

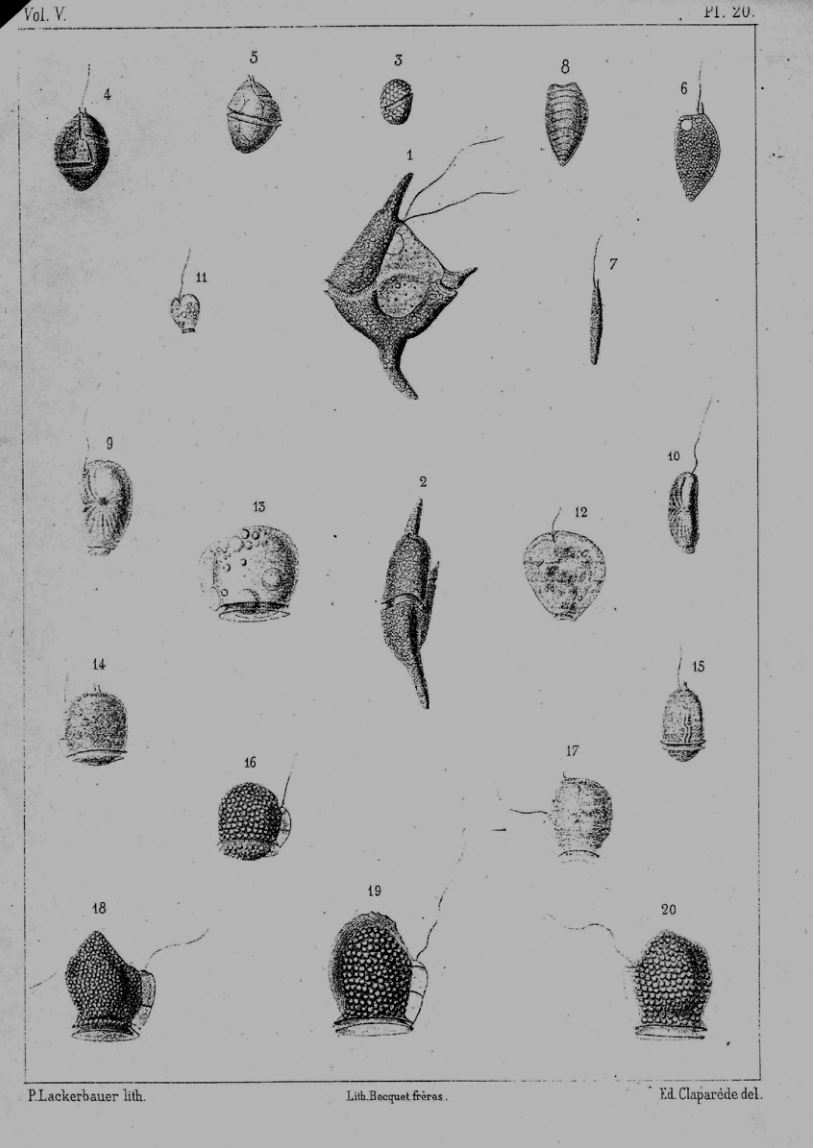
Report on the Alfred P. Sloan Foundation Workshop
on
Protistan Barcoding, Reference Material and Cultures
held
November 6 and 7, 2006
at the
Portland Harbor Hotel, Portland, ME USA
by

