

Occurrence of genus *Scenedesmus* Mayen (Chlorophyceae) from East Nepal

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Abstracts

A total 18 taxa of genus *Scenedesmus* (Chlorococcalean algae) has been reported from the freshwater habitats of east Nepal. Among them, 5 taxa viz., *Scenedesmus abundans*, *S. arcuatus* var. *platydiscus*, *S. disciformis*, *S. hystrix*, and *S. perforatus* are new records for Nepal. A total 12 taxa viz., *S. acuminatus*, *S. acutus*, *S. armatus* var. *asymmetricus*, *S. bernardii*, *S. bijuga*, *S. bijugatus* var. *graevenitzii*, *S. dimorphus*, *S. opoliensis*, *S. prismaticus*, *S. quadricauda* var. *longispina*, *S. quadricauda* var. *westii* and *S. smithii* are first time reported from east Nepal.

Key words: Green algae, chlorococcales, *Acutodesmus*, *Comasiella*, *Desmodesmus*, taxonomy, new to Nepal.

Introduction

Scenedesmus Mayen is a chlorococcalian freshwater green algae. It is single celled or colonial with 2, (usually 4 or 8), 16 to 32 celled coenobia. In colonial form, cells are arranged linearly in one row (4 celled) or alternately in 2 to 3 rows (8 or more celled), attaching with lateral walls or in sub-polar region only. Each cell is spherical to ellipsoidal, elongate or fusiform in shape; 3-78 μm long, 2-10 μm broad; apices capitate, obtuse, acute or tapering; cell wall ribbed, granulated or dented without spines. Nucleus single; chloroplast single, parietal with single pyrenoid. Reproduce asexually by non-motile autospores; sexual reproduction is rare, only reported in *S. obliquus*.

Scenedesmus is planktonic in eutrophic freshwater ponds and lakes distributed world-wide in all climates. It tolerates slight acidity but only low salinity and appropriate temperature for its growth is 28-30°C. *Scenedesmus* is used as a biological tool for physiological experiments and pollution problems. In sewage treatment, it provides oxygen to the bacteria for the breakdown of organic matters. *Scenedesmus obliquus* and *S. obtusus* are produced in mass culture and used as food because they contain rich protein and minerals. Recently, after *Botriococcus*, it is one of the important algae using for the production of biofuel.

There are more than 461 species of *Scenedesmus* recorded throughout the World, of which 74 are currently accepted taxonomically (Guiry & Guiry, 2013). The genus *Scenedesmus* was named by Meyen (1829). *Scenedesmus* of Nepal has been studied by Hirano (1955, 1963), Hickel (1973a, b), Nakanishi (1986), Nakano and Watanabe (1988), Sahay *et al.* (1992), Chaturvedi and Habib (1996), Das and Verma (1996) and Rai (2009) and altogether 46 species of *Scenedesmus* have been reported from the country till the time. Most of the species were reported from Kaski (Phewa, Rupa, Begnas, Khaste Lakes), Kathmandu (Rani Pokhari, Taudaha, Boudha), Lalitpur (Godawari), Chitwan (Narayangar), Nawalparasi (Gaindakot), Kanchanpur (Mahendranagar), Makawanpur (Hetauda fish pond, Kara river), Gorkha (Arughat, Ankhu

Khola, Luitel Bhanjyang), and Mustang (Tukucha Moor, Pisang) districts. The present communication described total taxa of genus *Scenedesmus* from east Nepal.

Materials and Methods

Algae samples were collected from lotic and lentic habitats of eastern Nepal with the help of plankton mesh net and by squeezing submerged parts of aquatic macrophytes and preserved in 4% formalin solution. Glycerine-mount temporary slides of fresh material were prepared and observed by LM Leica under 40X magnification. Photomicrography was taken with the help of Canon digital camera and identification was done following Prescott (1951), Philipose (1967), Hegewald and Silva (1988), John and Tsarenko (2002), and Guiry and Guiry (2013). Dimension of coenobia and cells, number and pattern of arrangement of cells in a colony, spines etc are considered as criterion for identification.

Taxonomic Description

Systematic position of *Scenedesmus* according to Guiry and Guiry (2013) is as follows:

Empire: Eukaryota
 Kingdom: Plantae
 Phylum: Chlorophyta
 Class: Chlorophyceae
 Order: Sphaeropleales
 Family: Scenedesmaceae
 Subfamily: Scenedesmoidea
 Genus: *Scenedesmus* Meyen 1829.

