

MONOGRAPH OF THE AMPHISIELLIDAE
AND
TRACHELOSTYLIDAE
(CILIOPHORA, HYPOTRICHA)

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Monograph of the
Amphisiellidae
and
Trachelostylidae
(Ciliophora, Hypotricha)

by

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Dedication

This book is dedicated to my mentor and friend Wilhelm (“Willi”) Foissner (University of Salzburg, Austria) on the occasion of his 60th birthday. Willi is a sedulous worker who provided many significant contributions to the systematics of the amphisiellids

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Preface

The present book is a monograph about two groups of hypotrichous ciliates, namely the Amphiseliidae and the Trachelostylidae. It is the third of six volumes which review the Hypotricha, one of the three major taxa of the spirotrichs. The first volume is about the Oxytrichidae, a rather large group, many species of which have 18 highly characteristically arranged frontal-ventral-transverse cirri and, much more importantly, a comparatively complex dorsal ciliature due to (oxytrichid) fragmentation of dorsal kineties during cell division (Berger 1999).

The second volume deals with the Urostyloidea, which are characterised by a zigzag-arrangement of the ventral cirri (Berger 2006). Although this pattern is often very impressive, it is a relatively simple feature originating by a more or less distinct increase of the number of frontal-ventral-transverse cirri anlagen. These anlagen produce cirral pairs which are serially arranged in non-dividing specimens. Some users are likely astonished that the monograph on urostyloids does not include *Uroleptus*, a group of tailed species, which also have a distinct zigzagging cirral pattern. However, morphological and molecular data indicate that the zigzag pattern of *Uroleptus* evolved independently, that is, convergently to that of the urostyloids. Thus, *Uroleptus* was excluded from the urostyloid review. A zigzag pattern is also known from some oxytrichids, for example, *Neokeronopsis*, *Territricha*, *Pattersoniella*, showing that this pattern evolved several times independently (Berger 1999, 2006, Foissner et al. 2004).

The present volume reviews the Amphiseliidae and the Trachelostylidae. The Amphiseliidae are characterised by a more or less distinct ventral file, termed amphiseliid median cirral row. Amphiseliids produce their frontal-ventral-transverse cirri from six anlagen (I–VI), a feature taken over from the ground pattern of the hypotrichs. The amphiseliid median cirral row usually originates from the two rightmost anlagen (V and VI); in some taxa, anlage IV forms the middle portion of the row. The anterior portion is formed from anlage VI and can therefore be easily homologised with the frontoterminal cirri of the 18-cirri hypotrichs. The amphiseliids have, like the urostyloids and some other taxa, taken over the simple dorsal ciliature from the ground pattern of the hypotrichs, that is, they basically have three bipolar kineties which divide by intrakinetal proliferation. There is of course some variation in the number of dorsal kineties within the amphiseliids. In some “amphiseliid” taxa, the formation of the dorsal kineties is not known, or they do not form a distinct amphiseliid median cirral row. They are preliminarily classified as incertae sedis in the amphiseliids, unless I could find a more parsimonious solution.

Few species previously assigned to the amphiseliids have dorsomarginal rows, that is, dorsal kineties which originate from/near the anterior end of the right marginal row primordia. Dorsomarginal rows are characteristic for the oxytrichids, but also for *Uroleptus* and some other taxa. To include these taxa, the Dorsomarginalia have been established (Berger 2006, p. 38). Consequently, the few “amphiseliids”

which possess dorsomarginal kineties are very likely misplaced in this group. Since their true position is not yet known, they are treated in the present book as non-oxytrichid Dorsomarginalia.

Few “amphisiellids” very likely have a dorsal kinety fragmentation characteristic for the oxytrichids, namely *Pseudouroleptus* and *Amphisiellides*. Thus, they are treated in a supplement to the oxytrichids.

Trachelostyla, the eponymous type of the Trachelostylidae, has been assigned to various higher taxa. It is an 18-cirri hypotrich which lacks dorsomarginal rows, but shows a multiple fragmentation in dorsal kinety 1 and forms two complete bipolar kineties from kinety 6 (Shao et al. 2007). The phylogenetic positions estimated from molecular data are varying (Schmidt et al. 2007, Shao et al. 2007), but indicate that *Trachelostyla* branched off rather early in the hypotrich tree. The trachelostylids are a small marine group possibly related to *Gonostomum*-like hypotrichs – a mainly terrestrial group previously mistakenly assigned to the oxytrichids (Berger 1999) – because the oral apparatus is similar and the postoral ventral cirri are displaced anteriorly.

Amphisiellids and the other taxa reviewed in the present volume are common only in marine and terrestrial habitats, that is, only very few species inhabit running waters, lakes, or ponds. The first and last detailed illustrated guide to these groups of hypotrichs was provided by Kahl (1932). Of course, Kahl’s book is outdated, especially as concerns the amphisiellids, because most species of this group are from soil and have been discovered mainly in the last five decades. Thus, it is not too early for a monographic treatment.

As in the monographs on the oxytrichids and urostyloids, almost all available data on morphology, ontogenesis, ecology, and faunistics have been included. For each species, a detailed list of synonyms is provided, followed by a nomenclature section. In the remarks, all important data concerning systematics, synonymy, phylogeny, and similar taxa are considered. The morphology section contains a thorough description, following the same sequence in every species. If the data on various populations or synonyms do not agree very well, then they are kept separate so that even workers who do not agree with the synonymy proposed can use the revision. For several species, cell division data are available. They are also included because the ontogenesis is often very important to understand the interphasic cirral pattern correctly. The occurrence and ecology section contains a description of the type locality and all other localities where a species was recorded. In addition, almost all illustrations published so far have been included. Thus, with the present book the general microscopist need not refer back to the widely scattered original literature. Specialists, however, should always check both the present treatise *and* the original description or authoritative redescription when redescrbing a known species.

The most prominent and productive workers dealing with amphisiellids and trachelostylids are, in chronological order, Kahl, Foissner, Hemberger, Eigner, Song, and Hu. However, several other authors also wrote important papers on the

alpha-taxonomy of these taxa. 59 amphisiellid, six trachelostylid, and 24 “other” species are treated as valid in the present revision. Details about synonymy rates will be provided in the last volume of the monographic series.

The oxytrichids and the urostyloids are groups characterised by rather good apomorphies, like dorsal kinety fragmentation or the presence of a distinct midventral complex (Berger 1999, 2006). Other higher taxa, including the amphisiellids, are much more difficult to characterise, that is, the assignment of the non-oxytrichid and non-urostyloid species and genera to a certain higher level group is a difficult task, as indicated by the rather different classifications and molecular trees published so far.

During the revision of the outstanding genera I will certainly find species which should have been treated in a previous volume. These species will be reviewed in supplements at the end of each book, as already done in Berger (2006) and the present revision. The last volume of the series will contain a key and a systematic index to all species so that the reader can find all hypotrichs very easily within the various volumes of the monographic series.

The next group which will be treated in the monograph series are the Kahliellidae, also a moderately large taxon. Fortunately, the Austrian Academy of Sciences is sponsoring a major part of the series so that the monographic treatment of the Hypotricha can be completed in the foreseeable future. I hope that many ciliate-lovers benefit from the series on hypotrichs.

Salzburg, April 2008

Helmut Berger

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