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David B. Czarnecki
Loras College

M. Jon Ross
University of Minnesota

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The Itasca State Park Algal Culture Collection at Loras College

DAVID B. CZARNECKI* and M. JON ROSS**

ABSTRACT—A list of over 125 algal cultures originating from Lake Itasca State Park is presented. These cultures, permanently housed at Loras College, Dubuque, Ia., include 115 taxa representing 68 genera from six algal Divisions. Approximately one-third of the taxa are desmids.

Introduction

The use of algal cultures (1,2) for studies of various biological phenomena has prompted the establishment of numerous facilities where different algae can be obtained (3). While both general (e.g., 4,5) and specific collections (e.g., 6) are readily accessible to North American workers, none appear to specifically address the needs of researchers at freshwater field stations. The intent of the Lake Itasca State Park Algal Culture Collection is to provide resident researchers and others interested in the algal flora of the area, with unialgal materials which can be used to corroborate observations and data generated by field-oriented research. This collection, begun in 1983, should prove increasingly valuable as workers address the ecological parameters responsible for the rich algal flora of the area (7-15). It is hoped that this report will stimulate further interest in algal research opportunities available at the University of Minnesota Forestry and Biological Station at Lake Itasca.

Availability of Cultures

The Lake Itasca State Park Algal Culture Collection is permanently housed in the Department of Biology at Loras College. Cultures are available for unrestricted use by individuals and organizations; a nominal fee will be assessed for cultures as previously described (6). Potential users of the collection should contact the senior author at Loras College, Dubuque, IA 52004-0178, telephone (319) 588-7231. It is hoped that a permanent culture facility will eventually be established at the Forestry and Biological Station for more direct access by users.

Source, Collection and Isolation of Algae

All cultures available through the Collection originated from habitats within the boundaries of Lake Itasca State Park. Suspected algal diversity and ease of accessibility have been the primary factors in selection of habitats for collection. Routine collecting techniques, e.g., net tows, grab samples, etc., have been used in the acquisition of algal specimens and thus far all samples have been collected during the summer months. Although the majority of isolations have

been made within two days, some isolations have been made up to two months from the date of collection. Micropipette techniques (16,17) have been the primary method of isolation for cultures in the Itasca Collection.

Protocol

Cultures are maintained under unialgal, batch condition in biphasic soilwater medium (1,6,18,19); culture transfers are made approximately every 10 weeks. The standard medium, designated CR1, consists of approximately 0.5mg magnesium carbonate, 1cc soil and 12ml distilled water. Culture tubes (16 x 125 mm borosilicate glass stoppered with teflon-lined screw caps) of this medium are steamed at 98-101° C and ambient pressure for one hour on each of three successive days and allowed to cool between steamings. This tyndallization technique appears to preserve the integrity of edaphic organics otherwise modified by autoclaving, while rendering the edaphic biota (bacteria and fungi) to noncompetitive levels for subsequent isolate growth. Soil used in CR1 originates from Flagstaff, Ariz., is primarily volcanic in nature, and has consistently provided favorable results (6).

Related formulations of the standard medium also used in the Collection are CR1+, CR1+pea and CR1(S). CR1+ is CR1 to which one drop (ca. 0.05ml) sterile synthetic sea water formulation (Instant Ocean, Aquarium Systems, Mentor, Ohio [20]) is added prior to tyndallization. CR1+pea is CR1 prepared in the usual manner to which one boiled split pea has been added (19). CR1(S) is CR1 minus the added carbonate to which 1ml of a sterile *Sphagnum* extract has been added prior to tyndallization. This extract is prepared by suspending powdered *Sphagnum* peat in 1L of a 1% (wt/vol) water solution of green ferric ammonium citrate, followed by standard autoclaving and filtering.

Cultures are permanently maintained under a 14:10 hr (light:dark) cycle where illumination is provided by Cool white and Gro-lux fluorescent lighting; temperatures range from 17-23° C (6).

Cultures

One hundred twenty-seven algal cultures representing 68 genera and 115 taxa are presently available from the Collection. Table 1 lists these cultures alphabetically by

*Biology Department, Loras College, Dubuque, IA

**Itasca Biology Program, University of Minnesota

genus. Each culture is designated by a identifying code, name, [reference used in identification], name of the person who isolated the alga, the date of isolation, and the location in the Park from which the alga was isolated.

The majority of cultures are of green algae (Division Chlorophyta) with 41 genera, followed by diatoms (Bacillariophyta) with 18 genera, bluegreens (= cyanobacteria) (Cyanophyta) with six genera and yellow greens (Tribophyta [= Xanthophyta]), golden browns (Chrysophyta) and euglenoids (Euglenophyta) with one genus each. Approximately one-third of all taxa are desmids, a group abundantly represented in the waters of Lake Itasca State Park (6,7,14).

