

---

John M. Archibald • Alastair G. B. Simpson  
Claudio H. Slamovits  
Editors

# Handbook of the Protists

Second Edition

Volume 2

With 383 Figures and 51 Tables

 Springer

---

# Contents

## Volume 1

<b>1 Protist Diversity and Eukaryote Phylogeny</b> .....	1
Alastair G. B. Simpson, Claudio H. Slamovits, and John M. Archibald	
<b>2 Glaucophyta</b> .....	23
Dana C. Price, Jürgen M. Steiner, Hwan Su Yoon, Debashish Bhattacharya, and Wolfgang Löffelhardt	
<b>3 Rhodophyta</b> .....	89
Hwan Su Yoon, Wendy Nelson, Sandra C. Lindstrom, Sung Min Boo, Curt Pueschel, Huan Qiu, and Debashish Bhattacharya	
<b>4 Zygnematophyta</b> .....	135
John D. Hall and Richard M. McCourt	
<b>5 Charophyceae (Charales)</b> .....	165
Richard M. McCourt, Kenneth G. Karol, John D. Hall, Michelle T. Casanova, and Michael C. Grant	
<b>6 Chlorokybophyceae, Klebsormidiophyceae, Coleochaetophyceae</b> .....	185
Martha E. Cook and Linda E. Graham	
<b>7 Bacillariophyta</b> .....	205
David G. Mann, Richard M. Crawford, and Frank E. Round	
<b>8 Phaeophyta</b> .....	267
Hiroshi Kawai and Eric C. Henry	
<b>9 Raphidophyceae (Raphidophyta)</b> .....	305
Takeo Horiguchi	
<b>10 Chrysophyta</b> .....	331
Jørgen Kristiansen and Pavel Škaloud	

<b>11</b>	<b>Eustigmatophyceae</b> .....	<b>367</b>
	Marek Eliáš, Raquel Amaral, Karen P. Fawley, Marvin W. Fawley, Yvonne Němcová, Jiří Neustupa, Pavel Příbyl, Lilia M. A. Santos, and Tereza Ševčíková	
<b>12</b>	<b>Xanthophyceae</b> .....	<b>407</b>
	Silvia Maistro, Paul Broady, Carlo Andreoli, and Enrico Negrisolo	
<b>13</b>	<b>Hyphochytriomycota and Oomycota</b> .....	<b>435</b>
	Gordon W. Beakes and Marco Thines	
<b>14</b>	<b>Labyrinthulomycota</b> .....	<b>507</b>
	Reuel M. Bennett, D. Honda, Gordon W. Beakes, and Marco Thines	
<b>15</b>	<b>Opalinata</b> .....	<b>543</b>
	Martin Kostka	
<b>16</b>	<b>Apicomplexa</b> .....	<b>567</b>
	Jan Votýpka, David Modrý, Miroslav Oborník, Jan Šlapeta, and Julius Lukeš	
<b>17</b>	<b>Dinoflagellata</b> .....	<b>625</b>
	Juan F. Saldarriaga and F. J. R. 'Max' Taylor	
<b>18</b>	<b>Ciliophora</b> .....	<b>679</b>
	Denis H. Lynn	
<b>19</b>	<b>Radiolaria and Phaeodaria</b> .....	<b>731</b>
	Demetrio Boltovskoy, O. Roger Anderson, and Nancy M. Correa	
<b>20</b>	<b>Chlorarachniophytes</b> .....	<b>765</b>
	Patrick J. Keeling	
<b>21</b>	<b>Phytomyxea</b> .....	<b>783</b>
	Simon Bulman and Sigrid Neuhauser	
<b>22</b>	<b>Paramyxida</b> .....	<b>805</b>
	Robert J. G. Lester and P. Mike Hine	

## Volume 2

<b>23</b>	<b>Haplosporidia</b> .....	<b>823</b>
	Carlos Azevedo and P. Mike Hine	
<b>24</b>	<b>Cryptophyta (Cryptomonads)</b> .....	<b>851</b>
	Kerstin Hoef-Emden and John M. Archibald	
<b>25</b>	<b>Haptophyta</b> .....	<b>893</b>
	Wenche Eikrem, Linda K. Medlin, Jorijntje Henderiks, Sebastian Rokitta, Björn Rost, Ian Probert, Jahn Throndsen, and Bente Edvardsen	

<b>26</b>	<b>Centrohelida and Other Heliozoan-Like Protists</b> .....	955
	Rebecca J. Gast	
<b>27</b>	<b>Jakobida</b> .....	973
	Alastair G. B. Simpson	
<b>28</b>	<b>Heterolobosea</b> .....	1005
	Tomáš Pánek, Alastair G. B. Simpson, Matthew W. Brown, and Betsey Dexter Dyer	
<b>29</b>	<b>Euglenida</b> .....	1047
	Brian S. Leander, Gordon Lax, Anna Karnkowska, and Alastair G. B. Simpson	
<b>30</b>	<b>Kinetoplastea</b> .....	1089
	Wendy Gibson	
<b>31</b>	<b>Preaxostyla</b> .....	1139
	Vladimir Hampl	
<b>32</b>	<b>Parabasalia</b> .....	1175
	Ivan Čepička, Michael F. Dolan, and Gillian H. Gile	
<b>33</b>	<b>Diplomonadida</b> .....	1219
	Rodney D. Adam	
<b>34</b>	<b>Retortamonadida (with Notes on <i>Carpediemonas</i>-Like Organisms and Caviomonadidae)</b> .....	1247
	Jaroslav Kulda, Eva Nohýnková, and Ivan Čepička	
<b>35</b>	<b>Amoebozoan Lobose Amoebae (Tubulinea, Flabellinea, and Others)</b> .....	1279
	O. Roger Anderson	
<b>36</b>	<b>Protosteloid Amoebae (Protosteliida, Protosporangiida, Cavosteliida, Schizoplasmodiida, Fractoviteliida, and Sporocarpic Members of Vannellida, Centramoebida, and Pellitida)</b> .....	1311
	Frederick W. Spiegel, Lora L. Shadwick, George G. Ndiritu, Matthew W. Brown, Maria Aguilar, and John D. Shadwick	
<b>37</b>	<b>Archamoebae</b> .....	1349
	Giselle Walker, Eliška Zadrobílková, and Ivan Čepička	
<b>38</b>	<b>Myxomycetes</b> .....	1405
	Steven L. Stephenson and Martin Schnittler	
<b>39</b>	<b>Dictyostelia</b> .....	1433
	Sandra L. Baldauf and Joan E. Strassmann	
<b>40</b>	<b>Choanoflagellatea</b> .....	1479
	Daniel J. Richter and Frank Nitsche	

---

<b>41</b>	<b>Blastocladiomycota</b> .....	1497
	Martha J. Powell	
<b>42</b>	<b>Chytridiomycota</b> .....	1523
	Martha J. Powell	
<b>43</b>	<b>Microsporidia</b> .....	1559
	Ann Cali, James J. Becnel, and Peter M. Takvorian	
<b>44</b>	<b>Apusomonadida</b> .....	1619
	Aaron A. Heiss, Matthew W. Brown, and Alastair G. B. Simpson	
<b>Index</b>	.....	1647