

Two new species of *Clypeocaenis* (Ephemeroptera, Caenidae) with a description of adult stage and biology of the genus

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Taxonomy, distribution, phylogeny, Upper Volta, Vietnam

Abstract. Adults of the genus *Clypeocaenis* are described for the first time. Two new species, *Clypeocaenis afrosetosa* sp.n. (larva) from Upper Volta and *C. oligosetosa* sp.n. (larva, subimago, adult male and female) from Vietnam, are described. A key to all known species of *Clypeocaenis* based on larval characters is presented. Bionomy, adult habits and life cycle of *C. oligosetosa* and the distribution and phylogeny of *Clypeocaenis* are discussed.

Of the 12 known genera of the family Caenidae, the genus *Clypeocaenis* discovered several years ago (SOLDÁN, 1978) in the Oriental region possesses unique autapomorphic morphological characters within the family. This genus was established to include two species from Iran and India known only in the larval stage. Since then two further new species have been collected in Africa and S.E. Asia. The present paper deals with their description. Direct observation of larval and adult habits, mating flight and microhabitat preference of larvae permit the outline of the biology of the new species from Vietnam. New data concerning the distribution and morphology of both larvae and adults of individual species enable us to discuss the distribution and phylogeny of the genus as well.

Clypeocaenis afrosetosa sp. n.

(Figs. 1, 4, 5, 8, 9—11, 15, 17)

Mature larva (holotype): Body length 2.2 (2.0—3.3) mm, length of cerci 1.5 (1.1—1.7) mm. Head unicolorous, light brownish or yellowish brown, eyes and ocelli black; epicranial suture forming distinct ring; genae with smooth lateral margins; clypeus oblong-shaped with a pair of long setae as long as 1/3 of antennae. Antennae yellowish, transparent distally, posterior segments with minute hairs; scape shorter by 1/2 than pedicel, segment 3 as long as pedicel or slightly longer, further segments as long as 1/2—2/3 of pedicel. Labrum rounded anterolaterally, anterior margin with rounded incurvation in middle and numerous bristles; labrum more than twice as broad as long. Middle mandibular incisors as long as outer ones, inner incisors shorter by 1/3 with apical bristles; mandibles with two transversal rows of long filtering setae. Maxillae asymmetrical, slightly s-curved with a group of short bristles on inner margin near base; maxillary palps with asymmetrical distal segment with bluntly pointed apex and slightly concave inner

margin. Hypopharyngeal superlinguae rounded, slightly produced laterally. Distal segment of labial palps pointed, without spines; basal segment with sparse bristles on outer margin. Glossae rounded, paraglossae bent and pointed.

Pro- and mesonotum light brown with inconspicuous paler smudges, wing pads lighter; distinct straight longitudinal ridge in middle of thoracic nota; pronotum rounded laterally and distinctly produced anterolaterally. Thoracic sterna paler, unicolorous. Legs yellowish brown, unicolorous, femora with coarse rounded microtrichia. Fore femora almost without hairs, with oblique irregular row of 4—6 short, pointed spines in apical third; middle and hind femora with row of short spines on outer margins, inner margins smooth without any bristles; tarsi of fore legs with inner row of short bristles, tibiae with long bristles on inner margin; tarsi and tibiae of middle and hind legs with hairs. Ratio femur : tibia : tarsus 5.1 : 4.8 : 3.8 fore legs, 4.6 : 2.7 : 2.7 middle legs and 6.0 : 3.7 : 2.7 hind legs.

Abdominal terga light brown, unicolorous, sterna slightly paler. Posterior margin of tergum II with conspicuous medial spine, terga VII—IX with distinct medial ridge but only slightly produced in middle of posterior margin; terga III—VII fully covered by gill cover; segments VII—IX with well developed posterolateral spines and convex toothed lateral margins with short bristles and spines. Gill cover quadrate, slightly broader than long with well developed inner ridge, oblique triangular ridge slightly developed; gill cover covered with sparse rounded microtrichia. Gills 3—5 pale, bluntly pointed with fringe bifid with darker stippling.

