



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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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

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8°44' & 9°14'N latitude and 76°59' & 77°16'E 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 surrounds 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. Eventhough 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 (100-200grams) were collected by quadrant sampling (1m²) 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 leidy* (Coûteaux et Chardez, 1981), *Cyclopyxis puteus* Thomas, 1960 and *Cyclopyxis tronconica* Godeanu, 1972 were earlier reported only from Corbett NP [14] in India. Eventhough 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 Netzeiliidae 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

Phylum tubulinea Smirnov et al., 2005
Class elardia Kang et al., 2017
Order Arcellinida Kent, 1880

Family Arcellidae Ehrenberg, 1843

1. *Arcella conica* (Playfair, 1918)
2. *Galeripora arenaria* (Greeff, 1866) González-Miguéns et al., 2021
3. *Galeripora discoides* (Ehrenberg, 1871) González-Miguéns et al., 2021

Family Netzeiliidae 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
9. *Cyclopyxis tronconica* Godeanu, 1972

Family Difflogiidae Wallich, 1864

10. *Difflogia oblonga* Ehrenberg, 1838
11. *Difflogia lithophila* Penard, 1902
12. *Difflogia globulosa* Penard, 1902
13. *Difflogia lebes* Penard, 1899
14. *Difflogia 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 plagiosoma* Bonnet and Thomas, 1955
20. *Centropyxis platystoma* Deflandre, 1929

Family Plagiopyxidae Bonnet and Thomas, 1960

21. *Plagiopyxis declivis* Bonnet, 1955

Family Hyalospheniidae Schultze, 1977, emend. Kosakyan and Lara, 2012

22. *Nebela bohémica* Taranek, 1882
23. *Padaungiella lageniformis* (Penard, 1890) Lara and Todorov, 2012
24. *Padaungiella tubulata* (Brown, 1910) Lara and Todorov, 2012
25. *Padaungiella wailesi* (Deflandre, 1936) Lara and Todorov, 2012
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.

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providing the facilities to do the work. Thanks are also due to the survey team for collecting the samples for the study.

COMPETING INTERESTS

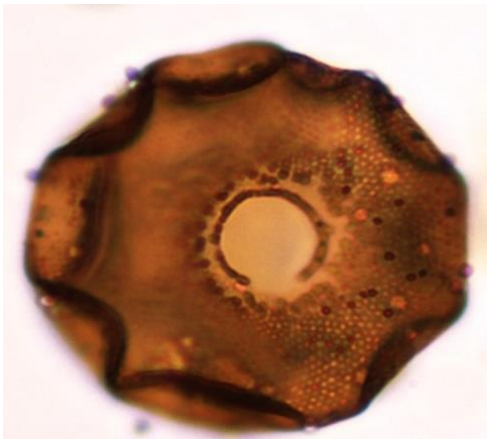
Author has declared that no competing interest exists.

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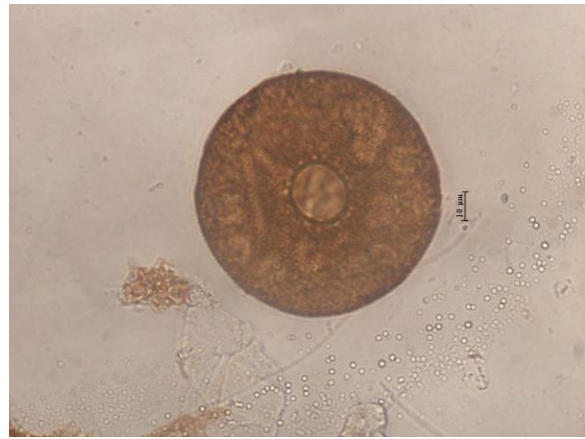
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ANNEXURE-1

