

# Fresh water green algae from Basti District, Uttar Pradesh

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Misra P.K., Mehrotra R.K., Prakash J. & Srivastava A.K. 2003. Fresh water green algae from Basti District, Uttar Pradesh. *Geophytology* 31(1&2) : 1-7.

Present paper deals with 17 taxa of class Chlorophyceae belonging to orders Chlorococcales and Zygnematales (Desmidiaceae). Chlorococcales includes 5 taxa, whereas Desmidiaceae includes 12 taxa. Since the algal flora of Basti district has not been reported earlier, all these taxa constitute new record for Basti.

**Key-words**—Algae, Chlorophyceae, Chlorococcales, Zygnematales, Basti, U.P.

## INTRODUCTION

RECENT surveys have revealed that aquatic flora of tropical countries has not been explored properly. The same applies to our country especially to Northern India. Fresh water algae of North Eastern region of Uttar Pradesh has not been studied so far. Prasad and Mehrotra (1977 b) and Sarma and Khan (1980) have given a detailed account of earlier work done on Algal Flora of India, Prasad and Misra (1992) have mentioned the work done on fresh water green algae of our country. Recent studies on fresh water algae have been done by Verma *et al.* (1996, 2000), Chaturvedi and Habib (1996), Tarar and Bodheke (1998), Habib *et al.*, (1998). Flint and Williamson, (1998, 1999), Williamson, (1999), Kant and Vohra (1999), Tewari and Chauhan, (2000), Suselea and Dwivedi, (2001), Misra, *et al.*, (2001).

During the present investigation, the algal samples were collected from Bakhira lake, this lake falls in Dhadya Gram Sabha and is geographically located between 26°-52'-30" to 26°-55'-15" north latitude and 83°-5'-30" to 83°-10'-30" east longitude, situated about 12 km. from the district Basti.

District Basti is situated in North-East region of Tarai and Bhabar belt in Uttar Pradesh, it is surrounded by Faizabad (South), Gonda (West), Gorakhpur (East) and Nepal (North) the total coverage of Basti district is approximately 8282 Sq. Km.

## MATERIAL AND METHOD

Samples collection were made during October 2000-2001 from Bakhira lake, submerged.

Angiospermic plants were squeezed and algal components were collected in plastic tubes. Collected samples were preserved in 3-4% formalin; Chlorophycean forms were stained with iodine solution and glycerine was used for mounting the material; detailed study of algal forms were made examined under a Nikon Labophot microscope II.

## SYSTEMATIC DESCRIPTION

*Class* – *Chlorophyceae*  
*Order* – *Chlorococcales*  
*Family* – *Hydrodictyaceae*  
*Genus* – *Pediastrum* Meyen 1829

### 1. *Pediastrum biradiatum*, Meyen

Pl. 1, Fig. 4

Colonies 4-8-16-32-64 celled (usually 8-16-32 celled) with medium perforation, marginal cells in contact at the base only, and provided with lobes formed by an incision reaching the middle of the cell. Lobes dilated and incised at the apex. Inner cells with lobes, which are neither dilated nor incised, cells 9-22µm broad, 15-30 µm long. Colonies 32 celled 80-150 µm in diameter.

*Locality* : Bakhira lake

*Coll. No. and Date* : BT/ 1,2,3,4,14,15  
(1-10-2001)

### 2. *Pediastrum duplex* Meyen

Pl. 1, Figs 1,2

Colonies usually with 16-32, some times with 4,8,64 or 128 cells. Cells with small lens shaped perforations between cells. Inner cell quadrate to angular

and not in contact at the central portion of the sidewalls, inner side of marginal cells concave, outer side with one to two short truncate processes. Cells (6) -8-21  $\mu\text{m}$  in diameter. 16 celled colonies up to 90  $\mu\text{m}$  in diameter.

Locality : Bakhira lake  
Coll. No. and Date: BT/ 1,2,3,11,46  
(1-10-2000)

### 3. *Pediastrum tetras* (Ehr.) Ralfs

Pl. 1, Fig. 3

Colonies rectangular, oval or circular of 4-8-16-(32) cells, without inter cellular spaces. Marginal cells divided into two lobes by a deep linear to cuneate incision on the outer side reaching to middle of the cell. Each lobe truncate, emarginate or further division into two lobes, inner cells 4-6 sided with a single linear-incision, eight-celled colonies 20-23  $\mu\text{m}$  and 16 celled colonies up to 50  $\mu\text{m}$  in diameter. Cell, 7-10  $\mu\text{m}$  long and 7  $\mu\text{m}$  broad.