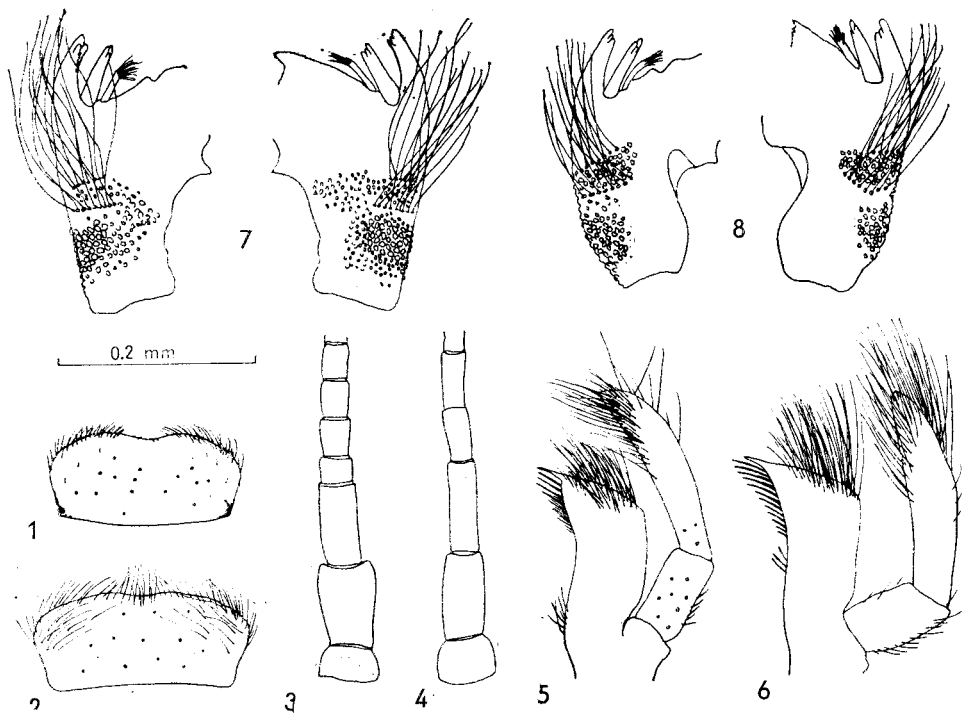
Adult and subimago unknown.

Specimens examined: Mature larva (holotype), 15 larvae (paratypes), Upper Volta (Haute Volta), Mossi Prov., eastern fork of the White Volta riv. (Volta Rouge), Zabre, May 22, 1964 leg. W. N. Muhi; holotype in alcohol, parts of paratypes on slides, deposited in the Institute of Entomology, Czechoslovak Academy of Sciences, České Budějovice. Further material examined: 5 larvae, Ghana, Black Volta riv., Bator, April 4, 1967 leg. T. Petr.

Etymology: From Latin *afro-* meaning inhabiting or coming from Africa and *setosus* meaning having conspicuous setae.

Distribution and biology: Ethiopian, so far known only from the above localities. Biology of this species poorly known. Detailed data concerning the locality in Ghana, including physico-chemical characteristics, are discussed by PETR (1970). Current was found to be a major factor determining the distribution of the benthic invertebrates at this locality (rapids of a large river). *C. afrosetosa* sp. n. (listed under the name "*Caenidae* sp. I" by PETR, 1970) was found at places with very fast current and stony bottom. Larvae were most abundant in 20—40 cm.s⁻¹ flow but occurred also in 75—140 cm.s⁻¹ flow (water temperature 31.7 °C, pH = 7.7, oxygen 6.6 to 7.6 ml.l⁻¹ with 90—104 % saturation).

Differential diagnosis and discussion: *C. afrosetosa* sp. n. can be distinguished from other *Clypeocaenis* species by the following combination of characters: (1) two long setae on posterior margin of clypeal protrusion, (2) genal costae without teeth, (3) antennal segments 3—6 as long as or longer than 1/2 of pedicel, (4) femora without long bristles, outer margins with short spines, (5) gill cover broader than long, oblique ridge well distinguishable, (6) segments VII—IX with well developed medial ridge, (7) segment 2 of maxillary palps asymmetrical and bluntly pointed, (8) segment 3 of labial



Figs. 1—8. *Clypeocaenis afrosetosa* sp. n. (1, 3, 5, 8), *C. oligosetosa* sp. n. (2, 4, 6, 7). 1, 2 — labrum. 3, 4 — antennae. 5, 6 — maxilla. 7, 8 — mandibles, mature larvae.

palps without subapical spines. This species occupies a relatively independent position. The characters (3, 4, 5) single it out from S. E. Asian species.

