Mayflies from Israel (Insecta, Ephemeroptera) II. - Caenidae

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Besides the common and widely distributed Caenis macrura Steph., three new species are described, Caenis pellenecii sp. nov. Both the Oriental (closely related to C. macrura), C. spenceri sp. nov., and C. parapelenecii sp. nov., both from the northern parts of the country, seem to be related to species from the Palearctic region (C. occulta Malz. and C. brevespi Kost.).

Key words: taxonomy, mayflies, new species, Caenis, Israel, Levant.

INTRODUCTION

For the historical aspect of the researches of the mayfly fauna of Israel and the Near East see S-STORE (1992).

The present paper is a further contribution to a work on Israel mayflies the first part of which is the above mentioned paper from S-STORE, dealing with the Hesperidae, the Ephemerellidae, the Leptophlebiidae and the Palingeniidae, 11 species of which could be recorded for the region. The investigations base on the collections of M. Samocha and the Institute of Life Sciences, Jerusalem.

The Caenis material of these collections, left me to the arrangement of Dr. T. Oral, consists nearly completely of larvae. For getting the imaginal stages rearing of nympha were done by Dr. R. Oral and Dr. M. Samocha. I wish to thank both colleagues for their help.

Only one Caenis species was known from Israel: Caenis macrura Steph. reported by Samocha (1972). Another species he mentioned, Caenis lacustris Burm. (sub. C. macrota Briez.), could not be found, neither in his collection nor in the other samples. Three new species have been included in the material and will be described here.

DESCRIPTION

Caenis macrura Steph., 1835

Stephens, 1835, Samocha, 1972; Malzacher, 1986

Caenis macrura is widely distributed in the Western Palearctic. For the Levant it was recorded by Samocha (1972), Peintz (1971) and Koch (1988). In Israel it's by far the most abundant Caenis species. From 630 simples more than 500 from all over the country contain C. macrura.

In the Mediterranean C. macrura has developed several subspecies or geographical races, the characteristics of which are highly variable. In Israel, Lebanon and Syria there are also different forms that could be caused by endemism in the area. Differences in size and in some morphological features can also be found.
between the generations of winter-spring and of summer-autumn. In the summer generation size seems to be a function of habitat conditions such as food supply and the duration of water conducting in temporary waters.

For the diagnosis of C. maculata, see Malzacher (1986, p. 15 ff.). Some diagnostic features of the larvae can be taken from the key below. Those features of the adults are the male genitalia (fig. 3c, f), the base of the antennal bristle (fig. 3d) and the shape of the scutellum (fig. 4c).

*Ceris gibsonensis* spec. nov.

**Material**

A lot of nymphs and larvae of different stages from Nahal Gibbon (6 samples) and Nahal Daljyot (=4 samples). Holotype: 1 male nymph with well-developed subimaginal genitalia (macro-side), Nahal Gibbon 2; 30.11.86; IES 5035. Paratypes: about 50 nymphs and larvae from the same sample. Holo-
typus housed in the Zoological Museum of Tel-Aviv University as well as most of the paratypes. Other paratypes in the author's collection and in the Museum of Zoology, Lausanne.

**Nymph**

Body length of mature nymph: male: 3.3-3.7 mm; female: 4.5-5.5 mm. Clothation of chitinous layers: rather evenly brown. Abdomen, legs and a dif-
fuse area in front of the wingbases paler.

Epidermal pigmentation: tandem with two transverse bands separated by the pale frontal-suture. The band on the vertex is often interrupted in the middle; two branches surround the hind parts of the lateral ocelli. The frontal band extends for-
ward between the antenna-bases and the frontal ocellus. Prothorax with extensive pigmentation and irregular pale areas on both sides. Mesonotum with lateral spots on the fore margin and the bases of the wing-sheathes.

Abdominal tergites 1 and 2 strongly, the others weakly browned. Second gills (gillcovers) spread; in its basal parts the spots are merging.

Second segment of the labial palps along the centre line about two and a half time as long as the third. Pronotum diverging to the front; lateral margins convex, regularly curved (fig. 3b). Transverse row of spines on the fore femur straight or irregular, spines more or less broad and truncate, finely frayed at the tip. A small number of similar spines on the surface of the middle and the hind femora. Claws with small teeth; a line of microsetae, apically following them at the hind claws, is more or less visible. Shield-shaped microtricha on the wing-sheathes (as in other parts of the body surface) large, often overlapping each other. The veins and the spaces between them are studded with them (fig. 2b) (in the other species only the veins).

