

## New and little-known species of mayflies (Ephemeroptera) from Algeria

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### Taxonomy, bionomy, Baetidae, Oligoneuriidae, Leptophlebiidae, 6 spp. n., redescrptions, Mediterranean

**Abstract.** Six new species and one subspecies: *Baetis rhithralis* (larva, subimago, adult male and female), *B. rhodani sinespinosus* (larva, adult female), *Cloeon saharense* (larva, subimago, adult male and female), *Procloeon stagnicola* (larva, adult male), *Choroterpes (Choroterpes) atlas* (larva, adult male, subimago) and *Choroterpes (Euthraulus) mauritanicus* (larva), are described from the Mediterranean area of Algeria. Three little known species, *Baetis neglectus* Navás, 1913; *B. iberi* Navás, 1913 (= *B. maurus* Kimmins, 1938 syn. n.) and *Oligoneuriella skounate* comb. n., are redescribed. Differential diagnoses, distribution and biology of these species are discussed.

In autumn 1981 (September—November) we had an opportunity to investigate about 40 localities situated mostly in humid and subarid zones of the Mediterranean area of Algeria. At these localities more than 20 mayfly species were found. The mayfly fauna of this area shows apparent relationships to the faunas of Europe and the Westpalaeartic, having several common elements (e.g. *Cloeon cognatum*, *Caenis moesta*, *Ephemera glaucops*, *Potamanthus luteus* and others, cf. EATON, 1899; LESTAGE, 1925), but evidently no relationships to the Ethiopian fauna, except for a single species living in the Ahaggar mountains and Sahara (cf. GRANDI, 1951; DEMOULIN, 1970). This paper deals with descriptions and redescrptions of new and little-known species from the families Baetidae (*Baetis*, *Cloeon*, *Procloeon*), Oligoneuriidae (*Oligoneuriella*) and Leptophlebiidae (*Choroterpes*) found recently. All material studied was collected by the senior author; holotypes are deposited in the Institute of Entomology of ČSAV in České Budějovice.

### *Baetis rhithralis* sp. n.

(Figs. 1—12)

Larva (paratype No. 1): Head and body dark greenish brown, head with numerous small pale spots of irregular shape round epicranial suture, frontal suture triangular; pro- and mesonotum with numerous pale whitish diffuse spots and smudges, especially near bases of wing pads; wing pads pale whitish, darker at apex; abdominal terga unicolorous, paler at sides, with pair of pale spots and diffuse divergent strokes in middle, terga VIII and IX slightly paler; abdominal sterna paler, without markings. Hind margins of terga with row of regular, triangular spines; surface of terga with sharply bent impressions, almost without scales. Antennae with conspicuous spines

at apex of each segment; labrum with 1 + 3—4 bristles; inner incisor of left mandible wide, with numerous rounded teeth, expanded at apex, that of right mandible very narrow and with several pointed teeth, mandibles with group of short bristles mesal to incisors; glossae nearly oblong-shaped, paraglossae wide, bristles as in Fig. 5. Segment 3 of labial palps produced into bluntly pointed projection, covered with several fine bristles. Legs pale, unicolorous; femora with only few short stout bristles on outer margins, evenly covered with triangular scales and impressions; inner margins of femora, tibiae and tarsi with sparse row of pointed bristles and scales; claws pointed, elongated, not hooked, with 12—16 teeth diminishing towards claw basis. Gill 1 missing, gills 2—4 asymmetric, bluntly pointed at apex, gills 5—7 pointed at apex, gill 7 conspicuously asymmetric with concave inner margin; gill margins with regular rows of teeth of same length and shape, gill 2 about 2.5 times longer than broad, gill 7 four times longer than broad, tracheization of gills well apparent. Cerci pale, unicolorous, without strip in middle, posterior margins of individual segments with numerous elongated flat spines.

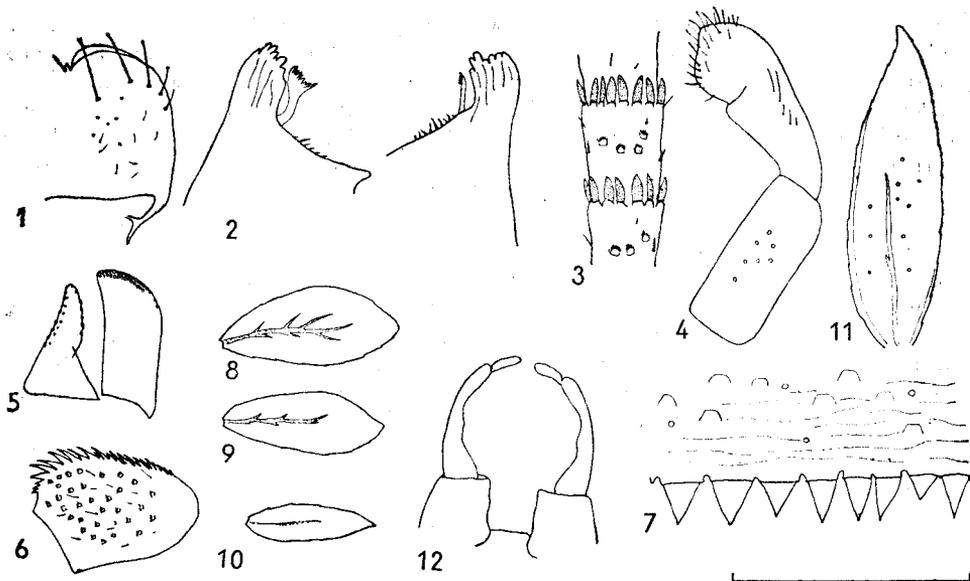
Subimago (paratype No. 2): Thorax dark brown, head brownish, paler; antennal flagellum whitish, scape and pedicel dark brown. Abdominal terga dark brown with slight rusty stippling and diffuse markings (a pair of divergent strokes) in middle; sterna lighter, brownish, darker at sides, without markings. Legs whitish, unicolorous, fore legs slightly darker. Wings dark grey, cilia paler. Cerci whitish, unicolorous.

Adult male (holotype): Turbinate eyes intensively dark orange, surface of eyes unicolorous, shaft with broad pale strip, turbinate eye base dark brown; eyes greyish black. Turbinate eyes ellipsoidal in dorsal view, their medial margins convex, paler strip of shaft well apparent. Antennae with whitish flagellum and brown basal segments. Thorax pitch brown, abdominal segments II—VI white, without markings; terga I, VII—X light brown with rusty dark brownish stippling and inconspicuous paler smudges. Wings milky grey, transparent, longitudinal veins slightly darker, pterostigma with 7—9 cross veins, some of them with indicated bifurcation; hind wing more than twice longer than wide, with two longitudinal veins; posterior vein bifurcated at middle, one free vein between bifurcation of posterior vein. Legs whitish, unicolorous, fore legs distinctly darker. Segment 1 of forceps oblong-shaped, about twice broader than long, segment 2 slightly tapered in middle, with inconspicuous bluntly pointed projection at same place, segment 3 narrow, elongated, ellipsoidal, 2.5 times longer than broad. Cerci light grey, unicolorous. Abdominal terga of female similar to those of subimago, wings with brown longitudinal veins.

Body length: Larva 5.0 (4.6—7.0) mm, adult 5.5 (5.0—6.2) mm; length of cerci: larva 3.5 (3.5—4.3) mm, adult 10.0 (8.5—11.0) mm.

Material examined: Holotype (adult male), paratype No. 1 (mature larva), paratype No. 2 (subimago), further paratypes (15 larvae, 2 adults, 6 subimagos): Algeria, Wilaya de Blida, Oued Merdja, Camp de Chênes, 9. x. 1981; adults reared from mature larvae. Parts of paratypes on slides, holotype in collection of Institute of Entomology, Czechoslovak Academy of Sciences, České Budějovice, some paratypes deposited in Institut National Agronomique, Alger.

Differential diagnosis and discussion: *B. rhithralis* sp. n. belongs in the *niger* species-group as defined by MÜLLER-LIEBANAU (1970). It can be



Figs. 1—12: *Baetis rhithralis* sp. n. 1 — labrum, 2 — mandibular incisors, 3 — antennal segments, 4 — labial palpus, 5 — glossa and paraglossa, 6 — paraproct plate, 7 — hind margin of tergum III, 8, 9, 10 — gills 3, 6 and 7, 11 — gill 7, detail, 12 — forceps. 1—11 — larva, 12 — adult. Scale 0.35 mm (1—6, 11); 0.07 mm (7); 0.7 mm (8—10, 12).

distinguished from other European *Baetis* by the following combination of characters: (1) distal margins of antennal segments with long spines, (2) labrum with 1 + 3—4 bristles, (3) right inner incisor of mandible very narrow and pointed, (4) segment 3 of labial palps bluntly pointed at apex, (5) no bristles in middle of glossae, (6) gill 1 missing, gills with minute teeth, (7) gill 7 with concave inner margin, (8) posterior margin of abdominal terga with regular short triangular teeth, (9) cerci unicolorous, without black band in larvae, and in males (10) turbinate eye with wide pale strip, (11) hind wings more than twice longer than broad, with single free vein, (12) segment 1 of forceps twice broader than long, segment 2 with inconspicuous projection in middle. This species is related to *B. niger* (L.) from which it is distinguished by different arrangement of characters (3, 5, 7, 8 and 9) in larvae and (10 to 12) in males. Different arrangement of characters (5, 8, 9) in larvae and (10—12) in males distinguishes *B. rhithralis* sp. n. from the closely related species *B. digilatus* BENGTTSSON. Name *rhithralis* means living in the zone of rhithron.

**Biology and distribution:** Larvae live in the zone of rhithron in smaller brooks with permanent water among stones and vascular hydrophytes. Subimago emerge in early afternoon, larvae are rare at known localities. A species with at least with 2—3 generations during the dry season (April—October), and overwintering probably in the larval stage; emergence ceased at the beginning of November. So far known only from several montane brooks (Oued Merdja, Oued Mouzaia and others) in the Atlas blidensis.

*Baetis rhodani sinespinosus* ssp. n.

