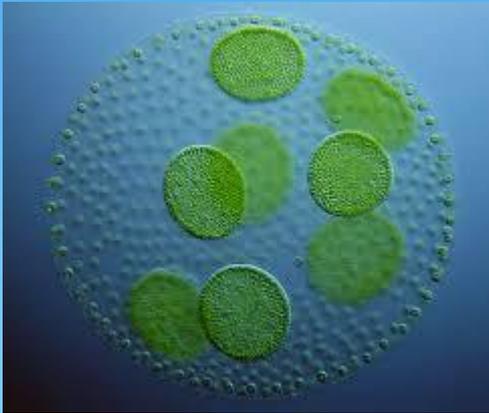


# Challenges in identification of microalgae & solutions



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# Algae studies

- \* **Algae studies in Turkey have continuously been increasing (particularly last 30 years) paralleling to the world. As a result of such efforts number of books and articles are rapidly increasing which give rise to addition of new taxa to the current algae list all over the world including Turkey.**



Collecting  
algal samples

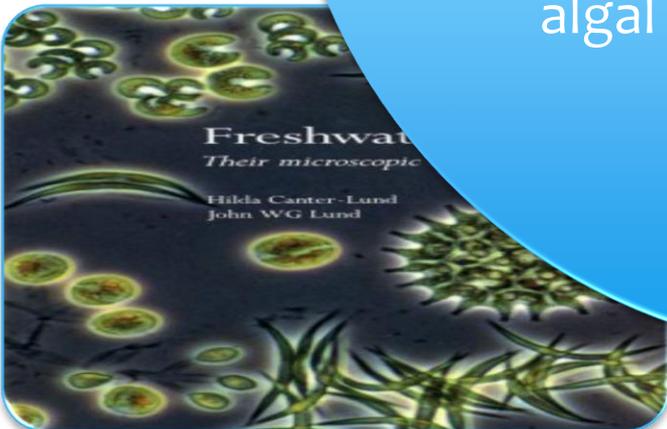


Analysing  
algal samples



Identification  
algal taxa

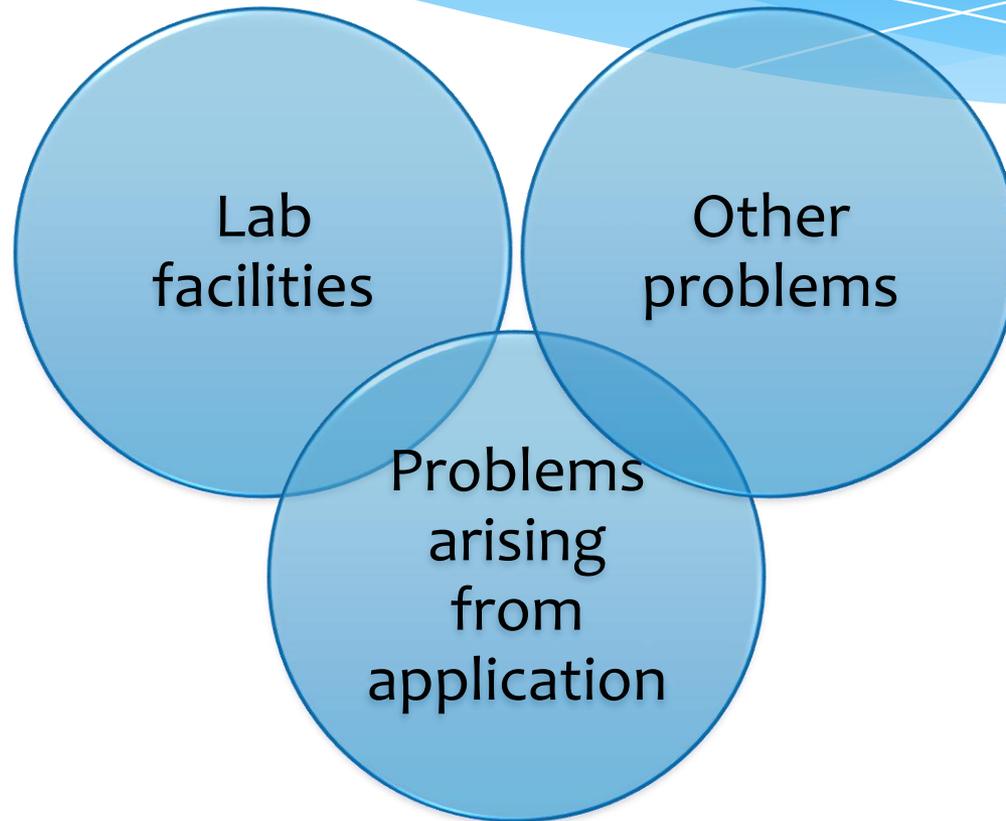
Description  
algal taxa



# Observation and diagnosis

- \* This situation could normally be accepted satisfactory. However one should also consider that this also can bring discussable problems with it. The basic and may be the most important problem of all is whether the identification of algal taxa have been done (or are being done) **properly**. Because, if not, that means we face the following problems.
  1. **Inconsistency and/or incompatibility of data** (verilerin tutarsızlığı)
  2. **Inefficient/incompetence observation and insufficient control** (İzlenilebilirliğinin ve kontrolünün yapılamaması)
  3. **It becomes difficult to compare species composition data** (depending on spatial and temporal changes) **in the same ecosystem**

# Difficulties in identification of Mikroalgae



# Problems related to lab. facilities

Lack of Efficient/suitable observation facilities (microscope, image analyses system etc.) in most labs.

Most of present equipments for observation are with old technology.

High cost of observation/identification equipments (DIC, TEM, SEM, IMAGE WORK STATION ) that are necessary for correct and fast identification.

# Problems related to observation process

Lack of common **preservation and preparation methods** for observation algae in Turkey