It is hoped that this report will help stimulate additional research on the nature, distribution, and specific adaptations of the algal flora of the Park. While laboratory conditions and cultures may not necessarily reflect natural systems, they do permit perturbations and manipulations, which may have predictive value in addressing natural phenomena.

Acknowledgements

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Table 1. Algal cultures from Itasca State Park, listed by genus. Cultures are designated by code, taxon, [identification reference], isolator, date isolated, and Park location of origin. Unless otherwise noted, cultures are maintained in CR1 medium and/or are of clonal origin.

| | |
|--------------------------------------|---|
| <i>Achnanthes</i> Bory | |
| L-48 | <i>microcephala</i> (Kuetz.) Grun. [21], D. Ongaro, 3.VII.85, Lake Itasca. |
| <i>Actinotaenium</i> (Naeg.) Teiling | |
| Z-17 | sp. [22], Czarnecki, 30.VIII.85, North Deming Pond (CR1(S)) |
| <i>Amphipleura</i> Kuetz. | |
| L-116 | <i>pellucida</i> (Kuetz.) Kuetz. [21], M. Edlund, 10.VII.87, Lake Itasca |
| L-117 | <i>pellucida</i> (Kuetz.) Kuetz. [21], Czarnecki, 13.VIII.87, Lake Itasca |
| <i>Ankistrodesmus</i> Corda | |
| CH-39 | <i>falcatus</i> (Corda) Ralfs [23], K. Ebel, 17.VII.85, Beaver Lake |
| <i>Arthrodesmus</i> Ehr. | |
| Z-15 | <i>convergens</i> Ehr. ex Ralfs [24], R. Meier, 25.VI.85, Lake Itasca (CR1(S)) |
| Z-32 | <i>validus</i> (West and West) Scott and Gronblad [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S)) |
| <i>Aulacoseira</i> Thwaites | |
| L-115 | <i>granulata</i> (Ehr.) Simons. [25, as <i>Melosira</i>], Czarnecki, 3.VIII.87, Lake Itasca |
| <i>Botryococcus</i> Kuetz. | |
| CH-28 | <i>braunii</i> Kuetz. [23], Czarnecki, 20.VI.84, North Deming Pond |
| CH-47 | <i>braunii</i> Kuetz. [23], Czarnecki, 30.VI.86, North Deming Pond |
| <i>Chaetophora</i> Schrank | |
| GR-21 | <i>elegans</i> (Roth) Ag. [23], D. Ongaro, 23.VI.85, LaSalle Creek |
| <i>Chroococcus</i> Naeg. | |
| IS-37 | <i>prescottii</i> Drouet and Daily in Daily [23], Czarnecki, 29.VIII.85, North Deming Pond (CR1(S)) |
| <i>Cladophora</i> Kuetz. | |
| CL-04 | <i>glomerata</i> (L.) Kuetz. [23], Czarnecki, 7.VII.85, Tank flow behind library, Forestry and Biological Station |
| <i>Coelastrum</i> Naeg. in Kuetz. | |
| CH40 | <i>microporum</i> Naeg. in Braun [23], Czarnecki, 8.VII.85, North Deming Pond |
| <i>Cosmarium</i> Corda | |
| Z-30 | <i>bisphaericum</i> Printz [22], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S)) |
| Z-16 | <i>subochthodes</i> Schmidle [22], K. Ebel, 23.VI.85, LaSalle Creek (CR1(S)) |
| Z-39 | <i>tenue</i> Archer [22], Czarnecki, 27.VIII.85, North Deming Bond (CR1(S)) |
| <i>Cosmocladium</i> Bréb. | |
| Z-42 | <i>constrictum</i> (Archer) [22], Czarnecki, 25.VI.86, Beaver Lake (CR1(S)) |
| Z-14 | <i>pusillum</i> Hilse [22], Czarnecki, 11.VI.84, North Deming Pond |
| <i>Cyclotella</i> Kuetz. | |
| A-84 | <i>gamma</i> Sov. [26], Czarnecki, 6.VII.83, Lake Itasca |
| L-101 | <i>gamma</i> Sov. [26], Czarnecki, 10.VIII.87, Lake Itasca |
| L-122 | <i>gamma</i> Sov. [26], Czarnecki, 10.VIII.87, Lake Itasca |
| L-37 | <i>meneghiniana</i> Kuetz. [25], Czarnecki, 23.VI.85, LaSalle Creek |
| L-38 | <i>meneghiniana</i> Kuetz. [25], Czarnecki, 23.VI.85, LaSalle Creek |
| L-76 | <i>meneghiniana</i> Kuetz. [25], Czarnecki, 23.VI.85, LaSalle Creek |
| <i>Cymbella</i> Ag. | |
| L-120 | <i>aspera</i> (Ehr.) H. Perag. [27], Czarnecki, 10.VIII.87, Lake Itasca |

