

Checklist for Ciliate Species (Protozoa, Ciliophora) Living in Turkish Inland Waters and Flooded Zones

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Özet: *Türkiye içsularında yaşayan Siliyat türleri (Protozoa, Ciliophora) için kontrol listesi.* Bu çalışmada lokal siliyat çalışmaları bir araya getirilmiştir. Sonuç olarak, 2 suphylum ve 10 sınıfa ait toplam 164 takson listelenmiştir. Altı takson cins düzeyine kadar teşhis edilmiştir. Bu çalışma Lynn (2003)'e göre revize edilmiş olan ve yüksek taksonlardaki değişimleri kapsayan Türkiye'deki ilk listedir.

Anahtar Kelimeler: Tür listesi, İçsular, Taşkın zonu, Ciliophora, Protist.

Abstract: The local ciliate studies were gathered in order to prepare a check list for the ciliates living in Turkish inland waters. As a result, total of 164 taxa belonging to 11 classes and 2 subphylum were listed. Six of these taxa were identified up to genus level. This was the first list for Turkey which was prepared according to the revised classification of Lynn (2003) and involves the changes in higher categories.

Key Words: Species list, Inland waters, Inundate zones, Ciliophora, Protist.

Introduction

Ciliates are the major and the most conspicuous group of eukaryotic unicellular organisms (Corliss, 1979) that occur in different kind of environments, wherever there are sufficient nutrients, moisture and appropriate microhabitats (Hattori, 1994).

They are basically found from the poles to the equator, in sea ice and in hot springs, in desert soils and tropical forest litter, and in small temporary ponds to the major oceans and flooded zones of the inland waters (Foissner 1995, 1997a, 1997b, 1998, 2000; Foissner et. al., 1999, 2002, 2004; Laybourn-Parry, 1992).

Many disciplines showed that ciliated protozoa are obvious components of many microhabitats (Fenchel, 1987; Laybourn-Parry, 1984). As a part of ecosystem they have a great importance in carbon fixation and nutrient cycling (Finlay et al., 1997).

Although living in different habitats and having such a great importance in carbon cycle, free-living ciliates are not studied in Turkey until late nineties.

The most detailed studies were performed by Şenler et al. (1998), Şenler and Yıldız (1998, 1999, 2004) who worked specially on rivers, small ponds and sewage treatment plants and by Çapar (1997, 2005, 2007a,b) on free living pond and wetland ciliates. The aim of this study is to report a checklist of non-parazitic ciliates living in turkish inland waters and inundate zones of these areas.

The past decades has been seen the presentations of several different systems of classification for the phylum Ciliophora (Corliss, 1979; Lynn and Small, 1988; 1997; Puytorac et al., 1994, Small and Lynn, 1985). This is the first list

for Turkish Ciliate Fauna that takes into consideration the classification according to Lynn 2003. This classification has a lot of differences at upper category levels comparison to Corliss, 1979; Lynn and Small, 1988; 1997; Puytorac et al., 1994, Small and Lynn, 1985. All these important differences are pointed out in the manuscript in order to prevent further probable mistakes.

