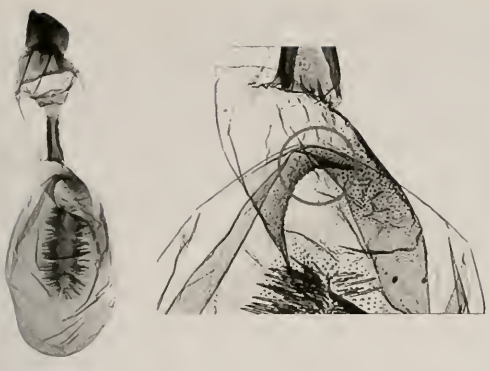

Fig. 1. *P. flexilinea* Warren.

Fig. 2. Potential new species.

3. A potential new species in the genus *Parasthena* Warren.

Specimens from Seram and Papua New Guinea were mentioned by Holloway (1997: 184) as "a related, somewhat more strongly marked, undescribed species", and the taxonomic status of this material has not been decided in the paper of Xue & Scoble (2002). Further female genitalia evidence has been found (Figs 1-2) now for separation: The potential new species shows an additional spinose crest in the posterior part of the corpus bursae, while this structure is absent in *P. flexilinea* Warren, 1902. The signum is much wider than in *P. flexilinea*. So, the material might belong to a potential new species in *Parasthena*.

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The Identity of the Australian Archiearinae

Peter B. McQuillan

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Dr. Peter B. McQuillan, School of Geography and Environmental Studies, University of Tasmania, Hobart; e-mail: P.B.McQuillan@utas.edu.au

The small subfamily Archiearinae is putatively basal in the Geometridae and amphipolar in distribution. The Australian members comprise 5 described and 2 undescribed diurnal species in two genera (*Acalyphes* Turner and *Dirce* Prout) restricted to the mountains of Tasmania. They have been allocated to the Archiearinae (sensu Fletcher 1953) on morphological criteria, but features such as their general hairiness, melanized cuticle, bright colours and rapid flight may be homoplasious.

New molecular evidence (28S D2) from a cross-section of ennomine genera and including *Archiearis* Hübner, identifies *Acalyphes* and *Dirce* as a clade embedded in the Australian generalised Ennominae, and the sister group to a cluster of southern Australian genera, including *Mnesampela* Guest and *Paralaea* Guest,which have a full complement of prolegs in the larvae. *Acalyphes* larvae have extra

prolegs on A3 to A5, as do their sister clade. However, extra prolegs are missing in the larvae of *Dirce*. Both *Acalyphes* and two species of *Dirce* feed on primitive endemic conifers, whereas *D. solaris* and *D. lunaris* are associated with Epacridaceae and Myrtaceae respectively. *Archiearis* is placed well outside most of the Australian ennomine genera analysed in a wider study.

On this evidence we conclude that the Australian "Archiearinae" are derived from an endemic Australian ennomine group, and that feeding on conifers is a derived rather than ancestral trait. Australian Myrtaceae are rich in essential oils such as alpha-pinene and cineole, so later adoption of conifers as foodplants may not be extraordinary. Their relationship to phenotypically similar southern Andean archiearine taxa, such as *Archiearides* Fletcher and *Lachnocephala* Fletcher, remains to be critically analysed. Extra prolegs in geometrid larvae appears to be a highly labile character, at least in some Australian higher taxa.

Some results of taxonomic research on larentiine moths from the Australasian region

Olga Schmidt

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Olga Schmidt, Münchhausenstr. 21, D-81247 München;
e-mail: olgaschmidt@hotmail.com

The Larentiinae are very diverse in the Australasian region. In Australia, the subfamily comprises about 280 described species in 46 genera. Larentiine moths are found in a variety of habitats from dry sclerophyll areas to rainforests. In Australia they are particularly diverse in the south-eastern tablelands and mountains, including Tasmania.

The main part of my research interest focuses on understanding phylogenetic relationships within larentiine geometrid moths at a higher taxonomic level. Current classifications of the subfamily are mostly based on taxa from the Holarctic region but a wider geographical approach is required. Taxonomic revisions of groups from other zoogeographical regions will provide the basis for creating a natural classification. In this respect taxonomic studies of genera from the Australasian region are important. In Australia, I reviewed the genera *Anachloris* Meyrick, *Chaetolopha* Warren, *Parachaetolopha* Schmidt, and *Scotocyma* Turner, as detailed below.

The Australasian genus *Anachloris* now includes three species. Their larvae feed on several species of *Hibbertia* (Dilleniaceae). Colour dimorphism was observed in later larval instars. Study of external characters and genitalia, as well as male genitalia musculature, revealed that the genus *Anachloris* does not belong to the tribe Hydriomenini in which it is currently placed. Six Australian species were assigned to the genus *Chaetolopha*, while for eight Papuan high altitude species a new genus, *Parachaetolopha*, was erected. A phylogenetic analysis yielded strong support for the separation of *Parachaetolopha* from *Chaetolopha* and the monophyly of *Parachaetolopha* is supported by ten synapomorphies. The Australasian genus *Scotocyma* is diverse in tropical and subtropical regions. Larvae of the type species, *S. albinotata*, feed on *Coprosma repens* (Rubiaceae). The tribal position of the genus is investigated. Several morphological characters support its placement in the tribe Xanthorhoini.