

## Five new species of *Oedogonium* Link (Chlorophyta), a freshwater filamentous algae from Nepal

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### Abstract

The present paper deals with six species of genus *Oedogonium* Link, among which five species are being recorded for the first time from Nepal. They are *Oedogonium leave* Wittrock, *O. peipingense* Jao, *O. pisanum* Wittrock, *O. plagiostomum* Wittrock and *O. undulatum* (Bréb.) A. Braun in De Bary.

**Key words:** *Oedogonium*, Chlorophyceae, filamentous algae, Nepal

### Introduction

Filamentous green algae of Nepal have not been studied adequately so far. Rai and Misra (2007) have reported 11 species of *Spirogyra* Link and 1 species of *Sirogonium* Kützing from east Nepal, all were new to Nepal. *Zygnema pectinatum* Vauch. Ag. is the single species reported from the country from the ponds at Godawari and Thimi (Shrestha & Manandhar, 1983; Haga, 1988). There are four species of *Ulothrix* reported from Nepal viz., *U. subconstricta* West, *U. tenuissima* Kutz. and *U. variabilis* Kutz. from Gaindakot, Tikauli and Narayanghat (Das & Verma, 1996) and *U. zonata* Weber et Mohr Kutz. from Patan and Thimi (Shrestha & Manandhar, 1983). Other filamentous chlorophyceae reported from Nepal belong to 6 taxa of *Trentepohlia* viz., *T. arborum*, *T. aurea*, *T. aurea* var. *polycarpa*, *T. aurea* var. *tenuior*, *T. effuse* var. *subtropica* and *T. monilia* growing on bark of trees in Janakpur and Kathmandu (Dwivedi, 1985; Akiyama, 1989). Similarly, a total 11 taxa of *Stigeoclonium* have been reported as *S. dejectum* and *S. echinalum* from Khumbu Himal (Kusel-fetzmann, 1969), *S. flagelliferum* from Kirtipur (Shrestha & Manandhar, 1983), *S. amoenum* and *S. nanum* from Janakpur (Dwivedi, 1985), *S. elongatum* from Rara lake (Watanabe, 1995), *S. stagnale* from Tandhi (Das & Verma, 1996) and *S. farctum*, *S. fasciculare*, *S. flagelliferum* and *S. pachydermum* from Koshi Tappu (Kargupta & Jha, 1997). Dwivedi (1985) has also reported 6 taxa of chaetophorales from Janakpur, all new for the country. Haga (1988) of Hokkaido University has reported 9 species of filamentous chlorophyceae from Kathmandu among which *Geminella minor*, *Klebsormidium pseudomirabile*, *Uronema confervicolum*, *U. gigas* and *Gongrosira papuasias* were new for Nepal.

Literature reveal that only five species of *Oedogonium* are reported from Nepal hitherto (Prasad, 2011). They are *O. cardiacum* (Hass.) Wittr. reported from Kathmandu (Shrestha & Manandhar, 1983); *O. rothii* (Le Cl) Pringsh. and *O. tapeinosportum* Wittr. from Rara lake (Watanabe, 1995); and *O. pseudoreum* Jao and *O. nanum* Wittr. from Mahendranagar (Habib, 1997). Thus an attempt was made to study the *Oedogonium* algae from east Nepal. This report may help to add the filamentous green algae to the algal database of Nepal.

## Materials and Methods

Algal samples were collected from different localities of eastern Nepal among which the samples collected from Koshi Barage reservoir, Titrigachi pond, Sawane-Thingabari rice field, roadside ditches at Tarahara and Rauta pokhari bear the specimens of *Oedogonium* (Fig. 1). Algae were picked up simply by hand from shallow edges of the ponds or occasionally by plankton net and then preserved in 4% formaldehyde solution. Preliminary screening of *Oedogonium* species from the samples was made in the Algae Research Lab, Department of Botany, P.G. Campus. Microphotography and measurement of specimens were carried out with the help of Olympus binocular microscope model CH20i and Canon digital camera. Identification was made with the help of relevant literature following Prescott (1951), Tiffany and Britton (1952), Gonzalves (1982) etc.



Figure 1. *Oedogonium* collection localities (1-5) in eastern Nepal.

