CHAPTER 2-2
PROTOZOA: CILIOPHORA AND HELIOZOA DIVERSITY

OTHER CILIOPHORA KNOWN FROM BRYOPHYTES

Figure 1. *Amphileptus pleurosigma*, a free-swimming, predatory ciliate. Photo by William Bourland.

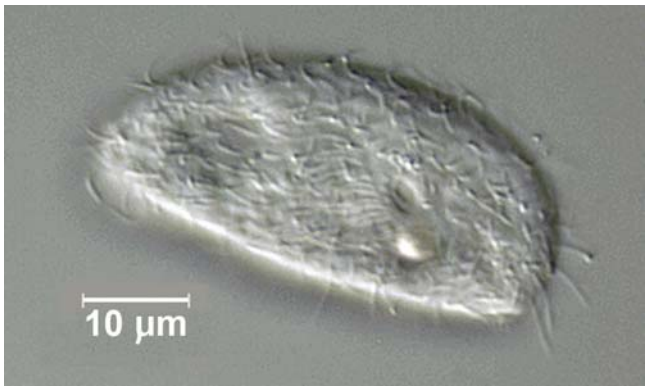

Figure 2. *Chilodontopsis depressa*, an algivorous ciliate (Risse-Buhl & Küsel 2008). Photo by William Bourland.

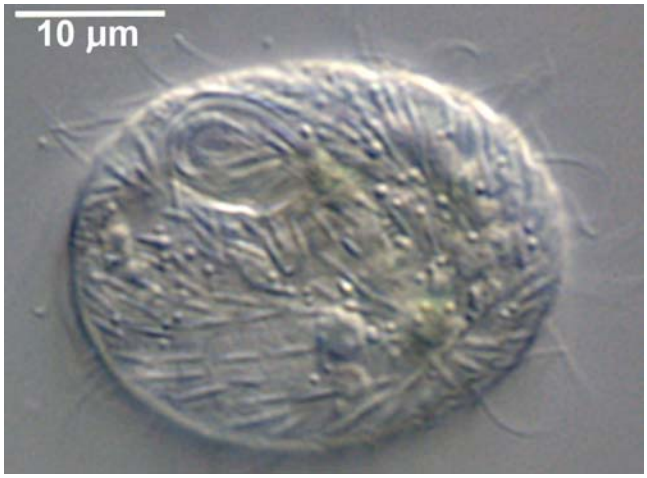

Figure 3. *Cinetochilum margaritaceum*, a bryophyte-inhabiting ciliate that Mieczan (2007) found in peatland ponds of Poland with *p*H of 5.0. Photo by William Bourland.

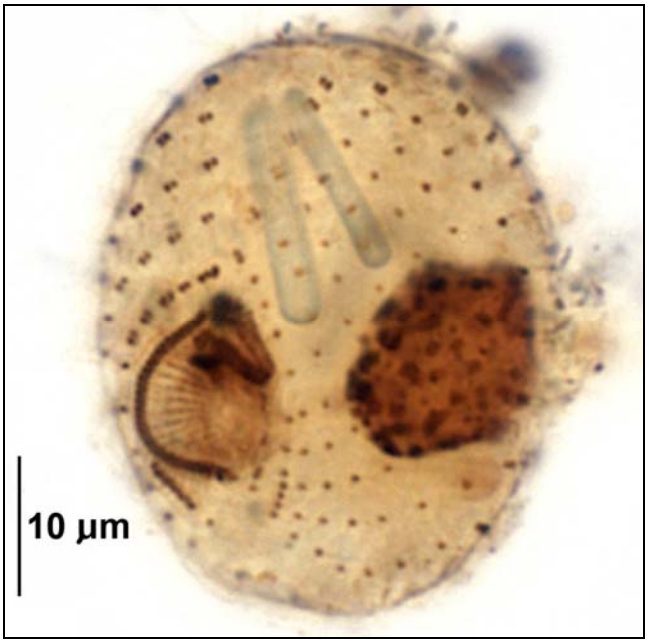

Figure 4. *Cinetochilum margaritaceum* stained to show organelles. Photos by William Bourland.

Figure 5. *Didinium nasutum*, a bryophyte-dwelling ciliate that feeds on *Paramecium*. This species is capable of encysting to avoid unfavorable conditions. Photo by William Bourland.