Systematic revisions are not being followed properly

**Efficiency/capability** for identification vary from one person to another (Teşhislerde yetkinlik sorunu)

**To be insistent for identification** for all taxa present in the sample. This may lead person to incorrect identification.

Identification of algae is **time taking** and quite **suffering work**.

Some researchers (**particularly young researchers**) find identification waste of time? So do not pay the necessary attention to diagnosis. Identification requires great **care** and **patience**.

# Other problems

High cost of algae books

Difficulty in purchasing

Reference books used for identification of algae are old and not specific.

En önemli sorunlardan biride tüm teşhis kaynaklarına ulaşsanız dahi bunların farklı ekosistem ve coğrafik bölgelerin alg florasını içermesi.

Lack of atlas (prefably digital one) for microalgae recorded in Turkey

Articles related to algal flora of both fresh water and marine habitats are limited.

# Is it possible to overcome such problems?

**Collective approach** should be adopted in place of traditional identification method

A new algae database should be established (without delay) which should be; **multifunctional, easy reachable, free Of charge**

**Digital photographs** of all algal species should be collected in a center (ALGAE CENTER). Type specimens should be determined.

Slides containing new records and algae proposed as a new species **should be sent** to this center in a well-preserved preparations.

Center should give service for correct identification and prepare new check-lists of algae regularly



# Work shops

Workshops for identification of algae should be **organized at regular bases**. Methodology and new aproaches in sistematics of algae should be introduced and discussed in such meetings. Reports should be published.

