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CASES TYPES AND BUILDING MATERIALS ON SOME CADDISFLYES SPECIES (TRICHOPTERA, INSECTA) FROM THE SUPERIOR BASIN OF BISTRIȚA RIVER

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Key words: *trichoptera, case building materials, Allogamus auricollis Pictet*

INTRODUCTION

The present work, dealing with benthic fauna of the Bistrița River, was developed following some observations on trichoptera pupal and larval cases. It is well known the building instinct of these insects' larvae. L. Botoşăneanu (1963) made a classification of all construction types of aquatic larvae of insects, separated in systematic groups from our country (also mentioning exotic species with special types of buildings). Some criteria of his classification are: the shape, the nature of building materials - organic (silk and other secretions, algae, vegetal detritus, leaves, wood, mollusk shells) or mineral (pebbles, sand), the mobility.

The exclusively mineral composition of some trichoptera larvae is already known (most Rhyacophilidae before pupation, Sericostomatidae, Glossossomatidae and other family's larvae), vegetal, or vegetal and mineral construction (most limnephilid larvae).

Most of caddisflies larvae keys, scientific articles describe the cases and some of their components in percentage without explanations on the origin or the method of obtaining these percentages. The characteristics of the larval or pupal case are still used to identify the family, genus even species (Tachet et all., 2000). Concerning particularly the species it is not anymore recommended as major criteria because the stressed larva (during the collection for example) which can live the case or, exceptionally, can use another species case after leaving its own (Wallace et all., 2003).

The main purpose of this study is to find out if some trichoptera larvae have any preference in choosing a construction material in natural conditions so we took a group of individuals large enough from a microhabitat. The microhabitat is described mainly by the substrate (Angelier, 2000). In our study the substrate was the area of the riverbed under a big rock from which we collected fixed pupa and last instar larval cases) of the species identified as *Allogamus auricollis*.

On the main course of Bistrița River, in the area of Vatra Dornei, the ground grevel is constituted mainly from cristaline schists present in the riverbed and also eocene calcares - apported by some of the tributaries - but „diluted" in the cristaline in this sector (Donisă & Poghirc, 1968).

MATERIAL AND METHODS

During the year of 2005 we collected macrobenthic fauna from the superior basin of the Bistrița River in May, July and September in six workstations: upstream of Cârlibaba, in the localities Ortoaia, Broşteni on the Bistrița River, and form its tributaries: Neagra Stream (locality of Neagra Broşteni), the Dorna River and the Negrişoara Stream - tributary of the Dorna River (near locality of Dorna Candreni).

Macrobenthic fauna was collected using a Surber sampler, conserved in formaldehyde 5%, sorted and identified on a binocular microscope.

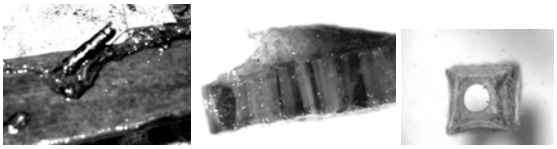
We identified a number of five families of Trichoptera mentioned in the order of abundance of the individuals, generally the same during the seasons at the collecting time: Limnephilidae, Hydropsychidae, Rhyacophilidae, Sericostomatidae and Brachycentridae.

We treated the mineral cases in KOH for 24 hours and dried them for 48 hours at 60°C to reduce the resistance of the silk matrix. The silk matrix was colored in eosin solution to observe the disposition of the pebbles and the sand grains.

The trial and the identification of the mineral components of each mineral case were made on a binocular microscope. The weight of each category of minerals for each case was measured on a digital balance, the results are given in milligrams.

REZULTS AND DISSCUTIONS

The limnephilids are the largest and most heterogenous group of thichopteres concerning the body morphology and diet, the manner and materials used in the construction of mineral, mixed or vegetal exclusively case (Fig.1 a).



a b c

Fig. 1 Trichoptera vegetal cases: a) a case of a limnephilid larva on woody substrate; b) square mainly vegetal case detailing the posterior end (c) of *Brachicentrus* sp. case.

Attempting to find out if there are some preferences in the choice of the construction materials we tried to analyze the cases of some species from the same habitat collected at the same time.