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Problems with Protists

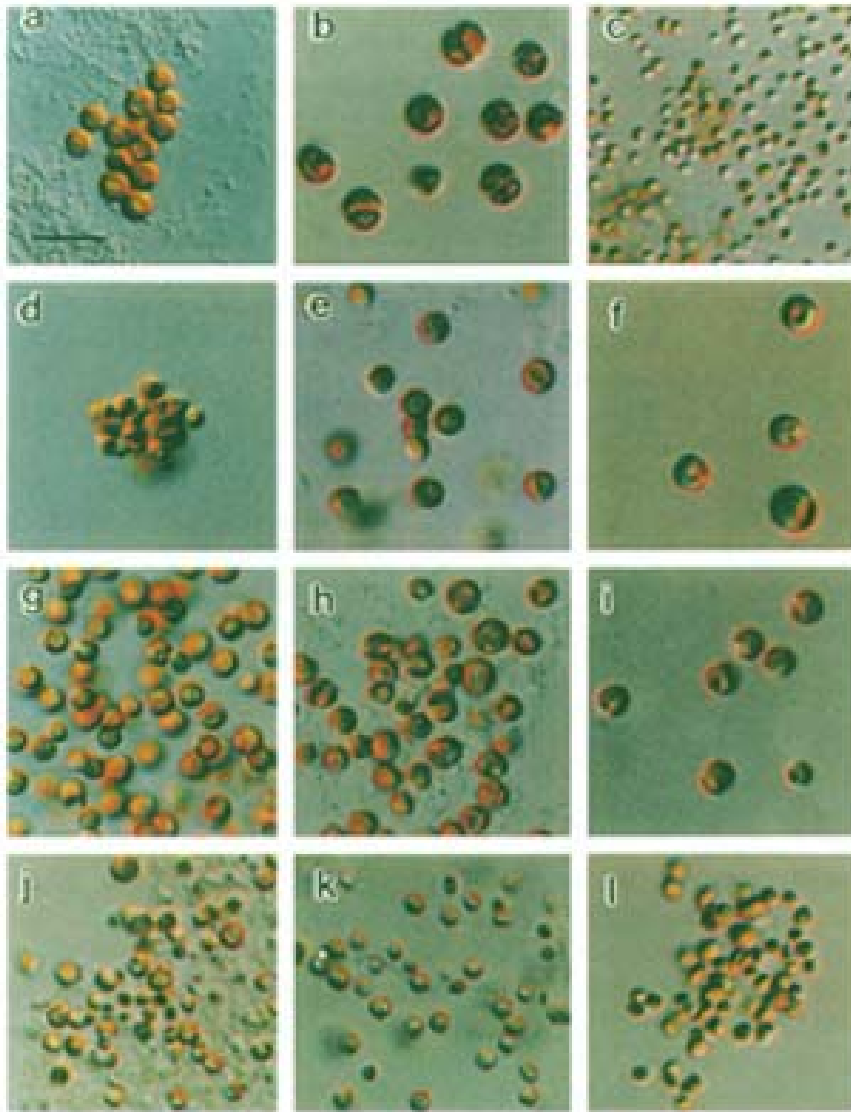


- Type material in >95% microscopic species does not yield DNA
- Cultures of species yield DNA but sometimes misidentified
- Many cryptic species complexes



Type material is often ink drawings but . . .
. . . Ink drawings don't yield DNA





Cryptic Diversity

Figure 1. Light micrographs of coccoid picoplankton showing similarity of shape and colour. Scale bar = 10 μm . (a, b) Haptophyceae (CCMP 625, 1416) (c-e) Green algae (CCMP 1205, 1220, 1407). (f) Unknown heterokont alga (CCMP 1144). (g-j) Pelagophyceae (CCMP 1145, 1395, 1410, *Pelagococcus subviridis* (CCMP 1429)). (k, l) Eustigmatophyceae (*Nannochloropsis oculata* (CCMP 525), *N. salina* (CCMP 527)).

Problem 1

How do we connect DNA from a culture to the correct name?



- Protist names - ICBN and ICZN.
- Codes allow for the use of ink drawings, photographs, permanent microscope slides, etc.
- Barcodes require DNA.
- DNA for microbial protists will be obtained almost exclusively from living organisms held in culture collections. Worldwide, there are approximately 200 culture collections that contain protists.

