A New Species of Testate Amoebae of the Genus *Difflugia* from the Freshwaters of Azerbaijan (Rhizopoda, Testacea, Difflugiiidae).

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A New Species of Testate Amoebae of the Genus *Difflugia* from the Freshwaters of Azerbaijan (Rhizopoda, Testacea, Difflugiiidae). Snegovaya, N. Yu., Tahirova, E. N. — A new testate amoebae species *Difflugia alekperovi* sp. n. was found during a faunistic study of inland waters of Lenkoran Region, South-Eastern Azerbaijan. The morphology and biometry of this species was described by LM and SEM investigations.

**Key words:** testate amoeba, *Difflugia*, South-Eastern Azerbaijan.

**Introduction**

The genus *Difflugia* was established by Leclerc in 1815 and now consists of more than 300 nominal species and varieties (Mazei, Tsyganov, 2006; Mazei, Warren, 2012). According to Mazei, Tsyganov (2006) diagnosis of the genus *Difflugia*, its members have agglutinated, acrostomic shells with terminally located aperture, without internal partitions. Aperture rounded, oval, lobate, toothed, but never slit. Shells form pyriform, elongated, cylindrical, spherical, ovoid, some forms are flattened laterally. According to Gauthier-Lièvre and Thomas (1958), the genus *Difflugia* is separated into 10 groups based on shell morphology: lobed, collared, compressed, urceolate, globose, ovoid globose, elongate, acute angled, horned and pyriform (Gauthier-Lièvre and Thomas, 1958; Yang, Shen, Feng, 2005).

In Azerbaijan, 101 species and subspecies of the genus *Difflugia* have been recorded (Snegovaya, 2001, Snegovaya, Alekperov, 2005; Snegovaya, Alekperov, 2009; Snegovaya, Alekperov, 2010 a, b), including 44 species found in Lenkoran region. Lenkoran is located on the South-East of Azerbaijan (fig. 1) and clearly differs from other regions by subtropical climate and very original flora and fauna with many endemic species.

**Material and methods**

Samples were taken from small forest water reservoir near Azfilial settlement: 38°40’56.5” N; 48°46’58.5” E; 51 m a. s. l. (fig. 2) in October 2013, and from Khanbulanchay water reservoir: 38°40’10.99” N; 48°46’05.87” E; 73 m a. s. l. (fig. 3) in May 2014, both Lenkoran district. Specimens were placed in microcapillary tubes and studied in vivo and in glycerol preparations. For scanning electron microscopy (SEM), the cells were transferred to a cover glass with microcapillary tubes, dried and then coated with gold. The shell morphology was examined using a scanning electron microscope, JEOL JCM-6000 operating at 15 kV. Statistics was performed using the program Sigma Stat 2.0 (X — arithmetic mean; M — median; SD — standard deviation; SE — standard error; CV — coefficient of variation (%); Max — maximum; Min — minimum; N — number of specimens).
Fig. 1. Map showing the location of sampling points on the water reservoir in Azfilial settlement (1) and Khanbulanchay water reservoir (2), Lenkoran District, Azerbaijan.

Рис. 1. Карта расположения точек сбора проб на водоёме в посёлке Азфилиал (1) и Ханбуланчайском водохранилище (2), Ленкоранский район Азербайджана.

Fig. 2–3. Water reservoir in Azfilial settlement (2) and Khanbulanchay water reservoir (3), Lenkoran District, Azerbaijan.

Рис. 2–3. Общий вид водоёма в посёлке Азфилиал (2) и Ханбуланчайского водохранилища (3), Ленкоранский район Азербайджана.
**Difflugia** Leclerc, 1815  
Type species: *Difflugia proteiformis* Lamarc, 1816.

**Difflugia alekperovi** sp. n. (fig. 4–7)


*Type location.* In the sediments of small forest water reservoir near Azfi lial settlement (38°40′56.5″ N; 48°46′58.5″ E; 51 m a. s. l.) and sediments of Khanbulanchay water reservoir (38°40′10.99″ N; 48°46′05.87″ E; 73 m a. s. l.) (Lenkoran District, Azerbaijan).

