



Description of a New Species of the Genus *Quadrullella* (Cockerell, 1909) Kosakyan *et al.*, 2016 (Amoebozoa : Arcellinida) from Western Himalaya, Uttarakhand, India

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Author's contribution

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

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ABSTRACT

A new species of testate amoeba namely *Quadrullella talukensis* Bindu **sp.nov.** from Western Himalaya, Uttarakhand, Himachal Pradesh, which is closely related to *Quadrullella alata* Gauthier-Lievre, 1957 is described and illustrated.

Keywords: Protist; testate amoebae; new species; *Quadrullella talukensis*; Uttarakhand; India.

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1. INTRODUCTION

Quadrullella (Amoebozoa, Arcellinida, Hyalospheniidae) is a genus of testate amoebae which secretes characteristic square plates to reinforce the test plates and comprises most species of hyalospheniid testate amoebae. They are mainly known from fens and freshwater habitats and have never been documented in deserts. The taxonomic status of most of the species are poorly studied. *Quadrullella symmetrica* (Wallich, 1863) Kosakyan et al., 2016 is the type species with cosmopolitan distribution. According to the recent studies by Kosakyan et al., [1] this genus includes eleven valid species in which shells composed of self secreted siliceous quadrangular plates. This is a speciose rich family of testate amoebae reported from moss habitats and detailed studies have been done with regard to distribution, taxonomy and ecology and considered as important bioindicators for ecological and environmental monitoring [2]. During the last decade a number of taxonomic studies have been done on this complex group in various parts of the world [2-8b] and in India it is being least attended.

In the present communication a new species *Quadrullella talukensis* sp.nov. is described based on 3 specimens. These specimens were obtained from tree mosses in a place named Taluka in Uttarkashi district of Uttarakhand at an altitude of 2030m with high moisture content which supports the earlier records of *Quadrullella* genus. Affinities of the new species with the closely related species are provided. The permanent slides of the holotype and paratypes were deposited in the 'National Zoological Collections' of the Western Ghat Regional Centre, Zoological Survey of India, Kozhikode (= Calicut), India.

2. MATERIALS AND METHODS

The holotype is collected by scraping the Moss samples (100- 200 gms) from upper surface of the tree bark by quadrant sampling (1 m²) and brought to the laboratory in polythene envelopes. The samples were cultured and processed in the lab with non-flooded petri dish method as described by Foissner [9] and morphology was studied under the compound microscope Leica DM 2000 and images were captured with the camera Model Leica Flexacam C3 and permanent mounts were prepared.

3. RESULTS

The systematic position of the genus *Quadrullella* is provided below.

Phylum Tubulinea Smirnov et al., 2005
Class Elardia Kang et al., 2017
Order Arcellinida Kent, 1880
Family Hyalospheniidae Schultze, 1977,
emend. Kosakyan and Lara, 2012
Quadrullella talukensis Bindu sp.nov
(Images 1 & 2)

3.1 Description

This new species can be distinguished from all other species of *Quadrullella* by the combination of the following characters.

In frontal view test is oviform or more or less like a bulb with a broadly rounded fundus with a wide, short neck; pseudostome wide and slightly arched and bordered by a thick chitinous lip. Test is with a thin and prominent keel surrounds the test towards the base of the collar; test is broad in lateral view and bulb like in apical view; pseudostome slightly curved outward; test light brown in colour, hyaline and covered with large square plates, regularly arranged, juxtaposed, keel is formed by two series of rectangular thin plates arranged uniformly throughout the test.

Dimensions: Length of the test 126 to 132 µm; width 95 to 102µm; collar width 40-43µm, collar height 28 to 30µm; pseudostome width 36 to 38 µm; keel 3 to 6 µm wide.

Ecology: Moss collected from Tree bark in the forest of Taluka, Uttarkashi district of Uttarakhand at an elevation of 2030m.

Material Examined: Holotype: India: Uttarakhand, Uttarkashi, Trekking valley, Taluka 30.73347 N, 78. 4246 E, 13.x.2019, coll. Bindu.L.(NZC Regd. No. IV- 24787); Paratype : The paratypes (Images 3 & 4) were also observed from the same moss sample (NZC Regd. Nos. IV-24788, IV-24789) from which holotype has been observed. The Holotype and paratypes were mounted in DPX on glass slides were deposited in the National Zoological collections of Western Ghat Regional Centre, Zoological Survey of India, Kozhikode, Kerala.

Etymology: The specific epithet is related with Taluka, locality, where the holotype was collected.

Variations: The paratypes showed only slight variations in measurements.

4. DISCUSSION

The new species is closely related to *Quadrullella alata* Gauthier-Lievre, 1957 having a lageniform test with a broadly rounded fundus and wide

neck. It differs by having thinner neck and longer height of the neck than *Q. talukensis*; pseudostome having slightly arched and bordered by a very thin chitinoid lip (thick chitinoid lip in *Q. talukensis*). Test with a flat keel surrounds the test towards the base of the collar and terminated by a sharp truncated nipple in apical view (no nipple formation in *Q. talukensis*).

