

# 3. Biology

The genus *Elachista* comprises most of the world's species of Elachistinae, with all the known species feeding on monocotyledonous plants. The genera feeding on dicotyledons, *Perittia*, *Urodeta* and *Stephensia*, together comprise less than 10% of the species in the subfamily.

The level of host plant specificity varies between species. Data from Europe suggest that a majority of species in the Elachistinae are not strictly monophagous, i.e. accepting only one plant species as their host. The majority of grass-feeders use several species of grasses, with the leaf structure perhaps a more significant selection criterion. Some species accept a number of distantly related soft and broad-leaved grass species as their host, while others may specialise in another assemblage of equally unrelated grasses with a sclerophyllous structure. Parenti and Varalda (1994) gave a summary of the published literature of host plant records of the Elachistinae, supplemented by their own observations. This source should be used cautiously since identification errors of plant or moth species in the original references were not corrected and, unfortunately, in several cases the original papers, which were not written in English, were misinterpreted, causing further confusion. This has led to the conclusion that some species are more polyphagous than they probably are in reality. For example, the host plant records of *Elachista albidella* and *E. albifrontella* from Huttunen (1980) have been confused with each other in Parenti and Varalda (1994), giving the impression that both species use both Poaceae and Cyperaceae as host plants. Likewise, Parenti and Varalda (1994) stated that the sedge-feeder *E. cinereopunctella* feeds on several Poaceae, referring to Gustafsson (1983) who actually only recorded the species in a habitat where these grasses grew. I am aware of only one case of an *Elachista* species (the European *E. albifrontella* Zeller) which has rarely been recorded on a host of another family (*Carex* in Cyperaceae) as well as on its ubiquitous range of grass hosts. Sometimes adults of *Elachista nobilella*, also a grass-feeder, emerge from rearings of the Juncaceae/Cyperaceae-feeding *E. gleichenella* (F.). This appears to be due to the full-grown larvae of *E. nobilella* accidentally being sampled with tufts of the host of

*E. gleichenella* (J. Tabell, *pers. obs.*). Further examples of species accepting both Poaceae and Cyperaceae as host plants may be verified in the future. However, sharing these plant families as host plants seems exceptional and accidental in the field, even if the larvae can be persuaded to accept unusual host plants in laboratory experiments (Parenti and Varalda 1994). Several sedge-feeding species in the *Elachista gleichenella* and *E. tetragonella* groups are frequently also found on Juncaceae, suggesting that this kind of shift is less demanding than a shift from Poaceae to Cyperaceae or vice versa.

The pattern observed in the members of the species-rich Australian *Elachista gerasmia* group gives a somewhat different picture. They often seem to be specific to their host plant species, and will accept only one or few host plants even if there is a large selection of closely related plants available in the genus *Lepidosperma*. Unfortunately, the taxonomy of *Lepidosperma* is controversial and, especially in Western Australia, appears to be in turmoil. Therefore the species of *Lepidosperma* from which *Elachista* have been reared have often been impossible to identify using contemporary sources. The author hopes *Lepidosperma* taxonomy progresses rapidly, as these plants have an important impact on the indigenous Australian *Elachista* species. They could provide a useful tool for the field identification of *Elachista* larvae, as rearing is by far the most fruitful way of obtaining specimens for most species of the *E. gerasmia* group.

In studies such as Stehr (1987), Traugott-Olsen and Nielsen (1977) and Kristensen (1998), the elachistine larva is characterised as typically prognathous, dorsoventrally flattened and with somewhat widened thoracic segments. While true for a majority of species in the northern hemisphere and the Australian representatives of those lineages, these traits do not unambiguously describe the larva of the *E. gerasmia* lineage that dominates the known Australian elachistine fauna.

The egg is laid on the surface of the host plant. The larva eats its way through the egg shell and the plant epidermis into the plant tissue, where it starts internal feeding. The egg shell remains on the plant apparently intact, sometimes for over a year if the