Locality : Bakhira lake  
Coll. No. and Date: BT/1,2,15,16,17,46  
(1-10-2000)

Family – *Oocystaceae*  
Genus – *Oocystis* Naeg. A. Braun  
1855

#### 1. *Oocystis naegeli* A. Braun

Pl. 2, Fig. 2

Colonies 2-4 celled with closely fitting envelope, cells ovoid to oblong, without polar modules cell membrane thick chloroplast one in the form of parietal plate, lacking pyrenoid cell 19-24  $\mu\text{m}$  long, lateral cell 13-14  $\mu\text{m}$  broad.

Locality : Bakhira lake  
Coll. No. and Date: BT/6 (1-10-2000)  
Genus : *Coelastrum* Naeg. 1849

#### 1. *Coelastrum* sp.

Pl. 1, Fig. 7

Colony usually a hollow sphere, rarely polygonal to pyramidal with 4-8-16-32 or up to 128 cells, cells spherical, ovoid or pyramidal, closely adjoined and compressed or inter connected by processes to form inter-cellular spaces, cell-wall often thickened to form polar out-growth or lateral processes for connecting the cells, chloroplast parietal cup-shaped or diffuse with one pyrenoid, reproduction by formation of auto-colonies.

Diameter : Cell 15-18  $\mu\text{m}$ .  
Locality : Bakhira lake  
Coll. No. and Date: BT/1,2,5,46,20,21  
(18-10-2001)

Order – *Zygnematales*  
Family – *Desmidiaceae*  
Genus – *Closterium* Nitzsch 1817

#### 1. *Closterium diana* Ehrenberg var. *minus* (Wille) Schoreder

Pl. 2, Fig. 9

Cell large, curved outer margin convex, end cell with rounded apices, chloroplast with 6-8 ridges and numerous pyrenoid.

Long cell 109  $\mu\text{m}$ , lat cell 11  $\mu\text{m}$ , lat apex 4  $\mu\text{m}$

Locality : Bakhira lake  
Coll. No. and Date: BT/3,12, (1-10-2000)

#### 2. *Closterium incurvum* Breb.

Pl. 2, Fig. 8

Cell small, 7-8 times longer than broad, strongly curved, outer margin with 180 degrees of arc, inner margin concave but not tumid in the middle, cell attenuated towards and acute apices; cell wall smooth; chloroplast ridged with 4 pyrenoids, arranged in a row.

## PLATE-1

- |   |  |
|---|--|
| 1. <i>Pediastrum duplex</i> x 2500        | 6. <i>Micrasterias mahabulenshwariensis</i> x 500          |
| 2. <i>Pediastrum duplex</i> x 2000        | 7. <i>Coelastrum</i> sp. x 2500                            |
| 3. <i>Pediastrum tetras</i> x 250         | 8. <i>Pleurotaenium ehrenbergii</i> x 200                  |
| 4. <i>Pediastrum biradiatum</i> x 500     | 9. <i>Cosmarium moniliforme</i> v. <i>limneticum</i> x 500 |
| 5. <i>Micrasterias pinnatifida</i> x 1000 |  |

