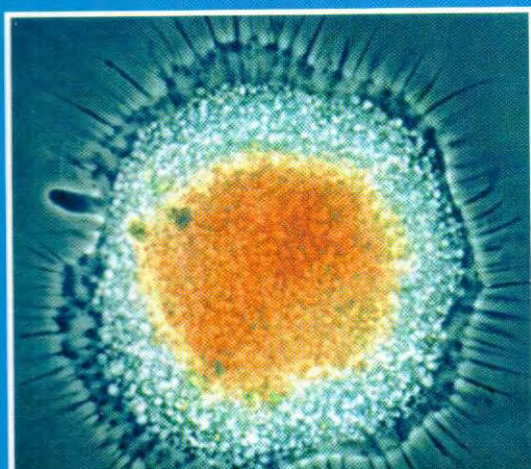




К. Кочеван,  
Н. Кочеван,  
П. Павлов

# БОТИСТОЛОГИЯ

---



**Tetramastigota**

- Retortamonadea
- Diplomonadea
  - Enteromonadida
  - Diplomonadida
- Oxymonadea
- Parabasalea
  - Trichomonadida
  - Hypermastigida

**Discicristata**

- Euglenozoa
  - Euglenida
  - Kinetoplasta
  - Bodonea
  - Trypanosomatidea
    - Diplonemida
- Heterolobosa
  - Schizopyrenidea
  - Acrasea

**Hemimastigophora****Pseudociliata****Chromista**

- Prymnesiomonada
- Cryptomonada
- Heterokonta
  - Proteromonadea
  - Opalineae
  - Chrysomonadea
    - Chrysomonadida
    - Pedinellida
    - Silicoflagellida
  - Bacillariophyceae
  - Heteromonadea
  - Eustigmatophyceae
  - Labyrinthulea
  - Raphidomonadea
  - Bicosoecidea
  - Hyphochytriomycetes
  - Oomycetes

**Alveolata**

- Dinoflagellata
- Diniferea

**Syndinea**

- Perkinsozoa
  - Family Colpodellidae

**Apicomplexa**

- Gregarinea
- Coccidea
  - Agamococcida
  - Protococcida
  - Adeleida
  - Eimeriida

**Haematozoa**

- Haemosporida
- Piroplasmida

**Ciliophora**

- Postciliodesmatophora

**Karyorelictea**

- Protostomatida

- Loxodida

- Protoheterotrichida

**Heterotrichea**

- Licnophorida

- Heterotrichida

- Intramacronucleata

**Spirotrichea**

- Protocruziida

- Phacodiniida

- Hypotrichia

- Oligotrichia

- Choreotrichia

- Stichotrichia

**Litostomatea**

- Haptoria

- Trichostomatia

**Phyllopharyngea**

- Phyllopharyngia

- Rhynchodia

- Chonotrichia

- Suctorina

**Nassophorea**

- Synhymeniida

- Nassulida

- Microthoracida

**Colpodea**

- Prostomatea

**Plagiopylea****Oligohymenophorea**

- Peniculia
- Scuticociliatia
- Hymenostomatia
- Apostomatia
- Peritrichia
- Sessilida
- Mobilida
- Astomatia
- Clevelandellida
- Odontostomatida
- Haplospora

**Cercozoa**

- Phytomyxa
- Reticulofilosa
- Monadofilosa

**Foraminifera**

**Biliphyta**

- Rhodophyta
- Glaucocytophyta

**Viridiplantae**

- Chlorophyta
- Prasinomads
- Ulvophyceae
- Trebouxiophyceae
- Chlorophyceae
- Volvocida
- Chlorococcales
- Streptophyta
- Mesostigmatophyceae
- Chlorokybophyceae
- Klebsormidiophyceae
- Conjugatophyceae

**Amoebozoa**

- Lobosa
- Gymnamoebea
- Acarpomyxea
- Testacealobosea

**Conosa**

- Archamoeba
- Mycetozoa
- Eumyxa
- Protostelea
- Myxogastrea
- Dictyostela
- Aconchulin

**Opisthokonta**

**Fungi**

- Chytridiomycota
- Zygomycota
- Eumycota
- Microspora
- Microsporea
- Rudimicrosporia
- Microsporia
- Ascomycota
- Archaeascomycota
- Hemiascomycota
- Euascomycota
- Family Nephridiophagidae
- Basidiomycota
- Choanozoa
- Mesomycetozoa
- Choanoflagellata
- Metazoa
- Myxozoa

**Eukaryota incertae sedis**

**Actinopoda**

- Acantharea
- Polycystinea
- Phaeodarea
- Heliozoa
- Actinophryida
- Desmothoracida
- Ciliophryida
- Taxopodida
- Centrohelida

**Paramyxea**



593.1  
28.691  
X 26

**Protistology, by Klaus Hausmann, Norbert Hiilsmann, Renate Radek**

H., : , 2010. — 495 ,

(2003 ).

384 . 22

— *Trypanosoma brucei* ( ) ( Oliver Meckes

Nicole Ottawa, Reutlingen, Germany). : 1450x;

— *Vampyrella ulothrichis* ( -  
) ( Norbert Hiilsmann, Berlin, Germany). : 450\*;

— *Paramecium bursaria* ; ( -

DAPI). — ( )  
( Arthur Hauck, Pfalzgrafeweiler, Germany). : 500x.

© E. Schweizerbart'sche Verlagsbuchhandlung,  
Stuttgart (Germany), 2003

© , , 2010

© , , 2010

ISBN 978 5 87317 662 5

## Из предисловия авторов ко второму изданию

Protozoology -

10 -

1985 -

1995

# Предисловие авторов к третьему изданию

1956 : « Protozoologie, » ;

1985 — ».

Protozoology Protistology,

« »

(Hans Machemer),

(Bochum),

Hallenberg,  
(Maria Mu  
Sauerland,  
lisch)

(Gunter Steinbrück)

: « »

( ), « »

( ), « » ( )

« » ( ).

(Frederic Bartlett),

(Karl Gottfried Grell)

« »

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(Peter Adam) — ;  
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-  
, Georg Thieme  
Verlag Stuttgart.  
( . Tosun) ( ) - (Erhard  
, Nägele) Schweizerbart'sche Verlags  
, buchhandlung ,  
-  
(Stefanie ( ) -  
Kortfleisch) ,  
-  
(Marcus Schober). -  
,  
2003



«  
1988  
»  
1996  
( 2003)  
«Protisto  
logy»,  
2003  
Hausmarm,  
([sakarpov4@gmail.com](mailto:sakarpov4@gmail.com),  
[s\\_korsun@ocean.ru](mailto:s_korsun@ocean.ru)).

I.

( )

( , ).

—Ur Thiere.

« »

«zoon»

Protozoa

(Ernst Haeckel, 1866).

(« »)

1818

(Georg August Goldfuss,  
Protozoa.

1782 1848)

1

Protozoa (Protista)

— **Animalcula** (

— Antoni van Leeuwenhoek, 1676):

Animalia, . . .

Volvocida,

Myxogastrea.

(  
Gottfried Wilhelm Leibniz, 1714):

(Myxozoa),

Metazoa.

Protista

Monas O.F. Müller, 1786; Cryptomonada Ehrenberg, 1838; Chrysomonadida Engler, 1898; Diplomonadida Wenyon, 1926; Trichomonadida Kirby, 1947; Proteromonadida Grasse, 1952; Prasinomonadea Christensen, 1962.

— **Infusoria, Animalcula Infusoria** (Martin Frobenius Ledermüller, 1763): (*Aufgufittierchen*).

(Jean Baptiste de Lamarck, 1744—1829) Infusoria

**Urthiere** (Lorenz von Oken, 1805): Infusoria,

» ( = Urtiere),

— **Protozoa** (Georg August Goldfuss, 1818): Infusoria  
« 1845 » (Carl Theodor von Siebold)

**Animalia Microscopica** (Jean Baptiste Bory de Saint Vincent, 1826): Animalcula Infusoria. (*Vorticella*) (règne psychodiale).

— **Eithiere, Oozoa** (Carl Gustav Carus, 1832): Animalcula Infusoria

**Archaeozoa** (Maximilian Perley, 1852):

Protozoa. ( ) -

( Archezoa) 1 -

**Microzoaires** ( Robert Whittaker, 1959). -

— Emile de Fromentel, 1874): -

( (Prokaryota = Monera). -

( Peter Simon Pallas — 1) -

1741 1811) (Felix , 2) -

Dujardin — 1801 1860) -

Zoophyta Zoophytes Infusories -

) XIX (Margulis et al., -

1990). , Protoctista -

Phaeo -

phyta, Chytridiomycota, Oomycetes, Rho -

dophyta

(Rudolf Leukart — 1822 1898) -

— **Protista** ( -

— Ernst Haeckel, 1866): -

(1848). -

**Acrita** ( — Richard Protista -

Owen, 1861): -

( Closteri -

) — Metazoa -

(Animalia) -

(Vegetabilia). : + -

= -

— **Protoctista** ( -

— John Hogg, 1861): -

: Protozoa, Archezoa, Protocista  
Protista<sup>1</sup>.

« »,

---

<sup>1</sup> « »

(Hans & Zacharias Janssen)  
1590 . . . . . 100  
1676 . . . . . 80  
( . . . . . ),  
animalcula.  
1678 . . . . .  
( . . . . . 1, 2 ).  
1 . . . . .  
( . . . . . 2 ).  
400 . . . . .  
(Delft), . . . . . XIX

1 «simple microscope»  
« »; a «compound microscope»  
« ».



ANTONIUS A LEEUWENHOEK.

*Regia Societatis Londinensis  
membrum.*

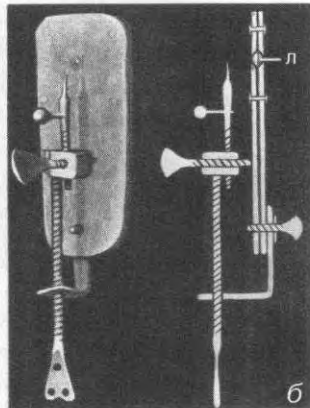
*J. Verkolge pinx*

*A. de Blou fec*

Рис. 1. Антон Левенгук, основатель научной микроскопии.

(Louis Joblot)





2.  
1670 ( ).

( ),  
250 ( )  
( ).

1727

---

ratio spontanea),	(gene 1749	-
1707 1788)	(George Buffon,	-
1713 1781).	(John Needham,	-
	, Animalcula	-
tozoa, . . .	Sperma-	-
	(Lazzaro Spallanzani, 1729 1799)	-
1805	XIX	-
	Urthiere (	-
	)	-
	;	-
	(Louis Pasteur, 1822	-

1895) (Robert Koch,  
1843 1910).

1775

(Henry Baker)

1754

«

1730 1784)

1768

(Otho Fredericus Müller,

( . 3).

(Beiträge zu nützlichem und vergntigen  
dem Gebrauch und Verbesserung des  
Microscopii),

(1755)

(August

10

«

Johann Resel von Rosenhof).

»

(Carl

(Nikolas Theodore de Saussure)

von Linne, «Systema », 1758), . .

1769

# ANIMALCULA INFUSORIA

FLUVIATILIA MARINA,  
DETEXIT, SYSTEMATOE DESCMPsit « . AD VIVUM  
DEUNEAM CURAVIT

OTHO FRIDERICPS NülLES,

DAWS QUONDAM A CONSMS & . 0  
& I SCIENTUWM SOGAUS.

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qp» COM TABULIS h. Vuew

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W A S R R I S T .

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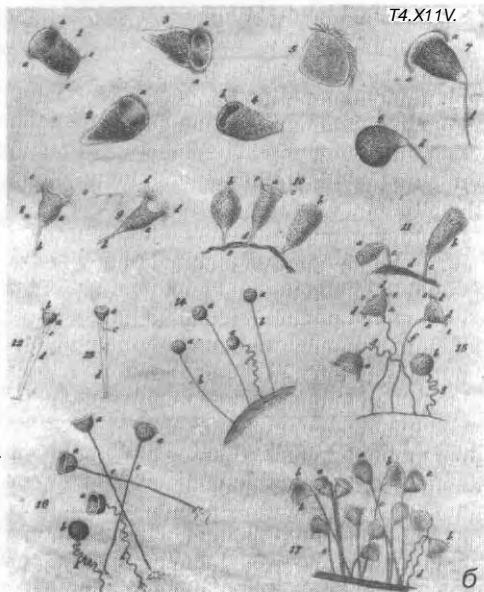
NATURELQUE CURIOSOL. REBOLD.

HAUN1M\*

Typo NICOLAI HÖLLERI, Aula Edna Typograph.

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. 3.

( )

( )

*Monas*, *Ceratium hirudinella*, *Bursaria truncatella*, *Euplotes patella*, *Lacrymaria olor*, *Stylonychia mytilus*.

XIX

XIX  
(Jan Evangelista Purkinje, 1787 1869)  
(Theodor Schwann, 1810 1882)  
(Matthias Jacob Schleiden, 1804 1881)

?

(Alcide d'Orbigny,

1802 1857)

Foraminifera (

).

(Christian Gottfried Ehrenberg, 1795 1876),

Protista, 1873

( ) .

1835

« » (Die Infusionsthierchen als vollkommene Organismen, . 4)

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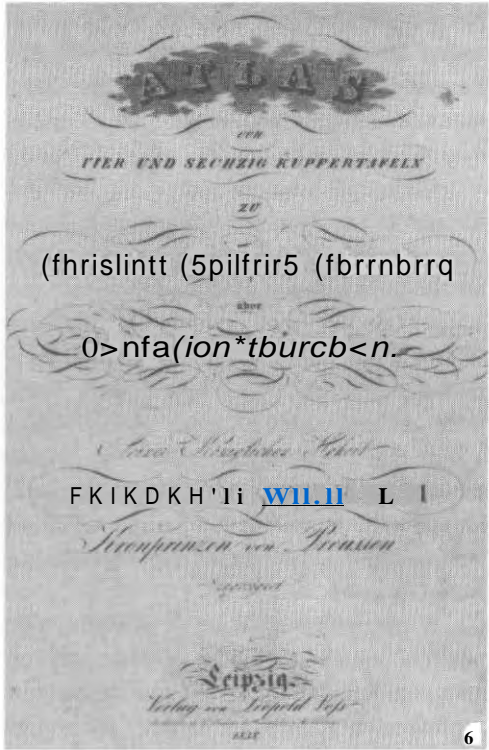
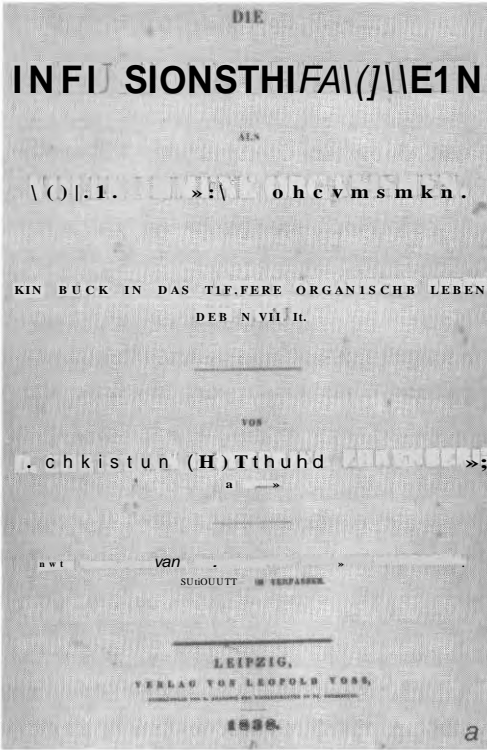
)

Sarcodina Sarco

( )

mastigophora,

( , ) .



4.

( )

( )

- Chlamydomonas, Cryptomonas, Dinobryon, Euglena, Euplotes, Loxodes, Nassula, Peridinium, Prorodon, Spirostomum, Synura

1840

: Actinophrys,  
Amoeba, Arcella, Bodo, Carchesium,

Coccolithophorida. —

; -  
 -  
 (1859 1930), -  
 ;  
 (George Klebs, 1857 1918)  
 -  
 ; -  
 (Rudolf Leukart,  
 1861 1822 1898), -  
 Sporozoa; -  
 (Max Schultze, 1825 1874), -  
 (Fritz Richard Schaudinn, 1871 1906); -  
 (Franz  
 Eilhard Schulze, 1840 1917) -  
 ; -  
 4000 -  
 ; -  
 (Edouard Gerard  
 Balbiani, 1823 1899)  
 ; -  
 (Otto Bütschli, 1848 1920), -  
 (Heinrich Anton de , 1831 1888), -  
 ; - (Clifford Dobell, 1951) « -  
 (Charles Louis »  
 Alphonse Laveran, 1845 1922), -  
 ( ) -  
 1907 -  
 ;  
 XIX  
 (Edouard Claparede, 1832 1871), - 1879  
 (Joseph Leidy)  
 (Johannes Lachmann) 1888 (Alfred  
 Stokes)  
 ; -  
 (Wil-  
 liam Savill Kent, 1845 1908) -  
 « » XX -  
 (Manual of the Infusoria); -  
 (Richard Hertwig,  
 1850 1937), -

1.

1:

(1675)

2:

(G.A. Goldfuss) (1818): Protozoa

(A. D'Orbigny) (1826): Foraminifera

X. (Chr. G. Ehrenberg) (1838):

3:

( . von Siebold) (1845):

(F. Dugardin) (1835) X. ( . von Mohl) (1846)

( . Schultze) (1861, 1863): —

4:

( . Gruby) (1843):

*Trypanosoma* ( )

(C.W. von Naegeli) (1857):

*Nosema bombycis*

(F. Lösch) (1875):

*histolytica*

(Entamoeba

P. (R. Leuckart) (1879):

Sporozoa

A. (A. Laveran) (1880):

(Plasmodium)

O. ( . Bütschli) (1881):

Myxosporidia (= Myxozoa)

(G. Balbiani) (1882):

Microsporidia (= Microspora),  
Sarcosporidia

(J.E. Dutton) (1902):

*Trypanosoma gambiense* —

5:

( . Bütschli),

(1878)

1.

- (F.E. Schulze), (1884)
- (R. Hertwig), (1885)
- (F. Schaudinn) (1902):  
«Archiv für Protistenkunde», 1988  
«Protist».
- (1904): Reichsge  
sundheitsamt Berlin Lichterfelde, 1906
- Bernhard Nocht Institute)
- (1908)¹:
- (Hartmann) (1914):  
Berlin Dahlem.
- 1947: — ; 1954  
«Journal of Protozoology» (1993 «Journal  
of Eukaryotic Microbiology»).
- 1963: «Acta Protozoologica»
- 1968: «Protistologica» (1987  
«Journal of Protistology»)
- 1972:  
(International Society of Evolutionary Protistology — ISEP)
- 1999: «Protistology»².
- 1961, :  
4 : 1965 , 1969 -  
, 1973 , 1977 , 1981 , 1985 -  
, 1989 , 1993 , 1997 , 2001 -  
/ , 2005 , 2009

( , 2001; Fokin, 2001). —

¹ 1922 1929  
» (Archives de la Societe Russe de Protistologie),





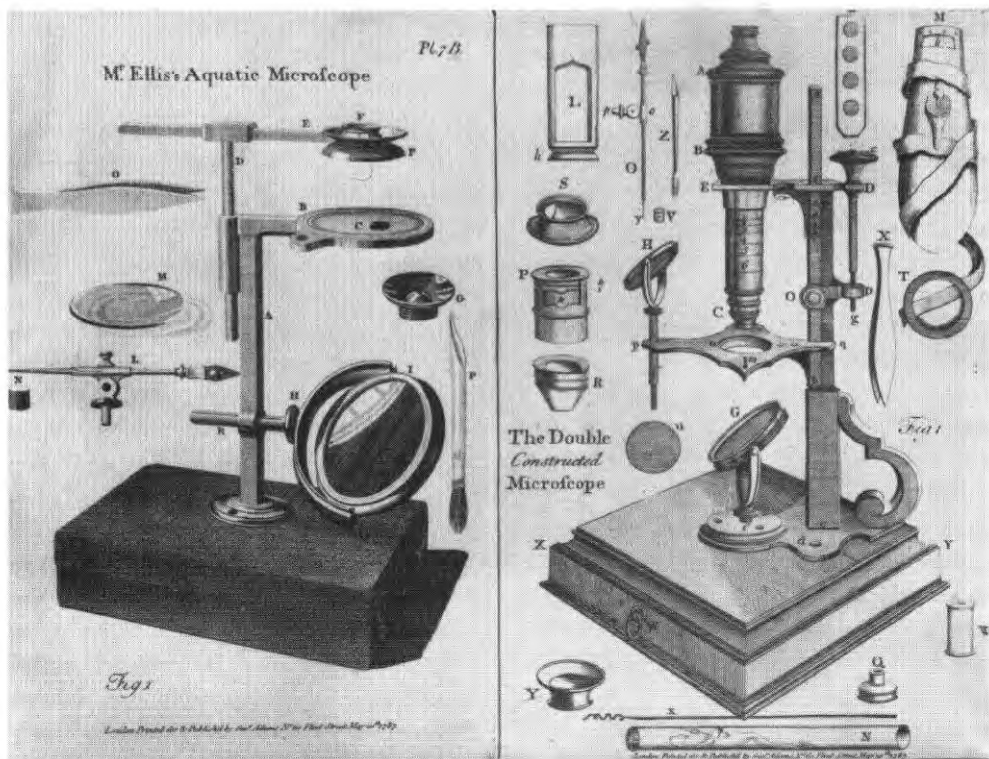


Рис. 5. Год 1787: две страницы из каталога британского изготовителя микроскопов.

(Frits Zernike).

(Ernst Ruska)

1986

(Manfred von Ardenne)

1960

1950

( . 6, 7).

( . 8).

8 ).

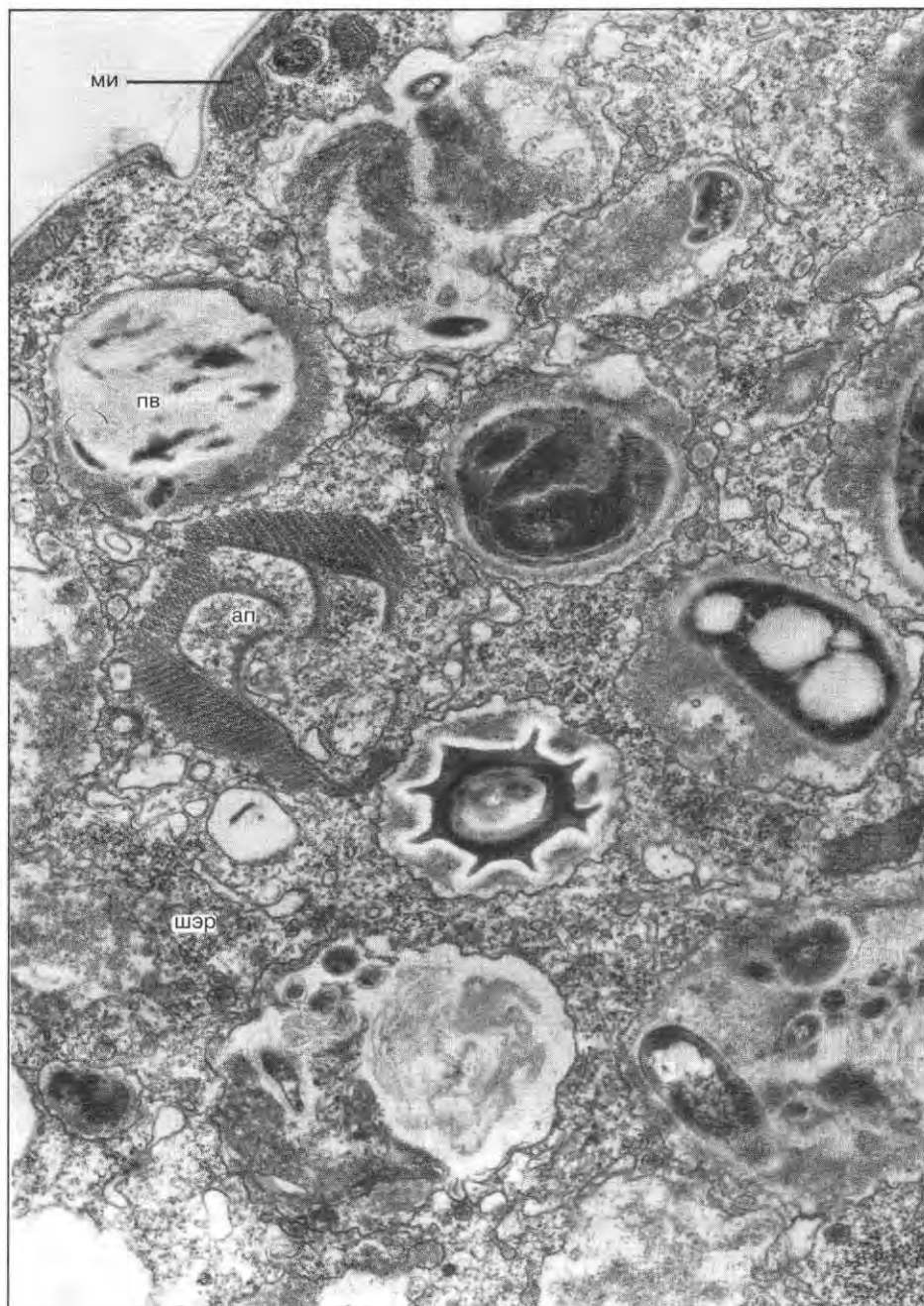
( . 8).

( . 8, ).

*Entamoeba*

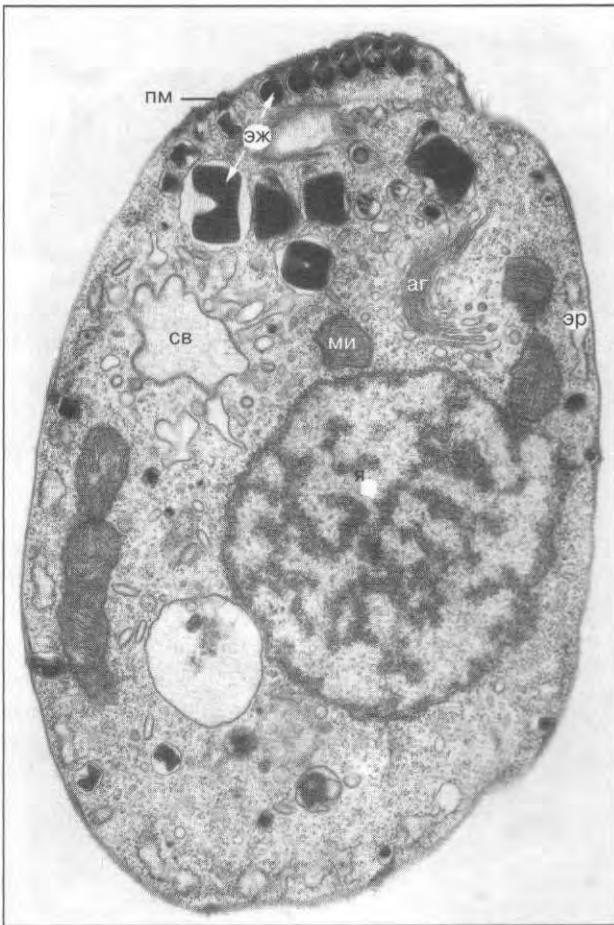
*Giardia,*

Apicomplexa



6.

*Entosiphon sulcatum*: an —



. 7.

*Goniomonas.*

( ):

— — — — —  
 , — — — — —  
 , — — — — —  
 — — — — —  
 , — — — — —  
 . . . . .

( . . 71).

( . 12)

( . 10),

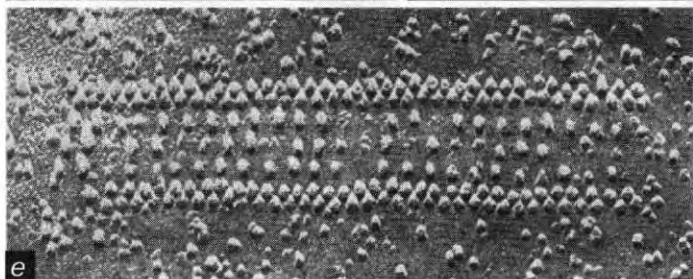
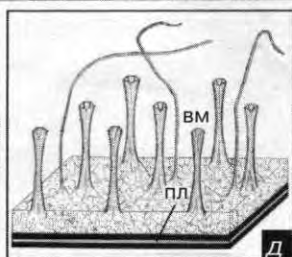
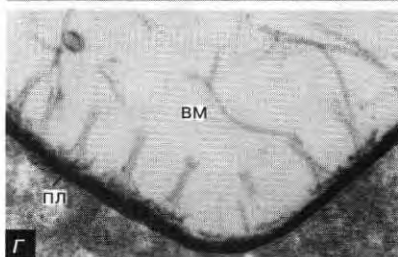
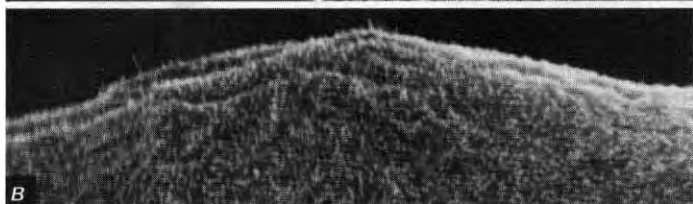
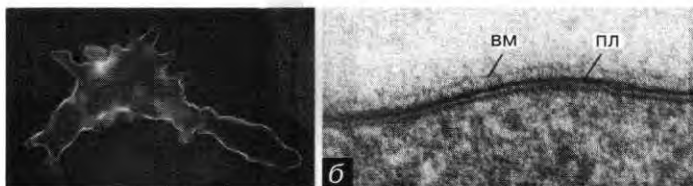
( . 11),

( . 13, 14),

( . 9),

( ),

*Tetrahymena* (Ciliophora)



8.  
 ( )  
 Amoeba proteus,  
 FITC Con ( );  
 Vampyrella lateritia  
 ( )  
 ( ); Vannella  
 simplex  
 ( ),  
 ( )  
 ( ).  
 Cyclidium ( ) ( —  
 ; —  
 ) . : — 150 ,  
 6—185 , — 7 500 ,  
 — 150 , —  
 100 .

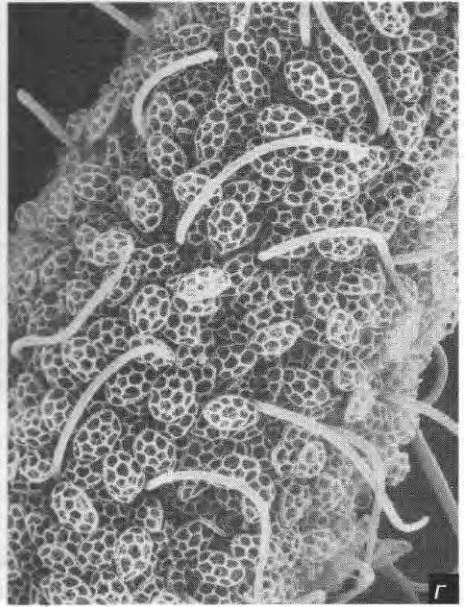
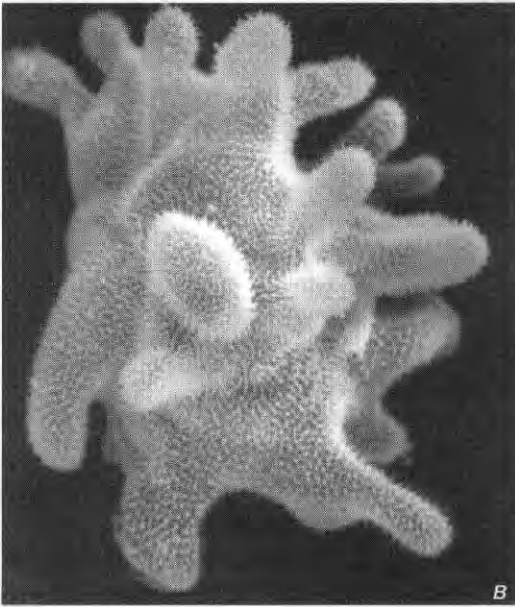
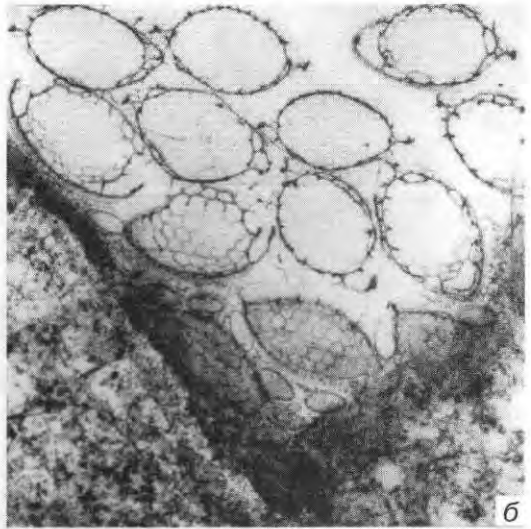
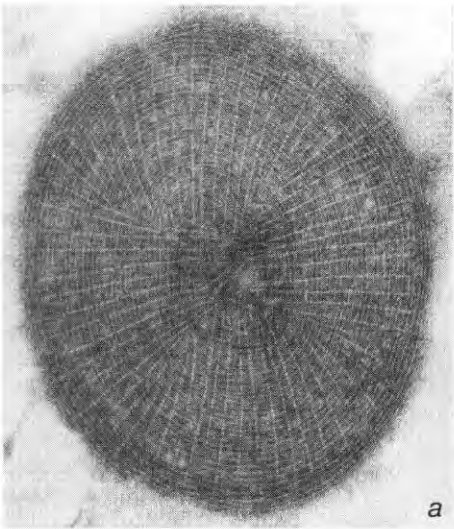
30

*Trichonympha* (Hypermastigida).

0,2 0,3

( . 15).

*Trypanosoma brucei*

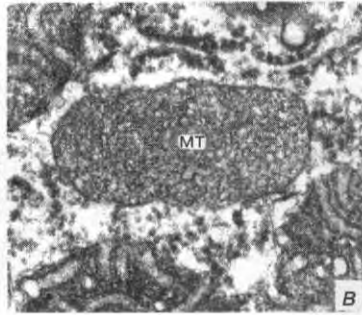
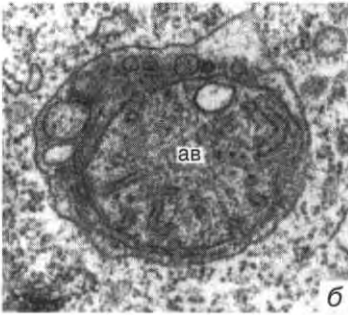
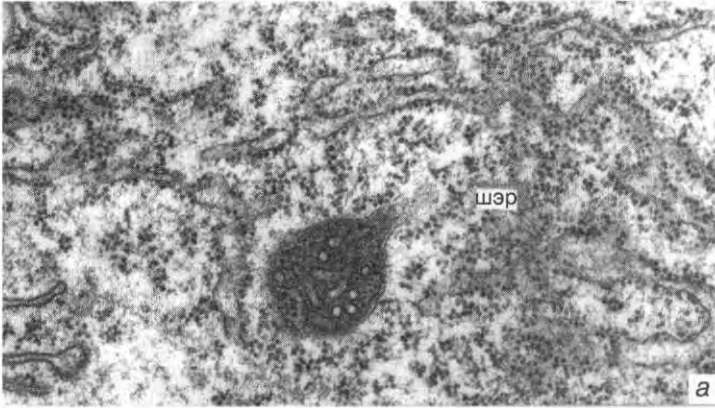


9.  
*Pleurochrysis* ( );  
 ( );

*Cochliopodium* ( ); *Dactylamoeba*,  
*Lepidotrachelophyllum* ( ) ( —

); — 77 , 6—28 , —

1 800 , — 4 200 .



. 10.

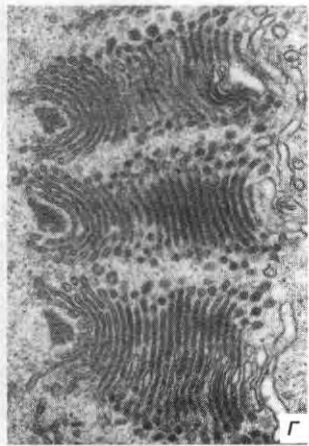
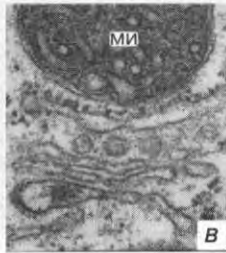
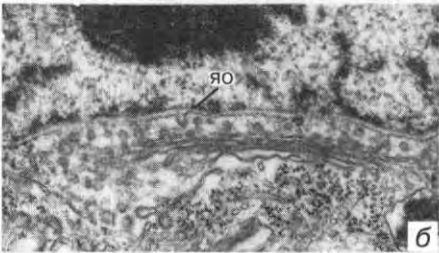
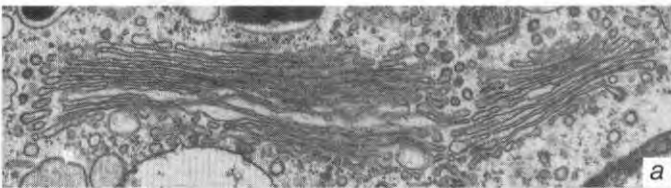
*Paramecium.*

( ) ( ) ;

( )

( ) ;

( ) ( ) . :  
— 25 , —  
35 мкм, — 50 .



. 11.

*Rhodomonas* ( ) ,

( ) ,

*Pseudomicrothorax* ( )

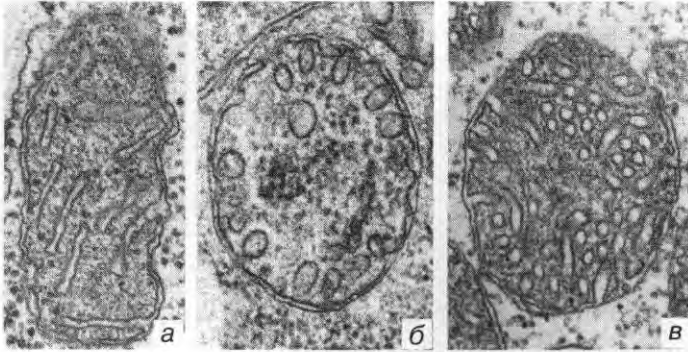
*Joenia* ( ) ,

—

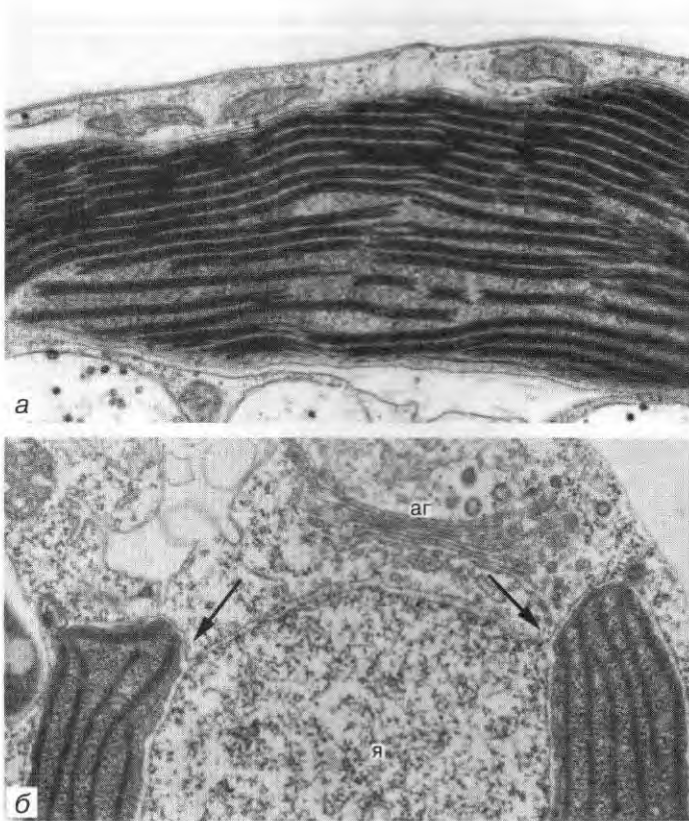
: — 25 , 6 — 25

— 50 , —

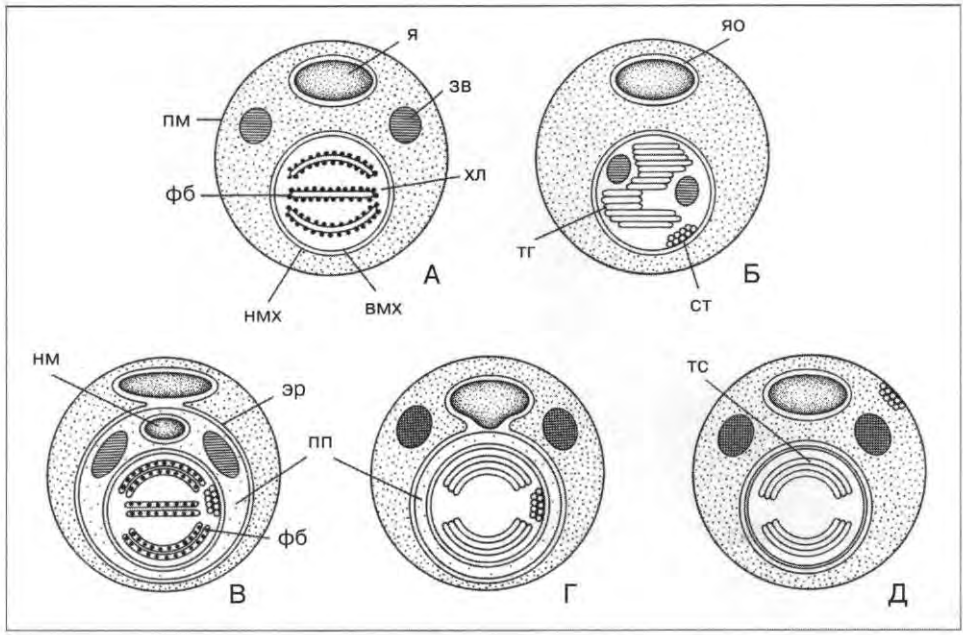




12. *Gonimonas* ( ), *Vampyrella lateritia* ( ) *Gonio-Paramecium caudatum* ( ).  
 : — 55 , 6 — 40 , — 60 .



13. *Rhodomonas* ( ): — ( — ) *Ochromonas* ( ), — : — 20 , — 18 .



14.

( ), ( ), Biliphyta  
 (A), Chlorophyta ( ), Cryptomonada ( ), Chrysomonadea ( ) Euglenida ( ).

( )  
 ( )  
 4 ( )  
 ( ), ( )  
 ( )  
 ( )  
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 2. — — ( )  
 ).

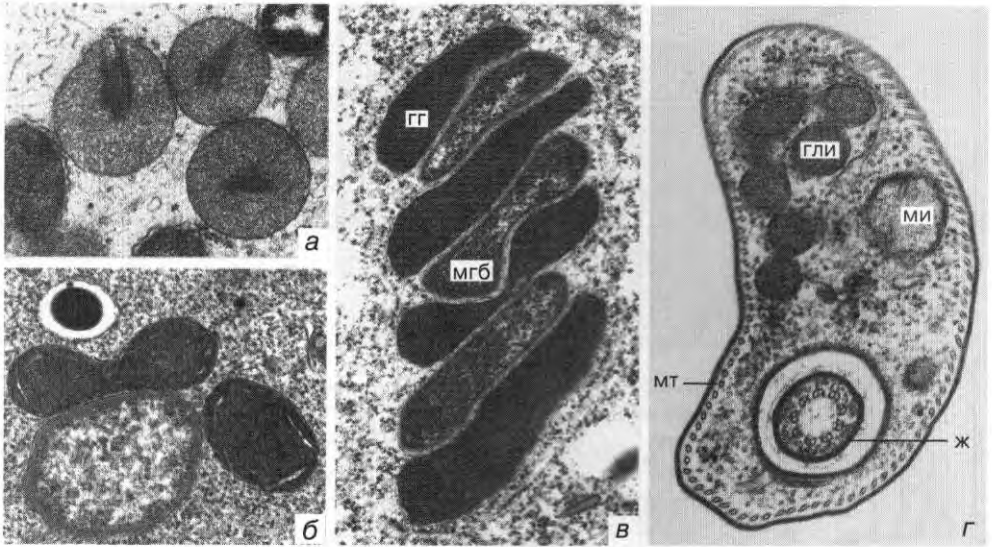
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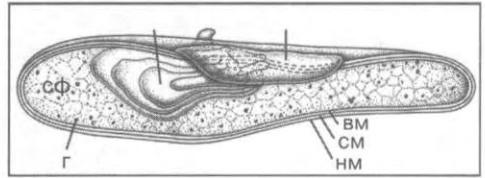
( 13 ). —

3



15. ( ) *Joenia annectens* ( ) *Metopus contortus* ( ) *Plagiopila frontata* ( ) ( ) *Trypanosoma brucei* ( ) , — ( — : Fenchel and Finley: Europ. J. Protistol. 26 [1991] 201).  
 ∴ a — 25 000x, б — 35 , — 20 , — 35

(= ) —  
*Entamoeba histolytica.*  
*Entamoeba*



16.  
*Plasmodium falciparum.*

Apicomplexa.

(apicoplast)  
apicomplexan plastid ( )  
)

( 16),

Apicomplexa.

35 . . . .

« »

, « » «

»,

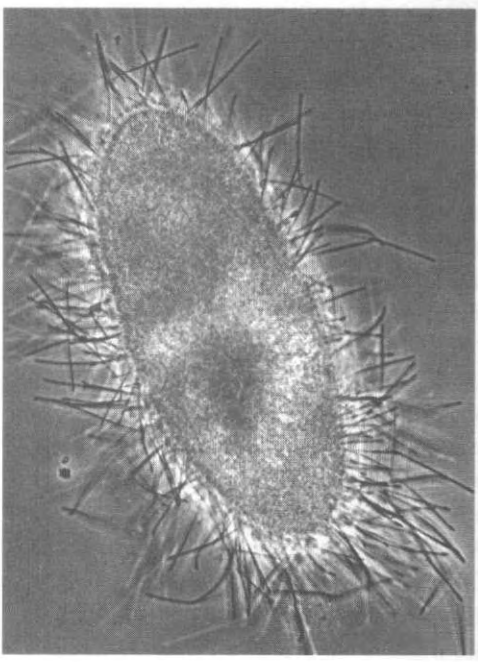
*Toxoplasma* *Plasmodium.*

*mecium* ( . 17).  
15

*Para-*

( . 14).

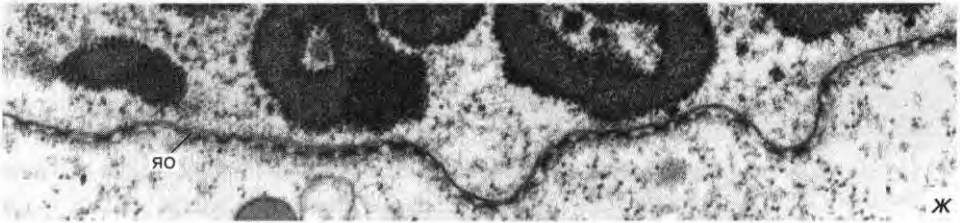
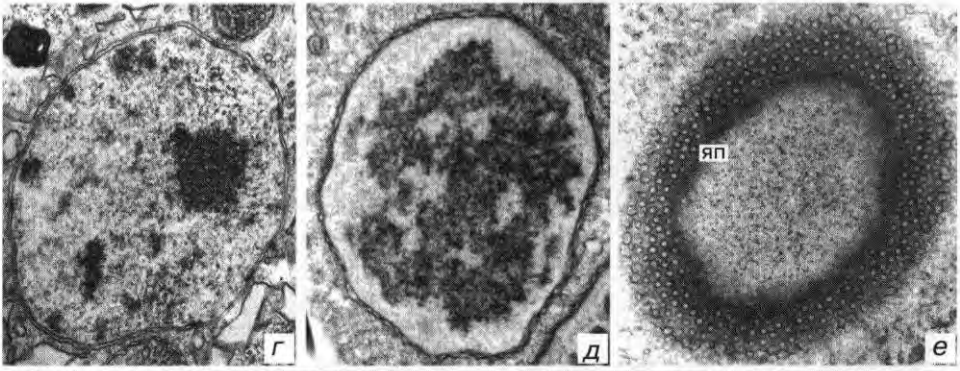
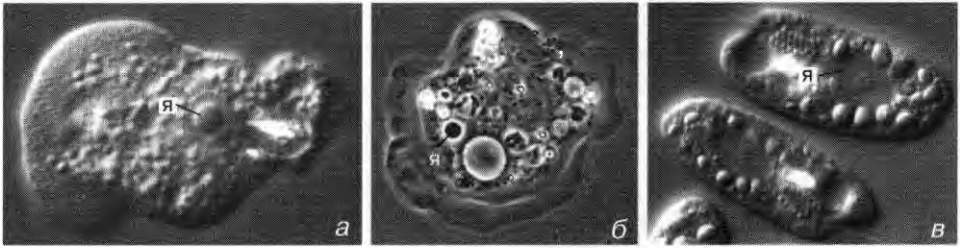
( . 18).



. 17.  
*mecium*. : 500 .

*Para-*

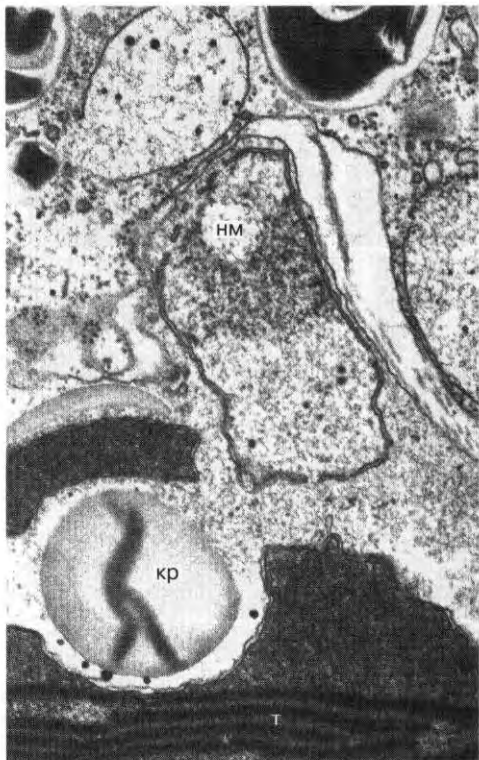
( . . 112 306).



18. ( ) *Vahlkampfia* ( ) *Thecamoeba* ( ) *Chilomonas* ( )  
 : *Vampyrella* ( ), *Pseudomicrothorax* ( ),  
*Staurojoenina*  
 ( ), ( ) *Pseudomicrothorax*  
 ( ) ( —  
 , ) . : — 1800 , — , — 1800 , — 18 , — 14 , — 10 800 ,  
 — 22 500 .

( . . 300).

( . 19)



19. ( )  
*Cryptomonas ovata*.

: 35

4 10

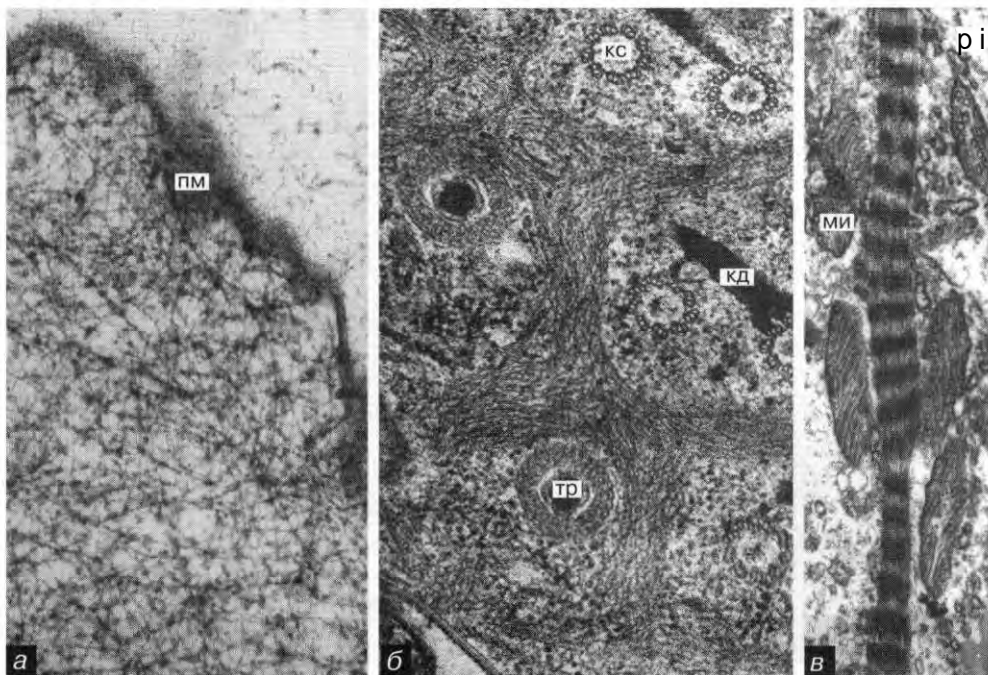
( . 20 ).

*Stentor*

( . 21 ).

( . 226, )

*Paramecium*.



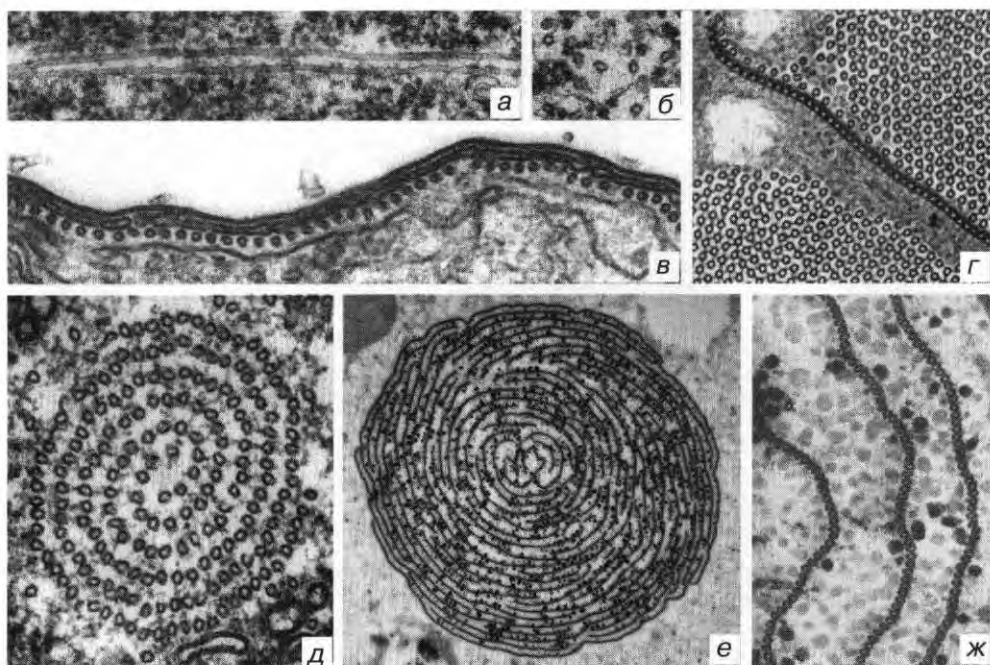
20. *Amoeba proteus* ( ) *Paramecium caudatum*  
 ( ) *Loxophyllum meleagris* ( ), — , — , — , —  
 — , — ( — , — )  
 ). : — 115 000 , 6 — 57 , — 19 .

( . 22, 23) -

( . 154 )

(Lobosa: *Amoeba*, *Mayorella*,  
*Nebela*, *Saccamoeba*, *Stereomyxa*; Hetero  
lobosa, *Conosa*, *Mesomycetozoa*);





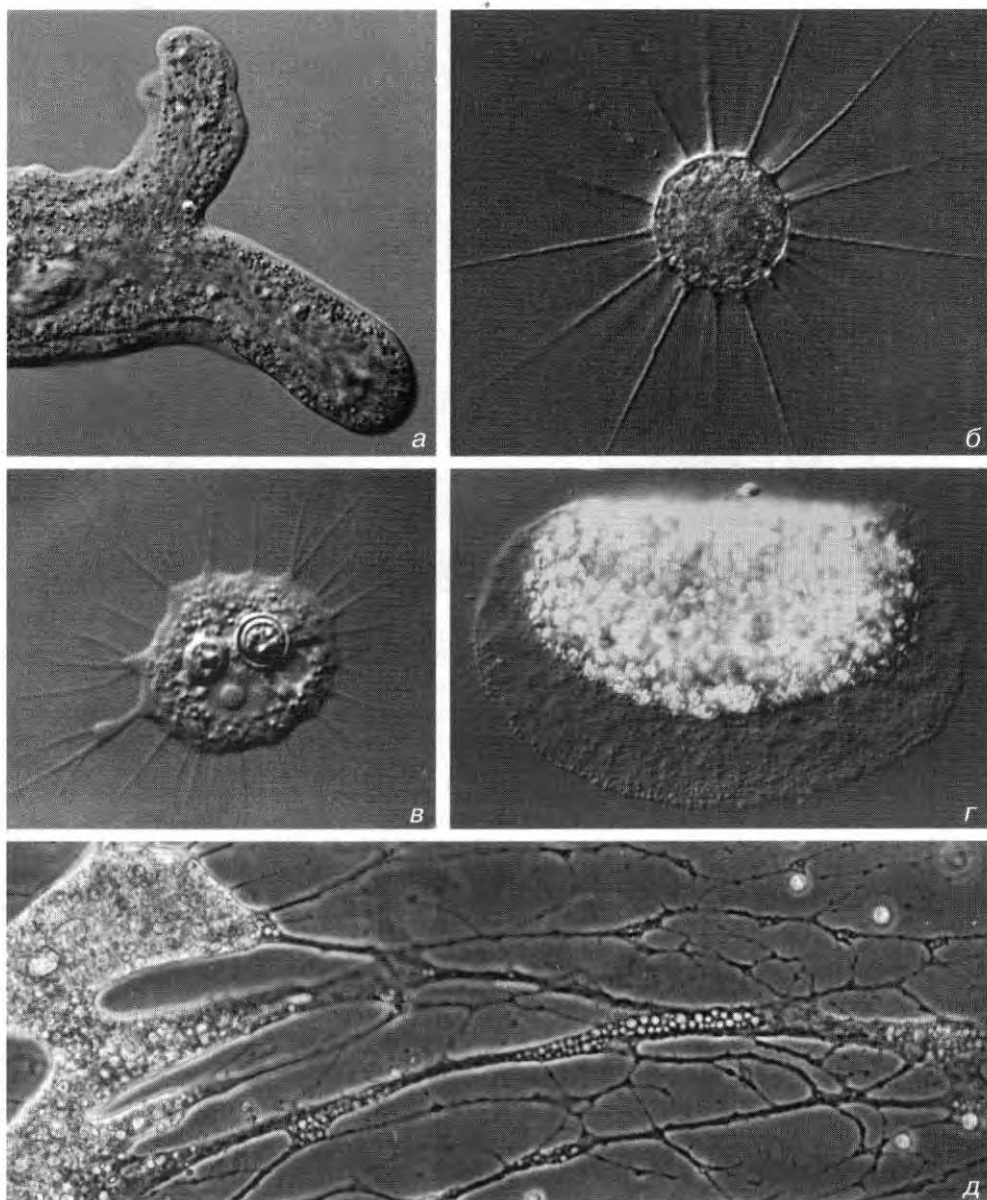
. 21. ( ) ( ) -  
*Paramecium*.  
*Euplotes* ( ) . *Nassula* ( ) . -  
*Actinophrys* ( ) . *Joenia*  
( , ) . : , - 38 , - 43 , - 33 , - 76 , - 7500 , - 30 .

(Aconchulina: *Nuclearia*, *Hyalodiscus*;  
Protostelea; Cercozoa: *Cyphoderia*; Hete  
rokonta: *Labyrinthulea*, *Chrysonomadea*;  
Chytridiomycota);

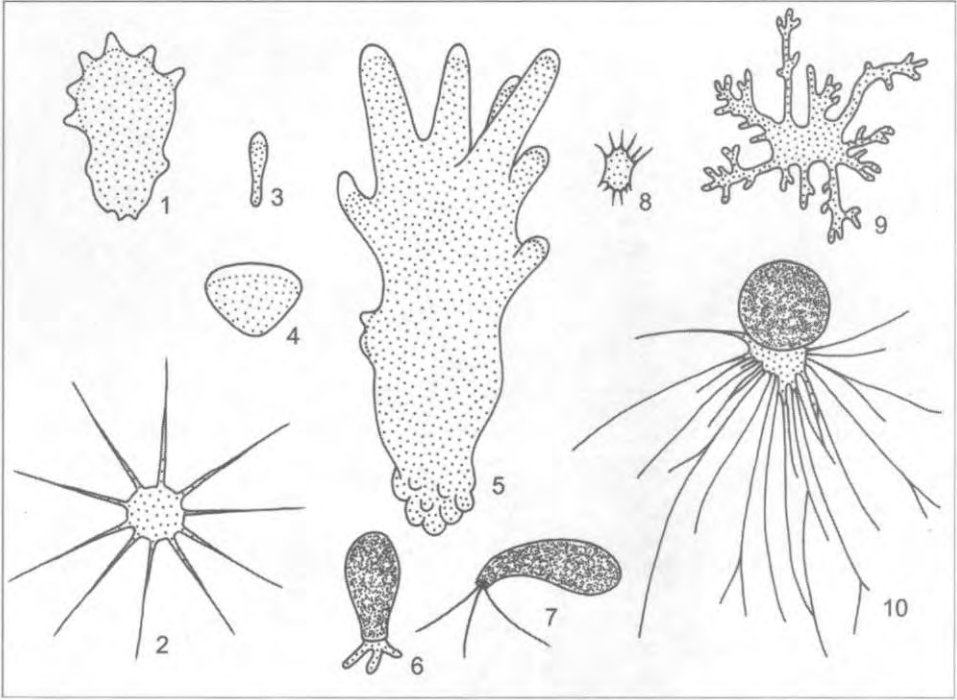
• - - - - - +  
- - - - - +  
(Acantharea, *Hyalodiscus*, +  
Polycystinea, *Phaeodarea*, : *Foraminifera*, +  
*Actinophrys*); -  
• - - - - + *Acantharea*, Poly-  
- - - - - cystinea .

(Foraminifera: *Allogromia*, *Reticulomyxa*);

• - - - - -  
- - - - -  
(Aconchulina: *Hyalodis-  
cus*; Lobosa: *Vannella*; - , - .



22. : *Amoeba proteus* ( ), *Actinophrys sol* ( ),  
*Nuclearia* ( ), *Hyalodiscus predatus* ( ), *Reticu*  
*lomyxa filosa* ( ) ( — , — 580 , — 875 , — 175 . ) . . : — 580 ,



23. ( ) 1 —  
 {Mayorella}, 2 — (Actinophrys<sup>1</sup>), 3 —  
 (Saccamoeba), 4 — (Vannella), 5 —  
 (Amoeba), 6 — (Nebela), 7 —  
 (Cyphoderia), 8 — (Nuclearia), 9 — (Stereomyxa), 10 —  
 (Allogromia<sup>2</sup>).

9x2+2

( . 36). Tetra

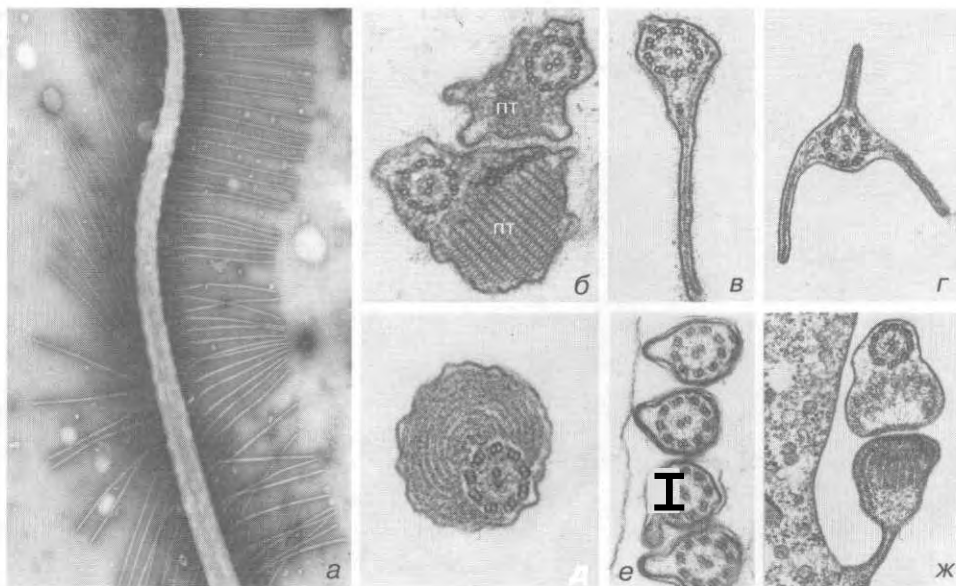
<sup>1</sup> Actinophrys

<sup>2</sup> Allogromia

Allogromia

Foraminifera

Gromia

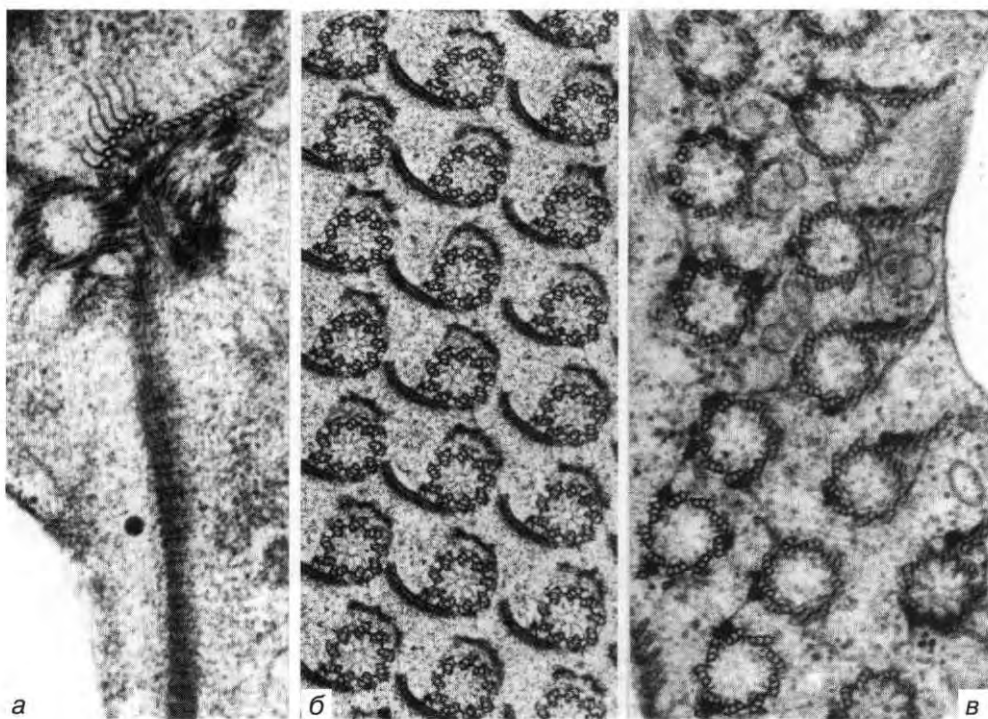


24. *Retortamonas* ( ), *Entosiphon* ( ), *Colponema loxodes* ( )  
*Tritrichomonas angusta* ( ) ( — 32, — 40, — 28 )  
*Stylonychia* ( ) ( — 16, 6 — 36 )  
*Foaina* ( ),

( . 25).

( . 24 ),  
 ( . 168).

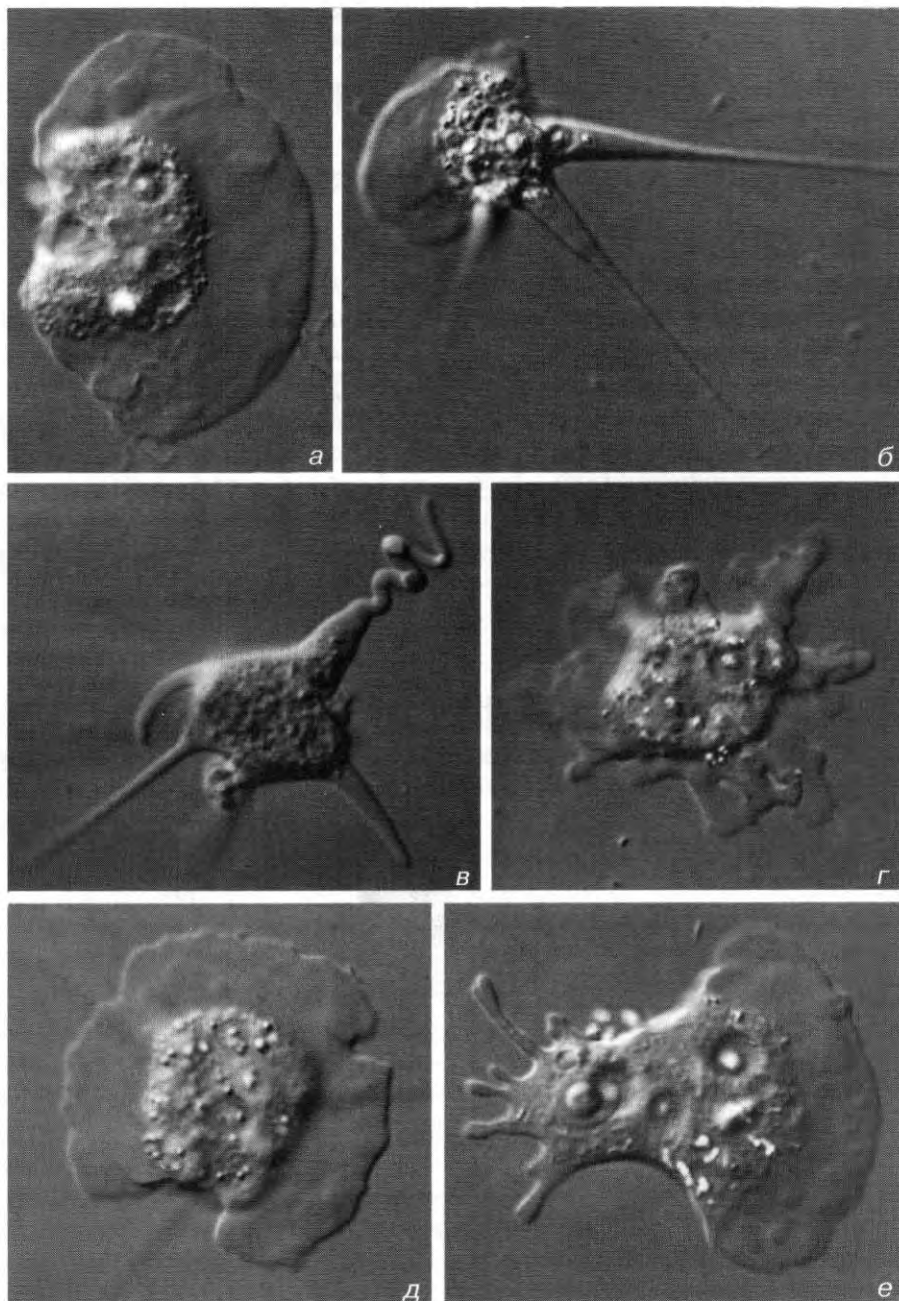
( . 26).



25. *Chilomonas* ( ), *Joenia* ( ) *Eufolliculina* ( ).  
 65, 6 — 48, — 65

( . 27):

28).



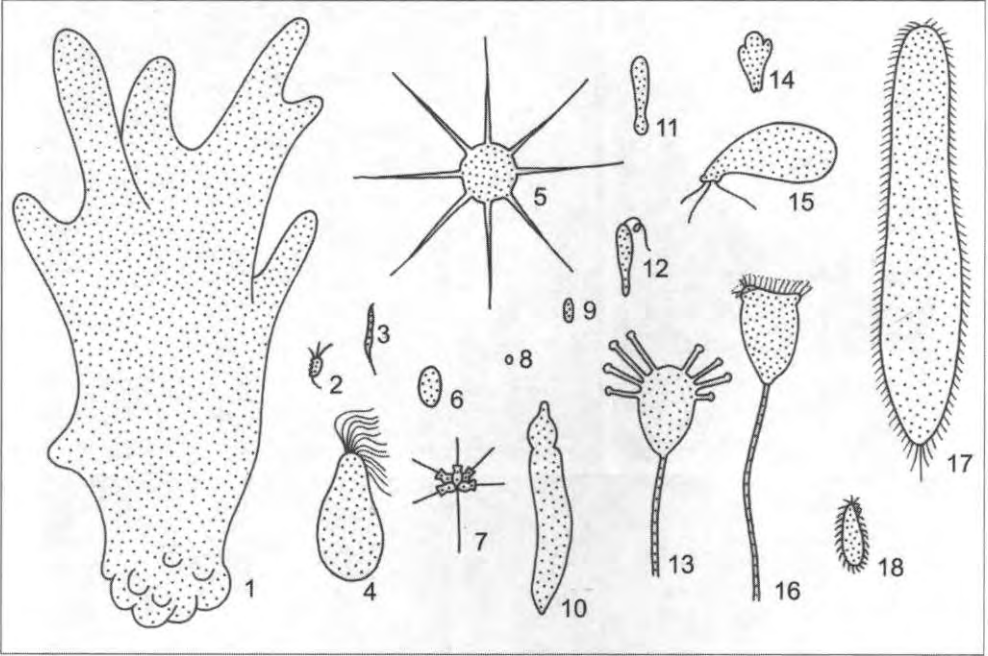
. 26.

«

*Vannella simplex.*  
 ( ). . : 930 .

( )

, ) ,



. 27.

(  
 ). 1 — *Amoeba*, 2 — *Trichomonas*, 3 — *Trypanosoma*, 4 — *Joenia*, 5 — *Actinophrys*, 6 — *Eimeria*, 7 — *Codonosiga*, 8 — *Microspora*, 9 — *Myxozoa*, 10 — *Gregarina*, 11 — *Saccamoeba*, 12 — *Euglena*, 13 — *Discophrya*, 14 — *Entamoeba*, 15 — *Trinema*, 16 — *Vorticella*, 17 — *Paramecium*, 18 — *Tetrahymena*.



. 28.

*Physarum polycephalum*,

5,54<sup>2</sup>,

1 ( )  
 , )

# II.

2500 1500

4550

4000

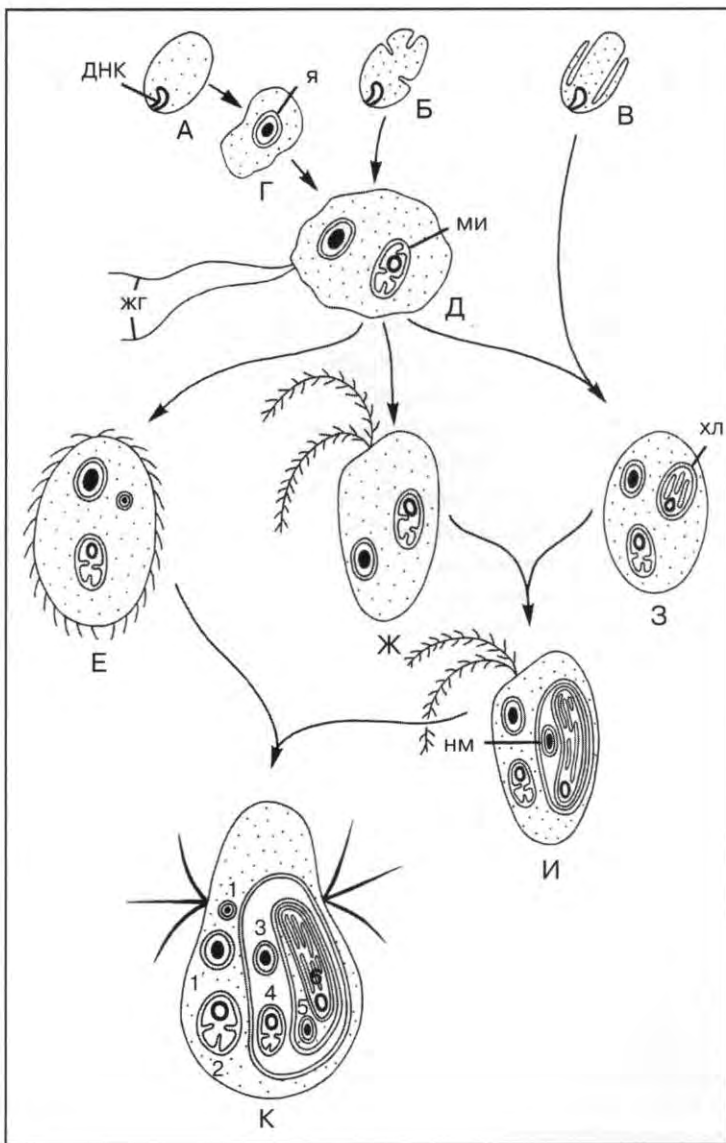
13 / 12

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			21%,	
Eukaryota.			400	
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2				
Metazoa				
( 550				
)			(	

29.



*Myrionecta (= Mesodinium) rubra,*

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2 —  
 , 5 —  
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30. ( ) -

(HP) - ( ) - ( ) - (2),

(3). + -

( ) (Eus) (D), (Chr),

4 (+ 1) ( ) + + -

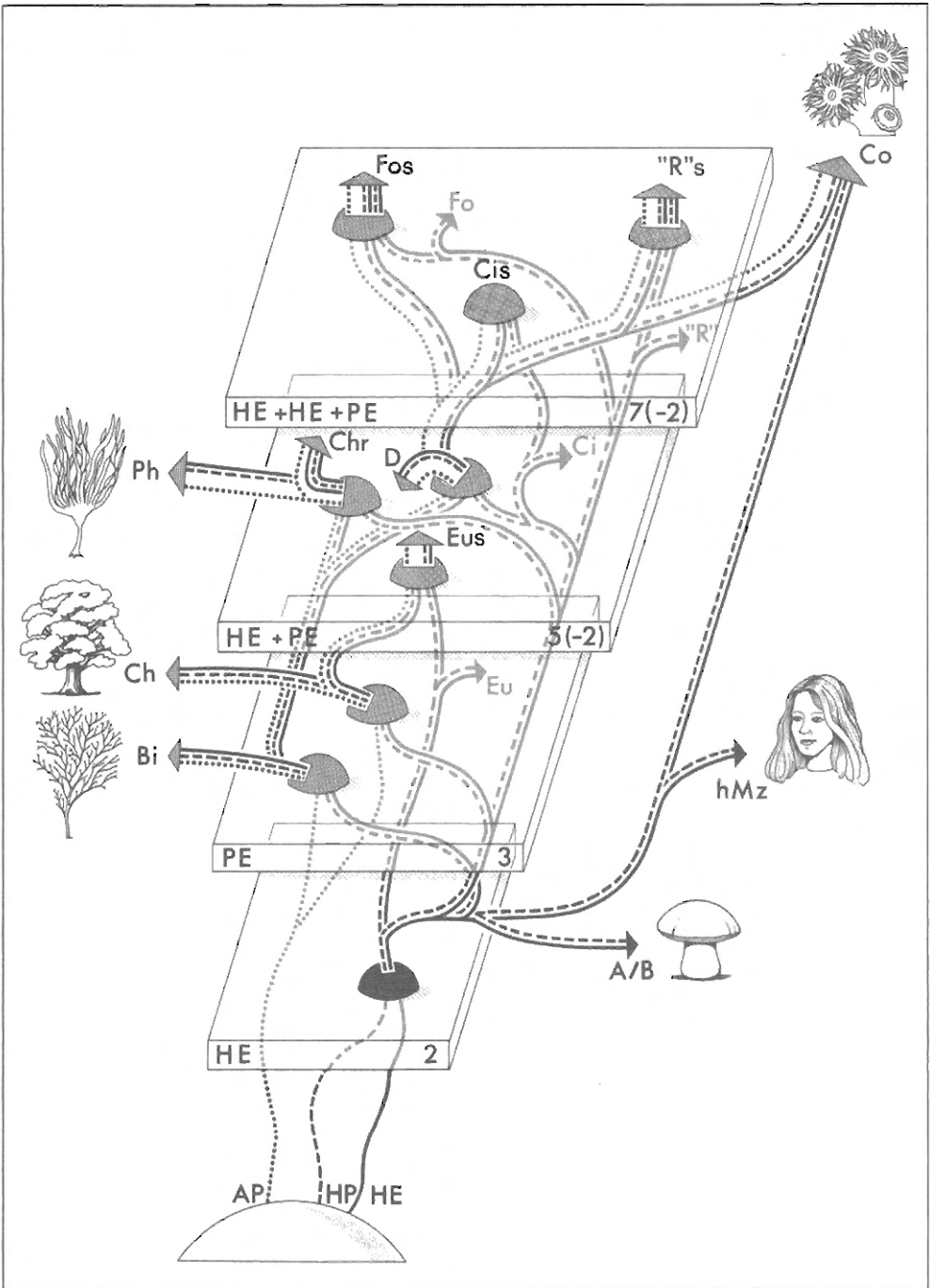
Fos) («.» «R»s), (Ci Cis), (Fo

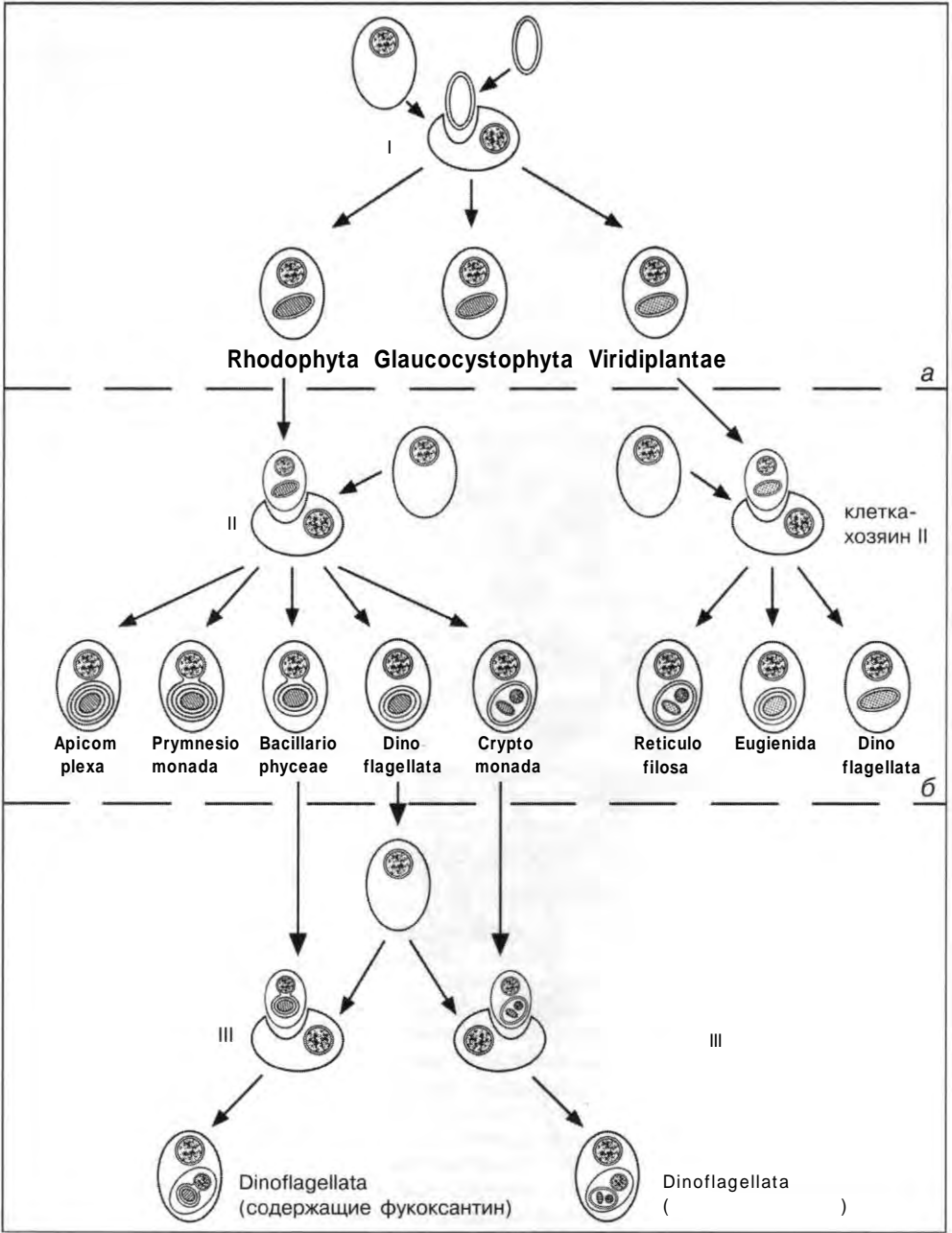
( - ). 5.

Biliphyta (Bi), Chlorobionta (Ch), Phaeophyta (Ph),

( / - Ascomycota/Basidiomycota) Metazoa (hMz) (

).





Chlorophyta,  
Rhodophyta Glaucocystophyta ( . 30).

31.

(= Chlorobionta), Rhodophyta Glaucocystophyta.

Viridiplantae

( . ) .

Parabasalia

1

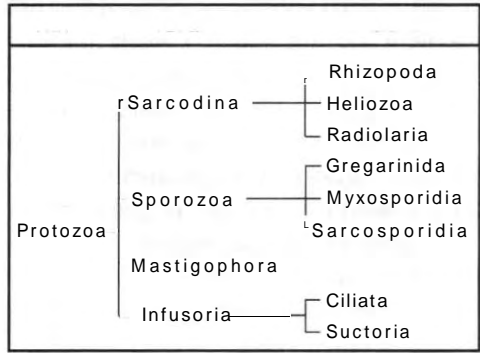
( . . . 33).

70S

- Sporozoa Leuckart, 1879; Acantharea  
 - Haeckel, 1881; Myxosporidia Biitschli,  
 1881.

Protozoa ( . 2).

2. 1889



XXI

Animalcula, Infu-

soria.

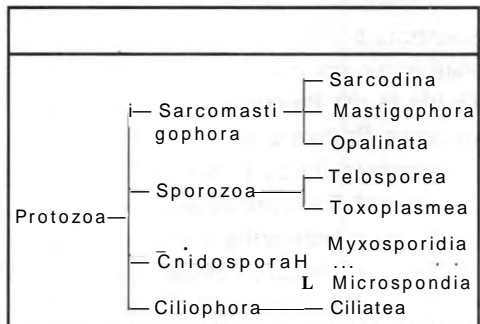
1964

3.

( 1842

3.

1964



: Polycystinea Ehrenberg,  
 1838; Rhizopoda von Siebold, 1845;  
 Ciliata Perty, 1852; Flagellata Cohn, 1853;  
 Radiolaria J. Mtiller, 1858; Suctoria Clapa  
 rède et Lachmann, 1858/59; Mycetozoa de  
 , 1859; Heliozoa Haeckel, 1866;  
 Mastigophora Diesing, 1866; Sarcodina  
 Schmarda, 1871; Filosea Leidy, 1879;



- « » (Hand-  
 - book of Protoctista),  
 Sporozoa Cnido 1990 , , -  
 spora ( ) - , -  
 Sporozoa ( Protoctista, -  
 ), Mastigo- , 35 -  
 phora Sarcodina - ( . 6). -  
 Sarcomastigophora. , -  
 - Protozoa,  
 -  
 - (Rhodophyta, Phaeophyta,  
 Chlorophyta) (Hypho  
 chytridiomycota, Plasmodiophoromycota,  
 Chytridiomycota Oomycota). ( -  
 ) 1980 ) -  
 ( , -  
 15 ) , -  
 / -  
 Protozoa ( . 4). -  
 4. -  
 1980 -

: Protozoa	
1.	Sarcomastigophora Honigberg & Balamuth, 1963
2.	Labyrinthomorpha Page, 1980
3.	Apicomplexa Levine, 1970
4.	Microspora Sprague, 1977
5.	Ascetospora Sprague, 1978
6.	Myxozoa Grasse, 1970
7.	Ciliophora Doflein, 1901

(1996), , -  
 1985 « -  
 » (The Illustrated  
 Guide to the Protozoa) , -  
 Protozoa 6 28  
 ( . 5). ( . 7). (1998)  
 (1980) , -  
 « -  
 » (The Illustrated Guide to the  
 Protozoa, 2000),

5.

