

Contributeurs :

Camille Blondel (LER-BL)  
Alain Lefebvre (LER-BL)  
Pascale Hébert (LER-BL)  
Danièle Maurer (LER-AR)  
Claire Meteigner (LER-AR)  
Myriam Rumèbe-Perrière (LER-AR)  
Guillaume Wacquet (LER-BL)

Novembre 2015 - R.INT.ODE/DYNECO/VIGIES/15-14

# Catalogue illustré des images d'un set d'apprentissage réalisé à l'aide de l'outil FlowCAM – ZooPhytoImage utilisé dans le cadre du REPHY

Images issues de numérisations de  
phytoplancton au grossissement 4X,  
d'échantillons d'eau, pour le set d'apprentissage  
global Manche-Atlantique





Catalogue illustré des images  
d'un set d'apprentissage réalisé à l'aide  
de l'outil FlowCAM – ZooPhytoImage  
utilisé dans le cadre du REPHY

Images issues de numérisations de phytoplancton  
au grossissement 4X, d'échantillons d'eau,  
pour le set d'apprentissage global  
Manche-Atlantique

# Sommaire

<b>1. Introduction</b>	<b>6</b>
<b>2. Description des fiches</b>	<b>8</b>
<b>3. Classes non intégrées au set</b>	<b>9</b>
3.1. <i>Asteroplanus karianus</i>	9
3.2. <i>Helicotheca</i>	9
3.3. <i>Hemiaulus</i>	9
3.4. <i>Proboscia indica</i>	9
3.5. <i>Dinophysis acuta</i>	10
3.6. <i>Diplopsalis Diplopelta Oblea</i>	10
3.7. <i>Heterocapsa</i>	10
3.8. <i>Pyramimonas</i>	10
3.9. <i>Pisces larva</i>	11
3.10. tintinnids	12
3.11. polen	12
<b>4. Classes des particules intégrées au set (débris)</b>	<b>13</b>
4.1. Black opaque	13
4.2. Bubble	13
4.3. Clear	14
4.4. Clear grainy	14
4.5. Dark grainy	15
4.6. Dark mineral	15
4.7. Fecal pellets	16
4.8. Fiber	16
4.9. Fiber dark	17
4.10. Granular clear	18
4.11. Granular dark	19
4.12. Membranous	20
<b>5. Classes phytoplancton intégrées au set</b>	<b>21</b>
5.1. Euglenoidea	21
5.2. <i>Phaeocystis</i>	22
5.3. <i>Ceratium</i>	23
5.4. <i>Neoceratium furca lineatum</i>	24
5.5. <i>Neoceratium fusus</i>	25
5.6. <i>Dinophysis</i>	26
5.7. <i>Dinophysis tripos</i>	27
5.8. <i>Alexandrium</i>	28
5.9. <i>Alexandrium affine</i>	28
5.10. <i>Gonyaulax</i>	29
5.11. <i>Gymnodinium Gyrodinium Torodinium</i>	30
5.12. <i>Lepidodinium mucous</i>	31
5.13. <i>Noctiluca</i>	32
5.14. <i>Peridinium Protoperidinium</i>	33
5.15. <i>Scrippsiella Ensiculifera Pentaparsodinium Bysmatrum</i>	34
5.16. <i>Polykrikos</i>	35
5.17. <i>Prorocentrum</i>	36
5.18. <i>Dissodinium Pyrocystis</i>	37
5.19. <i>Cylindrotheca Hantzschia Nitzschia</i>	38
5.20. <i>Pseudo-nitzschia</i>	39
5.21. <i>Bacteriastrum</i>	40
5.22. <i>Chaetoceros</i>	41
5.23. <i>Chaetoceros curvisetus</i>	42



5.24. Chaetoceros danicus.....	43
5.25. Chaetoceros socialis.....	44
5.26. Asterionellopsis glacialis.....	45
5.27. Cerataulina .....	46
5.28. Leptocylindrus.....	47
5.29. Ditylum brightwellii.....	48
5.30. Eucampia.....	49
5.31. Lauderia.....	50
5.32. Paralia.....	51
5.33. Gyrosigma Pleurosigma .....	52
5.34. Dactyliosolen fragilissimus .....	53
5.35. Guinardia delicatula.....	54
5.36. Guinardia flaccida.....	55
5.37. Guinardia striata .....	56
5.38. Proboscia Rhizosolenia .....	57
5.39. Rhizosolenia setigera .....	58
5.40. Skeletonema.....	59
5.41. Thalassionema .....	60
5.42. Thalassiosira big chaines .....	61
5.43. Thalassiosira cells .....	62
5.44. Thalassiosira small chaines.....	63
5.45. Odontella .....	64
5.46. Dictyocha .....	65
<b>6. Classes du zooplancton intégrées au set.....</b>	<b>66</b>
6.1. Ciliophora big.....	66
6.2. Ciliophora cone.....	67
6.3. Ciliophora small .....	68
6.4. Zooplankton spp .....	69



## 1. Introduction

Dans la démarche de constituer un set d'apprentissage pour l'outil de reconnaissance du phytoplancton généré grâce au logiciel ZooPhytoImage, trois laboratoires de l'Ifremer équipés d'un FlowCam dédié au REPHY ont participé à l'acquisition d'images\* : Boulogne-sur-mer (LER/BL), Nantes (LER/MPL/NT) et Arcachon (LER/AR).

Un set d'apprentissage "global" Manche-Atlantique 4X composé d'images provenant des banques d'images créées sur les trois sites d'acquisition a été constitué. Les images sont issues de 113 échantillons d'eau de mer d'Atlantique de 2011 à 2014 et 127 de Manche de 2013. Ce set est une base de travail pour les utilisateurs. Il doit être complété notamment pour inclure les classes peu abondantes ou encore non alimentées. Ce set doit aussi être optimisé par les utilisateurs pour créer un outil de reconnaissance performant et adapté.

Les utilisateurs du logiciel ZooPhytoImage, plus particulièrement lors des étapes de corrections d'erreurs de l'analyse d'échantillon, doivent avoir une connaissance visuelle de la représentation des particules dans chaque classe. D'autant plus s'ils n'ont pas participé à la constitution de la bibliothèque d'image. Il est apparu donc nécessaire de créer un catalogue de ces images, car visualiser les images directement dans l'arborescence numérique s'avère très fastidieux.

Ce document présente un échantillon d'images de chaque classe qui constitue ce set d'apprentissage Manche-Atlantique 4X, et aussi les classes dont les abondances sont insuffisantes pour être intégrés au set et pour lesquelles la collecte de nouvelles images est attendue (<LowAbundances>). L'ordre de présentation des classes intégrées au set correspond à l'ordre d'apparition de ces classes dans l'outil ZooPhytoImage, qui correspond à l'ordre des classes dans l'arborescence des répertoires contenant les vignettes.

**\* Contributeurs à l'acquisition d'images et constitution du set :**

**LER/BL : Guillaume Wacquet, Camille Blondel, Pascale Hébert et Alain Lefebvre,**

**VIGIES/Nantes : Nadine Neaud-Masson,**

**LER/AR : Danièle Maurer, Claire Meteigner et Myriam Perrière.**



Ce set comprend 7081 images classées dans 61 classes dont les effectifs sont présentés dans le tableau suivant

- 27 classes phytoplanctoniques appartenant aux *Bacillariophyceae*.
- 15 classes phytoplanctoniques appartenant aux *Dinophyceae*
- 4 classes phytoplanctoniques autres
- 3 classes zooplanctoniques
- 12 classes détritiques

Tableau 1 : Distribution des particules incluses entre les différentes classes

<i>Bacillariophyceae</i>	Nb
<i>Asterionellopsis glacialis</i>	179
<i>Bacteriastrium</i>	176
<i>Cerataulina</i>	123
<i>Chaetoceros</i>	203
<i>Chaetoceros curvisetus</i>	194
<i>Chaetoceros danicus</i>	62
<i>Chaetoceros socialis</i>	60
<i>Cylindrotheca Hantzschia Nitzschia</i>	68
<i>Dactyliosolen fragilissimus</i>	175
<i>Ditylum brightwellii</i>	184
<i>Eucampia</i>	107
<i>Guinardia delicatula</i>	31
<i>Guinardia flaccida</i>	202
<i>Guinardia striata</i>	78
<i>Gyrosigma Pleurosigma</i>	221
<i>Lauderia</i>	43
<i>Leptocylindrus</i>	197
<i>Odontella</i>	148
<i>Paralia</i>	84
<i>Proboscia Rhizosolenia</i>	161
<i>Pseudo-nitzschia</i>	185
<i>Rhizosolenia setigera</i>	41
<i>Skeletonema</i>	153
<i>Thalassionema</i>	130
<i>Thalassiosira cells</i>	38
<i>Thalassiosira big chaines</i>	107
<i>Thalassiosira small chaines</i>	97

Autres classes	
<i>Phaeocystis</i>	264
<i>Dictyocha</i>	94
<i>Euglenoidea</i>	53
<i>Noctiluca</i>	43

<i>Dinophyceae</i>	Nb
<i>Alexandrium</i>	187
<i>Alexandrium affine</i>	93
<i>Ceratium</i>	52
<i>Dinophysis</i>	174
<i>Dinophysis tripos</i>	35
<i>Dissodinium Pyrocystis</i>	41
<i>Gonyaulax</i>	48
<i>Gymnodinium Gyrodinium Torodinium</i>	124
<i>Lepidodinium mucous</i>	170
<i>Neoceratium furca lineatum</i>	151
<i>Neoceratium fusus</i>	183
<i>Peridinium Protoperidinium</i>	177
<i>Polykrikos</i>	22
<i>Prorocentrum</i>	258
<i>Scrippsiella Ensiculifera Pentapharsodinium Bysmatrum</i>	149

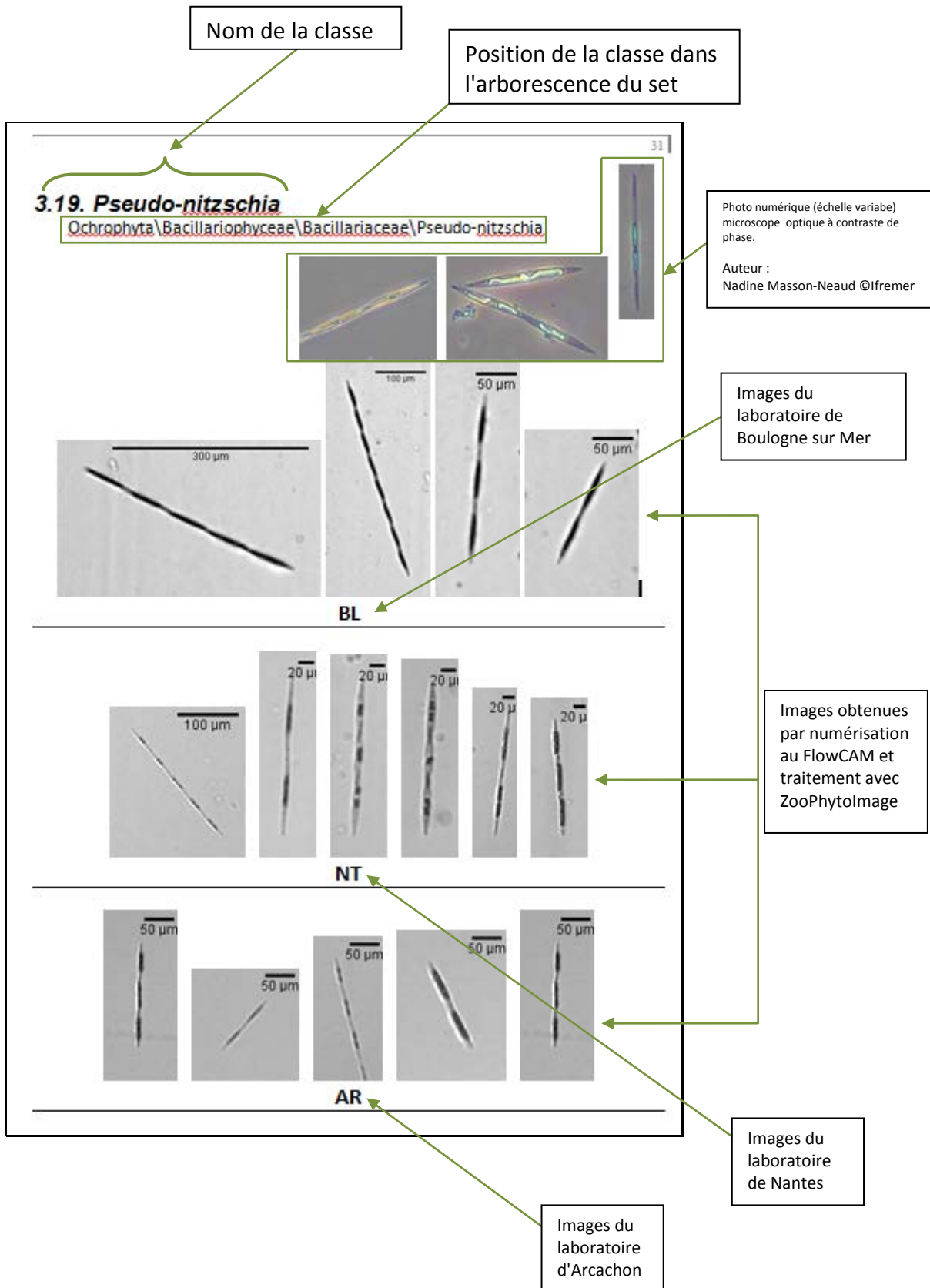
#### zooplancton

<i>Ciliophora_cils</i>	94
<i>Ciliophora_cone</i>	94
Zooplankton spp	34

#### Débris

black opaque	160
bubble	200
clear	163
Clear grainy	57
Dark grainy	41
Dark mineral	200
Fecal pellets	20
fiber	120
Fiber dark	59
Granular clear	74
Granular dark	100
membranous	80

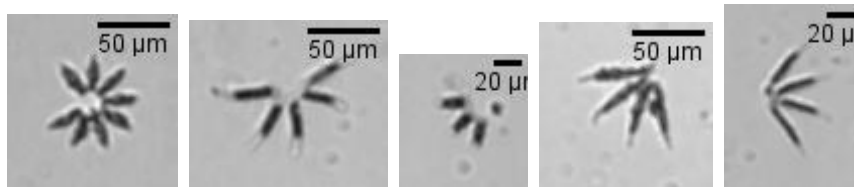
## 2. Description des fiches



### 3. Classes non intégrées au set

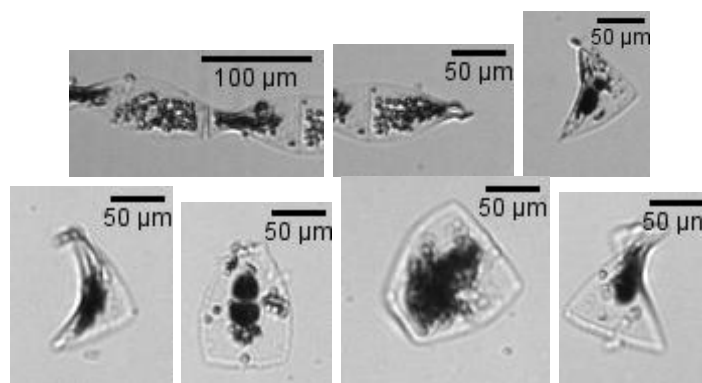
Sous répertoires de <LowAbundances> ces classes nécessitent l'acquisition de nouvelles images pour pouvoir être intégrées au set.

#### 3.1. *Asteroplanus karianus*



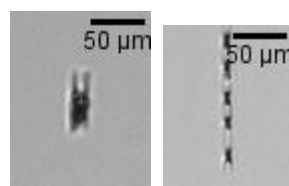
NT

#### 3.2. *Helicotheca*



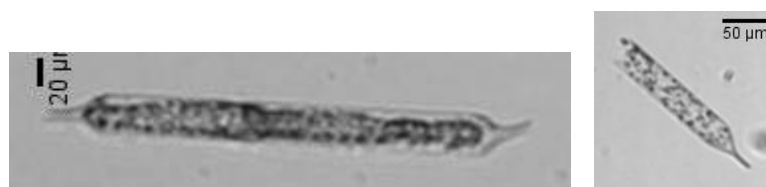
AR

#### 3.3. *Hemiaulus*



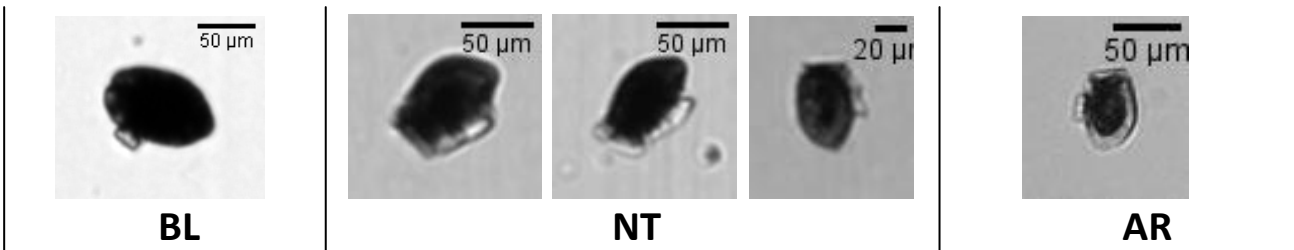
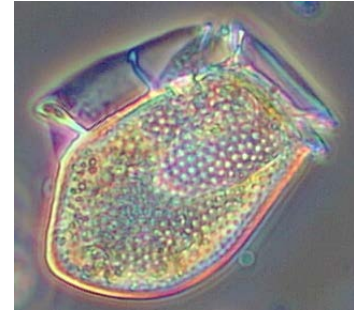
AR

