New Records of Testate Amoebae in Shenthuriney Wildlife Sanctuary, Kerala, India: Insights into Microbial Biodiversity

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Author’s contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Original Research Article

ABSTRACT

This report summarizes the results hitherto achieved in the study of moss inhabitant testate amoebae in Shenthuriney WLS, part of Western Ghats, Kerala. This is the first study on this important protozoan group in the sanctuary to document the testate fauna. The study reveals the novel records of 28 species of testate amoebae span over 6 families and 9 genera from Shenthuriney WLS, Kerala.

Keywords: Shenthuriney WLS; Kerala; moss; protozoa; testate amoebae.

1. INTRODUCTION

“Shendurney Wildlife Sanctuary, part of Western Ghats of Kerala owes its name to a tree locally called Chenkurinji, an endemic tree which is confined to this tract. Shendurney was declared as a Wildlife sanctuary in 1984 with a total extent of 172 sq. kms. The sanctuary falls between
8°44ʼ & 9°14ʼN latitude and 76°59ʼ877°16ʼE longitude and is located in the Pathanapuram taluk of Kollam district of Kerala state. The reserve forests of Thenmala, Thiruvananthapuram, Punalur forest divisions and Thirunelveli forest division of Tamil Nadu surround the sanctuary from all four sides. The sanctuary is a continuous stretch of vast and valuable forest area bounded on the east by the Sahyadri hills which act as a great barrier separating the two states, Kerala and Tamil Nadu” [1]. “The sanctuary lies on the either side of the Shendurney river and is located on the north of Kulathupuzha valley separated by Churuttumala ridge. The whole area is hilly in character with a gentle slope towards the west. The upper slopes are rugged, steep and inaccessible in many places. The highest peak is Alwarkurichi peak. Even though this sanctuary is admist in Western Ghats with rich biodiversity no attempts were so far made to explore the diversity of testate amoebae. Testate amoebae (TA) are a diverse and abundant group of protists found in a wide range of habitats around the world and are particularly abundant in wetlands” [1]. “Testate amoebae are routinely used as indicators of past changes in peatland hydrology” [2,1]. “These single-celled organisms respond quickly to environmental change, produce decay-resistant and taxonomically distinctive shells, and are generally well preserved and abundant in Holocene peat deposits and present in a variety of habitats like terrestrial, freshwater, estuarine and marine from the tropics to polar areas” [3,4]. “Testate amoebae form a very sensitive group of organisms” [5]. “Their short generation times make them useful indicators of environmental changes” [6,7,8]. “Their well-defined ecological preferences in relation to important ecological variables in different type of ecosystems have made them useful in biomonitoring” [9,10].

“Testate amoebae research has increased significantly over the past two decades due to their increasing use in different applied aspects as bioindicators for palaeoecological studies, in environmental monitoring, studies on their role in the cycling of elements in the terrestrial ecosystems and biogeographical and evolutionary studies” [11,15]. “It is very important to understand the diversity of free-living protists because it plays a very significant role in the ecological health and make up a large part of earth’s biodiversity” [11,12]. Even though its wide range of applications, not much serious studies have been done and herewith reporting 28 species as new records to this sanctuary.

2. MATERIALS AND METHODS
Moss samples (100-200 grams) were collected by quadrant sampling (1 m²) by scrapping from rock and tree bark from the study area during the faunistic survey to Western Himalaya in October 2019. The samples were processed with non-flooded petri dish method as described by Foissner [13] and from each sample permanent mounts were prepared and studied under Nikon 50 i compound microscope for species level identification. For species level identification the monograph of Todorov and Bankov was followed [13a].

3. RESULTS AND DISCUSSION
The present study results the reports of 28 species of testate amoebae from Shenthuriney WLS belong to 9 genera under 6 families (Images 1-28 as Annexure-1). Of these Cyclopyxis aplanata Deflandre, 1929, Cyclopyxis leidi (Coûteaux et Chardez, 1981), Cyclopyxis puteus Thomas, 1960 and Cyclopyxis tronconica Godanu, 1972 were earlier reported only from Corbett NP [14] in India. Even though Western Ghats are rich in biodiversity only 26 species have been reported from Peppara WLS, part of Western Ghats in Kerala [15]. Family hyalosphenidae represented the maximum number of species (7) followed by the families Netzeliidae and Centropyxidae (6 each). This is a part of study conducted by Zoological survey of India and this is only a baseline information from the rich biodiversity area and intensive studies should be done to reveal the actual testate fauna from this biodiversity hotspot.