» 1985

**Protozoa (Goldfufl, 1818) von Siebold, 1846**

- Sarcomastigophora Honigberg & Balamuth, 1963  
 Mastigophora Diesing, 1866  
     Phytomastigophorea Calkins, 1909  
     Zoomastigophorea Calkins, 1909  
 Opalinata Corliss & Balamuth, 1963  
     Opalinatea Wenyon, 1926  
 Sarcodina Schmarda, 1871  
     Rhizopodea von Siebold, 1845  
     Lobosea Carpenter, 1861  
     Acarpomyxea Page, 1976  
 (    Acrasea Schröter, 1886)  
     Mycetozoea de Bary, 1859  
 (    Plasmodiophorea Cook, 1928)  
     Filosea Leidy, 1879  
     Granuloreticulosea de Saedeler, 1934  
 (    Xenophyophorea Schulze, 1904)  
     Actinopodea Calkins, 1902  
     Acantharea Haeckel, 1881  
     Polycystina (Ehrenberg, 1838) Riedel, 1967  
     Phaeodarea Haeckel, 1879  
     Heliozoa Haeckel, 1866  
 Labyrinthomorpha Page, 1980  
 (    Labyrinthulea Levine & Corliss, 1963)  
 Apicomplexa Levine, 1970  
     Perkinsida Levine, 1978  
     Sporozoasida Leuckart, 1879  
 Microspora Sprague, 1969  
     Metchnikovellidea Weiser, 1977  
 [    Rudimicrosporea Sprague, 1977]  
     Microsporididea Corliss & Levine, 1963  
 [    Microsporea Delphy, 1963]  
 Myxozoa Grasse, 1970  
     Myxosporea Butschli, 1881  
     Actinosporea Noble, 1980  
 Ciliophora Doflein, 1901  
     Postciliodesmatophora Gerassimova & Seravin, 1976  
     Karyorelictea Corliss, 1974  
     Spirotrichea Butschli, 1889  
 Rhabdophora Small, 1976  
     Prostomatea Schewiakoff, 1896  
     Litostomatea Small & Lynn, 1981  
 Cyrtophora Small, 1976  
     Phyllopharyngea de Puytorac et al., 1974  
     Nassophorea Small & Lynn, 1981  
     Oligohymenophorea de Puytorac et al., 1974  
     Colpodea de Puytorac et al., 1974

<b>Protoctista (Hogg, 1861) Margulis &amp; Schwartz, 1988</b>	
<b>I</b>	
1. Rhizopoda	Lobosea Filosea
2. Haplosporidia	Haplosporea
3. Paramyxea	Paramyxidea Marteiliidea
4. Myxozoa	Myxosporea Actinosporea
5. Microspora	Rudimicrosporea Microsporea
<b>II</b>	
6. Acrasea	Acrasida
7. Dictyostelida	Dictyostelida
8. Rhodophyta	Rhodophyceae
9. Conjugatophyta	Conjugatophyceae
<b>III</b>	
10. Xenophyophora	Psamminida Stanomida
11. Cryptophyta	Cryptophyceae
12. Glaucocystophyta	Glaucocystophyceae
13. Karyoblastea	Karyoblastea
14. Zoomastigina	Amoebomastigota

Bicoecida	
Choanomastigota	
Diplomonadida	
Pseudociliata	
Kinetoplastida	
Opalinata	
Proteromonadida	
Parabasalia	
Retortamonadida	
Pyrsonymphida	
15. Euglenida	Euglenophyceae
16. Chlorarachnida	Chlorarachniophyceae
17. Prymnesiophyta	Prymnesiophyceae
18. Raphidophyta	Raphidophyceae
19. Eustigmatophyta	Eustigmatophyceae
20. Actinopoda	Polycystina Phaeodaria Heliozoa Acantharia
21. Hyphochytriomycota	Hyphochytrida
22. Labyrinthulomycota	Labyrinthulida Thraustochytrida
23. Plasmodiophoromycota	Plasmodiophorida
<b>IV</b>	
24. Dinoflagellata	Dinophyceae Syndiniophyceae
25. Chrysophyta	Chrysophyceae Pedinellophyceae Dictyochophyceae (= Silicoflagellata)
26. Chytridiomycota	Chytridiomycetes
27.	Protostelida Myxomycotina

6.

28. Ciliophora	Karyorelictea
	Spirotrichea
	Prostomatea
	Litostomatea
	Phyllopharyngea
	Nassophorea
	Oligohymenophorea
	Colpodea
29. Granuloreticulosa	Athalamea
	Foraminifera
30. Apicomplexa	Gregarinia
	Coccidia
	Haematozoa
31. Bacillariophyta	Coccinodiscophyceae

	Fragilariophyceae
	Bacillariophyceae
32. Chlorophyta	Prasinophyceae
	Chlorophyceae
	Ulvoephyceae
	Charophyceae
	4
33. Oomycota	Saprolegniomycetidae
	Peronosporomycetidae
34. Xanthophyta	Xanthophyceae
35. Phaeophyta	Phaeophyceae
36. incertae sedis:	Ellobiopsida
	Ebriida

7.

1996

Eukaryota	Microspore				
	Mastigota	Archamoebaea			
		Dimastigota	Tetramastigota	Retortamonada	
				Axostylata	
			Metakaryota	Euglenozoa	
				Heterolobosa	
				Dictyostela	
				Protostela	
				Myxogastrea	
				Chromista	
				Alveolata	
				Choanoflagellata	
				Chlorophyta	
				incertae sedis	Amoebozoa
Granuloreticulosa					
Actinopoda					
Ascetospora					
		Myxozoa			

## Protozoa

- Archezoa Cavalier Smith, 1983
  - Metamonada (Grasse, 1952) Cavalier Smith, 1981
    - Eopharyngia Cavalier Smith, 1993
    - Axostylaria (Grasse, 1952) Cavalier Smith, 1997
  - Trichochozoa Cavalier Smith, 1997
    - Anaeromonada Cavalier Smith, 1997
    - Parabasala (Honigberg, 1973) Cavalier Smith, 1997
- Neozoa Cavalier Smith, (1993), 1997
  - Sarcomastigota Cavalier Smith, 1983
  - Neomonada Cavalier Smith, 1997
    - Apusozoa Cavalier Smith, 1997
    - Isomita Cavalier Smith, 1997
    - Choanozoa Cavalier Smith, (1981), 1983
  - Cercozoa Cavalier Smith, (1995, 1997), 1998
    - Phytomyxa Cavalier Smith, 1997
    - Reticulofilosa Cavalier Smith, 1997
    - Monadofilosa Cavalier Smith, 1997
  - Foraminifera (d'Orbigny, 1826) (Eichwald, 1830), Margulis 1974
  - Amoebozoa Lühe, 1913
    - Lobosa (Carpenter, 1861) Cavalier Smith, 1997
    - Conosa Cavalier Smith, 1998
      - Archamoeba Cavalier Smith, 1983
    - Mycetozoa de Bary, 1859
      - Eumyxa Cavalier Smith, 1993
      - Dictyostelia Lister 1909
  - Discicristata Cavalier Smith, 1998
- Percolozoa Cavalier Smith, 1991
  - Tetramitia Cavalier Smith, 1993
  - Pseudociliata Cavalier Smith, 1993
- Euglenozoa Cavalier Smith, 1981
  - Plicostoma Cavalier Smith, 1998
  - Saccostoma Cavalier Smith, 1998
- Alveolata Cavalier Smith, 1991
- Miozoa Cavalier Smith, 1987
- Dinozoa Cavalier Smith, 1981
  - Protalveolata Cavalier Smith, 1991
  - Dinoflagellata (Butschli, 1885) Cavalier Smith, 1991
- Sporozoa (Leuckart, 1879) Cavalier Smith, 1981
  - Gregarinae (Haeckel, 1866) Cavalier Smith, 1998
  - Coccidiomorpha (Doflein, 1901) Cavalier Smith, 1993
  - Manubrispora Cavalier Smith, 1998
  - Heterokaryota (Hickson, 1903) Cavalier Smith, 1993
- Ciliophora (Doflein 1901, Copeland 1956) Cavalier Smith, 1998
  - Tubulicorticata de Puytorac et al., 1992
  - Epiplasmata de Puytorac et al., 1992
  - Filocorticata de Puytorac et al., 1992
- Actinopoda (Calkins 1902) Cavalier Smith, 1997
- Heliozoa (Haeckel, 1886) Margulis, 1974
- Radiozoa Cavalier Smith, 1987
  - Spasmata Cavalier Smith, 1993
  - Radiolaria (Miiller, 1858) Cavalier Smith, 1993

9.

» 2000

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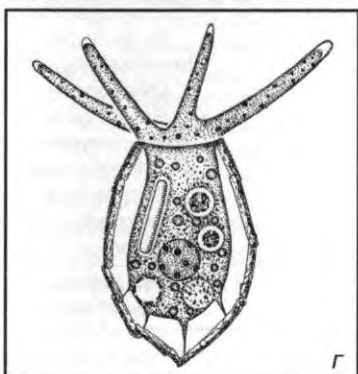
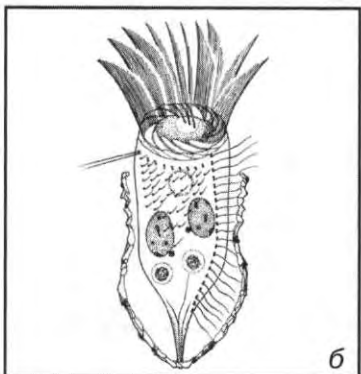
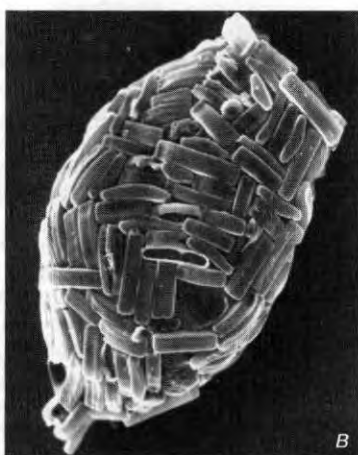
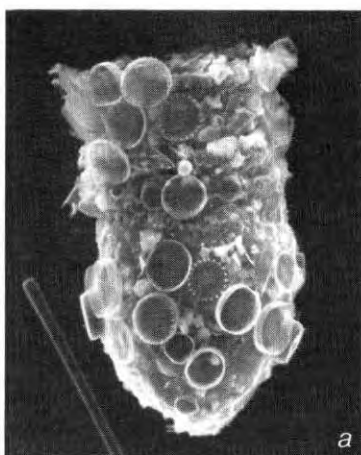
	Choanoflagellata Microsporida Myxozoa Volvocida	
	Apicomplexa Colpodellidae Ciliophora Dinozoa	
	Chryomonada Pelagophyceae Raphidomonadida	« »
	Slopalinida Synurophyceae Silicoflagellata	
	Acantharia	« »
	Arcellinida Heliozoa Granuloreticulosea Mycetozoa Phaeodaria Polycystina	
	Schizocladidae	« »
	Trichosidae Xenophyophorea	« »
	Pelobiontida Heterolobosea	
	Cryptomonadida Diplomonadida Euglenozoa Hemimastigophora Oxymonada Parabasalia Pedinophyceae Prasinophyceae Prymnesiida	« »
	Retortamonadida	
	Haplospora Plasmodiophora	

8 9.

( . 33).

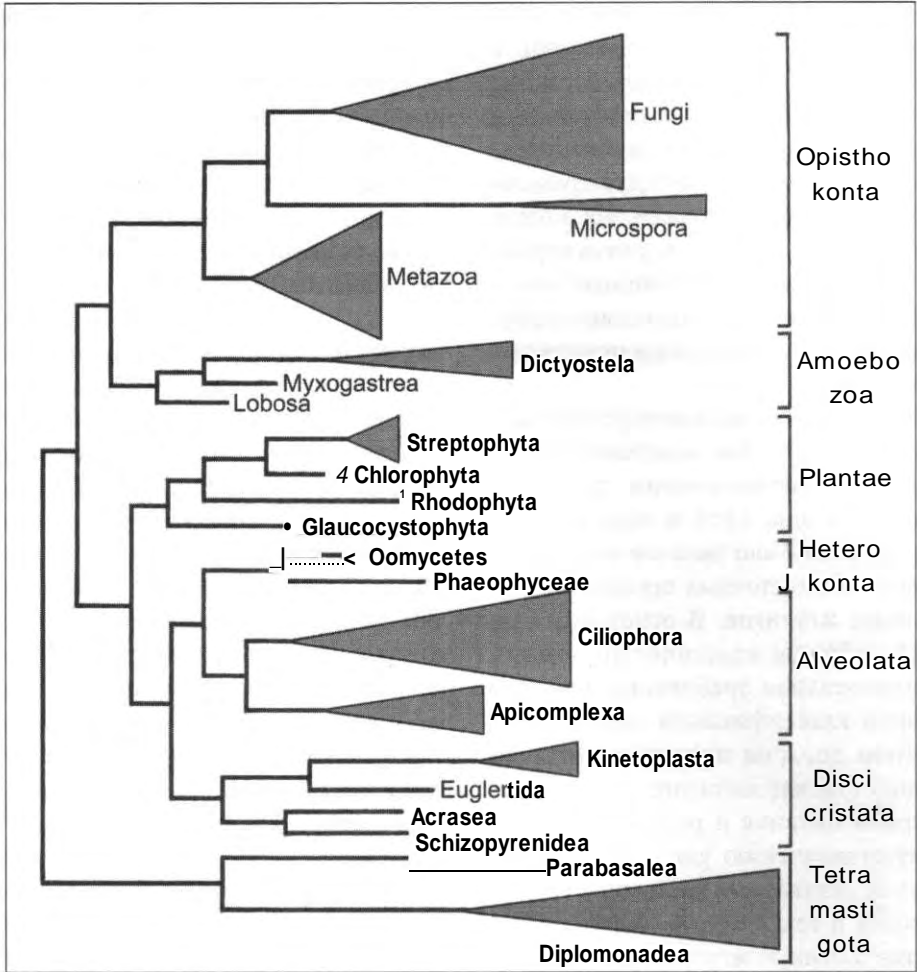
Protista

( . 32)



. 32.

— *Codo nella cratera* ( ); — *Diffflugia* ( ) ( : Foissner and Hausmann: *Microcosmos* 76 [1987] 258). : a 1 400x, — 700x, — 400x, — 200x.



33.

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( . ) .

(distance matrix),

(maximum parsimony)

(maximum

likelihood)

Protoctista

Protozoa,



1910

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« » « »

)

1 (

(9x2+ 2)

Flagellata Coën, 1853 Mastigophora  
Diesing, 1866

Mastigota.

Masti-

- gophora Flagellata,

( )

Phytoma

stigophorea

. Zoomastigo

phorea —

Sarcodina Rhizopoda

1 « »

( ) .

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» « »

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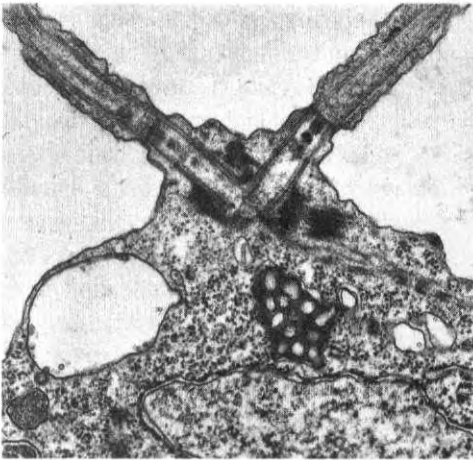
—

—

—

**EUKARYOTA** Chatton,  
1925 (Eucarya) —

Eukaryota



34.

( . 34).

*Diphyllia*  
*rotans* (= *Aulacomonas submarine*),

( : Brugerolle and Patterson: Europ.  
J. Protistol. 25 [1990] 191). : 20 000x.

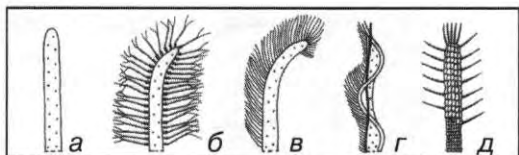
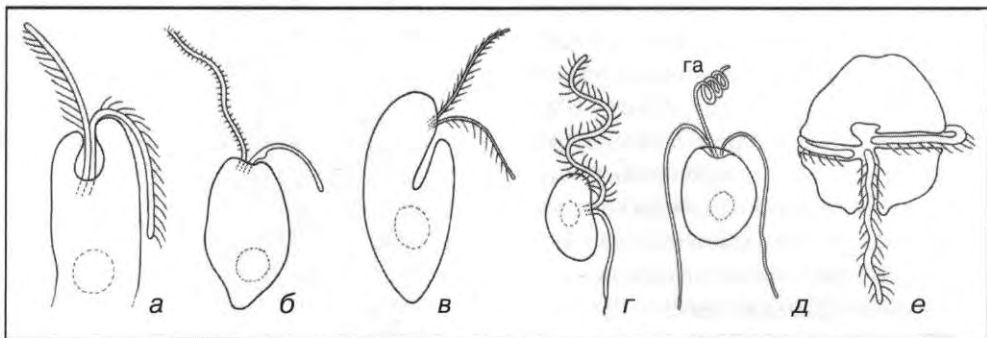


Рис. 35. Особенности организации свободной части жгутика у хлорофитов (а), хризомонад (б), эвгленовых (в), динофлагеллат (г) и прازیномонад (д).



. 36.

— Euglenida, —  
 ; — Chrysoomonadea, —  
 ; — Cryptomonada, —  
 ( ; — Labyrinthulea, — );  
 ; — Prymnesiomonada (= Haptomonada), —  
 ( ; — Dinoflagellata )).

( . 35),

( , )).

: ( ( . 34),

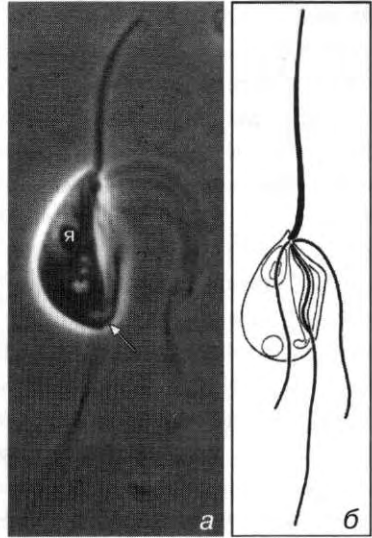
( . 36).

1: *Chlorarachnion*,

Cercozoa, (Conosa).

« »,

(1990). —



37. Tetramastigota. — *Trimastix marina*,

Eubacteria,

( . . . 328).

**TETRAMASTIGOTA** Hülsmann & Hausmann, 1994

mastigota,

Tetra

mastigota

( . . . 37).

Tetra

Excavata —

1 —

( ) ;

(

)

( . excavate — ).

Heterolobosa Excavata ( . 38).

(Retortamo

{Jakoba, Histiona, nas); Chilomastix —

Reclinomonas),

Trimastix, Carpediemonas

Malawimonas.

Excavata

Excavata,

Euglenozoa

Tetra

mastigota

Heterolobosa.

( )

**RETORTAMONADEA** Grassé,  
1952 —

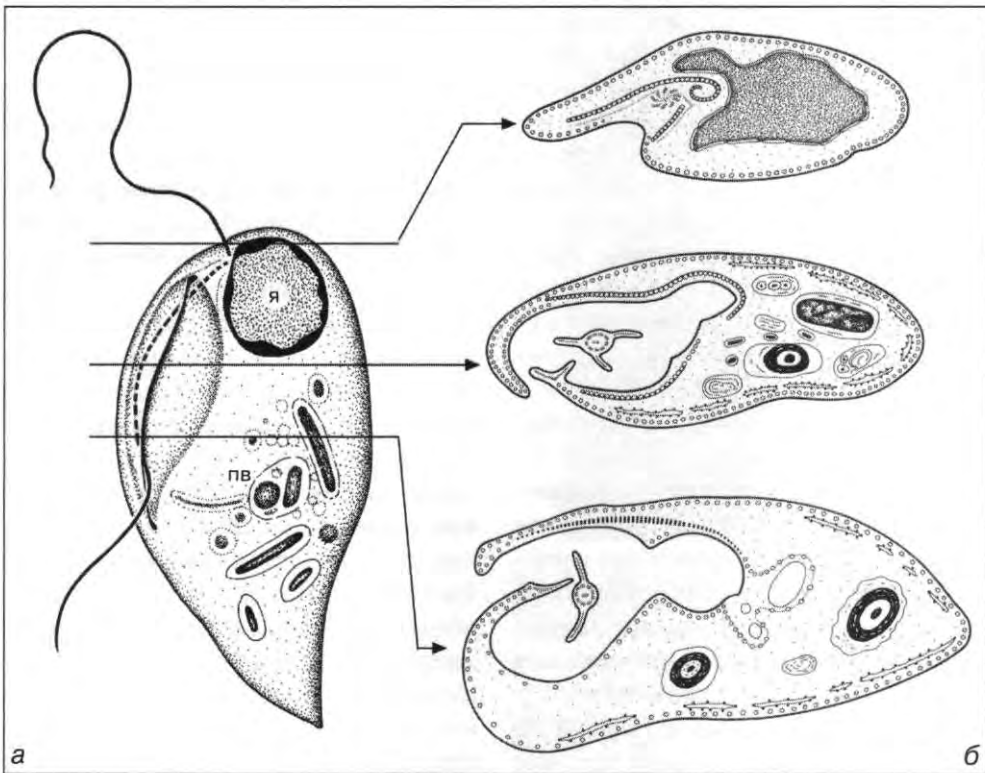
( 5 20 )

{Chilomastix mesnili

, Chilomastix gallinarum

).

: Chilomastix, Retortamonas.



38. Tetramastigota, Retortamonadea: *Retortamonas*, ( )

( ) . : - 7 , - 15

**DIPLOMONADEA** Wenyon,  
1926 —

: Enteromona  
dida Diplomonadida.

**Enteromonadida** Brugerolle,  
1975 —

Enteromonadida

15

, *Enteromonas hominis*)

: *Caviomonas*, *Enteromonas*, *Trimitus*.

**Diplomonadida** Wenyon,

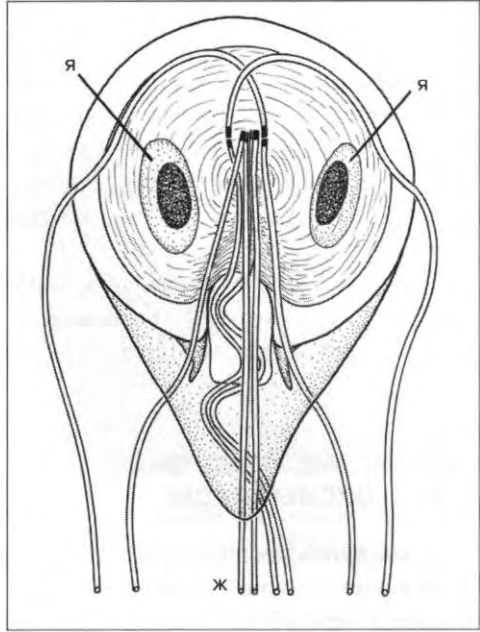
1926 —

Diplomonadea,

39).

*Giardia* (= *Lamb*

39)



. 39. Diplomonadea: *Giardia* (= *Lambia*)

( ) ( ) . : 6 ( )

100

),  
*Giardia*



50

: *Hexamita*, *Trepomonas*,  
*Trigonomonas*; : *Giardia*,  
*Octomitus*, *Spironucleus*.

« ... ». Polymastigi  
 dae

4

**OXYMONADEA** Grasse,

1952

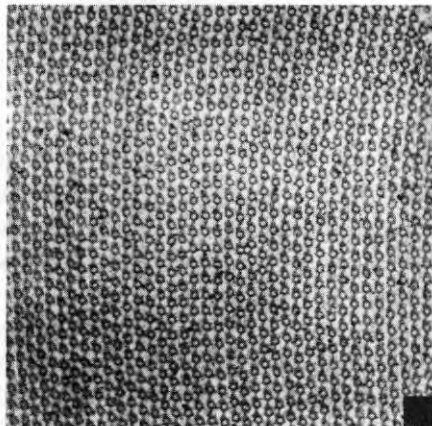
Oxymona-

didae

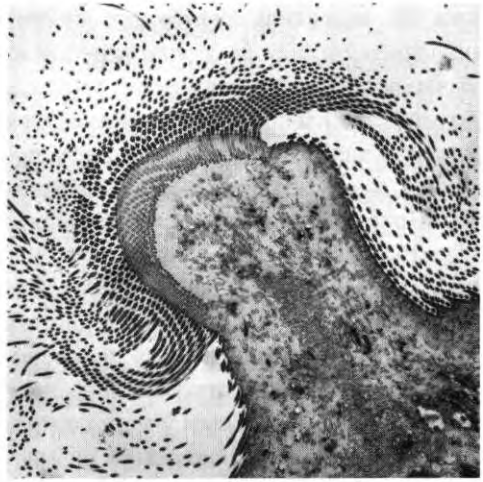
Oxymonadidae

Pyrrsonymphidae

40).



. 40. Oxymonadea: — *Monocercomonoides hausmanni* ( ), —  
 ( ), ( ), ( ) ( ). —  
 ( — : Radek: Arch. Protis  
 tenk. 144 [1994] 373; —  
 2 , 6 — 32



. 41. Parabasalea: *bonita*. : 1 800 .

Parabasalea

( . . . ),

( . 41, 44).

( . . . ),

*monas ivm*).

: *Monocercomonoides*,  
*monas*, *Pyrrsonympha*, *Saccinobaculus*.

**PARABASALEA** Honigberg,  
1973 —

(20 30)

Parabasalea —

Parabasalea —

Parabasalea

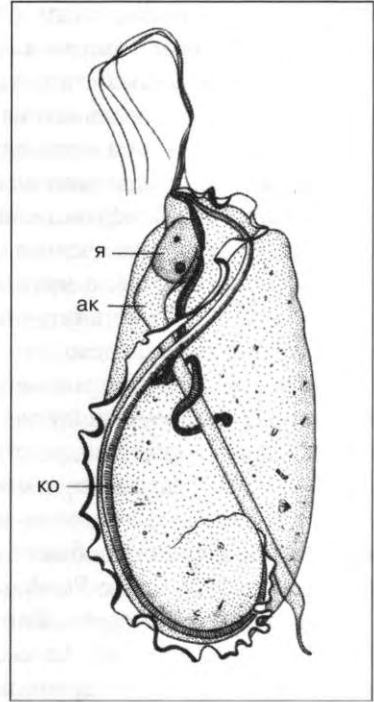
**Trichomonadida** Kirby,

1947 —

5 25

4 6

Trichomonadidae



42. Trichomonadida: *Trichomitopsis*  
(= *Trichomonas*) *termopsidis*.

3 500

*nas,*

; *Dientamoeba,*

(*Histomo*

).

( . 24 , 42).

monadida

*Trichomonas*

*nalis*

*hominis*,

: *Trichomonas vagi-*

*Mycoplasma*

. *hominis*

; . *foetus*

*Mixotricha paradoxa*,

Calonymphidae

( ) ,

( ) .

Cochlosomatidae

Trichomonadida.

*Cochlosoma*

. Tricho-

: *Dientamoeba* (

), *Monocercomonas* (3+1

*Pentatrichomonas* (5+1

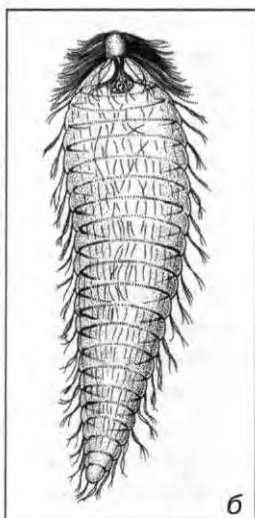
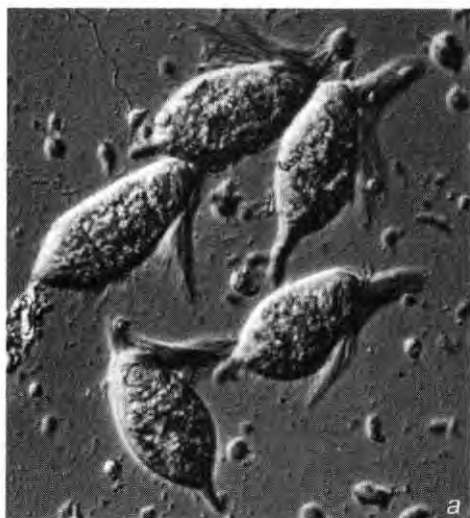
*chomonas* (3+1

*Calonympha* (

**Hypermastigida** Grassi &

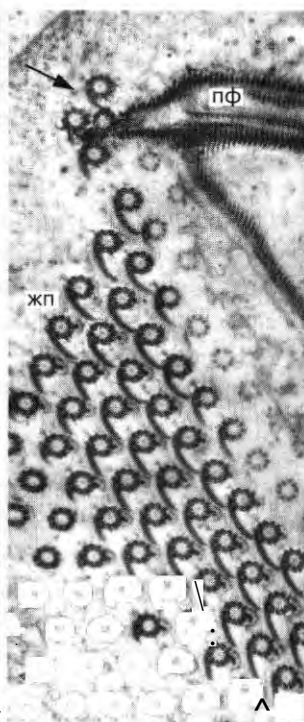
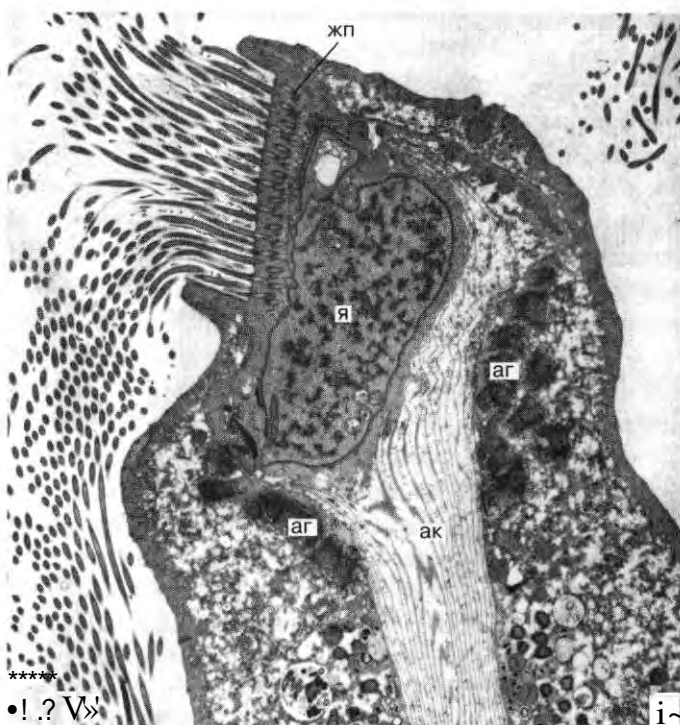
Foa, 1911 —

( . 43, 44).



43. *Hypermastigida*: — (*Joenia annectens*)

*Kalotermes flavicollis*,  
— *Teratonympha mirabilis* ( ).  
: — 200 , — 280 .



44. *Hypermastigida*: — *Joenia annectens* ( ), ( ), ( ) *J. annectens* ( ). — ( ) . — ( — : Radek and Hausmann: BIUZ 21 [1991] 160). : a — 3 , 6—13 .

(  
*Cryptocercus*),

Devescovichidae,

Hypermastigida

: Eucomonymphidae, Trichonymphidae Spirotrichonymphidae + Holomastigotidae.

, a Spirotrichonymphidae Holomastigotidae

: *Barbulanympha*, *Joenia*, *Lophomonas*.

**DISCICRISTATA** Cavalier

Smith, 1998

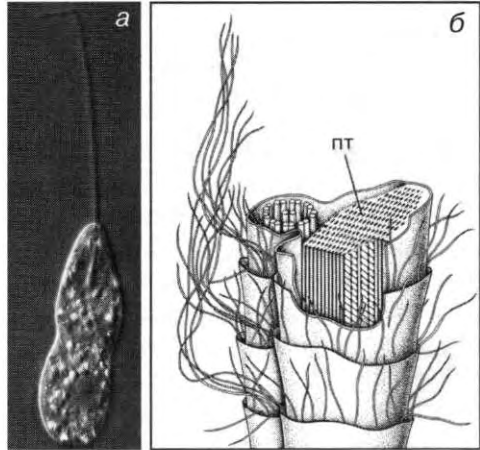
: Euglenozoa Heterolobosa.

**EUGLENOZOA** Cavalier

Smith, 1981

Euglenozoa

. 246, 45);



. 45. Discicristata, Euglenida: —

*Anisonema*.

( — ). : — 500 , — 40

nozoa, , Egle  
 ( ) .

3 ( . 46).

1,2

0,2

Euglenida,

Kinetoplasta.

— Eugleni-

da Kinetoplasta — Euglenozoa

:

*Postgaardi.*

( )

Hemimastigophora, *Stephanopogon*

*Bordnamonas*

Euglenozoa.

**EUGLENIDA** Butschli,

1884 —

1000

( . . . 45),

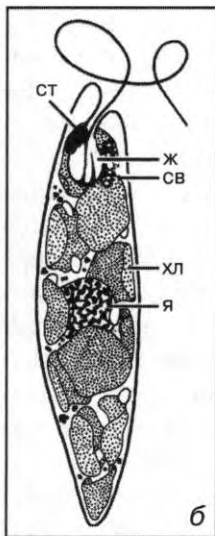
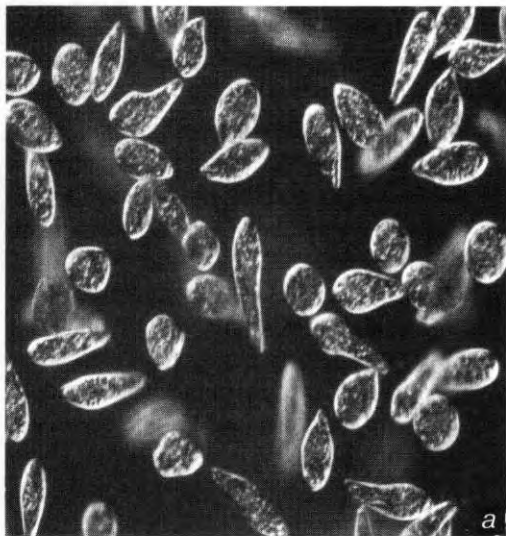
( . . . 262).

1 ге симбиоза гетеротрофной эвг-

2 Euglenida

Euglenozoa. —  
 Euglenida

3 « » « » . — « » .



46. Euglenida:

*Euglena gracilis*, —  
*Euglena gracilis*, —  
 — 1 200 .

« »

( , *Phacus*)

(*Trachelomonas*)

(*Colacium*).

( )

( , ),

( )

(2 20 ).



Chlorophyta. : *Anisonema*, *Astasia*, *Entosiphon*,

**KINETOPLASTA** Honigberg,

1963

( 800 )

( . 47),

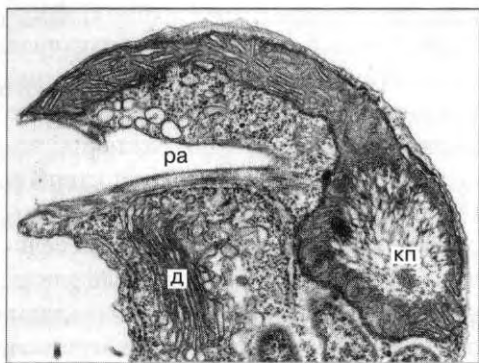
Euglenida

( . 48).

« »

*Astasia*.  
Euglenida

(Neusiedl,  
).



. 47. Kinetoplasta, Bodonea:  
*Bodo* ( )

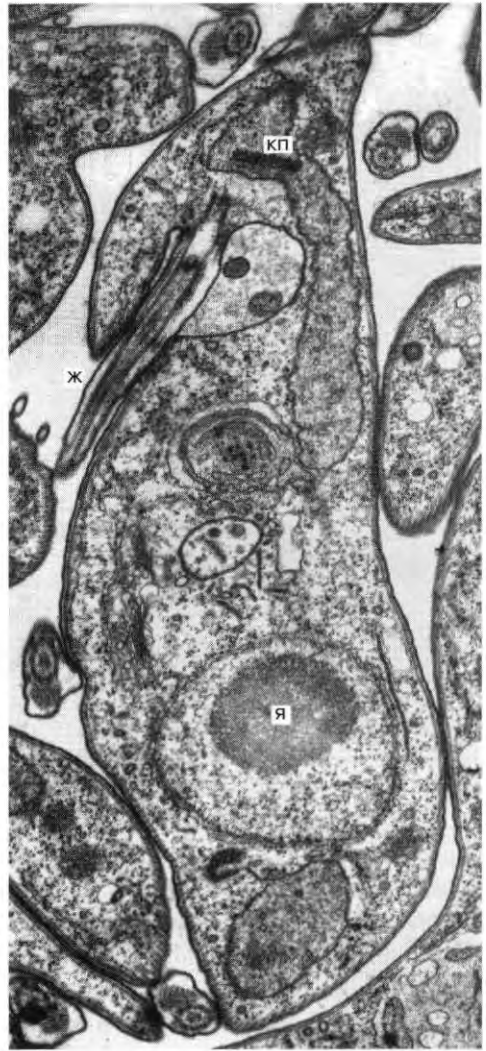
: *Euglena*,

*Eutreptia*, *Phacus*;

: 7 200 .

50).  
 ( . 49,  
 :  
 20 38 . . . ) 25 50,  
 (5000 27000, 0,46  
 2,5 . . .).

( . guide RNA),



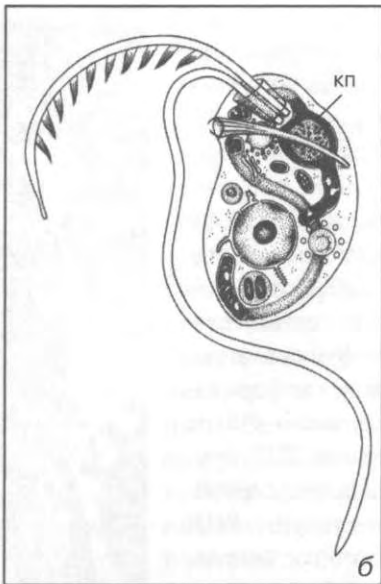
. 48. Kinetoplasta, Trypanosomatidea:  
*Trypanosoma brucei*

( . . . ) . . . : 20 . . .

( . . . ) . . .

( . . . ) . . .

;



49. *Bodonea*:  
*Bodo* ( )  
 ( ), —  
 ( — )  
 : — 1 , —  
 2 200 .

*Bodonea*

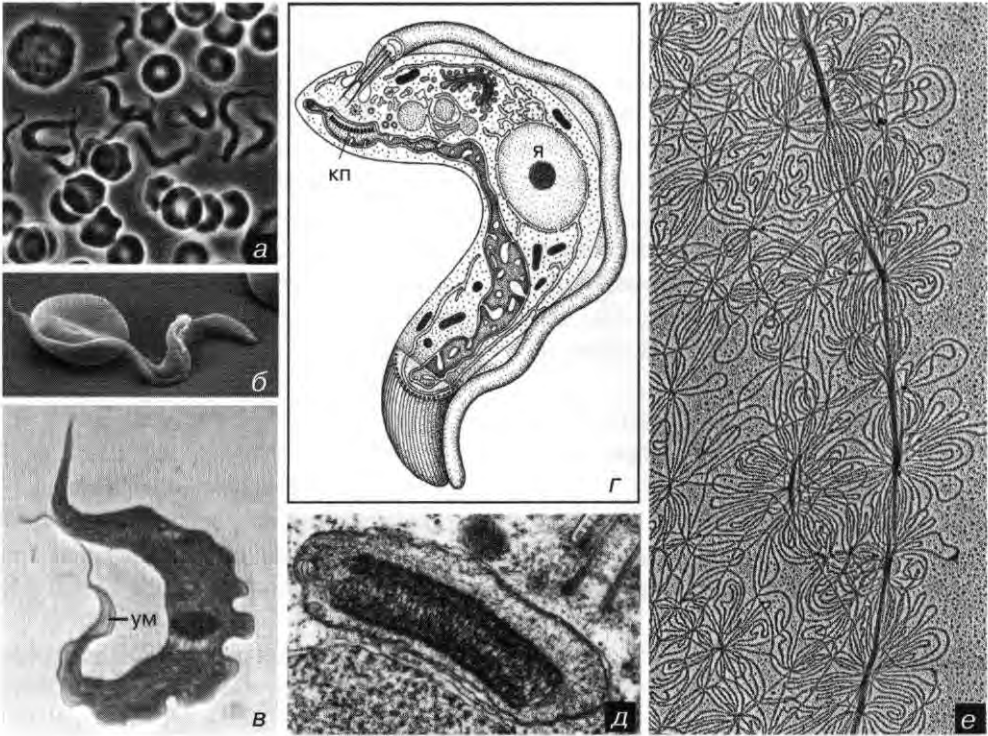
( . 49).

18S

1

2

2



50. Trypanosomatidea: *Trypanosoma brucei* ( — )  
*fallisi*; — *congolense*; —  
*Blastocrithidia triatomae*; — *Crithidia fasciculata*. —  
 ; — ( — )  
 ; — : Martin and Desser: J. Protozool. 37 [1990] 199); —  
 ; — : Perez Morga  
 and Englund: J. Cell Biol. 123 [1993] 1069). : a 800x, б 2 — 3 200x, —  
 7 200x, — 36 , e — 85 000x.

**BODONEA** Hollande, 1952 —

( . 49).  
 ; — ( — ) —  
 ( . 49).  
 ; — ( — ) —

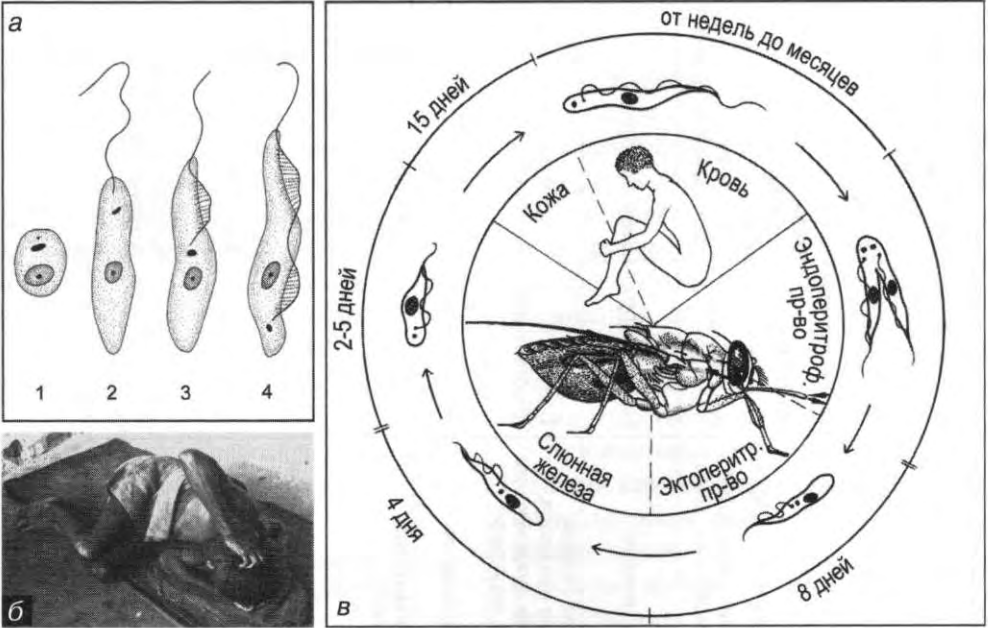


Trypanosoma

Leishmania,

(

			<i>Glossina</i> spp.	
	( )		<i>Glossina</i> spp.	
( )	( )		<i>Glossina</i> spp.	
			<i>Glossina</i> spp.	
			<i>Triatoma</i> <i>Rhodnius</i> spp.	
			<i>Tabanus</i> spp.	
			<i>Tabanus</i> <i>Stomoxys</i> spp.	
			<i>Lutzomyia</i> spp.	
( )			<i>Phlebotomus</i> spp.	
			<i>Phlebotomus</i> spp.	



51. Trypanosomatidea. — : 1 — (= ), 2 — (= ), 3 — (= ), 4 — (= );  
 — ( — );  
*Trypanosoma brucei gambiense.*  
 ( — ) WHO TDR Image Library,  
 ; — ).

*Trypanosoma* *Leish*  
 mania  
 : [*Tabanus* [Tabanidae — ], *Glossina* = [Muscidae — ], *Phlebotomus* [Psychodidae — ], *Triatoma* [*Rhodnius* [Reduviidae — ]], (Desmodontidae).  
*Trypanosoma*  
*brucei* ( . 51),

.52. Trypanosomatidea:

*Trypanosoma cruzi*: 1 —

( ), 2 3 —

(2)

(3), 4 —

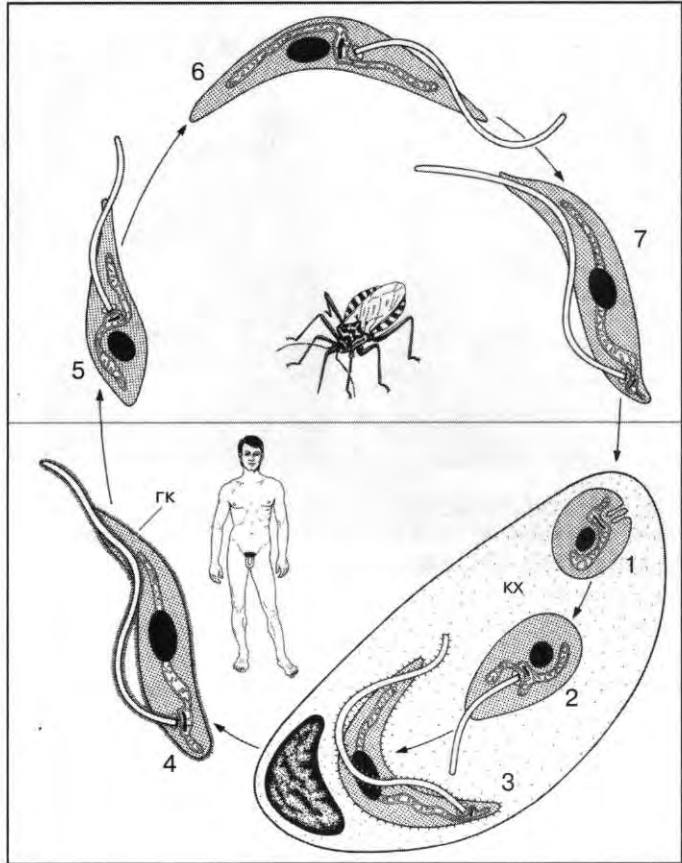
( ), 5 —

Redu

viidae, 6 —

(7), —

( ).







. 53. Trypanosomatidea:

WHO TDR Image Library, ( ) ( )

*Toxoplasma* *Pneumo-*  
*cystis*.

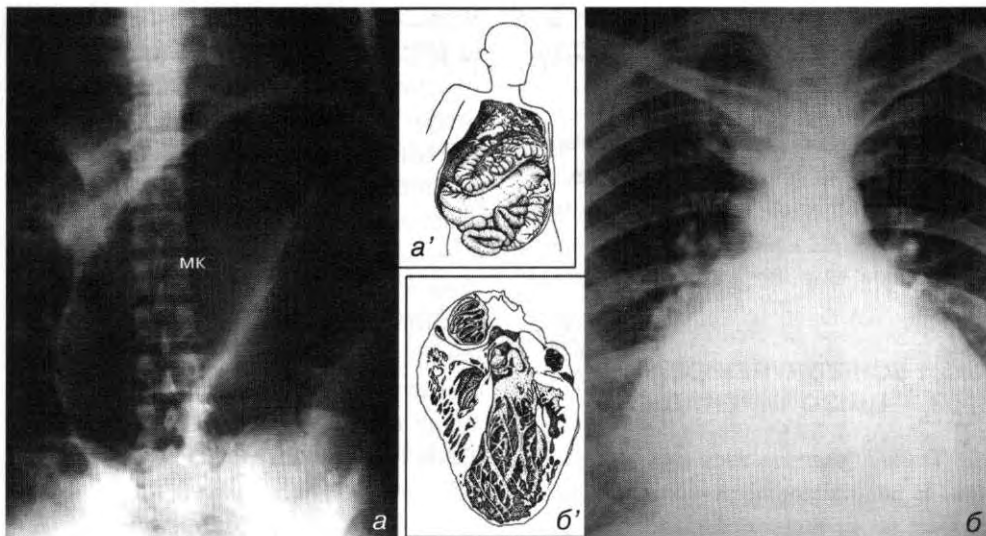
15 )

( . 52).

1000)  
40%

( . 53).

) *Leishmania donovani*



54. Trypanosomatidea:  
*Trypanosoma cruzi*, ' —  
 ( — ) ( —  
 1990, ' — )

( — ); , ' —  
 WHO TDR Image Library, Geneva

**DIPLONEMIDA** Cavalier

Smith, 1993

*Leishmania infantum*

2 : *Diplonema* ( *Isonema*)  
*Rhynchopus*.

( . 54).  
*Phytomonas*,

700  
 500

*Trypanosoma*.  
 : *Leishmania*, *Phytomonas*,  
*Trypanosoma*.

: *Diplonema*, *Rhynchopus*.

**HETEROLOBOSA** Page & Blanton, 1985 —

Sarcodina, -

(*Tetramitus*)

( . 55).

**SCHIZOPYRENIDEA** Singh, 1952 —

100 -

*Vahlkamfia*

*Tetramitus*,

*Naegleria*.

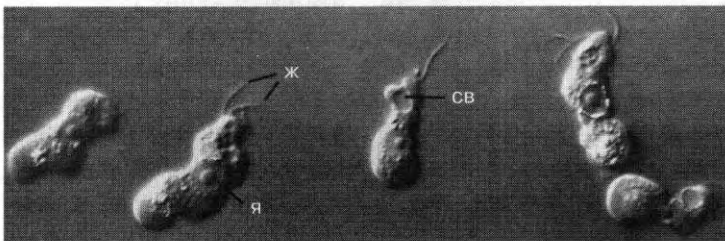
{*Naegleria*

*fowleri* , *Naegleria austriacensis* )

Acrasea.

40 ° (

. 19).

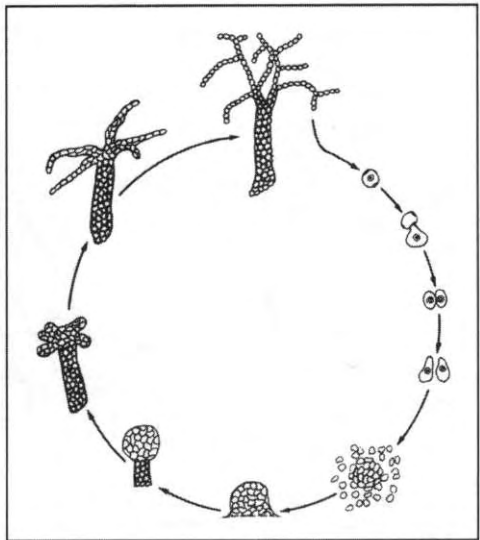


. 55. Heterolobosa, Schizopyrenidea:

*Naegleria*.

: 1

( ) .  
*Naegleria*  
 : *Naegleria* (  
 ), *Tetramitus* (  
 ), *Vahlkamfia* (  
 ), *Willaertia*.



**ACRASEA** Blanton, 1990 —

. 56. Acrasea: *Acrasis rosea* ( : Olive et al.: J. Protozool. 8 [1961] 467).

( . 56). Acrasea  
 :  
 ( ) .  
 : *Acrasis*, *Pocheina*.

\*  
 ( . 576).

**HEMIMASTIGOPHORA**

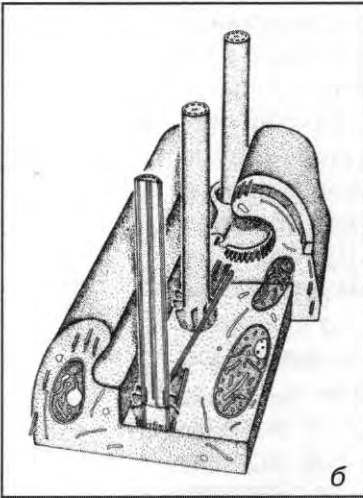
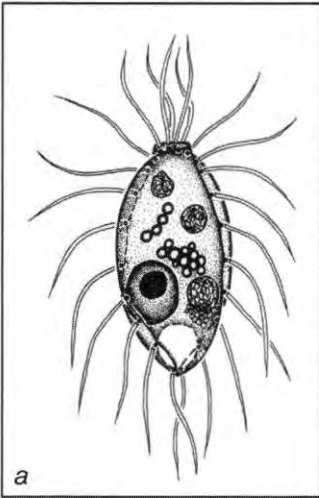
Foissner et al., 1988

20  
 10 60  
 ( . 57 ).

( . 57 ).

Discicristata

: *Hemimastix*, *Paramastix*,  
*Spiroonema*, *Stereonema*.



57. Hemimastigophora: — *Hemimastix amphikineta*. —

— . *amphikineta*.  
— . *amphikineta*



( : Foissner et al.: Europ. J. Protistol. 23 [1988] 361).  
a — 2 200x.

**PSEUDOCILIATA** Corliss & Lipscomb, 1985

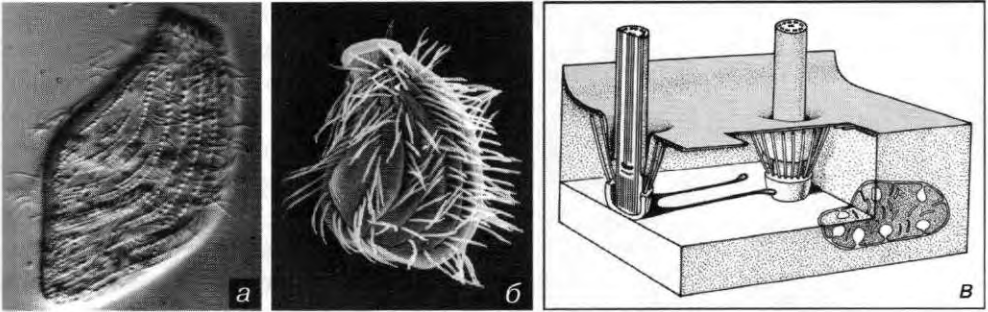
*Stephanopogon*

Ciliophora.  
*apogon*

*Stephanopogon*

*Stephanopogon* ( . 58).

(Primociliata).



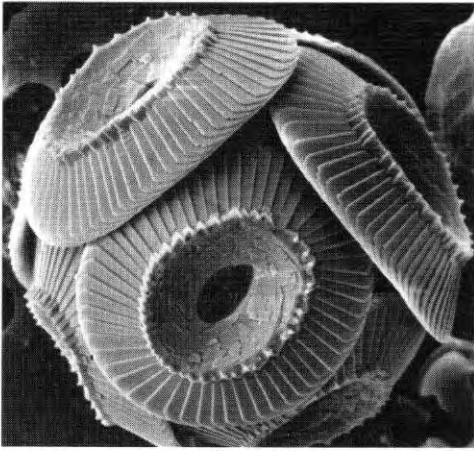
58. Pseudociliata. *Stephanopogon*: ( ), -  
 ( ) ( ) ( -  
 ; - ; - ) .  
 : - 800 , - 8

. ]  
 ;  
 , -  
 ( . 58 ).  
 2 16 ) —  
 — (20  
 50 ) ,  
 100 ( . 31).  
 : *Stephanopogon*.

**CHROMISTA** Cavalier Smith,  
 1987

**PRYMNESIOMONADA**  
 Hibberd, 1976 (Haptomonada,  
 Haptophyta) — 0 0

phyta Haptomonada, Hapto-



59. Chromista, Prymnesiomonada:

*Coccolithus pelagicus* ( ). : 4 300 .

500

( . 59).

( )

( . 60).

6 8

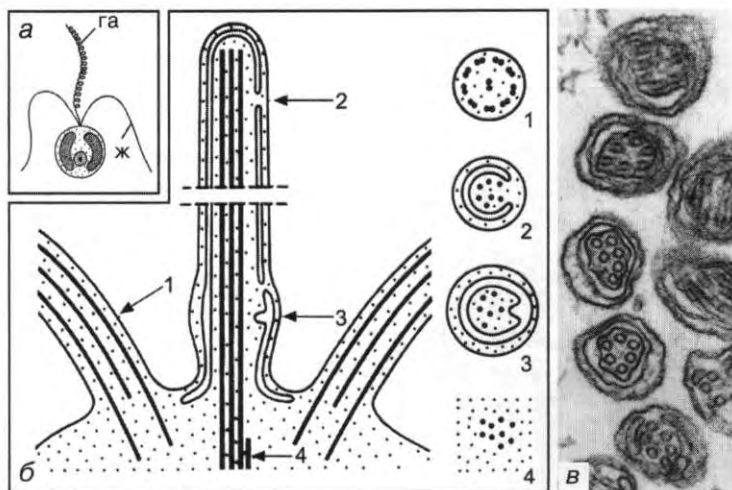
( . . 277).

100

*Phaeocystis*

( . . 353).

*Chrysochromulina*



60. Prymnesiomonada: — ( )  
 ( ); — : 1 —  
 9x2+2; 2 4 —  
 ( —  
 ). : —65

1988 - ra ( , -  
 - ); *Chrysochromulina*,  
 ( *Prymnesium* (  
 - ); *Diacronema*, *Pavlova* ( -  
 .)

**CRYPTOMONADA** Senn,

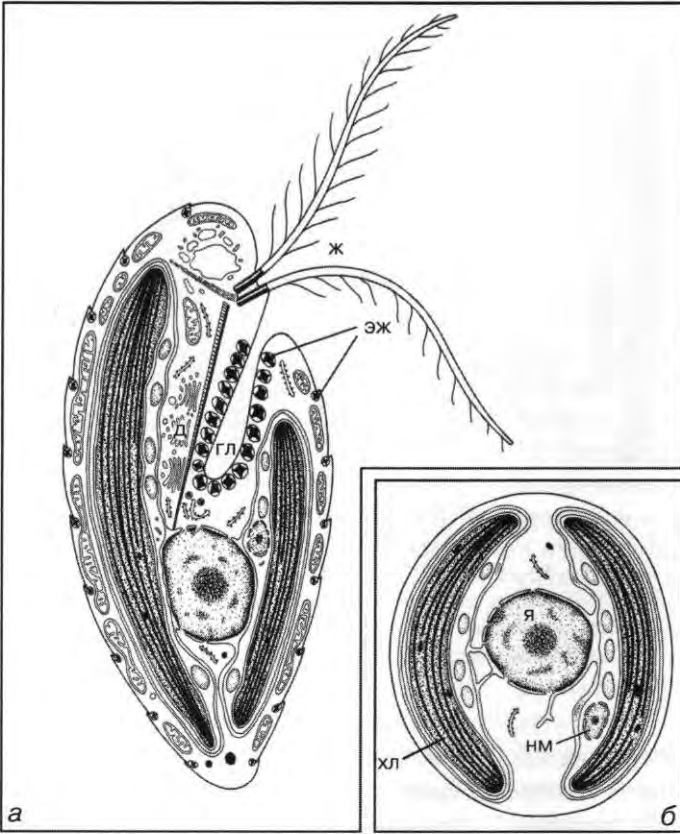
1900 —

1,5

: *Emiliana*, *Pleurochrysis* 61).

( ); *Coccolithus*, *Umbellosphae* ),





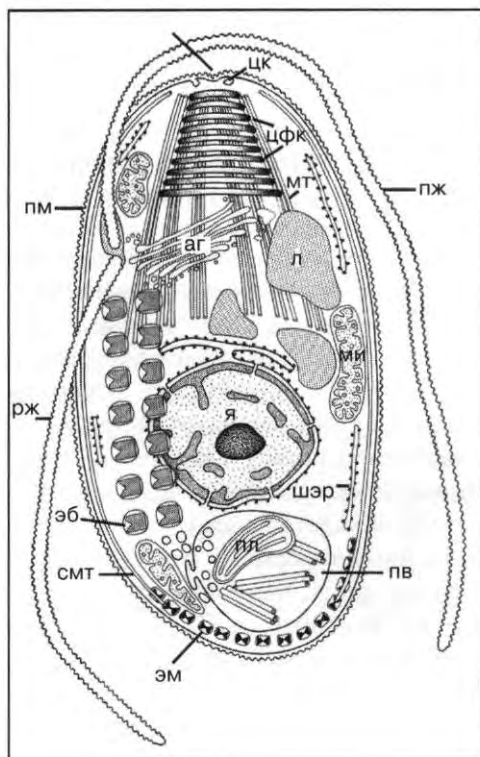
61. Chromista,  
 Cryptomonada: -  
 ( ) ( )  
 Cryptomonas  
 ovata, -  
 \*  
 ( ) ( ) . —  
 — , —  
 — , —  
 ( —  
 ). : 5 500 .

( . . 242).

Chlorophyta Rhodophyta,  
1

( . 61).

. 19)



. 62. Cryptomonada:

*Katablepharis remigera*.

*Guillardia theta*

551 264

$350 \times 10^9$

— 121

— 48

62, —

: *Chilomonas*, *Cryptomonas*,  
*Guillardia*, *Katablepharis*, *Pyrenomonas*,  
*Rhodomonas*.

**HETEROKONTA** Luther,

(Phaeophyta)

1899

», «  
; ,

( — strame  
nopiles),

( >  
. 254 ).

(

)

( . 29 ),

( . 254 ) ( . 249 ).

( );

1;

**PROTEROMONADEA** Grasse,  
1952

10 30

: *Karotomorpha*, *Proteromonas*.

**OPALINEA** Wenyon, 1926 —

400 4

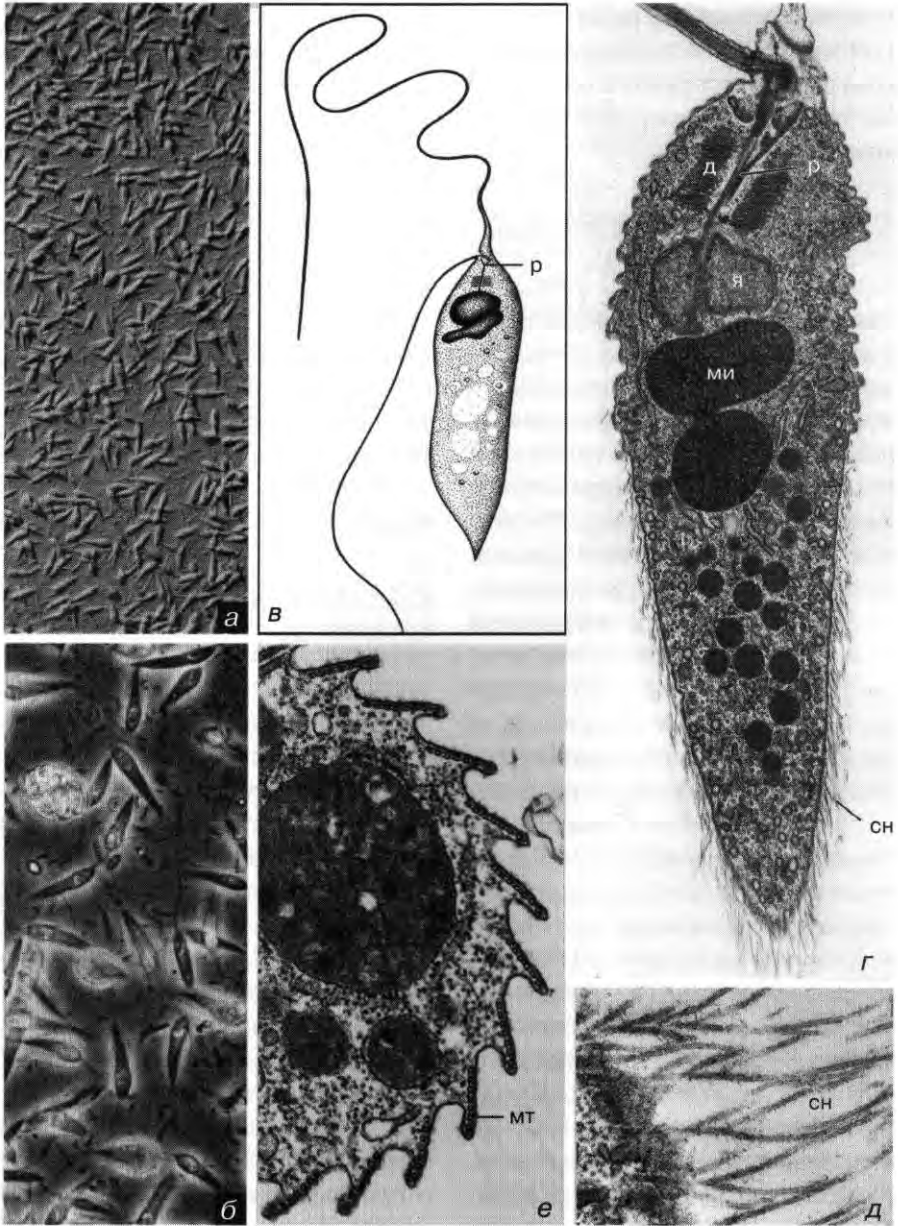
Opalineia

*Proteromonas* ( . 63)

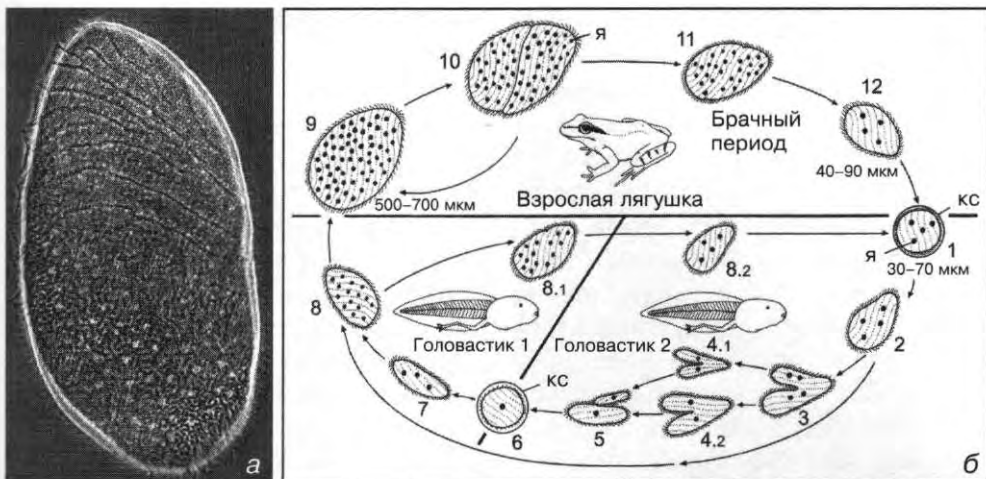
( 3 )

( . 64).

( )



63. Chromista, Heterokonta, Proteromonadea: *Proteromonas lacertae viridis* ( ): - ( , ), ( ) ( , ); - *Karotomorpha bufonis* ( ). - ( ) - ( ) . : - 350 , - 850 , - 3 500 , - 10 , - 50 , - 40 .



64. Heterokonta, Opalineae: — *Opalina ranarum* ; — -  
*ranarum*: (1); -  
(2); (3, 4);  
(5); *Opalina* -  
(6); (7, 8);  
(8.1, 8.2);  
(10), ( ) (9);  
2 12 (11, 12); (1),  
( ).

Ciliophora, -  
Opalineae —

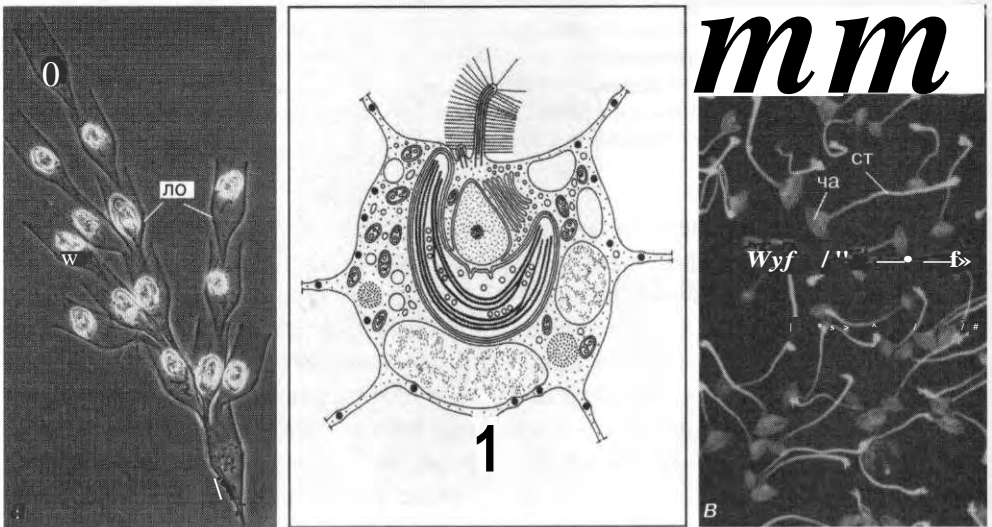
( . 646).

( ) .

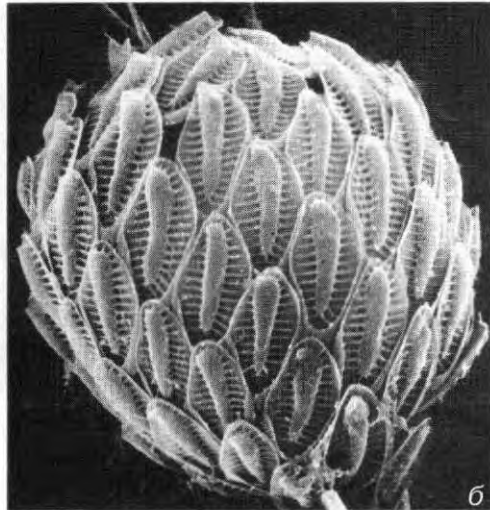
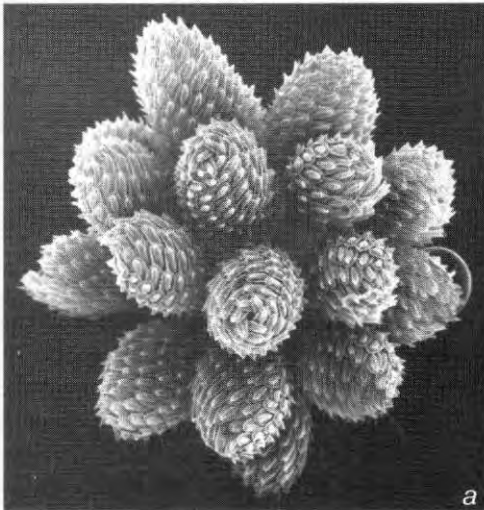
( )

( )

: *Cepedia*, *Opalina*, *Proto*  
*opalina*, *Zelleriella*.



65. Heterokonta, Chrysomonadea: a — *Dinobryon*,  
 ( ) ; — *Chrysamoeba radians*  
 ; — *Poterioochromonas malhamensis*  
 ( ) ( ) — ; —  
 ). : — 450 , 6 — 6 , — 750 .



66. Chrysomonadea: ( — ) . — 500 , — 3 .  
*Synura petersenii.* — ; — ; —

**CHRYSOMONADEA**<sup>1</sup> Engler,

1898 — ,  
 1000 —  
 5 20 ( . 65).  
 ( ) .  
 2  
 (*Synura, Mallomonas, Paraphysomonas*)  
 ( . 66).

<sup>1</sup> phyton — Chrysophyta.  
 phycos — Chrysophyceae  
<sup>2</sup>



*Dinobryon*

*Dinobryon*)

1

(... 67).

Chrysomonadea —

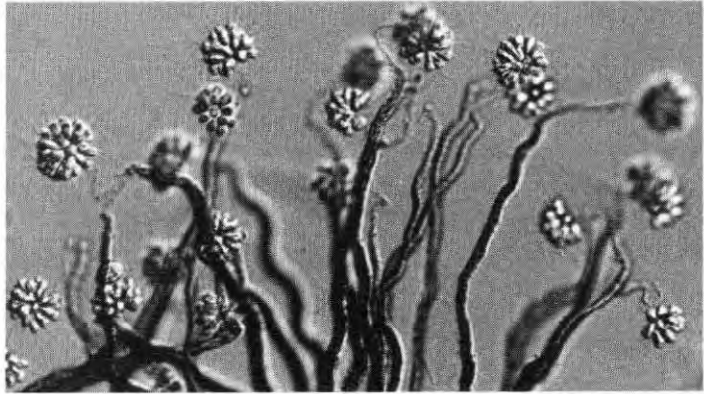
*Chrysamoeba*,  
— *Chry*

*sarachnion*.

« ... » (

monadida, Pedinellida : Chryso  
Silicoflagellida.

.67. Chrysomonadea:  
*Anthophysa* ( :  
 Zollfel and Hausmann:  
 Microcosmos 76 [1987]  
 353). : 230x.



**Chrysomonadida Pascher,**

1912

3

: *Oikomonas*, *Pedinella*,  
*Pteridomonas*.

: *Anthophysa*,  
*Dinobryon*, *Ochromonas*, *Synura*;  
 : *Chrysamoeba*, *Chrysarachnion*,  
*Chrysostephanosphaera*.

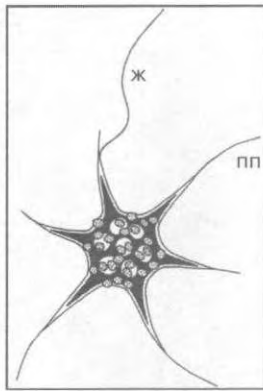
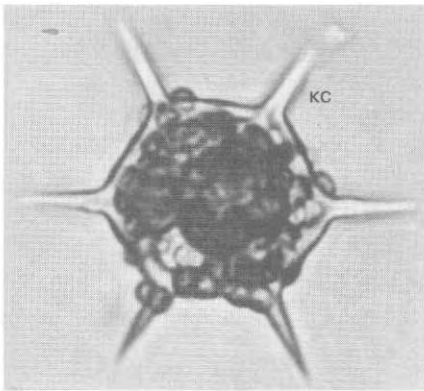
**Silicoflagellida Borgert, 1891**  
 (Dictyochales) —

**Pedinellida Pascher, 1910 —**

1

2

( , *Pteridomonas*)  
 ( )



. 68. Chryomonadea, Silicoflagellida: *Distephanus speculum* -  
 ( ), ( ) -  
 ( ) ( ) ( -  
 . : - 400 .

( . 68). -

( . 70).

: *Dictyocha*, *Distephanus*.

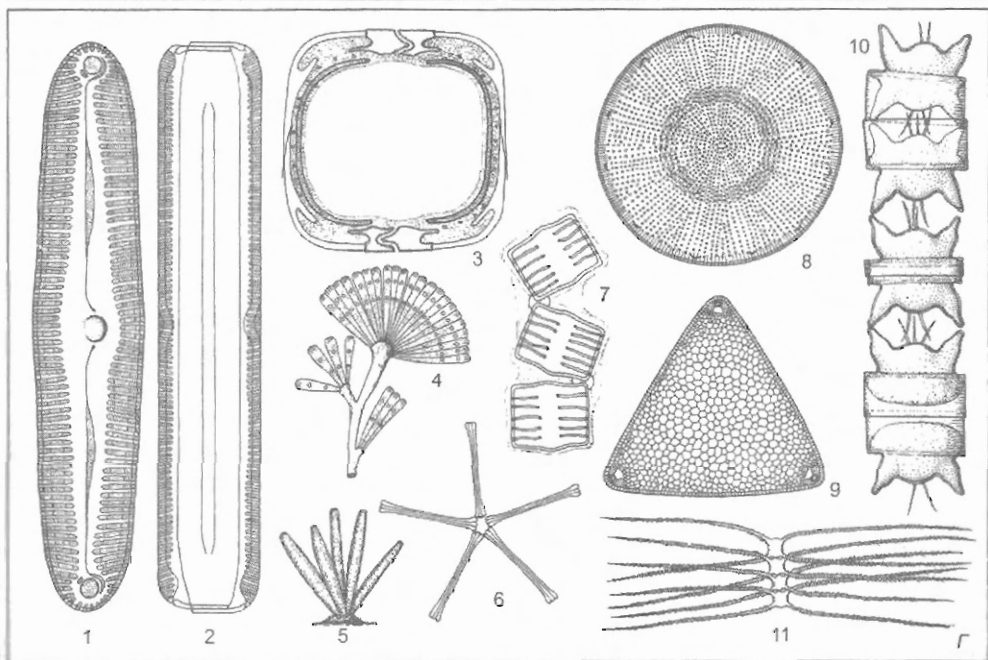
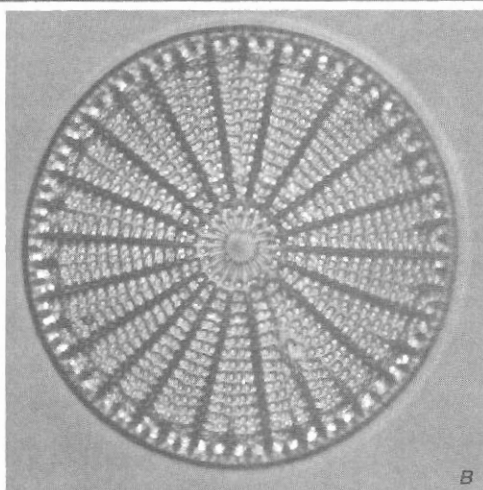
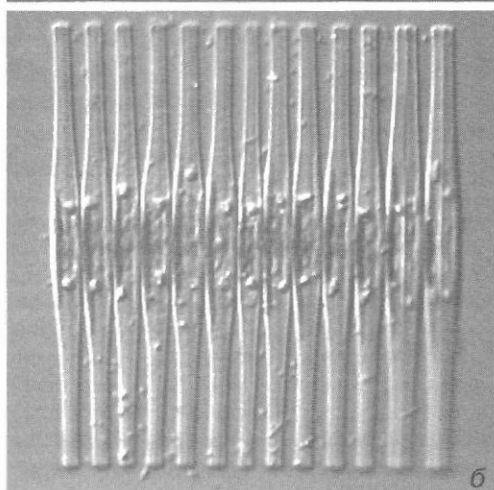
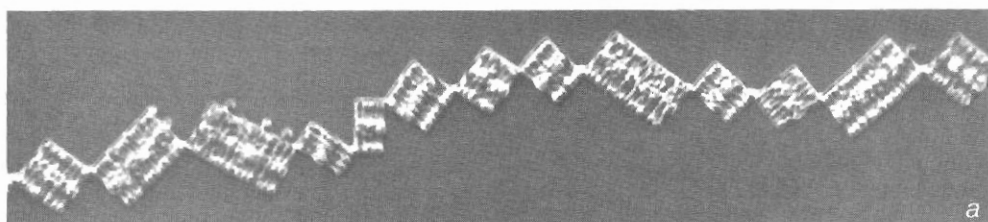
**BACILLARIOPHYCEAE**

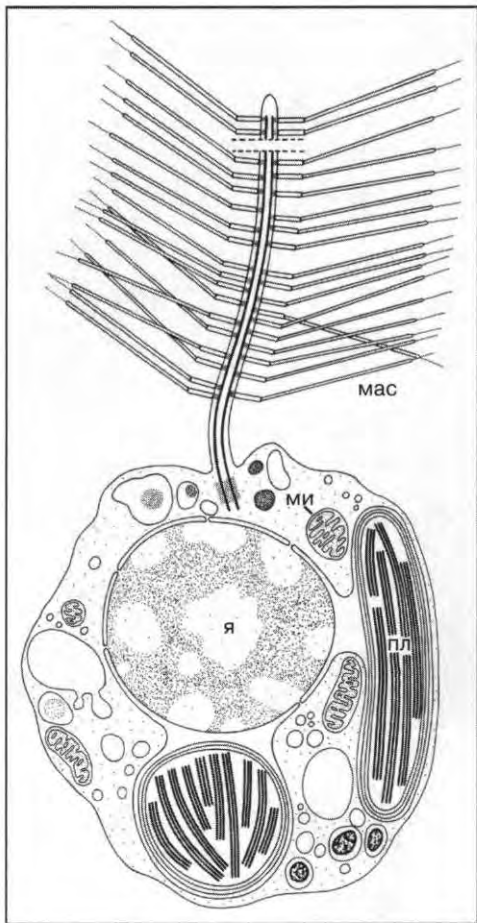
Haechel, 1878 (Diatomeae) —

100

( . 69).

. 69. Heterokonta, Bacillariophyceae: — *Tabellaria*, — *Fragilaria*,  
 — *Arachnoidiscus*, — : 1 7 — ; 8 10 —  
 ; 1 3 — *Pinnularia viridis*, 4 — *Licmophora flabellata*, 5 — *Synedra gracilis*,  
 6 — *Asterionella formosa*, 7 — *Tabellaria flocculosa*, 8 — *Coscinodiscus pantocseki*, 9 —  
*Triceratium distinctum*, 10 — *Odontella* (= *Biddulphia*) *aurita*, 11 — *Chaetoceros castracanei*  
 ( — ). : — 200 , — , — 800 , : 1 2 — 500 , 3— 1 ,  
 4 6 165 , 7 335 , 8 9 165 , 10 335 , 11 21 .

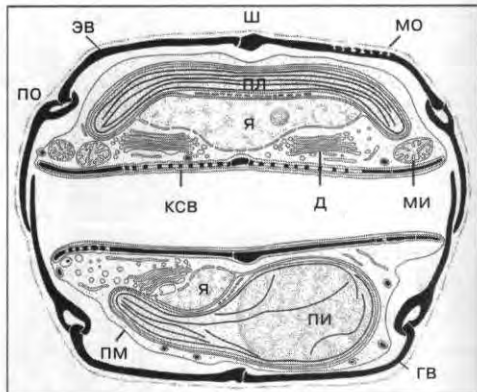




. 70. Bacillariophyceae:

*Lithodesmium undullatum*

— , —  
 , — ( — )  
 ). : 7 000 .  
 ( — )  
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 ( ) ,



. 71. Bacillariophyceae:

*Amphipleura*

*pellucida*,

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 : 10 .

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( . 71).

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*Pseudo nitzschia* (*P. multiseriata*,  
*P. australis*, *P. pseudodelicatissima*, *P. pun-  
gens* *P. seriata*)

SiO<sub>2</sub>),

*Thalassio*

*sira Chaetoceros convolutes,*

( )  
)

( , )

*Symbiodinium*

Centrales  
nales. , Centrales,

: *Bacillaria, Navicula, Nit  
zschia, Pleurosigma, Pseudo nitzschia.*

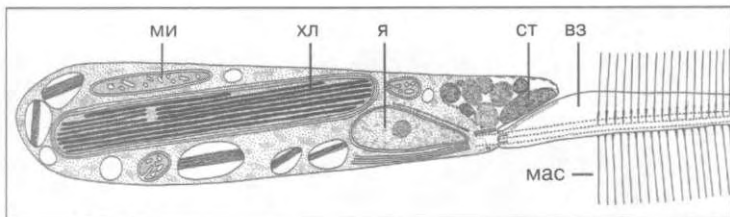
**HETEROMONADEA** Leedale,  
1983 (Xanthophyceae) —

( .70).

: *Biddulphia, Coscinodiscus,  
Odontella, Rhizosolenia.*

(3

(*Tribonema, Vaucheria*)



72. Heterokonta, Eustigmatophyceae:

( ) . : 4 400 .

( . 72),

( )<sup>1</sup>.

: *Chloro*  
*meson*; : *Chlamydomyxa*,  
*Rhizochloris*, *Reticulosphaera*.

: *Eustigmatos*, *Chlorobotrys*,

*Monodopsis*.

**EUSTIGMATOPHYCEAE**

Hibberd & Leedale, 1971 —

**E**

**LABYRINTHULEA** Cienkowski,  
 1867 (Labyrinthulomycota) —

6 15

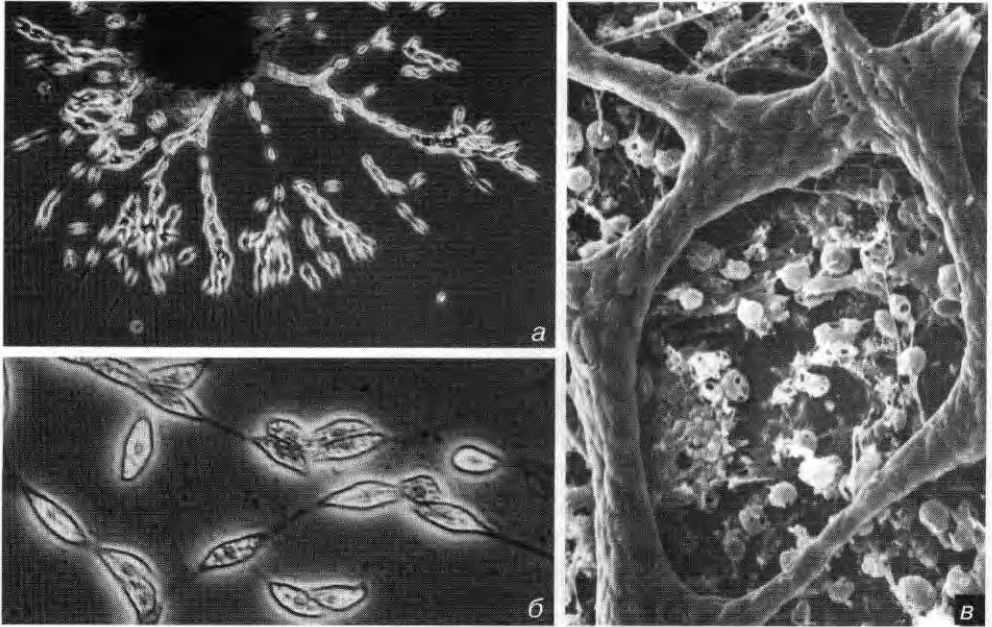
Labyrinthulida

Labyrinthulidae Thraustochytriidae,

(10 15 ) 40

( )  
 ( . 72).





73. Heterokonta, Labyrinthulea: — *Labyrinthula coenocystis*; —  
 Mikrosk. Anat. 102 [1969] 387). : a — 190x, — 800x, s — 330x. ( — : Stey: Zellforsch.

: *Labyrinthula zosterae*  
*L. macrocystis* —

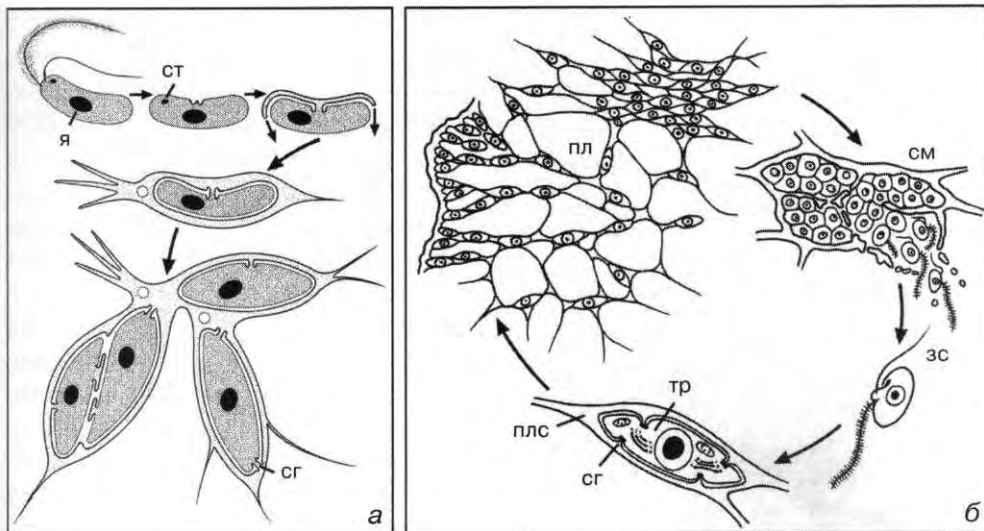
*Laby-*  
*rinthula*

( . 73).

(« »)

« »

( . 74).



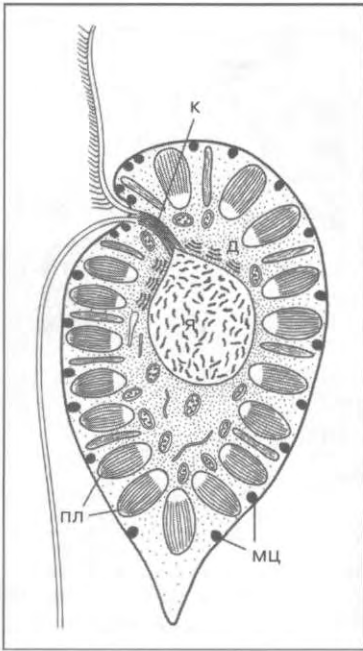
. 74. Labyrinthulea: —

Labyrinthula:

(= « »). —  
 ( ), — ( ),

Heterokonta.

: *Labyrinthula*, *Labyrinthu-  
 loides*, *Thraustochytrium*.



. 75. Heterokonta, Raphidomonadea: -  
 Chattonella sp. ( )  
 ( ), — ( )  
 .: 3 700 .

*Vacuolaria.*  
 ( Cercozoa).

**RAPHIDOMONADEA**  
 (Chloromonadea) Heywood &  
 Leedale, 1983 —

( 20 ) —

( . 75).

*Heterosigma*  
*shiwo*, *Chattonella antiqua*, *Ch. marina*,  
*Fibrocapsa japonica*

90 .

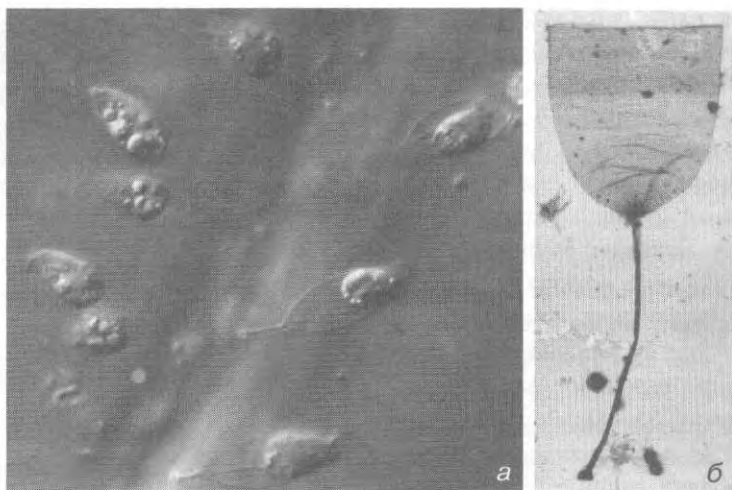


Рис. 76. Heterokonta, Bicosoecidea: живые особи (а) и препарат отдельного домика (б) *Bicosoeca* (= *Bicoeca*). (а — любезно предоставлен Х. Шнайдер, Ландау). Увел.: а — 800х, б — 2 400х.

: *Chattonella*, *Heterosigma*,  
*Gonyostomum*, *Fibrocapsa*, *Vacuolaria*.

**BICOSOECIDEA Grasse &  
 Deflandre, 1952 —**

40

( . 76, 273 ).

5

, 1 (

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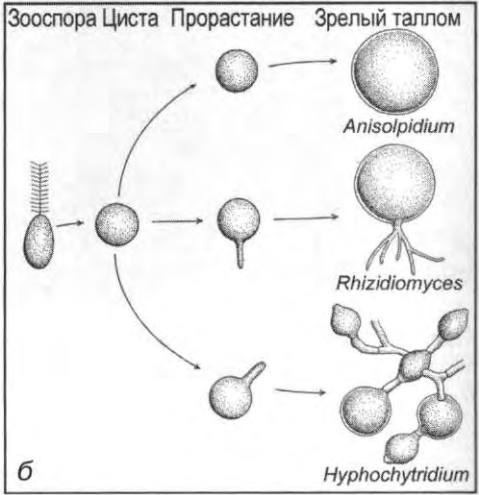
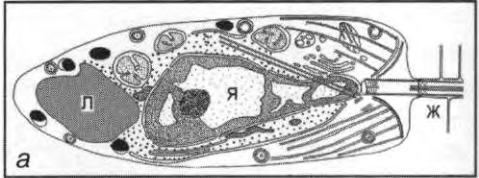
: *Bicosoeca* (= *Bicoeca*),  
*Cafeteria*, *Pseudobodo*.