#### 3.4. *Proboscia indica*

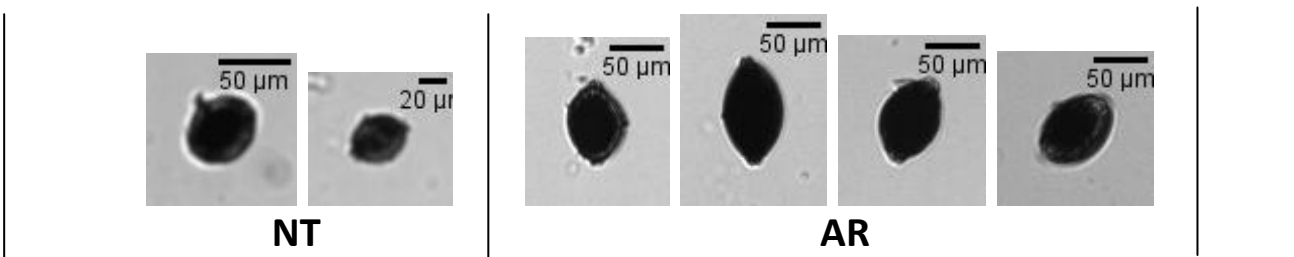


NT

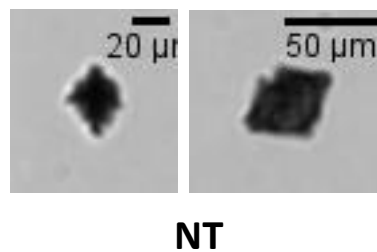
### 3.5. *Dinophysis acuta*



### 3.6. *Diplopsalis Diplopelta Oblea*

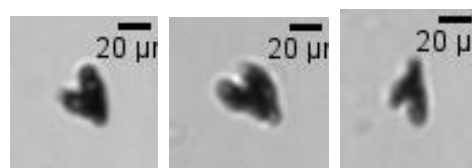


### 3.7. *Heterocapsa*



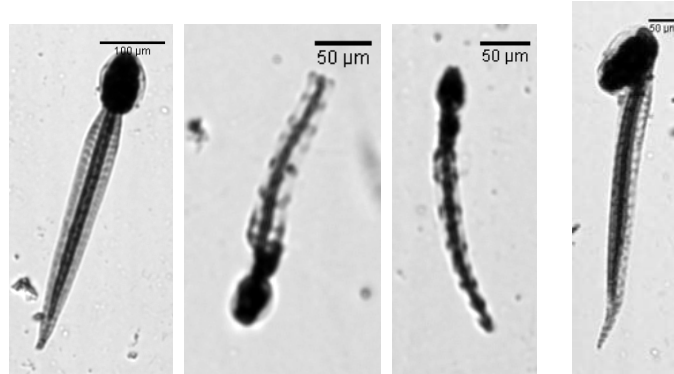
NT

### 3.8. *Pyramimonas*

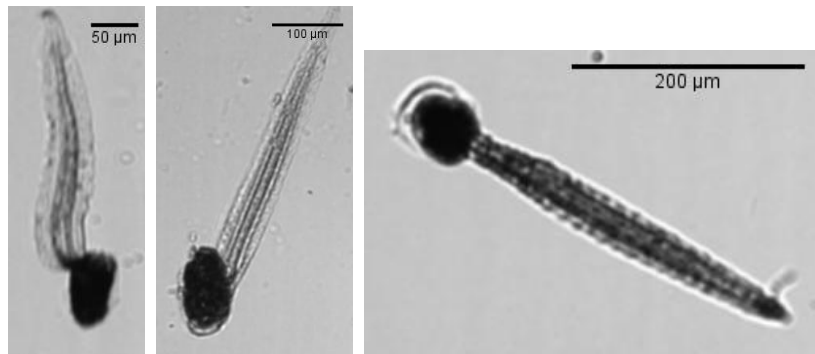


NT

### 3.9. Pisces larva

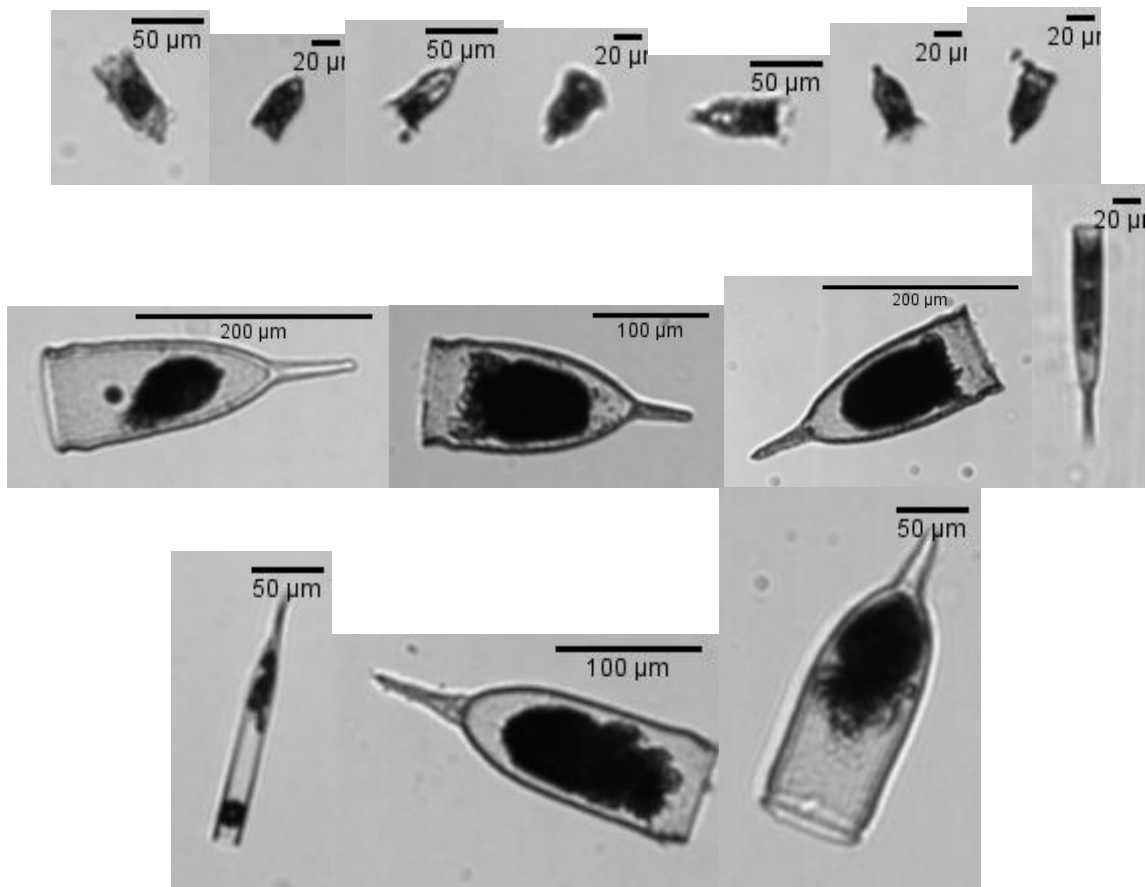


**BL**



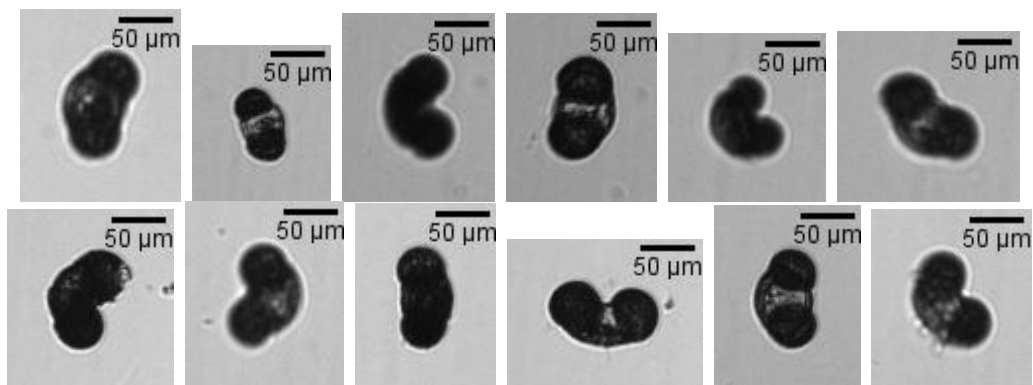
**NT**

### 3.10. tintinnids



NT

### 3.11. polen

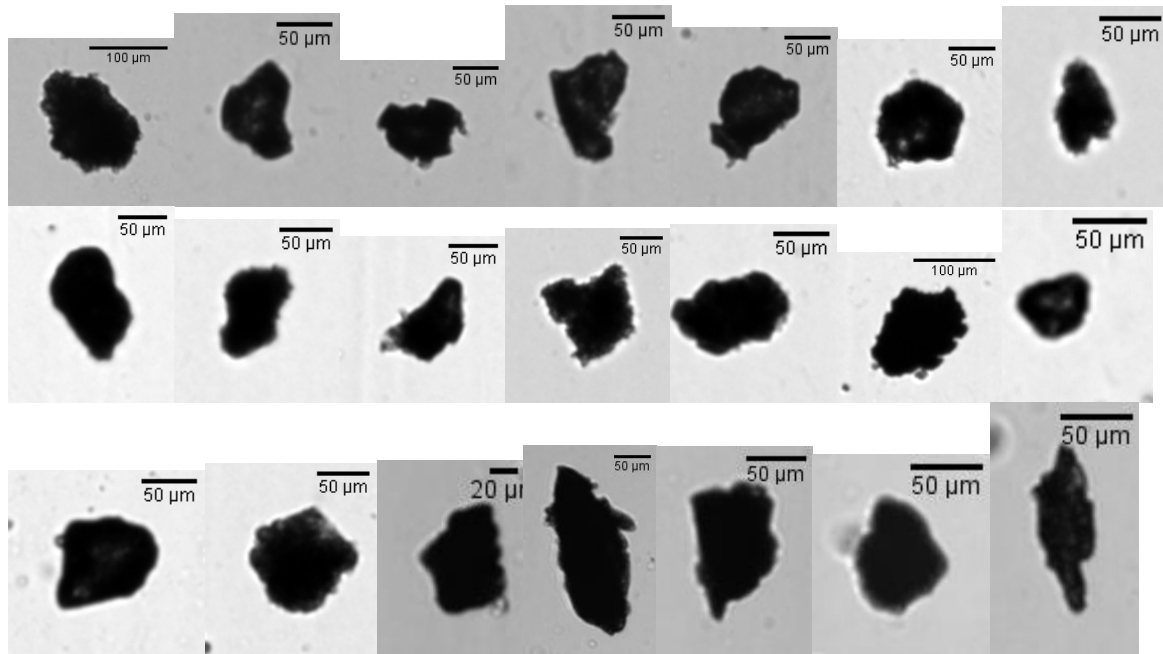


AR

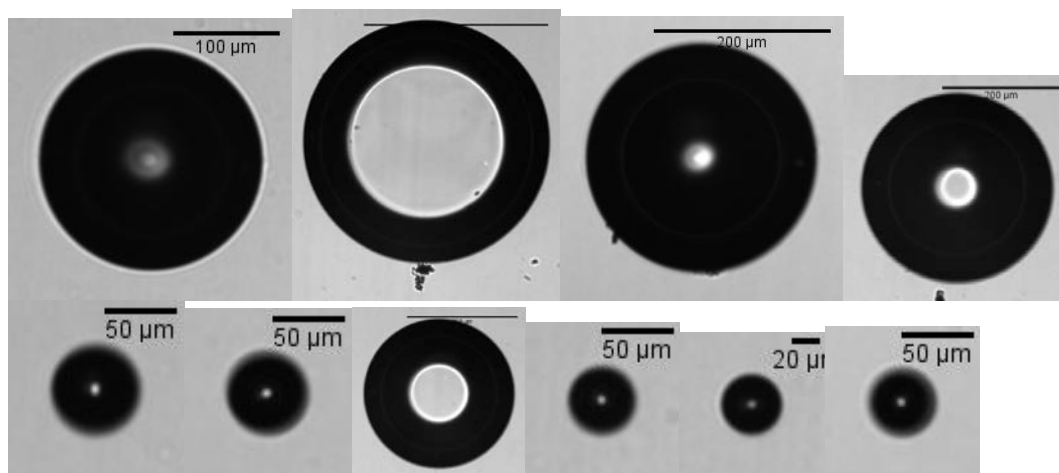


## 4. Classes des particules intégrées au set (débris)

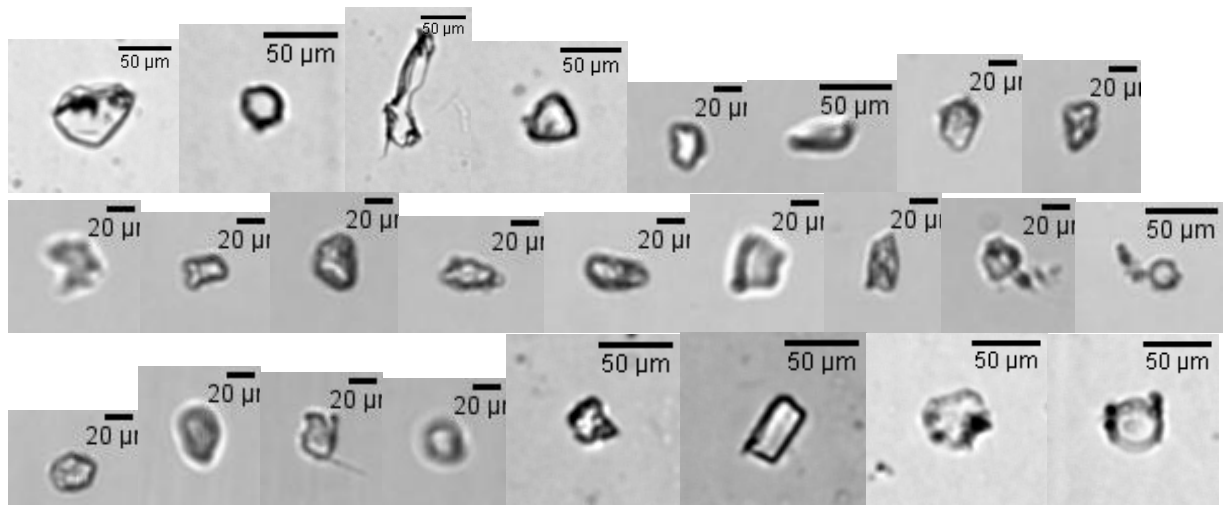
### 4.1. Black opaque



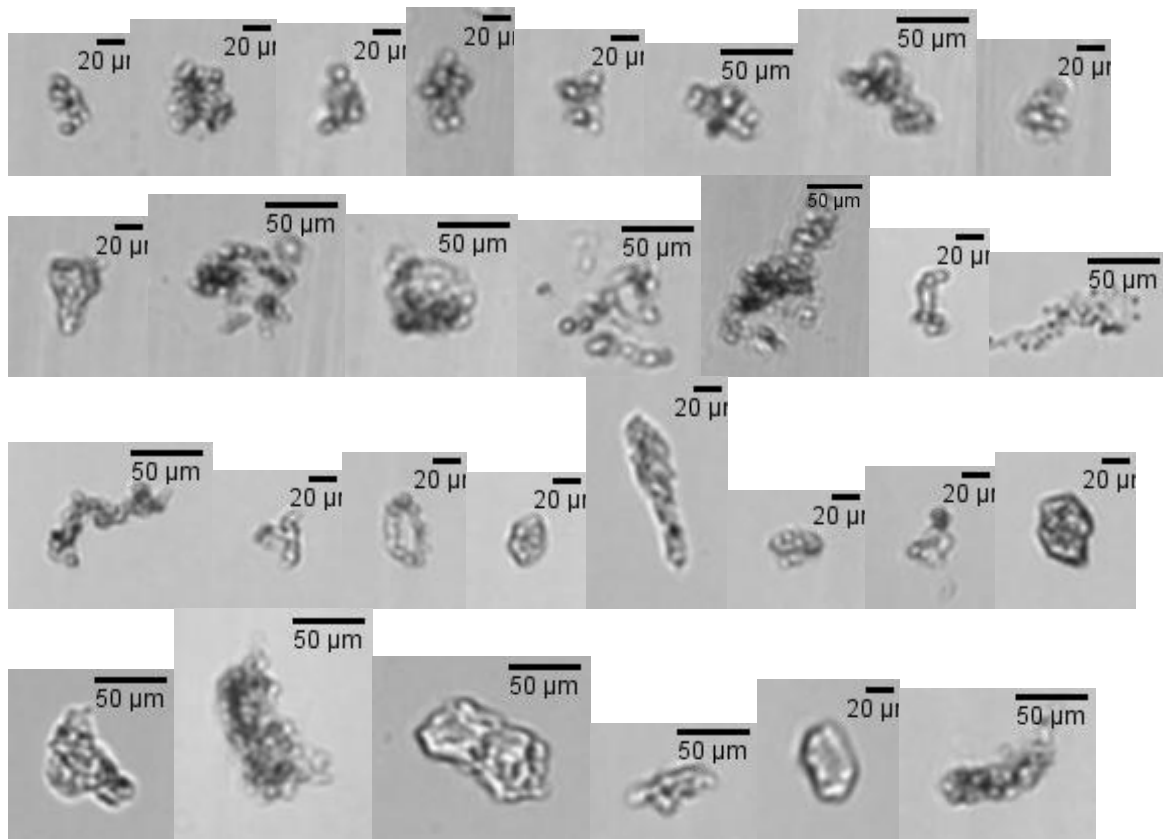
### 4.2. Bubble



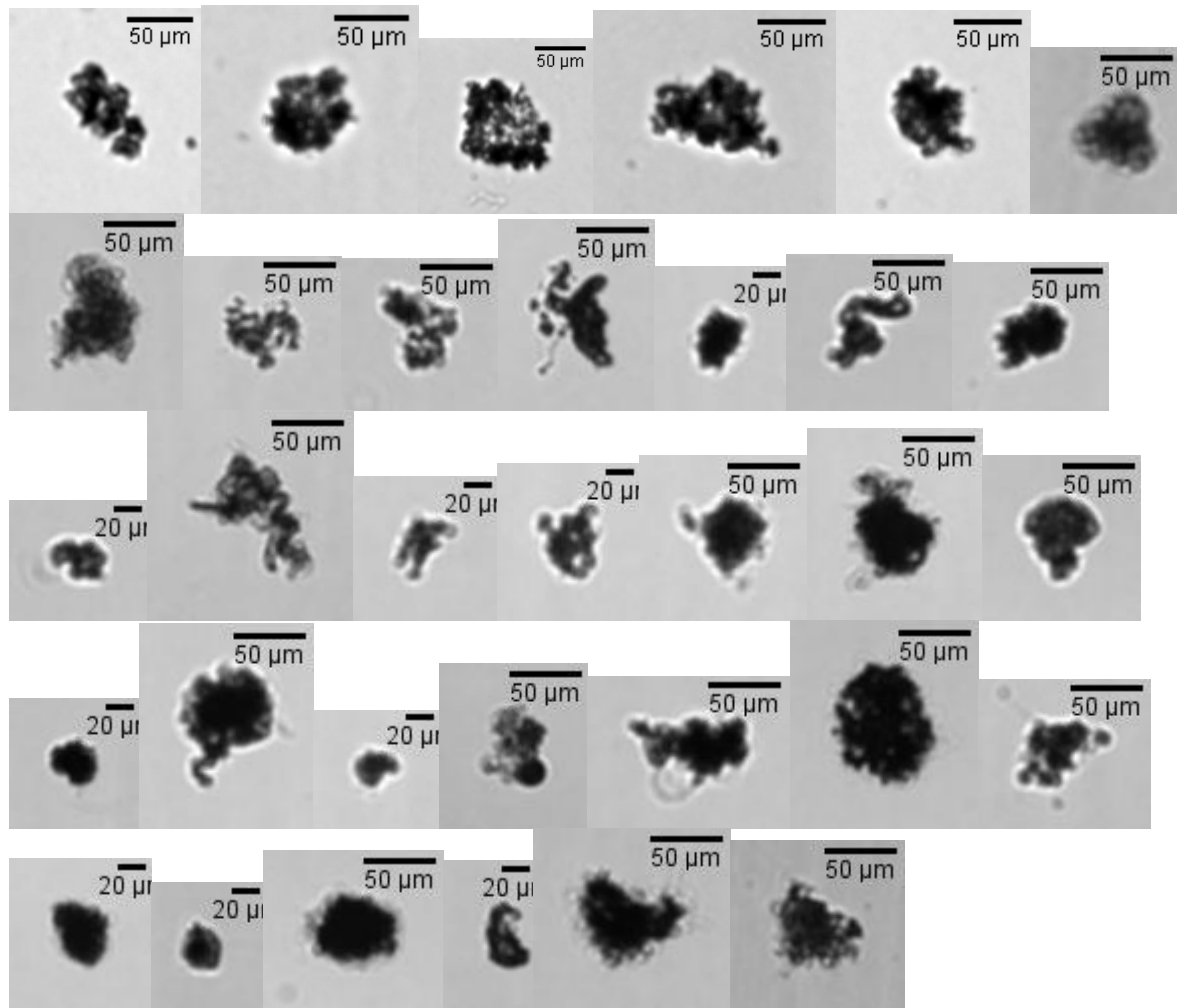
### 4.3. Clear



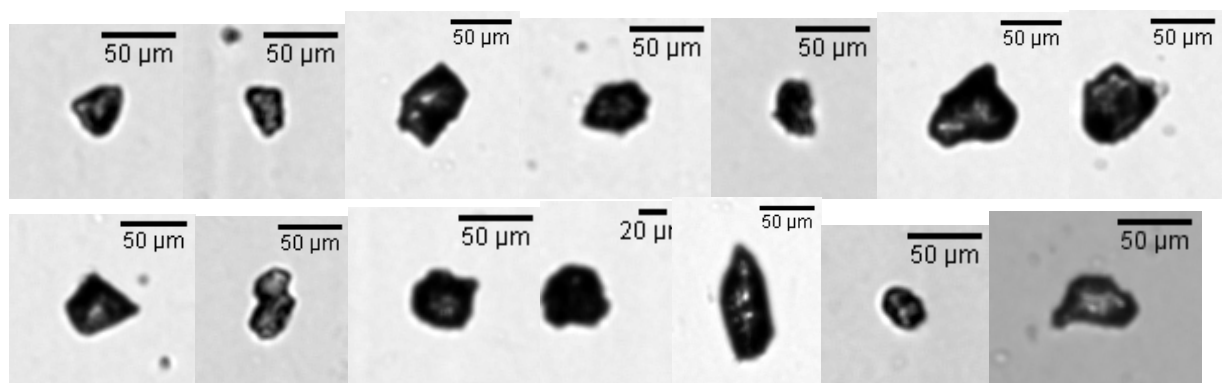
### 4.4. Clear grainy



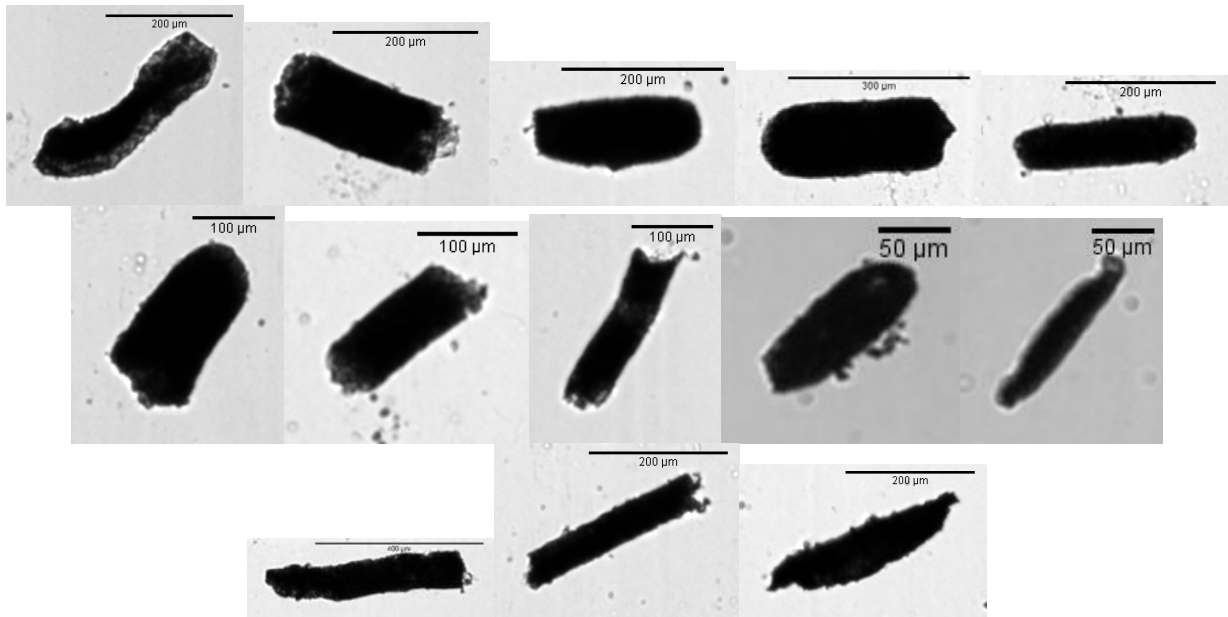
#### 4.5. Dark grainy



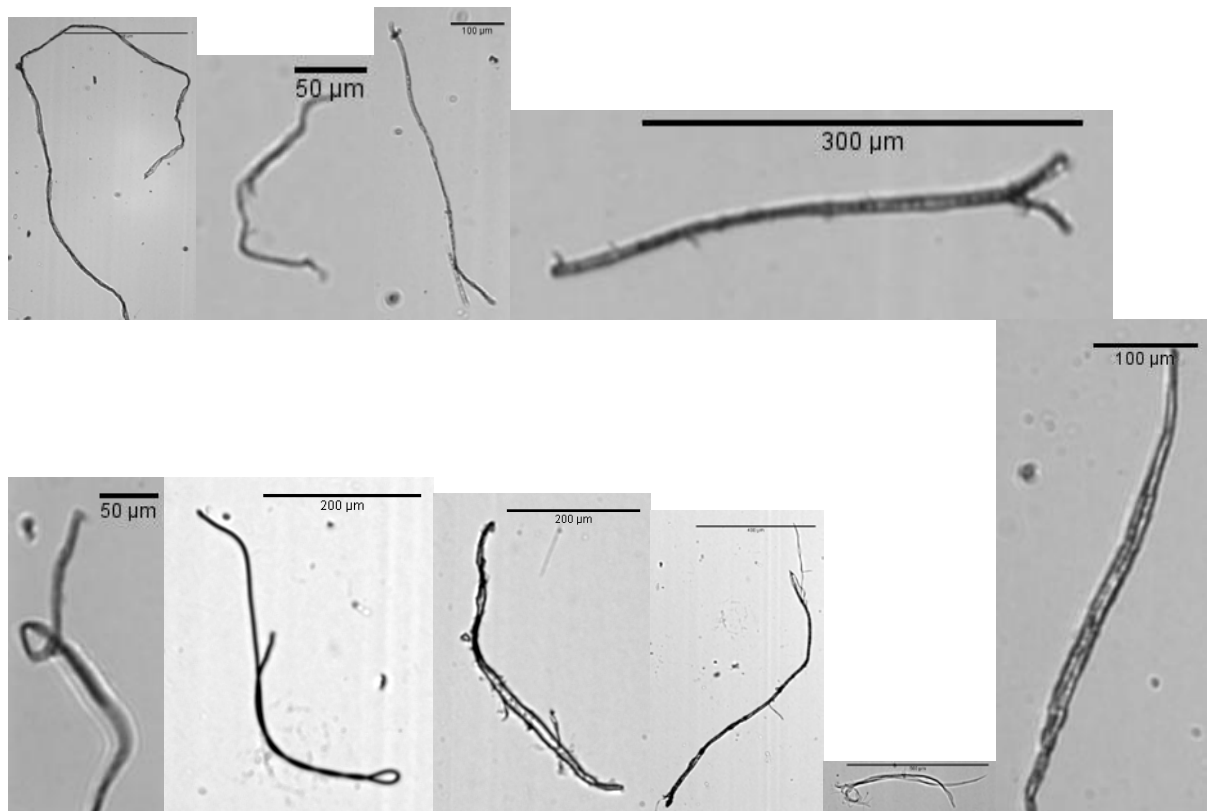
#### 4.6. Dark mineral



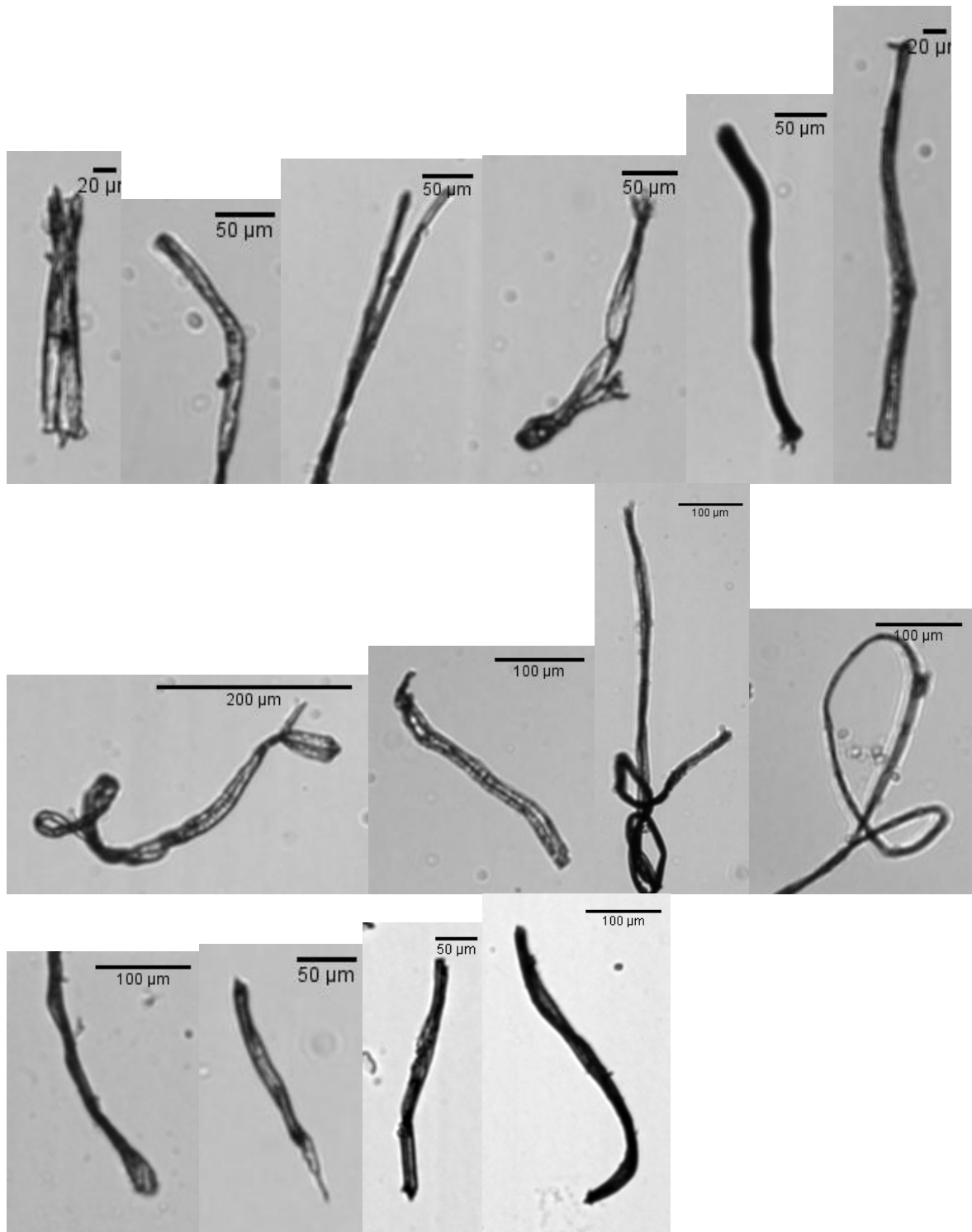
## 4.7. Fecal pellets



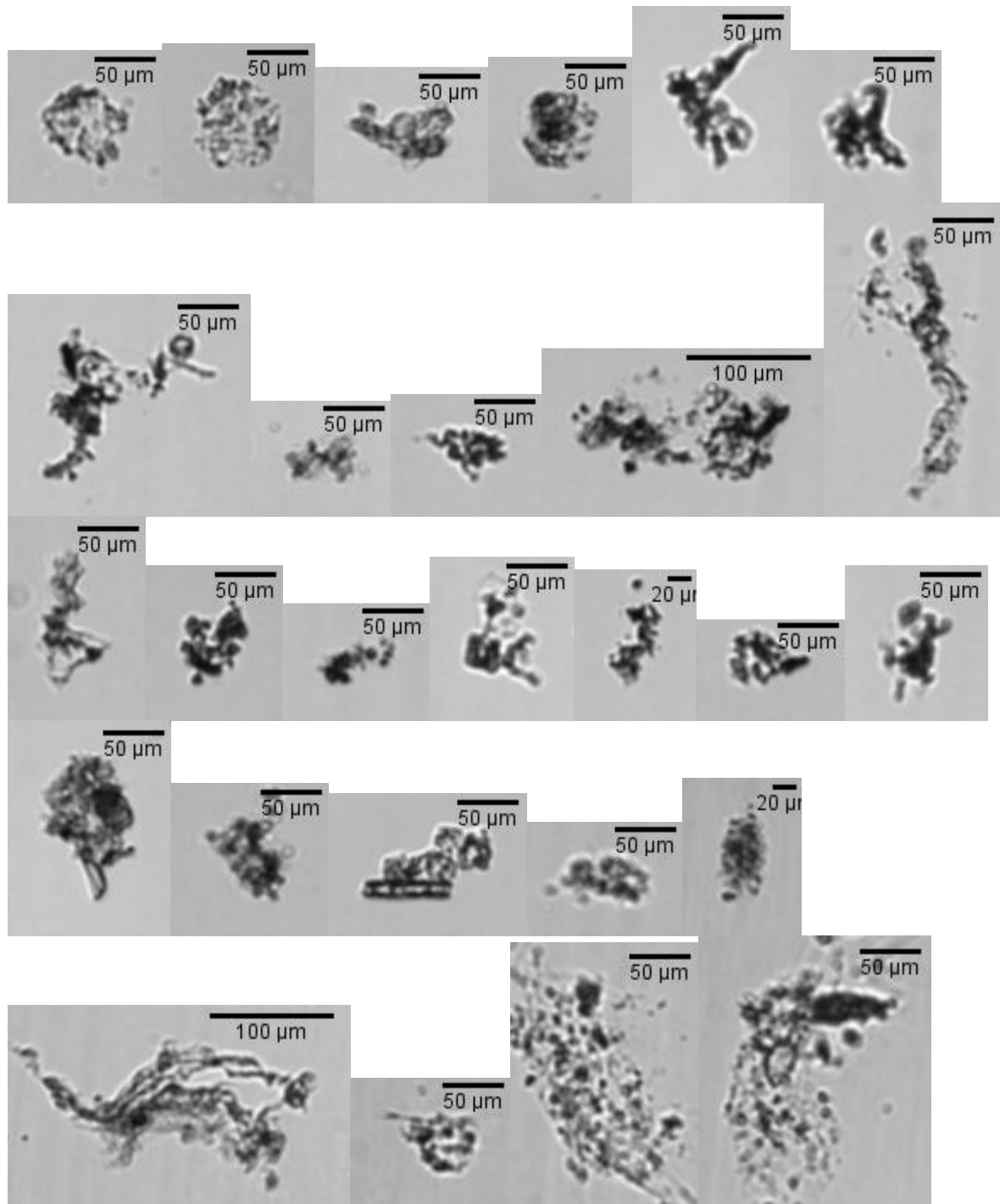
## 4.8. Fiber



## 4.9. Fiber dark

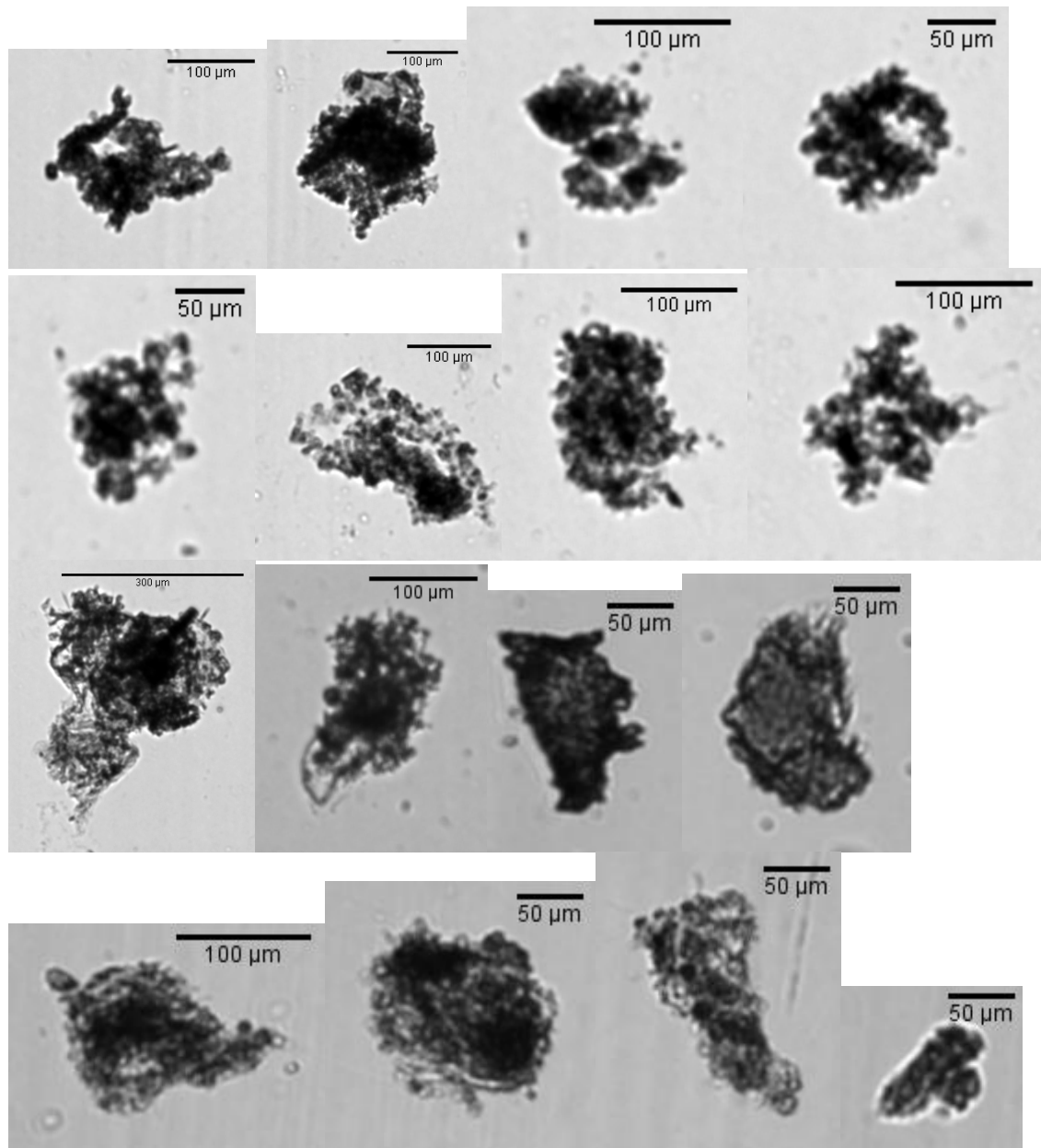


## 4.10. Granular clear

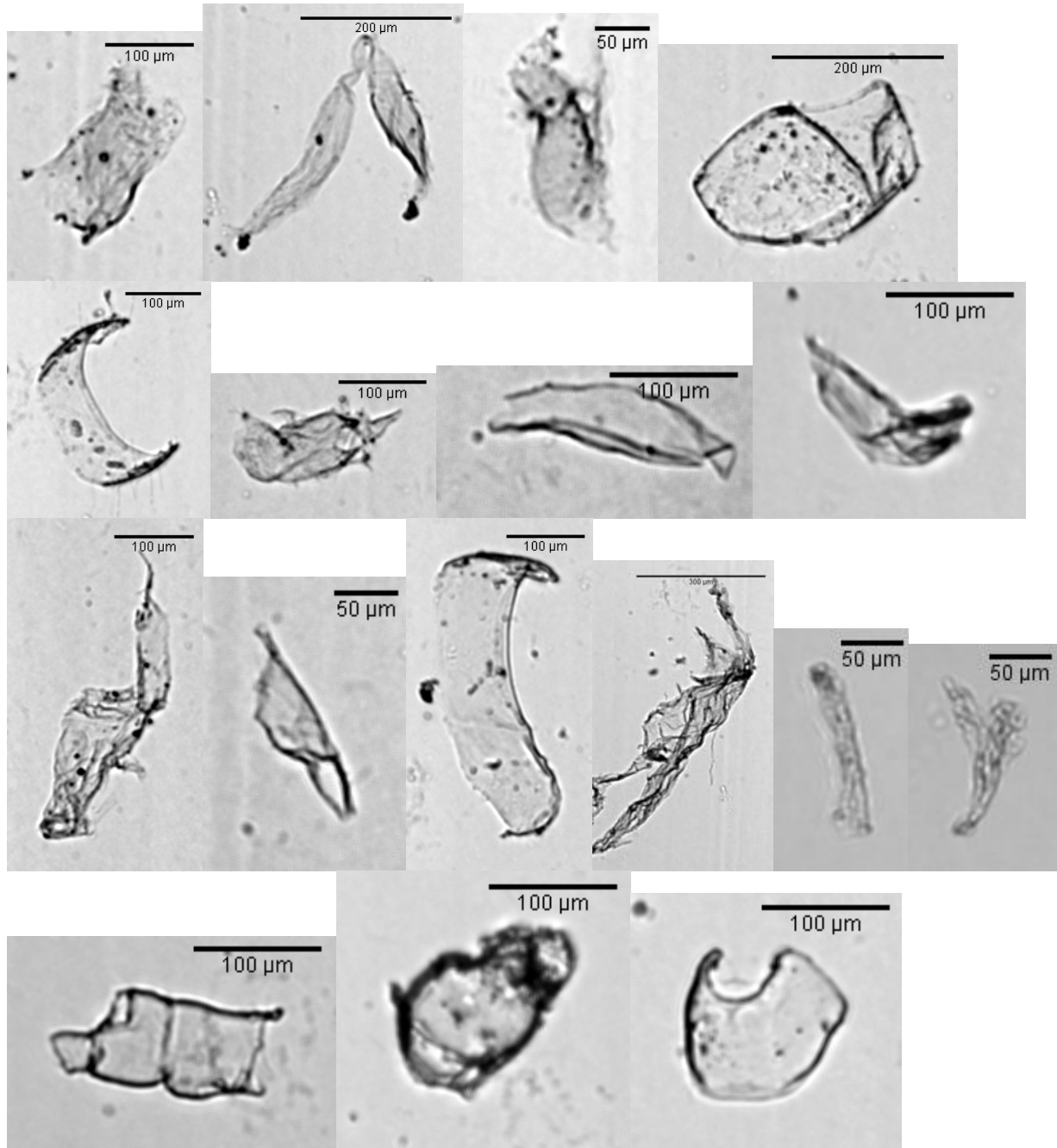




## 4.11. Granular dark



## 4.12. Membranous

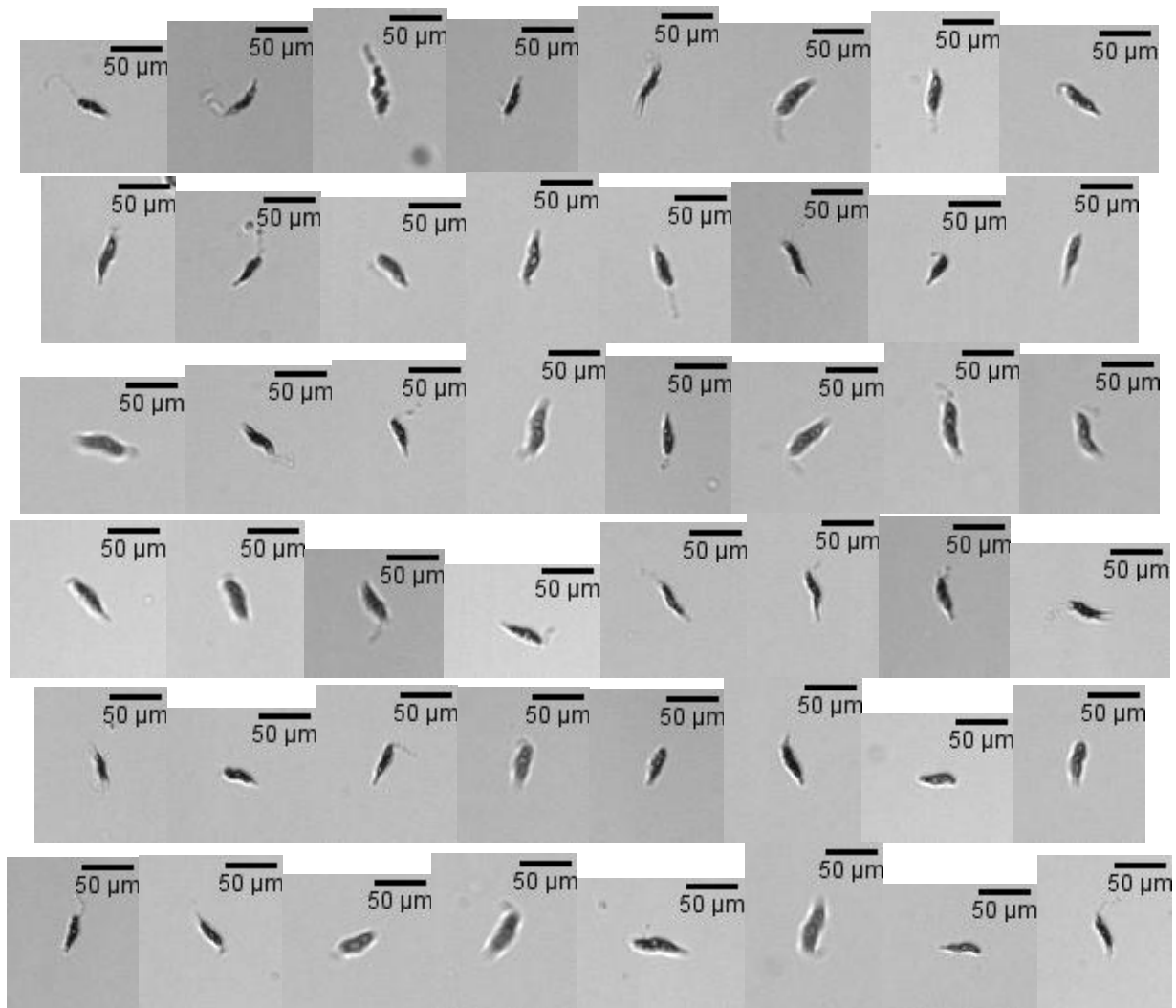




## 5. Classes phytoplancton intégrées au set

### 5.1. *Euglenoidea*

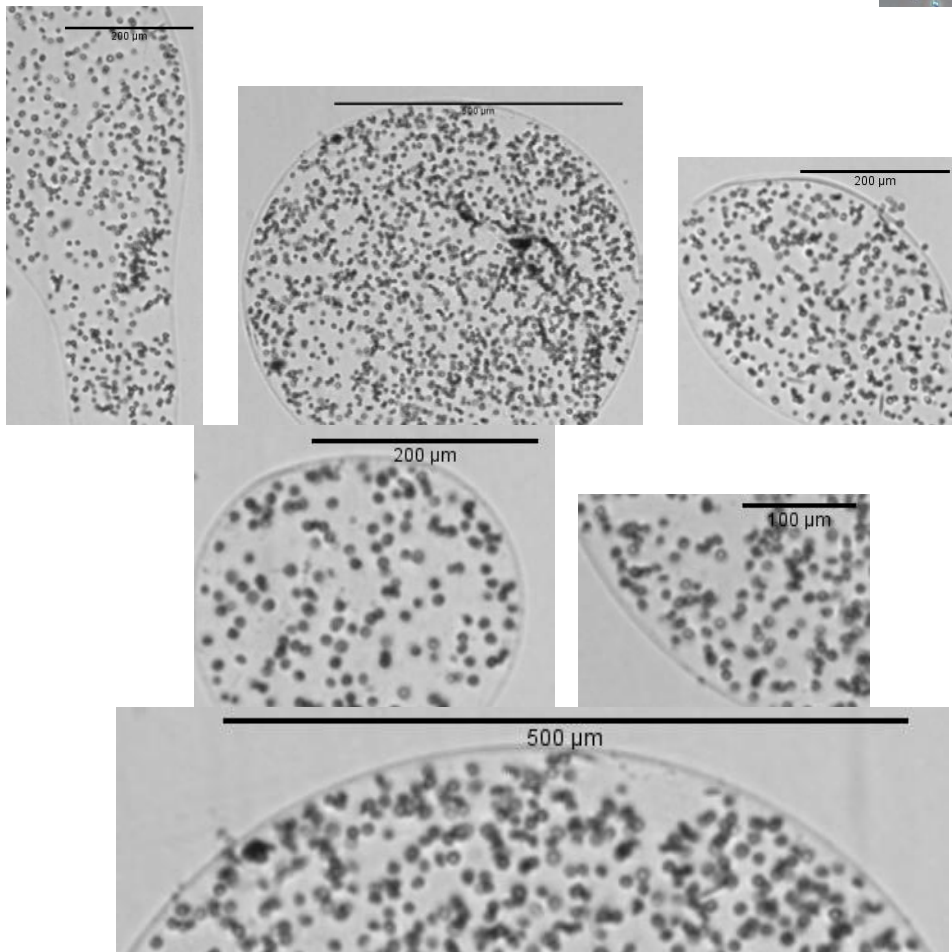
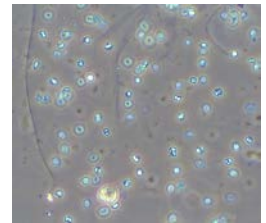
Euglenozoa\Euglenoidea



