

New Records of Rarely Occurring Genus *Zygnemopsis* (Skuja) Transeau from Darbhanga district, North Bihar, India

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ABSTRACT

In an aquatic ecosystem, the freshwater green macroalgae are known as primary producers. They are commonly used as a traditional food in several parts of the world. The present study identifies two species of rarely occurring *Zygnemopsis* Skuja Transeau from different localities of Darbhanga district, North Bihar. The two species of genus *Zygnemopsis* viz., *Zygnemopsis lamellata* and *Zygnemopsis transeauiana* under the order Zygnematales have been described. Of these two species, *Z. transeauiana* Randhawa is reported for the first time from Bihar and *Z. lamellata* Randhawa is reported for the second time from Bihar.

Keywords: Genus, New records, North Bihar, Zygnematales.

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INTRODUCTION

The conjugative green algae (Zygnematophyceae), known as silkweed, are freshwater filamentous macroalgae. Zygnemataceae comprise 13 genera like *Spirogyra*, *Zygnema*, *Sirogonium*, *Debarya*, *Zygnemopsis*, etc. *Zygnemopsis* Skuja in 1930 was described as a section of *Debarya*. In 1934, Transeau gave a clear definition of this genus. The length of the vegetative cell is 2 to 5 times its breadth or sometimes 10 times with two polster form stellate or slightly stellate chloroplasts, each containing single pyrenoids. The cell is filled with refractive pectic material at the beginning of the reproductive phase. Reproduction in *Zygnemopsis* Transeau takes place by zygospore, parthenospore and aplanospore. This genus has isogamous conjugation. During the process of reproduction, the vegetative cell gets slightly inflated. Zygospores are compressed spheroid, quadrate, truncate, or retuse angles filled in the conjugation canal and extended towards the filament. Mesospore of this genus is smooth, punctate, sorbiculate, or verrucose.

A total of 67 species of *Zygnemopsis* Skuja Transeau have been described so far worldwide. Out of the 67 species, 34 species of *Zygnemopsis* Skuja Transeau have been identified from the Indian habitat by Randhawa (1959), Panikkar (1997), Patel (1977), Kargupta and Jha (2004).

Some other quantum of work on *Zygnemopsis* was published by Das (1962), Sharma and Kargupta (1986), Chalotra *et al.* (2013), Halder (2015), Prasad and Kumari (1977). These species of *Zygnemopsis* were recorded from UP, Kolkata, and Kerala. Chalotra *et al.* (2013) identified three species of this genus from Jammu and Kashmir (*Z. minuta* Randhawa, *Z. tiffaniana* Transeau and *Z. splendens* Randhawa). Halder (2015), while exploring Hooghly, West Bengal, identified two species of *Zygnemopsis* Transeau (*Z. benghalensis* Sarma and Kargupta and *Z. Pseudolahaulensis* Srama and Kargupta) for the first time. Tagad (2016), while exploring Junnar Taluka, Pune, reported 112 genera of planktonic algae. He also reported two species of *Zygnemopsis* Skuja (*Z. decussata* Transeau and *Z. lamellate* Randhawa). Verma *et al.* (2021) studied the Chlorophyceae of Uttar Pradesh and published a checklist of chlorophyceae. This checklist includes ten species of *Zygnemopsis* Skuja.

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The morphological information of this genus is less known from Bihar. So, the present investigation aimed to explore the genus *Zygnemopsis* Skuja Transeau from Darbhanga district, North Bihar. This study explores the two species of *Zygnemopsis* from an unexplored region of Darbhanga, North Bihar.

MATERIAL AND METHODS

Algal samples were collected in sterile plastic containers from different localities, including both rural and urban areas with latitude and longitude 26°10'12.00"N and 85°54'0"E of Darbhanga district of North Bihar, during January 2021 and July 2023. The temperature and pH were recorded at the sample collection site. The samples were preserved in 4% FAA (Formalin-Aceto-Alcohol). The samples were examined using a microscope (Olympus) with model no- 7213. Samples were treated with 8% KOH (Potassium hydroxide) and lactic acid and kept for 24 hours to observe the sculpturing of zygospores. The camera lucida diagram was drawn using prism-type camera lucida, and the microphotographs of the samples were taken further. Identification of these taxa was accomplished with the help of monographs and authentic literature (Randhawa 1959; Sharma and Kargupta 1986; Patel and Kumar (1971, 1977).