*Description.* The shell in water samples from light- to dark-brown, in glycerol discolored to transparent. The cell shape is slightly ovoid, almost rounded. Shell length 86–188 μm, width 81–162 μm Shell surface is rough and covered with irregularly-shaped siliceous plate particles and pieces of diatoms. Terminally located aperture is very small (11–25 μm), circular, not surrounded with particles. Morphological and morphometrical characteristics of *D. alekperovi* sp.n. are shown in figures 4–7 and table 1. Living cells not observed. Very rare species, we found it only in autumn and spring.

*Diagnosis.* The shell is almost rounded, with very small rounded aperture. *Difflugia alekperovi* sp.n. is similar to *Difflugia subaequalis* Penard, 1910, *D.lithoplites* Penard, 1902, *D. lebes sphaerica* Gauthier-Lièvre et Thomas, 1958, *D. lebes masurica* Schönborn, 1965,
Table 1. Biometrical characteristic of Difflugia alekperovi sp. n.

<table>
<thead>
<tr>
<th>Character</th>
<th>X</th>
<th>M</th>
<th>SD</th>
<th>SE</th>
<th>CV</th>
<th>Min</th>
<th>Max</th>
<th>N</th>
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<tr>
<td>Shell length</td>
<td>134.8</td>
<td>135.5</td>
<td>33.229</td>
<td>10.508</td>
<td>0.247</td>
<td>86</td>
<td>188</td>
<td>10</td>
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<tr>
<td>Shell width</td>
<td>125.5</td>
<td>129.5</td>
<td>27.13</td>
<td>8.579</td>
<td>0.216</td>
<td>81</td>
<td>162</td>
<td>10</td>
</tr>
<tr>
<td>Diameter of aperture</td>
<td>19.7</td>
<td>21.5</td>
<td>4.715</td>
<td>1.491</td>
<td>0.239</td>
<td>11</td>
<td>25</td>
<td>10</td>
</tr>
</tbody>
</table>

D. geosphaira Ogden, 1991, D. globulosa Dujardin, 1837, D. globularis Wallich, 1864, D. minuta var. grandis Gauthier-Lièvre et Thomas, 1958, but differs: from Difflugia subaequalis by more rounded shell, smaller aperture, different shell covering; from D. lithoplites Penard, 1902, D. lebes sphaerica and D. lebes masurica by more rounded shell, size and shell covering; from D. geosphaira by more rounded shell, absence of collar, by aperture shape and size; from D. globulosa by more rounded shell, smaller size of the aperture; different shell covering; from D. globularis by more rounded shell, much smaller size of the aperture, different shell covering; from D. minuta var. grandis by more rounded shell form and different shell covering. Diagnostic characters of Difflugia species are given in table 2 and on fig. 8–28.

Etymology. The species was named in honor of the famous Azerbaijanian protistologist, Prof. Ilham Alekperov.

Table 2. Diagnostic characters of Difflugia species

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<tr>
<td>Aperature form and size, μm</td>
<td>11–12, circular, not surrounded with particles</td>
<td>65–70, with uneven outline, and three or four sharp grains looking like teeth</td>
<td>130–180, circular</td>
<td>83–98, circular</td>
<td>19–28, circular, surrounded by sponge of organic cement</td>
<td>33–58, circular, surrounded by smaller particles which often appear smooth due to the overlaying cement</td>
<td>48–60, circular</td>
<td>20–28, circular</td>
</tr>
<tr>
<td>Shell surface</td>
<td>Rough and covered with irregularly-shaped siliceous particles and diatoms frustules</td>
<td>Made of mineral grains and diatom frustules</td>
<td>Made of small mineral particles</td>
<td>Made of small mineral particles</td>
<td>Made of mineral particles</td>
<td>Made of large quartz particles but may also include diatom frustules</td>
<td>Made of quartz particles covered with large grain</td>
<td></td>
</tr>
</tbody>
</table>

References

Penard, 1902, http://www.arcella.nl/difflugia-lithoplites
Gauthier-Lièvre et Thomas, 1958; Mazei, Tsyaganov, 2006
Gauthier-Lièvre et Thomas, 1958; Mazei, Tsyaganov, 2006
Ogden, 1991, Mazei Tsyaganov, 2006
Mazei, Tsyaganov, 2006
Gauthier-Lièvre et Thomas, 1958; Mazei, Tsyaganov, 2006
Discussion


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