Notes on the Life Cycle of *Rhyacophila nubila* (Zett.) (Trichoptera) in a North Swedish River [1]

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Abstract

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The larval development of *Rhyacophila nubila* (Zett.) was followed 1973—75 in a small river in northern Sweden. The species has 5 instars in the river. The pattern of larval development is very complex. No definite statement can be made, but it is assumed that *R. nubila* is univoltine with two groups emerging at different times. No clear separation exists between the groups, hence the flight period is protracted and all larval stages can be found simultaneously during the summer.

Introduction

One of the dominant features of running waters is the continuous transport of fine particulate organic matter (FPOM). This constitutes the food base for several important bottom invertebrates, e.g. simuliids and net-spinning trichopterans. One successful predator being able to exploit the important food-chain FPOM-Simuliidae is the genus *Rhyacophila,* Trichoptera (Schwoerbel 1971, Ezenwa 1974, Karlström unpubl.). Many species of *Rhyacophila* are also abundant in fast-flowing streams (Percival & Whitehead 1929, Schwoerbel op. cit., Thut 1969).

The genus *Rhyacophila* is large. In Europa there are at least 72 species (Botosaneanu 1967) and in North America about 100 species (Wiggins 1966). In northern Sweden 3 species occur, with *R. nubila* (Zett.) as the dominating one. Despite its importance the lifecycle of *R. nubila* has not yet been worked out (Ulfstrand 1968). The species has a protracted flight-period, extending up to 4 months (Tobias 1969, Göthberg 1970, 1973).

Other species within the genus *Rhyacophila* have also been found to have a complex lifecycle (Thut 1969, Hynes 1970: 295).

The aim of this paper is to contribute to the understanding of the lifecycle of *R. nubila.*

Investigation area

The river Rickleån, 48 km long, has its rise in lake Bygdeträsket (29 km²) and enters the Bothnian Bay approximately 50 km north of Umeå (64°5′N). It is a small river, with stones and boulders in the rapids, surrounded mainly by forests. Further information can be found in Karlström (1973), Göthberg & Karlström (1975).

Methods

The material was taken with a semi-quantitative bottom fauna sampling device, using colonization baskets filled with stones from the river (Karlström 1974 a, b). The samples were screened through a net with a mesh-size of 250 µm. Head capsule measurements were made with an adjustable eyepiece micrometer.

Results and discussion

In the river *R. nubila* appears to have 5 instars, easily separated (Fig. 1). This phenomenon has also been reported for other species of *Rhyacophila* (Thut 1969).

During the summer all instars can be found and the instar frequency distribution shows

[1] Report from the Rickleå Field Station No 65.

