

STUDY OF EPHEMEROPTERA IN WARM SOMES GORGES

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Abstract: Ephemeroptera group is unique in the world of insects, because they have two adult stages. The first, called subimago, is developed from the final larval stage. This phenomenon, found to larvae favor the population of new areas. Ephemeroptera occupies an important place in the food chain, most of which are primary consumers. Larva and adults are also a consistently reservoir of nutrient for predators (fish, birds and spiders). Given their specific requirement of certain species Ephemeroptera bodies are excellent bio-indicators.

INTRODUCTION

Ephemeroptera name comes from the Greek „ephemeros”, less than a day, and „pteron” wings and refers to short adult life which is sometimes are called for one day. Ephemeroptera is an order which is so far known in 2000 about the species (Hubbard and Pappas, 1977; McCafferty and Edmunds, 1988), grouped in 23 genera (Hubbard, 1990) and distributed throughout the planet except Antarctica, arctic regions and some isolated islands. Ephemeroptera group is unique in the world of insects, because they have two adult stages. The first, called subimago, is developed from the final larval stage.

Larva of Ephemeroptera occupies an important place in the food chain, most of which are primary consumers. Larva and adults are also a consistently reservoir of nutrient for predators (fish, birds and spiders). Given their specific requirement of certain species Ephemeroptera bodies are excellent bio-indicators.

Environment pollution by discharge of industrial water, agricultural or domestic pollution arrangements on the river has a great effect on faunistic composition of this environment. Ephemeroptera morphology reflects adaptation of the larvae to the aquatic life and of subimago and imago stage to the air life. In addition, many morphological characters are decisive for the identification of taxa.

The larva form of the trachea aids allow distinguished European families. For determining species and genera, mouthparts have a primary importance (form, cili disposal Clear's hair and thorns, trachea leaf or gill-like used in many cases (Caenidae, Heptageniidae, Baetidae). Observing these characters requires microscopic examination of the various pieces. Clear configuration (side under extension, subungue as tarsa claws) provides some useful indications.

As a general rule, the adult form determination is made with male genital parts (gonopodes, penis). Specific identical characters (common) are rare in both sexes (wing ribs, the articles feet proportion) so that it is often difficult even impossible to determine female.

Eggs observation sometimes allows identification of females (eg. *Caenis* and the *Rhithrogena*).

It is important to collect and to preserved larval exuvia to consider the individual characters of larval and adult. Larva has cylindrical form or ventral flattened back, ranging from one family to another. However, the presence of 2 or 3 long caudal filaments, tracheal gill located on the belly and one on each foot claws characters are typical and common to entire la Ephemeroptera's larva.

Larva morphology is gradually approaching to that stage of imago, and crossing to the imago stage is made without complete metamorphosis. However the imago stage is preceded by a single wing stage insect in the world, the subimago.

This type of development is called prometabolite (Weber and Weidner, 1974). Embryo development, takes on average 10 to 20 days depending on water temperature. Some species such as *Baetis vernus* or *Ephemerella ignita*, performed in a egg diapause (Bohle, 1969).

Ephemeroptera's eggs are microscopic (200 micrometres/100micrometres) and have ovoid shape. They may be covered by a substance that is swelling on water contact .Immediately lodged eggs are carried by the current.

Special structures for fixing or an external adhesive blanket for fixation allow the fixing of the substrate. Their emergence is a critical phase in its transformation .During its development insect can not run from aquatic predators (fish, larvae of trichopter, plecoptera, Odonata, coleoptera etc.) land predators or air predators (spiders, dragonflies, birds, etc.)

Ephemeroptera have developed a number of emerging strategies. At *Electrogena* nimpha subimago transformation takes place under water and other nympha (*Ephemerellidae*, *Rhithrogena*, *Baetis*) detach the substrate and floating on the water surface and turns into subimago in about 20 seconds; *Ephemerellidae* swimm to surface and moult instantaneously; *siphonuridae*, *Habroleptoides* and *Paraleptophlebia* use another strategy: nimfpha are leaving the water climbing on vegetation or rocks where they turn into subimago.