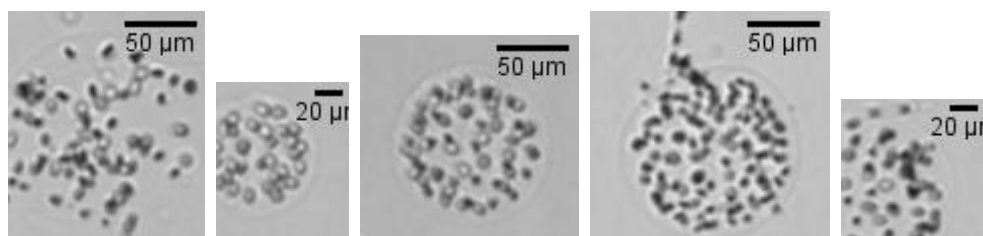
AR

## 5.2. *Phaeocystis*

Haptophyta\Prymnesiophyceae\Phaeocystaceae\Phaeocystis



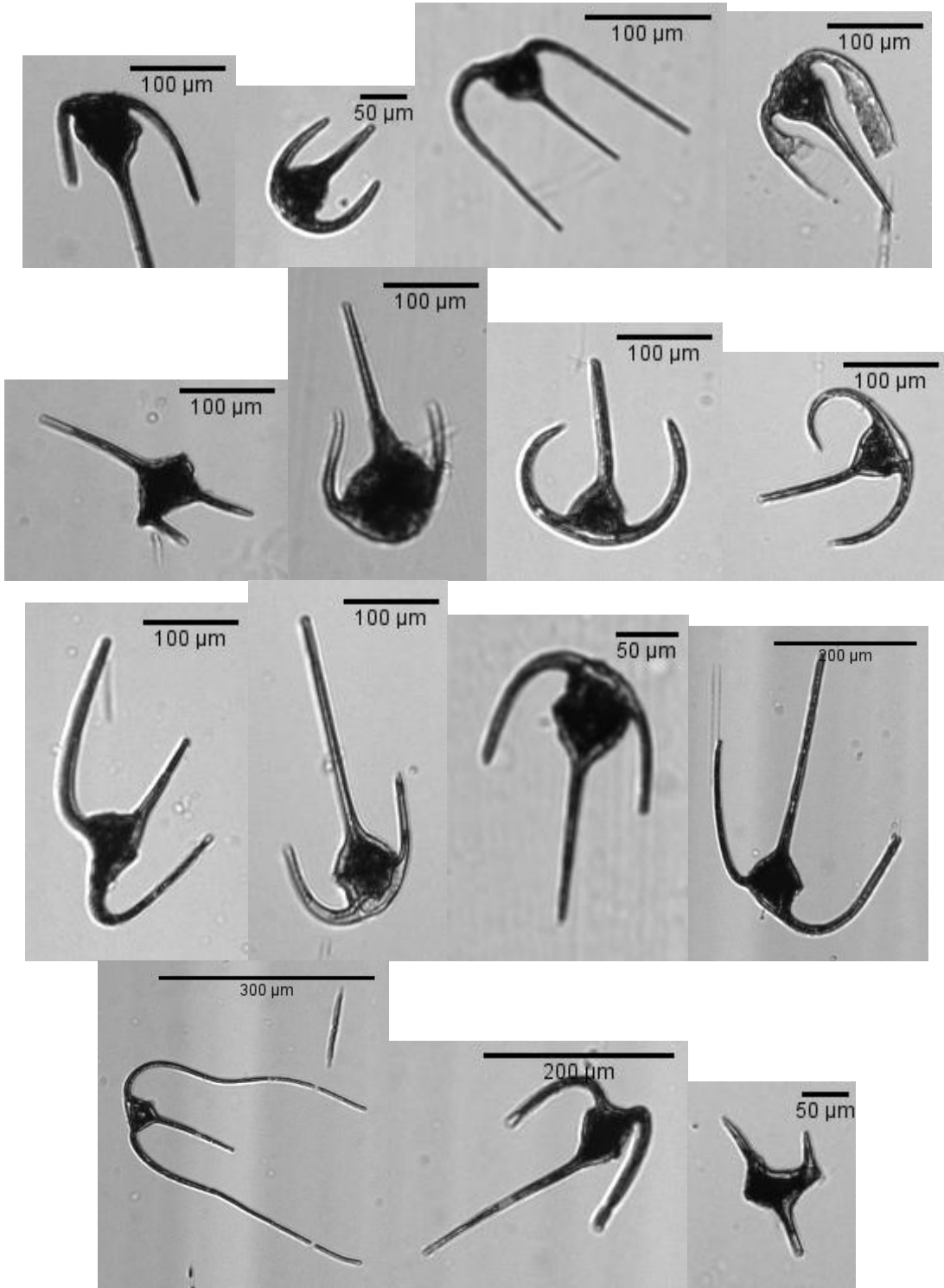
**BL**



**NT**

### 5.3. Ceratium

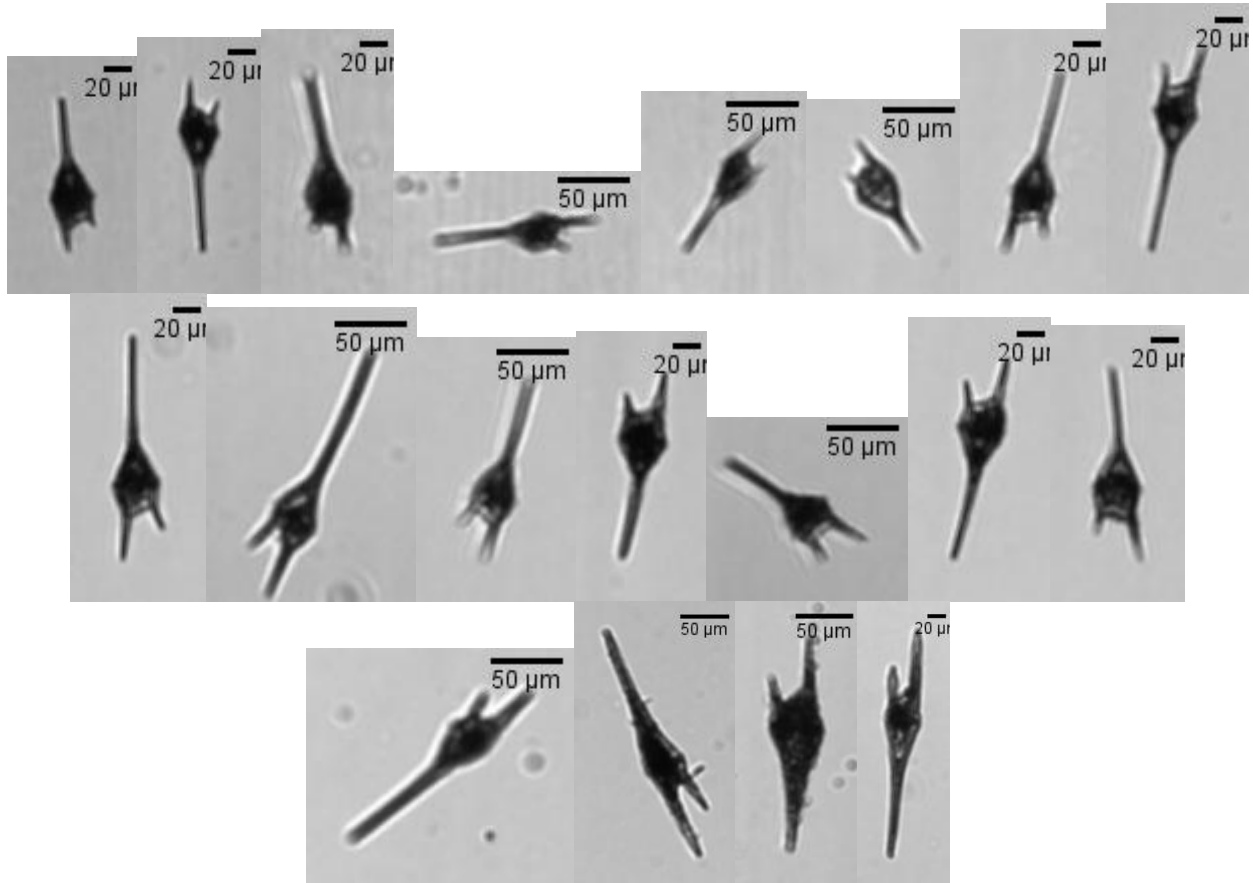
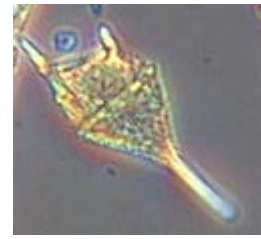
Myzozoa\Dinophyceae\Ceratiaceae\Ceratium



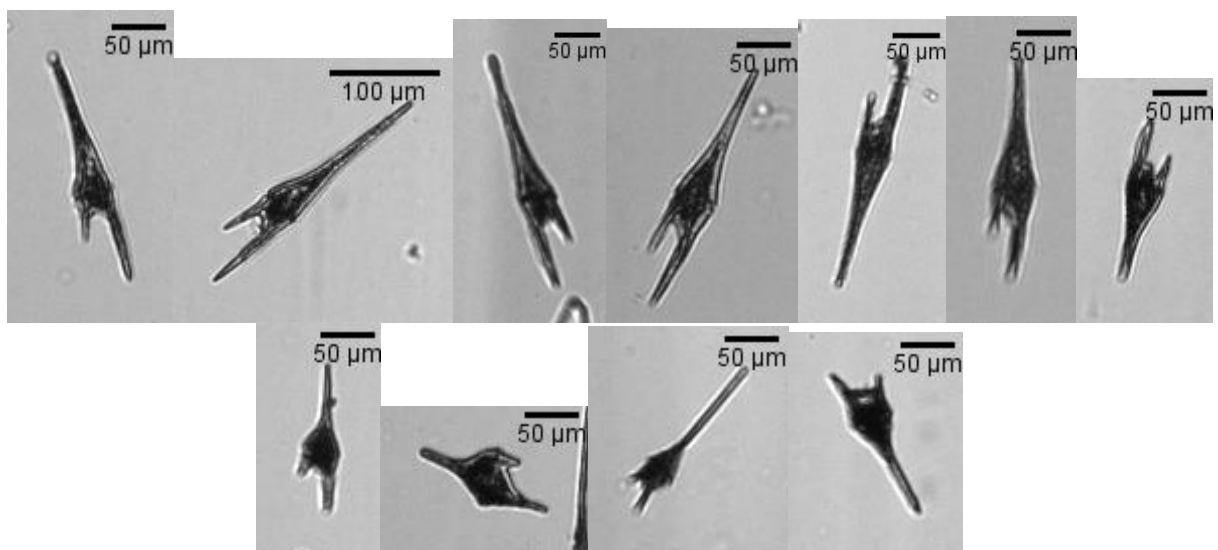
AR

## 5.4. *Neoceratium furca lineatum*

Myzozoa\Dinophyceae\Ceratiaceae\*Neoceratium furca lineatum*



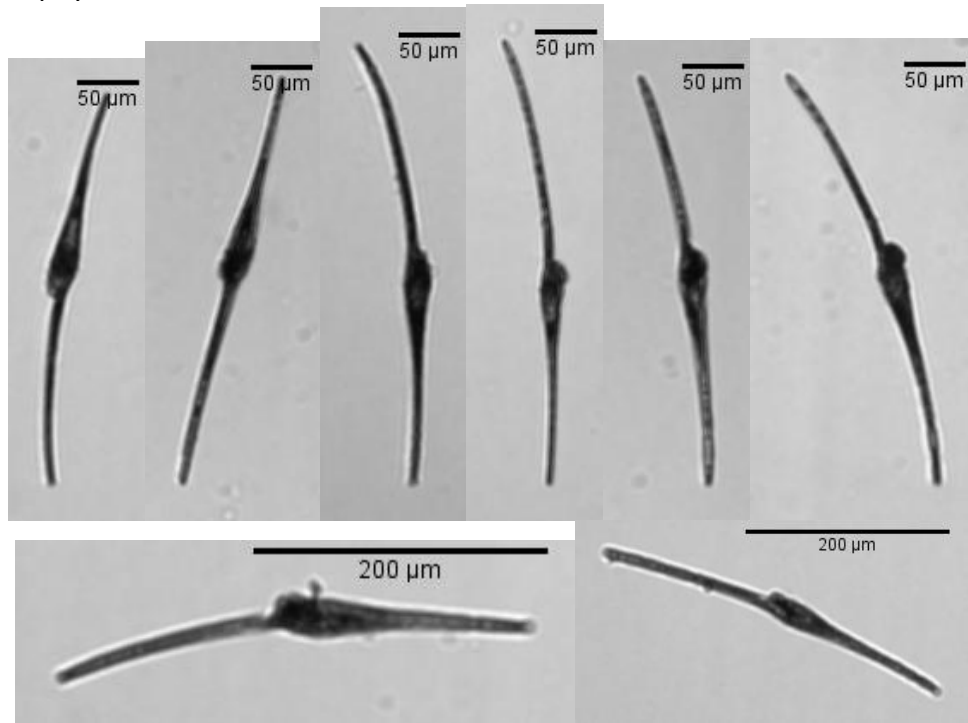
**NT**



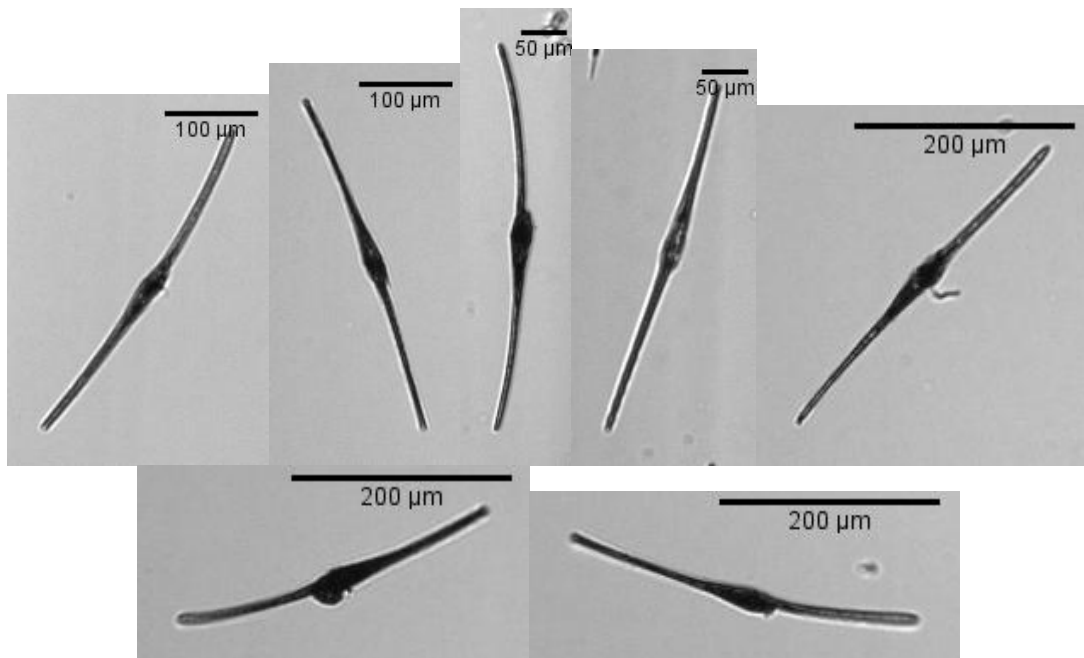
**AR**

## 5.5. *Neoceratium fusus*

Myzozoa\Dinophyceae\Ceratiaceae\*Neoceratium fusus*

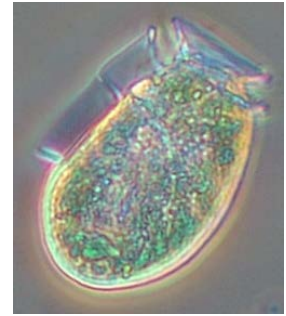


**NT**



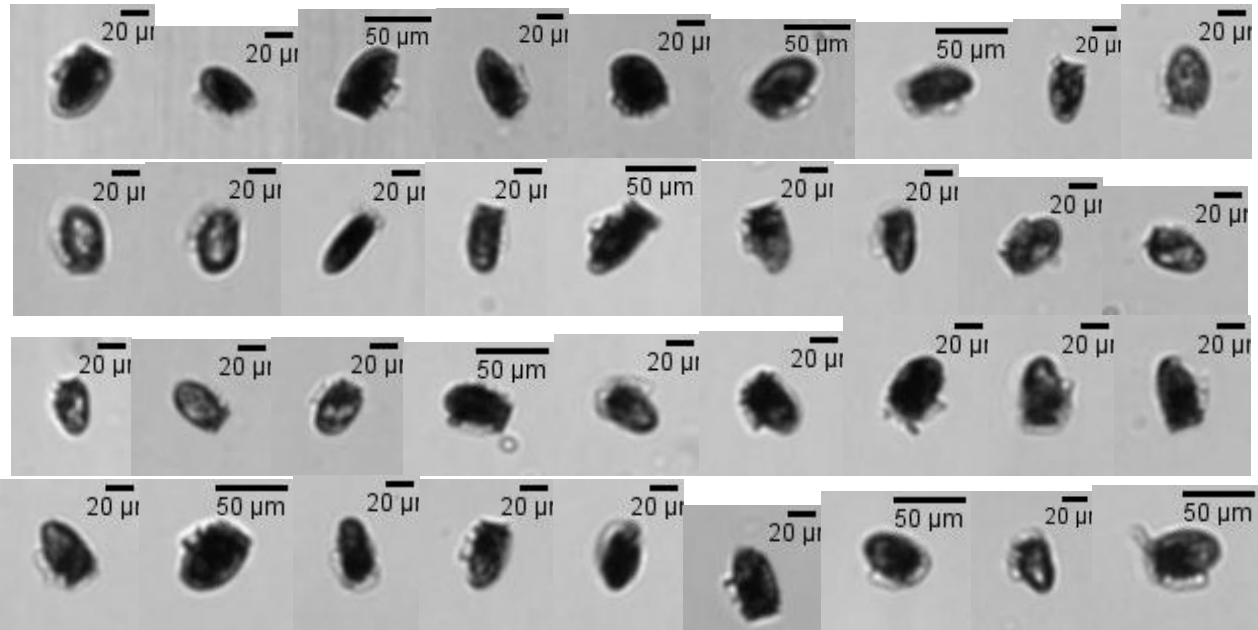
**AR**



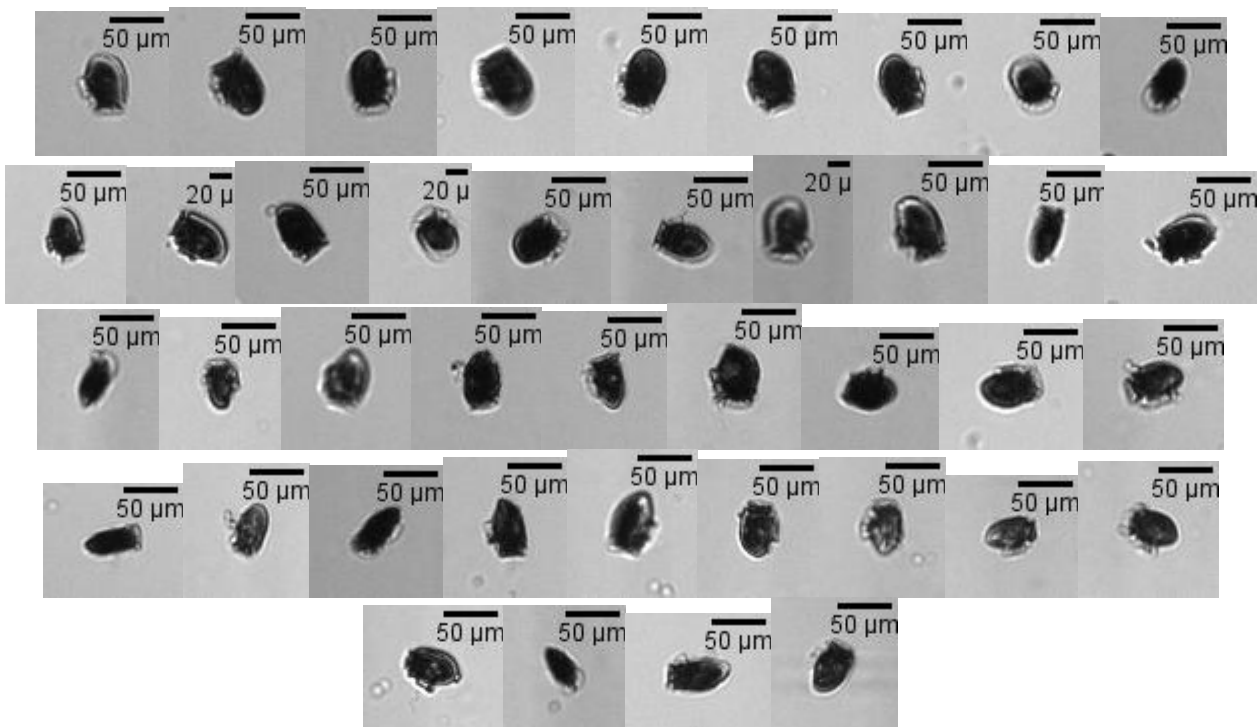


## 5.6. Dinophysis

Myzozoa\Dinophyceae\Dinophysiaceae\Dinophysis



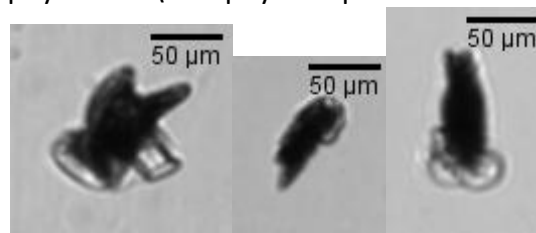
**NT**



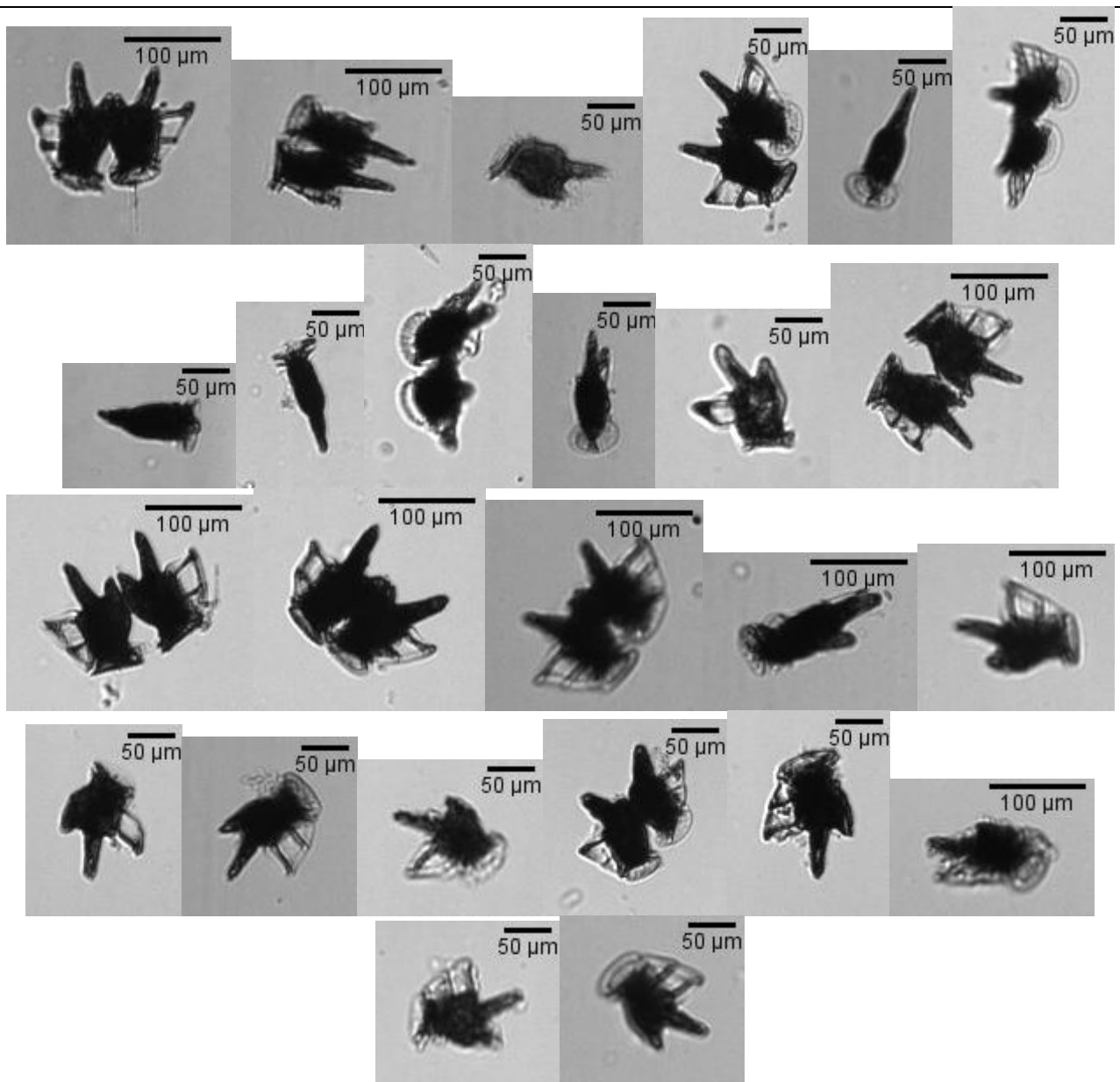
**AR**

## 5.7. *Dinophysis tripos*

Myzozoa\Dinophyceae\Dinophysiaceae\Dinophysis tripos



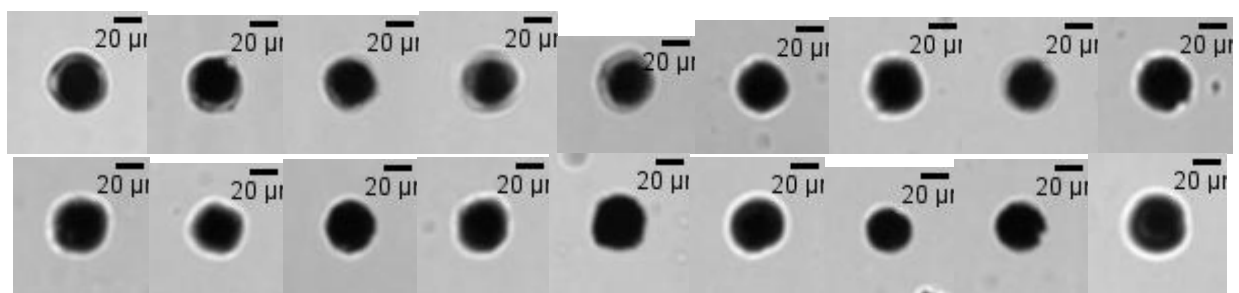
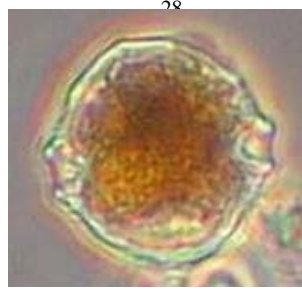
**NT**



**AR**

### 5.8. *Alexandrium*

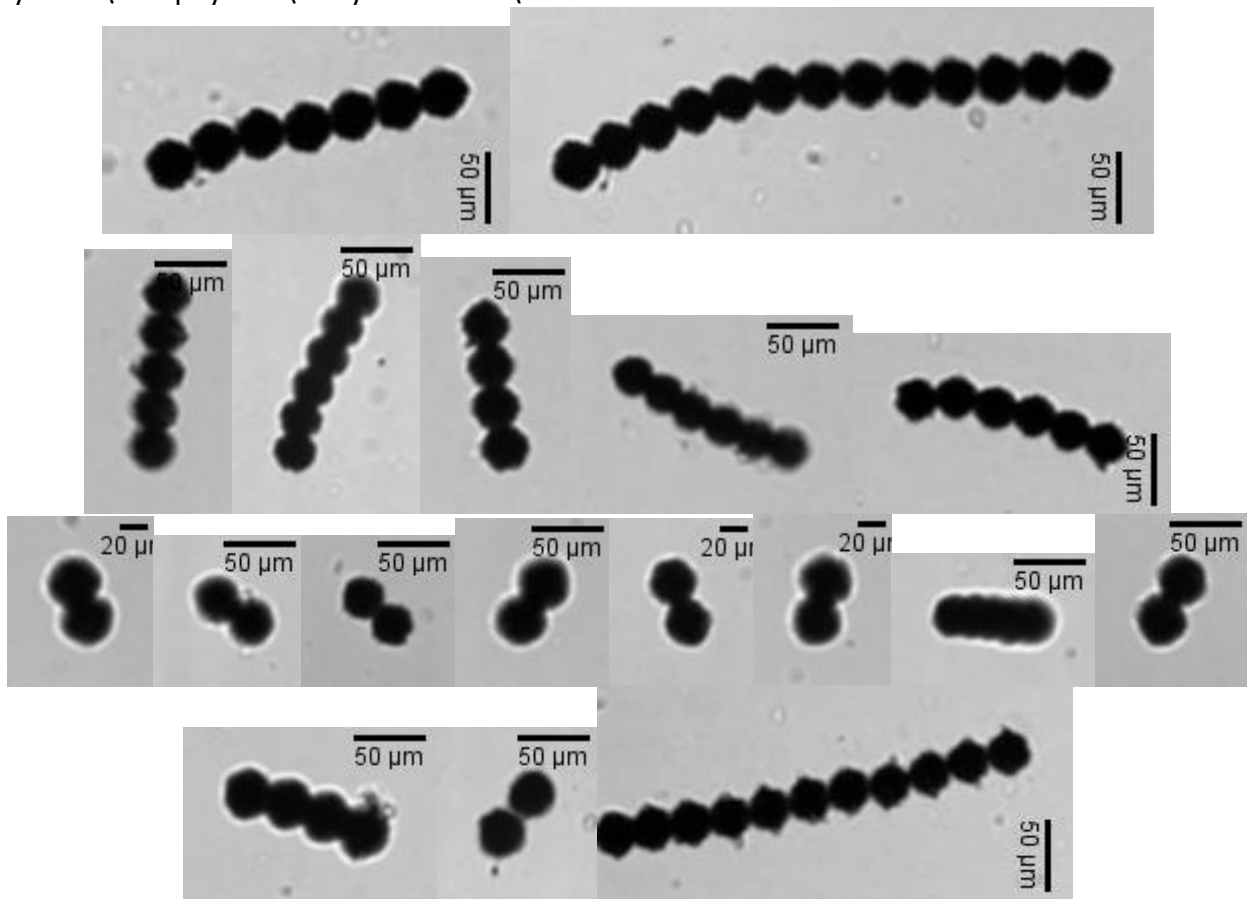
Myzozoa\Dinophyceae\Gonyaulacaceae\Alexandrium



NT

### 5.9. *Alexandrium affine*

Myzozoa\Dinophyceae\Gonyaulacaceae\Alexandrium affine

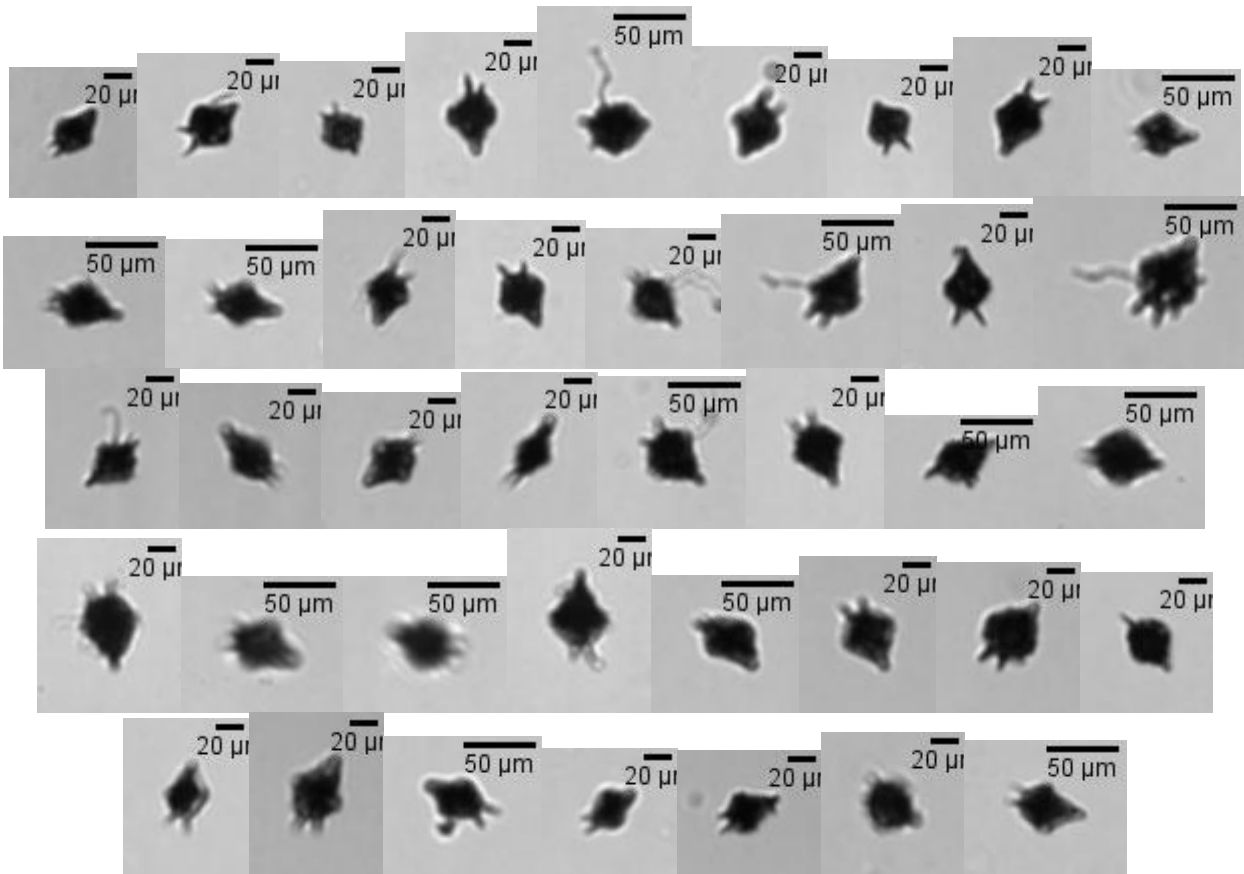
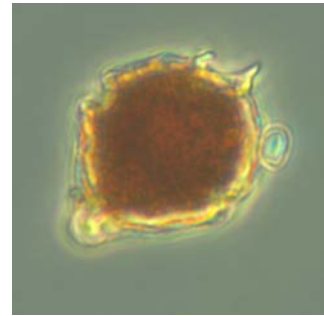


