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SYSTEMATIC ACCOUNT OF GENUS EUGLENA FROM DISTRICT NASHIK, (M.S.) INDIA.

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Abstract –
Euglena is unicellular green algae with two flagella, belongs to the group euglenoids. It is found mostly in small fresh water pools rich in organic matter. These are grow luxuriantly in such waters imparting its colour, dark green to the water body. The present study reveals 27 species. These are collected from various parts of Nashik and its tahsils. Among these *Euglena acus* var. *rigida*, *E. limnophila* var. *minor*, *E. obtusa* are reported new to India, Few taxa are also little known and appear as first reports for Maharashtra, these are *Euglena rostrata*, *E. wangi* .Rests are explored first time from this region. This enriches the algal flora of Nashik.

Index Term – Systematic account, Diversity, Euglenoids, Euglena, Nashik,

INTRODUCTION:

Algae are most common and widespread primitive group of autotrophic plants and global in occurrence. They are the most ancient of the organisms thriving from Pre-Cambrian period and today has successfully established almost in every kind of habitats including aquatic as lakes, pounds, pools, paddles, rivers and oceans. They are ubiquitous in their distribution and can survive even in the extremities of the environmental conditions. They are one of the most successful and important part of the aquatic food chains in the form of primary producers of organic matter in nature, thus, playing a major role as a basic constituent of a living community.

The unicellular green euglenoids in the fresh water reservoirs' from Nashik District has still ignore so these are unrecorded, therefore its urgent need to explore the flora to understand the taxonomy and diversity among genus Euglena of Nashik

Genus Euglena is a belonging to division Euglenophyta, order Euglenales and family Euglenaceae. Euglena is green in colour with one flagella, is found mostly in small fresh water pools rich in organic matter. This genera grow luxuriantly in such waters imparting it's colour to the water body. The green scums are indicators of presence of *Euglena.* This flourish well at temperatures above 25^{o}c and some grow very well on mud.

Genus- *Euglena* Ehrenberg (1838) is unicellular eukaryotic, free swimming i.e. motile with single whip like flagella or some time crawling due to nonmotile palmella. It is spindle, cylindrical, ovate or band-form micro algae. Cell constantly changing shape in its movement. Pellicle usually marked by longitudinal or spiral striae; some with a thin pellicle highly plastic; stigma usually anterior; chloroplasts dark green discoid, ribbon like band-form, fusiform or rarely star shaped plates. Chloroplast with or without pyrenoid. Two paramylum bodies located on either side of nucleus, rod-like to ovoid in shape or numerous and scattered throughout; contractile vacuole near reservoir.

The Euglena is found in shallow turbid waters, on moist soil, ditches, puddles, ponds. The plants were collected and identified in live conditions only so as to observe its motility, number of flagella and other details with treatment of dilute iodine.

RESEARCH METHODOLIGY:

The study is based on field, laboratory work and literature surveys, Samples were collected during Jan.2009 to Dec.2013. Collection were made with help of phytoplankton net and manually. Algal samples were preserved in 4% formalin. For the detailed studies of algae, Photomicrography has been done under Labomade electric microscope with digital camera.

Collection of algal samples:

The collections of algae from various habitats are made during the period from 2009-2013.The algae are collected by hand or with a knife, forceps etc. including part or entire substrates. They are also collected from stones in fast flowing water, aquatic plants, on dam walls and from any floating objects. Algae are also obtained by simply squeezing bryophytes and other aquatics. The phytoplanktons are collected by using a fine mesh phytoplankton net, with 25-30µ pores. Sufficient quantity of sample is concentrated by simply scooping a jar through the water for several times.

Storage and preservation of samples:

The algal samples are collected in bottles, jars or plastic bags of different sizes with some water from the collection sites. After collection the containers are kept open. Algae can be kept alive for short periods for one or two days in open petridishes, in a cool place with reduced light for their continuous growth and further observations.

For long term storage samples are preserved in preservative solutions, dried or as permanent microscope mounts. Samples are preserved in commercial formations like 4 % formalin and FAA.

The observations are based on living materials which are essential for its identification. The simplest method is to prepare a cavity glass slide by placing a drop of sample on to the slide with cover slip carefully over it and avoiding any air bubbles and observing the specimen under lower magnification of microscope. Observations are made more sequentially at under 4 x, 10x, 40x, 100 x magnification. India ink is also used to observe the flagella of motile organisms. This technique is also very useful for observing sheaths of individual cells or of mucilaginous organisms.

Measurements:

The measurements of the specimens are taken and used for its identification and subsequent classification. The metric units cm, mm, and µ are utilized. Stage and eyepiece micrometers are used for measuring the length and breadth of the organism.