RESULT AND DISCUSSION

In the present study, a total number of two species of the *Zygnemopsis* Skuja Transeau are described with the help of

microphotographs (MP) and camera lucida diagrams (CLD). Out of the two species, *Zygnemopsis transeauiana* Randhawa was reported for the first time from the Darbhanga district of North Bihar, and *Zygnemopsis lamellata* Randhawa was reported for the second time from Bihar after 2004 by Kargupta and Jha (2004).

Zygnemopsis transeauiana Randhawa

(Randhawa 1959; P. 202; Fig. 137)

Fig. 1 (MP): (a-e); Fig. 2 (CLD): (a-c)

Vegetative cells 16 to 20 μm in diameter, 28 to 60 μm long, each containing 2 rounded chloroplasts.

Reproduction takes place by aplanospore. Sometimes, it secretes shining pectic cellulose substance in a homogenous mass. Zygospores are ovoid to globose shaped, sometimes with equatorial ridges, 16 to 24 μm in diameter and 52 to 60 μm long; brownish. The zygospore wall is sorbiculate with pits 2 μm in diameter.

Habitat: Collection no- 99, Date- March 2023, collected from a ditch whose water temperature and pH were 21°C and 7.1, respectively, from Kusheshwar Asthan (District- Darbhanga).

The present species resembles the type species.

Distribution: Turkey (Aysel, 2005), Japan (Hirose *et al.*, 1977), India: Kolkata (Gupta, 2012), Solapur (Jaiswal, 2017), Uttar Pradesh (Verma *et al.*, 2021).

This is the first record of the species from Bihar.

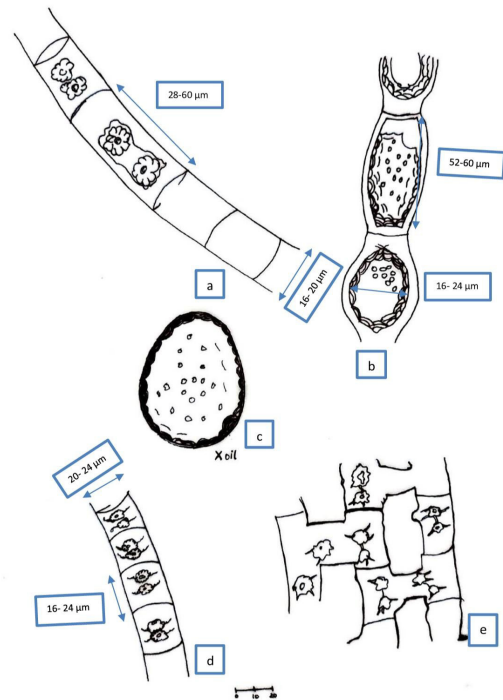


Fig. 2: (CLD): (a-c) *Zygnemopsis transeauiana* (Randhawa); (d-e) *Zygnemopsis lamellata* Randhawa