Kessler *et al.* (1997) has classified *Scenedesmus* into two subgenera i.e., *Scenedesmus* for non-spiny forms and *Desmodesmus* for spiny forms, on the basis of 16S rRNA gene sequence, DNA base composition, and DNA/DNA hybridization analysis. Later on, An *et al.* (1999) has confirmed a distinct separation between them by analyzing ITS-2 rDNA sequence and get separated into two distinct genera.

The lectotype of *Scenedesmus* is *Scenedesmus obtusus* Meyen. They are described as follows.

1. *Scenedesmus abundans* (Kirchner) Chodat (Figs. 22, 32, 33) (**Basionym:** *Scenedesmus caudatus* f. *abundans* Kirchner; **Heterotype:** *Scenedesmus sempervirens* Chodat)

Current accepted name *Desmodesmus abundans* (Kirchner) E. Hegewald

Characters: Colonies 2 to 4 celled, rarely 8 celled, arranged in a linear series; cells ovoid to oblong-ovoid, external cells with one or more median lateral spines from the outer face in addition to spines from the four corners of the colony, internal cells with 1-2 spines from their poles, or rarely without spines.

Dimension: Cells 6-15 µm long, 2-7 µm broad; spines 3.5-8 µm long.

Locality and Date: A pond at Koshi Tappu Wildlife Reserve, 81 m, Sunsari, Nepal (2065/8/11).

Distribution in Nepal: New to Nepal.

Distribution in the World: New South Wales, Queensland (Day *et al.*, 1995), Britain (John & Tsarenko, 2002), Iran (Afsharzadeh *et al.*, 2003), China (Cao *et al.*, 2005), Singapore (Pham *et al.*, 2011), Romania (Carauş, 2012).

2. *Scenedesmus acuminatus* (Lagerheim) Chodat (Figs. 23-25, 27, 28) (**Basionym:** *Selenastrum acuminatum* Lagerheim; **Homotype:** *Selenastrum acuminatum* Lagerheim; **Heterotypes:** *Scenedesmus acuminatus* var. *elongatus* G.M. Smith, *S. obliquus* var. *acuminatus* (Lagerheim) Chodat, *S. falcatus* Chodat, *S. bernardii* G.M. Smith, *S. acuminatus* var. *minor* G.M. Smith, *S. falcatus* f. *tortuosa* Skuja, *S. acuminatus* f. *tortuosus* (Skuja) Korshikov)

Current accepted name: *Acutodesmus acuminatus* (Lagerheim) Tsarenko

Characters: Colonies curved, usually 4 celled, sometimes 8 celled; cells fusiform, lunate with sharp pointed ends; external cells usually sharply lunate, internal cells sometimes flat; rarely, all cells in the same plane; cell wall smooth, without teeth or spines.

Dimension: Cell 12-45 µm long (between apices), 2-7 µm broad.

Locality and Date: Shallow marshy land at Koshi Tappu Wildlife Reserve, 80 m, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: Rupa and Khaste Lakes, 900 m, Kaski (Hickel, 1973a); Fish pond near Mahendranagar road, Kanchanpur (Chaturvedi & Habib, 1996).

Distribution in the World: Victoria (Day *et al.*, 1995), Britain (John & Tsarenko, 2002), Cuba, New South Wales, Pakistan (Mehwish & Aliya, 2005), Canary Islands, China (Hu & Wei, 2006), Turkey (Ersanli & Gönülol, 2006), Brazil (Menezes, 2010), Spain (Pérez *et al.*, 2010), Singapore (Pham *et al.*, 2011), Portugal, Queensland, Romania (Carauş, 2012).

3. *Scenedesmus acutiformis* Schröder (Figs. 1, 16, 17, 20)

Current accepted name: *Enallax acutiformis* (B. Schröder) F. Hindák

Characters: Colonies flat, usually 4 celled, sometimes 2 to 8 celled; cells arranged in a linear series, each cell fusiform, cylindrical with acute apices and a lateral longitudinal ridge; poles without teeth or spines; cell wall smooth.

Dimension: Cells 17.5-21.5 µm long, 6-6.5 µm broad.