NT



## 5.10. *Gonyaulax*

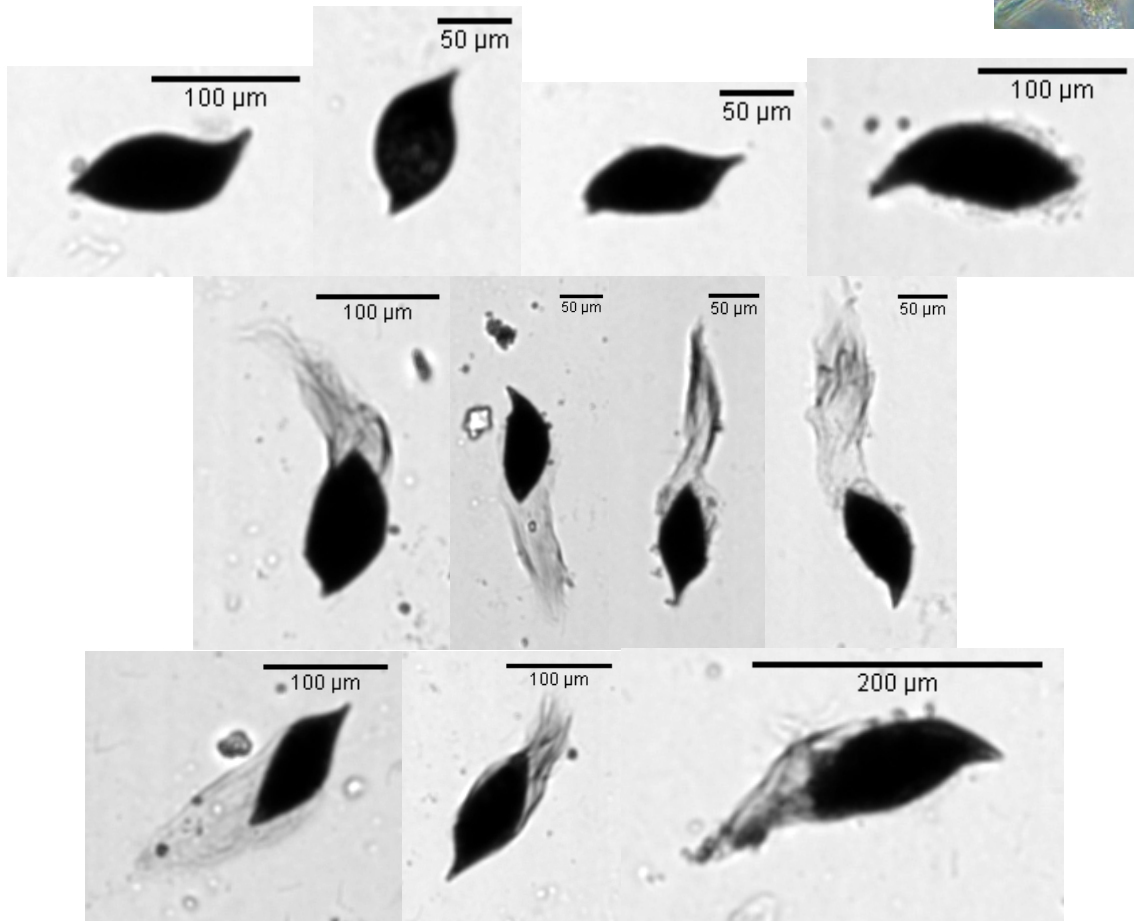
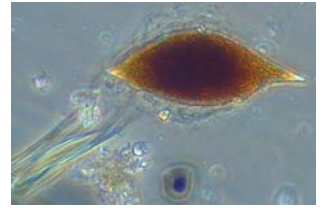
Myzozoa\Dinophyceae\Gonyaulacaceae\Gonyaulax



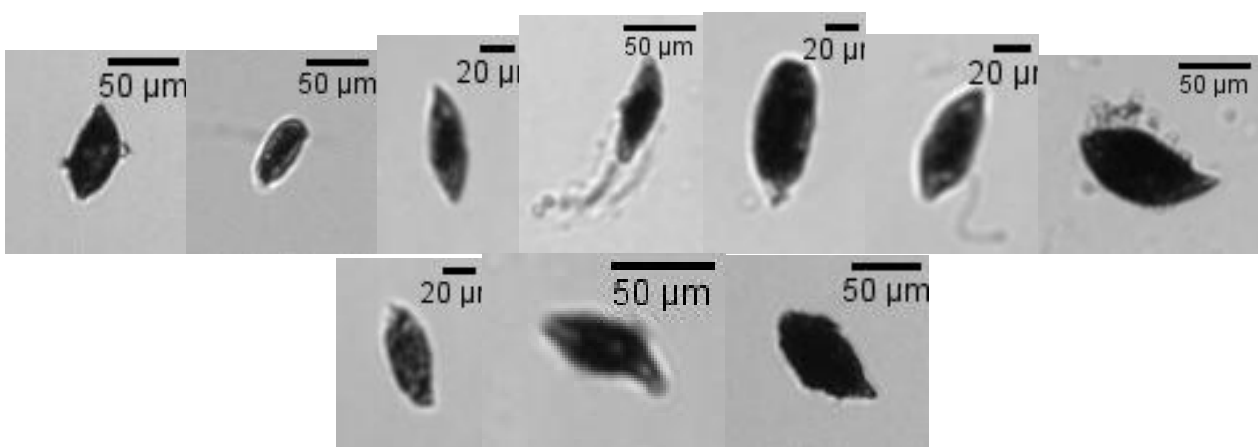
NT

## 5.11. *Gymnodinium Gyrodinium Torodinium*

Myzozoa\Dinophyceae\Gymnodiniaceae\Gymnodinium Gyrodinium Torodinium



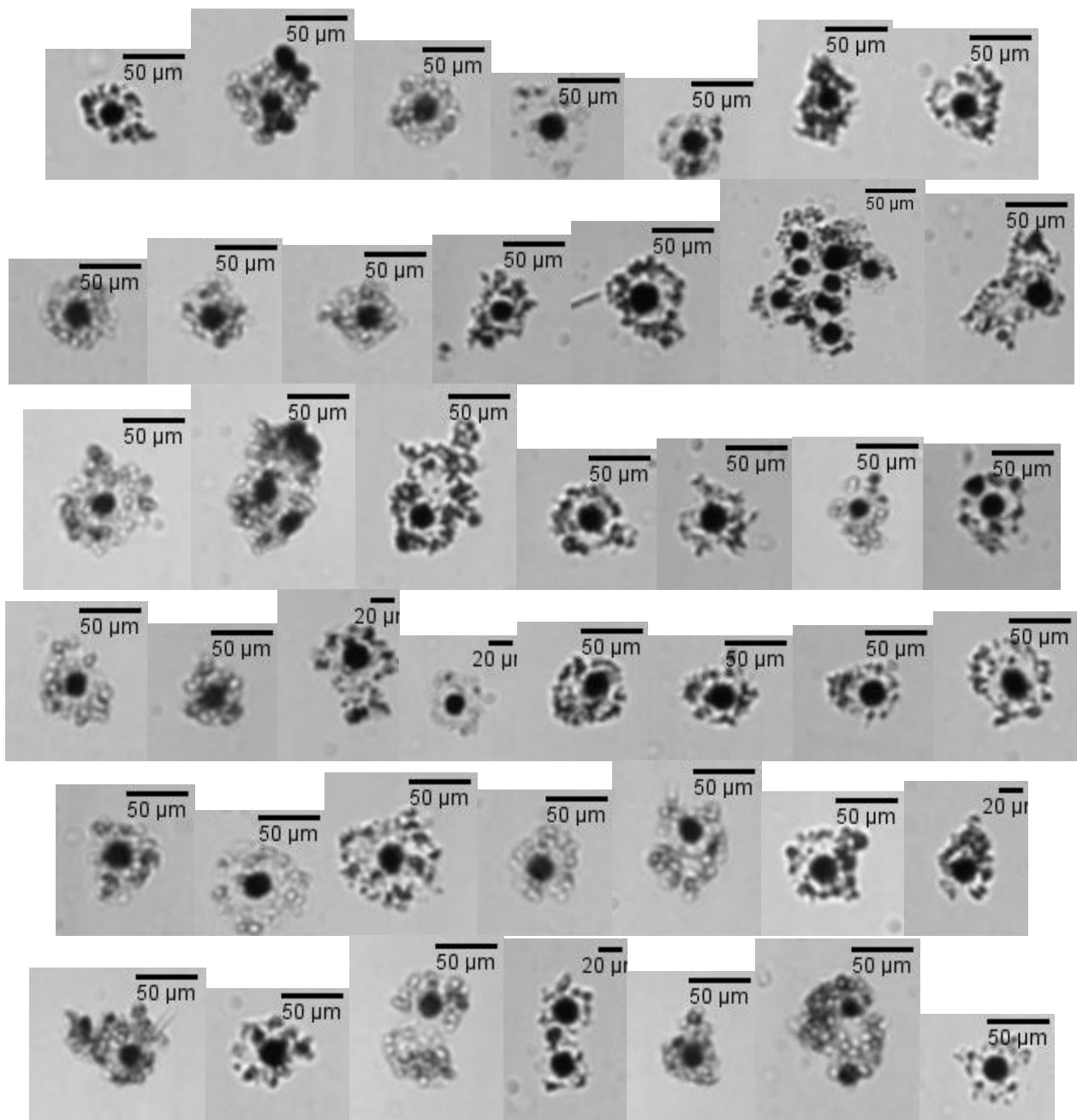
**BL**



**NT**

## 5.12. *Lepidodinium mucous*

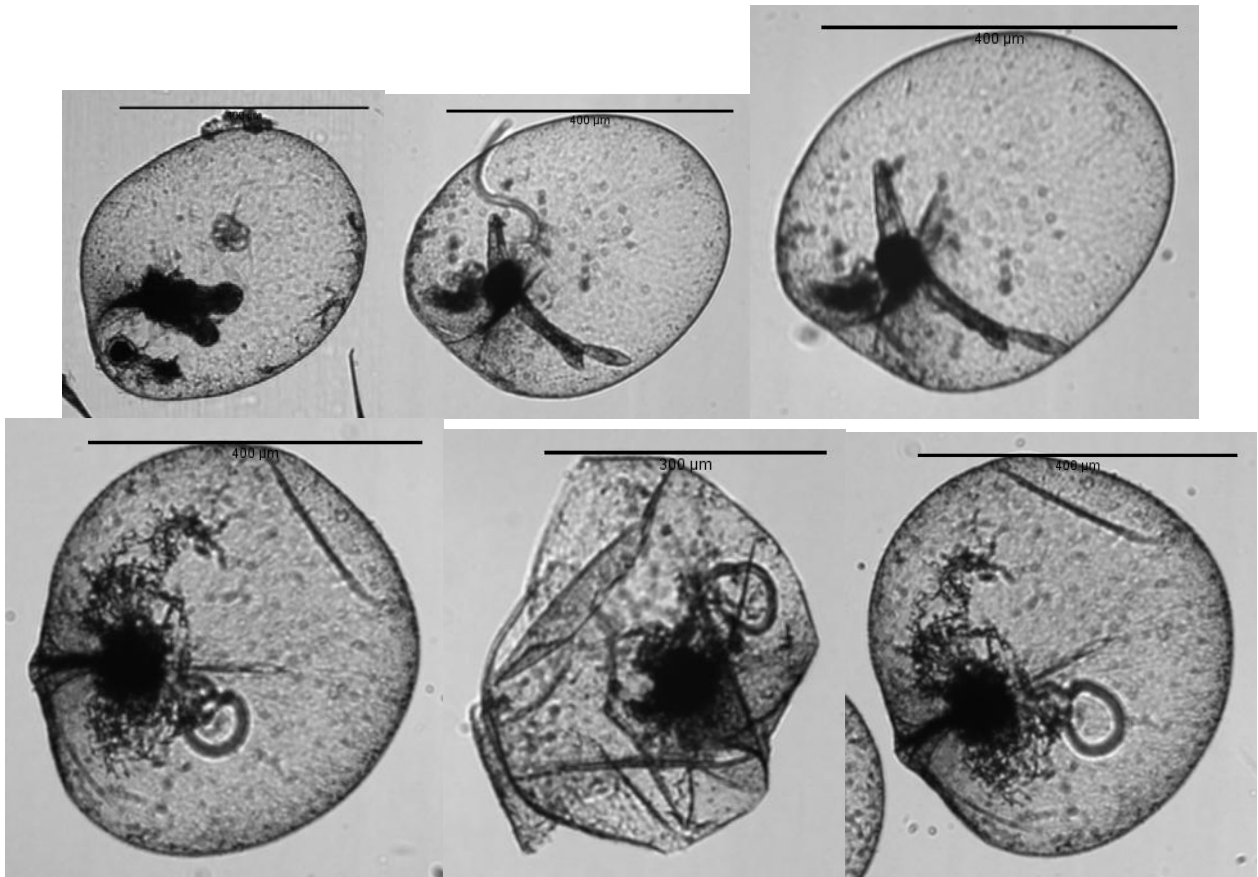
Myzozoa\Dinophyceae\Gymnodiniaceae\Lepidodinium mucous



NT

### 5.13. Noctiluca

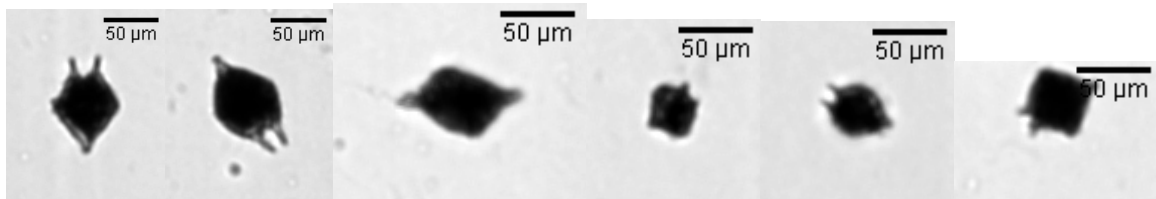
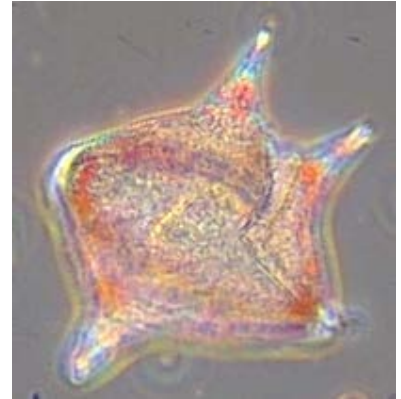
Myzozoa\Dinophyceae>Noctilucaceae>Noctiluca



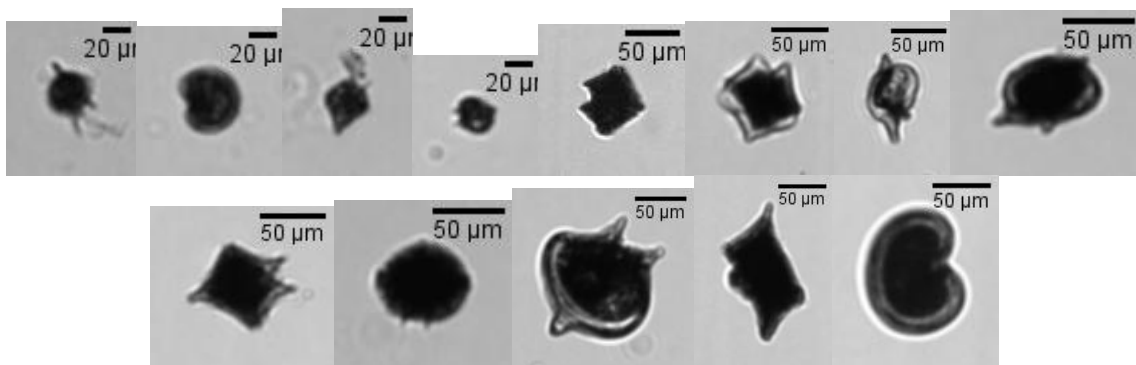
NT

## 5.14. *Peridinium Protoperidinium*

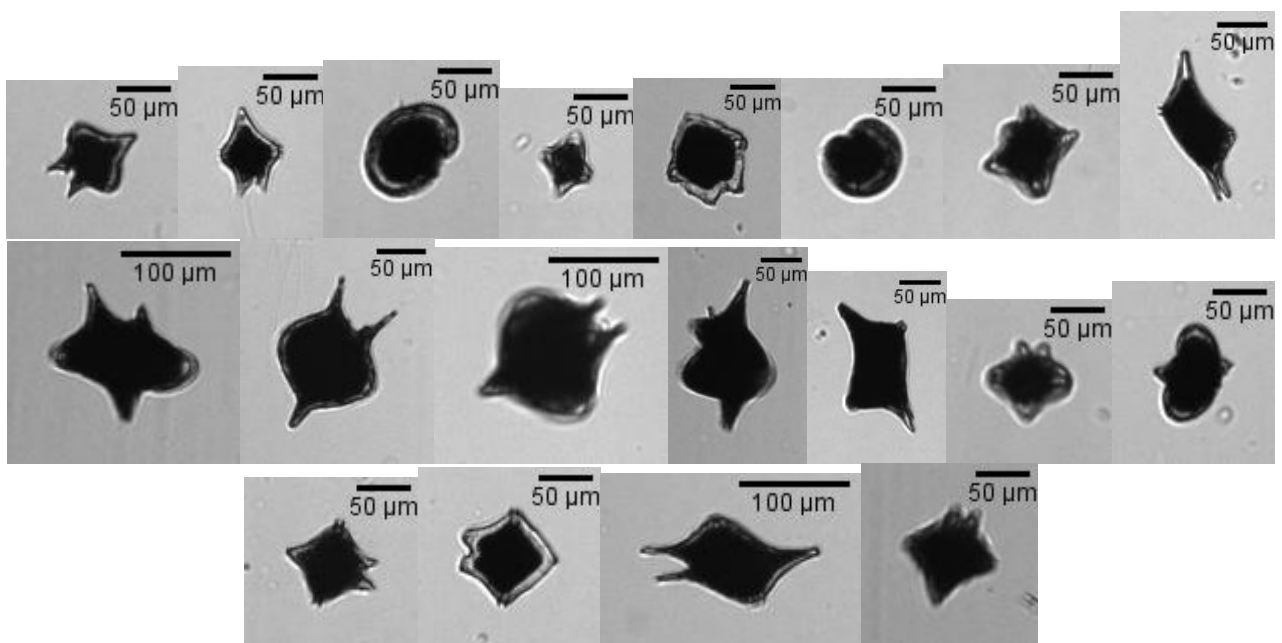
Myzozoa\Dinophyceae\Peridiniaceae Protoperidiniaceae  
 \Peridinium Protoperidinium



**BL**



**NT**

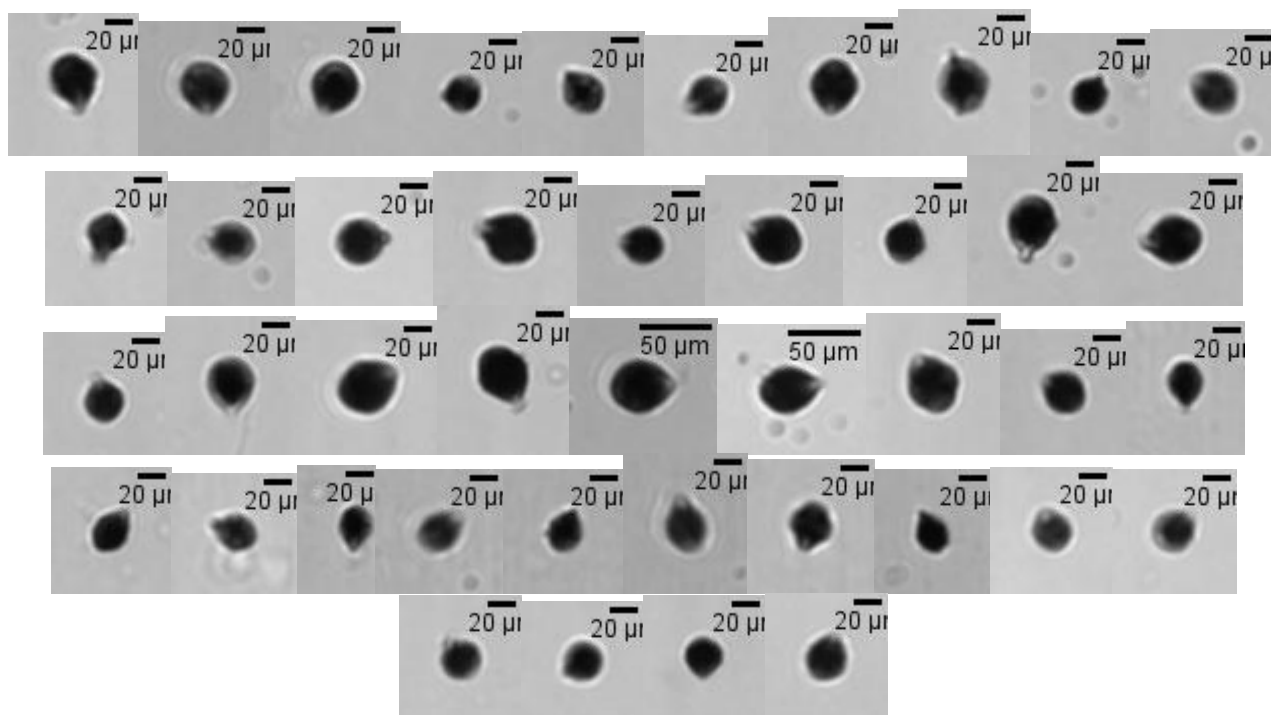


**AR**



## 5.15. *Scrippsiella* *Ensiculifera* *Pentapharsodinium* *Bysmatrum*

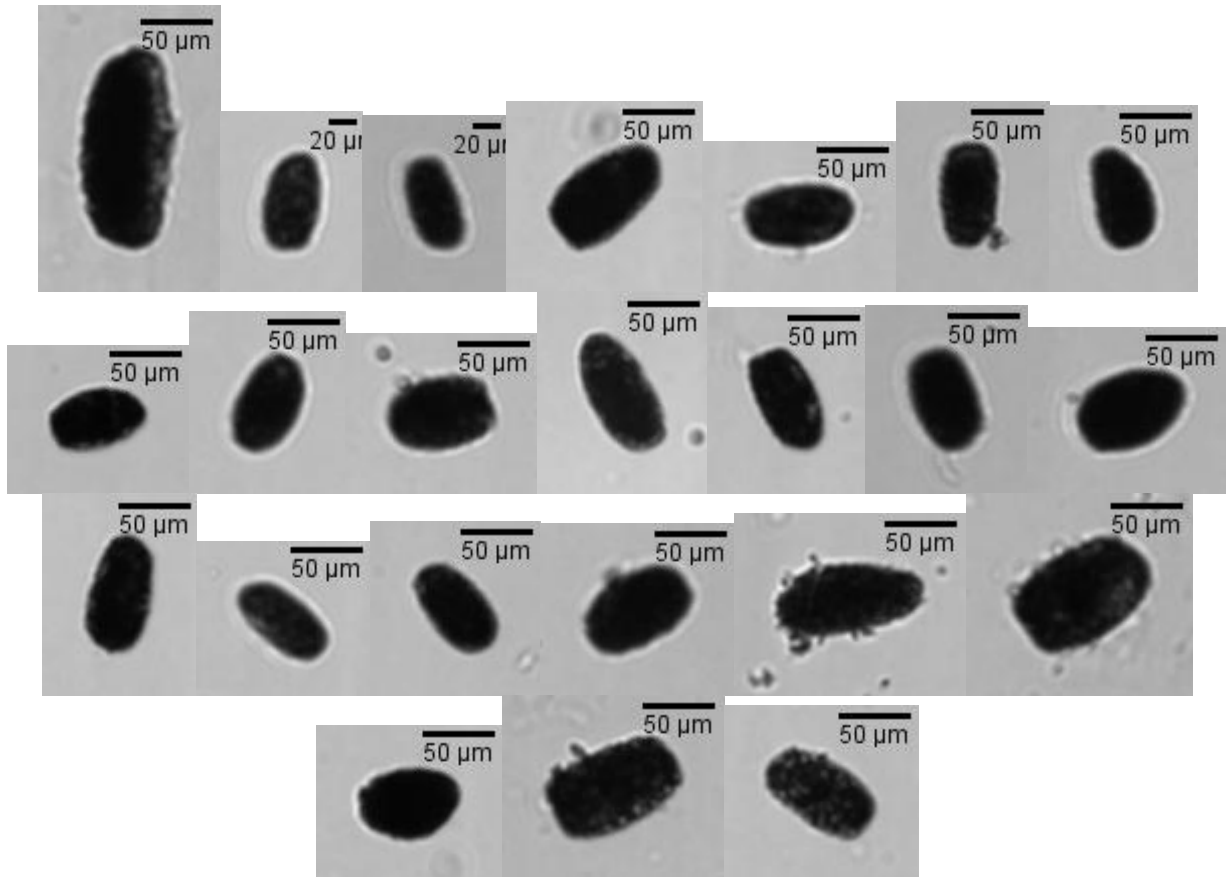
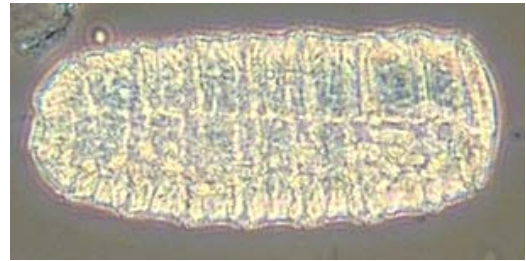
Myzozoa\Dinophyceae\Peridiniaceae Protoperidiniaceae\Scrippsiella Ensiculifera  
Pentapharsodinium Bysmatrum



NT

## 5.16. *Polykrikos*

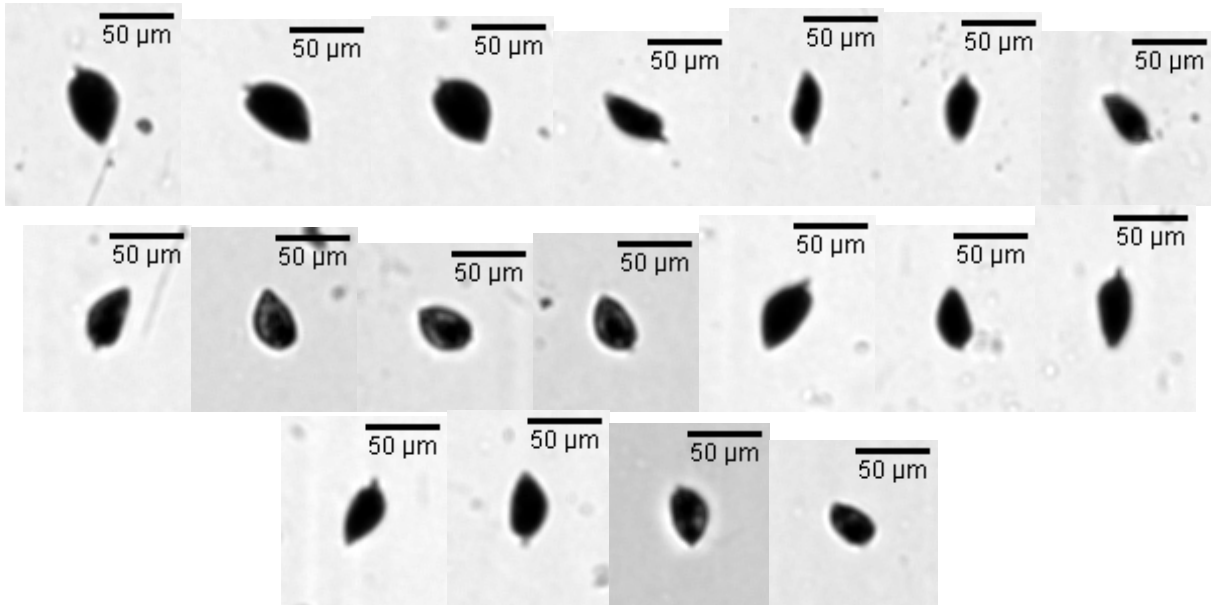
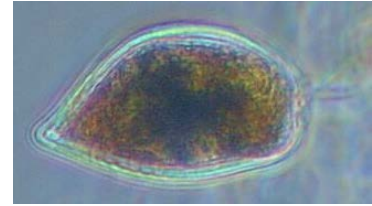
Myzozoa\Dinophyceae\Polykrikaceae\Polykrikos



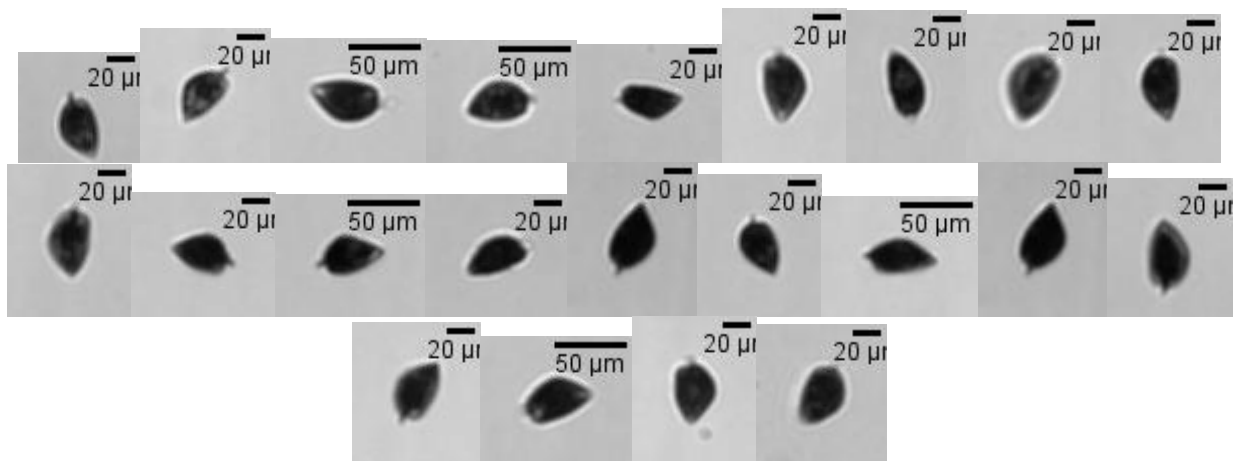
NT

## 5.17. Prorocentrum

Myzozoa\Dinophyceae\Prorocentraceae\Prorocentrum



**BL**

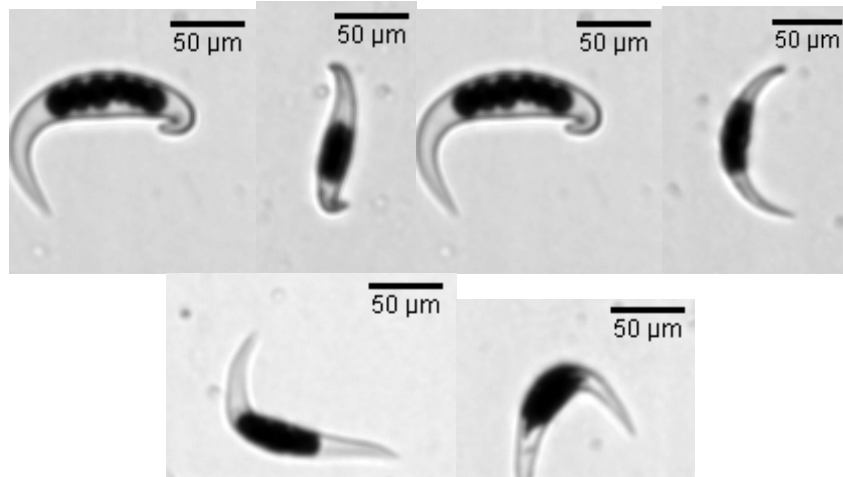


**NT**

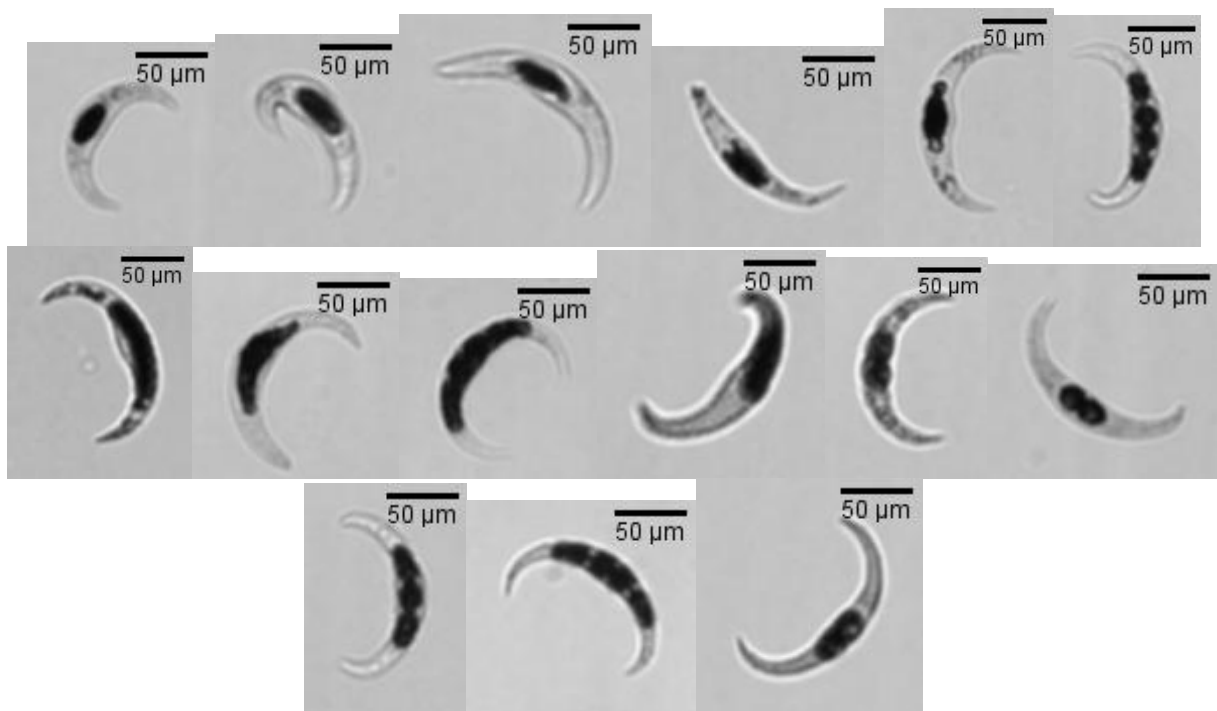


## 5.18. *Dissodinium Pyrocystis*

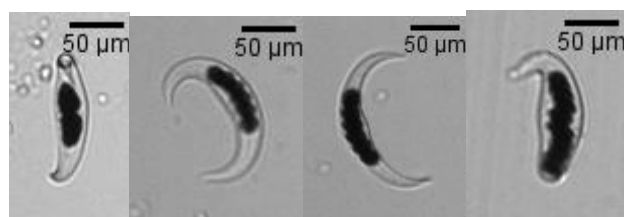
Myzozoa\Dinophyceae\Pyrocystaceae\Dissodinium Pyrocystis