In certain species emergence is synchronized so that many individuals are emerging in the same period forming big groups to surface (*Oligoneuriella rhenana*, *Ephoron virgo*). Light and temperature can act as factors of timing (Savolainen, 1978) simultaneous. Presence of a large number of individuals favoring the meeting between males and females, it may also contribute to the survival of Ephemeroptera population of despite pressure predators.

On the contrary some species, such as *Cloeon dipterum*, emergences may take several weeks; larva turns into subimago one by one. Some of the bodies remain in the water thus allowing the population to withstand unfavorable conditions. Long periods or emerging or flight contribute to reducing the adverse climatic factors. Stages of subimago wich not immediately turns in imago, hang on riparian vegetation and may remain on it some days. When the moult ends subimago adult male performing a nuptial flight for coupling.

Among the main types in samples identifies the following genders: *Habroleptoides*, *Ecdyonurus*, *Serratella*, *Rhitrogena*, *Baetis*.

EPEORUS GENDER

At male the first pair of legs are nearly the same length of body, tarsa is bigger than tibia length by 1 / 6. Tarsa articles taken in decrease order succeed: 1,2, 3, 4; 5. At female the

first pair of legs is shorter than body length, and tarsus in general is $\frac{3}{4}$ of the length of tibia. Tarsus articles are like the male articles, taken in decrease order.

Claws pairs from the first pair of legs, to the male are the same, and to the following legs are different between them. At female crows pairs from all legs are different. Penis lobes are lateral dilated and deprived of visible stili

ECDYONURUS GENDER

At male the previous feet overcome $1 - 1\frac{1}{2}$ body length, and tarsus is bigger than tibia length by $1\frac{1}{5} - 1\frac{1}{4}$. Tarsus articles present the following position in decrease order: 2, 3, 4, 1; 5. In general, the first article is almost equal to the article 4 and to the article 2 range from $\frac{3}{4}$ and $\frac{4}{12}$ length, in generally having about $\frac{6}{11}$. Tarsa of posterior legs are almost $\frac{4}{5}$ from tibia length and those articles represent the next provision in decrease order: 5 1 2 3; 4. X chest is very slightly convex in the middle side of the posterior edge.

At female earlier tarsi feet is almost $\frac{3}{4}$ of the length of tibia and rear tarsi feet have $\frac{4}{7}$ of the length of tibia. Tarsus articles in decrease order have the same sequence in both pairs, and the rear legs of male with the exception of article 2 which is visibly larger than the article 3. Also claws pairs in both sexes are different in appearance that all feet.

RHITROGENA GENDER

At male previous feet above $\frac{1}{8} - \frac{1}{5}$ of body length and tarsi have almost $\frac{2}{3}$ of that length. Taken in decrease order articles succeed as 3, 2, 4, 5; 1

Article 3 is almost equal to two, and the first article is shorter than article 2. Penis lobes are separated to the base, far and narrow, with issue baton. In ventral part are small titulators palm or narrow and with the peak bi-tridentat.

At female the top sternum is sunken giving the biloba appearance. To the both sexes, the first article of the posterior tarsus is equal to the second and all femoral present at the middle of external face, in general, a stain or a very elongated dark brown. Claws pairs from all feet are different between the appearances.

BAETIS GENDER

Body slender and elongate ends with two very long circle. His size is generally comprised between 4 and 11 mm, it varies according to species and even within the same species. The male has 2 eyes very developed cylindrical or trunk content - colored, sometimes serving to specify the species. The side eyes, in both sexes, are highly colored in black-gray.

Previous transparent wings presented at the external edge and a series of intercalary short and free ribs, ordered in pairs in the spaces between the longitudinal ribs and intercalary large ribs. Rear wings are very small, have an oval shape more or less elongate and 2 or 3 longitudinal ribs. At the edge there is always a palm triangular earlier with the peak more or less elongate and sharp.

MATERIAL AND METHOD

Drift samples were collected on 10-11 August 2005 using a device made from a metal frame, length and height of one meter, fitted with netting $250\ \mu\text{m}$, located at distance of 0.5 m from left bank namely the right bank of the river. Collected samples were immediately preserved in 4% formaldehyde aldehyde. In the laboratory separation of bodies of different taxonomic groups was made using binocular lamp. Measurement of physical-chemical

parameters was thus: dissolved O₂ content and O₂ saturation in water have been measured by oximetre portable type YSI model 55125. - water and air temperature - was measured by mercury thermometer. The material collected was preserved and stored in the laboratory. Samples were washed before sorting on sieve its sizes ranging from 250µm-4000µm, thereby achieving a distribution of organisms based on their size. Material sorting was made with a stereomicroscop type Nikon SMZ 800. Each taxonomic group was introduced in separated tubes and preserved in alcohol 70%, then labeled with the station name, date and time of collection, sample number, name and taxonomic group the number of individuals.



