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Which caddis larvae construct a new case for pupation?

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Abstract. Several species of limnephilid larvae construct new cases before pupation, but in other closely related species this behaviour was not observed.

Larvae of case-building caddisflies are known to extend their cases at the anterior end as they grow, and to cut off posterior sections which become too narrow for the larval body. Normally, the larva pupates in the larval case of the last instar after adding some larger stones at both ends, fastening the posterior or both ends somewhere on a rock or a similar structure and closing both openings.

In recent years I found several publications in which the construction of a separate pupal case in case-bearing caddis larvae was described as an extraordinary und phylogenetically remarkable fact.

WIGGINS (1998) points out that species of the genus *Yphria* (Phryganeidae) and the family Phryganopsychidae construct an entirely new and different case for pupation at the end of the final instar. "In all other phryganeids and, to my knowledge, in all other case-making families, the pupation occurs in the larval case." (l.c.:16). "This behaviour in *Yphria* and *Phryganopsyche* could be interpreted as a relict condition for the common ancestry of the Annulipalpia and Integripalpia." (l.c.:31).

"Phryganopsychid larvae construct a short rigid pupal case of woody materials for pupation. Construction of a different case for pupation is known elsewhere in the Integripalpia only in the atypical phryganeid genus *Yphria*; but larvae in all families of the Annulipalpia also construct a new enclosure for pupation, and this is interpreted as plesiomorphic behaviour." (WIGGINS & GALL 1993:151).

ZWICK (1998) observed that larvae of *Micrasema longulum* McL. (Brachycentridae) likewise construct a separate pupal case by building a very long case during their last instar and removing the posterior part.

These publications reminded me of an almost forgotten field observation in April 1971 in Crete where larvae of a limnephilid were common in some places. Most probably it was *Micropterna taurica* MART. (Limnephilidae). In the photograph, the larva on the left still has its typical case with a smooth surface, covered with carefully selected small flat stones. On the right is a pupal case from the same place, covered with coarse, irregularly arranged stones.

Among the hundreds of cases were some which had both conditions together. The anterior end of the case was then covered with coarse and the posterior end with smooth stones. Some of these cases were almost twice as long as a normal larval or pupal case. These larvae were able to construct a pupal case very quickly, maybe in a period of less than one hour. After the coarse pupal part was finished, the smooth larval part was bitten off, and the remaining empty smooth cases were found in large numbers on the stream bottom. Note that the smooth larval case is conical and slightly curved, while the coarse pupal case is cylindrical and straight.

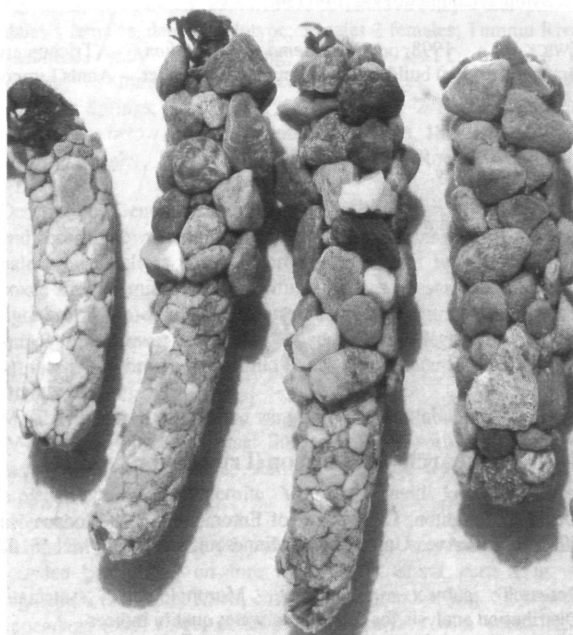
Looking through my larval collection I found more examples. These larvae were bred in the laboratory so their specific identity and common origin from one female was certain.

