

SERI/SP-232-3079a  
UC Category: 61c

ADDENDUM TO  
MICROALGAE CULTURE COLLECTION  
1986 - 1987

December 1987

Prepared by the  
SERI Microalgal Technology  
Research Group

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## INTRODUCTION

In 1984, the SERI Microalgae Culture Collection was established in support of the U.S. Department of Energy's Biofuels and Municipal Waste Technology Program. It provides a repository for strains identified or developed for mass culture biomass production and makes these strains readily available to the research community. The strains in the collection have been selected for their potential in biomass fuel applications, and many produce significant quantities of cellular storage lipids.

Two catalogs of the Microalgae Culture Collection have been printed and distributed free to those requesting them, one for 1985-1986 (Anonymous 1986) and one for 1986-1987 (Barclay *et al.* 1986). The 1986-1987 catalog is still current, and this year we plan to print only this addendum to that catalog. We will list only those species newly characterized and not listed in the 1986-1987 catalog. This includes a number of species collected as part of the cold-water collection and screening program as well as species collected from warm waters. Modifications to culture recipes are given. We are also providing a list of all past names of culture strains along with their current SERI designation. **We ask that all researchers reporting work on SERI strains use the current SERI designation.**

As in past years, cultures will be shipped free of charge to interested researchers. **Again, we request that investigators using species from this collection supply us with copies of pertinent publications of their research with these strains.** For explanatory notes on abbreviations see page 2 of the 1986-1987 catalog. Please note that conductivity is now reported in mS/cm (equivalent to mmho/cm) since this is the correct SI unit.

All cultures in this addendum and in Microalgae Culture Collection 1986-1987 are available without charge for research and culture applications. Requests for cultures are accepted by letter, which should be addressed as follows:

Dr. Jeff Johansen  
Microalgae Culture Collection  
Solar Energy Research Institute  
1617 Cole Blvd.  
Golden, CO 80401

Questions about the culture collection or requests for information can be made by phone to 303-231-1247.

Chaetoceros muelleri var. subsalsum (Lemm.) Johan. and Rush.

Strain: CHAET9

Taxonomy:     Division: Chrysophyta  
                  Class: Bacillariophyceae  
                  Order: Centrales  
                  Family: Chaetoceraceae

Collection site: Ephemeral pond near Ludlow Sheep Barns, east shore of Goshen Bay, Utah Lake, Utah, U.S.A. (S. Rushforth).

                  Date: July 24, 1985  
Water temperature: 34°C  
Salinity: 43 mS/cm

Size: valves 3-7  $\mu\text{m}$  wide, 4-12  $\mu\text{m}$  long, perivalvar length 4-10  $\mu\text{m}$ .

Growth form: unicellular, not forming chains or colonies.

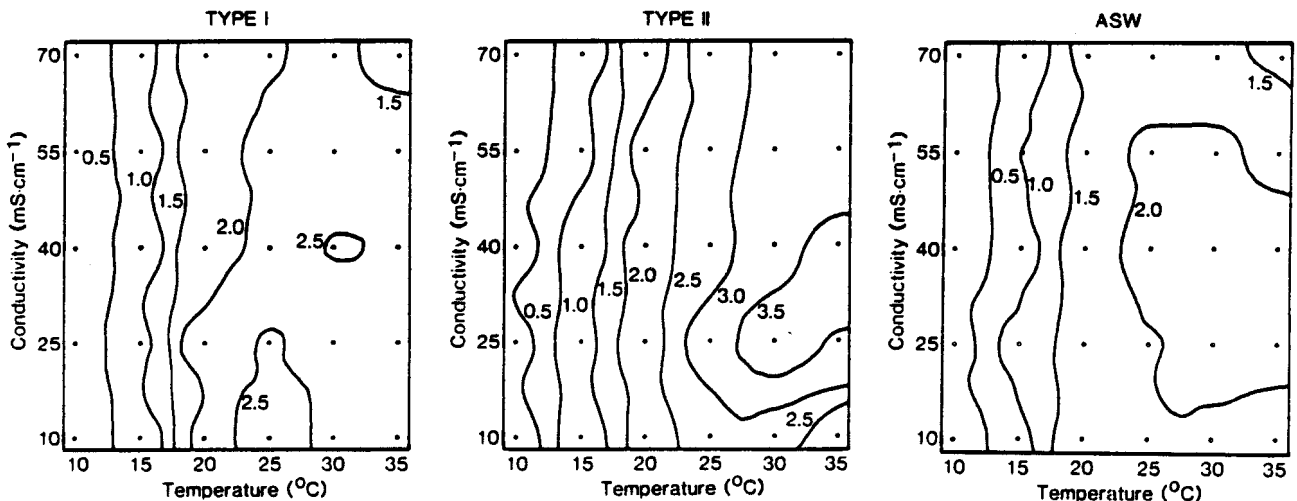
Growth rate at optimum: 4.0 doublings/day

Culture conditions:

                  Vitamins required: not determined  
Available nitrogen sources: urea, nitrate  
                  Suitable media: SERI Type II best, SERI Type I adequate  
Nutritional modes: autotrophic  
Temperature range: 10-35°C  
Temperature optimum: 30°C  
Salinity range: 10-115 mS/cm  
Salinity optimum: 25 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture.



**Lipid Content:**

**Nutrient sufficient:** 17.8%  
**Nitrogen deficient:** 27.6% (4 days deficiency)  
**Silicon deficient:** 24.8% (2 days deficiency)

**Notes Concerning this Strain:**

Identification has been verified with the observation of resting spores and consistent absence of valvar processes and chains. This is one of our most euryhaline strains, growing at 0.70 doublings/day at 115 mS/cm conductivity at 30°C. Growth below 0.50 doublings/day has been observed at 130 mS/cm conductivity. The site of origin is a playa lake, and is dry for several months of every year.

Chaetoceros muelleri var. muelleri Lemmerman

Strain: CHAET58

Taxonomy:     Division: Chrysophyta  
                  Class: Bacillariophyceae  
                  Order: Centrales  
                  Family: Chaetoceraceae

Collection site: Soap Lake, Washington, U.S.A. (J. Johansen).

                  Date: March 6, 1987  
Water temperature: 7°C  
Salinity: 11 mS/cm

Size: valves 3-9  $\mu\text{m}$  wide, 3.5-29  $\mu\text{m}$  long, perivalvar length 4-15  $\mu\text{m}$ .

Growth form: chain-forming (up to 20 cells/chain).

