

TWO NEW TAXA OF *ECBALLOCYSTOPSIS* (CHLOROPHYTA) FROM EASTERN INDIA

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ABSTRACT

Two new taxa of the genus *Ecballocystopsis* Iyengar (Chlorococcales, Chlorophyta), *E. himalayansis* sp. nov. and *E. dichotomus* var. *minuta* var. nov. occurring in two different localities, one in a water fall in Sikkim-Himalayas and another in a stream in Odisha are described. The former is the fourth species of *Ecballocystopsis* so far reported and the later is a variety of *E. dichotomus* Zheng-Yu et Lie- Jue earlier recorded from China. Comparative account of the morphological features of these species has been presented.

Keywords : *Ecballocystopsis*: *E. himalayansis* sp. nov., *E. dichotomus* var. *minuta* var. nov., Sikkim-Himalayas: new report.

INTRODUCTION

Ecballocystopsis Iyengar is a rarely occurring green algal genus so far reported with 3 species worldwide, i.e. *E. indica* Iyengar, *E. desikacharyi* Prasad and *E. dichotomus* Zheng-Yu et Lie- Jue. The taxa under the genus are distinguished from *Ecballocystis* Bohlin taxa having filamentous thallus instead of dendroid form (Iyengar 1932). *Ecballocystopsis indica* was first recorded from the Honey falls at Courtallum in Tamil Nadu state of India (Iyengar 1933). Later *Ecballocystopsis desikacharyi* was found occurring on moist tree barks in a nearby locality in Tamil Nadu, India (Prasad 1985), and *Ecballocystopsis dichotomus* on a wet rock in a small irrigated ditch in Hubei province of China (Zheng-Yu and Lie-Jue 1998). In the present work one new species of *Ecballocystopsis* and one variety of *E. dichotomus* have been recorded from a waterfall in Sikkim as well as in a stream in Odisha.

MATERIALS AND METHODS

Epilithic biofilms attached to the rocks in Banjhagri waterfall (27°21'06.5"N; 88°36'43.2"E), Gangtok, Sikkim-Himalayas and in Panchalingeswar stream (23°41'07.4"N; 87°40'45.3"E), Balasore, Odisha state were collected. Samples were stored in pre-sterilized Tarson specimen tubes, brought to the laboratory for analysis. Temperature, pH and conductivity of the water at the place of collection were recorded. Measurement of the dimension of cells was carried out using ocular and stage micrometer and microphotographs were taken in an Olympus BX41 microscope fitted with Nikon Coolpix 4500 digital camera. Identification of the taxa and comparison with earlier reported species were carried out following Iyengar (1933), Prasad (1985) and Zheng-Yu and Lie-Yu (1998). The holotypes are deposited at the Department of Biotechnology, Visva-Bharati, Santiniketan.