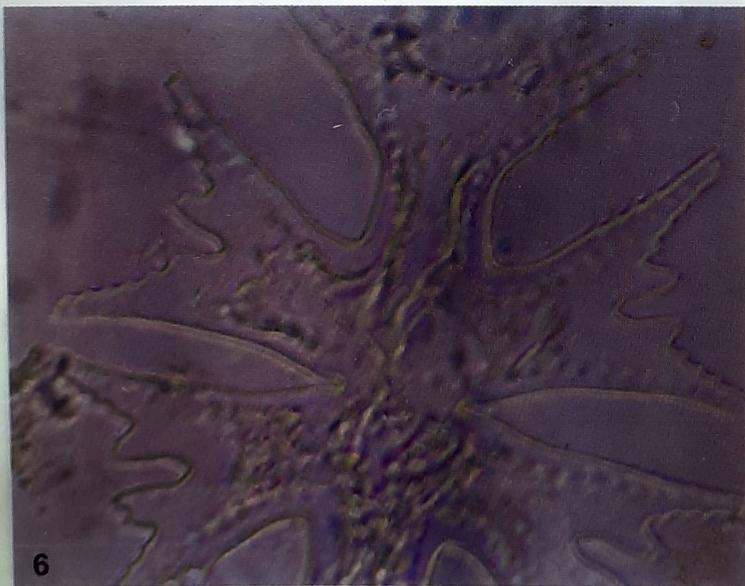
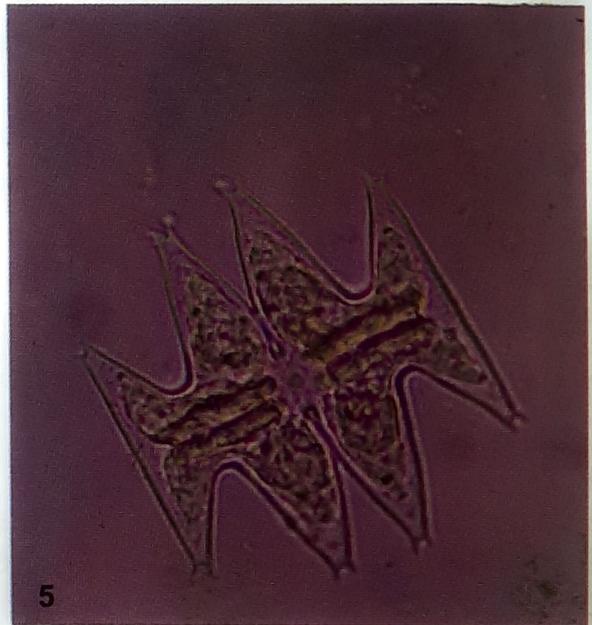
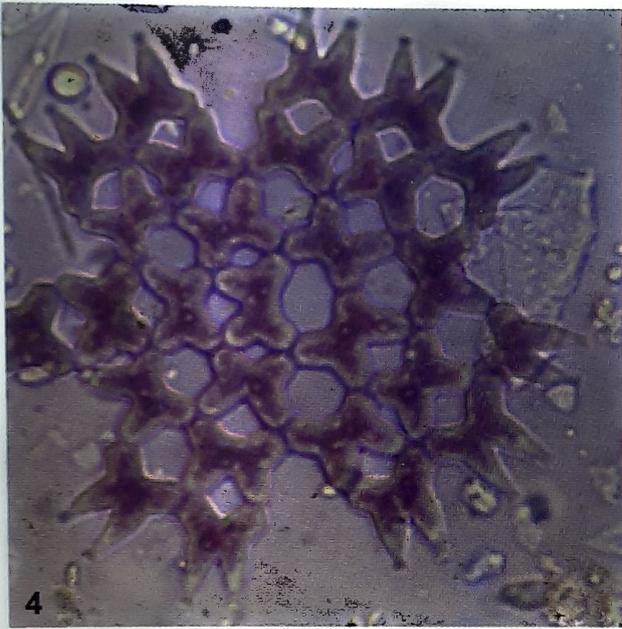
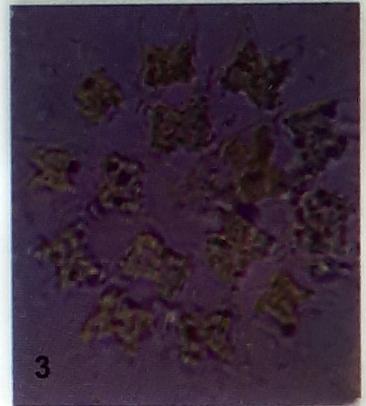
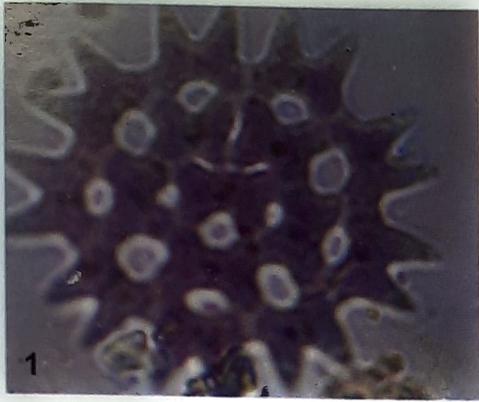


PLATE - 1

Long cell 95µm, lat cell 13µm, lat apex 1 µm

Locality : Bakhira lake  
Coll. No. and Date: BT/1,2,3,4,20,21,25,53,  
(1-10-2000)

3. *Closterium leibleinii* Kuetz.