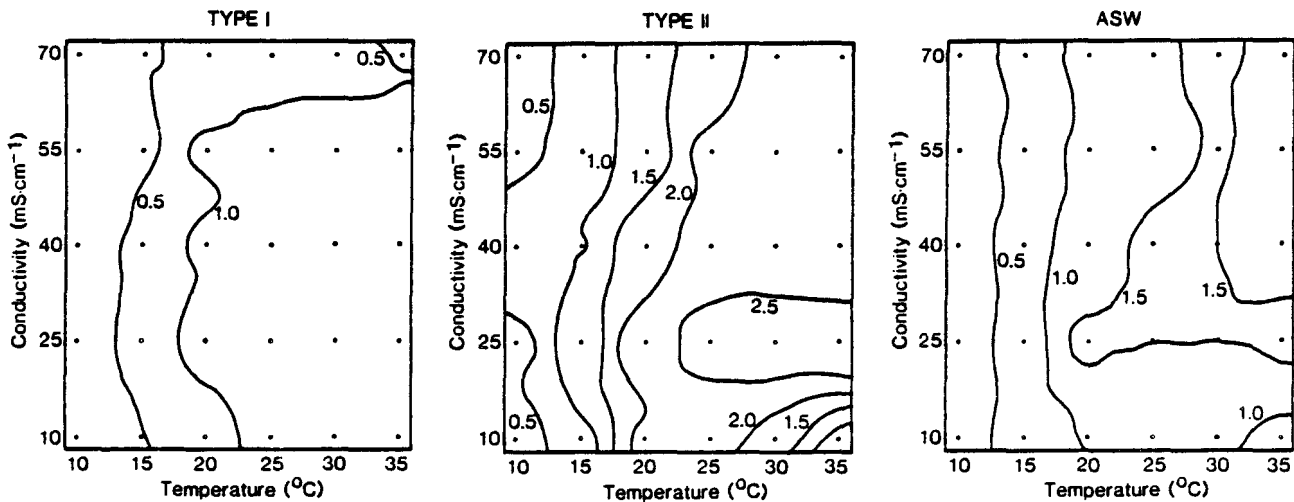
Growth rate at optimum: 2.8 doublings/day.

Culture conditions:

                  Vitamins required: not determined  
Available nitrogen sources: urea, nitrate  
                  Suitable media: SERI Type II best, Artificial seawater adequate  
Nutritional modes: autotrophic  
Temperature range: 10-35°C  
Temperature optimum: 25-30°C  
Salinity range: 10-70 mS/cm  
Salinity optimum: 25 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture.



Chaetoceros muelleri var. subsalsum (Lemm.) Johan. and Rush.

Strain: CHAET61

**Taxonomy:**    **Division:** Chrysophyta  
                  **Class:** Bacillariophyceae  
                  **Order:** Centrales  
                  **Family:** Chaetoceraceae

**Collection site:** Farmington Bay, Great Salt Lake, Utah, U.S.A. (S. Rushforth).

**Date:** August 7, 1986  
**Water temperature:** 25°C  
**Salinity:** 38 mS/cm

**Size:** valves 4-7  $\mu\text{m}$  wide, 5-12  $\mu\text{m}$  long, perivalvar length 5-10  $\mu\text{m}$ .

**Growth form:** unicellular, not forming chains.

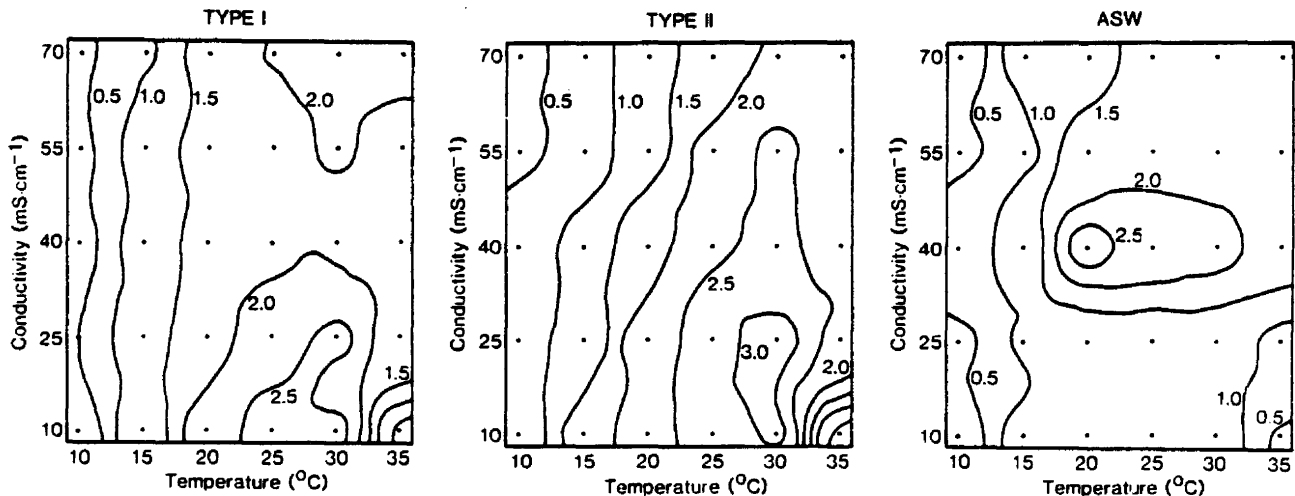
**Growth rate at optimum:** 3.3 doublings/day.

**Culture conditions:**

**Vitamins required:** not determined  
**Available nitrogen sources:** urea, nitrate  
                  **Suitable media:** SERI Type II best, SERI Type I adequate  
**Nutritional modes:** autotrophic  
**Temperature range:** 10-35°C  
**Temperature optimum:** 30°C  
                  **Salinity range:** 10-70 mS/cm  
                  **Salinity optimum:** 10-25 mS/cm, 40 mS/cm in Artificial seawater

**Temperature/salinity growth responses:**

Exponential growth rate (doublings/day) in semicontinuous batch culture.



Chaetoceros muelleri var. subsalsum (Lemm.) Johan. and Rush.

Strain: CHAET63

Taxonomy:    Division: Chrysophyta  
              Class: Bacillariophyceae  
              Order: Centrales  
              Family: Chaetoceraceae

Collection site: Farmington Bay, Great Salt Lake, Utah, U.S.A. (S. Rushforth).

              Date: September 4, 1986  
Water temperature: 24°C  
Salinity: 40 mS/cm

Size: valves 4-7  $\mu\text{m}$  wide, 4-10  $\mu\text{m}$  long, perivalvar length 4-9  $\mu\text{m}$ .

Growth form: unicellular, not forming chains.