Illustrations:

All the drawings are drawn with the help of Mirror- type and Prism type - Focus CLM-8 S.no.4647 Camera Lucida at the stage level using 10x, 40x 45x, 100x, objectives and 6x, 10x eye-pieces. The measurements were made by ocular and 45x, 100x objectives. Sketches were drawn on plain paper with the help of Rotering pen using black water proof India ink. The thickness of each sketch was maintained uniform.

Microphotographs:

The microphotographs are taken by camera by using "Lobo"- Trinocular microscope unit. Sony Cyber Shot DSC-W80 camera is used for all microphotographs.

Identification:

The identification of algae was done by using standard monographs and research papers

Result and Discussion:

Division Euglenophyta
Class Euglenophyceae
Order Euglenales
Genus- Euglena
Prescott -1951;

***Euglena acus* (O.F. Müller) Ehrenberg, 1830:** PP. -2, F.-20

Prescott -1951; 390: Pl. - 85, F.-28.

= *Vibrio acus* O.F. Müller.

= *Lepocinclis acus* (O.F. Müller) Martin et Melkonian 2003.

Cells 69.3 -70.1µ long, 16.5 -19.8µ wide, body long spindle or cylindrical, with a sharply pointed posterior end, anterior end narrowed and truncated, with or without slight constriction. Chloroplasts numerous, discoid, paramylon rods of varying length and many in number, generally four. Cell with central nucleus and distinct stigma. Flagellum short, about one-fourth the body length.

Habitat- Waghera Dam (04/04/2009), Niphad (10/06/2009), Salher (11/07/2009), Peint-Surgana (12/08/2009), PimpriTrimbak (18/09/2009), Pimpalgaon Bhor (14/09/2010), Karanjwan Dam (15/10/2009), Nasardi bridge (30/04/2010), Kashyapi Dam (28/10/2010), Ghodegaon (18/08/2011), Dugarwadi (10/06/2012), Tapovan (22/06/ 2012), Anjeneri (2/7/2012).

Distribution- Maharashtra (Kamat, 1974; Deore, 1978; Nandan, 1993; Jawale *et al.*, 2003; Vanjari and Kumawat, 2007), Madhya Pradesh (Mishra, 2007), Karnataka (Hosmani, 2008).

***Euglena acus* var. *rigida* E.Hübner, 1886:** Pl. - 2, F. - 5

Prescott -1951; 391: Pl. - 85, Fig.- 27.

Cells rigid, long, needle shape, 10.56-11.2µ in dia., 132- 135.5µ long, narrow and elongate, truncated at apex and tapering strongly into a sharply pointed tail. Slowly move, in one direction but continuously. Paramylum bodies 2, long rod like. Chloroplasts plate-like and ovoid bodies, numerous, arranging in a spiral way.

Habitat – Benze Farm (18/08/2011), NandurMadhameshwar (14/03/2012).

Distribution – Queensland (Day *et al.* 1995), Brazil (Alves-da-Silva and Menezes 2010).

***Euglena agilis* H. J. Carter, 1856**: Pl. - 2, F. - 2

John -2002; 148: Pl 35, Fig. G, H.

Cell highly metabolic, green, small, broadly ovate, 26.4-42µ long, 11.22-13.2µ broad. Anterior end rounded or truncate, attenuated posterior end and central region widest. Chloroplast two small ribbon like, arrange a star like, parietal with double pyrenoids. Paramylum numerous, rounded. Nucleus central, stigma prominent.

Habitat – Benze Farm (18/8/2011), Ashawadi (11/10/2012), occurred as scum in puddle near NandurMadhameshwar (14/03/2012).

Distribution – Maharashtra (Deore, 1978; Jawale *et al*, 2003).

***Euglena clara* Skuja, 1948:** Pl. -2, F. - 3

John -2002; 150: Pl.- 35, Fig.- N.

Cells rarely metabolic, elongated oval or ellipsoidal, rounded at both ends 29.7µ long, 13.2µ wide. Chloroplasts numerous, 10-12 disc -shaped with a pyrenoid. Paramylum sheath located at the center. Flagellum as equal or half of the cell. Nucleus ellipsoidal, distinct, stigma small not distinct.

Habitat- Niphad (10/06/2009), Salher (11/07/2009), Peint-Surgana (12/08/2009), Pimpri Trimbak (18/09/2009), Nasardi bridge (30/04/2010), Gangapur Dam (25/03/2011), Dental college (22/06/2012), Ghodegaon (18/08/2011), Dugarwadi (10/06/2012). Tapovan (22/06/12).

Distribution –Uttaranchal (Gupta, 2005).

***Euglena convoluta* Korshikov, 1941:** Pl. - 2, F.-9

Prescott - 1951; 391: Pl. - 86, Fig.-7-9, 14.