Pl. 2, Fig. 6

Cells of medium size, 7-8 times longer than broad strongly curved, outer margin with 154-180 degrees of arc, inner margin concave and slightly tumid in the middle, cell gradually attenuated to the acutely rounded apices, cell wall smooth; chloroplast with 4-5 ridges and a median row of 8-9 pyrenoids.

Long cells 229-235 µm, lat. cell 31-37 µm, lat. apex 7 µm

Locality : Bakhira lake  
Coll. No. and Date: BT/2,3,4,7,10,11,13,14,  
17,46 (1-10-2000)

4. *Closterium lunula* (Muel) Nitzsch. var. *massarti* (Wildem) Krieg. f. *nasutum* Scott et. Prescott

Pl. 2, Fig. 7

Cells large, straight, about 7 times longer than broad, both the margins convex and equally curved with 45 degrees of arc. Cell abruptly attenuated near truncate or truncately rounded apices, cell wall smooth, chloroplast with 7-9 ridges and numerous scattered pyrenoids.

Long Cell 694-713 µm, lat cell 91-104µm, lat apex 13-15 µm

Locality : Bakhira lake  
Coll. No. and Date: 2,3,4,5,6,7,10, (1-10-2000)

5. *Closterium peracerosum* Gay

Pl. 2, Fig. 5

Cell of medium size, 18-20 times longer than broad, moderately curved outer margin 30 degrees of arc inner slightly concave towards poles and more or less straight in mid region, cell gradually attenuated towards acute apices, cell wall smooth, chloroplast

ridged with an axial series of pyrenoids.

Long cell 192-199 µm, lat. cell 14-19 µm lat. apex 3-4 µm.

Locality : Bakhira lake  
Coll. and Date : BT/2,3,7,23,25 (18-10-2001)

Genus - *Cosmarium* Corda ex Ralfs 1843

1. *Cosmarium impressulum* Elfv var. *crenulatum* (Naeg) Kriegerer et. Gerloff

Pl. 2, Fig. 1

Cells very small, slightly longer than broad deeply constricted, sinus narrowly linear, semi cells vertically sub quadrate with triangulate, margin undulations sub acute apex narrow and retuse with rounded angles, cell wall smooth, top x view broadly elliptic chloroplast parietal with one pyrenoid in each semi cell.

Long cell 30 µm, lat. cell 24 µm, isthmus 6 µm.

Locality : Bakhira lake  
Coll. No. and Date: BT/10,11,14,15,16,46 (2-4-2001)

2. *Cosmarium moniliforme* (Turnp.) Ralfs var. *lamneticum* W.et. G.S. West

Pl. 1, Fig. 9

Cells commonly seen attached in pair of 2 or 4, apices slightly angular, isthmus broad, sinus, obtuse, cell wall smooth, each semicell with an axile chloroplast and one pyrenoid.

Locality : Bakhira lake  
Coll. No. and Date: BT/1,2,3,4,11,14,15,16,45  
(1-10-2000)

