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New Record of Desmids from Ramwell-Rhino Lake, Chitwan, Nepal

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Abstract: ***A total 21 taxa belonging to 5 genera of desmids have been described and illustrated from Ramwell- RhinoLake of which 9 taxa are recorded for the first time for Nepal. This is preliminary work on the desmids from this lake.***

Keywords: Algae, Ramwell-Rhino lake, Desmids, Nepal

1. Introduction

Ramwell- Rhino lake (latitude 27º37'5"N, longitude84º26'12"E, altitude 286 m amsl; area ca 80 ha) is an oxbow lake (Ramsar site) situated in Barandabahar corridor forest an extension of the buffer zone of Chitwan National Park. The lake is connected with other small pondsghols and swamps to words its North. The rich in total nitrogen and orthophosphate and low in transparency level as hypereutrophic category.

The work on desmids of Nepal has been carriedout by Hirano (1955, 1963, 1969, 1984), Forest(1965), Kusel-Fetzmann (1969), Hickel (1973), Ichimura and Kasal (1982), Shrestha and Manandhar (1983), Nakanishi (1986), Banbo *et. al.* (1989), Habiband Chaturvedi(1995, 1997), Rai (2007), Rai and Misra (2008) and (Rai, Rai and Paudel (2008) . The literature revealed that the desmids flora of Nepal has not been explored so for extensively and furthermore, the terai plan is least studied. Here, an attempt has been made to study the desmids from Ramwell-Rhino Lake.

In this paper, taxonomy and morphology of 21 taxa of desmids belonging to 5 genera (*Euastrum* 4, *Micrasterias* 4, *Cosmarium* 9, *Arthodesmus* 2, *Staurastrum* 2) has been described and illustrated .Out of these 9 taxa *viz. Euastrumansatum* Ralfs var. *pyxidatum* Delp. , E.*ansatum* Ehrenberg, *E. coralloides*Josh. Var. *trigibberum* Lagerh, *E. Sinuosum* Lenorm, var*reductum* west *et.* G.S, *cosmariumimpressulum* Elfv.Var. *crenulatum* (Naeg.), kriege*et* Gerloff , C. *Portianum* Arc. Var. *nephroideum*, *Arthodesmuscurvatus* Turner, *Staurastrumgranulosum* (Ehrenb.) Ralfs, *S. gracile* Var. *Coronulatum* Bodthas been reported for the first time for Nepal. All the reports are new for the lake as no work has been done hitherto.

2. Materials and Method

Algal samples were collected from different side of Ramwell-Rhino Lake during the period of June to September 2011. All the samples were taken by squeezing out the root of *Eichhorniacrassipes*, *Pistiastratiotes* and submerged aquatic macrophytes. Sample were tagged and labeled then preserved in 4 % formaldehyde solution on the spot. Morph taxonomy of the desmids was studied in the Laboratory of Department of Botany, P.G. Campus by screening and camera-lucida drawings. Identification was done on the basis of illustration and dimension of the relevant literature ad monographs mentioned below each taxon's name in the text.

Explanation of symbol and abbreviations
CL : Cell Length
LC : Latitude cell
LI : Latitude isthmus
SN : Sample Number
CD : Collection date

Taxnomic Description

1) ***Euastrumansatum***Ralfs var. ***pyxidatum***Delp.(pl.1,fig. 1.)
west, w. and west, G.S. 1905, pl.36, figs.14,15; Yamagishi, T. and Isoda, Y. 1968, P.67, pl-13, fig. 3
CL73µm,LC37µm, LI.8µm, SN.21, CD 5.9.2011
Distribution: New record for Nepal.

2) ***Euastrumansatum*** Ehrenberg(pl1, fig.2)
West, W. and west, G.S. 1905, p.27, pl. 36, figs.10-13; Prescott, G.W . And Scott, A.M. 1945, P.233, pl-3 fig.1; Yacubson, S. 1980, p.301 pl.11, fig 125.
CL.76µm, LC 38µm, SN 8, CD 21.8, 2011
Distribution: New record for Nepal.