Cells show slightly euglenoid movement, elongate to fusiform and spirally twisted, anterior end abruptly narrow and truncated posterior, attenuated gradually to form a long caudate. Flagellum short 1/6 th of the body length .Paramylum body two sizes, 6-8 in numbers, smaller and larger. Chloroplast numerous ovoid discs shaped without pyrenoids, Eyespot elliptical, composed of irregularly arranged granules. Cells 9.9-13.2µ dia. 118-120µ long. Sole report from Tamilnadu (Shankar Hosmani 2008).

Habitat-Harsool (14/02/2011), Sakur (10/05/2011), Rajurgaon (04/06/2011), Anandwali (30/12/2012).

Distribution – Tamilnadu (Shankar Hosmani, 2008), Romania (Caraus 2002, 2012), Libya (Nizamuddin, 2005).

***Euglena deses* Ehrenberg, 1833:** Pl. -2, F.-10

John - 2011; 151: Pl.37, Fig.-I, J.

=*Euglena deses* var. *intermedia* G.A.Klebs 1883.
=*Euglena intermedia* (Klebs) F.R.F.Schmitz 1884.
=*Euglena intermedia* var. *Klebsii* Lemmermann 1910.
=*Euglena deses* var. *tenuis* Lemmermann 1910.
=*Euglena deses* var. *gracilis* Playfair 1921.
=*Euglena deses* var. *minuta* Playfair 1921.
=*Euglena sima* Wermel 1924.
=*Euglena klebsii* (Lemmermann) Mainx 1927.
=*Euglena intermedia* var. *brevis* F.E.Fritsch and M.F.Rich 1930.
=*Euglena mesnili* Deflandre and Dusi 1935.
=*Euglena satelles* Braslavska-Spectorova 1937.
=*Euglena intermedia* f. *major* T.G.Popova 1955.
=*Euglena deses f. mesnili (Deflandre and Dusi) E.Pringsheim 1963.*
=*Euglena deses* f. *klebsii* (Lemmermann) T.G.Popova 1966.
=*Euglena deses* f. *major* T.G.Popowa 1966.
=*Euglena deses* var. *digrana* B.Zakrys 1986.
=*Euglena intermedia* var. *acidophila* Z.X.Shi 1989.

Cells elongate fusiform or sub-cylindrical, 56.4-59.4µ long, 9.9-11.55µ wide, Euglenoid movement violent, twisting and turning continuously, stigma distinct. Chloroplasts parietal, numerous, discoid, longitudinal with pyrenoids. Paramylon rod-shaped scattered. Flagellum smaller than the body length.

Habitat –Benze Farm (18/8/2011), Ozar (27/02/2012), Trimbak (21/01/2012).

Distribution- Maharashtra (Carter, 1856; Kamat and Freitas, 1976; Jawale *et al*, 2003; Vanjari and Kumawat, 2007), Tamilnadu (Mayakkannam, 2010).

Spain (Alvárez Cobelas 1984, Aboal, 1990), New South Wales, Queensland, Victoria (*Day et al.*, 1995), Israel (Stupina *et al.*, 2000), Britain (Wolowski 2002, Whitton *et al.* 2003), Romania (Caraus 2002; 2012), Oregon (Kingston and Gough 2009), Brazil (Alves-da-Silva and Menezes, 2010), Taiwan (Anon, 2012), Germany (Scholz and Liebezeit, 2012).

***Euglena ehrenbergii* Klebs, 1883:** Pl.-2, F.-26

Prescott -1951; 392: Pl. - 86, F.-13.

Cell straight, cylindrical, apical portion is slightly broad and flattened; posterior end rounded; plastic, often twisted 122-132µ long, 11.55µ dia.. Chloroplast small rod shape, ovoid disc, numerous; stigma conspicuous, flagellum one-half the body length; two paramylum (paramylon) bodies elongate.

Habitat-Dugaon (12/02/2009), Vani (12/03/2009), KaranjwanDam (15/10/2009), KashyapiDam (28/10/2010), BenzeFarm (18/8/2011), Anjeneri (5/07/2012).

Distribution- Maharashtra (Deore.1978; Bhosale and Dhumal, 2012), Tamilnadu (Shankar Hosmani, 2008).

***Euglena elongata* Schewiakoff, 1891:** Pl. -2, F. - 11

John- 2002; 151: Pl.33, Fig.-P

Cells medium size, 50-52µ long, 8.2-9.9µ in dia., elongate cylindrical or spindle shape, tapering to a blunt point posteriorly. Flagellum smaller than the cell. Cell length is 1/2 flagella length. Chloroplast one, band like, parallel to the long axis of the cell. Paramylum grains, numerous, small, rod shaped. Sole report from Tamilnadu (Shankar Hosmani, 2008).

Habitat – Chandasi (5/09/2012), College campus (14/11/2011).