Process on the hind margin of the second abdominal tergite with a broad base, continuously widened to the middle, with a short triangular tip. Spines on the hind corners of the abdominal segments of medium size often bent inwards. Spines of the segment 3 and 4 (5) dagger-shaped (fig. 1a and b). Hind margin of the ninth sternite with an indentation of medium depth often shaped like a notch (fig. 1b and c). With a large shagreen field consisting of irregular rows of small teeth or tubercles.

386
Fig. 1. *Caenis gilbomorica*, nymph. a. outline of female abdomen; basal bristles are shown on the segment 3-5; b. outline of male abdomen; c, d. different shapes of the terga of female nymphs; e. subimaginal genitalia taken from a mature male nymph; f. fore leg from subimaginal genitalia; g. base of subimaginal sternum from a mature male nymph; h. side of pronotum.

Fig. 2. Shieldshaped microtrichia from the surface of the nymphal wing sheaths. a. *Caenis minuta*; b. *Caenis gilbomorica*.
Some subimaginal features can be seen in male nymphs immediately before emerging, such as the genitalia (fig. 1e) and the antenna whose bristle is not basally dilated (fig. 1g).

_Caenis antoninae_ spec. nov.

**Material**

A great number of nymphs and larvae of different stages from over 100 samples from about 30 localities in the southern parts of the country especially from the Dead Sea and other desert areas. Some male and female imagines and subimagines from Nabal Anuqot and Nabal David reared from the nymphs by R. Ortal and M. Saxon. A few males from Ein Nvrera from the coll. Samoch.

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*Fig. 3 a-c. Caenis antoninae. a-d. Caenis mucronata. d-f. male genitalia. e-h. female genitalia. i-j. base of antenna.*

388
Besides the records from Israel the species have been found in Wadi Musa (near Petra), Northwest Jordan. (larvae and nymphs, coll. KENZEBELCHACH).

Holotypus: 1 male (micro-slide), Dead Sea Area, Nahal Arugot, 12.V.91 leg. SAKRIO. Paratypes: 7 males, 21 females, 3 larvae and some nymphal skins from the same sample. Holotypus housed in the Museum of Zoology, Lausanne. Paratypes shared between the Zoological Museum of Tel-Aviv University, the Museum of Zoology in Lausanne and the author's collection.

**Male**

Body length: 2.3-2.8 mm; wing length: 2.4-2.6 mm; length of fore leg: 2.2-2.4 mm. Ratio of fore femur: fore tibia = 0.51-0.54: 1; ratio of fore tibia : fore tarsus = 2.40-1.57 : 1; ratio of fore leg: hind leg = 1.79 - 1.86 : 1; ratio of tarsic segment of the fore tarsus : 2nd : 3rd : 4th : 5th = 1 : 2.6 - 3.5 : 1.72 - 2.4 : 2.1 - 2.8 : 1.8 - 2.2; the segments 1+2 about as long as the segments 3+4, sometimes a little bit longer but not as long as the segments 3-5.

Coloration of cuticular layers: the thorax, parts of the legs, the mouth parts, rudiments, the 10th tergite, the sclerites of the genitalia and the forecoxae intensively brown. Antenna base and sternites weakly yellowish-brown.

Epidermal pigmentation: Dorsal and frontal parts of the head, lateral and frontal parts of the pronotum, the praesulcaria, the tergites of the abdomen and the frontal veins of the wings with blackish-brown pigmentation, fore tibiae, tarsi and caudal filaments greyish, the latter basally with dark rings.

Base of antennal bristles strongly dilated; dilated part as long as the pedicel (Fig. 3c). Sclerotized triangle of the prosternum pointed, a little elongated, with con cave sides. Scutellum of the mesothorax elongated backwards, its sides forming an angle of 80-90°, the segment X of its lateral sclerites is less than two times as long as the segment Y (fig. 4d). Lateral filaments of the abdominal segments of mid/length.

Genitalia like in fig. 3a; penis lobes a little elongated; central sclerite triangular, forcipes like in fig. 3b, with an apically tuft of strong spines, basally stuck together.

309
**Female**

Body length: 3.5-4.5 mm; wing length: 2.9-3.2 mm.