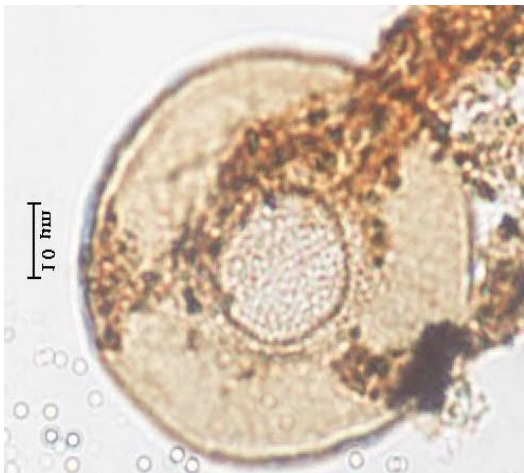


***Arcella conica* (Playfair, 1918)**

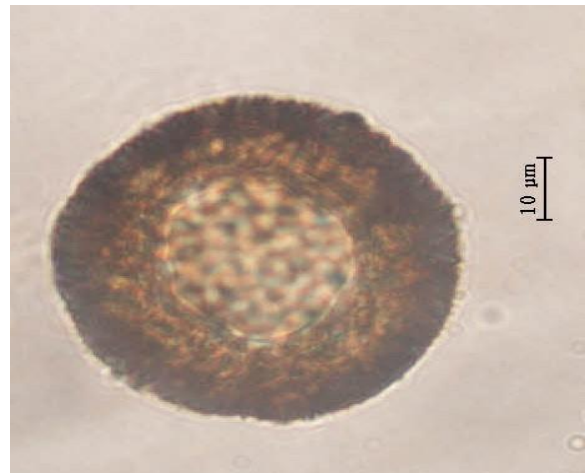


***Galeripora arenaria* (Greeff, 1866)**

González-Miguéns et al., 2021

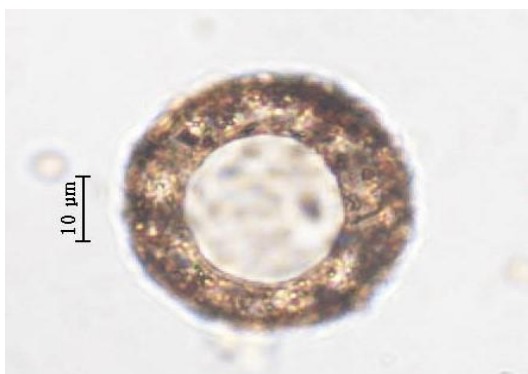


***Galeripora discoides* (Ehrenberg, 1871)**

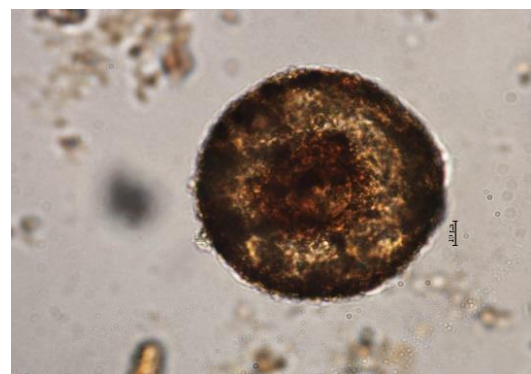


***Cyclopyxis aplanata* Deflandre, 1929**

González-Miguéns et al., 2021



***Cyclopyxis eurystoma* Deflandre, 1929**



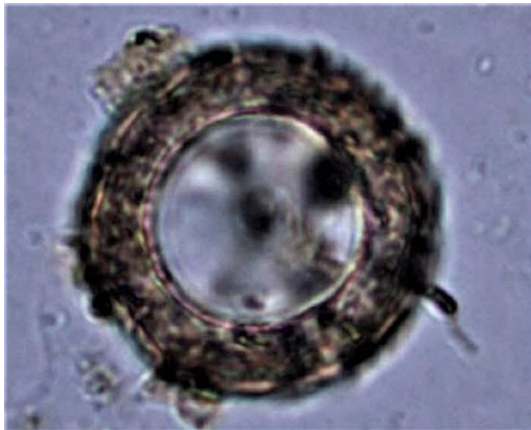
***Cyclopyxis kahli* Deflandre, 1929**



Cyclopyxis leidy (Coûteaux et Chardez, 1981)