Table 1 continued

L-72 *minuta* var. *silesiaca* (Bleisch ex Rabh.) Reim. [27], Czarnecki, 21.VI.86, North Deming Pond
L-53 *muelleri* Hust. [27], Czarnecki, 21.VI.85, Lake Itasca

Desmidium Ag.
Z-41 *apogonium* Bréb. in Bréb. and Godet [28], Czarnecki, 11.VII.86, North Deming Pond (CR1(S))

Dimorphococcus Braun
CH-46 *lunatus* Braun [23], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))

Docidium Bréb. emend. Lund.
Z-47 *baculum* Bréb. emend. Lund. [29], Czarnecki, 6.III.87, North Deming Pond (CR1(S))

Draparnaldia Bory
GR-23 *glomerata* (Vauch.) Ag. [23], Czarnecki, 7.VII.85, Tank flow behind library, Forestry and Biological Station

Epithemia Breb.
L-51 *turgida* (Ehr.) Kuetz. [27], Czarnecki, 23.VI.85, LaSalle Creek

Euastrum Ehr.
Z-38 *denticulatum* var. *denticulatum* (Kirch.) Gay [30], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
Z-18 *denticulatum* var. *quadrifarium* Kreiger [30], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))

Eudorina Ehr.
G-20 *elegans* Ehr. [23], Czarnecki, 19.VII.86, North Deming Pond
L-56 *curvata* (Kuetz.) Lagerst. [21], Czarnecki, 2.VII.85, LaSalle Creek
L-111 *curvata* (Kuetz.) Lagerst. [21], M. Edlund, 5.VII.87, North Deming Pond (CR1(S))
L-93 *flexulosa* Bréb. ex Kuetz. [21], Czarnecki, 6.III.87, North Deming Pond (CR1(S))

Eutetramorus Walton
CH-41 *planctonica* (Korch.) Bourr. [31], Czarnecki, 8.VII.85, North Deming Pond (non-clonal)

Fragilaria Lyngb.
L-50 *capucina* var. *mesolepta* Rabh. [21], Czarnecki, 21.VI.85, Lake Itasca
L-90 *capucina* var. *mesolepta* Rabh. [21], Czarnecki, 3.X.86, Lake Itasca
L-110 *crotonensis* Kitton [21], M. Edlund, 3.VIII.87, Lake Itasca

Gomphonema Ehr.
L-52 *gracile* Ehr. emend. V. H. [27], Czarnecki, 2.VII.85, LaSalle Creek
L-112 *grunowii* Patr. [27], M. Edlund, 22.VII.87, North Deming Pond
L-78 *parvulum* (Kuetz.) [27], M. Edlund, 1.VII.86, Elk Lake Fen
L-55 *truncatum* var. *capitatum* (Ehr.) Patr. [27], Czarnecki, 14.VIII.85, LaSalle Creek

Gomphosphaeria Kuetz.
IS-35 *lacustris* Chodat [23], D. Ongaro, 29.VII.85, South Park Drive, Southeast Pond

Gonium Muell.
G-19 *pectorale* Muell. [23], Czarnecki, 27.VI.86, North Deming Pond

Haematococcus Ag. emend. Wille
G-18 *lacustris* (Girod.) Rostafinski [23], Czarnecki, 1.VII.85, Sidewalk depression, Botany Building, Forestry and Biological Station (CR1 + pea)

Hyalotheca Ehr.
Z-44 *dissiliens* (Smith) Bréb. ex Ralfs [28], Czarnecki, 21.VI.86, North Deming Pond (CR1(S))
Z-45 *mucosa* (Mert.) Ehr. ex Ralfs [28], Czarnecki, 21.VI.87, North Deming Pond (CR1(S))

Kirchneriella Schmidle
CH-20 *lunaris* (Kirch.) Moebius [23], Czarnecki, 11.VIII.87, North Deming Pond

Lyngbya Ag.
IS-39 *birgei* G. M. Sm. [23], Czarnecki, 8.VII.86, Lake Itasca

Melosira Ag.
L-01 *varians* Ag. [32], Czarnecki, 19.VI.84, LaSalle Creek
L-107 *varians* Ag. [32], M. Edlund, 30.VI.87, Chambers Creek

