

This book is the first summary of our knowledge of benthic dinoflagellate species.

Dinoflagellates are important primary producers and symbionts, but, at the same time, also consumers and parasites. Species compositions of benthic habitats are quite distinct from those of planktonic habitats. Less than 10% of the approximately 2000 described extant dinoflagellate species appear to be benthic. They occur in different types of habitats (chapter II) and their morphology, their behavior, and some of their life cycles (chapter VI) seem to be well adapted to the benthic lifestyle. Information on their geographic distribution is still very limited and is compiled herein (chapter V).

The study of harmful benthic dinoflagellates started in the late 1970s when it was suspected that a benthic species, later named *Gambierdiscus toxicus*, was responsible for ciguatera fish poisoning, a type of human poisoning linked to the consumption of certain species of tropical reef fish. As the number of ciguatera fish poisoning incidents increases, and the distribution of toxin producing benthic taxa seems to be expanding, detailed understanding of the species diversity and the ability to accurately identify them is becoming increasingly important (chapter VII).

Dinoflagellate classification is currently undergoing changes and far from being settled, as new species and genera are discovered and systematic entities are rearranged. Many benthic dinoflagellate genera have unusual morphologies and appear to be only remotely related to known planktonic taxa, so that molecular phylogenetic analyses frequently show little statistical support for any relationship (chapter IV). Benthic species display unique thecal plate arrangements compared to planktonic species, e.g. *Adenoides*, *Amphidiniella*, *Cabra*, *Planodinium*, *Sabulodinium*, *Rhinodinium* (chapter III). Therefore, no classification on higher rank levels (e.g. family, order) was used throughout this book. Genera (and species within a genus) are presented in alphabetical order.

This book presents the first comprehensive identification help for benthic dinoflagellates. At the same time it

aims to lend support in order to improve monitoring efforts worldwide. About 190 species in 45 genera are presented in detail, illustrated with more than 200 color images, approximately 150 scanning electron micrographs, and more than 250 drawings.