Clypeocaenis oligosetosa sp. n.

(Figs. 2, 3, 6, 7, 12—14, 16, 18, 19—25)

Mature larva (holotype): Body length 3.7 (3.5—4.2) mm, length of cerci 2.2 (1.8—2.5) mm. Head unicolorous, whitish yellow with inconspicuous smudges or dark brownish stippling (larvae before moulting) near posterior margin, epicranial suture forming indistinct longitudinal ridge, clypeal protrusion rounded anteriorly with several (usually 4) long bristles and several short hairs. Genal costae smooth, without teeth. Antennae whitish yellow, unicolorous; scape shorter by $\frac{2}{3}$ than pedicel, segment 3 as long as pedicel, other segments as long as $\frac{1}{3}$ of pedicel length. Labrum slightly produced anterolaterally, 2.5 times as broad as long, with numerous bristles submarginally (Fig. 2); middle mandibular incisors as long as the outer ones, with three bluntly pointed teeth; inner incisors with rich apical tufts of bristles. Hypopharyngeal superlinguae slightly produced laterally. Segment 2 of maxillary palps nearly symmetrical, rounded at apex, maxilla straight; inner margin of segment 2 straight or slightly convex. Distal segment of labial palps bluntly pointed, with oblique row of subapical spines. Glossae rounded, paraglossae bent and pointed.

Pro- and mesonotum brownish yellow, with inconspicuous darker smudges and diffuse darker spot near the bases of wing pads and distinct straight medial ridge. Surface of thoracic nota coarsely chagrinated, with rounded microtrichia. Pronotum with straight lateral margins, produced anterolaterally. Thoracic sterna paler, unicolorous. Legs whitish, unicolorous. Fore femora with long bristles near base and subapical transversal row of 5–8 short pointed spines; a group of similar spines also on outer margin; middle and hind femora with long bristles (bristles longer than femora width) and only several short spines on outer margin; fore tibiae with long bristles on inner margin middle and hind tibiae with pointed spines; tarsi with hairs. Claws long and slender, slightly bent at apex, with 3–5 rounded teeth. Ratio femur : tibia : tarsus 5.7 : 4.9 : 4.5 fore legs, 5.5 : 3.2 : 3.2 middle legs and 6.8 : 4.5 : 3.5 hind legs.

Abdominal terga whitish yellow, slightly darker posteriorly, sterna whitish, unicolorous, without markings. Tergum II with pointed prominent spine in middle; this spine with dorsal black bordered ridge. Terga III–VI covered with gill cover, terga VII–IX with weakly developed medial ridge, their posterolateral spines well developed, lateral margin straight, covered with bristles. Posterior margin of terga VII–X with rounded or bluntly pointed teeth. Gill cover whitish yellow, distinctly longer than broad, evenly covered with small pointed microtrichia, groups of rounded microtrichia in the middle. Only medial black bordered submarginal ridge developed; this ridge with several pointed spines. Gills 3–5 colourless, translucent with slightly dark dusted fringe bifid, nearly symmetrical. Cerci light yellowish brown, with long hairs in the apical half.