Locality and Date: A shallow marshy land, 80 m, Koshi Tappu Wildlife Reserve, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: Pond near Godawari fish farm, 1500 m, Lalitpur (Nakano & Watanabe, 1988); Karra river at Hetauda, 500 m, Makawanpur (Sahay *et al.*, 1992); Mai Pokhari lake, 2150 m, Ilam (Rai, 2009)

Distribution in the World: Spain, Victoria (Day *et al.*, 1995), Britain (John & Tsarenko, 2002), New South Wales, Pakistan (Mehwish & Aliya, 2005), China (Hu & Wei, 2006), Romania (Carauş, 2012)

4. *Scenedesmus acutus* Meyen (Fig. 26) (**Heterotypes:** *Scenedesmus dimorphus* f. *granulatus* Isabella & R.J. Patel, *Arthrodesmus acutus* Ehrenberg ex Ralfs, *Scenedesmus crassus* Chodat, *Scenedesmus scenedesmoides* Chodat)

Current accepted name: *Scenedesmus obliquus* (Turpin) Kützing

Characters: Colonies usually 4 celled, sometimes 2 to 8 celled, mostly with clearly alternating cells, rarely solitary cells or forming one serial row; cells spindle, internal cells straight, external ones clearly arcuate; young ones concave, older ones slightly convex but with curved ends; poles sometimes finger-like extended; cell wall smooth.

Dimension: Cells 10.4-24 μm long, 3-7.2 μm broad.

Locality and Date: A shallow marshy land at Koshi Tappu Wildlife Reserve, 80 m, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: A pond at Ankhu Khola, 640 m, Gorkha (Hirano, 1955).

Distribution in the World: Denmark (Ettl & Gärtner, 1995), New South Wales (Day *et al.*, 1995), Spain (Aboal, 1996), China (Cao *et al.*, 2005), Argentina (Rodriguez *et al.*, 2006), Brazil (Menezes, 2010), Queensland, Romania (Caraus, 2012).

5. *Scenedesmus arcuatus* Lemm. var. *platydiscus* G.M. Smith (Fig. 4)

Current accepted name: *Comasiella arcuata* var. *platydisca* (G.M. Smith) E. Hegewald et M. Wolf

Characters: Colonies flat, 8 celled, arranged in double rows; cells oblong-ellipsoidal with rounded ends, cells between two rows distinctly alternate; without teeth or spines; cell wall smooth.

Dimension: Cells 8-14 μm long, 4-5.5 μm broad.

Locality and Date: Titrigachi pond and a shallow marshy land, 80 m, Koshi Tappu Wildlife Reserve, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: New to Nepal.

Distribution in the World: Queensland (Day *et al.*, 1995), Balearic Islands (Cambra Sánchez *et al.*, 1998), Britain (Whitton *et al.*, 2003), Turkey (Soylu & Gönülol, 2006), Spain (Fanés Treviño *et al.*, 2009), Brazil (Menezes, 2010).

6. *Scenedesmus armatus* (Chodat) G.M. Smith var. *asymmetricus* Philip. (Fig. 21)

Current accepted name: *Desmodesmus armatus* (R. Chodat) E. Hegewald var. *asymmetricus* Philip.

Characters: Colonies 4 - 8 celled, arranged in one row; a fairly long oblique spine from one pole of the terminal cell and a short more or less erect spine from the other pole, the long and short spines of the two terminal cells alternating with each other, one half of the internal cells with a short spine from one pole and the other half with a similar spine from the opposite pole, the short spines of the terminal and internal cells of each half of the colony standing in a row.

Dimension: Cells 11-12.3 μm long, 3.5-4.4 μm broad; short spines 3-3.5 μm long, long spines 5.8-6.2 μm long.

Locality and Date: A shallow marshy land, 80 m, Koshi Tappu Wildlife Reserve, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: Pond near Sarada Dam, Mahendranagar (Chaturvedi & Habib, 1996).

Distribution in the World: Kerala, India (Philipose, 1967).

7. *Scenedesmus bernardii* G.M. Smith (Fig. 12)

Current accepted name: *Acutodesmus bernardii* (G.M. Smith) E. hegewald, C. Bock et Krienitz

Characters: Colonies 4 to 8 celled; internal cells fusiform, lunate or sigmoid with acute apices and arranged alternately with their apices in contact with the apices or median portions of adjacent cells; terminal cells fusiform or lunate, usually attached to the apices of the inner cell and frequently at an angle to the plane of the colony; cell without teeth and spines; cell wall smooth.

