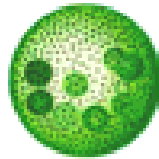


The Role of Culture Collections

- What are “public” culture collections?
- Established functions of algal culture collections
- The importance of cryopreservation
- Future services of public algal culture collections

Jerry Brand, UTEX (The Culture Collection of Algae)



A Brief History

Nearly every major collection of living microorganisms began as a private collection of one person

Early culture collections were narrow in scope; some early biases are still reflected in modern collections

Later government support mandated open access to Collection resources

The US NSF expects its supported algal collections to accession new published strains & make them available for pure research



Ernst Georg Pringsheim



Richard Starr
Director, UTEX
1951 - 98

Information Regarding Culture Collections & Their Holdings

World Federation of Culture Collections
(WFCC)

www.wfcc.info/

Some Large Public Algal Culture Collections in the Western World

Culture Collection of Algae & Protozoa
(CCAP, in Scotland)

www.ccap.ac.uk/

National Center for Culture of Marine Phytoplankton
(CCMP, in Maine, USA)

<http://ccmp.bigelow.org/>

Sammlung von Algenkulturen
(SAG. In Göttingen, Germany)

www.epsag.uni-goettingen.de/html/sag.html

Culture Collection of algae at Univ. of Texas
(UTEX, in Austin, Texas, USA)

www.utex.org

Paris Culture Collection of Cyanobacteria
PCC, in Paris, France)

www.pasteur.fr/recherche/banques/PCC/

Organization of Public Culture Collections

Typical Affiliations

- Component of a University
- Component of a State or National Laboratory
- Non-profit private enterprise

Typical Organizational Structure

Director (answerable to external and internal oversight committees)

Curator(s)

Operational Staff

Financial Support of Public Culture Collections

Typical example

Sale of Cultures and Services	(UTEX ~ 48% of total)
National Governmental support	(UTEX ~ 44% of total)
Institutional Support	(UTEX ~ 8% of total)

**Large public collections of algae contain many hundreds of strains
Accessibility to these strains is determined by:**

- policies of the host organization.**
- rules imposed by agencies that financially support the Collection.**

Primary Functions of the Major Service Collections of Algae in the USA

**Provide authentic living cultures in good condition those
(world-wide) to who request them**

**Accession new discoveries when feasible, especially they
are authenticated in an internationally recognized publication**

Additional Services of Major Collections of Algae

**Source of information for those wanting additional
instructions regarding the culturing of algae**

Outreach activities

Functions and Services of Some Collections

Cryopreservation

Documentation of Holdings by DNA sequencing, electron microscopy, etc.

Provision of a training site for scientists, technicians and others wishing to learn culturing methods

Taxonomic identification of strains external to the Collection on request.

Cryopreservation of Algae

Why do it?

- It protects against catastrophic loss of irreplaceable strains.
- It lowers cost of handling, especially for strains seldom needed.
- It minimizes errors due to handling or labeling mistakes.
- It decreases the probability of contamination of cultures.
- It protects against genetic selection or drift.

Successful Cryopreservation of a living organism may be described as:

Lowering the temperature of the organism below the glass transformation temperature for an indefinitely long period of time,

under conditions that allow it to remain viable and unaltered when thawed.

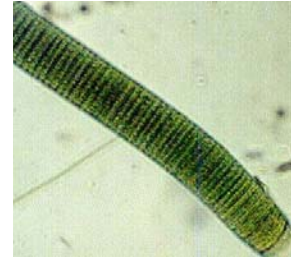
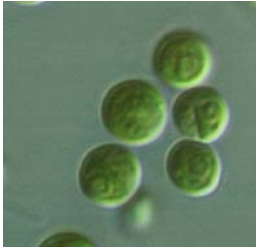
Reference: J. Day and J. Brand
Cryopreservation Methods for Maintaining Microalgal Cultures
Chap. 12, pp 165 – 187
in: *Algal Culturing Techniques*
edit. R. Andersen
Academic Press, 2005

Steps for successful cryopreservation;

- Start with a healthy culture that is not under severe stress,**
- Add a cryoprotective agent (CPA) to the culture,**
- Cool at a controlled rate,**
- Store at less than -130°C,**
- Thaw as rapidly as possible without causing heat damage,**
- Remove all CPA before illuminating for resumed growth,**

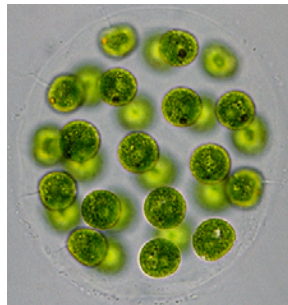
Easily Cryopreserved Morphologies

Unicells, small coenobia and amorphous colonies that do not have large intracellular vacuoles and are not multinuclear.



Morphologies that are more difficult to Cryopreserve

Siphonous cells or coenobic colonies. Filaments or large colonies with cytoplasmic communication among cells.



DNA Extraction and Sequencing is an Important Function of Culture Collections for:

- Accurate taxonomic identification of strains in the Collection**
- Confirmation of authenticity of cultures in the Collection**
- Provision of genomic DNA from strains in the Collection to users**
- Taxonomic identification of cultures sent for identification**

Personnel who operate culture collections of algae are especially equipped to train visitors in:

- taxonomic identification of algae**
- methods for laboratory culturing of algae**
- methods for measuring growth kinetics**
- procedures for removing contaminants**
- diagnosis of problems growing laboratory cultures**

We are still largely in the hunter and gatherer stage of exploiting algae for energy or food.