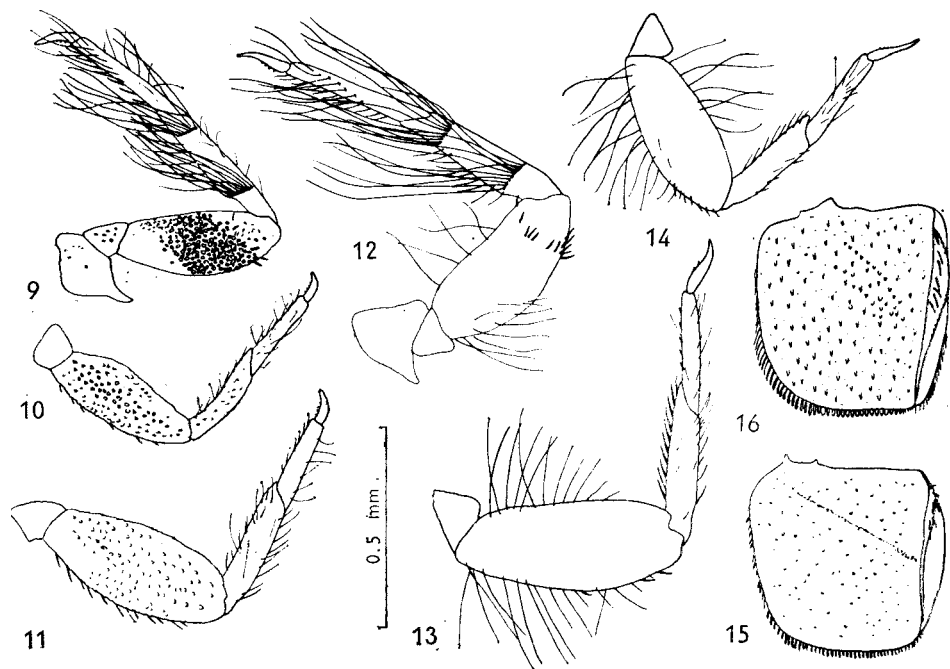
Adult male (paratype No. 1): Body length 2.8 (2.5–3.3) mm, length of cerci 7.5 (6.8–8.0) mm. Head with dark brown stippling on frons and occiput, epicranial suture light bordered, wide transversal pale band near posterior margin of occiput. Antennae pale whitish, flagellum transparent, ratio pedicel : scape 3.1 : 1.5. Eyes black, ocelli black bordered as wide as 1/2 of eye width.

Pronotum whitish yellow with a pair of diffuse anterolateral darker spots. Meso- and metanotum light whitish yellow with medial suture and margins of individual nota dark bordered. Wings oval, veins C, Sc, and R_s dark brown in basal half, other veins translucent, whitish or greyish, CuP distinctly forked. Marginal cilia of wings long, translucent, distinguishable also in apical half of wings. Ventral side of thorax pale, whitish, unicolorous. Fore coxae, femora and tibiae dark brown bordered, with dark dusting, fore tarsi paler; middle and hind legs whitish, unicolorous. Ratio femur : tibia : tarsus 4.6 : 7.1 : 7.5 fore legs, 5.7 : 3.5 : 2.5 middle legs and 4.3 : 2.8 : 2.2 hind legs.

Abdominal terga white, with very inconspicuous dark brownish dusting in middle of each tergum, this forming a longitudinal band on segments I–IV; sterna white, unicolorous, without markings. Segments VI–IX with straight lateral margins and well developed posterolateral spines. Subgenital plate oblong-shaped, penis and forceps whitish yellow, forceps base straight or slightly convex. Forceps asymmetrical, apex slightly bent medially, both inner and outer margins irregularly toothed; forceps evenly covered with numerous small microtrichia. Penis more than 5 times as broad as long, hind margin arcuately incurved in middle (Fig. 24). In some specimens penis with

convex hind margin without incurvation (Fig. 25). Cerci whitish, translucent, unicolorous without bristles in apical half.

Subimago (paratype No. 2): Head greyish, dark stippling of frons and occiput well apparent. Thorax greyish yellow, wings grey, first three veins dark brownish. Fore legs brownish, middle and hind legs grey. Abdomen white, cerci grey, not translucent.



Figs. 9—15. *Clypeocaenis afrosetosa* sp. n. (9—11, 15), *C. oligosetosa* sp. n. (12—14, 16), mature larvae. 9, 12 — fore leg. 10, 14 — middle leg. 11, 13 — hind leg. 15, 16 — gill cover.