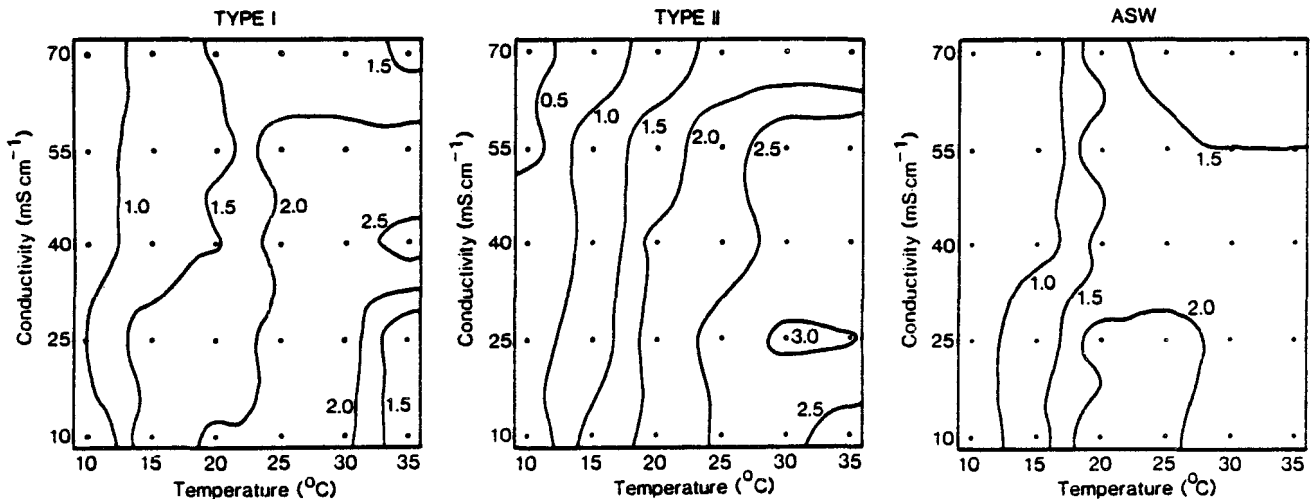
Growth rate at optimum: 3.1 doublings/day.

Culture conditions:

Vitamins required: not determined  
Available nitrogen sources: urea, nitrate  
Suitable media: SERI Type II best, other saline media adequate  
Nutritional modes: autotrophic  
Temperature range: 10-35°C  
Temperature optimum: 30°C in Type II, 25-30°C in other media  
Salinity range: 10-70 mS/cm  
Salinity optimum: 25 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture.





Cyclotella cryptica Reimann et al.

Strain: CYCLO4

Taxonomy: Division: Chrysophyta  
Class: Bacillariophyceae  
Order: Centrales  
Family: Thalassiosiraceae

Collection site: Wet meadow north of Goshen Playa, Utah County, Utah, U.S.A.  
(B. Barclay).

Date: May 24, 1985  
Water temperature: 28°C  
Salinity: 25 mS/cm  
pH: 8.4

Size: valves 6-8 um in diameter.

Growth form: unicellular.

Growth rate at optimum: 1.6 doublings/day.

Culture conditions:

Vitamins required: not determined

Available nitrogen sources: urea, nitrate

Suitable media: Artificial seawater best, SERI Type I adequate

Nutritional modes: autotrophic

Temperature range: 10-35°C

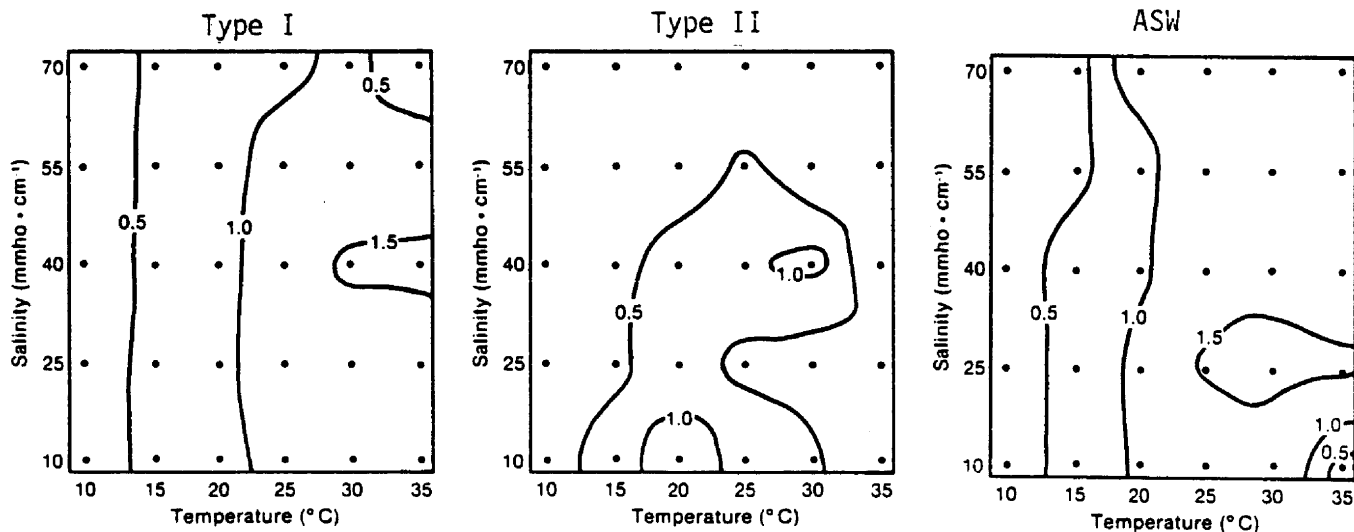
Temperature optimum: 30°C

Salinity range: 10-70 mS/cm

Salinity optimum: 25 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture.



**Lipid Content:**

**Nutrient sufficient:** 12.1%  
**Nitrogen deficient:** 11.3% (4 days deficiency)  
**Silicon defifient:** 13.2% (2 days deficiency)

**Notes Concerning this Strain:**

This strain is physiologically similar to CYCLO2, though growth rates are slightly lower than observed for that strain. CYCLO1 is the fastest growing strain of Cyclotella cryptica in the SERI collection, but researchers interested in studying physiological variability in this species may wish to work with more than one strain. Additional uncharacterized strains of C. cryptica are also available upon request.

Amphiprora hyalina Eulenstein

Strain: ENTOM3 (BB-333)

Taxonomy: Division: Chrysophyta  
Class: Bacillariophyceae  
Order: Pennales  
Family: Entomoneidaceae

Collection site: Biloxi Bridge, Biloxi, Mississippi, U.S.A. (M. Tadros).

Date: June 1986  
Water temperature: 27°C  
Salinity: 24 mS/cm  
pH: 7.5

Size: valve length 14-27  $\mu\text{m}$ , perivalvar width 9-16  $\mu\text{m}$ , 45-48 striae in 10  $\mu\text{m}$ .

Growth form: unicellular.