Genus - *Pleurotaenium* Naegli 1849

1. *Pleurotaenium ehrenbergii* (Breb.) De Bory

Pl. 1. Fig.8

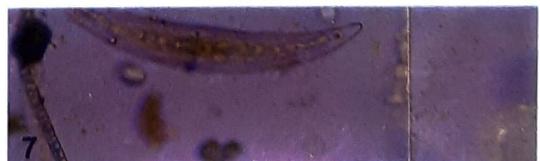
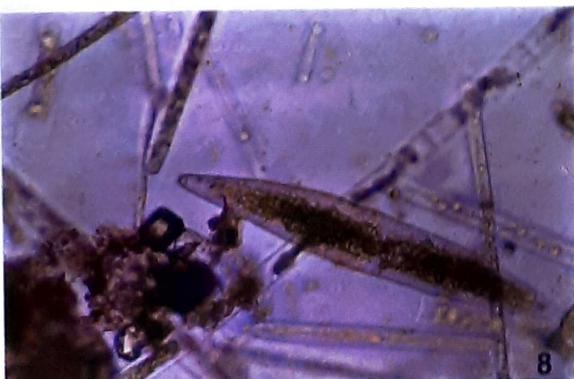
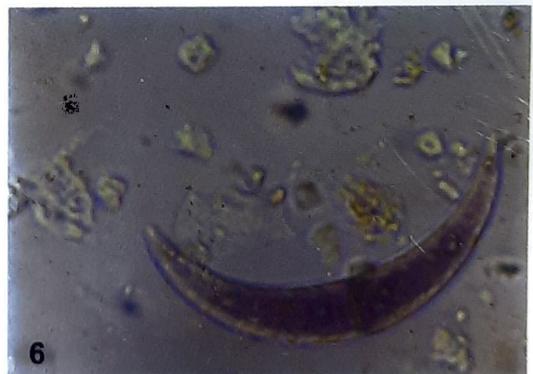
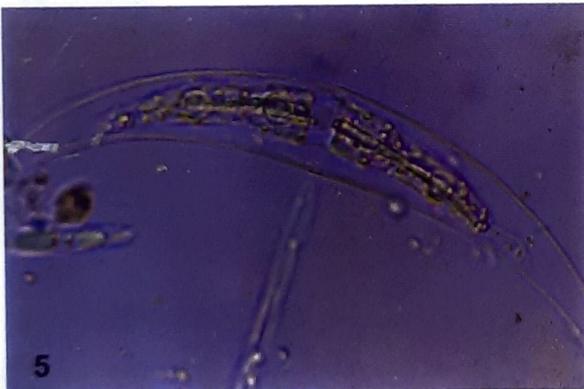
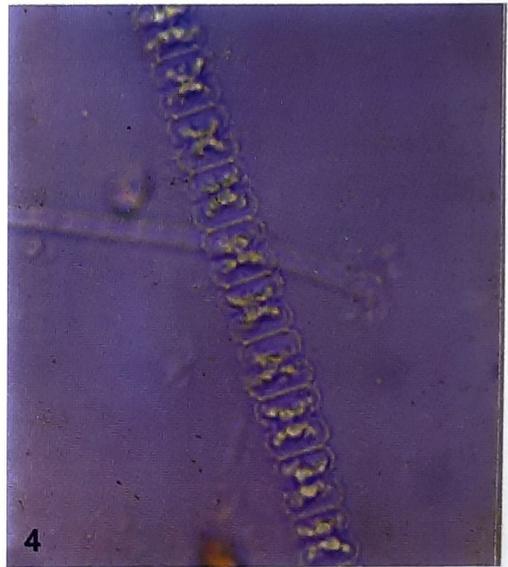
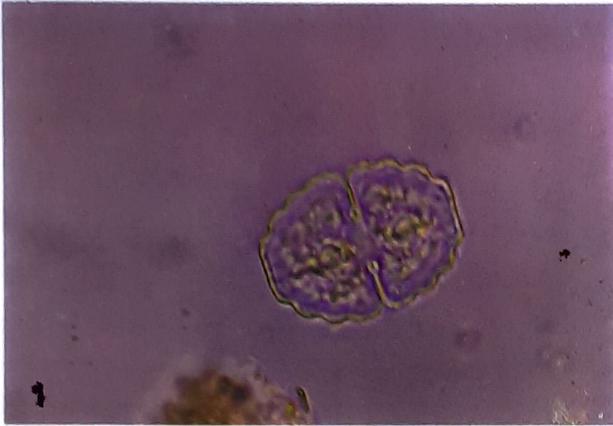
Cells fairly large, about 15-20 times longer than broad, sub-cylindrical slightly constricted at the base, semicells cylindrical, generally attenuated from base

PLATE-2

1. *Cosmarium impressulum* v. *crenulatum* x 100
2. *Oocystis naegeli* x 2000
3. *Desmidium baileyi* x 800
4. *Desmidium swartzii* x 1000
5. *Closterium peracerosum* x 50

6. *Closterium leibleinii* x 20
7. *Closterium lunula* var. *massarti* f. *nasutum* x 75
8. *Closterium incurvum* x 400
9. *Closterium diana* x 400

FRESH WATER GREEN ALGAE FROM DISTRICT BASTI, UTTAR PRADESH



towards apex, basal inflation small with one undulation, apex with a ring of 8-10 tuberos (4-5 visible in front view), cell-wall minutely punctate.