**BL**



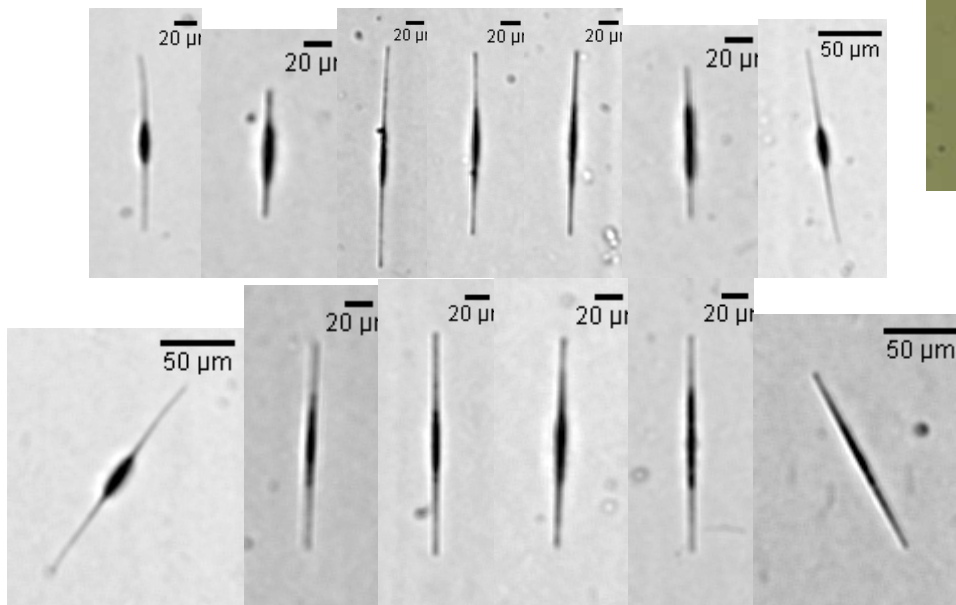
**NT**



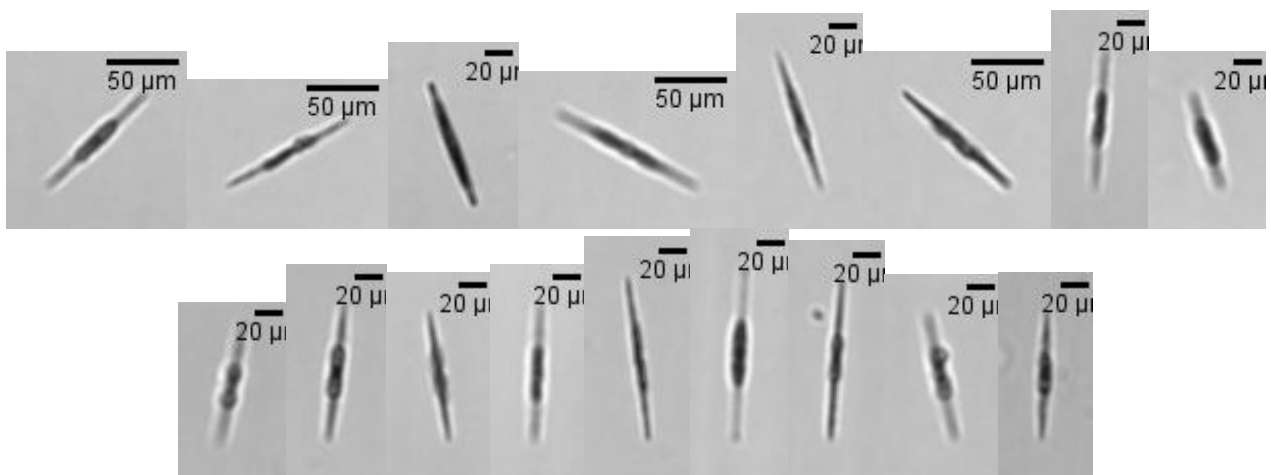
**AR**

## 5.19. *Cylindrotheca Hantzschia Nitzschia*

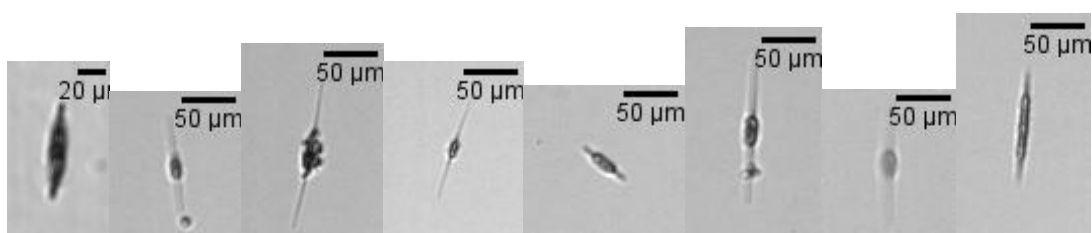
Ochrophyta\Bacillariophyceae\Bacillariaceae\Cylindrotheca Hantzschia Nitzschia



**BL**



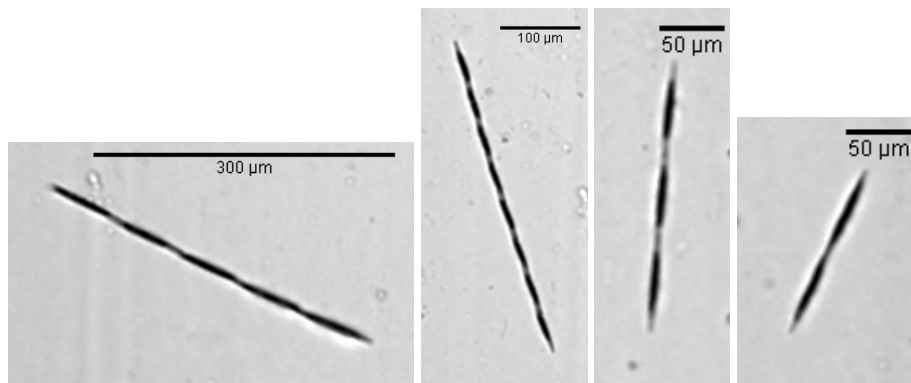
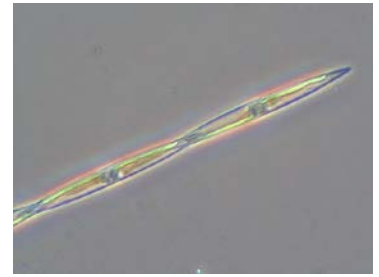
**NT**



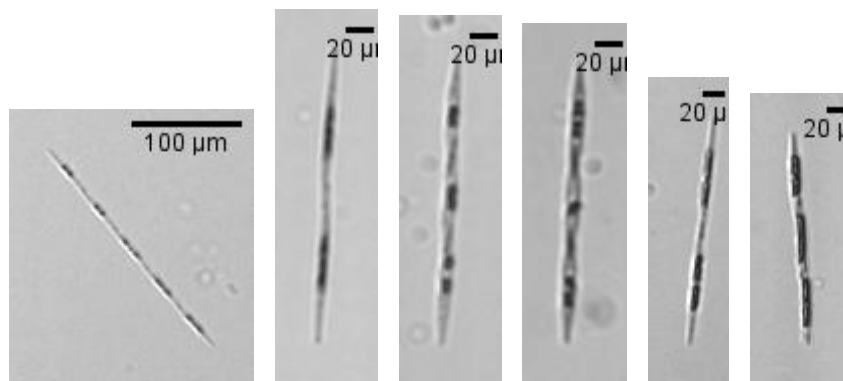
**AR**

## 5.20. *Pseudo-nitzschia*

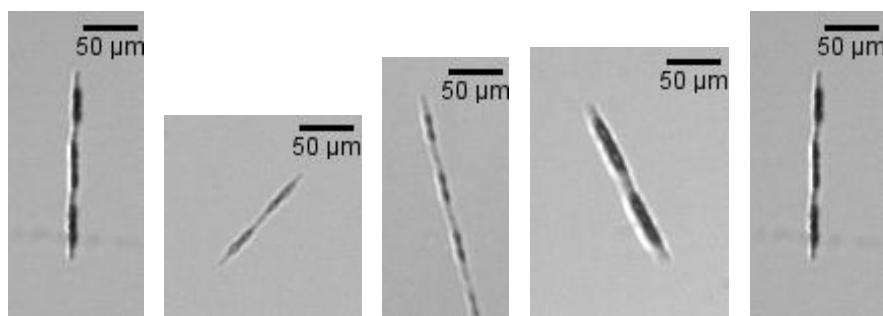
Ochrophyta\Bacillariophyceae\Bacillariaceae\Pseudo-nitzschia



**BL**



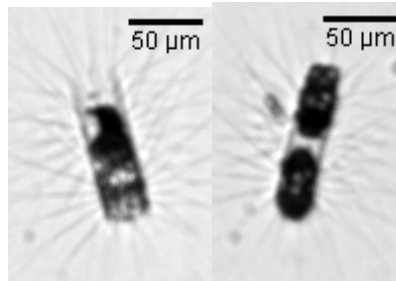
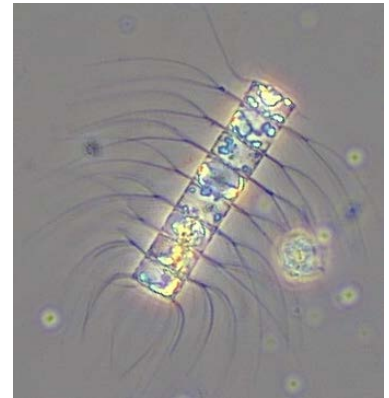
**NT**



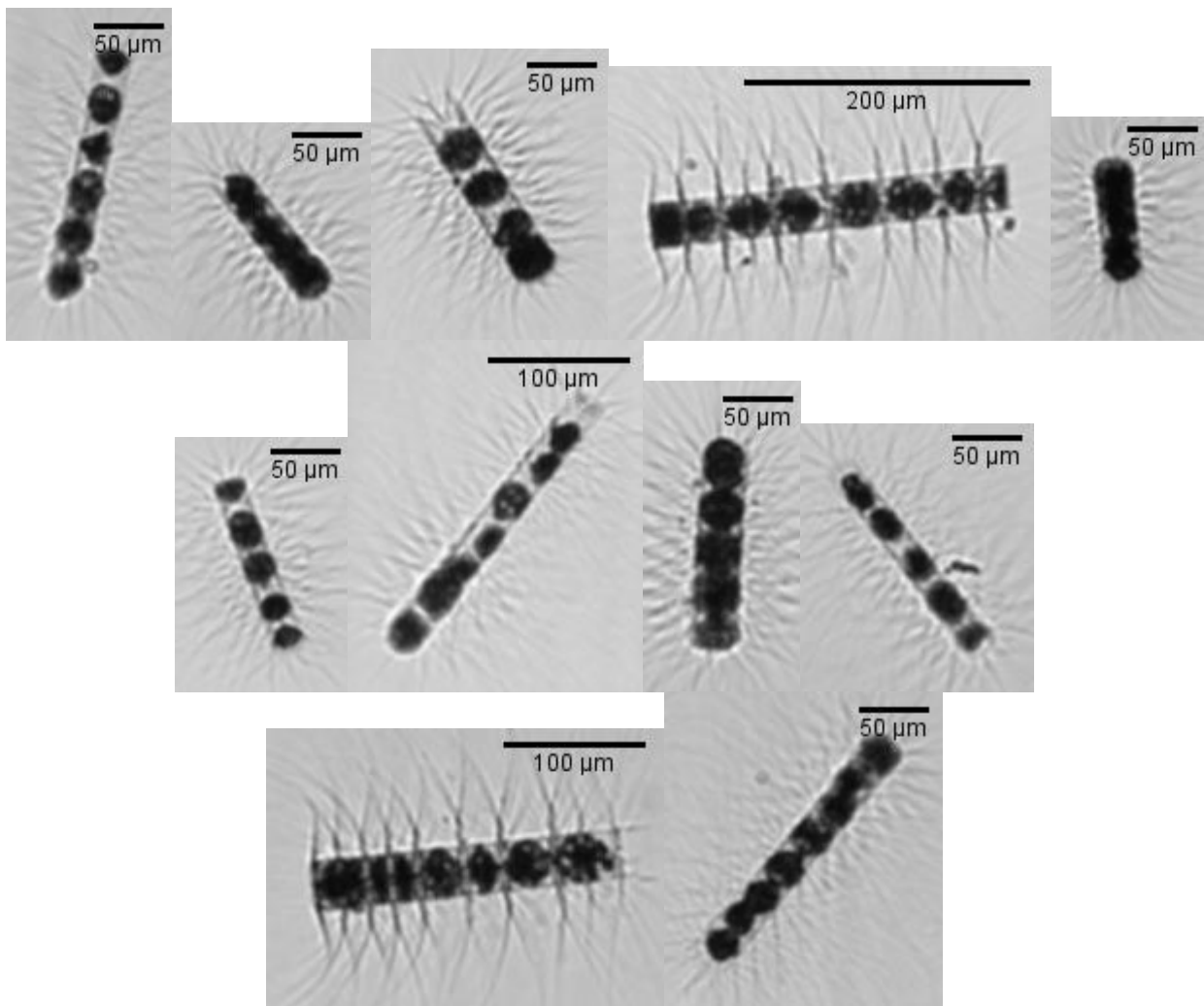
**AR**

## 5.21. *Bacteriastrum*

Ochrophyta \ Bacillariophyceae \ Chaetocerotaceae \ *Bacteriastrum*



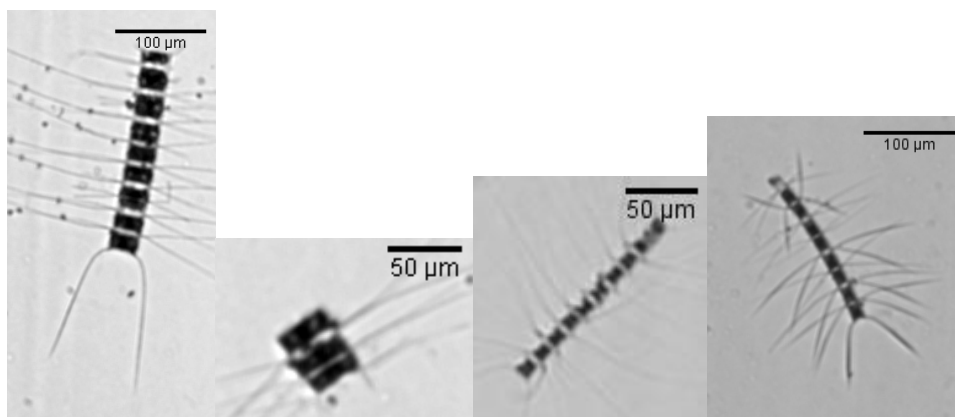
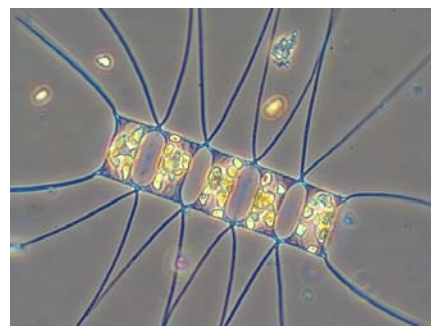
**BL**



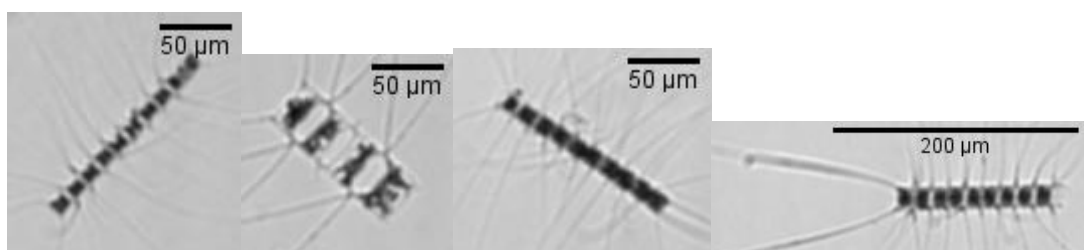
**NT**

## 5.22. Chaetoceros

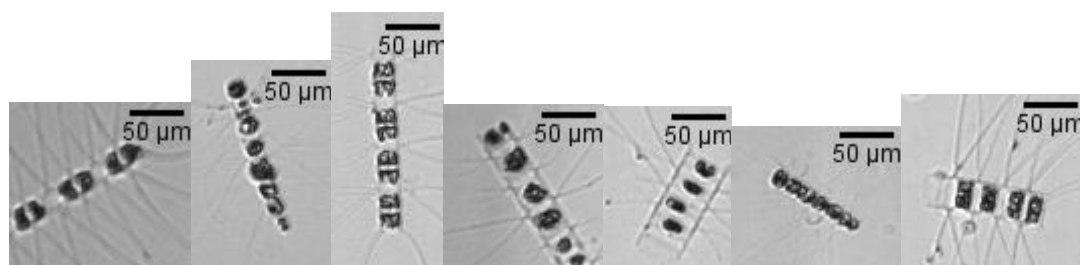
*Ochrophyta\Bacillariophyceae\Chaetocerotaceae\Chaetoceros*



**BL**



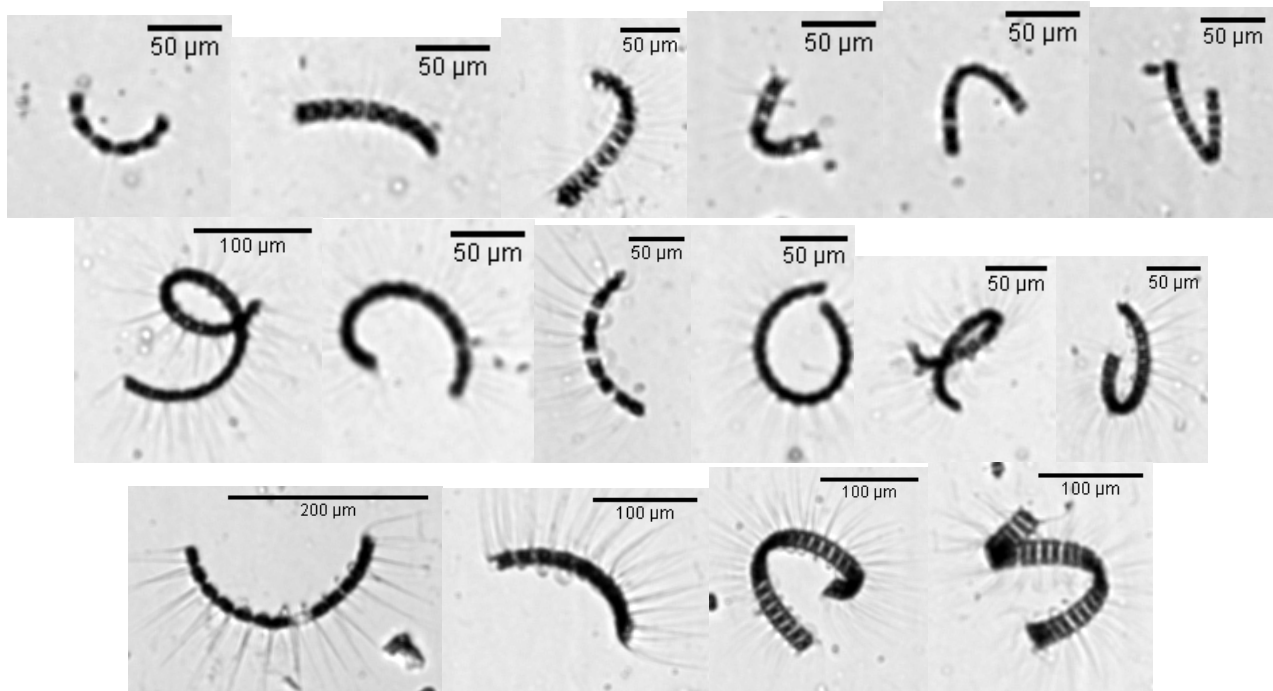
**NT**



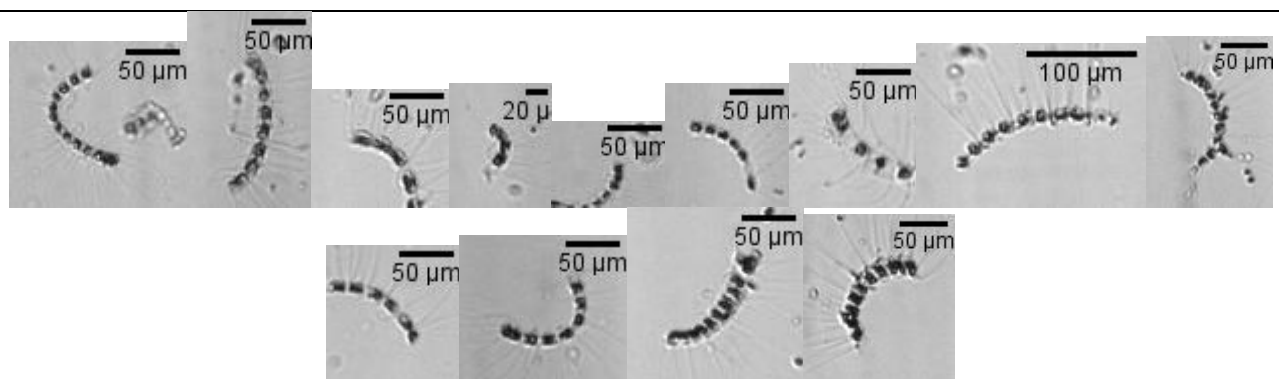
**AR**

### 5.23. *Chaetoceros curvisetus*

Ochrophyta\Bacillariophyceae\Chaetocerotaceae\Chaetoceros curvisetus



**BL**

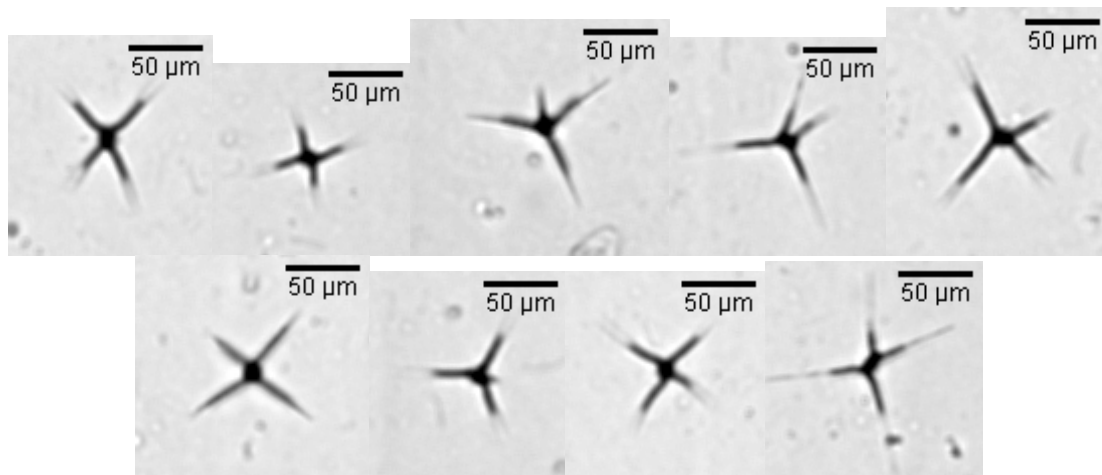
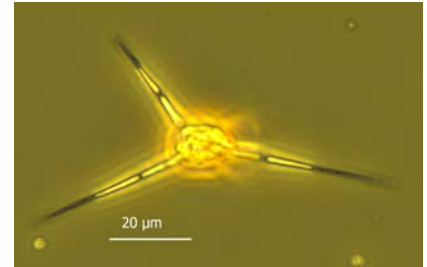


**NT**

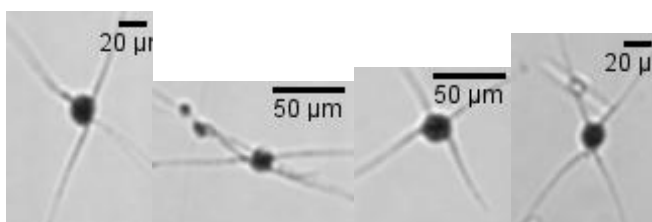


## 5.24. *Chaetoceros danicus*

Ochrophyta\Bacillariophyceae\Chaetocerotaceae\Chaetoceros danicus



**BL**

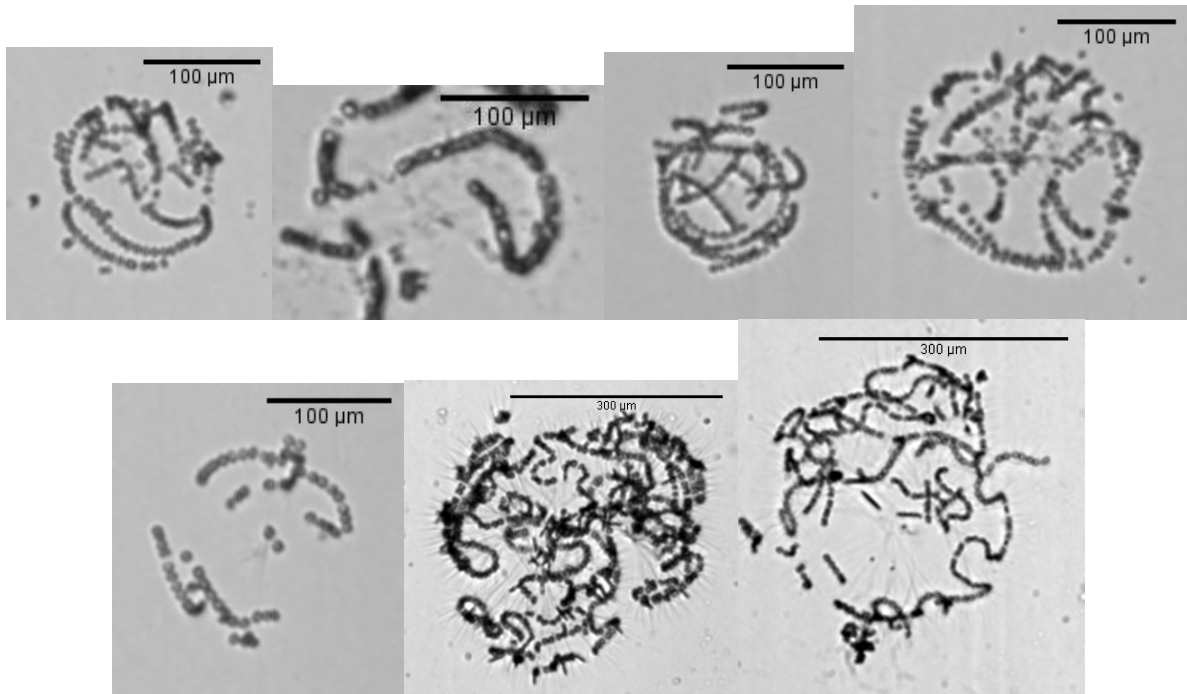


**NT**

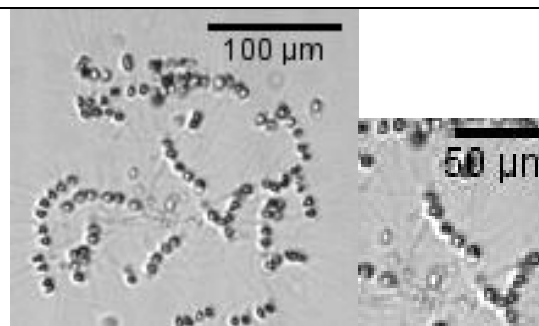


## 5.25. *Chaetoceros socialis*

Ochrophyta\Bacillariophyceae\Chaetocerotaceae\Chaetoceros socialis



**BL**

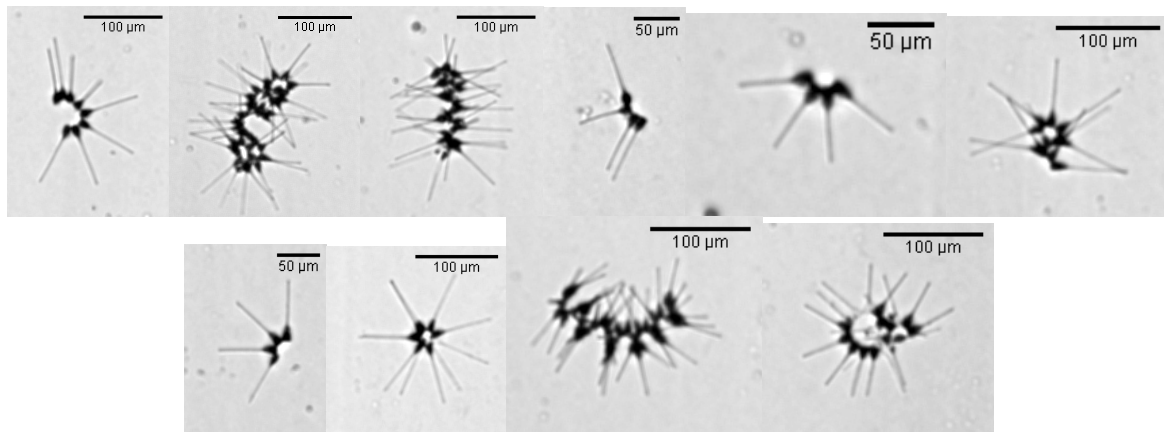
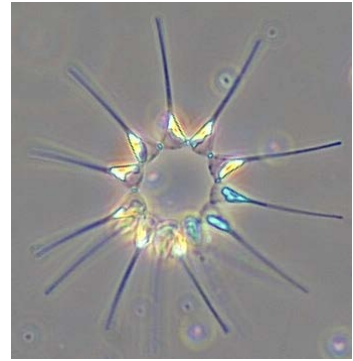


**NT**

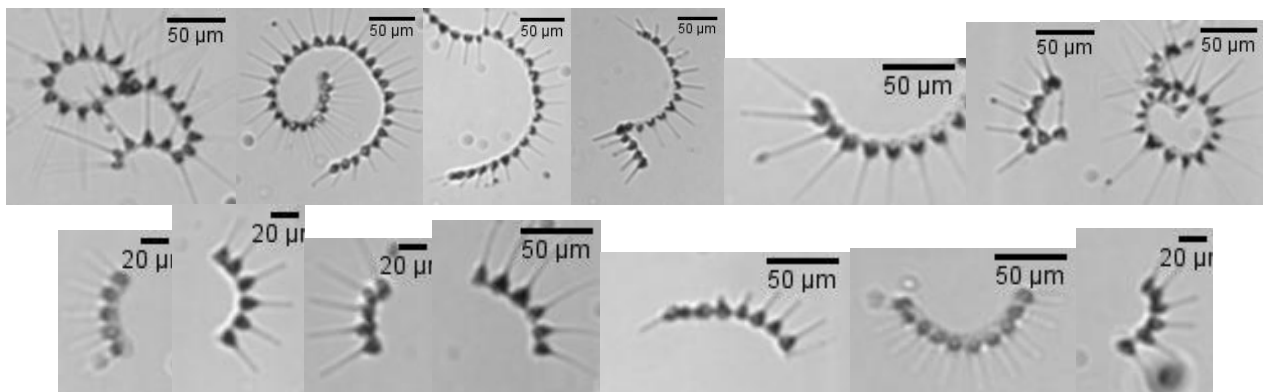


## 5.26. *Asterionellopsis glacialis*

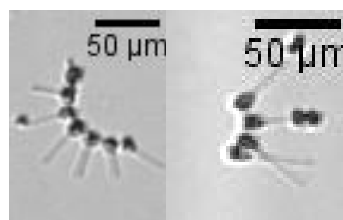
Ochrophyta\Bacillariophyceae\Fragilariaceae\Asterionellopsis glacialis



**BL**



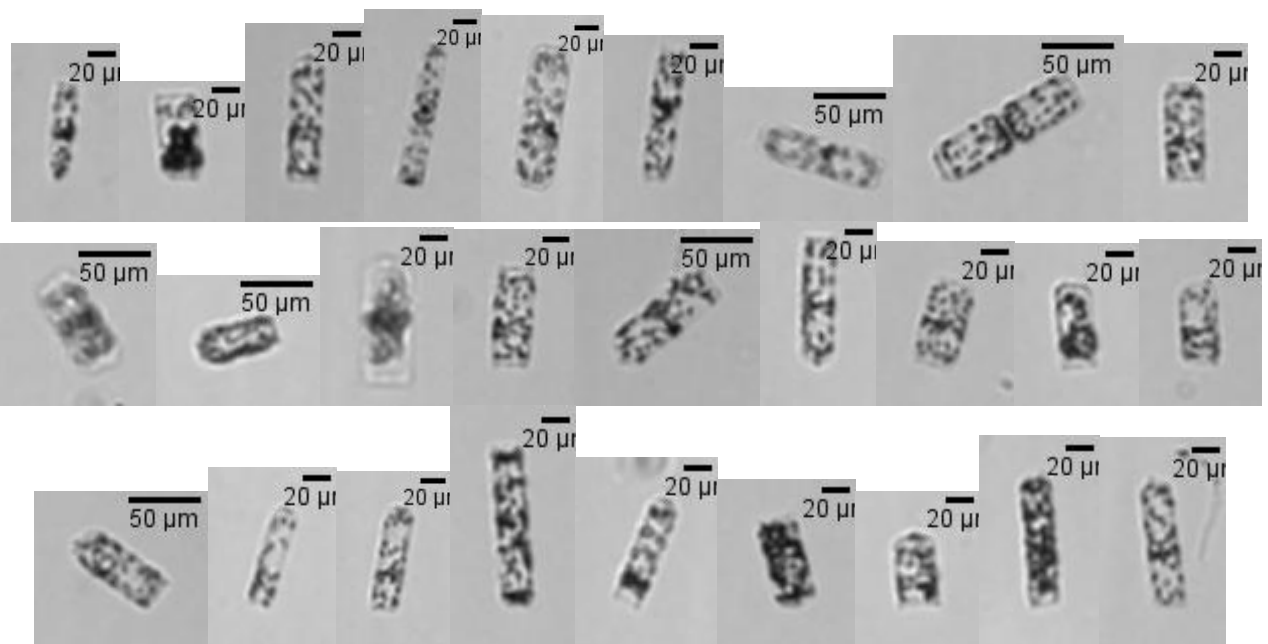
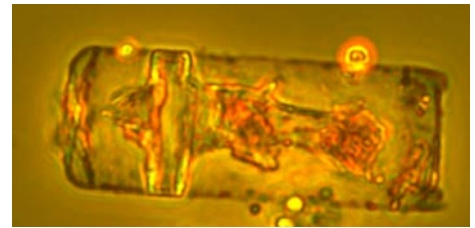
**NT**