The coloration of the females is like in the males. A character to distinguish them from females of other species is the shape of the scutellum sclerites (like in Fig. 4a).

**Larva**

Body length of mature nymph: male: 2.3-3.8 mm; female: 3.0-5.5 mm

Like in *C. mucrona* the great difference in the body length results from the fact that there are two generations per year: the summer/autumn one has got distinctly smaller specimens than the winter/spring generation. Each generation for its own shows a variability in the size of specimens because of different food and water conditions.

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Fig. 5. *Cercaea antennata*, nymph: a, ovipositor of female abdomen; lateral bristles are shown on the segment 7-9. b, 9th sternite of anseroid pyloric nymph; c, 9th sternite of a male nymph; d, part of the 9th sternite of a mature male nymph with hypostome field and sublingual papillae; e, shield-shaped microtrichia from the surface of the nymphal wing sheath.
Coloration of the chitinous layers: yellowish brown. Two pairs of longitudi-
nal pale spots on the mesothorax between the wingsheaths (insertion of muscles) are more or less visible.

Epidermal pigmentation: The intensity of the pigmentation is very variable. Transverse bands on the head are fused together. The vertex between the lateral ocelli often with a reticular pattern. A small paramedian spot on the mesothorax between the spots on the fore corners and on the wing bases. Apart from that the pigmentation of head and thorax is like in C. gilbenensis. Tergines of the abdomen strongly pigmented.

Second segment of the labial palpus along the centre line about two and a half to nearly three times as long as the third. Sides of the pronotum diverging forwardly; in the middle part straight or only slowly convex. Transverse row of more or less short, broad and truncate spines on the fore femora which are apically long and finely frayed. The row is straight and close, often more or less irregular. Similar spines of different length on the middle and hind femora. Base of the claws with small or very small teeth (often nearly invisible). Shieldshaped microtrichia on the wingsheaths (as on great parts of the body surface) small. The gaps in the rows are often as large as the diameters of the microtrichia. Between the rows there are broad spaces without any macrotrichia (fig. 5c). Process on the second tergite abruptly pro-
jecting from the base which is not continuously widened to the middle. Spines on the hind corners of the abdominal segments (especially the middle ones) large, with a broad base. Sides of all segments with large and very large bristles (fig. 5a). Inden-
tation at the ninth sternite deep and often notched (fig. 5a-c). With a small tri-
angular shagreen field with continuously distributed teeth or tubercles (fig. 5d).

Subimaginal features as to be seen in mature male nymph: genitailia as in fig. 5d. Base of antennal bristle dilated.

Caudis parabrevipes spec. nov.

Material

About 100 nymphs and larvae of different stages from the lower Jordan river near Aileny bridge and Abadilla bridge and from Nahal Zeppori. Holotypus: 1 male male nymph with well developed subimaginal genitalia (theco-slide). Lower Jordan river, st. 9, 13 V.79; IES 1484. Paratypes: About 45 nymphs and larvae from the same sample. Holotypus housed in the Zoological Museum of Tel Aviv Uni-
vity as well as most of the paratypes. Other paratypes in the author's collection and in the Museum of Zoology, Lausanne.

Nymph

Body length of mature nymph: male: 3.2-3.4 mm; female: 3.7-4.0 mm.

Coloration of chitinous layers light brownish. Epidermal pigmentation cannot be observed. Maybe it's faded away because of the long time of preservation (since 1976 to 1979).

Second segment of the labial palpus along the centre line about two times as long as the third. The second segment is a little bit longer than in the other species described here. Lateral margins of the pronotum straight and parallel. Transverse row of spines on the fore femora more or less straight. Spines short broad and truncate, apically finely frayed. A small number of similar spines can be found on the other femora, some of them are longer but never pointed. Hind margin of the ememora,
besides spines of middle length, with 3-6 ones that are very long (1/4 - 1/2) of the femur length. Surface structure consisting of small and short prickles the bases of which are joint by a network of waved lines. (Great parts of the upper body surface show this pattern). Base of the claws strongly demarcated. Hindclaws with 4 subapical row of microteeth.

Abdominal segments with small spines on the hindcorners the tips of which are often slowly bent outwards (fig. 6a). Lateral margins of segments 9 and 8 each with 5-7 short and truncate bristles (fig. 6d). Ventral depression at the ninth sternite small and as a rule shallow, sometime semicircular (fig. 6 a-d). With a large shagreen field consisting of rows of small teeth or tubercles (fig. 6g).