Phylum: CILIOPHORA Doflein, 1901

Subphylum: POSTCILIODESMATOPHORA Gerassimova and Seravin, 1976

Classis: KARYORELICTEA Corliss, 1974

Ordo: Loxodida Jankowski, 1980

Familia: Loxodidae Bütschli, 1889

Genus: *Loxodes* Ehrenberg, 1833

L. striatus (Engelmann, 1862)

Classis: HETEROTRICHEA Stein, 1859

Ordo: Heterotrichida Stein, 1859

Familia: Blepharismidae Jankowski in Small and Lynn, 1985

Genus: *Blepharisma* Perty, 1849

B. elangatum Perty, 1852

B. hyalinum Perty, 1849

Familia: Spirostomidae Stein, 1867

Genus: *Spirostomum* Ehrenberg, 1833

S. ambiguum Ehrenberg, 1838

S. minus Roux, 1901

S. teres Stein, 1867

Familia: Stentoridae Carus, 1863

Genus: *Stentor* Oken, 1815

S. coeruleus (Palas, 1766)

S. mulleri (Bory St. Vincent, 1824)

- S. multiformis* (Müller, 1786)
S. polyformis Johnson, 1893
S. polymorphus (Müller, 1773)
 Subphylum: INTRAMACRONUCLEATA Lynn, 1996
 Classis: SPIROTRICHEA Bütschli, 1889
 Subclassis: Hypotrichia Stein, 1859
 Ordo: Euplotida Small and Lynn, 1985
 Subordo: Euplotina Small and Lynn, 1985
 Familia: Aspidiscidae Ehrenberg, 1838
 Genus: **Aspidisca** Ehrenberg, 1830
A. cicada (Müller, 1786)
A. lynceus (Müller, 1773)
 Familia: Euplotidae Ehrenberg, 1838
 Genus: **Euplotes** Ehrenberg, 1830
E. aediculatus Pierson, 1943
E. affinis (Dujardin, 1841)
E. patella (Müller, 1773)
 Subclassis: Choreotrichia Small and Lynn, 1985
 Ordo: Tintinnida Kofoid and Campbell, 1929
 Familia: Codonellidae Kent, 1881
 Genus: **Codonella** Haeckel, 1873
Codonella sp.
 Ordo: Choreotrichida Small and Lynn, 1985
 Subordo: Strobilidiina Small and Lynn, 1985
 Familia: Strobilidiidae Kahl in Doflein and Reichenow, 1929
 Genus: **Strobilidium** Schewiakoff, 1893
S. caudatum (Fromental, 1876)
S. humile Penard, 1922
 Subclassis: Stichotrichia Small and Lynn, 1985
 Ordo: Stichotrichida Fauré-Fremiet, 1961
 Familia: Amphisiellidae Jankowski, 1979
 Genus: **Amphisiella** Gourret and Roeser, 1888
Amphisiella sp.
 Genus: **Hemiamphisiella** Foissner, 1988
H. granulifera (Foissner, 1987)
H. muscorum (Kahl, 1937)
 Familia: Spirofilidae von Gelei, 1929
 Genus: **Chaetospora** Lachmann, 1856
C. mülleri (Lachmann, 1856)
 Ordo: Sporadotrichina Fauré-Fremiet, 1961
 Familia: Oxytrichidae Ehrenberg, 1838
 Genus: **Cyrtohymena** Foissner, 1989
C. citrina (Berger and Foissner, 1987)
C. inquieta (Stokes, 1887)
C. tetracirrata (Gellért, 1942)
 Genus: **Histiculus** Corliss, 1960
H. vorax (Stokes, 1891)
 Genus: **Oxytricha** Bory de St. Vincent in Lamouroux, Bory de St. Vincent and Deslongchamps, 1824
O. fennica Reuther, 1961
O. lanceolata Shibuya, 1930
O. nauplia Berger and Foissner, 1987
O. setigera Stokes, 1891
 Genus: **Sterkiella** Foissner, Blatterer, Berger and Kohmann, 1991
S. histriomuscorum Foissner, Blatterer, Berger and Kohmann, 1991
 Genus: **Stylonychia** Ehrenberg, 1830
S. mytilus (Müller, 1773)
S. pustulata (Müller, 1786)
 Genus: **Tachysoma** (Stokes, 1887)
T. pellionellum (Müller, 1773)
 Genus: **Urosoma** (Kowalewski, 1882)
U. caudata (Stokes, 1885)
U. emarginata (Stokes, 1885)
U. similis (Foissner, 1982)
 Familia: Trachelostylidae Small and Lynn, 1985
 Genus: **Gonostomum** Sterki, 1878
G. affine (Stein, 1859)
G. kuehnelti Foissner, 1987
G. strenuum (Engelmann, 1862)
 Genus: **Hemisincirra** Hemberger, 1984
H. muelleri Foissner, 1986
H. octonucleata Hemberger, 1985
H. rariseta Foissner, Agahta and Berger, 2002
 Genus: **Lamtostyla** Buitkamp, 1977
L. longa (Hemberger, 1985)
L. perisincirra (Hemberger, 1985)
 Genus: **Terricirra** Berger and Foissner, 1989
T. matsusakai Berger and Foissner, 1989
 Genus: **Hemiurosoma** Foissner, Agatha and Berger, 2002
H. similis Foissner, 1987
 Genus: **Paragonostomum** Foissner, Agatha and Berger, 2002
P. caudatum Foissner, Agatha and Berger, 2002
 Genus: **Anatoliocirrus** Özbek and Foissner, 2002
A. capari Özbek and Foissner, 2002
 Ordo: Urostylida Jankowski, 1979
 Familia: Urostylidae Bütschli, 1889
 Genus: **Holosticha** Wrzesniowski, 1877
H. kessleri (Wrzesniowski, 1877)
H. pullaster (Müller, 1773)
 Genus: **Uroleptus** Ehrenberg, 1831
U. piscis (Müller, 1773)
 Subclassis: Oligotrichia Bütschli, 1887
 Ordo: Halteriida Petz and Foissner, 1992
 Familia: Halteriidae Claparède and Lachmann, 1858
 Genus: **Halteria** Dujardin, 1841
H. grandinella (Müller, 1773)
 Ordo: Strombidiida Petz and Foissner, 1992
 Familia: Strombidiidae Fauré-Fremiet, 1970
 Genus: **Strombidium** Claparède and Lachmann, 1859
S. viride Stein, 1867
Incertae sedis in Class SPIROTRICHEA
 Classis: ARMOPHOREA Jankowski, 1964
 Ordo: Armophorida Jankowski, 1964
 Familia: Caenomorphidae Poche, 1913
 Genus: **Caenomorpha** Perty, 1852
C. uniserialis Levander, 1894
 Genus: **Cirranter** Jankowski, 1964
C. mobilis (Penard, 1922)
 Familia: Metopidae Kahl, 1927