Figure 6. *Oxytricha fallax*, a ciliate, has a complex grouping of cilia that are used for sweeping food into the gullet. It lives among bryophytes, as well as other habitats. Lower organism has been stained. Photos by William Bourland.

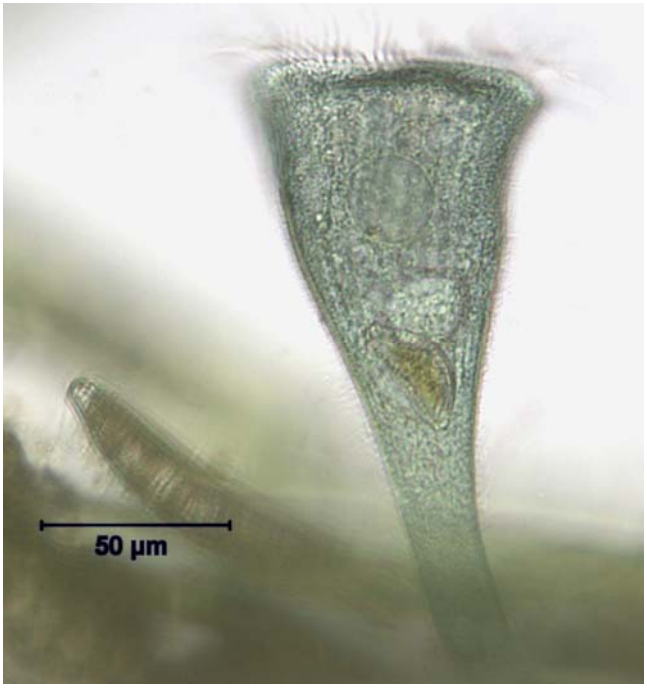

Figure 7. *Stentor multiformis*, a ciliate that occurs in peatlands (Mieczan 2006) and can attach to moss leaves. Photo by William Bourland.

Figure 8. *Colpoda steinii*, a constant member of *Sphagnum* communities in two Polish peatlands (Mieczan 2006). Photo by Yuuji Tsukii.

Figure 9. Two *Holophyra* species, ciliates that can inhabit *Sphagnum* in peatlands (Mieczan 2006). Photos by Yuuji Tsukii.

Figure 10. *Monodinium*, a ciliate that sometimes occurs on *Sphagnum* in peatlands (Mieczan 2006). **Upper:** Cell showing ring of cilia. **Lower:** Dividing cell. Photos by Yuuji Tsukii.

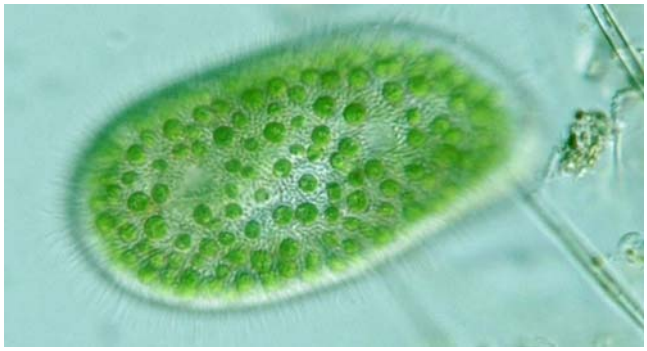

Figure 11. *Paramecium bursaria*, a common species that can occur on *Sphagnum* in peatlands in Poland (Mieczan 2006). This one has algal symbionts. Photo by Yuuji Tsukii.

Figure 12. *Spathidium muscicola*, a ciliate that can live among mosses. Photo by Yuuji Tsukii.

Figure 13. *Steinia sphagnicola*. **Upper:** Normal cell. **Lower:** Cell dividing. Photo by Yuuji Tsukii.