Dimension: Cells 8-25 μm long, 3-5.5 μm broad.

Locality and Date: An artificial pond near human settlement area, 81 m, Koshi Tappu Wildlife Reserve, Sunsari (2065/08/11).

Distribution in Nepal: A pond near Arughat, 770 m, Gorkha (Hirano, 1963); Fish pond at Hetauda, Makawanpur (Sahay *et al.*, 1992).

Distribution in the World: Australia and New Zealand (Day *et al.*, 1995), Britain (Whitton *et al.*, 2003), Romania (Caraus, 2012).

8. *Scenedesmus bijuga* Turpin (Lagerheim) (Figs. 29-31) (**Basionym:** *Achnanthes bijuga* Turpin)

Characters: Colonies 2, 4, or 8 celled, flat, arranged in one linear row; cells oblong to ovoid with broadly rounded ends, external cells broader than the internal ones with convex outer margin, internal cells narrower with broadly rounded ends; without teeth and spines.

Dimension: Cells 9-15 μm long, 3-5 μm broad.

Locality and Date: An artificial pond near human settlement area, 81 m, Koshi Tappu Wildlife Reserve, Sunsari (2065/08/11).

Distribution in Nepal: Rupa and Begnas lakes, 900 m, Kaski (Nakanishi, 1986).

Distribution in the World: Spain (Alvarez Cobelas & Gallardo, 1986), Arkansas, North America (Smith, 2010), Singapore (Pham *et al.*, 2011).

9. *Scenedesmus bijugatus* (Turp.) Kütz. var. *graevenitzii* (Bernard) Chodat (Figs. 5, 19, 40, 41)

Characters: Colonies 4 to 8 celled; cells fusiform, ellipsoid, oblong-ellipsoid to ovoid with obtuse apices, cells arranged in alternate series with adjacent cells in contact only along a short portion of their length; without teeth and spines.

Dimension: Cells 11-16 μm long, 4.5-6.5 μm broad.

Locality and Date: Locality and Date: Triyuga river, 152 m, Gaighat, Udayapur (2003/05/25); A shallow marshy land, 80 m, Koshi Tappu Wildlife Reserve, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: Lamaha river (Sahay *et al.*, 1992).

Distribution in the World: North America (Prescott, 1951), India (Philipose, 1967).

10. *Scenedesmus dimorphus* (Turp.) Kütz. (Fig. 34) (**Basionym:** *Achnanthes dimorpha* Turpin; **Homotype:** *Scenedesmus obliquus* var. *dimorphus* (Turpin) Hansgirg, *S. acutus* var. *dimorphus* (Turpin) Rabenhorst, *Achnanthes dimorpha* Turpin; **Heterotype:** *Scenedesmus antennatus* Brébisson, *S. costulatus* Chodat, *S. acutus* var. *obliquus* Rabenhorst)

Current accepted name: *Acutodesmus dimorphus* (Turpin) Tsarenko

Characters: Colonies 4 to 8 celled; cells arranged in a linear or sub-alternating series (in 8 celled colony); cells fusiform, external cells more or less lunate or curved, internal cells straight and more or less hexagonal in shape; cell apices sharp and acute, without teeth and spines.

Dimension: Cells 17-20 µm long, 3-5 µm broad.

Locality and Date: Birat Pokhari, 135 m, Anarmani, Jhapa (2004/06/17); A shallow marshy land, 80 m, Koshi Tappu Wildlife Reserve, Sunsari, Nepal (2065/9/18).

Distribution in Nepal: A pond at Baudha, 1300 m, Kathmandu (Hirano, 1963); Fish pond at Hetauda, Makawanpur (Sahay *et al.*, 1992).

Distribution in the World: Northern Territory, Queensland and Victoria (Day *et al.*, 1995), Britain (Whitton *et al.*, 2003), Spain, Pakistan (Leghari *et al.*, 2005), China (Hu & Wei, 2006), Turkey (Ersanli & Gönülol, 2006), Iran (Ramzannejad Ghadi, 2008), Arkansas (Smith, 2010), Brazil (Menezes, 2010), New Zealand (Broady *et al.*, 2012), Queensland, Romania (Caraus, 2012).

