



The Australasian Genus *Scotocyma* Turner (Lepidoptera: Geometridae: Larentiinae)



Olga Schmidt

Zoologische Staatssammlung München

Introduction

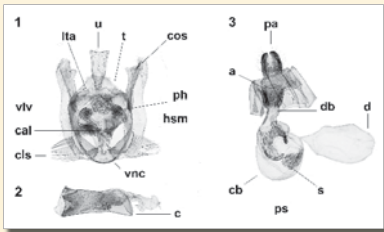
The Larentiinae, a large subfamily of the looper moth family Geometridae, has a worldwide distribution, with the highest species diversity in temperate regions [1]. The larentiine genus *Scotocyma* is atypical for the subfamily in this respect because it occurs mainly in tropical and subtropical regions.

The genus contains medium-sized, rather uniformly brownish-coloured moths. The male and female genitalia have the best diagnostic characters for precise species identification. Nevertheless, in most species the genitalia have not been studied so far, which revealed the need to a critical revision of the genus.

A revision of the genus *Scotocyma* has been done recently [4], [5]. The results are as follows:

- Keys to species and distribution maps were provided;
 - A phylogenetic analysis was performed to test the monophyly of the genus;
 - Distribution patterns of the species were examined;
 - A biogeographic discussion was included;
 - The tribal position of the genus was clarified.
- Some results of this study are presented here.

Nomenclature of the genitalia



S. samoensis: 1 - male genitalia, armature; 2 - aedeagus; 3 - female genitalia.

a - antrum; c - coecum; cal - calcar; cb - corpus bursae; cls - comb-like structures; cos - costa valvae; d - diverticulum; db - ductus bursae; hsm - hood-shaped membrane; Ita - lateral tegminal arms; pa - papillae anales; ph - patches of hair; ps - patch of sclerotisation; s - signum; t - tegumen; u - uncus; vlv - valva; vnc - vinculum.

Diagnosis

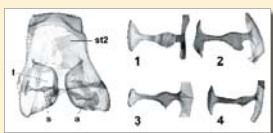
- **Adult.** Labial palpus thick, short, curved. Antenna simple in both sexes. Hind wing with termen crenulate. Underside of wings with contrasting whitish bands. Ansa with a small scoloparium.
- **Male genitalia.** Uncus simple or broadened distally; valvae narrowed medially, with comb-like structures or their rudiments; calcar present; aedeagus thick and short.
- **Female genitalia.** Antrum large, sclerotised, broadened distally, folded; corpus bursae membranous, with patches of sclerotisation on its ventral and dorsal sides, with large diverticulum; ductus seminalis inserted ventrally on corpus bursae; signum present.



S. sumatrensis, the labial palp.



S. sumatrensis, underside of wings.



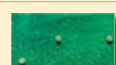
Tympanal organ of *S. sumatrensis* and ansa of: (1) *V. excentrata*, (2) *S. miscix*, (3) *S. albinotata*, (4) *S. scoptepla*; a - ansa, s - scoloparium, st2 - sternum2, t - tympanum.



Male coremata and ring between the seventh and eighth segments in *S. sumatrensis*.

Biology

Little is known of the biology of *Scotocyma* species. Larvae of *S. albinotata* were found feeding on *Coprosma repens* (Rubiaceae). The plant is native to New Zealand and widespread in the Pacific Basin. Reports on other species are lacking.



Eggs of *S. albinotata*.



The larva of *S. albinotata* in alert position.



The larva of *S. albinotata* feeding on *Coprosma repens*.

Habitat



The Bunya Mountains (E Australia), one of the localities of *S. albinotata*.

The species of the genus *Scotocyma* occur mainly in the subtropical and tropical primary forest at moderate to rather high elevations of 340-1800 m.

The *Scotocyma* species seem to be rare, since few specimens were obtained in most areas, even where collecting has been strategic and intensive.

Distribution

The genus *Scotocyma* is widely distributed in the Australasian region from Papua New Guinea in the west, to Samoa Islands in the east, including the north- and central-eastern Australia and New Caledonia, Borneo, Sulawesi, and Sumatra.