Distribution – Tamilnadu (Shankar Hosmani, 2008), Queensland (Day *et al.* 1995), Britain (Wolowski 2002, Whitton *et al.* 2003), Romania (Caraus 2002; 2012), Singapore (Pham *et al.* 2011), Punjab (Anon, 2012).

***Euglena gracilis* Klebs, 1883:** Pl. - 2, F.-29.

Prescott -1951; 393: Pl. - 85, F.-17.

Cell body fusiform, cylindrical to elongate ovate, 59.4 - 82.5µ long, 9.9 -16.5µ dia. highly plastic. Swim rapidly, fusiform, chloroplasts variable in number. Chloroplasts 6-12 per cell, large flat, shield-shaped, saucer-shaped, a pyrenoid covered with paramylum sheath located at the center. Flagellum 1/2 to 2/3 of the body length.

Habitat- Niphad (10/06/2009), Salher (11/07/2009), Waghera Dam (04/04/2009), Peint-Surgana (12/08/2009),Pimpalgaon Bhor (14/09/2010), PimpriTrimbak(18/09/2009), Nasardi bridge (30/04/2010), Ozar (27/02/2012), Dental College (22/06/2012), Tapovan (22/06/2012).

Distribution- Maharashtra (Patil and Nandan, 1994; Vanjari and Kumawat, 2007), Uttar Pradesh (Misra *et. al*., 2009).

***Euglena granulata* (Klebs) Schmitz, 1884:** Pl. -2, F. - 4

John -2002; 153: Pl.36, Fig. A.

Cells fusiform, anterior end conical, bluntly rounded at apex (spindle-shaped), 62-66µ long, 19.8-23.1µ dia. Pellicle distinctly striated, euglenoide movement active. Chloroplasts 12-14, saucer-shaped, slightly lobed with a pyrenoid. Flagellum length as equal as the cell length. Many small paramylum granules present within cytoplasm.

Habitat- Harsool (14/02/2011), Sakur (10/05/2011), Anandwali (14/11/2011), Gangapur Farm (25/01/2012).

Distribution – Maharashtra (Jawale *et al*, 2003).

***Euglena intermedia* (Klebs) F.R.F. Schmitz, 1884:** PP - 1

John -2002; 151: Pl. - 37, F.-K.

=*Euglena deses* Ehrenberg.

= *Euglena deses* var. *intermedia* G. A. Klebs.

Cell cylindrical, 23.1µ length, 13.2µ in dia., with the anterior end blunt, and the posterior end in a short spine. Pellicle faintly striated, chloroplast discoid, paramylum in the form of rods, flagellum very short, and eyespot purplish red, large.

Habitat- Ozarkhed Dam (30/03/2012).

Distribution- Maharashtra (Deore, 1978; Narkhede, 2006), Israel (Stupina *et al.*, 2000),

***Euglena limnophila* Ehrenberg, 1830:** Pl. -2, F. - 12

John - 2002; 153:Pl. -34 Fig.-B.

=*Phacus limnophila* (Lemmermann) Linton et Karnkowska 2010.

Cells long, spindle or cylindrical to spindle shape, never twisted 46.2 -50µ long, 9.9-13.2µ broad, anterior attenuated, posterior tapered into a sharp, straight tail. Euglenoide movement very slow. Chloroplasts numerous, small disc-shaped without pyrenoids. Flagellum shorter than the cell length, two types of paramylum bodies, one small bar-shaped, another 2 ring-shaped ones at both sides of the nucleus.

Habitat – Someshwar (02/11/2009), Rajurgaon (14/06/2011).

Distribution- Maharashtra (Jawale *et al*, 2003), Tamilnadu (Shankar Hosmani, 2008).

***Euglena limnophila* var. *minor* Ehrenberg, 1830:** Pl. -2, F.- 14

Sandra, 2004.

Cell fusiform, 62.7-66µ long, 9.9-11.55µ broad, varieties differ from the type by the smaller dimensions of the cell.

This name is currently regarded as a synonym of Phacus limnophilus var. swirenkoi (Arnoldi) Taşkin and Alp

Habitat-Waghera Dam (04/04/2009), Pimpalgaon Bhor (14/09/2010), Peint-Surgana (12/08/2009), Pimpri, Trimbak (18/09/2009), Rajurgoan Stone Mine (09/03/2012), Tapovan (22/06/2012), Dental College (22/06/2012).

Distribution -Europe: Netherlands (Veen et al. 2015), Romania (Caraus 2002).

South America: Argentina (Tell 1985), Brazil (Alves-da-Silva & Menezes 2010).

***Euglena minuta* Prescott, 1944:** Pl. - 2, F. - 6, 7, 8

Prescott-1951; 393: Pl.-85, Fig.-23, 24.

Cells actively euglenoide movement, fusiform to pyriform, produced posteriorly into a short, blunt, often curved tip. Flagellum smaller than the length of the cell. Chloroplast plate form with pyrenoids, paramylum bodies many small rods. Cells 6.6µ in dia., 11.55-13.2µ long.