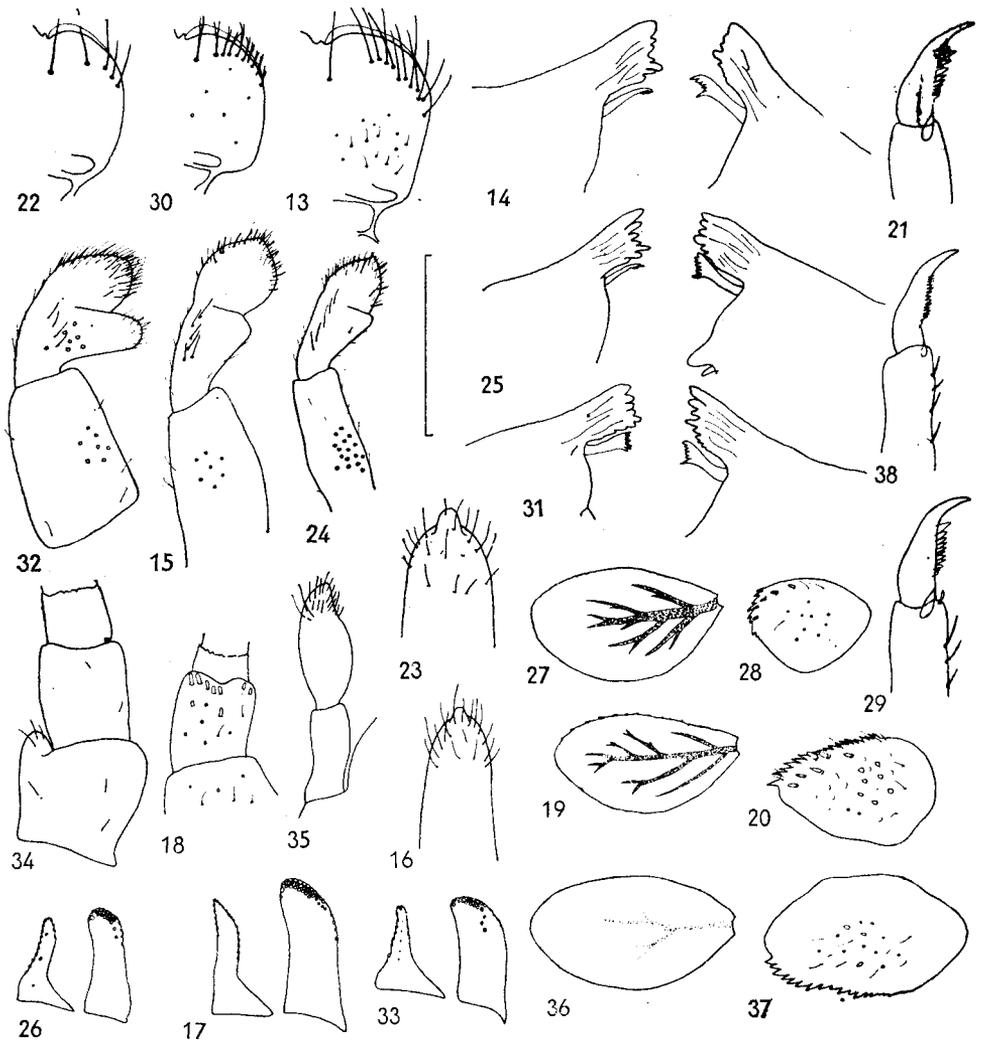
(Figs. 13—21, 39—41)

Larva (holotype): Body pale, with greenish or brownish markings, head and pronotum with diffuse darker smudges, mesonotum slightly darker, with pair of large pale spots near bases of wing pads, wing pads whitish, with inconspicuous longitudinal strips. Abdominal terga I—VI and IX pale, terga VII—VIII and X darker, with pair of large diffuse spots; pair of dark spots in middle of terga, apparent especially on terga I—III and VIII—IX. Ventral side of body whitish, without markings. Antennal pedicel with group of pointed scales, scape almost without scales. Labrum with 1 + 9—12 bristles, mandibular incisors similar to those of *B. rhodani rhodani*, outer incisors broader, not pointed, with rounded and numerous projections; distal segment of maxillary palps with rectangular projection at tip but without apical scale; paraglossae with four regular rows of bristles at apex; segment 2 of labial palps triangular, only moderately produced medially at apex, segment 3 rounded but with distinct small pointed tip, covered evenly with flat bristles. Legs whitish, unicolorous; femora with outer margins covered with sparse short flat bristles and inner margin with groups of short pointed setae and scales; claws pointed, slightly bent, with about 15 teeth. Hind margins of terga with row of sparse scales alternating with fine hairs and triangular spines; scales of this type are completely absent on surface of terga, and scales occurring here are broader, without separated bases and triangular; surface of terga densely covered with semilunar impressions. Gills only slightly asymmetric, rounded, with intensively pigmented tracheization, having indicated plamate branching of tracheae (very strong inner branches); outer margins of gills covered with row of stout spines alternating with teeth, minutely haired; gills 1 and 7 as long as 1/2 of gill 3. Paraproct plate as in Fig. 20, similar to that of *B. r. rhodani*. Cerci pale, darker in apical half, without strips.

Adult female (paratype No. 1): Head light yellowish brown thorax brown, thoracic sterna paler; abdominal sterna I—VII yellowish brown, with diffuse markings (a pair of elongated spots) in middle, sterna VIII to IX whitish; terga I—VII dark brown, slightly darker at posterior margin, without markings, terga VIII—X whitish. Wings transparent, with pitch brown veins; 7—8 simple cross-veins in pterostigma; hind wing 2.5 times longer than broad with two longitudinal veins; third, posterior vein shorter than half of wing, no intercalaries between second and third veins. Fore legs dark brown, middle and hind legs whitish yellow, tibiae and tarsi darker. Subimago (dissected from mature larva): Turbinate eyes with dark orange surface, shaft brown, light ring (as *B. r. rhodani*) not distinguishable. Body olive brown, abdominal terga similar to those of larvae, wings grey, unicolorous.

Body length: Larva (mature) 5.5 (5.0—6.5) mm, adult female 5.2 mm; length of cerci: larva 3.0 (3.0—4.0) mm, adult female 9.5 mm.

Material examined: Mature larva (holotype), adult female (paratype No. 1), 23 larvae (further paratypes): Algeria, Wilaya de Blida, Oued Mouzaïa, 26. x. 1981; 50 larvae (further paratypes), same data, small mountain brook near Rouisseau des Singes, 9. x. 1981 leg. T. Soldan. Holotype in collection of Institute of Entomology, some paratypes in Institut National Agronomique, Alger.



Figs. 13—38: 13—21 *Baetis rhodani sinespinosus* ssp. n.; 22—29 — *Baetis iberi* NAVÁS; 30 to 38 — *Baetis neglectus* NAVÁS. 13, 22, 30 — labrum, 14, 25, 31 — mandibular incisors, 15, 24, 32 — labial palpus, 16, 23 — apex of maxillary palps, 17, 26, 33 — glossae and paraglossae, 18, 34 — base of antenna, 19, 27, 36 — gill 3, 20, 28, 37 — paraproct plate, 21, 29, 38 — claws, 35 — maxillary palpus. Scale 0.3 mm (13—15, 17, 18, 20, 22, 24—26, 28, 30—35, 37); 0.6 mm (19, 21, 27, 29, 36, 38); 0.06 mm (16, 23).

**Differential diagnosis and discussion:** This species belongs to the *rhodani* species-group (cf. MÜLLER-LIEBENAU, 1970). The larvae can be distinguished by the following combination of characters from all remaining species of this group: (1) pointed scales on antennal pedicel, (2) labrum with 1 + 7—12 bristles, (3) no scale at tip of last segment of maxillary palps, (4) paraglossae with 4 regular rows of setae at apex, (5) last segment of

labial palps apparently pointed, segment 2 moderately produced medially at apex, (6) scales, hairs and spines on posterior margin of abdominal terga, (7) no such scales on surface of terga, (8) paraproct plate with numerous teeth on its margin, (9) femora with sparse row of pointed bristles on outer margin, (10) claws pointed, slightly bent, without bristles at apex, (11) paracercus fully developed, (12) gills with indicated palmate tracheization, (13) gill margin with teeth alternating with spines. The arrangement of several characters (1, 3, 4, 5, 6, 7 and 12) distinguishes *B. rhodani sinespinosus* ssp. n. from closely related *B. rhodani rhodani* (PICTET) as well as the shape and venation of hind wing of female.

Biology and distribution: Larvae live in mountain brooks and streams in the humid zone of the Atlas (Atlas Tellien). They occur mainly under stones at the streamline. They have a relatively wide ecological range inhabiting small brooks with permanent water (often only 20–40 cm wide and very shallow) as well as larger and moderately polluted streams; larvae abundant at known localities but completely missing in subarid zone (Hautes Plateaux, Atlas Saharien). A species with at least two generations during the dry season, overwintering in the larval stage (half-grown or older larvae). No larvae ready to emergence were observed after the end of October; they cease development during winter months.

*Baetis iberi* NAVÁS

(Figs. 22–29, 42–45)

*Baetis iberi* NAVÁS, 1913 : 63.

*Baetis maurus* KIMMINS, 1938 : 302, syn. n.

*Baetis* cfr. *maurus*: MÜLLER-LIEBENAU, 1974 : 15.

*Baetis maurus*: PUTHZ, 1978 : 258.

Larva: Body whitish yellow, head with darker smudges round epicranial suture; thorax predominantly pale, with darker smudges and several diffuse spots near wing pads bases, wing pads pale; abdominal terga II, III, VI to VIII greyish brown, with pairs of darker or lighter spots, terga I, IV, V and IX–X paler, pairs of spots more diffuse. Abdominal pattern is very variable in specimens of the same population, some have predominantly pale abdomens as others have mostly dark terga. Labrum with 1 + 4–5 bristles; outer mandibular incisors with 6–7 bluntly pointed teeth, inner incisors similar to those of *B. alpinus*; apex of distal segment of maxillary palps with short, finger-like projection; paraglossae with 4 irregular rows of bristle, 1–2 bristle inserted in middle; labial palps with elongated triangular distal segment. Legs pale; femora and tarsi with subapical dark diffuse spots, outer margins of femora with row of sparse apically rounded bristles, claws without a pair of subapical bristles. Posterior margins of abdominal terga with row of low, bluntly pointed spines, surface of terga with elongated impressions and fine hairs. Gills rounded, nearly symmetrical, with almost indistinct tracheization, row of regular minute teeth on gill margin. Ceret pale, unicolorous, paracercus very reduced, 3–5 segmented.

Subimago: Body olive brown, ventral side paler, turbinate eyes orange. Wings dark grey, veins slightly paler. Legs pale, femora with diffuse spots.