Genus: **Bothrostoma** Stokes, 1887

B. undulans Stokes, 1887

Genus: **Brachonella** Jankowski, 1964

B. spiralis (Smith, 1894)

Genus: **Metopus** Claparède and Lachmann, 1858

M. es (Müller, 1776)

M. hasei Sondheim, 1929

M. minor Kahl, 1927

M. striatus Mc Murrich, 1884

Classis: LITOSTOMATEA Small and Lynn, 1981

Subclassis: Haptoria Corliss, 1974

Ordo: Haptorida Corliss, 1974

Familia: Actinobolinidae Kahl, 1930

Genus: **Actinobolina** Strand, 1928

A. radians (Stein, 1867)

A. vorax (Wenrich, 1929)

Familia: Didiniidae Poche, 1913

Genus: **Didinium** Poche, 1913

D. nasutum (Müller, 1773)

Genus: **Monodinium** Fabre-Domergue, 1888

M. balbiani (Fabre-Domergue, 1888)

Familia: Homalozoonidae Jankowski, 1980

Genus: **Homalozoon** Stokes, 1890

Homalozoon sp.

Familia: Lacrymariidae de Fromentel, 1876

Genus: **Lacrymaria** Bory de St. Vincent, 1826

L. olor (Müller, 1789)

Familia: Pseudoholophryidae Berger, Foissner and Adam, 1984
Genus: **Pseudoholophrya** Berger, Foissner and Adam, 1983

P. terricola Berger, Foissner and Adam, 1984

Familia: Spathidiidae Kahl in Doflein and Reichenow, 1929

Genus: **Protospathidium** Dragesco and Dragesco-Kernéis, 1979

P. muscicola Dragesco and Dragesco-Kernéis, 1979

Genus: **Spathidium** Dujardin, 1841

S. muscicola Kahl, 1930

S. muscorum Dragesco & Dragesco-Kernéis, 1979

S. procerum Kahl, 1930

S. spathula Müller, 1786

Familia: Tracheliidae Ehrenberg, 1838

Genus: **Dileptus** Dujardin, 1840

D. mucronatus Penard, 1922

Genus: **Trachelius** Schrank, 1803

T. ovum (Ehrenberg, 1831)

Familia: Trachelophyllidae Kent, 1882

Genus: **Enchelyodon** Claparède and Lachmann, 1859

E. elegans (Kahl, 1926)

E. nodosa Berger, Foissner and Adam, 1984

Genus: **Lagynophrya** Kahl, 1927

L. acuminata (Kahl, 1935)

Genus: **Trachelophyllum** Claparède and Lachmann, 1859

T. apiculatum (Perty, 1852)

T. pusillum Claparède and Lachmann, 1859

Ordo: Pleurostomatida Schewiakoff, 1896

Familia: Amphileptidae Bütschli, 1889

Genus: **Amphileptus** Ehrenberg, 1830

A. pleurosigma (Stokes, 1884)

Familia: Litonotidae Kent, 1882

Genus: **Acineria** Dujardin, 1841

A. incurvata Dujardin, 1841

A. uncinata Tucolesco, 1962

Genus: **Litonotus** Wresniowski, 1870

L. carinatus (Stokes, 1885)

L. crystallinus (Vuxanovici, 1960)

L. cynus (Müller, 1773)

L. lamella (Müller, 1773)

Genus: **Loxophyllum** Dujardin, 1841

Loxophyllum sp.

Classis: PHYLLOPHARYNGEA de Puytorac et al., 1974

Subclassis: Phyllopharyngia de Puytorac et al., 1974

Ordo: Chlamydodontida Deroux, 1976

Familia: Chilodonellidae Deroux, 1970

Genus: **Chilodonella** Strand, 1928

C. uncinata (Ehrenberg, 1838)

Genus: **Phascolodon** Stein, 1859

P. vorticella Stein, 1859

Genus: **Thigmogaster** Deroux, 1976

T. oppositovacuolatus Agustin and Foissner, 1989

Genus: **Trithigmotoma** Jankowski, 1967

T. cucullus (Müller, 1786)

T. steinii (Blochmann, 1895)

Ordo: Dysteriida Deroux, 1976

Familia: Dysteriidae Claparède and Lachmann, 1858

Genus: **Trochilia** Dujardin, 1841

T. minuta (Roux, 1901)

Subclassis: Suctoria Claparède and Lachmann, 1858

Ordo: Exogenida Collin, 1912

Familia: Podophryidae Haeckel, 1866

Genus: **Podophrya** Ehrenberg, 1838

P. halophila Kahl, 1934

Genus: **Sphaerophrya** Claparède and Lachmann, 1859

S. magna (Maupas, 1881)

Classis: NASSOPHOREA Small and Lynn, 1981

Ordo: Microthoracida Jankowski, 1967

Familia: Microthoracidae Wrzesniowski, 1870

Genus: **Drepanomonas** Fresenius, 1858

D. pauciciliata Foissner, 1987

Classis: COLPODEA Small and Lynn, 1981

Ordo: Bryometopida Foissner, 1985

Familia: Kreyellidae Foissner, 1979

Genus: **Kreyella** Kahl, 1931

K. minuta Foissner, 1979

Ordo: Colpodida de Puytorac et al., 1974

Familia: Colpodidae Bory de St. Vincent, 1826

Genus: **Colpoda** Müller, 1773

C. cucullus (Müller, 1773)

C. inflata (Stokes, 1884)

C. magna (Gruber, 1879)

C. minima (Alekperov, 1985)

C. steinii Maupas, 1883

Ordo: Cyrtolophosidida Foissner, 1978

Familia: Platyophryidae de Puytorac, Perez-Paniagua and Perez-Silva, 1979
 Genus: **Platyophryides** Foissner, 1987
P. latus (Kahl, 1930)
 Classis: PROSTOMATEA Schewiakoff, 1896
 Ordo: Prostomatida Schewiakoff, 1896
 Familia: Apsikratidae Foissner, Berger and Kohmann, 1994
 Genus: **Apsiktrata** Foissner, Berger and Kohmann, 1994
Apsiktrata sp.
 Ordo: Prorodontida Corliss, 1974
 Familia: Colepidae Ehrenberg, 1838
 Genus: **Coleps** Nitzsch, 1827
C. hirtus (Müller, 1789)
C. nolandi Kahl, 1930
 Familia: Holophryidae Perty, 1852
 Genus: **Holophrya** Ehrenberg, 1831
H. discolor Ehrenberg, 1833
 Familia: Lagynidae (Schutze, 1854)
 Genus: **Lagynus** Quennerstedt, 1867
L. elegans (Engelmann, 1862)
 Familia: Urotrichidae Small and Lynn, 1985
 Genus: **Urotricha** Claparède and Lachmann, 1859
U. globosa Schewiakoff, 1892
 Classis: PLAGIOPYLEA Small and Lynn, 1985
 Ordo: Plagiopylida Small and Lynn, 1985
 Familia: Plagiopylidae Schewiakoff, 1896
 Genus: **Plagiopyla** Stein, 1860
P. nasuta Stein, 1860
 Familia: Trimyemidae Kahl, 1926
 Genus: **Trimyema** Lackey, 1925
T. compressa Lackey, 1925
 Classis: OLIGOHYMENOPHOREA de Puytorac et al., 1974
 Subclassis: Peniculia Fauré-Fremiet in Corliss, 1956
 Ordo: Peniculida Fauré-Fremiet in Corliss, 1956
 Subordo: Frontoniina Small and Lynn, 1985
 Familia: Frontoniidae Kahl, 1926
 Genus: **Disematostoma** Lauterborn, 1894
D. buetschlii Lautern, 1894
 Genus: **Frontonia** Ehrenberg, 1838
F. angutsa Kahl, 1931
F. leucas Ehrenberg, 1833
 Familia: Lembadionidae Jankowski in Corliss, 1979
 Genus: **Lembadion** Perty, 1849
L. lucens (Maskell, 1887)
 Subordo: Parameciina Jankowski in Small and Lynn, 1985
 Familia: Parameciidae Dujardin, 1840
 Genus: **Paramecium** O. F. Müller, 1773
P. aurelia-complex (Ehrenberg, 1838)
P. bursaria (Ehrenberg, 1831)
P. caudatum Ehrenberg, 1833
P. putrinum (Clapare and Lachmann, 1859)
 Familia: Urocentridae Claparède and Lachmann, 1858
 Genus: **Urocentrum** Nitzsch, 1827
U. turbo (Müller, 1786)
 Subclassis: Scuticociliatia Small, 1967
 Ordo: Philasterida Small, 1967

Familia: Cinetochilidae Perty 1852
 Genus: **Cinetochilum** Perty, 1849
C. margaritaceum (Ehrenberg, 1830)
 Familia: Loxocephalidae Jankowski, 1964
 Genus: **Dexiotricha** Stokes, 1885
D. granulosa (Kent, 1888)
 Familia: Philasteridae Kahl, 1931
 Genus: **Philasterides** Kahl, 1931
P. armatus (Kahl, 1926)
 Familia: Pseudocohnilembidae Evans and Thompson, 1964
 Genus: **Pseudocohnilembus** Evans and Thompson, 1964
P. pusillus (Quennerstedt, 1869)
P. putrinus (Kahl, 1928)
 Familia: Uronematidae Thompson, 1964
 Genus: **Uronema** Dujardin, 1841
U. nigricans (Müller, 1786)
 Ordo: Pleuronematida Fauré-Fremiet in Corliss, 1956
 Familia: Cyclidiidae Ehrenberg, 1838
 Genus: **Cyclidium** Müller, 1786
C. glaucoma Müller, 1773
C. heptatrichum Schewiakoff, 1893
C. terricola Kahl, 1931
 Familia: Pleuronematidae Kent, 1881
 Genus: **Pleuronema** Dujardin, 1836
P. coronatum Kent, 1881
 Subclass: Hymenostomatia Delage and Hérouard, 1896
 Ordo: Hymenostomatida Delage and Hérouard, 1896
 Subordo: Tetrahymenina Fauré-Fremiet in Corliss, 1956
 Familia: Glaucomidæ Corliss, 1971
 Genus: **Glaucoma** Ehrenberg, 1830
G. reniforme (Schewiakof, 1892)
G. scintillans (Ehrenberg, 1830)
Incertae sedis in Family Glaucomidæ
 Genus: **Dexiotrichides** Kahl, 1951
D. centralis (Stokes, 1886)
 Familia: Tetrahymenidae Corliss, 1952
 Genus: **Tetrahymena** (Furgason, 1940)
T. pyriformis Lwoff, 1947
 Familia: Turaniellidae Didier, 1971
 Genus: **Colpidium** Stein, 1860
C. colpoda (Losana, 1829)
C. truncatum Stokes, 1885
 Genus: **Dexiostoma** Jankowski, 1967
D. camphyllum (Stokes, 1886)
 Subclassis: Peritrichia Stein, 1859
 Ordo: Sessilida Kahl, 1933
 Familia: Astylozoidae Kahl, 1935
 Genus: **Astylozoon** Engelmann, 1862
A. fallax Engelmann, 1862
A. faurei Kahl, 1935
 Familia: Epistylididae Kahl, 1933
 Genus: **Epistylis** Ehrenberg, 1830
E. coronata Nush, 1970
E. digialis (Linneus, 1758)
E. entzii Stiller, 1933
E. pilicalitis Ehrenberg, 1838