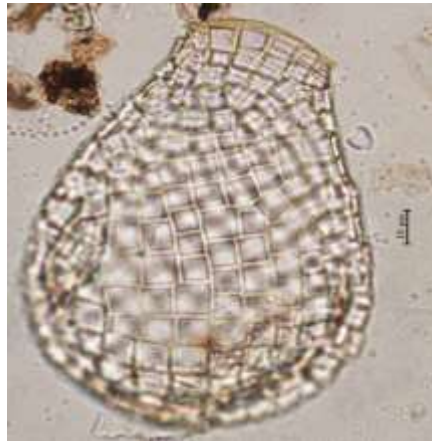


Image 1. *Quadrullella talukensis* sp. nov. holotype

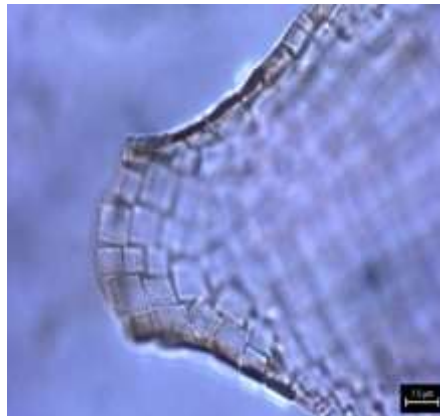


Image 2. *Quadrullella talukensis* sp. nov., pseudostome

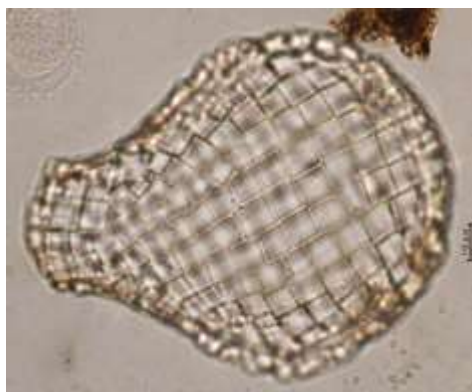


Image 3. *Quadrullella talukensis* sp. nov. Paratype

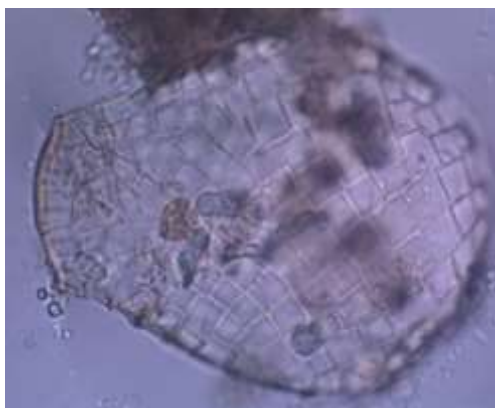


Image 4. *Quadrulella talukensis* sp. nov. Paratype

The keel is formed by two series of rectangular plates (one for each side) as in *Q. talukensis*. Length of the test is 140-150 μm (126 to 132 μm in *Q. talukensis*), width 70-90 μm and collar width 33-35 μm (95-102 μm and 40-43 μm respectively for *Q. talukensis*); pseudostome width is 30 μm and keel width is 5-10 μm (36 to 38 μm and 3 to 6 μm in *Q. talukensis*).

In testate amoebae the variability of the main morphological and morphometric characters is common in different individuals of a given species, especially when comparing populations from different habitats and geographical regions [10]. Only six species under *Quadrulella* genus have been recorded from India viz., *Q. elegans* Gauthier-Lièvre, 1958; *Q. madibai* Kosakyan et al., 2016; *Q. quadrigera* Deflandre, 1936; *Q. symmetrica* (Wallich, 1863) Kosakyan et al., 2016; *Q. tropica* Wailes, 1912 and *Q. variabilis* Kosakyan et al., 2016. In the present study the new species *Q. talukensis* from Taluka, Uttarkashi district, Uttarakhand can strongly be differentiated from the nearest species *Q. alata* Gauthier-Lièvre, 1957 with the presence of bulb shaped test with a broadly rounded fundus and short neck against lageniform test, long neck and lesser thickness of the aperture for *Q. alata*. Both the species are marked with a specialized keel; in *Q. alata* the width of the keel is more compared to *Q. talukensis* and in *Q. alata* the keel is terminated at the apical end by a sharp truncated nipple which is flattened in *Q. talukensis*. The dimensions such as length and width of the test, width and height of the collar and pseudostome width are more in *Q. talukensis* than *Q. alata*. The above mentioned morphological differences strongly suggest that *Q. talukensis* is a new species and future phylogenetic research would be valuable and molecular data may provide new insights into the

phylogenetic relationships within the genus and with related genera.

5. CONCLUSION

The present communication describes a new species of testate amoeba viz., *Quadrulella talukensis* sp. nov. from tree moss of Uttarakhand district. The morphological differences strongly suggest that *Q. talukensis* is a new species and future phylogenetic research would be valuable and molecular data may provide new insights into the phylogenetic relationships within the genus and with related genera. This placed the current study in better context of the scientific progress of the testate study.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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