It is known that the larva of *Allogamus auricollis* from the family Limnephilidae builds its case from grosser sand and pebbles. With our method we described for mineral cases we analyzed 16 cases of last instar larvae and pupae of *Allogamus auricollis* fixed under a big rock (Fig. 4, a, b) collected from the Negrişoara stream in July 2005. We identified as mineral components of cases: quartzite, calcite, chlorite, mica and sandstone.

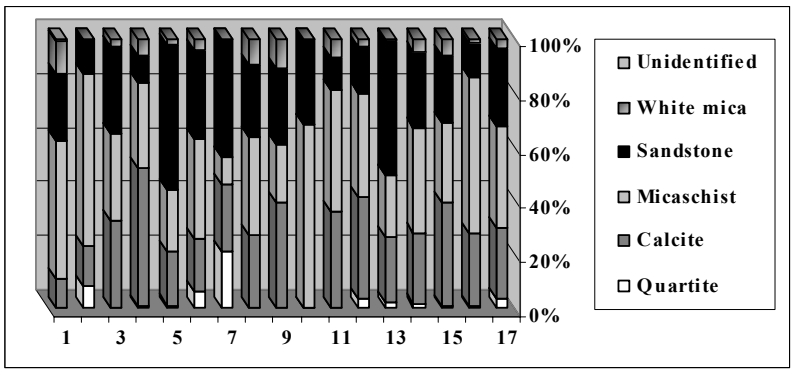


Fig. 2 Minerals utilization in the building of 17 last instar larval and pupal cases of *Allogamus auricollis* from Poiana Negri station (July 2005)

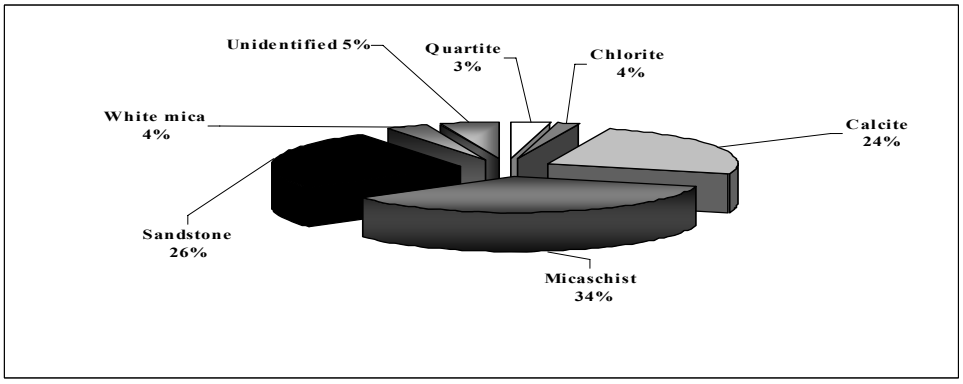


Fig. 3. Medium values in minerals use in the building of 16 last instar larval and pupal cases of *Allogamus auricollis* from Poiana Negri station (July 2005)

The weight of each category of minerals for each case was measured in a digital balance; the results are given in percentage of weight corresponding to the weight in milligrams for each mineral category in each case analyzed - figured on y axe of the diagram from 1 to 17 (Fig.2).

The geological map (1968) for the watercourse of Negrişoara Stream shows sedimentary deposits from the source to the confluence with Dorna River. A strong argument is the presence of a fossil, *Assilina* sp. (Foraminifera) from superior Paleocene – Eocene found in only one larval case as a construction material. The presence of this fossil confirms the sedimentary origin of the substrate.

Analyzing the proportion of the minerals used we can say that the mineral components are sedimentary. The existence of micaschist must be considered as lithic fragments with origin in sedimentary rock.

The medium values of these mineral categories for all the pupal and larval cases in the diagram (Fig.3).