Subimaginal features as to be seen in mature male nymphs: genitalia as in fig. 6g, with long, laterally protruding penis-lobes. Antennal bristle a little diurnal at the base (fig. 6e).
KEY TO THE LARVAE

(Besides the above mentioned species another one is taken into account here that may be found in Israel: Caeidia robusta)

1. Hind margin of the 9th sternite rounded. Fore femur without a transverse row of spines. Fore corners of the pronotum angular. Microrichia -e on the underside of the second gills forming a band of transverse rows consisting of 5-8 scales

- Caeidia robusta

   - Hind margin of the 9th sternite with an indentation of varying depth. Fore femur with a transverse row of spines. Fore corners of the pronotum rounded. Microrichia on the underside of the second gills forming a simple row

   2. Abdominal segments with small spines on the hindcorners (fig. 6a). Lateral margins of segments 9 and 8 each with 5-7 short and truncate bristles (fig. 6a). 9th sternite like in fig. 6a-d. Indentation small and shallow, sometimes semicircular

   - Caeidia pachycheles

   - Spines on the hind corners of the abdominal segments longer. 9th segment of different shape (figs. 1a-c und 5a-d). Bristles on the segments 9 and 8 longer and more numerous (figs. 1a und 5a)

   - Caeidia antonitae

3. Shield-shaped microrichia' on the wingsheathes small (fig. 5e). Indentation at the 9th sternite deep and more or less notched (fig. 5a-c). Male nymphs (last stage of the larval development) the base of the analateral bristle is dilated (fig. 5c).

   - Caeidia gilbenesis

   - Shield-shaped microrichia on the wingsheathes large (like in figs 2a and b).

   - Base of the analateral bristle of male nymphs not dilated (figs 1a und 5d)

   - Caeidia pachycheles

4. Spines on the hind corners of the segments 3 and 4 (5) daggar-shaped (fig. 1a, b). Indentation at the 9th sternite of medium depth (fig. 1a-c). Shield-shaped microrichia very large, often overlapping each other. They are to be found also in the spaces between the veins of the wingsheathes (fig. 2b). 2nd gills spiny-angled.

   - Caeidia gilbenesis

   - Spines on the hind corner of the segments 3 and 4 short, not dagger-shaped. Indentation at the 9th sternite deeper and basally rounded. Shield-shaped microrichia like in fig. 2a not in the spaces between the veins.

   - Caeidia mactavus

RELATIONSHIP AND DISTRIBUTION

All here described species are closely related. They belong to the C. mactavus species-complex that is characterized by forcps with apically tufted of spines in combination with well developed, laterally more or less protruding penis-lubes and prolonged 5th legs in the males and an indentation at the 9th sternite in the larvae.

There is a distribution center of C. mactavus in the Eastern Mediterranean and it seems that the Israeli populations are situated in its southeastern border. The same goes for C. robusta Ehren (that is not a member of the mactavus complex). C. gilbenensis may have branched off recently from C. mactavus.

1 This microrichia is very soft and often hardly to be seen. Sometimes they are missed off or covered with mid-guts. For making them visible take the wingsheathes off from the larva for separate examination (if possible under PHACO).

393
C. parabrevispes and C. aterior are on the other hand seem to be northeastern outposts of Ethiopian species-groups. C. parabrevispes shows characters of the C. brevispes-group, very abundant and widely distributed in Africa, such as long pro- truding penis-lobes, very short apophyses of the styliiger-sclerite and base of the antennal bristle only slightly dilated. C. aterior is very similar to species of the C. scotti-group, especially C. scotti (U.M.) and C. occulta MAZ. The main distribution of this group is East and Southeast Africa. Its diagnostic features are long apophyses at the styliiger-sclerite, a strongly dilated base of the antennal bristle and in the larval small shield-shaped microtrichia (observed in C. occulta; see MALZACHER, 1990). There are also similarities between C. aterior and the West Palearctic C. luctuosa (BROOKS) that show a strongly dilated antennal bristle, too, but is differs by the shape of the scutellar-scervices (fig. 4b) and the lacking of shield-shaped microtrichia.

REFERENCES

received June 13, 1992; accepted July 9, 1992

394