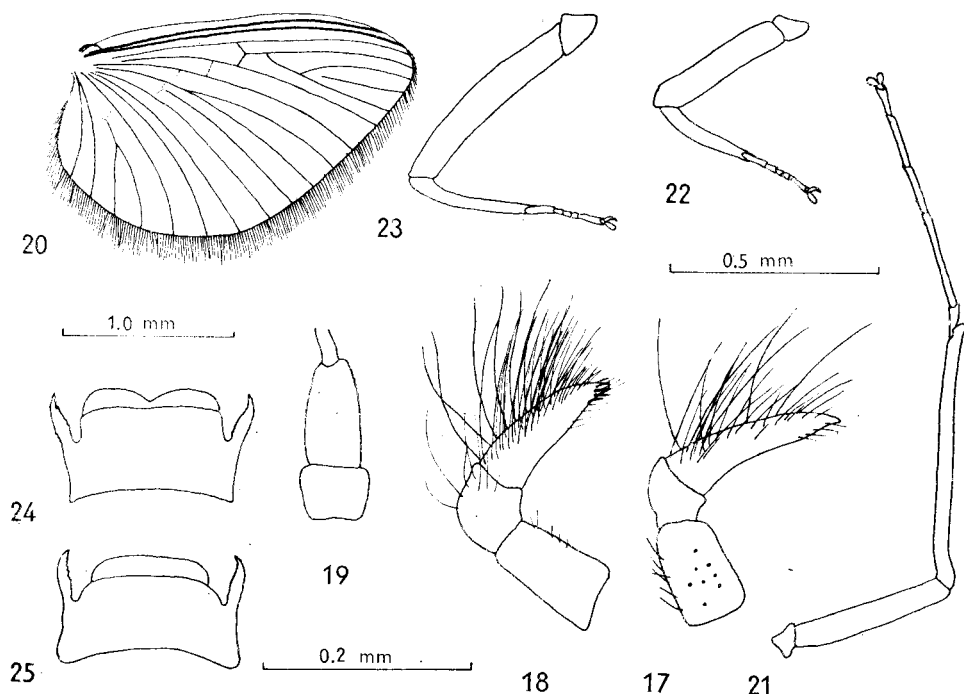
Female (paratype No. 3): Body length 3.0 (2.7—3.5) mm, length of cerci 3.1 (2.5—3.5) mm. Coloration generally paler than in males, dark markings on head diffuse, antennae greyish. Thorax light brownish yellow, nota darker, wings same colour as in male. Abdomen whitish, without medial darker band. Cerci yellowish, not translucent.

Specimens examined: Mature larva (holotype), adult male (paratype No. 1), subimago (paratype No. 2), adult female (paratype No. 3), 165 larvae, 174 adults ♂♀ (paratypes), Vietnam, Thuan hai Prov., Song Kinh-dinh riv., Nha-Ho, 15 km W of Phan-rang, 108°52'19" E, 11°37'58" N, April, 16 — May, 5, 1982 leg. T. Soldán. Holotype in alcohol, parts of paratypes on slides, deposited in the Institute of Entomology ČSAV, Č. Budějovice. Further material examined: cca 5000 adults ♂♀, same data as holotype.

Etymology: From Latin *oligosetosus* meaning having or possessing several setae.

Distribution: unknown except from the type locality, Oriental.

Biology: The Kinh-dinh is a large lowland river (about 200 m across) with rich permanent water 20—150 cm in mean depth during the dry season



Figs. 17–25. *Clypeocaenis afrosetosa* sp. n. (17), *C. oligosetosa* sp. n. (18–25). 17, 18 – mature larva, labial palpus. 19 – male, antenna. 21, 22, 23 – fore, middle and hind leg, male. 20 – male, wing. 24, 25 – male, penis and forceps, ventral view.

and about 5 m water level fluctuation in the wet season. During the period studied, the water level fluctuation was ± 10 cm, water temperature 26.4°C at night min., max. 29.8°C by day. Air temperature for the period of light trapping was min. 22.7°C at night, max. 37.7°C by day and mean around 28.4°C . At the type locality the river is regulated in order to supply a system of artificial irrigation (Plate I, Figs. 1, 2)* and forms a large number of rapids and backwaters. Judging from the primary plant succession on the river bed this regulation originates from at least 50 years ago (Rejmánek, pers. comm.). Larvae of *C. oligosetosa* occur mainly at depth of 5–35 cm; they prefer stones up to 10–15 cm in diameter and current speed is the main factor regulating their distribution within microhabitats. They were found only exceptionally at plant roots, sandy and clayey microhabitats (less than 0.4% of total mayfly standing crop). Their qualitative presentation in stony microhabitats with 10–30, 30–60 and 80–120 cm.s^{-1} current speed was 0.7–1.0%, 7–9% and 18–20% of the total mayfly standing crop respectively. Larvae were found mostly together with *Tricorythus*, *Choroterpides*, *Prosopistoma*, *Pseudocloeon* and *Cinygmmina* larvae. They live under stones at the streamline, with head upstream orientation. They are firmly attached, never occurring on the exposed upper surface of stones.

* Plate I will be found at the end of this issue.