11. *Scenedesmus disciformis* (Chodat) Fott et Komárek (Fig. 11) (**Basionym:** *Scenedesmus bijugatus* var. *disciformis* Chodat)

Current accepted name: *Scenedesmus verrucosus* Y.V. Roll

Characters: Colonies 2, 4, usually 8 celled; cells arrange in two rows, each joined together without distinct openings; each cell cylindrical with rounded tops slightly arcuated, on the margin with concave or convex outer sides; cell wall smooth.

Dimension: Cells 17-20 µm long, 8-9.5 µm broad.

Locality and Date: MMAM Campus pond, 72 m, Biratnagar, Morang (2004/02/02); A shallow pond, 80 m, Koshi Tappu Wildlife Reserve, Sunsari, Nepal (2065//11).

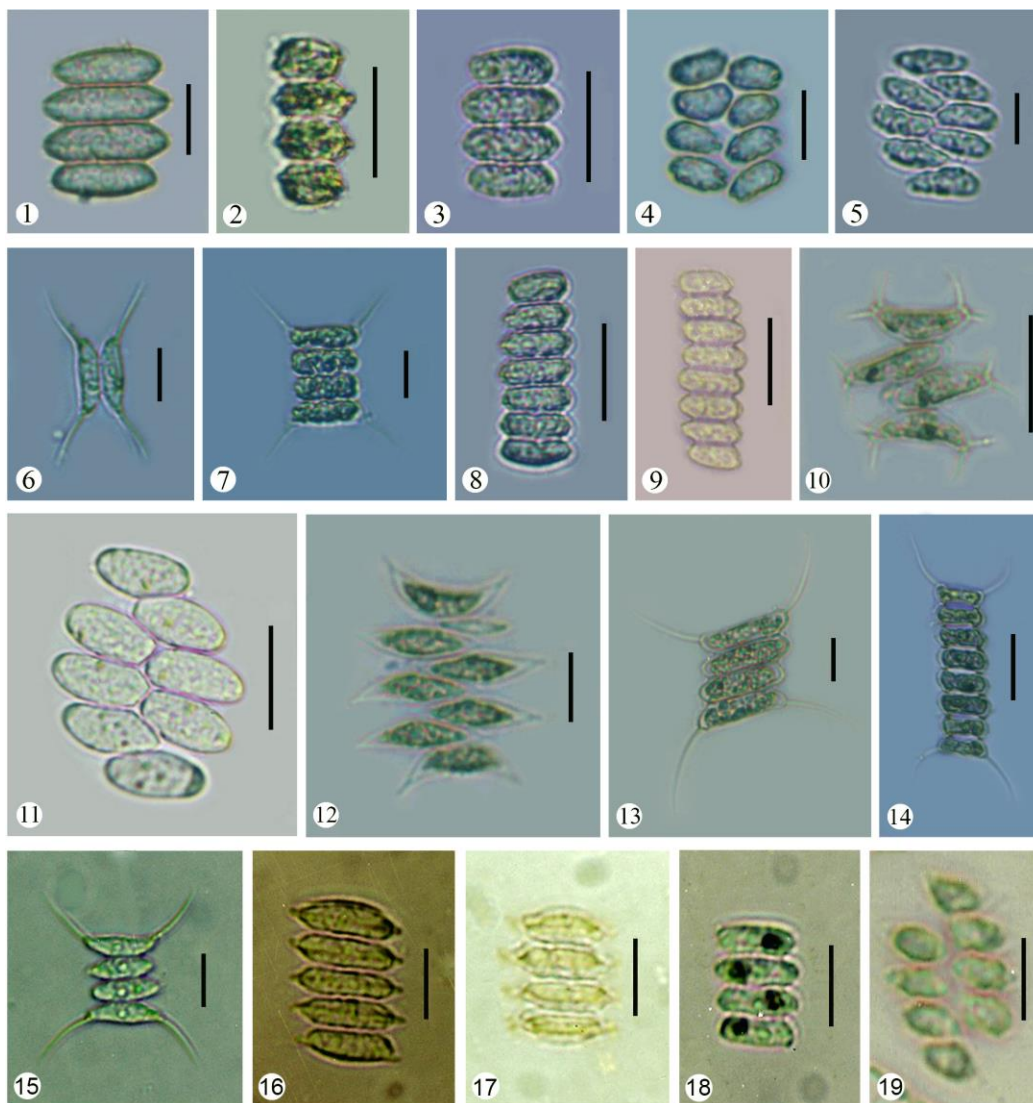
Distribution in Nepal: New to Nepal.