3.1 Systematic List of Testate Amoebae Recorded as per the Classification of Adl et al., 2019

<table>
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<tr>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
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<th>Genus</th>
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</tr>
</tbody>
</table>

Phylum Tubulinea Smirnov et al., 2005
Class Elida Kang et al., 2017
Order Arcellinida Kent, 1880

Family Arcellidae Ehrenberg, 1843
1. Arcella conica (Playfair, 1918)
2. Galeripora arenaria (Greeff, 1866) González-Miguëns et al., 2021
3. Galeripora discoides (Ehrenberg, 1871) González-Miguëns et al., 2021

Family Netzeliidae Kosakyan et al., 2016
4. Cyclopyxis aplanata Deflandre, 1929
5. Cyclopyxis eurystoma Deflandre, 1929
6. *Cyclopyxis kahli* Deflandre, 1929
7. *Cyclopyxis leidy* (Coûteaux et Chardez, 1981)
8. *Cyclopyxis puteus* Thomas, 1960

**Family Diffugiidae** Wallich, 1864
10. *Diffugia oblonga* Ehrenberg, 1838
11. *Diffugia lithophila* Penard, 1902
12. *Diffugia globulosa* Penard, 1902
13. *Diffugia lebes* Penard, 1899
14. *Diffugia lucida* Penard, 1890

**Family Centropyxidae** Jung, 1942
15. *Centropyxis aculeata* Ehrenberg, 1838
16. *Centropyxis constricta* Penard, 1902
17. *Centropyxis elongata* (Penard, 1890) Thomas, 1959
18. *Centropyxis oblonga* Deflandre, 1929
19. *Centropyxis plagostoma* Bonnet and Thomas, 1955
20. *Centropyxis platystoma* Deflandre, 1929

**Family Plagiopyxidae** Bonnet and Thomas, 1960

**Family Hyalospheniidae** Schultz, 1977, emend. Kosakyan and Lara, 2012
22. *Nebela bohemica* Taranek, 1882
26. *Quadrulella variabilis* Kosakyan et al., 2016
27. *Quadrulella symmetrica* (Wallich, 1864) Schulze, 1875
28. *Quadrulella tropica* Wailes, 1912

**4. CONCLUSION**

The study resulted the records of 28 species of testate amoebae span over 9 genera and 6 families. No studies have been done earlier with regard to testate amoebae from Shenturiney Wild life Sanctuary and all the species recorded in the present study are new records from the sanctuary.

**ACKNOWLEDGEMENTS**

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**COMPETING INTERESTS**

Author has declared that no competing interest exists.

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ANNEXURE-1

Arcella conica (Playfair, 1918)

Galeripora arenaria (Greeff, 1866)

González-Miguéns et al., 2021

Galeripora discoïdes (Ehrenberg, 1871)

Cyclopyxis aplanata Deflandre, 1929

González-Miguéns et al., 2021

Cyclopyxis eurystoma Deflandre, 1929

Cyclopyxis kahli Deflandre, 1929
Cyclopyxis leidy (Coûteaux et Chardez, 1981)

Cyclopyxis puteus Thaomas, 1960

Cyclopyxis tronconica Godeanu, 1972

Difflugia oblonga Ehrenberg, 1838

Difflugia lithophila Penard, 1902

Difflugia globulosa Penard, 1902
**Bindu; J. Sci. Res. Rep., vol. 29, no. 9, pp. 55-63, 2023; Article no.JSRR.106471**

**Difflugia lebes** Penard, 1899

**Difflugia lucida** Penard, 1890

**Centropyxis aculeata** Ehrenberg, 1838

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**Centropyxis oblonga** Deflandre, 1929
*Centropyxis plagiostoma*  
Deflandre, 1929

*Centropyxis platystoma*  
Bonnet and Thomas, 1955

*Plagiopyxis declivis*  
Bonnet, 1955

*Nebela bohemica*  
Taranek, 1882

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

*Padaungiella tubulata*  
(Brown, 1910) Lara and Todorov, 2012
Padaungiella wailesi (Deflandre, 1936)  
Quadrulella variabilis Kosakyan et al., 2016  
Lara and Todorov, 2012  

Quadrulella tropica Wailes, 1912  
Quadrulella symmetrica (Wallich, 1864)  
Schulze, 1875

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