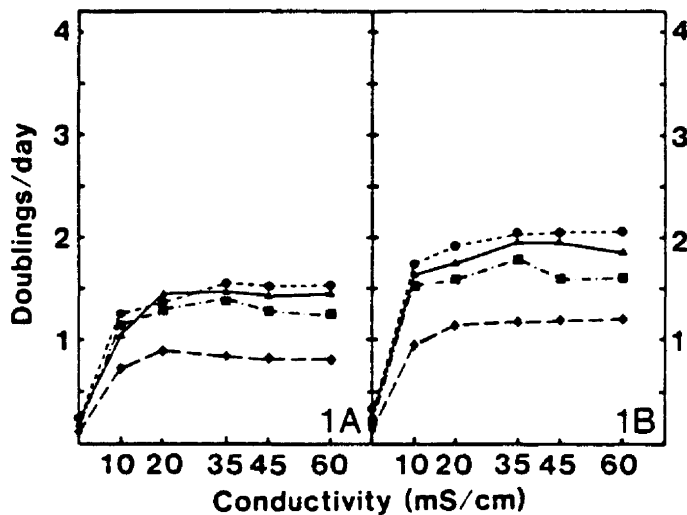
Growth rate at optimum: 2.0 doublings/day.

Culture conditions:

Vitamins required: not determined  
Available nitrogen sources: nitrate best, urea good, ammonium poor  
Suitable media: f/2  
Nutritional modes: autotrophic  
Temperature range: 20-35°C  
Temperature optimum: 25-30°C  
Salinity range: 10-60 mS/cm  
Salinity optimum: 35-60 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture. Fig. 1A. 80  $\text{uE}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Fig. 1B. 160  $\text{uE}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Temperatures tested were: 20°C (diamonds), 25°C (triangles), 30°C (circles), 35°C (squares).

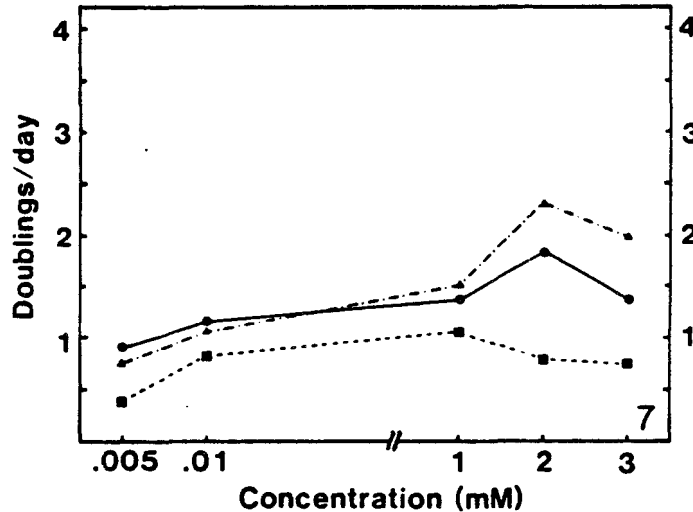


**Lipid Content:**

**Nutrient sufficient:** 22.1%  
**Nitrogen deficient:** 30.2% (3 days deficiency)  
**Silicon defifient:** 37.1% (3 days deficiency)

**Nitrogen Preference:**

Exponential growth rate using nitrate (triangles), urea (circles) and ammonium (squares) as nitrogen source.



**Notes Concerning this Strain:**

Reimer (Patrick and Reimer 1975) points out that Amphiprora Ehr. is invalidly described and that species belonging to the genus should be placed in Entomoneis Ehr. However, in his treatment of Entomoneis he does not transfer A. hyalina to Entomoneis. We agree with the use of the epithet Entomoneis, but as this is an inappropriate place to make a nomenclatural change we use Amphiprora.

## Unidentified Prasinophyte

**Strain:** GREEN3

**Taxonomy:** Division: Chlorophyta  
Class: Prasinophyceae

**Collection site:** Sheep pond, Hwy 83, Box Elder County, Utah, U.S.A. (P. Lemke and J. Johansen).

**Date:** October 23, 1986  
**Water temperature:** 28°C  
**Salinity:** 38.7 mS/cm  
**pH:** 8.9

**Size:** 7-13  $\mu\text{m}$  wide, 11-18  $\mu\text{m}$  long.

**Growth form:** unicellular, dorsiventrally flattened biflagellate possessing an apical flagellar pit. Starch producing pyrenoid present.

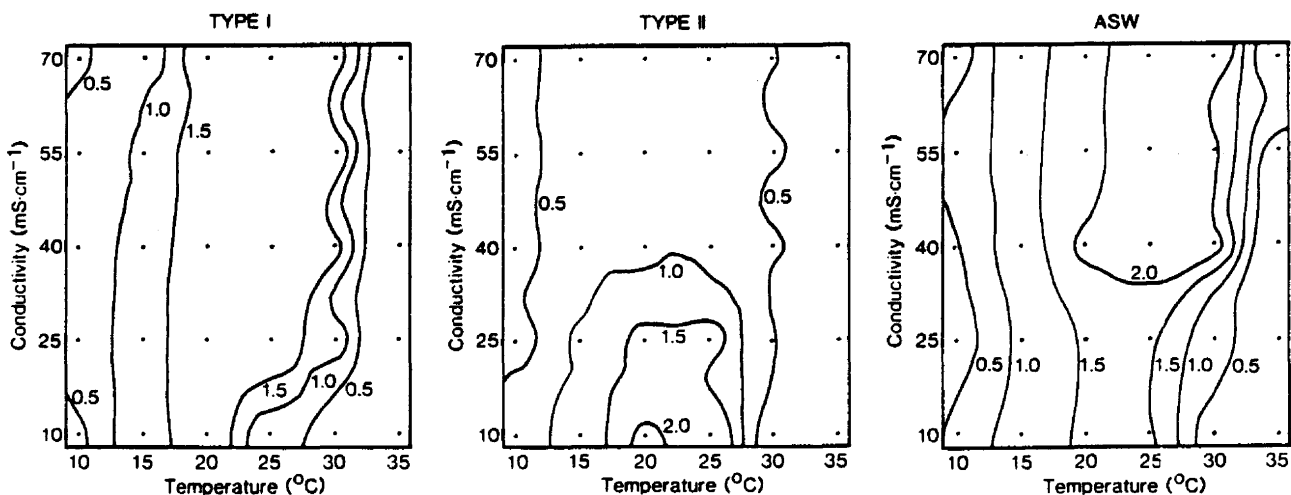
**Growth rate at optimum:** 2.4 doublings/day.