Distribution in the World: Spain (Aboal, 1996); Romania (Caraus, 2012).

12. *Scenedesmus hystrix* Lagerheim (Figs. 3, 8, 9, 18)

Current accepted name: *Desmodesmus hystrix* (Lagerheim) E.H. Hegewald

Characters: Colonies 2, 4, 8 celled; cells arranged in one linear series; each cell oblong-cylindrical with obtuse ends; cell membrane covered with minute spines.



Figures: 1, 16, 17. *Scenedesmus acutiformis*; 2. *S. prismaticus*; 3, 8, 9, 18. *S. hystrix*; 4. *S. arcuatus* var. *platydiscus*; 5, 19. *S. bijugatus* var. *gravenitzii*; 6, 15. *S. opoliensis*; 7. *S. quadricauda* var. *longispina*; 10. *S. smithii*; 11. *S. disciformis*; 12. *S. bernardii*; 13. *S. quadricauda* var. *westii*; 14. *S. perforatus* (Scale bar = 10 μ m)

Dimension: Cells 13-19 μ m long, 4-7 μ m broad.

Locality and Date: Triyuga river, 152 m, Gaighat, Udayapur (2003/05/25).

Distribution in Nepal: New to Nepal.

Distribution in the World: Queensland (Day *et al.*, 1995), Spain (Cambra Sánchez *et al.*, 1998), Andorra, Balearic Islands, Britain (John & Tsarenko, 2002), Pakistan (Mehwish & Aliya, 2005), Romania (Caraus, 2012).

13. *Scenedesmus opoliensis* P.G. Richter (Figs. 6, 15, 35-39) (**Heterotype:** *Scenedesmus carinatus* f. *brevicaudatus* Uherkovich; *Scenedesmus opoliensis* var. *setosus* Dedusenko)

Current accepted name: *Desmodesmus opoliensis* (P.G. Richter) E. Hegewald

Characters: Colonies 2, 4 celled; cells cylindrical to subfusiform, arranged in a linear series; adjacent cells in contact only along one third of their length; internal cells tumid in the median region and attenuated towards the ends; terminal cells often narrower and sub-rectangular; poles of all cells semitruncate to rostrate, sometimes ending in one or two very short spines; terminal cells with long, more or less recurved spine.

Dimension: Cells 13-15 μm long, 4.2-4.5 μm broad; spines 11-12.5 μm long.

Locality and Date: Hattisar Campus pond, 511 m, Dharan, Sunsari (2004/05/28).

Distribution in Nepal: Rupa lake and Khaste lake, 900 m, Kaski (Hickel, 1973a); A pond at Custom Office, Mahendranagar, Kanchanpur (Chaturvedi & Habib, 1996).

Distribution in the World: New South Wales and Victoria (Day *et al.*, 1995), Portugal and Spain (Cambra Sanchez *et al.*, 1998), Britain (Whitton *et al.*, 2003), China (Hu & Wei, 2006), Turkey (Ersanli & Gönülol, 2006), Arkansas (Smith, 2010), Singapore (Pham *et al.*, 2011), Romania (Caraus, 2012).

14. *Scenedesmus perforatus* Lemm. (Fig. 14)

Current accepted name: *Desmodesmus perforatus* (Lemmermann) E. Hegewald

Characters: Colonies usually 8 celled, sometimes 4 celled; cells with capitate ends; outer face of external cells slightly convex, inner face concave; poles curved outwards and with a long recurved spine; internal cells with concave sides and with linear to lenticular perforations between adjacent cells; cell membrane smooth or punctuate.

Dimension: Cells 16.5 μm long, 5-5.5 μm broad; spines 18 μm long; opening between the cells 1.4 μm .

Locality and Date: Mechi Pokhari, 80 m, Mahespur, Bhadrapur, Jhapa (2004/06/17).

Distribution in Nepal: New to Nepal.