60

12

**HYPHOCHYTRIOMYCETES**

Patterson, 1982 —



25

4 6 ( . 77 )

Heterokonta,

. 77. Heterokonta, Hyphochytriomycetes:

*Hyphochytrium* ( )

( ), —

( — )

∴ — 5

*Rhizidiomyces*.

776,

*Hyphochytrium*.

18 48

: *Anisopidium*, *Hyphochytrium*, *Rhizidiomyces*.

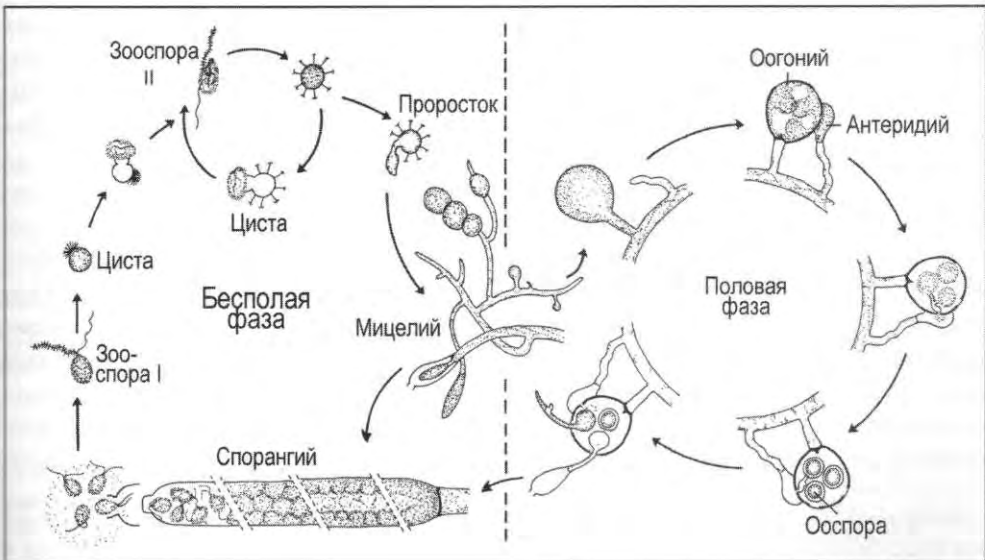
: *Phytophthora infestans* —

**OOMYCETES** Dick, 1976 —

800

65

(The Great Irish Potato Famine),



78. Heterokonta, Oomycetes:

*Saprolegnia*;

Oomycetes

(I)

(II)

( ),

( ),

(

1840 <sup>1</sup>; *Pythium* spp.,

; *Plasmopara viticola* —

; *Saprolegnia* spp.

*Achlya* spp.,

<sup>2</sup>

( . . 238).

*Saprolegnia*)

( . . 78).

1

1840

1

1845 1852 . —

« »

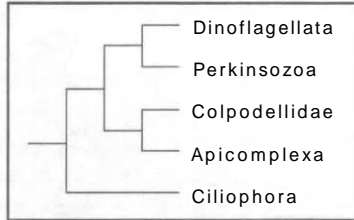
« »

( . . ) —

11.

Alveolata

( )



(3 1,3

(3 1,6

(Perkinsozoa

Colpodellidae)

( . 11).

Apicom-

plexa —

: *Achlya*, *Albugo*, *Haptoglossa*, *Plasmopara*, *Phytophthora*, *Pythium*, *Saprolegnia*.

1200

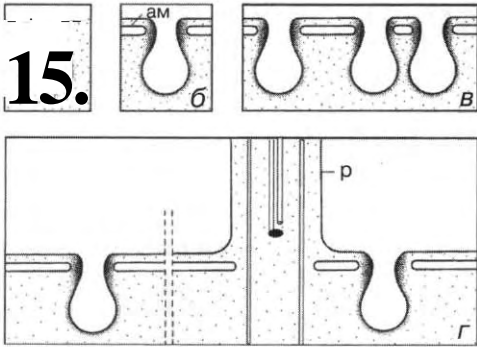
**ALVEOLATA** Cavalier Smith, 1992 —

*Perkinsus*;

— Ciliophora, Apicomplexa Dinoflagellata, Ascetospora (Haplospora)

Apicomplexa ( . 79).





15.   
 .79.   
 Perkinsus; Alveolata:   
 Apicomplexa;   
 ( )   
 ( )   
 ( )

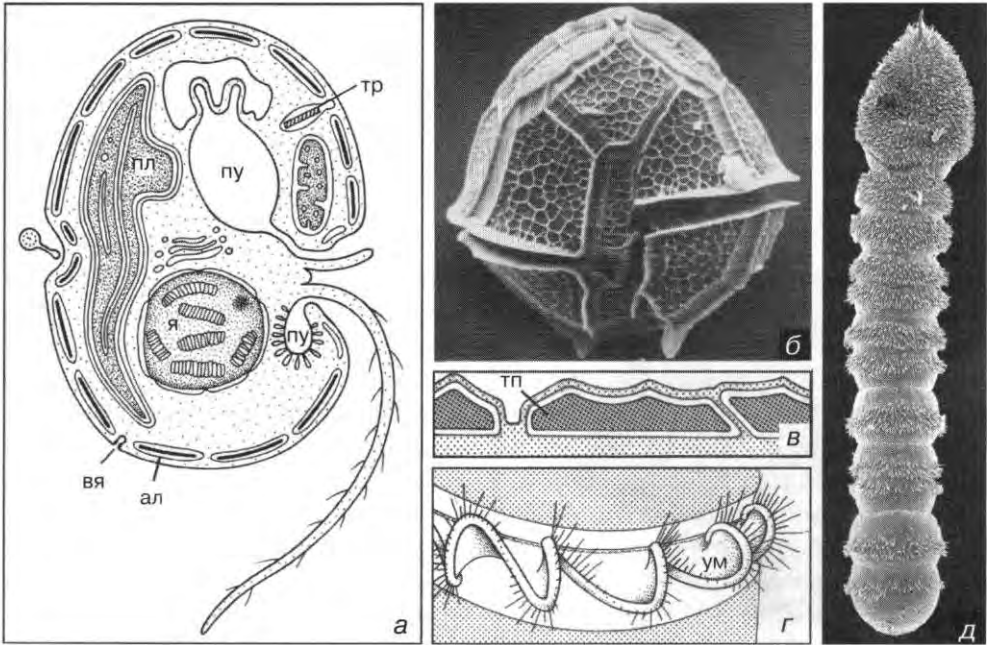
80).   
 ( )

, Perkinsozoa *Colpodella*.   
 ;   
 , Perkin-   
 sozoa   
 , a Colpodellidae —   
 Apicomplexa.

**DINOFLAGELLATA** Biitschli,   
 1885 (Dinozoa, Dinophyta) —

2500

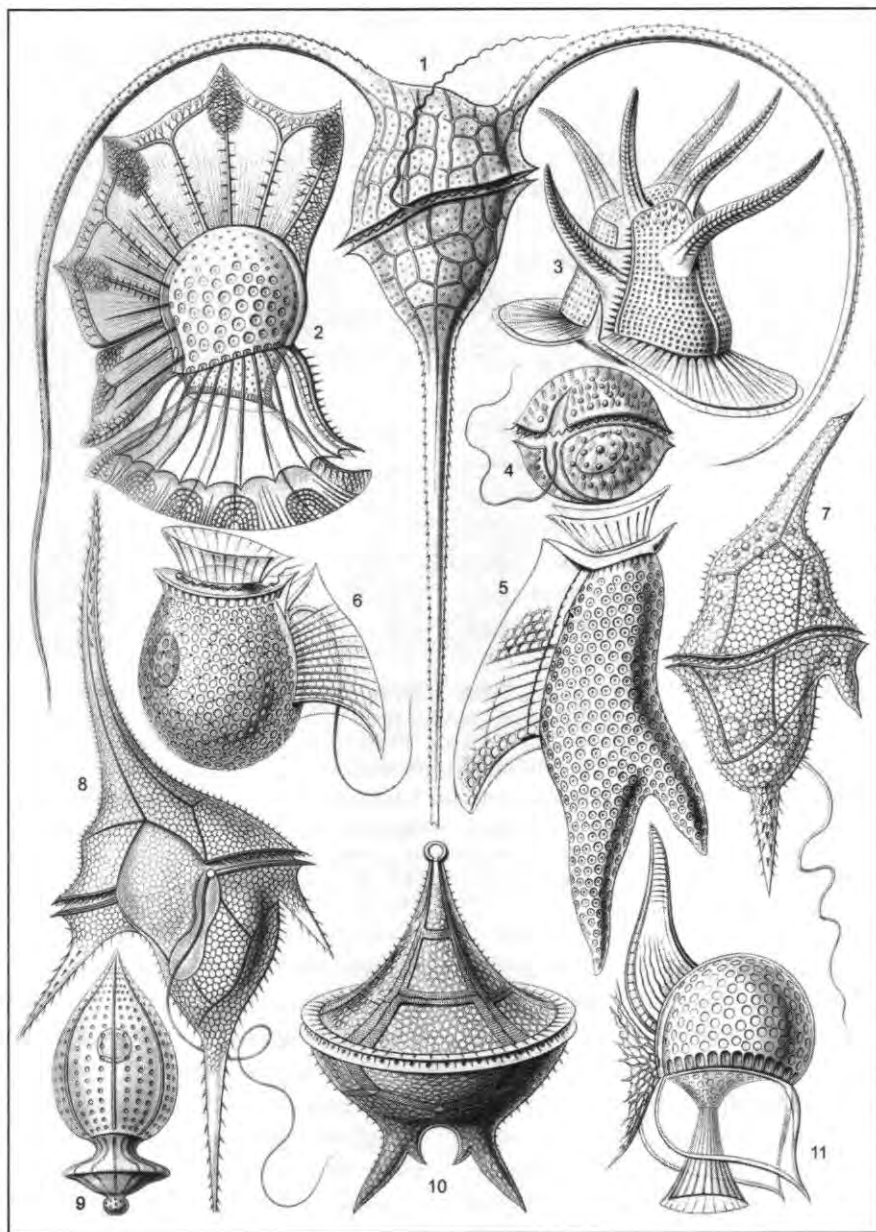
4000



80. Alveolata, Dinoflagellata: — ; —  
*Pehdinium bipes*; — ( ) ; —  
 ( ) ; —  
 ( ) ; —  
*Haplozoon axiothellae*. — ; — ; —  
 — ; — ( — ; —  
 Р.М. ; — : Leander et al.:  
 Europ. J. Protistol. 38 [2002] 287). : 6 — 1 000x, —800x.

( . 80 )

( . 81).



81. Dinoflagellata:  
 (Peridinea). 1 — *Ceratium tripos*, 2 — *Ornithocercus magnificus*, 3 — *Ceratocorys horrida*, 4 — *Goniodoma acuminatum*, 5 — *Dinophysis homunculus*, 6 — *D. sphaerica*, 7 — *Ceratium cornutum*, 8 — *C. macroceros*, 9 — *Pyrgidium pyriforme*, 10 — *Peridinium divergens*, 11 — *Histioneis remora* ( : Haeckel: *Kunstformen der Natur*. Verlag des Bibliographischen Instituts. Leipzig 1899 1904).

( . . . 31):  
 Ornithocercus magnificus, Citharistes  
 regius;  
 1  
 2

Ceratium;  
 Gymnodinium mikimotoi, G. breve G. gala  
 theanum;  
 Gymnodinium eucyaneum G. acidotum;  
 Lepidodinium viride, Gymnodinium chlo  
 rophorum;  
 Peridinium balticum, P. foliaceum;  
 Podolampas bipes.  
 To,  
 Noctiluca scintillans  
 Nocti-

( . . . 31):  
 ( . . . 31).

1  
 2

2 :  
 (3  
 Nocti  
 luca *Protopteridinium* ( . . . 285).  
 (*Blastodinium*, *Oodinium*).  
 ( . . . 244)  
*Zooxanthella*, *Symbiodinium* —  
 (*Polykrikos*),  
 ( . . . 237).  
 1998  
 Warnowiidae  
 « bleaching » (coral)  
 1  
 1997 1998  
 Scleractinia. —

30

*Alexandrium tamarense*, *A. catenella*,  
*Gambierdiscus toxicus*, *Gonyaulax tama-*  
*rense* *Gymnodinium catenatum*.

(ciguatera).

*Pfiesteria piscicida*

*Noctiluca scintillans* *Gonyaulax*.

( ),

, 440

Dinoflagellata

: Diniferea Syndinea.

Diniferea.  
 dinea —

Syn-

1

: *Alexandrium*, *Amoeboph-*  
*rya*, *Blastodinium*, *Ceratium*, *Dinophysis*,

*Gambierdiscus, Gymnodinium, Lepidodinium, Noctiluca, Oodinium, Ornithocercus, Pfiesteria, Podolampas, Prorocentrum, Protoperidinium, Symbiodinium, Syndinium, Zooxanthella.*

Apicomplexa

**PERKINSOZOA** Noreen

( . 82)

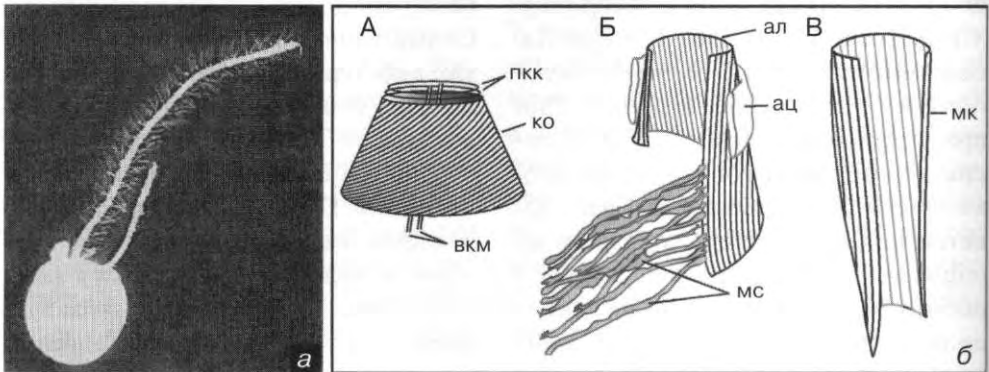
et al. 1999 —

Perkinsozoa

18S

, *Perkinsus*

*Colpodella*



. 82. Alveolata, Perkinsozoa: —

*Perkinsus marinus*; —

Dinoflagellata ( ). Apicomplexa ( , )

Apicomplexa (A), Perkinsozoa ( )

( ). *Perkinsus* ( ):

*Amphidinium poecilochroum* ( ) ( —

). .: — 4 500 .

*Perkinsus*

*Perkinsus*

*Perkinsus*

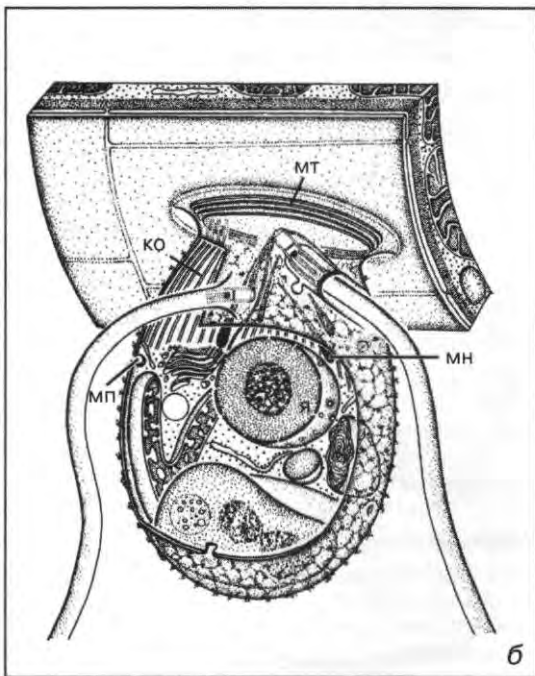
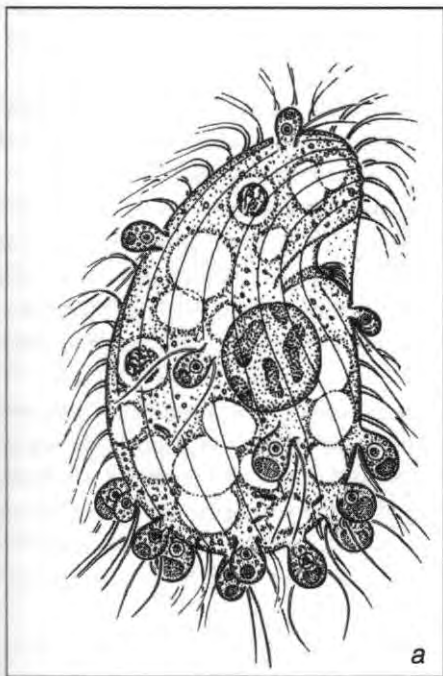
*Parviluci*

*fera* (*P. infectans*)

Alexandrium,

: *Parvilucifera*, *Perkinsus*,

*Rastrimonas*.



83. Alveolata, Colpodellidae: a — *Colpodella gonderi* (= *Spiromonas*) (Colpoda); — ( ), ( ), ( ) ( : Foissner and Foissner: Protistologica 20 [1984] 635). : a — 750x, 6 — 7 000x.



**Colpodellidae** Simpson & Patterson, 1996

*Colpodella* (*Spiromonas*) —  
(. 83).

4800

*Colpodella*  
Perkinsozoa

(. 84).

: *Perkinsus*  
Dinoflagellata, a Colpo-

(. 85)

dellidae,

Apicomplexa (. 11).

: *Colpodella*.

**APICOMPLEXA** Levine,

1970 —

Sporozoa, Apicomplexa

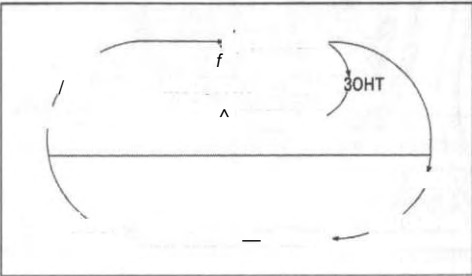
20

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Apicomplexa

(. 86,

87):

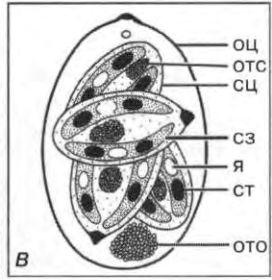
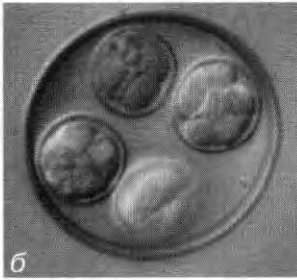
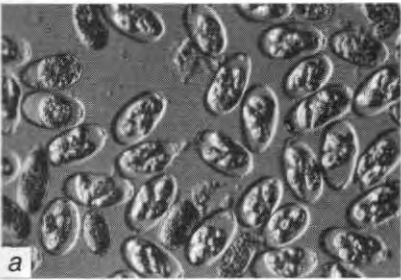


( )

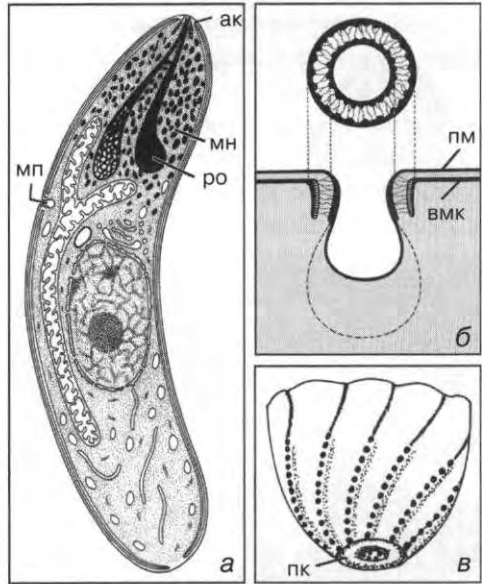
. 84. Alveolata, Apicomplexa:

(= ),

2 8



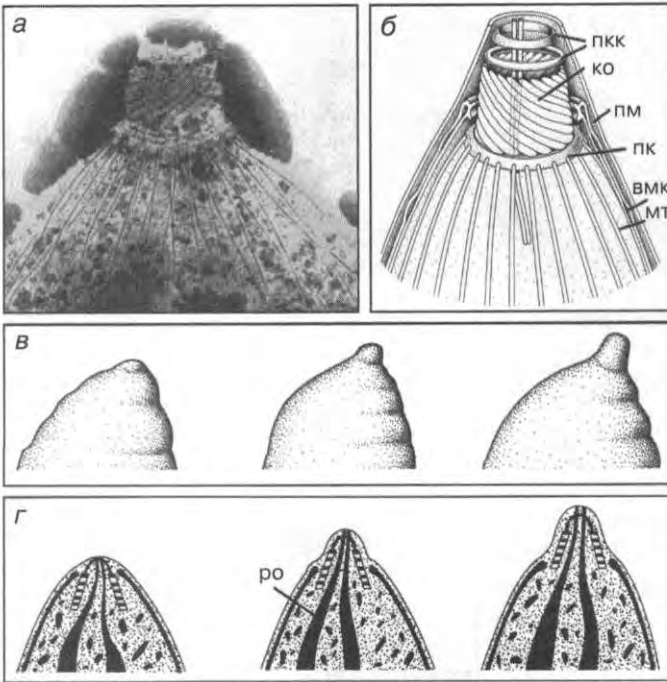
85. Apicomplexa: — *Eimeria stiedae*; — *Eimeria sp.*,  
; —  
( —  
), — 1



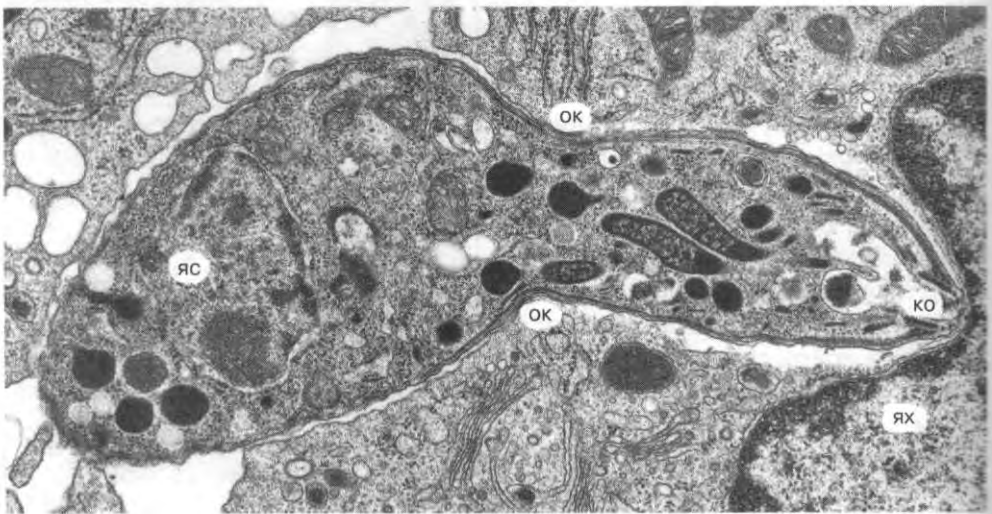
( . 87, 88, 98).

86. Apicomplexa: —  
—  
( )  
( ), —  
( ), —  
( ) ( —  
rich proteins). —  
).

(hystidine

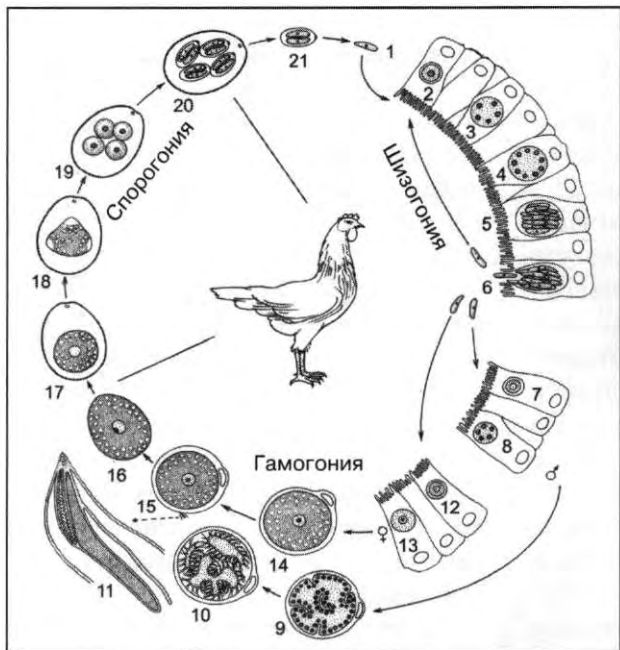


87. Apicomplexa: ...  
 : — ...  
 ; — ...  
 ; — ...  
 (= ), — ...  
 : Nichols et al.: J. Protozool. 34 [1987] 217; 6 r ...  
 ). : — 35



88. Apicomplexa: *Toxoplasma gondii* ...  
 ( : Nichols and O'Connor: Lab. Invest. 44 [1981] 324). : 20





. 89. Apicomplexa: -  
*Eimeria maxima*. 1 -  
 , 2 6 - -  
 , 7 15 - , 12 14 -  
 , 8 11 -  
 , 16 -  
 ( ), 17 20 -  
 , 21 - ( ).

Apicomplexa

*Eimeria*,  
*Eimeria*

1  
 1  
 3

2  
 3

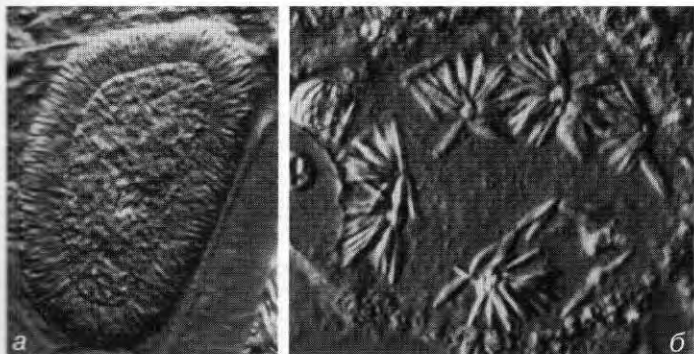
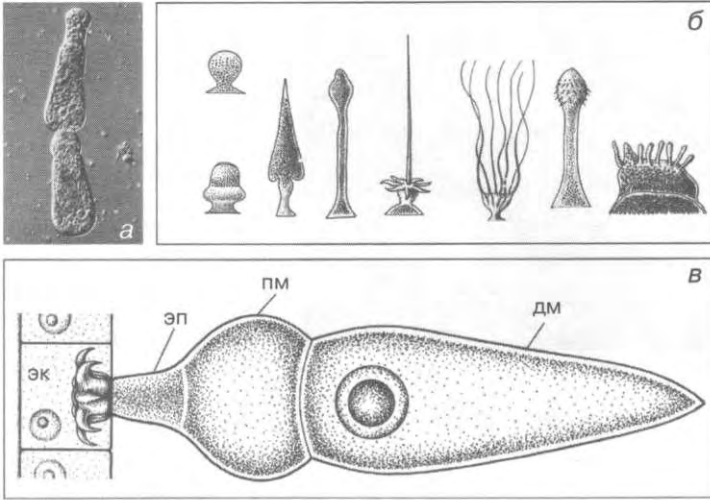


Fig. 90. Apicomplexa:  
 ( ) ( )  
*Eimeria canadensis* ( : Müller et al.: J. Protozool. 20 [1973] 293). .. a — 800x, b — 1 000x.

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2100	-		



. 91. Apicomplexa.  
 Gregarina: — грегарины  
 ; б —  
 ; —  
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 ( ), и  
 ( )  
 ( — по:  
 ). : — 85 .

**GREGARINEA** Dufour, 1828

1465

Apicomplexa

Gregarina, Coccidea Haematozoa.

Conoidasida; Haematozoa

Aconoi

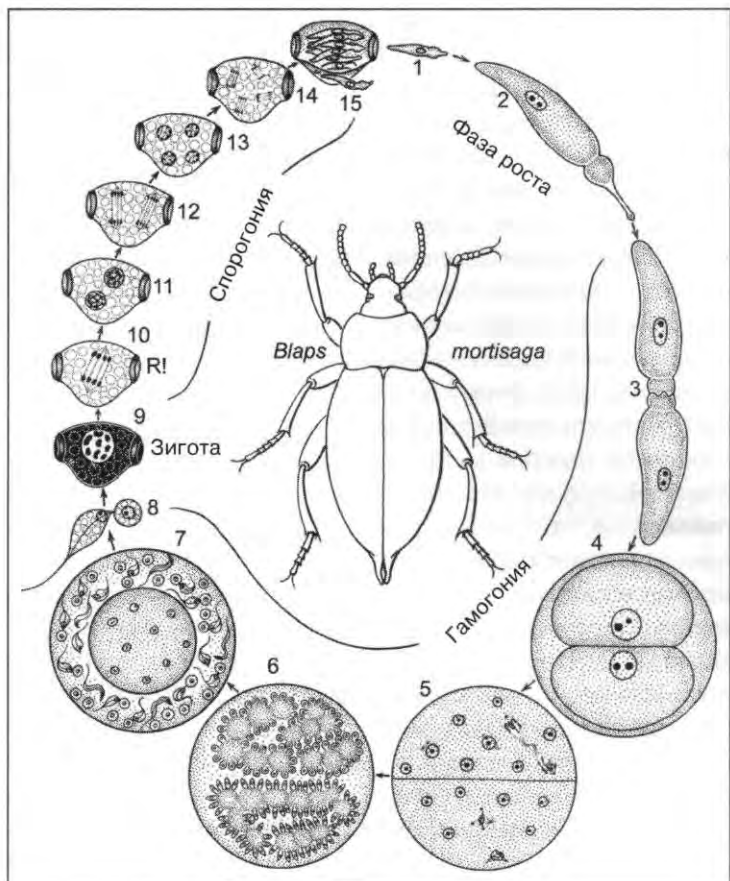
dasida.

( . 91 )

1

Apicomplexa I

Neogregarinida



92. Gregarina:

*Blaps mortisaga* (1 4)

*Stylocephalus longicollis*.

(5 14).

(1); (2).  
 (3).  
 (4). (5),  
 (6, 7). (7). (7, 8). (10).  
 (9). (11 15).  
 8 ( ) ( ).  
 ( ) ( ), 4  
 ( ) ( ) 16  
 ( ) ( ) 10



( . . 269).

2 ;

: Gregarina, Mattesia, Monocystis, Selinidioides, Stylocephalus, Siedleckia.

**COCCIDEA** Leukart, 1879 —

( . 916)

( )

( ).

( . 89).

4 32 ( )

( ) ,

( . 92).

2 8 ( )

( ).

Protococcida.

(Archi , Neogrega

rinida).

( ),

1

— Eugregarinida —

2 « » — , Sipunculida  
Enteropneusta. —

ОТРЯД *Agamococcida* Levine, 1979 —  
Агамоккоциды

ОТРЯД **Agamococcida** Levine, 1979 —

Агамоккоциды  
Агамоккоциды — это группа паразитических простейших, принадлежащих к классу жгутиконошцы. Они имеют характерную форму и размеры. Жизненный цикл включает несколько стадий. Известны следующие роды: *Rhytidocystis*, *Gemmo* *cystis*.

Агамоккоциды — это группа паразитических простейших, принадлежащих к классу жгутиконошцы. Они имеют характерную форму и размеры. Жизненный цикл включает несколько стадий. Известны следующие роды: *Rhytidocystis*, *Gemmo* *cystis*, *Haemogregarina*.

ОТРЯД **Protococcida** Kheisin, 1956  
(Coelotrophida) —

Протоккоциды  
Протоккоциды — это группа паразитических простейших, принадлежащих к классу жгутиконошцы. Они имеют характерную форму и размеры. Жизненный цикл включает несколько стадий. Известны следующие роды: *Eleutheroschizon*, *Grellia*.

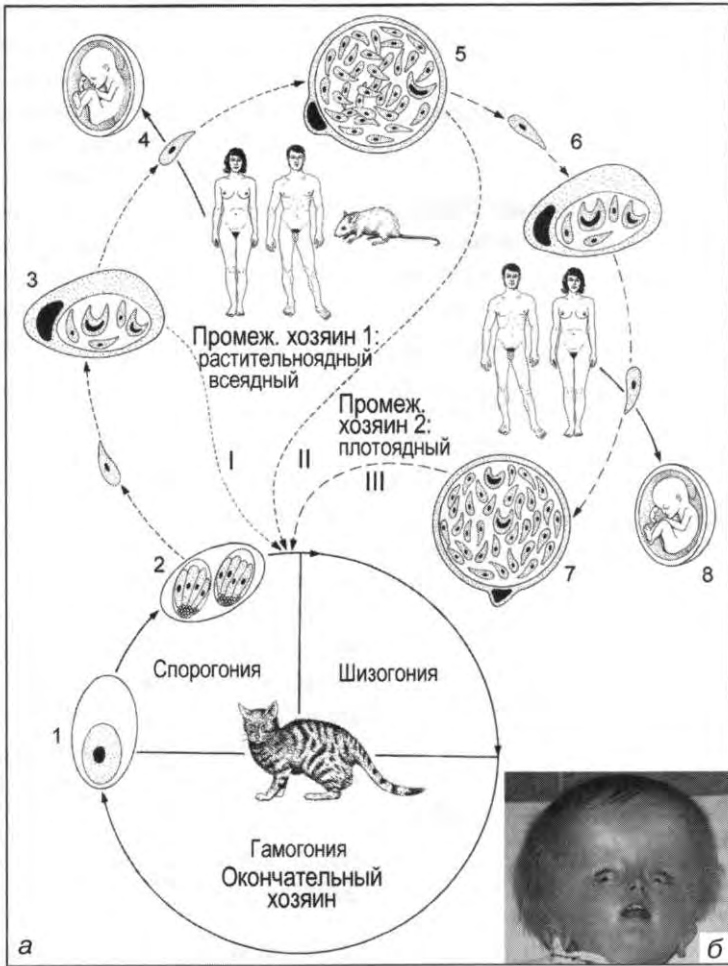
Протоккоциды — это группа паразитических простейших, принадлежащих к классу жгутиконошцы. Они имеют характерную форму и размеры. Жизненный цикл включает несколько стадий. Известны следующие роды: *Eleutheroschizon*, *Grellia*, *Klossia*, *Adelea*, *Haemogregarina*, *Karyolysus*, *Klossia*.

ОТРЯД **Adeleida** Leger, 1911 —

Аделеиды  
Аделеиды — это группа паразитических простейших, принадлежащих к классу жгутиконошцы. Они имеют характерную форму и размеры. Жизненный цикл включает несколько стадий. Известны следующие роды: *Eleutheroschizon*, *Grellia*, *Klossia*, *Adelea*, *Haemogregarina*, *Karyolysus*, *Klossia*.

**Eimeriida** Leger, 1911 —

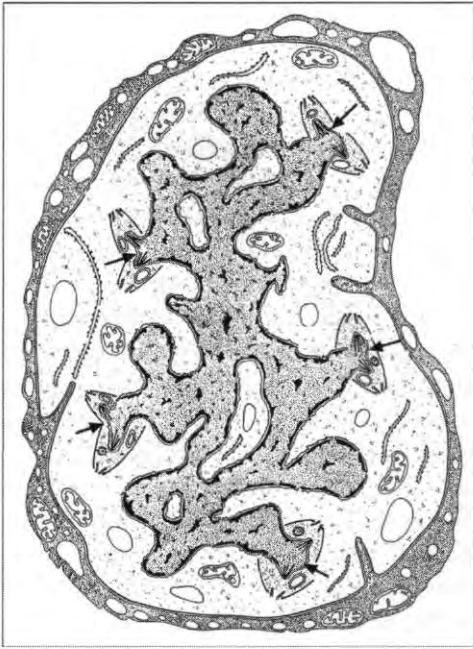
Аделеиды  
Аделеиды — это группа паразитических простейших, принадлежащих к классу жгутиконошцы. Они имеют характерную форму и размеры. Жизненный цикл включает несколько стадий. Известны следующие роды: *Eleutheroschizon*, *Grellia*, *Klossia*, *Adelea*, *Haemogregarina*, *Karyolysus*, *Klossia*.



93. Apicomplexa, Coccidia: — *Toxoplasma gondii*. 1 —  
 ; 2 — ; 3 —  
 ; 4 —  
 ( )  
 (5) ( )  
 ) ; 6 — 3 5  
 (7)  
 (8);  
 : (I) — 9 11 ,  
 1 (II) — 21 24 2 (III) — 3  
 ; — 14  
 ( — , — ).

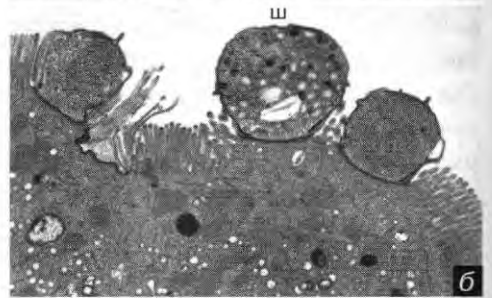
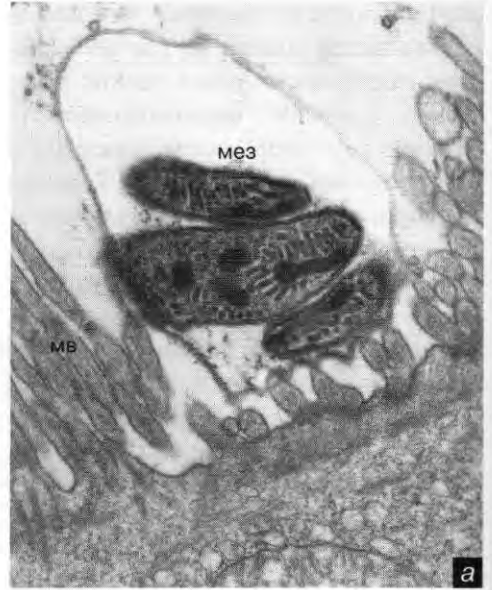
450 *Eimeria*  
 ( 4 , 2  
 89) *Isospora*  
 (2 , 4  
 )  
 {*Toxo-*  
*plasma, Sarcocystis, Frenkelia*}.  
*Toxoplasma gondii* (2  
 4 )  
 (. 93).  
*Toxo-*  
*plasma gondii*

( .  
 ).  
 (« »)  
 «  
 »,  
 (... ).



94. Coccidea: *Sarcocystis sui hominis*.

( : Heydorn and Mehlhorn: Zentralbl. bakt. Microbiol. Hyg. 1. AMI., Orig. A, 240 [1978] 123).



95. Coccidea: *Cryptosporidium parvum*.

*Sarcocystis*, *Aggregata* *Frenkelia*.

( )  
 ).  
 ( )  
 )  
 ), *Sarcocystis sui ho-*  
*minis* ( ), *S. equicanis*

( )  
 ( )  
 ; — ( ) ( —  
 X.  
 — )  
 6 4 500 .  
 ( ) *S. ovifelis* ( )  
 ).

( . 94).

*Cryptosporidium parvum*

( . 95).

*dium*

*Cryptospori-*

: *Cryptosporidium*, *Eimeria*, *Frenkelia*, *Isospora*, *Sarcocystis*, *Toxoplasma*.

**HAEMATOZOEAE** Vivier, 1982

Haematozoa

Aconoidina

Aconoidasida.

(= )

Haematozoa —

mosporidia Piroplasmida

**Haemosporidia** Danilewsky

1885 —

Haemosporidia

*Plasmodium* ( )

( )

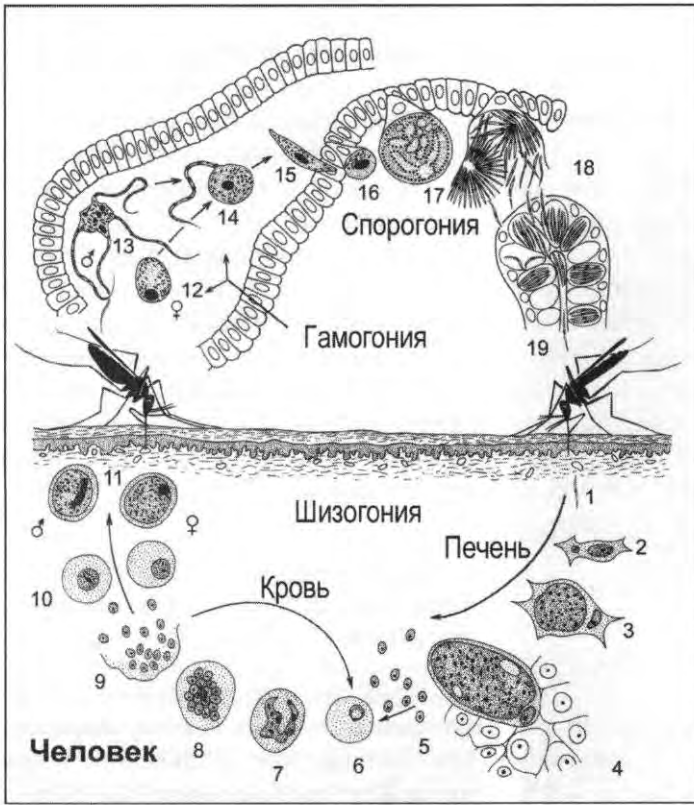
*Anopheles*, *Aedes*

*Culex*;

*Plasmodium*

(DEC. 96),

(NO 1 )



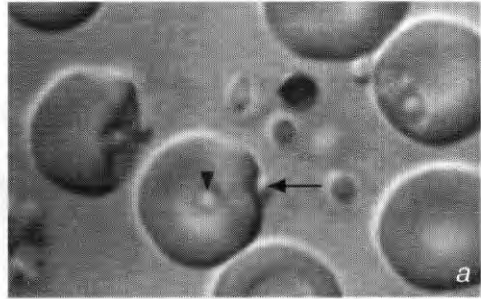
. 96. Apicomplexa,  
 Haematozoa: -  
                   *Plasmodium*  
*vivax*. -  
 : 1 5 —  
                   , 6 9 —  
                   , 10 11 —  
                   ;  
                   *Anopheles*:  
 12 —  
                   , 13 —  
                   ,  
 14 —  
 15 —  
                   , 16—18 —  
                   , 19 —  
                   (  
 ).

( . 97, 98),

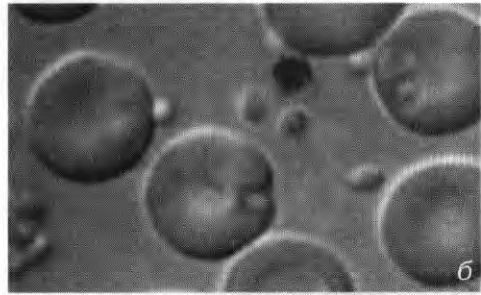
( ) ,

( ) .

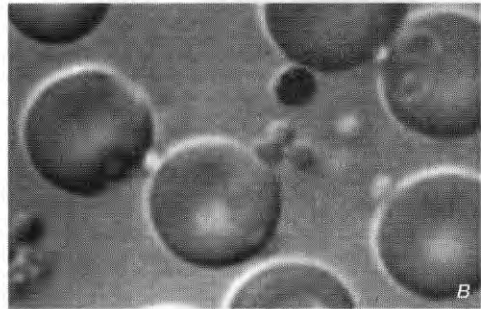
10



( )



16 °

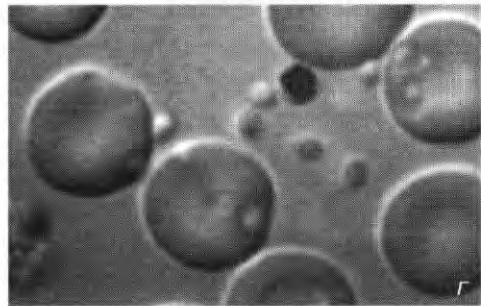


11 160

*Plasmodium*,

12.

malala



aria —

( )

97. Haematozoa: ( )

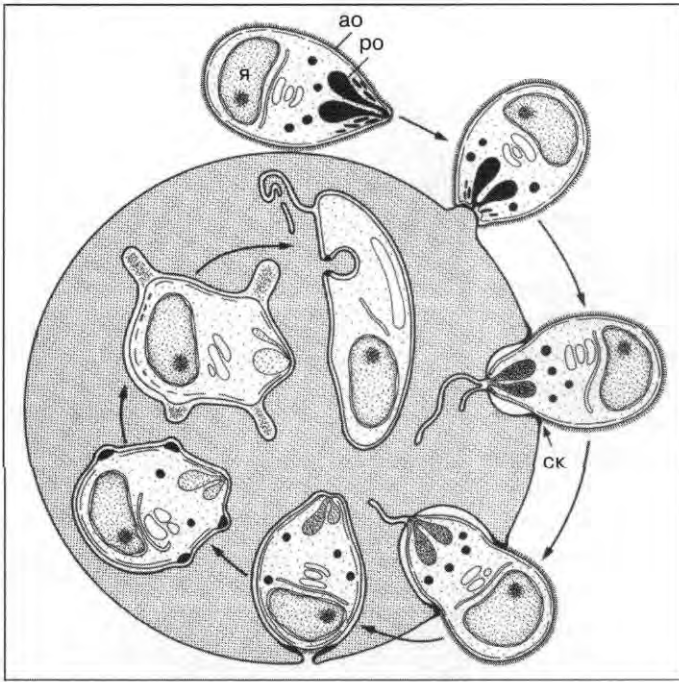
*Plasmodium*

( ) ( )

100

4





. 98. Haematozoa:

*Plasmodium knowlesi*

12.

*Plasmodium*

<i>P. vivax</i>		8 16	48	
<i>P. ovale</i>		15	48	
<i>P. malariae</i>		20 35	72	+/
<i>P. falciparum</i>		7 12		+

; 300

1858 1869

— 18 XX  
 : « », «  
 », «  
 ».

*P. vivax*

1997 2000 1996—

*dium falciparum.*  
500 *Plasmo-*  
, 300

Haemosporidia.

(Ixodidae).

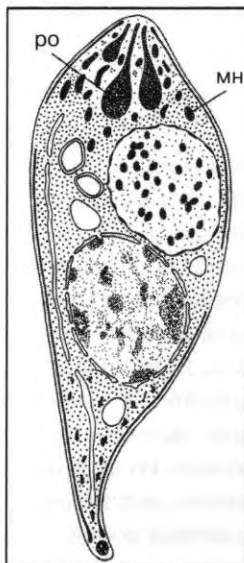
5

2

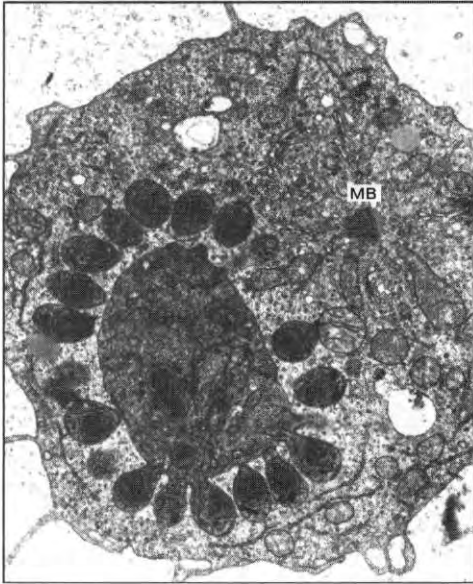
: *Haemoproteus*, *Leucocyto-*  
*zoon*, *Plasmodium.*

**Piroplasmida** Wenyon,

1926 —



99. Haematozoa: *Babesia bigemina*,



100. Haematozoa:  
*Theileria annulata*

( ) X.  
) : 5 700 .

*Babesia*

*Babesia bigemina*

( . 99), 50%. *Babe-*  
*sia* ( . *bovis*, . *divergens* . *microti*)

;

*Plasmodium*, —

100).

*Theileria* ( .

);  
( -  
) ,

: *Babesia*, *Dactylosoma*,  
*Piroplasma*, *Theileria*.

**CILIOPHORA** Doflein,

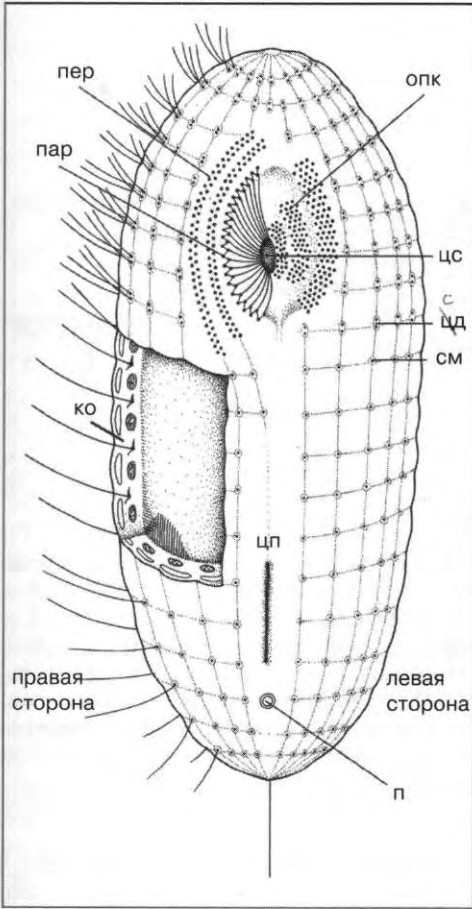
1901 —

Ciliata

(Perty, 1952) Infusoria (Bütschli, 1887).  
8000

( . 101),

: (1)  
, (2)  
(3)



14

: (1) (2)

(*Euplotes*, . 104)

(*Coleps*, . 134),

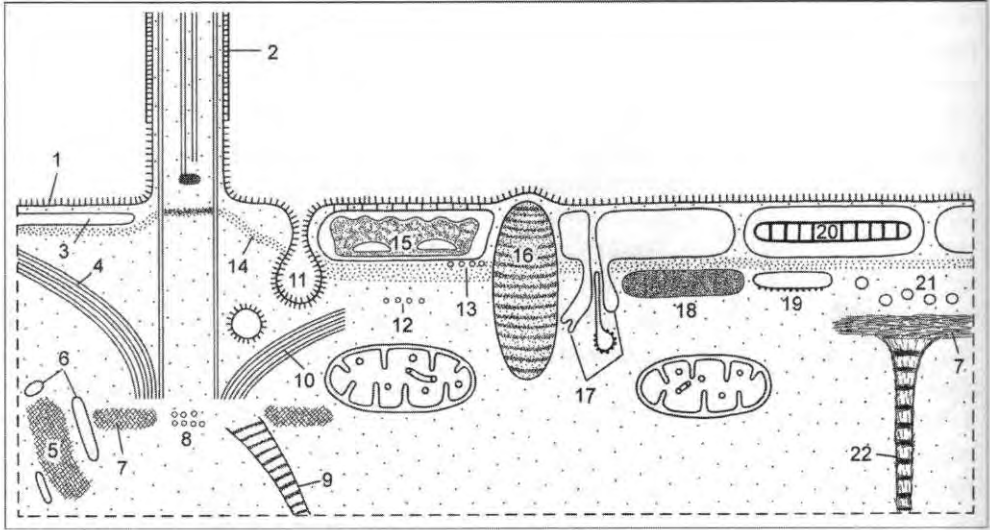
. 101. Alvelolata, Ciliophora:

105),

( . 102, 103),

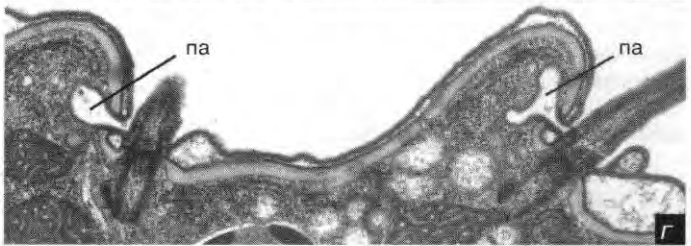
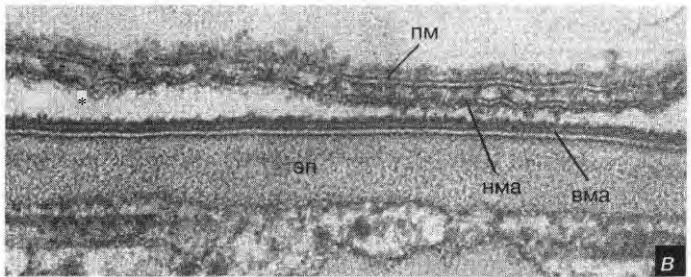
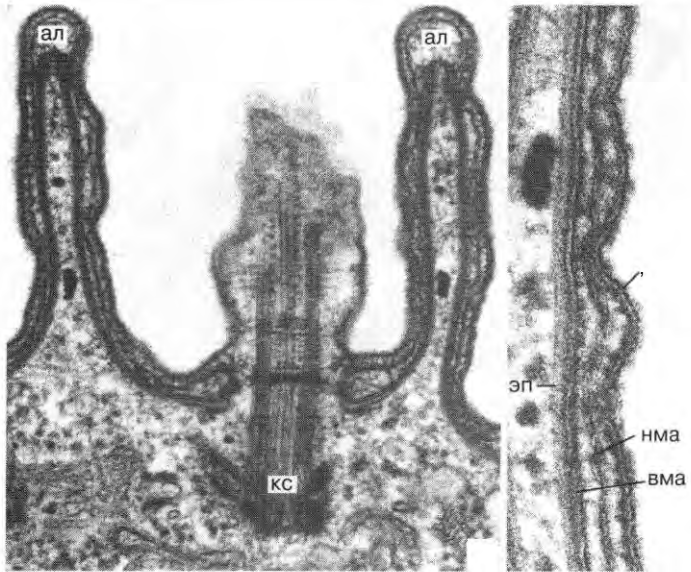
), ( . 102, 103),

)



102. Ciliophora:

- 1 —
  - 2 —
  - 3 —
  - 4 —
  - 5 —
  - 6 —
  - 7 —
  - 8 —
  - 9 —
  - 10 —
  - 11 —
  - 12 —
  - 13 —
  - 14 —
  - 15 —
  - 16 —
  - 17 —
  - 18 —
  - 19 —
  - 20 —
  - 21 —
  - 22 —
- ( ) .
- ( ) .
- ( . 106) .
- ( . 107) .
- ( . 115) .
- ( . 108) :

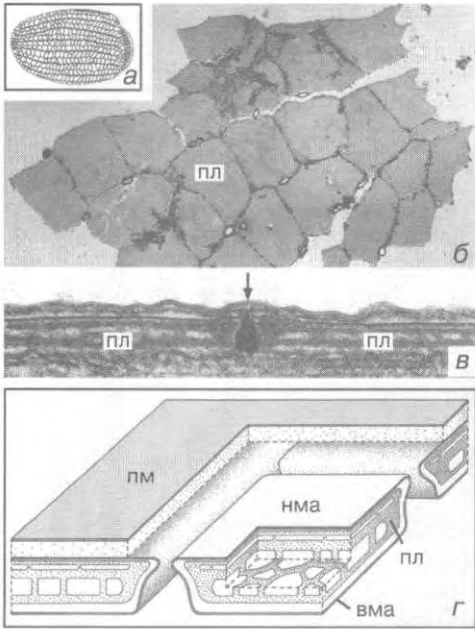


103. Ciliophora:

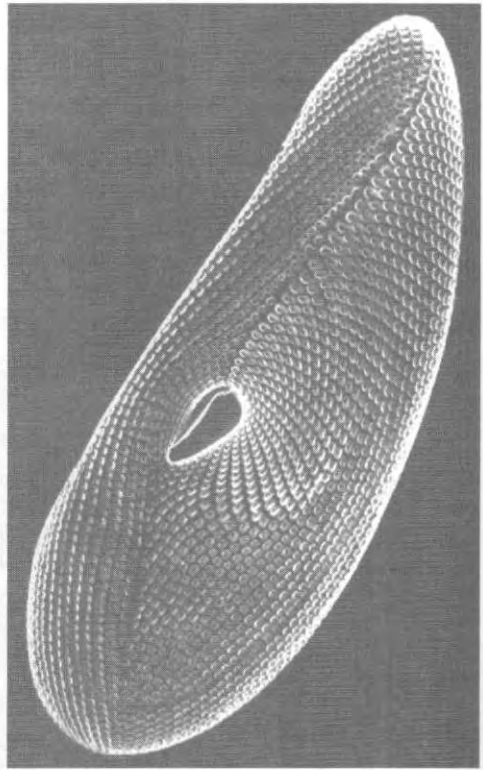
*Paramecium* ( , ) *Pseu*  
*domicrothorax* ( , ), —

— , —  
— , —  
— , —  
— , —  
50 , 6 — 150 ,  
160 , — 25 .

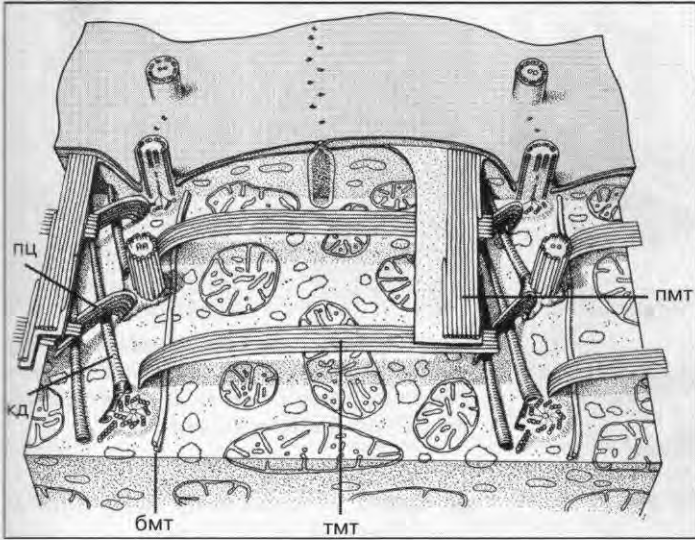
— « » ,  
— — —  
— — —  
— — —  
*Glaucoma ferox*;  
— — —  
( ) — — —  
( ) . — — —



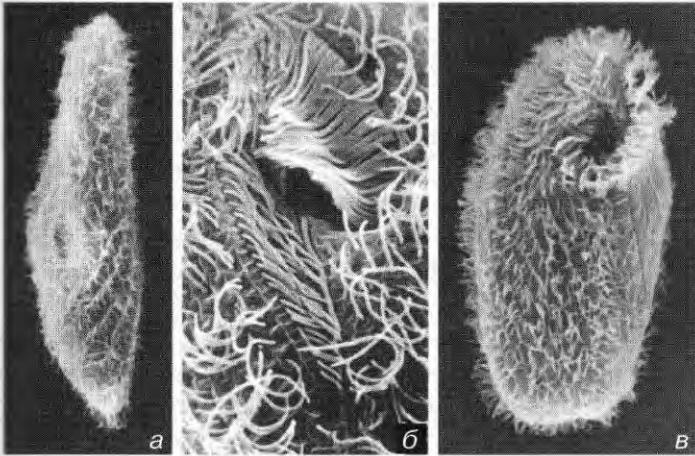
104. Ciliophora: *Paramecium*.  
 (a) — SEM, 250x; (b) — TEM, 200x; (b') — TEM, 200x; (c) — Schematic diagram, 85 000x.  
 (Source: Hausmann and Kaiser: J. Ultrastruct. Res. 67 [1979] 15).



105. Ciliophora: *Paramecium*.  
 (Source: Jeanmaire et al.: Europ. J. Protistol. 29 [1993] 311).  
 Magnification: 600x.



. 106. Ciliophora: -  
*Tetrahymena.*  
 - -  
 , - -  
 , - -  
 - -  
 , - -  
 ( ) .

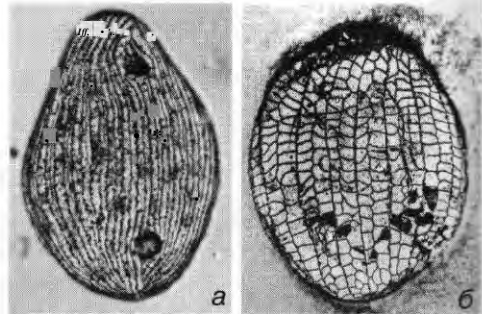
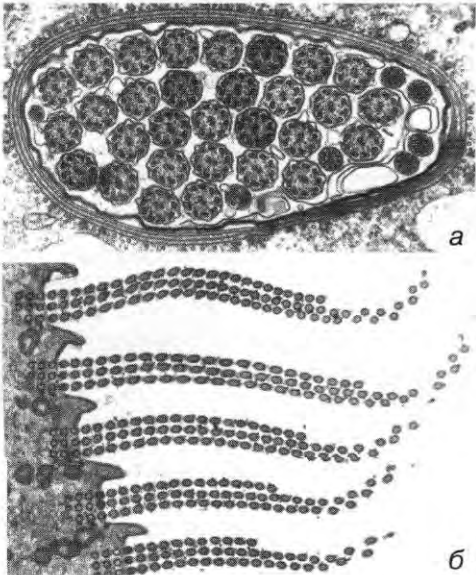


. 107. Ciliophora: -  
*Para-*  
*mecium* (a), *Frontonia* ( )  
*Climacostomum* ( )  
 ( -  
 ).  
 ∴ - 270 , -  
 1 400 , -200 .

100  
 101  
 102  
 103  
 104  
 105  
 106  
 107  
 108  
 109  
 110  
 111  
 112  
 113  
 114  
 115  
 116  
 117  
 118  
 119  
 120

( ) - ( ) -  
 : ( ) , ( ) -  
 ( ) —  
 ,  
 ( . 109).  
 ,  
 ,





108. Ciliophora: —  
*Euplotes vannus*; —  
*Euplotes vannus* ( — :  
 Hausmann and Kaiser: J. Ultrastruct. Res. 67  
 [1979] 15). : a — 24000x, 6 — 1 700x.

109. Ciliophora:  
*Colpidium* ( ) *Euplotes* ( ) ( —  
 ). : — 450 .

( ) ( . 112).

( 2 5 ),

( . 113).

111, 215).

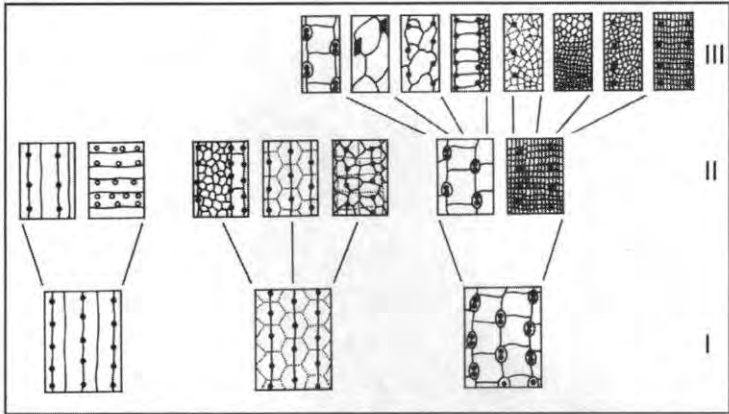
( . 106,

( . 114).

( Karyorelictida !

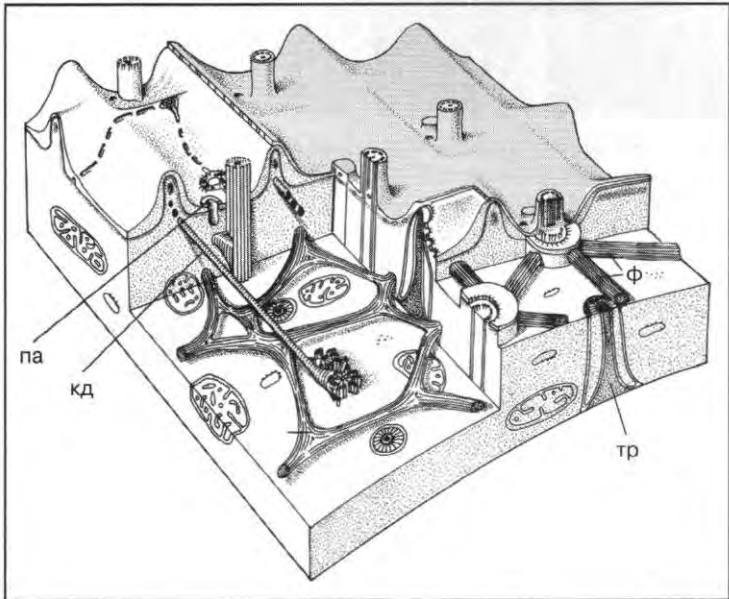
. 110. Ciliophora:

(I III)



. 111. Ciliophora:

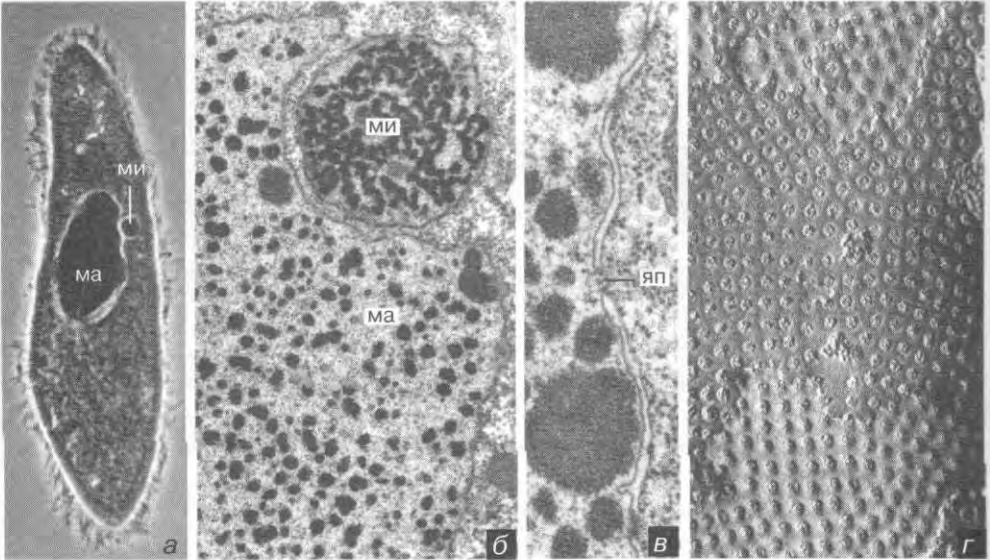
*Paramecium caudatum.*



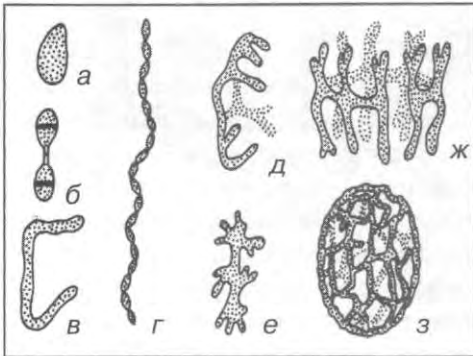
Ciliophora ( . 1146).

Ciliophora

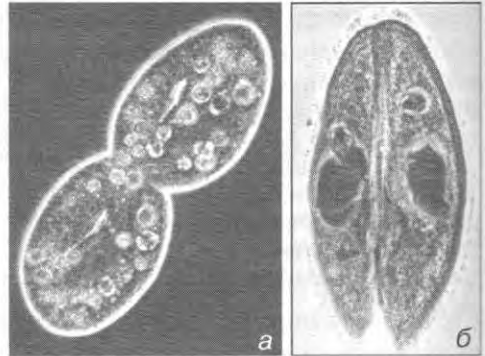
(Bütschli) ( ),



112. Ciliophora: *Paramecium* ( ), *Colpidium* ( , ); — *Paramecium*, — ( — ). : — 400 , — 15 , — 60 , — 40 .

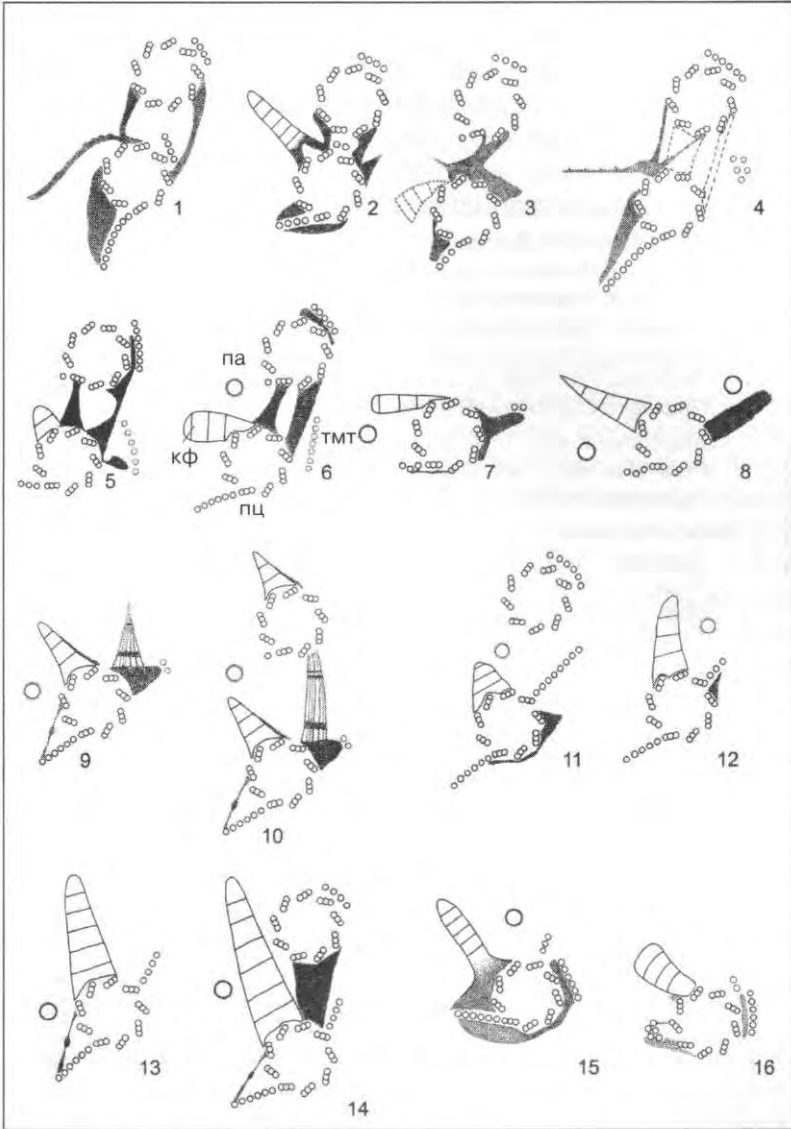


113. Ciliophora: — *Paramecium*, — *Stylonychia*, — *Vorticella*, — *Spirostomum*, — *Ophryodendron*, — *Conchophthirius*, — *Ephelota*, — *Metaphrya* ( ).



114. Ciliophora: *Paramecium* ( ) ( ). : — 250 , — 290 .

Holotricha, Chonotricha, Peritricha, Spirotricha Suctoria. 1970



115. Ciliophora:

- ( ), ( ), Karyorelictea: *Geleia* (1) *Proto-*  
*cruzia* (2); Spirotrichea: *Stylonychia* (3) *Climacostomum* (4); Colpodea: *Sorogena* (5)  
*Pseudoplatyophrya* (6); Phyllopharyngea: *Hypocoma* (7) *Trichophrya* (8); Nassophorea:  
 (9) (10) *Nassula*; Oligohymenophorea: *Colpidium* (11) *Ichthyo-*  
*phthirus* (12); Prostomatea: (13) (14) *Coleps*; Litostomatea:  
*Epidotrachelophyllum* (15) *Isotricha* (16) ( ).

**CILIOPHORA** Doflein, 1901**POSTCILIODESMATOPHORA** Gerassimova & Seravin, 1976

Karyorelictea Corliss, 1974

Heterotrichea Stein, 1859

**INTRAMACRONUCLEATA** Lynn, 1996

Spirotrichea Biitschli, 1889

Protocruziidia de Puytorac et al., 1984

Phacodiniidia Small &amp; Lynn, 1985

Hypotrichia Stein, 1859

Choreotrichia Small &amp; Lynn, 1985

Stichotrichia Small &amp; Lynn, 1985

Oligotrichia Biitschli, 1887

Litostomatea Small &amp; Lynn, 1981

Haptoria Corliss, 1974

Trichostomatia Biitschli, 1889

Phyllopharyngea de Puytorac et al., 1974

Phyllopharyngia de Puytorac et al., 1974

Rhynchodia Chatton &amp; Lwoff, 1939

Chonotrichia Wallengren, 1895

Suctoria Claparède &amp; Lachmann, 1858

Nassophorea Small &amp; Lynn, 1981

Colpodea Small &amp; Lynn, 1981

Prostomatea Schewiakoff, 1896

Plagiopylea Small &amp; Lynn, 1985

Oligohymenophorea de Puytorac et al., 1974

Peniculia Faure Fremiet in Corliss, 1956

Scuticociliatia Small, 1967

Hymenostomatia Delage &amp; Herouard, 1896

Apostomatia Chatton &amp; Lwoff, 1928

Peritrichia, Stein, 1859

Astomatia Schewiakoff, 1896

ca: Kinetophragminophorea (

),

Oligohymenophorea (

)

Polyhymenophorea (

).

( . 115).

(... 13).

**POSTCILIODESMATOPHORA**  
Gerassimova & Seravin, 1976

(  
Oligotrichia Stichotrichia).

(Karyorelictea),

(Heterotrichia).

**KARYORELICTEA** Corliss,

1974 —

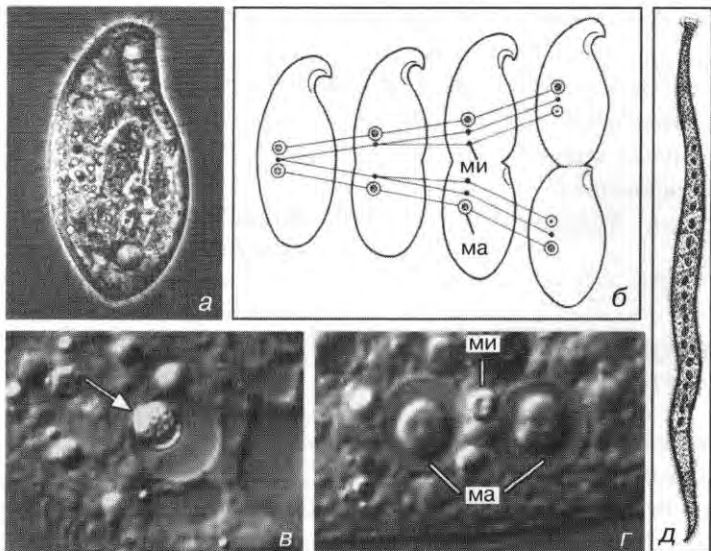
(... 116)

(*Protocruzia* Spirotrichea).

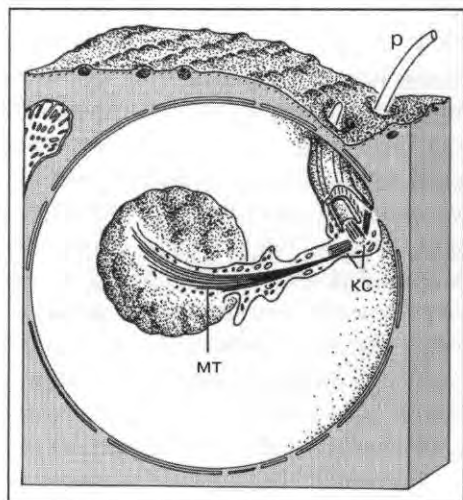
: Proto  
stomatida, Loxodida Protoheterotrichida.

Karyorelictida (  
Holotricha)

Loxodida;



116. Ciliophora, Postciliodesmatophora, Karyorelictea: — *Loxodes*; —  
 ( ) ; —  
 ( ) ;  
 —  
*Loxodes*  
 ( ) ; —  
*Trachelocerca* ( —  
 ; —  
 ; — :  
 Dragesco: Trav. Biol. Roscoff 12 [1960] 1).  
 : a — 220x, —  
 2 , — 170 .



117. Postciliodesmatophora, Karyorelictea: *Loxodes*.

( . 117), , -

: *Trachelocerca*, *Trachelonema*, *Tracheloraphis* (Protostomatida); *Loxodes*, *Remanella* (Loxodida); *Avelia*, *Geleia* (Protoheterotrichida).

**HETEROTRICHEA** Stein,

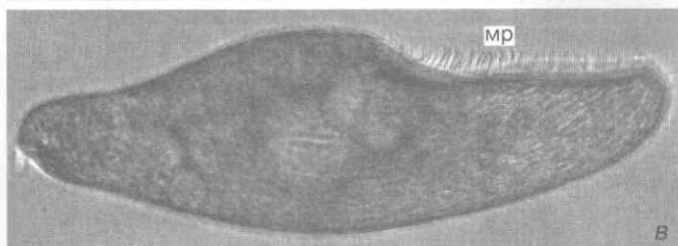
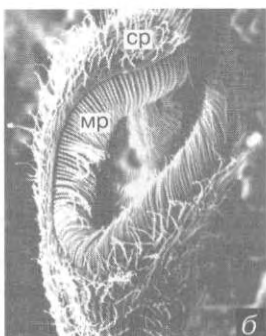
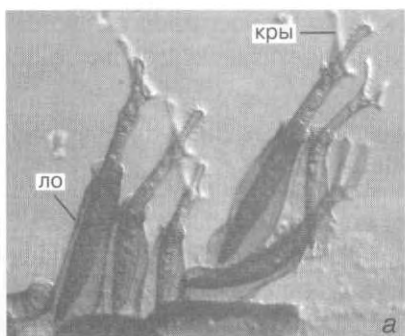
1859 —

Heterotrichea ( Spirotrichea)

( . 118).

( ) .

( ) ;  
 ( ) . — ( ) .



118. Postciliodesmatophora, Heterotrichea: — *Eufolliculina* ( )

( ) ;  
 ( ) *Eufolliculina*  
 ( ) ; — *Blepharisma*.  
 : — 75 , 6 — 2 500 ,  
 —

(Licnophorida

Heterotrichida),

Folliculinidae,

**Heterotrichida** Stein, 1859

2 ;  
*Spirostomum*,  
*Stentor*  
*Blepharisma* ; *Stentor coeruleus*  
 , a *Stentor igneus* —  
 Heterotrichida

; ( . 118).  
 : *Blepharisma*, *Condylostoma*,  
*Folliculina*, *Peritromus*, *Spirostomum*,  
*Stentor*.

**INTRAMACRONUCLEATA**

Lynn, 1996

Peritricha ( . 264).

Postciliodesmatophora).



( . . . 13).

(Protocruziidia Phacodi  
sedis mutabilis.

**SPIROTRICHEA** Biitschli,

1889 —

**Protocruziidia** de Puytorac  
etal. 1987

( . . . ).

: *Protocruzia*.

**Phacodiniidia** Small &  
Lynn, 1985

119).

: *Phacodinium*.

sedis mutabilis<sup>1</sup> (Armophorida,  
Odontostomatida Clevelandellida).

Protocruziidia

**Hypotrichia** Stein, 1859 —

2,

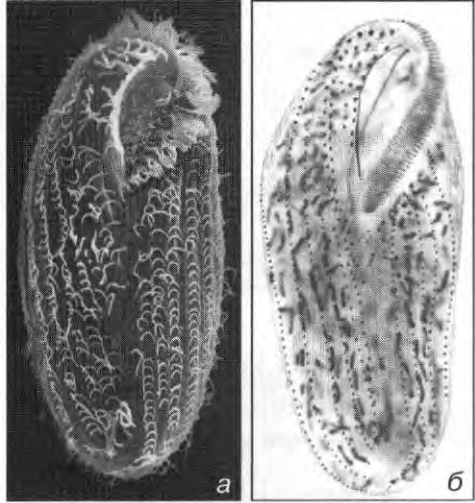
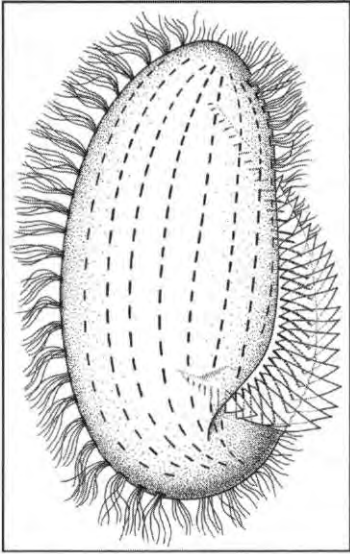
( . . . 299) —

Spi-  
rotrichea,

Hypotrichia, Choreotrichia, Stichotrichia  
Oligotrichia

Nassophorea ( . . . ), что

<sup>1</sup> Sedis mutabilis —



119. Ciliophora, Intramacronucleata, Spirotrichea:  
*Phacodinium metchnikoffi* ( ).  
 : 540 .

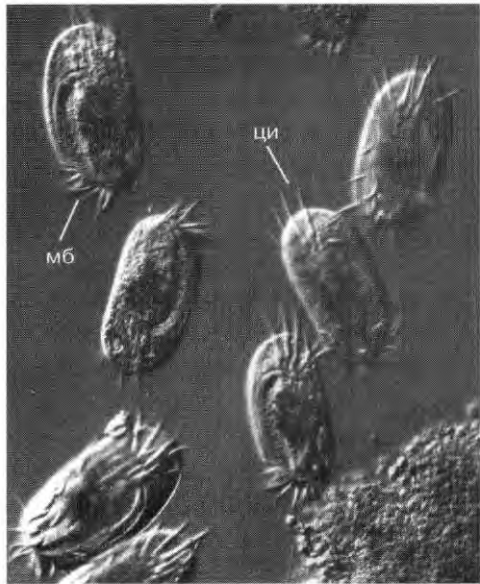
120. Spirotrichea:  
*Urostyla grandis*:

( ) ( ) ( ) ( )  
 ) . : — 190 .

Stichotrichia:

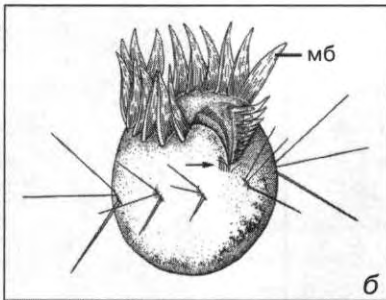
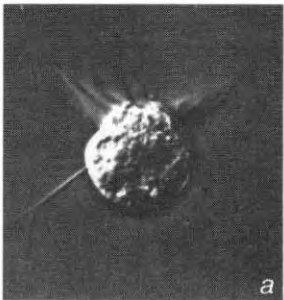
( . 120, 121).

, Hypotrichia,  
 , Stichotrichia Oligotrichia,  
 — Stichotrichia Hypotrichia  
 trichia  
 (Oligotrichia).



: *Aspidisca*, *Euplotes*, *Uro-nychia*, *Urostyla*.

121. Spirotrichea: *Euplotes*  
 ( ) ( ) . : 260 .



122. Spirotrichea:  
*Halteria* ( )  
 ( )  
 ( ) ( —  
 )  
 — 500 , — 700 .

**Oligotrichia** Biitschli,

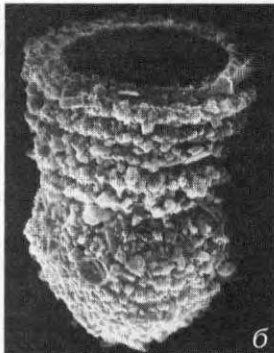
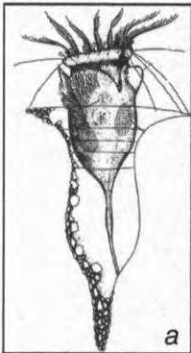
1889 — ,

( 40 )

( . 122).

: *Halteria*, *Strombidium*,  
*Tontonia*.

**Choreotrichia** Small &  
 Lynn, 1985



123. Spirotrichea: — *Tintinnopsis*

; — *Codonella* ( —

; — : Barnatzky et al.: Zool.

Scripta 10 [1981] 81) : a — 650x, — 720x.

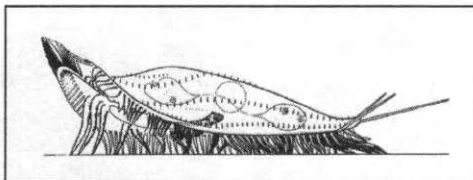
123).

*Tintinnina*,

*Choreotrichia*

*Choreotrichia*

(*Strombidopsis*, *Strobilidium*).  
: *Codonella*, *Favella*, *Tintinnidium*.



**Stichotrichia** Small & Lynn, 1985

*Stichotrichia* ( *Stichotrichia*, *Stichotrichia* )  
распространены в пресных и солоноватых водах.  
Их тело имеет длину от 10 до 100 мкм, а диаметр — от 1 до 2 мкм.  
Благодаря своим ресничкам, они способны к активному движению.  
Число ресничек варьирует от 1 до 100.  
Рыболовство в пресных водах.  
Личинки имеют длину от 1 до 10 мкм.  
: *Keronopsis*, *Stichotricha*, *Stylonychia*, *Urostyla*.

124. Spirotrichea: *Stylonychia*,  
( X,  
) . : 200 .

Trichostomatia ( *Trichostomatia* ).

**Haptoria** Corliss, 1974

Населяют пресные и солоноватые воды, а также влажные почвы.  
Узкой анастомозирующей цитоплазматической сетью.  
Цитоплазма содержит многочисленные гранулы.  
Личинки имеют длину от 1 до 10 мкм.  
: *Amphileptus*, *Litonotus*, *Loxophyllum*;  
: *Dileptus*, *Trachelius*;  
: *Didinium*, *Homalozoon*, *Lacrymaria*, *Lepidotrachelophyllum*, *Myrionecta* (= *Mesodinium*).

( . 125). *Myrionecta* (= *sodinium*) *rubra*,  
« »,

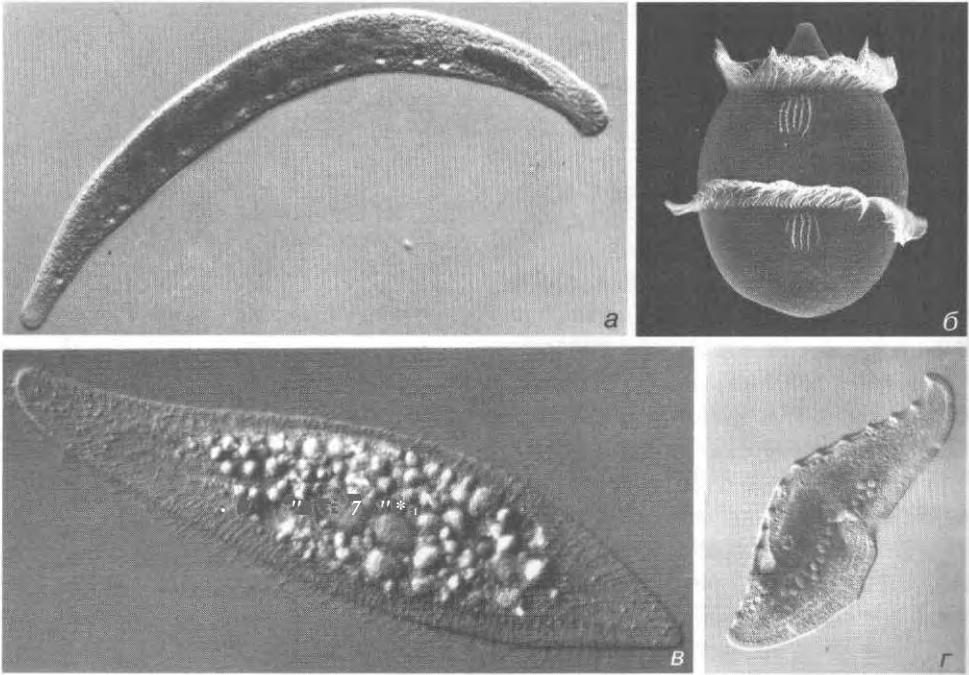
: *Amphileptus*, *Litonotus*, *Loxophyllum*;  
: *Dileptus*, *Trachelius*;  
: *Didinium*, *Homalozoon*, *Lacrymaria*, *Lepidotrachelophyllum*, *Myrionecta* (= *Mesodinium*).

**LITOSTOMATEA** Small & Lynn, 1981

Litostomatea  
Haptoria ( *Haptoria* ),

**Trichostomatia** Butschli, 1889

Trichostomatia ( *Trichostomatia* ).



125. Intramacronucleata, Litostomatea: — *Homalozoon*; — *Didinium*; — *Litonotus*; — *Loxophyllum* ( — 290, — 590, — 150 ). . . . . : — 190, —

( . 126).

: *Balantidium*, *Entodinium*.  
*Ophryoscolex*, *Troglodytella*.

**PHYLLOPHARINGEA** de  
Puytorac, 1974

Trichostomatia ;

ирус

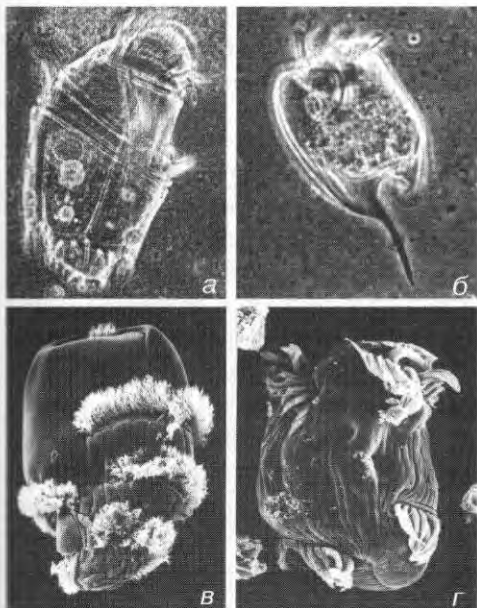


Fig. 126. Litostomatea: — *Ophryoscolex*; — *Entodinium*; — *Trogloditella gorillae*; — *Tetratouxum parvum* ( — 190, — 220, — 440 .