3) ***EuastrumCoralloides***Josh.Var**.** ***trigibberum***Lagerh, (pl. 1, fig. 3)
Scott A.M. and Prescott. G.W. 1961, P.24, Pl.13, Fig. 1,2,
CL37µm,LC 26 µm , LI 6 µm, SN 23, CD 5.9.2011

3. Distribution: New record for Nepal.

1. ***EustrumSinuosum***Lenorm. Var. ***reductum***west.G.S. West; (pl.1, fig.4.)
west, w. and west , G.S. 1997, p. 160, pl.8, fig. 17; 1905,p. 22, pl.36 fig 2,3; Yamagishi, T. and Isoda, Y. 1968 p. 29, pl.4, fig.1.
CL 58µm, LC 33µm, LI 7 µm, SN. 8, CD 21.8.2011
Distribution: New record for Nepal.

2. ***MicrasteriasFoliacea*** Bail (pl.1, Fig. 5.)
Smith, G.M. 1924,pl. 65 fig. 1-2; Scott, A.M. and Prescott, G.W. 1961, p.48, pl.20, fig. 4; NurulIslam, A.K.M. 1970, p. 919,
pl. 9, figs. 5-6 Pl.12, figs.4-5

CL 57µm, LC 68µm, LI 15 µm, SN. 14, CD 21.8.2011
Distribution: KoshiTappu, 206m (Rai and Mishra, 2008); Bees hazaar Lake, Chitwan(S.K.Rai, R.K. Rai and N. Paudel,2008)

3. ***MicrasteriasMahabuleshwarensis*** Hobson (Pl. 6, fig.6)
Turner. W. B. 1892, P. 95, Pl. 6, fig. 1 ; Scott A. M. and G.W. Prescott 1961, p. 51, pl. 23, fig. 1; Nurul Islam, A.K.M. 1970,
p. 920. pl.9, fig.3
CL 122µm, LC 90µm, LI 22 µm, SN 20 , CD 5.9.2011
Distribution: Bees hazzar Lake, Chitwan(S.K. Rai. R.K.Rai and N Paudel, 2008)

4. ***MicrasteriasPinnatifida***(Kuetz.) Ralfs (pl.1, fig. 7)
West, W. and West, G.S. 1905, p. 80, pl.41 fig.7-11;
Scott A.M. and Prescott, G. W. 1961, P. 51, Pl.12, fig. 6; Nural Islam A.K.M. 1970, p. 920, pl. 10, fig. 3-7.
CL 48 µm, LC 54µm, LI 13µm, SN. 2, CD 21.8.2011
Distribution: LuitelBhanjyang 770m. Gorkha (Hirano 1955);KoshiTappu, 206m (Rai and Misra, 2008) ; Bees Hazzar Lake,
Chitwan (S.K. Rai, R.K. Rai and N. Paudel, 2008)

5. ***Micrasterias radians*** Turner.(pl. 1 , fig. 8)
Turner, W.B. 1892, P. 91, Pl. 5, fig. 6a; Scott, A.M. and Prescott, G.W. 1961, p. 51, Pl. 23, fig. 1; Yacubson, S. 1980 p. 302,
pl. 13, fig. 149
CL 108µm, LC 99µm, LI 16 µm, SN 9. CD 21.8.2011
Distribution: Tahachal, 1300m, Kathmandu (Hirano, 1950); Bees Hazzar Lake, chitwan(S.K. Rai, R.K Rai and N. Paudel, 2008)

6. ***Cosmariumamoenum***Breb. Var. ***Maius***Kamat(Pl. 1, fig. 9)
kamat, N.D. 1962, P. 273, pl. 4, fig. 15.
CL 118µm, LC 62µm, LI 16 µm, SN. 21 , CD 5.9.2011
Distribution: KoshiTappu , 206m (Rai and Misra, 2008)