Potamophylax nigricornis PICT. and *Halesus digitatus* SCHRANK normally show the usual condition where only the anterior end or both ends are covered with some larger stones before pupation, but in the cases on the right one can see that they may also be completely or almost completely covered with coarser material which indicates an occasional construction of pupal cases by a few individuals.

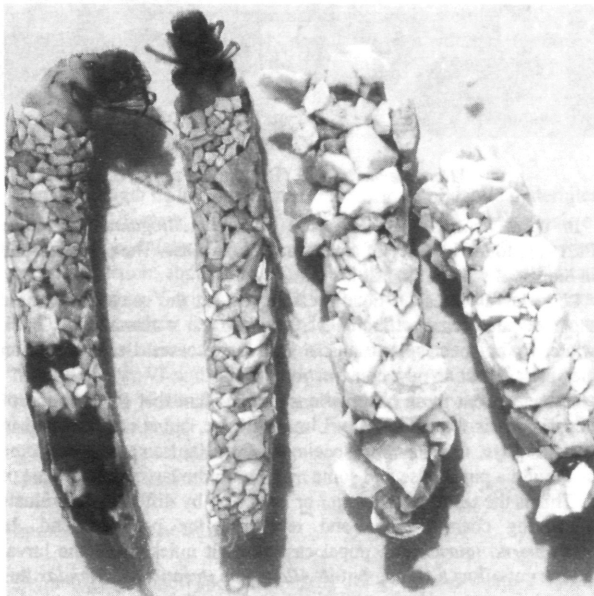


Potamophylax nigricornis (Wienerwald, Austria)

In *Allogamus uncatus* BRAUER and *A. mendax* MCL. the different shape of larval and pupal case is clearly seen, and it appears that this

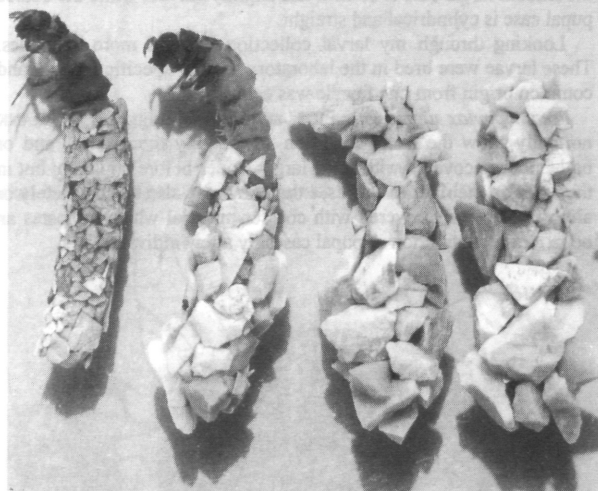


Micropterna taurica (Spili, Crete)

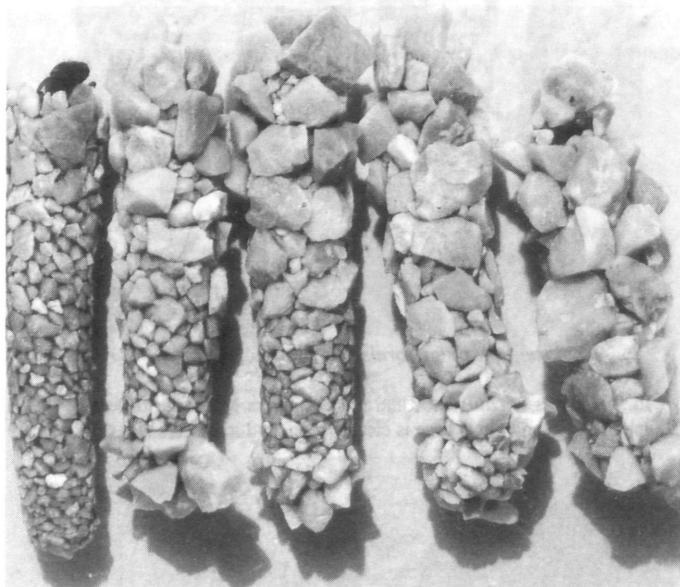


Allogamus uncatus (Lunz, Austria)

is normal in these species. The same may be true for *Micropterna nycteroberia* MCL. and *M. sequax* MCL. In some cases in the latter one may see the progressive replacement of fine by coarse stones, but the total length of the case remains more or less the same. This means that the pupal case is not necessarily constructed in a short time, but takes longer while the posterior end is bitten off in separate smaller portions.