Fig. 127. Intramacronucleata, Phyllopharyngea: *Chilodonella* ( — 680 .

Phyllopharyngia (phyllae),  
 Nassophorea.

*Chilodonella* ( . 127)  
 : *Chlamydodon*, *Chilodonna*, *Chitonella*, *Dysteria*.

**Rhynchodia** Chatton & Lwoff, 1937

**Phyllopharingia**  
 Puytorac et al., 1974

(  
 )  
 cyt

**Suctorina** Claparède & Lachmann, 1858 —

( ),  
: , *Crebricoma*.

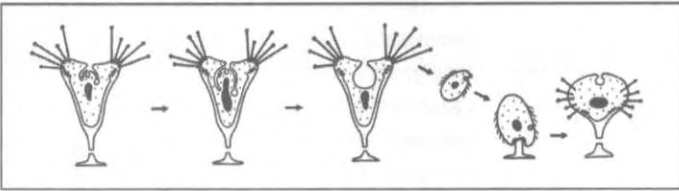
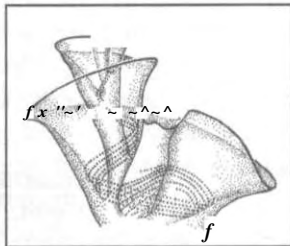
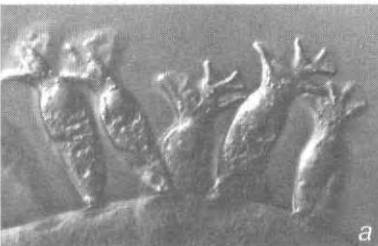
**Chonotrichia** Wallengren, 1895 —

( . 129). **Chonotrichia**, су-

( ),

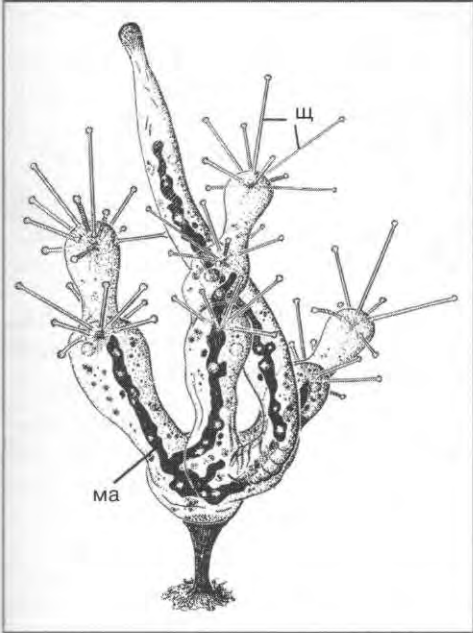
( . 128).

: *Heliochona*, *Spirochona*,  
*Stilochona*.



. 128. Phyllopharyngea  
— *Spirochona gemmipa*  
ra  
( —  
( —  
; — по  
) . . — 200

. 129. Phyllopharyngea  
Acineta ( )  
) .



130).

( . 131).

Fig. 130. Phyllopharyngea: *Dendrosomides grassei*, ( : Batisse: Protistologica 22 [1986] 11) .: 550 .

: *Dendrocometes*, *Discoph*, *Ephelota*, *Tokophrya*.

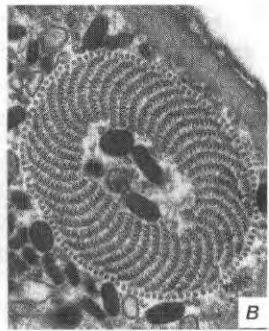
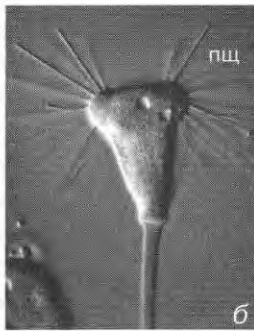
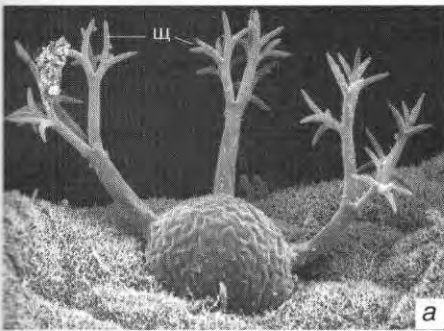


Fig. 131. Phyllopharyngea: — *Dendrocometes* ( ); — *Tokophrya* ( ); — *Acinetopsis* ( — ); — : Grell and Meister: Protistologica 18 [1982] 67). .: a — 450x, — 320x, — 22 .



**NASSOPHOREA** Small & Lynn,  
1981

( . 132).

: *Furgasonia*, *Nassula*.

**Microthoracida** Jankowski,  
1967

Nassulida,  
Microthoracida

279, 281).

: *Microthorax*, *Pseudomic  
rothorax*.

Hypotrichia,

Spirotrichia, Nassophorea

Nassophoria.

**COLPODEA** Small & Lynn,

1981 —

Colpodea

*Colpoda* O.F. M tiller, 1773. 150

**Synhymeniida** de Puytorac et  
al., 1974

( . 115).

( ),

: *Synhymenia*.

**Nassulida** Jankowski, 1967

Colpodea

(>100 )

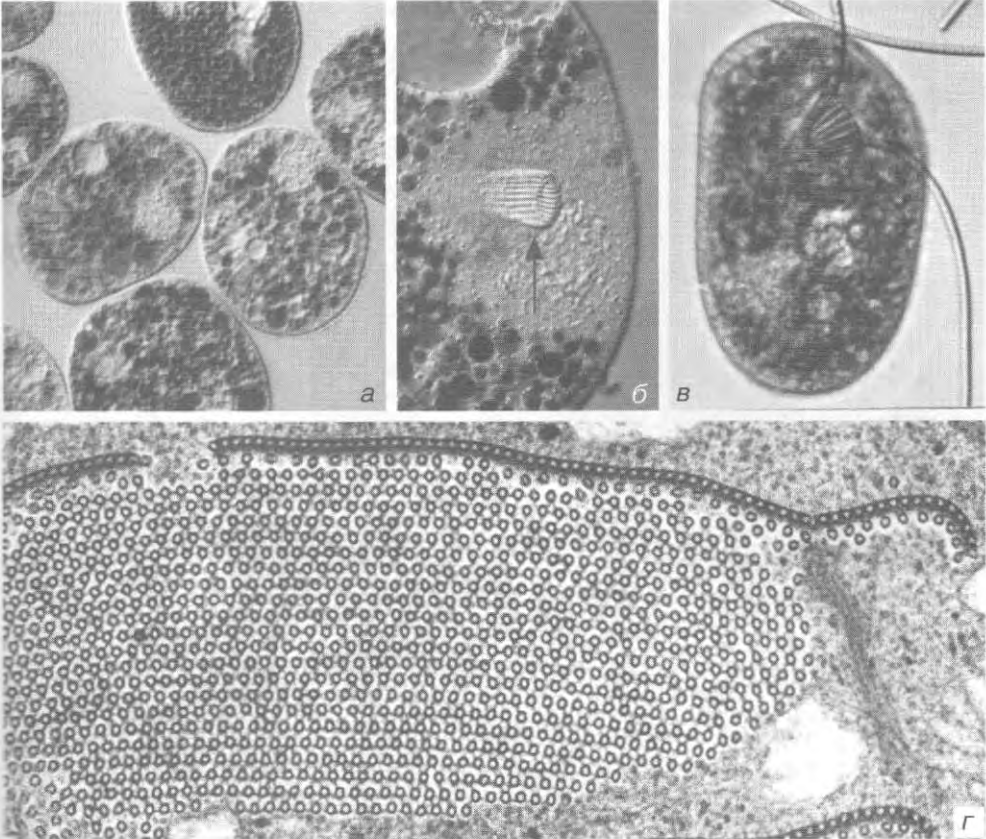


Рис. 132. Intramacronucleata, Nassophorea:

*Nassula ornata* ( ),  
( , ):

: — 120 , — 350 , — 240 , — 47 .

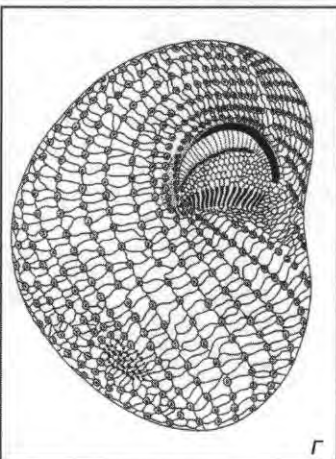
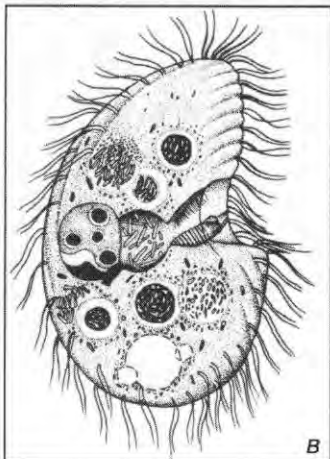
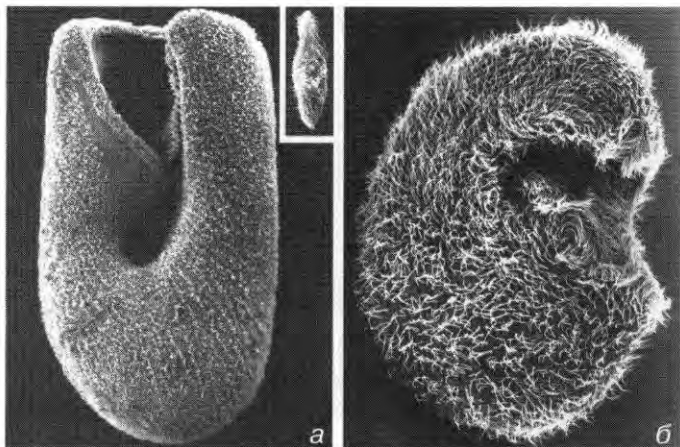
( .  
1J3),  
-  
-  
-  
( 2 ) *Bursaria*  
*truncatella*

: *Bresslaua*, *Bursaria*, *Colpoda*, *Hausmanniella*, *Sorogena*.

**PROSTOMATEA** Schewiakoff,

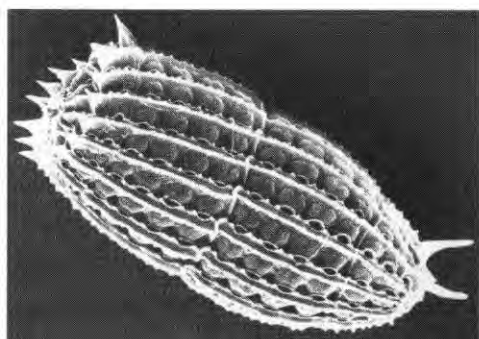
1896

Prostomatea



133. Intramacro-  
nucleata, Colpodea: —  
*Bursaria truncatella* (

*Paramecium*);  
— *Bresslauides australis*;  
— *Colpoda* ( —  
); — *Hausmanniella*  
( —  
) ( —  
; — : Piatt  
and Hausmann: Arch.  
Protistenk. 143 [1993] 297:  
— )  
: — 90 , — 480 .  
— 550 , — 500 .



134. Intramacronucleata, Prostomatea:  
*Coleps hirtus* (

( . 134).

: *Coleps*, *Holophrya*, *Pro-*  
*rodon*.

**PLAGIOPYLEA** Small & Lynn,  
1985

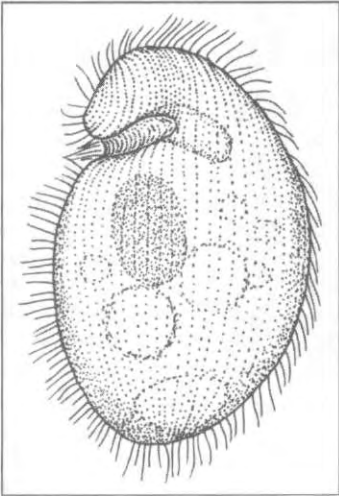


Рис. 135. Intramacronucleata, Plagiopylea:

*Plagiopyla frontata* (

), : 900 .

Величина, мкм, - ( )  
 Цвет, - ( )  
 Место обитания, - ( )  
 Жизненный цикл, - ( )  
 Питание, ;  
 • Особенности: ( . 135).  
 : *Plagiopyla*, *Sonderia*.

**Класс OLIGOHYMENOPHOREA**

de Puytorac et al., 1974

Величина, мкм, -  
 Цвет, - ( )  
 Место обитания, -  
 Жизненный цикл, -  
 Питание, -  
 Особенности, -

Класс **Ciliophora**.  
 Место обитания, - ( )  
 Особенности, -

» ( ) ( . .  
 1376).

Nassophorea,

( )  
 ( )  
 ( )  
 ( )

**Peniculia** Faure Fremiet,

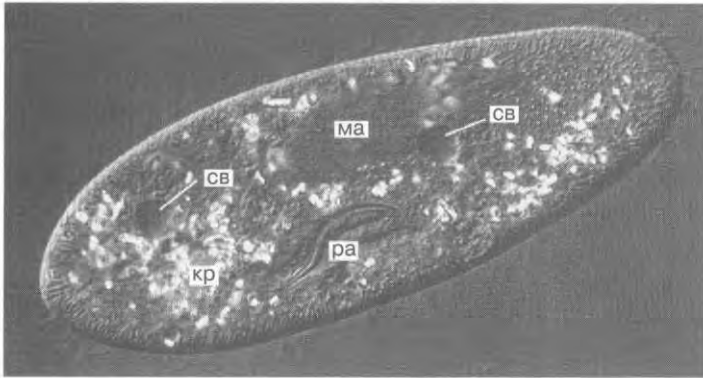
1956

Peniculia -

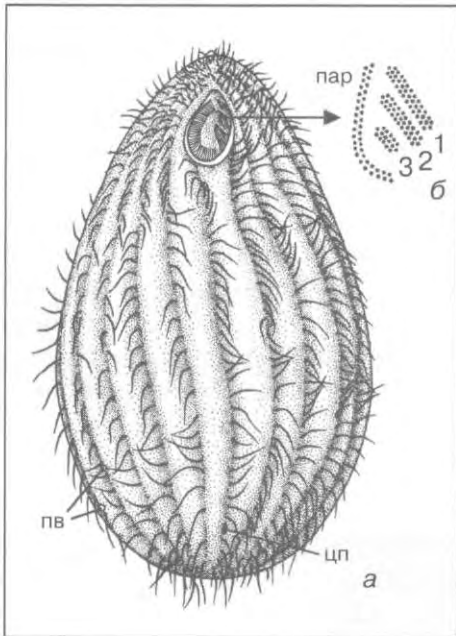
Oligohymenophorea:

« » ( .

, - ( ) -



. 136. Intramacronucleata, Oligohymenophorea: *Paramecium caudatum*.  
 , pa —  
 , —  
 450 .



. 137. Oligohymenophorea: *Tetrahymena*.  
 (1 3)  
 ) ( ), —  
 ). .: — 1 200 .

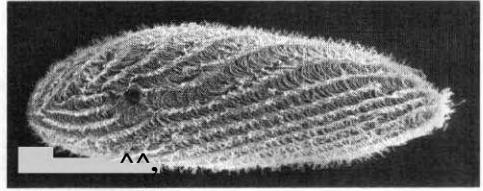
, *Tetrahymena* ( . 137).  
 ;  
 ,  
 — *Paramecium caudatum*.  
 : *Frontonia*, *Paramecium*.

**Scuticociliata** Small, 1967

Hymenostomatia, Scuticociliata  
 ;

*Paramecium* ( . 136) , *Cyclidium*, *Orchitophna*, *Philasteria*, *Pleuronema*, *Uronema*.

**Hymenostomatia** Deltage  
& Hérouard, 1896



138. Oligohymenophorea: *Ophryoglena atra* ( ). : 320 .

Hyme-  
nostomatia  
:  
,  
(=  
, =  
, =  
, =  
( . 137).  
,  
( . 137).  
*Ophryoglena*

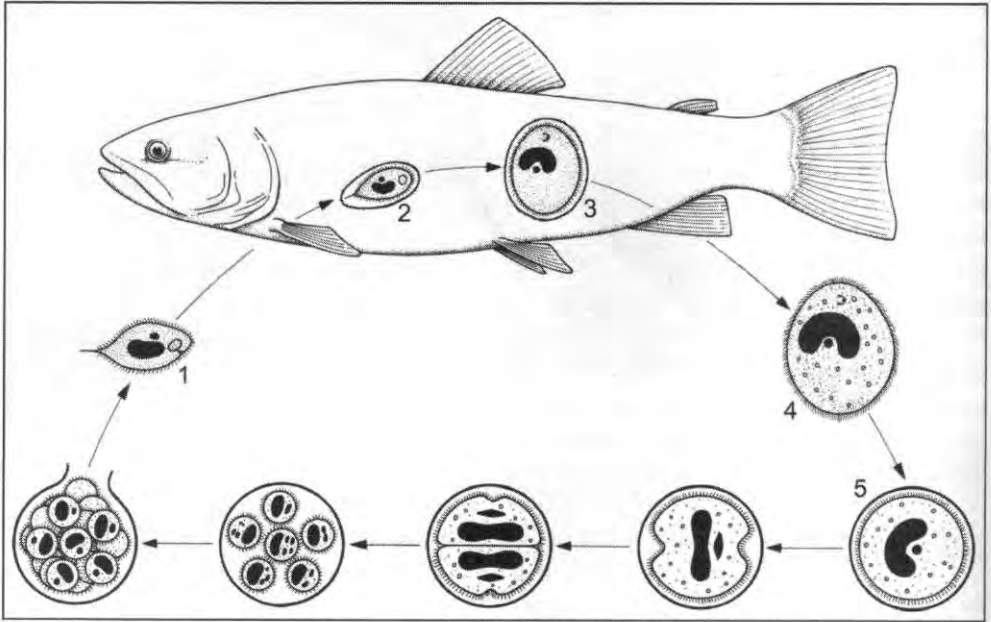
: *Colpidium*, *Ichthyophthi-  
rius*, *Ophryoglena*, *Tetrahymena*.

**Apostomatia** Chatton &  
Lwoff, 1928 —

Hymenostomatia  
:  
,  
,  
(*Ichthyophthirus*)  
(*Ophryoglena*)<sup>1</sup> ( . 138).  
*Tetrahymena pyriformis*  
(рис. 137) . *thermophila*:  
*Ichthyophthirus*

( . 140).  
( ,  
)  
( ).  
: *Foettingeria*, *Hyalophysa*,  
*Spirophrya*.

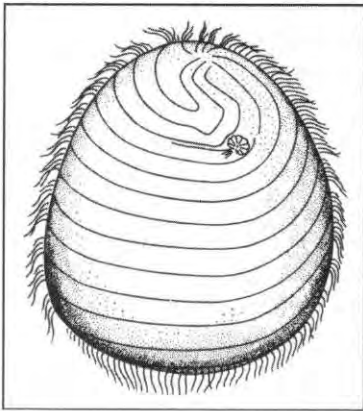
<sup>1</sup> Индузия



139. Oligohymenophorea:  
 ( ), 2 —  
 , 5 —  
 ).

*Ichthyophthirius multifiliis*: 1 —  
 , 3 — , 4 — (

**Peritrichia** Stein, 1859 —



140. Oligohymenophorea:  
*Foettingeria* ( : Corliss: Trans. Amer.  
 Microsc. Soc. 97 [1978] 419). : 480x.

1000  
 —  
 (= )  
 ( . 141).  
 ( ),

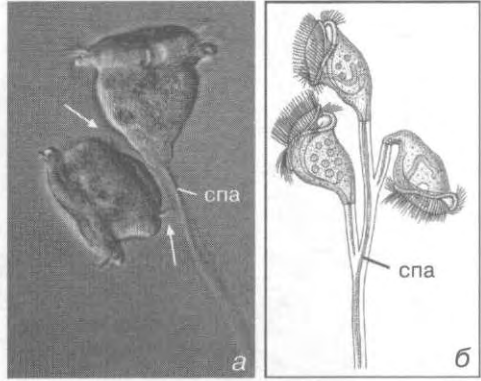
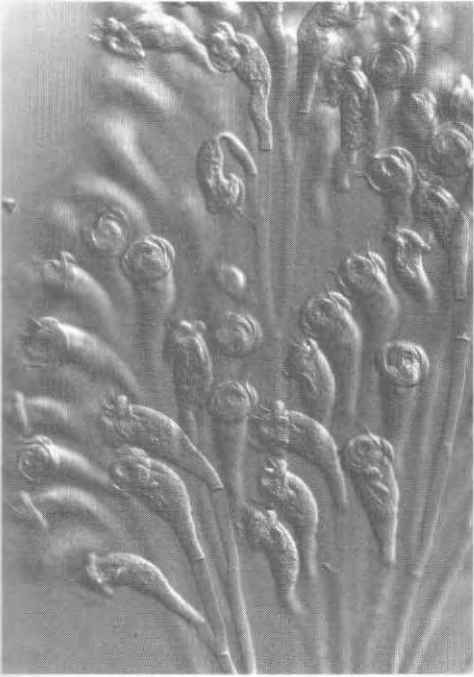


Рис. 141. Oligohymenophorea:

*Epistylis*,

де ( )

Литература

x.

) . : 180 .

**Sessilida** Kahl, 1933

( )

место

клетки

визр,

водоросли

зел,

> (рис. 142),

белок,

структ

привл

росток

мер, *Epistylis*);

по т

во т

*Vorticella* *Carchesium*

142. Oligohymenophorea: — *Vorticella*

; ( )

( ),

*Carchesium*.

( — ).

— 140 .

(*Ophrydium*, . 143).

144).

( )

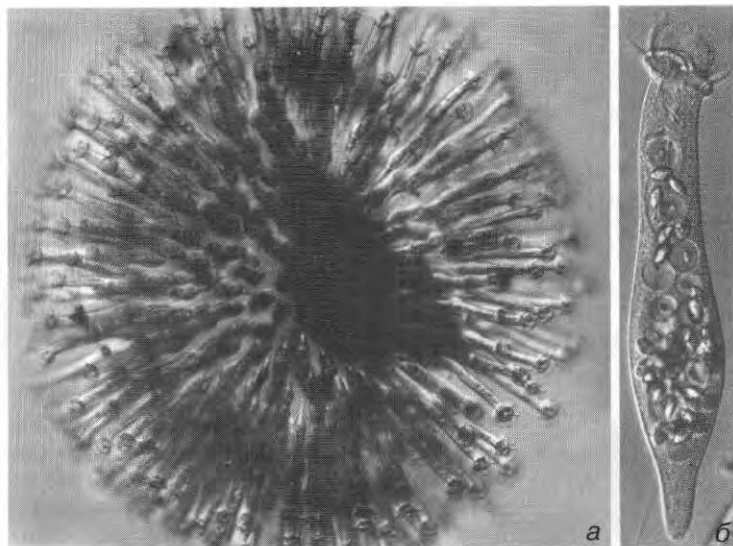
Peritricha

: *Carchesium*, *Cothurnia*,

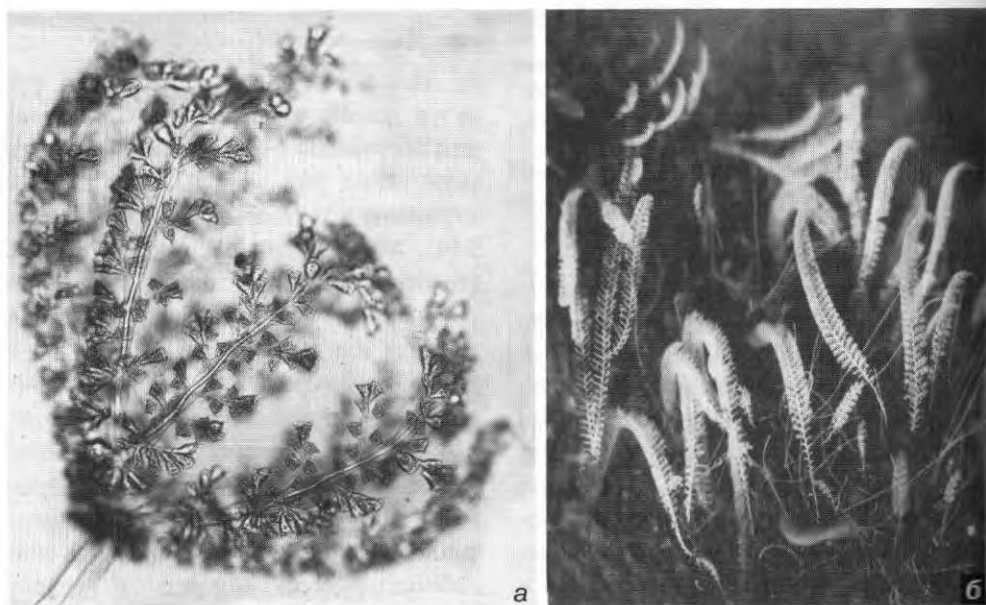
*Epistylis*, *Ophrydium*, *Vaginicola*,

*Vorticella*.

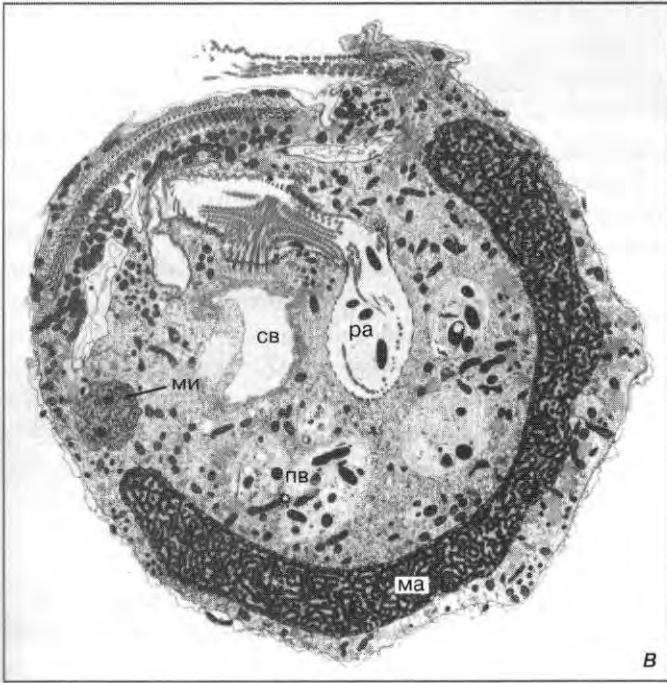
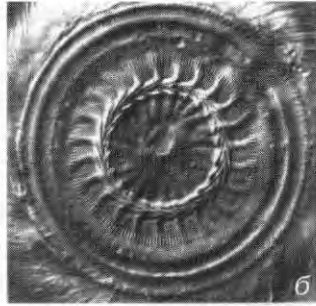
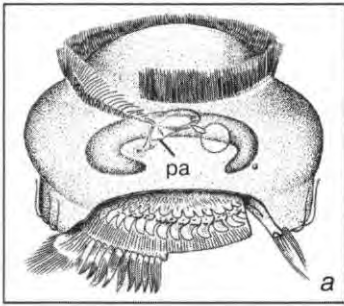




143. Oligohymenophorea: ( ) — ( ) *Ophrydium* ( : Hausmann and Ostwald: *Mikrocosmos* 76 [1987] 129). : a — 35x, — 160x.



144. Oligohymenophorea: a — *Zoothamnium arbuscula*; б — *Z. niveum*, ( — ). : — 80 , — 4 .



145. Oligohymenophorea: *Trichodina*. — ;  
 — ;  
 ( — );  
 — ;  
 , ( ),  
 ( ), ( ),  
 ( ) ( — )  
 ; — :  
 Hausmann and Hausmann:  
 J. Ultrastruct. Res. 74 [1981]  
 131). : a — 800x, —  
 1 , — 2 600x.

**Mobilida** Kahl, 1933

Peritricha  
 Mobilida.

( . 145).

*Trichodina pediculus*

. *pediculus*

. *cyprinis*,

**Clevelandellida** de Puytorac & Grain, 1976

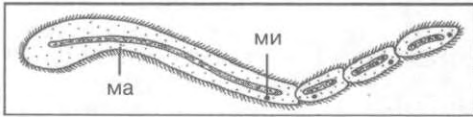
: *Trichodina*, *Urceolaria*.

**Astomatia** Schewiakoff,

1896 —

( . 146) —

Oligohymenophorea



. 146. Oligohymenophorea:

Radio

phrya.

( . 75) .

: *Anoplophrya*, *Haplophrya*,

*Radiophrya*.

Intramacronucleata

(*sedis mutabilis*').

<sup>1</sup> . 158.

: *Clevelandella*, *Nyctotherus*.

**Odontostomatida** Sawaya,

1940

Odontostomatida

147).

8 10

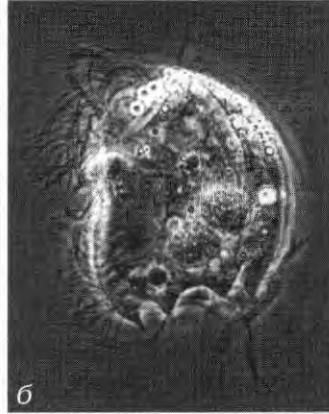
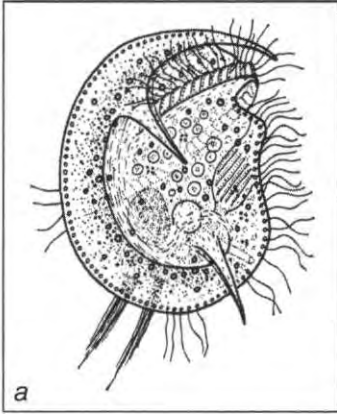
. Odontostomatida

: *Discomorphella*, *Epalxella*,  
*Mylestoma*, *Saprodinium*.

**HAPLOSPORA** Caulery &

Mesnil, 1889 —

*Haplosporidium* ( . 148),



147. Oligohymenophora:  
*Discomorpha pectinata* ( )  
*Saprodinium putrinium* ( )  
 ( —  
 ;  
 —  
 ) . ∴ —500 , —  
 450 .

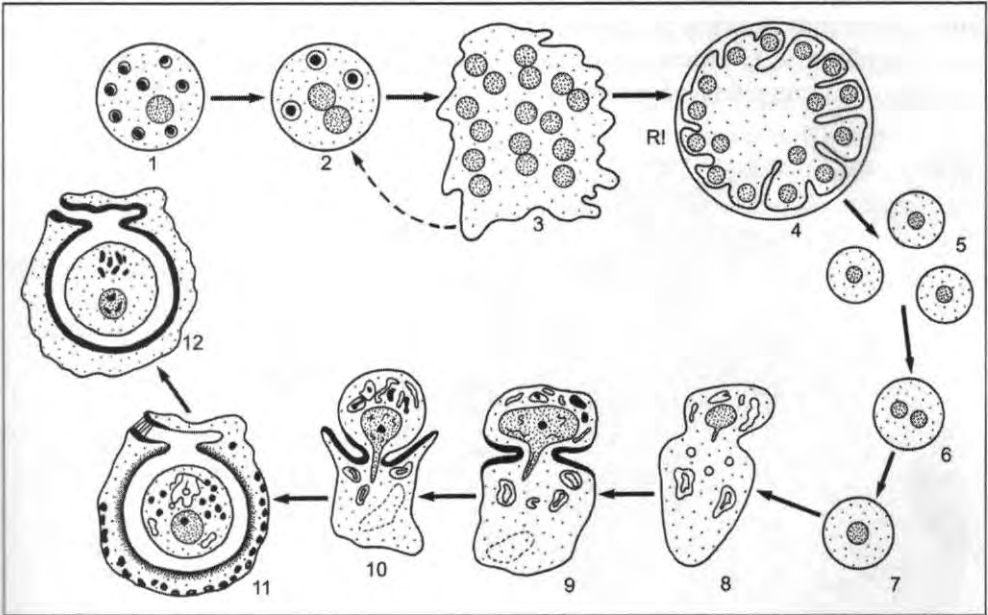
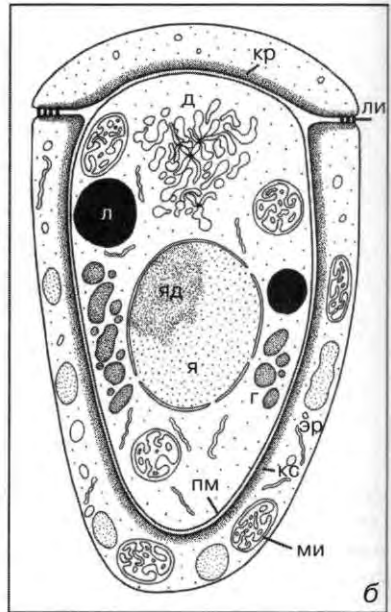
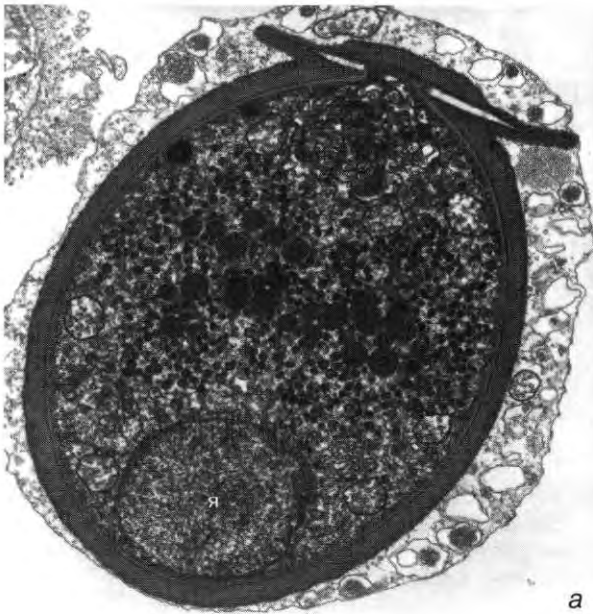


Fig. 148. Alveolata, Haplospora:

1 — *Haplosporidium*. 2 —  
 3 —  
 4 —  
 5 —  
 6 —  
 7 12 —  
 R! — ( ) .

;  
 -  
 -  
 -  
 , -



149. Haplospora: —  
); —

*Minchinia louisiana* ( —  
*Minchinia nelsoni*. —

). : — 11,000 .

Haplo-

spora

Alveolata.

( . 149).

: *Haplosporidium*, *Minchinia*, *Urosporidium*.

**CERCOZOA** Cavalier Smith, 1998

70

250

Rhizopoda *sensu*

von Siebold, 1845  
(Heterokonta)

( . . 181 ).

: *Phytomyxa*, *Reticulofilosa*  
*Monadofilosa*.

**PHYTOMYXA** Cavalier  
Smith, 1998 (Plasmodiophorea) —

*Haplosporidium*

Haplospora Paramyxia

Cercozoa,

Ascetospora.

Reticulofilosa Monadofilosa.

: *Plasmodiophora*, *Sorosphaera*, *Spongospora*, *Tetramyxa*.

**RETICULOFILOSA**

Cavalier Smith, 1998  
(Chlorarachnida) —

Monadofilosa.

( *Reticulosphae*

( . 150).

).

( . 151).

(

)

1

*Plasmodiophora brassica*

4 8

(

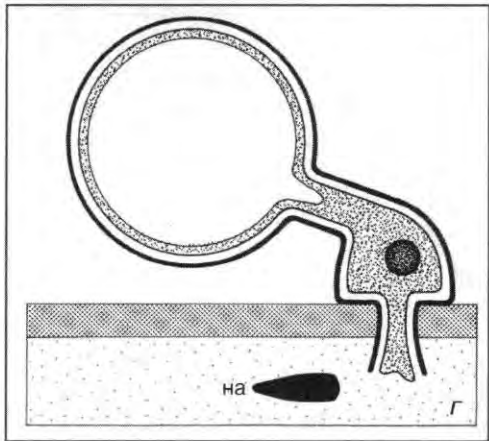
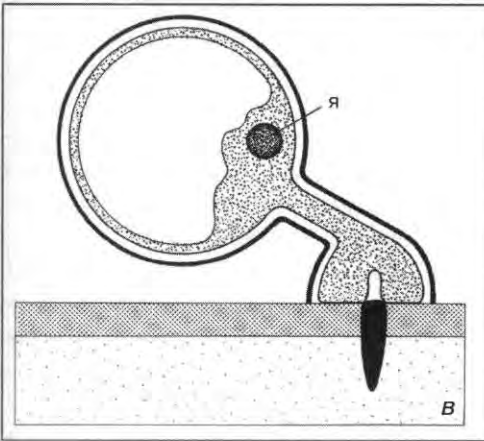
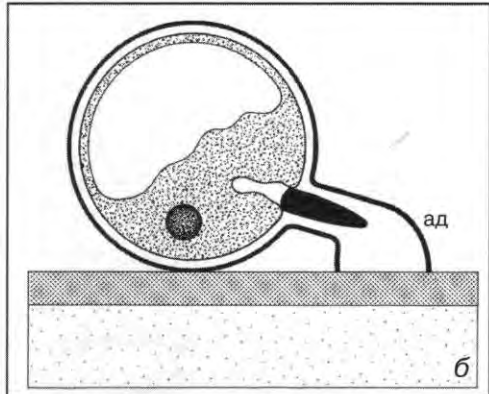
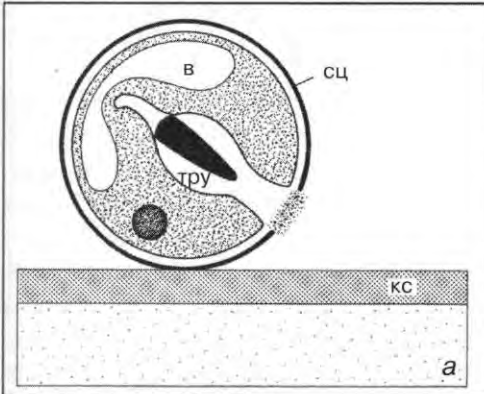
).

(

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(

)



150. Cercozoa, Phytomyxa:

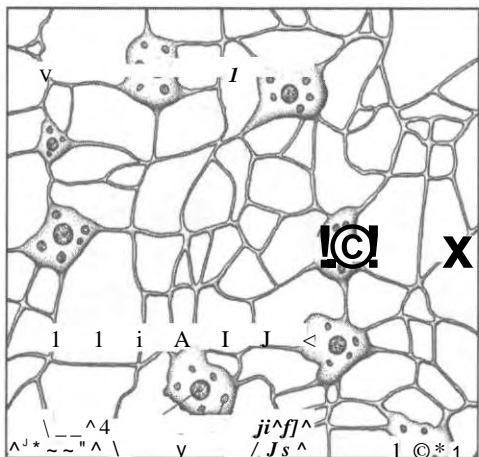
Plasmodiophora

( ). — , — , — ( )

*Chlorarachnion reptans* *Lotharella amoebiformis*.

( ) — .  
 ( )  
 ( )





. 151. Cercozoa, Reticulofilosa:  
Chlorarachnion:

( ) ( ) . : 1 500 .

: Chlorarachnion, Lotharella, Gymnochlora.

**MONADOFILOSA**

Cavalier Smith, 1998

Gromiida)  
1879 (

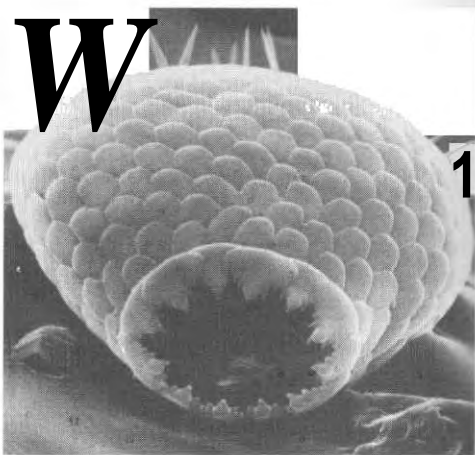
Filosea Leidy,

zoa),

Fungi/Meta

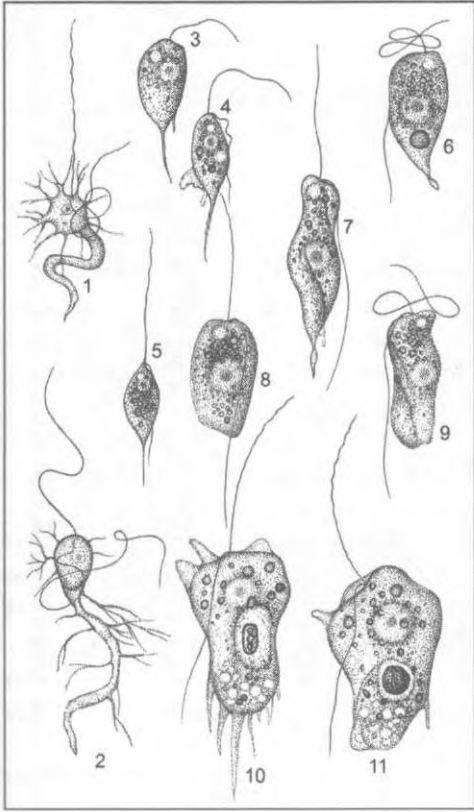
(Lecythium),  
(Pseudodiffugia)  
(Euglypha, . 152).

*Paulinella chromatophora*



. 152. Cercozoa, Monadofilosa:  
Euglypha (

). : 980 .



153. Monadofilosa:  
 1 2 — *Cercobodo\**  
*draco* ;  
 3 5 — *varians*; 6 9 — *norrvicensis*; 10  
 11 — *pyriformis* ( ). : 1 11 —  
 1

(Sarcomonadea)

*Cryothecomonas*,

*Thaumatomonas* (

) *Cercomonas* (

*Cercobodo*

*Cercomonas*. —

0,035 0,040

).  
 ( . 153).  
 : *Cyphoderia*, *Euglypha*,  
*Lecythium*, *Paulinella*, *Pseudodiffugia*,  
*Trinema* ( ); *Cerco-*  
*monas*, *Cryothecomonas*, *Thaumatomonas*  
 ( ).

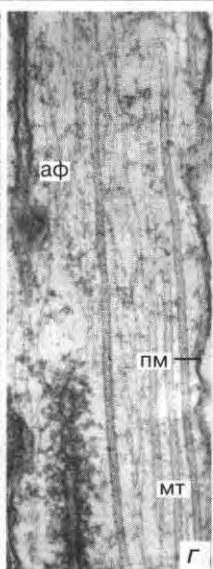
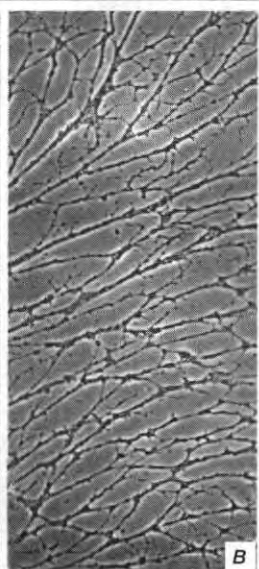
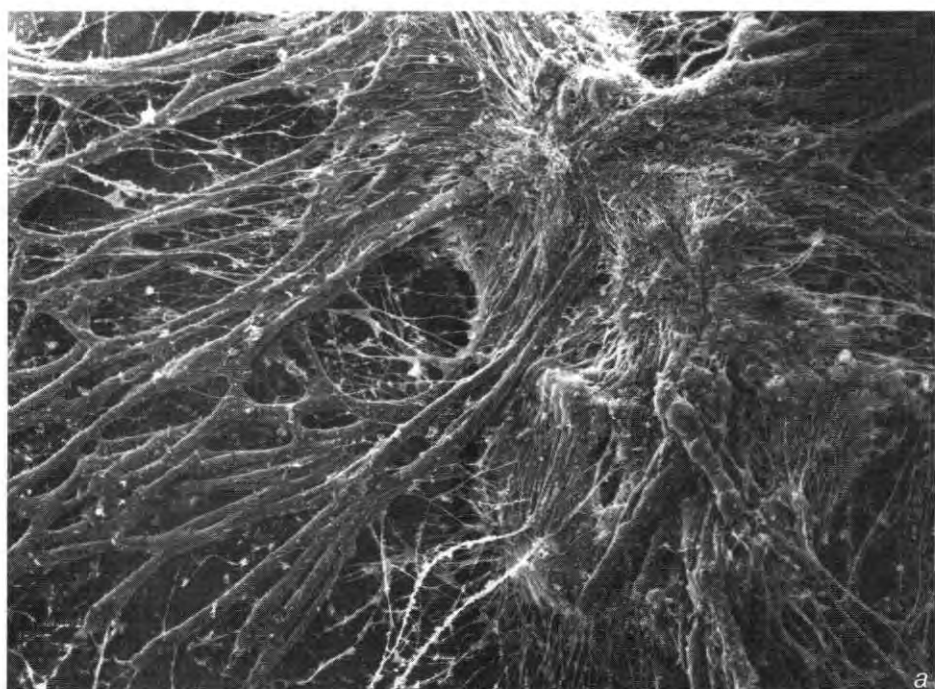
**FORAMINIFERA** d'Orbigny,  
 1828 (Granuloreticulosa) —

Cercozoa

<1 ( . 154).<sup>2</sup>

( . 22 , 23

10) —



154. Foraminifera:

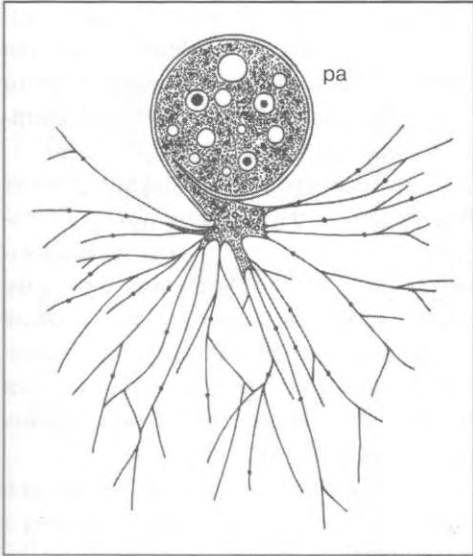
*Reticulomyxa filosa*.

—

(

200, —, — 70

:: — 100, —



*Reticulomyxa* ( . 154)

Allogromiida,

(*Lieberkuhnia*,

*Microgromia*)

nifera:

Forami-

. 155. Foraminifera: *Lieberkuhnia*.  
pa — ( ). .: 220 .

1

36

Granuloreticulosa *sensu* de Saedeleer -

4000

50

: *Athalamea* ( ),

*thalamea* (

, . 155) *Foraminifera* (

20

).

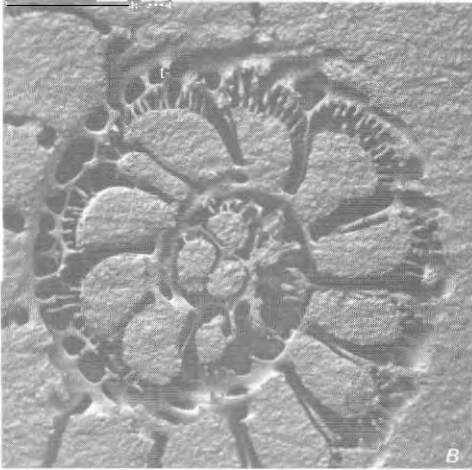
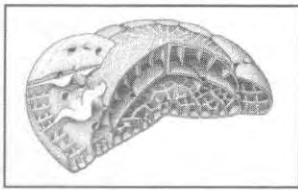
(*Biomy*

, *Pontomyxa*, *Reticulomyxa*)

( ),

*lomyxa filosa*,

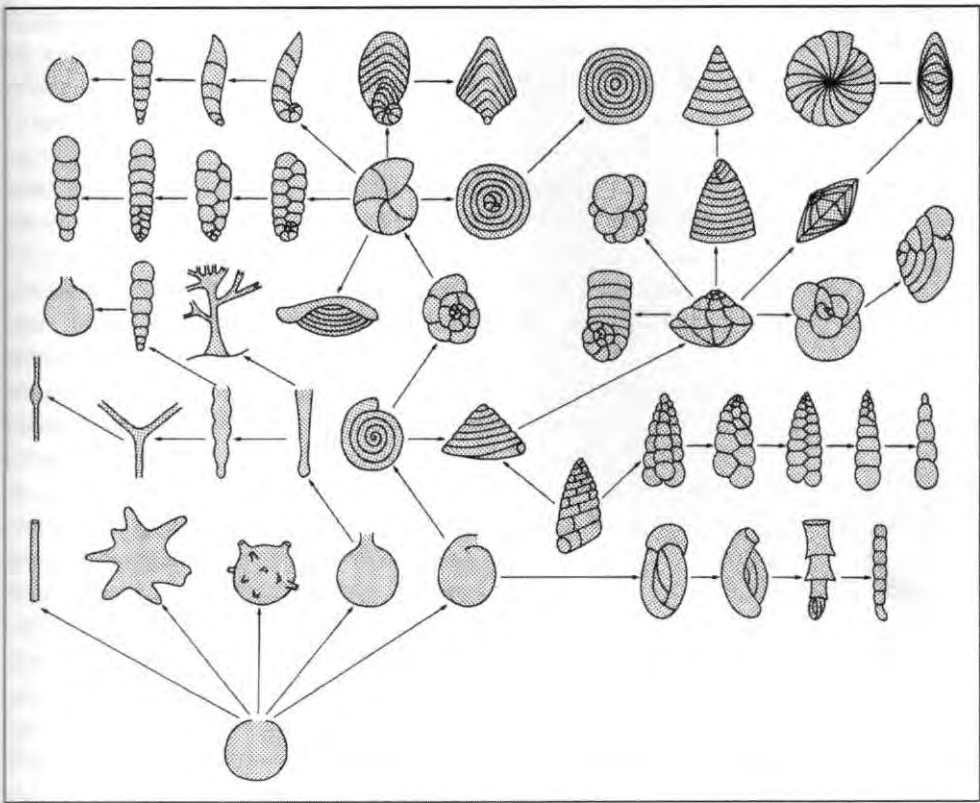
*Reticu-*



156. **Foraminifera:** —  
 Sorites; —  
 Orbitolina; —  
*Parrellina hispidula* ( —  
 ; — : **Hottinger:**  
**Schweizerische Palaont. Abh.** 101 [1980] 115).  
 .: — 20 , — , — 140 .

Foraminifera

- Allogromiida (



157. Foraminifera:

( ).

- Textulariida ( ).

Xenophyophorea (

).

- Fusulinida (

).

- Rotaliida (

- Miliolida (

tularia Allogromiida)

Miliolida),

(Rotaliida

158):

( . 157,

2 3 ),

(

;

),

(

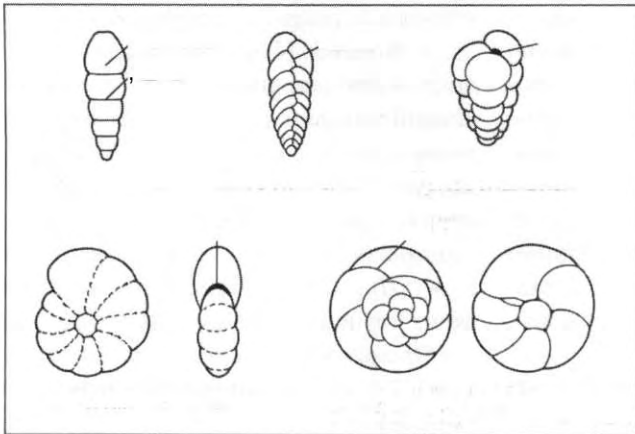
),

(

(

( . 157).

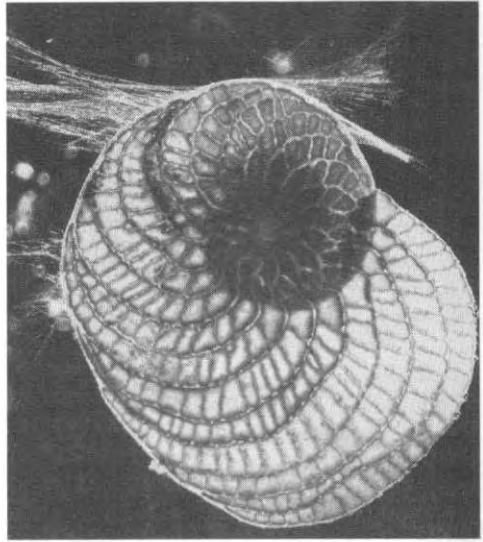
144°



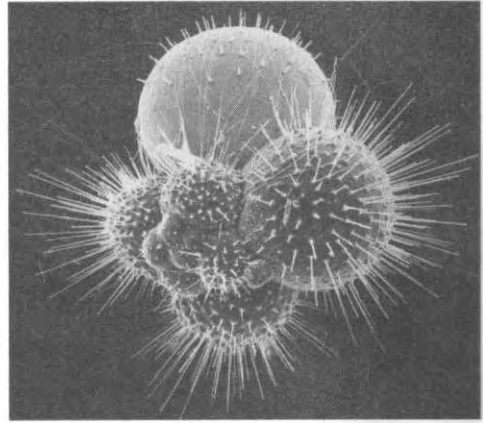
. 158. Foraminifera:

( . 157).

( ), ( )  
 ( . 159)  
 ( . 160).  
 3000  
 ( . 160)  
 — *Gymnodi*  
*nium beii*  
*nium*.  
*Symbiodi*  
 03

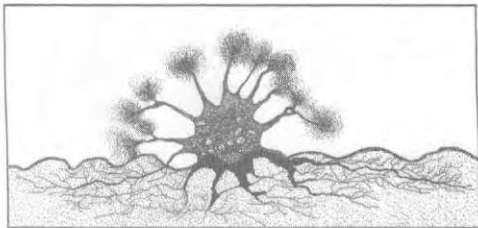


159. Foraminifera: *Heterostegina depressa* ( ).  
 : 5 .

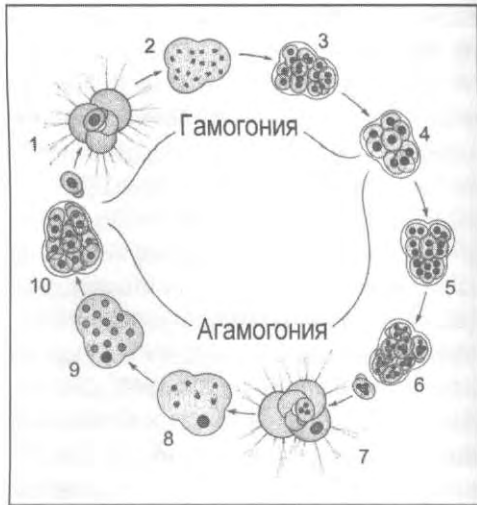


160. Foraminifera: *Globigerina bulloides* ( ).  
 : 170 .





161. Foraminifera: *Astrorhiza limicola*



162. Foraminifera:

*Rotaliella*

*heterokaryotica*.

- 1 —
- 2 —
- 3 —
- 4 —
- 5 —
- 6 —
- 7 —
- 8 —
- 9 —
- 10 —

( . 161).

: *Allogromia*, *Globigerina*, *Hastigerina*, *Heterostegina*, *Lieberkuhnia*, *Orbitolina*, *Reticulomyxa*, *Rotaliella*, *Schwagerina*, *Textularia*, *Triloculina*.

162) —

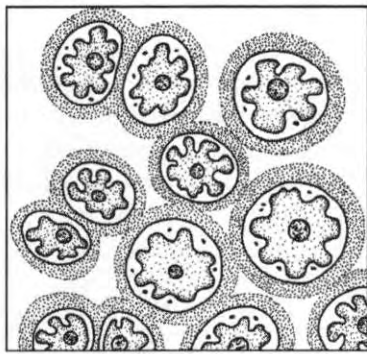
**BILIPHYTE** Cavalier Smith, 1981

**Rhodophyta Glaucocestophyta.**

**RHODOPHYTA** Wettstein,

1901 —

6000



163. Biliphyta, Rhodophyta:  
*Porphyridium omentum*,  
 (

...): 550 .

: (1)

; (2)

; (3)

; (5)

( . 163),

1'

( )

( ,

),

Rhodophyta

Apicomplexa ,  
Alveolata,

: *Porphyridium* (  
).

**GLAUCOCYSTOPHYTA**

Kies & Kremer, 1986 —

Alveolata,

Viridiplantae (= Chloro  
bionta, )

13 (4 )

*Cyanophora*

*doxa*

( )

*Glaucocystis*

*G. nosto*

*chinearum* ( . 164)

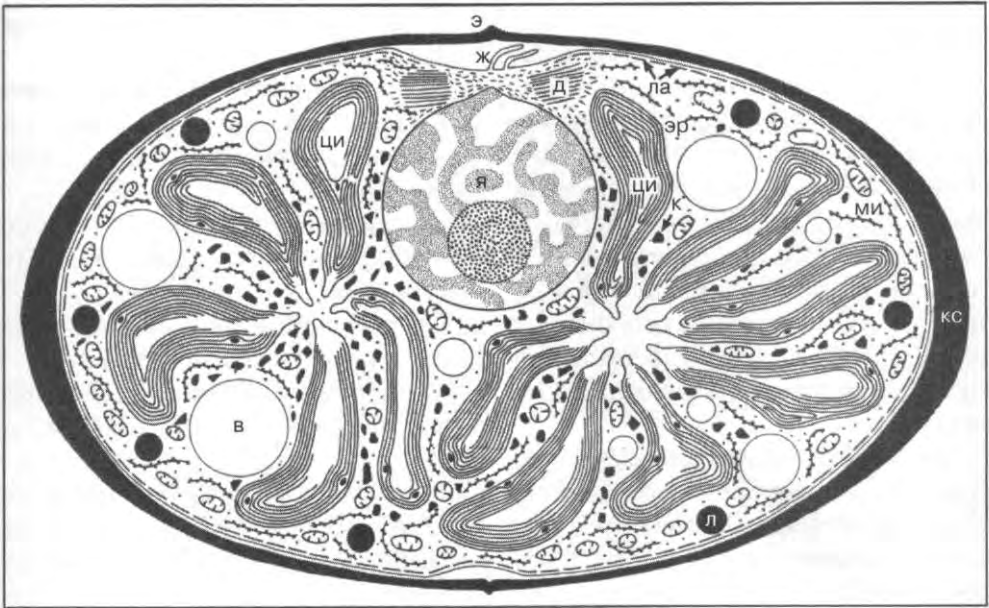
*Trachelomonas* (Euglenida).

(

).

(

)



164. Biliphyta, Glaucocystophyta: *Glaucocystis nostochinearum*.

( ),  
 (= )  
 : 5

(Embryophyta),

*PaulineUa chromatophora*,

*Gymnodinium Massar*

8000

tia,

250

: *Cyanophora*, *Cyanoptycha*,

*Gloeochaete*, *Glaucocystis*.

**VIRIDIPLANTAE** Cavalier Smith,

1981 (Chlorobionta) —

( ),

( )

•  
- ,  
•  
- ,  
•  
•  
•

: (1)

( ), (2)

(3)

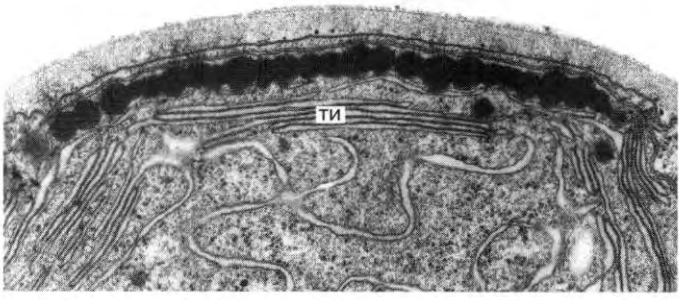
( . . 249)  
(  
[  
],  
),  
( )

*Meso*

*stigma* ( )

);

( )



165. Viridiplantae:  
*Chlorogonium*  
( )  
)

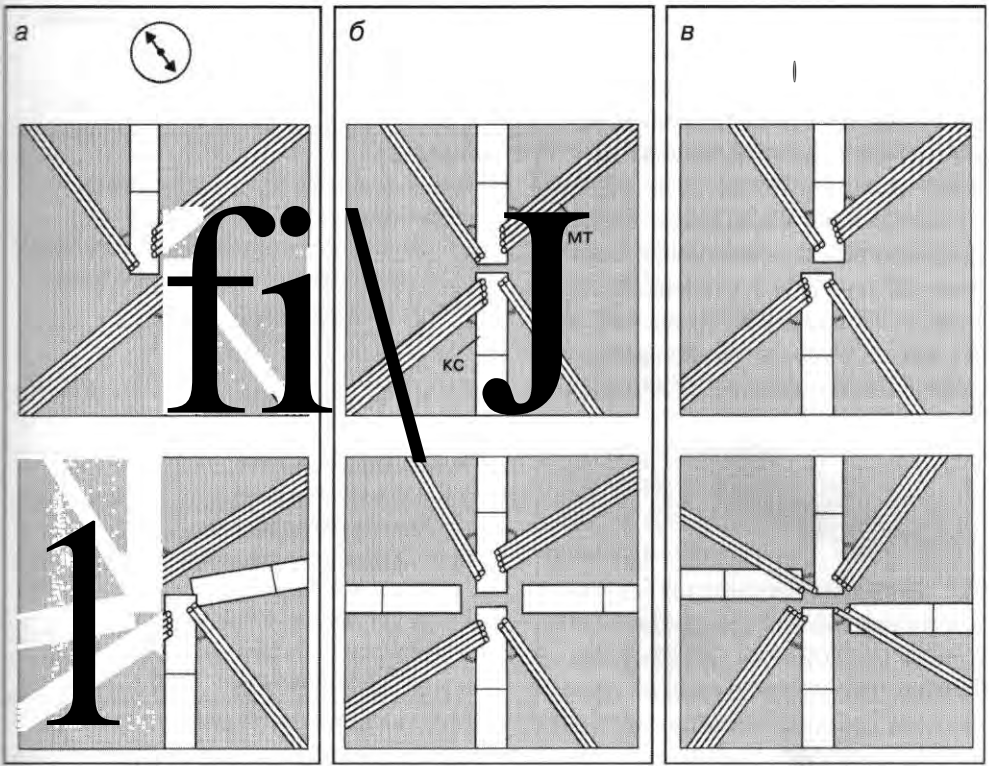


Рис. 166. Viridiplantae:

а) ( ) ; б) ( ) ( ) ; в) ( ) ( ) ;  
 г) ( ) ; д) ( ) ;

е) ( ) ; ж) ( ) ; з) ( ) ;  
 и) ( ) ;

: (1)

Viridiplantae: Chlorophyta Streptophyta,

( ) ;  
 4 4 ( ) ;  
 4 ( ) ; — ;

14.

Viridiplantae.

( )

( ) ; Chlorophyta

( . 166)

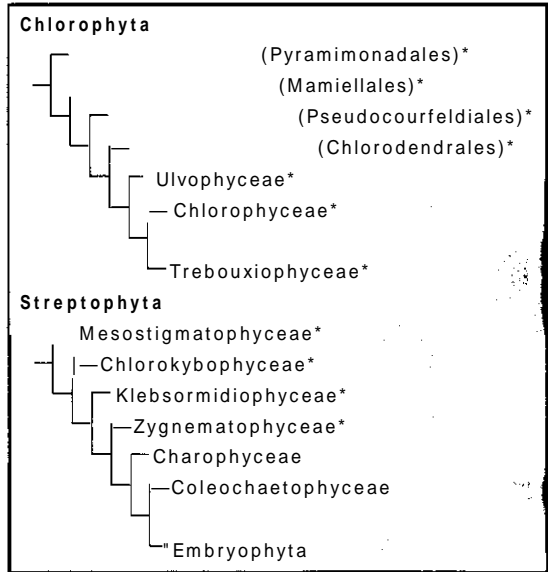
14

**CHLOROPHYTA**  
Pascher, 1914

Chlorophyta

( ) ,

(Ulvophyceae, Trebouxiophyceae, Chlorophyceae).



50 ) ,

( 40

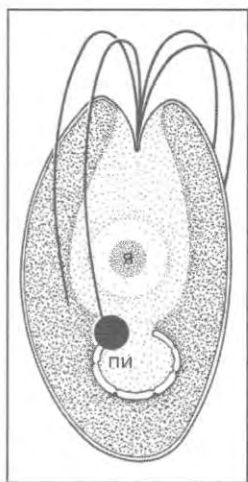
( . 166).

14,  
*t&pusyATI*

В отличие от Volvocida, многоклеточные

Prasinomo

nadea



167. Viridiplantae, Chlorophyta, *Tetraselmis bichlora*.  
1600

1 16, 4 ( . 167).

*Tetraselmis*,

( ).

Pyramimonadales

*Katablepharis* ( . .

62).

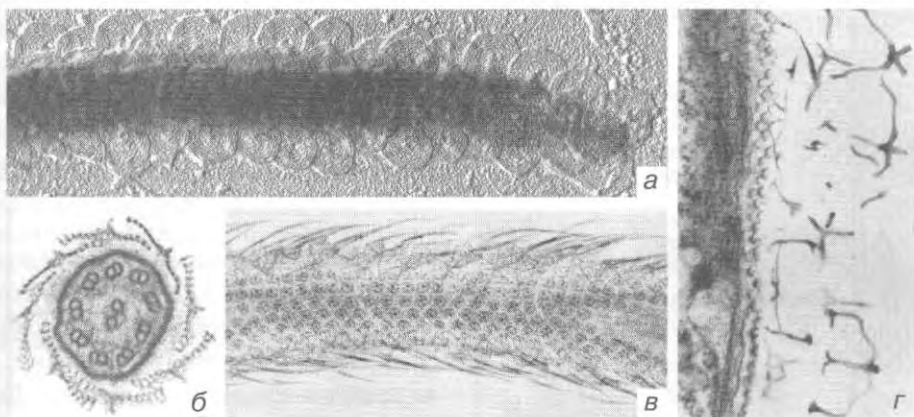
{*Tetraselmis convolutae*

= *Platymonas convolutae*)

*Convoluta roscoffensis*,

: *Pyramimonas*,

*monas* (Pyramimonadales), *Mamiella*,  
(Mamiellales), *Nephroselmis*, *Pseudo*

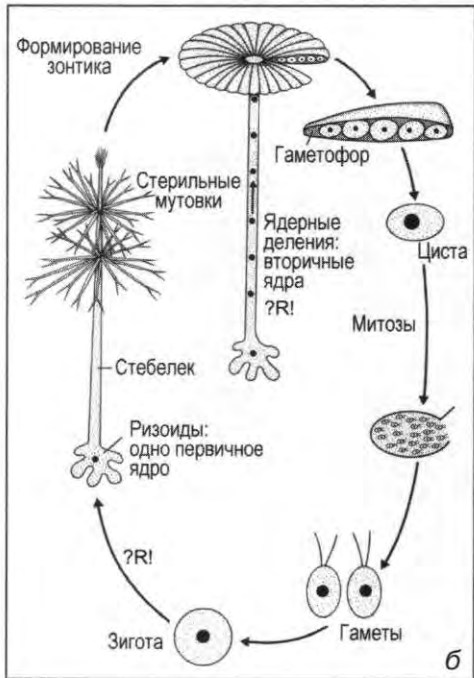
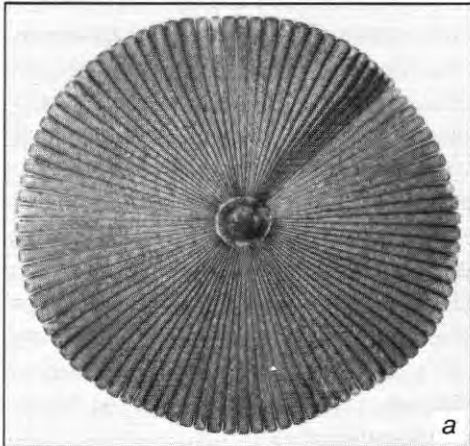


168. Chlorophyta, ( ), — *Mantiella squamata*; — *Mamiella gilva*; , — *Pyramimonas tetrahynechus* ( . . 47 , — 68 , —



*scourfeldia* (Pseudoscourfeldiales), *Tetra-selmis* (Chlorodendrales), *Prasinomonas*.

**ULVOPHYCEAE** Mattox & Stewart, 1984 —



(*Ascosiphonia*, *Cladophora*, *Derbesia*, *Ulothrix*)

(*Ulva*, *Caulerpa*, *Halimeda*).

(*Dasycladales*).

diales).

( . . . 166).

**Dasycladales**

( -

) ,

(

)

( . 169).

— *Acetabu-*

*laria acetabulum* —

: *Acetabularia*, *Dasycladus*.

**TREBOUXIOPHYCEAE** Friedl,

1995 —

( , -

)

. 169. Chlorophyta, Ulvophyceae: *Acetabularia*: — —

( ). . . — 8 .

Trebouxiophyceae —

( . 170).

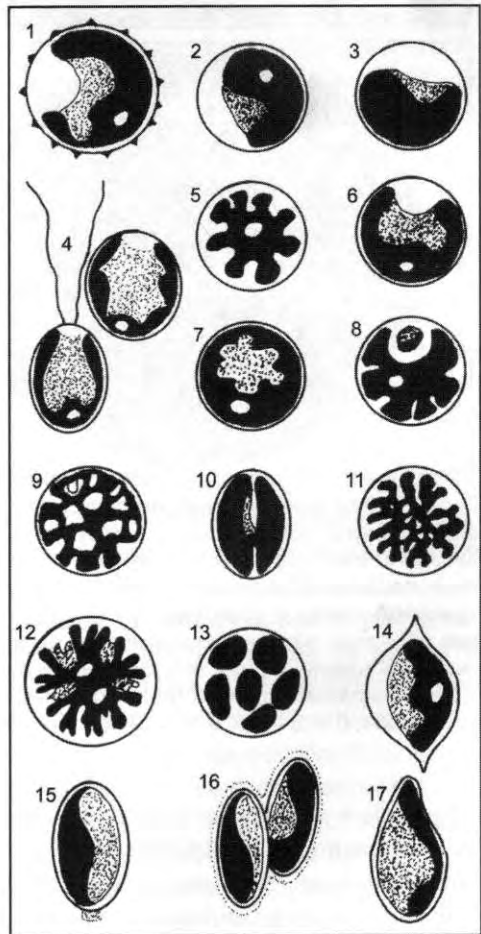
*Chlorella* (*cium bursaria*)

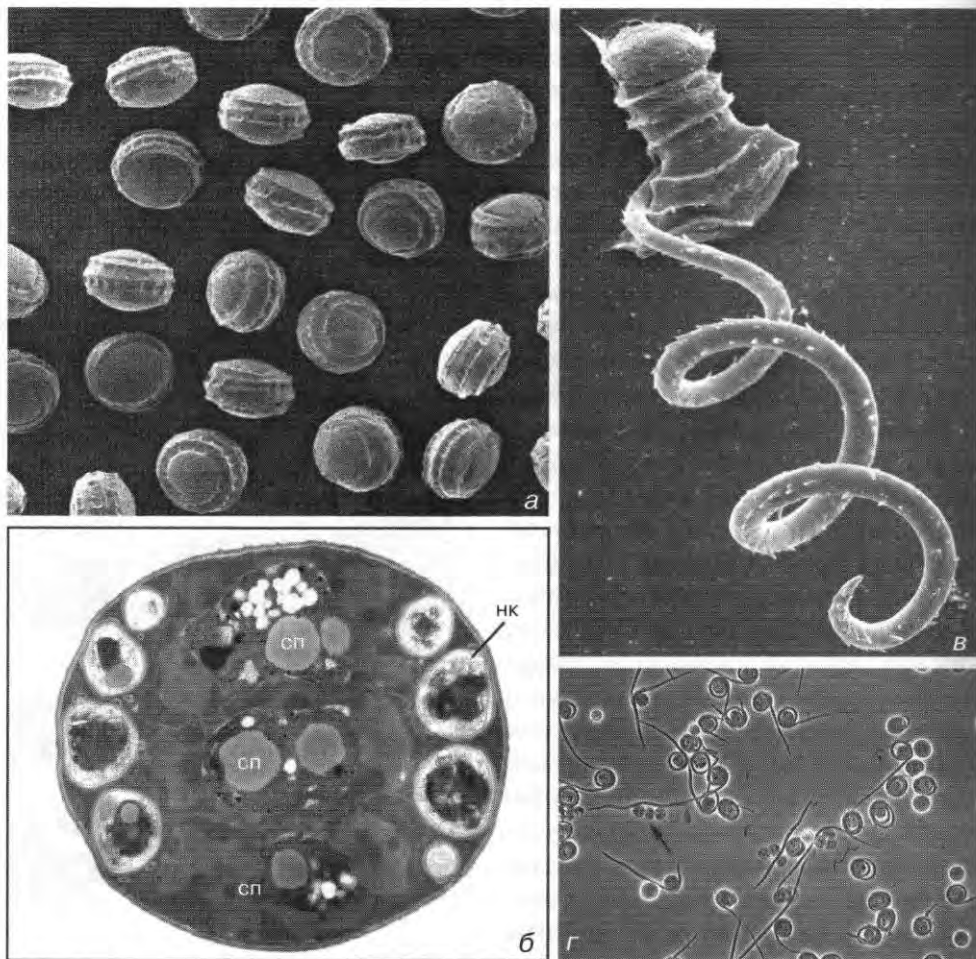
*Chlorella*)

*Trebouxia* —

. 170. Chlorophyta:

: 1 — *Trochiscia*, 2 — *Chlorella*,  
 3 — *Palmellococcus*, 4 — *Chlamydomonas*  
 ( ), 5 —  
*Radiosphaera*, 6 — *Chlorococcum*, 7 — *Neo*  
*chloris*, 8 — *Trebouxia*, 9 — *Spongiochloris*,  
 10 — *Myrmecea*, 11 — *Dictyochloropsis*, 12 —  
*Macrochloris*, 13 — *Bracteacoccus*, 14 —  
*Scotiellopsis*, 15 — *Pseudococcomyxa*, 16 —  
*Coccomyxa*, 17 — *Choriocystis* ( : Kremer:  
*Mikrokosmos* 87 [1998] 25). : 1 11  
 15 17—1 , 12 —350x, 13 14—550x.





171. Trebouxiophyceae: *Helicospohidium* sp.: (a) spores; (б) cross-section of a cell with spores (СП) and other organelles (HK); (в) filamentous structure; (г) spores with flagella. ( : Boucias et al.: J. Eukaryot. Microbiol. 48 [2001] 460). a—2 800x, б—3 200x, в—5 100x, г—600x.

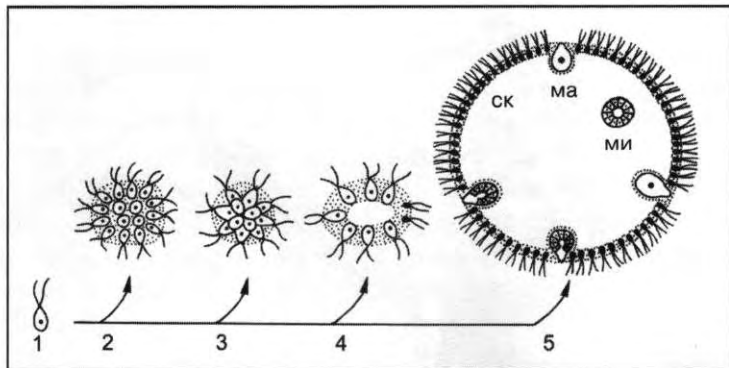
*cosporidium parasiticum* - Myxozoa  
 Tre- Microspora) Ascomycetes.  
 bouxiophyceae.  
 Cnidospora (

, ; -  
, , , ,  
,  
. *Helicosporidium*  
( ),  
( ),  
( ),  
)  
171).  
5 9  
3/4  
*Helicosporidium*  
( )  
( )  
24  
« »  
3,5  
72  
« »  
« »

(  
)  
(  
)  
*Helicosporidium*  
: *Chlorella*, *Nanochlorum*,  
*Trebouxia* (  
) , *Helicosporidium* (  
)  
*Helicosporidium*

**CHLOROPHYCEAE**

Christensen, 1994 (Phytomonadea) —  
, Volvocida  
(Volvocales) Chlorococcales,  
— Chaetophorales Oodogonia  
les,  
(  
)  
*Oodogoniales*  
;



172. Chlorophyta, Chlorophyceae:  
 monas (1), Gonium (2), Pandorina (3),  
 Volvox (5), Eudorina, Volvox

Eudorina (4)

Chlamydo-

( )

**Volvocida** France, 1894

(Volvocales) —

Volvocida —

Polytoma, Hyalogramonium,

( )

: Chlamydomonas, Chlorogonium, Dunaliella, Pandorina, Volvox.

**Chlorococcales** Marchand,

1895 —

(Chlamydomonas, Chlorogonium),

1000

: Goni-

um, Eudorina, Pleodorina, Volvox (172).

(

).

*Chlamydomonas*

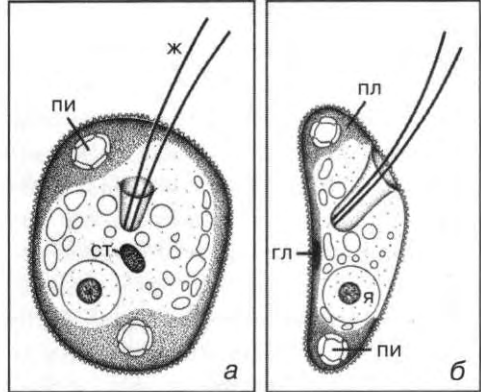
: *Chlorococcum*, *Pediastrum*, *Scenedesmus*.

**STREPTOPHYTA** Jeffrey,

1982

(Charales, Coleochaetales Embryophyta),

(Mesostigmatales, Chlo-rokybophyceae, Klebsormidiophyceae Conjugatophyceae)



173. Viridiplantae, Streptophyta, Mesostigmatophyceae: *Mesostig viride*: ( ) ( ), — ( ) .  
 : 2 200 .

**MESOSTIGMATOPHYCEAE**  
 Marin & Melkonian, 1999

( . 173),

**KLEBSORMIDIOPHYCEAE**

van den Hoek et al., 1995

Klebsormidiophyceae

15

1

: *Mesostigma* (  
) , *Chaetosphaeridium* (  
).

*Klebsormidium* —

**CHLOROKYBOPHYCEAE**

Bremer, 1985

Chlorokybophyceae

(

: *Klebsormidium* (

), *Raphidonema*, *Stichococcus*.

**CONJUGATOPHYCEAE**

Engler, 1892 (Zygnematophyceae) —

: *Chlorokybus atmos*

*phyticus*.

Amoebozoa,

Lobosa Conosa.

LOBOSA Carpenter,

1861 —

Conjugatophyceae

( ) . 174.

: *Closterium*, *Micrasterias*.

AMOEBOZOA Luhe, 1913

Acarpomyxea

(

).

Amebozoa

Cercozoa Schizopyrenidea.

*Multicilia*

Conosa.

Conjugatophyceae

(Gymnamoebia, Acarn)  
(Testacealobosea).

GYMNAMOEBEA Haeckel,

1862

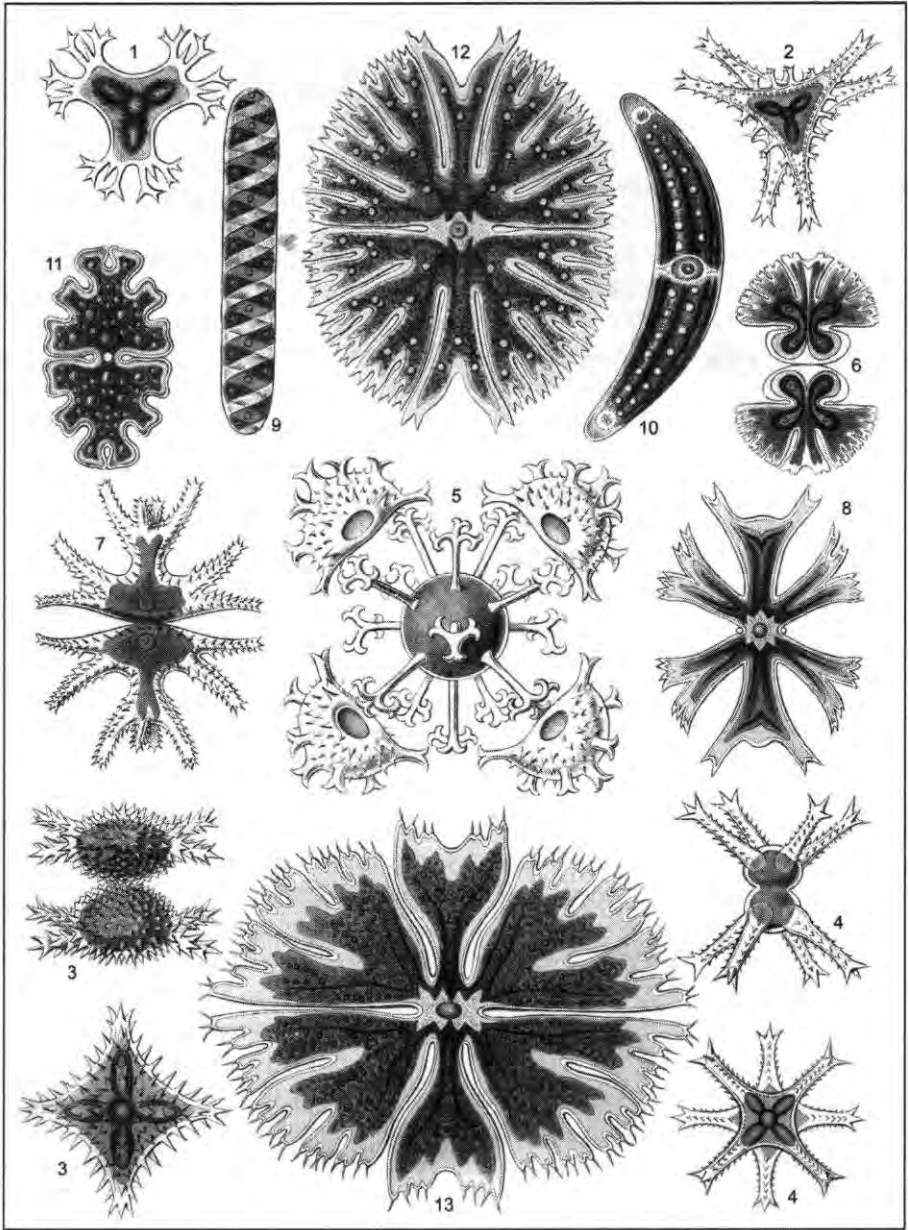
( . 175).

( . 176 )

(*Vannella*, . . 8).

( , (Gymnamoebia)).

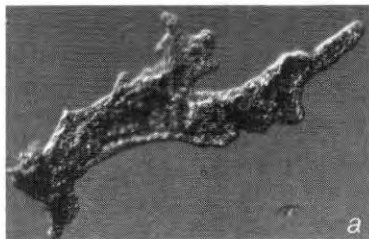




174. Streptophyta, Conjugatophyceae:

: 1 — *Staurastrum furcatum*, 2 — *S. vestitum*, 3 — *S. aculeatum*, 4 — *S. paradoxum*, 5 — *S. spinosum*, 6 — *Micrasterias denticulata*, 7 — *M. trigemina*, 8 — *M. melitensis*, 9 — *Spirotaenia condensata*, 10 — *Closterium costatum*, 11 — *Euastrum pecten*, 12 — *E. agalma*, 13 — *E. apiculatum* ( : Haeckel: *Kunstformen der Natur*. Verlag des Bibliographischen Instituts, Leipzig 1899 1904).

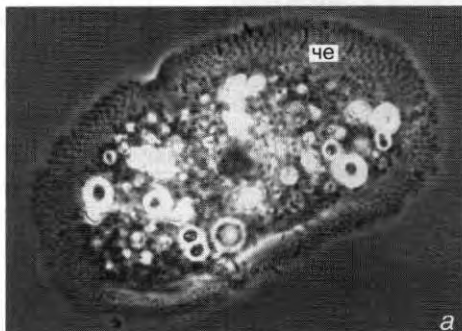
. 175. Amoebozoa,  
Lobosa, Gymnamoebea:  
*Amoeba proteus*:



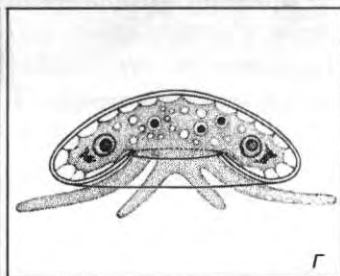
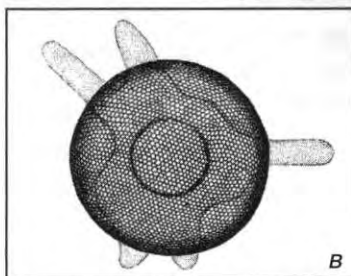
( )  
( )

— 180 .

. 176. Gymnamoebea  
( ) Testacealobosea  
( ) : — *Cochliopodidum*,



( ) ; —  
*Diffugia*; , —  
*Arcella vulgaris*,



( —  
, ; —  
) . : — 800 ,  
— 450 , — 220 .

*nense*.

( . . 259),

( . . 26).

(*Acanthamoeba*).

*Multicilia*

*Amoeba proteus*.

*Vannella* , *Hartmannella*,  
*Chaos caroli*

*Acanthamoeba*.

TESTACEALOBOSEA de Seadeleer, 1934 —

*Acanthamoeba*,  
*Acanthamoeba castellanii*, *A. culbertsoni* *A. polyphaga*

*Cochliopodium* ( . 176 )

*Acanthamoeba*,  
*Acanthamoeba*

( . . 221 ).

: *Acanthamoeba*, *Amoeba*, *Chaos*, *Cochliopodium*, *Dactylamoeba*, *Hartmannella*, *Mayorella*, *Multicilia*, *Saccamoeba*, *Thecamoeba*, *Vannella*.

( . 1765, . . 32 , )

ACARPOMYXEA Page, 1976

( . 176 ,

).

: *Arcella*, *Diffugia*, *Hyalosphenia*, *Nebela*.

( . . 23, 9).

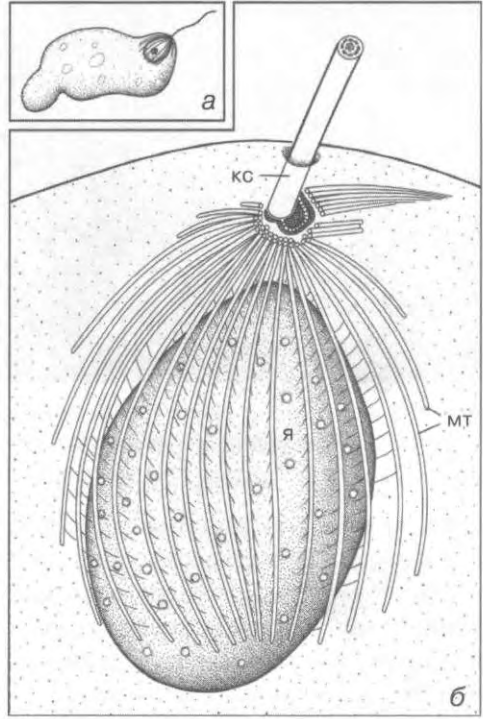
CONOSA Cavalier Smith,

1998

: *Corallomyxa*, *Leptomyxa*,  
*Stereomyxa*.

Conosa

Инфузория **ARCHAMOEBA**  
 Cavalier Smith, 1983



177. Amoebozoa, Conosa, Archamoeba:  
 Mastigina ( ),

( . 177).

( ) ( ) ( ) , —  
 ( ) . ∴ — 250 , —  
 12

*Pelomyxa*

*palustris* ( . 178),

Rhizopoda Pelobiontida  
 Page, 1976.

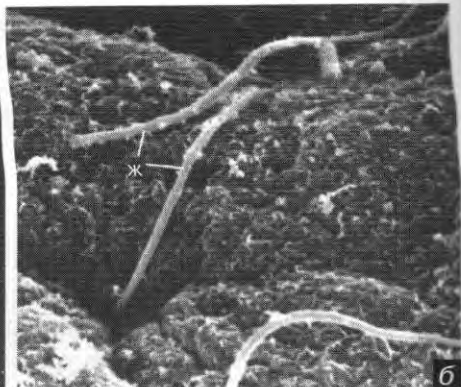
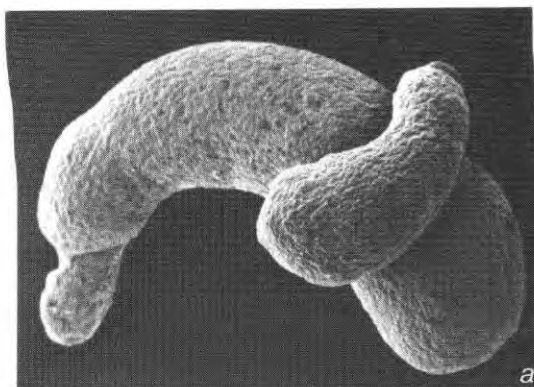
XIX

1 5

( )

( . 259).

*Mastigella* *Pelomyxa*. —  
 9x2+2



178. Archamoeba:

*Pelomyxa palustris* ( ) ( ) ( )

: — 100 , 6 — 8 .

*Mastigina.*

*Mastigella Mastigamoeba*

*Entamoeba histolyti-*

*ca.* —

*Enta-*

*moeba.*

: *Entamoeba, Mastigella, Mastigina, Pelomyxa, Mastigamoeba (= Phreatamoeba).*

MYCETOZOA de

1859

Acrasea,

4

(Protostelea,

Myxogastrea Dictyostela)

(Aconchulina).

Acarpomyxea

: *Cavostelium*, *Ceratiomyxa*,  
*Protostelium*.