Adult male: Facetted surface of turbinate eyes intensively orange, with conspicuous light ring round margin, well distinguishable from above; shaft of eyes very low (only about 1/4 eye width) and yellowish; in dorsal

labial palps apparently pointed, segment 2 moderately produced medially at apex, (6) scales, hairs and spines on posterior margin of abdominal terga, (7) no such scales on surface of terga, (8) paraproct plate with numerous teeth on its margin, (9) femora with sparse row of pointed bristles on outer margin, (10) claws pointed, slightly bent, without bristles at apex, (11) paracercus fully developed, (12) gills with indicated palmate tracheization, (13) gill margin with teeth alternating with spines. The arrangement of several characters (1, 3, 4, 5, 6, 7 and 12) distinguishes *B. rhodani sinespinosus* ssp. n. from closely related *B. rhodani rhodani* (PICTET) as well as the shape and venation of hind wing of female.

**Biology and distribution:** Larvae live in mountain brooks and streams in the humid zone of the Atlas (Atlas Tellien). They occur mainly under stones at the streamline. They have a relatively wide ecological range inhabiting small brooks with permanent water (often only 20–40 cm wide and very shallow) as well as larger and moderately polluted streams; larvae abundant at known localities but completely missing in subarid zone (Hautes Plateaux, Atlas Saharien). A species with at least two generations during the dry season, overwintering in the larval stage (half-grown or older larvae). No larvae ready to emergence were observed after the end of October; they cease development during winter months.

#### *Baetis iberi* NAVÁS

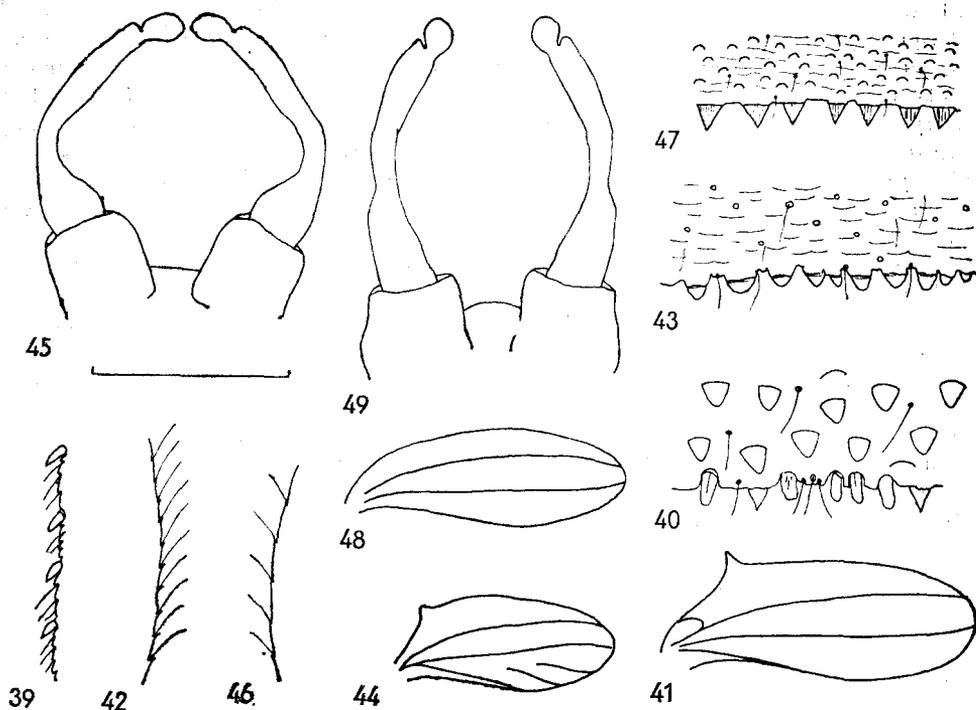
This species actually represents

*Baetis pavidus* Grandi

**Larva:** Body whitish yellow, head with darker smudges round epicranial suture; thorax predominantly pale, with darker smudges and several diffuse spots near wing pads bases, wing pads pale; abdominal terga II, III, VI to VIII greyish brown, with pairs of darker or lighter spots, terga I, IV, V and IX–X paler, pairs of spots more diffuse. Abdominal pattern is very variable in specimens of the same population, some have predominantly pale abdomens as others have mostly dark terga. Labrum with 1 + 4–5 bristles; outer mandibular incisors with 6–7 bluntly pointed teeth, inner incisors similar to those of *B. alpinus*; apex of distal segment of maxillary palps with short, finger-like projection; paraglossae with 4 irregular rows of bristle, 1–2 bristle inserted in middle; labial palps with elongated triangular distal segment. Legs pale; femora and tarsi with subapical dark diffuse spots, outer margins of femora with row of sparse apically rounded bristles, claws without a pair of subapical bristles. Posterior margins of abdominal terga with row of low, bluntly pointed spines, surface of terga with elongated impressions and fine hairs. Gills rounded, nearly symmetrical, with almost indistinct tracheization, row of regular minute teeth on gill margin. Cercus pale, unicolorous, paracercus very reduced, 3–5 segmented.

**Subimago:** Body olive brown, ventral side paler, turbinate eyes orange. Wings dark grey, veins slightly paler. Legs pale, femora with diffuse spots.

**Adult male:** Facetted surface of turbinate eyes intensively orange, with conspicuous light ring round margin, well distinguishable from above; shaft of eyes very low (only about 1/4 eye width) and yellowish; in dorsal



Figs. 39—49: 39—41 — *Baetis rhodani sinespinosus* ssp. n.; 42—45 — *Baetis iberi* NAVÁS; 46—49 — *Baetis neglectus* NAVÁS. 39, 42, 46 — detail of gill margin, 40, 43, 47 — hind margin of tergum III, 41, 44, 48 — hind wing, 45, 49 — forceps. 39, 40, 42, 43, 46, 47 — larva, 41 — adult female, 44, 48, 45, 49 — adult male. Scale 0.3 mm (45, 49); 0.6 mm (41, 44, 48); 0.06 mm (39, 40, 42, 43, 46, 47).

view, eyes of irregular shape with only slightly convex inner margins and outer margins produced into bluntly pointed wide projection. Thorax pitch brown, paler in pleural area, abdomen light brown; both sterna and terga unicolorous, without markings, posterior segments lighter. Legs pale, with darker stippling on femora; tibiae and tarsi of fore legs olive brown. Wings translucent, slightly brownish, longitudinal veins slightly darker; pterostigma milky, with about 8—10 partially branched veins; hind wings twice longer than wide, costal angulation directed basally, with three longitudinal veins and several free veins (Fig. 44). Cerci brown, unicolorous, paler distally, forceps as in Fig. 45.

Adult female: Body coloration as in male, abdominal sterna with markings consisting of a pair of dark spots and a pair of divergent strokes. Wings slightly milky, veins dark brown.

Body length: Larva 4.7 (3.5—5.5) mm, adult 5.0 (4.0—5.0) mm; length of cerci: larva 3.0 (3.0—4.2) mm, adult 8.0 (7.7—9.0) mm.

Material examined: Wilaya de Blida, Oued Chiffa, Gorges de la Chiffa, 25. ix. 1981; Wilaya de M'Sila, Oued El Ham, Chellal, 3. x. 1981; Wilaya de Constantine, Oued Rhumel, Oued Merzoug, 29. ix. 1981; Wilaya de Batna, Oued Bouilef, Sidi Kasserou, 4. x. 1981; Wilaya de

Biskra, Oued El Abiod, M'Chouneche, 30. ix. 1981, in total 486 larvae, 141 ♂♂, 30 ♀♀, 5 subimagos.

**Differential diagnosis and discussion:** This species belongs to the *alpinus* species-group, with affinities (arrangement of tergal characters) also to the *lutheri* species-group (cf. MÜLLER-LIEBENAU, 1970). It is morphologically well characterized, differing from other species of these groups in the following characters: (1) labrum with 1 + 4–5 bristles, (2) no scales at tip of distal segment of maxillary palps, (3) no scales or semicircular impressions on surface of terga, (4) claws without subapical bristles, (5) turbinate eyes very low, irregular in shape in dorsal view, (6) hind wings with several intercalaries and costal angulation directed toward wing basis, (7) last segment of forceps rounded, only slightly longer than wide. I believe that this species known from Morocco (KIMMINS, 1938) and Portugal (MÜLLER-LIEBENAU, 1974) is conspecific with *Baetis iberi* described from Spain (NAVÁS, 1913). Although the type specimen (subimago) is not preserved (cf. MÜLLER-LIEBENAU, 1970), specific arrangement of hind wing — free veins and unusual position of costal angulation (“Ala posterior ovalis; margine costali convexo, dente parvo triangulari, venis 3 duabus primis antrorsum convexis, tertia ultra medium alae finiente; venulis intercalabris longitudine retrorsum crescentibus...” in original description) — as seen also in the original illustration and the similar eye coloration and body length support this conclusion.