## Results

### *Systematic position*

Phylum: Chlorophyta  
 Subphylum: Tetraphytina  
 Class: Chlorophyceae  
 Order: Oedogoniales  
 Family: Oedogoniaceae  
 Genus: *Oedogonium* Link 1820

### *Genus character*

Filament single, unbranched and attached or free-floating; vegetative cell uninucleate, cylindrical, or *sometimes* capitellate, nodulose or undulate and anterior end with caps or ring-like scars formed by cell division; basal cell having holdfast; terminal cell obtuse, apiculate or hyaline; chloroplast parietal, reticulate with numerous pyrenoids.

Reproduction by multiflagellate zoospores; oogonia and eggs, antheridia and multiflagellate sperms, oospores; dwarf males, androsporangia, androspores.

### *Key to the species*

1. Dwarf male plants present, attached on or near oogonia; walls of vegetative cells undulate; vegetative cells 66 µm long, 18.7 µm broad.----- *O. undulatum*
1. Dwarf male plants absent. 2
  2. Oogonia opening by a pore; wall of oospores smooth.----- 3
  2. Oogonia opening by a lid; dioecious.----- 5
3. Monoecious; oogonia depressed-globose, 24-29.5µm long, 24.5-30µm broad.--- *O. laeve*
3. Dioecious; oospores globose, subglobose or cylindric globose.----- 4
  4. Female vegetative cells 40-60 µm long, 20 µm broad; oogonia 45 µm long, 41 µm in diameter.----- *O. plagiosomum*
  4. Female vegetative cells 110-150 µm long, 30-32 µm broad; oogonia 80 µm long, 66 µm in diameter.----- *O. peipingense*
5. Operculum median; oogonia depressed-globose or subpyriform-globose, 19.5-21.5 µm long, 19 µm in diameter; oospores not filling the oogonia.----- *O. tapeinosporum*
5. Operculum superior; oogonia ovoid to ellipsoid-ovoid, 40 µm long, 36 µm in diameter.--  
----- *O. pisanum*

### *Taxonomic description*

#### **1. *Oedogonium laeve* Wittrock (Pls. 1-2)**

Prescott, G.W. 1951, p. 179; Tiffany, L.H. and Britton, M.E. 1952, p. 64, pl. 17, fig. 130.

Taxonomic characters: Monoecious, macrandrous; vegetative cell cylindrical, 25-29 µm long, 9-10 µm broad; oogonium solitary, depressed globose, pore median, 24-29.5 µm long, 24.5-30 µm broad; oospore depressed globose, filling oogonia, wall smooth, 23-26 µm long, 30-35 µm broad; antheridia not seen.

Localities: Rauta Pokhari, 26°55'53.24"N & 86°41'21.73"E, 1770 m, Udayapur; Roadside ditches at Tarahara, 26°42'25.36"N & 86°16'36.47"E, 142.98 m, Sunsari.

Collection numbers and dates: EN 300 (03-11-2004); EN 302 (10-09-2004).

Distribution in Nepal: New record for Nepal.

## **2. *Oedogonium peipingense* Jao (Pl. 3)**

Gonzalves, E.A. 1982, p. 334, fig. 9.227; Misra *et al.* 2002, p. 108, pl. 1, figs. 11, 14.

Taxonomic characters: Female vegetative cell 110-150  $\mu\text{m}$  long, 30-32  $\mu\text{m}$  broad; oogonium 80  $\mu\text{m}$  long, 66  $\mu\text{m}$  in diameter.

Locality: Roadside ditches at Tarahara, 26°42'25.36"N & 86°16'36.47"E, 142.98 m, Sunsari.

Collection number and date: EN 302 (10-09-2004).

Distribution in Nepal: New record for Nepal.

World distribution: India (Misra *et al.*, 2002).

## **3. *Oedogonium pisanum* Wittrock (Pl. 4)**

Prescott, G.W. 1951, p. 186, pl. 36, figs. 8-9; Tiffany, L.H. and Britton, M.E. 1952, p. 80, pl. 22, figs. 196-197.

Taxonomic characters: Dioecious, macrandrous; vegetative cell cylindrical, 40-55  $\mu\text{m}$  long, 13-16  $\mu\text{m}$  broad; oogonium solitary, ellipsoid to ovoid, operculate, division superior, 40  $\mu\text{m}$  long, 36  $\mu\text{m}$  broad; oospore globose, nearly filling oogonium, wall smooth, 18-37  $\mu\text{m}$  long, 18-25  $\mu\text{m}$  broad; antheridium 5-8  $\mu\text{m}$  long, 6-8  $\mu\text{m}$  broad.