MYXOGASTREA Olive, 1970 —

EUMYXA Cavalier Smith,

1998

Eumyxa

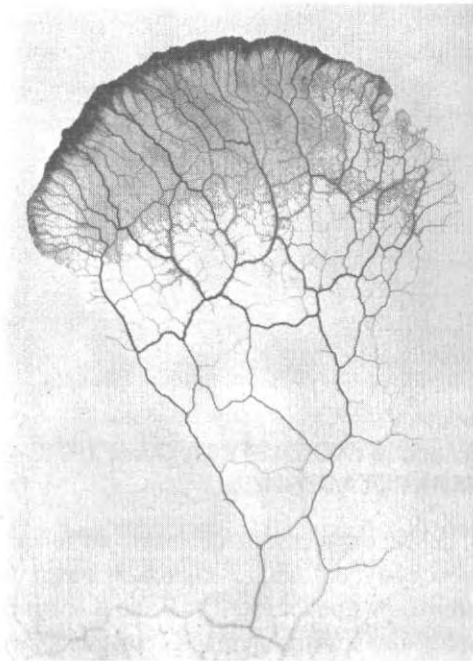
: Protostelea Myxogastrea,

1

( . . . 28),

PROTOSTELEA Olive, 1970 —

( 12 ) ( . . 179).



. 179. Conosa, Mycetozoa, Myxogastrea:  
*Physarum confertum* ( :  
Stiemerling: Cytobiologie 1 [1970] 399). — :  
2x.

: *Echinostelium*, *Physarum*.

*Trichia*.

**DICTIOSTELA Olive,**

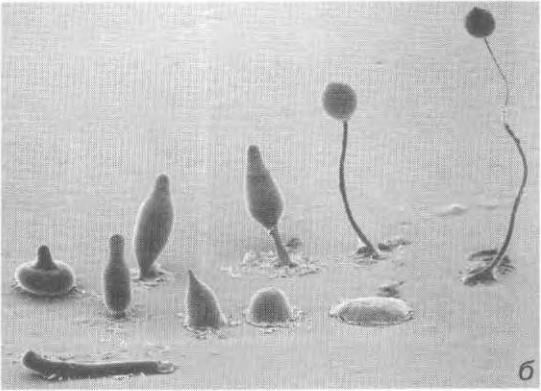
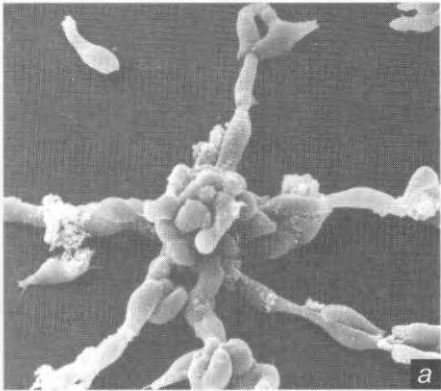
1970 —

( . 180, 316).

( . 180 ).

( , ).

1



180. Mycetozoa, Dictyostela: — ; —  
*Dictyostelium* ( — ; — ) . : — 620 , — 40 .

Gromiida

( . 181, . . 22 ).

Lobosa (Gymnamoebae, Acarpomyxea  
 Testacealobosea)

6 , , -

, Aconchulina

: *Acytostelium*, *Dictyostelium*, *Polysphondylium*.

( . . 22 ),

**ACONCHULINA**

de Saedeleer, 1934

( . . 283),

chulinida)

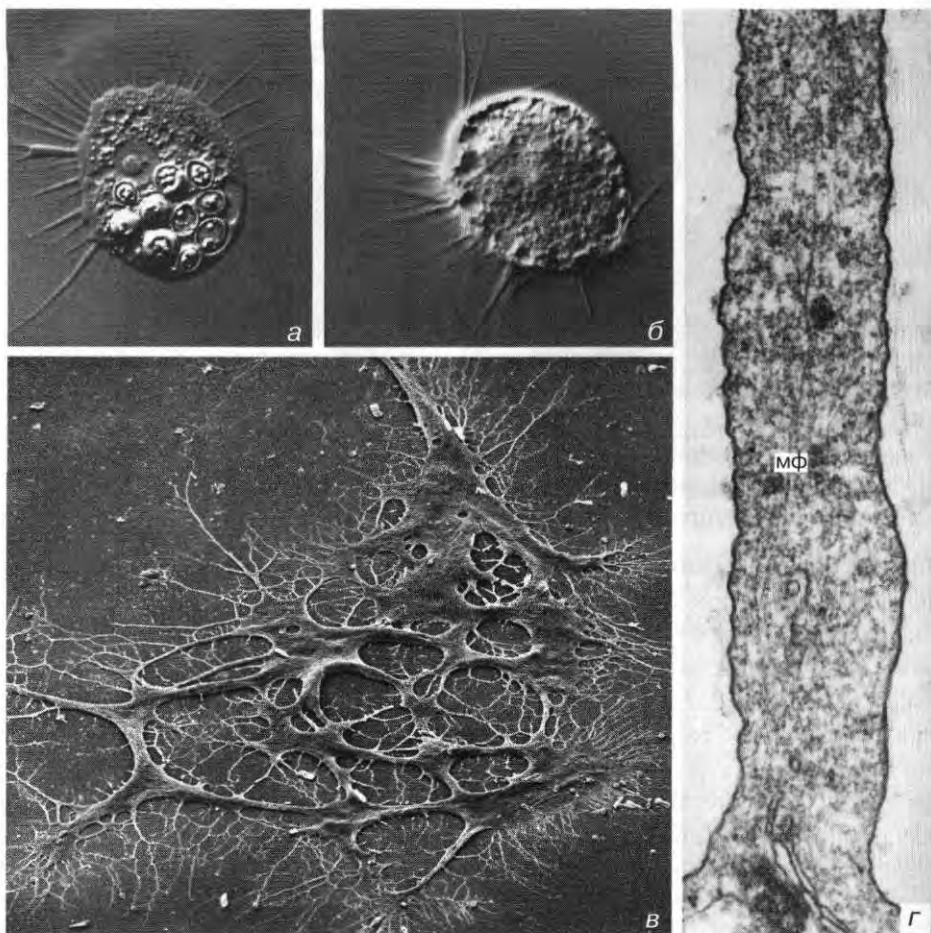
Gromiida.

Cercozoa.

Aconchulina

Vampyrellidae,





181. Mycetozoa, Aconchulina: — *Nuclearia*; — *Lateromyxa*  
 — *Thalassomyxa australis*; — *Vampyrella lateritia*  
 ; — : N. Hülsmann: J. Eukaryot. Microbiol. 40 [1993] 141; — : Grell: Protisto-  
 logica 21 [1985] 215). : a — 500x, — 800x, — 160x, — 37

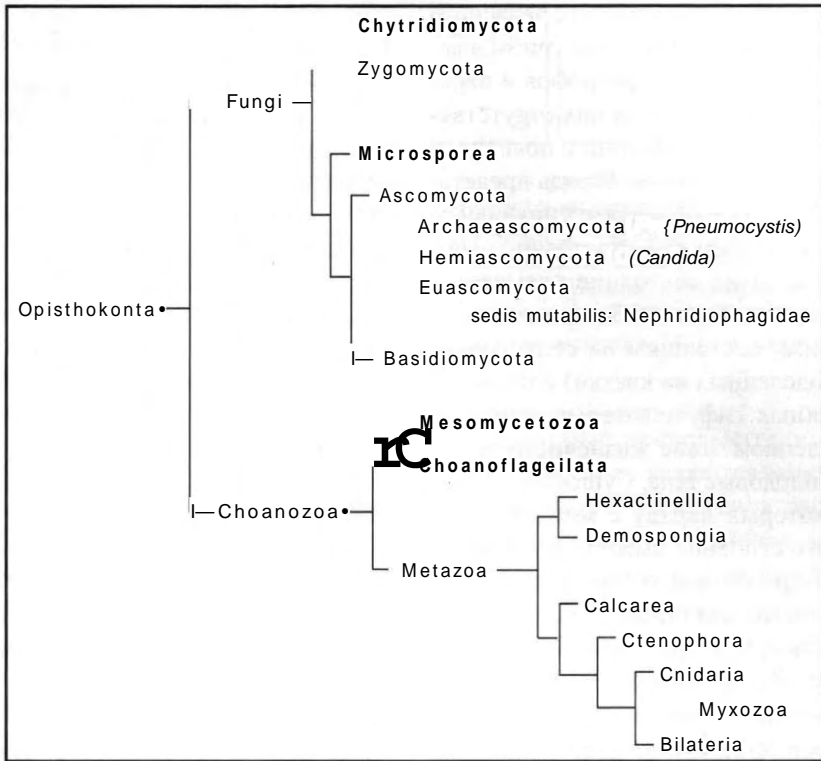
Aconchulina

ОПИСТОКОНТА Cavalier  
 Smith & Chao, 1995 —

- : *Arachnula*, *Gobiella*,
- Hyalodiscus*, *Lateromyxa*, *Nuclearia*,
- Thalassomyxa*, *Vampyrella*.

15.

( ), ( ).



FUNGI Nees, 1817 —

Animalia, Fungi, 100, 100  
 (Mesomycetozoa,  
 Nephridiophagidae), 10  
 Chytridiomycota ( ), Zygomycota ( ) Eumycota (Micro  
 ( . 15).

spora, Ascomycota Basidiomycota)<sup>1</sup>.

Fungi

:

;

( )

;

Opisthokonta.

Chytridiomycetes 5

Chytridiales

),

1

( . 182).

( . .

**CHYTRIDIOMYCOTA**

de , 1863 —

(*Polyphagus*);

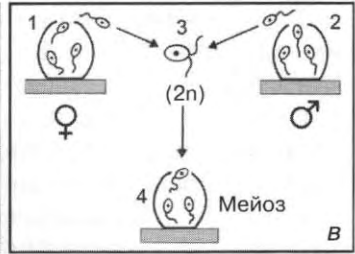
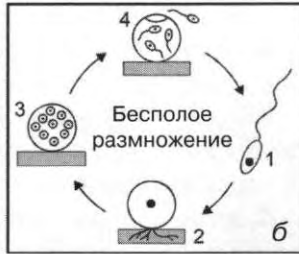
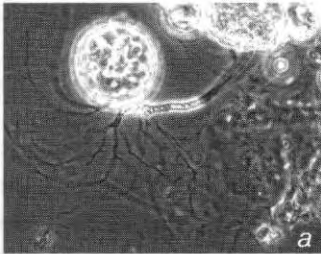
900

Aconchulina. Chytridiales

<sup>1</sup> 2007

(Hibbett

et al., 2007. A higher level phylogenetic classification of the Fungi. *Mycol. Res.* 111 (5): 509-547). —



182. Opisthokonta, Fungi, Chytridiomycota: —  
 ; — ; 1 — , 2 — , 3 — , 4 —  
 ; — (1) (2)  
 (3); (4) ( —  
 ) . ∴ —2

Chytridiomycota.

Spizellomycetales

1.

*Olpidium*,

*Rhizophydium*

*sphaerotheca*,

: *Neocallimastix*, *Olpidium*,  
*Piromyces*, *Polyphagus*, *Sphaeromonas*.

Chytridiomycota

Chytri-

ZYGOMYCOTA Barr,

1982 —

*Xeocallimastix frontalis*,

1000

0<sub>2</sub> 2.

Chytridiales.

Spizellomycetales

Neocallimastigales. —

),  
 (« — 1200  
 » — 144  
 ).  
 (Apicomplexa, Ciliophora),  
 ( )  
 ).

Zygomycota : Zygomycetes Trichomycetes.

**EUMYCOTA** Cavalier Smith, 1998 (Dikaryomycota) —

Microsporea

Eumycota —  
 ( ), ( ) 70S  
 Microsporea. ( 16S 23 S ),

Sporozoa

**MICROSPORA** Sprague, 1982

Microsporea.

**MICROSPOREA** Sprague, 1982 —

1  
 20

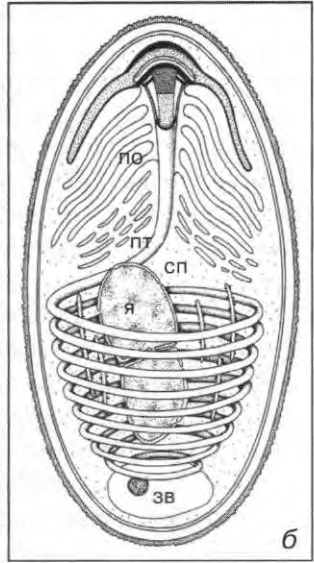
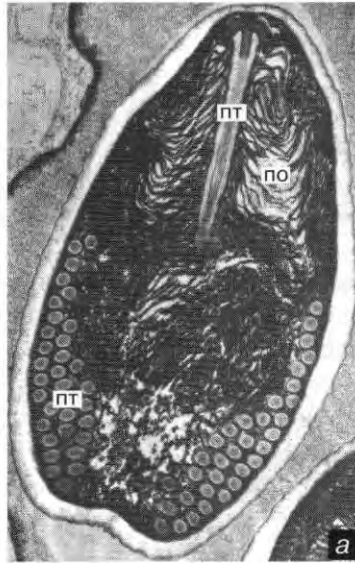
. 183. Fungi, Eumycota,  
Microspora: —

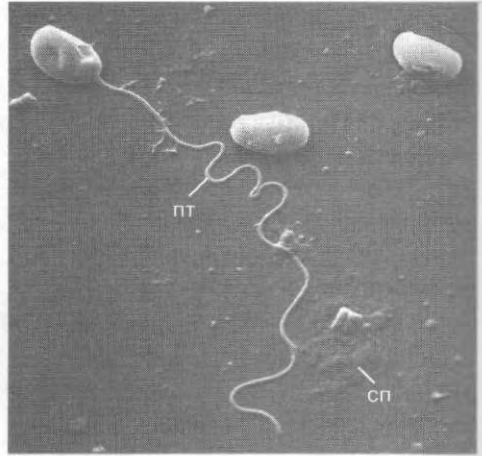
*Pleistophora hypheobryconis*

( )

( ), —

— ( — : Lorn and  
Corliss: J. Protozool. 14  
[1967] 141). : 16





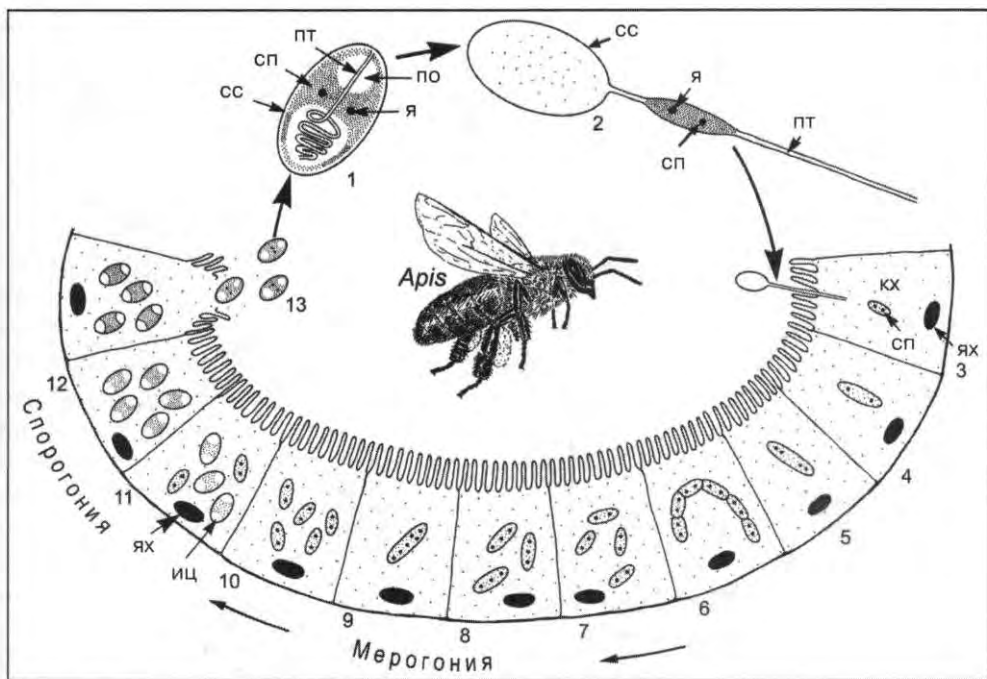
184. Microspore: ( ) *Nosema tractabile* ( : Larsson: Protistologica 17 [1981] 511). : 2900 .

vivo

in

5 30

( . 184).



185. Microspore:

*Nosema apis*,

( ). 1 —

. 2, 3 —

. 4 10 —

. 11 12 —

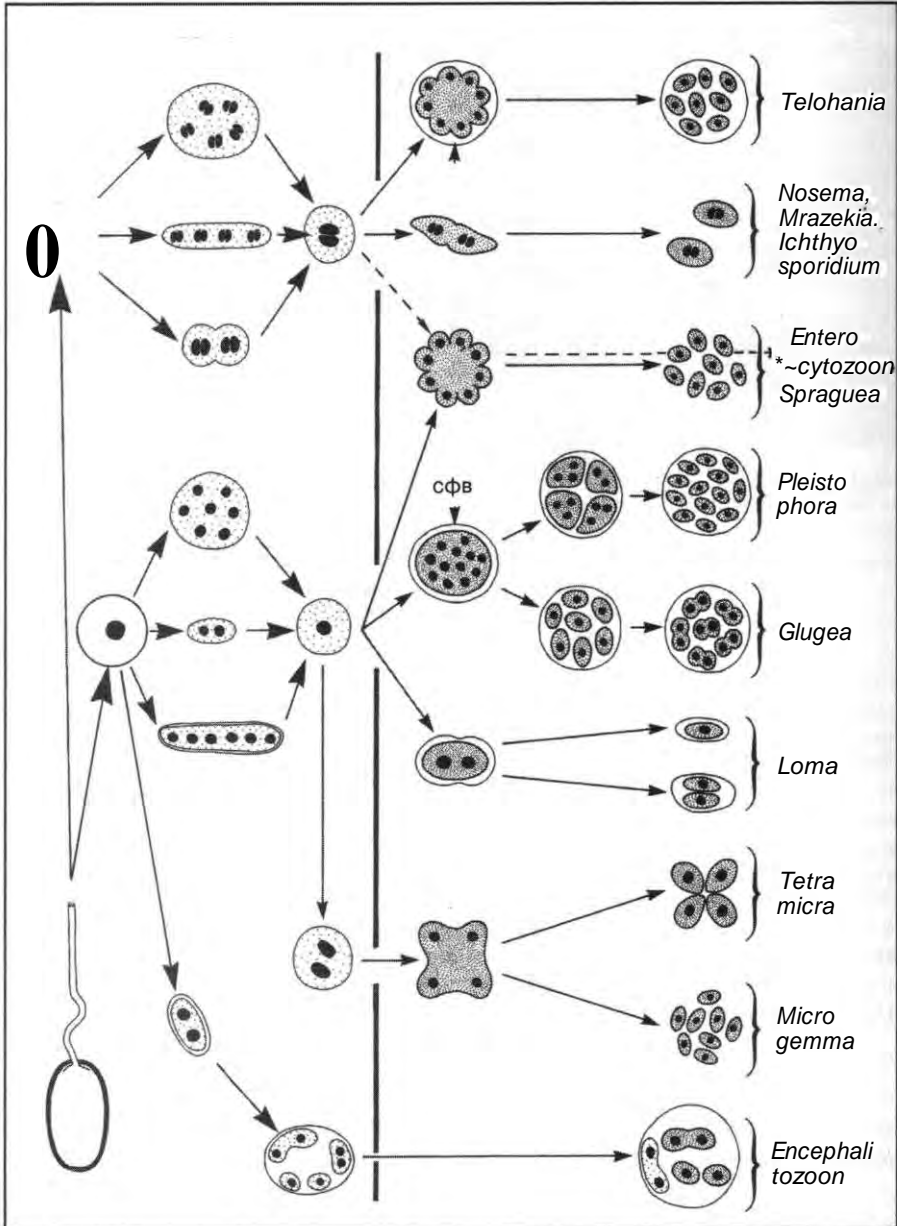
(10),

. 13 —

( ).

( . 185).





186. Microspora:

Encephalitozoon

( ) ( )



)  
: *Amphiacantha*, *Desportesia*, *Metchnikovella*.

**Microsporia** Delphy, 1963

*Microsporea sensu stricto*,

( ) .

: *Amblyostoma*, *Encephalitozoon*, *Enterocytozoon*, *Glugea*, *Nosema*, *Pleistophora*, *Vairimorpha*.

**ASCOMYCOTA** Berkeley,

1857 —

75%  
Fungi.

( , )  
( ),  
( ).  
( )  
( )  
( )  
( )

8).  
Ascomycota  
*Saccharomyces cerevisiae*,

Ascomycota  
: Archaeascomycota  
Hemiascomycota Euascomycota.

Euascomycota (90%)

Archaeascomycota Hemiascomycota

Archaeascomycota

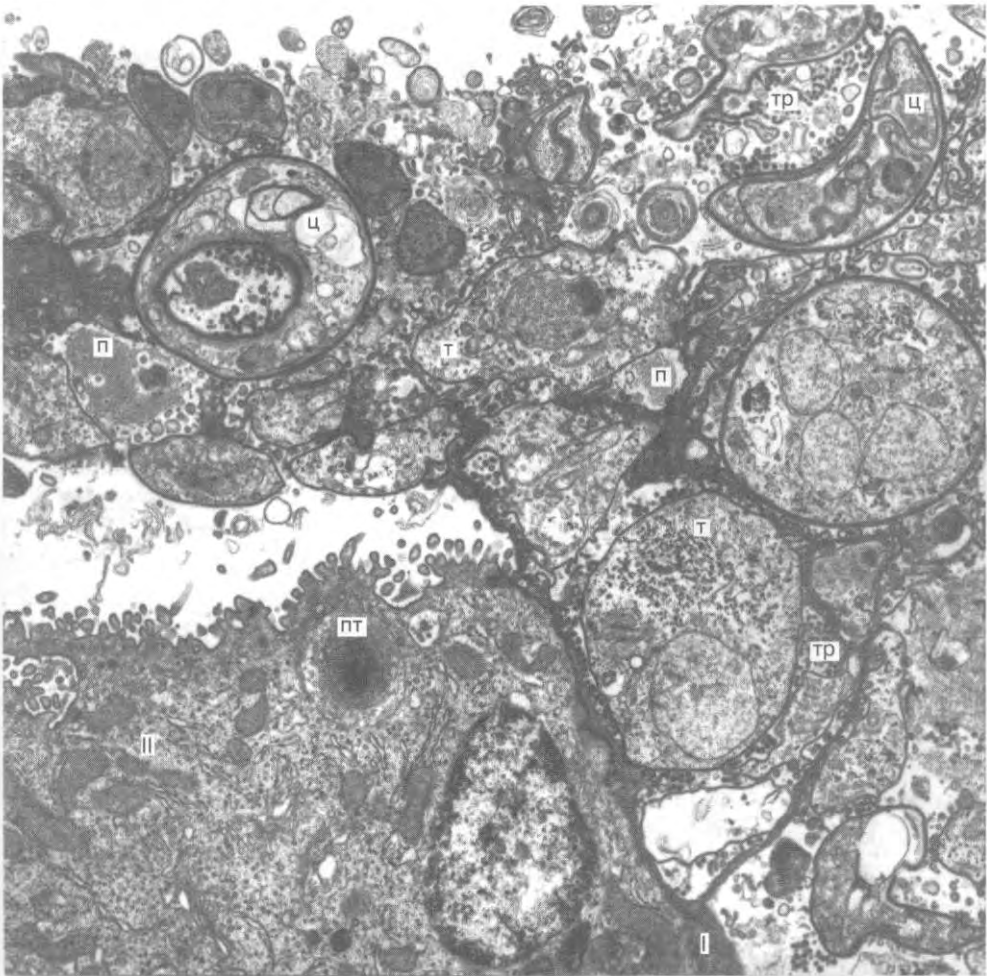
*Pneumocystis carinii* ( *Pneumocystidales*) ( . 187).

*P. carinii*  
Ascomycota.

1912

( ) ,

Вос-  
доль-  
век-  
тенс-  
опре-  
запи-  
это-  
( )  
че-  
рас-  
ост-  
мер-



187. Eumycota, Ascomycota: *Pneumocystis carinii*. I (I), II, ( ), II, ( ) *Pneumocystis* ( : Kaneshiro et al.: J. Eukaryot. Microbiol. 40 [1993] 805). : 8 000x.

*Pneumo-*  
*cystis carinii*,

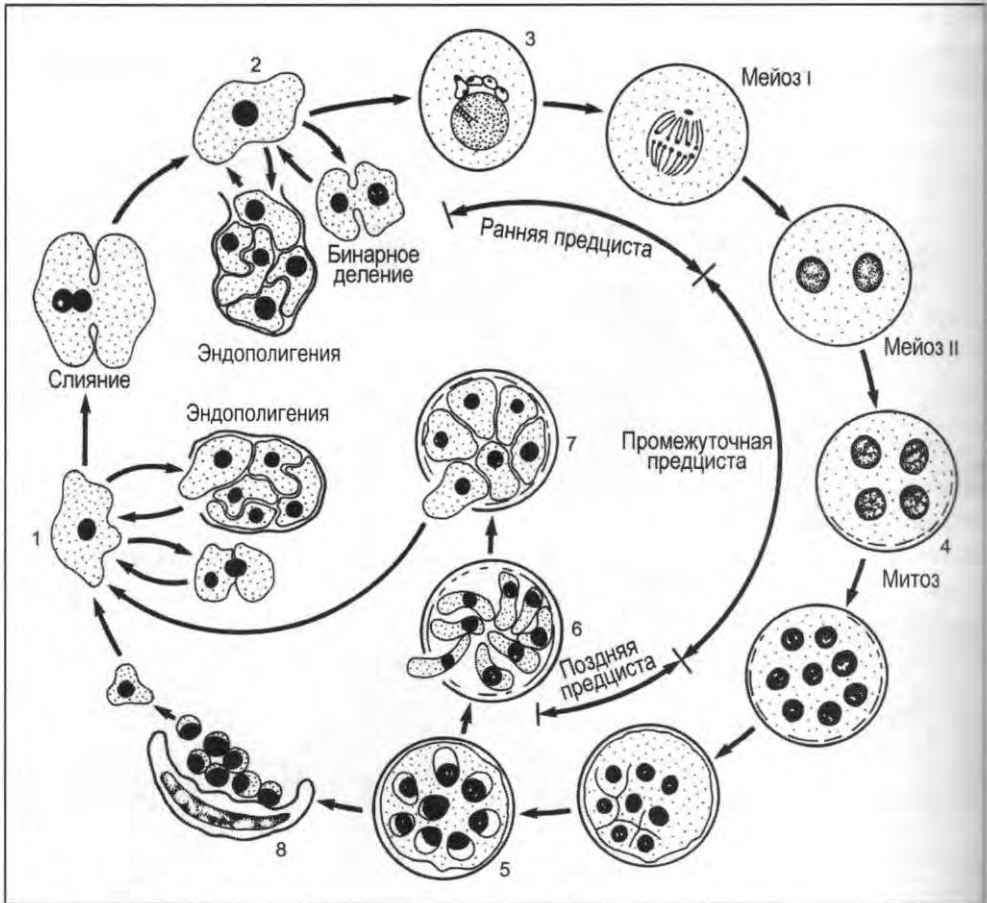


Рис. 188. Ascomycota: схема внутрилегочного клеточного цикла *Pneumocystis carinii*. 1 —

2 —  
3 —  
4 —  
5) ; (6)  
7) 8 —

, , —

( )

50%

*Candida albicans*

Hemiascomycota

*P. carinii*

*Saccharomyces*

*cerevisiae*,

( . 189,190).

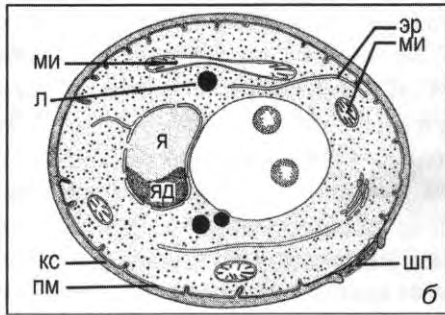
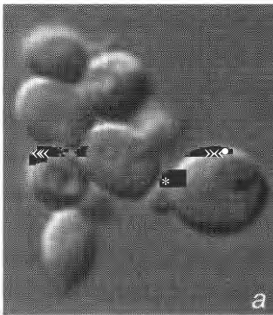
Archaeascomyco-

ta — Schizosaccharomycetales —

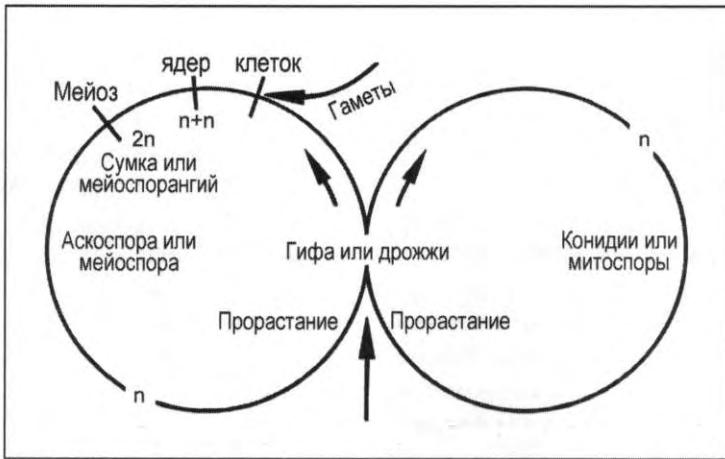
( , *Schizosaccharomycespombe*).

*Candida albicans*

37 ° .



. 189. Ascomycota: *Saccharomyces*.



190. Ascomycota ( )  
 )  
 ( )  
 ( ) (2 )  
 ( )

**Nephridiophagidae**

Sprague, 1970

Nephridiophagidae ( ) 191 — это

— *Cryptococcus*.

*Nephridiophaga apis*

— *neiformans*.

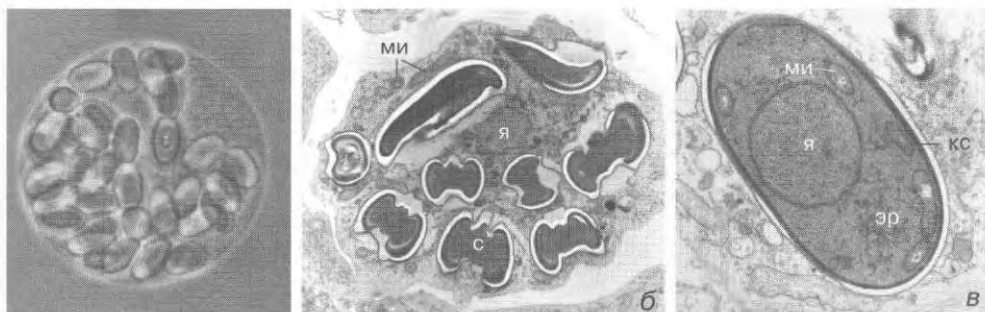
Nephridiophagidae ( « » — « » « » — )

**Coelosporidiidae,**

*Coelospo-  
ridium*

(3 6%)

7 8%



191. Ascomycota, Nephridiophagidae: *Nephridiophaga blattellae*:  
 ( ); ( )  
 ( ); ( )  
 ( ), ( )  
 ( ). : - 1 800 , 6-4 , - 5

Nephridiophagidae

192). ( 5 10 2 4 ;  
 : *Nephridiophaga*, *Orycto*  
*spora*, *Coleospora*.

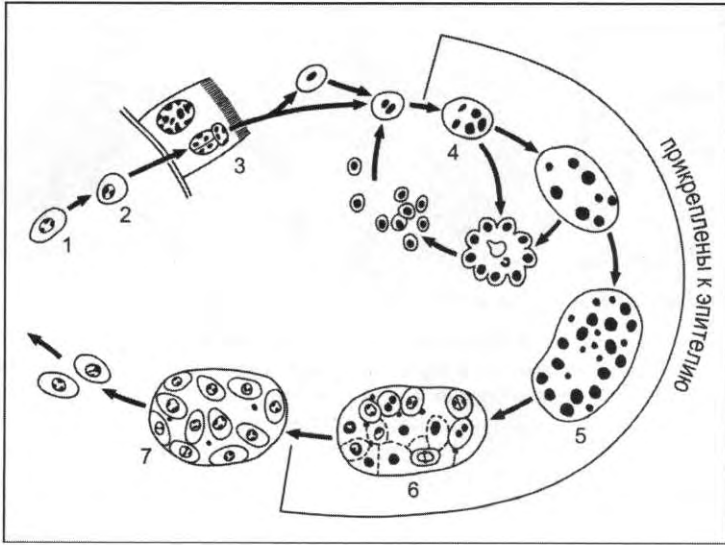
BASIDIOMYCOTA de

1866 —

*Nephridiophaga blattellae*,

« »





192. Nephridiophagidae:

*Nephridiophaga blattellae*.

- (1)
- (2)
- (3),
- (4)
- (5) —
- (6).
- (7) ( )

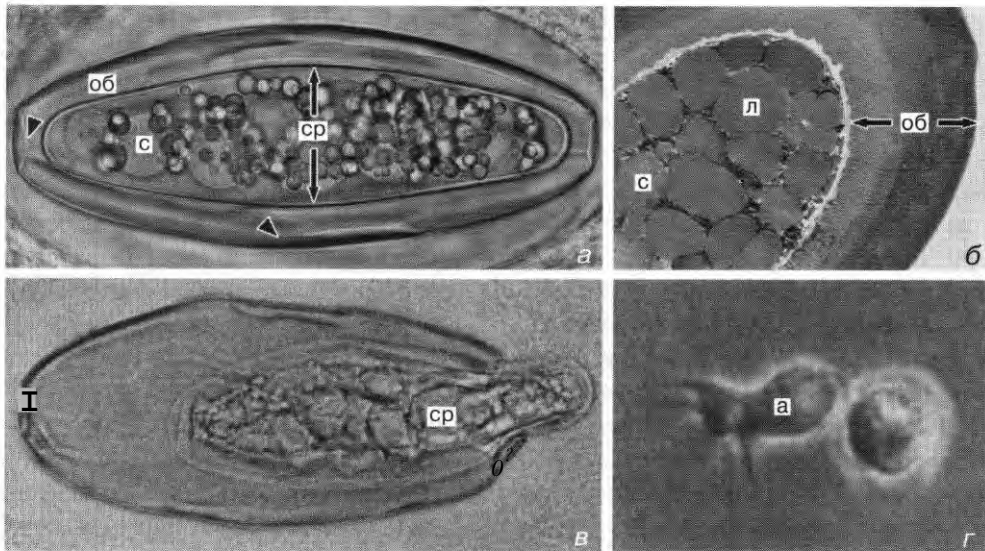
**CHOANOZOA** Cavalier

Smith, 1981

**DEUTEROMYCETES**

(Metazoa),  
Mesomycetozoa

( )



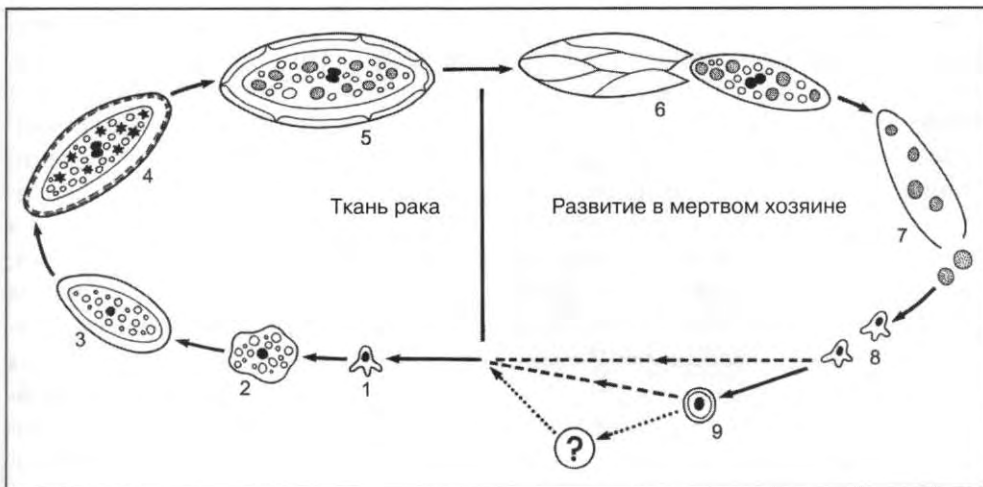
193. Opisthokonta, Choanozoa, Mesomycetozoa: *Psorospermum haeckeli* ( , , )  
 ( ), —  
 ( ) ( ), ( ) —  
 ( );  
 ( ), — ( ), — ( )  
 ( : Vogt and Rug: J. Exp. Zool. 283 [1999] 31). : a — 600x, — 1 600x, — 530 , — 1

DRIP — —  
 : *Der*  
 : Choanozoa Mesomyce- *mocystidium*, rosette agent, *Ichthyophonus*  
 tozoa Choanoflagellata, - *Psorospermium* ( . 193).  
 Metazoa. Ichthyosporea.

**MESOMYCETOZOA** Herr  
 et al., 1999 *Rhinosporidium seeberi* DRIP  
 . 1999  
 Mesomycetozoa  
 (« \_\_\_\_\_ »). -  
 . Mesomycetozoa  
 Choanofla

gellata,	-	20	<i>Dermo-</i>
	Animalia <sup>1</sup>	<i>cystidium;</i>	
	Mesomycetozoa		
	;		
	-		
	-		
;	-		
	-		
	-		
	Psoro		
<i>spermium haeckeli</i>	<i>Ichthyophonus</i>		
<i>hoferi;</i>	<i>Dermocystidium</i>		
	-		
	in	agent, —	rosette
vitro,	-	;	
	-		
	6		
	-		
<i>Psorospermium, Ichthyophonus</i>	<i>Dermo-</i>		
<i>cystidium</i>			
:	-		
	-		
	-		
(	-		
),	-		
	-		
	-		
	-	<i>Ichthyophonus hoferi</i>	
	( . 194).	( )	80
	-		
	-		
	Mesomycetozoa		
	-		
	-		
	-		
	-	<i>I. hoferi</i>	

<sup>1</sup> Animalia Metazoa, Fungi



194. Choanozoa, Mesomycetozoa: *Psorospermium haeckeli*. 1 — , 2 — , 3 — , 4 — , 5 — , 6 — , 7 — , 8 — , 9 — , ? — ( : Vogt and Rug: J. Exp. Zool. 283 [1999] 31).

( Eumycota)  
*Psorospermium haeckeli*  
 100 200  
 Mesomycetozoa,  
*P. haeckeli*  
 Mesomycetozoa,

*Amoebidium parasiticum*, *Anurofeca richardsi*, *Sphaeroforma arctica*, *Rhinosporidium seeberi*.

273 ).

( . 195, . рнс. Choanoflagellata

( )

( )

*Rhinosporidium seeberi*

*nosiga*)

(*Codonocladium*);

: *Amoebidium*, *Anurofeca*, *Dermocystidium*, *Ichthyophonous*, *Rhinosporidium*, *Psorospermium*, *Sphaeroforma*.

(*Salpingoeca*).

**CHOANOFLAGELLATA**

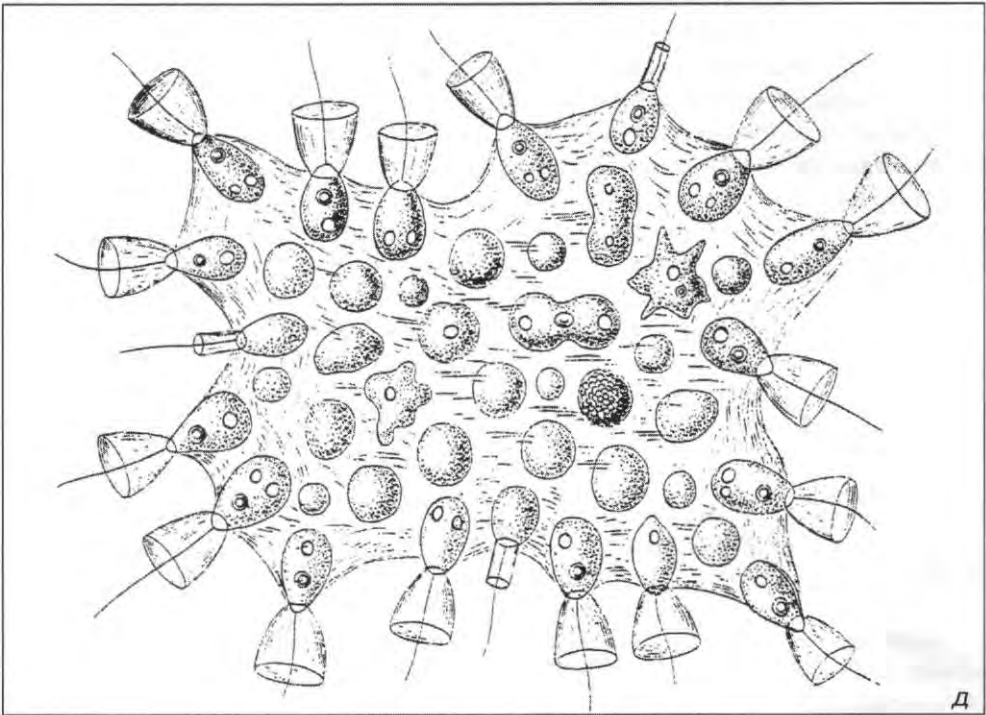
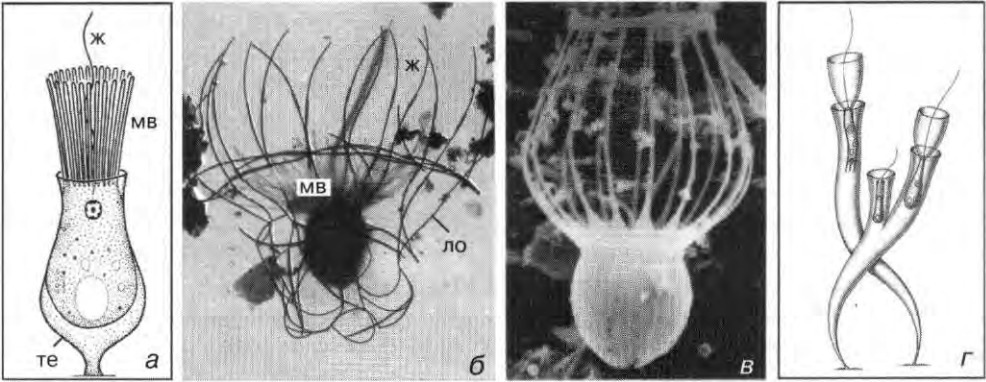
Kent, 1880 —

1956).

10

*Sphaeroeca volvox* ( 300 500 )

*Proterospongia*



195. Choanozoa, Choanoflagellata: — *Salpingoeca amphoridium*  
 ( ); — *Acanthoecopsis apoda* ( ), — *Diplothea costata*; — *Salpingoeca*  
*cornuta*, — *Proterospongia haeckeli* 40 ( —  
 ; — ).  
 — 1 700 , 6 — 21 , — 2 900 , — 380 , — 1 200 .

( . 195 ).

— , — Meta-  
zoa — , —  
: Myxozoa.

Myxozoa —

( )

**MYXOZOA** Grassé, 1970 —

1

1350

52

: *Codonosiga*, *Parvicorbicula*, *Salpingoeca*.

**METAZOA** Haeckel,

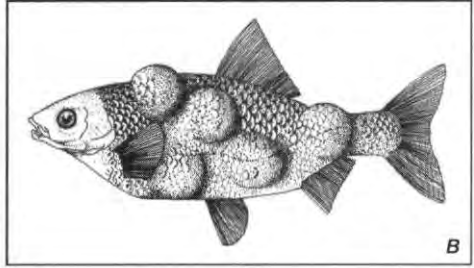
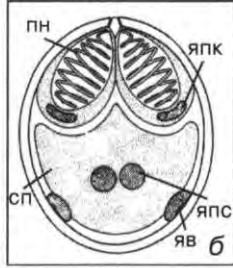
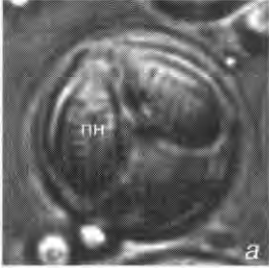
1874

Metazoa —

Cnidospora

Myxozoa (

196)

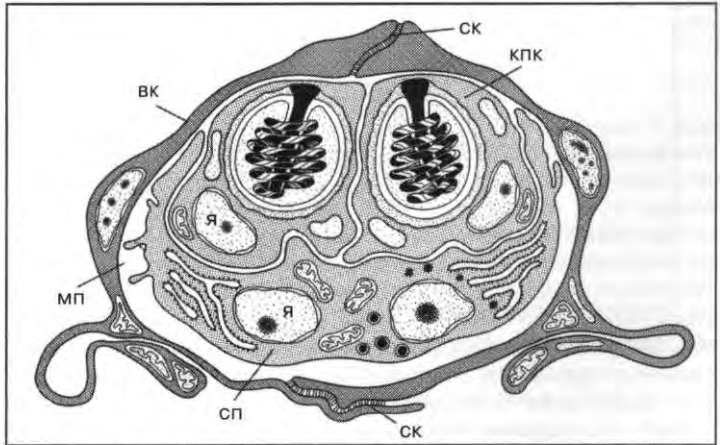


196. Choanozoa, Metazoa, Myxozoa: ( ) ( )  
*Myxobolus*; — , — , — *Myxobolus*. — , —  
 ( — : Schmahl et al.: Europ. J. Protistol. 25 [1989] 26; — ).  
 ∴ — 2 200 .

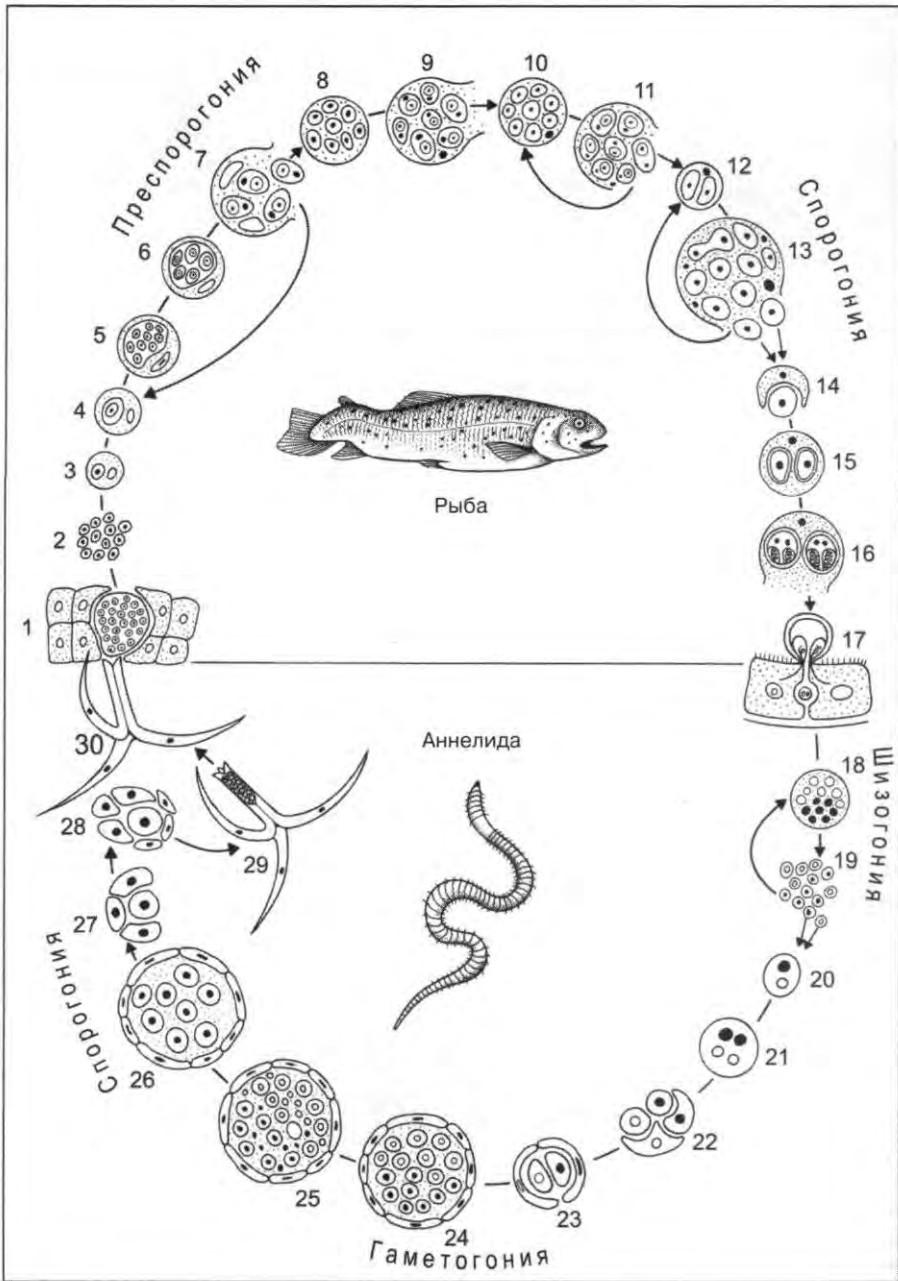
—  
 — ( — . 197).  
 —  
 —

18S  
 Myxozoa —  
 Narcome —  
 Myxozoa —  
 dusa Cnidaria. — Meta-  
 zoa , Cnidaria — 1980 ,  
 —  
 — *bralis*  
 —  
 ∴ *Tubifex tubifex*

197. Myxozoa:  
*Leptotheca elon*  
 gata. —  
 ( )  
 ( ), —  
 —  
 —  
 ( )  
 ∴ 3 200 .







198. Мухозоа:

*Myxobolus cerebralis*. 1 16 —

Мухозоа,

; 17

30 —

. 1 —

; 2 —

( . 198).

— Myxosporea (

sporea (

6 — 12

Myxozoa.

Actinosporea

Myxozoa,

*Myxobolus cerebralis* ( . 198).

; 3 13 —

21 26 —

; 24 25 —

8 . 27 29 —

(29)

(30);

Eukaryot. Microbiol. 48 [2001] 339).

Actino

198, 1 2; 199).

( . 198, 3 13).

Myxozoa,

Actinosporea

Myxozoa,

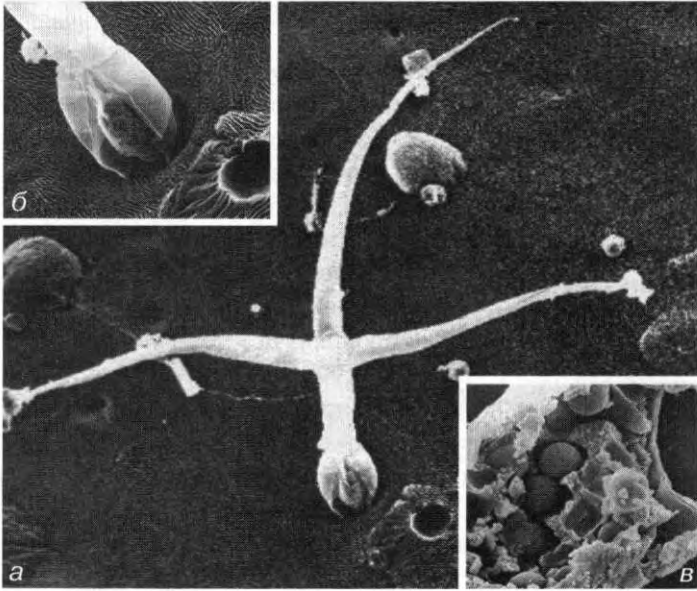
*Myxobolus cerebralis* ( . 198).

; 14 16 —

; 17 —

. 18 20 —

( : Kent et al.: J.



. 199. Myxozoa:

*Myxobolus*

*cerebralis*

1 . . . . . - 700 , -  
 , - 3 200 .

«            »  
 «            ».

( . 198, 13 16).

. *cerebralis*,

),  
 ( )

16 16

8 ( -

198, 27 29) 8 ( .

*Myxo-*

*bolus*

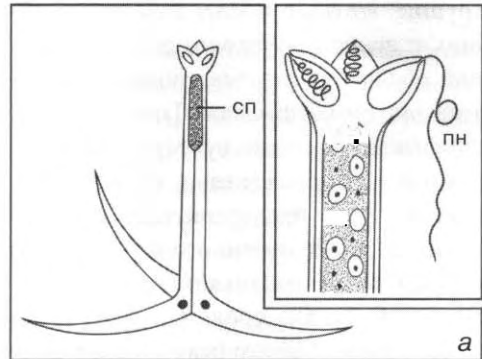
( . 198, 17 20).

200). 8 ( 4,

*Tetraspora*)

20 25)

( . 198,



. 200. Myxozoa: —

*Myxobolus cerebri*,

( )

16

( )

( ) (

).

1. — .).

Myxozoa

*Myxobolus* 22)

Sarcodina (

*pfeifferi*,

(Cyprinoidae) (

. 196);

7

*Myxobolus cerebrialis*

(\*)

: *Henneguya*, *Myxobolus*,

*Sphaerosoma*.

**ACTINOPODA\*** Calkins, 1902 —

**EUKARYOTA** incertae sedis

( , )

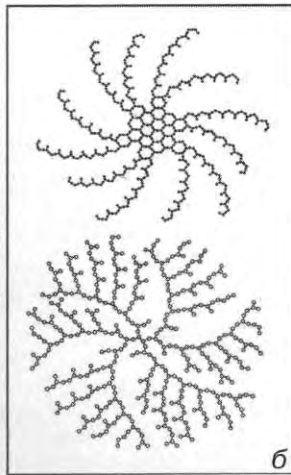
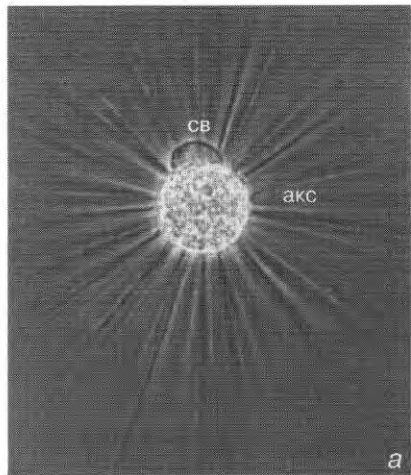
( . 201).

( . 202).

).

Sarcodina (

201. Actinopoda,  
Heliozoa:  
: — Actinoph  
rys sol



( ), — ;  
—  
( — ).  
∴ —

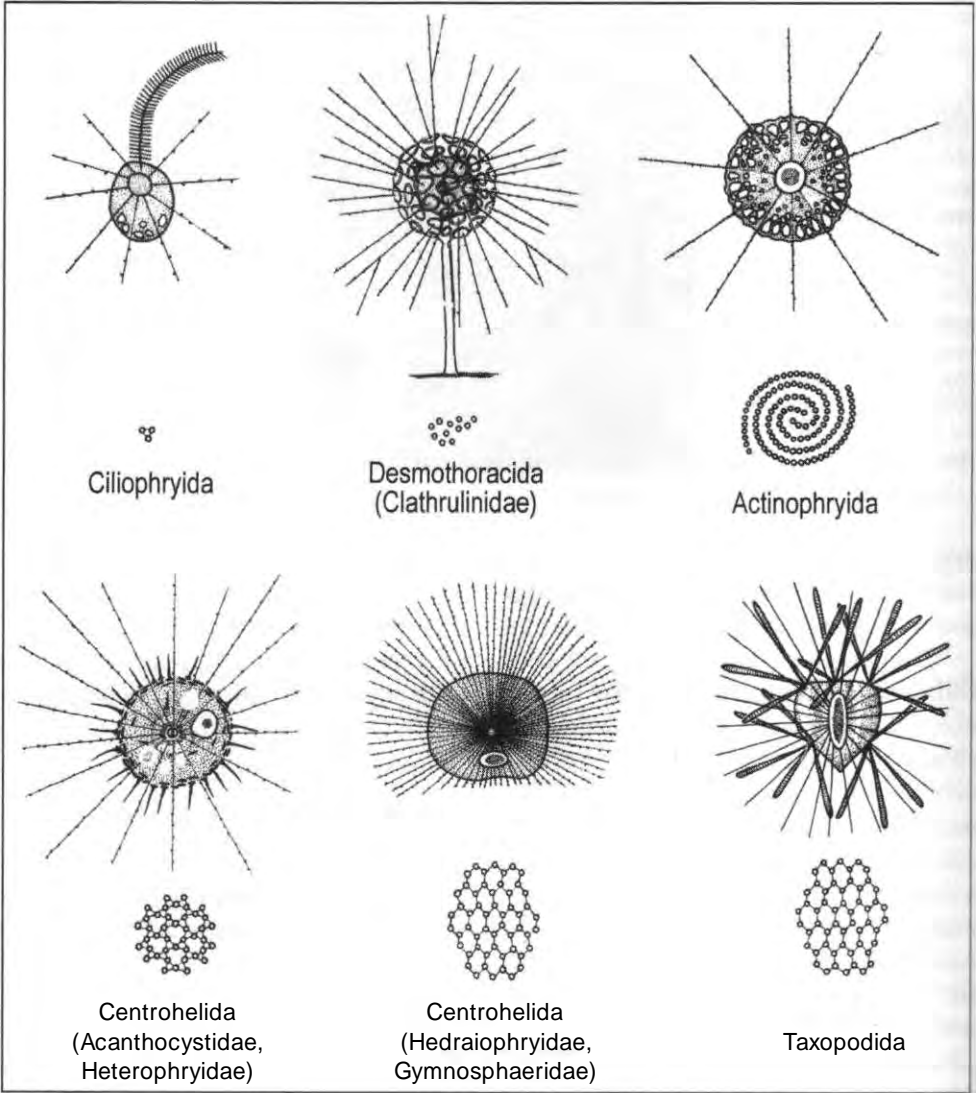
( . 203).  
Actinopoda  
Heliozoa Radiolaria.

**Acantharea** Haeckel, 1881 —

Radiolaria  
(50 — 1 )  
10 20  
( ),  
( ) ( . 204).

1  
2  
( — — — — — ).  
Cercozoa

2003 ..  
Cercozoa.

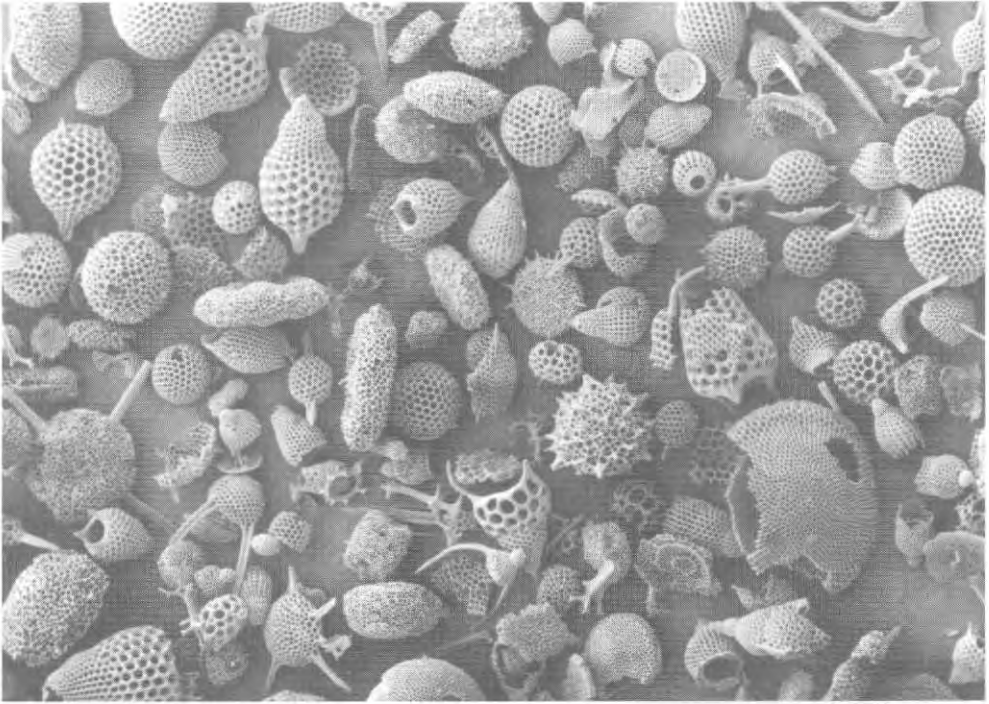


. 202.

).

( )

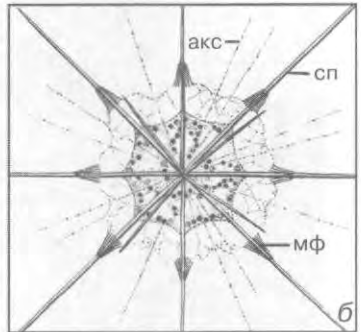
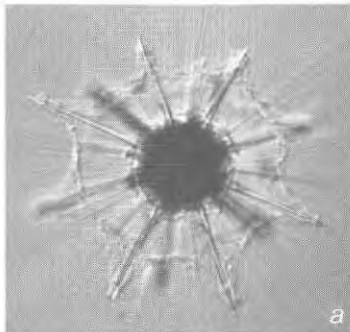
; . . .



203. Polycystinea:

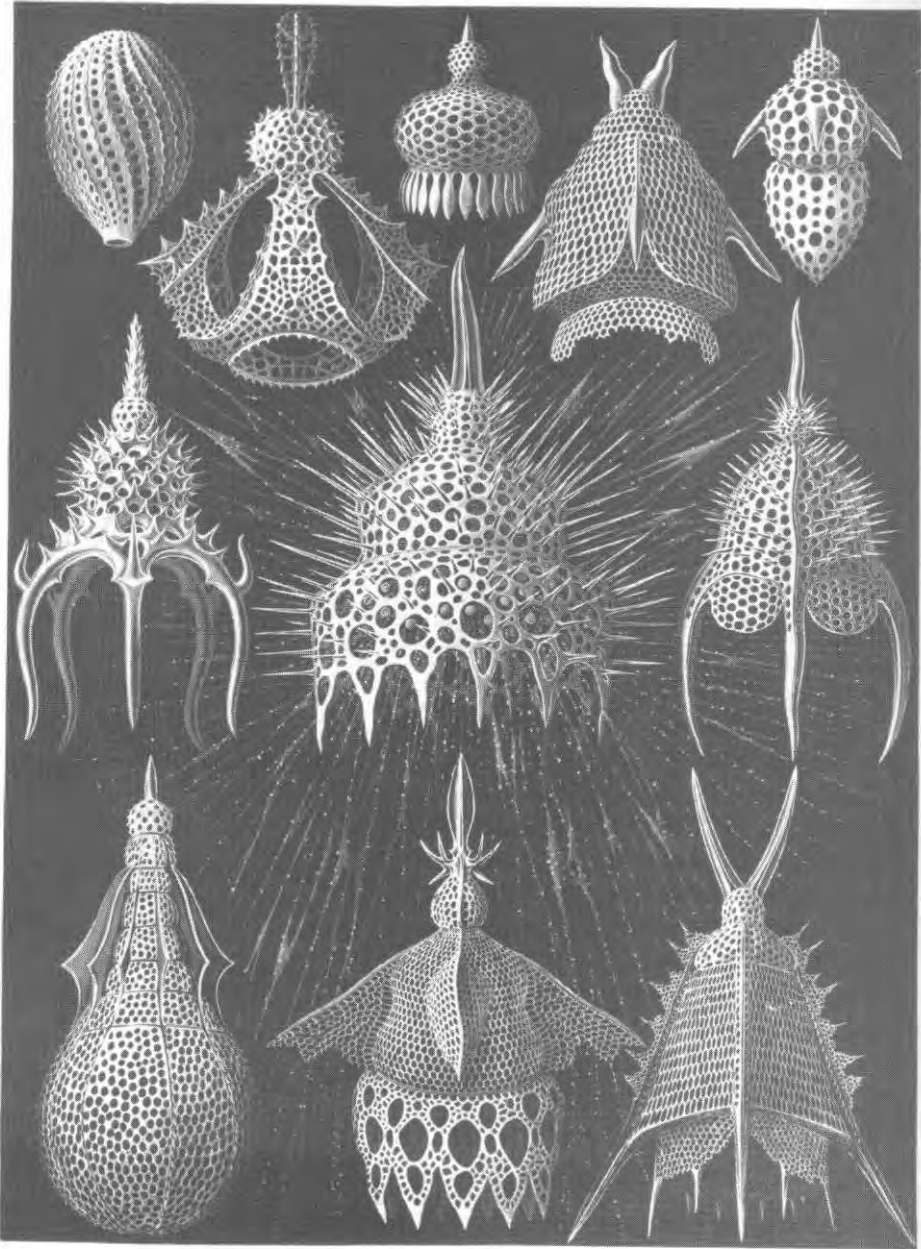
200

204. Acantharea:



40





Cyrtoclelea.

„ , • \* • ' • ; . »

. 205. Polycystinea: Nasserida ( : Haeckel: Kunstformen der Natur. Verlag Bibliogr. Inst., Leipzig and Wien, 1899 1904).

4 : Holocanthida (10 ),  
 Symphyacanthida, Chaunacanthida Arth  
 racanthida ( 20 ), —

: *Acanthocolla*, *Acantholi*  
*thium*, *Acanthometra*, *Amphiacon*.

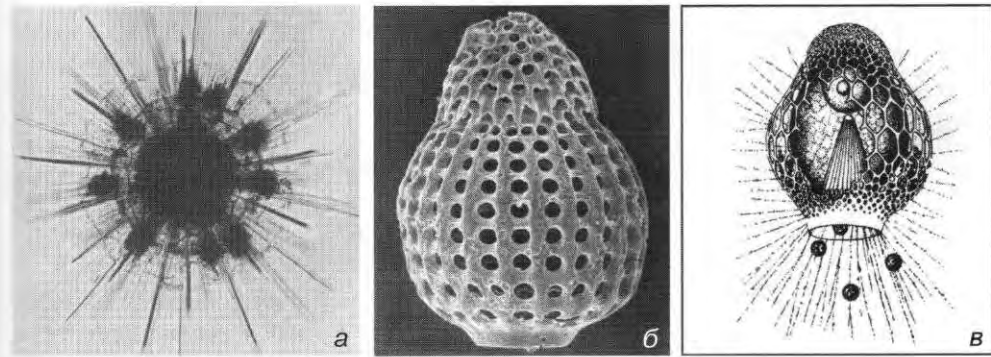
**Polycystinea** Ehrenberg, 1838 —

30 6  
 2 , 12 ;

( . 205).

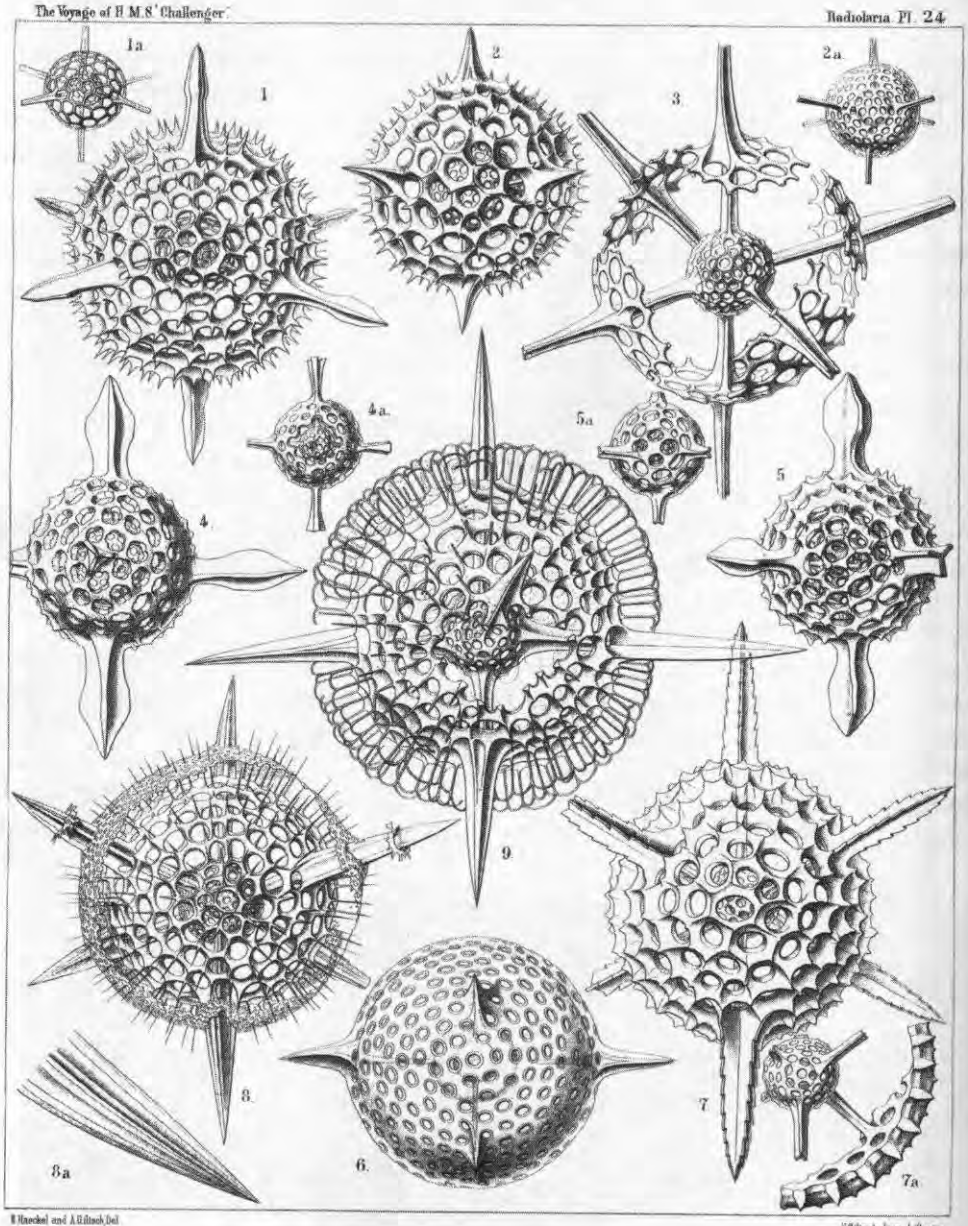
Polycystinea;

( . 206 ).



. 206. Polycystinea: — ; — ; —  
*Cyrtocalpis urceolus* ( — ; — ; — : K.Q. Qrell:  
 Protistology, Springer, Heidelberg 1973). : a — 200x, — 400x, — 260x.

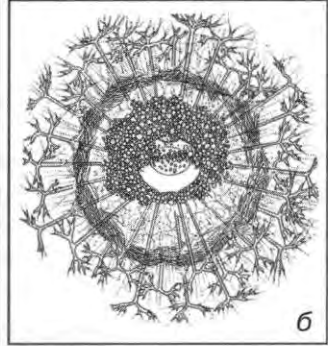
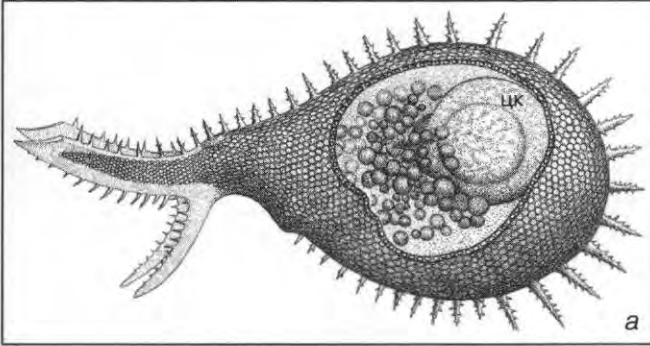
SFUMBBIARIA VASSKXLASXA TAF. IS.



1.7 HEXACONTIUM. 8.0 HEXACROMYUM

. 207. Polycystinea:  
2. Theil. Berlin, 1887).

( : Haeckel: Die Radiolarien (Rhizopoda, Radiolaria)



208. Phaeodarea: — Challegeyron wyvillei: ( ) ; — Auloceros elegans ( — , — ). : — 260 , — 20 .

mellaria

Spu

Nasselaria

( . 2066, ).

Spumellaria Nasselaria  
205 207.

( . 208).

: Collozoum, Eucoronis,  
Thalassicolla.

**Phaeodarea** Haeckel, 1881 —

darea

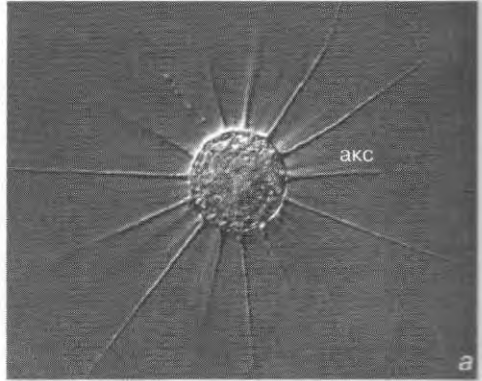
Phaeo-

(Phaeocalpida,  
Phaeoconchida, Phaeocystida, Phaeo-  
dendrida, Phaeogromida, Phaeogymno-  
cellida Phaeosphaerida)  
: Astracantha, Aulacantha,  
Coelodendrum, Phaeodina.

**HELIOZOEAE\*** Haeckel, 1866

( . . . 202),

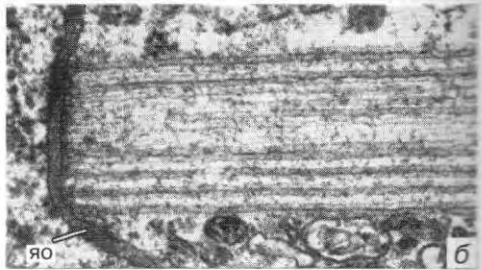
( . . . ).



**Actinophryida** Kuhn, 1926 —

( . . . 202).

( . . . 209).



. 209. Heliozoa: — *Actinophrys sol* ( . . . ); — ( . . . ); — ( . . . ); — ( . . . ), 6 — 58

( . . . 202).

: *Actinophrys*, *Actinosphaerium*, *Camptonema*.

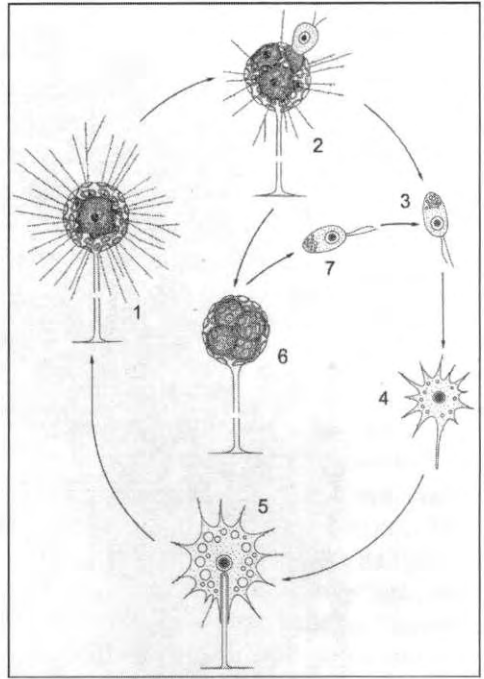
**Desmothoracida** Hertwig & Lesser, 1874 —

( . 210).  
 : *Clathrulina, Hedriocystis,*  
*Orbulinella.*

**Ciliophryida** Febvre Chevalier,  
 1985 —

( . 202).  
 : *Actinomonas, Ciliophrys,*  
*Pteridomonas.*

**Taxopodida** Fol, 1883 —



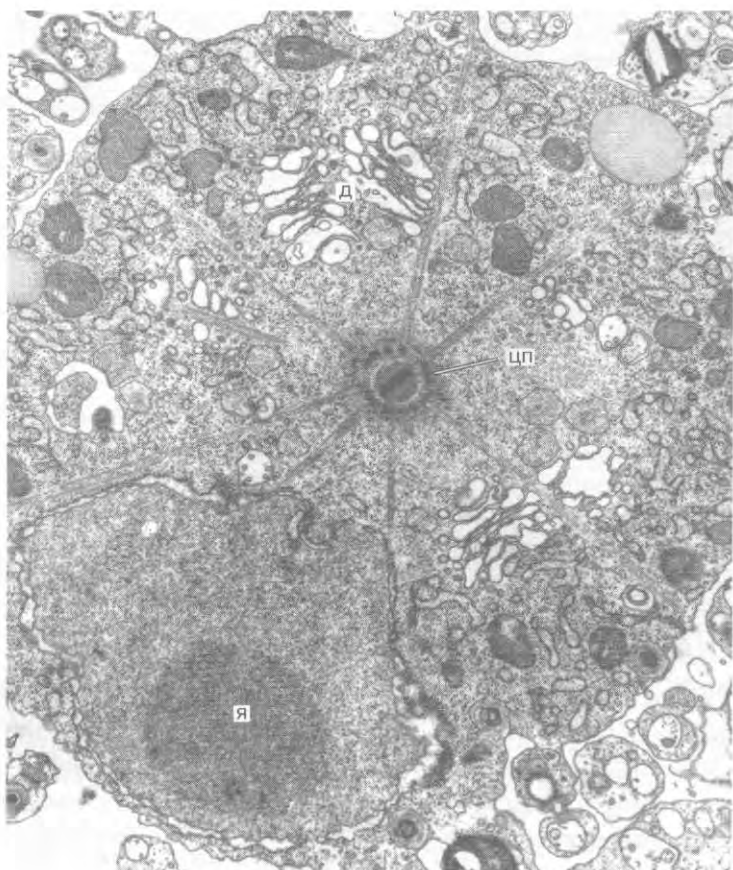
. 210. Heliozoa, Desmothoracida:  
*Clathrulina elegans.*  
 (1)  
 (2)  
 (3),  
 (4).  
 (5)  
 (1).  
 (6).  
 (7),  
 (4),  
 ( )).

202).

: *Sticholonche.*

**Centrohelida** Hartmann, 1913 —

( . 211).



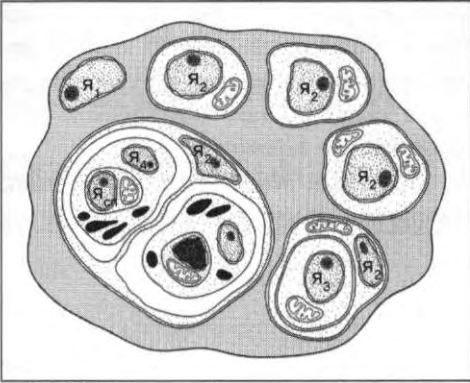
211. Centrohelida: *Heterophrys marina*; ( ). — ( : Bardele: Cell Tiss. Res. 161 [1975] 85). 40 000x.

( . . 202).

: *Acanthocystis*, *Gymnosphaera*, *Hedraiophrys*, *Heterophrys*.

**PARAMYXEA** Levine, 1979 —

( . 212).



212. Paramyxea:

*Paramarteilia orchestiae*.

*Paramarteilia*.

Haplospora.

(9x1+0).

30

*teilia*

(*Ostrea edulis*).

Para-myxea

Chytri

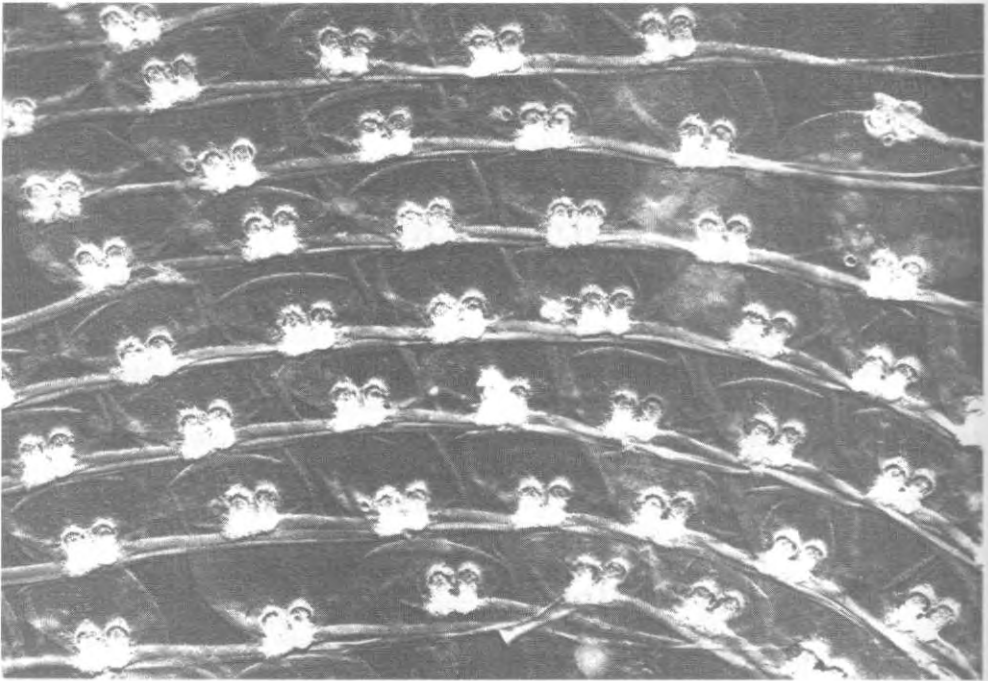
diomycota, Microsporea,

*Labyrinthomyxa*, Myxozoa



( Haplospora) -  
 Ascetospora. -  
 -  
*Marteilia refringens*,  
 ,  
 Haplospora. Paramy *Paramyxa*. : *Marteilia*, *Paramarteilia*.





. 213. *Paramecium*  
 . : 12 000 .

( )

( . . 168),

<sup>1</sup> ( . . 9, 176).

<sup>2</sup> ( . 218)

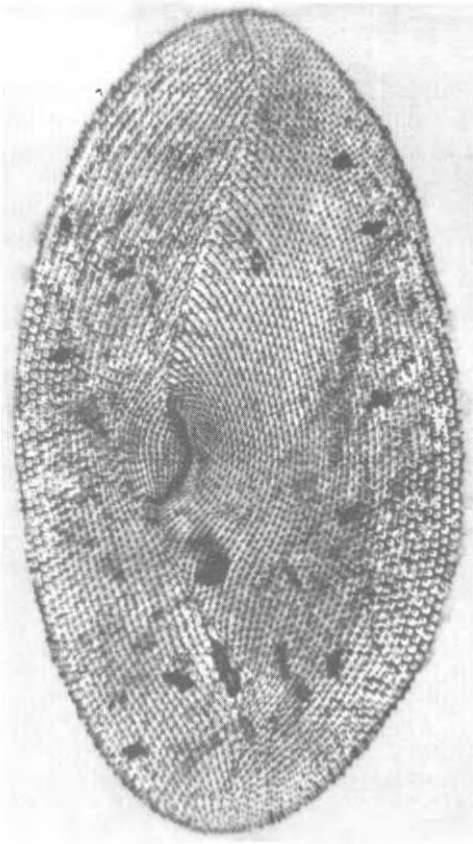
( , )

( , ), ( ) ,

( . 217).

1

2



. 214.  
*Paramecium* (

*Pleurochrysis*

( . 219).

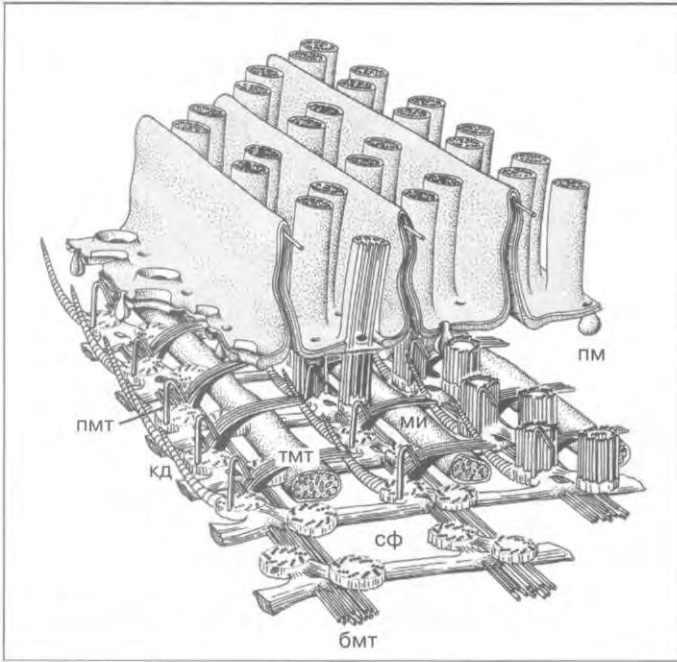
*Eufolliculina uhligi* ( . 220).

( . 221).

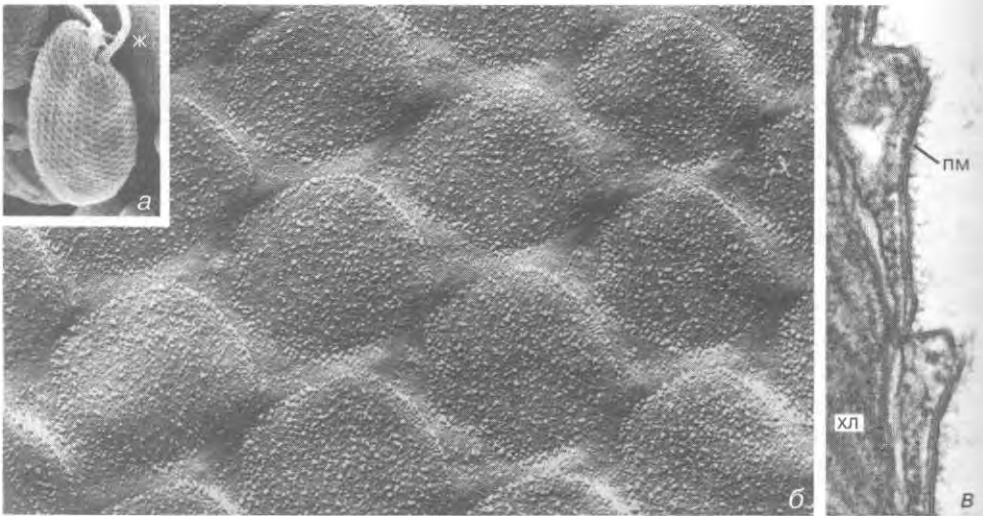
, *Actinophrys*.

15

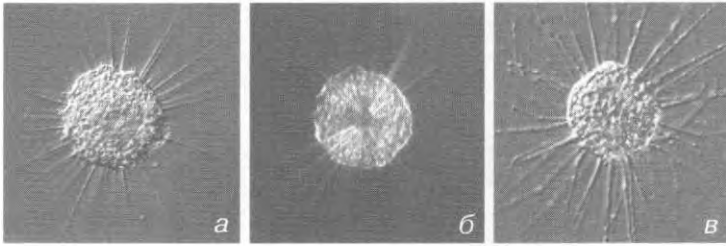
1



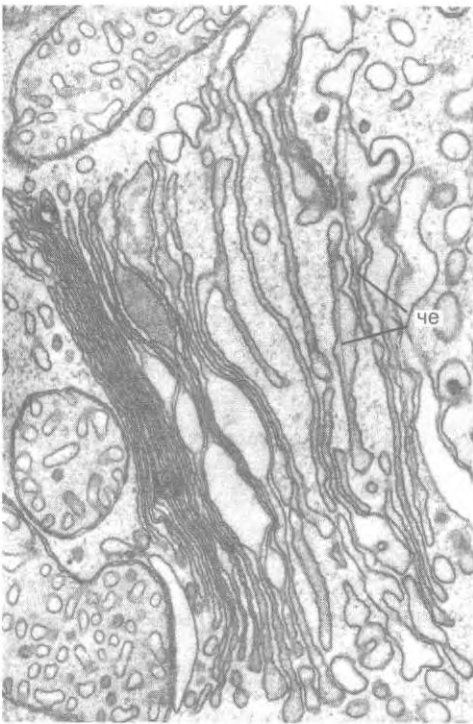
215. *Conchophthirus curtus*.  
— *Conchophthirus curtus*.  
( : Hausmann and Walz: Protoplasms 101 [1979] 349).



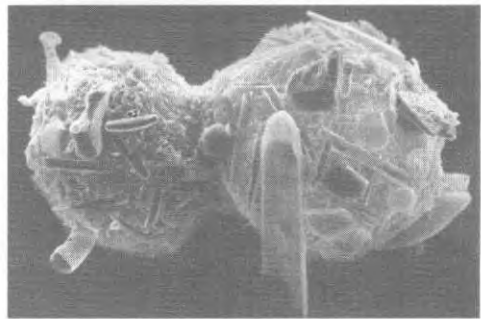
216. *Rhodomonas*.  
( : Hausmann and Walz: Protoplasms 101 [1979] 349).  
.: a 2 800x, 6 4 8 000x, 80 000x.



217. *Actinophrys sol* ( ); ( ); ( ).

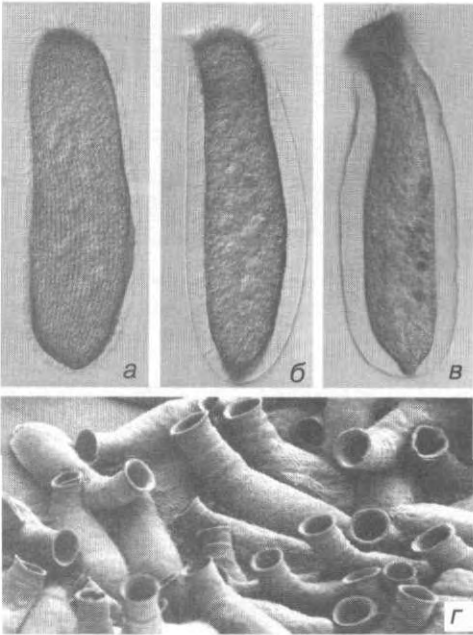


218. *Pleurochrysis* ( ) ( ).



219. *Diffugia*; ( )

270



220. *Eufolliculina*  
 ( )  
 ( , ).  
 ( ) ( : Mulisch and Hausmann: J. Protozool. 30 [1983] 97).  
 — 140x, — 80x.