Baetis sp.



Ecdyonurus sp.



Habrolpetoides sp.



Serratella sp.



Epeorus sp.

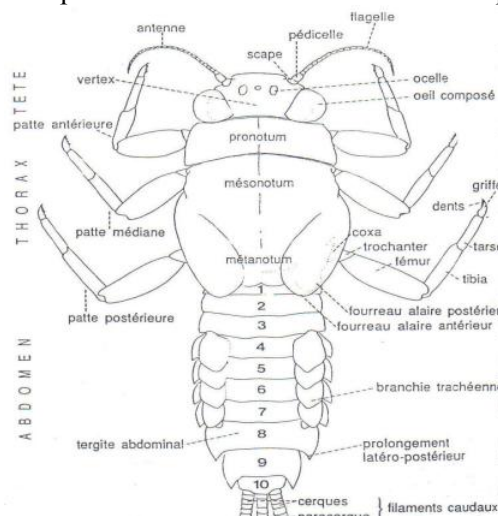
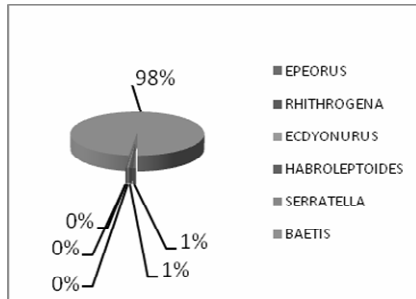
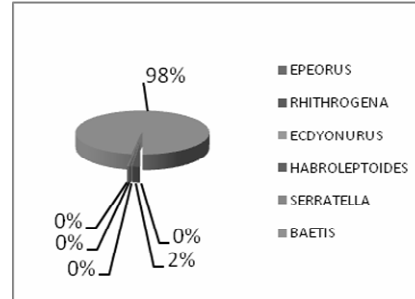


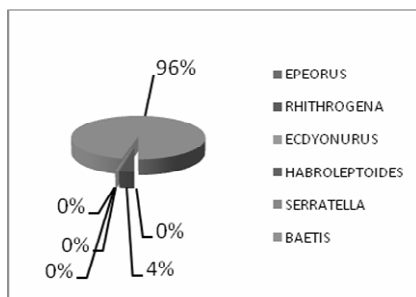
Fig 1 External morphology of Ephemeroptera larvae (after Studeman 1992)



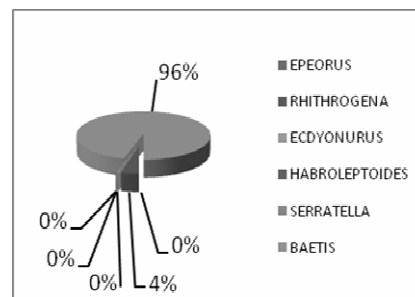
Ephemeroptera percentage abundance at 12.00 - 12.30 o'clock the right bank



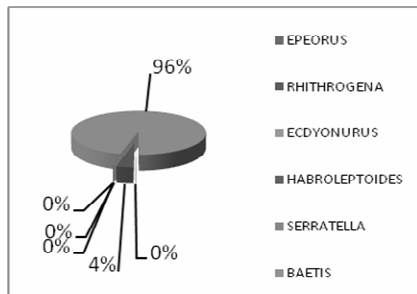
Ephemeroptera percentage abundance at 18.00 - 18.30 o'clock the left bank



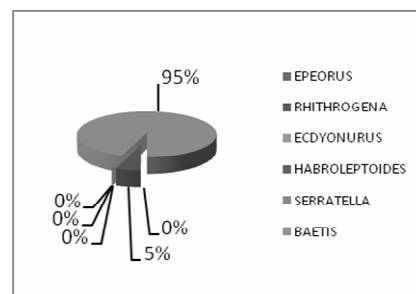
Ephemeroptera percentage abundance at 24.00 - 24.30 o'clock the left bank



