

CHIRONOMID (DIPTERA) PUPAE. MORPHOLOGICAL, BEHAVIORAL AND PHYSIOLOGICAL ADAPTATIONS

Summary

For over two recent decades chironomid pupal exuviae instead of larvae of these dipterans have been used as good indicators (biomonitors) of water quality due to difficulties with the larvae: firstly in identifying this stage and secondly in spending much time to sort bottom samples. In turn the collection of pupal exuviae is an effective method to collect complete species assemblages and to gain knowledge on chironomid diversity. The pupal thoracic horn (respiratory organ) is an important diagnostic character used by taxonomists to separate species. Recent investigations of the chironomid thoracic horns show a significant relationship between their morphological characters and physiological and behavioural adaptation of pupae. The primitive respiratory organ of most Podonominae and Tanypodinae is a double-walled tube with a smaller or larger plastron plate (surface of intensive oxygen uptake).

In turn lentic, oxyregulatory species of Chironomini (Chironominae) possess a developed plumose thoracic horns, extensive anal fringe (to perform undulatory movements of the abdomen to drive water through the silken tube), and large body size, like *Chironomus*. This genus inhabited environments poorer in oxygen than those inhabited by taxa with a less extensive respiratory surface and fringe and small body size (*Paratendipes*, *Polypedilum*, *Microtendipes*). Hemoglobin concentration in Chironomini was not correlated with its morphology: both the body size and the surface development of pupal thoracic horns. Probably the hemoglobin level reflects a fast response to short-term environmental fluctuations (oxygen), while morphological changes may be a response to a long-term adaptation to oxygen level.