Habitat – Dugaon(12/02/2009),Vani (12/03/2009),Someshwar (2/12/2009) Gangapur Farm(25/01/2012), Dindori (30/03/2012), Dental College (22/06/2012).

Distribution - Maharashtra (Kamat and Freitas, 1976; Talekar and Jadhav, 2009).

Queensland (Day *et al.*, 1995), Pakistan (Leghari *et al.*, 2005), Turkey (Soylu and Gonulol, 2006), Brazil (Alves-da-Silva and Menezes, 2010).

***Euglena mutabilis*, F. Schmitz, 1884:** Pl. -2, F.- 16

John-2002; 155: Pl.37, Fig.-O.

Cell narrowly cylindrical, slender elongate spindle shape, anterior rounded and posterior tapered. Cells 83.1-90µ long, 9.9-19.1µ broad, spiral striation. Nucleus posterior, flagellum longer than body. Stigma about 4.95-6.6µ in dia. Chloroplasts numerous, fusiform aligned with the striae. Paramylum bodies ovoid.

Habitat –Darana dam (15/08/2012).

Distribution – Tamilnadu (Mayakkannam, 2010); Kerala (John and Francis, 2007).

Spain (Alvárez Cobelas, 1984, Aboal, 1990), Victoria (*Day et al.*, 1995), Britain (Wolowski, 2002, Whitton *et al.*, 2003), Czech Republic (Gross, Oesterhelt, Tischendorf and Lederer 2002), Romania (Caraus, 2002, 2012), China (Hu and Wei, 2006), Brazil (Alves-da-Silva and Menezes, 2010), Singapore (Pham *et al.*, 2011).

***Euglena obtusa* F. Schmitz, 1884:** Pl. - 2, F.- 17

John-2002; 155: Pl.36, Fig.-G.

Cell highly metabolic cylindrical, pear shape towards ends, apices obtusely rounded 82.5-108.9µ long and 13.2-19.8µ wide. Chloroplasts numerous 28-40, tightly packed, saucer or disc shaped, each with central paranoid. Flagellum short than the cell. Nucleus spherical, eyespot (stigma) 5µ long. Rare alga.

Habitat – Gangapur Dam (22/03/2011).

Distribution – Spain (Alvárez Cobelas, 1984), Britain (Wolowski, 2002, Whitton *et al.*, 2003), Germany (Scholz and Liebezeit, 2012).

***Euglena oxyuris* Schmarda, 1846:** Pl. - 2, F.-24

Prescott -1951; 393: Pl. - 85, F.-18.

= *Lepocinclis oxyuris* (Schmarda) Marin et Melkonian 2003.

Cells slightly metabolic, keeping the constant shape in the movement, 173.5-200µ long, and 19.8-26.4 2µ wide. Cell cylindrical, almost always twisted, rounded or truncated at anterior end, tapered gently to a tail at the posterior end. Numerous discoid chloroplasts. Paramylum bodies two, rectangular, stigma large, sluggish. Body flattened, twisted, with longitudinal groove. Flagella short, active, eyespot red, big.Rare in occurrence.

Habitat- Ozarkhed (30/03/2012).

Distribution- Maharashtra (Deore, 1978; Jawale *et al.,* 2003, Bhosale and Dhumal, 2012)

***Euglena proxima* Dangeard, 1901:** Pl. - 2, F.-18

Prescott - 1951; 394: Pl. - 85, fig. - 25.

Cells metabolic, spindle-form, narrowed posteriorly to a blunt tip, periplast spirally striated. Chloroplasts numerous, discoid, no pyrenoids. Many rod-shaped paramylum bodies, scattered throughout the cell. Cells 52.8-66µ long, 16.5- 21.4µ.in dia. and eyespot 11.55µ long.

Habitat –Gangapur Farm (12/12/2011).

Distribution- Maharashtra (Kamat, 1968, 1974), Karnataka (Bharati and Hegde, 1982; Hosmani, 2008), Tamilnadu (Mahendraperumal and Anand, 2009; Mayakkannam, 2010).

***Euglena pisciformis* Klebs, 1883:** Pl. -2, F.-15

John-2002; 148:

= *Euglena agilis* H. J. Carter 1856.

An alga 39.6µ long, 26.4 -28µ wide, spindle-form when full extended, often rounded with bluntly pointed anterior and sharply attenuated, bluntly pointed or rounded posterior end. Pellicle striated faintly, 2 leaf-like chloroplasts, each containing a pyrenoid covered by sheath of paramylon. Paramylon granules small, oval. Flagellum 1-2 times as long as body length, active, eye spot large, 3-4µ long.

Habitat- Gangapur farm (12/12/2012).

Distribution - Maharashtra (Deore, 1978).