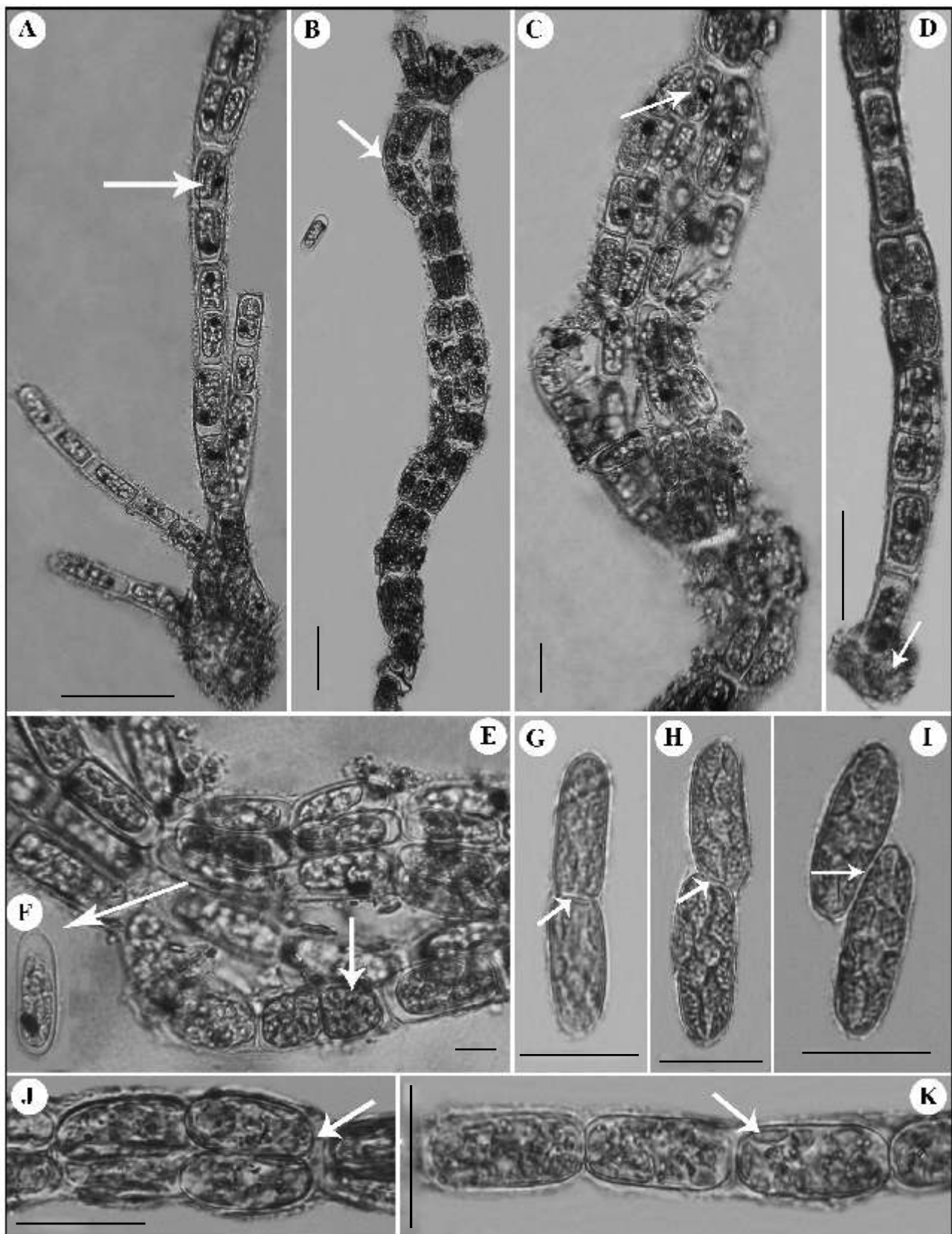
RESULTS

Two new species of *Ecballocystopsis* Iyengar were recorded from lotic water bodies in two different states of eastern region of India. Morphological features of these taxa are as follows:

1. *Ecballocystopsis himalayansis* S. Bhakta & Adhikary sp. nov.

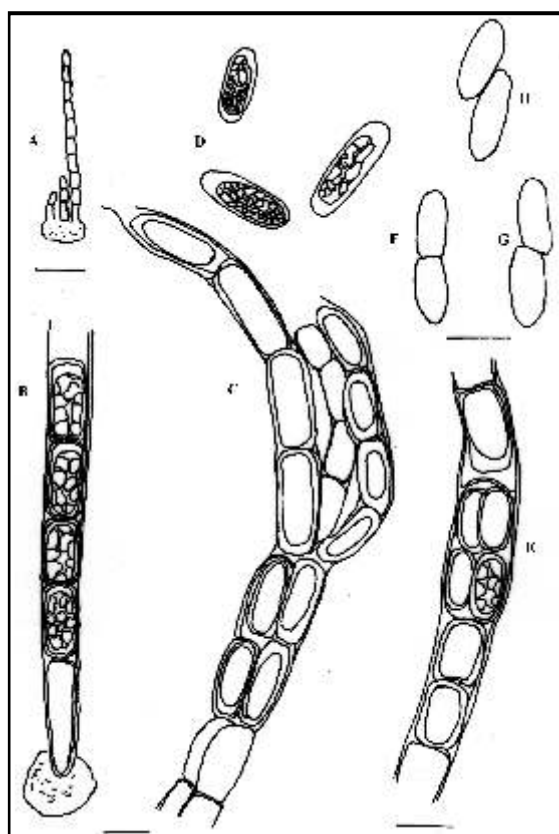
(Fig.1. A-F; Fig. 2. A-D)

Thallus green, composed of more than 150 cells, filamentous, branched, producing loops of 2-6 rows of cells with free apical ends, wall of the cell gelatinized except the end of the filament, basal cell attached to substratum with mucilage, cells elongated, longer than broad, 13 - 18µm broad and 28 - 51µm long, with parietal chloroplasts, pyrenoid absent, absence of polar nodule, however, the mucilaginous thickening sometimes seems like polar nodule, autospore elongated to ellipsoid, liberated from the mature filament, cell division both transverse and longitudinal.



Scale bar : E-K=10μm; C=20μm; A,B & D=50μm

Fig. 1. : *Ecballocystopsis* sp.1 (*E. himalayansis* sp. nov.), (A) cells dividing longitudinally, (B-C) formation of loop with 2-6 rows of cells, (D) mucilaginous base of the filament, (E) autospores in the filament and (F) a single autospore liberated from the filament; *Ecballocystopsis* sp. 2 (*E. dichotomus* var. *minuta* var. nov.), (G-I) cells dividing (G) transversally, (H) obliquely and (I) longitudinally, (J) formation of loop in the filament, and (K) presence of parietal chloroplast.



Scale bar : A = 100µm; B-D = 20µm & E - H = 50µm

Fig. 2. : *Ecballocystopsis* sp. 1 (*E. himalayensis* sp. nov.), (A, B) erect filament with uniseriate cells and mucilaginous base, (C) branched filament showing loop formation, (D) autospores liberated from matured filament; *Ecballocystopsis* sp. 2 (*E. dichotomus* var. *minuta* var. nov.), (E) formation of loop within the filament, (F) cell dividing transversely, (G) obliquely and (H) longitudinally.

