

# Biogeography and Dispersal of Micro-organisms: A Review Emphasizing Protists

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# Key Terms:

Cryptogram spores

Cyst viability

Flagship species

Gondwana

Human dispersal

Laurasia

Local vs. global diversity

Protozoa

Undersampling



# How our understanding was flawed:

Our general understanding of micro-organisms is based on scattered fragments of data, often based on conflicting methodology. This leads to

We once believed that when it came to micro-organisms that “everything was everywhere”. This stemmed from Beijerinck’s famous metaphor. However it can not be falsifiable and is a metaphor.

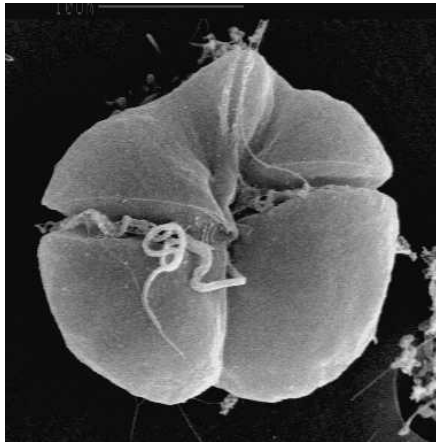
We do not know global diversity measure so we can not compare.

Undersampling

# Specific examples:

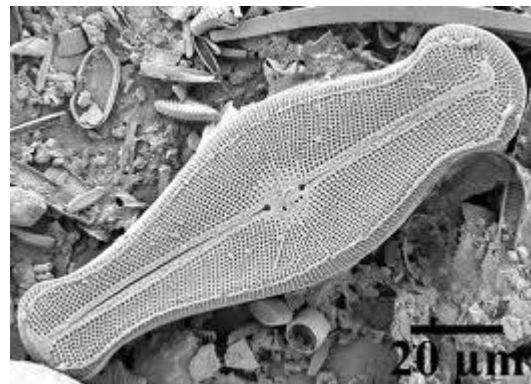
## Dinoflagellates

- Strict endemism
- ~80% endemism in polar regions
- Structure involves two flagella that propel the organism in a whirling motion



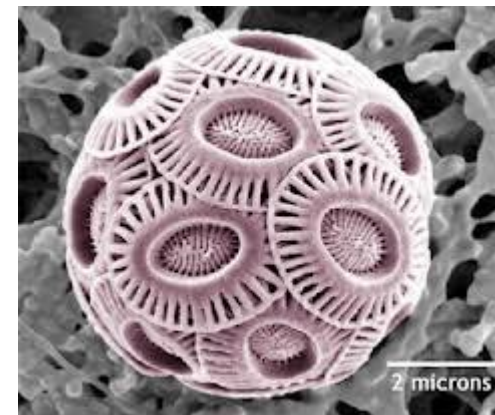
## Diatoms

- Among the most common type of phytoplankton
- *Actinella* genus contains 29 species, 9 of these are endemic to Australasia, some are limited to a few lakes
- Silica shell



## Coccolithophores

- Reliable identification requires an electron microscope
- Calcified shell
- Classified into 5 zones, however there are few “bipolar” species.



# Specific examples:

## Chrysophytes

- Show distinct distribution patterns based on ecological factors
- Good example of distribution, genus *Mallomonas* has 172 described taxa, 31 cosmopolitan, 59 Northern temperate-subarctic-artic, 17 are bipolar, 18 restricted to the tropics, and 17 with scattered distributions.



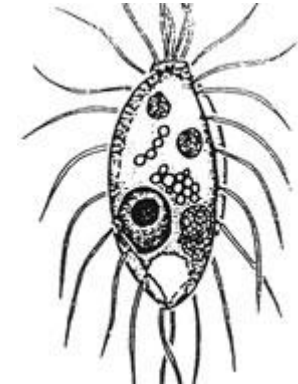
## Desmids

- Have an obvious cosmopolitan distribution, but there are northern and southern species
- *M. cruxmelitensis* occurs mostly in temperate regions while *M. radians* has a pantropical distribution



## Naked amoebae, heliozoa, and heterotrophic flagellates

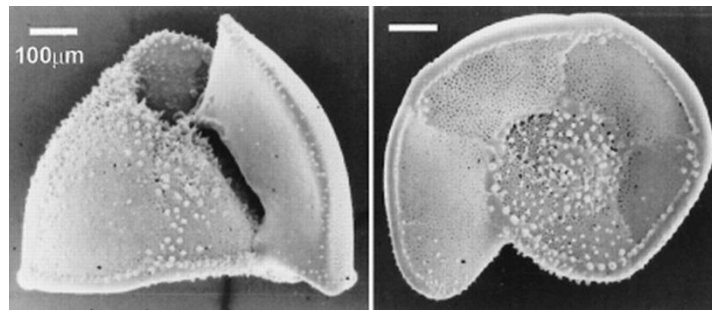
- Difficult to identify
- One soil flagellate, *Hemimastix Amphikineta*, has a distant distribution pattern aligning with Gondwanaland and the transitional area.



# Specific examples:

## Foraminifera

- Data came from fossilized specimen
- *Globorotalia truncatulinoides*, consists of 4 rRNA lineages and should be considered different species. 2 can be found in subtropical waters, 1 in the subarctic, and 1 in the subantarctic.



# Conclusion