### Culture conditions:

**Vitamins required:** not determined  
**Available nitrogen sources:** urea  
**Suitable media:** Artificial seawater  
**Nutritional modes:** autotrophic  
**Temperature range:** 10-30°C  
**Temperature optimum:** 25°C  
**Salinity range:** 10-70 mS/cm  
**Salinity optimum:** 40 mS/cm

### Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture.



Navicula acceptata Hustedt

Strain: NAVIC6

Taxonomy:   Division: Chrysophyta  
              Class: Bacillariophyceae  
              Order: Pennales  
              Family: Naviculaceae

Collection site: Biloxi Bridge, Biloxi, Mississippi, U.S.A. (M. Tadros).

              Date: May 1985  
Water temperature: 26°C  
              Salinity: 22 mS/cm  
              pH: 7.8

Size: valves 6-9  $\mu\text{m}$  long, 3-4.5  $\mu\text{m}$  wide, 15-16 striae in 10  $\mu\text{m}$ .

Growth form: unicellular.

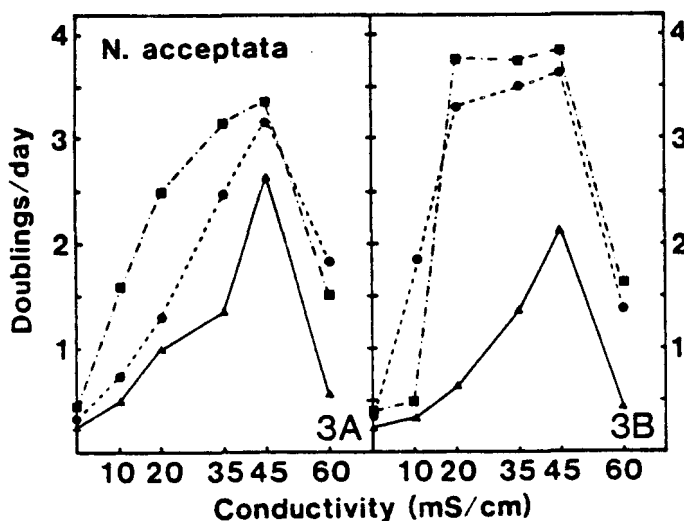
Growth rate at optimum: 3.8 doublings/day.

Culture conditions:

              Vitamins required: not determined  
Available nitrogen sources: nitrate or ammonium good, urea poor  
              Suitable media: f/2  
              Nutritional modes: autotrophic  
              Temperature range: 20-35°C  
              Temperature optimum: 35°C  
              Salinity range: 10-60 mS/cm  
              Salinity optimum: 20-45 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture. Fig. 1A. 80  $\mu\text{E}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Fig. 1B. 160  $\mu\text{E}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Temperatures tested were: 25°C (triangles), 30°C (circles), 35°C (squares).

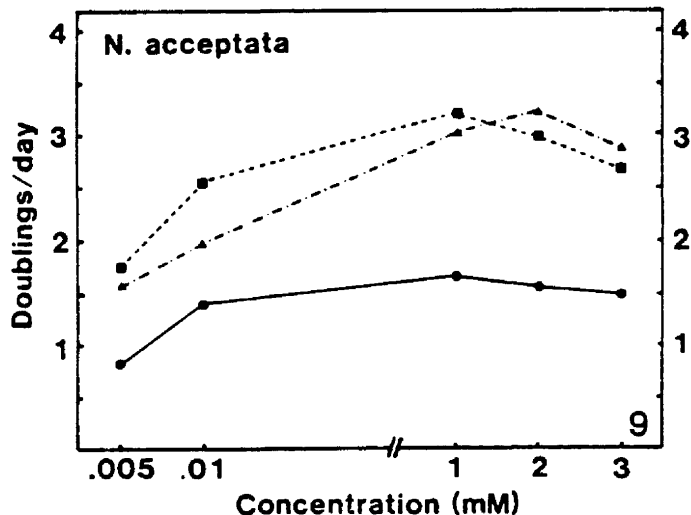


**Lipid Content:**

Nutrient sufficient: 21.8%  
Nitrogen deficient: 32.4% (3 days deficiency)  
Silicon deficient: 48.5% (3 days deficiency)

**Nitrogen Preference:**

Exponential growth rate using nitrate (triangles), urea (circles) and ammonium (squares) as nitrogen source.



**Notes Concerning this Strain:**

NAVIC6 and NAVIC8 have slightly coarser striae than described for *N. acceptata*, but other features are typical of the species.

Navicula acceptata Hustedt

Strain: NAVIC8 (SB-304)

Taxonomy:    Division: Chrysophyta  
              Class: Bacillariophyceae  
              Order: Pennales  
              Family: Naviculaceae

Collection site: St. Joseph Bay, Florida, U.S.A. (M. Tadros).

              Date: June 1986  
Water temperature: 30°C  
              Salinity: 31 mS/cm  
              pH: 6.2

Size: valves 6-10  $\mu\text{m}$  long, 3-4  $\mu\text{m}$  wide, 15-16 striae in 10  $\mu\text{m}$ .

Growth form: unicellular.

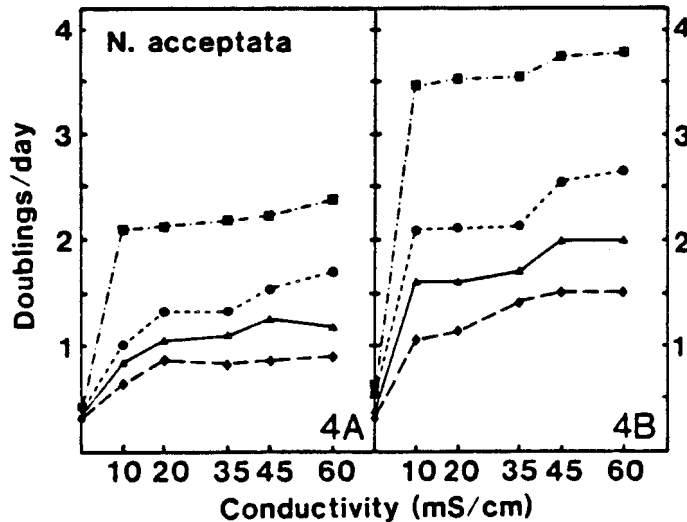
Growth rate at optimum: 3.8 doublings/day.

Culture conditions:

              Vitamins required: not determined  
Available nitrogen sources: nitrate best, ammonium good, urea poor  
              Suitable media: f/2  
              Nutritional modes: autotrophic  
              Temperature range: 20-35°C  
              Temperature optimum: 35°C  
              Salinity range: 10-60 mS/cm  
              Salinity optimum: 45-60 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture. Fig. 1A. 80  $\text{uE}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Fig. 1B. 160  $\text{uE}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Temperatures tested were: 20°C (diamonds), 25°C (triangles), 30°C (circles), 35°C (squares).