7. ***CosmariumContractum***Kirchn. Var. ***Pachydermum***Scott et Prescott (pl. 1, fig. 10)
Scott, A.M. and G.W. Prescott 1961, p. 56, pl. 27 fig. 6
CL 34 µm, LC 27µm, LI 6 µm, SN.19, CD 5.9.2011
Distribution: Bees - hazzarlake,Chitwn(S.K. Rai, R.K Rai and Paudel, 2008)

8. ***Cosmarium forceps*** Bruehl et Biswas (Pl. 1, fig. 11)
Bruehe , P. and Biswas, K. 1926, P. 286, pl. 9, fig. 86
CL 60µm, LC 51µm, LI 39 µm, SN. 9, CD 21.8.2011
Distribution: Bees-hazzar lake, Chitwan (S.K. Rai, R.K. Rai and N. Paudel , 2008)

9. ***Cosmariumhammeri***Reinsch Var. ***hopmalodermum*** (Nordst) W.et G.S.(pl. 1, fig. 12)
West, W. and West, G.S. 1905, p. 182, pl. 62, figs. 22-23; Skuja, H .1964, p. 198. pl.32, fig. 12.
CL 58µm, LC 34µm, LI 12µm, SN. 25, CD12.9.2011
Distribution: Bees-hazzar Lake, Chitwan(R.K. Rai, S.K. Rai and N. Paudel, 2008)

10. ***Comariumimpressulum***Elfv.Var. ***Crenulatum***(Naeg.) Krieger et. Gerloff(Pl. 1, fig. 13)
Krieger, W. and Gerloff. J. 1965, P. 136, pl. 29, fig. 6; Suxena, M.R. 1979, p. 118, pl. 4, figs. 43-a-c
CL 29µm, LC 25µm, LI 6 µm, SN 3,CD21.8.2011
Distribution: New record for Nepal .

11. ***Cosmariumlundelli***Delp. Var. ***Circulare*** (Reinsch) Krieg ,(pl. 1, fig. 14)
Bharati, S.G. and G.R. Hegde 1982, p. 744, pl. 1, fig. 2
CL 55µm, LC 29µm, LS 8 µm, SN 5, CD 21.8.2011
Distribution: Mewa valley (Hirano, 1984); Mahendranagar (Habib and Chaturvedi, 1997) Bees -hazzar lake, Chitwan(S.KRai, R.K. Rai and N. Paudel, 2008)

12. ***Cosmariumportianum*** Arc. Var. ***nephroideum*** Witter, (Pl. 1, fig.15)
West, W.and West , G.S. 1908, P. 167, pl.80, figs. 10; Irenee- Marie, F. 1939, P. 185, pl. 23, fig. 3.
CL 23µm, LC 17µm, LI 6 µm, SN 25, CD12.9.2011
Distribution: New record for Nepal

13. ***Comariumstriolatum***Naeg;(pl.1, fig. 16,)
Scoot, A.M. and Prescott, G.W. 1961, p.70, pl. 25, figs. 2-3; Prasad, B.N. and Misra, P.K. 1992, p. 184, pl.23, fig. 4,
CL 108µm, LC 62µm, LI 53 µm, SN 23, CD 21.8.2011
Distribution: Bees- hazzar lake, Chitwan(S.K. Rai, R.K. Rai and N. Paudel,2008)

14. ***Cosmariumsublateriundatum*** Waste et West(pl. 1, fig. 17)
West, W. and West, G. S. 1907, p.202, pl. 13, fig. 13, Nurula Islam,
A.K.M. and Yusuf Harron, A.K. 1980, p.580, pl. 22, fig. 263-264
CL 43µm, LC 42µm, LI 13 µm, SN 5,CD21.8.2011

