomen not produced at its apex, somewhat constricted at its base. Wings not preserved.

Mesothrips crassipes, n. gen., n. sp.

4 specimens. Galkino, East Kara-tau. 1926. A. Martynov.

In all specimens the head, thorax, abdomen and basal portions of the legs preserved; wings unfortunately not preserved.

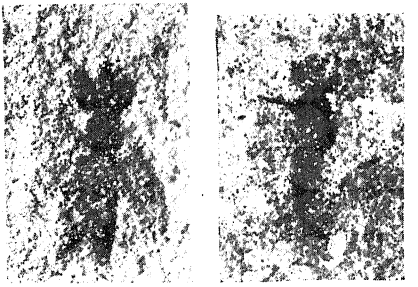

Fig. 16. *Mesothrips crassipes*, n. gen, n. sp. Two photographs.

Fig. 17. *Mesothrips crassipes*, n. gen., n. sp. General aspect of the body.

Antennae slender, composed of about 6—7 joints. Head narrow. Anterior femora very thick, bulbous. Abdomen somewhat constricted at its base, apparently slightly broader (in the basal portion) than the thorax; narrowing to the end, but not produced.

Length of the body 2—2,5 *mm.*

It is interesting to note the presence of *Thysanoptera* in Upper-Liassic beds of Galkino, however, the preservation of the specimens is not quite satisfactory, and it is very difficult to determine the systematical position of this form more precisely. Probably the specimens figured above are females.