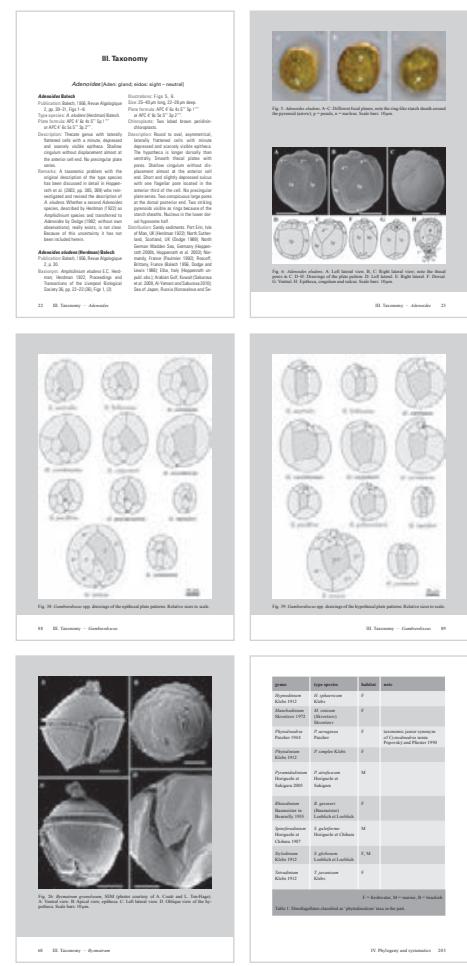


Table of Contents

Greetings	4	<i>Herdmania</i>	109	'Dinotoms' – <i>Dinothrix, Durinskia, Galeidinium, 'Gymnodinium' quadrilateralum, 'Peridinium' quinquecornue</i>
Foreword	5	<i>Heterocapsa</i>	111	<i>Galeidinium, 'Gymnodinium' quadrilateralum, 'Peridinium' quinquecornue</i>
Contents	7	<i>Katodinium</i>	112	<i>Dinoflagellate taxa with cryptophytes (klepto)chloroplasts</i>
Acknowledgements	10	<i>Moestrupia</i>	115	<i>Dinoflagellate taxa with cryptophytes (klepto)chloroplasts</i>
		<i>Ostreopsis</i>	116	The phytodinialean dinoflagellates ('Phytodiniales')
I. Introduction	12	' <i>Peridinium</i> ' partim = new genus	126	'Phytodiniales'
		<i>Pileidinium</i>	128	
II. 'Materials & Methods'	16	<i>Plagiodinium</i>	129	
Habitats	16	<i>Planodinium</i>	130	V. Biogeography
Sampling	16	<i>Polykrikos</i>	132	
Extraction = separation from the substrate	16	<i>Prorocentrum</i>	134	VI. Ecology
Fixation and Electron Microscopy (EM)	19	<i>Pseudothecadinium</i>	152	Attachment
Culturing	19	<i>Pyramidodinium</i>	154	Life cycles
Quantification	19	<i>Rhinodinium</i>	155	Tide pools
	21	<i>Roscoffia</i>	156	Vertical migration
III. Taxonomy	21	<i>Sabulodinium</i>	160	Blooms
<i>Adenoïdes</i>	22	<i>Scrippsiella</i>	163	Spatial distribution
<i>Alexandrium</i>	22	<i>Sinophysis</i>	165	Temporal distribution
<i>Amphidiniella</i>	22	<i>Spiniferodinium</i>	173	Quantitative Data
<i>Amphidiniopsis</i>	24	<i>Stylocodium</i>	175	
<i>Amphidinium</i>	25	<i>Symbiodinium</i> spp.	177	VII. Toxins of benthic dinoflagellates and benthic harmful algal blooms
<i>Ankistrodinium</i>	27	<i>Testudodinium</i>	178	
<i>Apicoporus</i>	41	<i>Thecadinium</i>	180	Introduction
<i>Biecheleria</i>	56	<i>Togula</i>	188	<i>Gambierdiscus</i>
<i>Bispinodinium</i>	58	<i>Vulcanodinium</i>	191	<i>Ostreopsis</i>
<i>Bysmatrum</i>	61			<i>Coolia</i>
<i>Cabra</i>	62	IV. Phylogeny and systematics	193	<i>Prorocentrum</i>
<i>Coolia</i>	64	Phylogeny of the morphological		<i>Amphidinium</i>
<i>Dinothrix</i>	70	adaptations	194	<i>Alexandrium</i>
<i>Durinskia</i>	74	<i>Amphidinium</i>	195	<i>Vulcanodinium</i>
<i>Galeidinium</i>	80	<i>Amphidiniopsis, Archaeoperidinium,</i>		
<i>Gambierdiscus</i>	82	<i>Herdmania – Peridiniales</i>	195	References
<i>Glenodinium</i>	85	<i>Cabra, Rhinodinium, Roscoffia –</i>		Taxonomic index
<i>Gymnodinium</i>	86	<i>Podolampadaceae</i>	196	Useful web pages
<i>Gyrodinium</i>	95	<i>Coolia, Gambierdiscus, Ostreopsis –</i>		Picture credits
<i>Halostyloidinium</i>	96	<i>Gonyaulacales</i>	196	Authors' Addresses
	103	<i>Prorocentrum & Adenoïdes</i>	197	
	107	<i>Sinophysis & Sabulodinium</i>	197	

Order Form

I/we would like to order from

E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller)
Johannesstr. 3A | 70176 Stuttgart | Germany
Phone +49 (0)711 351456 0 | FAX +49 (0)711 351456 99
order@schweizerbart.de | www.schweizerbart.de/9783510614028

..... Copies

Kleine Senckenberg-Reihe 54
Mona Hoppenrath | Shauna A. Murray | Nicolas Chomérat | Takeo Horiguchi
Marine benthic dinoflagellates – unveiling their worldwide biodiversity
14.8 x 21 cm | paperback | 19.90 € | ISBN 978-3-510-61402-8

Name _____

Address
.....

Date _____

Signature