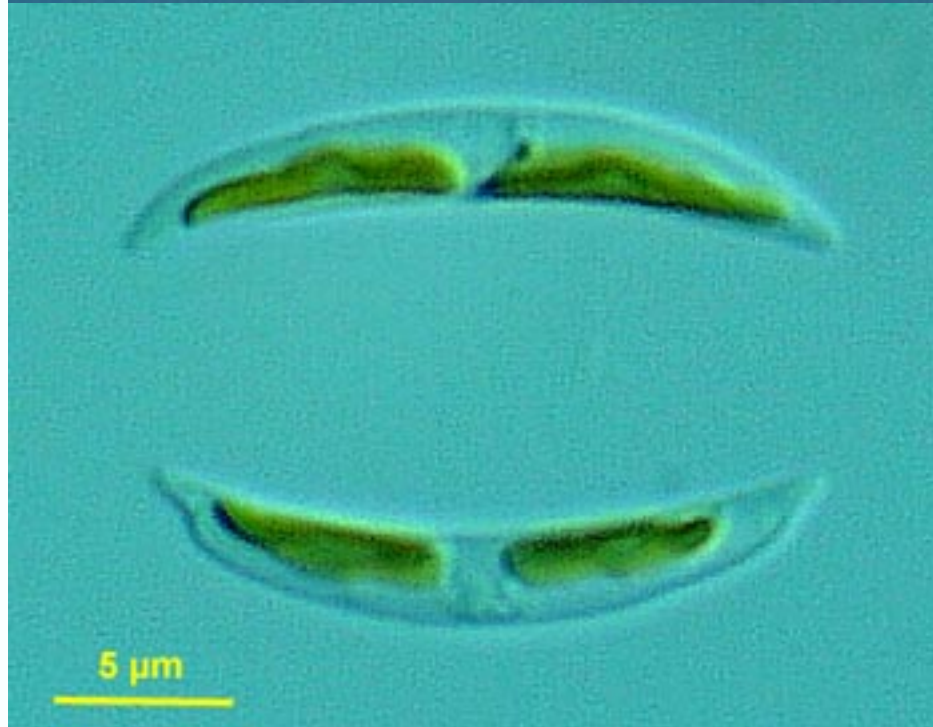
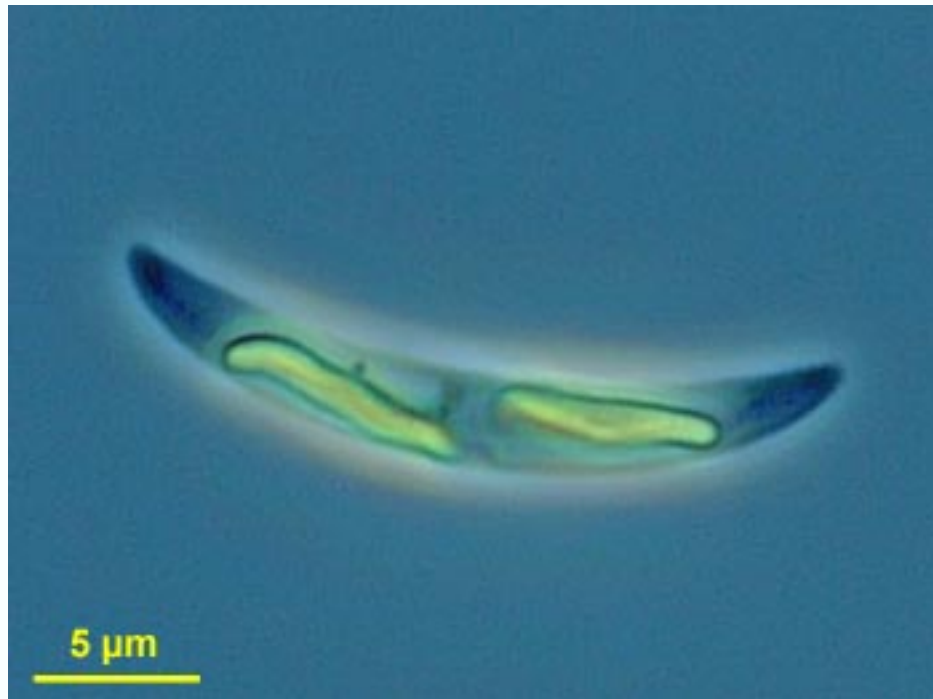
Recommendations for Problem 1

How do we connect DNA from a culture to the correct name?

- (1) Use current codes but work for changes.
- (2) The current codes should require some type of DNA sequence information for new species descriptions.
- (3) Epitype and neotype options - unambiguous reference material when the holotype and other type material cannot yield DNA.
- (4) Cryopreserve epitype cultures when available.

Problem 2

Which of the many cultures should be chosen to be the "official" culture upon which the barcode becomes anchored?