Locality: Paddy fields at Sawane-Thingabari, 26°47'40.50"N & 87°19'26.94"E, 495 m, Panchakanya, Sunsari.

Collection number and date: EN 24 (30-08-2002).

Distribution in Nepal: New record for Nepal.

World distribution: Britain (Huxley & Pentecost, 2002), Portugal (Cambra Sánchez *et al.*, 1998), Spain (Alvárez Cobelas & Gallardo 1986), Victoria (Day *et al.*, 1995).

## **4. *Oedogonium plagiostomum* Wittrock (Pl. 5)**

Prescott, G.W. 1951, p. 173, pl. 32, figs. 3-4; Tiffany, L.H. and Britton, M.E. 1952, p. 70, pl. 18, figs. 142-143.

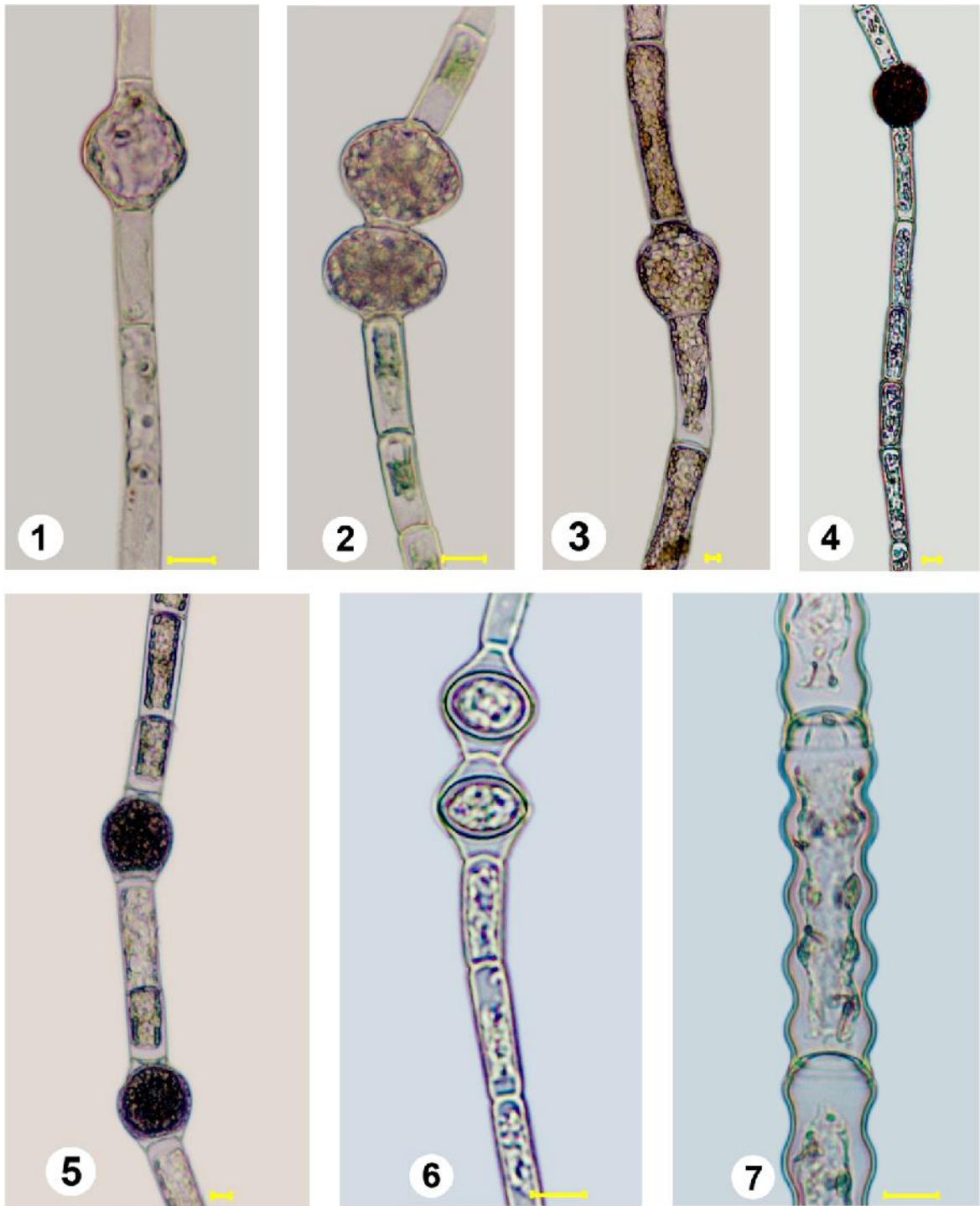
Taxonomic characters: Dioecious, macrandrous; vegetative cell cylindrical, rather stout, 40-60  $\mu\text{m}$  long, 20  $\mu\text{m}$  broad; oogonium solitary, obovoid-globose, pore superior, 45  $\mu\text{m}$  long, 41  $\mu\text{m}$  broad; oospore globose, wall thick and smooth, 40  $\mu\text{m}$  broad; antheridium 8-12  $\mu\text{m}$  long, 20-24  $\mu\text{m}$  broad.