Adults emerge before sunrise at 0400—0430 h. They moult into the imaginal stage within several minutes after subimaginal moulting; this moulting occurs during flight in both sexes; the subimaginal skin sometimes remains attached to cerci in males. Some females were observed to mate in the subimaginal stage. The peak of mating flight activity occurs at 0445—0515 h, and mating activity ceases after 0530 h (morning sunlight). The flight patterns of both males and females are identical with those of the genus *Caenis*, and specific swarm markers seem to be presented by areas free of vegetation and areas lighter than the background (cf. SAVOLAINEN, 1978). Only males were attracted to the mercury vapour light trap situated about 800 m from the river bank, and we observed no phototropic activity of subimagos and females.

This type of mating flight is typical for specialized genera in the tropics, but I did not observe any of about 15 mayfly further species to fly at the same time except for two *Cloeon* spp. (cf. EDMUNDS & EDMUNDS, 1980). Contrary to some authors (e.g. BISHOP, 1973 or EDMUNDS & EDMUNDS, 1980) I believe that the most serious predators of adults of *Clypeocaenis* and some other genera (e.g. *Baetis*, *Cinygmmina*) are spiders. I observed at least 1/3—1/2 of the total swarm caught in spiders' webs at the locality studied. Fecundity of females is 268—391 eggs. Life cycle remains unknown. This species has probably at least 2—3 generation per year. Adults swarmed every day during the period studied (April 16 to May 5), but I found only older to mature larvae so emergence seems to be therefore not continual. Oviposition is realized by the same way as in *Caenis* — females fall after mating and short compensatory flight to water surface and the eggs attach themselves to the substratum after the rupture of a hydrophobic intersegmental abdominal cuticle (cf. GRANDI, 1955).

Differential diagnosis and discussion: Larvae of *C. oligosetosa* sp. n. can be distinguished from other *Clypeocaenis* species according to the characters in the following key:

- 1 (2) Margins of femora with short pointed spines (Figs. 9—11) or smooth; gill cover broader than long with well apparent oblique fork of triangular ridge and covering abdominal segments III—VI; distal segment of maxillary palps bluntly pointed at apex, asymmetrical *C. afrosetosa* sp. n.
- 2 (1) Margins of femora with long bristles (Figs. 12—14); gill cover distinctly longer than broad without oblique fork of triangular ridge (Fig. 16) and covering abdominal segments III—VI; distal segment of maxillary palps rounded at apex, nearly symmetrical.
- 3 (4) Clypeal protrusion with only two setae; fore femora without subapical row of spines and subapical group of spines on outer margin; bristles of middle and hind femora shorter than femur width; hind margin of tergum VII with medial projection and branched scales *C. bisetosa* SOLDÁN
- 4 (3) Clypeal protrusion with more than two (at least 4) setae; fore femora with subapical transverse row of spines and subapical group of spines on outer margin; bristles of middle and hind femora longer than femur width; hind margin of tergum VII without medial projection, with rounded spatulate scales.
- 5 (6) Body length 2.8—3.0 mm; clypeal protrusion with 10—15 setae; genal costae toothed; surface of gill cover coarsely chagrinated, with rounded microtrichia; abdominal terga dark brownish *C. multisetosa* SOLDÁN
- 6 (5) Body length 3.8—4.2 mm; clypeal protrusion with 4—6 setae; genal setae smooth, not toothed; surface of gill cover with scattered pointed microtrichia, abdominal terga pale, whitish yellow *C. oligosetosa* sp. n.

Adults of *Clypeocaenis* can be distinguished from other genera of the family Caenidae by the following combination of characters: (1) clypeal protrusion

apparent also in subimagos and slight even in adults, (2) fore coxae contiguous, (3) pedicel twice as long as scape, (4) fore wings with cilia on hind margin to apex of wing, (5) CuP distinctly forked, (6) posterolateral margins of abdominal segments short, (7) forceps irregularly toothed with numerous small microtrichia, (8) penis very broad, with incurved or slightly convex hind margin. Some characters (1, 4, 5, 8) seems to be very specific within the family and important for differential diagnosis if they are common for all species of *Clypeocaenis*. On the other hand, distinguishing of adult Caenidae is very problematic since adult are considerably reduced (there are 15–20 distinguishing characters in larvae but only 3–4 in males). Adults of *Clypeocaenis* are distinctly distinguished from *Brachycercus*-like genera and from *Austrocaenis* (fore coxae widely separated) but they are closely related to those of *Caenis*-like genera (*Caenis*, *Caenomedea*, *Caenodes* — cf. THEW, 1960; SOLDÁN, 1978). Especially the arrangement of forceps approaches *Clypeocaenis* to *Caenomedea*. Judging from the arrangement of penis and forceps some Ethiopian species of *Caenis* (e.g. *Caenis basuto* described by DEMOULIN, 1970 from South Africa, larvae unknown) might actually belong to *Clypeocaenis*.