),

*Paramecium.*

*Paramecium.*

*Amoeba proteus.*

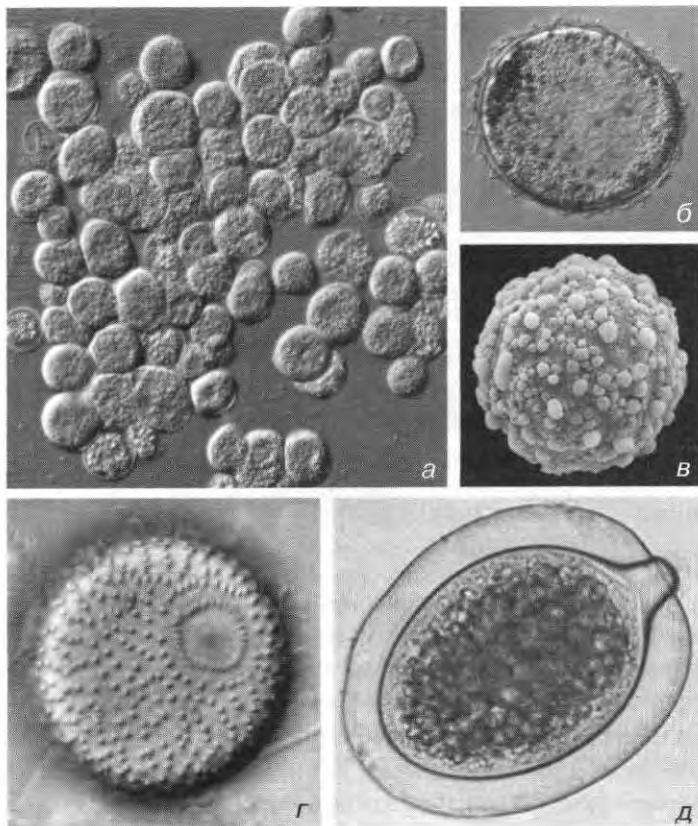
*Stentor*

(*Vorticella, Carchesium, Tokoph*) ( . 141, 142, 144),

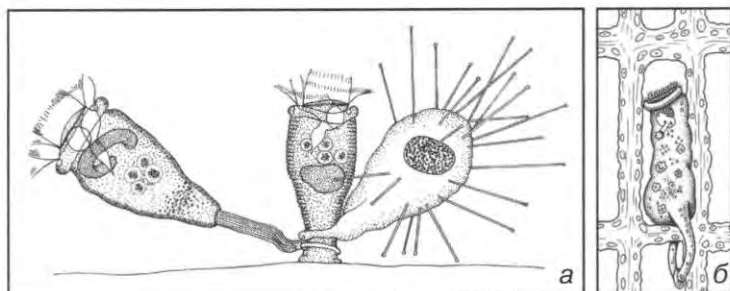
( . 222)

(*Tricho*

. 221. *Acanthamoeba* (a), *Climacostomum* ( ), *Actinosphaerium* ( ), *Frontonia* ( ) ( —

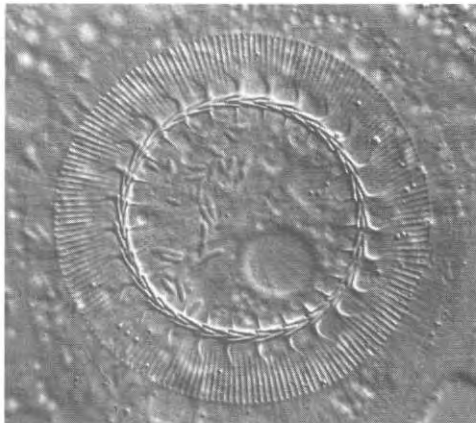


Hausmann and Rambow: Mikrokosmos 74 [1985] 208; — : Hausmann and Foissner: Mikrokosmos 75 [1986] 193).  
 .: a 500x, 250x, 700x, 600x, 400x.



. 222. *Erastophrya chattoni* ( ), *Ellobiophrya donacis*, *Donax vittatus* ( — ; — ) . *Epistylis Iwoffii* ( ) *Apiosoma amoeba*; — . : — 550 , — 450 .





. 223. *Trichodina*  
( : Hausmann and Hausmann: J. Ultrastruct.  
Res. 74 [1981] 144). : 850x.

*dind*) ( . 223).

( . . 39),

( . . 91)

( )

*Poteriochromonas,*

224),

225.

<sup>1</sup> ( . . 210).

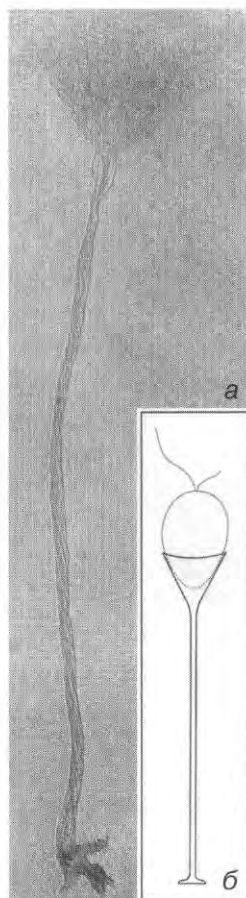
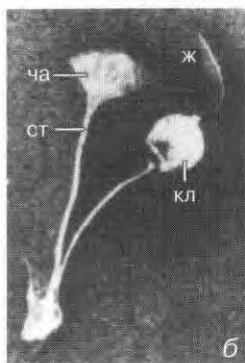
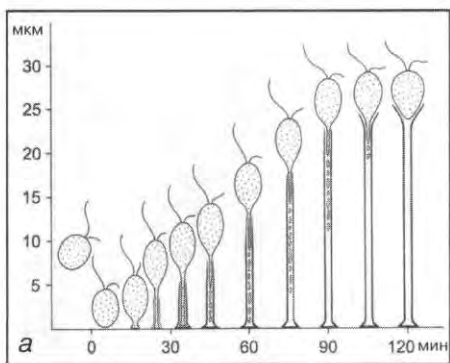
. 224.

*monas malhamensis* (Chrysoomonadea) ( )

( : Schnepf et al.: Planta 125 [1975] 45). : 4,000 .

*Poterioochro*

( )



. 225. —

*monas*; —

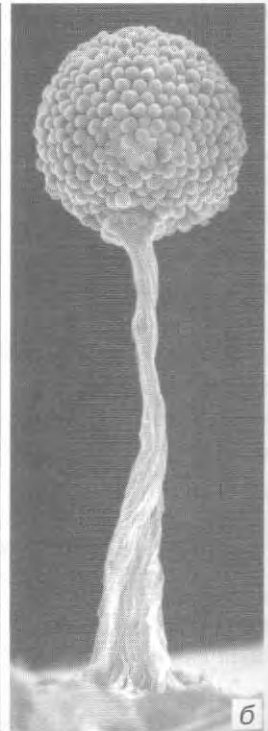
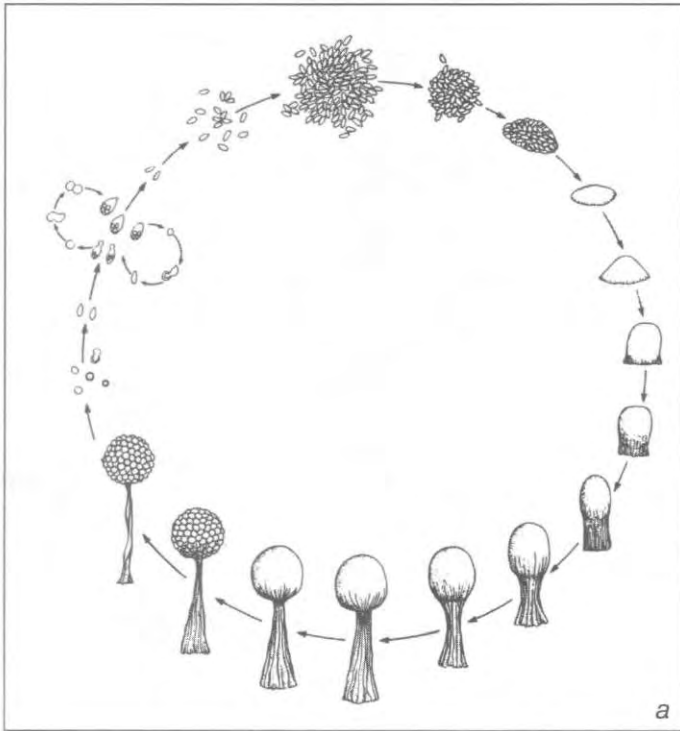
*Poterioochro*

( — , — ; — ) . : — 1 .

*Sorogena* ( . 226).

60

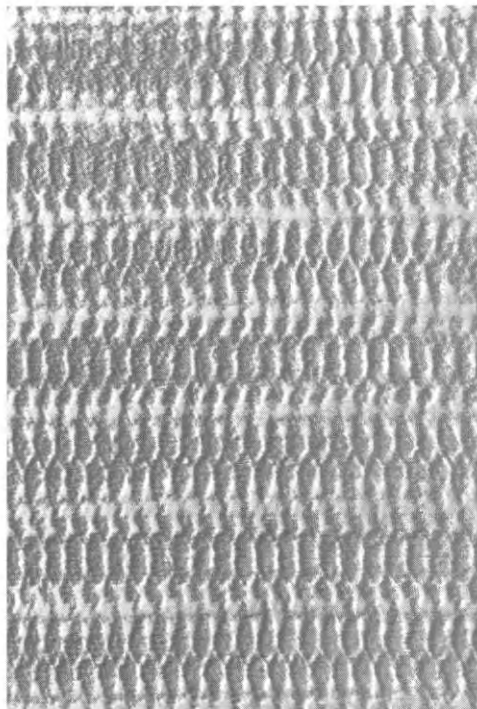
30



226. — *Sorogena*; — *Sorogena* ( — ; — : Olive and Blanton: J. Protozool. 27 [1980] 293). — : — 120x.

*chodind*)

( . 196, 197),



. 227.  
*Paramecium* ( : Hausmann: Ann. Stat.  
 Biol. Besse en Chandesse 7 [1973] 331).  
 .: 260 000x.

15

*Paramecium* ( .

17, 227).

16

).



16.

			(?)	

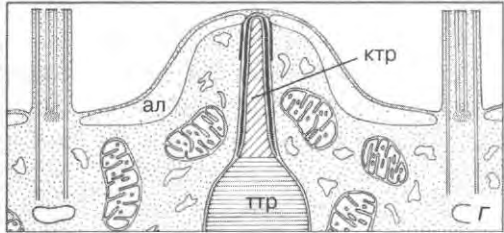
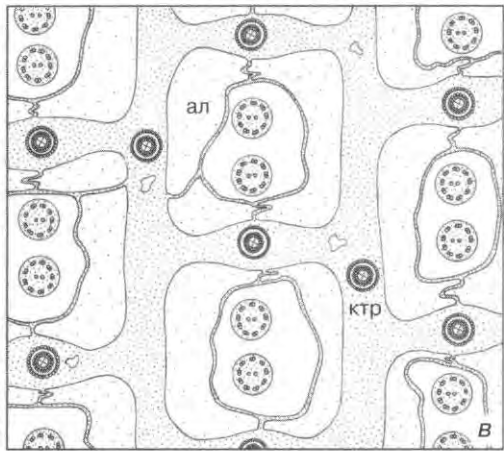
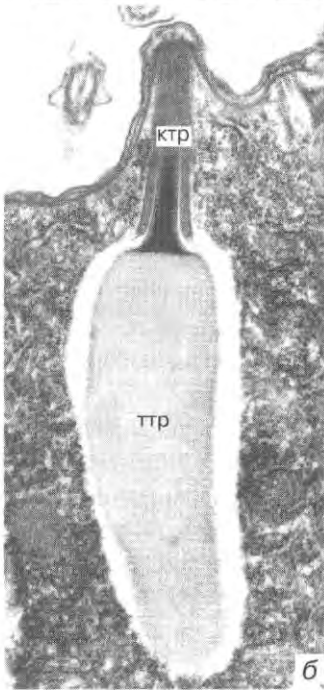
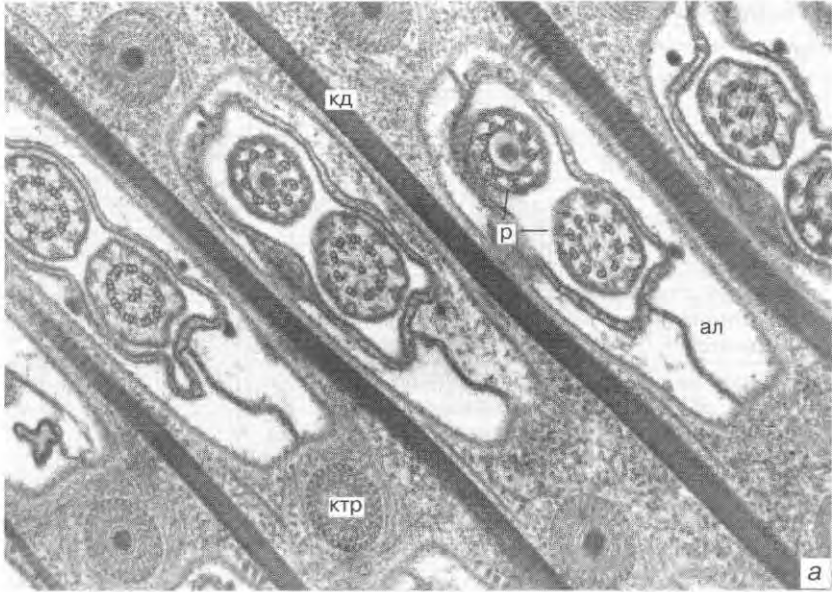
( . 228).

*Paramecium*

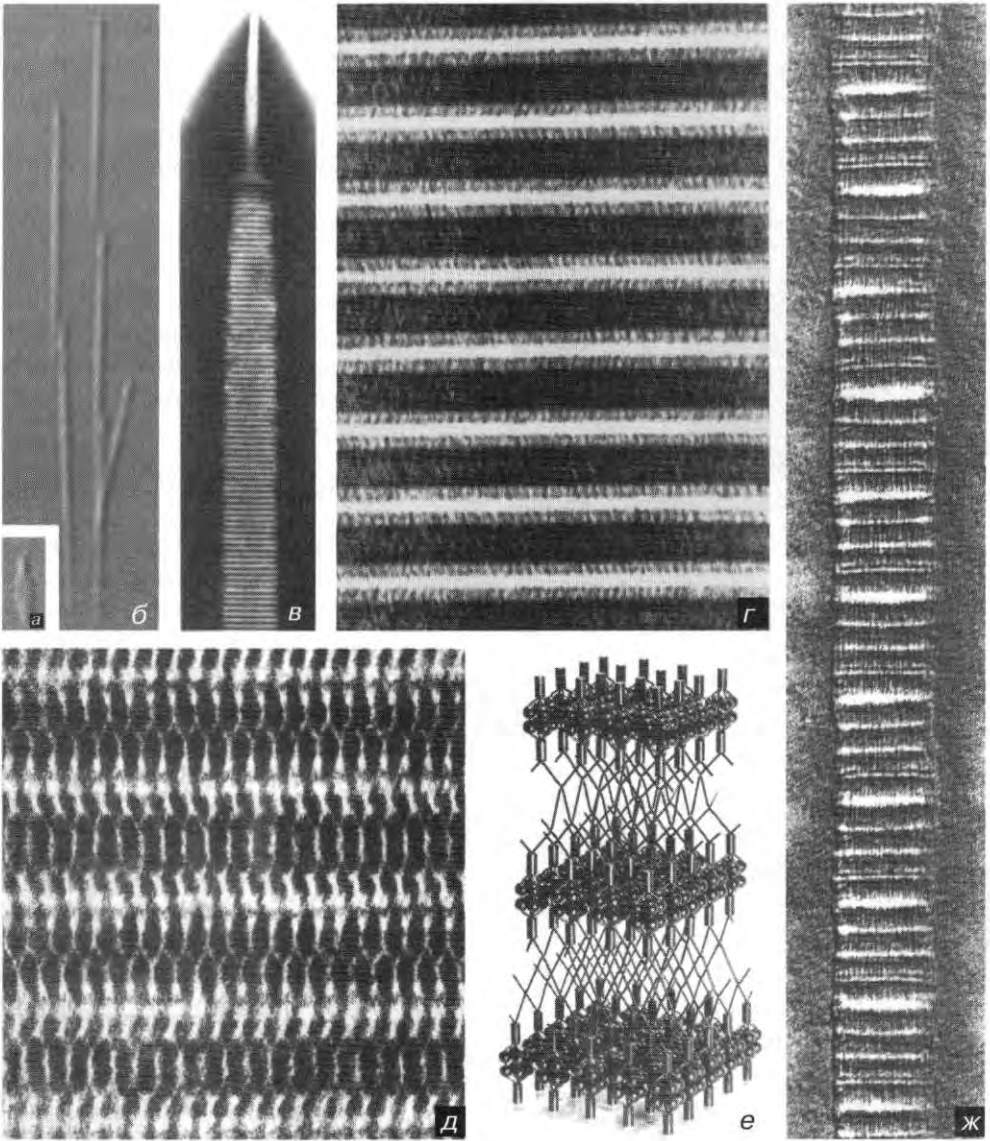
7

8  
;  
( . 229).

56

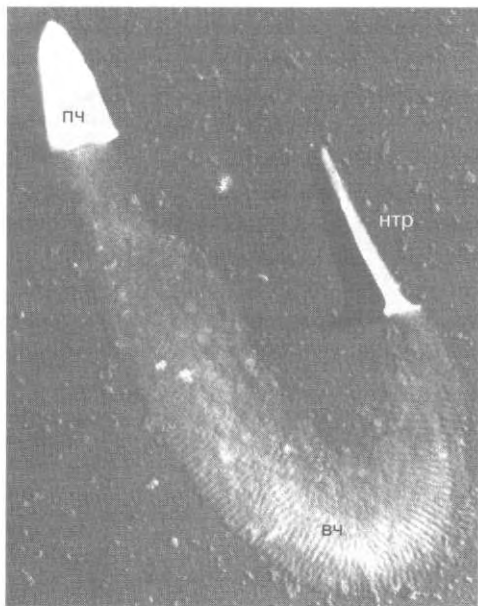


228. *Paramecium*: ( ), — ( ) ( : Hausmann: Int. Rev. Cytol. 52 [1978] 197). : а 52 000x, б — 24 000x.



229. *Paramecium* ( )      *Oxyrrhis* ( ): — — — — —  
 ; — ( — — — — — ) ; —  
 ; — ; — ; — ; — ; —  
 ( : Hausmann: Int. Rev. Cytol. 52 [1978] 197). : a 900x, 900x, s  
 11 000x, 220 000x, 330 000x, 200 000x.





*Paramecium*  
58

. 230. ( *Paramecium*,  
( : Hausmann: Int. Rev. Cytol.  
52 [1978] 197). : 15 500x.

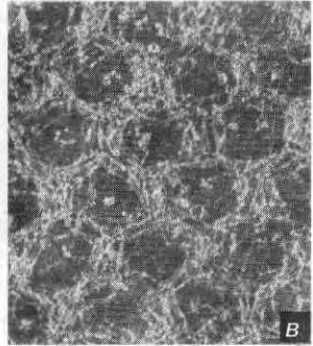
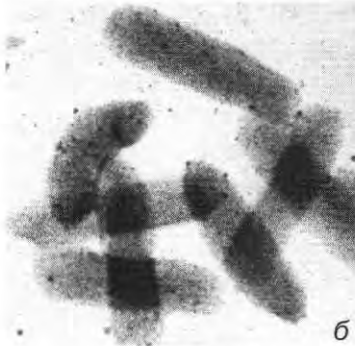
( . 231),

( . 230).

( , *Didinium*)

*Paramecium*.

« — »

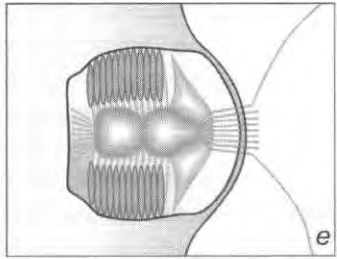
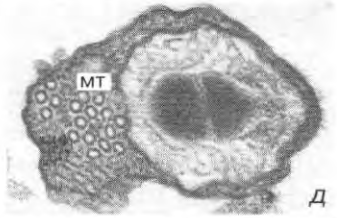
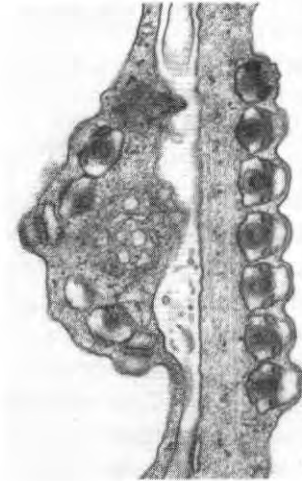


. 231.  
*Loxophyllum*  
 ( )  
 ( , );

( ), —  
*Clathrulina* ( )  
*Acanthocystis* ( ), —

*Raphidiophrys contractilis*

— ( )  
 — : Hausmann: Int. Rev. Cytol. 52 [1978] 197;  
 : Bardele: Z. Zellforsch. Mikrosk. Anat. 130 [1972] 219; e — : Sakaguchi et al.: Europ. J. Protistol. 37 [2002] 453). : a 57 000x, b 7 200x, c 132 000x, r 38 000x, d 73 000x.



Euglenida

Oomycetes

87). ( . 86,

( . 88, 98)

( )

( , *Blepharisma*

*Stentor*)

( , *Loxodes* *Trachelonema*).

. *japonicum*

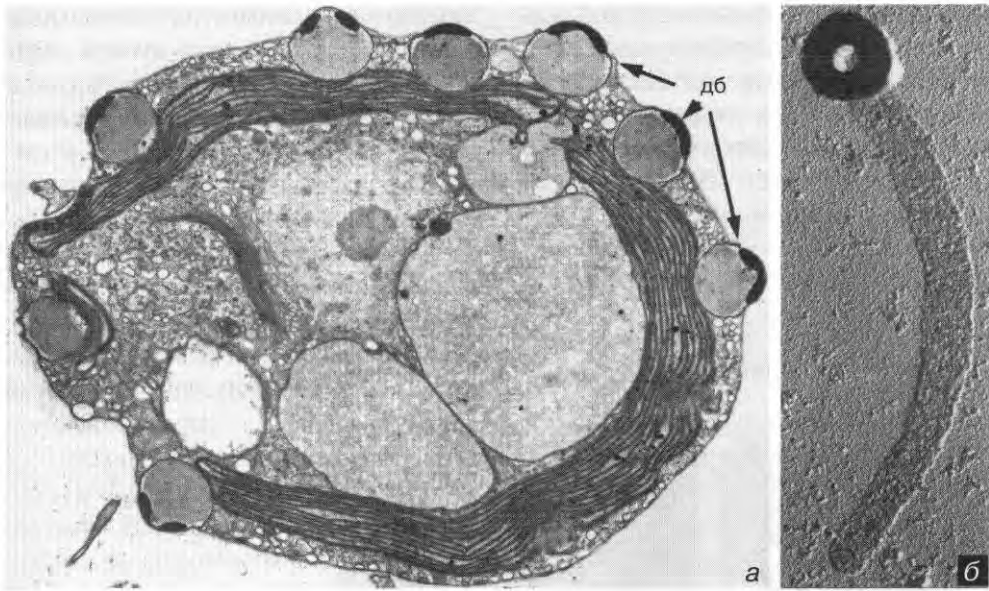
0,3

0,6

*Dileptus*,

Apicomplexa

*Stentor coeruleus*

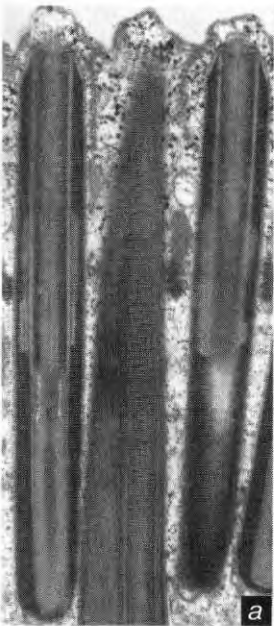


232. : — *Ochromonas tuberculatus*  
 ( ); — ( : Hibberd: Brit. J. Phycol. 5 [1970] 119). : a — 7 000x, 6 — 11 000x.

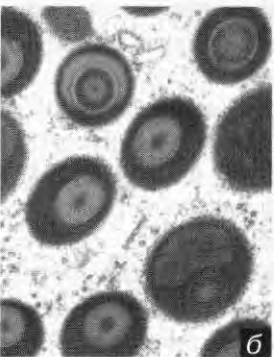
*Climacostomum*  
*virens*  
 ( ),  
*Blepharisma*  
*Stentor*

( . 232).

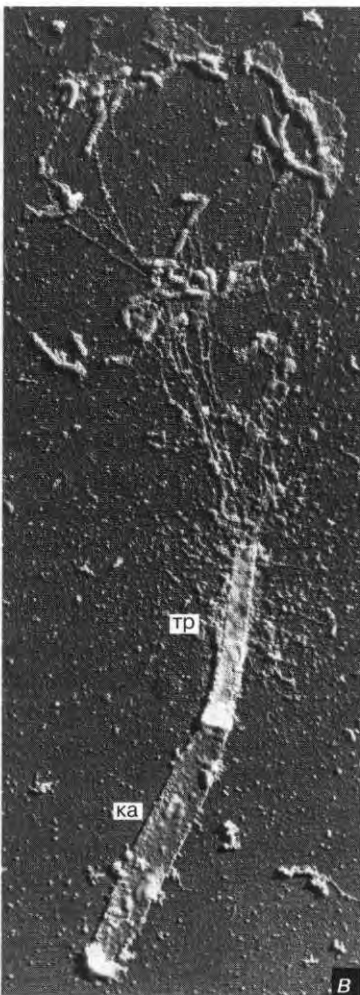
( ) ,



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б



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ka

B

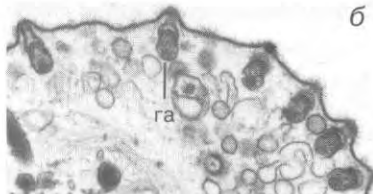
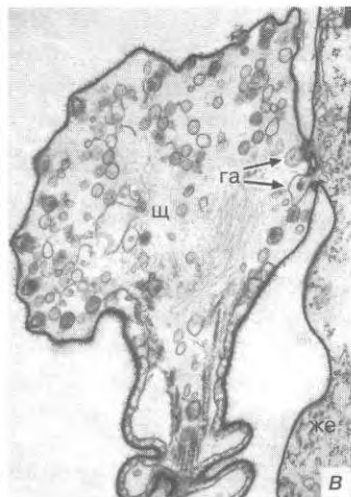
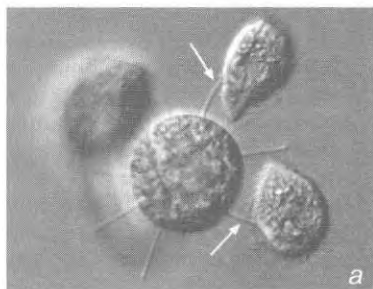
. 233. Homalozoon ( , )  
 Loxophyllum ( ):  
 ( ) ; —  
 — : Kuhlmann and Hausmann: Protistologica 16 [1980] 125; — : Hausmann and Wohlfarth Bottermann: Z. Zellforsch. Mikrosk. Anat. 140 [1973] 235). : a 35 000x, 6 3 5 000x, s 15 000x.

233).

( . 234).

Haptoria

*Trachelonema sulcata* *Tracheloraphis dogieli* *Trachelonema*



. 234.

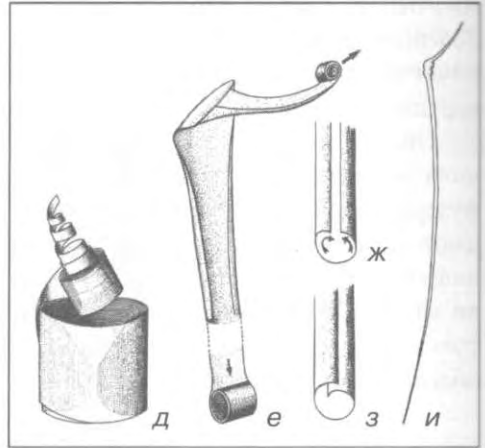
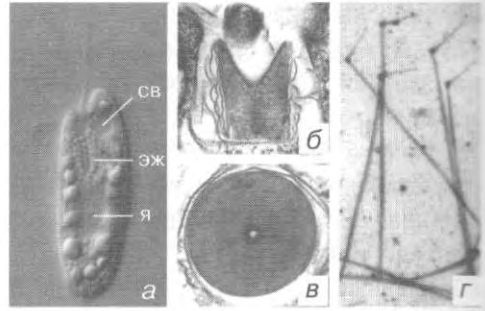
( ) ; — ( ) ( ) ( ) — : Bardele and Grell: Z. Zellforsch. Mikrosk. Anat. 80 [1967] 219). .: a 250x, 6 2 2 000x, 22 000x.

( . 235).

R (refractory,

*Paramecium*.

R



. 235.

*Chilomonas Paramecium*:

( )

( ) ( ) ;

; —

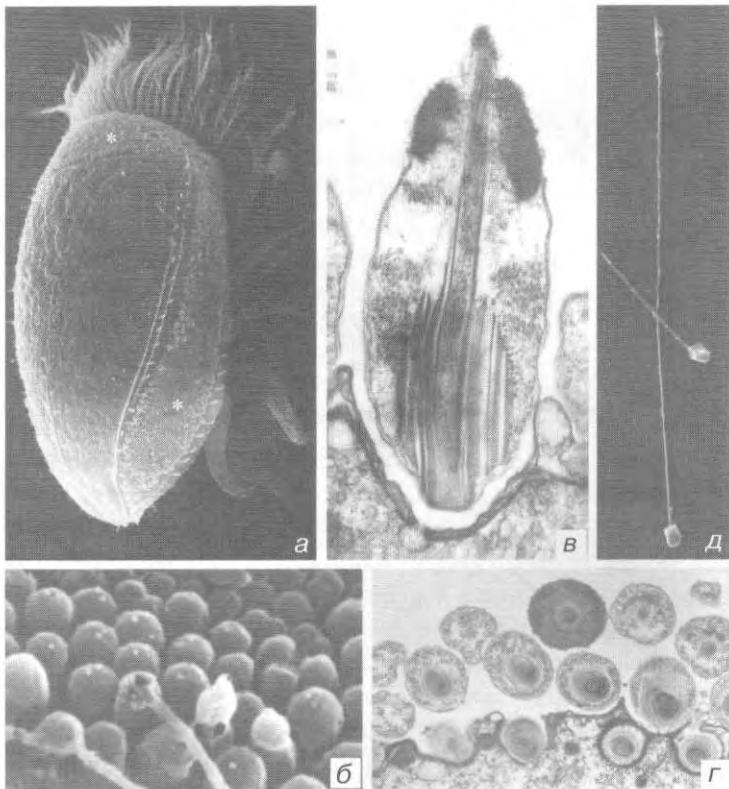
( )

( ) ( : Hausmann: Int.

Rev. Cytol. 52 [1978] 197). : a 2 600x, 6 1 9 000x, — 30 000x, — 5 000x.

( . 236).

. 236. -  
 : , — *Euplo-*  
*tidium itoi*  
 (\*); -  
 ( ) ( )  
 ; — -  
 ( : Verni and  
 Rosati: J. Protozool. 37  
 [1990] 337). : a  
 580x, 6 6 000x, e  
 20 000x, 7 000x,  
 2 000x.



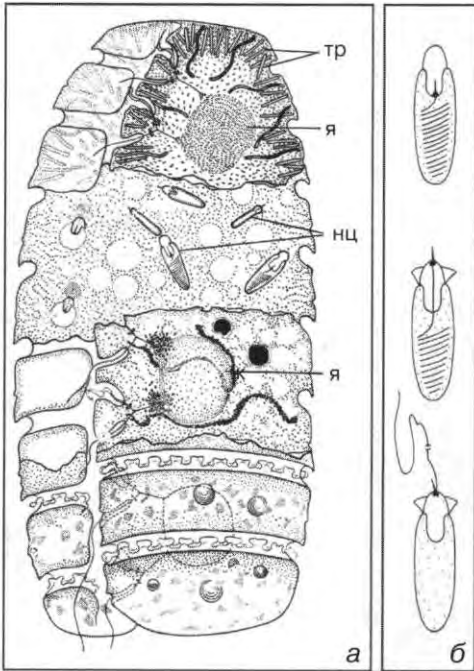
237).

(*Haptoglossa*),

)

( .





. 238),

( . . 150, 183, 184).

*Haptoglossa mirabilis*  
*Adineta*

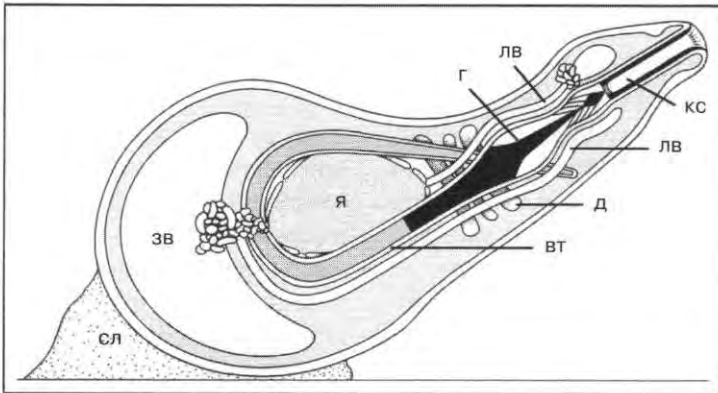
. 237.

*Polykrikos*.

(1 3) ( — : Chatton and

Grasse: . R. Soc. Biol. 100 [1929] 281).

∴ a 600x.



. 238.

*Haptoglossa mirabilis*.

( . . ) . ∴ 6 .

( . 238).  
15

( ) ( . 239),

( ),

( ).

100

— , *Paramecium* ( . 240) —

(15 20)

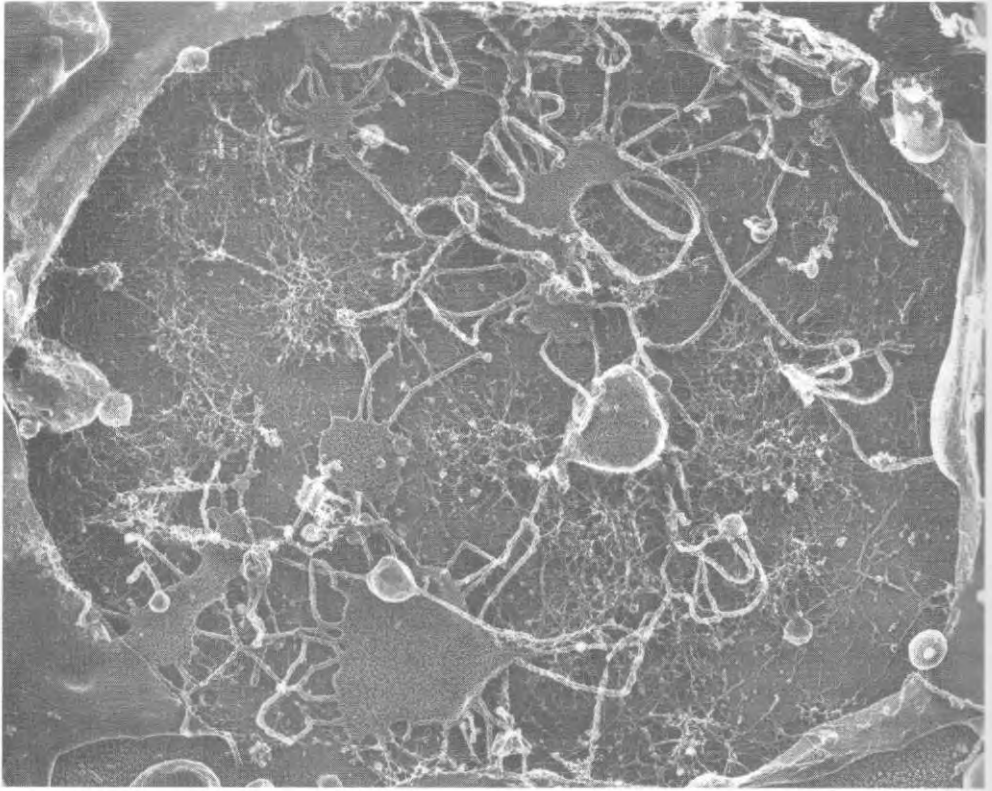
*Homalozoon* .<sup>1</sup>

*Dileptus*

*Loxophyllum Spirostomum,*

1

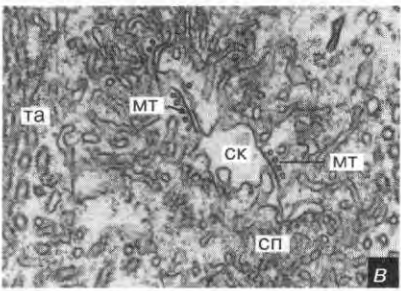
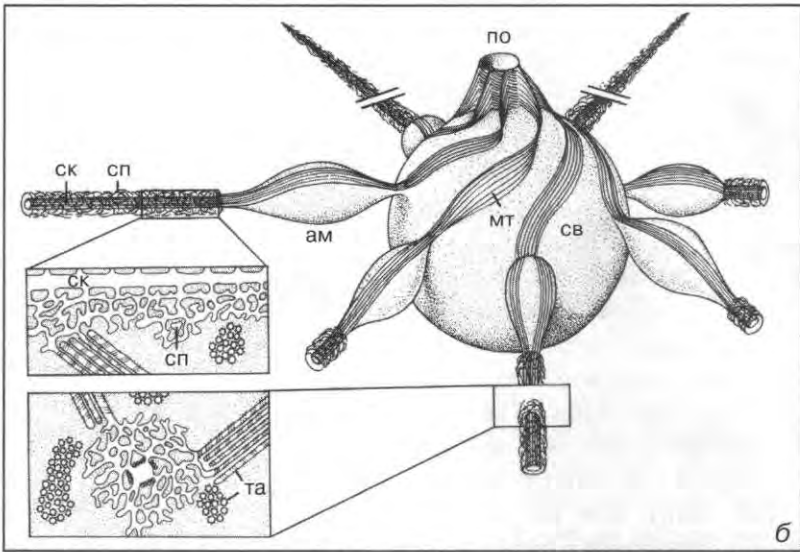
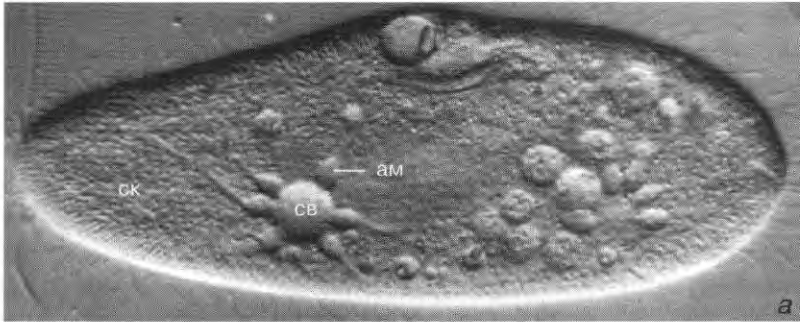
*Reticulomyxa*



. 239.  
*Dictyostelium*.  
[1993] 1311). : 19000x.

( : Heuser et al.: J. Cell Biol. 121

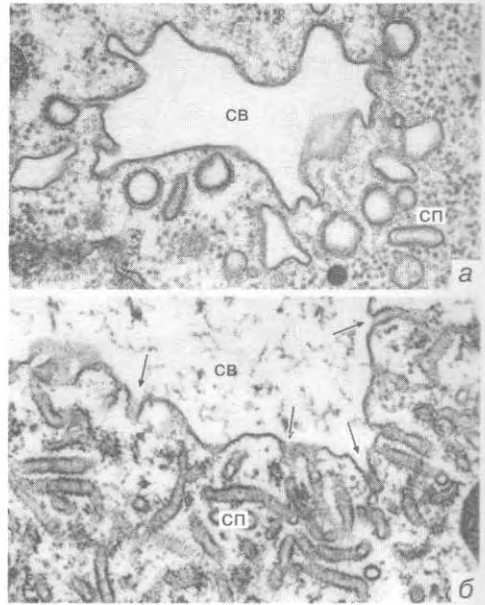
( . 240).



. 240. *Paramecium*: — ; — ;  
 — ( ), ( ),  
 ( ) ( ). — ( ) —  
 ( ). ( ) ( ) ( ) — : Hausmann and  
 Allen: Cytobiologie 15 [1977] 303). : a 650x, —40 000x.

( . 241 ).

( . 2416).



. 241.

( )

( ) *Goniomonas*  
( ) *Pseudomicrothorax* ( ).

( ) ( — : Hausmann  
and Patterson: Exp. Cell Res. 135 [1981] 449:  
— : Hausmann: Arch. Protistenk. 127  
[1983] 319). . : a 35 000x, 6 40 000x.

<sup>1</sup> *Paramecium* ( . 240)



*Chlamydomonas*

(45 117 / )  
( 7 />

«

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[Faint, illegible text, likely bleed-through from the reverse side of the page]

in vitro 35 . In vivo

[Faint, illegible text, likely bleed-through from the reverse side of the page]

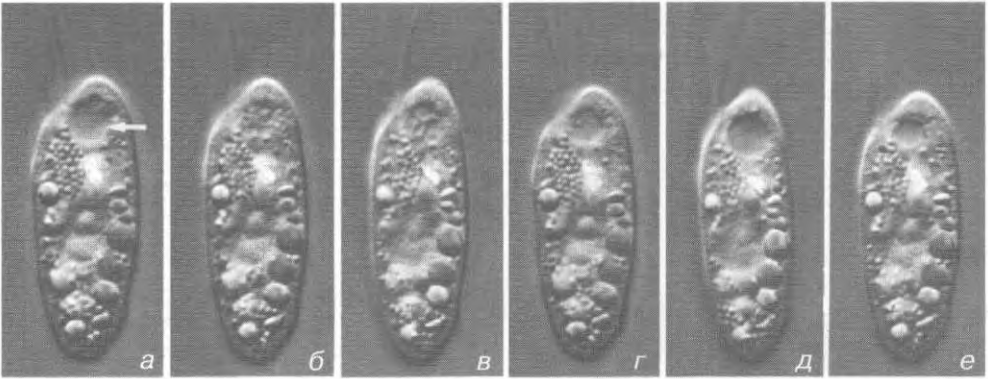
242.

*Paramecium caudatum* ( . 243).

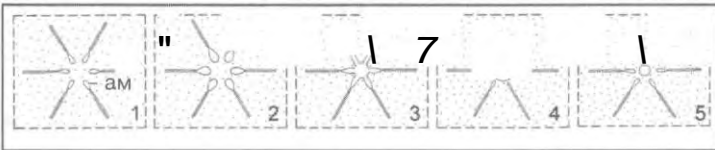
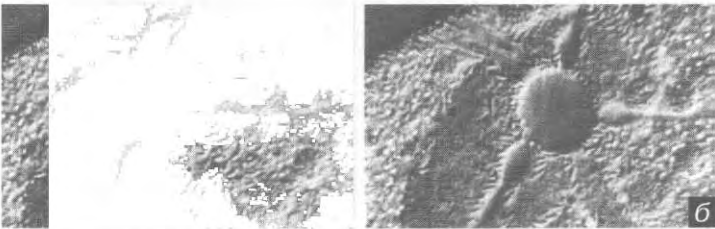
( )

( )

).

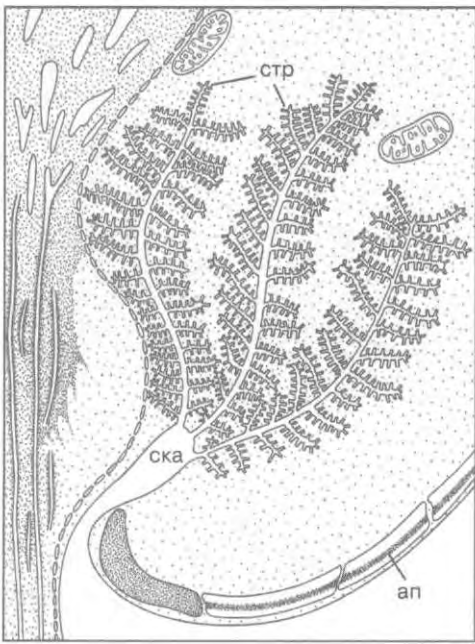


242. ( ) ( ) *Chilomonas*  
 ( ) ; 10 ( ) ( : Patterson and Hausmann: Br. phycol.  
 J. 16 [1981] 429). : a e 3 000x.



243. -  
*Paramecium:*  
 - ; -  
 ; -  
 (1 5) ,  
*P. caudatum*  
 8 -  
 , -  
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 750 .

( . 244).



. 244.  
*Oodinium*. an —  
 (=



. 245.  
*Paramecium*

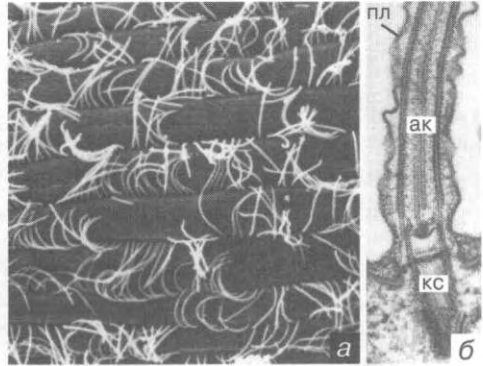
( 2,5 ) .

4 \* =

245).

0,3

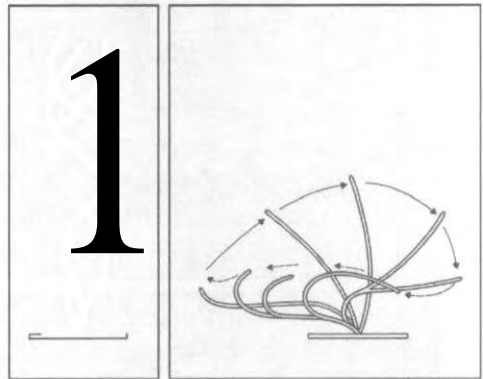
( )  
( . 246).



. 246.  
*Homalozoon* ( )  
*Paramecium* ( ),

1 200 , 6 3 2

( . 247).



. 247.  
( ) ( ) ( ) .

( )<sup>1</sup>) 13

9x2+2;

( ) 10  
, 3

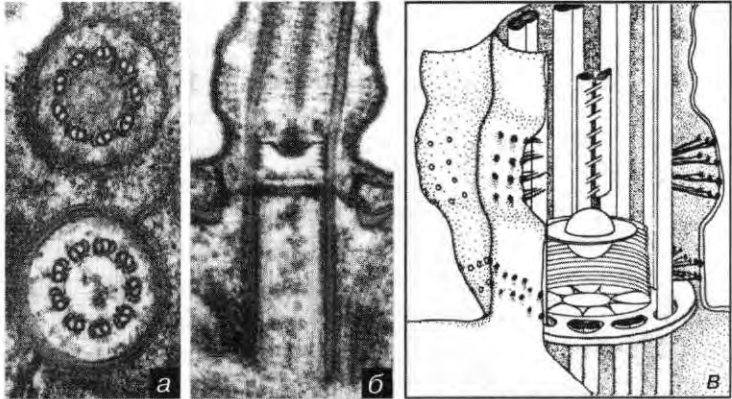
( . 248).

( )  
( ) .

), (

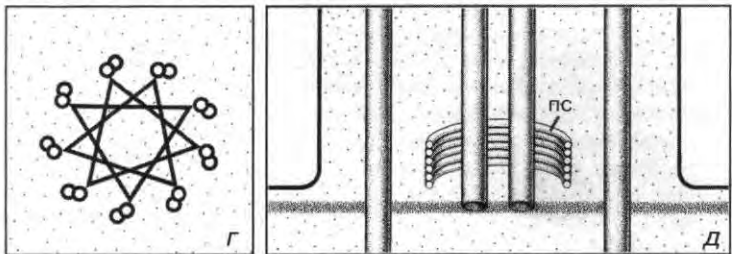


. 249.



Chlorophyta

( ) Heterokonta ( —  
 : Dentler: Int. Rev.  
 Cytol. 72 [1982] 1).  
 ∴ 6 0 000x.



249).

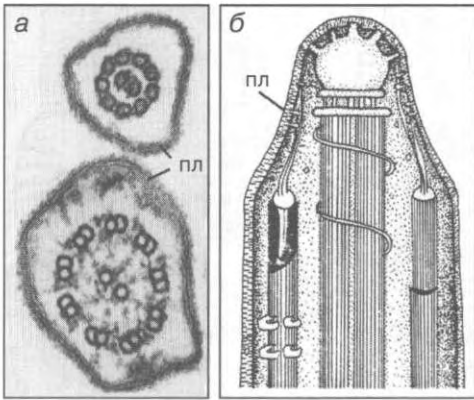
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250 ).

. 250.

Dentler: Int. Rev. Cytol. 72 [1982] 1).  
85 000x.

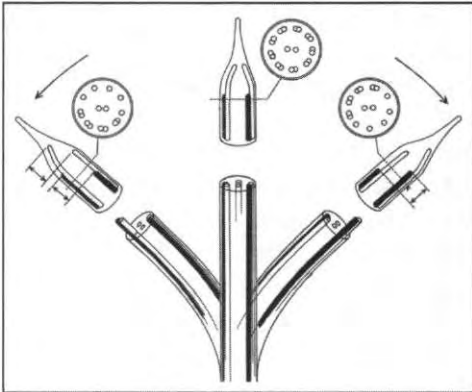
( . 2506).

9x2+2

0,25 мкм.

: 9x2+5, 9x2+0, 6x2+0  
3x2+0.

( . 251).



251.

( ) .

( . 252).

( )

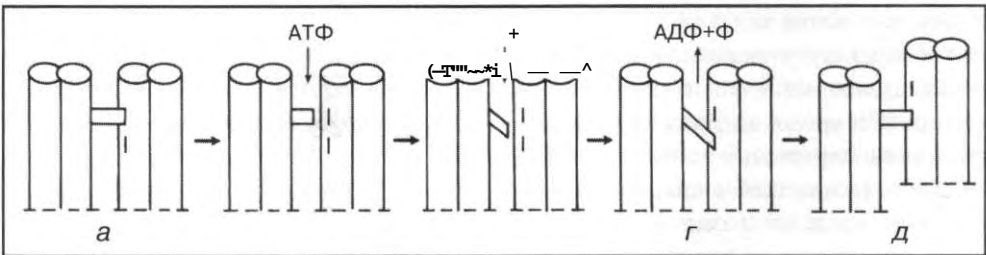
( + ),

40°.

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252.

40'

( )

( ) .

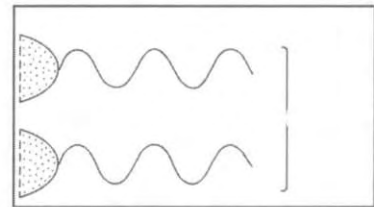
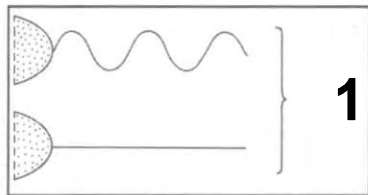


253).

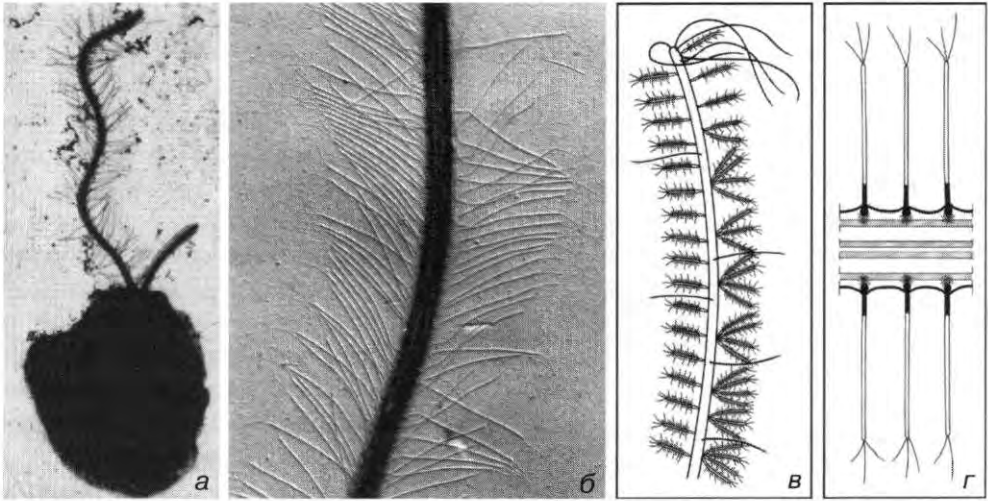
*Paramecium*)

( *Ochromonas*, . 254),

( . 2476).



. 253.



. 254.

*Poteriochromonas*; —

*Paraphysomonas cyllicophora*; —

*Ochromonas danica*; —

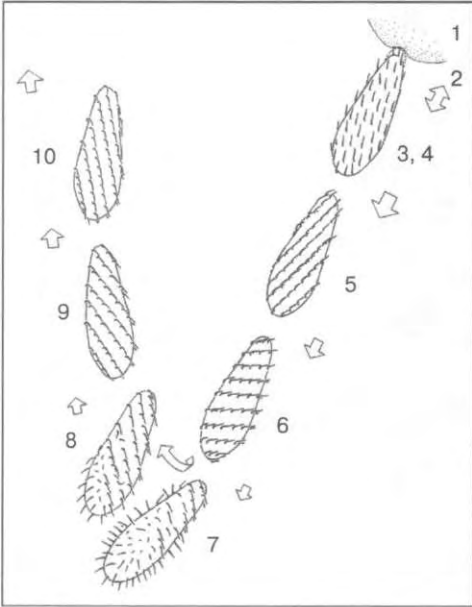
( . 255). *Paramecium*

1

2 4

2

( )



. 255.

*Paramecium*,

*Para-*

*Paramecium*

*Opalina.*

*Paramecium*

( : (4)

(7, 8).

(4 7)

(7, 8) ( : Machemer and de Peyer: Verh. Dtsch. Zool. Ges. 70 [1977] 86).

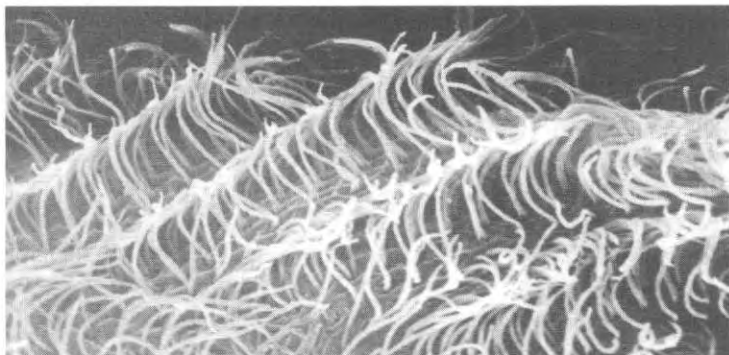
( . 256).

).

( )  
*nophorea*

*Oligohyme*

( . 249 ).



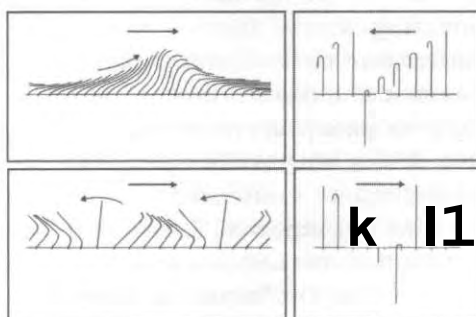
. 256.

*Paramecium*  
 ( : Hausmann: Mikro  
 kosmos 63 [1974]  
 165). : 2 000x.

*Mixotricha paradoxa.*

*Opalina.*

( . 257).



. 257.

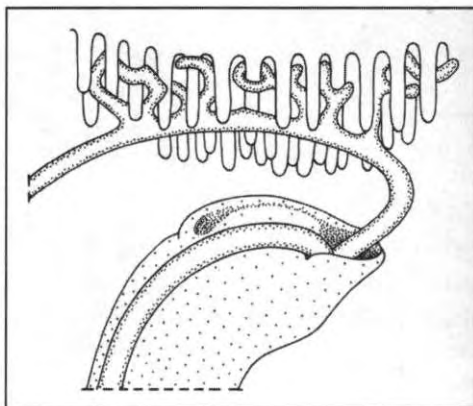
( ).

*Opalina* *Isotricha*.

*mecium*.

*Para-*

*Paramecium*



. 258.

*Cryptobia*

( )

( . 258).

( . . 21, 40).

246).

24 , 254)

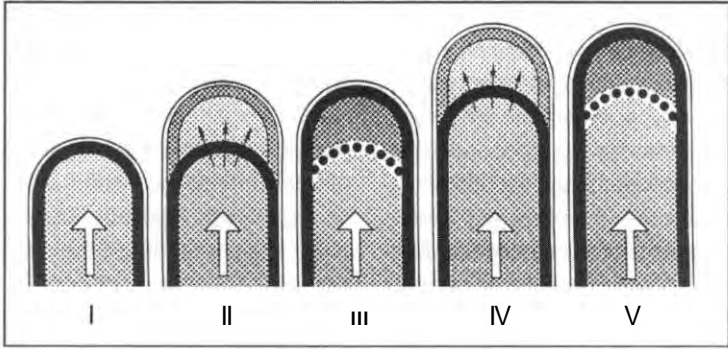
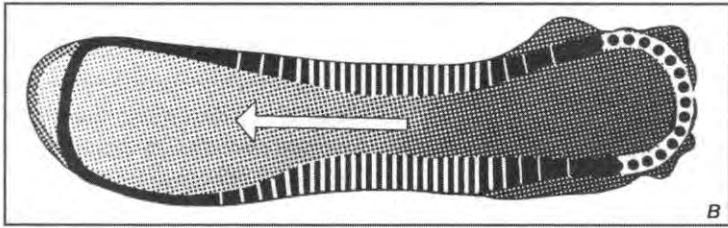
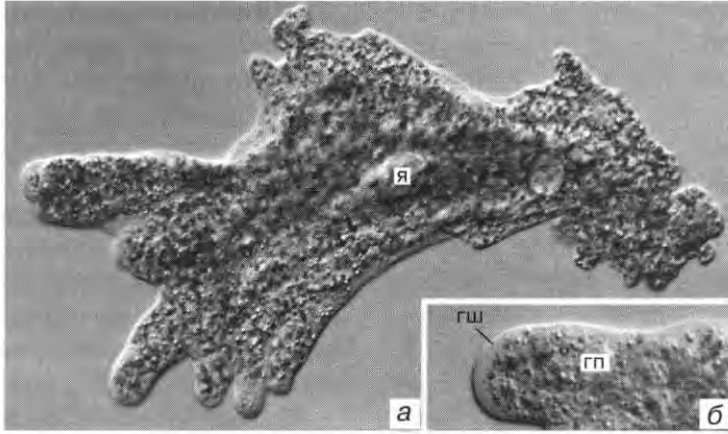
( . . 168).

( . . 50),

*Crypto*

*Triadopsis* *Helix*.

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 Dictyostelium,  
 -  
 Amoeba proteus  
 Chaos chaos,  
 -  
 -  
 -  
 Amoeba  
 proteus  
 ( . . 60).  
 Haptomonada.  
 ,  
 ( . 259).  
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 ( .  
 0,01 ).  
 0,02 ;  
 2 10 .  
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 -  
 ,  
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 -  
 ( . 259).  
 Amoeba proteus  
 ; ( .  
 . 277). (



259. : — *Amoeba proteus*. — ( ) . — ( ) ; — (II, IV), (III, V), ( ) ( : Stockem and Kloposca: Int. Rev. Cytol. 112 [1988] 137). : a 350x, б 400x.

8

0,5 ).

F

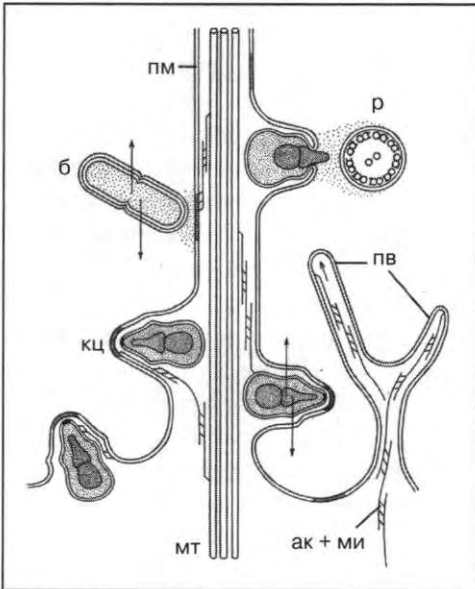
*Physa*

( I,  
II),

(



*Physarum.*



*Physarum*

2\*

27

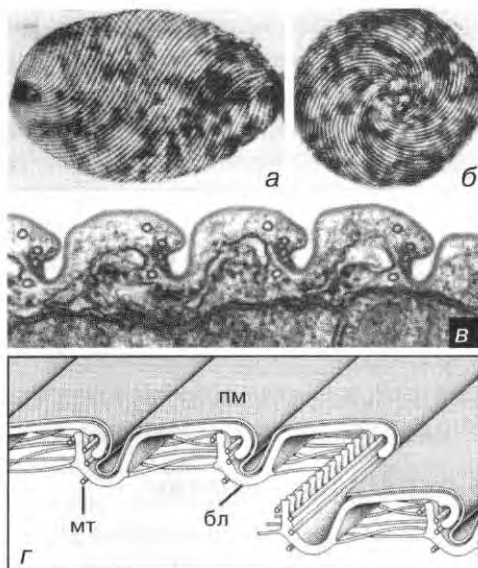
. 260.

( ) .

( ) ,

Actinopoda

( . 260).



261). *Distigma*

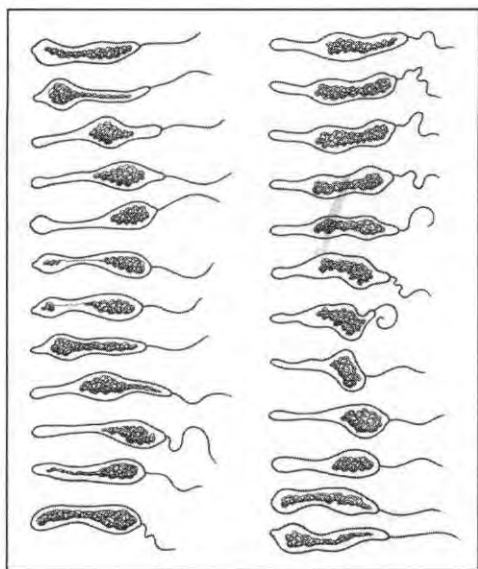
. 262.

*Euglena*; —

; — *Astasia longa*; —

( — : Foissner: Acta biol. Acad. Sci. Hung. 28 [1977] 157; —

). . : — 720 , 65



. 261.

( ) *Distigma*.

— 2 —

( : Hausmann and Hulsmann: Photo Med' 4 [1981] 253).

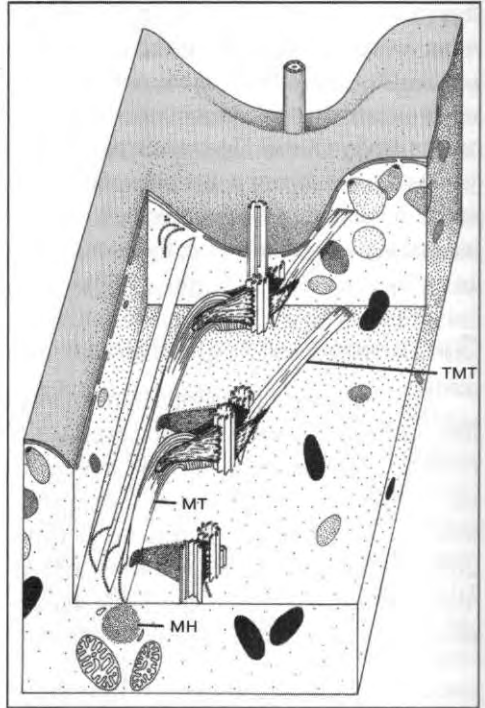
( . 262).

*Distigma*

, *Stentor*

5 10

( ) ,



. 263.

*Eufolliculina.*

( ) —

( ) —

( : Mulisch et al.: Protistologica 17 [1981] 285).

4

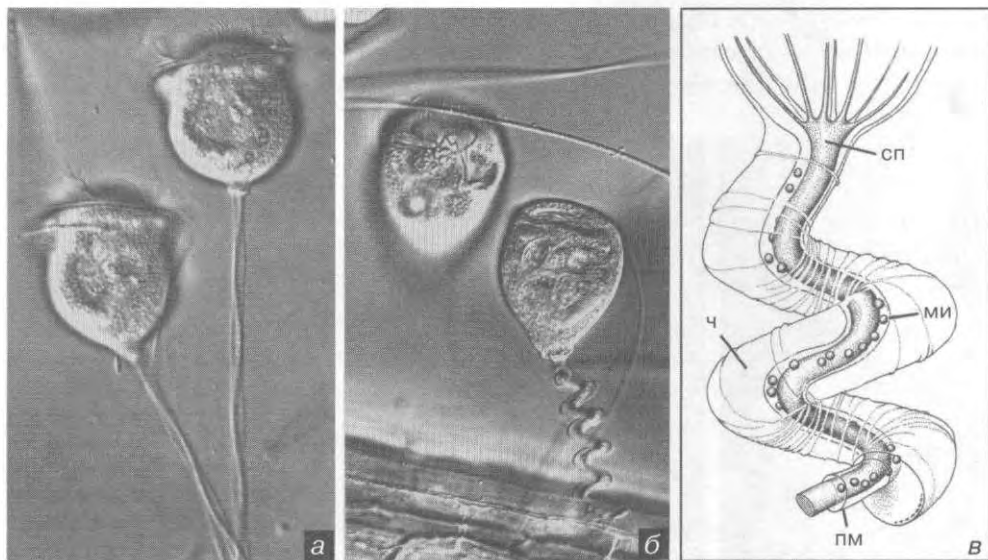
( . 263).

( ) ,

(10 12 )

Heterotrichea.

( )



. 264.

*Vorticella* ( )

( ); ( ):

( ), — ; —

( — : Kleinig and Sitte: Zellbiologie, Stuttgart 1992; —

). : — 220 .

( . 264).

2

3 ( )

*Vorticella*

1

5 7

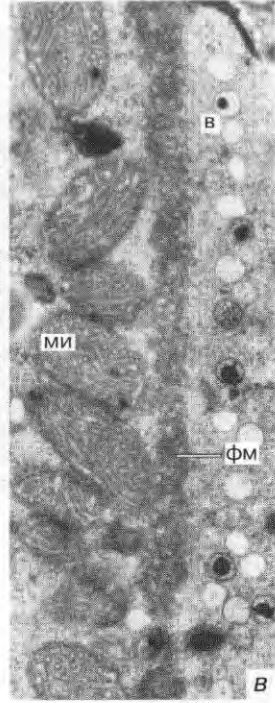
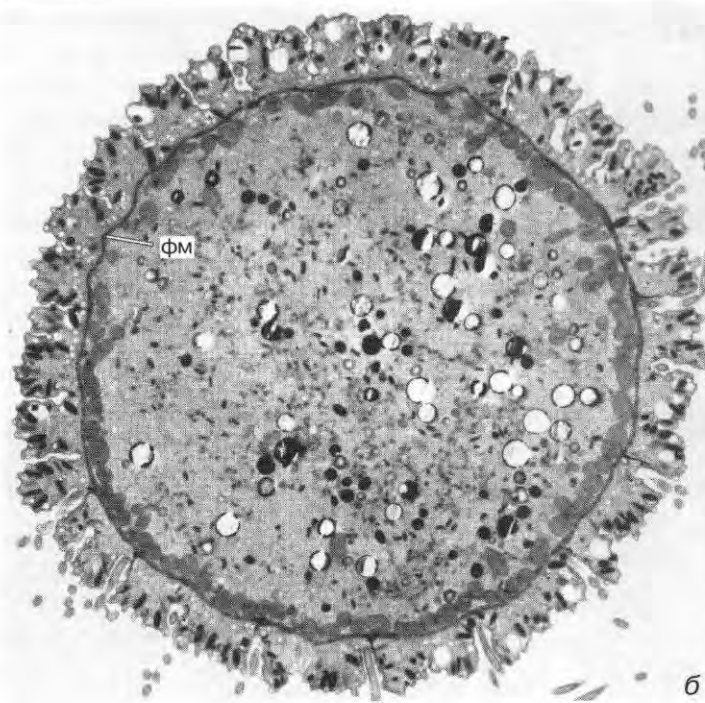
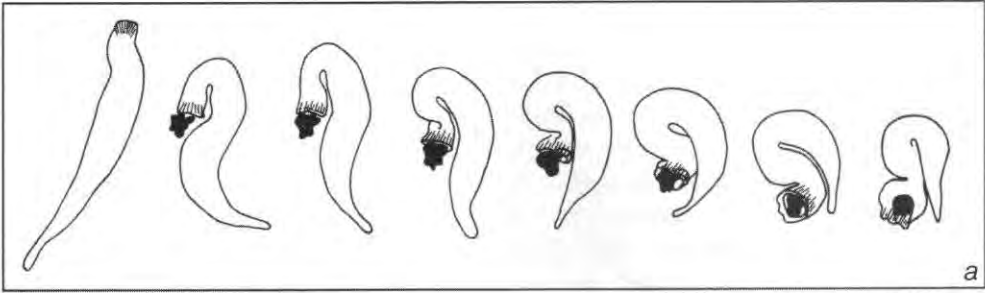
( . 265).



. 265.  
Hausmann: Mikrokosmos 76 [1987] 176).

*Lacrymaria olor* ( ) ( :

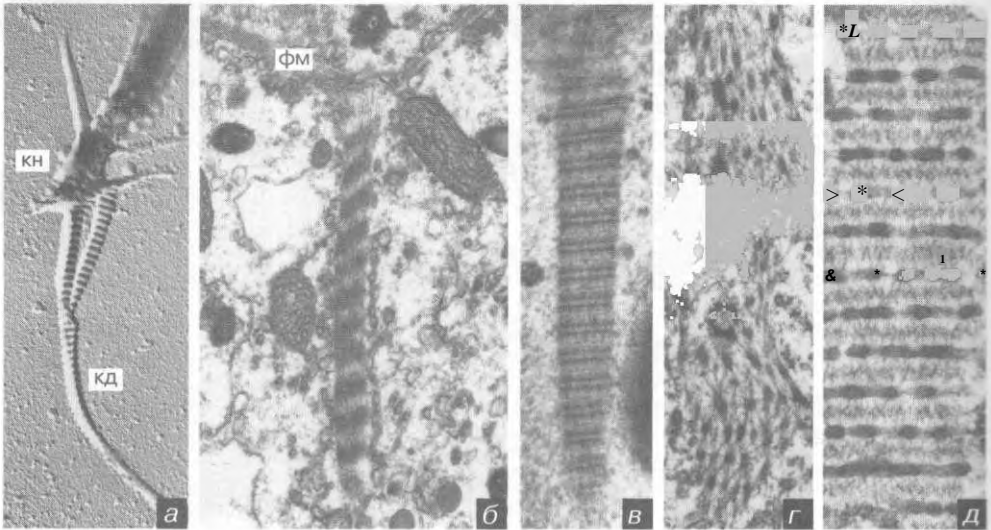
— 200 .



. 266. ( ); , — Homalozoon ( ), — ( : Kuhlmann et al.: Protistologica 16 [1980] 39). : 6 5 500x, — 30 000x.

( . 266).

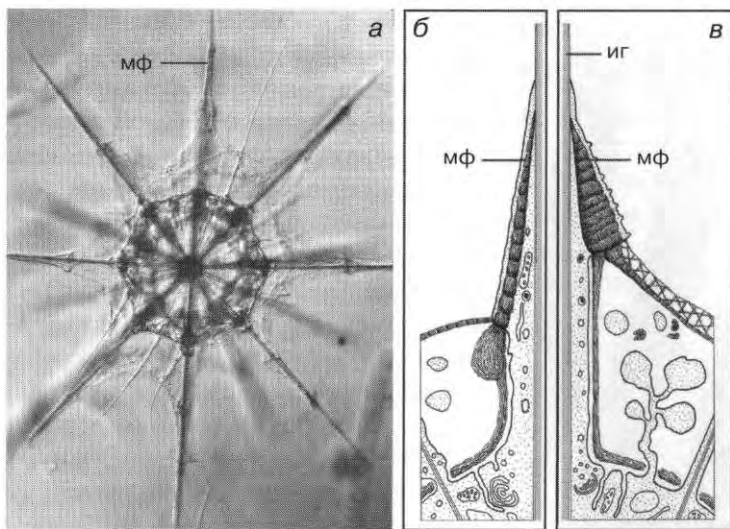
267).



. 267.

Chilomonas; —  
 Trichodina. : 25 , 6 2 0 , — 60 , 30 , 65

*Loxophyllum*; —



. 268.  
 ( ) ( )  
 ( ), -  
 ( ) -  
 ( ) -  
 ( -  
 ). ∴ - 160 .

( ) Acantharea,

( . 268).

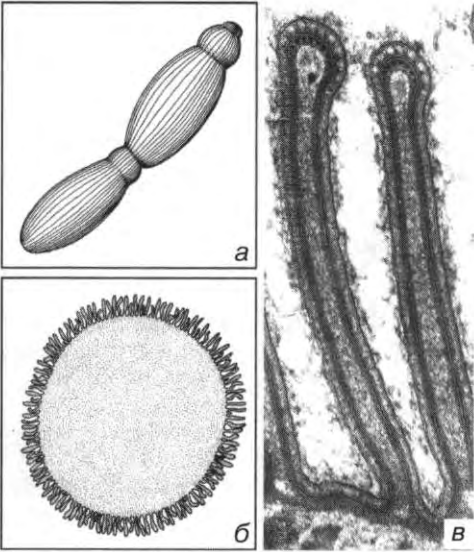
*Noctiluca scintillans.*

*Paramecium*

( . 111).

*Trichodina,*





. 269.

( ) ; —  
*Gonospora beloneides*  
 ( — ) . : 48

( . 269).

*Plasmodium* ( )

(throm  
bospondin related anonymous protein —  
TRAP),  
Apicomplexa. TRAP

, TRAP

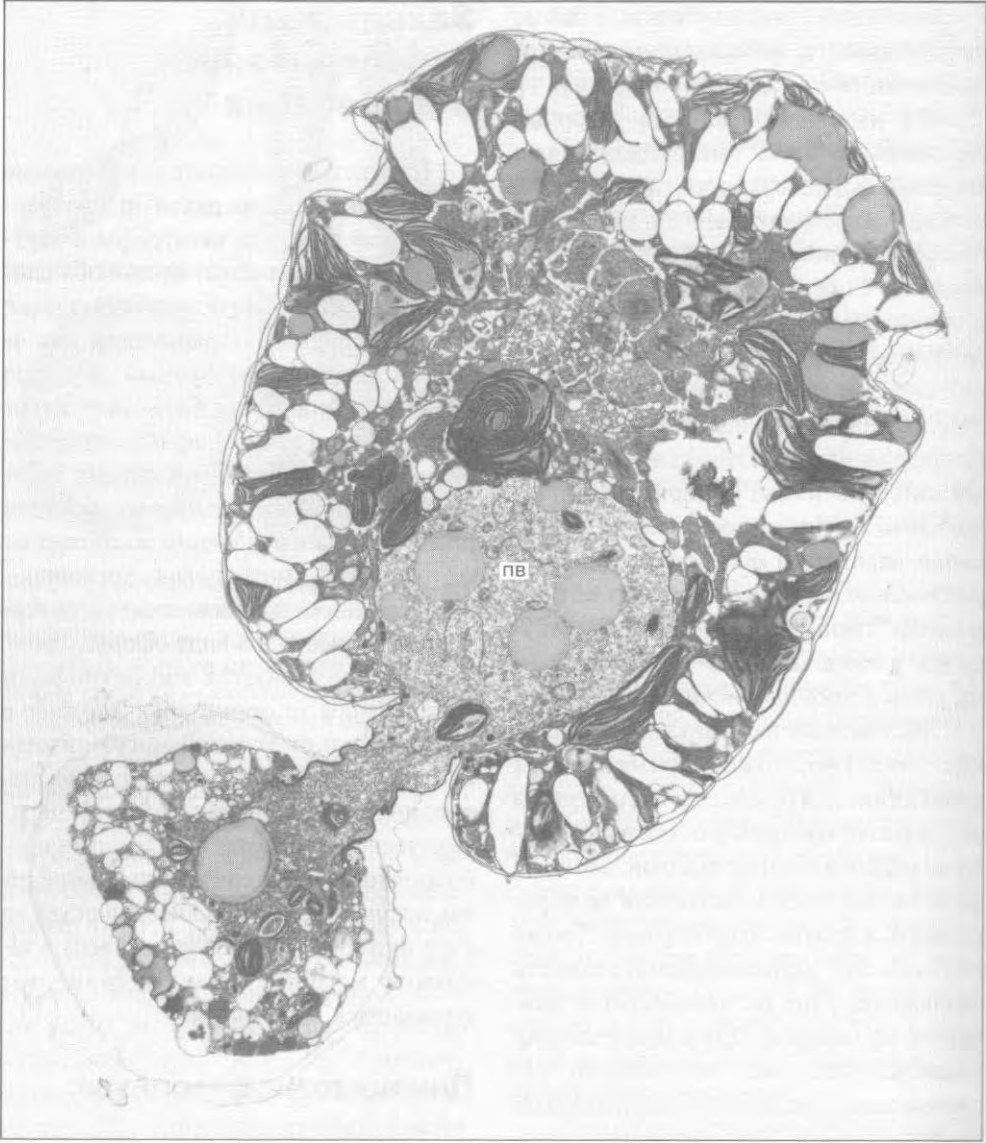
),  
( . 270),

( . . 174)

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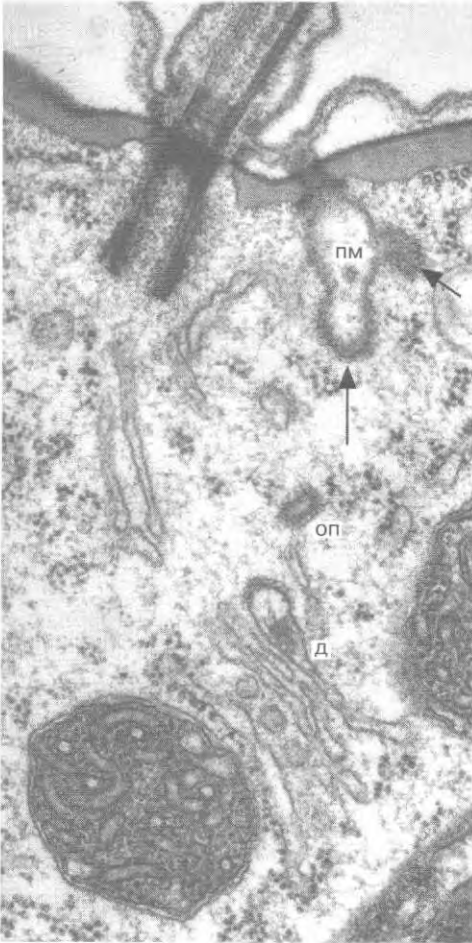
2



. 270.  
27 [1981] 600). : 4 000x.

*Amphidinium cryophilum*,  
( : Wilcox and Wedemayer: J. Phycol.





272. *Pseudo*  
*microthorax*: (on) -  
 ( ) -  
 ( ) - : 40

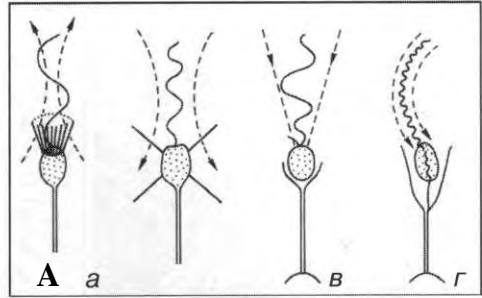
*Paramecium*

Micrograph showing a cell with a large, dark, circular structure (possibly a nucleus or large organelle) and various granular and fibrous structures. The image is mostly blank with some faint markings.

*Climacostomum*

*Actinophrys*<sup>1</sup>

1



273.

— *Codonosiga*, — *Actinomonas*, — *Ochromonas*,  
— *Bicosoeca*. ( )

273 276).

274.

Prymnesiomonada

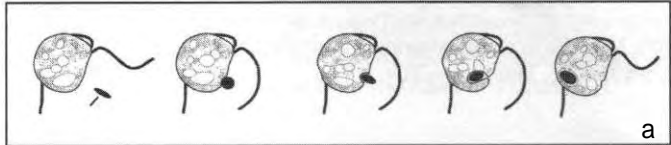
( . 277; . 60).

274.

Opisthokonta

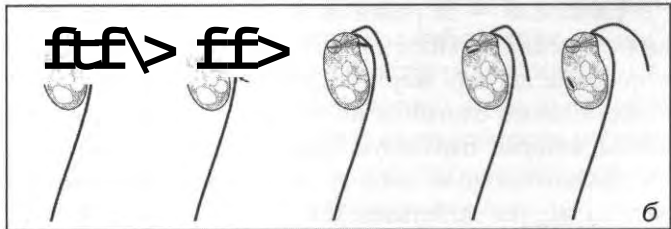
*Cafeteria roen*

*bergensis* ( ) *Bodo saltans*  
( )

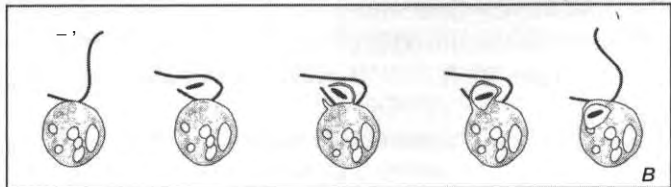


( )

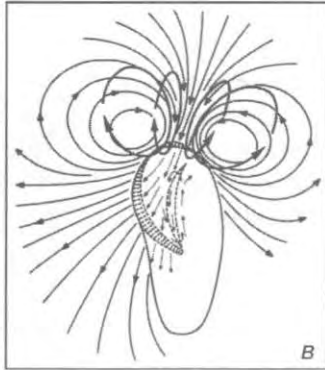
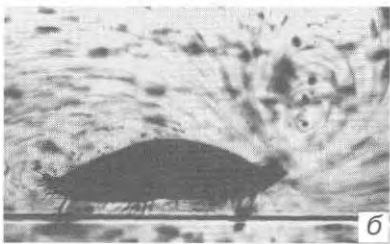
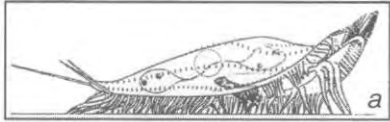
{*Cafeteria*}  
{*Bodo*}



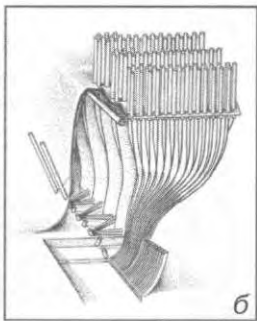
*Spumella* sp. ( )



( : Boenigk and Arndt:  
*J. Eukaryot. Microbiol.* 47  
[2000] 350).



. 275. -  
 Sty  
 ( ,  
 lonychia:  
 )  
 ( ).



1  
 ( . 279),  
 ( . . 131).

. 276. *Eufolliculina*, -  
 ( )  
 ( ),

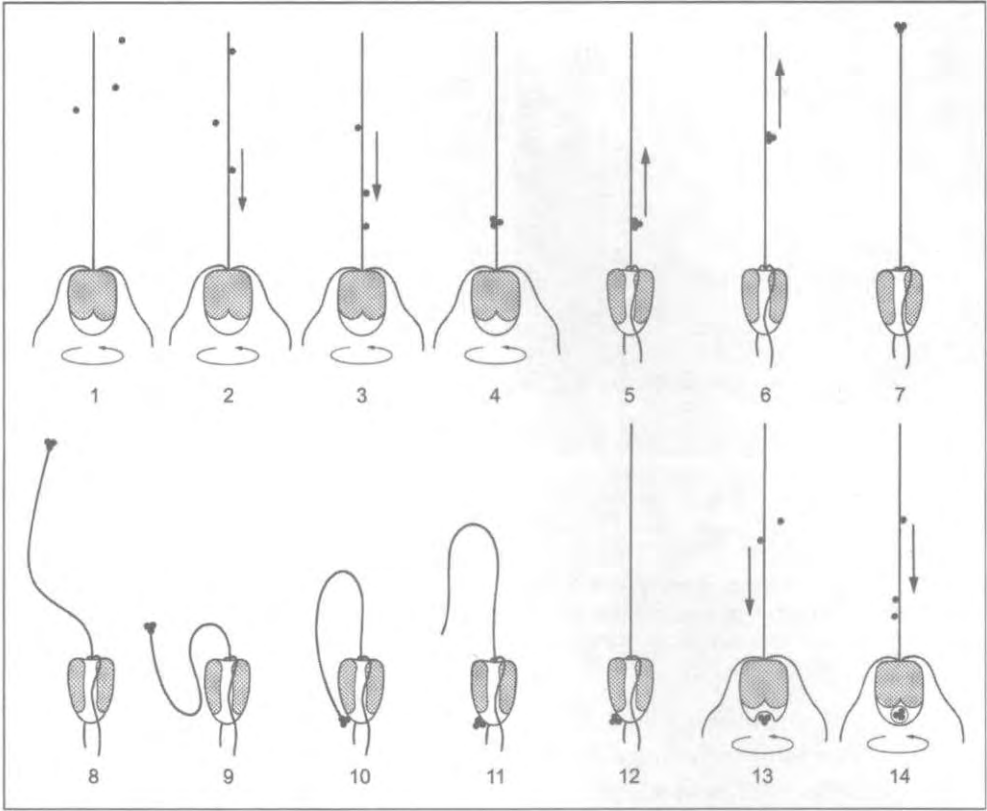
( : Mulisch and Hausmann: Protistologica 20  
 [1980] 415). : a 70x.

*Pseudomicrothorax*

5  
*Oscillatoria*

( . 280, 281).

( . 278).



. 277.  
*mulina hirta*:

(4),

(1 2),

(5 7),

(8 14)

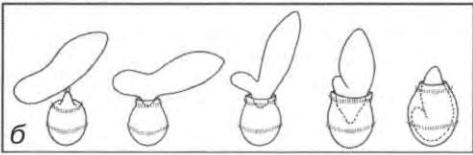
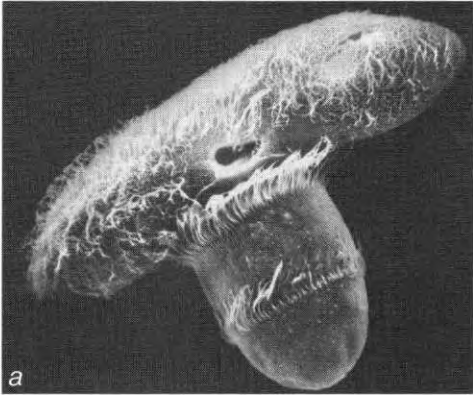
*Chrysochro*  
 (3),

).

*Pseudomicrothorax dubius* -

( . 282).





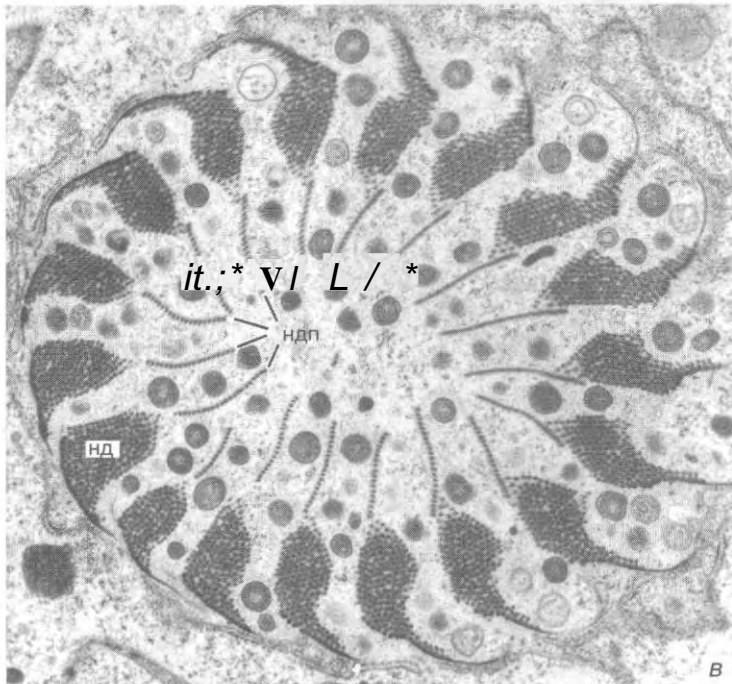
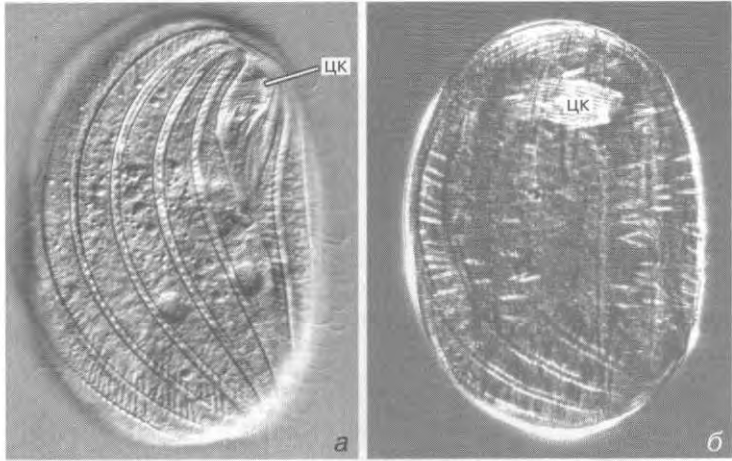
278. *Didinium nasutum* Paramecium ( — ). : — 290 .