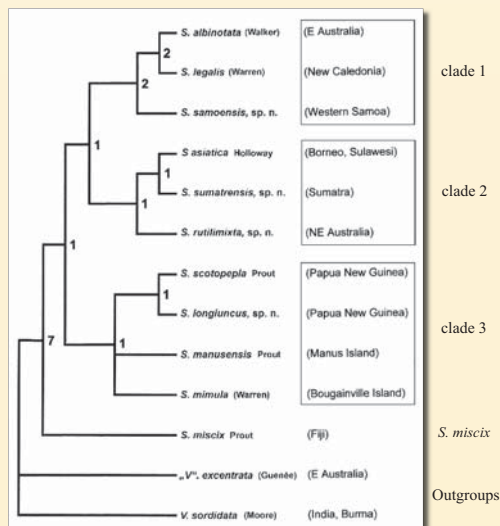


Distribution map of the genus *Scotocyma*.

Results

The phylogenetic analysis was performed using PAUP* version 4b10 [6]. Bremer support values were calculated with AutoDecay version 4.0 [2] and PAUP*. The figure below (strict consensus tree) was prepared using MacClade version 3.07 [3].

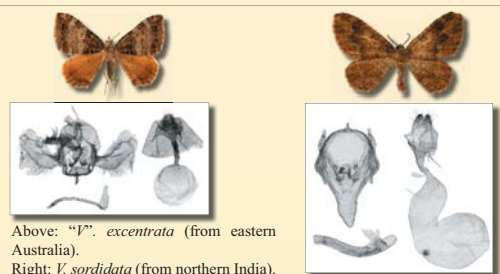
Fifty morphological characters were used in the phylogenetic analysis. All multistate characters were treated as unordered and all characters had equal weight. Twenty seven characters were binary, the rest were multistate with three to seven states. The data matrix is given in [4].



Strict consensus tree. Bremer support for the nodes is shown.

Outgroups

Two species of the genus *Visiana* s.l., namely *V. sordidata* (Moore), the type species of the genus, and "*V.*" *excentrata* (Guenée) were chosen as outgroup taxa for the phylogenetic analysis because they are presumably closely related to the species of the genus *Scotocyma*.



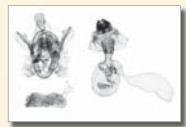
Above: "*V.*" *excentrata* (from eastern Australia). Right: *V. sordidata* (from northern India).

clade 1

The characters defining the first clade are:



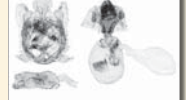
S. albinotata



Teeth on lateral tegminal arms strongly developed;



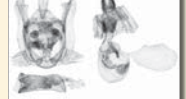
S. legalis



Folds in antrum rather broad, two or three on each side.



S. samoensis

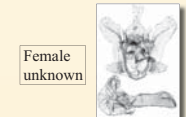


clade 2

The character defining the second clade is:



S. asiatica

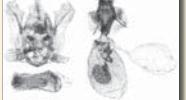


Female unknown

Brownish median band in a forewing underneath with medial projection outwards narrowly rounded.



S. sumatrensis



S. rutilimixta



Male unknown

clade 3

The characters defining the third clade are:



S. scoptepla



Female unknown

Brownish median band in forewing underneath with medial projection outwards rather sharp;



S. longiuncus

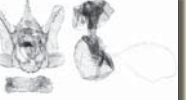


Female unknown

Medial spot at the termen in forewing underneath medium-sized, square, with distinct edges;



S. manusensis



Signum in corpus bursae shifted to the side.



S. mimula



Male unknown

S. miscix

S. miscix from Fiji Islands is a sister group to the rest of *Scotocyma*.



References

- [1] Common, I.F.B. (1990). *Moths of Australia*. (Melbourne University Press: Melbourne).
- [2] Eriksson, T. (1998). AutoDecay 4.0 (program distributed by the author). Department of Botany, Stockholm University, Stockholm.
- [3] Maddison, W.P. & Maddison, D.R. (1992). MacClade: Analysis of Phylogeny and Character Coevolution. Version 3 Documentation. Sinauer Associates, Sunderland: Massachusetts.
- [4] Schmidt, O. (in press). A revision of the genus *Scotocyma* Turner (Lepidoptera: Geometridae: Larentiinae). *Australian Journal of Entomology*.
- [5] Schmidt, O. (in press). Australasian genus *Scotocyma* Turner (Lepidoptera: Geometridae: Larentiinae) and the recently described species *S. sumatrensis* Schmidt. *Heterocera Sumatrana*.
- [6] Swofford, D.L. (2002). PAUP*. Phylogenetic Analysis Using Parsimony (*and Other Methods). Version 4. Sinauer Associates, Sunderland, Massachusetts.