Distribution: Astrem at Tukucha moor, 2,600m, Mustang (Hirano ,1955); river of pashupatinath, 1,300m, Kathmandu(Bando et al. 1989) , Bees-hazzar lake, Chtwan (S.K. Rai, R.K. Rai and N. Paudel, 2008)

15. ***Arthodesmus convergence***Ehr. Var. ***curtus*** Turner (pl.1fig.18)
scott, A.M. and G.W. Prescott 1991, p.74, pl.34, fig 5
CL 84µm, LC 57µm, LI 20 µm, SN 7CD 21.8.2011
Distribution: Bees-hazzar lake, chitwan, and 286m. (S.kRai, R.kRai and N. Paudel, 2008)

19.***Arthodesmus curvatus*** Turner (pl.1, fig 19)
Turner, W.B .1892, p. 135, pl.11 fig. 8
CL 94 µm, LC 44µm, LI 12 µm, SN 23,CD2.9.2011
Distribution: New record for Nepal.

20. ***Staurastrumgranulosum*** (Ehrenb) Ralfs(pl.1, fig. 20)
West, W. and West, G.S. 1912, p. 188,
pl. 128, figs.10-12
Taft, C.E. 1945, p. 203, pl. 5, fig. 3
CL 35 µm, LC 30µm, LI 10 µm, SN3,
CD 21.8.2011
Distribution: New record for Nepal.

21. ***Sturastrumgracile*** Var**. *Coronulatum***
Bodt(pl1, fig. 21)
West, W. west. G.S. andCarter, N.
1923, p. 100, pl. 144, fig. 10; scott,
A.M. and corasdale, H. 1964, p.32, pl.
7, figs. 153, 154
CL 44µm, LC 29µm, LI 10 µm, SN 5,
CD 21.8.2011
Distribution: New Record for Nepal.