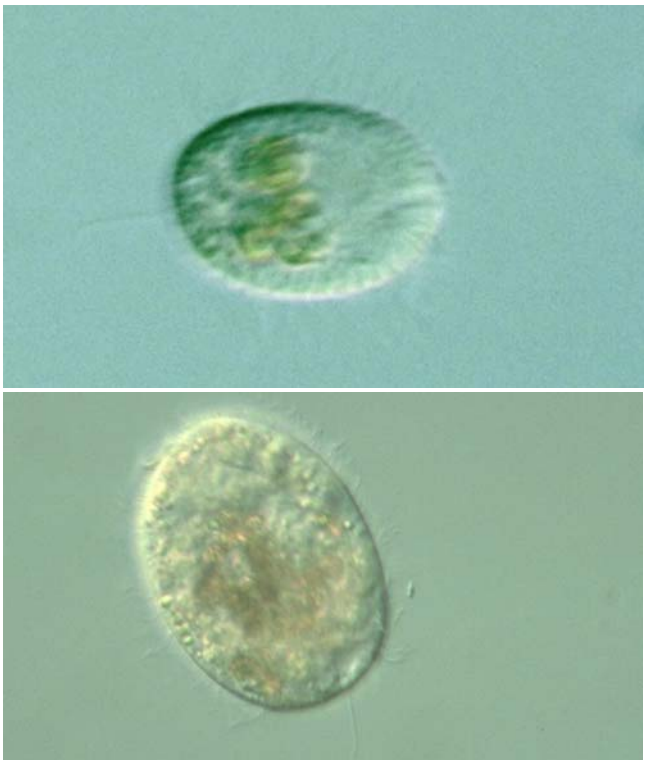

Figure 14. **Upper:** *Urotricha farcta*. **Lower:** *Urotricha platystoma*. This genus occurred on mosses in Polish peatlands (Mieczan 2006). Photo by Yuuji Tsukii.

Figure 15. *Strombidium viride*, a ciliate that occurred occasionally on mosses in peatlands in Poland (Mieczan 2006). Photo by Yuuji Tsukii.

Heliozoa

The heliozoans look like a sunburst with their sticky, wirelike pseudopods. About 20 species live among *Sphagnum* in pools with *p*H ranging 5-5.6 (Hingley 1993). The sticky pseudopods, known as **axopods**, are used to ensnare food such as algae and smaller protozoa, and to protect the organisms. They also facilitate a slow movement, since these organisms lack cilia or flagella. The beautiful and delicate moss dwellers include *Actinophrys sol* (Figure 16) and *Actinosphaerium eichhorni* (Figure 17).

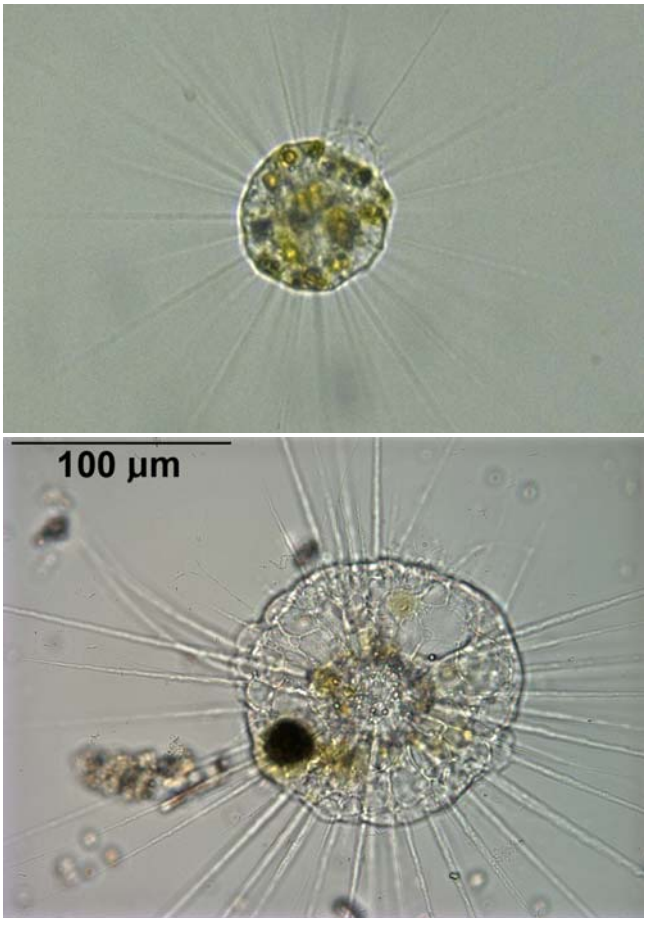

Figure 16. *Actinophrys sol* showing radiating pseudopodia. **Upper:** Photo by Yuuji Tsukii. **Lower:** Photo by William Bourland.