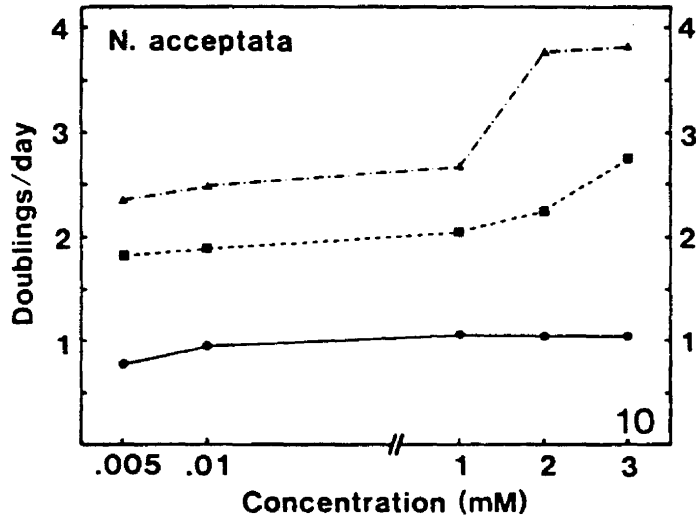


**Lipid Content:**

**Nutrient sufficient:** 19.2%  
**Nitrogen deficient:** 38.2% (3 days deficiency)  
**Silicon defifient:** 42.5% (3 days deficiency)

**Nitrogen Preference:**

Exponential growth rate using nitrate (triangles), urea (circles) and ammonium (squares) as nitrogen source.



Navicula saprophila Lange-Bertalot and Bonik

Strain: NAVIC24

**Taxonomy:** Division: Chrysophyta  
Class: Bacillariophyceae  
Order: Pennales  
Family: Naviculaceae

**Collection site:** Lake Lenore, Washington, U.S.A. (J. Johansen).

Date: March 6, 1987  
Water temperature: 9°C  
Salinity: 1.1 mS/cm

**Size:** valves 1.8-2.7 µm wide, 6-8 µm long.

**Growth form:** unicellular.

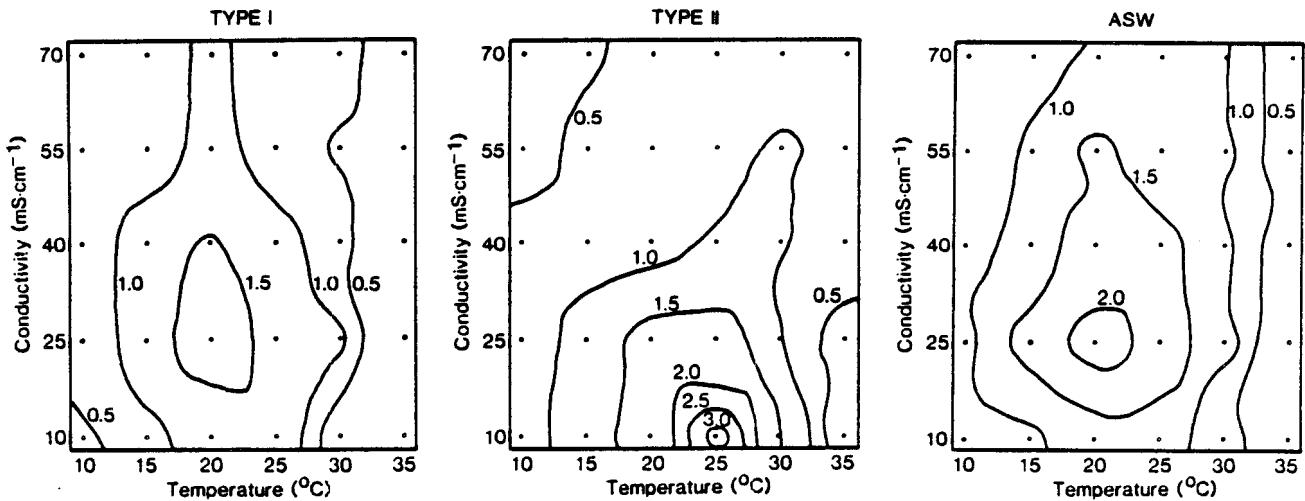
**Growth rate at optimum:** 3.1 doublings/day.

**Culture conditions:**

**Vitamins required:** not determined  
**Available nitrogen sources:** urea  
**Suitable media:** SERI Type II, Artificial seawater adequate  
**Nutritional modes:** autotrophic  
**Temperature range:** 10-30°C  
**Temperature optimum:** 25-30°C in Type II, 20°C in other media  
**Salinity range:** 10-70 mS/cm  
**Salinity optimum:** 10 mS/cm in Type II, 25 mS/cm in other media

**Temperature/salinity growth responses:**

Exponential growth rate (doublings/day) in semicontinuous batch culture.



Nitzschia dissipata (Kuetz.) Grunow

Strain: NITZS13 (SB-307)

Taxonomy:    Division: Chrysophyta  
              Class: Bacillariophyceae  
              Order: Pennales  
              Family: Nitzschiaceae

Collection site: St. Joseph Bay, Florida, U.S.A. (M. Tadros).

              Date: June 1986  
Water temperature: 29°C  
              Salinity: 28 mS/cm  
              pH: 8.2

Size: valves 18-28 x 4-6.5  $\mu\text{m}$ , (6)8-10 fibulae in 10  $\mu\text{m}$ , 48-51 striae in 10  $\mu\text{m}$ .

Growth form: unicellular.

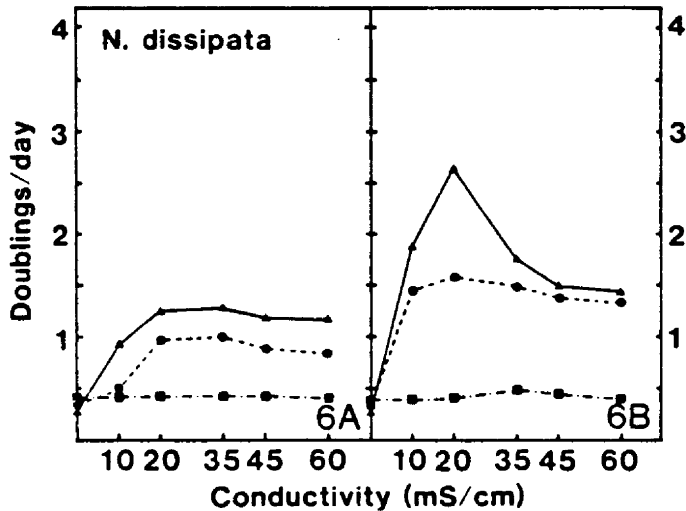
Growth rate at optimum: 2.6 doublings/day.