Adults of *C. oligosetosa* sp. n. cannot be compared with adults of other *Clypeocaenis* species since they remain unknown. Coloration of head and wings resembles that of subimago of *C. bisetosa* dissected from mature larvae. Penis of this specimen possess straight posterior margin with several short bristles (SOLDÁN, 1978) and, similarly to some specimens of *C. oligosetosa*, no incurvation in the middle.

Notes on distribution and phylogeny of *Clypeocaenis*

The genus *Clypeocaenis* was originally considered to be exclusively Oriental (SOLDÁN, 1978) since there was no record of larvae of this type from other regions. Occurrence of *C. afrosetosa* sp. n. in the Upper Volta and Ghana documents also an Ethiopian distribution for this genus. Further undescribed species undoubtedly live in some areas of equatorial Africa. Dr. Edmunds (pers. comm.) informs me that he has found many *Clypeocaenis* larvae in Caenidae material from South Africa. On the other hand, the centre of distribution of this genus remains in the India plate area of Southeast Asia, from where almost certainly the Caenidae have spread to much of the world (cf. EDMUNDS, 1979). The Oriental-Ethiopian distribution of *Clypeocaenis* is most likely not the consequence of the drift of the Indian plate from Madagascar. *Clypeocaenis* apparently followed the route through the Middle East. This can be documented by the occurrence of *C. bisetosa* in Iran and by the absence of *Clypeocaenis* in Madagascar (cf. DEMOULIN, 1970; EDMUNDS, 1979; DEMOULIN, 1973).

The genus *Clypeocaenis* represents unique apomorphic phyletic lineage among the genera of the family Caenidae. It is well distinguished from relatively plesiomorphic lineage of *Caenis*-like genera (larvae unspecialized, sprawlers or slow moving clingers, body not flattened, legs unspecialized, eyes normal, ocelli without tubercles) and also from *Brachycercus*-like genera lineage which show some apomorphic characters (larvae specialized or even semi-burrowing sprawlers, body flattened, legs specialized with long bristles, eyes prominent, ocelli with tubercles). While there are some transitions between *Caenis*-like and *Brachycercus*-like lineages (e.g. Ethiopian *Austrocaenis*

and other genera) the genus *Clypeocaenis* is quite isolated. Autapomorphic characters are represented by clypeal protrusion with long setae, genal costae, 2-segmented maxillary palps, arrangement of gill cover and unique arrangement of fore legs. Since this *Clypeocaenis* lineage does not share any characters with that of *Brachycercus*-like genera it apparently evolved from *Caenis*-like ancestor. Larvae are filter-feeders possessing secondary specialisation of mouthparts and legs for straining food from the current. This presumption based on morphological observation (cf. SOLDÁN, 1978) was ascertained by direct observation of living larvae in the Vietnamese locality of *C. oligosetosa*.

Morphological arrangement of filtering setae on legs and mouthparts is nearly identical with that of most genera of the family Oligoneuriidae (cf. GRANDI, 1947), a family quite unrelated to the Caenidae. This is a further example of larval convergence between the Schistonota and Pannota (cf. McCafferty & Edmunds, 1979). Otherwise the filter-feeding of *Clypeocaenis* larvae is unique among the Pannota which, despite morphologically very specialized larvae, conserved non-specialized feeding types. Only some Tricorythidae (*Tricorythus*, *Neurocaenis*) (Pannota) possess a funnel-like arrangement of setae on the mouthparts. If they are filterers as well, this type of filter feeding is quite different from the leg filtration of *Clypeocaenis* larvae.

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Два новых вида *Clypeocaenis* (Ephemeroptera, Caenidae) с описанием взрослой стадии и данными по биологии рода

Таксономия, распространение, филогения, Верхняя Волта, Вьетнам

Резюме. Впервые дано описание взрослых особей рода *Clypeocaenis*. Описаны два новых вида: *Clypeocaenis afrosetosa* sp. n. (личинка) из Верхней Волты и *C. oligosetosa* sp. n.