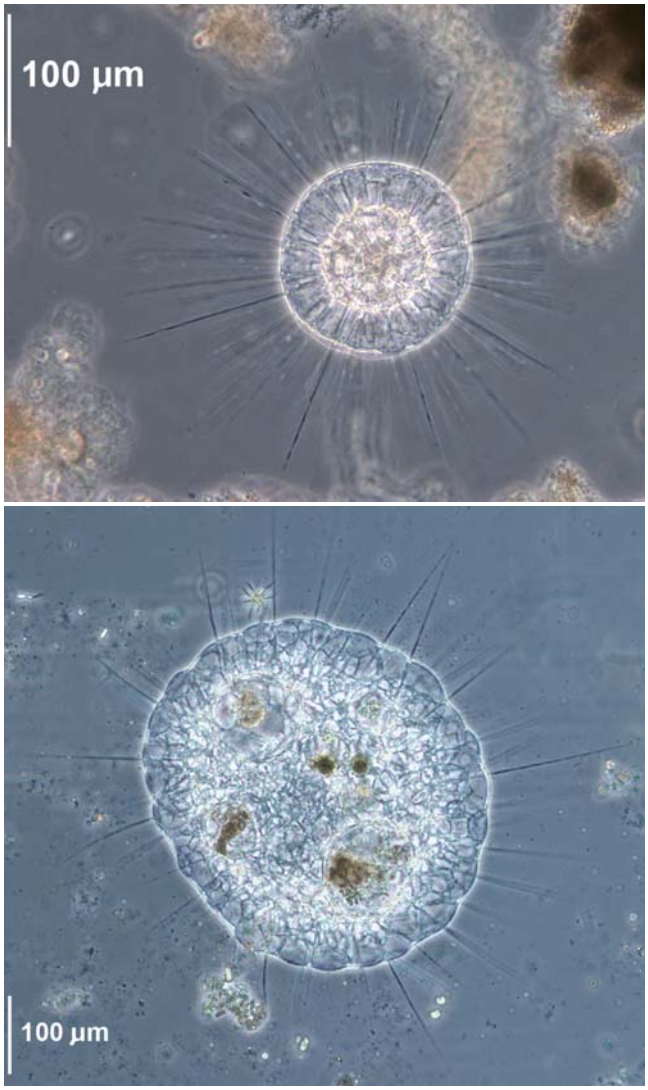

Figure 17. *Actinosphaerium eichhorni*. Photos by William Bourland.

Summary

Although they are more difficult to detect, the Ciliophora are quite common among bryophytes. They are best detected by culturing, and then the many species seen in this chapter become active. Heliozoa are not common among bryophytes, and only the few species shown here are familiar ones in a bryophyte habitat.

Acknowledgments

This chapter would not have existed without my new, but never seen, friends, William Bourland and Yuuji Tsukii. William Bourland provided me with a set of his pictures of bryophyte inhabitants. Yuuji Tsukii gave me unlimited permission to use his many, many images on the Protist Information Server website.

Literature Cited

Hingley, M. 1993. Microscopic Life in *Sphagnum*. Illustrated by Hayward, P. and Herrett, D. Naturalists' Handbook 20. [i-iv]. Richmond Publishing Co. Ltd., Slough, England, 64 pp. 58 fig. 8 pl. (unpaginated).

Mieczan T. 2006. Species diversity of protozoa (Rhizopoda, Ciliata) on mosses of *Sphagnum* genus in restoration areas of the Poleski National Park. Acta Agrophys. 7: 453-459.

Mieczan, T. 2007. Planktonic ciliates in peat ponds of different acidity (E Poland). Electronic Journal of Polish Agricultural Universities (EJPAU) 10 #20 accessed online at <http://www.ejpau.media.pl/volume10/issue4/art-20.html>.

Risse-Buhl, U. and Küsel, K. 2008. Colonization dynamics of biofilm-associated ciliate morphotypes at different flow velocities. Eur. J. Protistol. Accessed 12 January 2009 at <http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B7GW3-4TWSWJK-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=72e1521f8b2c0570cf1ccbe243e4b04b>.