*Grossglockneria Pseudoplatyophrya,*

*Gymnodinium, Paulsenella Peridiniopsis.*

Aconchulina

(*Gobiella, Hyalodiscus, Lateromyxa, Vampyrella*)

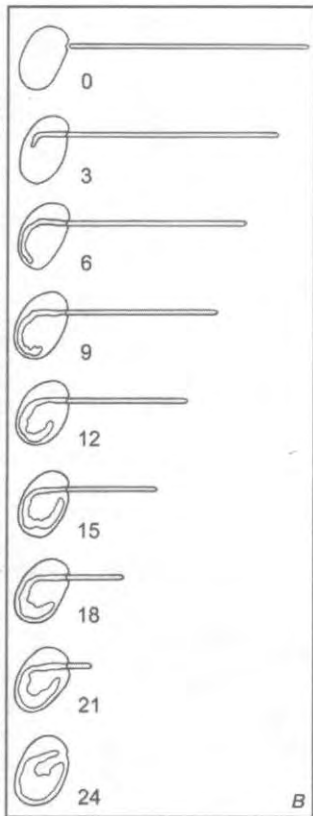
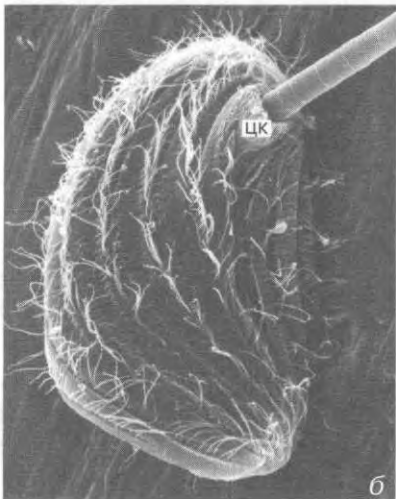
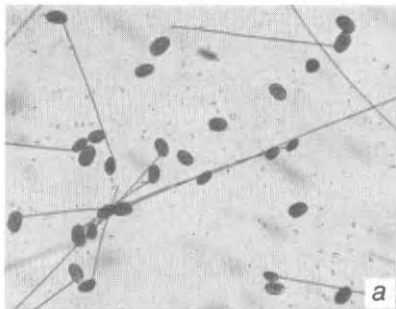


.279. ( )  
*Pseudomicrothorax*  
 ( ), -  
 ( ) -  
 ( ). -  
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 ( )  
 ( ) ( ),  
 ( : Hausmann and Peck: Differentiation 11 [1978] 157). :  
 800 , — 15 .

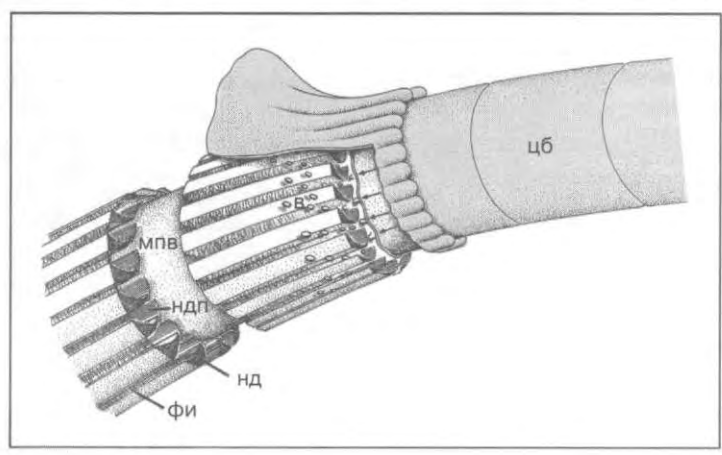
(*Oedogonium*, *Spirogyrd*),

283).

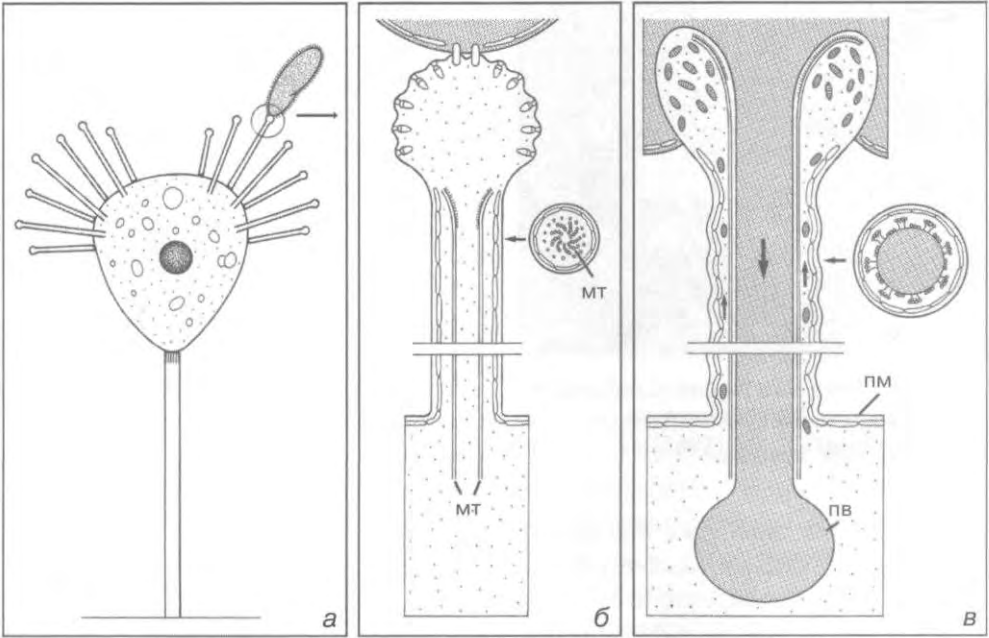
( .



. 280.  
*Pseudomicrothorax*  
*Oscillatoria*. —  
 — *Oscillatoria*  
 ( ),  
 ; —  
 5 ( :  
 Hausmann and Peck:  
 Differentiation 14 [1979]  
 147). : a 40x,  
 1 000x.



. 281.  
*Pseudomicrothorax*  
 ( ) ( )  
 ( ) —



. 282.

( );

: ( )

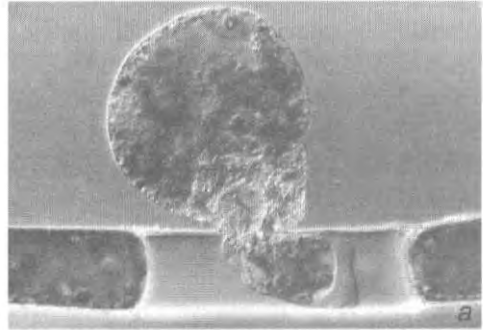
( )

( )

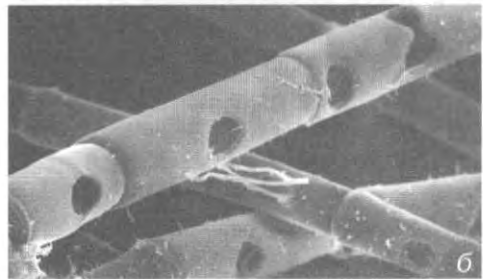
( ),

( ) ( ), —

( , , ).



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. 283.

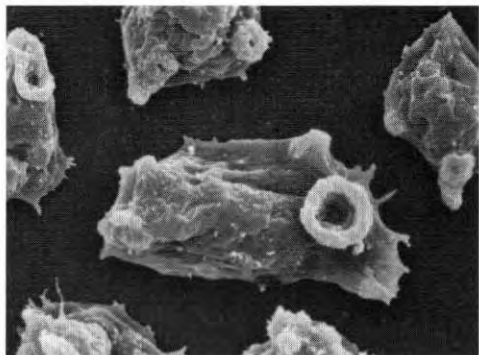
— *Hyalodiscus*

*Oedogonium*; —

*Gobiella*

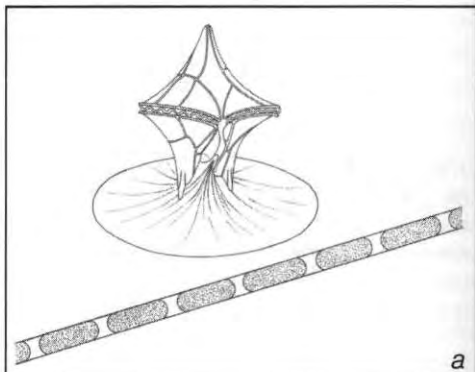
*Oedogonium*. ∴ —

400 ,

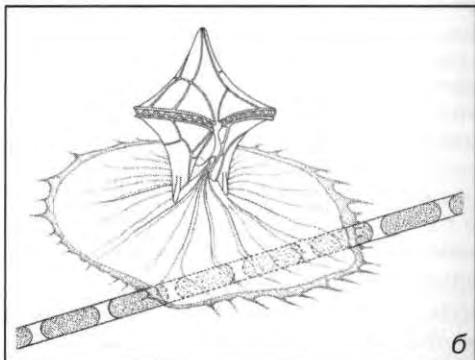


284. *Naegleria fowleri*  
( ) ( : John  
et al.: J. Protozool. 32 [1985] 12). :  
1 800x.

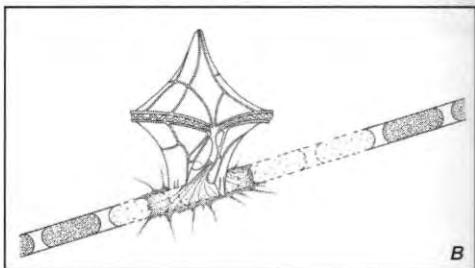
( . 284).



a



b



B

*Protoperidinium conicum*

( . 285),

(

).

20 30

. 285.

*Protoperidinium*

*conicum*.

( ),

( )

( ) (

). : 400 .

, *Trichonympha*).

215). ( . . . 102, 103, 111,

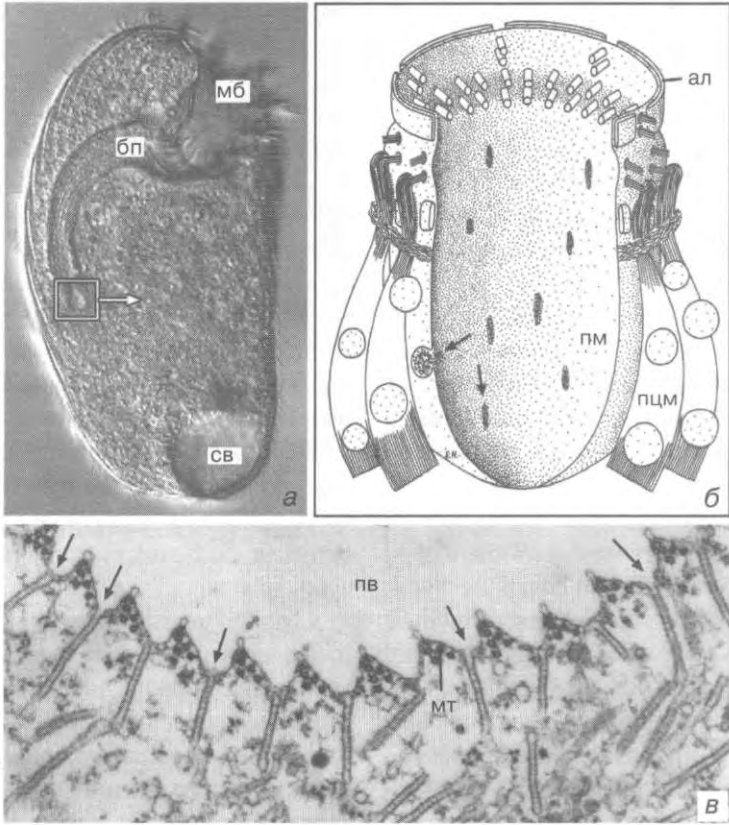
( . . . )

).

( . . . 279 ),

( . . . 286).

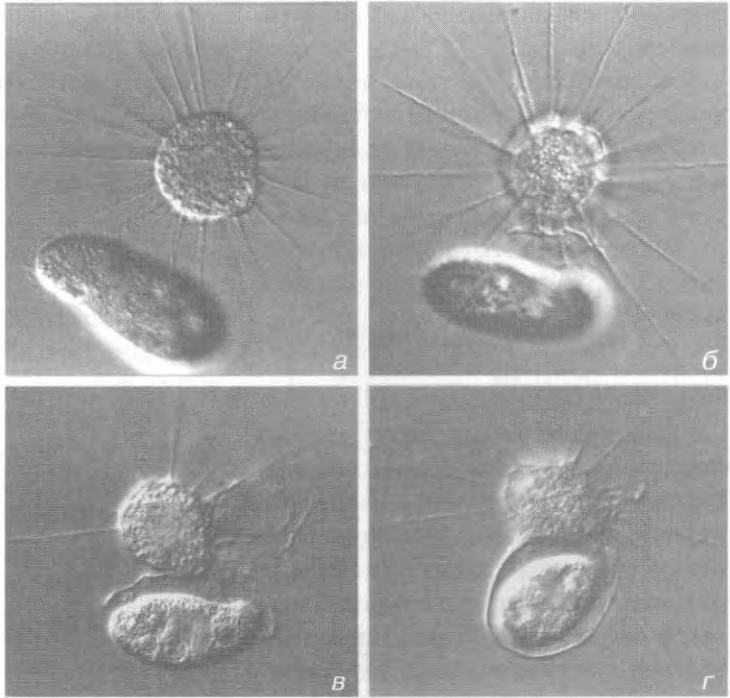
(15 / )



286. : , — *Climacostomum*  
 ( ) ( )  
 ( )  
 ( )  
 ), — , —  
 ; — ( )  
*Trichodina*. — ( — : Fischer Defoy and  
 Hausmann: Differentiation 20 [1981] 141; — : Hausmann and Hausmann: J. Ultrastruct. Res.  
 74 [1981] 131). . a 500x, 55 000x.

*Pseudomicrothorax dubius*

*Pseudomicrothorax*



. 287.  
*Actinophrys sol* -  
 ( ) -  
*Colpi*  
*dium* ( ). -  
 15 -  
 ( : Hausmann  
 and Patterson: Cell  
 Motil. 2 [1982] 9).  
 ∴

. *Actinophrys sol* -  
 ( . 287).

15



( )

20

( . 289).

*Paramecium.*

I ( 1).

( . 288).

15

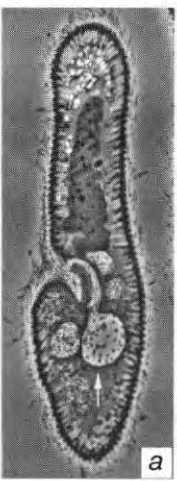
6

1

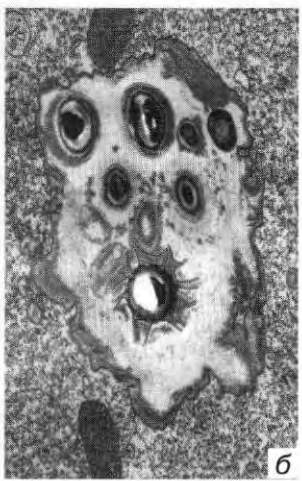
0,1

0,4

0,8



a



b

. 288.

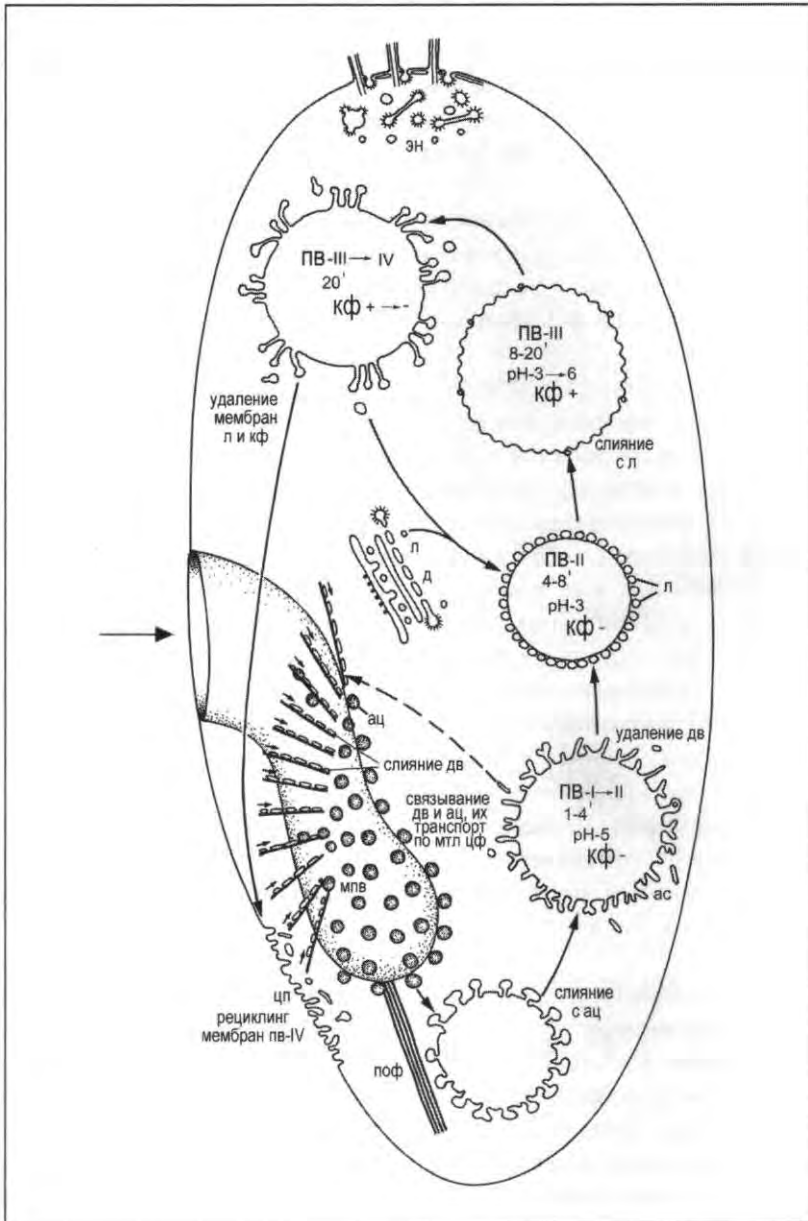
*Paramecium.*

( ),

(

, )

13 000



289.

*Paramecium*,

1— IV —

( )

1 -

1 . -

6 , 1 -

( ). - ( ).

( ) -

1. -

( , ) -

0,2 0,4 -

1, -

( ) , -

( ), -

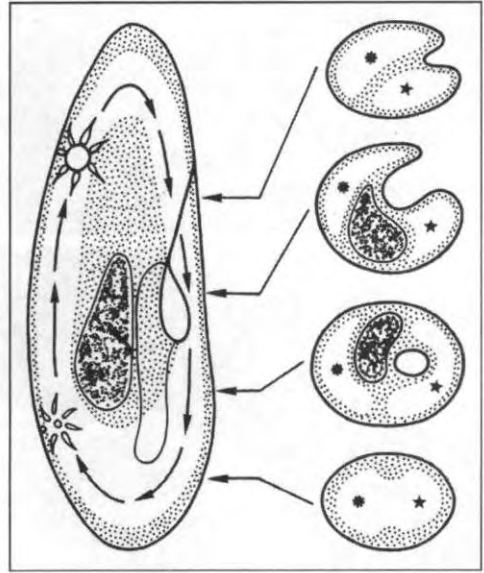
— IV.

---

1

*mecium,*

*Para-*



. 290.

*Paramecium*

*mecium*

*Para-*

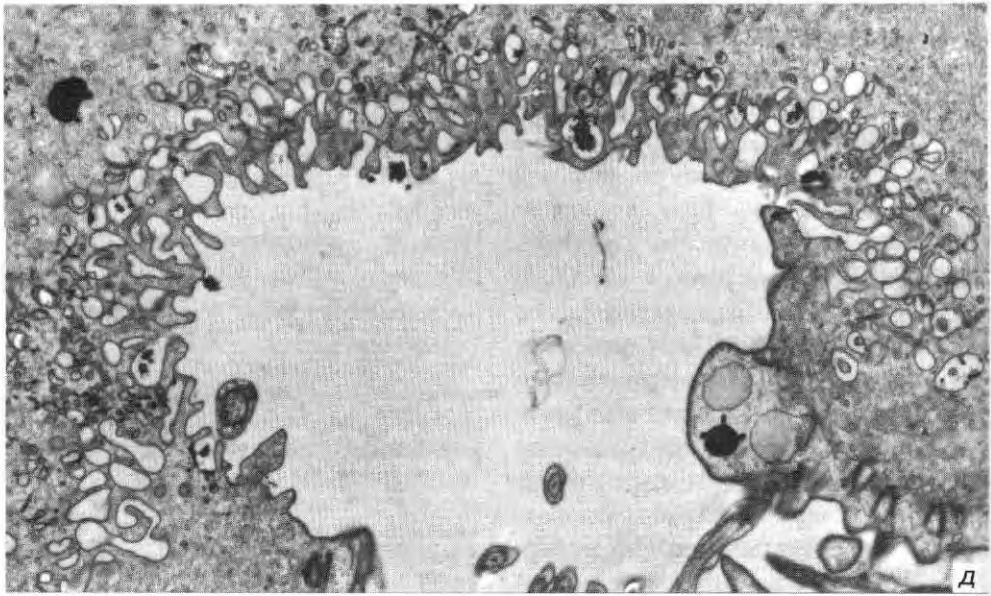
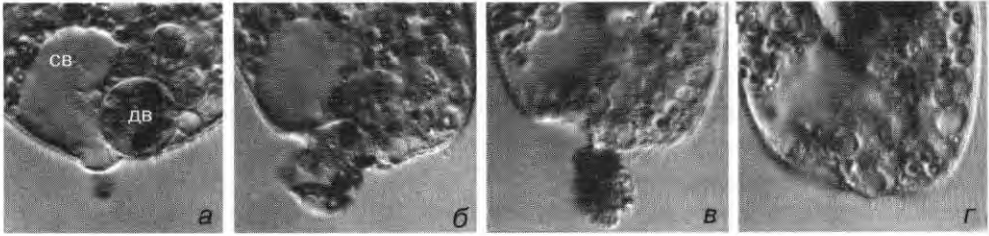
290).

( )

( ) 2 3 ( )

3

( . 291).



291. *Climacostomum*. — ( )  
 ). — ( )  
 ).  
 ( : Fischer Defoy and Hausmann: Zoomorph. 100  
 [1982] 121). : — 470 , 13 000 .

( )  
 ( . 292).

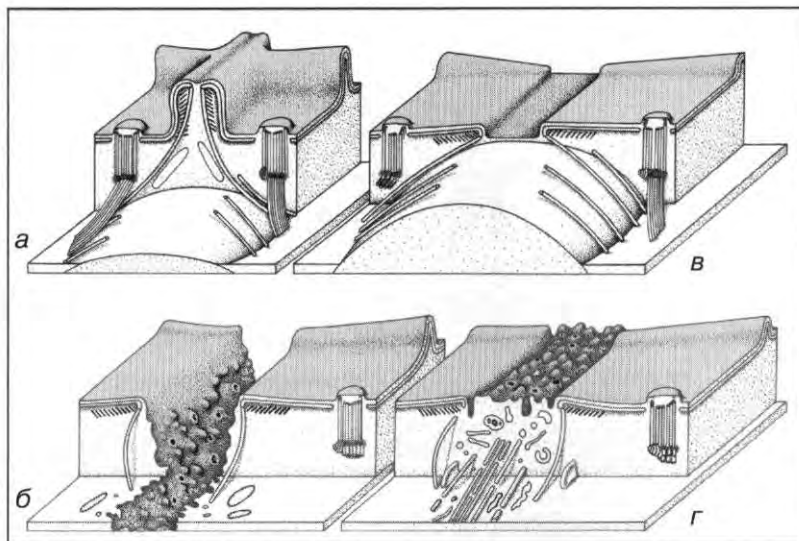
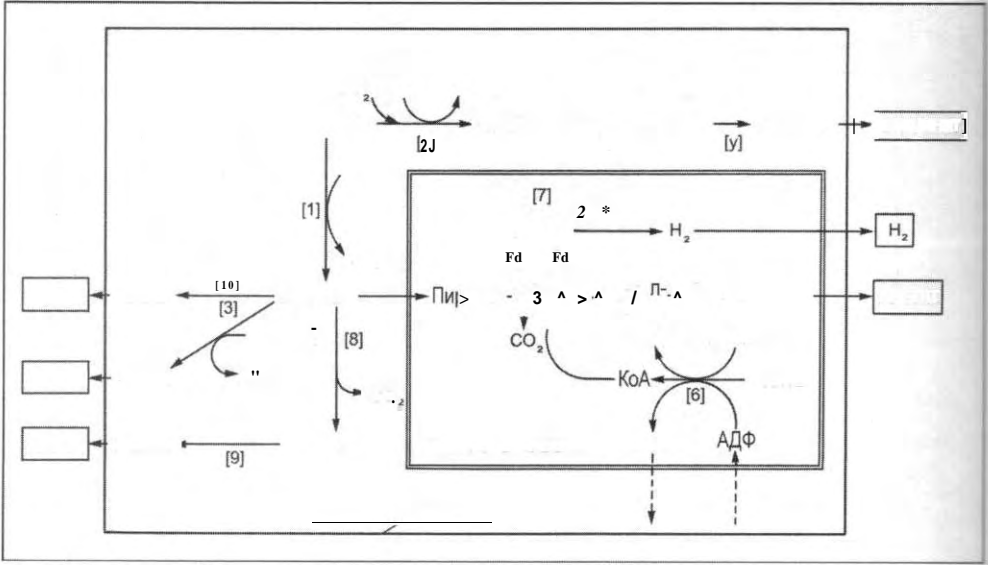


Рис. 292. Схема функционирования цитопрокта у *Paramecium*: приближение дефекационной вакуоли к цитопроктору (а, б) и везикуляция мембраны дефекационной вакуоли после слияния с поверхностью клетки (в, г) (по Аллену и Вольфу).

Microspore<sup>1</sup>, *Entamoeba*,

( . 291, 292).



293.

*Trichomonas vaginalis*      *Tritrichomonas foetus*.

(                    ), [3]                    , [1]                    , [2]  
 , [5]                    /                    , [4]                    , [7]  
 [8]                    , [9]                    , [10]                    ( *Trichomonas vaginalis*), [ ]                    ( *Tritrichomonas foetus*), [ ]  
 ( *Tritrichomonas foetus*), [Fd]                    ( : Miiller, 2002).

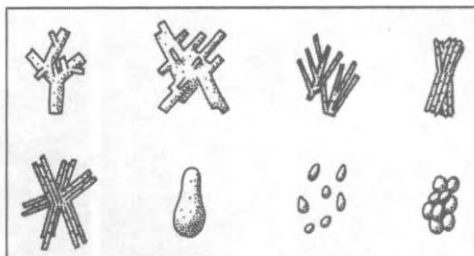
02,                    ( . 293).

0

02.

I ( , *Giardia intestinalis*, *Entamoeba histolytica*)

basalea) II ( 15).



294.

*Paramecium* ( ).

02 2.

5

*Paramecium tetraurelia*

$[(MgCa)NH_4P_0^4x6H_2O]$  —

294),

1





---

*Paramecium*,

( )

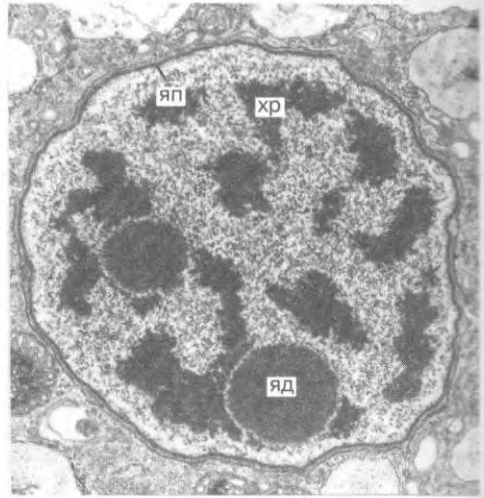
( . 296)

*Chaos, Pelomyxa, Actinosphaerium, Opalina*

( , Api

complexa)

Coccidia,



. 296. *Lateromyxa gallica* (Vampyrellidae)

15 000 .

*Peridinium balticum*)

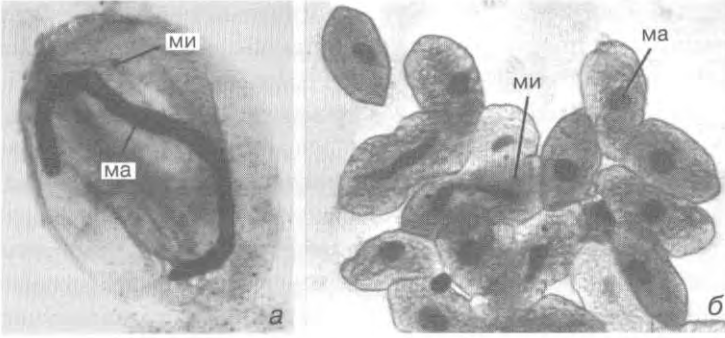
( . 112, 113,

297)

( )

( , *Rotalliella*

*heterokaryotica*; . 162).



. 297. -  
*Euplotes* ( )  
*Tetrachymena* ( )<sup>1</sup>  
 -  
 -  
 -  
 -  
 -  
 500 , 200 .

100 \* .

( . 7, 18, 296)

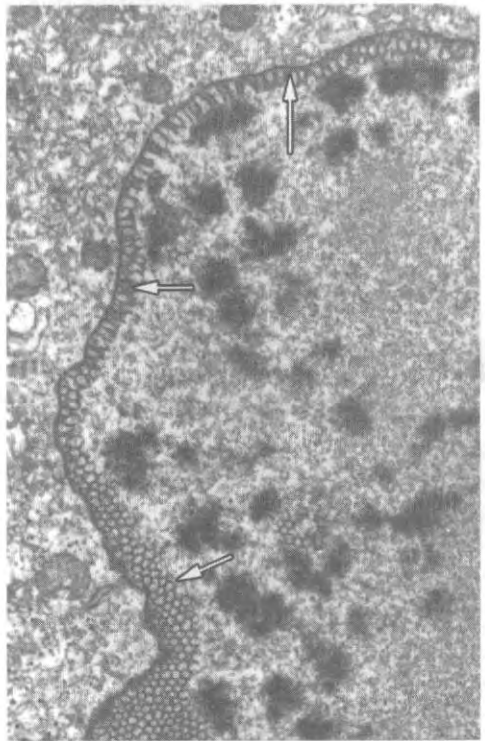
*proteus*

( . 296). *Amoeba*

( . 298), —

*phrys*)

( , *Actino*



. 298. ( )  
*Amoeba proteus* ( )  
 , ) . : 12

1

2976 —

\*

600

( . 296).

Apicomplexa

( , *Barbulanym*  
*pha, Trichonympha*)

*Tetrahymena.*

( Vol  
vocida,  
, Apicomplexa),  
(  
*Actinophrys, Noctiluca*)

( ).

1,  
(  
2).  
*Tetra-*  
*hymena thermophila* 10 20

5%

1  
*Paramecium caudatum* *Paramecium aurelia*  
)

-  
-

( . . . 321).

(S )  
G, G<sup>2</sup>,

( ) ( ).

-  
-  
-  
-  
-  
-

*Parame-*  
*cium* S

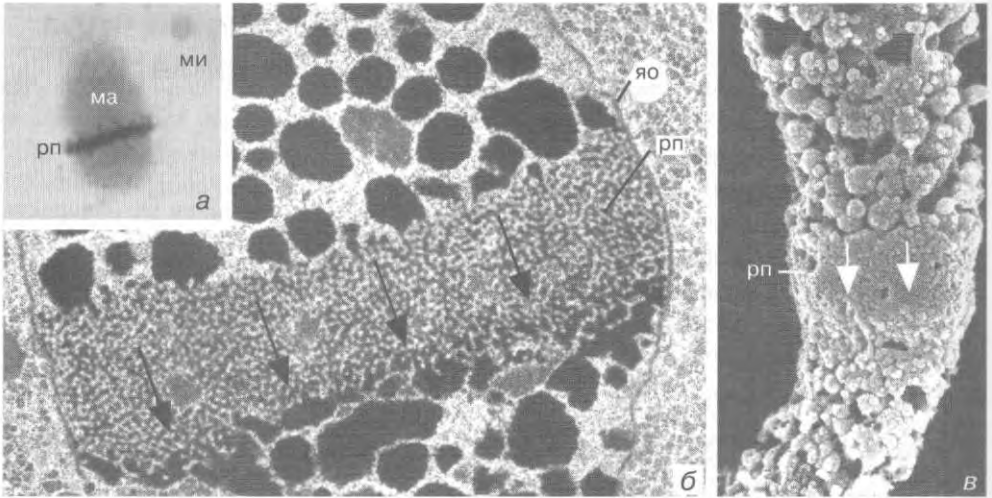
*Paramecium*

( . . . 299).

( . . .

).

-  
-  
-



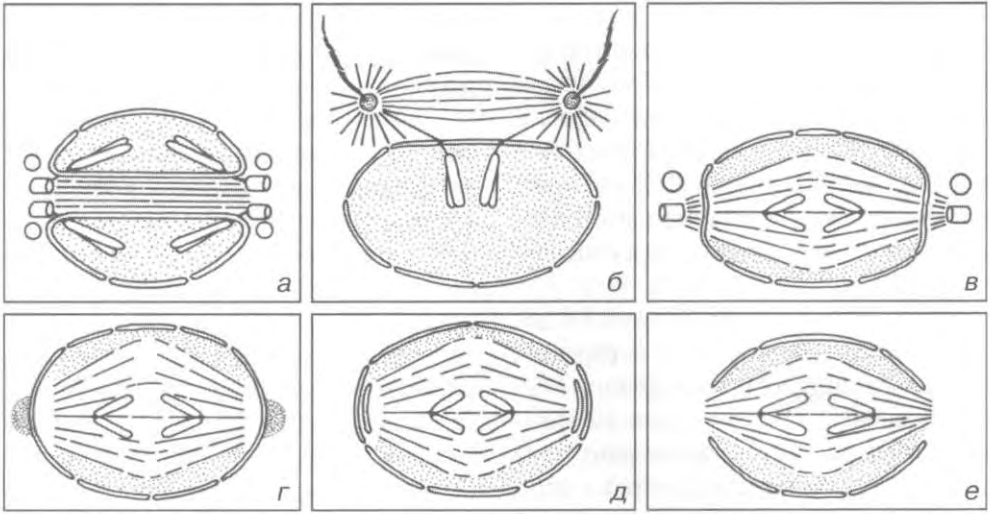
299. ( ) ( ) *Stylonychia* ( ) ( ) *Euplotes* ( ) ( )  
 ), — ( — : Steinbruck: *Europ. J. Protistol.* 26 [1991] 2; —  
 40). : а 650x, б 13 500x, — 7 000x.

( . 300).

*Monocystis*)

( ( )

)



. 300.

( ); —  
 ( ); —  
 ( ); —  
 ( ); —  
 ( ); —

( Volvocida)

(*Amoeba proteus*),  
 (*Monosiga ovata*),  
*Deplauxis*  
 ( , *Actinophrys*).

Apicomplexa.

{*Euglypha*, *Arcella*},  
 , *Arachnula*, *Lateromyxa*, *Vampyrella*  
 (*Trypanosoma*  
*cruzi*)  
 ( ), ( ,  
 . *raiae*)





*Stentor*

I

( . 301).

, *Bursaria*, *Paramecium*),

( )

I

( I).

, *Urostyla grandis*.

, *Homalozoon*

*to cruzia*

(*Arcella*, *Lateromyxa*

*gallica*),

(*Amblyospora*),

Myxozoa (*Aurantiactinomyxon*),

(*Prorocentrum*),





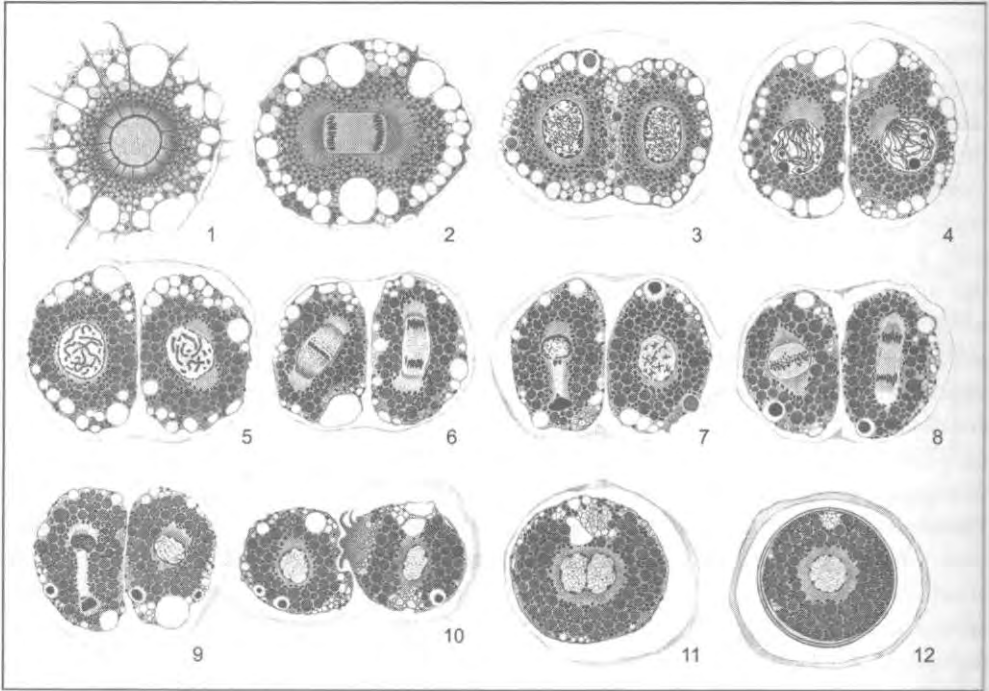












304. ( = ) *Actinophrys sol* (1); (2 9)'; (10) (11) (12) ( ). : 540 .

) ,  
 ( -  
 )<sup>2</sup> ( . 305). -

Foraminifera. *Hetero*  
*stegina depressa*

1

*Actinophrys sol*

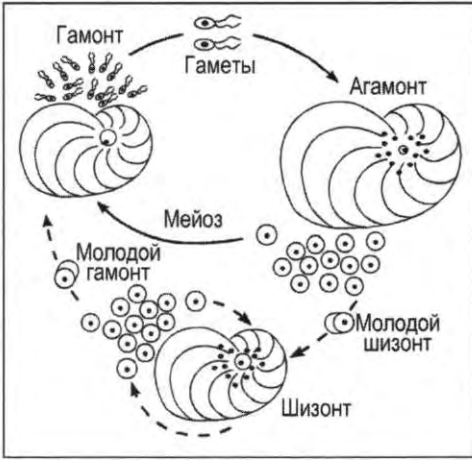
: 2 3 —

; 4 7 —

; 8 9 —

2

( ),



. 305.

( )

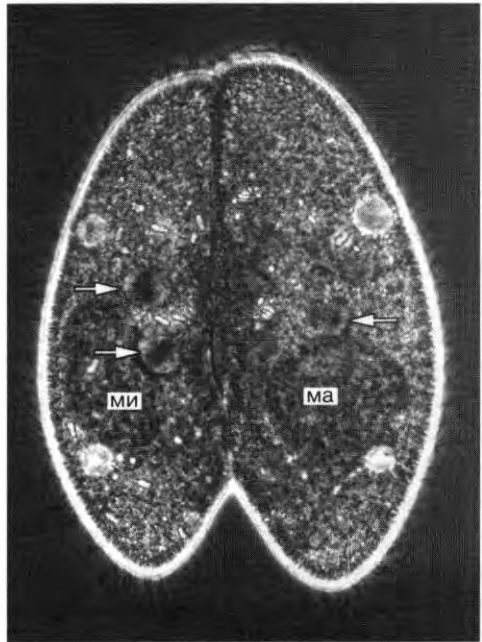
( )

*Hymenomonas carterae*

, *Cladophora*).

( . 306)

*Paramecium cauda*  
tum 16



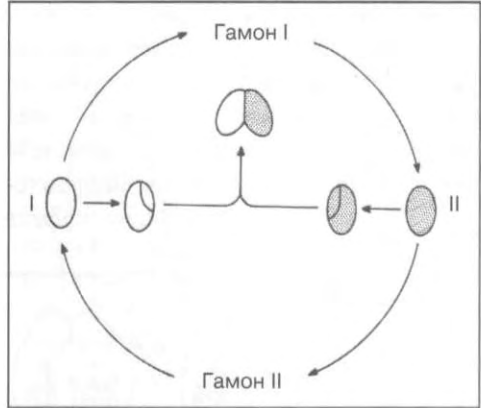
. 306. *Paramecium cauda*  
tum: ( )

( -  
( -  
)

.: 350 .



*crassus, Tetrahymena thermophila*)



307. *Blepharisma*

*Paramecium caudatum*  
(306).

I,  
II,  
I ( )

(1) « »  
*Blepharisma japonicum*,

II;  
G, R<sup>2</sup>,  
II G<sup>2</sup> R<sup>r</sup>  
*Euplotes octocarinatus* 10  
(G., G<sup>2</sup>, G<sup>3</sup>,  
G<sup>4</sup>),  
(R, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>).

*Blepharisma japonicum*  
(G<sup>15</sup> G<sup>2</sup>),

1 2  
3 4,  
GP G<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>;  
R., R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>.

(R<sub>j</sub>, R<sup>2</sup>). I

(2)

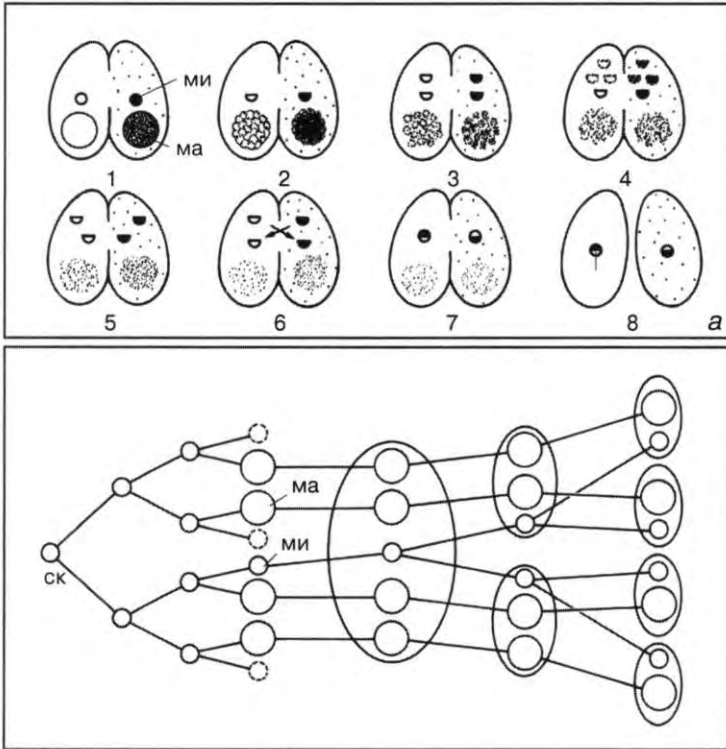
( ) .

*Euplotes raikovi*.

( )

*raikovi*

*Euplotes*



308.

*Paramecium caudatum* ( ):

( ) (2 4);

) (5);

(6),

(7);

( )

1,

(8)

( ) .

( ) .

(  
)

( . 308 ).

).

*Paramecium*

(  
)

( . 3086).

( )

1

1

«  
»  
«  
**Ciliophora:** «

» —

» —

( )

sea, Myxogastrea, Dictyostela; . 56, 179, 180) Sorogena ( . 226)

( . 309).



. 309.

Paramecium

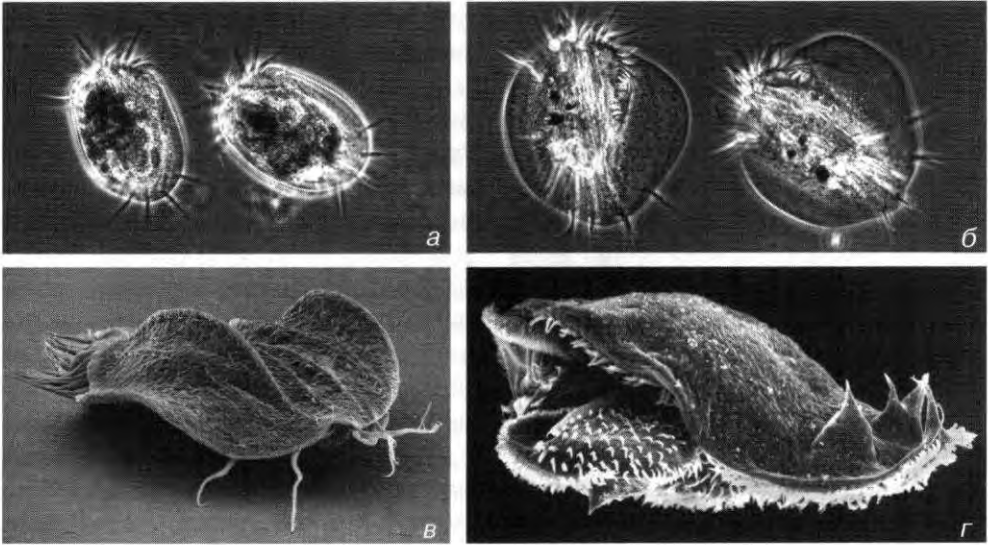
( , Apicomplexa),

( : Iftode et al.: Development 105 [1989] 191). : 600x.

	-	( <i>Stentor</i> , <i>Fabrea</i> , <i>Blepharisma</i> )	-
	-	( <i>Epistylis</i> ),	-
	-	<i>Hyalophysa chattoni</i>	-
	-	<i>Euplotes muscicola</i> .	-
	-	<i>Lateromyxa gallica</i> ,	-
	-		-
	-		-
	-	<i>Naegleria gruberi</i>	-
	-	(	-
	-	<i>Acantha</i> 80%),	-
<i>moeba</i>	-		-
	-		-
	-		-
	-		-
S	-		-
	-		-
	-	<i>Acanthamoeba</i>	-
	-	(	-
	-	)	-
	-	<i>Euplotes</i>	-
	-	, <i>Pseudomicrothorax</i>	-
	-		-
	-	<i>Bursaria</i>	-
	-	, <i>Colpoda</i>	-
	-		-
	-		-
	-		-
	-		-
	-		-
	-	<i>Colpoda</i>	-
	-		-
	-		-
	-	<i>Giardia</i>	-
<i>lamblia</i> ,	-		-
<i>Actinophrys sol</i> ,	-		-







. 311. *Euplotes octocarinatus* ( )  
*Lembadion* ( , ); —

*Onychodromus quadricornutus* ( — : Kuhlmann and Heckmann: Science 227 [1985] 1347;  
 137). .: 270 , — 760 , 280 . ; — : Wicklow: J. Protozool. 35 [1988]

*Lembadion*. —

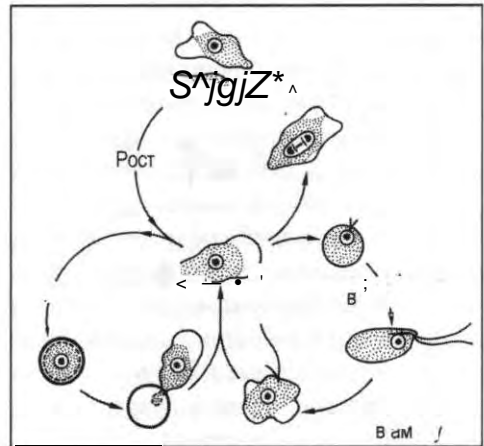
*Euplotes*

( . 311).  
*Lembadion* *Euplotes*  
*octocarinatus*

( . 3116, ),

*Euplotes*.  
*Naegleria*

*Tetramitus*



. 312. *Naegleria gruberi* ( )

( )

*Clathrulina elegans*

( )

( . . 210).

*Naegleria*

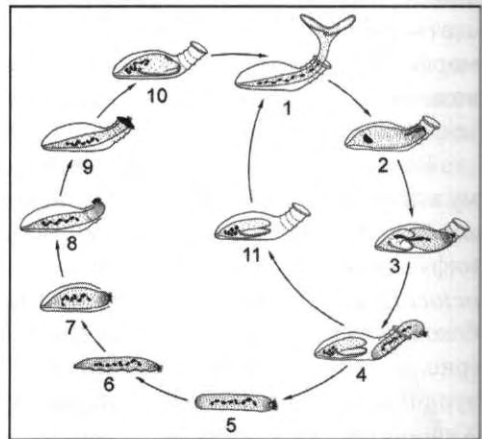
;

Suctororia ( . . 130, 131)

*Tetramitus*,

),

( . . 118)

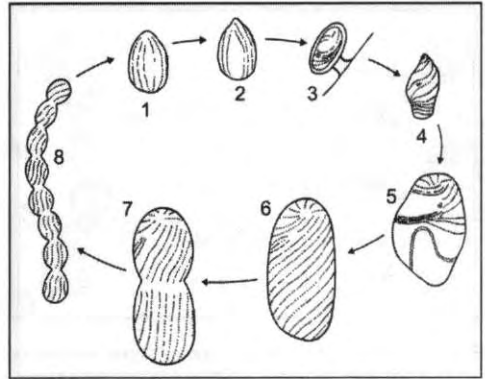


. 313.

*Eufolli*

*culina uhligi*: 1 — , 2 4 —  
5 — , 6 10 —  
, 11 —

( : Mulisch and Patterson: Protistologica 19 [1983] 235).



. 314.

*Polyspira delagei*: 1 —

, 2 —

, 3 —

, 4 —

, 5 —

, 6 —

, 7-8 —

( ) ( ).

*Spirophrya subparasitica*

*Zoothamnium alternans* *Z. arbus*

*cula* ( . 144).

( )

( . 313).

( . 220),

( . 313).

( . 51, 52).

*Trypanosoma*

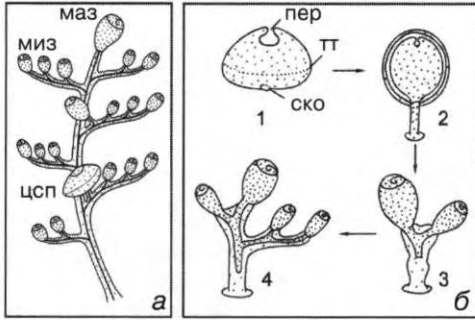
( . 51).

*Trypanosoma*

*mega*

( . 314).

(



( . 316).

*Dictyostelium discoideum* ( . . 180)

. 315.

*Zoothamnium*: —

*Z. alternans*

( )

( ),

( ); —

*Z. arbuscula*: 1 —

( ),

( ) ( ); 2 —

; 3 —

; 4 —

( —

, — ).

( ).

315).

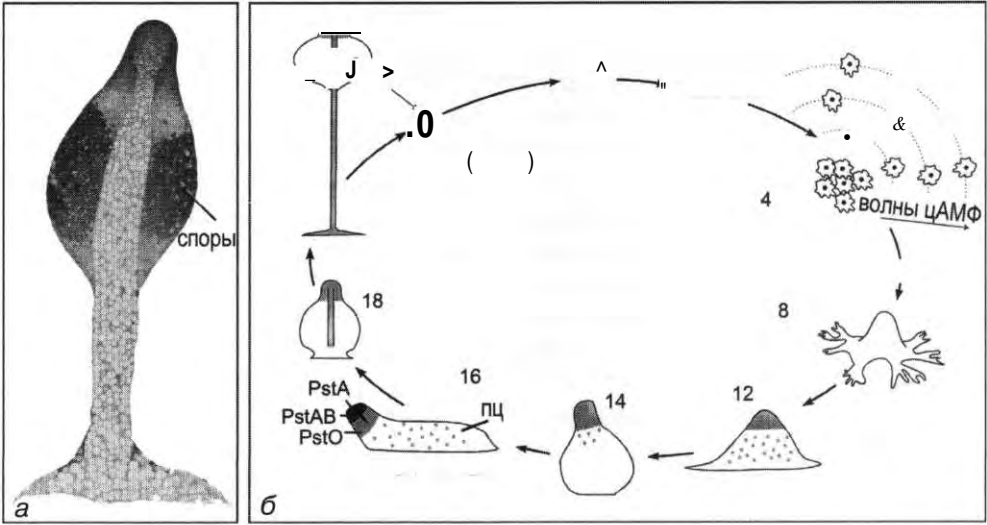
( )

( ).

*deum*

*Dictyostelium discoi*

1



316. *Dictyostelium discoideum* ( ):

( ) *Dictyostelium*

PstA, PstAB, PstO —

( — 60 )

(pstA pstB).

(pstAB)

Myxogastrea,

2.

179).

DIF (differentiation inducing factor — DIF I

lina; . . . 313)

Eufollicu

Apicomplexa).

*Discoideum murocoides*

) ( . . . 80 ), 146).

, *Toxoplasma*;

*Dimorpha mutatis*

( ) ,

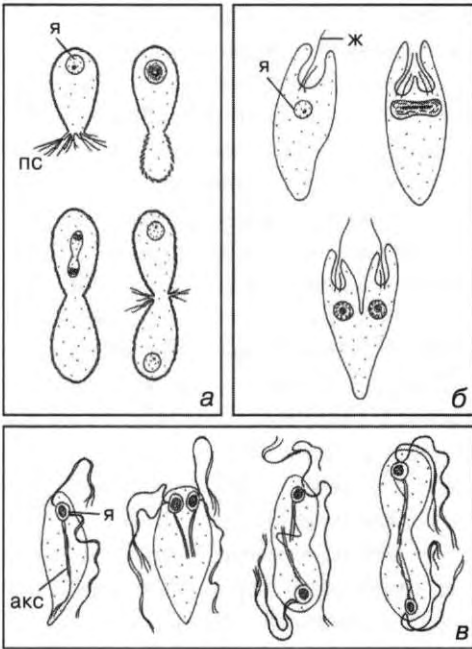
( )

( ) .

( . 317 ) .

*Amelia vulgaris*

( )



. 317 .

(*Euglypha*, ) ,

(*Euglena*, )

{*Devescovina*,

), — ( ) .

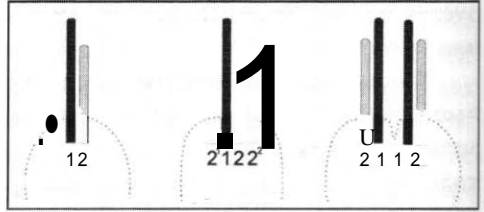


*Euglena*,

3176).

318).

*Neph*



318.

*Nephroselmis olivacea*:

(1)

(2)

(2'

2²).

( ) .

*roselmis olivacea*

Hypermastigida

*Joenia*;

44).

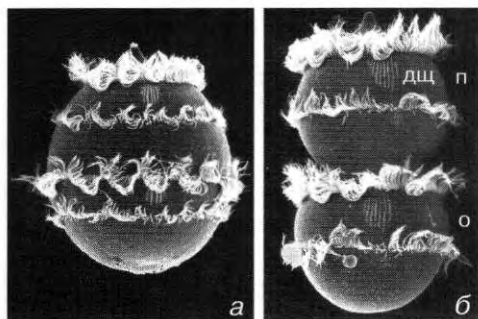
( . 317 ).

*Volvox*

*Volvox carteri*

(

)



319. *Didinium nasutum*:

*Volvox carteri*

*Ephelota gemmipara*

*Tachyblaston ephelotensis*,

(3206).

Suctorio.

*Acineta tuberosa*

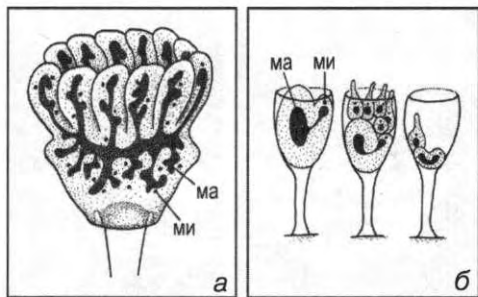
114).

2+

319).

(, *Halteria*, *Tintinnidium*).

*Opercularia* *Tintinnopsis subacuta*



. 320.  
*lota* ( ) *Tachyblaston* ( ), —  
 , — ( ) .

. 129).

. 89)  
 complexa

( , *Eimeria*,  
 Api-

*Eimeria*

. 3036. );  
 )

( . . 90);

( , *Sarco*  
*cystis*)

*Pelomyxa*,

( )  
 ( . . 162).

*Astomatia* *Apostomatia* ( . . 314)

( , *Radioph*  
*rya*)

( . . 146);

( , *Haptophrya*).  
*Foettingeria*

321).

(cyclin dependent protein kinases, Cdk).  
Cdk

G<sub>2</sub> S  
( . 321).

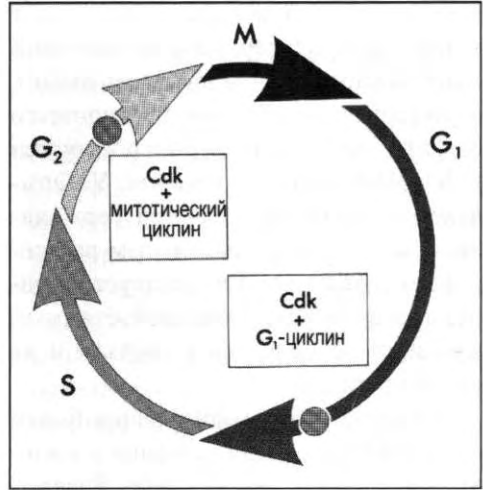
Cdk, G<sub>k</sub>  
(M phase promoting factor, MPF),

MPF,

Cdk G<sub>r</sub> УПК

Cdk,

Cdk



. 321.  
(  
)  
(S) ( ). (Cdk)

. G, G<sub>2</sub> —

*Tetrahymena*

*Tetrahymena pyriformis*, *thermophila*  
*Paramecium caudatum*

(meiosis reinitiating factor, MRIF),  
MPF.

*Tetrahymena* *Paramecium.* *Tetra-*  
*hymena* MRIF<sub>2+</sub> -

( )

Cdk,

(*Tetrahymena thermophyla*, *Parame-*  
*cium tetraurelia*),

*Dunaliella tertiolecta*, *Dictyostelium*  
*discoideum* *Plasmodium falciparum.*  
Cdk,

( . . . 102).

*Paramecium.*

. 105),

(*Leishmania mexicana*, *Trypanosoma*  
*brucei*),

(*Paramecium tetrau-*  
*relia*, *Stylonychia lemnae*, *Tetrahymena*  
*thermophila* ),), (Pro

*rocentrum minimum*, *Alexandrium tama-*  
*rense*), *Dunaliella tertiolecta*, *Physarum*  
*polycephalum* *Dictyostelium discoi-*  
*deum.* *Eufolliculina uhligi*

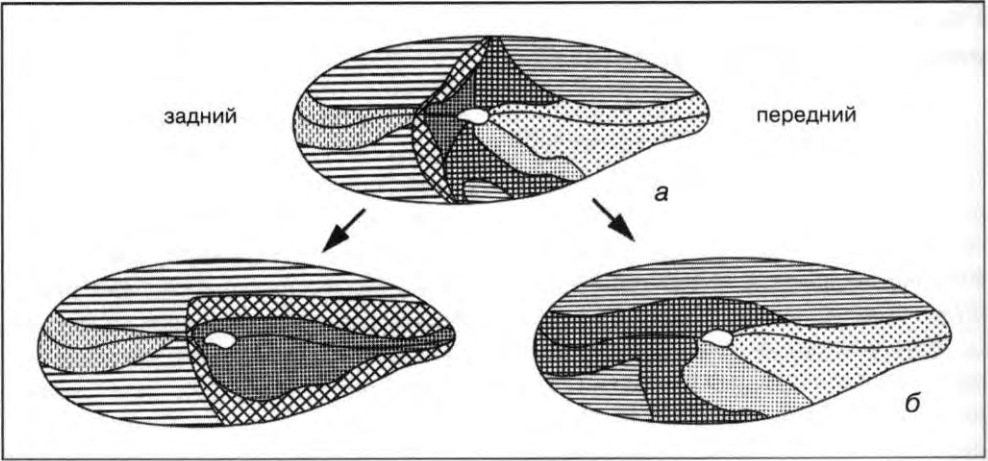
*Stentor*, *Paramecium*, *Tetrahymena*

( )

Cdk,

*Cryptothecodinium cohnii*





. 322.

*Paramecium* ( ) ;

( ) :  
 — ( ) ( ) .

« »

*Oxytricha*.

*Stentor*

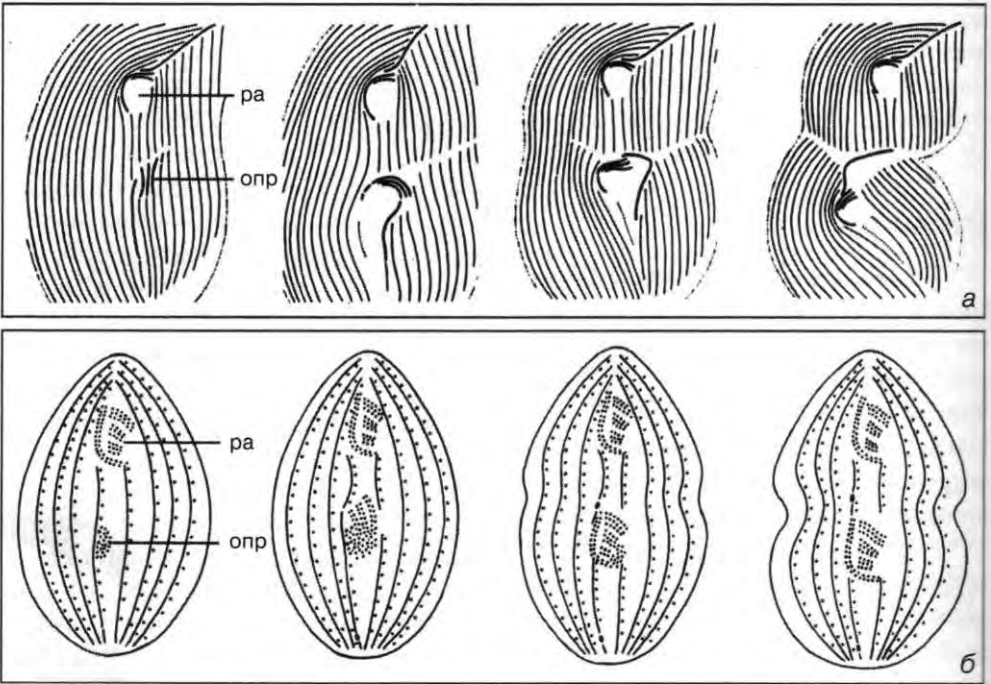
*Paraurostyla weis*

*sei*

« »







. 323.

*Trithigmostoma steini*; —

*Tetrahymena*. —

( — : Hofmann and Bardele: Europ. J. Protistol. 23 [1987] 2).

( . 324).

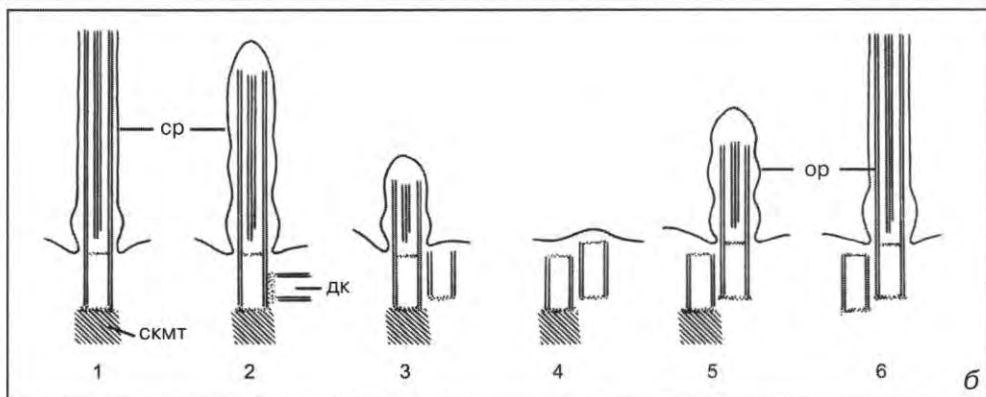
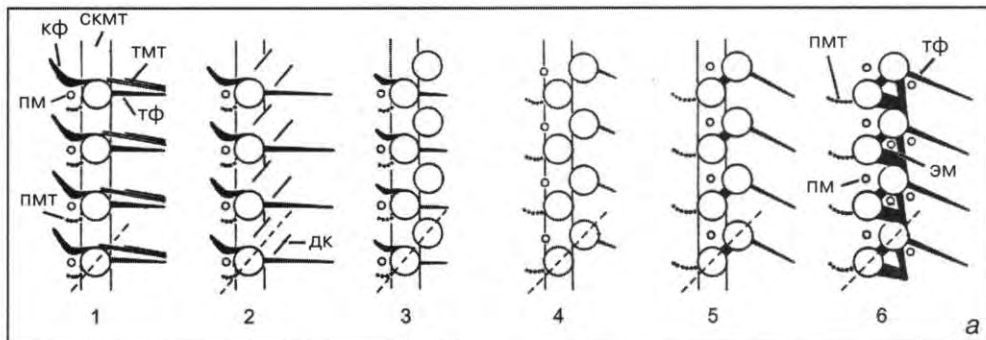
*Oxytricha*

*fallax*

de 324, 325).

*novo.*

*Tetrahymena Paraurosyella*



. 324.

*Trithymostoma steini* ( —

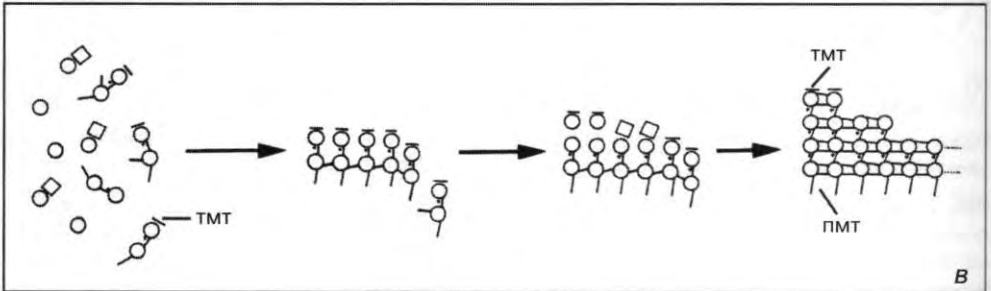
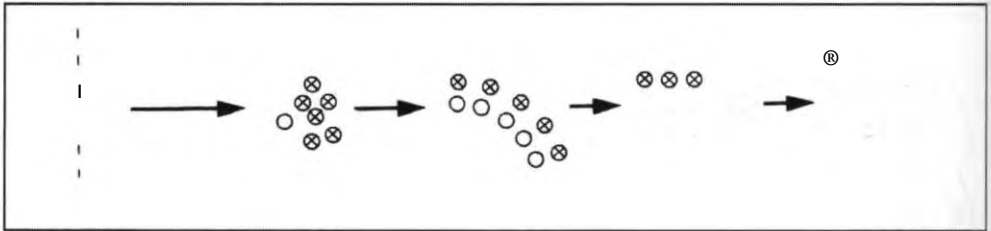
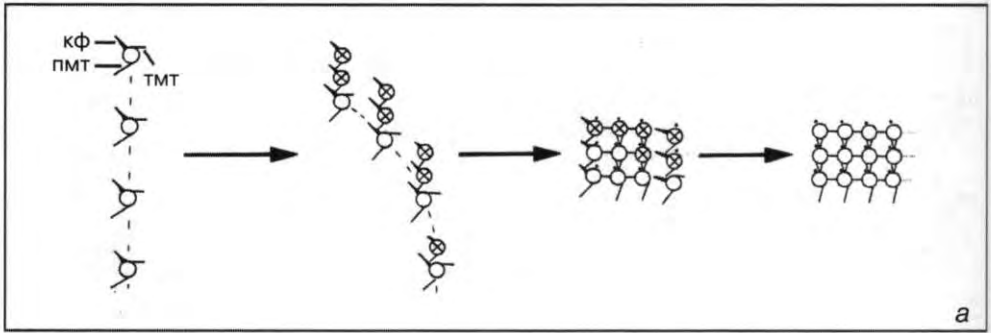
; 2 4 — ( ) ; 5 — ( ) ; 6 —

Protistol. 23 [1987] 2).

( : Hofmann and Bardele: Europ. J.

( . 325 ).

*Stentor*



325. : — *Furgasonia blochmanni*; — *Tetra-*  
*hymena thermophila*; — *Paraurostyla weissei*.

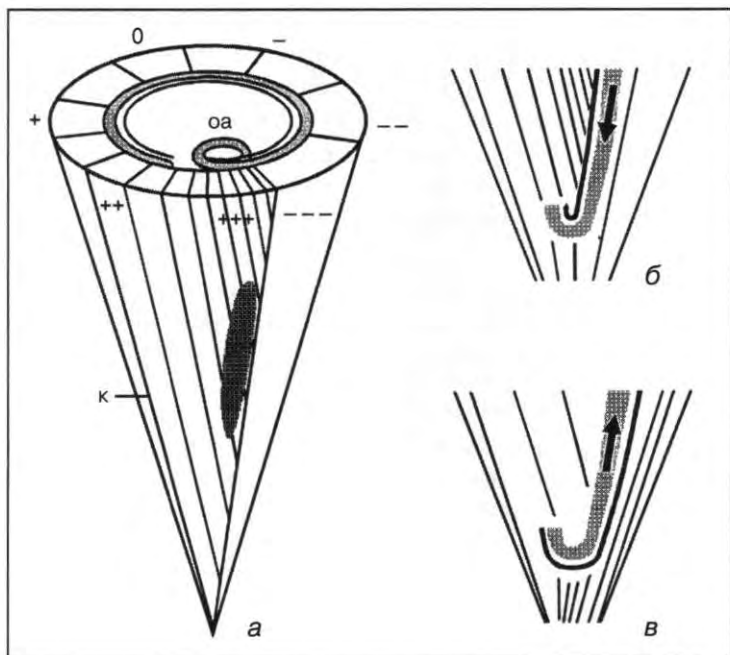
( : Eisler: *Europ. J. Protistol.* 24 [1989] 181).

( . 326).

( ),

( . 326 ).

*Stentor*



. 326.

) *Stentor*.

—

( )

( —

).

(—/+++).

, —

( )

( )

( )

; —

).

(

)

).

(

)

;

).

(

*Tetrahymena*,

*Paramecium*.

( )

10

*vitro.*

*in*

*soma brucei*

*Trypano-*

( . . . 51).  
 « . . . » (variant surface glycoproteins — VSG).

14  
 VSG.  
 « » VSG  
 1000  
 VSG  
 327).  
 . *brucei*

VSG  
 $10^{-2}$   $10^{-6}$

VSG

VSG,

327. . . *brucei*  
 20 100

1000

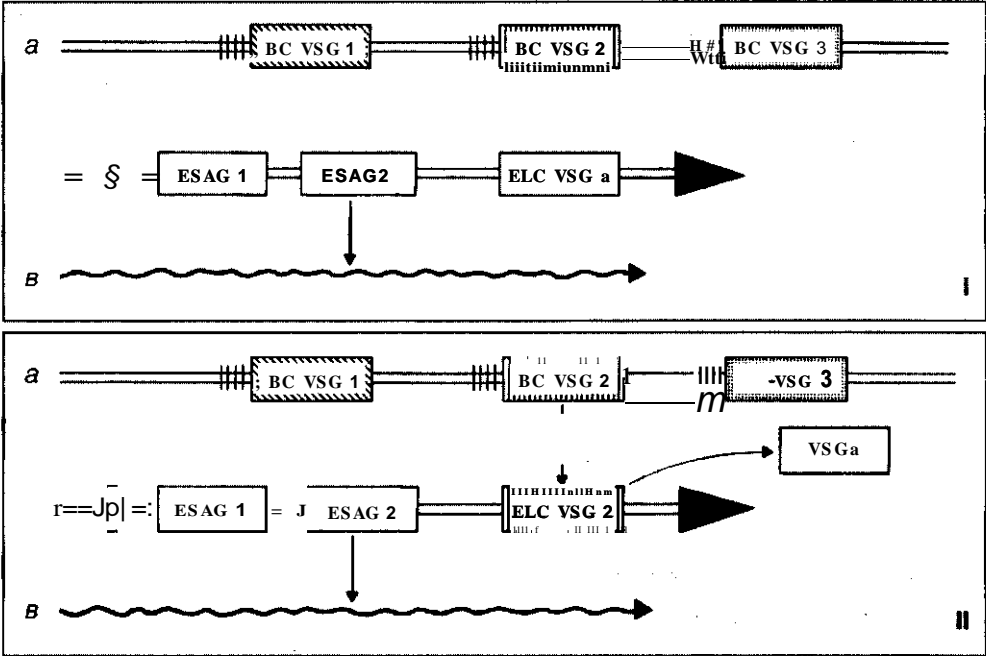
VSG.

1  
 VSG

VSG

(ELC VSG

VSG:  
 3



327.

(basic copy VSG, BC VSG; ) VSG; — VSG

VSG (expression linked copy, ELC VSGa) ( ) — ELC VSGa

« » ( ) — ELC VSGa

(expression site associated genes) ESAG 1 ESAG 2 ( ) — VSG 2

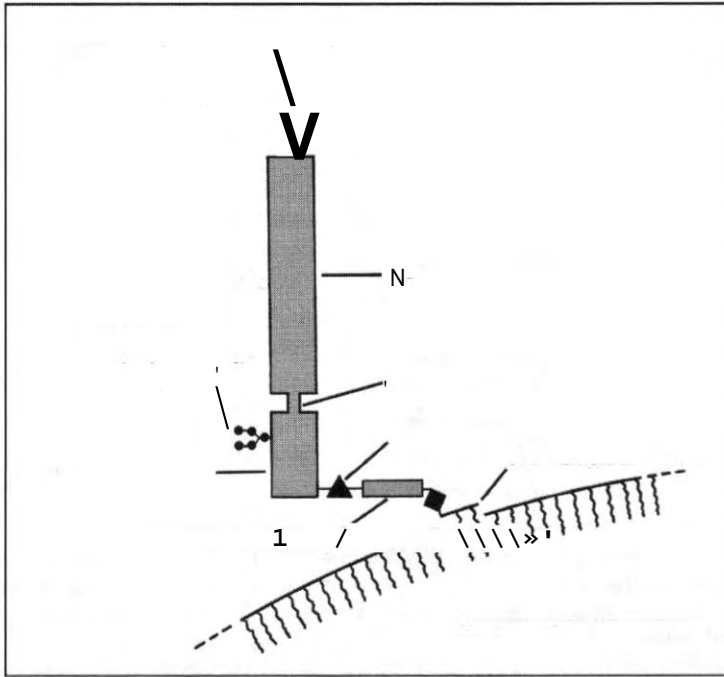
II: VSG 2 VSGa VSG 2; — VSG

VSG,









. 329.  
VSG *Trypano-*  
*soma congolense* (по  
).

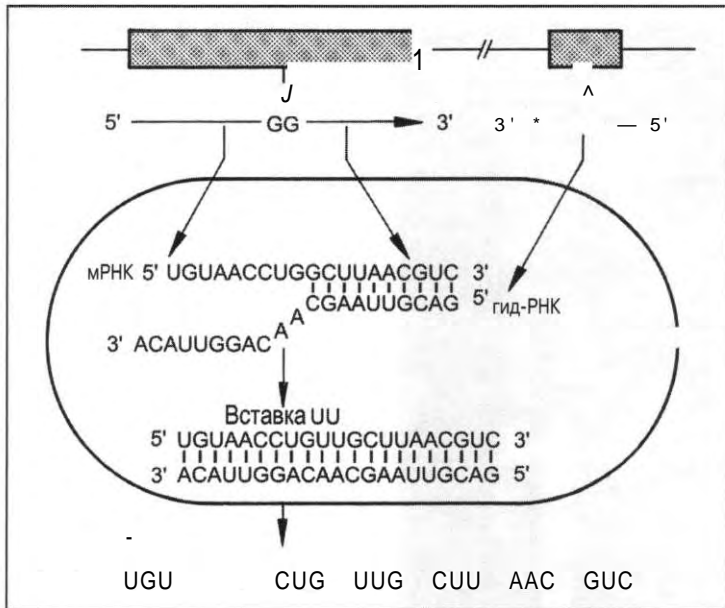
( )  
( )

50%

(guide RNA,

( . 330).

*Physarum*



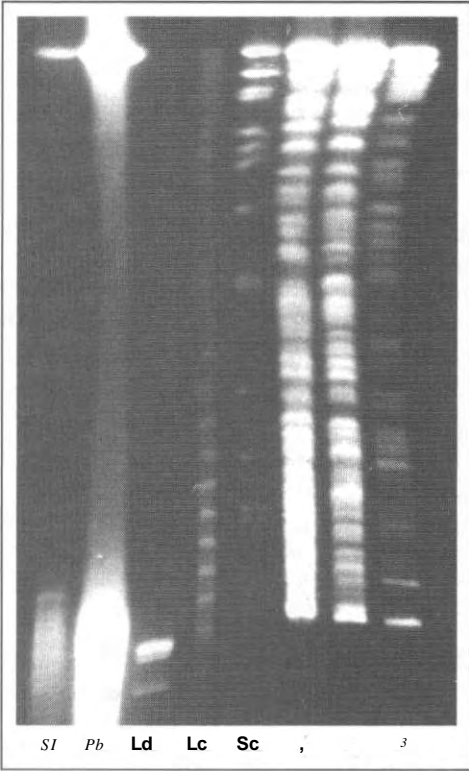
. 330.

( ) .

(

),

?



Hymenostomata (

*Tetrahymena*

*Paramecium*)

Stichotrichia Hypotrichia (

, *Stylonichia*, *Oxytricha* *Euplotes*).

(

).

. 331.

*Tetrahymena*

*hymena* 10 20%

*thermophila* (<sub>2</sub>)

*pyriformis* (<sub>3</sub>)

*Stylonichia lemnae* (SI) *Paramecium*

*bursaria* (Pb),

{*Saccharomyces cerevisiae*, Sc),

(Lc)

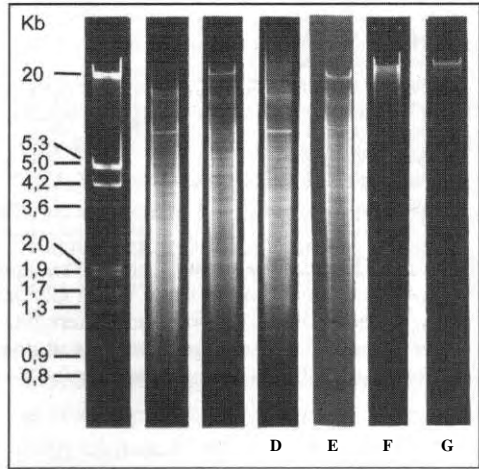
(Ld).

331).

49 . . . .

*Tetrahymena*

20 1000 . . . .



( . . . 302).

*Stylonychia*

98%

100 15  
*hymena*

( . . . 332). *Tetra-*

. 332.

*mecium*

F —

G —

*Para-*

0,5 . . . . .

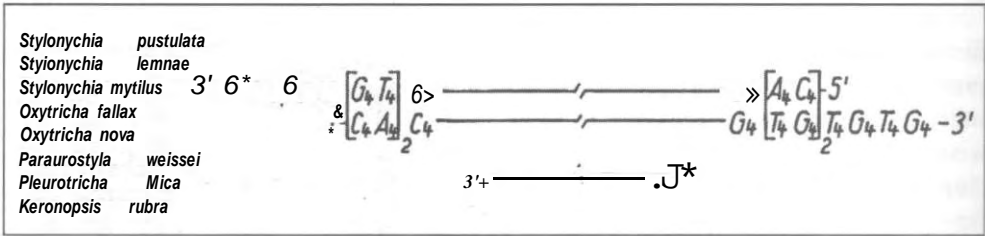
10 . . . . .

333.

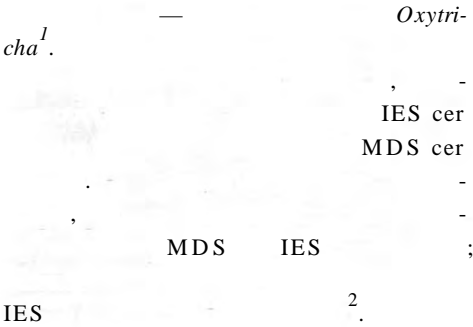
50 -

(internal eliminated segments, internal eliminated sequences — IES),

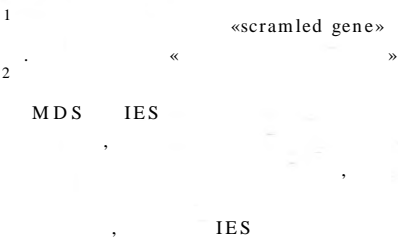
(macronuclear destined sequences — MDS), —



. 333.



Hymenostomatia, Stichotrichia







*Tetrahymena*

*Tetra-*

*hymena*

( . 17).

*Tetrahymena Euplotes.*

*Tetrahymena*

TTGGGG

*Tetrahymena.*

*Euplotes*

TTTTGGGG

*Euplotes.*

*Tetrahymena*

3'

17.

*Didymium*

Ciliophora	<i>Tetrahymena</i>	TTGGGG
	<i>Glaucoma</i>	TTGGGG
	<i>Paramecium</i>	TT(T/G)GGG
	<i>Stylonychia</i>	TTTTGGGG
	<i>Oxytricha</i>	TTTTGGGG
	<i>Paraurostyla</i>	TTTTGGGG
	<i>Onychodromus</i>	TTTTGGGG
	<i>Urostyla</i>	TTTTGGGG
	<i>Keronopsis</i>	TTTTGGGG
	<i>Pleurotricha</i>	TTTTGGGG
	<i>Euplotes</i>	TTTTGGGG
Kinetoplastidea	<i>Trypanosoma</i>	TTGGGA
	<i>Crithidia</i>	TTGGGA
Apicomplexa	<i>Plasmodium</i>	(C/T)TTGGGA
Myxogastrea	<i>Physarum</i>	TTGGGA
	<i>Didymium</i>	TTGGGA
Dictyostelia	<i>Dictyostelium</i>	AG,,,
Chlorophyta	<i>Chlamydomonas</i>	TTTTGGGA

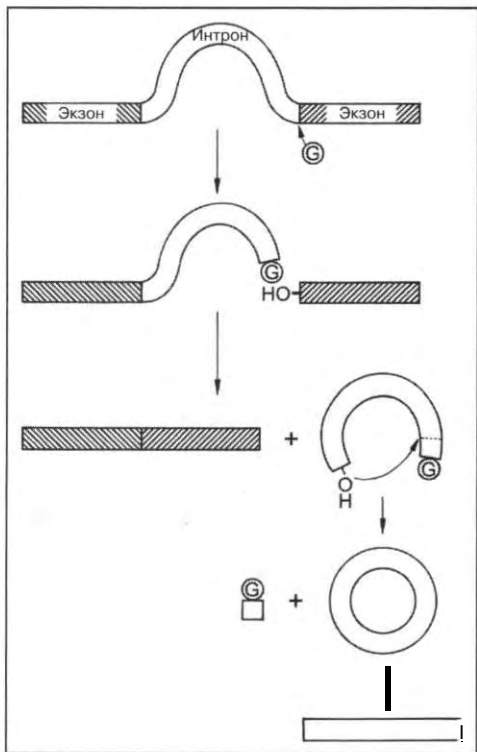
*vitro*

G

( )

*in*





334.  
*thermophila.*

*Tetrahymena*

(G)

2.

G

(

( 334).

*Tetrahymena, Paramecium, Stylo-*  
*nichia Oxytricha* —  
 TAG, —

*Physarum*

18. TAG TGA,

	TGA	TAG
<i>Tetrahymena</i>		Gin Gin
<i>Paramecium</i>		Gin Gin
<i>Stylonychia</i>		Gin Gin
<i>Oxytricha</i>		Gin Gin
<i>Paraurostyla</i>		Gin Gin
<i>Euplotes</i>	Cys	
<i>Blepharisma</i>	?	?

( . 18).

, — TGA. *Tetrahymena ther*  
*mophila*

TGA.

Apicomplexa:

*Plasmodium falciparum*, *P. vivax*, *P. ovale*  
*P. malariae*.

*Plasmodium*,

. *Euplotes* *Blepharisma*

TGA (

)

*Euplotes*.

*Euplotes*

Hypotrichia

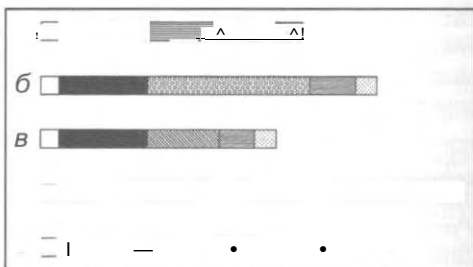
(

*Stylonychia*

*Oxytricha*,

)

TGA



. 335.

*Plasmodium falciparum*.

( ) .

*P. falciparum*

96).

( . . 97, 98).

dium

*Plasmo-*

20

(S 1).

VSG

( . . 335).

S

*P. falciparum*

■



*Chlamydomonas*.

*tyostelium* *Entamoeba*

*Dic*

1

( )

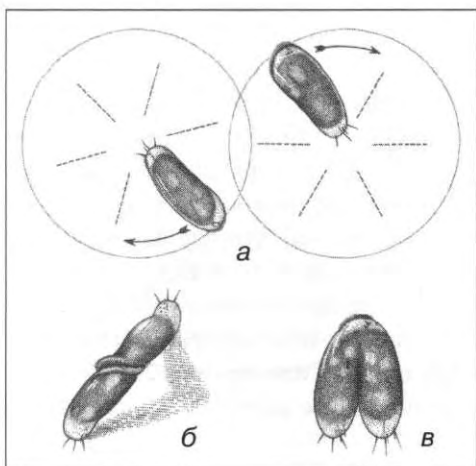
( )

( . 336).

*nychia Euplotes)*

2+

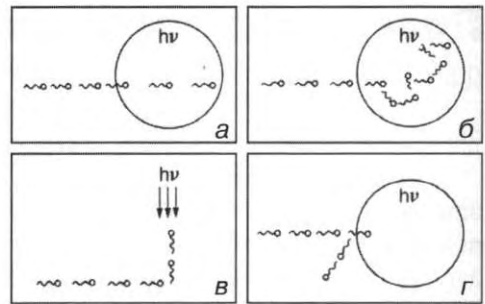
(Stylo



. 336. «  
*Stylonichia mytilus*:

( )





. 337.

( ... )

( $h\nu$ ): — ( )

( ... )

); — :

),

; — ( )

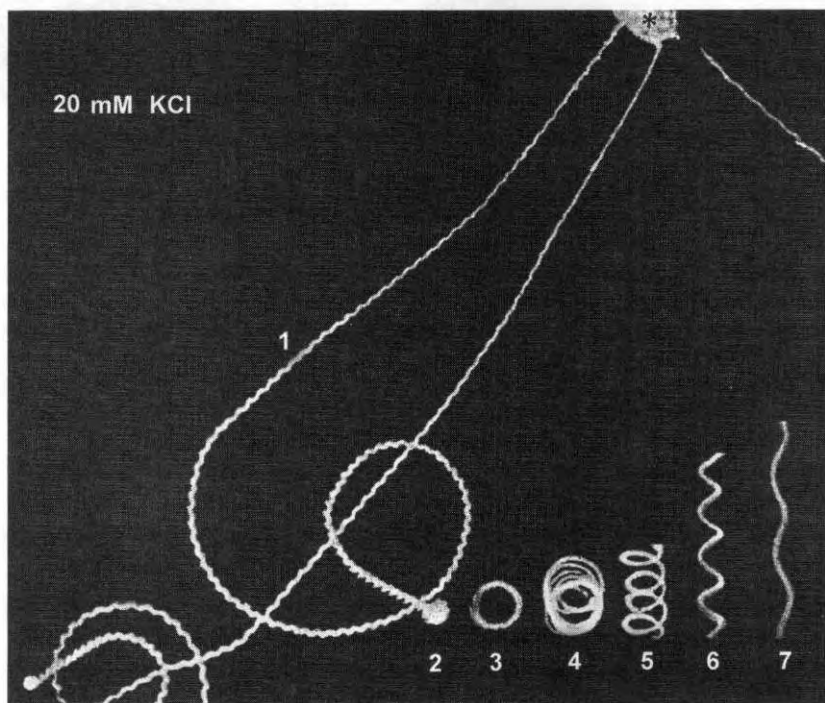
( . 337 ).

( ... ).

( . 337 , , ).







338. *Paramecium*

20 mM KCl

(\*)

(1)

40

(2)

(3)

(4-7)

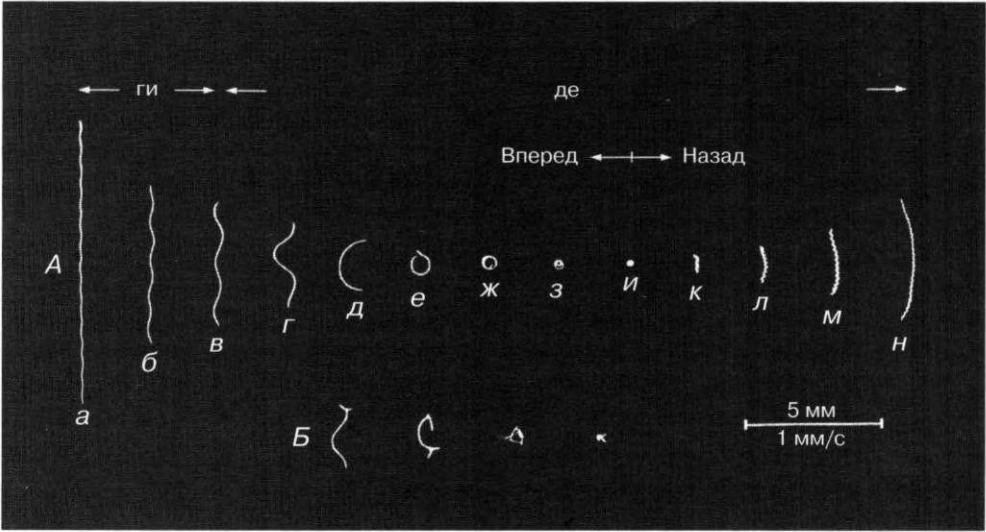
7-

463)

339,

*Paramecium*.