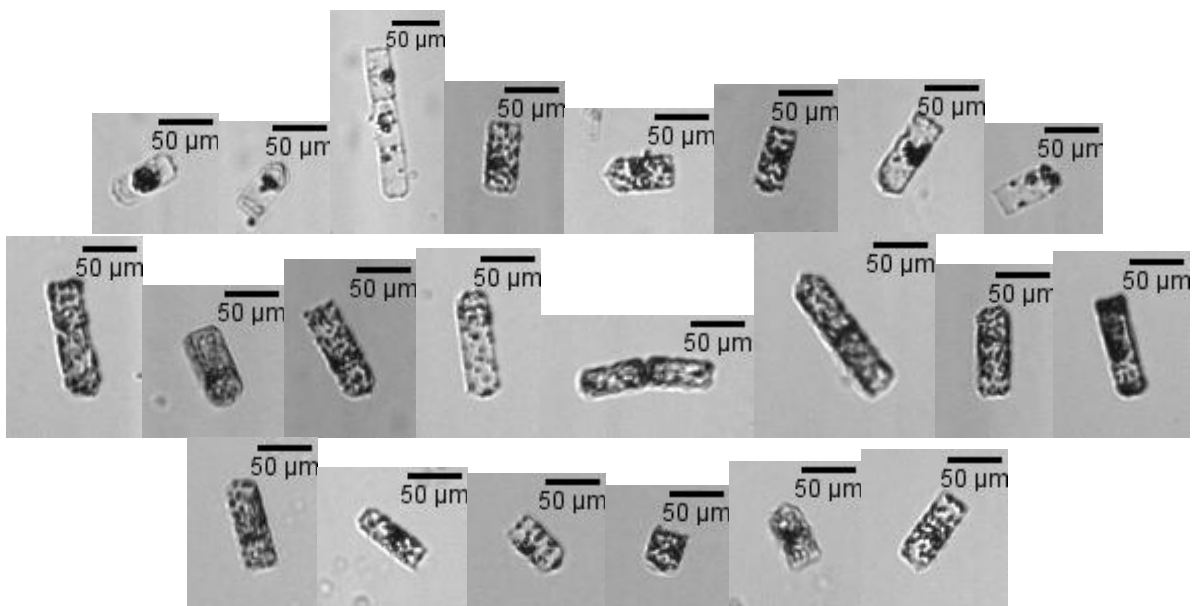
**AR**

## 5.27. *Cerataulina*

Ochrophyta\Bacillariophyceae\Hemiaulaceae\Cerataulina



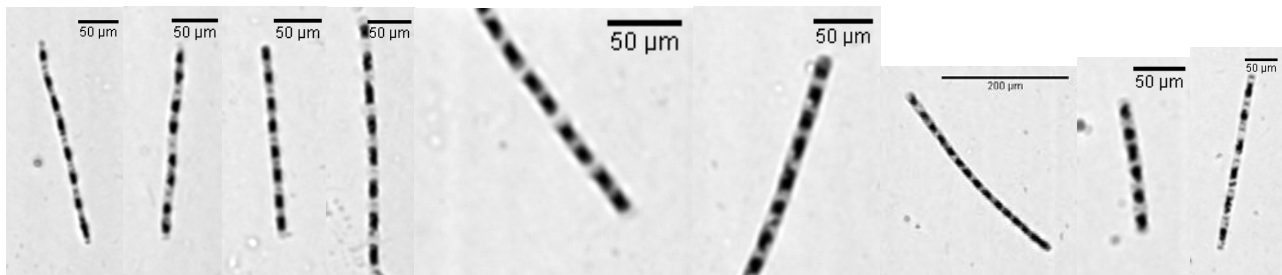
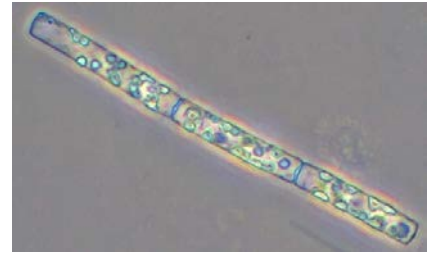
**NT**



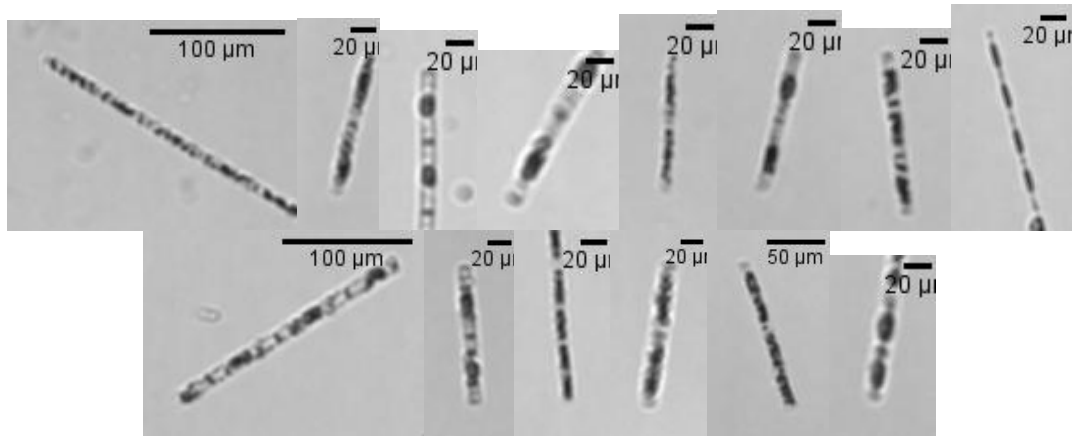
**AR**

## 5.28. *Leptocylindrus*

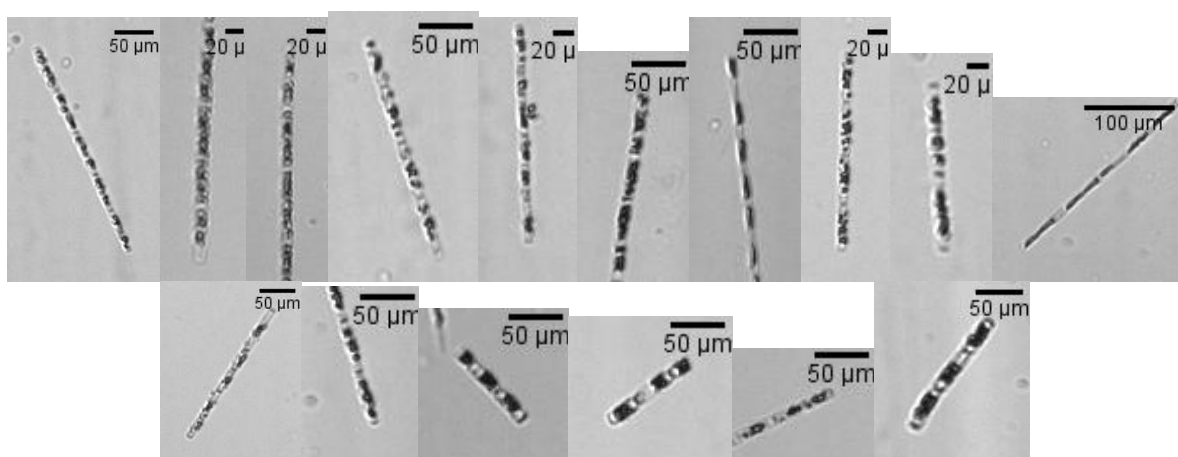
Ochrophyta\Bacillariophyceae\Leptocylindraceae\Leptocylindrus



**BL**



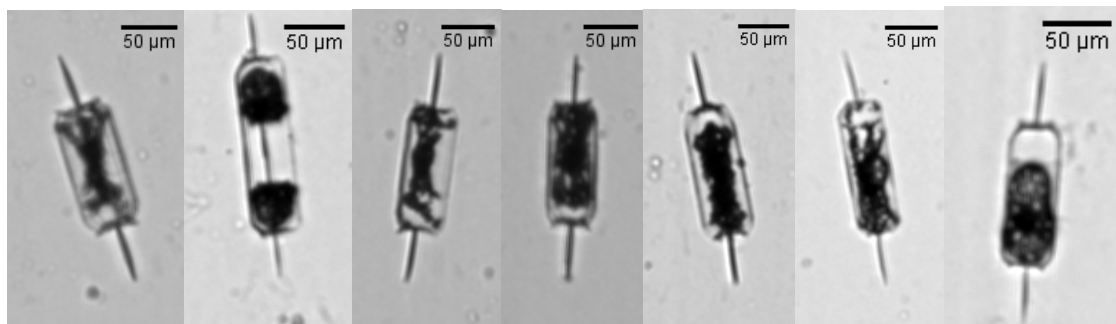
**NT**



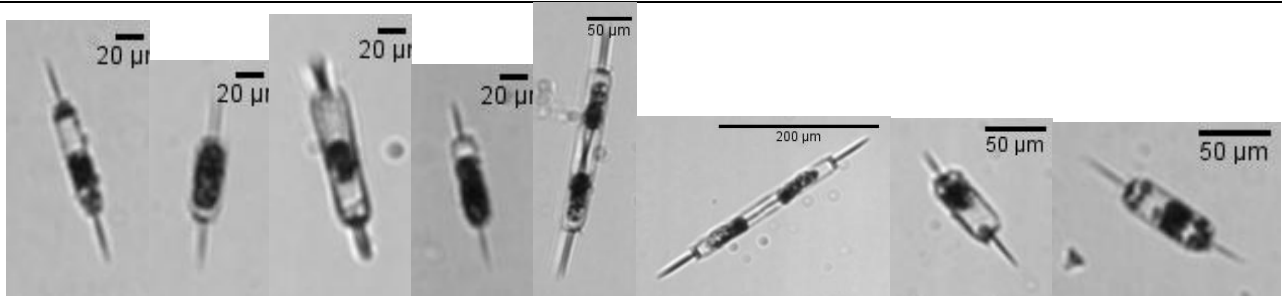
**AR**

## 5.29. *Ditylum brightwellii*

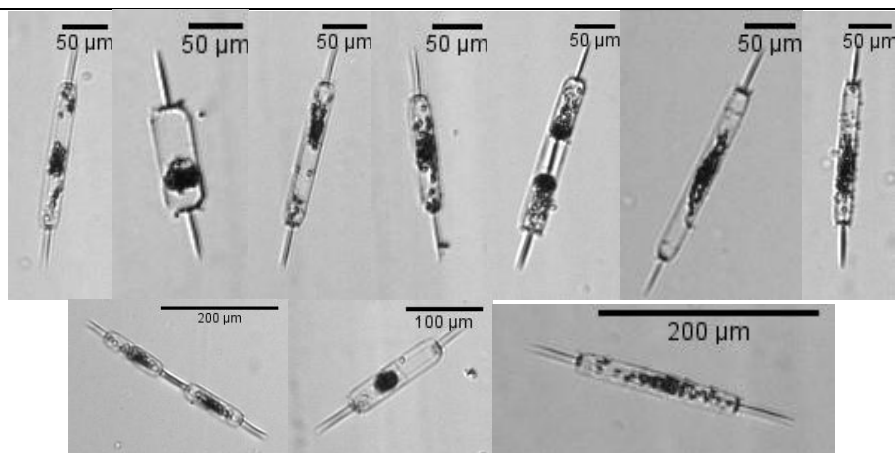
Ochrophyta\Bacillariophyceae\Lithodesmiaceae\Ditylum brightwellii



**BL**



**NT**

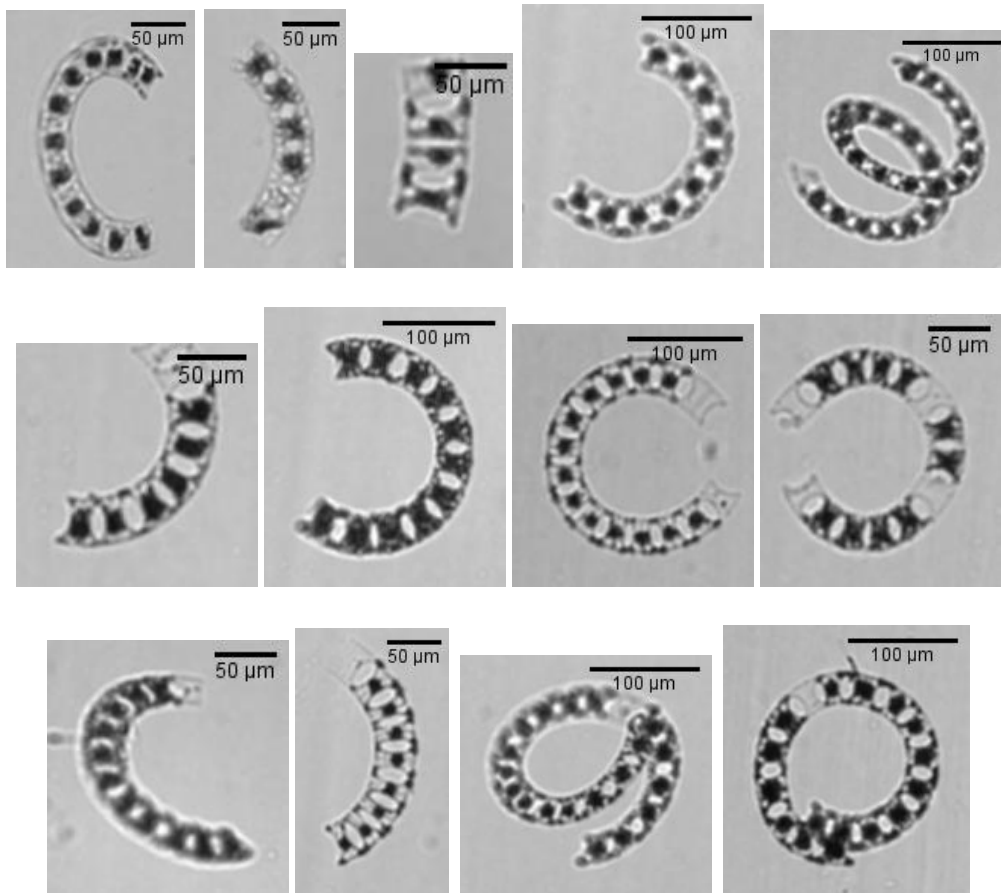
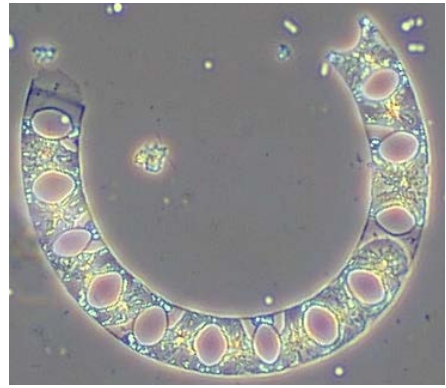


**AR**



### 5.30. *Eucampia*

Ochrophyta\Bacillariophyceae\Hemiaulaceae\Eucampia

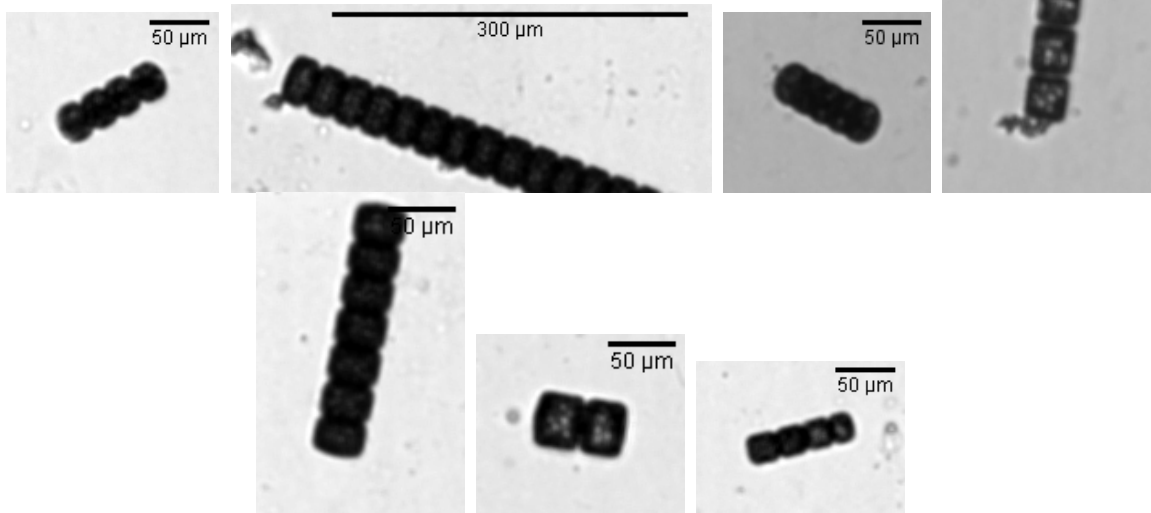
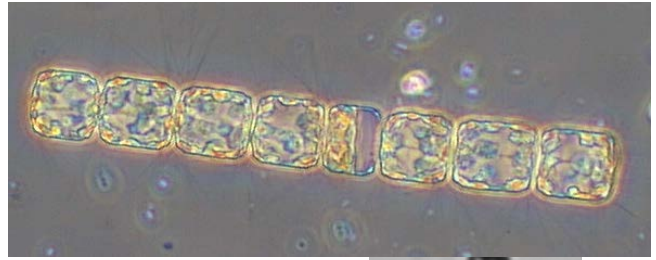


NT

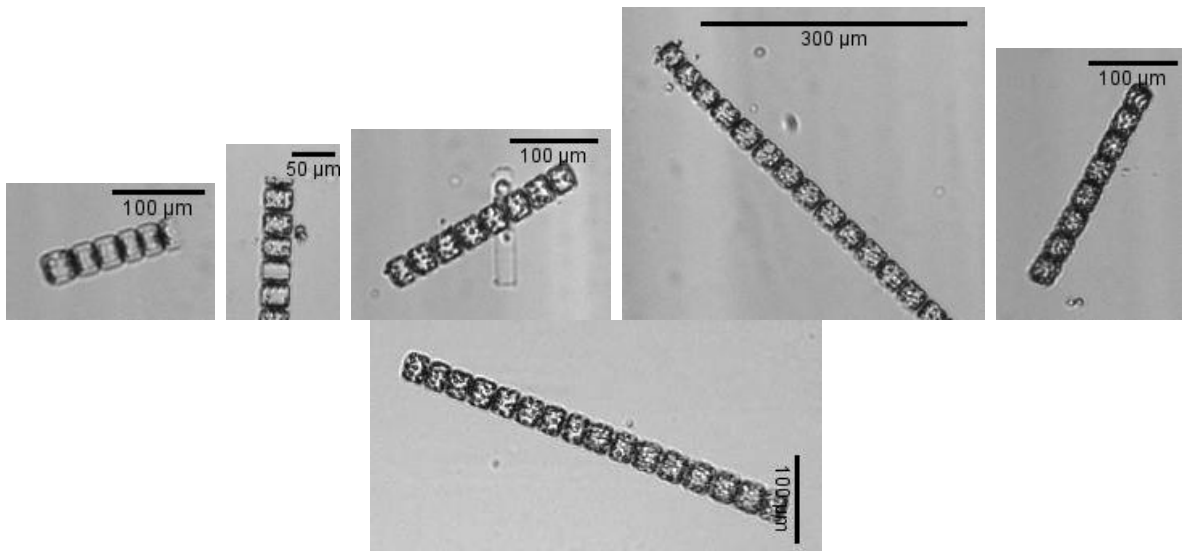


### 5.31. *Lauderia*

Ochrophyta\Bacillariophyceae\Lauderiaceae\Lauderia



**BL**

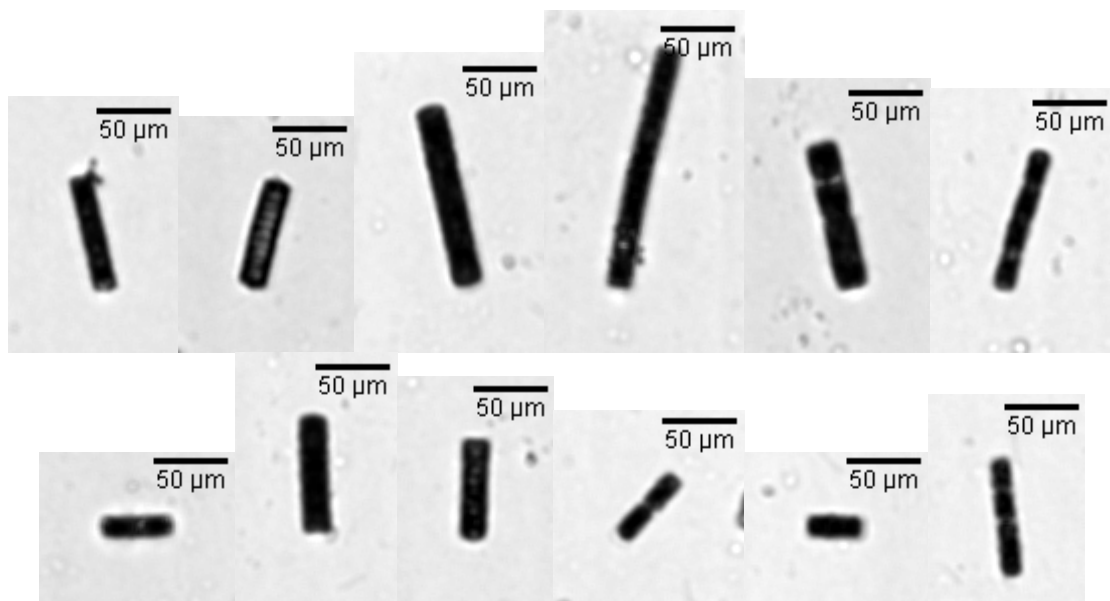


**NT**



### 5.32. *Paralia*

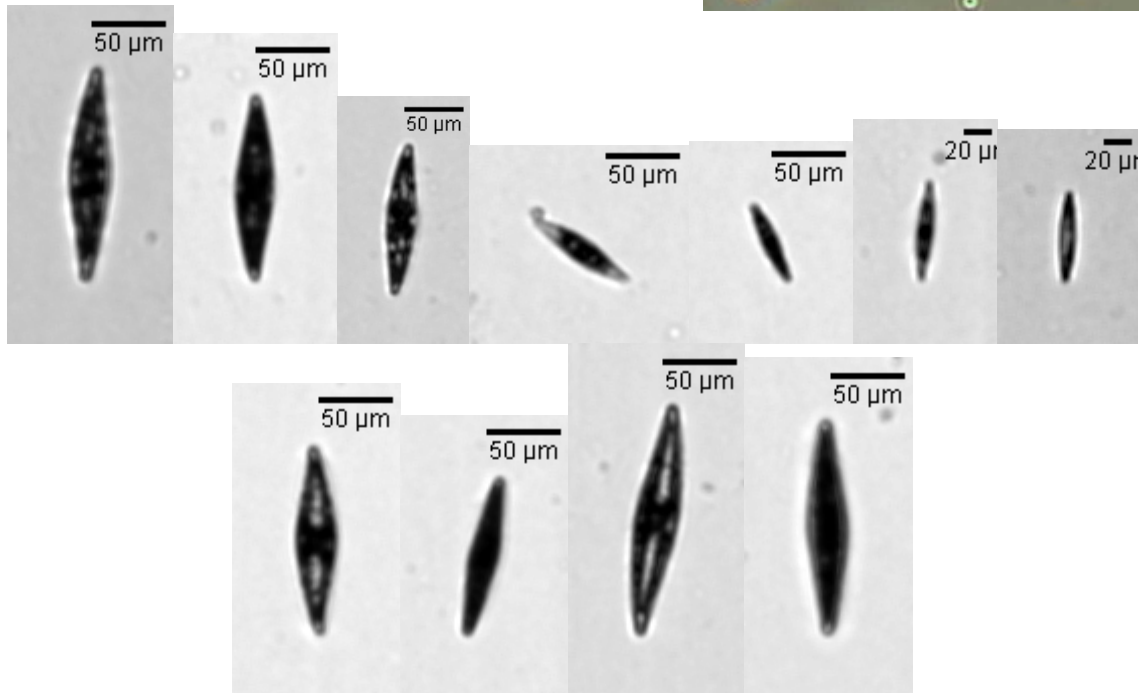
Ochrophyta\Bacillariophyceae\Paraliaceae\Paralia



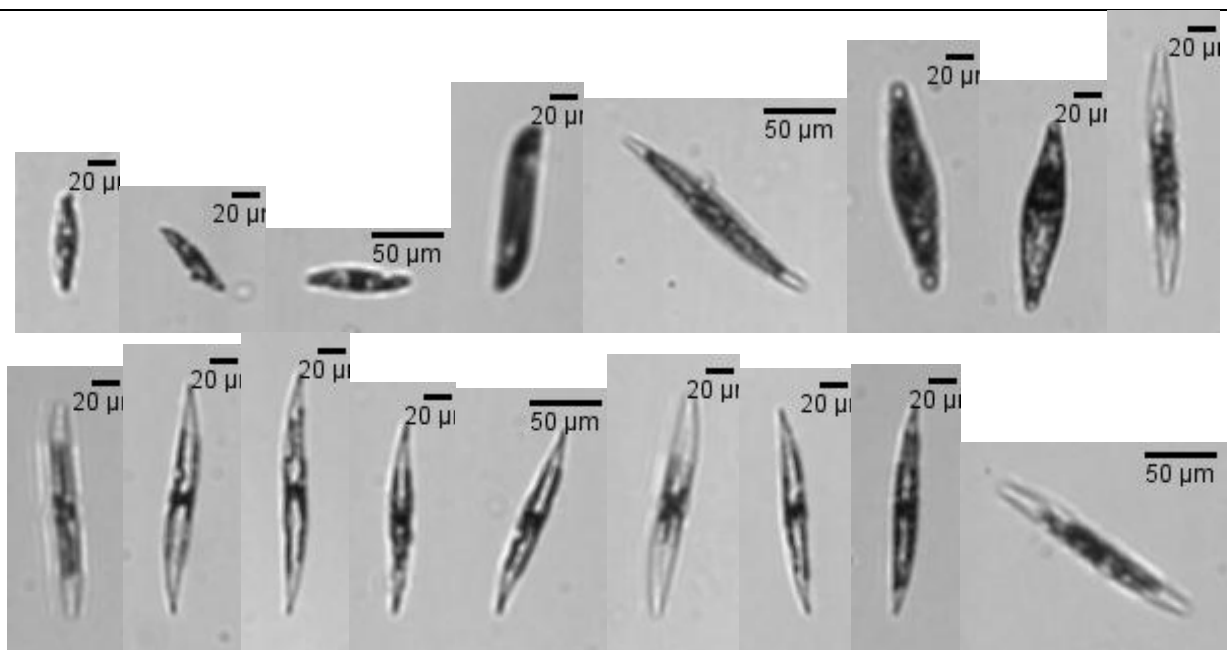
BL

### 5.33. *Gyrosigma Pleurosigma*

Ochrophyta\Bacillariophyceae\Pleurosigmataceae  
 \Gyrosigma Pleurosigma



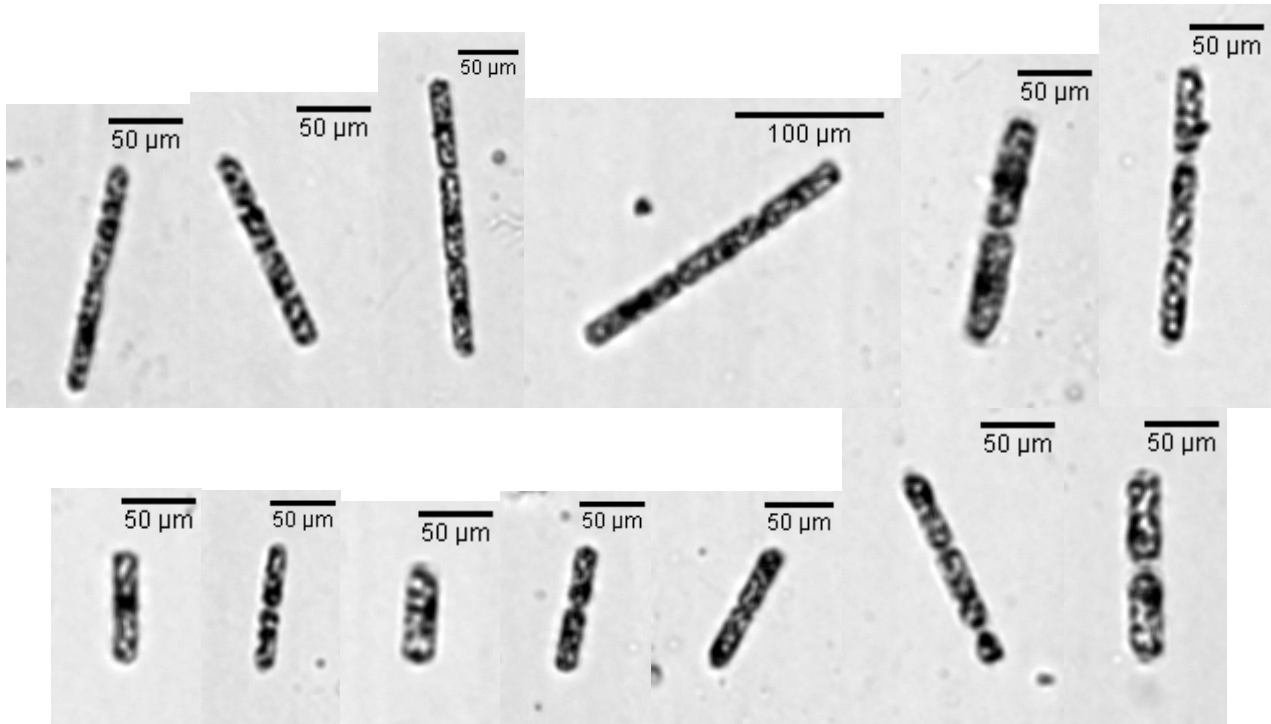
**BL**



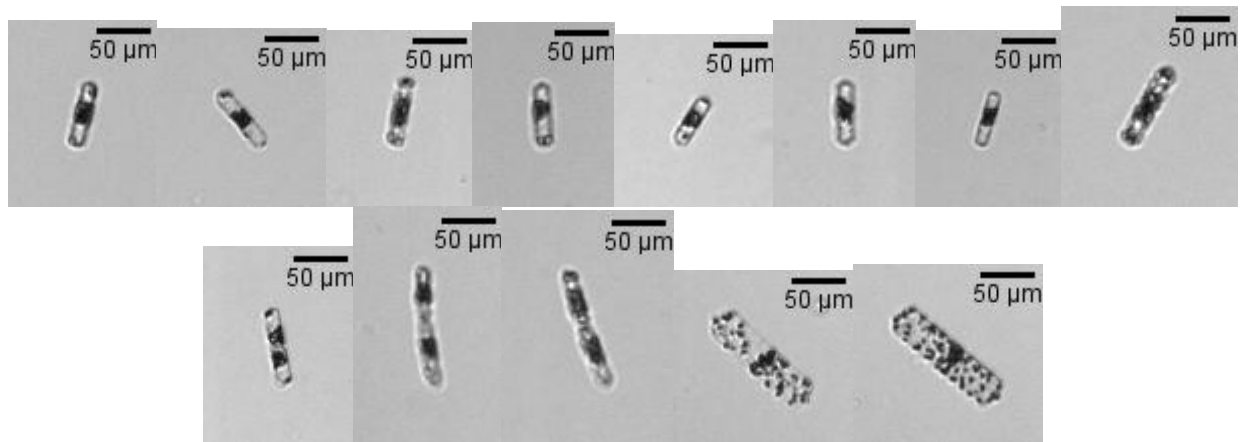
**NT**

### 5.34. *Dactyliosolen fragilissimus*

Ochrophyta\Bacillariophyceae\Rhizosoleniaceae\Dactyliosolen fragilissimus



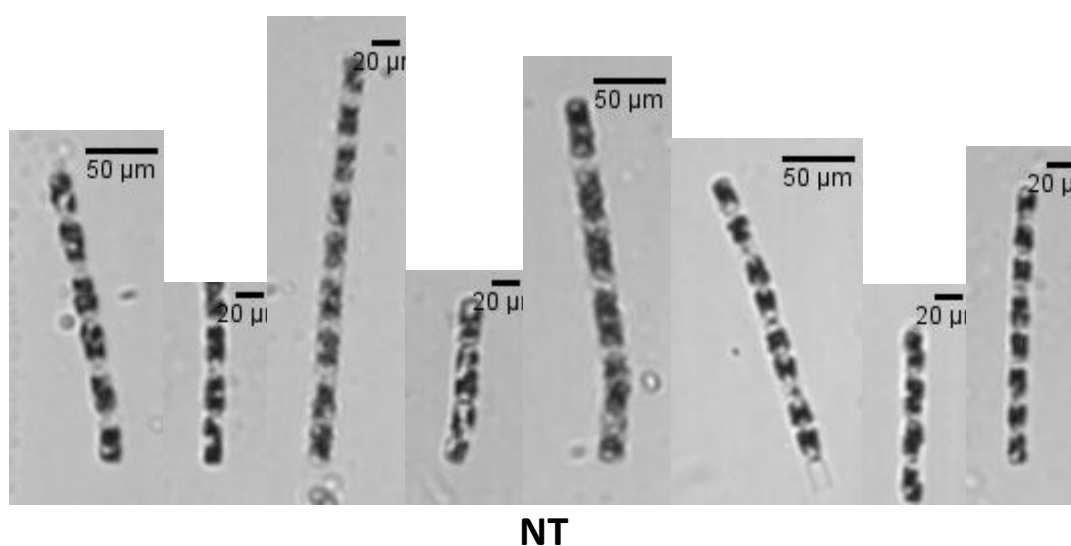
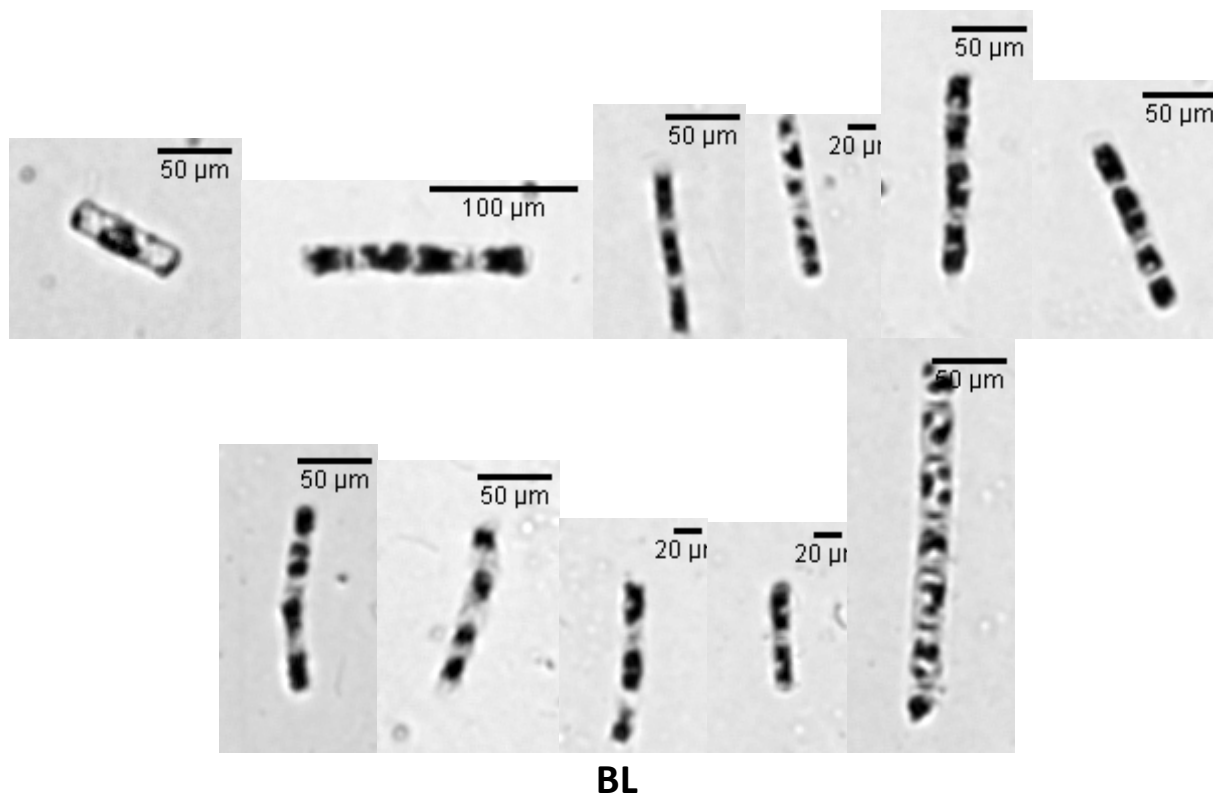
**BL**



