



Universiteit
Leiden
The Netherlands

Phylogenetic, taxonomic and biogeographical studies in the Pithophoraceae (Cladophorales, Chlorophyta)

Boedeker, C.

Citation

Boedeker, C. (2010, December 21). *Phylogenetic, taxonomic and biogeographical studies in the Pithophoraceae (Cladophorales, Chlorophyta)*. Retrieved from <https://hdl.handle.net/1887/16263>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/16263>

Note: To cite this publication please use the final published version (if applicable).

**Phylogenetic, taxonomic and biogeographical studies
in the Pithophoraceae (Cladophorales, Chlorophyta)**

Christian Boedeker

**Netherlands Centre for Biodiversity Naturalis
(section National Herbarium of the Netherlands),
Leiden University branch
2010**

für Horst

Boedeker, C.

Phylogenetic, taxonomic and biogeographical studies in the Pithophoraceae
(Cladophorales, Chlorophyta)

ISBN: 978-90-9025862-1

NUR: 922

Cover: *Basycladia* sp. on freshwater turtle, photograph by Jason M. Hogle (with permission)

Design and layout: René Glas (www.reneglas.com)

Printing: Wöhrmann Print Service, Zutphen

Chapter 2: reprinted from *Aquatic Ecology* 43 (4): 891-902. Boedeker, C. & Immers, A. No more lake balls (*Aegagropila linnaei* Kützing, Cladophorophyceae, Chlorophyta) in The Netherlands? © 2009, with permission from Springer; and from *Aquatic Botany* 92: 75-77. Boedeker, C. The attached form of the endangered freshwater alga *Aegagropila linnaei* Kützing (Chlorophyta) is found in the Zuideindigerwiede, The Netherlands. © 2010, with permission from Elsevier Limited.

Chapter 3: reprinted from *BioScience* 60 (3): 187-198. Boedeker, C., Eggert, A., Immers, A. & Smets, E. Global decline of and threats to *Aegagropila linnaei*, with special reference to the lake ball habit. © 2010, with permission from the American Institute of Biological Sciences.

Chapter 4: reprinted from *Journal of Biogeography* 37 (8): 1491-1503. Boedeker, C., Eggert, A., Immers, A. & Wakana, I. 2010. Biogeography of *Aegagropila linnaei* (Cladophorophyceae, Chlorophyta): a widespread freshwater alga with low effective dispersal potential shows a glacial imprint in its distribution. © 2010, with permission from John Wiley & Sons.

Chapter 5: reprinted from *Phycologia* 49 (6): 525-536. Boedeker, C., Ramírez, M. E. & Nelson, W. A. *Cladophoropsis brachyartra* from southern South America is a synonym of *Wittrockiella lyallii* (Cladophorophyceae, Chlorophyta), previously regarded as endemic to New Zealand. © 2010, with permission from Allen Press.

Chapter 6: reprinted from *Botanica Marina* 53: 351-356. Boedeker, C. & Hansen, G. 2010. Nuclear rDNA sequences of *Wittrockiella amphibia* (Collins) comb. nov. (Cladophorales, Chlorophyta) and morphological characterisation of the mat-like growth form. © 2010, with permission from De Gruyter (article available from www.reference-global.com).

Chapter 7: submitted in part

Remainder of the thesis: © 2010, Netherlands Centre for Biodiversity Naturalis (section NHN).

The chapters may differ slightly from the original publications.

No part of this publication, apart from bibliographic data and brief quotations in critical reviews, may be reproduced, re-recorded or published in any form, including print, photocopy, microfilm, electronic or electromagnetic record without written permission from the publisher.

This thesis is not to be considered as printed matter in the sense of ICBN art. 29.

**Phylogenetic, taxonomic and biogeographical studies in the
Pithophoraceae (Cladophorales, Chlorophyta)**

PROEFSCHRIFT

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof. mr. P.F. van der Heijden,
volgens besluit van het College voor Promoties
te verdedigen op dinsdag 21 december 2010
klokke 10.00 uur

door

Christian Bödeker
geboren te Münster (Duitsland)
in 1976

P r o m o t i e c o m m i s s i e

Promotor • Prof. Dr. E.F. Smets

Copromotor • Dr. F. Leliaert (Universiteit Gent, België)

Overige leden • Prof. Dr. P. Baas
Dr. F. T. Bakker (Wageningen Universiteit)
Prof. dr. O. De Clerck (Universiteit Gent, België)
Dr. M. E. Noordeloos
Prof. dr. P. C. van Welzen

Contents

Chapter 1 •	General introduction	9
Chapter 2 •	The current situation of the freshwater green alga <i>Aegagropila linnaei</i> Kützing (Ulvophyceae, Chlorophyta): no more lake balls in the Netherlands	17
Chapter 3 •	Global decline of and threats to <i>Aegagropila linnaei</i> , with special reference to the lake ball habit	33
Chapter 4 •	Biogeography of <i>Aegagropila linnaei</i> (Cladophorophyceae, Chlorophyta): a widespread freshwater alga with low effective dispersal potential shows a glacial imprint in its distribution	49
Chapter 5 •	<i>Cladophoropsis brachyartra</i> from southern South America is a synonym of <i>Wittrockiella lyallii</i> (Cladophorales, Chlorophyta), previously regarded as endemic to New Zealand	65
Chapter 6 •	Nuclear rDNA sequences of <i>Wittrockiella amphibia</i> (Collins) comb. nov. (Cladophorales, Chlorophyta) and morphological characterization of the mat-like growth form	79
Chapter 7 •	Molecular phylogeny, taxonomy and niche evolution of the <i>Aegagropila</i> -clade (Cladophorales, Chlorophyta), including the description of <i>Aegagropilopsis</i> gen. nov. and <i>Pseudocladophora</i> gen. nov.	87
Chapter 8 •	General Discussion	125
	Summary & Conclusions	135
	Nederlandse samenvatting	139
	References	143
	Supplementary Material	175
	Curriculum vitae	219
	List of Publications	221
	Acknowledgements	223