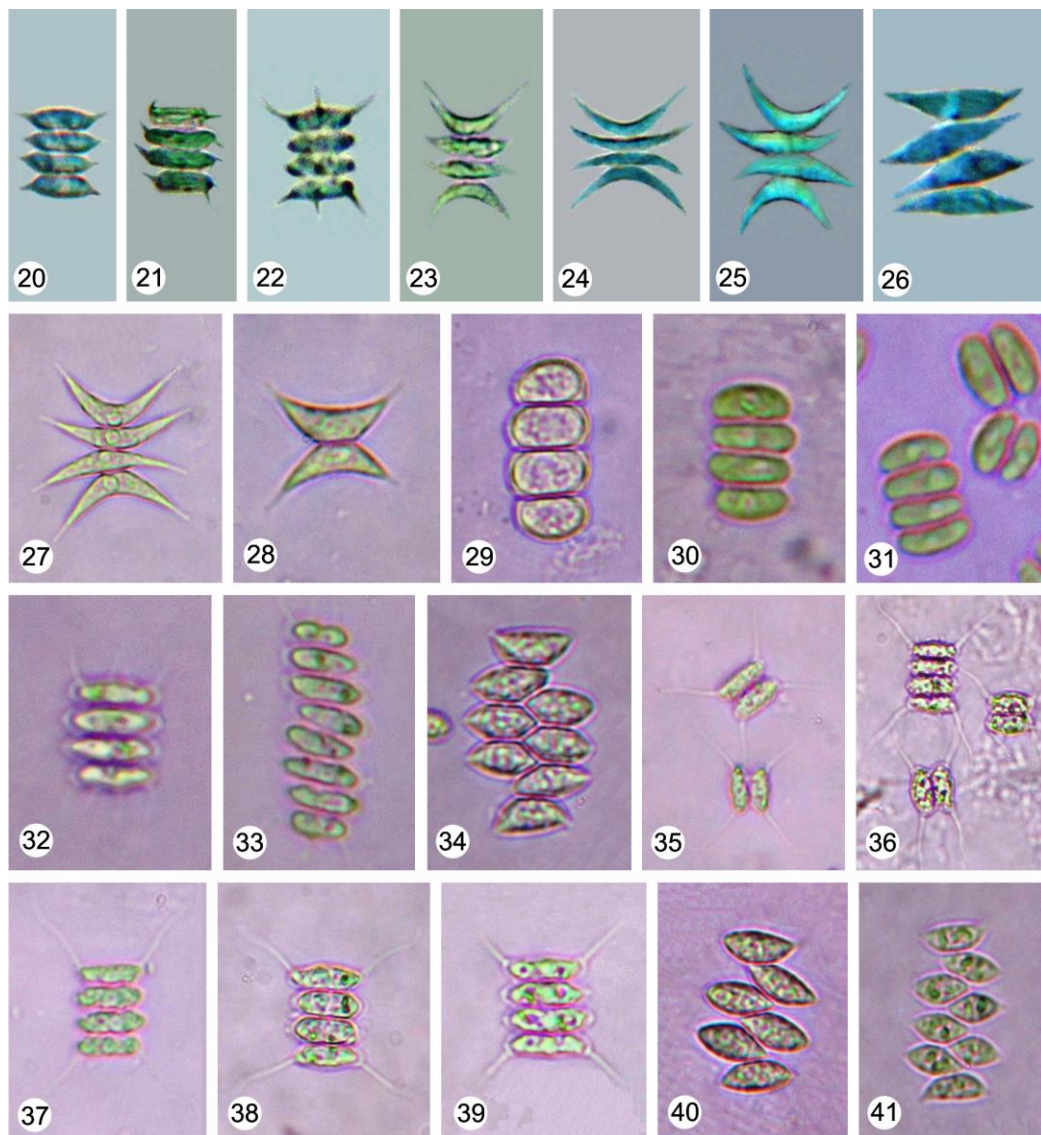
Distribution in the World: Australia and New Zealand (Day *et al.*, 1995), Pakistan (Mehwish & Aliya, 2005), China (Hu & Wei, 2006), Turkey (Ersanli & Gönülol, 2006).

15. *Scenedesmus prismaticus* Bruehl et Biswas (Fig. 2)

Characters: Colonies 4 celled; cells arranged in a single linear series; cells prismatic with pyramidal end faces, meeting at sharp angles; each cell with a median longitudinal ridge, prominent at the poles.