Micrasterias Ag.
Z-21 *crux-melitensis* (Ehr.) Ralfs [30], Czarnecki, 29.VIII.85, North Deming Pond (CR1(S))
Z-19 *laticeps* Nordstedt [30], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
Z-20 *papillifera* Bréb. ex Ralfs [30], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
Z-23 *radiata* Hass. [30], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))

Microcystis Kuetz.
IS-05 *aeruginosa* Kuetz. emend. Elenkin [23], Czarnecki, 13.VI.84, Lake Itasca

Mougeotia Ag.
Z-G sp. [23], Czarnecki, 21.VI.86, North Deming Pond

Navicula Bory
L-81 *americana* Ehr. [21], Czarnecki, 16.VII.86, North Deming Pond (non-clonal)
L-74 *cuspidata* (Kuetz.) Kuetz. [21], Czarnecki, 7.VII.86, North Deming Pond
L-118 *cuspidata* (Kuetz.) Kuetz. [21], Czarnecki, 10.VIII.87, Lake Itasca

Table 1 continued

- L-121 *pupula* var. *rectangularis* (Greg.) [21], Czarnecki, 10.VIII.87, Lake Itasca
 L-82 *radiosa* Kuetz. [21], Czarnecki, 19.VII.86, North Deming Pond
 L-45 *tantula* Hust. [33], R. Meier, 10.VII.85, Lake Itasca
- Neidium* Pfitz.
 L-119 *affine* (Ehr.) Pfitz. [21], Czarnecki, 10.VIII.87, Lake Itasca
- Nephrocytium* Naeg.
 CH-50 *lunatum* W. West [23], Czarnecki, 3.VII.86, North Deming Pond (CR1(S))
- Netrium* (Naeg.) Itzs. and Roth
 ZZ-05 *interruptum* var. *sectum* West and West [34], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
- Nitzschia* Hass.
 L-57 *fruiticosa* Hust. [35], Czarnecki, 2.VII.85, LaSalle Creek
 L-46 *palea* (Kuetz.) W. Sm. [25], R. Meier, 12.VII.85, LaSalle Creek
- Onychonema* Wallisch
 Z-46 *laeve* var. *micracanthum* Nordst. [28], Czarnecki, 19.VII.86, North Deming Pond (CR1(S))
- Oscillatoria* Vauch.
 IS-38 *limnetica* Lemm. [23], Czarnecki, 30.VI.86, North Deming Pond
- Pandorina* Bory
 G-11 *morum* (Muell.) Bory [23], Czarnecki, 14.IV.84, French Creek Drainage (CR1 + pea)
- Paulschulzia* Skuja
 GR-20 *pseudovolvox* (Schulz) Skuja [36], K. Ebel, 19.VII.85, Lake Itasca
 GR-24 *pseudovolvox* (Schulz) Skuja [36], Czarnecki, 25.VI.85, Lake Itasca
- Pediastrum* Meyen
 CH-55 *simplex* (Meyen) Lemm. [23], Czarnecki, 13.VIII.87, Lake Itasca
- Penium* Bréb.
 Z-43 *cylindrus* (Ehr.) Bréb. ex Ralfs [29], Czarnecki, 21.VI.86, North Deming Pond (CR1(S))
- Pinnularia* Ehr.
 L-73 *viridis* (Nitz.) Ehr. [21], Czarnecki, 21.VI.86, North Deming Pond
 L-109 *viridis* (Nitz.) Ehr. [21], M. Edlund, 30.VI.87, Chambers Creek
- Plectonema* Thuret
 IS-24 *wollei* Farlow [23], Czarnecki, 9.VII.83, Lake Itasca (CR1+)
- Pleurotaenium* Naeg.
 Z-33 *coronatum* (Bréb.) Rabh. [29], Czarnecki, 29.VIII.85, North Deming Pond (CR1(S))
 Z-35 *ehrenbergii* f. *rectum* Irene-Marie [29], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
 Z-22 *trabecula* var. *hutchinsonii* (Turner) Croas. [29], Czarnecki, 29.VIII.85, North Deming Pond (CR1(S))
- Quadrigula* Printz
 CH-44 *closterioides* (Bohlin) Printz [23], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
- Radiofilum* Schmidle
 GR-25 *conjunctivum* Schmidle [23], Czarnecki, 21.VI.86, North Deming Pond (CR1(S))
- Rhopalodia* Muell.
 L-86 *gibba* (Ehr.) Muell. [27], M. Edlund, 8.VII.86, Lake Itasca
 L-103 *gibba* (Ehr.) Muell. [27], M. Edlund, 7.VII.87, Lake Itasca
- Schizochlamys* Braun in Kuetz.
 GR-26 *gelatinosa* Braun in Kuetz. [23], Czarnecki, 25.VII.86, Beaver Lake
 GR-28 *gelatinosa* Braun in Kuetz. [23], Czarnecki, 11.VII.86, North Deming Pond (CR1(S))
- Selanastrum* Reinsch
 CH-48 *gracile* Reinsch [23], Czarnecki, 16.VII.86, North Deming Pond (CR1(S))
 CH-56 *bibraianum* Reinsch [23], Czarnecki, 11.VIII.87, North Deming Pond (CR1(S))
- Sorastrum* Kuetz.
 CH-45 *americanum* (Bohlin) Schmidle [23], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
- Spirotaenia* Bréb.
 ZZ-06 *condensata* Bréb. [34], Czarnecki, 30.VI.86, North Deming Pond (CR1(S))
- Spondylosium* Bréb.
 Z-37 *pulchrum* (Bail.) Archer [28], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
- Staurastrum* Meyen
 Z-34 *arcuatum* Nordst. [24], Czarnecki, 29.VIII.85, North Deming Pond (CR1(S))
 Z-24 *bieneanum* Rabh. [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
 Z-29 *brachioprominens* Börgesen [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
 Z-28 *cornutum* Archer [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
 Z-27 *dilatatum* (Ehr.) Ralfs [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
 Z-25 *gracile* Ralfs ex Ralfs [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))