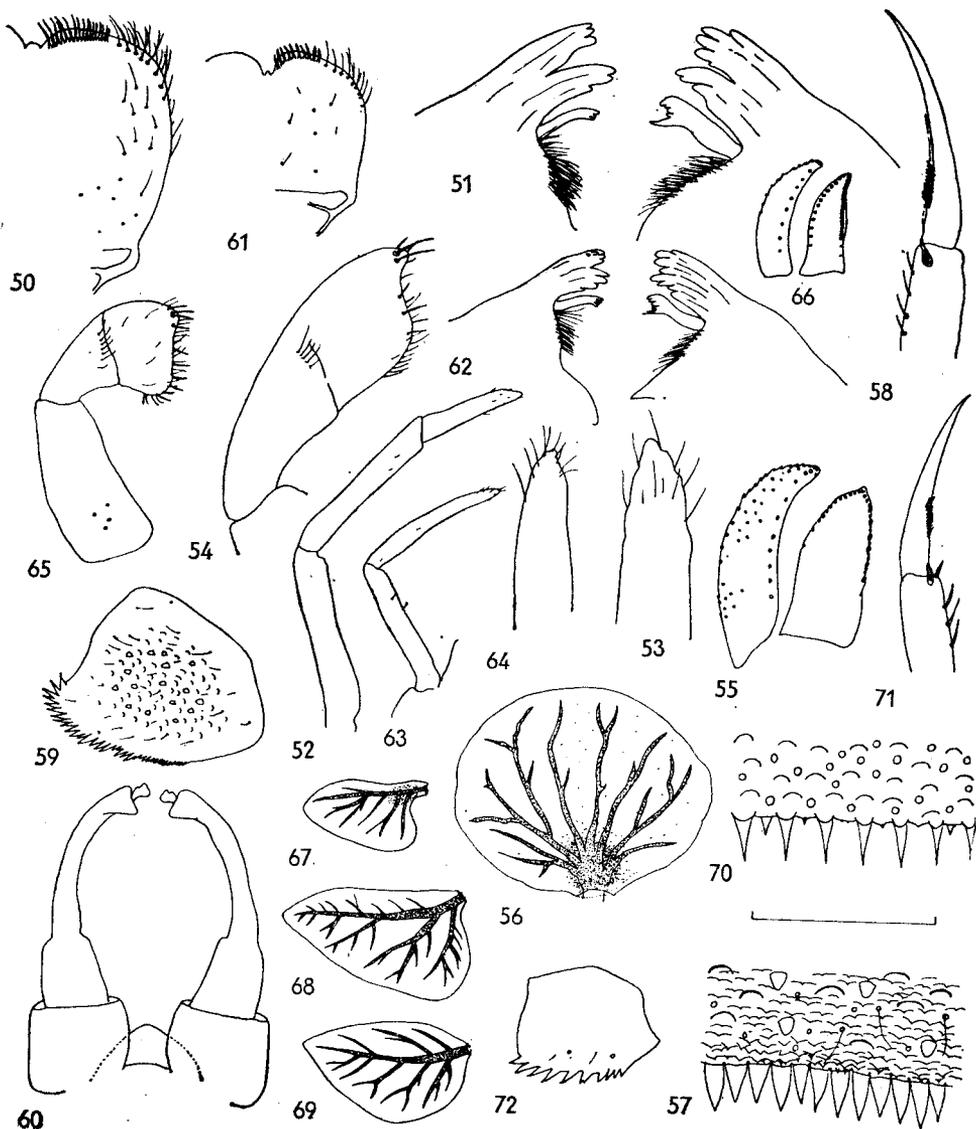
**Biology and distribution:** Biology similar to that of the previous species but the larvae seem to prefer larger and moderately eutrophized streams. They probably overwinter as young larvae and the eggs apparently survive the dry season in periodic brooks (e.g. Oued El Abiod and its tributaries). Larvae occur exclusively at the streamline, occurring also in larger rivers (Oued Chelif). Typical Westmediterranean species, occurring in the Iberian peninsula and Maghreb; in Algeria inhabiting also subarid zone (Hauts Plateaux) and semi-deserts (Wilaya de Biskra).

*Baetis neglectus* NAVÁS

(Figs. 30–38, 46–49)

*Baetis neglectus* NAVÁS, 1913 : 62.

**Larva:** Head and thorax olive brown, head without spots, thorax with whitish spots and smudges on pro- and mesonotum, conspicuous pale spot near bases and between wing pads, wing pads dark; narrow longitudinal band on pro- meso- and metathorax. Colour patterns of abdominal terga varying; terga I, IV, VII and X usually paler, other terga dark, greyish brown with paler smudges near sides; all terga with pair of diffuse paler spots and divergent short strips in middle. Antennae pale, scape with finger-like projection; labrum rounded, with 1 + 8–9 branched setae; outer mandibular incisors with 5–7 well apparent rounded teeth, inner incisors equal in width, broad; segment 2 of maxillary palps oval, bluntly pointed, expanded in middle, subapical incurvation on inner margin apparent; segment 2 of labial palps as long as wide, its medial projection rounded with concave inner margin, segment 3 asymmetrical, paraglossae with two or three irregular rows of bristles. Legs pale, femora with 1–2 transversal brownish grey strips and row of short setae, rounded at apex on outer margin; claws pointed, bent,



Figs. 50-72: 50-60 - *Cloeon saharense* sp. n.; 61-72 - *Procloeon stagnicola* sp. n. 56, 61 - labrum, 51, 62 - mandibular incisors, 52, 63 - maxillary palps, 53, 64 - apex of maxillary palps, detail, 55, 66 - glossae and paraglossae, 56, 69 - gill 7, 57, 70 - hind margin of tergum III, 58, 71 - claws, 59, 72 - paraproct plate, 60 - forceps and penis cover, 65, 54 - labial palps, 67, 68 - gills 1 and 3, 50-59, 61-72 - larva, 60 - adult male. Scale 0.6 mm (56, 67, 68, 69); 0.3 mm (60, 50-52, 54, 55, 58-63, 65, 66, 71, 72); 0.06 mm (53, 57, 64, 70).

with about 10 teeth. Posterior margins of abdominal terga with regular row of short triangular spines; surface of terga with numerous semilunar impressions and hairs. Gills asymmetrical, tracheization almost indistinct, margins

with minute teeth and hairs. Cerci pale brownish, with slight dark band in middle.

Subimago: Body pale brownish, abdominal terga with diffuse markings as in larvae, whitish yellow; wings pale greyish; legs pale, femora with darker smudges.

Adult male: Facetted surface of turbinate eyes reddish brown, shalf dark yellow, eyes ellipsoidal, nearly symmetric (inner margin less convex) in dorsal view. Thorax brown, abdomen translucent slightly brownish, posterior segments whitish, markings indistinct. Legs whitish, femora slightly darker but without distinct band. Wings translucent, veins not distinguishable, pterostigma with about 5 unbranched cross veins and several imperfect veins; hind wings nearly three times longer than broad, without costal angulation and having only two longitudinal veins and no intercalaries. Segment 2 of forceps constricted in middle, basal segment with apparent posteromedial projection, segment 3 spherical, approximately as long as wide. Cerci whitish, first 2—3 segments brownish.

Adult female: Head whitish, thorax light brown, pronotum with diffuse paler spots, abdomen whitish yellow, terga slightly darker at the sides, sterna with indistinct diffuse markings. Wings translucent, veins not distinguishable in pterostigma, other veins not pigmented. Legs whitish, unicolorous. Cerci pale.

Body length: Larva 4.0 (4.0—6.0) mm, adult 4.5 (4.0—6.0) mm; length of cerci: larva 2.5 (2.1—3.0) mm, adult 7.5 (6.0—7.8) mm.

Material examined: Wilaya de Blida, Oued El Harrach, Bougara, 19. x. 1981; Wilaya de Medea, Oued Seghouane, Seghouane, 19. x. 1981; Wilaya de Constantine, Oued Rhumel, Constantine, 2. x. 1981; Wilaya de Biskra, wells and canals in oases Chetma, Droh, El Berd and Touggourt, 30. x. 1981, in total 502 larvae, 54 ♂♂, 25 ♀♀, 8 subimagoes.

Differential diagnosis and discussion: *B. neglectus* clearly belongs to the *atrebatinus* species-group (cf. MÜLLER-LIEBENAU, 1970; MÜLLER-LIEBENAU & SOLDÁN, 1981). It can be separated from other species of this group by the following combination of characters: (1) scape with anterolateral lobe, (2) labrum with 1 + 8—9 branched setae, (3) distal segment of maxillary palps with indentation at apex, (4) segment 2 of labial palps as long as wide, with well developed median lobe, (5) outer margin of femora with setae rounded at apex, (6) abdominal terga with low spines on margins, (7) turbinate eyes without darker ring, (8) penis cover rounded, (9) segment 3 of forceps spherical, (10) shaft of eyes same colour as facetted surface. Larvae are related to those of *B. atrebatinus* EATON, differing mainly in arrangement of characters on legs, mouthparts and abdominal terga (4, 5, 6); adult approaches that of *B. balcanicus* MÜLLER-LIEBENAU & SOLDÁN but is distinguished by different arrangement of penis cover (8) and turbinate eyes (10). Although the type material of *B. neglectus* described by NAVÁS (1913) from Spain ("Zaragoza, orillas del Ebro") is not preserved (cf. MÜLLER-LIEBENAU, 1970: 187), I believe this redescribed material to be conspecific, taking into account details of coloration and arrangement of hind wings in the original description. Specimens from the Saharan oases are smaller and distinguished also by several details in the arrangement of mouthparts and gills from those collected in the humid zone.

**Biology and distribution:** Larvae live in shallow brooks and streams of the humid zone, occurring mainly at the streamline of running waters with permanent water. In oases in the Sahara they inhabit all types of running waters, especially wells (foggara) and flowing canals for irrigation (séguais). Larvae are very rare in streams in the humid zone, mass occurrence is found in some oases (Chetma). Life cycle similar to that of previous species but overwintering in egg stage cannot be excluded; in Sahara emergence not interrupted all the year round. Rare species but probably widely distributed in Maghreb and the Iberian peninsula.

*Cloeon saharensense* sp. n.

(Figs. 50—60)

**Larva (paratype No. 3):** Head and thorax whitish yellow, with inconspicuous darker smudges, two longitudinal diffuse bands on mesonotum, wing pads slightly darker especially at apex; abdominal terga II, III, VI and VIII dark olive brown, with a pair of large diffuse pale spots in middle, spots fused in terga II and VI, terga I, IV, V, VII and IX—X pale with pair of divergent spots near anterior margin and pair of elongated spots situated laterally, tergum IX with dark anterior margin, tergum X without markings. Antennae very long, reaching abdominal segments VI—VIII, each segment with a group of triangular spines situated posterolaterally. Labrum oblong-shaped, with several groups of bristles (margin, posterolateral group); outer mandibular incisors notched with bluntly pointed teeth; maxillary palps 3-segmented, last two segments partially fused, segment 1 twice, segment 2 about 1.5 times longer than segment 3; inner incisors wide, with blunt teeth. Segment 3 of labial palps fused with segment 2, asymmetrical, produced into a point with concave posterior margin, glossae and paraglossae same width, pointed and nearly symmetrical. Legs pale, with inconspicuous diffuse dark subapical spot on femora and slightly darker tarsi, femora with sparse, short, pointed apical spines; claws slender and pointed, their basal half with row of pointed minute teeth. Dorsal lamella of gill 1 rounded, with straight inner margin. 1.5 times longer than wide, shorter by 1/3 than nearly circular ventral lamella; dorsal lamellae of gills 2—6 times broader than long, with well-developed outer basal lobe, rounded or moderately bluntly pointed at apex, shorter by 1/3 than ventral lamellae; gill 7 simple, asymmetric, rounded, broader than long, slightly larger than other gills. Posterior margin of abdominal terga with row of irregular triangular spines, surface of terga with wide semicircular impressions and hairs. Cerci slightly ringed, with indistinct darker wide band in middle. Lateral margins of abdominal terga without spines.

