Chapter 1

Introduction[1]

Helmut Berger

Consulting Engineering Office for Ecology, Radetzkystrasse 10, 5020 Salzburg, Austria
https://www.protozoology.com
https://orcid.org/0000-0002-1726-0082
berger.helmut@protozoology.com

The present monograph, "Terrestrial ciliates (Protista, Ciliophora) from Australia and some other parts of the world", is Wilhelm ("Willi") Foissner's last work on ciliates. Willi died on March 20, 2020 (Berger 2020).

In 2013 Wilhelm Foissner applied for his last project at the Austrian Science Fund with the working title "Biodiversity of Soil Ciliates (Protista, Ciliophora) from Australia". The main goal of this study was to describe all new ciliates which he has discovered in many soil samples collected by him and others in Australia (Fig. 1a–h). As in his other monographs on ciliates from certain biogeographic regions (see below), the present work also contains some new taxa which have their type locality not in Australia, but in other countries, namely Austria, Botswana (Fig. 1i–k), Brazil, Dominican Republic, Jamaica, Madeira Island, Mexico, Namibia, Sweden, The Netherlands, and the USA.

Willi's first works dealing with Australian soil ciliates were published in 1988 (Blatterer & Foissner 1988, Foissner 1988). Other papers and books treating Australian ciliates and other protists are Blatterer & Foissner (1992), Foissner (1990, 1991, 1994, 1995, 1997a, 1997b, 1998, 2003a, 2003b, 2016a, 2016b), Foissner & O'Donoghue (1990), Foissner et al. (1988a, 1988b, 1999, 2001, 2002, 2008), Gabilondo & Foissner (2009), Kumar & Foissner (2016, 2017), Lüftenegger & Foissner (1991), Oertel et al. (2008), Omar & Foissner (2011), Vďačný & Foissner (2012, 2017a, 2017b, 2019), Vďačný et al. (2012), and Weisse et al. (2007, 2008). For many abstracts dealing with protists from Australia, see website www.wfoissner.at.

Wilhelm Foissner already published monographs dealing with ciliates from other areas of the world, namely on the soil ciliates from Namibia (Foissner et al. 2002) and from Venezuela and Galápagos (Foissner 2016). In addition, his scientific legacy harbors material from many other biogeographic regions.

Since 2017 I assisted Willi with word processing, that is, I transferred his hand-written texts into word-files. The main work in the present book is Chapter 4 where the taxa are described and

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Fig. 1a–k. Sampling in Australia (a–h) and Botswana (i–k). **a:** Uluru (Ayers Rock) in the middle of Australia. **b, c:** Typical Australian plants, eucalypts (b) and grass tress (c). **d:** Happily coming back from sampling with Peter O'Donoghue. **e:** Salt lake near Adelaide. **f:** Willi cuddling a koala. **g:** Excursion to Murray river with Australian colleagues. **h:** Termite hill mounds in Northern territory. **i:** Evening in Okavango delta. **j:** Hippos in river Kwai. **k:** Willi, Pezi Speta and Franz Speta inspecting a possible sampling site. Note comfortable clothing. Photos kindly supplied by Ilse Foissner.

documented in about 1100 figures. In addition, he has prepared two further parts, namely one on sampling, collection of material for preparations, etc. (Chapter 2) which is based mainly on Foissner et al. (2002), and an update of his well-known description of the methods to study ciliates, mainly based on Foissner (1991, 2014) (Chapter 3). Unfortunately, W. Foissner could not finish the systematic part of his last project, which thus contains only a part of the Australian species discovered by him. In addition, he did not start with the general section which should contain, as

in his other monographs (Foissner et al. 2002, Foissner 2016), inter alia, detailed descriptions of the samples collected by him and others during several journeys to this continent, a detailed list of the species recorded from Australia, and some comments on the biogeography of ciliates. Since I was not actively involved in this project, I cannot finish this study as it was originally planned. Few weeks before his sudden death he informed a colleague that it needs still about three further years of intensive work to finish the monograph. Therefore, I came to the conclusion — in agreement with Ilse Foissner and Erna Aescht — to publish the available parts of the manuscript as they are. Originally it was planned to publish the work in the book series Denisia (Linz), as he did it with some of his previous monographs (Foissner 2016, Foissner et al. 2002, Vďačný & Foissner 2012). However, since a restructuring of the Museum in Linz is currently underway, we decided to publish W. Foissner's last monograph not in Denisia, but in my Series Monographiae Ciliophorae. Since Willi passed away in March 2020, a review process is not possible and thus the manuscript is published as it was when he died. I made only very minor changes (e.g., correction of spelling errors, rough adaptation of editorial style on previous numbers, e.g., Berger 2018). In some cases, I had to make notes which are clearly indicated in footnotes.