(личинка, субимаго, имаго самца и самки) из Вьетнама. Приведен определитель всех известных видов рода *Clypeosaenis* на основании личиночных признаков. Обсуждается биология, поведение взрослых особей и жизненный цикл вида *C. oligosetosa* и также распространение и филогения рода *Clypeosaenis*.

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REVIEW

Janík M. Stollmann A. et al.: *Rozsutec, štátna prírodná rezervácia* (Rozsutec, staatliches Naturschutzgebiet). 1045 S., 12 Karten und Tabellenbeilagen. Verlag Osveta, Martin 1981. Preis 120,— Kčs.

Ein Kollektiv von 46 Autoren bearbeitete das Naturschutzgebiet Rozsutec in der Kleinen Fatra. Der Geographie und der Geschichte sind 4 Beiträge, der Geologie, Pedologie und Hydrologie 10 Beiträge, den Ergebnissen der botanischen Forschung 13 Beiträge, den Ergebnissen der Zoologischen Forschung 18 Beiträge gewidmet. Die einzelnen Studien sind reichlich mit Beilagen dokumentiert. Jeder Beitrag hat eine Literaturübersicht und russische und deutsche Zusammenfassung.

In 11 arachnoentomologischen Studien sind 1650 Arten angeführt, die hier im Laufe einer zweijährigen Forschung festgestellt wurden. Der Grossteil der Beiträge ist auf eine eingehende Übersicht ausgewählter Gruppen gerichtet und enthält wertvolle Belege zur Zoogeographie, nicht nur dieses Gebietes, sondern der ganzen Nordkarpaten. Genannt seien hier Abhandlung über das Vorkommen der Vertreter der Ordnung Opilionidea (P. Hrozaár) werden, der Familie Braconidae (M. Čapek, J. Lukáš), der Überfamilie Apoidea (A. Beláková), der Familie Cecidomyiidae (M. Skuhrová), der Familie Tabanidae, Sarcophagidae (V. Gunárová, M. Slamečková, V. Petřivalský) und der Familie Syrphidae (Š. Stolar). Ausser den eingehenden Studien über diese Insektengruppen finden sich hier 3 Arbeiten, die über grössere Ordnungen und Unterordnungen be-

richten. J. Čepelák behandelte die Unterordnung Brachycera. Im Hinblick darauf, dass uns bisher ein Katalogwerk über Zweiflügler fehlt, hat diese gründliche Studie einen Dokumentationswert. Auch die umfangreiche Studie über die Dynamik und die Artenzusammensetzung der Schmetterlinge (A. Čaputa) weist auf den Reichtum dieses Naturschutzgebietes hin. Der Autor hat hier 27% der bei uns bekannten Arten festgestellt und verwendete eine halbautomatische Lichtfalle, die sich gut bewährte. Die Abhandlung über festgestellte Vertreter der Ordnung Coleoptera (L. Korběl M. Valenčík) umfasst umfangreiche Ermittlungen über diese Ordnung. Es fehlt hier allerdings eine Bemerkung, dass im Vrátna Tal, also in der nächsten Umgebung des Rozsutec, der berühmte Endemit *Gauroles excellens* von Dr. K. Branczik entdeckt und von ihm 1876 beschrieben wurde.

Der Grossteil der entomologischen Beiträge stützt sich nicht nur auf die qualitative Analyse, sondern wird auch übersichtlich nach zöologischen Kriterien durch quantitative Ermittlungen dokumentiert. Dadurch, dass keine Spezialisten zur Hand waren, blieb eine Reihe einzelner Insektenordnungen unbearbeitet, z. B. Orthoptera, Plecoptera usw.

Das Buch ist typographisch gut ausgestattet und wird ein gutes Hilfsmittel für jene sein, die an die bisherige Tradition entomologischer Arbeiten in den weiteren Naturschutzgebieten anknüpfen werden.

A. Pfeffer

SOLDÁN T., 1983: Two new species of *Clypeocaenis* (Ephemeroptera, Caenidae) with a description of adult stage and biology of the genus



PLATE I, Figs. 1-2: Type locality of *Clypeocaenis oligosetosa* sp. n., Song Kinh-dinh near Nha-ho, Vietnam. 1 — general view. 2 — detail of place below the river regulation.