Long cell 393-416  $\mu\text{m}$ , lat. cell-20-28  $\mu\text{m}$ , lat apex 12-19  $\mu\text{m}$

Locality : Bakhira lake

Coll. No. and Date: BT/17 (1-10-2000)

Genus - *Micrasterias* C.A. Agardh 1827

1. *Micrasterias mahabuleshwariensis* Hobson

Pl. 1, Fig.6

Cells of medium size, 1-1.5 times longer than broad, constriction deep, sinus open with acuminate extremity, semi cells 3 lobed with symmetry in three planes, incisions between lobes wide, polar lobe large with sub-quadrate lower half and dilated upper half producing prominent diverging denticulate processes and exhibiting a pair of small, accessory, asymmetrical denticulate process in front and back near slightly concave base, margin with small and acute spines, lateral lobes with wide, deep and acute angled incision, divided into two attenuated and denticulate processes, apices of all the processes tri or quadric denticulate portion above the isthmus furnished with a row of denticulations.

Long cell 119-126  $\mu\text{m}$ , lat. cell 88-92  $\mu\text{m}$

Locality : Bakhira lake

Coll. No. and Date: BT/3,6,16,18,19,20,36 (1-10-2000)

2. *Micrasterias pinnatifida* (Kuetz.) Ralfs

Pl. 1, Fig. 5

Cells small, slightly broader than long, deeply constricted sinus linear but slightly open outwards, semi cells 3 lobed, inter-cellular incisions deep and broadly-rounded, lateral lobes horizontal, semi fusiform with minutely bifid, apices exhibiting acuminate ends, polar lobe with basal portion sub-rectangular and apical portion with extremities like lateral lobes but relatively shorter in length, cell wall minutely punctate.

Long cell 42-54  $\mu\text{m}$ , lat. cell 51-57  $\mu\text{m}$

Locality : Bakhira lake

Coll. No. and Date: BT/3,6,16,18,19,20,36 (1-10-2000)

Genus - *Desmidium* C.A. Agardh, 1824

1. *Desmidium baileyi* (Ralfs) Nordst.

Pl. 2, Fig. 3

Cell small, united to form straight filament lacking gelatinous sheath, little broader than long, median-constriction reduced to a faint undulation, cell out line rectangular with the lateral parallel margins and broad apices showing deep and semi elliptic depression, adjacent cells separated by elliptical to sub rectangular opening, cell wall smooth, each semi cell with two axile chloroplast, each containing one pyrenoid.

Long cell 15-17  $\mu\text{m}$ , lat. cell-21-22  $\mu\text{m}$ .

Locality : Bakhira lake

Coll. No. and Date: BT/11,13,14,15,16, (18-10-2001)

2. *Desmidium swartzii* C.A. Agardh

Pl. 2, Fig. 4

Cells rather small, united in to spirally twisted filaments lacking gelatinous sheath, cell twice as broad as long, narrowly rectangular, moderately constricted with open sinus, semi-cells oblong with more or less straight apical margins, lateral margin obliquely rounded, cell wall smooth, chloroplast axile and disposed in relation to two pyrenoid.

Long cell 14-15  $\mu\text{m}$ , lat. cell-27-33  $\mu\text{m}$ .

Locality : Bakhira lake

Coll. No. and Date: BT/1,2,5,6,16,46 (1-12-2000)

## DISCUSSION

During the course of present investigation, a total of 17 taxa of fresh water chlorophyceae have been studied belonging to only two orders namely Chlorococcales and Zygnematales. Chlorococcalean genera are *Pediastrum* Mayen *Oocystis* Naegli and *Coelastrum* Naegli whereas desmids genera are *Cosmarium* Corda, *Closterium* Nitzsch *Pleurotaenium* Naegli *Micrasterias* Agardh, and *Desmidium* Agardh are represented by 2,5,1,2, and 2 taxa respectively. These taxa re new additions to the district of Basti, however these have been described from some other of our country.

## ACKNOWLEDGEMENT

Authors are thankful to Head, Department of Botany, Lucknow University, Lucknow for providing laboratory and library facilities.

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