Cyclopyxis puteus Thomas, 1960



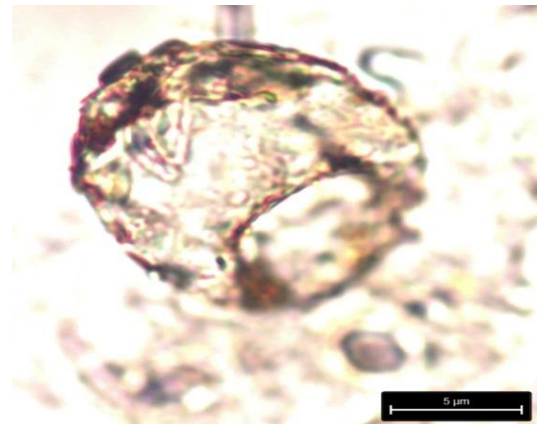
Cyclopyxis tronconica Godeanu, 1972



Diffugia oblonga Ehrenberg, 1838



Diffugia lithophila Penard, 1902



Diffugia globulosa Penard, 1902



***Diffugia lebes* Penard, 1899**



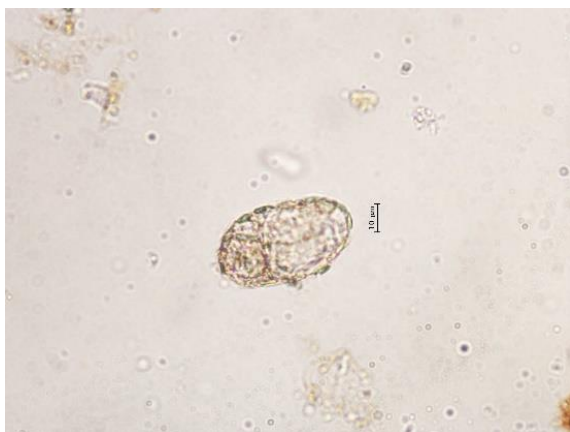
***Diffugia lucida* Penard, 1890**



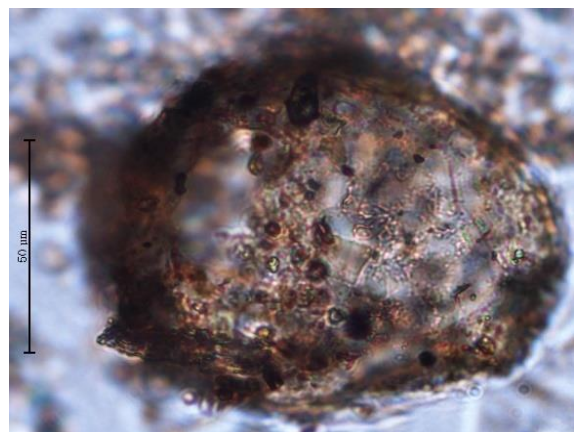
***Centropyxis aculeata* Ehrenberg, 1838**



***Centropyxis constricta* Penard, 1902**



***Centropyxis elongata* (Penard, 1890) Thomas, 1959**



***Centropyxis oblonga* Deflandre, 1929**

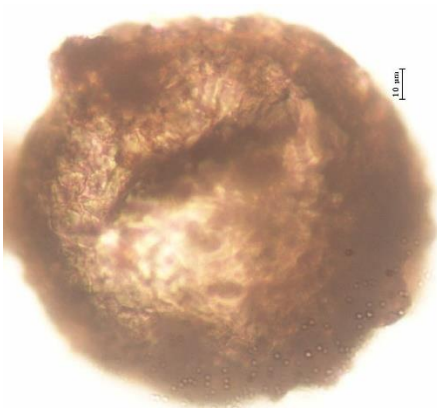


Centropyxis plagiostoma



***Centropyxis platystoma* Deflandre, 1929**

Bonnet and Thomas, 1955



***Plagiopyxis declivis* Bonnet, 1955**



***Nebela bohémica* Taranek, 1882**



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



***Padaungiella tubulata* (Brown, 1910) Lara and Todorov, 2012**



***Padaungiella walesi* (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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