Table 1 continued

- Z-31 *johnsonii* var. *depauperatum* G. M. Sm. [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
Z-48 *manfeldtii* var. *parvum* Mess. [24], Czarnecki, 13.VIII.87, Lake Itasca
Z-40 *ophiura* Lundell [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))
- Stauroneis* Ehr.
L-77 *phoenicenteron* f. *gracilis* (Ehr.) Hust. [21], Czarnecki, 7.VII.86 North Deming Pond
- Synedra* Ehr.
L-102 *acus* Kuetz. [21], M. Edlund, 22.VII.87, Chambers Creek
L-105 *capitata* Ehr. [21], M. Edlund, 22.VII.87, Chambers Creek
L-49 *delicatissima* var. *angustissima* Grun. [21], Czarnecki, 21.VI.85, Lake Itasca
L-113 *nana* Meist. [25], M. Edlund, 3.VIII.87, Lake Itasca
L-47 *ulna* (Nitz.) Ehr. [21], R. Meier, 2.VII.85, Lake Itasca
L-108 *ulna* (Nitz.) Ehr. [21], M. Edlund, 30.VI.87, Chambers Creek
- Synura* Ehr.
CHR-7 *petersenii* Ehr. [37], Czarnecki, 14.VI.84, French Creek Drainage
CHR-10 *uvella* Ehr. [37], Czarnecki, 19.VII.86, North Deming Pond (CR1(S))
- Tabellaria* Ehr.
L-104 *flocculosa* (Roth) Kuetz. [21], M. Edlund, 3.VII.87, Lake Itasca
L-106 *flocculosa* (Roth) Kuetz. [21], M. Edlund, 30.VI.87, Chambers Creek
L-114 *flocculosa* (Roth) Kuetz. [21], Czarnecki, 29.VII.87, Lake Itasca
- Tetraedron* Kuetz.
CH-53 *limneticum* Borge [23], M. Edlund, 2.VII.86, Lake Itasca
CH-52 *minima* (Braun) Hansgirg [23], M. Edlund, 8.VII.86, North Deming Pond
- Trachelomonas* Ehr.
EU-2 *charkowiensis* Swirensko ex Deflandre [23], Czarnecki, 27.VI.86, North Deming Pond (CR1 + pea)
- Tribonema* Derbes and Solier
X-06 *bombycinum* (Ag.) Derbes and Solier [23], Czarnecki, 23.VII.85, LaSalle Creek
X-07 *bombycinum* (Ag.) Derbes and Solier [23], Czarnecki, 8.VII.85, North Deming Pond (non-clonal)
- Volvox* L.
G-21 *globator* L. [23], M. Hurley, 11.VII.86, North Deming Pond
G-17 *tertius* A. Meyer [23], Czarnecki, 11.VII.86, South Park Drive, Southeast Pond
- Xanthidium* Ehr.
Z-35 *antilopaenum* var. *oligacanthum* Schmidle [24], Czarnecki, 27.VIII.85, North Deming Pond (CR1(S))