Allogamus mendax (Gd.St.Bernard, Switzerland)



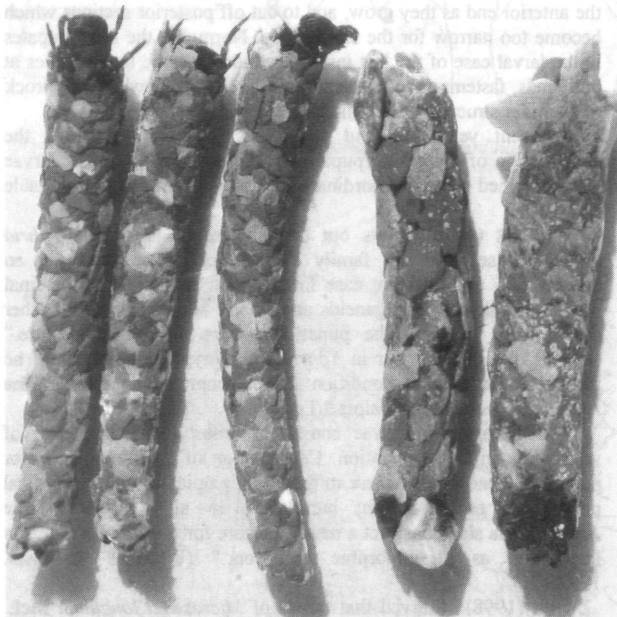
Micropterna sequax (Bretagne, France)

In other species, e.g. the very common *Allogamus auricollis* PICTET, I found no trace of a separate pupal case. The pupa is found in the larval case of the last instar.

Long larval cases do not necessarily mean the construction of a separate pupal case. *Allogamus pertuli* MAL., a remarkable Greek winter-flying species, has unusual long larval cases. Before pupation they are cut, but no new construction occurs.

From these observations it is evident that construction of pupal cases is found in many Limnephilidae, but it is performed in various ways. Even among specimens from the same mother, some may build a pupal case and some may retain the larval case or part of it. This is the result of an earlier or later stop by different individuals in adding coarse stones and removing the posterior end. In *Micropterna taurica*, the pupal case is built quickly and the larval case is cut off as a whole, but in *Allogamus uncatus* and *mendax* this happens in stages. However, indications of such behaviour were also found in *Halesus digitatus* and *Potamophylax nigricornis*.

It is likely that the construction of a separate pupal case occurs in many species in other families where it has been overlooked. At the present state of our knowledge it is clear that caddis larvae with this behaviour do not constitute a monophyletic group. Workers are free to speculate about phylogeny, and certainly behavioural and anatomical as well as eidonomical characters are equally acceptable for phylogenetic study. However, it must be pointed out that behavioural characters to be analysed are the details of behaviour, such as inherited motions and programmes performed by the animals themselves. The products such as cases, nets and the like, are not suitable for this purpose. This point is unfortunately often overlooked.



Allogamus pertuli (Karpenision, Greece)

References

- WIGGINS, G.B., 1998, The caddisfly family Phryganeidae (Trichoptera). – University of Toronto Press, 306 pp.
- WIGGINS, G.B., GALL, W.K., 1993, The Asian caddisfly family Phryganopsychidae: phylogenetic novelty or relict? – Proc. 7th Int. Symp. Trichoptera 1992:149-154.
- ZWICK, P., 1998, *Micrasema longulum* (Trichoptera: Brachycentridae) builds a special pupation chamber. – Annls Limnol. 34:437-444.

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