Habitat : Attached to rock in the water fall; Temperature - 22 °C; pH- 6.5; Conductivity - 792 µs.

Type : Sikkim, Gangtok, Banjhagri, 2.06.2012, Sukumar Bhakta 1793, (Holo: Department of Biotechnology, Visva-Bharati, Santiniketan).

2. *Ecballocystopsis dichotomus* Zheng-Yu et Lie- Jue var. *minuta* S. Bhakta & Adhikary var. nov.

(Fig. 1. G-K; Fig. 2. E-H)

Thallus dark green, filamentous, branched, composed of less than 50 cells, producing loops of 2 rows of cells, wall of the cell gelatinized, basal cell of the filament attached to substratum with mucilage, cells elongated, longer than broad, 4 - 6µm broad and 11 - 15µm long, chloroplast parietal, cell division transverse, longitudinal and oblique, pyrenoid absent, autospore present.

Habitat : Attached to submerged rocks in fast flowing stream; Temperature - 23.8 °C; pH-8.9; Conductivity- 883µs.

Type : Odisha, Balasore, Panchalingeswar, 25.05.2012, Sukmar Bhakta 4623 (Holo : Department of Biotechnology, Visva-Bharati, Santiniketan).

DISCUSSION

The morphological features of the two new records of *Ecballocystopsis* were compared with the other three species reported previously (Table-1). The newly described taxon, *Ecballocystopsis himalayensis* sp. nov. differs from *E. indica* and *E. dichotomus* in having more than 150 cells in the filament and with larger cell dimensions. The cell division pattern in *E. dichotomus* is transverse, longitudinal and oblique where as the present taxa shows only transverse and longitudinal cell division pattern. It differs from *E. desikacharyi* having *dichotomus* branching and longitudinal cell division, and with *E. indica* with the branching pattern. Since the

Table 1. : Comparison of the morphological features in three species of *Ecballocystopsis* reported earlier with the newly reported taxa of this work.

Features	Earliar reports			Present report	
	<i>Ecballocystopsis indica</i>	<i>Ecballocystopsis desikacharyi</i>	<i>Ecballocystopsis dichotomus</i>	<i>Ecballocystopsis himalayansis</i> sp. nov.	<i>Ecballocystopsis dichotomus</i> var. <i>minuta</i> var. nov.
Cell number	<60	<12	>100	>150	<50
Habitat of occurrence	Inside a waterfall	Moist tree bark	Submerged rock in a ditch	Attached to rock in a water fall	Attached to rock in a fast flowing stream
Polar nodule	+	-	+	-	-
Loop formation	+	-	+	+	+
Dichotomous branching	-	-	+	+	+
Cell length (µm)	17-42	25-65	12-32	28-51	11-15
Cell breadth (µm)	11-16	14-25	7-14	13-18	4-6
Cell division	Transverse and longitudinal	Transverse	Transverse, longitudinal and oblique	Transverse and longitudinal	Transverse, longitudinal and oblique
Altitude (m)	Not mentioned	About 1800	About 250	1765.45	68.18
Location of occurrence	Honey fall Tirunelveli, Tamilnadu	Coonoor, Nilgiris, Tamilnadu	Chong-Yang country, Hubei province, China	Panchalingeswar stream, Balasore, Odisha, India	Banjhagri fall, Gangtok, Sikkim-Himalayas, India

organism significantly differs in the morphological features from other described species of *Ecballocystopsis* (Iyengar 1933, Prasad 1985 and Zheng-Yu and Lie- Jue 1998), it is named as *E. himalayansis* **sp. nov.** after the region where it is occurring. The other taxa is similar to *E. dichotomus* except the absence of polar nodule and with smaller cell dimensions, hence named as *E. dichotomus* var. *minuta* var. nov.

ACKNOWLEDGEMENTS

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पूर्वी भारत से इक्बेलोसायस्टोप्सिस (क्लोरोफायटा) के दो नये टैक्सा

एस. भक्त एवं एस. पी. अधिकारी

सारांश

दो भिन्न अंचलों से प्राप्त वंश इक्बेलोसायस्टोप्सिस (क्लोरोकोक्सेल्स, क्लोरोफायटा) की दो नयी जातियों इ. हिमालयेंसिस जाति नोव. तथा इ. डिकोटोमस प्रभेद माईनुटा प्रभेद नोव. का वर्णन किया गया है। इनमें से एक सिक्किम-हिमालय में एक जल प्रपात में तथा दूसरी ओडिशा में एक झरने से मिली है। इनमें पहली इक्बेलोसायस्टोप्सिस आज तक रिपोर्ट की गयी चौथी जाति एवं दूसरी चीन से पूर्वाभिलेखित इ. डिकोटोमस झेंग-यू ज्यू का एक प्रभेद है। इन जातियों की आकृतिमूलक विशेषताओं का तुलनात्मक विवरण प्रस्तुत किया गया है।