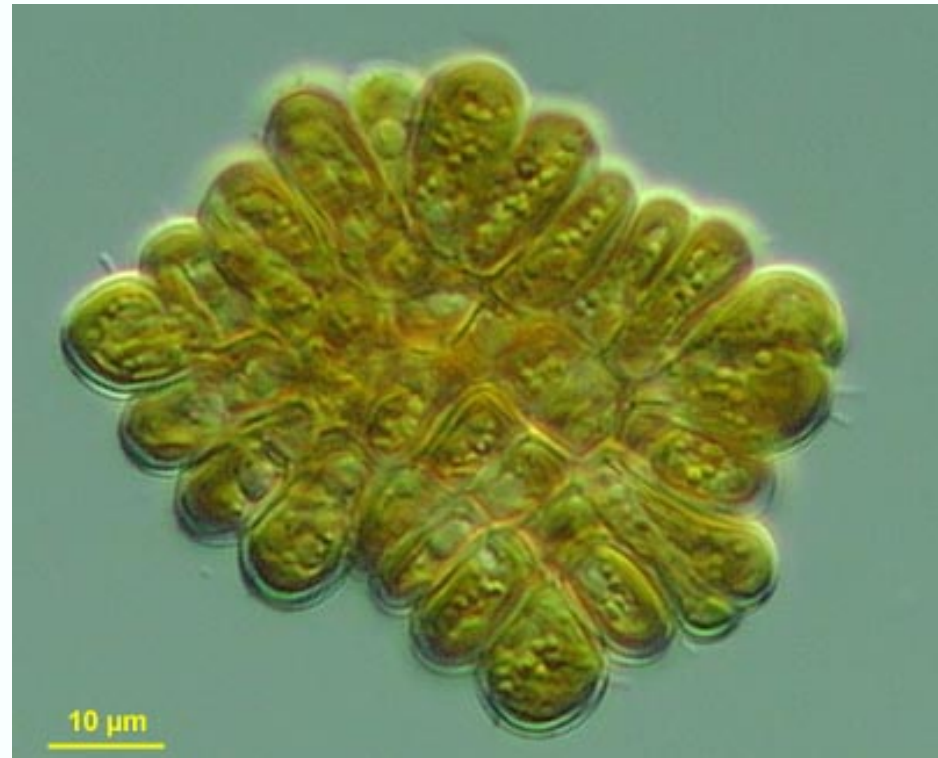
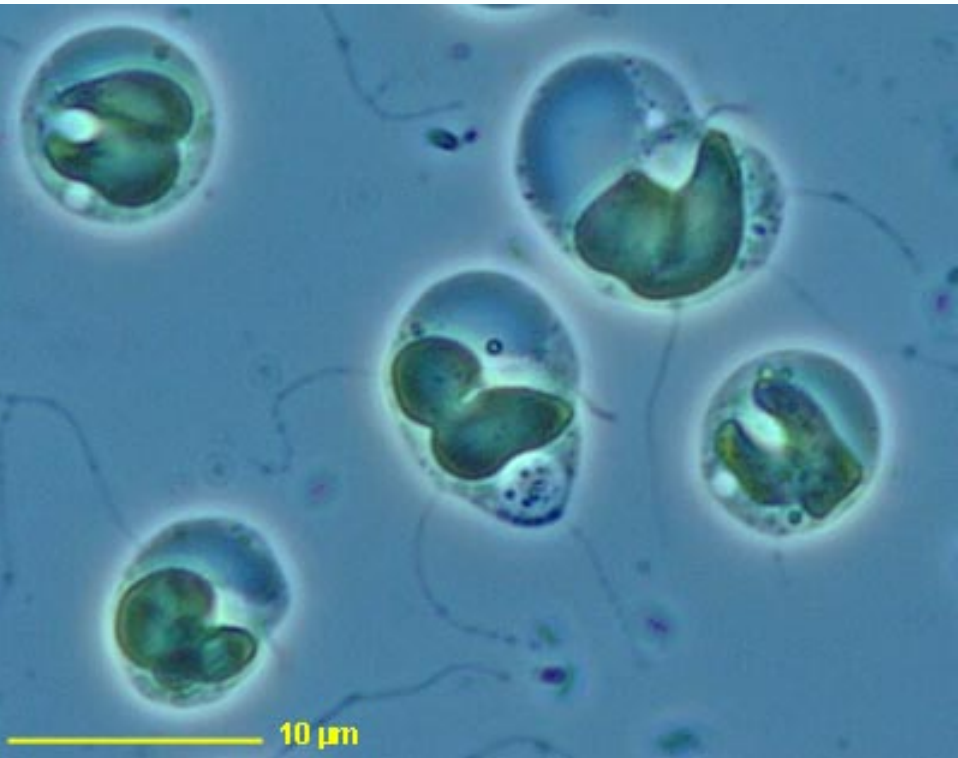
(1) Choice of a specific, single culture strain for epitypification or neotypification should adhere to the following guidelines:

- (a) If an actual type culture exists, this specific strain must be used. If not available, then
- (b) An authentic culture strain must be used if it exists. If not available, then
- (c) A culture strain from the type locality must be used if it exists. If not available, then
- (d) A culture strain from the same continent and habitat type must be used if it exists. If not available, then
- (e) A culture strain from the same habitat type must be used if it exists. If not available, then
- (f) A culture strain that best represents the species must be used.