Locality: Roadside ditches at Tarahara, 26°42'25.36"N & 86°16'36.47"E, 142.98 m, Sunsari.

Collection number and date: EN 302 (10-09-2004).

Distribution in Nepal: New record for Nepal.

World distribution: India (Anonym, 2012), Queensland (Bostock & Holland, 2010).



Plates 1-2. *Oedogonium laeve* Wittrock, Plate 3. *O. peipingense* Jao, Plate 4. *O. pisanum* Wittrock, Plate 5. *O. plagiostomum* Wittrock, Plate 6. *O. tapeinosporum* Wittrock, Plate 7. *O. undulatum* (Bréb.) A. Braun in De Bary. (Scale bar in each plate = 10  $\mu$ m)

**5. *Oedogonium tapeinosporum*** Wittrock (Pl. 6)

Prescott, G.W. 1951, p. 188, pl. 38, figs. 11-12; Watanabe, M. 1995, p. 10, fig. 27.

Taxonomic characters: Dioecious, macrandrous; vegetative cell cylindrical, 22-27  $\mu\text{m}$  long, 5-8  $\mu\text{m}$  broad, basal cell hemispherical; oogonium solitary, globose to subelliptical, operculate, division median, 19.5-21.5  $\mu\text{m}$  long, 19  $\mu\text{m}$  broad; oospore globose, not filling oogonium, wall smooth, 17-17.5  $\mu\text{m}$  long, 12.5-13  $\mu\text{m}$  broad; antheridium not seen.

Locality: Titrigachi pond, 26°37'04.16"N & 87°01'27.99"E, 216 m, Koshi Tappu, Kusaha, Sunsari.

Collection number and date: EN 101 (21-12-2002).

Distribution in Nepal: A small pond south of Rara lake, 3,030 m, Kaski (Watanabe, 1995). New for eastern Nepal.

World distribution: Britain (Huxley & Pentecost, 2002), Portugal (Cambra Sánchez *et.al.*, 1998), Queensland (Bostock & Holland, 2010).

**6. *Oedogonium undulatum*** (Bréb.) A. Braun in De Bary (Pl. 7)

Prescott, G.W. 1951, p. 209, pl. 40, figs. 3-5; Tiffany, L.H. and Britton, M.E. 1952, p. 84, pl. 24, fig. 229.

Taxonomic characters: Dioecious, nannandrous, gynandrosporous or idioandrosporous; vegetative cell capitellate, 4-5 undulation per cell, 66  $\mu\text{m}$  long, 18.7  $\mu\text{m}$  broad, constrictions 14  $\mu\text{m}$  wide, basal cell elongate and not undulate; oogonium solitary or two, subglobose or ellipsoid-globose, operculate, division inferior, wide; oospore globose, filling the oogonia, wall smooth, 48  $\mu\text{m}$  broad; antheridium not seen.

Locality: Water reservoir south of highway adjacent to the boarder of India, between Koshi Barrage and Bhandabari, 26°31'14.60"N & 86°57'08.44"E, 162 m, Sunsari.

Collection number and date: EN 128 (29-03-2003).

Distribution in Nepal: New record for Nepal.

World distribution: Britain (Huxley & Pentecost, 2002), China (Hu & Wei, 2006), New South Wales, Northern Territory, Pakistan (Munir *et al.*, 2007), Queensland, Romania (Caraus, 2012), Spain (Cambra Sánchez *et.al.*, 1998), Victoria (Day *et al.*, 1995).

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