Young resarchers (post graduate) should be encouraged for correct identification

# Strategic planning

Common  
methodology

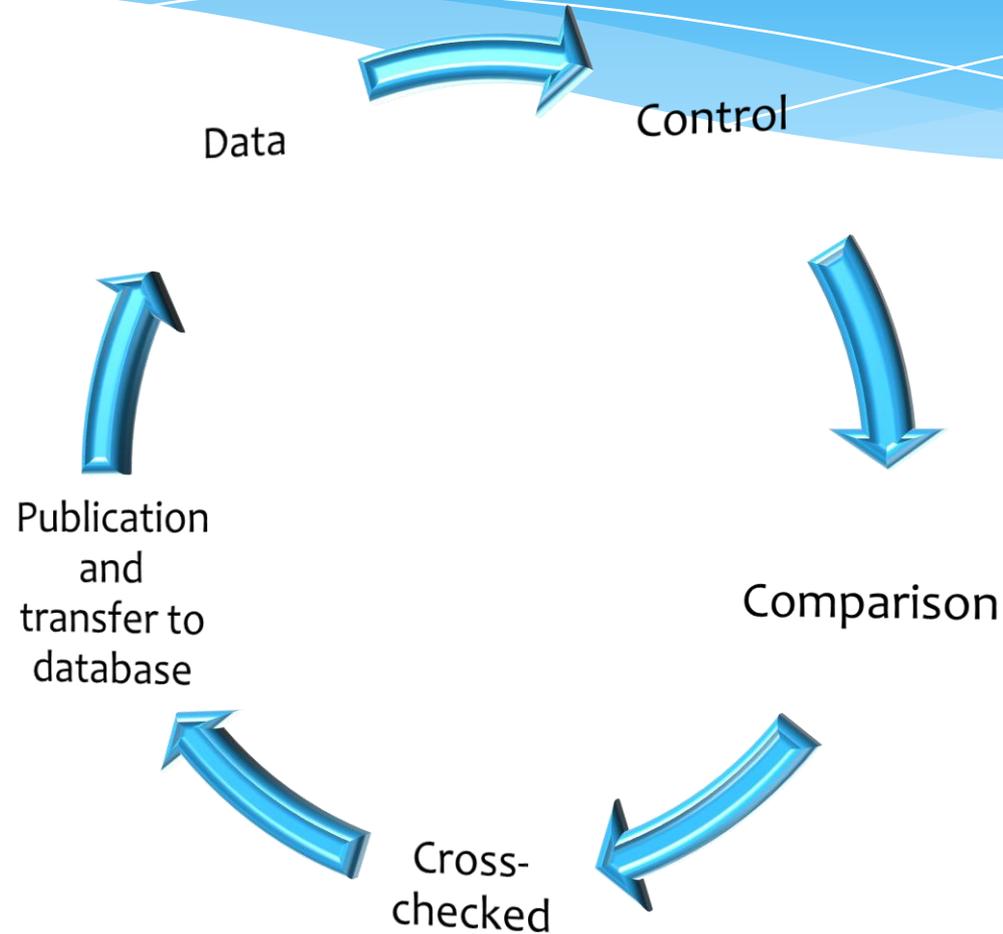
Data  
processing

Verification  
and  
publication of  
data

Final algae list  
(should be  
forward to  
algae center)

Type  
specimens and  
common data  
should be  
forwarded to  
Algae Center

# Application of strateji



# WHY DATABASE?

Databases are useful and/or necessary for **keeping data** (data store), **data upgrading**, **reaching data** (in a quick way)

Rapid and continuous **increase** in number of algae data

# Advantage of database

Seperate information sheet for each algal taxon.

**Data consistency/compability**

Preventing incompability.

**Data safety** (veri güvenilirliği)

# *Advantage of database*

**Database prevents data repetition (data repetition is common)**

**database easily intercorrelated with subsystems**

**It makes it possible to integrate with other database elsewhere**

# Advantage of database

**Database provide data unification (data unity-veri bütünlüğü).**

**Data unification provide correct data and data consistency (verilerin doğruluğunu ve tutarlılığını)**

**However some limitations are possible in data unification (Veri bütünlüğünü sağlamak)**

Böylece verilerin doğru ve tutarlı olması sağlanmış olur.

# *Advantage of database*

Aslında "aynı anda" kavramı bilgisayar biliminde yer almaz.

**Database softwares do not let any datum to be handled by more than one person simultaneously.** Access is usually given one person to handle data (multiple use often impossible)

# Data safety

It is not a desired case that data users **reach all the data** at database. (e.g. At a bank, data reached by bank manager cannot be reached by people working under him.) Each data users have access at certain levels.

**Another example:** In a membership forum, members can only arrange their personel page whilst **admin** can **make all the necessary changes** in personel pages.

# Why Freshwater Algae Database?

- \* **Lack of** any previous algae database in Turkey
- \* **The necessity to gather** data/information related to algal species (habitats, image etc.)
- \* **The necessity to store** data in an electronic platform
- \* users to reach data **on line** quickly.
- \* To use the advantage of **internet** (today's world this is inevitable)
- \* **Fast developments/improvements** in computer and internet technology
- \* **Integration** of networks/databases
- \* To be **enrichable**
- \* Contribution to **National Biological diversity**

# Why Freshwater Algae database ?

- \* **Increase in numbers** of studies related to freshwater algae (species composition, abundance etc.
- \* Freshwater algae **constitute a noticeable part** in our national **biological diversity** (with respect to distribution and taxa richness).
- \* **To yield/complete** the National Biological Diversity
- \* To store/list freshwater algae with latest and contemporary information
- \* To determine abundance&distribution of the **algae with economic value**
- \* To determine list of **toxic algae** and their distribution
- \* To evaluate **water and ecological quality** of freshwater habitats.

# TURKISH FRESHWATER ALGAE DATABASE (TÜBİTAK TBAG-Ü/20-2196T063)

- \* **Turkish Freshwater Algae database**
- \* **Turkish Freshwater algae Image database**
- \* **Have been established by our research team**

# TURKISH FRESHWATER ALGAE DATABASE (TÜBİTAK TBAG-Ü/20-2196T063)

- \* In the database
- \* **Bacillariophyta 3658**
- \* Chlorophyta 1321,
- \* Chrysophyta 14,
- \* Cryptophyta 18,
- \* Cyanophyta 730,
- \* Dinophyta 72
- \* Euglenophyta 299,
- \* Prasinophyta 3,
- \* Rhodopyta 3,
- \* Xanthopyta 11
- \* