Abstract

Background

Until now, a complete checklist of *Sphagnum*-dwelling testate amoebae in Bulgaria has never been published. Records for species diversity and distribution in the country were scattered in many faunistic and ecological publications. The aim of the present study is to summarise all data for the species distribution at the level of country by reviewing the existing literature and by additional data obtained in our research over the past two years.

New information

The checklist comprises 171 species, classified into 43 genera, 20 families, three orders, three classes and three phyla. We present data for 16 new *Sphagnum*-dwelling testate amoebae in Bulgaria and new distribution data for 134 species. Of them, 99 species are recorded from Stara Planina Mt., for which there was no available data to date. Additionally are recorded 69 new species for Pirin Mt., 21 for Vitosha Mt. and 18 for Rila Mt. Thirty six species are synonymised according to the latest taxonomic changes. Two misidentified taxa (*Euglypha brachiata* Penard, 1902 and *Diffugia compressa* var. *africana* Gauthier-Lièvre et Thomas, 1958) are transferred into valid species *E. acanthophora* and *Zivkovicia*...
compressa, respectively. Three of the recorded species have not been included in the checklist, because they are currently not referring to testate amoebae (Cochliopodium bilimbosum (Auerbach 1856) and Cochliopodium echinatum Korotneef, 1879 are gymnamoebae (naked amoebae) and Microgromia elegantula (Penard 1904) = Paralieberkuehnia elegantula (Penard 1904) is freshwater foraminifera).

Keywords

Amoebozoa, Cercozoa, Stramenopiles, biodiversity, distribution, Sphagnum mosses, Bulgaria

Introduction

Testate amoebae are a polyphyletic assemblage of at least three major, unrelated taxonomic groups of eukaryotes (Adl SM et al. 2012). They are present in most terrestrial and freshwater environments and more marginally in brackish and marine habitats. They are especially abundant and diverse in Sphagnum mosses. Research on testate amoebae have increased significantly over the past two decades due to their increasing use in different applied aspects: as a bioindicators for palaeoecological studies, in environmental monitoring, pollution hazards, ecotoxicology, studies on their role in the cycling of elements in terrestrial ecosystems, biogeographical and evolutionary studies etc. (Aoki, Yoshiyuki et al. 2007, Booth 2002, Charman 2001, Charman et al. 1998, Lamentowicz and Mitchell 2005, Mitchell et al. 2008, Nguyen-Viet et al. 2007, Swindles et al. 2008, Swindles et al. 2015, Qin et al. 2013).

Studies on Sphagnum-dwelling testate amoebae in Bulgaria started at the beginning of the 20th century, when Pateff (1924), Pateff (1928) published his works on freshwater Rhizopoda in the country. He recorded a total of 118 rhizopods, of which 52 testate amoebae were from Sphagnum mosses in the Rila, Rhodopes and Vitosha Mountains. Later, Valkanov (1932), Valkanov (1934) published results of his studies on the fauna of alpine lakes in the Rila and Pirin Mountains and recorded many testate amoebae, which are typical inhabitants of peat mosses. Unfortunately, they were recorded along with all other species and no distinction was made amongst the species found in the lakes themselves and in the Sphagnum mosses from the lake shore. In the 60s and 70s of the 20th century, several publications on testate amoebae from the Vitosha, Rhodopes and Pirin Mountains were published (Golemansky 1965, Golemansky 1966, Golemansky 1968, Golemansky 1974), including a lot of data on Sphagnum-dwelling testate amoebae. At the end of the 20th and beginning of the 21th century, the number of publications concerning various aspects of taxonomy, systematics, morphology and ecology of sphagnicolous testate amoebae in Bulgaria increased considerably (Golemansky and Todorov 1990, Golemansky and Todorov 1993, Golemansky and Todorov 2006, Golemansky and Todorov 1985, Golemansky et al. 2006, Heger et al. 2010, Kosakyan et al. 2012, Todorov 1993, Todorov 2004, Todorov 2005, Todorov 2010, Todorov and Golemansky 1995, Todorov and
Materials and methods

The data presented in the checklist are based primarily on published information concerning *Sphagnum*-dwelling testate amoebae in Bulgaria. In addition, data from our research conducted over the past two years are also included. We have tried to explore the diversity and distribution of testate amoebae in the main areas of the country where peat mosses are more widespread. Genus *Sphagnum* in Bulgaria numbers 27 species (Natcheva and Ganeva 2005) distributed in mires in mountain areas of the country above the tree belt or in mires in coniferous forest, these being an important component of habitat 91D0 (Bog Woodland) of Directive 92/43/EEC. Some of the species (e.g. *Sphagnum capillifolium* (Ehrh.) Hedw., *S. subsecundum* Nees, *S. girgensohnii* Russ., *S. centrale* C.E.O.Jensen, *S. platyphyllum* (Lindb. ex. Braithw.) Sull. ex Warnst., *S. squarrosum* Crome, *S. teres* (Schimp.) Ängstr.) are more widespread in mires of Western Stara Planina, Rhodopes, Vitosha, Rila and Pirin Mountains, where, with other bryophytes and sedges, they comprise the specific mire flora.

The material for the present study was extracted from wet *Sphagnum* mosses, gathered at Vitosha and Western Stara Planina Mountains in 2016 and Rila and Pirin Mountains in 2017. A total of 109 samples from 18 localities were sampled and examined. All data, concerning sampling localities including date, region, altitude, coordinates, *Sphagnum* moss species, as well as many physical and chemical parameters of the sampling sites, are provided in Suppl. material 2.

Testate amoebae were extracted from fresh *Sphagnum* mosses at the sampling site and concentrated by sieving (350 μm). The resulting fraction (50 ml) was observed with an optical microscope “Amplival” (Zeiss-Jena) using 40x objective and 10x ocular lens. For scanning electron microscopy (SEM), specimens were isolated by searching through small isolates of material in a petri dish. Specimens were extracted using a glass micropipette, washed several times in distilled water and then individual shells were positioned with a single-hair brush on a previously mounted double-sided adhesive tape on a standard aluminium stub and air-dried. The shells were coated evenly with gold in a vacuum coating unit. The photomicrographs were obtained using a JEOL JSM-5510, operating at 10 kV.
Figure 1.

Characteristic *Sphagnum*-dwelling testate amoebae from the order Arcellinida.

a: *Arcella intermedia* (Deflandre) (Arcellidae) [doi](#)

b: *Hyalosphenia papilio* (Leidy) (Hyalospheniidae) [doi](#)

c: *Gibbocarina galeata* (Penard) (Hyalospheniidae) [doi](#)

d: *Padaungiella lageniformis* (Penard) (Hyalospheniidae) [doi](#)

e: *Quadrulella longicollis* Taranek (Hyalospheniidae) [doi](#)

f: *Quadrulella symmetrica* (Wallich) (Hyalospheniidae) [doi](#)
Figure 2.

Characteristic *Sphagnum*-dwelling testate amoebae from the order Arcellinida.

a: *Lagenodiffugia bryophila* (Penard) (Diffugiidae) doi

b: *Zivkovicia compressa* (Carter) (Diffugiidae) doi

c: *Heleopera rosea* Penard (Incertae sedis Arcellinida) doi

d: *Heleopera petricola* Leidy (Incertae sedis Arcellinida) doi

e: *Lesquereusia spiralis* (Ehrenberg) (Incertae sedis Arcellinida) doi

f: *Lesquereusia epistomium* Penard (Incertae sedis Arcellinida) doi
Figure 3.
Characteristic Sphagnum-dwelling testate amoebae from the order Euglyphida.

a: *Euglypha tuberculata* Dujardin (Euglyphidae)  
doi

b: *Assulina seminulum* (Ehrenberg) (Assulinidae)  
doi

c: *Sphenoderia fissirostris* Penard (Sphenoderiidae)  
doi

d: *Sphenoderia lenta* Schlumberger (Sphenoderiidae)  
doi

e: *Cyphoderia major* (Penard) (Cyphoderiidae)  
doi

f: *Campascus minutus* Penard (Cyphoderiidae)  
doi
The checklist is annotated with information regarding the synonymous names (if available), species distribution in *Sphagnum* mosses in Bulgaria, the relevant literature sources and notes (mainly taxonomic). The higher classification used here follows Adl SM et al. 2012 and Meisterfeld (2002a), Meisterfeld (2002b). Taxonomic revision of some genera and
families, as well as numerous taxonomic and nomenclature changes, based on recent molecular studies and subsequent phylogenetic reconstructions, have also been taken into account (Blandenier et al. 2017, Chatelain et al. 2013, Gomaa et al. 2013, Gomaa et al. 2017, Heger et al. 2010, Kosakyan et al. 2016a, Kosakyan et al. 2012, Kosakyan et al. 2016b, Lahr et al. 2013, Lara et al. 2007, Mazei and Warren 2012, Mazei and Warren 2014, Mazei and Warren 2015).

The list does not include separate varieties and forms recorded from Bulgaria, despite the fact that, according to the International Code of Zoological Nomenclature, article 45.6.3, when the name was published before 1961 using the abbreviation ‘var.’ or ‘f.’, it is deemed to be subspecific rather than infrasubspecific. However, due to the fact that many of these taxa have not sufficiently detailed descriptions, which in many cases are based on signs that do not have much taxonomic significance (small differences in size, the presence or absence of spines/horns and their number, the number of lobes of the aperture etc.), these taxa remain with unclear taxonomic status. So, until the clarifying of their status with the help of combined morphological and molecular approaches and full confirmation of their validity, we prefer to adopt a conservative position and consider these taxa as the product of the phenotypic plasticity of nominal species. Nevertheless, in ‘Notes’ to each nominal species, we have included all the records for these infrasubspecific taxa, in the event that some of them may be raised in rank in the future.

Checklist of *Sphagnum*-dwelling testate amoebae in Bulgaria

Kingdom Protozoa Owen, 1858

Subkingdom Neozoa Cavalier-Smith, 1993

Phylum Amoebozoa Lühe, 1913, emend. Cavalier-Smith, 1998

Subphylum Lobosa Carpenter, 1861, emend. Cavalier-Smith, 2009

Class Tubulinida Smirnov et al., 2005

Order Arcellinida Kent, 1880

Suborder Arcellina Haeckel, 1894

Family Microcoryciidae de Saedeler, 1934

Genus *Microcorycia* Cockerell, 1911
**Microcorycia flava** (Greeff, 1866), emend. Penard, 1902

**Nomenclature:**
- *Amphizonella flava* Greeff, 1866
- *Corycia flava* Greeff, 1866
- *Corycia Dujardini?* Gagliardi, 1871 (in part)

**Distribution:** Rhodopes Mt. (Golemansky et al. 2006).

**Family Microchlamyidae** Ogden, 1985

**Genus Microchlamys** Cockerell, 1911

**Microchlamys patella** (Claparede and Lachmann, 1859) Cockerell, 1911

**Nomenclature:**
- *Pseudochlamys patella* Claparede and Lachmann, 1859

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

**Family Arcellidae** Ehrenberg, 1843

**Genus Arcella** Ehrenberg, 1832

**Arcella arenaria** Greeff, 1866

**Nomenclature:**
- *Arcella aureola* Maggi, 1883
- *Arcella microstoma* Penard, 1890

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, new data).

**Arcella bathystoma** Deflandre, 1928

**Distribution:** Rila Mt. (new data).
Arcella catinus Penard, 1890

Nomenclature:

Arcella vulgaris Leidy, 1879 (in part)
Arcella artocrea Penard, 1902
Arcella vulgaris var. compressa Cash, 1905
Arcella catinus var. australis Playfair, 1918

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1928, Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Arcella dentata Ehrenberg, 1830

Nomenclature:

Arcella stellaris Perty, 1852
Arcella Okeni Perty, 1852
Arcella stellata Ehrenberg, 1854

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006).

Arcella discoides Ehrenberg, 1871

Nomenclature:

Arcella discoidea Ehrenberg, 1843

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: Besides the nominal species, two infrasubspecific taxa have also been recorded: Arcella discoides var. pseudovulgaris Deflandre, 1928 (Vitosha Mt.) and Arcella discoides var. scutelliformis Playfair, 1918 (Pirin Mt., Rhodopes Mt., Rila Mt.).

Arcella gibbosa Penard, 1890

Distribution: Rhodopes Mt. (Golemansky et al. 2006); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Arcella hemisphaerica Perty, 1852

Nomenclature:

Arcella vulgaris var. hemisphaerica Wailes, 1918

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemsky 1968, Golemsky et al. 2006); Rila Mt. (Todorov 2004, new data); Vitosha Mt. (new data).

Notes: The species has been recorded both as nominal species and as infrasubspecific taxon Arcella hemisphaerica f. undulata Deflandre, 1928 (Rhodopes Mt., Rila Mt.).

Arcella intermedia (Deflandre, 1928) Tsyganov and Mazei, 2006

Nomenclature:

Arcella hemisphaerica var. intermedia f. undulata Deflandre, 1928

Distribution: Pirin Mt. (new data); Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

Arcella rotundata Playfair, 1918

Distribution: Pirin Mt. (Golemsky 1974, new data); Rhodopes Mt. (Golemsky et al. 2006); Rila Mt. (Todorov and Golemsky 2000, Todorov 2004, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemsky and Todorov 1985, Golemsky and Todorov 1990, Todorov 1993, Todorov and Golemsky 1995, new data).

Notes: Besides the nominal species, two infrasubspecific taxa have also been recorded: Arcella rotundata var. stenostoma Deflandre, 1928 (Vitosha Mt.) and Arcella rotundata var. stenostoma f. undulata Deflandre, 1928 (Rhodopes Mt., Vitosha Mt.).

Arcella vulgaris Ehrenberg, 1830

Distribution: Rhodopes Mt. (Pateff 1924, Golemsky et al. 2006); Rila Mt. (Todorov and Golemsky 2000); Vitosha Mt. (Golemsky and Todorov 1985, Golemsky and Todorov 1990, Todorov 1993, Todorov and Golemsky 1995, new data).

Notes: The species has been recorded both as nominal species and as infrasubspecific taxon Arcella vulgaris f. undulata Deflandre, 1928 (Rila Mt.).

Family Netzeliidae Kosakyan, Lara, Gomaa and Lahr, 2016
Genus *Netzelia* Ogden, 1979

*Netzelia tuberculata* (Wallich, 1864) Netzel, 1983

Nomenclature:
*Diffugia proteiformis* subsp. *globularis* var. *tuberculata* Wallich, 1864
*Diffugia tuberculata* Archer, 1867
*Diffugia lobostoma* Leidy, 1879 (in part)
*Nebela tuberculata* Owen and Jones, 1976
*Diffugia tricuspis* Medioli and Scott, 1983 (in part)

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov 2004).

Notes: The species has been recorded both as nominal species and as synonym *D. tuberculata* (Rhodopes Mt.).

Suborder *Difflugina* Meisterfeld, 2002

Family *Difflugiidae* Wallich, 1864

Genus *Diffugia* Leclerc, 1815

*Diffugia acuminata* Ehrenberg, 1838

Nomenclature:
*Diffugia curvicaulis* Penard, 1899
*Diffugia acuminata* var. *umbilicata* Penard, 1902
*Diffugia venusta* Ogden, 1983

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Vitosha Mt. (Pateff 1924, new data).

Notes: The species has been recorded both as nominal species and as synonym *D. venusta* (Rhodopes Mt.).

*Diffugia ampullula* Playfair, 1918

Distribution: Pirin Mt. (new data); Rila Mt. (Todorov 2005, new data); Vitosha Mt. (new data).
**Difflugia angulostoma** Gauthier-Lièvre and Thomas, 1958

*Distribution:* Rila Mt. (Todorov and Golemansky 2000); Stara Planina Mt. (new data).

**Difflugia bacillariarum** Perty, 1849

*Nomenclature:*

- *Diffugia bicornis* Penard, 1890
- *Diffugia australis* var. *minor* Gauthier-Lièvre et Thomas, 1958

*Distribution:* Stara Planina Mt. (new data); Rila Mt. (Golemansky and Todorov 1993).

**Difflugia brevicolla** Cash, 1909

*Nomenclature:*

- *Diffugia pyriformis* var. *atricolor* Penard, 1902

*Distribution:* Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (new data); Stara Planina Mt. (new data).

**Difflugia bryophila** (Penard, 1902) Jung, 1942

*Nomenclature:*

- *Diffugia pyriformis* var. *bryophila* Penard, 1902
- *Diffugia oblonga* var. *longicollis* Gassowsky, 1936
- *Diffugia longicollis* (Gassowsky, 1936) Ogden and Hedley, 1980
- *Diffugia gassowskii* Ogden, 1983

*Distribution:* Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Notes:* The species has been recorded both as nominal species and as synonym *D. gassowskii* (Rhodopes Mt., Rila Mt., Vitosha Mt.).

**Difflugia distenda** Ogden, 1983

*Nomenclature:*

- *Diffugia acuminata* var. *inflata* Penard, 1899
- *Diffugia bicruris* Gauthier-Lièvre et Thomas, 1958.

*Distribution:* Pirin Mt. (new data); Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).
**Diffugia elegans** Penard, 1890

**Nomenclature:**

*Diffugia amphoralis* Hopkinson, 1909

*Diffugia australis* (Playfair, 1918) Gauthier-Liévre et Thomas, 1958

*Diffugia borodini* Gassowsky, 1936

*Diffugia elegans* f. *bicornis* Jung, 1936

*Diffugia elegans* f. *tricornis* Jung, 1936

*Diffugia juzepehiensis* Dekhtyar, 1993

*Diffugia leidyi* Wailes, 1912

*Diffugia Solowetskii* Mereschkowsky, 1877

*Diffugia tricornis* (Jung, 1936) Ogden, 1983

*Diffugia varians* Penard, 1902

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *D. amphoralis* (Rila Mt., Vitosha Mt.).

**Diffugia glans** Penard, 1902

**Distribution:** Rila Mt. (Todorov and Golemansky 2000).

**Diffugia globulosa** Dujardin, 1837

**Nomenclature:**

*Diffugia proteiformis* Ehrenberg, 1838 subsp. *globularis* Wallich, 1864

*Diffugia globularis* (Wallich, 1864) Leidy, 1877

*Diffugia chardezi* Godeanu, 1972

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Todorov 1993, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *D. globularis* (Rhodopes Mt., Rila Mt., Vitosha Mt.).
**Difflugia hiraethogii** Ogden, 1983

Distribution: Pirin Mt. (new data); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); **Stara Planina Mt.** (new data); Vitosha Mt. (new data).

**Difflugia lanceolata** Penard, 1890

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, new data); **Stara Planina Mt.** (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990).

**Difflugia lobostoma** Leidy, 1874

Distribution: Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006)

**Difflugia lucida** Penard, 1890

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); **Stara Planina Mt.** (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Difflugia mammillaris** Penard, 1893

Distribution: Rila Mt. (Todorov 2004).

**Difflugia mica** Frenzel, 1892

Distribution: Rila Mt. (Todorov 2005); Vitosha Mt. (new data).

**Difflugia microclaviformis** (Kourov, 1925) Ogden, 1983

Nomenclature:

Difflugia pyriformis var. venusta Penard 1902

Difflugia oblogna var. venusta Cash, 1909

Difflugia oblonga var. microclaviformis Kourov, 1925

Distribution: Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990).

Notes: The species has been recorded both as nominal species and as the infrasubspecific taxon Difflugia oblonga var. microclaviformis (Vitosha Mt.).
**Difflugia minuta** Rampi, 1950

Distribution: Pirin Mt. (new data); Rila Mt. (Todorov 2004, Todorov 2005); Vitosha Mt. (new data).

**Difflugia molest**a Penard, 1902

Nomenclature:
*Diffuglia levanderi* Playfair, 1918

Distribution: Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov 2004, Todorov 2005, new data); Vitosha Mt. (new data).

**Difflugia oblonga** Ehrenberg, 1838

Nomenclature:
*Diffuglia bacillifera* Penard, 1890
*Diffuglia lacuensis* (Penard, 1899) Ogden, 1983
*Diffuglia oblonga f. cyphodera* Jung, 1942
*Diffuglia oblonga var. incondita* Gauthier-Lièvre et Thomas, 1958
*Diffuglia oblonga var. lacuensis* Cash and Hopkinson, 1909
*Diffuglia oblonga var. parva* Thomas, 1954
*Diffuglia parva* (Thomas, 1954) Ogden, 1983
*Diffuglia pyriformis var. lacuensis* Penard, 1899

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: Besides the nominal species, the synonyms *D. parva* (Rhodopes Mt., Rila Mt., Vitosha Mt.), *D. lacuensis* (Rhodopes Mt., Vitosha Mt.), *D. bacillifera* (Rila Mt., Vitosha Mt.) and infrasubspecific taxa *D. oblonga var. lacuensis* (Vitosha Mt.) and *D. oblonga var. parva* (Rila Mt., Vitosha Mt.) have also been recorded.

**Difflugia penardi** Hopkinson, 1909

Nomenclature:
*Diffuglia fallax* Penard, 1890
*Diffuglia pyriformis var. tenuis* Penard, 1890
*Diffuglia manicata* Penard, 1902
Diffugia oblonga var. tenuis Wailes and Penard, 1911

Diffugia tenuis (Penard, 1890) Ogden, 1983

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: The species has been recorded both as nominal species and as synonym D. manicata (Rhodopes Mt., Rila Mt., Vitosha Mt.).

Diffugia petricola Cash, 1909

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov 2004, Todorov 2005).

Diffugia pristis Penard, 1902

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

Diffugia pulex Penard, 1902

Nomenclature:
Diffugia minuta var. minor Godeanu, 1972
Diffugia ovalisina Beyens et Chardez, 1994

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Pateff 1924, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Diffugia pyriformis Perty, 1849

Distribution: Rhodopes Mt. (Pateff 1924); Rila Mt. (Pateff 1924); Vitosha Mt. (Pateff 1924).

Diffugia rotunda (Chardez, 1956) Ogden, 1983

Nomenclature:
Diffugia globularis var. sphaerica Chardez, 1956

Distribution: Rila Mt. (Todorov 2004).
**Difflugia rubescens** Penard, 1891

Distribution: Pirin Mt. (Golemansky 1974, new data); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Difflugia stoutii** Ogden, 1983

Distribution: Rila Mt. (Todorov and Golemansky 2000).

**Difflugia subaequalis** Penard, 1910

Distribution: Pirin Mt. (Golemansky 1974).

**Difflugia urceolata** Carter, 1864

Nomenclature:
- *Difflugia urceolata* var. *olla* Leidy, 1879
- *Difflugia urceolata* var. *sphaerica* Playfair, 1917

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006).

**Difflugia ventricosa** Deflandre, 1926

Distribution: Rhodopes Mt. (Golemansky et al. 2006).

**Difflugia viscidula** Penard, 1902

Nomenclature:
- *Difflugia lemani* Blanc, 1892
- *Difflugia histrio* Penard, 1908
- *Difflugia lemani* var. *palustris* Chardez, 1956
- *Difflugia lebes* var. *masurica* Schönborn, 1965
- *Difflugia lebes* var. *bretschkoi* Laminger, 1971
- *Difflugia finstertaliensis* Laminger, 1971

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Vitosha Mt. (Pateff 1928, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990).
Notes: The species has been recorded as nominal species, as synonym *D. lemani* (*Vitosha Mt.*), as infrasubspecific taxon *D. lemani* var. *palustris* (*Vitosha Mt.*) and as *Diffugia* sp. (*Vitosha Mt.*).

**Genus Lagenodifflugia** Medioli and Scott, 1983

**Lagenodifflugia bryophila** (Penard, 1902) Ogden, 1987

Nomenclature:

*Pontigulasia bryophila* Penard, 1902

*Pontigulasia bryophila* var. *elachys* Jung, 1942

*Pontigulasia varadi* Godeanu, 1972

*Zivkovicia bryophila* (Penard, 1902) Ogden, 1983

Distribution: **Pirin Mt.** (Golemansky 1974, new data); **Rhodopes Mt.** (Pateff 1924, Golemansky et al. 2006); **Rila Mt.** (Pateff 1924, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: The species has been recorded both as nominal species and as synonym *P. bryophila* (**Rhodopes Mt.**, **Rila Mt.**, **Vitosha Mt.**).

**Lagenodifflugia montana** (Ogden and Zivkovic, 1983) Ogden, 1987

Nomenclature:

*Pontigulasia montana* Ogden and Zivkovic, 1983

Distribution: **Pirin Mt.** (new data); **Rila Mt.** (new data).

**Lagenodifflugia vas** (Leidy, 1874) Medioli and Scott, 1983

Nomenclature:

*Diffugia vas* Leidy, 1874

*Diffugia pyriformis* var. *vas* Leidy, 1879

*Pontigulasia vas* (Leidy) Schouteden, 1906

*Zivkovicia vas* (Leidy, 1874) Ogden, 1983 (in part)

Distribution: **Pirin Mt.** (new data); **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (new data); **Vitosha Mt.** (new data).
Genus *Pontigulasia* Rhumbler, 1896

*Pontigulasia elisa* (Penard, 1893) Schouteden, 1906

**Nomenclature:**

*Difflugia elisa* Penard, 1893

*Pontigulasia incisa* Rhumbler, 1896

**Distribution:** Pirin Mt. (new data); Rila Mt. (Golemansky and Todorov 1993); Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).

*Pontigulasia rhumbleri* Hopkinson, 1920

**Nomenclature:**

*Pontigulasia compressa* Rhumbler, 1896

(non *Pontigulasia compressa* (Carter, 1864))

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Todorov 2004, Todorov 2005); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924).

**Notes:** The species has been recorded both as nominal species and as synonym *P. compressa* (Rhodopes Mt., Rila Mt., Vitosha Mt.).

Genus *Zivkovicia* Ogden, 1987

*Zivkovicia compressa* (Carter, 1864)

**Nomenclature:**

*Difflugia compressa* Carter, 1864

*Difflugia pyriformis* var. *vas* sub- var. *bigibbosa* Penard, 1899

*Pontigulasia bigibbosa* Penard, 1902

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *P. bigibbosa* (Pirin Mt., Vitosha Mt.). Furthermore, in several publications on the testate amoebae from *Vitosha* Mt. (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995), the infrasubspecific taxa *Difflugia compressa* var. *africana* Gauthier-Lièvre et Thomas, 1958 has erroneously been
recorded, because the description of the found individuals fully corresponds to *Z. compressa*.

**Zivkovicia spectabilis** (Penard, 1902) Ogden, 1987

**Nomenclature:**
- *Pontigulasia spectabilis* Penard, 1902
- *Zivkovicia vas* (Leidy, 1874) Ogden, 1983 (in part)

**Distribution:** Rhodopes Mt. (Golemansky 1968); Rila Mt. (Todorov 2004).

**Notes:** The species has been recorded both as nominal species and as synonym *P. spectabilis* (Rhodopes Mt.).

**Family Centropyxidae** Jung, 1942

**Genus Centropyxis** Stein, 1857

**Centropyxis aculeata** (Ehrenberg, 1830) Stein, 1857

**Nomenclature:**
- *Arcella aculeata* Ehrenberg, 1830
- *Diffugia aculeata* Perty, 1852
- *Echinopyxis aculeata* Claparède et Lachmann, 1859

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** Besides the nominal species, two infrasubspecific taxa *Centropyxis aculeata* var. *oblonga* Deflandre, 1929 (Rhodopes Mt., Rila Mt., Vitosha Mt.) and *Centropyxis aculeata* var. *grandis* Deflandre, 1929 (Vitosha Mt.) have also been recorded.

**Centropyxis aerophila** Deflandre, 1929

**Nomenclature:**
- *Diffugia constricta* Ehrenberg, 1838
- *Arcella arctiscon* Ehrenberg, 1854

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and
Golemansky 2000, Todorov 2004, Todorov 2005, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** Besides the nominal species, the infrasubspecific taxon *Centropyxis aerophila* var. *sphagnicola* Deflandre, 1929 has also been recorded (**Rila Mt., Vitosha Mt.**).

### Centropyxis cassis (Wallich, 1864) Deflandre, 1929

**Nomenclature:**

*Diffugia cassis* Wallich, 1864

**Distribution:** **Pirin Mt.** (new data); **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (Todorov 2004, Todorov 2005, Todorov and Golemansky 2000, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

### Centropyxis constricta (Ehrenberg, 1838) Penard, 1902

**Nomenclature:**

*Diffugia constricta* Ehrenberg, 1838

*Arcella constricta* Ehrenberg, 1841

**Distribution:** **Pirin Mt.** (Golemansky 1974, new data); **Rhodopes Mt.** (Pateff 1924, Golemansky et al. 2006); **Rila Mt.** (Pateff 1924, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *D. constricta* (**Rhodopes Mt., Rila Mt., Vitosha Mt.**).

### Centropyxis cryptostoma Bonnet, 1959

**Distribution:** **Rila Mt.** (new data).

### Centropyxis discoides (Penard, 1890) Deflandre, 1929

**Nomenclature:**

*Centropyxis aculeata var. discoides* Penard, 1890

**Distribution:** **Pirin Mt.** (new data); **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (Todorov 2005, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Golemansky 1965, Golemansky and Todorov 1990, new data).
Centropyxis ecornis (Ehrenberg, 1841) Leidy, 1879

Nomenclature:

Arcella ecornis Ehrenberg, 1841

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995, new data).

Centropyxis elongata (Penard, 1890) Thomas, 1959

Nomenclature:

Diffugia constricta var. elongata Penard, 1890

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, new data); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995).

Centropyxis gibba Deflandre, 1929

Distribution: Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov 2005).

Centropyxis hirsuta Deflandre, 1929

Distribution: Rila Mt. (Todorov 2004).

Centropyxis laevigata Penard, 1890

Distribution: Rhodopes Mt. (Golemansky et al. 2006).

Centropyxis minuta Deflandre, 1929

Nomenclature:

Diffugia constricta p. p. Leidy, 1879, PL. XVIII, figs. 15-16
Diffugia constricta p. p. Penard, 1902, p. 299, figs. 13-14

Distribution: Rhodopes Mt. (Golemansky et al. 2006).

Centropyxis orbicularis Deflandre, 1929

Distribution: Pirin Mt. (new data); Rila Mt. (new data); Stara Planina Mt. (new data).
**Centropyxis plagiostoma** Bonnet and Thomas, 1955

*Distribution:* Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993).

**Centropyxis platystoma** (Penard, 1890) Deflandre, 1929

*Nomenclature:*

*Diffugia platystoma* Penard, 1890

*Diffugia constricta* p. p. Leidy, 1879, PL. XVIII, figs. 20-21

*Diffugia constricta* p. p. Penard, 1902, p. 299, figs. 8, 11, 12

*Distribution:* Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Notes:* Besides the nominal species, the infrasubspecific taxon *Centropyxis platystoma* var. *armata* Deflandre, 1929 has also been recorded (Vitosha Mt.).

**Centropyxis spinosa** (Cash, 1905) Deflandre, 1929

*Nomenclature:*

*Centropyxis aculeata* var. *spinosa* Cash, 1905

*Distribution:* Pirin Mt. (new data); Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).