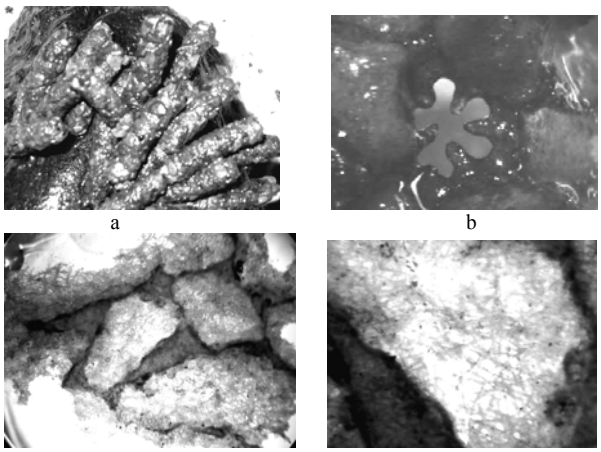
Sandstone and calcite are used in almost the same proportion, being the most resistant minerals available in the riverbed; the micaschist increases the weight, being mostly used. The mica is the most friable material comparing to the others; it is used in small quantities, comparable with the chlorite and the quartite. The entire structure becomes very resistant due to the matrix (Fig. 4, c, d). We found the species living in medium current velocity (25-50 cm/s), on stony substratum (dales, blocks, sand as the literature provide (Wallace et all., 2003).

In the sericostomatide's cases collected from the same station at the same time we identified the same mineral components at the last instar larvae of *Sericostoma personatum* Spencer (Fig. 5, a). We observed fine sand and very small pieces of the others minerals, almost perfectly cemented in the matrix so the surface appears scaled. The treatment method we used and the very small dimensions of the mineral particles didn't allow us to make the quantitative and qualitative study as we did for *Allogamus auricollis*. Its conical and apparently smooth form gives it hydrodynamic advantages so we could faind it in different water velocity area, mostly on stony substratum.

The rhyacophilid trough shaped pupal case (Fig. 5 b) was found under quite big stones. They are made from the most resistant categories of minerals (we didn't find mica scales) from the riverbed.

The pebbles of the cases are held together by silk, leaving between their margins space for the free circulation of the water. A very small number of pupal cases were integrally collected. We didn't find yet conclusive similarities between their cases.

The five brachycentrid last instar larvae we collected (in epirithron only in the study period time), *Brachicentrus subnubilus* Curt. and *Bracycentrus montanus* Klap., have similar cases, made from wood stripes and sand cemented with secretions, having resistant anchorage of silk and secretion (Fig. 1 b, c).



a b c d

Fig. 4. *Allogamus auricollis* a) the group of pupal cases; b) posterior end with secretions grill of the last instar larva case; c, d) details of the silk matrix of the pupal case.

a b

Fig. 5. Mineral cases *a) Sericostoma personatum* b) last instar larva of Rhyacophila sp. (arrow) in the case build before pupation (view after the artificial cut in his superior part).

CONCLUSIONS

We attempted to do a study on this amazing constructing behavior of the trichoptera larvae starting with the observations we made on some of their external aspects.

We were not able to define the composition of mixed cases (mineral and vegetal) in percentage, for the entire vegetal material, the identification being very difficult.

The study on *Allogamus auricollis* cases led us to the idea that the choice of the minerals is made in order of the availability of the mineral components (medium values: micaschist 34%, sandstone 26% calcite and 24%; chlorite 4%, white mica 4%, quartite 3%) in the riverbed, all having sedimentary rock origin considering the geological structure of the study area.

We observed at all the studied species with mineral cases that the silk matrix is conferring to the case the resistance to breakages. In the vegetal cases mainly the secretions have this role.

Considering preliminary our data, we intend to search for correlations in other physical parameters of the used minerals, analyzing also, by the same method, cases of the same species colonies of pupal and larval cases from other workstation and try to check them in the laboratory.

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REZUMAT

Trichopterele sunt un grup bine reprezentat în fauna macrobentică a râului Bistrița, regăsindu-se în listele de specii bioindicatoare a calității apei în ecosistemele lotice. De la izvoare până la vărsare în lacul Bicaz, în fauna macrobentică a râului Bistrița s-au identificat în anul 2005 specii aparținând la cinci familii, din care patru familii construiesc căsuțe de diferite tipuri. Lucrarea îşi propune să inventarieze şi să caracterizeze principalele tipuri de căsuțe şi natura minerală şi organică a materialelor utilizate în raport cu tipul de substrat colonizat.

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