**Subimago:** Eyes dark red, thorax brown with paler smudges. Abdomen yellowish brown in males, whitish yellow in females, without markings. Wings unicolorous whitish grey; legs whitish yellow, with distinguishable subapical diffuse spot on femora. Cerci slightly ringed.

**Adult male (holotype):** Turbinate eyes with dark rusty red and conspicuously convex faceted surface and low (as 1/2 eye width) and whitish yellow shaft. Antennae pale, scape with dark brown base. Thorax whitish yellow, pro- and metanotum light brown; abdominal terga whitish, with very slight pale brown stippling. Wings including veins translucent, slightly milky, pterostigma with 2—3 oblique, simple cross veins. Legs pale whitish,

subapical spots of femora hardly distinguishable. Basal segment of forceps oblong-shaped, about twice broader than long; segment 2 constricted in 1/3 of its length (this constriction well apparent also on outer margin) and conspicuously expanded at apex; segment 3 asymmetric, bent. Cerci very slightly ringed, whitish.

Adult female (paratype No. 1): Head and body whitish yellow, unicolorous, eyes dark brown. Legs whitish yellow, without markings. Wings as in male, pterostigma with 2—3 cross veins, membrane c and sc without pigmentation. Cerci as in male.

Body length: Larva 7.0 (5.8—8.0) mm, adult 7.5 (7.0—8.0) mm; length of cerci 6.0 (5.5—7.4) mm, adult 13 (10.0—14.5) mm.

Material examined: Holotype (adult male), paratype No. 1 (adult female), paratype No. 2 (subimago male), paratype No. 3 (larva), further paratypes (1 male subimago, 1 female subimago, 96 larvae): Algeria, Wilaya de Biskra, periodic brook and irrigation pools (séguias) near oasis Droh, 1. x. 1981; further paratype (1 larva), Wilaya de Medea, Oued Chelif, Bougzoul, 18. x. 1981; further paratypes (2 larvae), Alger, El Harrach, reservoir de S.E.R.A.G., 6. x. 1981; adults reared from nature larvae. Parts of paratypes and holotype on slides; holotype in collection of Institute of Entomology, some paratypes deposited in Institut National Agronomique, Alger.

Differential diagnosis and discussion: *C. saharensis* sp. n. occupies a quite independent position. Some characters show affinities to the *dipterum* species-group (3-segmented palpus of maxillae, ovoviviparity, shape of penis cover), others (colourless wings in females, some characters on gills and legs) to the *simile* species-group (cf. SOWA, 1975, 1980). Female characters show certain relationships also to species from the Afrotropical region (cf. GILLIES, 1980), especially to *C. gambiae* GILLIES, *C. dentatum* KIMMINS and *C. cylindroculum* (KIMMINS); but males and larvae can be easily distinguished by a number of characters. The following combination of characters distinguishes *C. saharensis* sp. n. from all known *Cloeon* species: (1) maxillary palps 3-segmented, (2) apex of labial palps tapered, (3) outer mandibular incisors notched, (4) no spines on lateral margins of abdominal segments, (5) gills circular, last gill largest, rounded, (6) wings of both sexes colourless, 2—3 cross vein in pterostigma, (7) abdomen of both sexes colourless, (8) segment 2 of forceps apically expanded, penis cover rounded.

Biology and distribution: Larvae live in periodic brooks and pools of arid and subarid zones and in séguias of date palm oases in the Sahara. They are able to tolerate very warm (over 35 °C) saline water, poor in oxygen. All developmental stages of larvae occur simultaneously, and adult emergence probably continues all the year round. At most localities, where it occurs, *C. saharensis* sp. n. is the only mayfly species. Larvae occur rarely together with other mayflies (*Cloeon cognatum* STEPHENS, *Caenis moesta* BGTSS.) and they are very rare in such case. Subimagoes moult in late afternoon (1600 to 1800 hrs), subimaginal stage lasts only 10—12 hours (through the night) — this is an apparent adaption to unfavourable diurnal humidity conditions in the desert. Dissections of mature nymphs and females show this species to be oviviviparous (only single follicle developed in ovarioles — cf. DEGRANGE, 1959). Distribution probably restricted to arid and subarid (Hautes Plateaux) zones in North Africa, occurrence in humid zone (El Harrach) very rare.

*Procloeon stagnicola* sp. n.

(Figs. 61—72)

Larva (paratype No. 1): Head pale with slightly darker frons; pronotum pale with two pairs of diffuse spots situated posterolaterally, mesonotum with five pairs of darker spots near bases of wing pads and several darker smudges, wing pads pale; otherwise thorax pale except intensively blackish brown episternites and epimerons of legs; abdominal terga III—VI dark brown, with pair of large diffuse spots in middle, terga I—II, IV, V and VII—X pale with darker posterior margins and diffuse indistinct darker spots. Antennae with darker spot on scape and pedicel, reaching to abdominal segment III. Labrum with marginal row of bristle, medial bristle flat and rounded; outer mandibular incisors with 8—12 bluntly pointed teeth, inner incisors as in Fig. 62, numerous sharp bristles medially to inner incisors. Segments of maxillary palps equal in length, distal segment bluntly pointed at apex; segment 3 oblong-shaped, with rounded corners and slightly concave posterior margin. Legs pale, with diffuse spots on femora, coxae and tibiae in some specimens; claws with about 5—7 teeth situated in basal half, femora with submarginal rows of short pointed spines. Gills 1 bluntly pointed, gills 2—7 pointed at apex, without distinct rudiments of second lamella, rich and distinct tracheization. Posterior margin of abdominal terga with regular row of pointed spines, hind margin of paraprost plate with teeth. Cerci pale, ringed, with wide dark band in distal portion.

Adult male (holotype): Turbinate eyes regularly ellipsoidal in dorsal view, twice longer than wide, faceted surface light yellow, with narrow conspicuous black marginal ring; shaft of eyes as long as eye width, constricted in middle, light yellow, basal portion darker. Antennae pale brownish, base of flagellum darker. Thorax light brown, ventral side paler, mesonotum with inconspicuous paler smudges; abdomen whitish yellow, segments VII—X whitish, terga slightly darker on sides; terga I—III and sterna I—V with inconspicuous markings consisting of pair of short divergent bands. Wings translucent or slightly milky, with contrasting blackish longitudinal veins; pterostigma with 6 oblique cross veins, some not reaching sc. Inconspicuous light brown spot near base of wing. Legs whitish yellow, tibiae and tarsi of fore legs darker, tarsi of middle and hind legs with blackish stippling. Forceps pale, segment 1 slightly broader than long, segment 2 with well apparent rounded projection near base, segment 3 narrow, nearly symmetric. Penis cover with semicircular, wide posterior portion. Cerci whitish, very slightly ringed.

Body length: Larva 5.0 (4.0—5.5) mm, adult 5.7 mm; length of cerci: larva 2.5 (2.5—3.0) mm, adult 11 mm.

Material examined: Holotype (adult male), paratype No. 1 (larva), further paratypes (7 larvae): Algeria, Wilaya de Blida, Oued Hamiz, Khemis El Khechna, 27. ix. 1981; further paratypes (14 larvae), Oued Chiffa, Gorges de la Chiffa, 25. ix. 1981; further paratype (larva), Oued El Harrach, Bougara, 20. x. 1981; further paratype (larva), Wilaya de Constantine, Oued Rhumel, Constantine, 2. x. 1981; adult reared from mature larvae. Parts of holotype and paratypes on slides; holotype in collection of Institute of Entomology, some paratypes in Institut National Agronomique, Alger.

Differential diagnosis and discussion: This species shows apparent relationship to European species of the genus *Procloeon* [*P. bifidum* (BENGTS-

SON), *P. concinnum* (EATON) and *P. ornatum* [TSHERNOVA]. It can be distinguished by the following combination of characters: (1) labrum with flat, rounded bristles on margin, (2) gills pointed at apex, indistinct rudiments of second lamella, (3) spines on lateral margins of abdominal segments from segment V—VI, (4) last gill as long as gill 3, (5) eyes of males twice longer than wide, constricted with conspicuous narrow black ring, (6) no red markings on abdomen, (7) wings with blackish veins, pterostigma with 6 cross veins, (8) forceps with basal medial projection on segment 2, (9) penis cover semicircular, rounded on posterior margin. Larvae of *P. stagnicola* sp. n. approach those of *P. ornatum* being distinguished mainly by characters on gills and coloration (cf. SOWA, 1975b); adults are similar to those of *P. concinnum* and are distinguished mainly by characters on turbinate eyes, wings (pterostigma) and by different shape of penis forceps (cf. EATON, 1883 to 1888, KIMMINS, 1960).

**Biology and distribution:** Larvae live on brooks and streams of the humid zone, clearly preferring pools and backwaters with very warm water. They live among vascular hydrophytes as well as on stones together with *Cloeon cognatum* larvae. Emergence of adults ceases in late October. This species probably overwinters in the egg stage (cf. SOWA, 1975b). Distributed on northern slopes of the Atlas Tellien; solitary to rare.

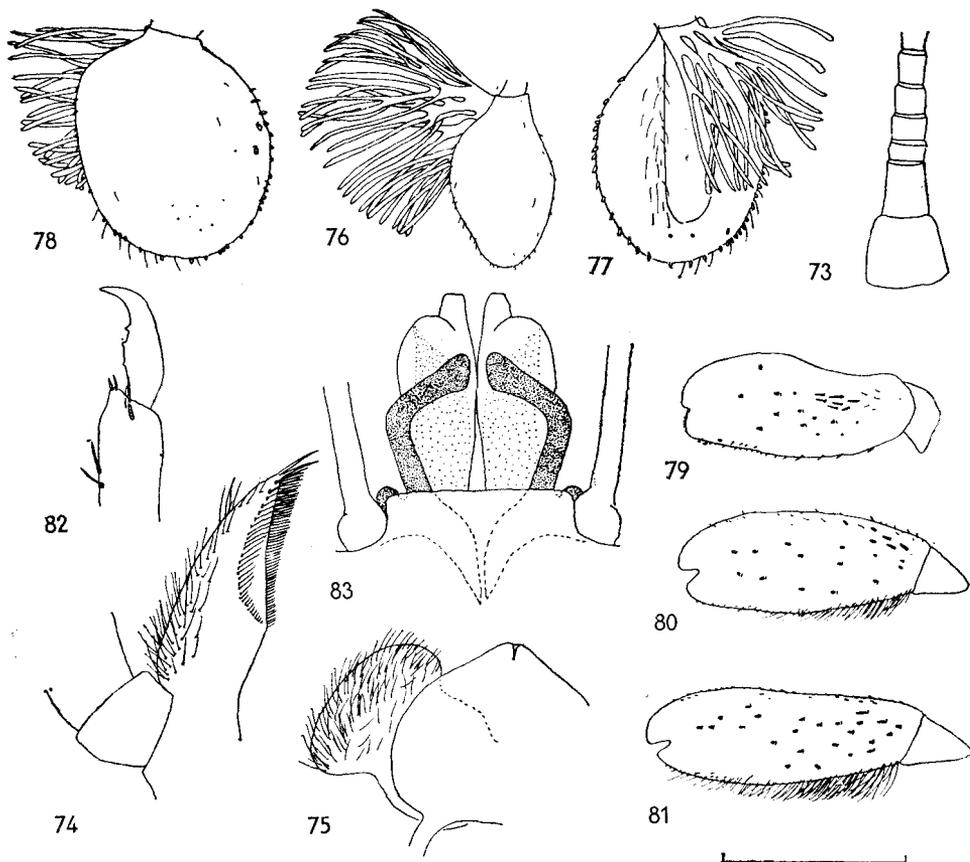
*Oligoneuriella skounate* **comb. n.**

(Figs. 73—83)

*Oligoneuriella rhenana*: LESTAGE, 1925 : 15.