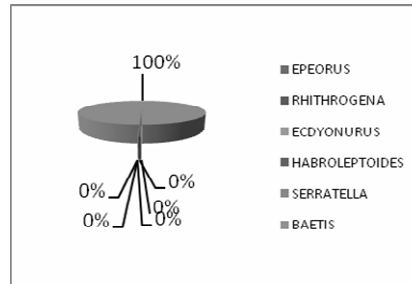
Ephemeroptera percentage abundance at 24.00 - 24.30 o'clock the right bank



Ephemeroptera percentage abundance at 03.00 - 03.30 o'clock the left bank



Ephemeroptera percentage abundance at 03.00 - 03.30 o'clock the right bank



Ephemeroptera percentage abundance at 06.00 - 06.30 o'clock the right bank

Grupul	Md1	Ms1	Md2	Ms2	Md3	Ms3	Md4	Ms4	Md5	Ms5	Md6	Ms6	Md7	Ms7	Md8
Nematoidea	12	13	10	12	24	13	16	12	7	2	7	6	8	9	9
Oligochaeta	3	8	4	3	1	3	2	7	1	8	2	8	14	6	0
Copepoda	0	6	1	1	0	0	0	5	1	0	0	5	0	1	1
Ostracoda	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Amphipoda	1	0	2	1	0	2	2	1	1	0	0	2	1	1	1
Hydrachnidia	482	828	473	638	314	520	246	247	121	178	99	178	256	257	110
Ephemeroptera	565	1034	529	701	634	809	1696	3038	1149	1773	1419	2420	1399	1380	375
Plecoptera	44	97	99	133	206	269	223	170	82	98	74	86	95	119	38
Trichoptera	6	8	15	11	9	15	5	4	4	6	2	11	6	60	5
Chironamidae	598	756	789	884	381	474	395	537	158	201	172	261	366	380	232
Alte larve diptere	33	23	55	57	51	35	185	205	71	75	47	85	42	35	34
Coleoptera	0	0	4	0	1	1	2	0	2	3	5	1	1	1	2
Colembola	1	54	7	59	33	51	0	29	22	17	6	17	46	49	0
Izopoda	0	1	0	0	0	1	1	0	0	0	0	1	2	1	0
Crosteacea	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Turbelariata	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0

THE ASSOCIATIONS OF ORGANISMS PRESENT IN THE DRIFT
Groups of organisms recognized and the bodies number in collected samples

RESULTS AND DISCUSSION

Analyzed carefully diagrams which express percentage abundance built by gender identified in samples is taken note that between the two sides are light different. Also note that *Epeorus* gender, *Ecdyonurus* and *Serratella* are very poorly represented on both sides, while the type *Rhitrogena* can get up to 5% in the sample at 03.00 and 4% in the sample of 24.00 in the rest producing evidence percentage abundance of 1-2%.

It is observed in this kind that in some samples (12.00, 15.00, 18.00, 09.00 hour) individuals of this group have equal percentage values especially on the left side. Regarding the genus *Baetis* lower values are reached in the samples after midnight, and the sample from 03.00-03.30 hours, with the dawn of day, their number decreases to 95%.

Note that the sample in the morning from 06.00 percentage abundance made by individuals of the genus *Baetis* is 100%.

CONCLUSIONS

According to the results obtained in this work license drift phenomenon has proved to be a mass meeting among demersal macroinvertebrates, emphasizing mainly the individuals of the genera belonging to the order Ephemeroptera: *Baetis*, *Rhitrogena*, *Ecdyonurus*, *Epeorus*, *Habroleptoides*, *Serratella*

Abundance on the largest percentage values are achieved by individuals belonging to the genus *Baetis*, followed by *Rhitrogena* other types being less represented in that regard. Regarding the variation in the number of subsistence individuals in samples harvested Note that it is comparatively higher in the left bank towards the right bank.

Number of individuals of *Baetis* is constantly rising since samples from 12.00 to 06.00 hours in the morning with a maximum at 21.00. At *Rhitrogena* rising number begins with samples collected in the zone 03.00 - 03.30.

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