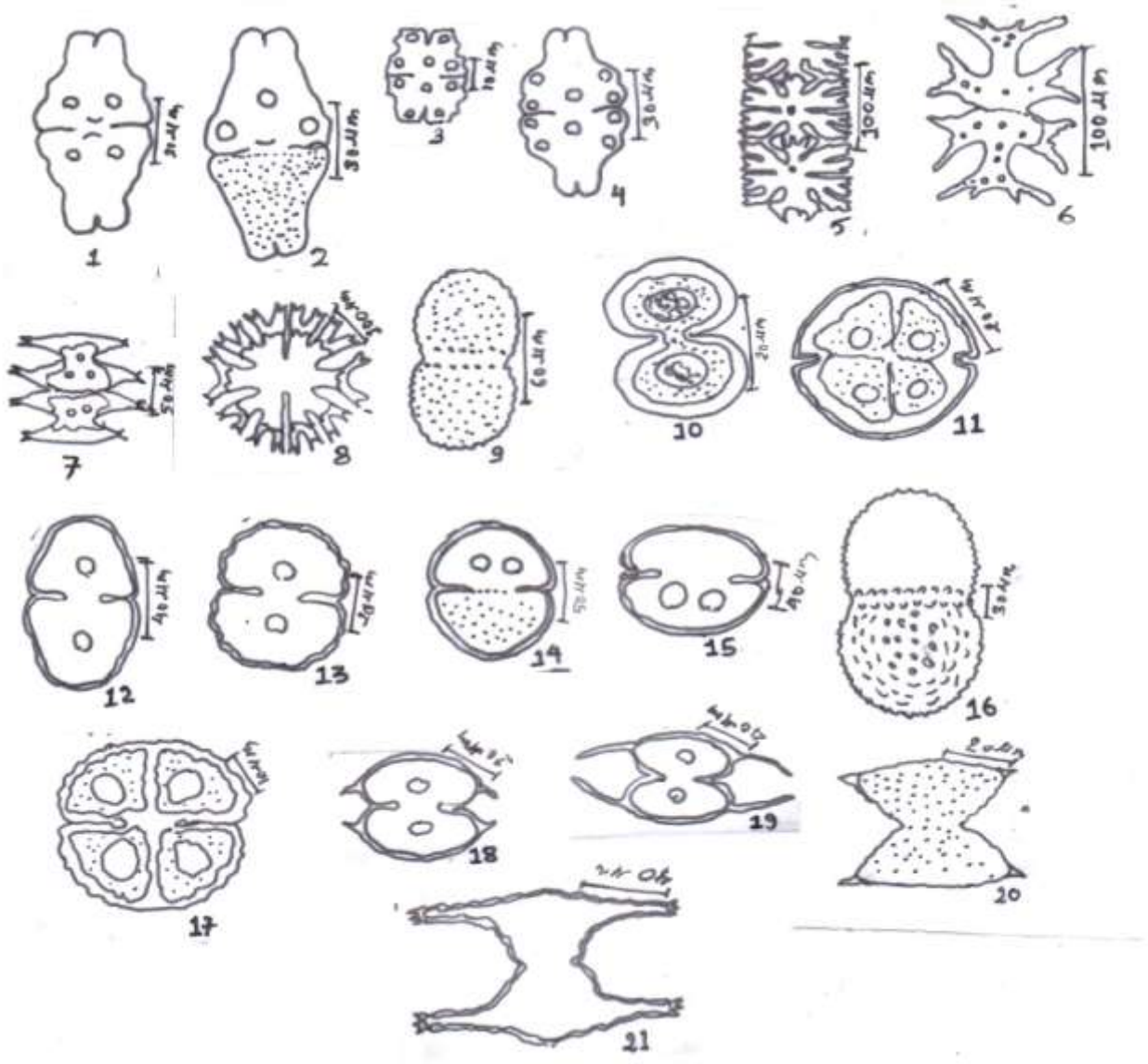

Plate-1

Fig.1 *Euastrumansatum*Ralfs var. *pyxidatum*Delp., **Fig.2** *E.ansatum* Ehrenberg., **Fig.3** *E.coralloides* Josh. Var. *trigibberum*Lagerh, **Fig 4**. *E. sinuosum*Lenorm. Var.*reductum*., **Fig. 5** *MicrasteriasFoliacea* Bail, .**Fig.6** *M. mahabuleshwarensis* Hobson., **Fig.7** *M. Pinnatifida* (kuetz.) Ralfs **Fig. 8** *M. radians* Turner. **Fig. 9** *Cosmariumamoenum*Breb. Var. *maius*kamat. **Fig.10** *C. contracum*kirchn .Var.*Pachydermum.* **Fig.11** *C. forceps* Bruehl*et* Biswas. **Fig.12** *C. hammeri*Reinsch var. *homalodermum*(Nordst)., **Fig.13** *C.impressulum*Elfv. Var. *Crenulatum* (Naeg)., **Fig.14** *C. lundelli*Delp. Var. *circulare* (Reinsch) Krieg. **Fig.15** *C. Portianum* Arc. Var. *nephroideum* witter, **Fig.16** *C. striolatum*., **Fig.17** *C. sublateriundatum*wast*et* wast., **Fig.18** *Arthodesmusconvergens* Ehr. Var.*curtus*Turner., **Fig.19** *A. curvatus* Turner. **Fig.20** *staurastrumgranulosum* (Ehrenb). Ralfs.., **Fig.21** *S. gracile*var*Coronulatum*Bodt

4. Conclusion

Present investigation shows that the desmids flora of Ramwell-Rhino Lake is rich and diverse. Among the genera *cosmarium* has the maximum taxa representing by 9 out of 21where *Arthodesmus* and *staurastrum* have rare. *Staurastrum* described by scott and prescott (1961). Othergenus like as *Euastrum* described by Ehrenberg. Therefore, it needs further study to be confirmed. For a complete documentation of the specimen, regular seasonal explorations of the lake will be essential.

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