*Oligoneuriopsis skounate* DAKKI & GIUDICELLI, 1980 : 13.

**Larva:** Head dark yellowish brown, occiput and frons paler, pale transverse band in front of eye. Pro- and mesonotum with numerous pale longitudinal bands and spots; a pair of large whitish spots in middle of pronotum and near wing pad bases, wing pads unicolorous, with inconspicuous darker longitudinal strips. Abdominal terga brown, paler at the sides, with pair of small rounded spots and single large unpaired spot in middle and pair of conspicuous triangular spots oblique to posterior margin. Thoracic sterna whitish; abdominal sterna yellowish brown, with submarginal diffuse darker smudges and pair of kidney-shaped spots. Scape and pedicel brown; flagellum pale, with conspicuous dark band in apical third. Labrum with rounded posterior margin, mandibular incisors (outer and middle) equal in width and length, maxilla pointed, with concave inner margin; hypopharyngeal lingula bluntly pointed in middle of anterior margin, nearly triangular. Legs pale, femora with wide dark spot in middle, tibiae darker at bases and at apices; fore femora with group of long pointed spines in middle, middle and hind femora with long rounded flat setae on margins and short spatulate scales on surface, bristles only at bases; tibiae with bluntly pointed apices; ratio femur : tibia : tarsus 115 : 150 : 45 for fore legs, 125 : 105 : 55 for middle legs, 145 : 100 : 55 for hind legs; claws hooked, with 2—6 minute bluntly pointed teeth. Lateral abdominal spines with moderately convex margins, directed outwards at apex. Surface of terga with spatulate scales and numerous rounded microtrichia, a group of long cotton-like bristles situated anterolaterally, sterna with scales and medial group of long pointed bristles. Gill 1 ellipsoidal, less than twice longer than wide, shorter by 1/3 than other gills, with sparse scales on margin and rich, long bundle of tracheae; gills



Figs. 73—83: *Oligoneuriella skounate*, 73 — base of antenna, 74 — maxilla, 75 — hypopharynx, 76, 78 — gills 1 and 7, dorsal view, 77 — gill 3, ventral view, 79, 80, 81 — fore, middle and hind femora, 82 — claws, 83 — forceps and subgenital plate. 73—82 — larva, 83 — adult male. Scale 1.0 mm (73—78); 3.0 mm (79—81).

2—7 rounded (longer by  $\frac{1}{5}$  than wide) with narrow central cavity and regular marginal row of spatulate scales, bristles on margin very rare, tracheal bundle shorter than gill, gills slightly asymmetric. Cerci intensively black, with wide whitish band in distal portion.

Adult male: Head and thorax light brown, eyes dark grey, abdomen paler, with diffuse markings similar to those of larvae. Antennae with dark brown scape and pedicel and base of flagellum. Tibia of fore legs dark brown femora dark brown bordered, middle and hind legs pale, whitish. Wings milky whitish grey, longitudinal veins slightly paler, as many as 25—30 simple cross-veins in c membrane, about 13—15 cross-veins attached to sc in sc membrane. Forceps base light brown, oblong-shaped with slightly convex posterior margin, last segment of forceps longer than segment 2, narrower by  $\frac{1}{3}$ . Outer penis lobes conspicuously bent nearly at right angle in middle and slightly expanded at apex. Cerci whitish, with pale ciliae.

Body paler in females and subimagoes, legs whitish, wings very slightly brownish in females.

Body length: Larva 13 (12–16.5) mm, adult 11.5 (11.0–14.0) mm; length of cerci: larva 5.5 (5.0–6.5) mm, adult 13 (11–14.5) mm.

Material examined: 5 ♂♂, 3 ♀♀, 3 subimagoes, 269 larvae: Algeria, Wilaya de Blida, Oued Chiffa, Gorges de la Chiffa, 25. ix., 8.–9. x. 1981; 28 larvae, Wilaya de Constantine, Oued Rhumel and Oued Merzoug, Vostantine, 2. x. 1981; 3 larvae, Wilaya de Tizi Ouzu, Oued Isser, Isser-ville. 5. x. 1981. Material in collection of Institute of Entomology and in Institut National Agronomique, Alger.

Differential diagnosis and discussion: *O. skounate* shows certain relationships to the Middle East and Asian species of the genus *Oligoneuriella*, especially to *O. orontensis* KOCH (cf. SOLDÁN & LANDA, 1977; KOCH, 1980), while its relationships to the European species are not so pronounced (cf. SOWA, 1973; ALBA & SOWA, 1982). *O. skounate* comb. n. can be distinguished by the following combination of characters: (1) body dark with bright markings on abdomen, (2) hypopharyngeal lingua nearly triangular, (3) lateral spines of abdominal terga convex, (4) tibia of fore leg longer than that of other legs, tibia of middle leg twice longer than tarsus, (5) first gill smaller than others, (6) nearly no bristles on gill margins, (7) long bristles on sterna, (8) apex of tibia bluntly pointed, (9) sterna with anterolateral group of cotton-like bristles, (10) numerous cross-veins in c membrane, (11) outer penis lobes bent at right angle. The characters (2, 6, 7, 8) distinguish this species from *O. orontensis*, apart from different colour patterns (adult of *O. orontensis* unknown). This species actually belongs to the genus *Oligoneuriella* ULMER as apparent from wing venation and larval morphology (cf. CRASS, 1947; AGNEW, 1973).

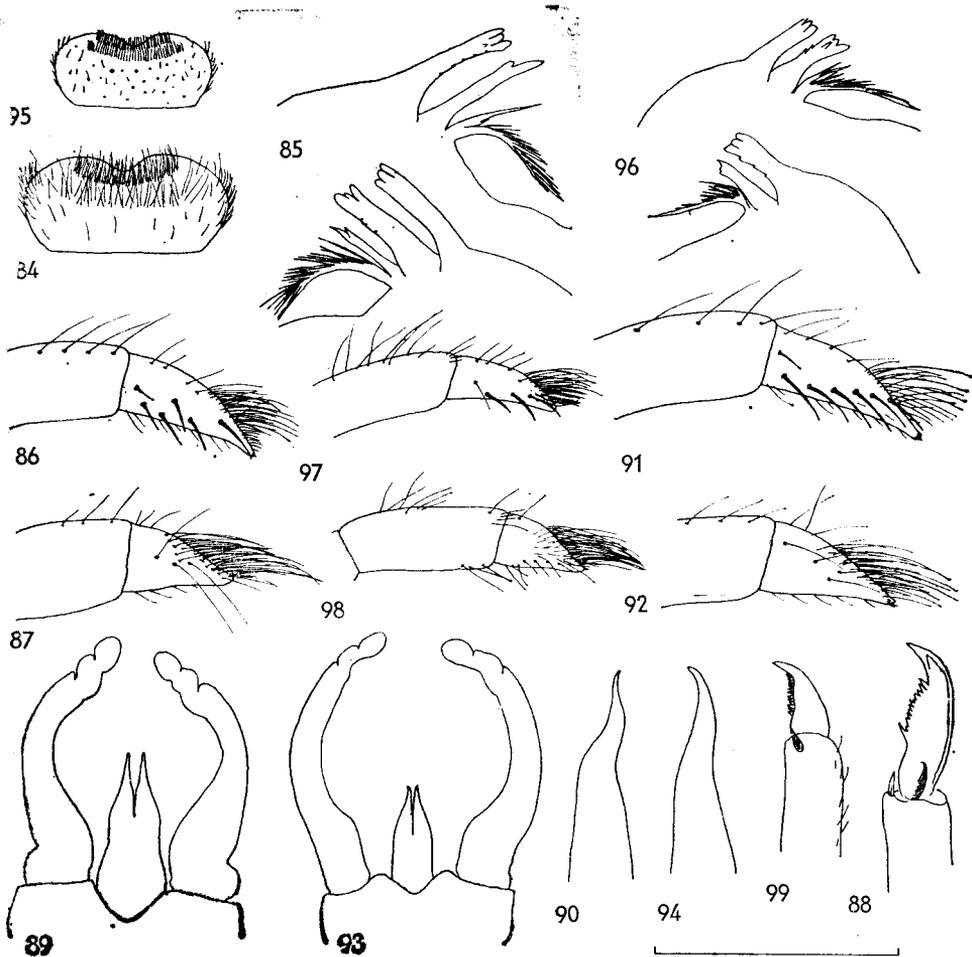
Biology and distribution: Larvae live under stones at the streamline in larger streams with rich and permanent water, they are able to tolerate moderately eutrophicated water. Typical "summer" species, with rapid growth of larvae in summer months; overwintering in egg stage, eggs with numerous adhesive structures similar to those of *O. rhenana* (IMHOFF) (Plate I, Figs. 1–3)\*. Distributed in streams on northern slopes of the Atlas Tellien in Algeria, and also in Morocco from where it is recorded as *O. rhenana* (cf. LESTAGE, 1925). Abundant at localities, emergence finishes at the beginning of October; adults fly after midnight. For further data concerning biology of this species see DAKKI & GIUDICELLI (1980).

*Choroterpes* (*Choroterpes* s. str.) *atlas* sp. n.