- (2) If possible, new type material should include a cryopreserved culture strain.
- (3) The name of the species is tied to the specific culture (via epitypification or neotypification). If other cultures bearing that name are believed to belong to a different species, then they must be given different names (i.e., other existing names or described as a new species).
- (4) Scientific debate on the separation or combination of species must follow the codes. That is, splitter and lumper discussions will be taxonomy as usual, but the names will be anchored to biological material (e.g., a specific culture) so that biological investigation can be part of the discussions.

Problem 3

How do we coordinate the names, the cultures, the barcode sequences and important information for each species?



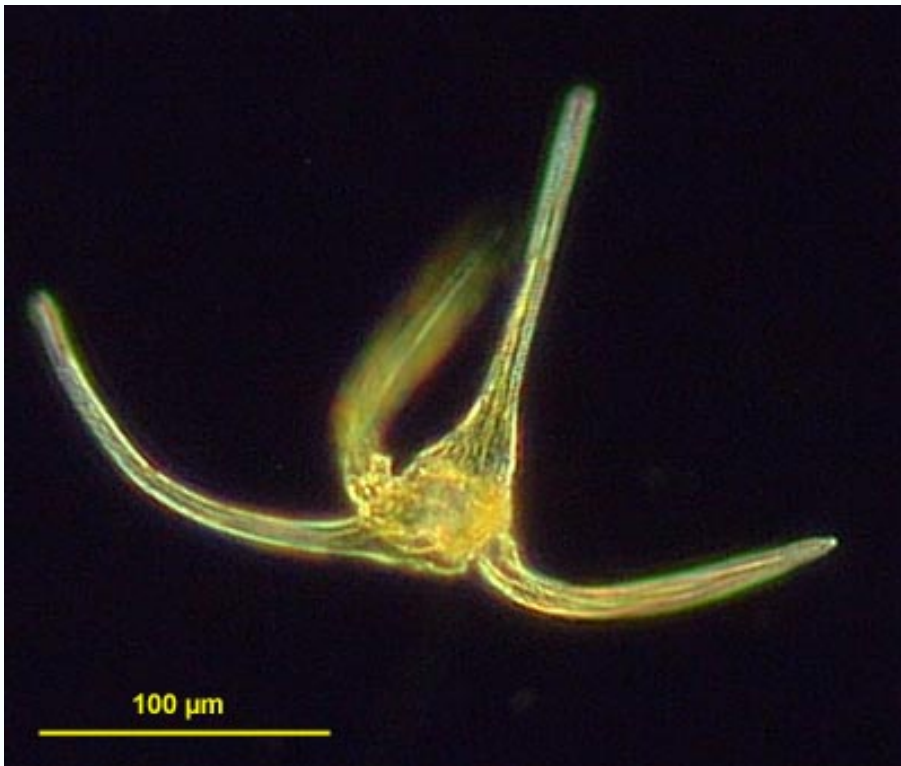
Recommendations for Problem 3

How do we coordinate the names, the cultures, the barcode sequences and important information for each species?

1. Barcode sequences in DDBJ, EMBL, GenBank should state that the barcode comes from the type material for that species or from other material that is believed to be representative of that species.
2. There should be voucher specimens for all barcodes. The culture can be a voucher but electronic images should be available.
3. There should be biogeographical, ecological, and environmental data associated with the organism, its barcode and its culture.
4. Registry of names - linked to data described above.
5. Cyberinfrastructure designed with dynamic internet links between collections

Problem 4

*How do we implement the
barcode/culture/name process?*



Recommendations for Problem4

*How do we implement the
barcode/culture/name process?*

1,000 strain challenge from the Canadian Barcode of Life Network.

(a) cover the breadth across all protistan groups

(b) include species with 5-10 strains to provide depth

Seaweeds & Network emphasized groups not be included

Rowena Stern, Jerry Brand and many others assembled a list and the DNA is being sent to the Network.

GenBank and EMBL are establishing procedures for identifying barcodes and will adjust with the changing needs of the scientific community

- Thanks to Sloan Foundation for funding the workshop
- Thanks to the Canadian Barcode of Life Network for inviting me