***Euglena rostrata* J. Schiller in Huber-Pestalozzi, 1955:** Pl. - 2, F.-1

Prescott-1951;

Beaked euglena, unicellular, slow euglenoide movement Body elongated and conical with the hinder part gradually attenuated into the tail. Head slightly bend and tail very short. Stigma anterior, chloroplasts discoid, without pyrenoid. Paramylum two bodies located on either side of nucleus. Previously recorded in Tamilnadu (2010). No reports from Maharashtra.

Habitat–Rajurgoan(26/01/2011),Ozar (27/02/2012), Nandur Madhameshwar (14/03/2012).

Distribution- Tamilnadu (Mayakkannam, 2010).

***Euglena sanguinea* Ehrenberg, 1832:** Pl. - 2, F.-23

Prescott -1951; 394: Pl. - 86, F.-1, 2.

= *Oscillaria sanguinea* (Ehrenberg) Itzigsohn and Rothe 1852.

= *Euglena viridis* var. *sanguinea* (Ehrenberg) Playfair.

= *Astasia haematodes* Ehrenberg 1830.

= *Euglena sanguinea* var. *furcata* Hübner 1886.

= *Euglena haematodes* (Ehrenberg) Lemmermann 1908.

= *Euglena paludosa* Mainx 1926.

= *Euglena mucifera* Mainx 1926.

= *Euglena rubida* Mainx 1928.

= *Euglena fundoversata* L.P.Johnson 1944.

= *Euglena magnifica* E.G.Pringsheim 1956.

Cells 20-30µ broad, 90-100µ long, broadly spindle shape, rounded anteriorly, gradually tapering to a point posteriorly. Pellicle striated, chloroplast numerous, elongate, paramylum spherical, flagellum usually very long, eyespot very large. It is highly metabolic.

Habitat-Ozar (27/02/2012), Nandur Madhameshwar (14/03/2012), Dental College (22/06/2012).

Distribution- Maharashtra (Kamat, 1974; Deore, 1978; Bhosale and Dhumal, 2012), Tamil Nadu (Mahendraperumal and Anand, 2009; Mayakkannam, 2010).

***Euglena sanguinea* var. *sanguinea* Ehrenberg, 1832:** PP. -2, F.- 23

Prescott-1951; 394: Pl. - 86, F.-1, 2.

Body broadly fusiform, ovoid-pyriform to sub cylindrical 49.5µ long, 13.2µ wide; posterior bluntly rounded; flagellum about the body length; pellicle striated. Chloroplasts numerous, elongated, parallel to the striae; anterior rounded, posterior tapered with a short process. Flagella as long as the body length.

Habitat- Ozar (27/02/2012), Nandur Madhameshwar (14/03/2012).

Distribution-Tamilnadu (Mahendraperumal and Anand, 2009; Mayakkannam, 2010).

***Euglena sociabilis* P.A. Dangeard, 1901:** Pl. -2, F. - 19, 20

protist.i.hosei.ac.jp/pdb/images/.../euglena/sociabilis/index.html

Cells fusiform or cylindrical, 46.2-49.5µ long, 19.8µ wide, anterior rounded, posterior tapered into a short process, highly plastic. Chloroplasts, numerous 6-11 in numbers, elongate, each containing large pyrenoids with discoid paramylon bodies. Flagellum 1-1.5 body length.

Habitat – Jadhav wadi (20/01/2011), Dental College (22/06/2012).

Distribution-Uttar Pradesh (Chaudhary and Prasad, 1986), Orissa (Ratha *et.al*. 2006), Tamilnadu (Mayakkannam, 2010).

New South Wales, Queensland (Day *et al.* 1995), Romania (Caraus 2002; 2012), Brazil (Alves-da-Silva and Menezes, 2010).

***Euglena spirogyra* Ehrenberg, 1832:** Pl. - 2, F. - 28

Prescott -1951; 394: Pl. - 86, F.-15

A cell cylindrical, 30-37µ broad, up to 127-134µ long anterior end is bluntly rounded, and the posterior end is extended into a distinct tail piece. Pellicle with bead like hemispherical or spirally arranged striae, chloroplast many. Paramylum rods two, are of varying length. Flagellum short. Eyespot bright red and larger.

Habitat- Dental College (22/06/2012).

Distribution- Maharashtra (Kamat, 1962), Karnataka (Hosmani and Bharati, 1983; Hosmani 2008).

***Euglena spirogyra* var. *marchica* Lemmermann:** Pl.-2 , F.-13

protist.i.hosei.ac.jp/.../spirogyra/var_01/sp_16.html

=*Euglena spirogyra* Ehrenberg- 1832.

=*Euglena spirogyra* var. *fusiformis* Deflandre 1924.