The raw manuscript of Chapter 4 contained the descriptions of the gymnostomatean taxa *Lamelliophrya* nov. gen. and *L. australiensis* nov. spec. As type species Willi has fixed *L. brasiliensis* nov. spec.[1] He proposed the following diagnosis for the genus: "Lingulotrichidae with tongue-shaped, two-dimensional cortical scales (lepidosomes) without anchoring structure adhering lepidosomes to pellicle. Dorsal brush heteromorphic and with more than three rows." The diagnosis for *L. australiensis* is: "Size in vivo about 110 × 20 µm, up to 40% contractile; cylindroid. Macronucleus oblong, polymorph. Two types of extrusomes attached to oral bulge: type I spiniform, slightly curved, about 10 µm long; type II oblong, slightly curved, about 2 µm long. Lepidosome layer obliquely striated, 2–3 µm thick. On average 20 ciliary rows, five anteriorly modified to a dorsal brush with minute bristles (± 2 µm). Oral bulge oblique, about 6 µm wide and 1 µm high. Moves like a contractile *Euglena*." Unfortunately, the type species *L. brasiliensis* was not yet described and I could not find the raw data (ring binder with live observations, slides, micrographs) within reasonable time. Thus, I do not include *Lamelliophrya* and *L. australiensis* in the present monograph (Chapter 4). It will be published later when I have an overview about the content of the many hundreds of ring binders with unpublished material left behind by W. Foissner.

Wilhelm Foissner was a highly productive microscopist. Most of his scientific life Willi used a Reichert Polyvar (since about mid-1980s). He made many thousands of permanent preparations. Most of them are still in his huge private collection, but many are already deposited in museums, mainly in the Upper Austrian Museum in Linz (Aescht 2008, 2013, 2018a, b). For almost each permanent preparation exists a sheet of paper where he has noticed the co-ordinates of many individuals. Since in future Foissner's collection of slides will be studied with other devices I provide an instruction how to use his co-ordinates on other microscopes (Fig. 2). On the type and voucher slides which are already in depositories the relevant specimens have been marked by black ink circles on the cover-glass (for examples, see Aescht 2008, p. 133–137 and Fig. 1a–e to Fig. 39a–f in Chapter 5 of present book).

Example for specimen X in Figure 2

Direction 1/Direction 2

29.2/115.0 Co-ordinates on Foissner's sheet (zero point on Foissner's Polyvar: 1.2/108.2)

28.0/6.8 Neutral co-ordinates (zero point: 0.0/0.0)

[1] The names *Lamelliophrya*, *L. australiensis*, and *L. brasiliensis* are disclaimed for nomenclatural purposes (ICZN 1999, Article 8.3), that is, these three taxa are not made available in the present work.

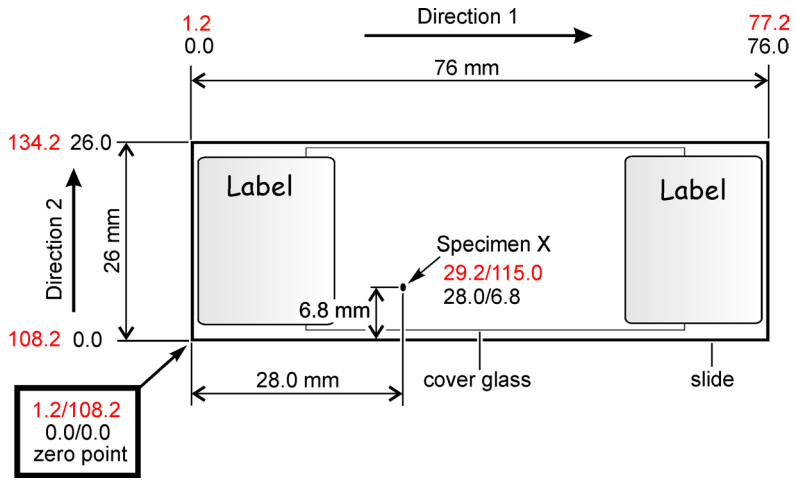

Fig. 2. Schematic illustration of a slide to demonstrate the conversion of Foissner's co-ordinates (red) into neutral co-ordinates (black) with the neutral zero point (0.0/0.0) at the lower left corner of the slide. For details, see text.

Calculation of neutral co-ordinates of specimen X

Direction 1
Subtract 1.2 (= 1.2 mm) from Foissner's value (29.2 in example)
Example: 29.2–1.2 = 28.0

Direction 2
Subtract 108.2 (= 108.2 mm) from Foissner's value (115.0 in example)
Example: 115.0–108.2 = 6.8

Find specimen X with your microscope

1. Go to the zero point of the slide (lower left corner)
2. Move 28.0 mm in direction 1
3. Move 6.8 mm in direction 2
4. Now you should see specimen X with your microscope!

Recommendation

Marking of relevant specimens on a microscopic slide deposited in a museum is usually done by a black ink circle (e.g., Aescht 2008, p. 133ff; Foissner et al. 2002, p. 35; Chapter 5 of present book). This method is basically usable, but has some disadvantages, for example, (i) specimens may be masked by the usually rather broad and clumsy ink circle; (ii) the ink circles may disappear when the slide is checked with oil immersion or anisole; (iii) the slide cannot be cleaned easily without wiping off the ink; (iv) making the circles is rather laborious.

To avoid all these problems, I highly recommend mentioning the co-ordinates of the relevant specimens (e.g., holotype, drawn paratype, drawn voucher, neotype) in the publication. To be independent of the microscope used, the co-ordinates should refer to the so-called "neutral zero point" (NZP) of the slide, that is, the lower left corner of the slide (Fig. 2). In addition, at least the slide containing the holotype specimen should be shown as a micrograph in the original description. For micrographs of the slides containing the species described in Chapter 4, see Chapter 5.

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