(Figs. 84–90, 100–102)

Larva (Paratype No. 2): Head pale, clypeus and genae dark brown dusted; large, H-like brownish black stippling on frons and occiput; two pair of longitudinal dark brownish bands not reaching to posterior margin on pronotum, meso- and metanotum pale yellowish with several short blackish strips near wing bases; abdominal terga blackish brown, with triangular whitish spots in middle; these spots, contrary to *Ch. picteti*, diffuse on terga VI and VIII, terga IX and X almost whitish, ventral side of body whitish.

\* Plates I–II will be found at the end of this issue.



Figs. 84-99: 84-90 - *Choroterpes (Choroterpes) atlas* sp. n.; 91-94 - *Choroterpes (Choroterpes) picteti* EARON; 95-99 - *Choroterpes (Euthraulius) mauritanicus* sp. n. 84, 95 - labrum, 85, 96 - mandibular incisors, 86, 91, 97 - apex of labial palps, 88, 99 - claws, 87, 92, 98 - apex of maxillary palps, 89, 93 - forceps and penis, ventral view, 90, 94 - penis lobes, lateral view. 84-88, 91, 92, 95-99 - larva, 89, 90, 93, 94 - adult male. Scale 0.8 mm (84, 89, 88, 90, 94, 95, 99); 0.4 mm (85-87, 91, 92, 95-98).

Middle mandibular incisor approximately as broad as outer ones, middle and outer incisors with 3 rounded teeth; distal segment labial palps 2.5 times longer than broad at base, with two rows (2 + 4) of setae; paraglossae nearly circular, with convex posterior margin; distal segment of maxillary palps triangular, bluntly pointed at apex, ratio width at base: length 2.4 : 3.5. Legs whitish yellow, without distinct darker spot, very slight brownish stippling in middle of femora, tibiae and tarsi pale. Gill 1 very narrow, slightly bent and pointed at apex; Gills 2-7 narrow, dorsal lamella twice longer than broad (ratio length: width in dorsal lamellae of *Ch. picteti* 4.5 : 3);

ratio length : width of ventral lamella 3 : 2 (11 : 7 in *Ch. picteti*), medial projections of dorsal lamellae narrow, cross veins not apparent; medial projections of ventral lamellae exceeding by  $1/2$ — $2/3$  lateral ones (only slightly exceeding in *Ch. picteti*). Cerci pale distinctly ringed.

Subimago (living): Turbinate eyes dark red, lateral ring well apparent, thorax dark brown, abdomen paler. Wings greyish, veins paler; hind wings whitish; legs yellowish brown, fore legs slightly paler.

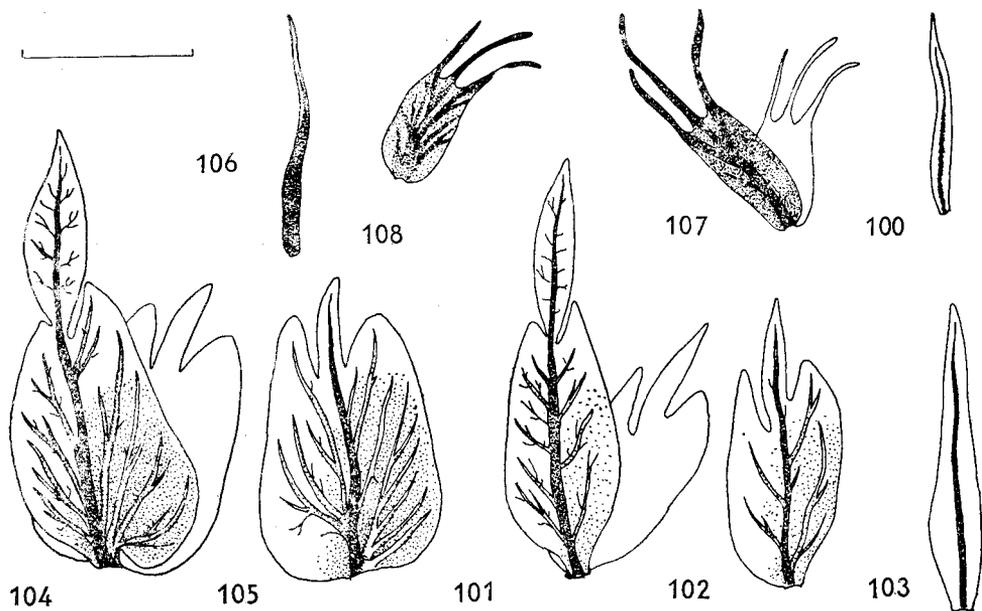
Adult male (holotype): Turbinate eyes oval in dorsal view, inner margin straight or slightly convex, shorter than those in *Ch. picteti*; faceted surface with black ring on margin, shaft with blackish dusting, ocelli whitish. Antennae with brown basal segments and whitish flagellum. Thorax pitch brown; abdominal terga I—VIII with paler triangles in middle, terga IX and X pale, blackish lateral spots (bands in *Ch. picteti*) on the sides of terga; abdominal sterna brownish grey, sternum IX dark grey. Fore wings translucent, first three veins yellowish brown, other veins brownish at base, dark brown apically; membranes c and sc uncoloured, translucent and slightly milky, only 6—7 cross-veins in pterostigma; hind wings with translucent whitish venation, anterior margin with rounded costal angulation, nearly straight. Fore legs blackish brown, middle and hind legs with paler tibiae and tarsi, without spots; tibiae of fore legs 2.1 times longer than femora (1.7 times in *Ch. picteti*). Forceps light greyish brown. apical portion of basal segment and segments 2 and 3 pale; no projection near base of segment 1 as in *Ch. picteti*. Penis lobes constricted and acute, not bent apically. Cerci dark brown near base, paler in distal portion, distinctly dark ringed.

Body length: Mature larva 7 (6.0—7.8) mm, adult male: 8.4 mm; length of cerci: larva 8.5 (7.0—9.0) mm, adult 11 mm.

Material examined: Holotype (adult male), paratype No. 1 (adult male), paratype No. 2 (larvae), further paratype (13 larvae): Algeria, Wilaya de Blida, Oued Chiffa, Gorges de la Chiffa, 8.—9. x. 1981; further paratypes (5 larvae) Wilaya de Tizi Ouzu, Oued Isser, Isser-ville, 5. x. 1981. further paratypes (3 larvae); Wilaya de Blida, Oued Hamiz, Khemis El Khechna, 27. ix. 1981. Holotype in collection of Institute of Entomology, some paratypes in Institut National Agronomique, Alger. Adults reared from mature larvae, parts of paratypes on slides.

Differential diagnosis and discussion: This species does not appear to be closely related to *Ch. lindrothi* PETERS described from Morocco (PETERS, 1980). It is closely related to the European *Ch. picteti* EATON from which it can be distinguished by the following characters: in larvae arrangement of mandibular incisors (rounded teeth) and distal segments of both maxillary and labial palps (segments shorter, different arrangement of setae — Figs. 91, 92), coloration of abdomen, gills much narrower (Figs. 100—105), medial projection more exceeding, cerci ringed; in adults eyes shorter, shaft dark, tibiae of fore legs longer in relation to femora, membranes c and sc only slightly milky, 6—7 cross-veins in pterostigma, anterior margin of hind wings straight, different coloration of abdomen, forceps without basal medial projection, penis lobes constricted and straight (Figs. 89, 90, 93, 94). Also ornamentation of egg chorion is different (see Pl. II, Figs. 6—9), adhesive structures arranged more regularly, both polar and equatorial discs differently shaped.

Biology and distribution: Larvae live in permanent streams on northern slopes of the Atlas Tellien in Algeria. They occur always together with those of *Ch. picteti* (this species listed from Algeria by LESTAGE, 1925).



Figs. 100—108: 100—102 — *Choroterpes (Choroterpes) atlas* sp. n.; 103—105 — *Choroterpes (Choroterpes) picteti* EATON; 106—108 — *Choroterpes (Euthraulius) mauritanicus* sp. n. 100, 103, 106 — gill 1, 101, 104, 107 — gill 3, dorsal view, 102, 105, 108 — gill 3, ventral lamella. Scale 1 mm.

Contrary to larvae of *Ch. picteti*, which are abundant also in pools often not communicating with streams during the dry season, they live only at places with at least moderately flowing water. Overwintering probably in egg stage; emergence ceases in the middle of October but some larvae survive till November.

*Choroterpes (Euthraulius) mauritanicus* sp. n.

(Figs. 95—99, 106—108)

Larva (holotype): Head brownish, clypeus and genae with blackish stippling, occiput paler; antennae pale, scape and pedicel brownish; pronotum yellowish, dark anterolaterally, with medial dark brown and pair of oblique strips in middle; mesonotum whitish with dark smudges and diffuse anterolateral spots, dark band along outer margin of wing pads, abdominal terga with blackish stippling, inconspicuous lighter band in middle, terga VIII—X paler; ventral side of thorax with blackish stippling; abdominal sterna pale yellowish, dark pigmented nerve ganglia well apparent. Outer and middle mandibular incisors approximately equal in length and width, with bluntly pointed teeth; inner incisors with very long medial branch (longer than outer incisors) irregularly covered with long hairs and spines, mandibles with only 10—12 marginal setae situated in distal portion. Segment 2 of maxillary palps more than twice longer than distal segment; paraglossae covered with club-shaped, flat setae, glossae ellipsoidal with nearly straight medial

margin. Legs pale whitish, femora with dark brown stippling pronounced in anterior half, tibiae with narrow dark longitudinal band in some specimens. Margins of femora and tibiae with sparse pointed bristles of different length, no scales present. Claws relatively wide, hooked at apices, with about 12—10 teeth. Gills blackish, tracheization distinct, black; dorsal lamellae of gills 2—6 slightly asymmetric, ventral lamellae symmetric; projections black, without marginal hairs, as long as lamellae. Cerci yellowish brown, very slightly ringed.

Subimago and adult unknown.

Body length: 5.0 (4.5—5.0) mm, length of cerci 6.2 (5.5—6.8) mm.

Material examined: Holotype (mature male larva), paratypes (7 larvae): Algeria, Wilaya de Blida, Oued Chiffa, Gorges de la Chiffa, 8.—9. x. 1981, 7. xi. 1981. Parts of holotype on slide, type material deposited in Institute of Entomology, Praha.