=*Lepocinclis fusca* (Klebs) Kosmala et Zakryś 2005.
=*Lepocinclis spirogyroides* (Ehrenberg) 2003.
Cells elongate, cylindrical, twisted, 80-125µ long and 10-35µ wide. Anterior end little narrowed and rounded; posterior end drawn out, bent tail; spiral striae, made up of small knobs. Chloroplasts numerous, disc like with two ovoidal paramylum bodies as two flattened rings, one is at anterior and other at posterior to the central nucleus. Flagella about 1/4 the body length. Eyespot at the anterior end.Not common in ditches and swamps
Habitat- Dental College (22/06/2012).
Distribution- Maharashtra (Jawale *et al*, 2003).

***Euglena variabilis* G.A. Klebs, 1883:** Pl. - 2, F. - 21, 22

John-2002; 158: Pl.35, Fig.-
Cells 31.35-39.6µ long and 14.85 -16.5µ broad. Swim actively, without changing shape, short cylindrical to ovoid. Anterior end broadly rounded, undulated at middle portion of the cells and posterior end tapering to a blunt short tail piece, pellicle very distinctly spirally striated. Chloroplast numerous, disk-shaped, parietal without pyrenoids. Paramylum grains locate near the nucleus, numerous, small ellipsoidal or short and rod shape, granulate. Nucleus spherical, 5-7µ in dia., eyespot very prominent, curved lamellar-shaped, red color, 4-5µ in length. Flagellum longer than the body length.
Habitat – Gangapur Dam area (25/03/2011).

***Euglena viridis* (O.F.Müller) Ehrenberg, 1830:** PP. -1

John -2002; 158: Pl.37, Fig.-A.B.
= *Cercaria viridis* O.F.Müller 1786.
= *Euglena viridis* var. *mucosa* Lemmermann 1910.
= *Euglena viridis* var. *purpurea* Playfair 1921.
= *Euglena viridis* var. *lefevrei* M.Chadefaud 1937.
= *Euglena viridis* f. *salina* Popowa 1947.
= *Euglena viridis* var. *halophila* E.G.Pringsheim 1953.
= *Euglena viridis* var. *maritima* E.G.Pringsheim 1953.
= *Euglena archaeoviridis* B.Zakrys and P.L.Walne 1994.
Cell elongate, ribbon like, green, swim rapidly 56.1µ long, 19.9 -20µ wide; anterior end rounded, posterior end pointed; fusiform during locomotion, highly plastic when stationary chloroplasts many, band like, radialy arranged, Mucous body granular in shape. Flagellum longer, eyespot red. Cell roundup very readily and form cyst.
Habitat-Dugaon (12/02/2009), Vani (12/03/09), Ozarkhed Dam (30/03/2012), Dental College (22/06/2012).
Distribution- Maharashtra (Deore, 1978, Jawale *et al.,* 2003; Vanjari and Kumawat, 2007; Bhosale and Dhumal, 2012), Madhya Pradesh (Mishra, 2007).

***Euglena wangi* Chu, 1946:** Pl. -2, F. - 25, 27

Sachitra-2006; 61-73.
Cell green, fusiform or sub cylindrical, slightly metabolic, 37-41µ long, 19.1-20.46µ broad. Anterior end conical, posterior end tapered into a prolong tail and wide central region. Stigma small, chloroplasts numerous, disc-shaped, small, without pyrenoid. Spherical nucleus, central and prominent, discoid paramylon grains in the periplast. It seems a first report of the alga from this locality and Maharashtra.
Habitat – Ozar (22/03/2011), Dugarwadi (10/06/2012).
Distribution – Orissa (Ratha *et al*, 2006), Tamilnadu (Mayakkannam, 2010).

Conclusion

Nashik division has numerous water reservoirs (favorable habitats) with enough sunlight and heavy rainfall. This support the growth of fresh water algae. The Present investigation is deals with the study of taxonomy of fresh water microalgae- Euglena in and around water reservoirs of Nashik. Euglena is a single cell microalga. It is found in shallow waters, on moist soil, ditches, puddles, ponds. The plants were collected and identified in live conditions only so as to observe its motility, number of flagella and other details with treatment of dilute iodine. The taxa *E. acus, E. ehrenbergii, E. gracilis, E. limnophila, E. mutabilis, E. sanguine, E. viridis* are found most common. The euglenas are found almost in all types of habitats in appreciable population. Among these Euglena *acus* var. *rigida*, *E. limnophila* var. *minor*, *E. obtusa* are reported new to India, Few taxa are also little known and appear as first reports for Maharashtra, these are *Euglena rostrata, E. wangi* .

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*Originals not seen.