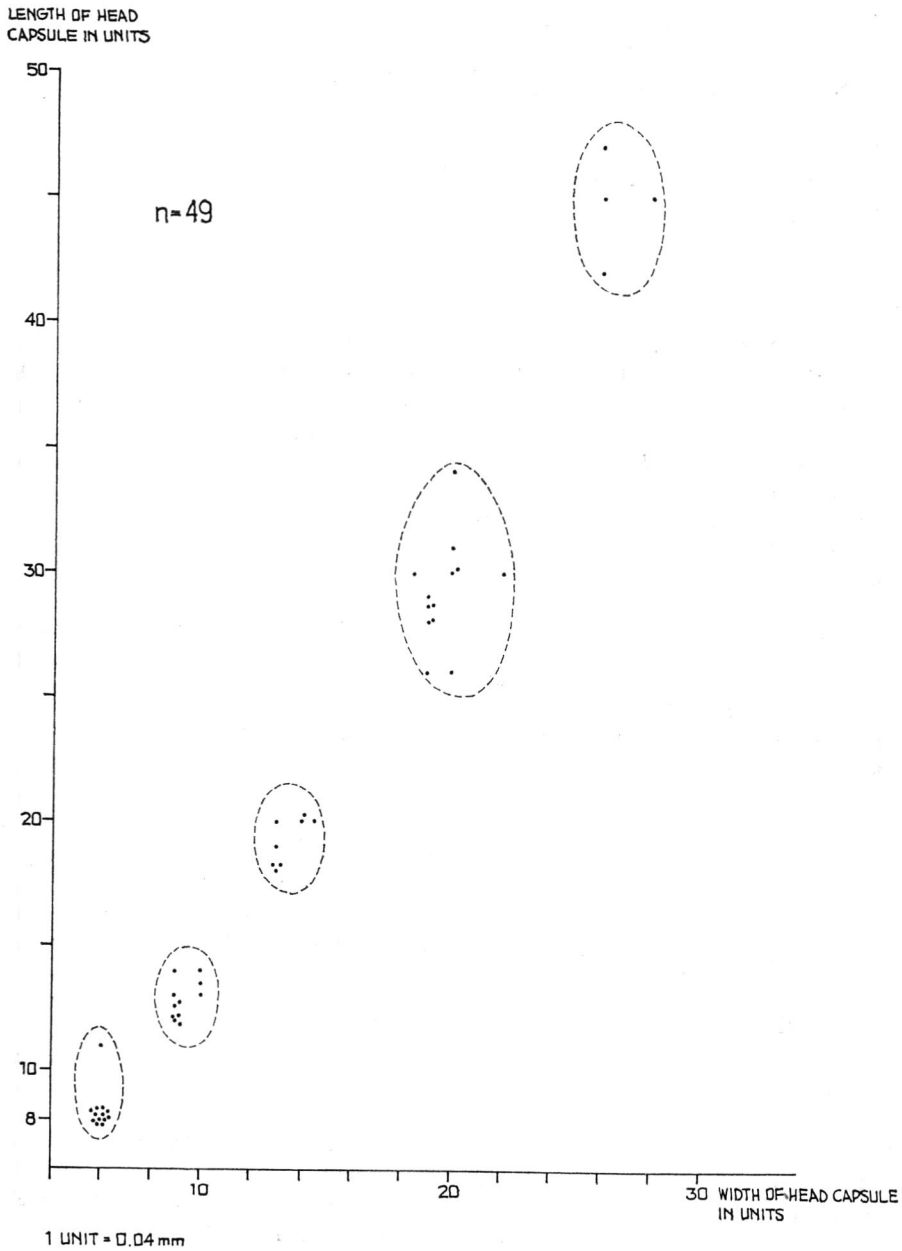

Fig. 1. Length and width of the head capsule of *Rhyacophila nubila* (Zett.). The material is from Storlångforsen rapids, Rickleån river Aug. 18, 1973.

no distinct peak. In the late autumn the distribution pattern changes giving a peak of small instars (Fig. 2). A successive change is brought about during the winter, and in the spring larger instars dominate. No eggs seem to hatch during the winter, and, thus, it appears that each autumn a cohort starts to grow and in the early summer this cohort concludes its larval development.

The instar frequency distribution shows

generally an unimodal pattern. During the weeks 29—36 1973, there is a slight tendency towards a bimodal pattern. But it is not possible to state definitely whether the species has one or two generations per year. It is, however, not likely that a large species like *R. nubila* would be able to develop a second generation during the summer. In the literature the univoltine lifecycle seems to be the dominating one within the *Rhyacophila*.

Ulfstrand (1968) assumed that *R. nubila* has a two-year cycle in the river Vindelälven. Part of his data support the assumption, but he only occasionally found 1 st instar larvae. Ulfstrand used the total body length to characterize the larval stage. This method is, however, not without limitations, which Ulfstrand also admits. The data from the river Rickleån hardly permit a two-year cycle. Thut (1969) reported that for *R. verrula* Milne all instars were found at practically every sampling date and that the emergence pattern was diffuse. He believes the species to be univoltine.

It is reasonable to assume that the protracted flight-period of *R. nubila* is accompanied with copulation, oviposition and hatching of eggs during the whole vegetation period. Individuals emerging early in the summer will give rise to next year's first specimens. These are followed later in the summer by a second, more numerous group, giving birth to the autumnal peak of 1 st instar larvae. But there is no definite separation between the two groups, which results in a long, unbroken flight-period and simultaneous occurrence of larvae of all instars during the summer. Smith (1968) also found that a species of *Rhyacophila* had two peaks of emergence, one in early spring, and the other in early fall. He assumed that the two groups were of the same generation.

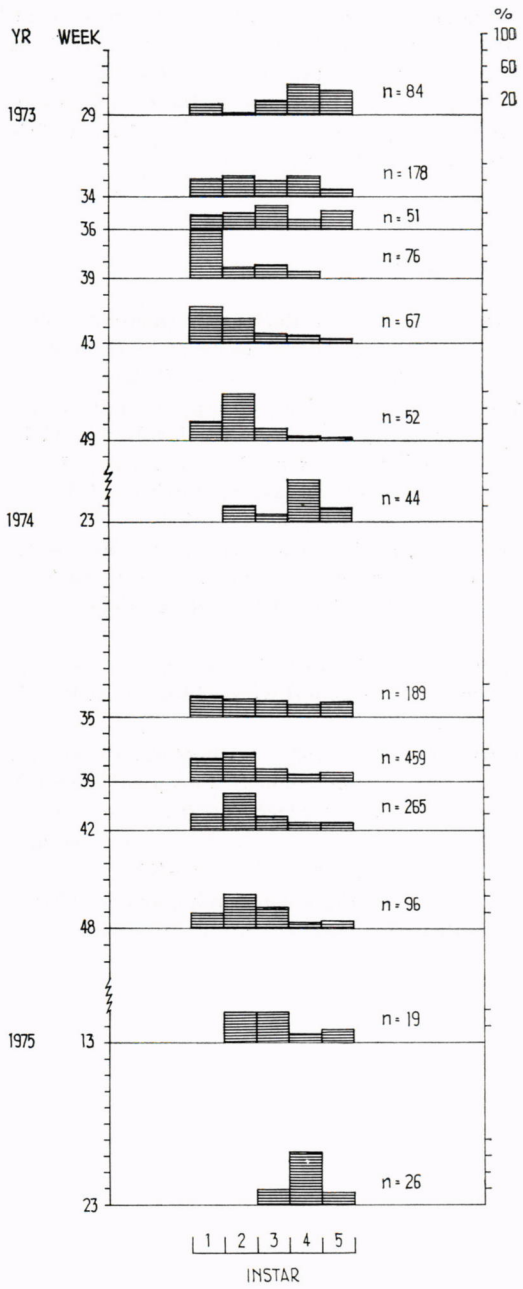

Fig. 2. Instar frequency distribution of *Rhyacophila nubila* (Zett.) from Storlångforsen rapids, Rickleån river 1973—75. Frequencies are given in per cent.

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