Culture conditions:

              Vitamins required: not determined  
Available nitrogen sources: nitrate good, urea and ammonium poor  
              Suitable media: f/2  
              Nutritional modes: autotrophic  
              Temperature range: 15-30°C  
              Temperature optimum: 25°C  
              Salinity range: 10-60 mS/cm  
              Salinity optimum: 20 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture. Fig. 1A. 80  $\text{uE}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Fig. 1B. 160  $\text{uE}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  illumination. Temperatures tested were: 25°C (triangles), 30°C (circles), 35°C (squares).

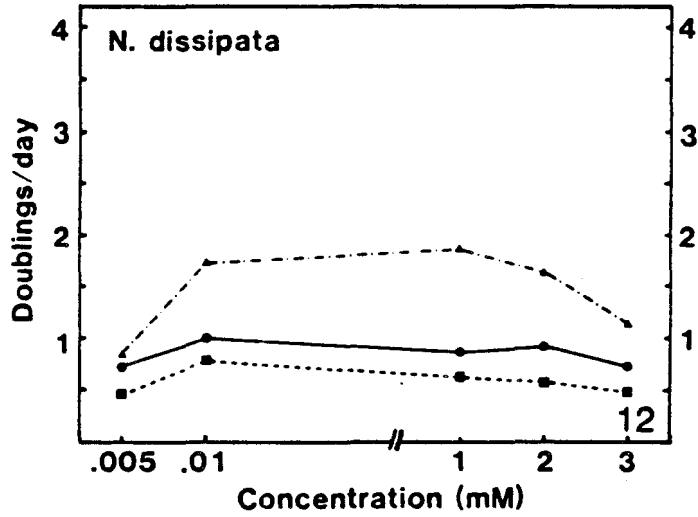


**Lipid Content:**

**Nutrient sufficient:** 27.6%  
**Nitrogen deficient:** 45.9% (3 days deficiency)  
**Silicon deficient:** 47.2% (3 days deficiency)

**Nitrogen Preference:**

Exponential growth rate using nitrate (triangles), urea (circles) and ammonium (squares) as nitrogen source.



Nitzschia communis Rabenhorst

Strain: NITZS28

Taxonomy:    Division: Chrysophyta  
              Class: Bacillariophyceae  
              Order: Pennales  
              Family: Nitzschiaceae

Collection site: Soap Lake, Washington, U.S.A. (J. Johansen).

                  Date: March 6, 1987  
Water temperature: 7°C  
Salinity: 11 mS/cm

Size: valves 4-5 x 25-27  $\mu\text{m}$ , fibulae 11-12 in 10  $\mu\text{m}$ , striae 30-35 in 10  $\mu\text{m}$ .

Growth form: unicellular.

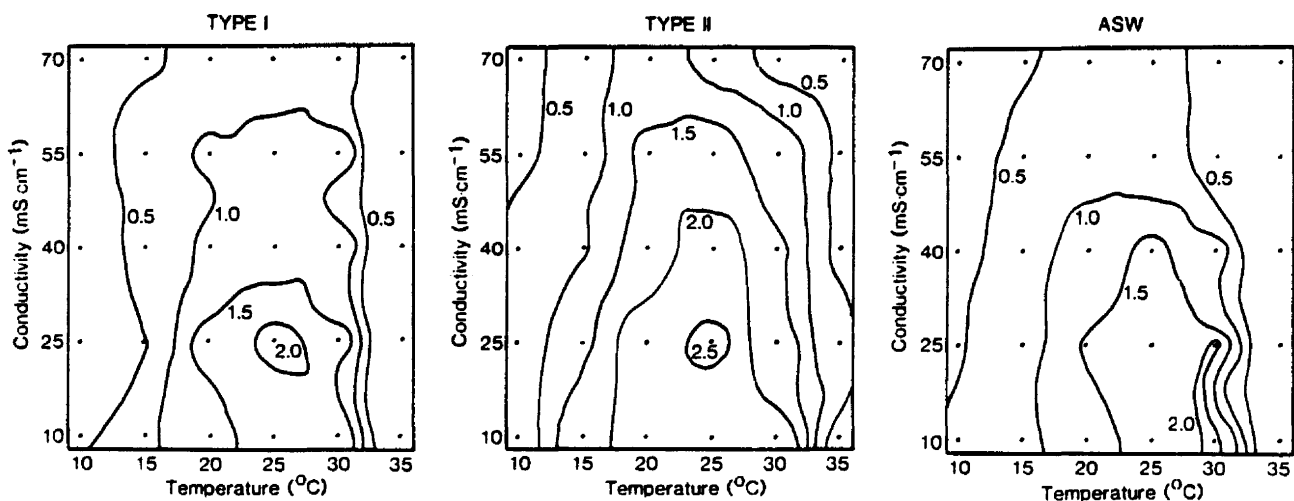
Growth rate at optimum: 2.7 doublings/day.

Culture conditions:

          Vitamins required: not determined  
Available nitrogen sources: urea  
          Suitable media: SERI Type II, other saline media adequate  
          Nutritional modes: autotrophic  
          Temperature range: 10-30°C  
          Temperature optimum: 25°C  
          Salinity range: 10-70 mS/cm  
          Salinity optimum: 25 mS/cm

Temperature/salinity growth responses:

Exponential growth rate (doublings/day) in semicontinuous batch culture.



## MODIFICATIONS TO CULTURE MEDIA

### Modified PII Trace Element Stock

This trace metal stock is used in making GPM, SERI Type I, and SERI Type II media. We have modified it by adding Mo, Cu, and Ni. The full recipe is listed below.

Dissolve in 1 liter H<sub>2</sub>O:

Na <sub>2</sub> EDTA . . . . .	6.00 g
FeCl <sub>3</sub> ·6H <sub>2</sub> O . . . . .	0.29 g
H <sub>3</sub> BO <sub>3</sub> . . . . .	6.84 g
MnCl <sub>2</sub> ·4H <sub>2</sub> O . . . . .	0.86 g
ZnCl <sub>2</sub> . . . . .	0.06 g
CoCl <sub>2</sub> ·6H <sub>2</sub> O . . . . .	0.026 g
NaMoO <sub>4</sub> ·2H <sub>2</sub> O . . . . .	0.005 g
CuSO <sub>4</sub> ·5H <sub>2</sub> O . . . . .	0.002 g
NiSO <sub>4</sub> ·6H <sub>2</sub> O . . . . .	0.052 g

Adjust pH to 7.8-8.0 with NaOH. Keep refrigerated.