Plate -1

Euglena intermedia	*Euglena sanguinea Var. sanguinea*	*Euglena viridis*

PLATE-2

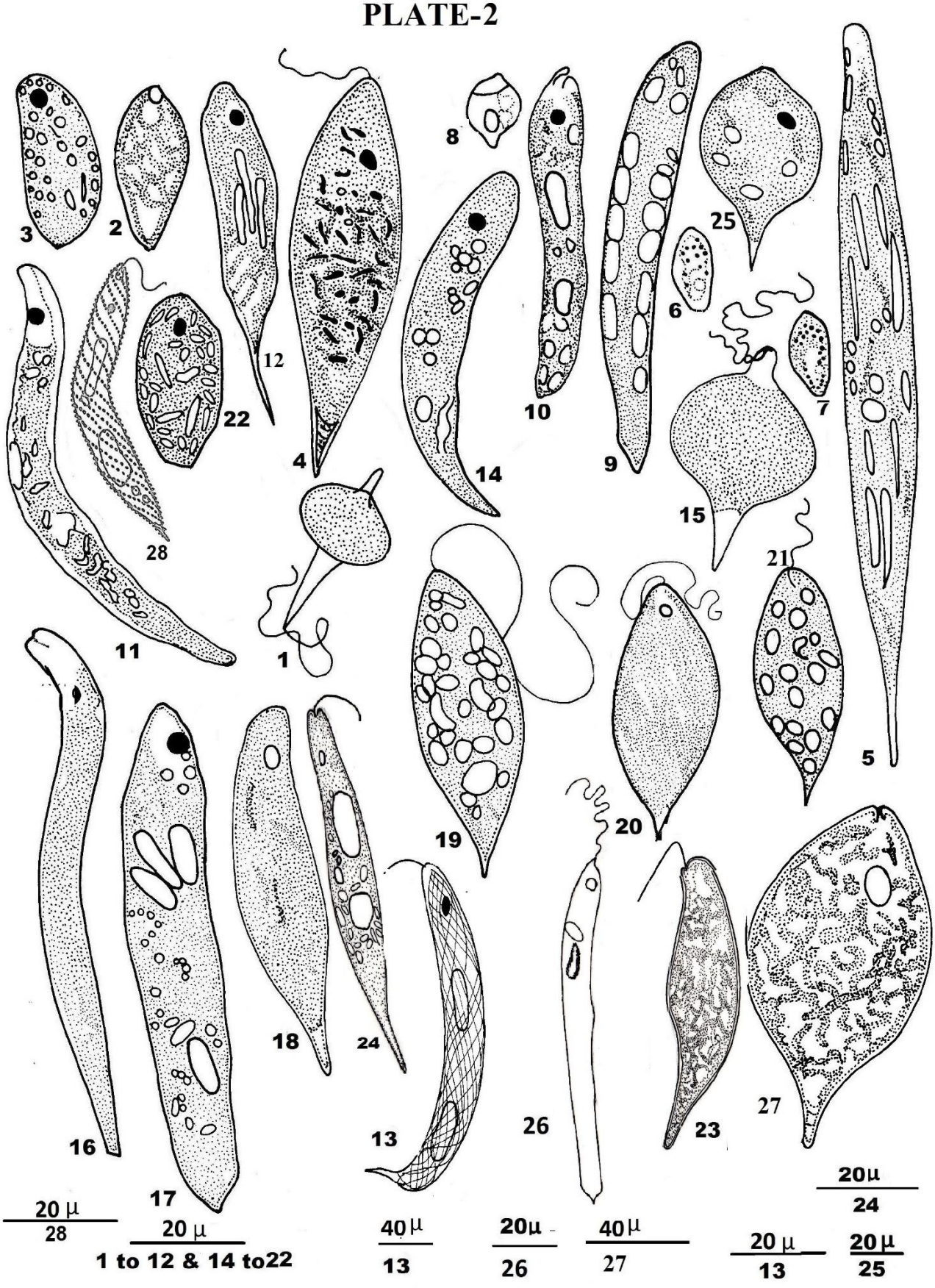

PLATE – 2

Fig. 1*Euglena rostrata* Fig. 2 *E. agilis* Fig. 3*E. clara* **Fig**. 4 *E. granulata*. Fig. 5 *E. acus* var. *rigida*. Fig. 6, 7, 8 *E. minuta* Fig. 9 *E. convolute* Fig.10 E. *deses* Fig.11*E. elongate* Fig.12*E. limnophila* Fig.13 *E. spirogyra var. marchica* Fig. 14 *E. limnophila* var. *minor* Fig. 15*E. pisciformis* **Fig**. 16 *E. mutabilis* Fig.17*E. obtusa.* Fig. 18*E. proxima* Fig. 19, 20 *E. sociabilis* Fig. 21, 22 *E. variabilis* Fig. 23*E. sanguinea* Fig. 24*E. oxyuris* Fig. 25, 27.*E. wangi* Fig. 26 *E. ehrenbergii* Fig. 28 *E. spirogyra*