**AR**

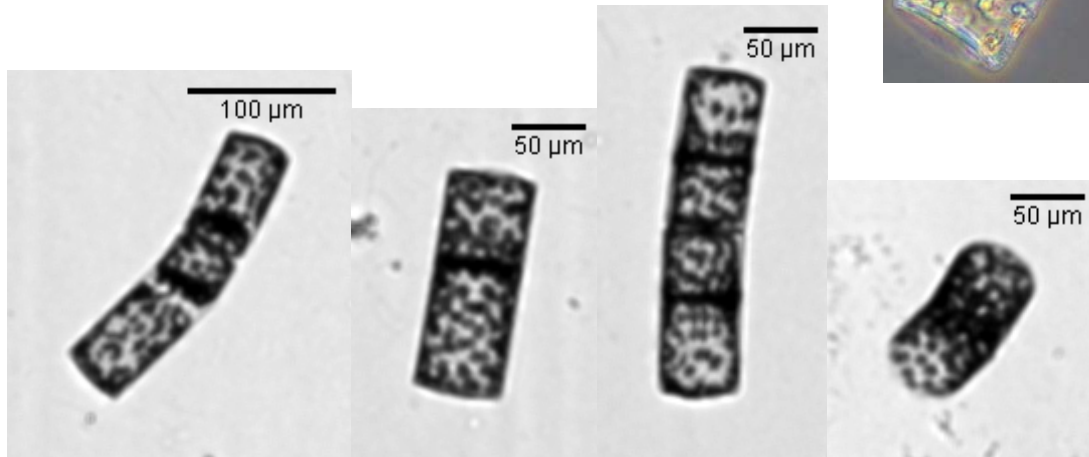
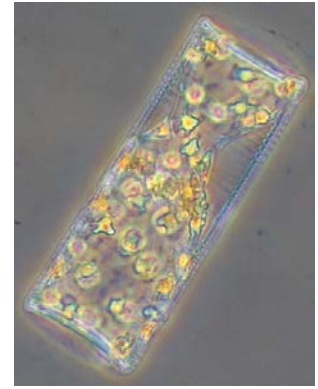
### 5.35. *Guinardia delicatula*

Ochrophyta\Bacillariophyceae\rhizosoleniaceae\Guinardia delicatula

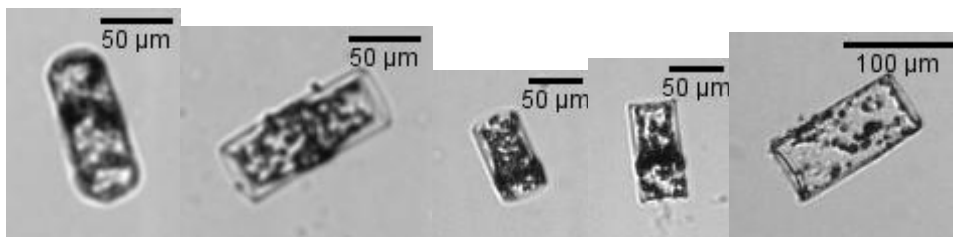


### 5.36. *Guinardia flaccida*

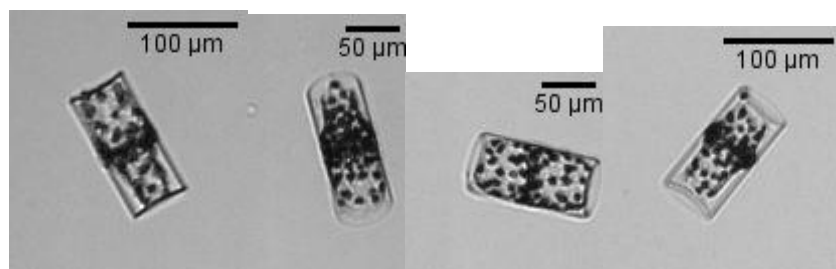
Ochrophyta\Bacillariophyceae\rhizosoleniaceae\Guinardia flaccida



**BL**



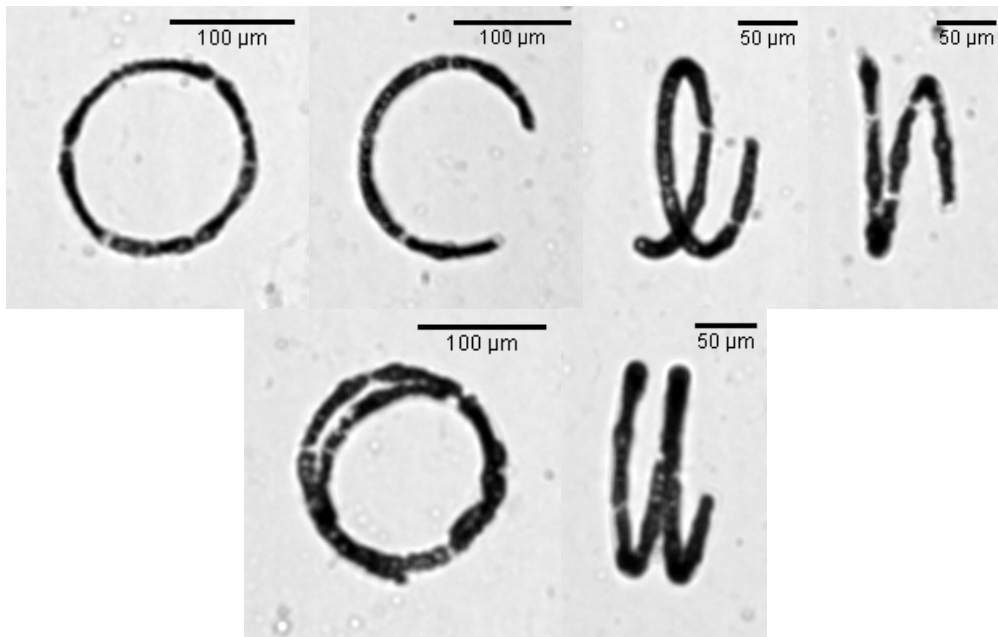
**NT**



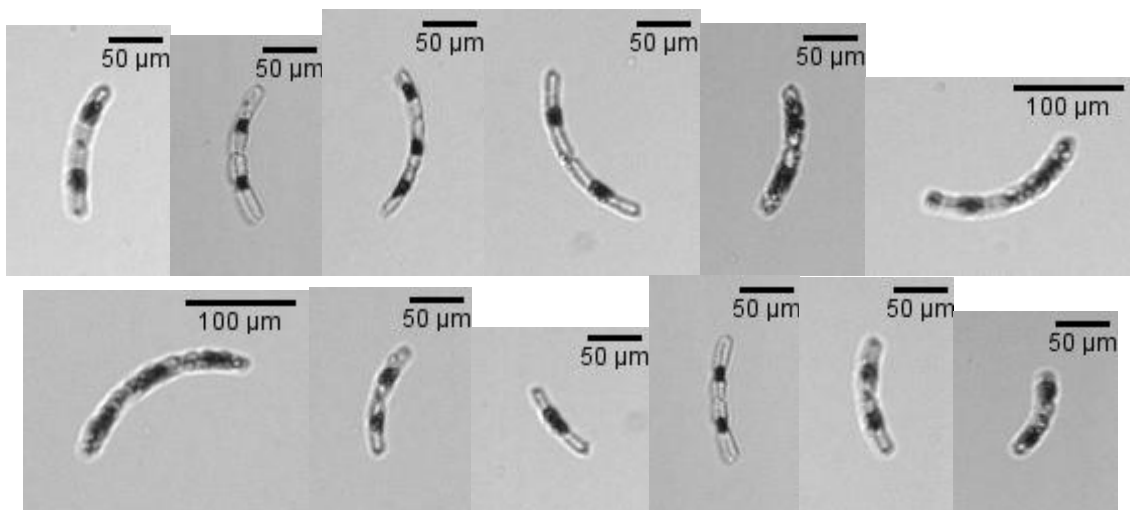
**AR**

### 5.37. *Guinardia striata*

Ochrophyta\Bacillariophyceae\rhizosoleniaceae\Guinardia striata



**BL**

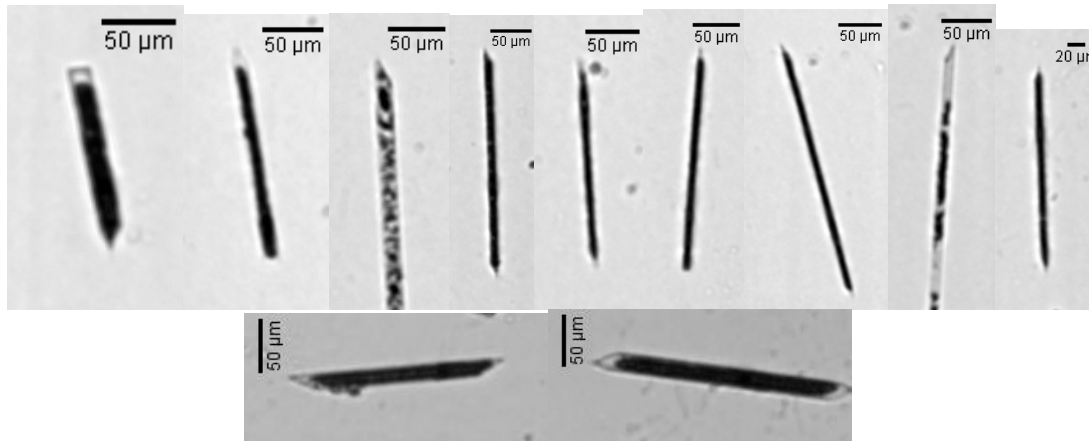


**AR**

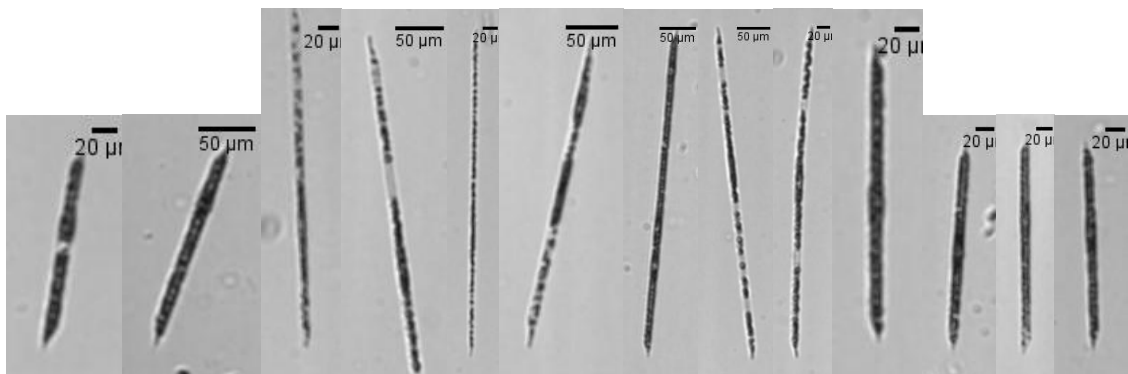


### 5.38. *Proboscia Rhizolenia*

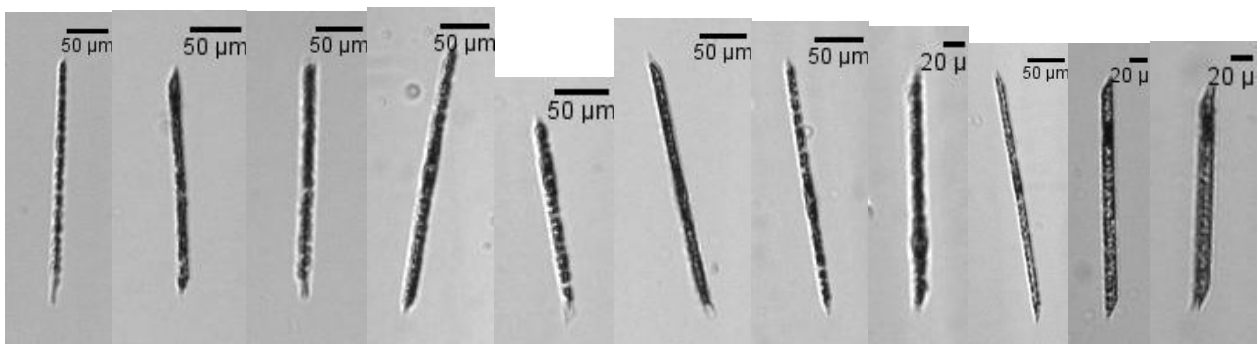
Ochrophyta\Bacillariophyceae\rhizoleniaceae\Proboscia Rhizolenia



**BL**



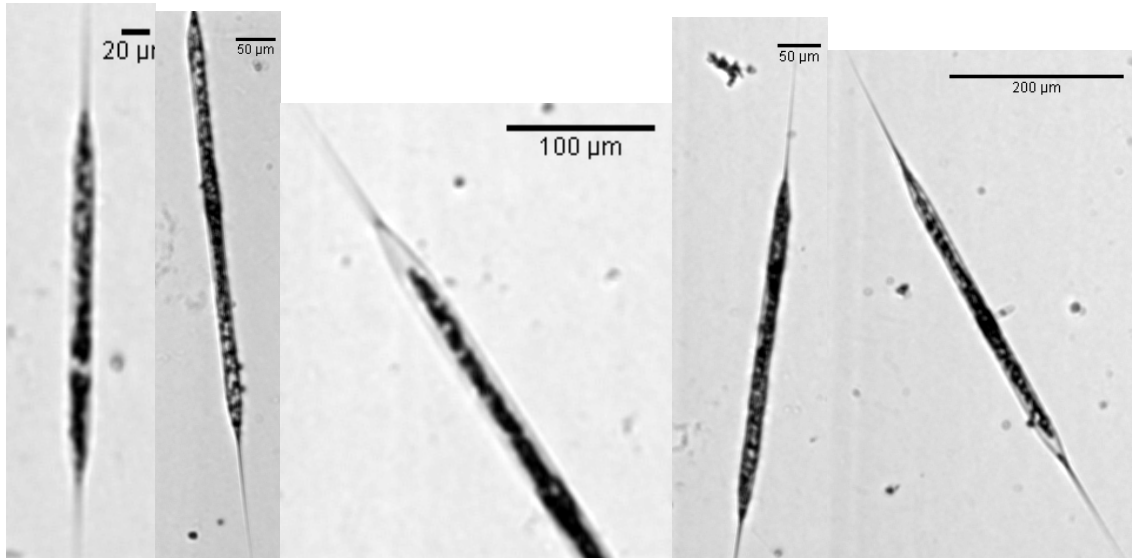
**NT**



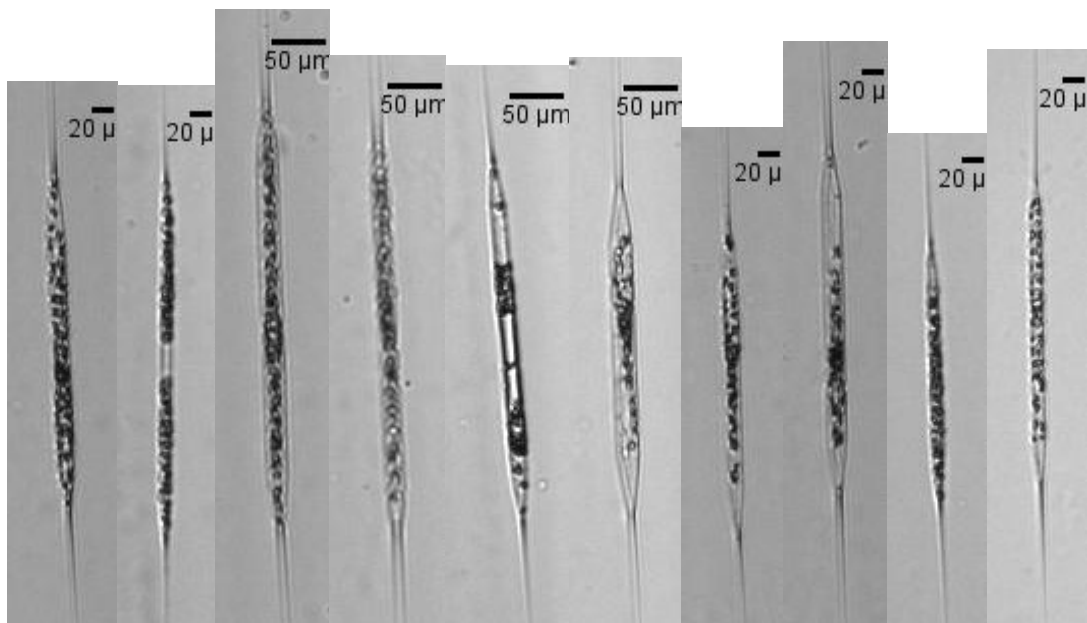
**AR**

### 5.39. *Rhizosolenia setigera*

Ochrophyta\Bacillariophyceae\rhizosoleniaceae\rhizosolenia setigera



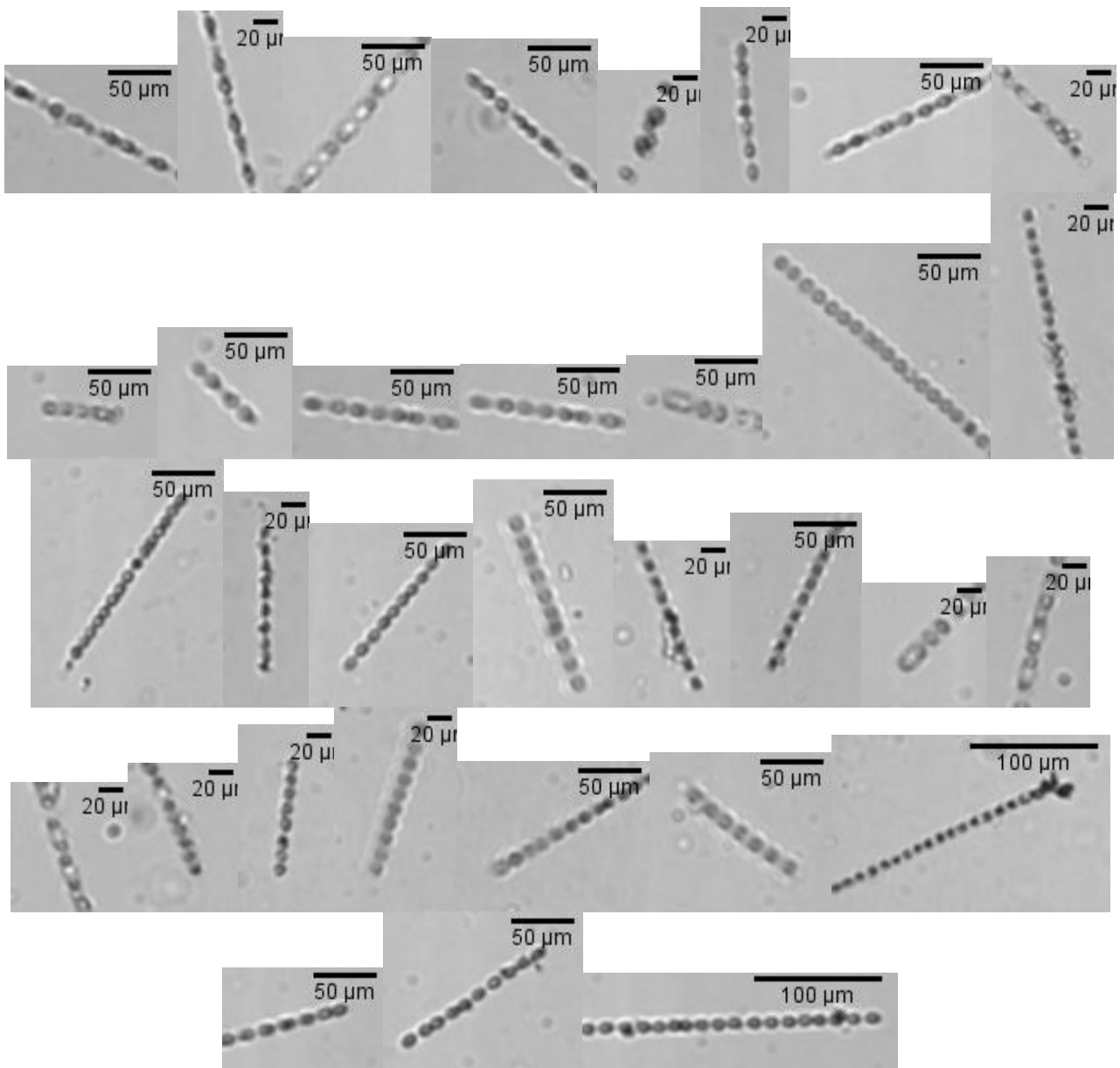
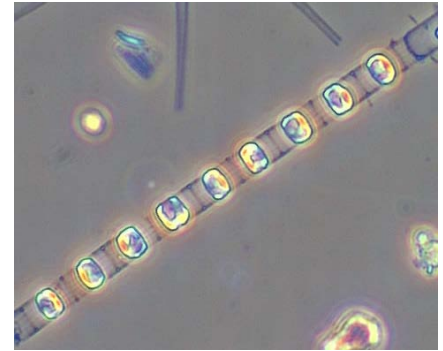
**BL**



**AR**

## 5.40. *Skeletonema*

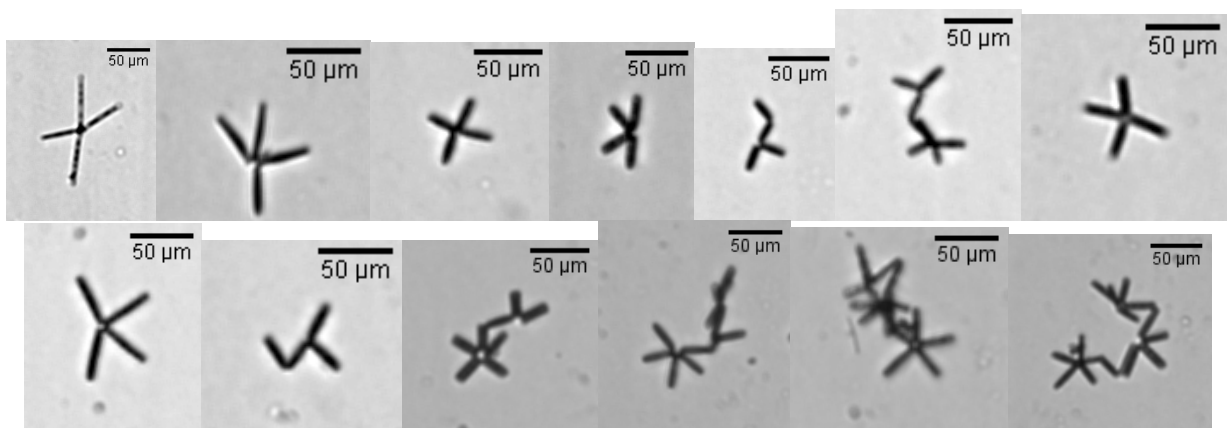
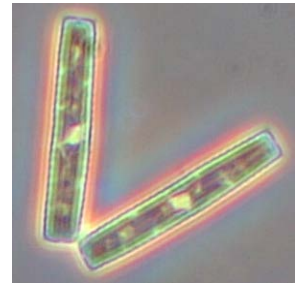
Ochrophyta\Bacillariophyceae\Skeletonemaceae\Skeletonema



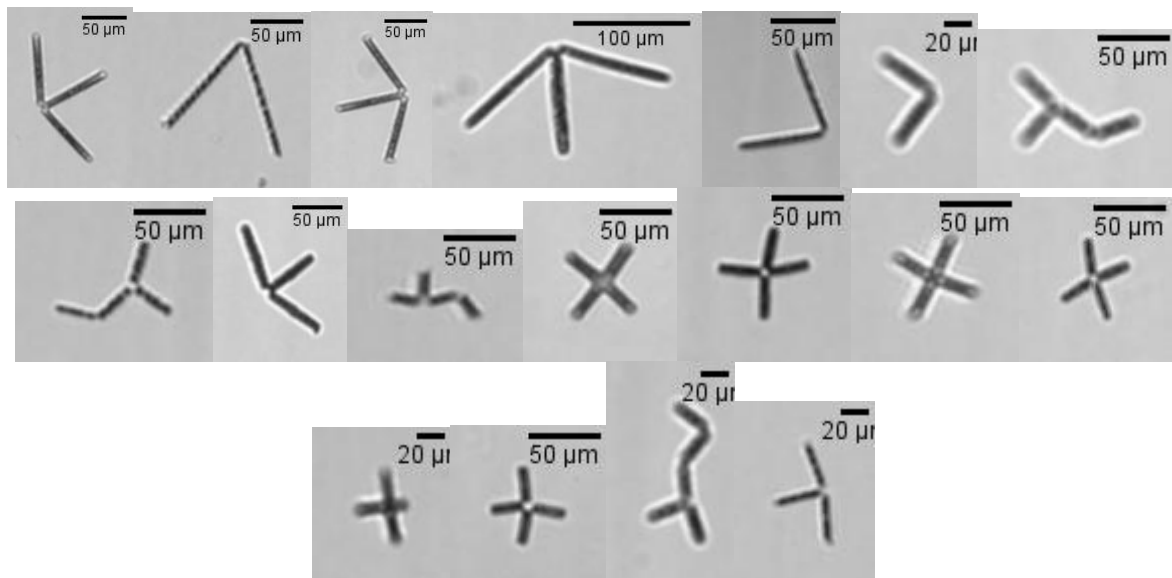
NT

## 5.41. *Thalassionema*

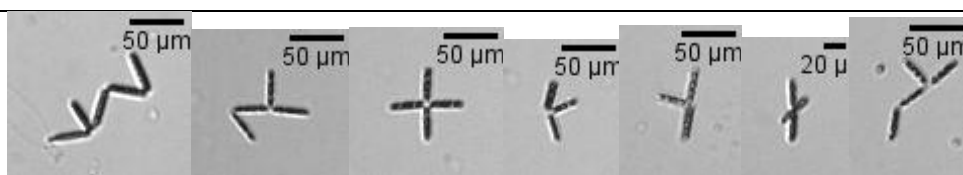
Ochrophyta\Bacillariophyceae\Thalassionemataceae\Thalassionema



**BL**



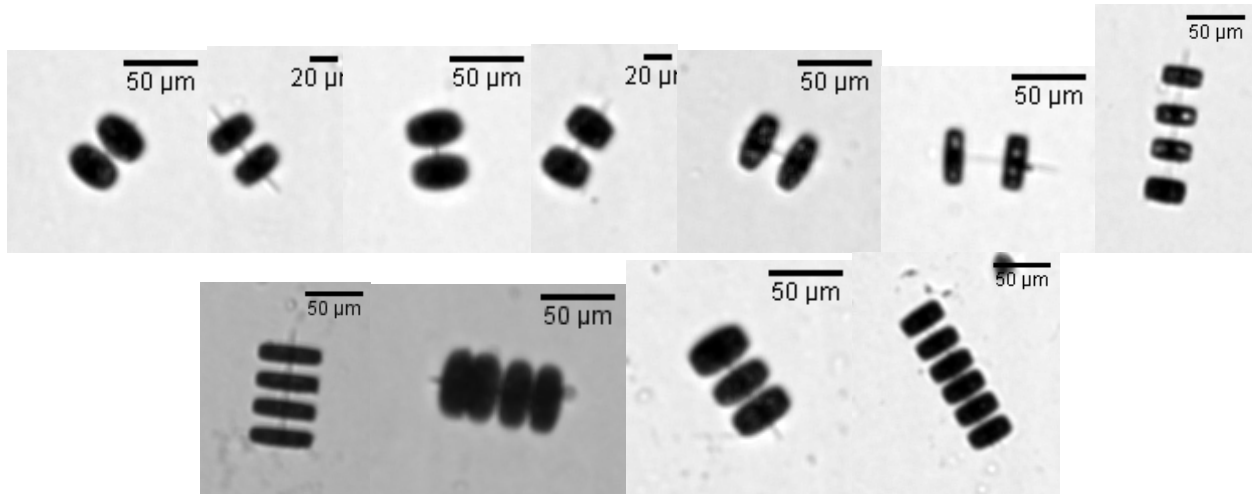
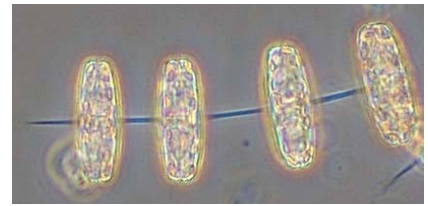
**NT**



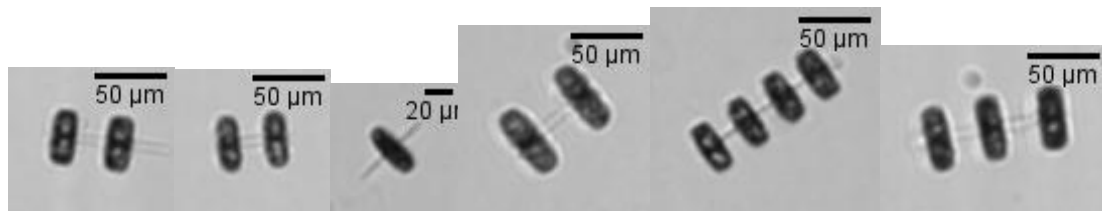
**AR**

## 5.42. *Thalassiosira big chaines*

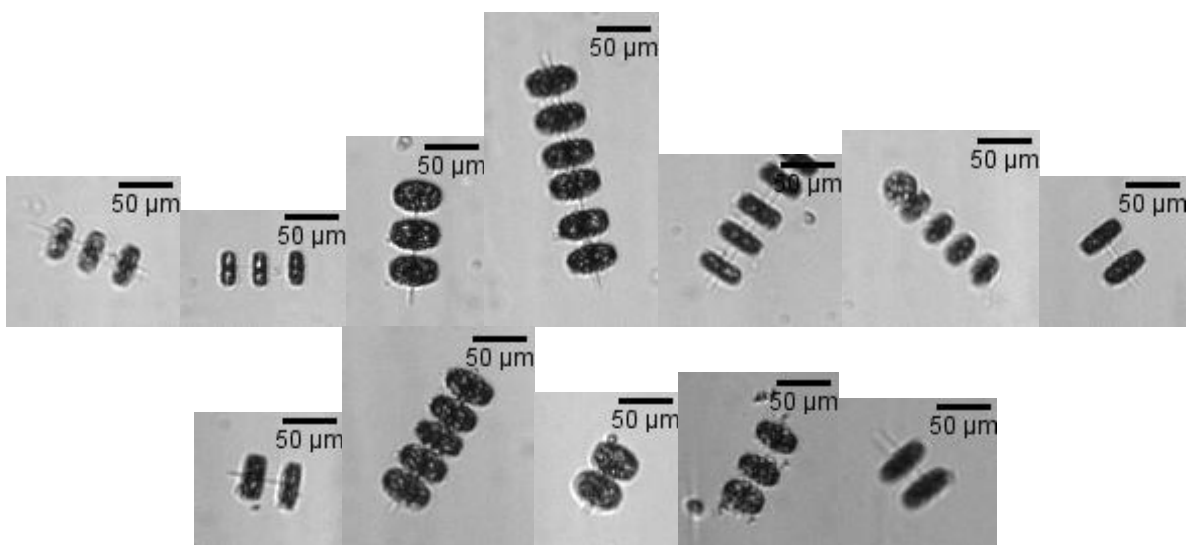
Ochrophyta\Bacillariophyceae\Thalassiosiraceae\Thalassiosira big chaines