Differential diagnosis and discussion: This species can be compared with *Ch. (Euthraulius) balcanicus* IKONOMOV described from Yugoslavia (IKONOMOV, 1961) but does not appear to be closely related. *Ch. (E.) mauritanicus* sp. n. is distinguished by the following combination of characters: (1) inner mandibular incisors very long with basal bundle of hairs, (2) marginal mandibular setae sparse, situated distally, (3) segment 2 of maxillary palps more than twice longer than segment 3, (4) glossae rounded, paraglossae with club-shaped setae, (5) gills black, projections without hairs, (6) legs without scales.

Biology and distribution: Adults fly in mid- October, larvae live in the same situations as those of *Ch. (Ch.) atlas* sp. n. requiring permanent and moderately flowing water. Contrary to the latter species, *Ch. (E.) mauritanicus* sp. n. overwinters in the larval stage (very young larvae were found in November). Embryonic development of eggs (Pl. I, Figs. 4, 5) lasts about 20—30 days. Larvae very rare at a single known locality.

#### Acknowledgements

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### Новые виды поденок (Ephemeroptera) из Алжира

Таксономия, бионимия, Baetidae, Oligoneuriidae, Leptophlebiidae, 6 spp. n., новое описание, Средиземноморье

**Резюме.** Описание шести новых видов поденок из средиземноморской части Алжира: *Baetis rhithralis* (личинка, субимаго, взрослые самец и самка), *B. rhodani sinespinosus* (личинка, взрослая самка), *Cloeon saharensense* (личинка, субимаго, взрослые самец и самка), *Procloeon stagnicola* (личинка, взрослый самец), *Choroterpes* (*Choroterpes*) *atlas* (личинка, имаго самца, субимаго) и *Choroterpes* (*Euthraulius*) *mauritanicus* (личинка). Дано новое описание двух недостаточно известных видов, *Baetis neglectus* Navás, 1913 и *B. iberi* Navás, 1913 (= *B. maurus* Kimmins, 1938 syn. n.). Приведены дифференциальные диагнозы и обсуждается распространение и биология всех названных видов.

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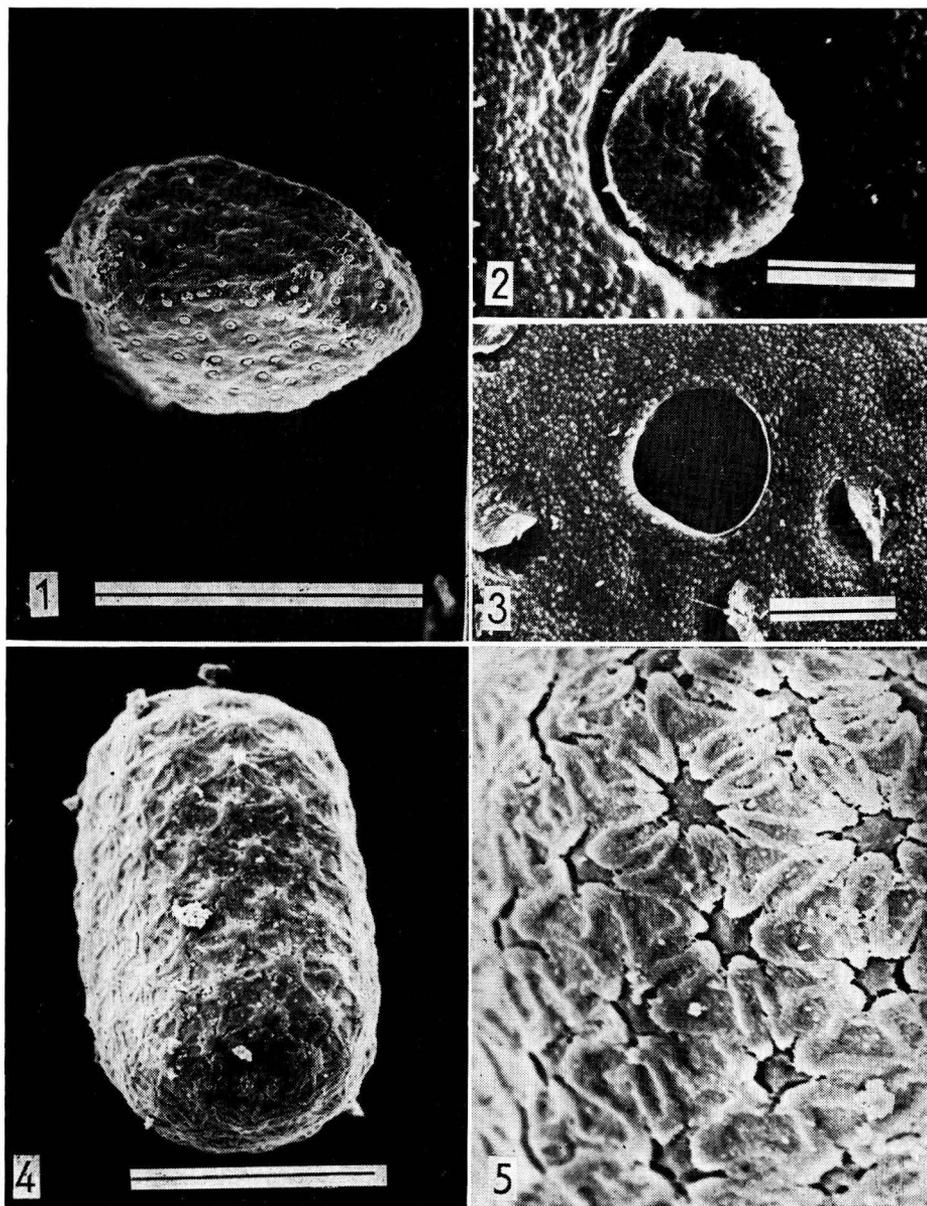


PLATE I, Figs. 1-5: 1 - *Oligoneuriella skounate*, egg scale 400  $\mu\text{m}$ , 2 - *O. skounate*, adhesive structure, detail scale 3  $\mu\text{m}$ , 3 - *O. skounate*, micropyle scale 10  $\mu\text{m}$ , 4 - *Choroterpes (Euthraulius) mauritanicus* sp. n., egg scale 100  $\mu\text{m}$ , 5 - *Ch. (E.) mauritanicus* sp. n. ornamenting of chorion, detail scale as in figs. 8-9. Critical point drying, gold coated, 20 kV, Tesla BS 300.

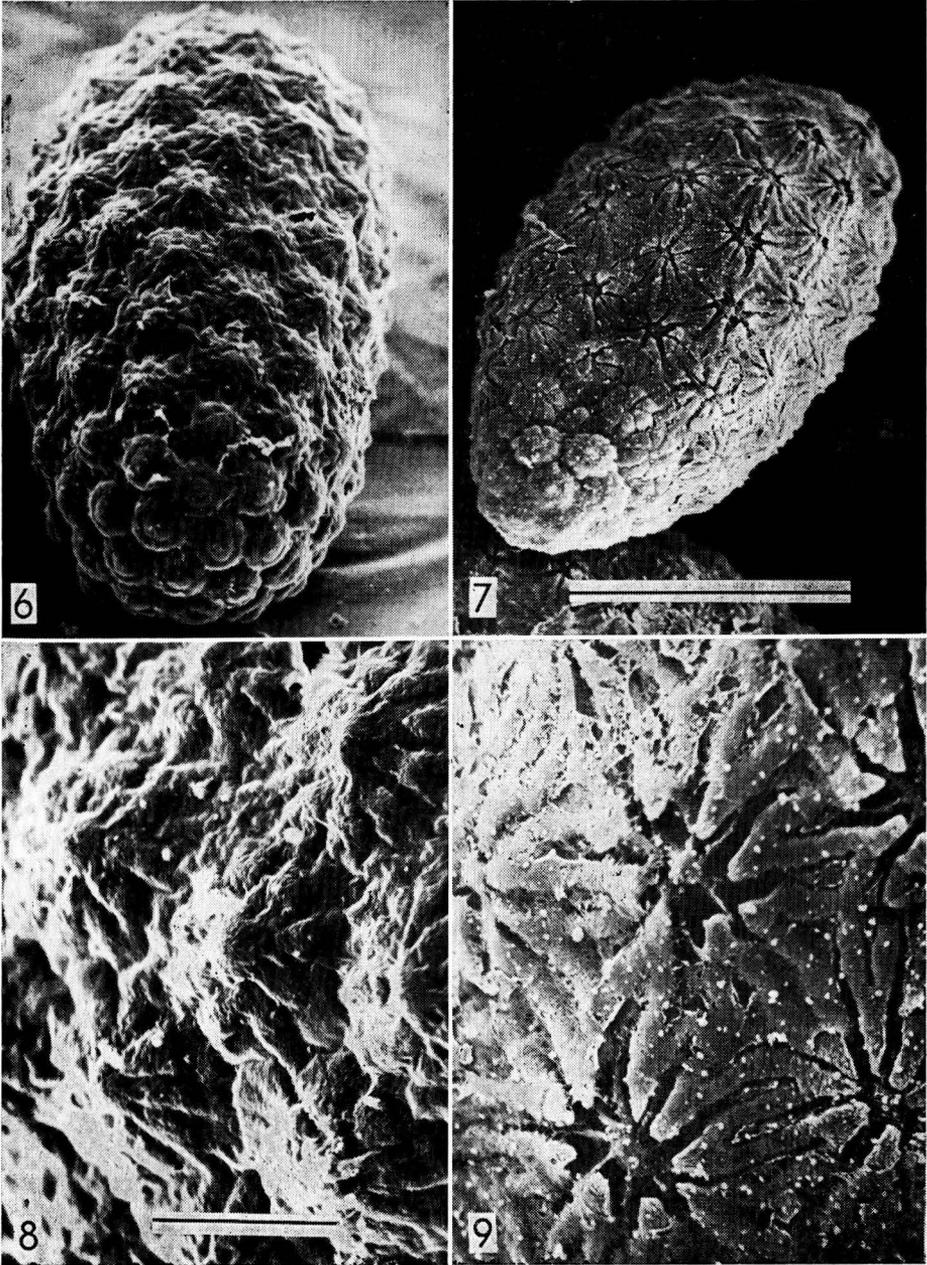


PLATE II, Figs. 6-9: 6 - *Choroterpes (Choroterpes) atlas* sp. n., egg scale 100  $\mu$ m, 7 - *Ch. (Ch.) picteti* EATON, egg scale 100  $\mu$ m, 8 - *Ch. (Ch.) atlas* sp. n., ornamenting of chorion (equatorial area) scale 25  $\mu$ m. Critical point drying, gold coated, 20 kV, Tesla BS 300.