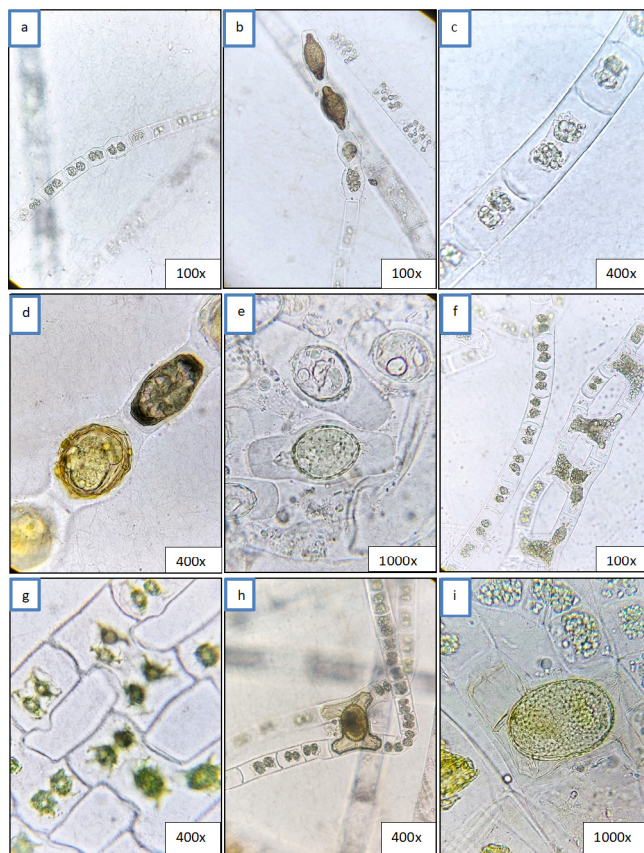


Fig. 1: (MP): (a-e) *Zygnemopsis transeauiana* (Randhawa); (f-i) *Zygnemopsis lamellata* Randhawa

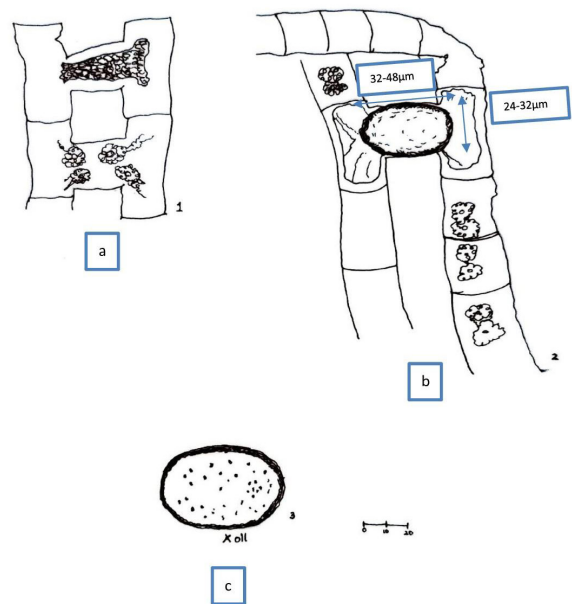


Fig. 3: (CLD): (a-c) *Zygnemopsis lamellata* Randhawa

Zygnemopsis lamellata Randhawa

(Randhawa 1959; P. 200; Fig. 134)

Fig. 1 (MP): (f-i); Fig. 2 (CLD): (d-e); Fig. 3 (CLD): (a-c)

Vegetative cells 20 to 24 μm in diameter and 28 to 44 μm long, each with 2 rounded chloroplasts.

Conjugation scalariform. Zygospore globose, quadrangular shape; 32 to 48 μm in diameter, 24 to 32 μm long; secretes

shining white pectic cellulose substance in homogenous mass; median spore wall dark blueish green in color, reticulate and also punctate with pits of 1-µm in diameter.

Habitat: Collection no- 109, Date- April 2023, collected from a ditch (pH 7.4; temperature 23°C) from Kusheshwar Asthan (Dist- Darbhanga).

The present specimen resembles the type species.

Distribution: Myanmar (Skuja, 1949), Svalbard (Pichrtova, 2018), India: Bihar (Kargupta and Jha, 2004), Kolkata (Gupta, 2012), Uttar Pradesh (Verma *et al.*, 2021).

This is the second record of the species from Bihar after Kargupta and Jha (2004).

CONCLUSION

The current study reports the taxonomic description of species of genera *Zygnemopsis* Skuja which belongs to family Zygnemataceae. Its fruiting stage is observed at pH 6.8 to 7.5 and temperature 21 to 25°C. The species *Zygnemopsis lamellata* Randhawa occurs most commonly inside and outside India. However, *Zygnemopsis transeauiana* Randhawa rarely occurs in Bihar. The morpho-taxonomic study of both species will provide new taxonomic information and its ecological significance. It was determined that Bihar region still has macroalgal wealth and we need to expertise on the algal flora of Bihar as very less studies have been carried out from this place.

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AUTHOR CONTRIBUTION

Anuradha Kumari: designs the experiments, execution, methodology and experimentation data collection, analysis

and ms writing. Ankit Kumar Singh: direction in writing of MS and compilation. All authors approved the final manuscript.

CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

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