**BL**



**NT**

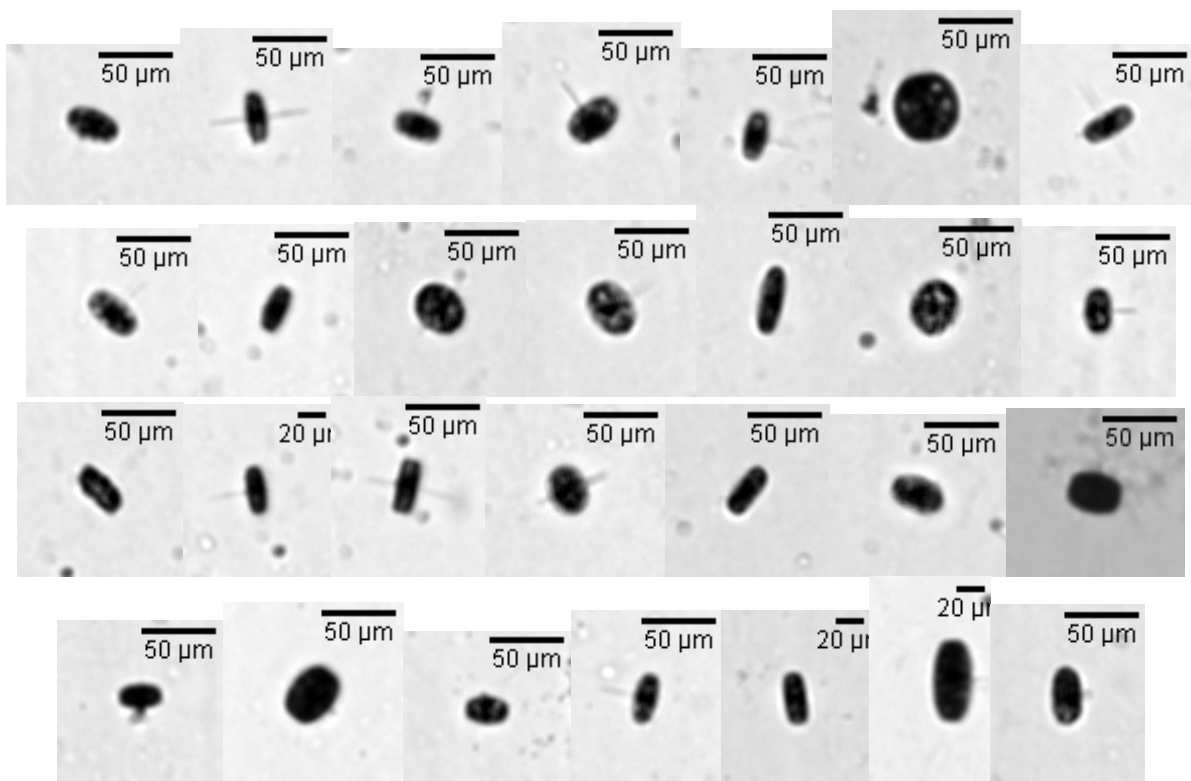
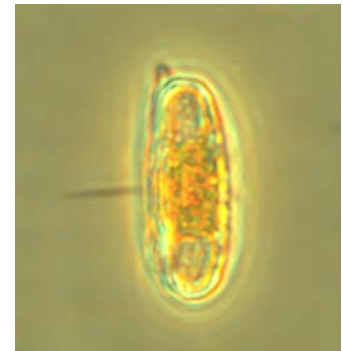


**AR**

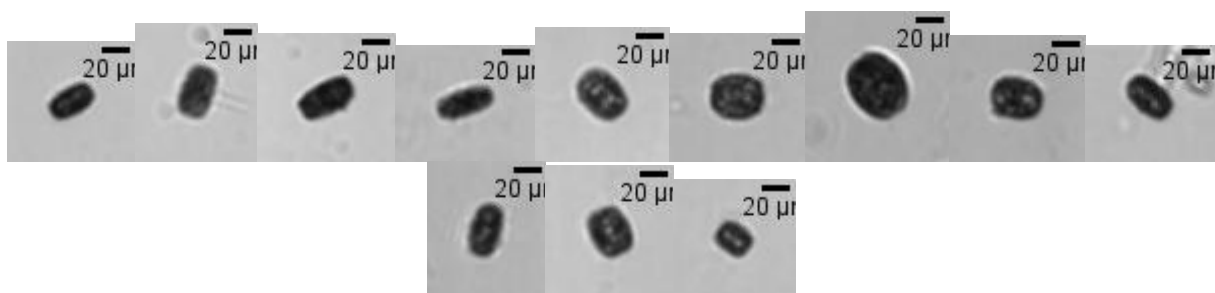


### 5.43. *Thalassiosira* cells

Ochrophyta\Bacillariophyceae\Thalassiosiraceae\Thalassiosira cells



**BL**

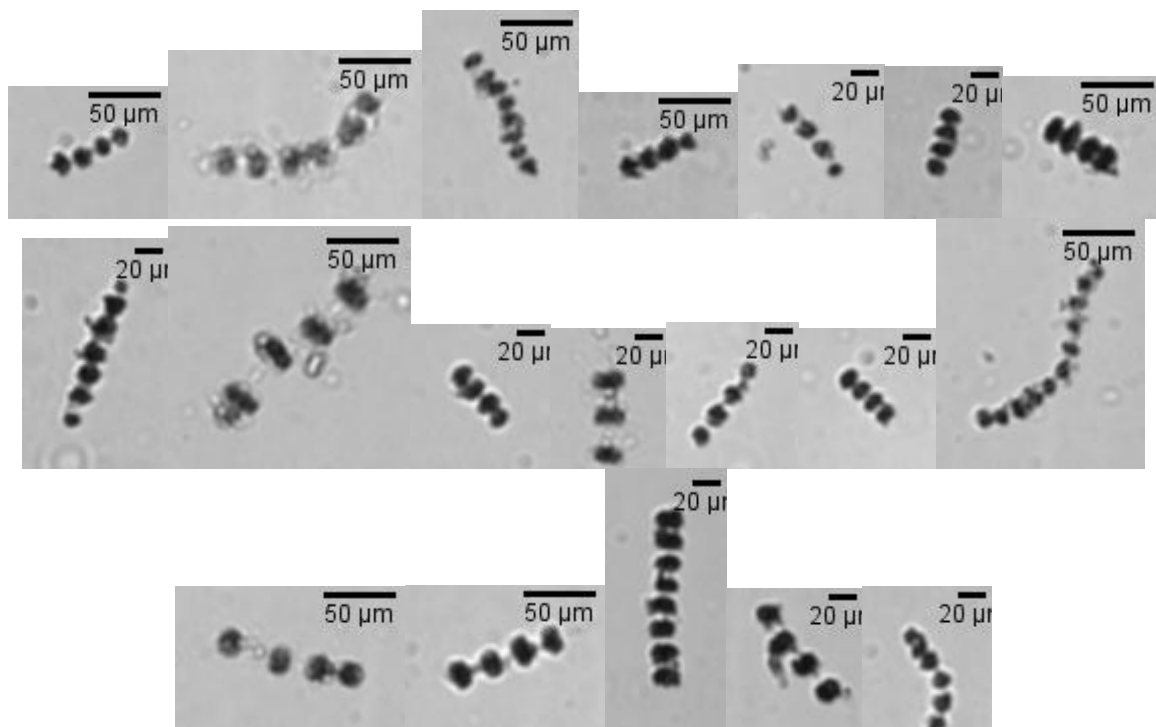


**NT**



## 5.44. *Thalassiosira small chaines*

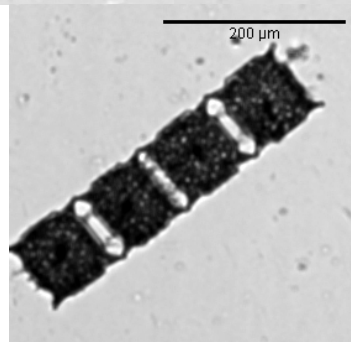
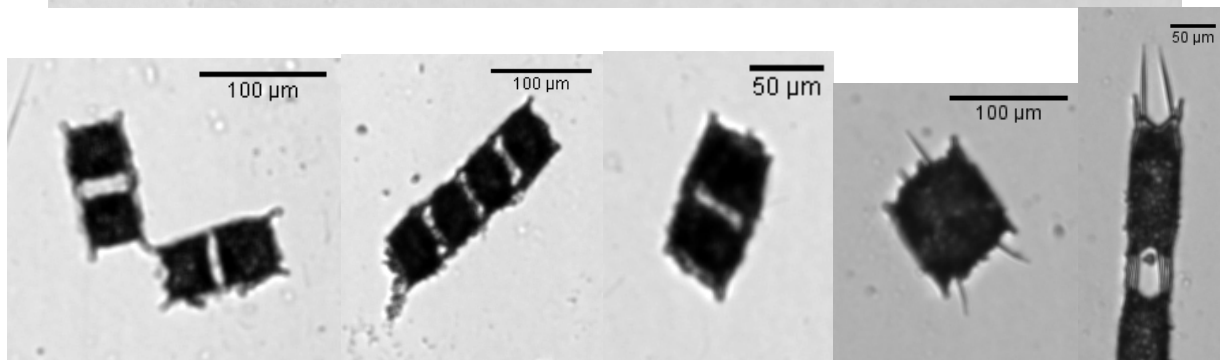
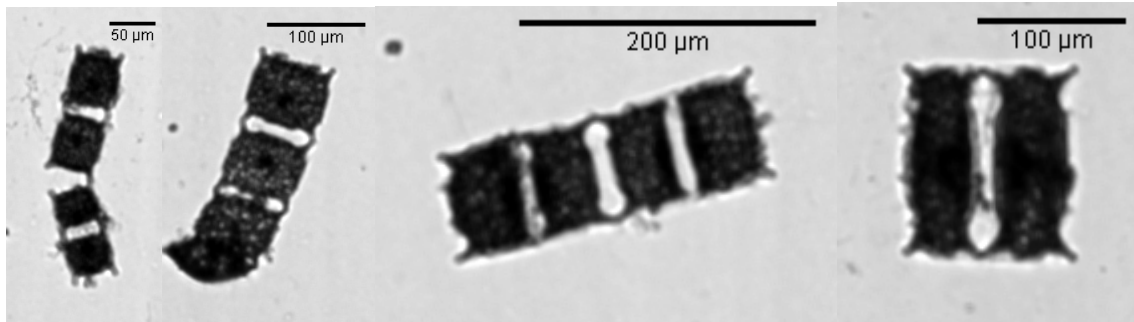
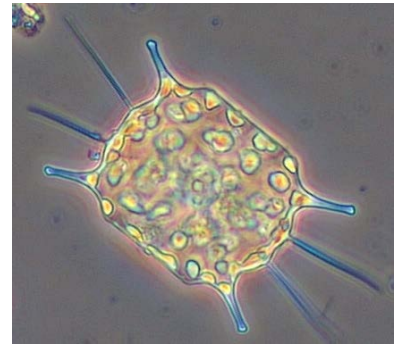
Ochrophyta\Bacillariophyceae\Thalassiosiraceae\Thalassiosira small chaines



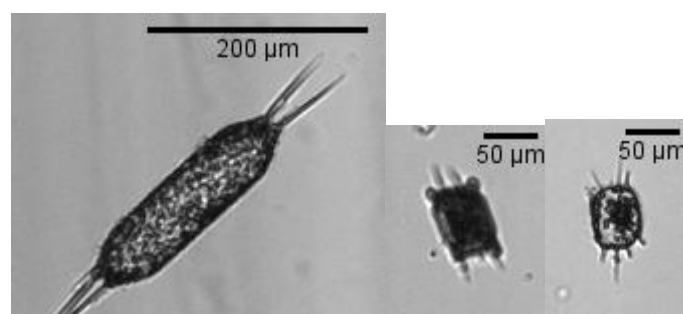
NT

## 5.45. *Odontella*

Ochrophyta\Bacillariophyceae\Triceratiaceae\Odontella



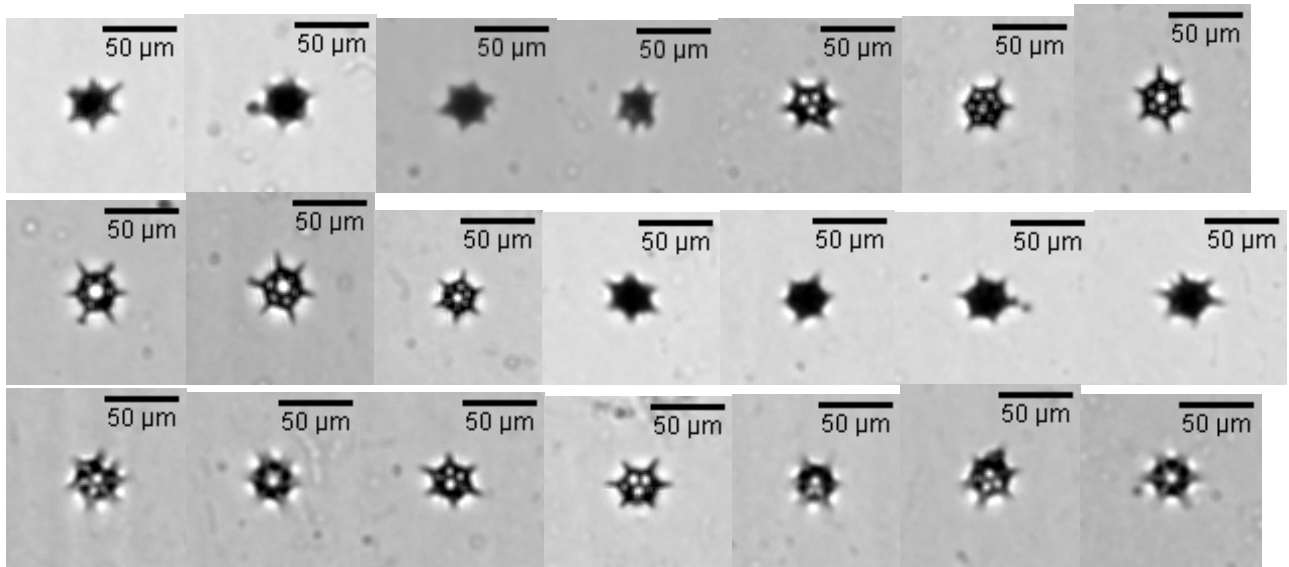
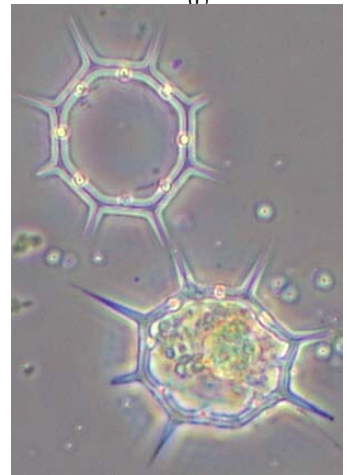
**BL**



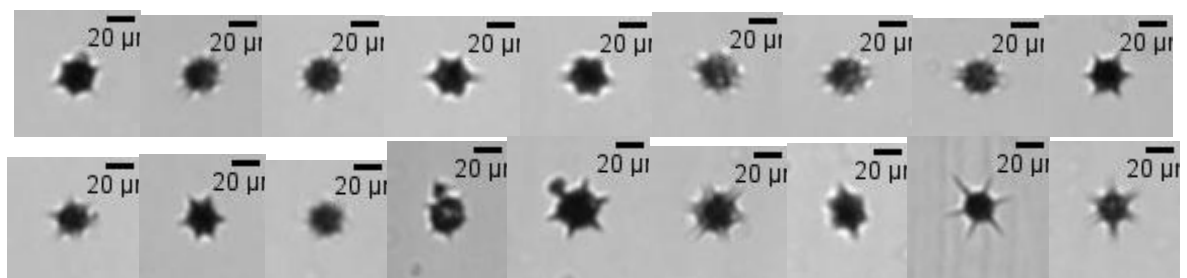
**AR**

## 5.46. *Dictyocha*

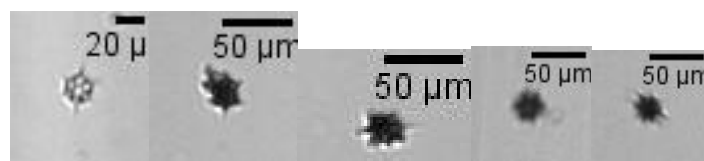
Ochrophyta\Dictyochophyceae\Dictyochaceae\Dictyocha



**BL**



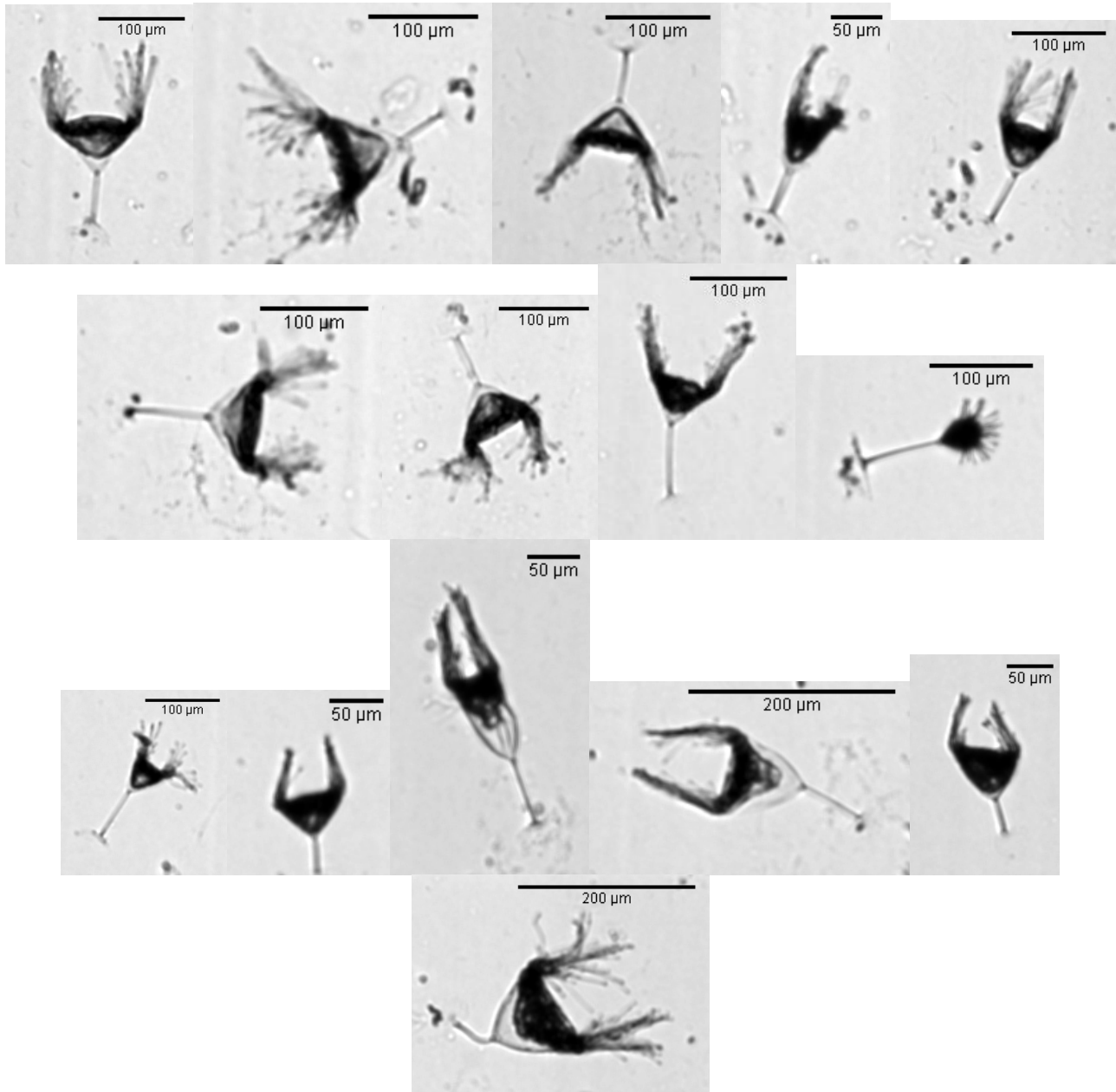
**NT**



**AR**

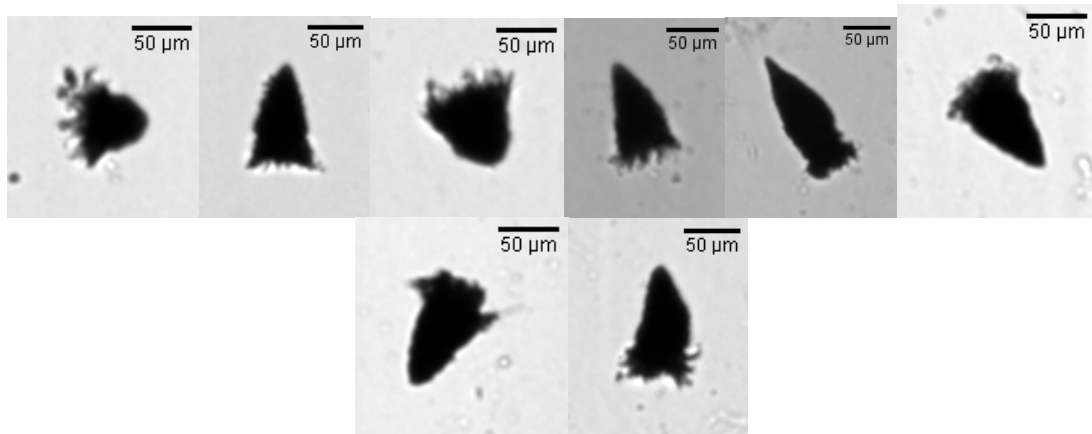
## 6. Classes du zooplancton intégrées au set

### 6.1. *Ciliophora* big

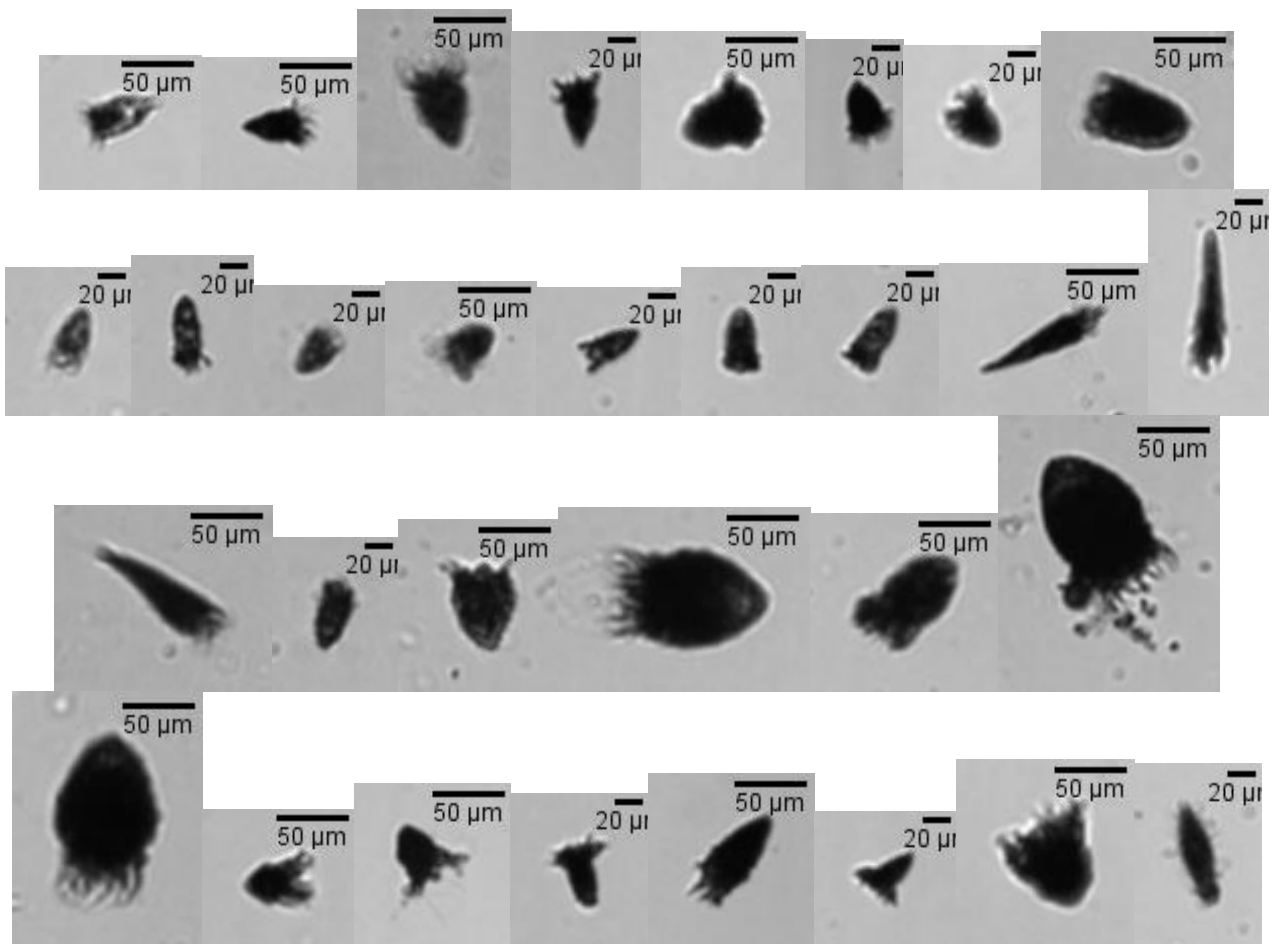


BL

## 6.2. Ciliophora cone

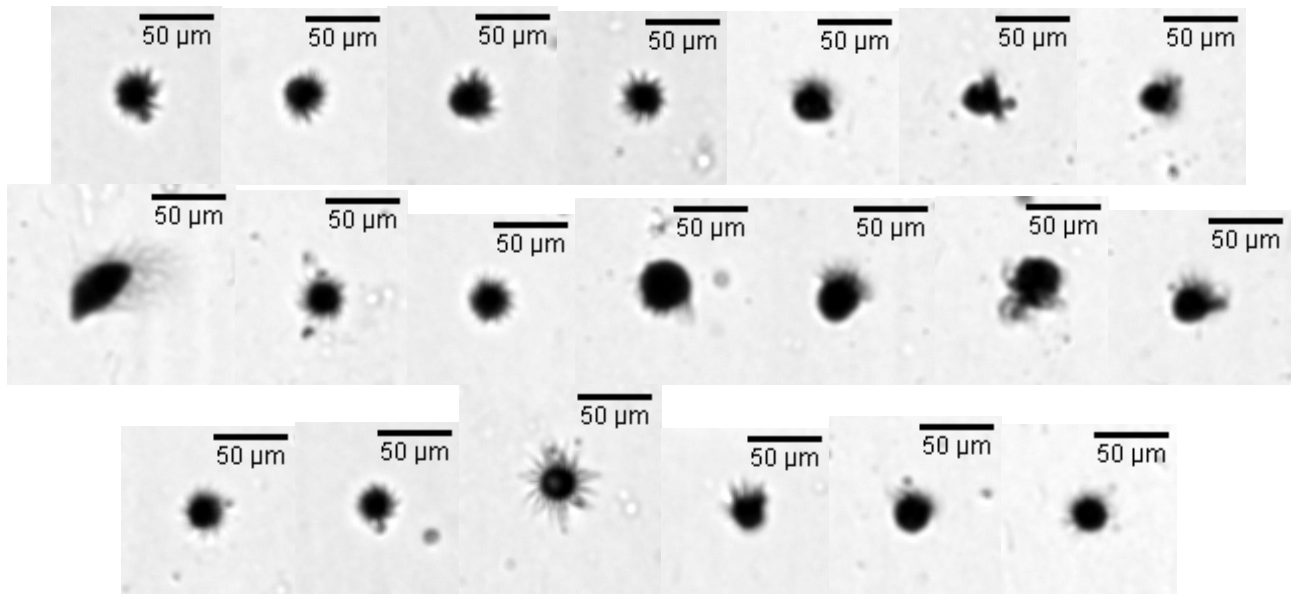


**BL**

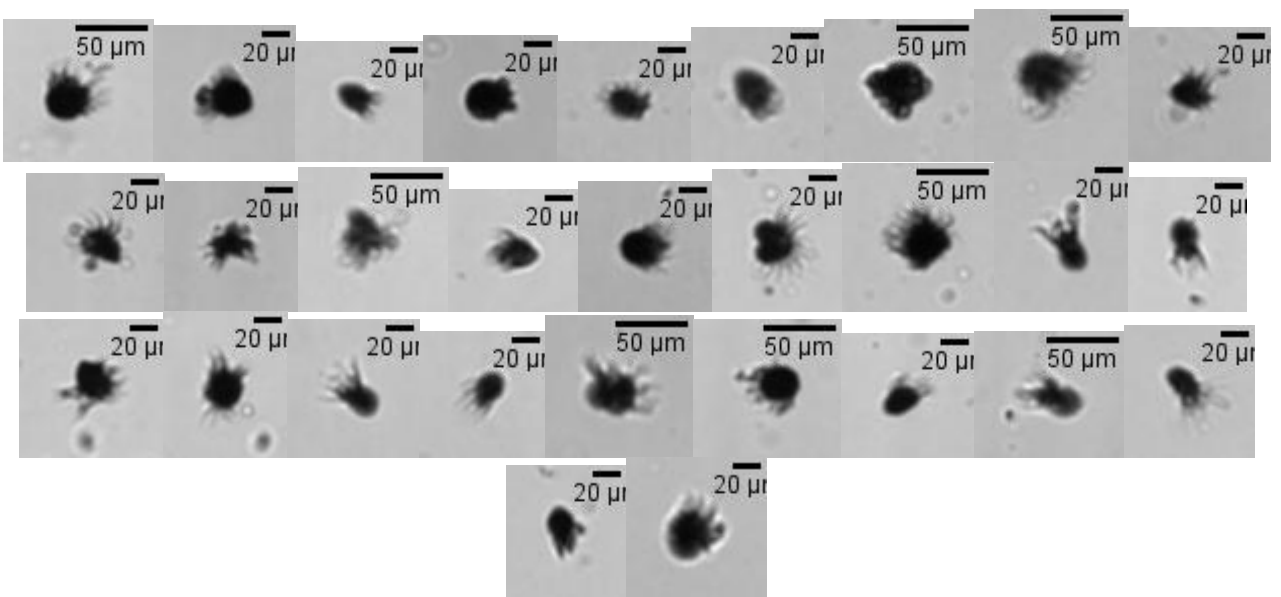


**NT**

### 6.3. Ciliophora small



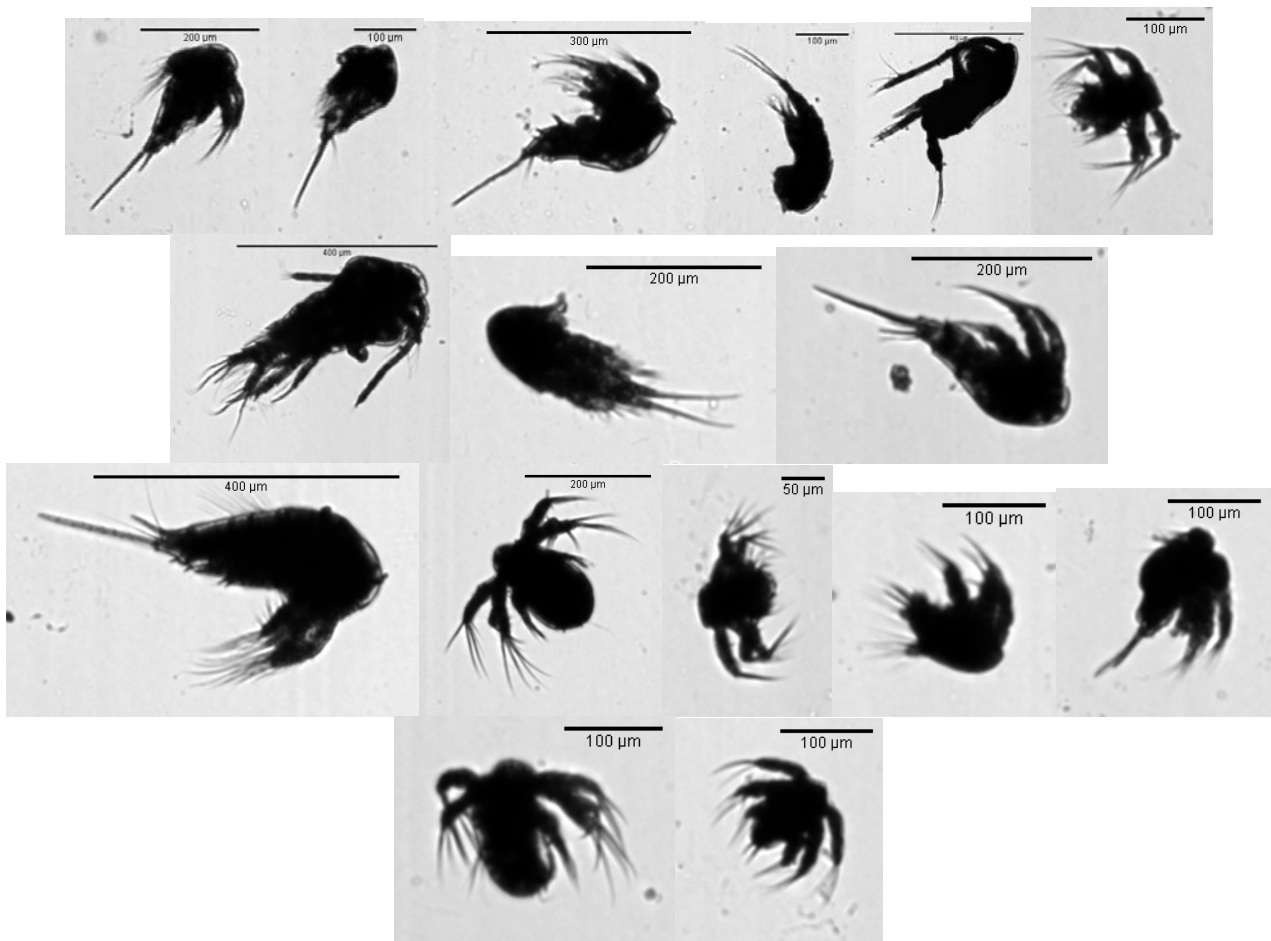
**BL**



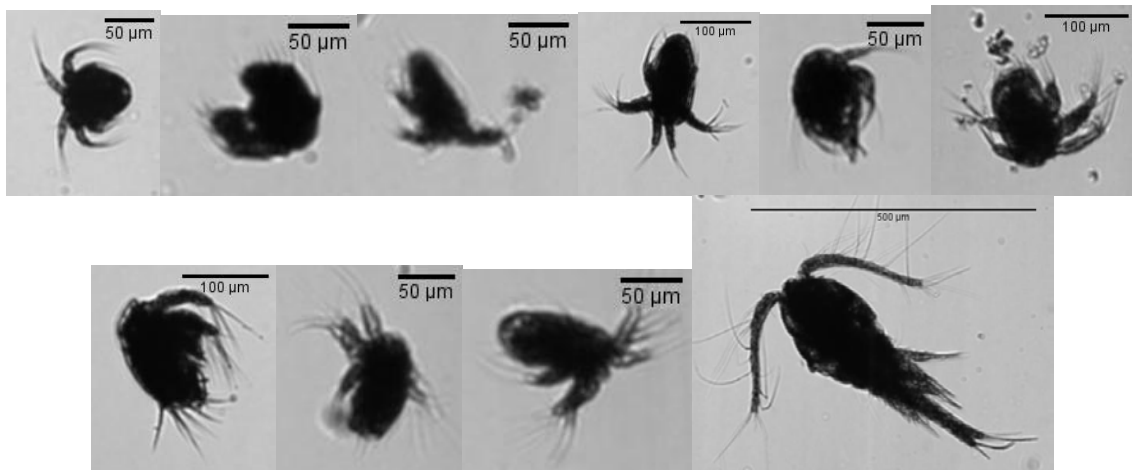
**NT**



## 6.4. Zooplankton spp



**BL**



**NT**