E. rotans Svec, 1897

Familia: Operculariidae Fauré-Fremiet in Corliss, 1979

Genus: *Opercularia* Goldfuss, 1820

O. coarctata (Claparede and Lachmann, 1858)

O. micridiscum Fauré-Fremiet, 1904

Familia: Opisthnectidae Foissner, 1976

Genus: *Opisthnecta* Fauré-Fremiet, 1906

Opisthnecta sp.

Familia: Vaginicolidae de Fromentel, 1874

Genus: *Cothurnia* Ehrenberg, 1831

C. annulata Stokes, 1885

C. omulata Stokes, 1885

Genus: *Platycola* Kent, 1882

P. decumbens (Ehrenberg, 1830)

Genus: *Vaginicola* Lamarck, 1816

V. tincta Ehrenberg, 1830

Familia: Vorticellidae Ehrenberg, 1838

Genus: *Carchesium* Ehrenberg, 1830

C. polypinum (Linneus, 1758)

Genus: *Parazoothamnium* Piesik, 1975

Parazoothamnium sp.

Genus: *Vorticella* Linnaeus, 1767

V. campanula (Ehrenberg, 1831)

V. convallaria (Linneus, 1758)

V. microstoma Ehrenberg, 1830

V. natans Faure-Fremiet, 1924

V. octava Stokes, 1885

V. picta (Ehrenberg, 1831)

Familia: Zoothamniidae Sommer, 1951

Genus: *Zoothamnium* Bory de St. Vincent, 1826

Z. pygmaeum d'Udekem, 1862

Ordo: Mobilida Kahl, 1933

Familia: Trichodinidae Claus, 1874

Genus: *Trichodina* Ehrenberg, 1830

T. pediculus Ehrenberg, 1831

The overwhelming portion of the ciliates with the occurrence of a total of 164 taxa belong to three systematic assemblages as oligohymenohorans (%30.5), spirotrichids (% 26.7) and litosmatids (% 16.5) (Table 1).

Table 1. Taxonomic groups including species numbers and their percentages.

Subphylum	Class	Species number	%
Postciliodesmatophora	Karyorelictea	1	0.6
	Heterotrichea	10	6.1
Intramacronucleata	Spirotrichea	44	26.7
	Armophorea	8	4.9
	Litostomatea	27	16.5
	Phyllopharyngea	8	4.9
	Nassophorea	1	0.6
	Colpodea	7	4.3
	Prostomatea	6	3.6
	Plagiopylea	2	1.2
	Oligohymenophorea	50	30.5

References

Corliss J. O., 1979, The ciliated protozoa characterization, classification and

guide to literature, Pergamon Press, Oxford, New-York, I-XVI, 455p.

Çapar, S., 1997, Systematic studies on the free-living ciliophoran species living in Mogan Lake, Hacettepe University, Institute of Pure and Applied Sciences, Master Thesis, 96p. (in Turkish).

Çapar, S., 2005, A systematic study on wetland ciliates (Ciliophora, Protista) of Gökusu Delta, Hacettepe University, Institute of Pure and Applied Sciences, PhD Thesis, 246p. (in Turkish).

Çapar, S., 2007a, Hypotrich Ciliates (Protozoa: Ciliophora) Of Gelingüllü Dam Lake, Yozgat-Turkey. Hacettepe J. Bio&Chem., 35(1), 45-56.

Çapar, S., 2007b, Morphology and morphometrics of two anaerobic ciliates *Metopus minor* (Kahl, 1927) and *Metopus hasei* (Sondheim, 1929) from Gökusu Delta with ecological notes. Hacettepe J. Bio&Chem., 35(1), 19-15.

Fenchel, T., 1987, Ecology of protozoa, The biology of phagotrophic protists, Springer-Verlag, Berlin, 197p.

Finlay, B., S.C. Marberly, J. I. Cooper, 1997, Microbial diversity and ecosystem, OIKOS 80: 209-213.

Foissner, W., 1995, Tropical protozoan diversity: 80 ciliate species (Protozoa: Ciliophora) in a soil sample from a tropical dry forest of Costa Rica, with descriptions of four new genera and seven new species. Arch. Protistenk. 145: 37-77.

Foissner, W., 1997a, Soil ciliates (Protozoa: Ciliophora) from evergreen rain forest of Australia, South America and Costa Rica: diversity and description of new species, Biol. Fertil. Soils, 25: 317-339.

Foissner, W., 1997b, Faunistic and taxonomic studies on ciliates (Protozoa, Ciliophora) from clean rivers of Bavaria (Germany), with descriptions of new species and ecological notes, Limnologica 27(2), 179-238.

Foissner, W., 1998, An up date compilation of world soil ciliates (Protozoa, Ciliophora) with ecological notes, new records, and redescrptions of new species. Europ. J. Protistol 34: 195-235.

Foissner, W., 2000, W., A compilation of soil and moss ciliates (Protozoa: Ciliophora) from Germany, with new records and descriptions of new and insufficiently known species, Europ. J. Protistol., 36: 53-28.

Foissner, W., H. Berger, J. Schamburg, 1999, Identification and ecology of limnetic plankton ciliates, Bavarian State Office for Water and Management, Munich, 1999, Report Issue: 3/99, 79p.

Foissner, W., S. Agatha, H. Berger, 2002, Soil ciliates (Protozoa, Ciliophora) from Namibia (Southwest Africa), with emphasis on two contrasting environments, the Etosha Region and the Namib Desert, Denisia 05/2002, 1459 p.

Foissner, W., H. Berger, K. Xu, Zechmeister-Boltenstern, 2004, A huge undescribed soil ciliate (Protozoa:Ciliophora) diversity in natural forest stands of central europa, Biodiversity and conservation, 00: 1-85.

Hattori, T., 1994, Soil microenvironment. Soil Protozoa, (eds) Darbshire, J. CAB International, UK,43-65.

Laybourn-Parry J., 1984, A functional biology of free-living protozoa. University of California Press, Berkeley, 218p.

Laybourn-Parry, J., 1992, Protozoan plankton ecology, Chapman and Halm, 2-6 Boundary Row, London.

Lynn, D. H., E. Small, 1988, An update on the systematics of the phylum Ciliophora Doflein, 1901: the implications of kinetid diversity, Biosystems, 21, 317-322.

Lynn, D. H., E. Small, 1997, A revised classification of phylum Ciliophora Doflein, 1901, Rev., Soc. Mex. Hist. Nat., 47: 65-78.

Lynn, D. H., 2003, Home page. The Ciliate resource archive, <http://www.Uoguelph.ca/~ciliates/classification/genera.html> (19 Agst. 2003)

Puytorac P., A. Batisse, G. Deroux, A. Fleury J. Grain, M. Laval-Peuto, M. Tuffrau, 1994, Position d'une nouvelle classification du phylum des protozoaires ciliophora Doflein, 1901. Trans. Amer. Microsc. Soc., 95: 739-751.

Small, E. B., Lynn, D. H., 1985, Phylum ciliophora, p. 393-575, In: J. J. Lee, S. H., Hutner and E. C. Bovee, (Eds) An illustrated guide to the Protozoa. Society of Protozoologist, Lawrer, Kansas.

Şenler, N. G., İ. Yildiz, 1998, An investigation ciliate species on five rivers flowing into Van Lake. YY, Fen Bilimleri Enstitüsü Dergisi. 5: 1-19.

Şenler, N. G., İ. Yildiz, An investigation on the ciliated protozoan biological sewage treatment plant of Yüzüncü Yıl University. Y.Y.U Fen Bilimleri Enstitü Dergisi, 6: 1-10, 1999.

Şenler, N. G., İ. Yildiz, 2004, Faunistic and morphological studies on ciliates (Protozoa, Ciliophora) from a small pond, with response of ciliate populations to changing environmental conditions, Turk. J., Zool., 28: 245-265.

Şenler, N. G., H. Bıyık, E. Öğün, İ. Yıldız, 1998, The pollution parameters and protozoological investigations on three rivers flowing into Van Lake. Bulletin of Pure and Applied Science. 17: 35-50.