Some diatoms have recently been shown to have a selenium requirement, particularly members of the Thalassiosiraceae (Price et al. 1987). We have observed morphological aberrations identical to those reported for Se-deficient Thalassiosira pseudonana (Doucette et al. 1987) in our cultures of Thalassiosira weissflogii and Cyclotella cryptica, and recommend the addition of Se to the PII trace metal stock if these diatoms are being cultured. The final concentration should be 10<sup>-9</sup> M in the culture medium, which can be achieved by dissolving 35 mg Na<sub>2</sub>SeO<sub>3</sub> in 1 liter H<sub>2</sub>O, and then adding 1 ml of this solution to the PII trace metal stock.

### Fe-EDTA Solution

For routine culture maintenance we add 0.060 ml Fe-EDTA solution per liter of SERI Type I and SERI Type II media. This solution is made by dissolving 26.1 grams of EDTA in 268 ml of 1N KOH, to which 24.9 grams FeSO<sub>4</sub>·H<sub>2</sub>O are added. Volume is made up to one liter with distilled water. The solution is bubbled overnight before using.

### SERI Type I and Type II Media

For routine culture maintenance and physiological experiments, urea is used as the nitrogen source. It is added either as 1ml/l of a 0.3 M urea solution, or directly as 18 mg urea/l. PII trace metals and Fe-EDTA are added as indicated above. For all diatom cultures, 0.5 g Na<sub>2</sub>SiO<sub>3</sub>·9H<sub>2</sub>O is dissolved in 25 ml distilled water, pH adjusted to 9.3-9.5, and then added to the medium. Both Type I and Type II media are filter sterilized, with all enrichments except silica being run through the filter before the salt solution. Silica is added last while vigorously agitating the flask. Silica solutions should be mixed just prior to filtration.

## CURRENT SERI STRAIN DESIGNATIONS

We ask that all researchers use the strain designations listed in the far left column. Some designations used in the past are listed on the right. For cultures from other culture collections and/or with a past publication history, it is probably best to give both designations, the less preferred name to be given only once in parentheses. Examples of these strains include UTEX 572 (BOTRY1), ISOCH1 (T-ISO), and NANNP2 (Nanno-Q).

STRAIN	SPECIES	PAST DESIGNATIONS
AMPHO1	<u>Amphora coffeiformis</u>	S/AMPHO-1
AMPHO27	<u>A. delicatissima</u>	ASU 0032, MLS-1
AMPHO28	<u>A. coffeiformis</u>	ASU 3001, GR-2
ANKIS1	<u>Ankistrodesmus falcatus</u>	S/ANKIS-1, Pyramid Lake 91-1
BOEKE1	<u>Boekelovia hooglandii</u>	S/BOEKE-1
BOTRY1	<u>Botryococcus braunii</u>	UTEX #572
CHAET1	<u>Chaetoceros gracilis</u>	S/CHAET-1, CHGRA
CHAET6	<u>C. muelleri</u> var. <u>subsalsum</u>	NM-6
CHAET9	<u>C. muelleri</u> var. <u>subsalsum</u>	UT-147
CHAET10	<u>C. muelleri</u> var. <u>subsalsum</u>	S/CHAET-4, UT-27
CHAET14	<u>C. muelleri</u> var. <u>subsalsum</u>	S/CHAET-2, SS-14
CHAET15	<u>C. muelleri</u> (undescribed var.)	49-1A
CHAET38	<u>C. muelleri</u> var. <u>subsalsum</u>	SH9-1
CHAET39	<u>C. muelleri</u> var. <u>subsalsum</u>	UL-7
CHAET58	<u>C. muelleri</u> var. <u>muelleri</u>	
CHAET59	<u>C. muelleri</u> var. <u>subsalsum</u>	
CHAET61	<u>C. muelleri</u> var. <u>subsalsum</u>	
CHAET63	<u>C. muelleri</u> var. <u>subsalsum</u>	
CHLOR1	<u>Chlorella</u> species	S/CHLOR-1, S01
CHLOR2	<u>C. ellipsoidea</u>	S/CHLOR-2, BL-6
CHLOR3	<u>Chlorella</u> species	S/CHLOR-3, SC-2
CYCLO1	<u>Cyclotella cryptica</u>	S/CYCLO-1, DI-35
CYCLO2	<u>C. cryptica</u>	F-1, Paul's Cyclotella
CYCLO4	<u>C. cryptica</u>	UT-65
ELLIP1	<u>Ellipsoidon</u> species	NANNO13, 70-01
ENTOM3	<u>Amphiprora hyalina</u>	BB-333
FRANC1	<u>Franceia</u> species	ASU 0146, LCC-1
ISOCH1	<u>Isochrysis</u> aff. <u>galbana</u>	S/ISOCH-1, Tahitian T-ISO
MONOR1	<u>Monoraphidium minutum</u>	S/MONOR-1, Mom's Ranch
MONOR2	<u>M. minutum</u>	S/MONOR-2
NANNO2	<u>Nannochloris</u> species	HB44
NANNO12	<u>Nannochloris</u> species	120-01
NANNP1	<u>Nannochloropsis salina</u>	S/NANNO-1, GBSTICHO
NANNP2	<u>Nannochloropsis</u> species	S/NANNO-2, Nanno-Q
NAVIC1	<u>Navicula saprophila</u>	Navicula F-2, Paul's Navicula
NAVIC2	<u>N. saprophila</u>	26-1A
NAVIC6	<u>N. acceptata</u>	SB-264
NAVIC7	<u>N. saprophila</u>	BB-260
NAVIC8	<u>N. acceptata</u>	SB-304
NAVIC24	<u>Navicula saprophila</u>	

STRAIN	SPECIES	PAST DESIGNATIONS
NITZS1	<u>Nitzschia</u> <u>species</u>	S/NITZS-1, Mono Lake Nitzschia
NITZS2	<u>Nitzschia</u> <u>dissipata</u>	S/NITZS-2, DI-160, Tadros Hantzschia
NITZS13	<u>Nitzschia</u> <u>dissipata</u>	SB-307
NITZS14	<u>N. communis</u>	ASU 0665, PV-2
NITZS28	<u>N. communis</u>	
OOCYS1	<u>Oocystis</u> <u>pusilla</u>	S/OOCYS-1
PHAE01	<u>Phaeodactylum</u> <u>tricornutum</u>	S/PHAE0-1, TFX-1
PHAE02	<u>P. tricornutum</u>	S/PHAE0-2, BB
PLEUR1	<u>Pleurochrysis</u> <u>carterae</u> var. <u>dentata</u>	Pleurochrysis dentata
TETRA1	<u>Tetraselmis</u> <u>suecica</u>	S/PLATY-1
TETRA4	<u>Tetraselmis</u> <u>species</u>	HB47
THALA2	<u>Thalassiosira</u> <u>weissflogii</u>	CO-F15
THALA6	<u>T. weissflogii</u>	SH14-89



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