**Centropyxis sylvatica** (Deflandre, 1929) Bonnet and Thomas, 1955

*Nomenclature:*

*Centropyxis aerophila* var. *sylvatica* Deflandre, 1929

*Distribution:* Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Family Trigonopyxidae Loeblich and Tappan, 1964

Genus *Cyclopyxis* Deflandre, 1929

*Cyclopyxis arcelloides* (Penard, 1902) Deflandre, 1929

**Nomenclature:**

*Centropyxis arceloides* Penard, 1902

**Distribution:** *Vitosha Mt.* (Pateff 1928, Golemansky 1965, Golemansky and Todorov 1990, new data).

**Notes:** The species is recorded both as nominal species and as synonym *Centropyxis arceloides* (*Vitosha Mt.*).

*Cyclopyxis eurystoma* Deflandre, 1929

**Nomenclature:**

*Centropyxis* (*Cyclopyxis*) *eurystoma* Deflandre, 1929

**Distribution:** *Pirin Mt.* (Golemansky 1974, new data); *Rhodopes Mt.* (Golemansky 1968, Golemansky et al. 2006); *Rila Mt.* (Golemansky and Todorov 1993, Todorov and Golemansky 2000, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Cyclopyxis kahli* Deflandre, 1929

**Nomenclature:**

*Centropyxis* (*Cyclopyxis*) *kahli* Deflandre, 1929

**Distribution:** *Pirin Mt.* (Golemansky 1974, new data); *Rhodopes Mt.* (Golemansky et al. 2006); *Rila Mt.* (Golemansky and Todorov 1993, Todorov and Golemansky 2000, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Cyclopyxis pirini* Golemansky, 1974

**Distribution:** *Pirin Mt.* (Golemansky 1974); *Vitosha Mt.* (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Cyclopyxis puteus* Thomas, 1960

**Distribution:** *Rila Mt.* (new data).
Genus *Trigonopyxis* Penard, 1912

*Trigonopyxis arcula* (Leidy, 1879) Penard, 1912

**Nomenclature:**

*Difflugia arcula* Leidy, 1879

*Cystidina arcula* (Leidy, 1879) Volz, 1929

**Distribution:** Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, new data).

Family Plagiopyxidae Bonnet and Thomas, 1960

Genus *Bullinularia* Deflandre, 1953

*Bullinularia indica* (Penard, 1907) Deflandre, 1953

**Nomenclature:**

*Bulinella indica* Penard, 1907

*Bullinula indica* Penard, 1912

**Distribution:** Pirin Mt. (new data); Rila Mt. (new data).

Genus *Plagiopyxis* Penard, 1910

*Plagiopyxis callida* Penard, 1910

**Nomenclature:**

*Bullinula indica* var. *callida* Jung, 1936

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

*Plagiopyxis declivis* Thomas, 1955

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, new data); Stara Planina Mt. (new data); Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995, new data).

*Plagiopyxis glyphostoma* Bonnet, 1959

**Distribution:** Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).
Plagiopyxis labiata Penard, 1910

  Nomenclature:
  Centropyxia labiata Bartoš, 1947

  Distribution: Pirin Mt. (Golemansky 1974); Rila Mt. (Golemansky and Todorov 1993).

Plagiopyxis minuta Bonnet, 1959

  Distribution: Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).

Plagiopyxis oblonga (Bonnet et Thomas, 1955)

  Distribution: Stara Planina Mt. (new data).

Family Hyalospheniidae (Schulze, 1877) Kosakyan et Lara, 2012

Genus Hyalosphenia (Stein, 1857) Schulze, 1877

Hyalosphenia elegans (Leidy, 1874) Leidy, 1879

  Nomenclature:
  Difflugia (Catharia) elegans Leidy, 1874
  Hyalosphenia turfacea Taránek, 1881

  Distribution: Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).

Hyalosphenia papilio (Leidy, 1874) Leidy, 1875

  Nomenclature:
  Difflugia (Catharia) papilio Leidy, 1874

  Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Genus Nebela (Leidy, 1874) sensu Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

Nebela aliciae Mitchell et Lara, 2013

  Distribution: Stara Planina Mt. (new data); Vitosha Mt. (new data).
**Nebela collaris** (Ehrenberg 1848) Leidy, 1879

**Nomenclature:**

*Diffugia collaris* Ehrenberg 1848
*Diffugia cancellata* Ehrenberg 1848
*Diffugia reticulata* Ehrenberg 1848
*Diffugia carpio* Ehrenberg 1854
*Diffugia laxa* Ehrenberg 1871
*Diffugia cellulifera* Ehrenberg 1874
*Nebela numata* Leidy 1874
*Nebela bohemica* Taranek 1882
*Nebela sphagnophila* (Steinecke) Van Oye 1933
*Nebela tincta* var. *major* Deflandre 1936
*Nebela tincta* f. *stenostoma* Jung 1936

**Distribution:** *Pirin Mt.* (Golemansky 1974, new data); *Rhodopes Mt.* (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); *Rila Mt.* (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, Kosakyan et al. 2012; new data).

**Notes:** The species has been recorded as nominal species, as synonym *N. bohemica* (*Pirin Mt.*, *Rhodopes Mt.*, *Rila Mt.*, *Vitosha Mt.*) and as infrasubspecific taxon *Nebela tincta* var. *major* (*Vitosha Mt.*).

**Nebela flabellulum** Leidy, 1874

**Nomenclature:**

*Diffugia* (*Nebela*) *flabellulum* Leidy, 1874

**Distribution:** *Rhodopes Mt.* (Golemansky 1968, Golemansky et al. 2006); *Stara Planina Mt.* (new data).

**Nebela guttata** Kosakyan et Lara, 2013

**Distribution:** *Pirin Mt.* (new data); *Rila Mt.* (new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (new data).
**Nebela militaris** Penard, 1890

*Distribution*: Pirin Mt. (new data); *Rila Mt.* (Pateff 1924, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Nebela pechorensis** Kosakyan et Mitchell, 2013

*Distribution*: Pirin Mt. (new data); *Rila Mt.* (new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (new data).

**Nebela rotunda** Penard, 1890

*Nomenclature:*

*Nebela tincta var. rotunda* Penard, 1890

*Distribution*: *Vitosha Mt.* (new data).

**Nebela tincta** (Leidy, 1879) Awerintzew, 1906

*Nomenclature:*

*Hyalosphenia tincta* Leidy, 1879
*Nebela bursella* Vejdovsky, 1882
*Nebela minor* Penard, 1902
*Nebela parvula* Cash, 1909

*Distribution*: Pirin Mt. (Golemansky 1974, new data); *Rhodopes Mt.* (Golemansky 1968, Golemansky et al. 2006); *Rila Mt.* (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Notes*: The species has been recorded both as nominal species and as synonyms *N. bursella* (*Rila Mt.*, *Vitosha Mt.*), *N. minor* (*Rhodopes Mt.*, *Rila Mt.*) and *N. parvula* (*Pirin Mt.*, *Rhodopes Mt.*, *Vitosha Mt.*).

**Genus Gibbocarina** Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

**Gibbocarina galeata** (Penard, 1890) Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

*Nomenclature:*

*Nebela galeata* Penard, 1890
Distribution: Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: So far, all records for the species have been as N. galeata.

Genus Longinebela Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

Longinebela ampulla Todorov, Bankov and Ganeva, 2018

Distribution: Stara Planina Mt. (Todorov et al. 2018).

Longinebela golemanskyi (Todorov, 2010) Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

Nomenclature:
Nebela golemanskyi Todorov, 2010

Distribution: Vitosha Mt. (Todorov 2010, new data).

Notes: The species has been recorded as N. golemanskyi.

Longinebela penardiana (Deflandre, 1936) Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

Nomenclature:
Nebela penardiana Deflandre, 1936

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, Kosakyan et al. 2012, new data).

Notes: So far, all records for the species have been as N. penardiana.

Longinebela speciosa (Deflandre, 1936) Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

Nomenclature:
Nebela speciosa Deflandre, 1936
Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, new data); Stara Planina Mt. (new data); Vitosha Mt. (Todorov and Golemansky 2000, Todorov and Golemansky 1995, Kosakyan et al. 2012, new data).

Notes: So far, all records for the species have been as N. speciosa.

*Longinebela tubulosa* (Penard, 1902) Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

Nomenclature:

*Nebela tubulosa* Penard, 1902

Distribution: Pirin Mt. (new data); Rila Mt. (Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995, Kosakyan et al. 2012, new data).

Notes: So far, all records for the species have been as *N. tubulosa*.

Genus *Padaungiella* Lara et Todorov, 2012

*Padaungiella americana* (Taranek, 1882)

Nomenclature:

*Nebela americana* Taranek, 1882.

Distribution: Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1990).

Notes: All records for the species have been as *N. americana* (*Rhodopes Mt.*, *Vitosha Mt.*). This species is with doubtful identity since it is sharing overlapping characters with *P. lageniformis* and with *P. wailesi*.

*Padaungiella lageniformis* (Penard, 1890) Lara et Todorov, 2012

Nomenclature:

*Nebela lageniformis* Penard, 1890

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, Kosakyan et al. 2012, new data).
Notes: All records for the species (except these in Kosakyan et al. 2012) have been as *N. lageniformis*.

**Padaungiella nebeloides** (Gauthier-Lièvre and Thomas, 1958) Lara et Todorov, 2012

**Nomenclature:**
*Difflugia nebeloides* Gauthier-Lièvre and Thomas, 1958
*Nebela nebeloides* (Gauthier-Lièvre and Thomas, 1958) Todorov, Golemansky and Meisterfeld, 2010

**Distribution:** Pirin Mt. (new data); Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (Todorov et al. 2010, new data).

Notes: The species has been recorded by the synonymous name *N. nebeloides*. It should be noted that Mazei and Warren (2014) erroneously synonymised *D. nebeloides* with *D. linearis* (Penard, 1890) Gautier-Lièvre et Thomas, 1958, because they have not taken into account the fact that this species has recently been transferred from the genus *Difflugia* into the genus *Nebela* and subsequently in the newly described genus *Padaungiella* (Todorov et al. 2010, Kosakyan et al. 2012).

**Padaungiella tubulata** (Brown, 1911) Lara et Todorov, 2012

**Nomenclature:**
*Nebela tubulata* Brown, 1911

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: So far, all records for the species have been as *N. tubulata*.

**Padaungiella wailesi** (Deflandre, 1936) Lara et Todorov, 2012

**Nomenclature:**
*Nebela wailesi* Deflandre, 1936

**Distribution:** Rhodopes Mt. (Golemansky et al. 2006).

Notes: The species has been recorded by the synonymous name *N. wailesi*. 
Genus *Planocarina* Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

*Planocarina carinata* (Archer, 1867) Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

**Nomenclature:**

*Nebela carinata* (Archer, 1867) Leidy, 1879

**Distribution:** Rila Mt. (Golemansky and Todorov 1993); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995).

**Notes:** So far, all records for the species have been as *N. carinata*.

Genus *Quadrulella* (Cockerell, 1909) sensu Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

*Quadrulella longicollis* (Taranek, 1882)

**Nomenclature:**

*Quadrulella symmetrica* var. *longicollis* Taranek, 1882

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, Kosakyan et al. 2012, new data).

**Notes:** So far, all records for the species (except this one of Kosakyan et al. 2012) have been as the infrasubspecific taxon *Q. symmetrica* var. *longicollis* (*Rhodopes Mt.*, *Rila Mt.*, *Vitosha Mt.*).

*Quadrulella symmetrica* (Wallich, 1864) Cockerell, 1909

**Nomenclature:**

*Difflugia proteiformis* var. *symmetrica* Wallich, 1863  
*Difflugia pyriformis* var. *symmetrica* Wallich, 1864  
*Difflugia symmetrica* Wallich, 1864  
*Assulina assulata* Ehrenberg, 1871  
*Assulina leptolepis* Ehrenberg, 1871  
*Difflugia assulata* Ehrenberg, 1871  
*Difflugia carolensis* Ehrenberg, 1871
*Quadrula symmetrica* Schulze, 1875

*Nebela* (*Quadrulella*) *symmetrica* Deflandre, 1936

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, Kosakyan et al. 2012, new data).

**Notes:** Besides the nominal species, the infrasubspecific taxon *Quadrulella symmetrica* var. *irregularis* Wailes et Penard, 1911 has also been recorded (Rhodopes Mt., Rila Mt., Vitosha Mt.).

*Quadrulella tubulata* Gauthier-Lièvre, 1953

**Distribution:** Pirin Mt. (Golemansky 1974).

*Quadrulella variabilis* Kosakyan, Lahr, Mulot, Meisterfeld, Mitchell and Lara, 2016

**Distribution:** Pirin Mt. (new data); Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

**Suborder Phryganellina Bovee, 1985**

**Family Phryganellidae Jung, 1942**

**Genus Phryganella Penard, 1902**

*Phryganella acropodia* (Hertwig and Lesser, 1874) Hopkinson, 1909

**Nomenclature:**

*Difflugia acropodia* Hertwig and Lesser, 1874

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Phryganella hemisphaerica* (Penard, 1890) Penard, 1902

**Nomenclature:**

*Pseudodifflugia hemisphaerica* Penard, 1890
Diffugia globulosa Leidy, 1879 (in part)

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (new data)

Phryganella nidulus Penard, 1902

**Nomenclature:**

*Diffugia globulosa* Leidy, 1879 (in part)

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Todorov 2004, Todorov 2005, new data); Vitosha Mt. (Pateff 1924).

Phryganella paradoxa Penard, 1902

**Distribution:** Rhodopes Mt. (Golemansky et al. 2006); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Family Cryptodifflugiidae Jung, 1942

Genus Cryptodifflugia Penard, 1890

Cryptodifflugia compressa Penard, 1902

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, new data).

Cryptodifflugia oviformis Penard, 1890

**Nomenclature:**

*Difflugiella oviformis* Bonnet and Thomas, 1955

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1928, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *D. oviformis* (Rila Mt., Vitosha Mt.), as well as infrasubspecific taxon *Difflugiella oviformis* var. fusca Bonnet and Thomas, 1955 (Rhodopes Mt., Rila Mt., Vitosha Mt.).
Genus *Wailesella* Deflandre, 1928

*Wailesella eboracensis* (Wailes and Penard, 1911) Deflandre, 1928

**Nomenclature:**

*Cryptodifflugia eboracensis* Wailes and Penard, 1911

**Distribution:** Pirin Mt. (new data); *Rhodopes Mt.* (Golemansky et al. 2006); *Rila Mt.* (Golemansky and Todorov 1993, Todorov and Golemansky 2000, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Pateff 1928, Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *C. eboracensis* (*Vitosha Mt.*).

Order Arcellinida INCERTAE SEDIS

Genus *Argynnia* Vucetich, 1974

*Argynnia bipes* (Carter, 1870) Murray, 1870

**Nomenclature:**

*Difflugia bipes* Carter, 1870

*Nebela bipes* Murray, 1870

*Nebela bicornis* West, 1905

**Distribution:** *Rhodopes Mt.* (Pateff 1928, Golemansky et al. 2006); *Vitosha Mt.* (Pateff 1928, Golemansky and Todorov 1990).

**Notes:** The species has been recorded as synonym *N. bipes* (*Rhodopes Mt.*, *Vitosha Mt.*).

*Argynnia dentistoma* (Penard, 1890)

**Nomenclature:**

*Nebela dentistoma* Penard, 1890

*Nebela crenulata* Penard, 1893

*Nebela collaris* Leidy, 1879 (in part)

**Distribution:** Pirin Mt. (Golemansky 1974, new data); *Rhodopes Mt.* (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); *Rila Mt.* (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); *Stara Planina Mt.* (new data); *Vitosha Mt.* (Pateff 1928, Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** So far, all records for the species have been as synonyms *N. dentistoma* (Pirin Mt., Rhodopes Mt., Rila Mt., Vitosha Mt.), *N. crenulata* (Rhodopes Mt., Rila Mt., Vitosha Mt.), as well as infrasubspecific taxa *Nebela dentistoma* var. *oblonga* Gauthier-Lièvre, 1853 (Rila Mt.).

*Argynnia vitrea* (Penard, 1899)

**Nomenclature:**
*Nebela vitrea* Penard, 1899

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded as synonym *N. vitrea* (Rhodopes Mt., Rila Mt., Vitosha Mt.).

**Genus Awerintzewia** Schouteden, 1906

*Awerintzewia cyclostoma* (Penard, 1902) Schouteden, 1906

**Nomenclature:**
*Heleopera cyclostoma* Penard, 1902

**Distribution:** Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006).

**Notes:** The species has been recorded both as nominal species and as synonym *H. cyclostoma* (Rhodopes Mt.).

**Genus Heleopera** Leidy, 1879

*Heleopera petricola* Leidy, 1879

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Notes: Besides the nominal species, two infrasubspecific taxa Heleopera petricola var. amethystea Penard, 1899 (Rila Mt.) and Heleopera petricola var. major Deflandre, 1928 (Vitosha Mt.) have also been recorded.

*Heleopera rosea* Penard, 1890

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Heleopera sphagni* (Leidy, 1874)

**Nomenclature:**

Diffugia (Nebela) sphagni Leidy, 1874
Nebela sphagni Leidy, 1876
Nebela picta Leidy, 1879

**Distribution:** Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993).

*Heleopera sylvatica* Penard, 1890

**Distribution:** Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov 2005, new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990).

Genus *Lesquereusia* Schlumberger, 1845

*Lesquereusia epistomium* Penard, 1902

**Nomenclature:**

Lesquereusia jurassica var. epistomium Penard, 1893

Lesquereusia epistomium Penard, 1902

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Lesquereusia gibbosa Thomas and Gauthier-Lièvre, 1859

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Lesquereusia modesta Rhumbler, 1896

Nomenclature:
Diffugia spiralis Leidy, 1879 (in part)

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Lesquereusia spiralis (Ehrenberg, 1840) Bütschli, 1880

Nomenclature:
Diffugia spiralis Ehrenberg, 1840
Lecquereusia jurassica Schlumberger, 1845
Diffugia helix Cohn, 1853

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Genus Pyxidicula Ehrenberg, 1838

Pyxidicula patens (Claparede and Lachmann, 1858)

Nomenclature:
Arcella patens Claparede and Lachmann, 1858

Distribution: Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006).
Subkingdom / Supergroup Rhizaria Cavalier-Smith, 2002
Phylum Stramenopiles Patterson, 1989, emend. Adl et al., 2005
Class Labyrinthomycetes Dick, 2001
Order Amphitremida (Poch, 1913) Gomma, Mitchell and Lara, 2013
Family Amphitremidae Poch, 1913
Genus Archerella Loeblich and Tappan, 1961

Archerella flavum (Archer, 1877) Loeblich and Tappan, 1961

Nomenclature:
Ditrema flavum Archer, 1877
Amphitrema flavum Archer, 1877

Distribution: Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: The species has been recorded as synonym A. flavum (Rhodopes Mt., Vitosha Mt.).

Phylum Cercozoa Cavalier-Smith, 1998, emend. Adl et al., 2005
Subphylum Filosa Cavalier-Smith, 2003
Class Silicofilosea Adl et al., 2005, emend. Adl et al., 2012
Order Euglyphida Copeland, 1956, emend. Cavalier-Smith, 1997
Family Euglyphidae Wallich, 1864
Genus Euglypha Dujardin, 1841

Euglypha acanthophora (Ehrenberg, 1841) Perty, 1849

Nomenclature:
Diffugia acanthophora Ehrenberg, 1841
Euglypha alveolata Dujardin, 1841 (in part)
Euglypha setigera Perty, 1852 (in part)
Diffugia setigera Ehrenberg, 1871
Diffugia Setigerella acanthophora Ehrenberg, 1871
Euglypha brachiata Penard, 1902 (non Leidy, 1879)
Euglypha alveolata var. gracilis Taránek, 1881 (in part)
Euglypha armata Wailes and Penard, 1911
Euglypha australica Playfair, 1918 (in part)

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** Pateff (1924) and Golemansky et al. (2006) erroneously recorded the species *E. brachiata* (Rhodopes Mt., Vitosha Mt.), because the description of the found individuals fully corresponds to *E. acanthophora*.

Euglypha aspera Penard, 1899

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Todorov 2004, new data).

Euglypha bryophila Brown, 1911

**Nomenclature:**

*Euglypha α* Vejdovsky, 1882
*Euglypha cristata* Penard, 1890 (in part)

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, new data).

Euglypha ciliata (Ehrenberg, 1848), Leidy, 1878

**Nomenclature:**

*Diffugia ciliata* Ehrenberg, 1848
*Euglypha setigera* Perty, 1852 (in part)
Diffugia pilosa Ehrenberg, 1871

Diffugia Setigerella ciliata Ehrenberg, 1871

Diffugia Setigerella pilosa Ehrenberg, 1871

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: The species has been recorded both as nominal species and as infrasubspecific taxon E. ciliata f. glabra Wailes, 1915 (Rhodopes Mt., Rila Mt.).

Euglypha compressa Carter, 1864

Nomenclature:

Euglypha ampullacea Hertwig and Lesser, 1874

Euglypha ciliata Leidy, 1879 (in part)

Euglypha α Vejdovsky, 1882 (in part)

? Euglypha zonata Maggi, 1888

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: The species has been recorded both as nominal species and as infrasubspecific taxon E. compressa f. glabra Wailes, 1915 (Rhodopes Mt.).

Euglypha crenulata Wailes, 1912

Distribution: Vitosha Mt. (Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995).

Notes: The species has been recorded as infrasubspecific taxon E. crenulata var. minor Wailes, 1912.

Euglypha cristata Leidy, 1874

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
**Euglypha denticulata** Brown, 1912

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

**Euglypha filifera** Penard, 1890

Nomenclature:

*Euglypha setigera* Perty, 1852 (in part)

*Euglypha ciliata* Leidy, 1879 (in part)

*Euglypha longispina* Taránek, 1881

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Euglypha laevis** (Ehrenberg, 1845) Perty, 1849

Nomenclature:

*Diffugia laevis* Ehrenberg, 1845

*Euglypha alveolata* Leidy, 1879 (in part)

*Euglypha γ* Vejdovsky, 1882

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Euglypha rotunda** Wailes and Penard, 1911

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
**Euglypha strigosa** (Ehrenberg, 1871) Leidy, 1878

**Nomenclature:**
- *Diffugia strigosa* Ehrenberg, 1871
- *Diffugia Setigerella strigosa* Ehrenberg, 1871
- *Euglypha ciliata* var. *strigosa* Leidy, 1879 (in part)
- *Euglypha heterospina* Penard, 1890

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1928, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** Besides the nominal species, two infraspecific taxa *Euglypha strigosa* f. *glabra* Wailes and Penard, 1911 (Rila Mt.) and *Euglypha strigosa* f. *heterospina* Wailes and Penard, 1911 (Rhodopes Mt., Rila Mt., Vitosha Mt.) have also been recorded.

**Euglypha tuberculata** Dujardin, 1841

**Nomenclature:**
- *Diffugia areolata* Ehrenberg, 1841
- *Euglypha alveolata* Dujardin, 1841 (in part)
- *Euglypha tuberculosa* Dujardin, 1841
- *Diffugia alveolata* Pritchard, 1861
- *Euglypha pusilla* Entz, 1877
- *Euglypha β* Vejdovsky, 1882

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** The species has been recorded both as nominal species and as synonym *E. alveolata* (Rhodopes Mt., Vitosha Mt.).
Family Trinematidae Hoogenraad and De Groot 1940, emend Adl et al. 2012

Genus *Trinema* Dujardin, 1841

*Trinema complanatum* Penard, 1890

**Nomenclature:**

? *Arceella nidus-pendulus* Ehrenberg, 1841

*Trinema acinus* Leidy, 1879 (in part)

**Distribution:** Pirin Mt. (new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

**Notes:** Besides the nominal species, two infrasubspecific taxa *Trinema complanatum* var. *aerophila* (Decloître, 1950) Bonnet and Thomas, 1960 (Vitosha Mt.) and *Trinema complanatum* var. *globulosa* Chardez, 1959 (Rhodopes Mt., Vitosha Mt.) have also been recorded.

*Trinema enchelys* (Ehrenberg, 1838) Leidy, 1878

**Nomenclature:**

*Difflugia enchelys* Ehrenberg, 1838 (in part)

*Trinema acinus* Dujardin, 1841

*Arceella enchelys* Ehrenberg, 1844

*Euglypha pleurostoma* Carter, 1857

*Euglypha enchelys* Wallich, 1864

*Trinema (Difflugia) encheli* Crevier, 1870

**Distribution:** Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

*Trinema galeata* (Penard, 1890) Jung, 1942

**Nomenclature:**

*Trinema enchelys* var. *galeata* Penard, 1890
Distribution: Rila Mt. (Golemansky and Todorov 1993).

**Trinema grandis** (Chardez, 1960) Golemansky, 1963

Nomenclature:

*Trinema enchelys* var. *grandis* Chardez, 1960

Distribution: Rila Mt. (Golemansky and Todorov 1993, new data).

**Trinema lineare** Penard, 1890

Nomenclature:

*Difflugia enchelys* Ehrenberg, 1838 (in part)

_Arcella hyalina_ Ehrenberg, 1841

_Arcella enchelys_ Ehrenberg, 1854

_Trinema acinus_ Leidy, 1879 (in part)

_Trinema enchelys* forma β* Awerintzew, 1906

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Genus *Corythion* Taranek, 1881

**Corythion delamarei** Bonnet and Thomas, 1960

Distribution: Vitosha Mt. (Todorov 1993, Todorov and Golemansky 1995).

**Corythion dubium** Taránek, 1881

Nomenclature:

_Arcella constricta_ Ehrenberg, 1841 (in part)

_Arcella disphaera_ Ehrenberg, 1841 (in part)

_Trinema acinus_ Leidy, 1879 (in part)

_Trinema constricta* Ceretes, 1889

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and
Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Notes: Besides the nominal species, two infrasubspecific taxa Corythion dubium var. aerophila Decloître, 1950 (Vitosha Mt.) and Corythion dubium var. orbicularis Penard, 1910 (Vitosha Mt.) have also been recorded.

Genus Playfairina Thomas, 1961

Playfairina valkanovi Golemansky, 1966

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1966, Golemansky and Todorov 1993, Todorov and Golemansky 1995, Golemansky and Todorov 2006, new data).

Family Sphenoderiidae Chatelain, Meisterfeld, Roussel-Delif and Lara, 2013

Genus Sphenoderia Schlumberger, 1845

Sphenoderia fissirostris Penard, 1890

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Sphenoderia lenta Schlumberger, 1845

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).

Sphenoderia minuta Deflandre, 1931

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Golemansky and Todorov 1993, new data); Stara Planina Mt. (new data); Vitosha Mt. (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
**Sphenoderia ovoidea** Jung, 1942

Distribution: **Stara Planina Mt.** (new data); **Vitosha Mt.** (new data).

**Sphenoderia splendida** (Playfair, 1917) Deflandre, 1931

Nomenclature:

*Sphenoderia fissirostris* var. *splendida* Playfair, 1917

Distribution: **Pirin Mt.** (new data); **Rila Mt.** (new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (new data).

**Genus Trachelocorythion** Bonnet, 1979

**Trachelocorythion pulchellum** (Penard, 1890) Bonnet, 1979

Nomenclature:

? *Euglypha minima* Perty, 1852

*Corythion pulchellum* Penard, 1890

*Chorythion pulchellum* Awerintzew, 1907

? *Hyalina neta* Jung, 1942

Distribution: **Pirin Mt.** (new data); **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (Todorov and Golemansky 2000, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (new data).

**Family Assulinidae** Lara et al., 2007

**Genus Assulina** Leidy, 1879

**Assulina muscorum** Greeff, 1888

Nomenclature:

*Assulina seminulum* Leidy, 1879 (in part)

*Assulina minor* Penard, 1890

Distribution: **Pirin Mt.** (new data); **Rhodopes Mt.** (Golemansky 1968, Golemansky et al. 2006); **Rila Mt.** (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Assulina seminulum (Ehrenberg, 1848) Leidy, 1879

Nomenclature:
Diffugia seminulum Ehrenberg, 1848
Diffugia Assulina seminulum Ehrenberg, 1871
Diffugia semen Ehrenberg, 1871
Euglypha brunnea Leidy, 1874
Euglypha seminulum Leidy, 1878

Distribution: Rhodopes Mt. (Golemansky 1968, Golemansky et al. 2006); Rila Mt. (Pateff 1924, Golemansky and Todorov 1993, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1990, new data).

Genus Placocista Leidy, 1879

Placocista glabra Penard, 1906

Distribution: Pirin Mt. (Golemansky 1974).

Notes: The species has been recorded as infrasubspecific taxon Placocista glabra var. minima Decloître, 1955 (Pirin Mt.).

Placocista spinosa (Carter, 1865) Leidy, 1879

Nomenclature:
Euglypha spinosa Carter, 1865

Distribution: Rila Mt. (Golemansky and Todorov 1993).

Family Cyphoderiidae de Saedeleer, 1934

Genus Cyphoderia Schlumberger, 1845

Cyphoderia amphoralis (Wailes and Penard, 1911)

Nomenclature:
Cyphoderia trochus var. amphoralis Wailes and Penard, 1911

Distribution: Pirin Mt. (new data); Rhodopes Mt. (Todorov et al. 2009); Rila Mt. (Heger et al. 2010, new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).
Cyphoderia ampulla (Ehrenberg, 1840) Leidy, 1878

Nomenclature:
Diff lugia ampulla Ehrenberg, 1840
Diff lugia lagena Ehrenberg, 1841
Cyphoderia margaritacea Schlumberger, 1845
Euglypha curvata Perty, 1852
Lagynis baltica Schultze, 1854
Euglypha ampulla Claparède and Lachmann, 1859
Euglypha baltica Wallich, 1864
Euglypha margaritacea Wallich, 1864
Diff lugia Seelandica Ehrenberg, 1869
Diff lugia adunca Ehrenberg, 1871
Diff lugia alabamensis Ehrenberg, 1871
Diff lugia uncinata Ehrenberg, 1871
Diff lugia margaritacea Ehrenberg, 1871

Distribution: Pirin Mt. (Golemansky 1974, new data); Rhodopes Mt. (Pateff 1924, Golemansky et al. 2006; Todorov et al. 2009, Heger et al. 2010); Rila Mt. (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2004, Todorov 2005, Todorov et al. 2009, new data); Stara Planina Mt. (new data); Vitosha Mt. (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, Todorov et al. 2009, Heger et al. 2010, new data).

Cyphoderia major (Penard, 1891)

Nomenclature:
Cyphoderia margaritacea var. major Penard, 1891

Distribution: Pirin Mt. (new data); Rila Mt. (Todorov et al. 2009, Heger et al. 2010, new data); Stara Planina Mt. (new data); Vitosha Mt. (new data).

Genus Campascus Leidy, 1879

Campascus minutus Penard, 1899

Nomenclature:
Campascus triqueter var. minuta Awerintzew, 1906
Distribution: **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (Todorov and Golemansky 2000, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Golemansky 1965, Golemansky and Todorov 1990, new data).

**Campascus triqueter** Penard, 1891

Distribution: **Rila Mt.** (Golemansky and Todorov 1993, Todorov and Golemansky 2000); **Vitosha Mt.** (Golemansky 1965, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995).

Family Paulinellidae de Saedeller 1934, emend. Adl et al. 2012

**Genus Paulinella** Lauterborn, 1895

**Paulinella chromatophora** Lauterborn, 1895

Distribution: **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (Todorov 2004).

Order INCERTAE SEDIS euglyphid testate amoebae

**Genus Tracheleuglypa** Deflandre, 1928

**Tracheleuglypa acolla** Bonnet et Thomas, 1955

Distribution: **Pirin Mt.** (new data); **Rhodopes Mt.** (Golemansky et al. 2006); **Rila Mt.** (Todorov and Golemansky 2000, Todorov 2005, new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Todorov 1993, Todorov and Golemansky 1995, new data).

**Tracheleuglypa dentata** (Moniez, 1888) Deflandre, 1928

Nomenclature:

*Sphenoderia lenta* Leidy, 1879 (in part)

*Euglypha β* Vejdovsky, 1882

*Euglypha dentata* Moniez, 1888

*Sphenoderia dentata* Penard, 1890

Distribution: **Pirin Mt.** (Golemansky 1974, new data); **Rhodopes Mt.** (Golemansky 1968, Golemansky et al. 2006); **Rila Mt.** (Golemansky and Todorov 1993, Todorov and Golemansky 2000, Todorov 2005 new data); **Stara Planina Mt.** (new data); **Vitosha Mt.** (Pateff 1924, Golemansky 1965, Golemansky and Todorov 1985, Golemansky and Todorov 1990, Todorov 1993, Todorov and Golemansky 1995, new data).
Notes: The species has been recorded both as nominal species and as synonym *S. dentata* (Vitosha Mt.).

Family Chlamydophryidae de Saedeleer, 1934

Genus *Lecythium* Hertwig and Lesser, 1874

*Lecythium mutabilis* (Bailey, 1853)

Nomenclature:

- *Pamphagus mutabilis* Bailey, 1853
- *Pamphagus avidus* Leidy, 1879
- *Lecythium mutabile* Wailes, 1915

Distribution: *Rila Mt.* (Pateff 1924).

Notes: The species has been recorded as synonym *P. mutabilis* (*Rila Mt.*).

Family Pseudodifflugiidae de Saedeleer, 1934

Genus *Pseudodifflugia* Schlumberger, 1845

*Pseudodifflugia fascicularis* Penard, 1902

Distribution: *Rhodopes Mt.* (Golemansky 1968, Golemansky et al. 2006); *Rila Mt.* (Pateff 1924).

*Pseudodifflugia gracilis* Schlumberger, 1845

Nomenclature:

- *Pleurophrys sphaerica* Claparède and Lachmann, 1858
- *Pleurophrys angulata* Mereschkovsky, 1879

Distribution: *Rhodopes Mt.* (Golemansky et al. 2006); *Rila Mt.* (Golemansky and Todorov 1993, Todorov and Golemansky 2000).

Discussion

Prior to our investigation, the number of known *Sphagnum*-dwelling testate amoebae in Bulgaria was 155. Our study increases this number with 16 species and the present checklist comprises 171 species classified into 43 genera, 20 families, three orders, three classes and three phyla. We present data for 16 new *Sphagnum*-dwelling testate amoebae
in Bulgaria and new distribution data for 134 species. Of them, 99 species are recorded from Stara Planina Mt., for which there was no available data to date. Additionally we report 69 new species for Pirin Mt., 21 for Vitosha Mt. and 18 for Rila Mt. Thirty six species have been synonymised according to the latest taxonomic changes. All known synonyms of valid names are also listed. The species *Euglypha brachiata* Penard, 1902 and the infrasubspecific taxa *Diffugia compressa* var. *africana* Gauthier-Lièvre et Thomas, 1958 have erroneously been recorded, because the descriptions of the found individuals fully correspond to *E. acanthophora* and *Z. compressa*, respectively. These misidentified taxa have been transferred to valid species. Three of the recorded species have not been included in the checklist, because they are currently not refering to testate amoebae (*Cochliopodium bilimbosum* and *C. echinatum* are naked amoebae and *Microgromia elegantula* is freshwater foraminfera).

About 30% (51 species) of all recorded testate amoebae are typical sphagnicolous inhabitants, which only exceptionally can be found in other habitats. These are mostly the representatives of the genera *Nebela* (5 species), *Sphenoderia* (5), *Lesquereusia* (4), *Longinebela* (4), *Padaungiella* (4), *Quadrulella* (4), *Heleopera* (3) etc. The most numerous (67 species, 39%) are the species which are found in *Sphagnum* mosses but are also common inhabitants of freshwater basins. The genera *Diffugia* (28), *Centropyxis* (7) and *Arcella* (6) have the largest number of representatives in this group. Most likely, some of these species are not usual inhabitants and fall incidentally into the *Sphagnum* mosses, which develop around the shores of freshwater basins (e.g. *Diffugia lobostoma*, *D. microclaviformis*, *D.urceolata*, *Netzelia tuberculata* etc.). The relative share of species that are rather inhabitants of soils and soil mosses, but also occur in peatlands is comparatively smaller (about 18%, 31 species). Most of them rarely occur and usually have a low population density in *Sphagnum* mosses (e.g. *Awerintzewia cyclostoma*, *Bullinaria indica*, *Centropyxis cryptostoma*, *Centropyxis orbicularis*, *Cyclopyxis arceloides*, *Cyclopyxis puteus*, *Heleopera sylvatica*, *Padaungiella wallesi*, *Plagiopyxis callida*, *Plagiopyxis labiata*, *Trinema galeata* etc.). The number of eurybiotic species, which are widely distributed in diverse habitats, including peatlands, is the smallest. Twenty one species (about 12% of all recorded) can be referred to eurybionts. Of these, the most frequently occurring in *Spagnum* mosses are *Centropyxis aerophila*, *Corythion dubium*, *Cyclopyxis eurystoma*, *Euglypha laevis*, *Phryganella acropodia*, *Trinema lineare* etc.

On a generic level, the genera *Diffugia* (32), *Centropyxis* (17), *Euglypha* (13), *Arcella* (10) and *Nebela* (8) have the greatest species richness. These five genera constitute about 47% of all testate amoebae recorded in *Sphagnum* mosses in Bulgaria. Of the other genera, 23 are represented with 2-5 species and 15 with one species only.

From families, the largest richness have *Diffugiidae* (39 species, 4 genera), *Hyalospheniidae* (26, 7), *Centropyxidae* (17, 1), *Euglyphidae* (13, 1) and *Arcellidae* (10, 1), which together make up two thirds of *Sphagnum*-dwelling testate amoebae in Bulgaria. Six families are represented by one species of one genus only (Microcoyciidae, Microchlamyidae, Netzeliiidae, Amphitremaidae, Paulinellidae and Chlamydophryidae).
At a higher taxonomic level, the most numerous is the order Arcellinida, which includes 128 species of 28 genera and 11 families, followed by the order Euglyphida with 42 species of 14 genera and 8 families and finally by the order Amphitremida with one species of 1 genus and 1 family only.

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References

- Adl SM, Simpson AGB, Lane CE, Lukeš J, Bass D, Bowser SS, Brown MW, Burki F, Dunthorn M, Hampel V, Heiss A, Hoppenrath M, Lara E, le Gall L, Lynn DH, McManus H, Mitchell EAD, Mozley-Stanridge SE, Parfrey LW, Pawlowski S, Rueckert S, Shadwick L, Schoch CL, Smirnov A, Spiegel FW (2012) The revised classification of eukaryotes. Journal of Eukaryotic Microbiology 59: 429-514. https://doi.org/10.1111/j.1550-7408.2012.00644.x
- Aoki, Yoshiyuki, Hoshino, Mitsuo, Matsubara, Teruo (2007) Silica and testate amoebae in a soil under pine–oak forest. Geoderma 142: 29-35. https://doi.org/10.1016/j.geoderma.2007.07.009
- Blandenier Q, Lara E, Mitchell EAD, Alcantara DMC, Siemensma FJ, Todorov M, Lahr DJG (2017) NAD9/NAD7 (mitochondrial nicotinamide adenine dinucleotide dehydrogenase gene)—A new “Holy Grail” phylogenetic and DNA-barcoding marker for Arcellinida (Amoebozoa)? European Journal of Protistology 58: 175-186. https://doi.org/10.1016/j.ejop.2016.12.002
- Booth RK (2002) Testate amoebae as paleoindicators of surface-moisture changes on Michigan peatlands: Modern ecology and hydrological calibration. Journal of Paleolimnology 28 (3): 329-348. https://doi.org/10.1023/A:1021675225099
- Charman DJ, Roe HM, Gehrels WR (1998) The use of testate amoebae in studies of sea-level change: a case study from the Taf Estuary, south Wales, UK. The Holocene 8 (2): 209-218. https://doi.org/10.1191/095968398676389446
- Charman DJ (2001) Biostratigraphic and palaeoenvironmental applications of testate amoebae. Quaternary Science Reviews 20: 1753-1764. https://doi.org/10.1016/s0277-3791(01)00036-1
- Chatelain AP, Meisterfeld R, Roussel-Delif L, Lara E (2013) Sphenoderiidae (fam. nov.), a new clade of euglyphid testate amoebae characterized by small, round scales
surrounding the aperture. Protist 164 (6): 782-792. https://doi.org/10.1016/j.protis.2013.08.001

- Golemansky V (1965) Étude sur les espèces et l'écologie des rhizopodes (Rhizopoda, Testacea) des hautes tourbières de la montagne Vitocha. Annuaire de l'Université de Sofia, Faculté de Biologie. 59 (1): 17-38. [In Bulgarian, with Russian and French summaries].
- Golemansky V (1966) Playfairina valkanovi nov. sp. - une nouvelle rhizopode d’eau douce (Rhizopoda, Testacea). Comptes Rendus de l'Académie Bulgare des Sciences 19 (1): 57-59.
- Golemansky V (1968) On the species composition and distribution of the rhizopod fauna of upper Smolian Lakes. Bulletin de l'Institut de Zoologie et Musée de Sofia 27: 171-187. [In Bulgarian, with Russian and English summaries].
- Golemansky V (1974) La faune rhizopodique (Rhizopoda, Testacea) du littoral et du benthal du lac Popovo dans la montagne de Pirine. Bulletin de l'Institut de Zoologie et Musée 40: 47-58. [In Bulgarian, with Russian and French summaries].
- Golemansky V, Todorov M (1985) Comparative studies on the composition and distribution of the thecamoeban fauna (Rhizopoda, Testacea) in three types of soil in Vitosha Mountain. Acta Zoologica Bulgarica 29: 50-64. [In Bulgarian, with Russian and English summaries].
- Golemansky V, Todorov M (1990) Rhizopod fauna (Protozoa, Rhizopoda) from Vitoša. In: Fauna of Southwestern Bulgaria, Part 3. BAS, Sofia, 19-48. [In Bulgarian, with Russian and English summaries].
- Golemansky V, Todorov M (1993) Testate amoebae (Protozoa, Rhizopoda) in the watercatchment area and littoral of the “Beli Iskar” dam. Acta Zoologica Bulgarica 46: 3-9.
- Golemansky V, Todorov M (2006) Morphology, biometry and ecology of Playfairina valkanovi Golemansky, 1966 (Testaceafilosia: Trinematidae), with a supplement to the diagnosis of the genus Playfairina Thomas, 1961. Acta Zoologica Bulgarica 58 (3): 291-298.
- Golemansky V, Todorov M, Temelkov B (2006) Diversity and biotopic distribution of the Rhizopods (Rhizopoda: Lobosia and Filosia) from the Western Rhodopes (Bulgaria). In: Beron, P. Biodiversity of Bulgaria. 3. Biodiversity of Western Rhodopes (Bulgaria and Greece) I. Pensoft & National Museum of Natural History, Sofia, 205-220 pp.
- Gomaa F, Mitchell EAD, Lara E (2013) Amphitremida (Poche, 1913) is a new major, ubiquitous labyrinthulomycete clade. PLoS ONE 8 (1): e53046. https://doi.org/10.1371/journal.pone.0053046
- Gomaa F, Lahr DJ, Todorov M, Li J, Lara E (2017) A contribution to the phylogeny of agglutinating Arcellinida (Amoebozoa) based on SSU rRNA gene sequences. European Journal of Protistology 59: 99-107. https://doi.org/10.1016/j.ejop.2017.03.005
- Heger TJ, Mitchell EAD, Todorov M, Golemansky V, Lara E, Leander BS, Pawlowski J (2010) Molecular phylogeny of euglyphid testate amoebae (Cercozoa: Euglyphida) suggests transitions between marine supralittoral and freshwater/terrestrial environments are infrequent. Molecular Phylogenetics and Evolution 55: 113-122. https://doi.org/10.1016/j.ympev.2009.11.023
- Kosakyan A, Heger TJ, Leander BS, Todorov M, Mitchell EA, Lara E (2012) COI barcoding of nebelid testate amoebae (Amoebozoa: Arcellinida): extensive cryptic
diversity and redefinition of the Hyalospheniidae Schultze. Protist 163: 415-434. https://doi.org/10.1016/j.protis.2011.10.003

- Kosakyan A, Gomaa F, Lara E, Lahr DJ (2016a) Current and future perspectives on the systematics, taxonomy and nomenclature of testate amoebae. European Journal of Protistology 55: 105-117. https://doi.org/10.1016/j.ejop.2016.02.001

- Kosakyan A, Lahr DJG, Mulot M, Meisterfeld R, Mitchell EAD, Lara E (2016b) Phylogenetic reconstruction based on COI reshuffles the taxonomy of hyalosphenid shelled (testate) amoebae and reveals the convoluted evolution of shell plate shapes. Cladistics 32 (6): 606-623. https://doi.org/10.1111/cla.12167

- Lahr DJ, Grant JR, Katz LA (2013) Multigene phylogenetic reconstruction of the Tubulinae (Amoebozoa) corroborates four of the six major lineages, while additionally revealing that shell composition does not predict phylogeny in the Arcellinida. Protist 164 (3): 323-339. https://doi.org/10.1016/j.protis.2013.02.003

- Lamentowicz M, Mitchell EAD (2005) The ecology of testate amoebae (Protists) in Sphagnum in north-western Poland in relation to peatland ecology. Microbial Ecology 50 (1): 48-63. https://doi.org/10.1007/s00248-004-0105-8

- Lara E, Heger TJ, Mitchell EAD, Meisterfeld R, Ekelund F (2007) SSU rRNA reveals a sequential increase in shell complexity among the euglyphid testate amoebae (Rhizaria: Euglyphida). Protist 158 (2): 229-237. https://doi.org/10.1016/j.protis.2006.11.006

- Mazei Y, Warren A (2012) A survey of the testate amoeba genus Diffugia Leclerc, 1815 based on specimens in the E. Penard and C.G. Ogden collections of the Natural History Museum, London. Part 1: species with shells that are pointed aborally and/or have aboral protuberances. Protistology 7 (3): 121-171.

- Mazei Y, Warren A (2014) A survey of the testate amoeba genus Diffugia Leclerc, 1815 based on specimens in the E. Penard and C.G. Ogden collections of the Natural History Museum, London. Part 2: species with shells that are pyriform or elongate. Protistology 8 (4): 133-171.

- Mazei Y, Warren A (2015) A survey of the testate amoeba genus Diffugia Leclerc, 1815 based on specimens in the E. Penard and C.G. Ogden collections of the Natural History Museum, London. Part 3: species with shells that are spherical or ovoid. Protistology 9 (1): 3-49.

- Meisterfeld R (2002a) Order Arcellinida Kent, 1880. In: Lee JJ, Leedale GE, Bradbury P (Eds) The illustrated guide to the Protozoa. Second edition, Volume II. Society of protozoologists, Lawrence, Kansas, USA, 827–860 pp. [ISBN 1-891276-23-9].

- Meisterfeld R (2002b) Testate amoebae with Filopodia. In: Lee JJ, Leedale GF, Bradbury P (Eds) The illustrated guide to the Protozoa. Second edition, Volume II. Society of protozoologists, Lawrence, Kansas, USA, 1054–1084 pp. [ISBN 1-891276-23-9].

- Mitchell EAD, Charman DJ, Warner BG (2008) Testate amoebae analysis in ecological and paleoecological studies of wetlands: past, present and future. Biodiversity and Conservation 17 (9): 2115-2137. https://doi.org/10.1007/s10531-007-9221-3

- Natcheva R, Ganeva A (2005) Check-list of the bryophytes of Bulgaria II. Musci. Cryptogamie Bryologie 26: 209-232.

- Nguyen-Viet H, Bernard N, Mitchell EAD, Cortet J, Badot PM, Gilbert D (2007) Relationship between testate amoeba (Protist) communities and atmospheric heavy metals accumulated in Barbula indica (Bryophyta) in Vietnam. Microbial Ecology 53 (1): 53-65. https://doi.org/10.1007/s00248-006-9108-y
• Pateff P (1924) Kenntnis der Süßwässerrhizopoden von Bulgarien. Arbeiten der Bulgischen Naturforschenden Gesellschaft 11: 1-46. [In Bulgarian, with German summary].
• Pateff P (1928) Einige neue Süßwassershizopoden von Bulgarien. Arbeiten der Bulgischen Naturforschenden Gesellschaft 13: 131-136. [In Bulgarian, with German summary].
• Qin Y, Mitchell EAD, Lamentowicz M, Payne RJ, Lara E, Gu Y, Huang X, Wang H (2013) Ecology of testate amoebae in peatlands of central China and development of a transfer function for paleohydrological reconstruction. Journal of Paleolimnology 50 (3): 319-330. https://doi.org/10.1007/s10933-013-9726-6
• Swindles GT, Charman DJ, Roe HM, Sansum PA (2008) Environmental controls on peatland testate amoebae (Protozoa: Rhizopoda) in the North of Ireland: Implications for Holocene palaeoclimatic studies. Journal of Paleolimnology 42 (1): 123-140. https://doi.org/10.1007/s10933-008-9266-7
• Todorov M (1993) Testate Amoebae (Protozoa, Rhizopoda) in soils of Vitoša Mountain (Bulgaria). Acta Zoologica Bulgarica 46: 16-23.
• Todorov M, Golemansky V (1995) Ecological characteristics of soil Testacea (Protozoa, Rhizopoda) of Vitoša Mountain (Bulgaria). Acta Zoologica Bulgarica 48: 3-22.
• Todorov M, Golemansky V (2000) Testate Amoebae (Protozoa: Testacea) of the Glacial Lakes in the Rila National Park (Southwestern Bulgaria). In: Golemansky V, Naidenow W (Eds) Biodiversity and Evolution of Glacial Water Ecosystems in the Rila Mountains. Professor Marin Drinov Academic Publishing House, Sofia, 15-26 pp.
• Todorov M (2004) Testate amoebae (Protozoa, Rhizopoda) of the Ribni Ezera Glacial Lakes in the Rila Mountains (South-West Bulgaria). Acta Zoologica Bulgarica 56 (3): 243-252.
• Todorov M (2005) Testate amoebae (Protozoa, Rhizopoda) of the glacial lakes Smradlivo ezero in the Rila National Park (Southwestern Bulgaria). Acta Zoologica Bulgarica 57 (1): 13-23.
• Todorov M, Golemansky V, Mitchell EAD, Heger TJ (2009) Morphology, biometry, and taxonomy of freshwater and marine interstitial Cyphoderia (Cercozoa: Euglyphida). Journal of Eukaryotic Microbiology 56 (3): 279-289. https://doi.org/10.1111/j.1550-7408.2009.00394.x
• Todorov M (2010) Nebela golemanskyi sp. nov., a new sphagnoecolic testate amoeba from Bulgaria (Amoebozoa: Arcellinida, Nebelidae). Acta Protozoologica 49 (1): 37-43.
• Todorov M, Golemansky V, Meisterfeld R (2010) Is Diffugia nebeloides (Amoebozoa: Arcellinida) really a Diffugia? Re-description and new combination. Acta Zoologica Bulgarica 62 (1): 13-20.
• Todorov M, Bankov N, Ganeva A (2018) Longinebela ampulla sp. nov. (Arcellinida: Hyalospheniidae), a new testate amoeba from Sphagnum peatlands in Bulgaria. Acta Zoologica Bulgarica 70 (2): .

Checklist of Sphagnum-dwelling testate amoebae in Bulgaria
• Valkanov A (1932) Notizen über das Leben bulgarischer Hochgebirgsseen. Arbeiten der Bulgarischen Naturforschenden Gesellschaft, Sofia 15-16: 207-226. [In Bulgarian, with German summary].

• Valkanov A (1934) Beitrag zur Hydrofauna Bulgariens. Sofia 1-32. [In Bulgarian, with German summary].

Supplementary materials

Suppl. material 1: Checklist of Sphagnum-dwelling testate amoebae from Bulgaria_Distribution data doi

Authors: Nikola Bankov, Milcho Todorov and Anna Ganeva
Data type: Distribution data
Brief description: Data for the distribution of testate amoebae in Sphagnum mosses in Bulgaria on the basis of literature and of additional data, obtained in our research over the past two years.
Filename: Checklist of Sphagnum-dwelling testate amoebae from Bulgaria_Distribution data.xlsx - Download file (364.00 kb)

Suppl. material 2: Sampling sites information doi

Authors: Nikola Bankov, Milcho Todorov and Anna Ganeva
Data type: Sampling sites data
Brief description: Data concerning sampling sites, including date, region, altitude, coordinates, Sphagnum moss species, as well as many physical and chemical parameters of the sampling sites.
Filename: Checklist Sphagnum-dwelling testate amoebae in Bulgaria_Sampling sites data.xlsx - Download file (22.89 kb)