( : Machefer: J. Protozool. 36 [1989]

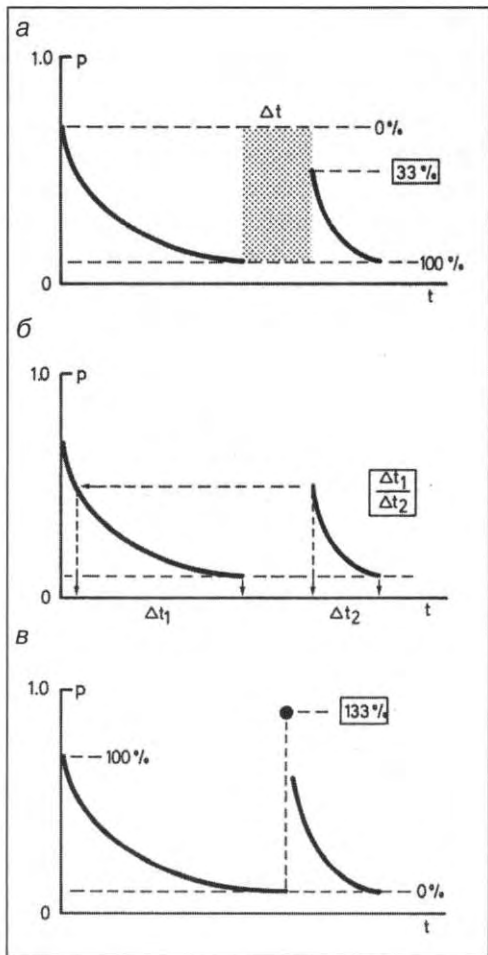


339. *Paramecium*  
 ( )  
 )  
 ( )  
 ( ; ; )  
 ( )  
 ( : Macheimer and Sugino: . Biochem. Physiol. 94A

[1989] 365).

338).

( . 339)



340.

*Spirostomum*

( )

(t)

12

100%

(At),

(33%)

100%

( )

( )

( : Macheimer:

BIUZ 18 [1988] 122).

*Stylony-*

340).

chia

*Spirostomum Stentor,*

. 339),

*Paramecium,*

( )

( ),

( ),

( . 3416,1).

( . 341 ).

2

II-I, III-I).

( . 3416,

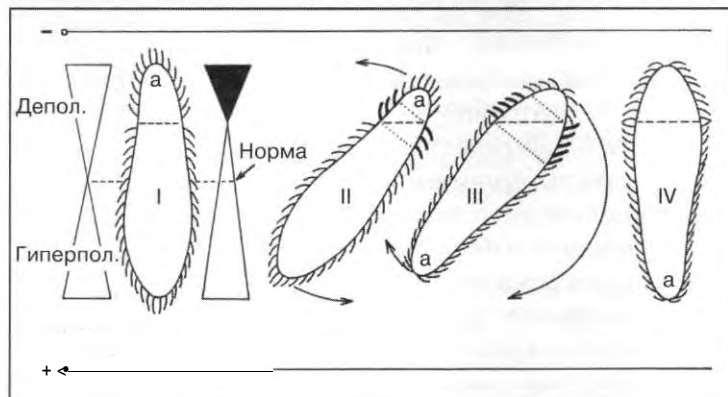
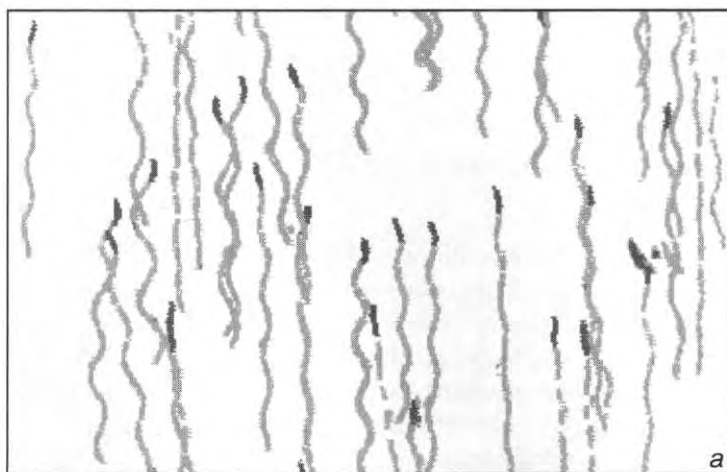
( . 3416).

( );

(*Opalina,*

*Chilomonas).*

( .



. 341.

*Paramecium*, —

( ) , —

) ( ) I: ( ) , —

( ) ( ) , —

( ) , — ; —

) , II, ( ) , —

III: , ( ) , —

), ( ) , —

IV: ( + ) , —

( + ) , —

III —

I ( : Macheimer: Galvanotaxis: Grundlagen der elektro-  
mechanischen Kopplung und Orientierung bei *Paramecium*. In: Praktische Verhaltensbiologie,  
ed. by G.H.K. Zupanc, Parey, Berlin 1988).

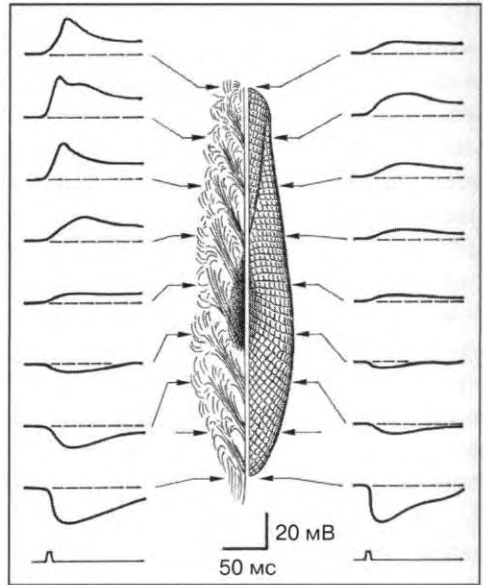


*(Spirostomum, Cli  
macostomum)*

*(Spirostomum, Cli*

*(Loxodes).*

*Stentor*



*Paramecium*

. 342.

*Paramecium* (

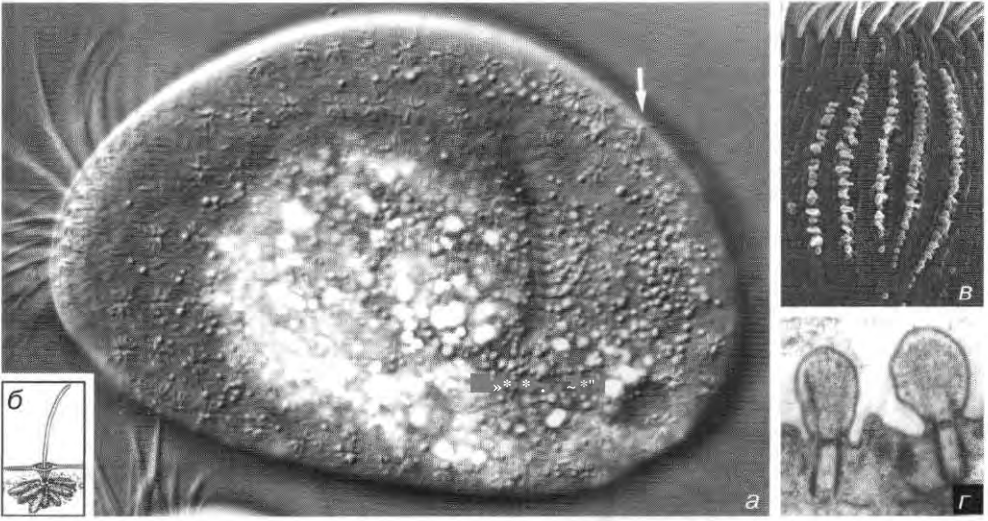
( . . . 255).

*(Paramecium, Stylonychia)*

342).

*Paramecium*

( : Ogura and Machemer: J.  
. Physiol. 135 [1980] 233).

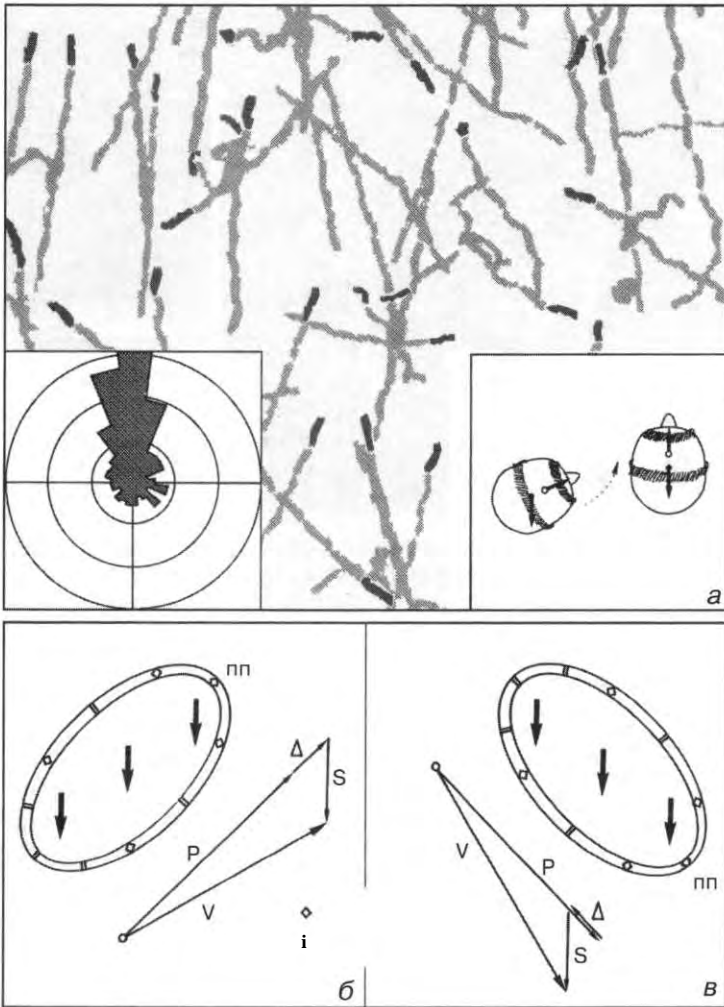


343. *Euplotes vannus*:  
 ( — *Didinium* , —  
 ); — *Didinium*  
 ( — ; — ) . ∴ — 1 , —  
 500 , 17 500 .

*Paramecium* ( ) . «  
 »  
 ( . 342) . *Para-*  
*mecium*

*Paramecium caudatum* , —  
 , —  
 , —  
 ( , —  
 ) , —

( . 343) . *Loxodes* , —  
 — *Loxodes* , —



. 344.

Didinium.

( ), ( ), —  
 ( ), ( — ).  
 342). —  
 ( — propulsion) (V) —  
 (S)  
 V, S. ( ). ( )

( : Machefer and Braucker: Acta Protozool. 31 [1992] 185).

( . 342)

( . .

*Loxodes*

339).

,

.

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—

,

( g), ).

(

( -

+

. —

. .)

.

,

-

( .

). —

2

« »

,

(

*Loxodes*

; . . 116, 117).

(

)

,

*Paramecium*

,

,

,

:

( . 3446),

1

*Loxodes*

,

2

. — . .

*Paramecium*

*Paramecium*

2+

^

( « »),

*Paramecium*

(

)

12

, *Didinium*,  
 : (1)  
 ; (2)  
 0<sup>2</sup>  
 ».  
 ; (3)  
*Paramecium*.  
*Paramecium*  
 1  
 + ( . . 307),  
 (*Paramecium*),  
 (*Blepharisma*,  
*Plasmo-* *Euplotes*). *Chlamydomonas*  
*dium* ( )  
 : ( $\geq 10^3$  )  
*Paramecium*

*Amoeba proteus*

(  
) 10

*Paramecium bur*

saria,

(  
) (  
)

(  
, — .).

(  
— .).

*mydomonas* ( . 345).

*mecium bursaria*  
*cium multimicronucleatum*

*Para-*  
*Parame-*

10"

2+  
2+

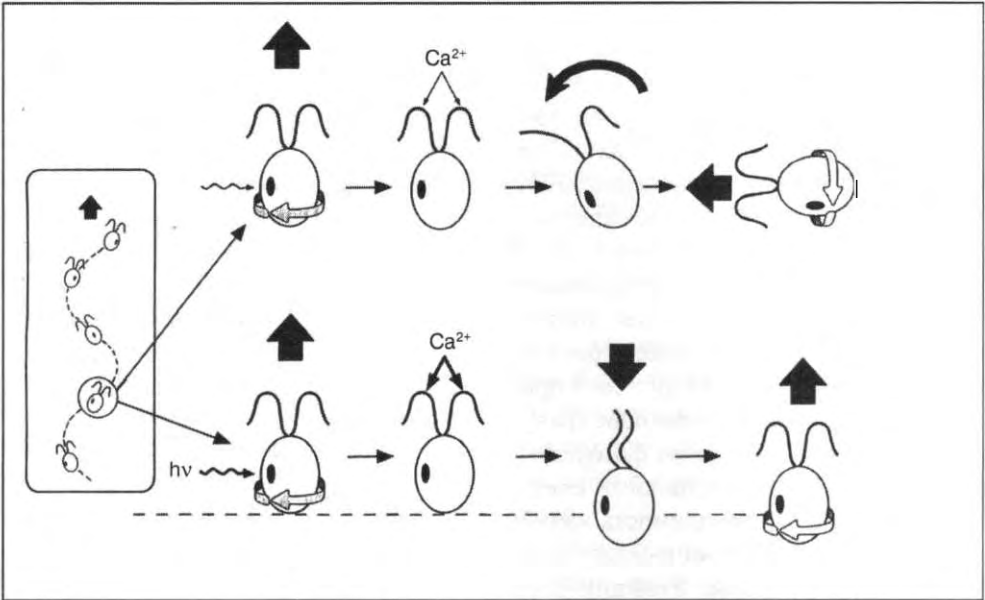
(  
) *Paramecium*

2+  
(10<sup>-8</sup>).

saria

*Paramecium bur-*

*Paramecium* ( . 255),



345.

*Chlamydomonas*.  
( ).

( ).

$2^+$

( ).

$2^+$

( ).

( ).

( )

$2^+$

( ).

( ).

$2^+$

( ) ( : Witman: TICB 4 [1993] 403).

1

1

( ).

(

).

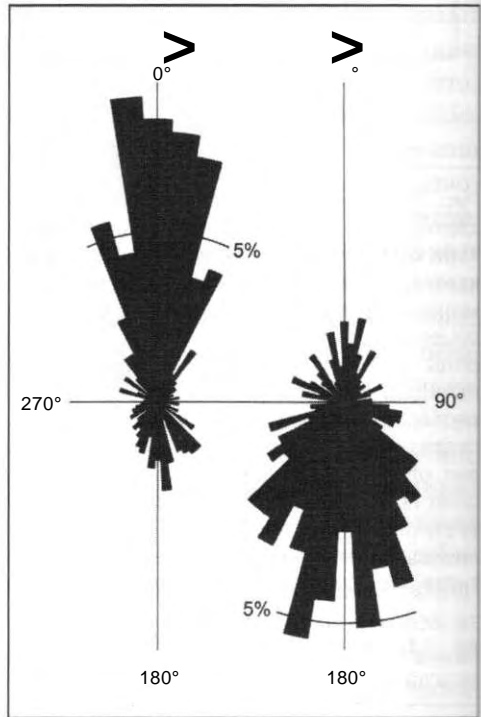


*Chlamydomonas*

*Ophryoglena*,

( . 345).

2+



. 346.

*Ophryoglena*

( )  
*Ophryoglena* ( : Kuhlmann: Europ. J. Protistol. 29 [1993] 344).

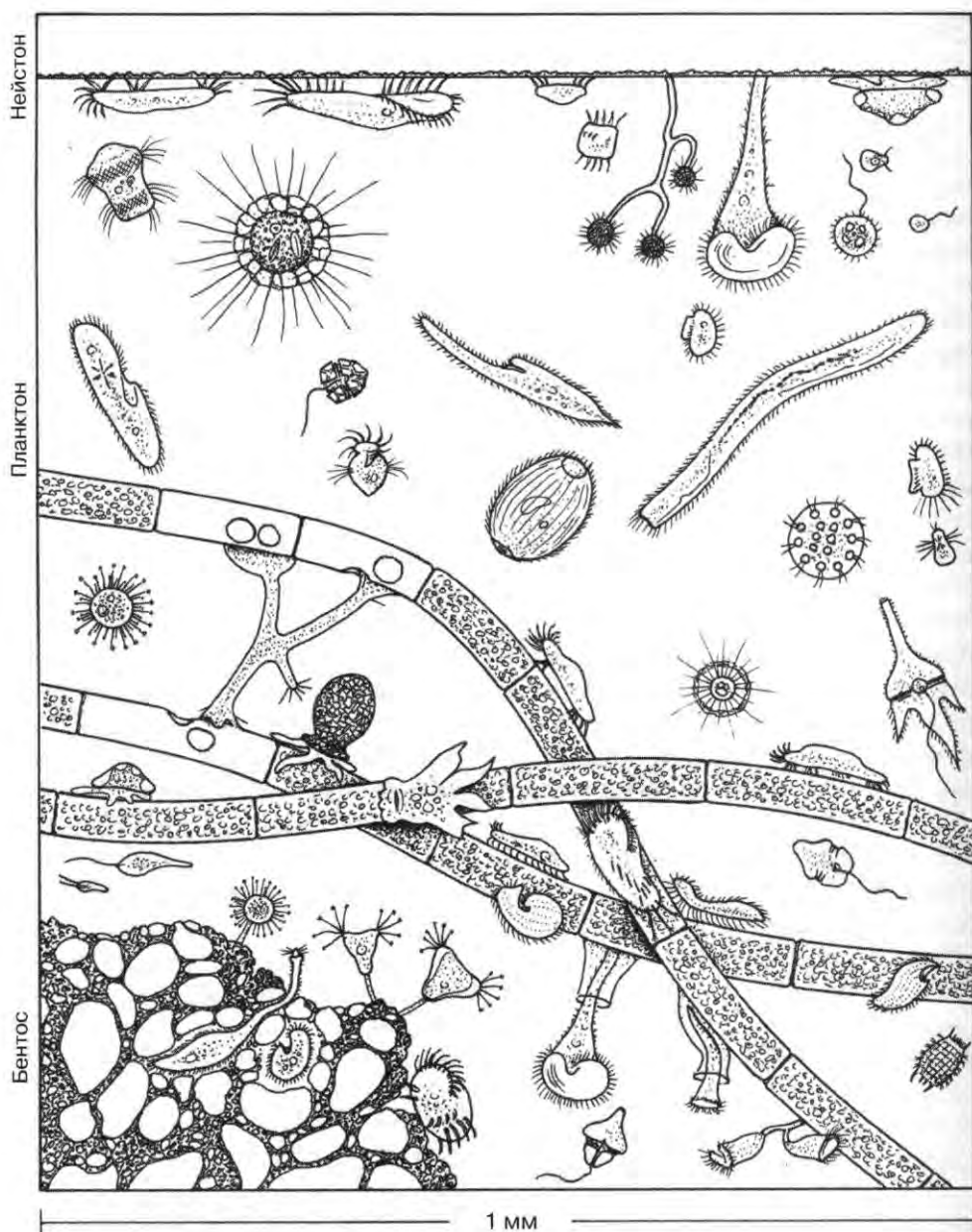
*Chlamydomon* —

— *Ophryoglena*.

— *Stentor*, *Fabrea*

( . 346).

( . 347).

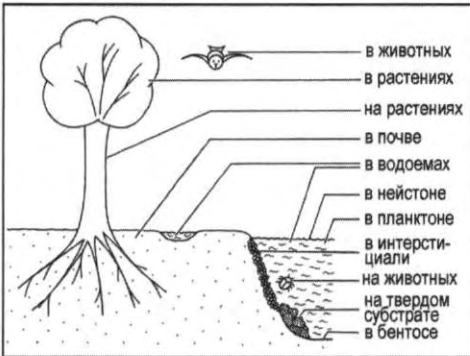


*Colpoda*

*Colpo-*

*da*

( . 348).



*Paramecium multimicronucleatum*

( )

348.



*Thecamoeba terricola*.

*Colpoda*,

20,

( . . . 56, 179, 180)  
*Sorogena* ( . . . 226)

100  
( . . . 349).

NaCl<sup>1</sup>  
144% ( 10 ° );  
38% <sup>2</sup>.

<sup>1</sup> NaCl,  
<sup>2</sup>

35% , 38%

*Amphidinium*, *Gymnodinium* — *Glenodinium*,

*Oxytricha fallax*

41 56 ° ,

*Euplo-*

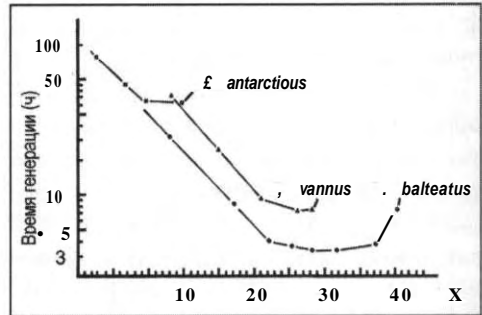
*tes*

2 ° ( . 350).

35 °

*Dunaliella* (Chlorophyceae),

*Trimyema minutus*



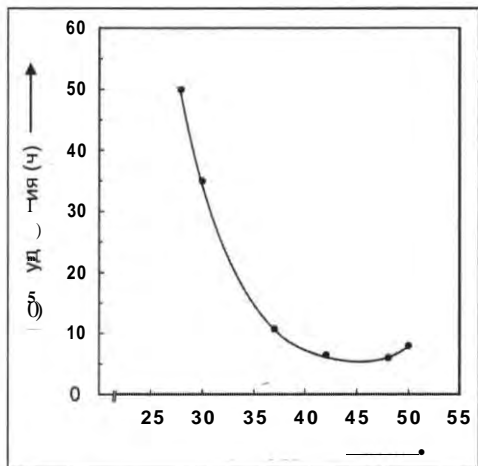
. 350.

*Euplo-* . *antarcticus* ( . ),

*vannus* ( . ), £. *balteatus* ( . ).

40 ° .

( . ).

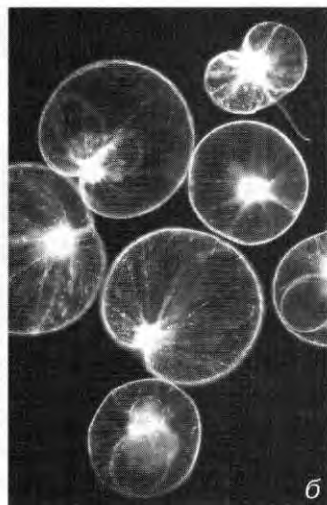
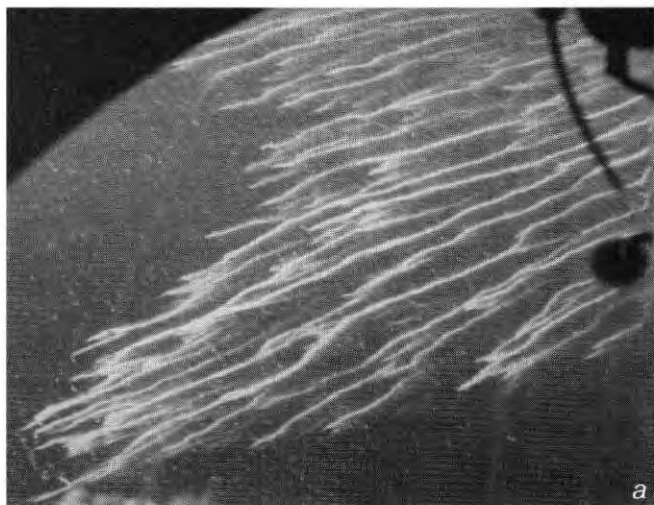


50 ° ;  
 — 6 —  
 48 ° ( . 351).  
 (Schizopy  
 renida, Heterolobosea)  
 40 °  
 (*Naegleria fowlery*, *N. australiensis*)  
 ( . 19).

. 351.  
 EV10  
*Trimyema minutum*.

28 ' 52 " ( : Baumgartner et al.:  
 J. Eukaryot. Microbiol. 49 [2002] 227).

*Noctiluca scintillans* ( . 352),



. 352. *Noctiluca scintillans* ( ); —  
*Noctiluca* ( — ) . . — 25 .



19. *Naegleria* -

4 ° ( : de

Jonckheere: Acta Protozool. 41 [2002] 309)

<i>Naegleria</i>	(°C)
<i>N. andersoni</i>	40
<i>N. australiensis</i>	42
<i>N. carteri</i>	45
<i>N. chilensis</i>	30
<i>N. clarki</i>	37
<i>N. fowleri</i>	45
<i>N. fultoni</i>	35
<i>N. galeacystis</i>	35
<i>N. gruberi</i>	39
<i>N. indonesiensis</i>	38
<i>N. italica</i>	42
<i>N. jadini</i>	35
<i>N. jamiesoni</i>	42
<i>N. lovaniensis</i>	45
<i>N. minor</i>	38
<i>N. morganensis</i>	44
<i>N. niuginensis</i>	45
<i>N. pagei</i>	37
<i>N. pringsheimi</i>	37
<i>N. pussardi</i>	41
<i>N. robinsoni</i>	38
<i>N. sturti</i>	44
<i>N. tihangensis</i>	42



. 353.

( ),

*Phaeo*

cystis

1981

(

X.

).

*Chrysochromulina polylepis*,

« »

1988

*Phaeocystis*.

( . 353).

*Metopus*

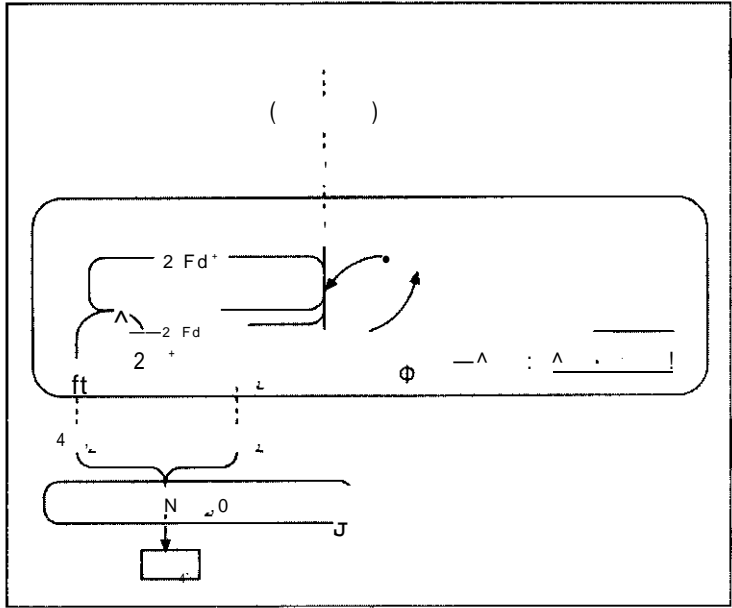
*nomorpha*

*Trepomonas*

*mita*.

2,

( . 354).



. 354.

( ) .

( , *Loxodes Spirostomum,* -

.).

*Chlorella Trebouxia,* -

( . 355).

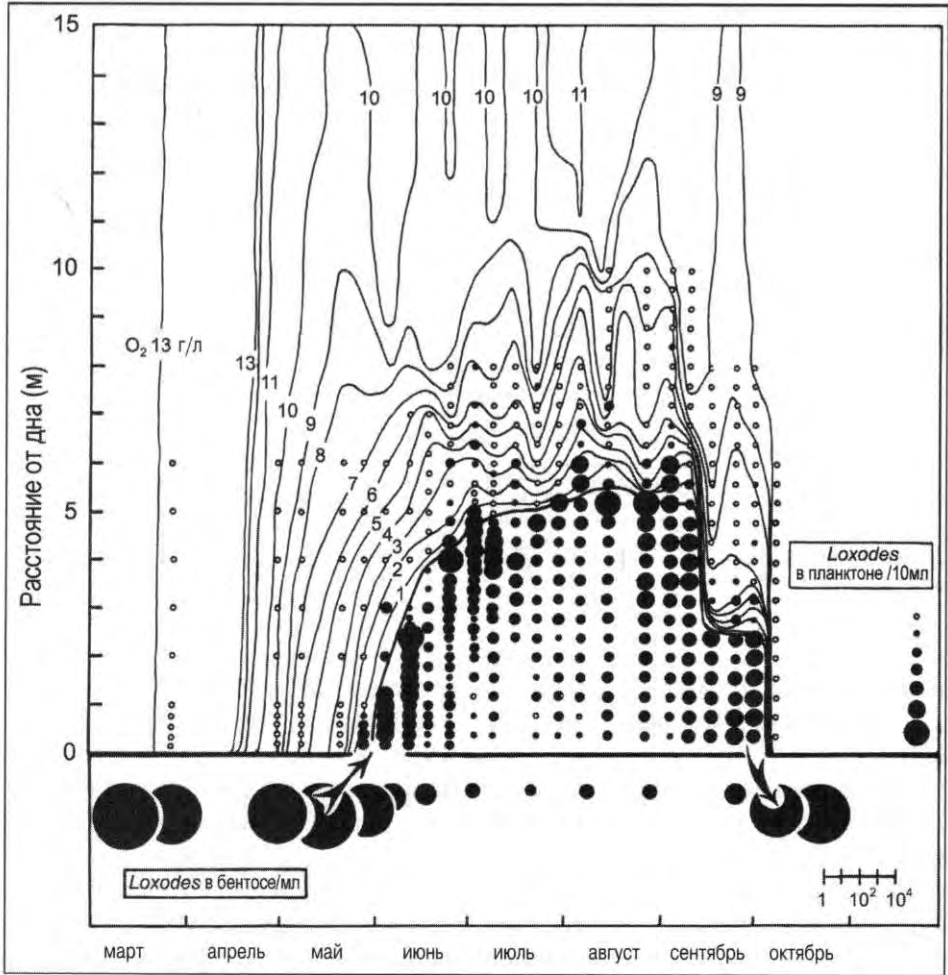
*Loxodes*

*Climacostomum virens Paramecium* , , -

*bursaria,* , -

*Vorticella Frontonia.* ( . . 116, 117).

( . . 116, 117).



355. Water, Lake District, England

*Loxodes* (Esthwaite

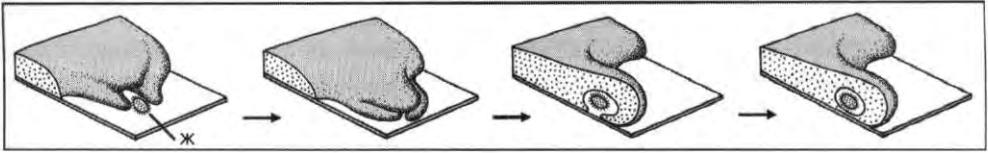
(0 2 / )  
*Loxodes*

™

5 6

$O_2$  ( )

Finlay and Fenchel: Freshwater Biological Association Annual Report 54 [1986] 73).



. 356.

*Amoeba proteus*.

( ) .

( . 356).  
*Reti-  
culomyxa* (Foraminifera)

*Reti*

*Volvox* ( . 357).

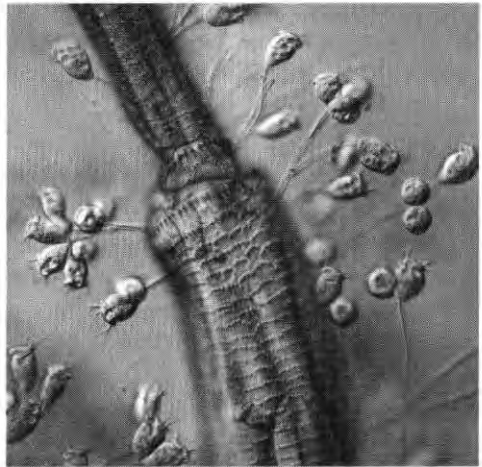
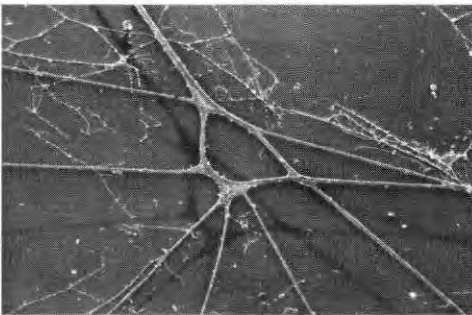
358).

*Spirochona*,

*Vorti*

*cella Stentor*

*Ophrydium versatile*.



. 357.  
*culomyxa filosa*,

: 200 .

*Reti*

. 358.

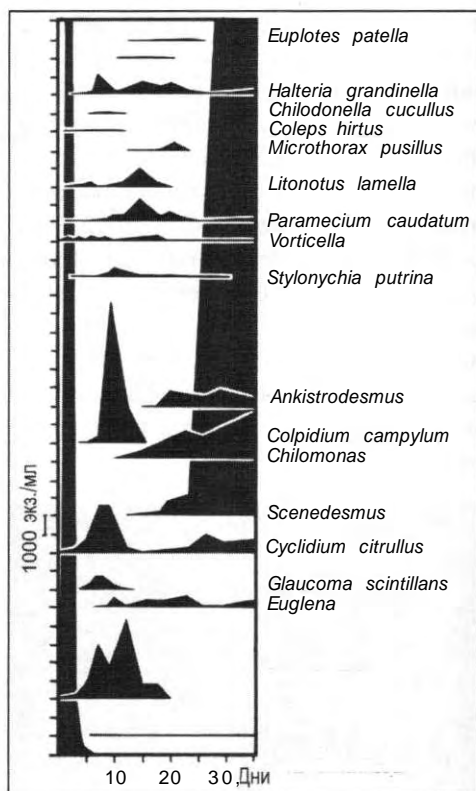
( : Hausmann  
and Rambow: Mikrokosmos 74 [1985] 208).  
: 110x.

1963 :

*Tokophrya lemnae*

(*Lemna minor*).

15



60

359.

35 ( ).

*Didinium nasutum* *Paramecium caudatum*,  
*Trachelius ovum* *Ophrydium*  
*versatile*.

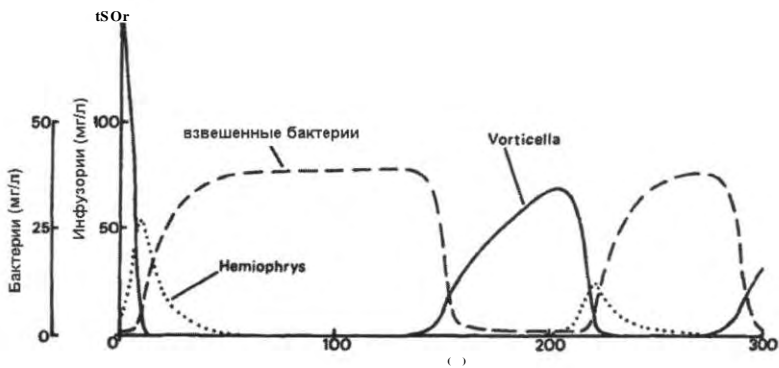
( . 359).

( . 361).

( . 360).

*Vorticella*  
*Hemiophrys*,

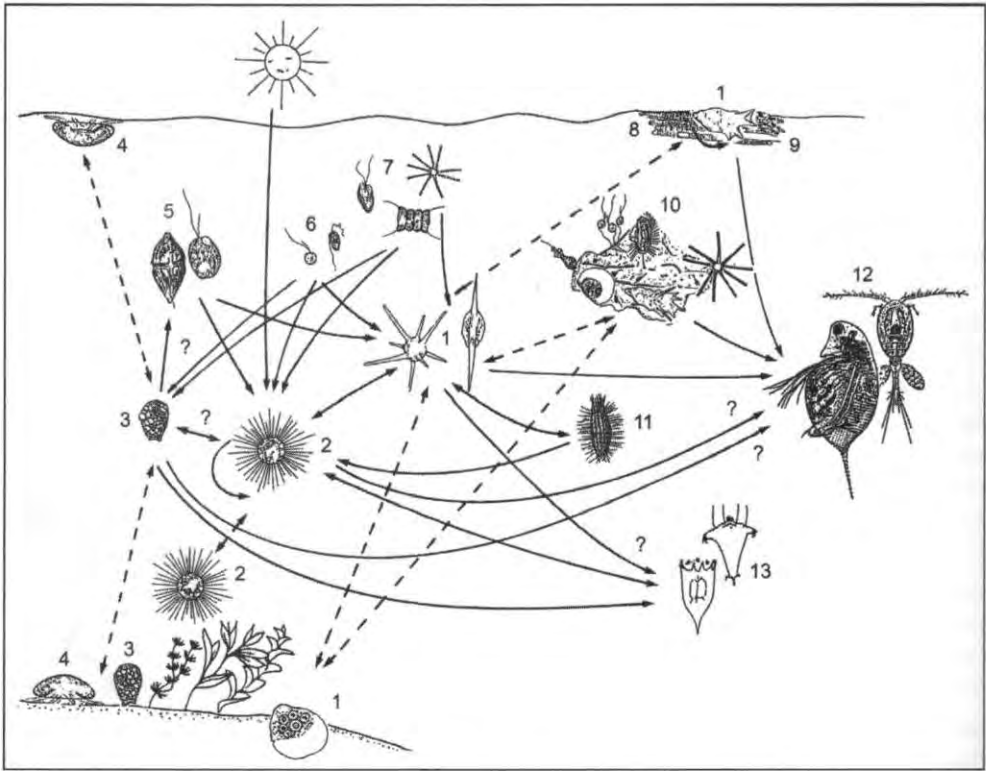
*Hemiophrys*



. 360.

*Vorticella*

*Hemiophrys* ( ) .



. 361 .

- 
- . 1 —
- , 2 —
- , 3 —
- 4 —
- , 5 —
- , 6 —
- , 7 —
- , 8 —
- , 9 —
- , 10 —
- , 11 —
- , 12 —
- , 13 —

( : Arndt: Marine Microbial Food Webs 7 [1993] 3).

( . . 142 ),

( . . 55, 312)

( . . 26).

2 4%

( , )

—

( . . 310).

*Chlorella*

( . . 362),

40%

(

*Vorticella*

*Hyalosphenia papilio,*

*Mayorella viridis,*

*cystis turfacea*

*costomum virens.*

*Acantho*

*Clima*

*Amoeba proteus* *Chaos*

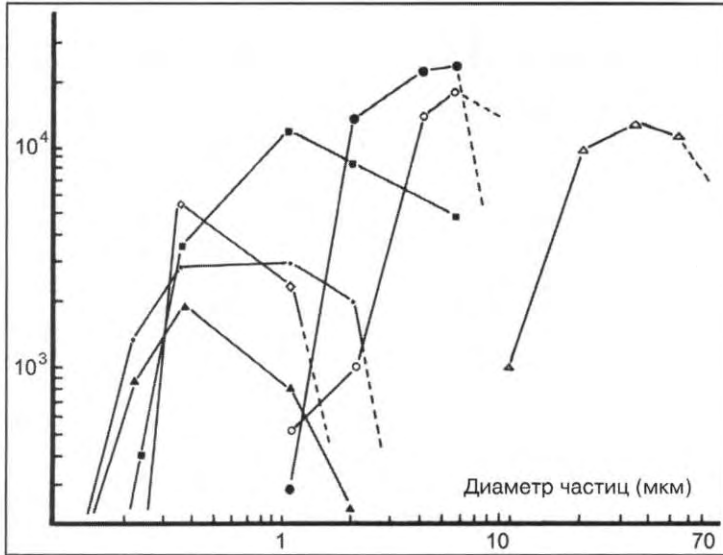
*chaos*

*Pseudomicrothorax*

*dubius,*

*Vampyrella,*





. 362.

*Glaucoma scintillans*, • — *Paramecium caudatum*, — *Blepharisma americanum*, • —  
*Colpidium campylum*, 0 — *Cyclidium glaucoma*, • — *Euplotes moebiusi*, — *Bursaria*  
*truncatella* ( ).

100%

: 500

( . . 347, 348)

20

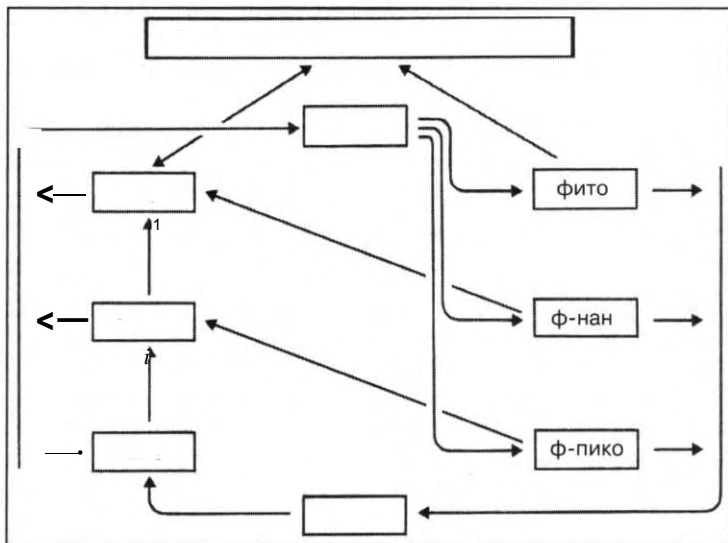
(2 20 ) 50%

(20 200 )

(

20.

1	0.2 2	
2	2 20	( )
3	20 200	( )
4	200 2 000	( )
5	2 20	( )
6	20 200	( )
7	200 2 000	
8	2 20	



363.

2 (2 20 ), (0,2  
(20 200 ), ( )  
)

(3)

100 ;

180

( 363).

350

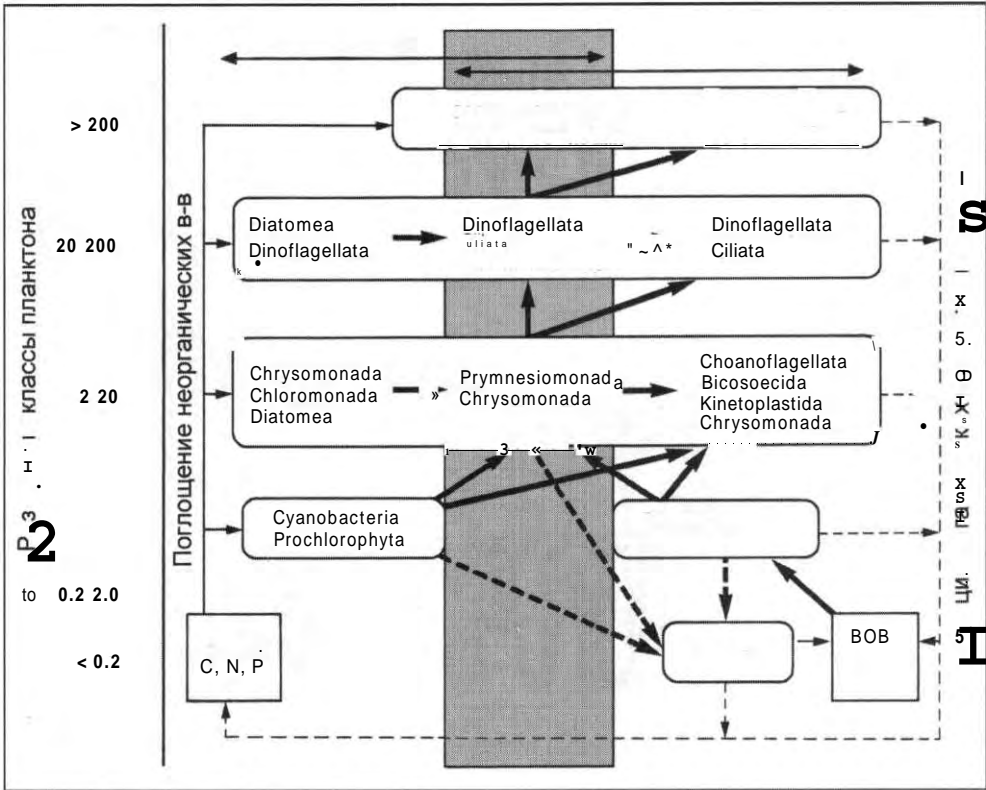
364.

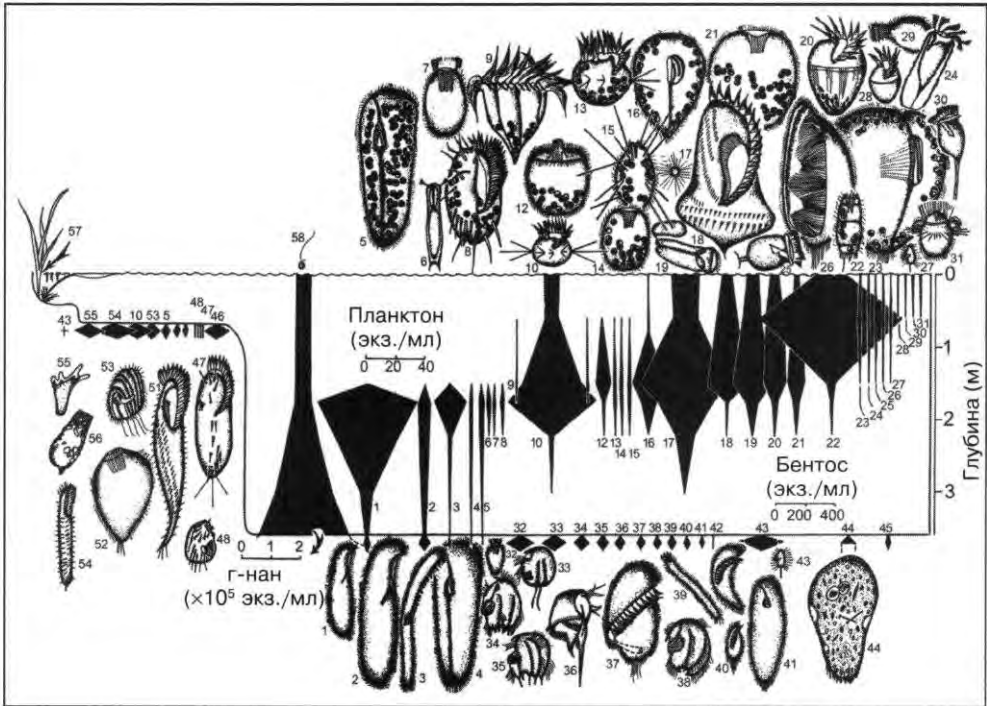
1 ( 365).

(1)

(2)

100 250



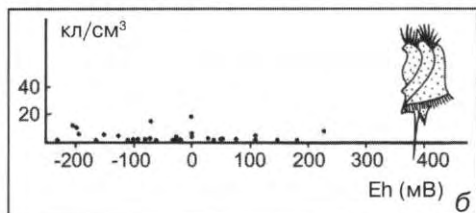
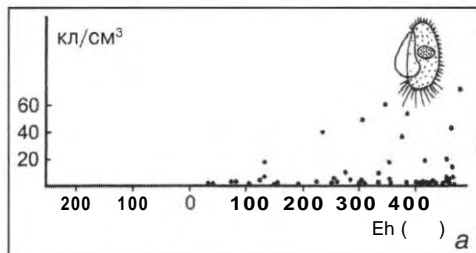


. 365.

( , ).  
 , [S] (sequestered) — , [Z]  
 ; —  
 (1 5 44), ( : Finlay et al.: Europ. J. Protistol. 23 [1988] 205).  
 1 — *Loxodes striatus* (200; ; 5 50); 2 — *Loxodes magnus* (400; ; 5 50);  
 3 — *Spirostomum teres* (300; ; 2 10); 4 — *Frontonia leucas* (300; ; 3 50);  
 5 — *Frontonia vernalis* (300; [Z]; 3 50); 6 — ; 7 — *Enchylis* sp. (60; ; <5);  
 8 — *Euplotes daidaleos* (80; [Z], ; <5); 9 — *Strombidium velox* (50; [Z]; 5 10);  
 10 — *Halteria grandinella* (50; [Z]; 5); 11 — ; 12 — *Monodinium balbiani* (75; [Z]; 5 10);  
 13 — *Halteria grandinella* var. *chlohgella* (50; [Z]; 5); 14 — *Prorodon* sp. 1 (50; [Z]; 2 5);  
 15 — *Actinobolina radians* (60; [Z]; 5); 16 — *Disematostoma* (75, 100; [Z]; 3 20);  
 17 — *Acanthocystis pantopodeoides* (18; ?; <5); 18 — *Hypotrichidium conicum* *H. geleii* (120/100; ; 3 25/2 10);  
 19 — ; 20 — *Strombidium viride* (70; ; 2 10); 21 — *Prorodon* sp. 2 (80 100; [Z]; 2 15);  
 22 — *Coleps hirtus* (45; [Z]; 2 5); 23 — *Stokesia vernalis* (150; [Z]; 3 30);  
 24 — *Tintinnidium* sp. (75; ; 2 5); 25 — *Vorticella bosminae* (20; ; <2);  
 26 — *Lembadion magnum* (120; ; 5 25); 27 — *Cyclidium* sp. (20; ; <2);  
 28 — *Strombidium* sp. (30; ; 2 5); 29 — *Enchelydium clepsiniiforme* (60; ; 2 5);  
 30 — *Vorticella* sp. (40; ; <2); 31 — *Askenasia volvox* (40; ; 2 5);  
 32 — *Enchelydium amphora* (35; ; <5);  
 33 — *Mylestoma anatinum* (25; ?; ?); 34 — *Epaxella* sp. (30; ?; ?); 35 — *Saprodinium*

1

( . 366).



. 366.

*Pleuronema coronatum* ( )

*morpha levanderi* ( )

(Eh) ( ).

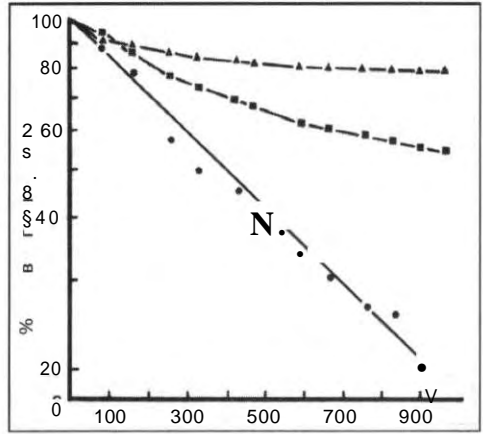
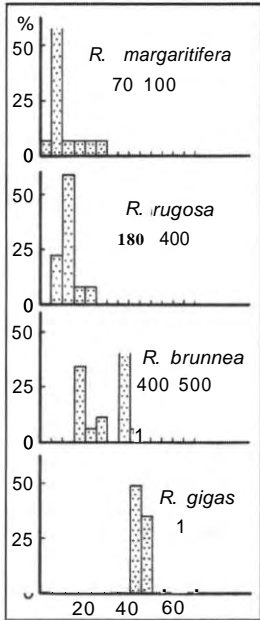
*Remanella*,

( . 367).

( . 368).

1

sp. (40; ; <2); 36 — *Caenomorpha lauterborni* (70; ; 5); 37 — *Brachonella spiralis* (120; ; 5 20); 38 — *Pelodinium reniforme* (50; ?; ?); 39 — *Chaenea sapropelica* (100; ?; ?); 40 — *Metopus undulans* (70; ; <2); 41 — *Loxocephalus luridus* (150; ?; ?); 42 — *Metopus curvatus* (60; ; <2); 43 — Scuticociliata; 44 — *Pelomyxa palustris* (100 700; ; > 200); 45 — *Acanthamoeba*, *Vahlkampfia*; 46 — Scuticociliata; 47 — *Stylonychia* (70/130; ; 2 10); 48 — *Aspidisca cicada* (30; ; <2); 49 — 12; 50 — 30; 51 — *Paruroleptus* sp. (130; ; <20); 52 — *Rhagadostoma* sp. (100; ; 5 10); 53 — *Cinetochilum margahtaceum* (30; ; <2); 54 — *Holosticha* sp. (80; ; 2 10); 55 — *Oscillosignum*, *Vahlkampfia*; (25/7; ; 2 5); 56 — *Centropyxis*, *Diffflugia*; ; 57 — *Vorticella*; 58 — (1 5).



. 368.

( ),

(•),

(•) ( )).

. 367.

*Remanella.*

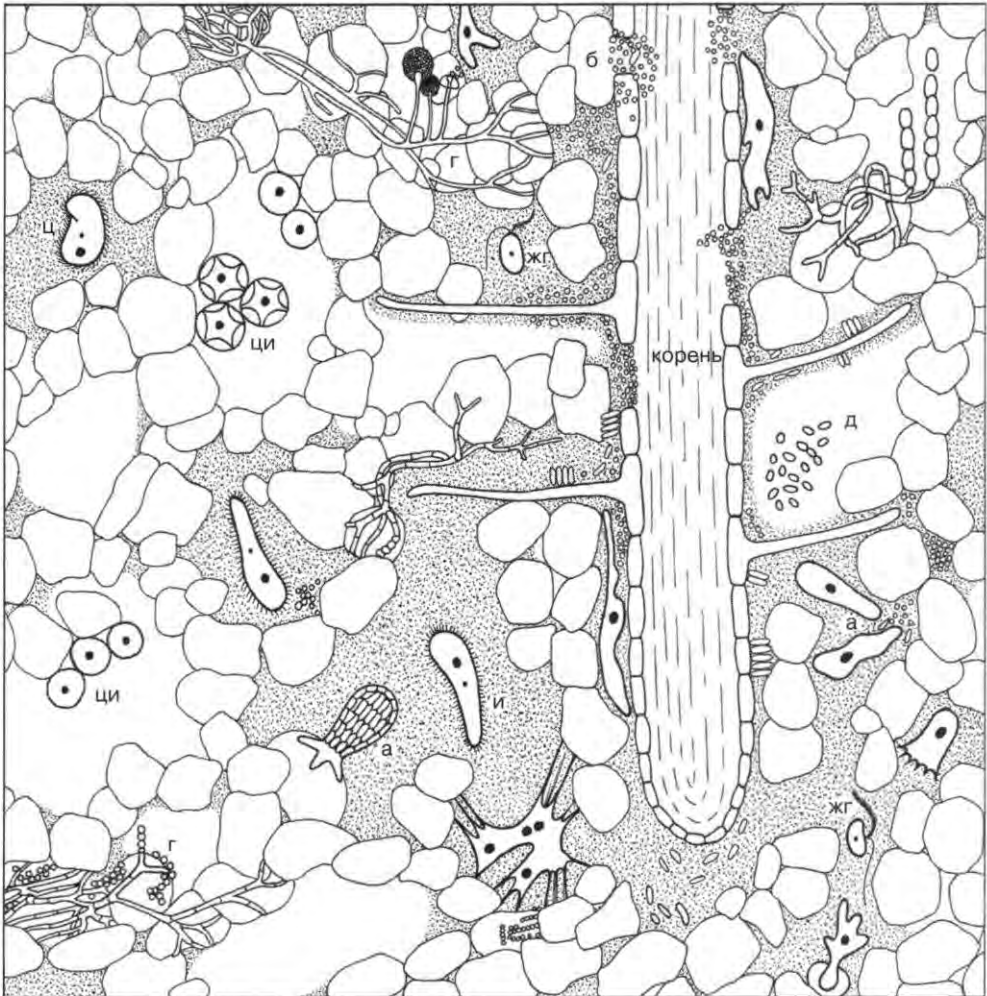
( )).

*Ophryoglena*  
*Tetrahymena*].

1

( . « »). —

30 ( . 369).



. 369.

( ) ;

( ' - ).



5

35 70%

( . 370).

Colpodea, Hypotrichia Prostomatea.

80 90%

10 20%

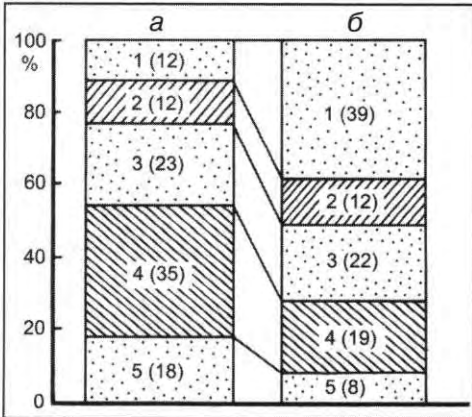
30%

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20 200

: 2



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14 000

. 370.

( )

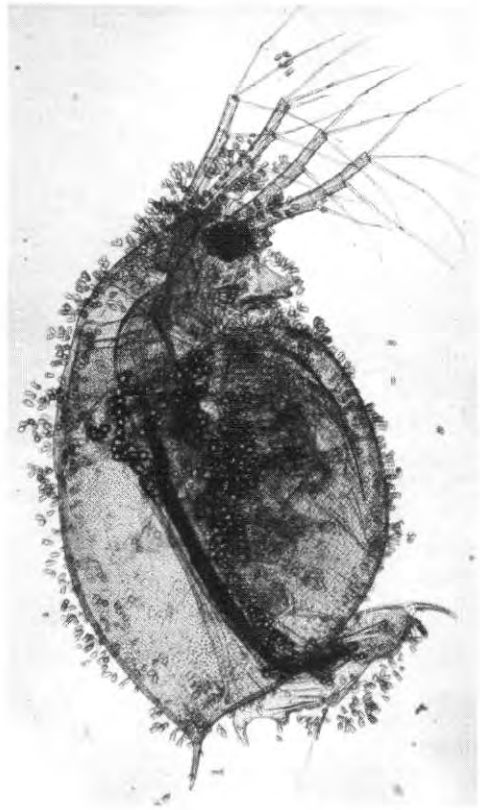
). 1 — , 2 —

, 3 — , 4 —

, 5 — ;

( )

).



371.  
 ( : Hausmann and Rambow: Mikro-  
 kosmos 74 [1985] 208). : 50x.

( . 371, 372).

( , *Ichthyophthi-  
 rius multifiliis*, . 139).

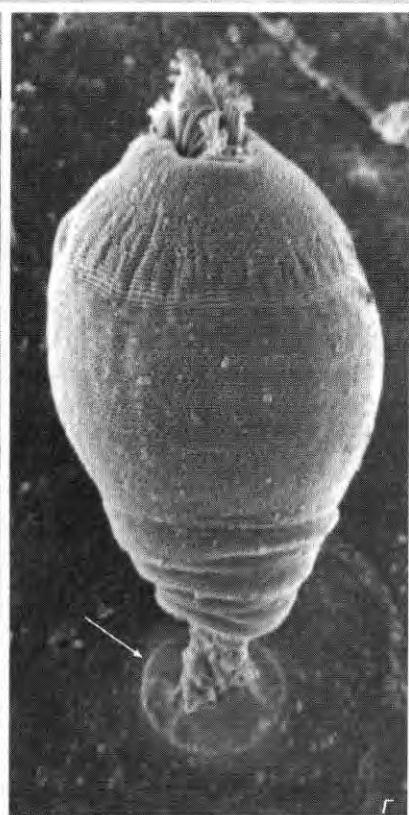
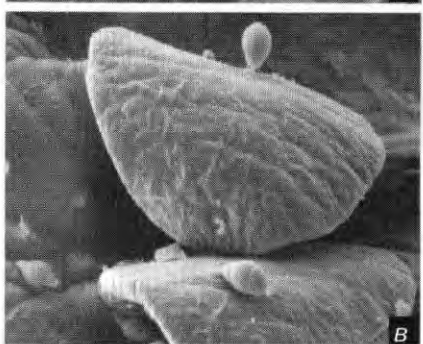
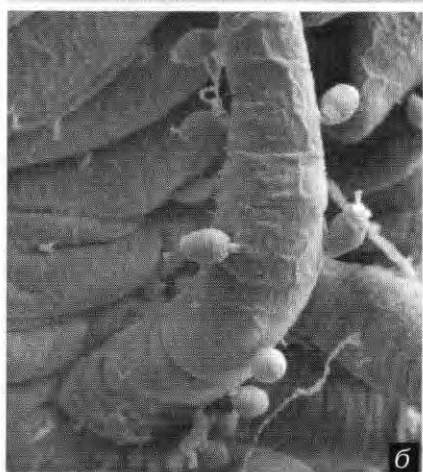
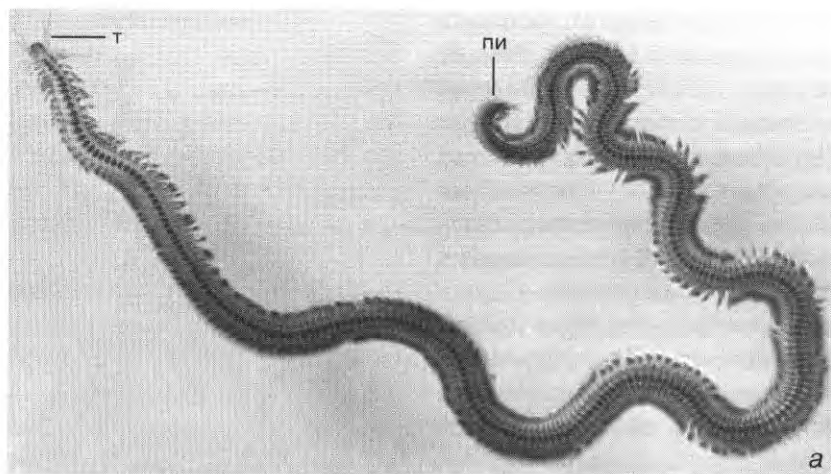
( , )

1

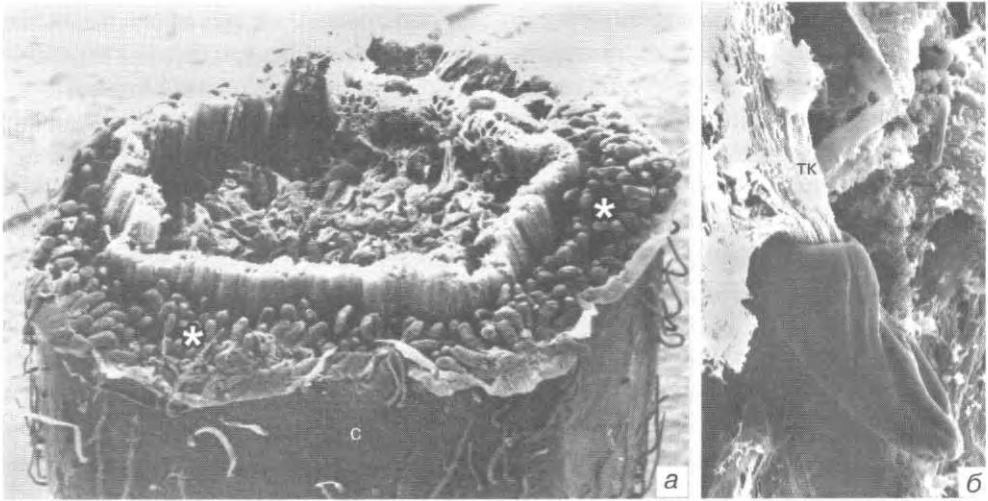
2

**Amphipoda** —

*Dendrocometes paradoxus* —



372. *Anaitides mucosa* ( )  
 ( ) ( ) ( , ) — — , —  
 ( : Hausmann: Mikrokosmos 69 [1980] 156). : 2,2 , 180 , —150 , 1 800 .



373. ( ) (*Medicago sativa*),  
*Epidinium* ( , \*);  
 ( ) ( : Bauchop: Appl. Environ. Microbiol. 37  
 [1979] 1217). : a 40x, 350 .

Entodi  
 niomorpha ( . 126)  
*leu*  
*cocephala*,  
 1

*Metopus*,

( — — — ) — — — , — — —

( , ,

).

03

( , )

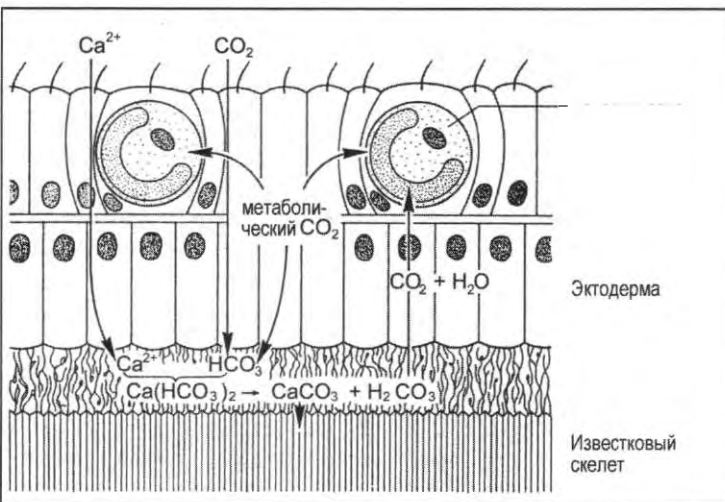
( , )

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02

( . 374).

02,



. 374.

( . ).

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( , )

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1

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( , )

« »

*Naegleria*

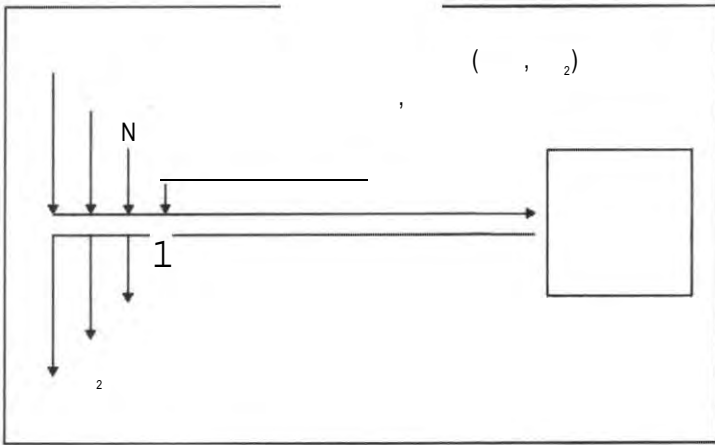
*Acanthamoeba*

---

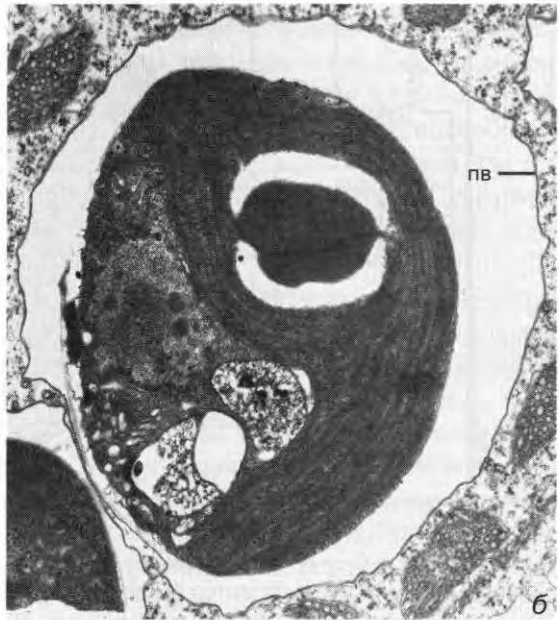
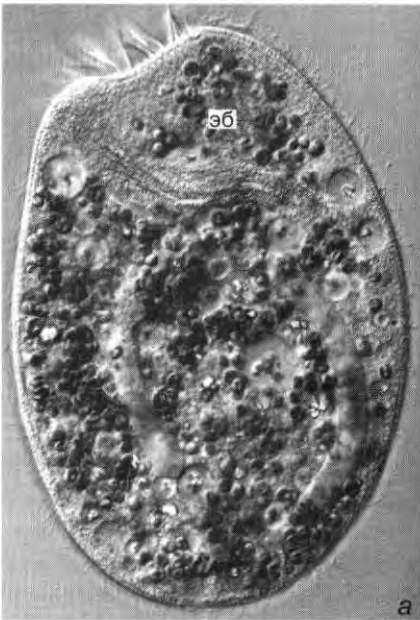
1 (0 150 )

2





. 375.



. 376.

*Climacostomum virens*

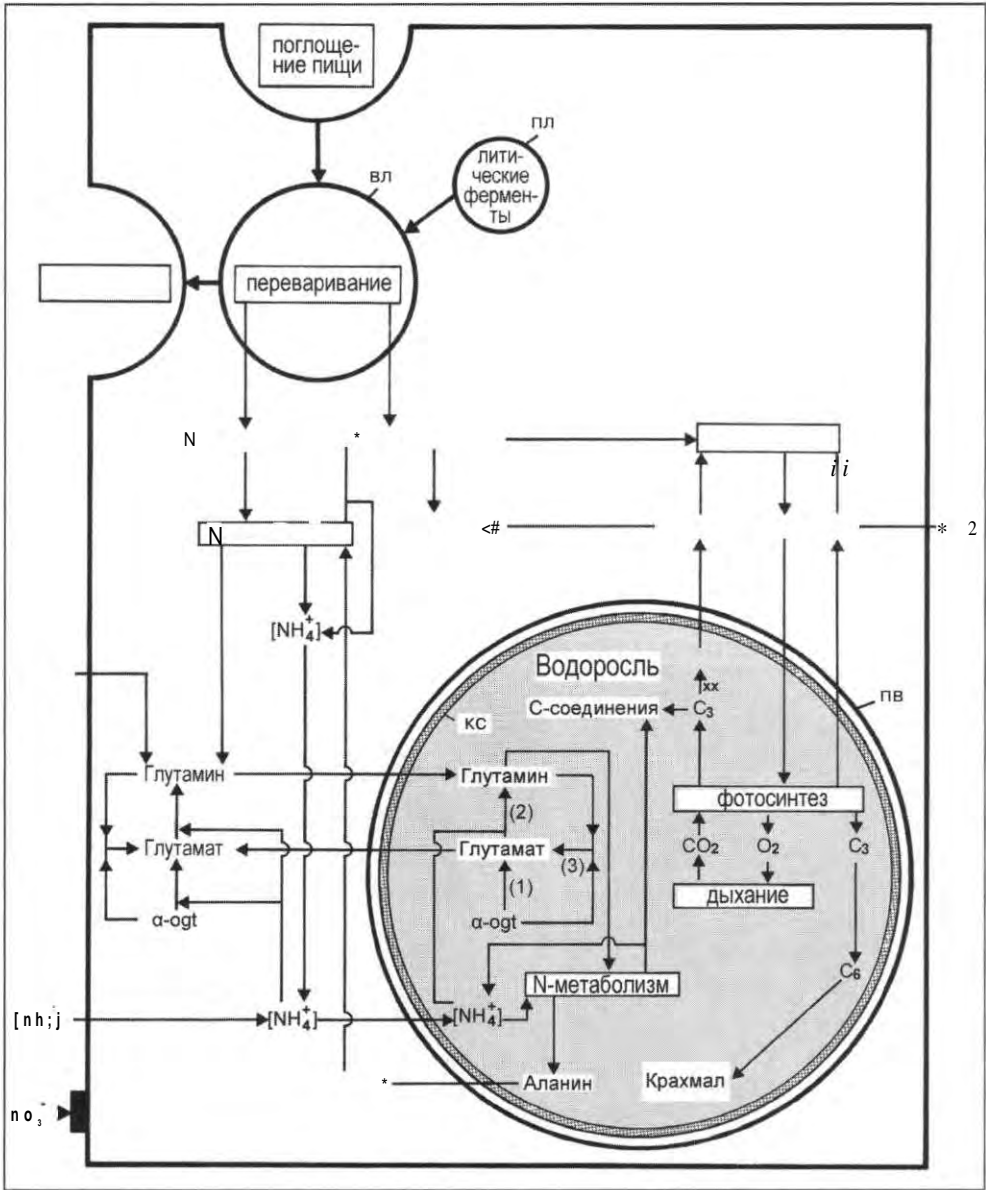
*Chlorella*: —

( ) ( : Reisser et al.: Protoplasma 119 [1984] 93).

.. a — 500x, —

24 000x.





377. *Chlorella* sp.

N

*Paramecium bursaria*

*Chlorella*,

, 3 —

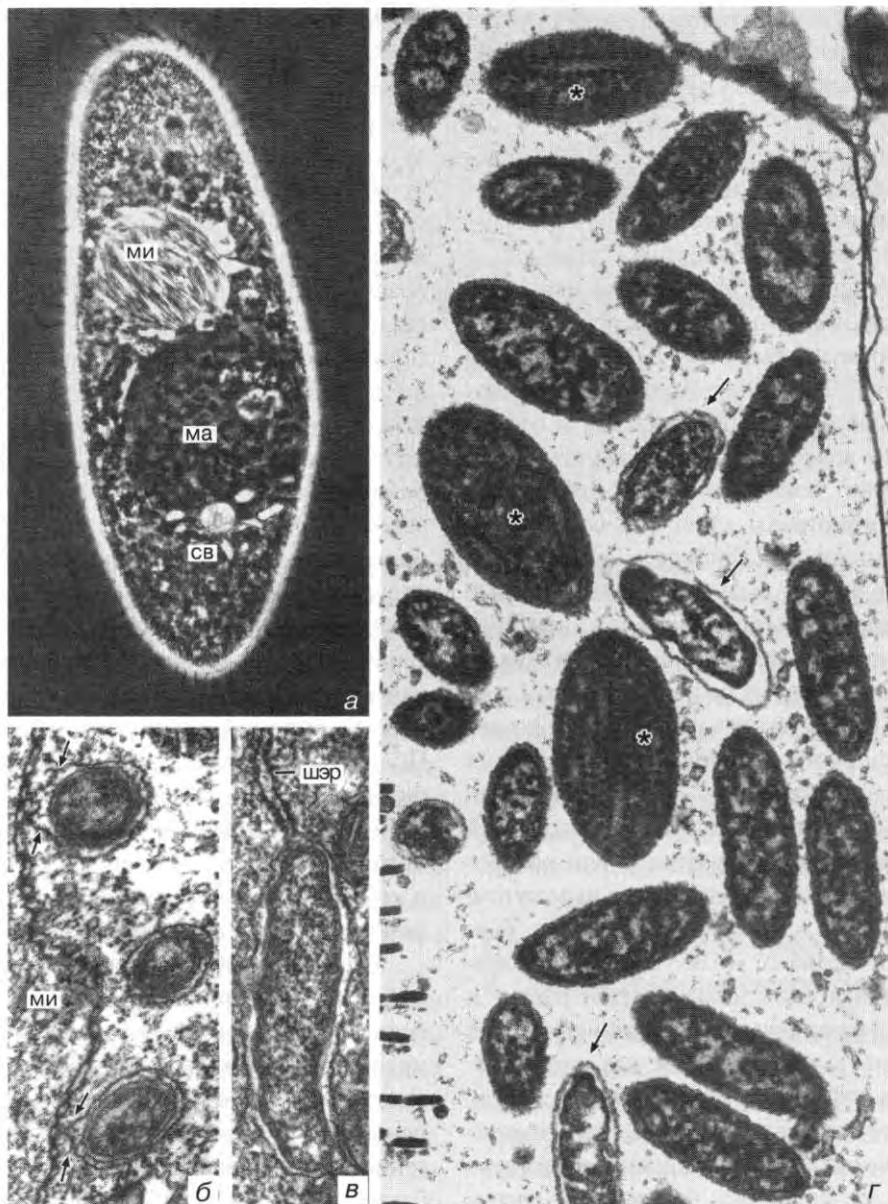
, 1 —  
, ос ogт —

, 2 —

( ).







378. *Holospira elegans* ( ) *Paramecium caudatum* ( )  
*Paramecium caudatum* ( ) ;  
*Entosiphon sulcatum* ( ) ( ) ;  
 ( ) *Trichodina pediculus*,  
 (\*) ( ) , — ( —  
 , . : 520 , 14 000 , — 15 000 , 11

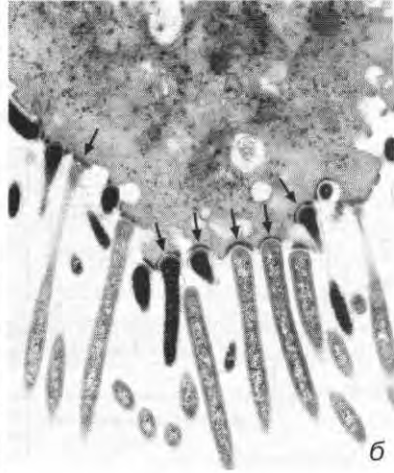
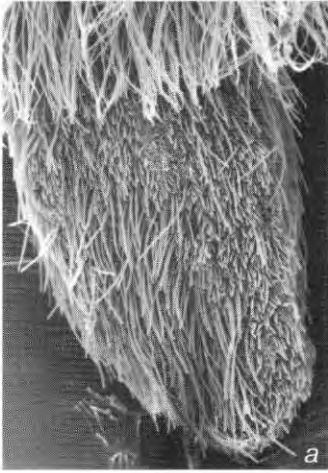
13, ( *thamoeba castellanii*, *A. palestinensis*, *Hartmanella vermiformis*, *Naegleria* spp.) ( , *Tetrahymena thermophila*).

*Legionella pneumophila*,

*Aeromonas salmonicida*, *Edwardsiella tarda*, *Listeria monocytogenes*, *Mycoplasma Vibrio cholerae*,

: *Pseudomonas* spp., *Salmonella* spp., *Shigella* spp.

*Amoeba proteus*, (X



. 379.

*Joenia* ( ),

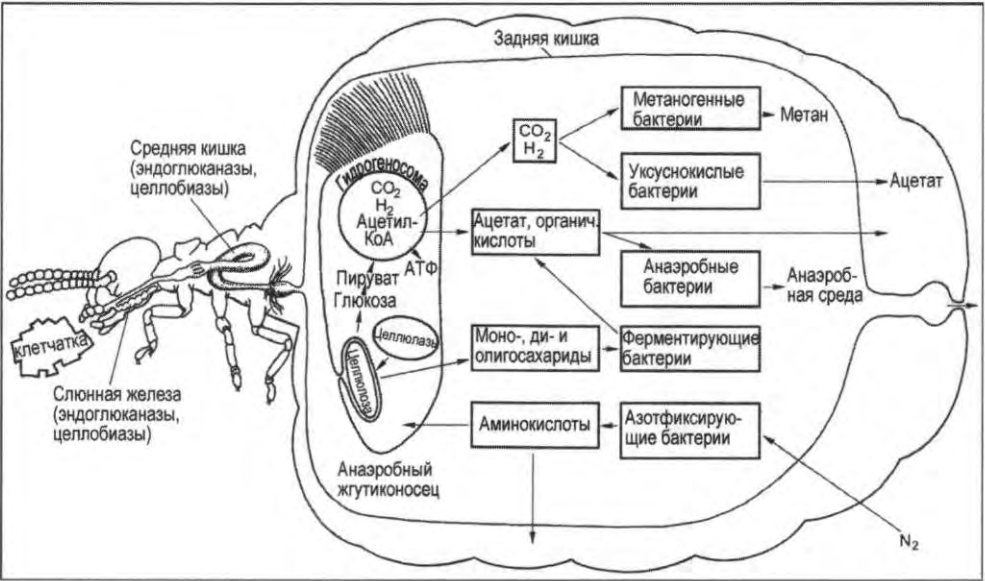
( ,  
) ( : Radek  
and Hausmann: Acta  
Protozool. 31 [1992]  
93). : a 1 000x,  
6 8 000x.

*Joenia*,

( . 379).

( . 380).

*Mixotricha paradoxa*



. 380.

( : Radek: Ecotropica 5 [1999] 183).

*Heterosigma akashiwo*  
*Phaeocystis*

*Plasmodiophora*  
(*Polymyxa*, *Spongospora*)

(peanut clump

), virus),

(potato mop top virus)

(broad bean

myxa Chytridiomycota.

Phyto

necrosis virus).

(oat mosaic virus).  
*Olpidium brassicae*

(tobacco  
 (melon

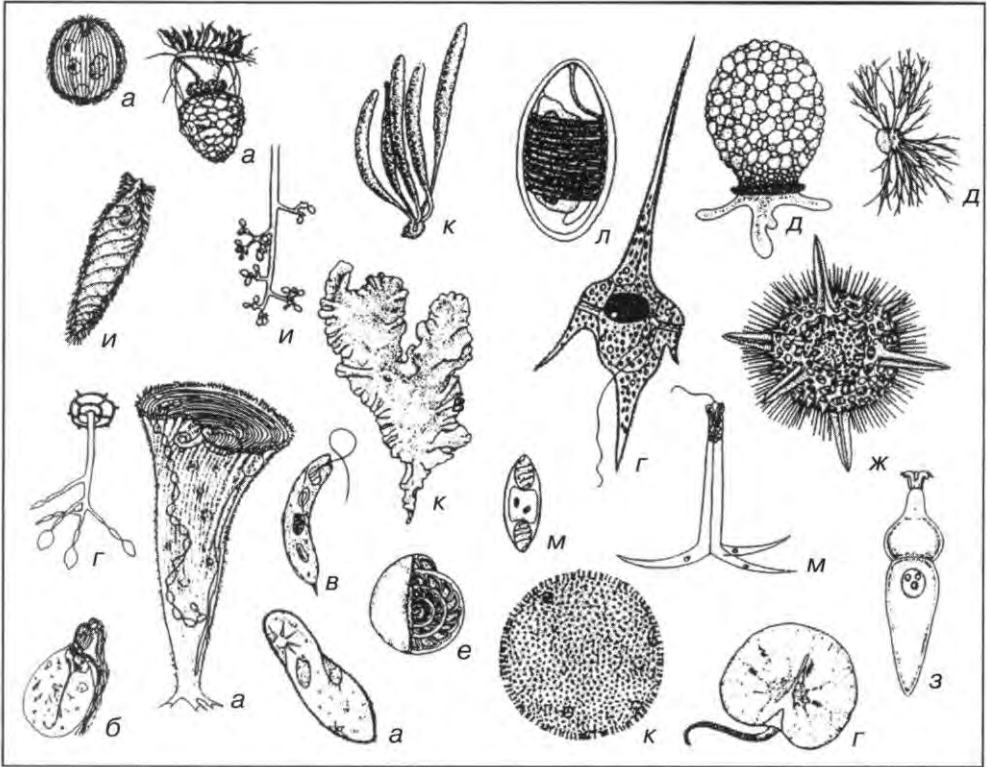
necrosis virus)  
 necrotic spot virus).

1)  
 (< 1 ),  
 ; 2)

( . 381).  
 213  
 3 ; 3)

100  
 89% ( . . « » — everything  
 , 65% , is everywhere).  
 70% , 60% , 55% 1 650  
 , 25% , 15% , 95  
 , 15% ;  
 2,5%  
 ( , )  
 ( )  
 85%





. 381.

); —

( , ) ; — ; —

); —

( )

( ); —

Myxozoa (

) ( : Corliss: Acta Protozool. 41 [2002] 199).

15% 30, 50%

30

12 *Tetrahymena*

( . 382); , . *australis*

. *capricornis*

*Chaos carolinense* Ch.

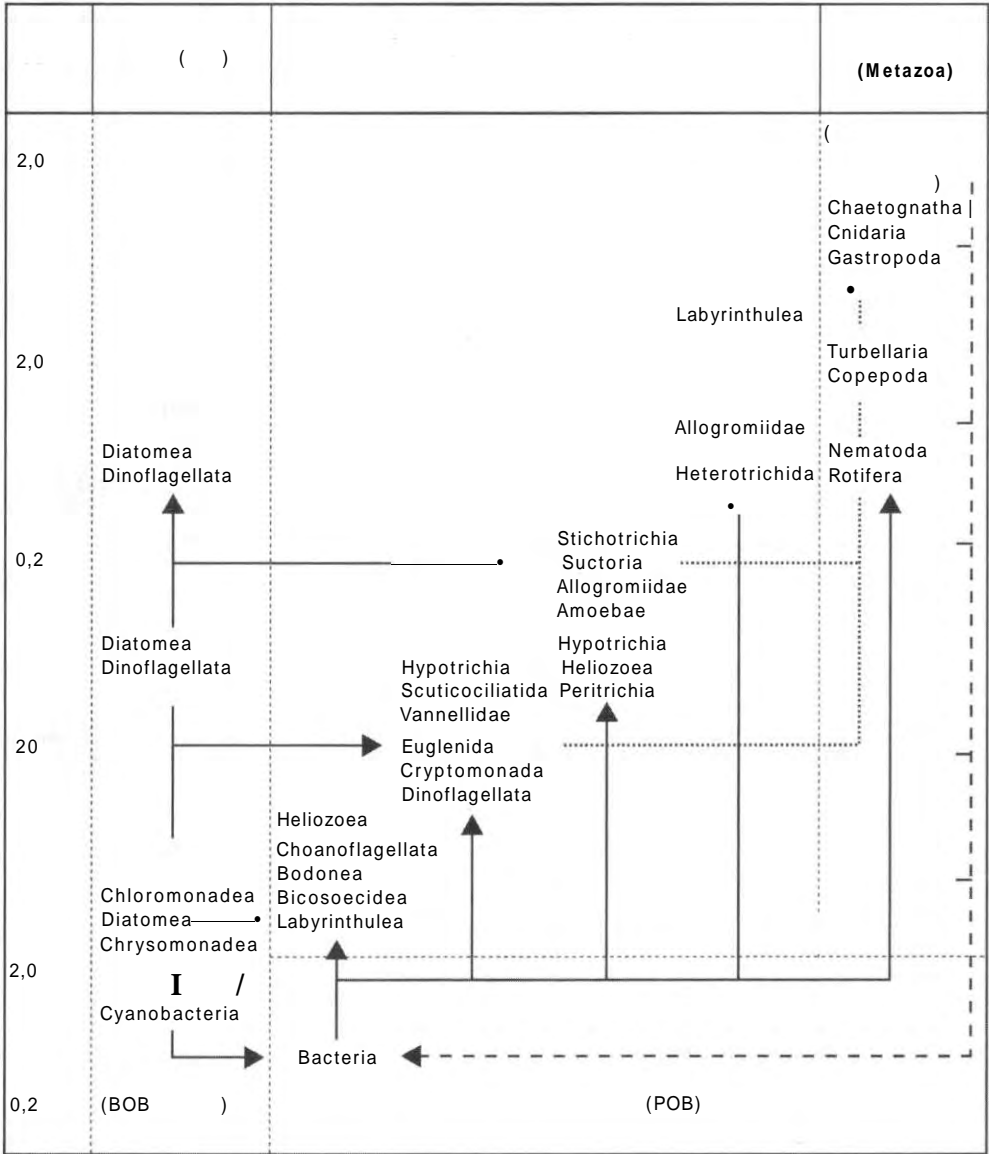
*illinoisense*



. 382.

*Tetrahymena pyriformis*. 1 — . *thermophila*, 2 — . *americanis*, 3 — . *borealis*, 4 — . *cosmopolitana*, 5 — . *pigmentosa*, 6 — . *canadensis*, 7 — . *tropicalis*, 8 — . *hyperangularis*, 9 — . *australis*, 10 — . *capricornis*.

21.



( ) ;  
 ; -  
 ( ) ( ),  
 ( ) ,

*Folliculina boltoni* —

300

*Reticulo*

*filosa* —

60 ( )  
)

1000

150

1

*Odontella*

(= *Biddulphia*) *sinensis*

*Coscinodiscus*

*walesii*

XX

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1 < » («larger foraminifers» «large foraminifers»  
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;

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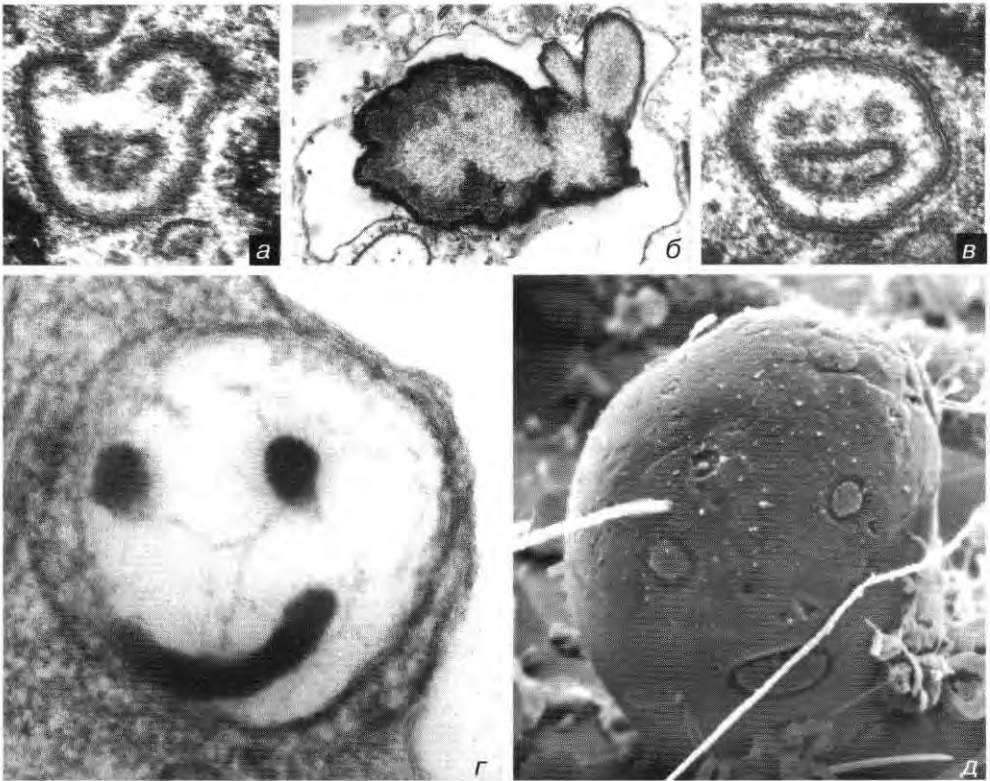
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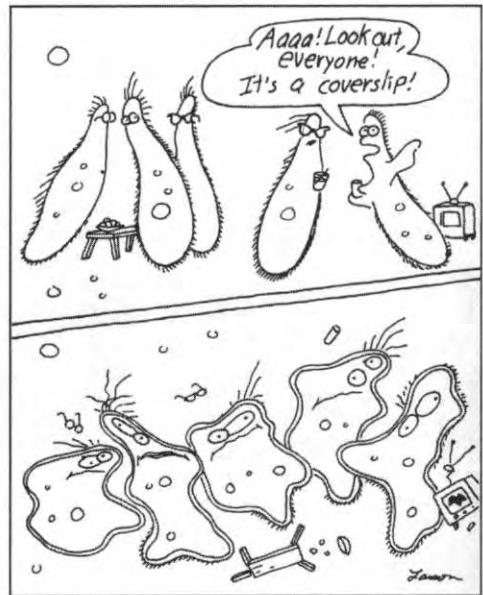


383.  
 ( , ),  
*Pseudomicrothorax dubius*, —  
*Actinophrys sol*, —  
 ( —  
 — 80 , 55 , 4

( , )  
 ( ): —  
*Climacostomum*, —  
 ) . : — 80 , —

( . 383)...

( . 384).



. 384.

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