Dimension: Cells 12-15 μm long, 7.5 μm broad.

Locality and Date: Titrigachi pond, 81 m, Koshi Tappu, Kusaha, Sunsari (2003/03/29).



Figures: 20. *Scenedesmus acutiformis*; 21. *S. armatus* var. *asymmetricus*; 22, 32, 33. *S. abundans*; 23-25, 27-28. *S. acuminatus*; 26. *S. acutus*; 29-31. *S. bijugatus*; 34. *S. dimorphus*; 35-39. *S. opoliensis*; 40-41. *S. bijugatus* var. *gravenitzii*.

Distribution in Nepal: Karra river at Hetauda, 500 m, Makawanpur (Sahay *et al.*, 1992); A pond near Mahendranagar Bazar, Kanchanpur (Chaturvedi & Habib, 1996).

Distribution in the World: India and Malaysia (Ettl & Gartner, 1995).

16. *Scenedesmus quadricauda* (Turp.) Bréb. var. *longispina* (Chodat) G.M. Smith (Fig. 7)
(Basionym: *Scenedesmus longispina* R. Chodat)

Current accepted name: *Scenedesmus longispina* R. Chodat

Characters: Colonies usually 2-4 celled; cells ovoid to cylindrical, spines slightly longer than the length of the cells, internal cells without spines, sometimes with very short delicate spines from some of their poles; cell wall smooth.

Dimension: Cells 15 μm long, 5 μm broad; spines 13-15 μm long.

Locality and Date: Mechi Campus pond, 93 m, Bhadrapur, Jhapa (2004/06/17).

Distribution in Nepal: Fish pond and Karra river, Hetauda, Makawanpur (Sahay *et al.*, 1992); A pond near Nepal forest at Mahendranagar, Kanchanpur (Chaturvedi & Habib, 1996).

Distribution in the World: Arkansas, North America (Smith, 2010)

17. *Scenedesmus quadricauda* (Turp.) Bréb. var. *westii* G.M. Smith (Fig. 13)

Current accepted name: *Scenedesmus maximus* (West & G.S. West) Chodat

Characters: Colonies usually 4 to 8 celled; cells ovoid to cylindrical, arranged obliquely, larger than var. *longispina*, spines slightly curved; cell wall smooth.

Dimension: Cells 21 μm long, 5.6 μm broad; spines 20-25 μm long.

Locality and Date: Birat Pokhari, 135 m, Anarmani, Jhapa (2004/06/17).

Distribution in Nepal: Fish pond, Hetauda, Makawanpur (Sahay *et al.*, 1992).

Distribution in the World: As *Scenedesmus maximus*, Spain (Cambra Sánchez *et al.*, 1998), As *S. westii*, Arkansas, North America (Smith, 2010)

18. *Scenedesmus smithii* Teil. (Fig. 10)

Characters: Colony 4 celled; cells arranged in a sub-alternating series, more or less naviculoid with the sides of cells, where they are in contact with one another, flat; 2 to 3 sharp spines from the pole of each cell, spines sometimes oblique.

Dimension: Cells 19 μm long, 5-6 μm broad; spines 5 μm long.

Locality and Date: Pond at Botany Dept, MMAM Campus, 72 m, Biratnagar, Morang (2004/02/02); Birat Pokhari, 135 m, Anarmani, Jhapa (2004/06/17).

Distribution in Nepal: A pond near Indo-Nepal road, Mahendranagar, Kanchanpur (Chaturvedi & Habib, 1996).

Distribution in the World: Romania (Caraus, 2012).

Conclusion

The present work described a total 18 taxa of genus *Scenedesmus* collected from freshwater lotic and lentic habitats of east Nepal. Out of them, five taxa viz., *Scenedesmus abundans*, *S. arcuatus* var. *platydiscus*, *S. disciformis*, *S. hystrix*, and *S. perforatus* are new records for Nepal. Similarly, total 12 taxa viz., *S. acuminatus*, *S. acutus*, *S. armatus* var. *asymmetricus*, *S. bernardii*, *S. bijuga*, *S. bijugatus* var. *graevenitzii*, *S. dimorphus*, *S. opoliensis*, *S. prismaticus*, *S. quadricauda* var. *longispina*, *S. quadricauda* var. *westii* and *S. smithii* are new to study area (east Nepal).

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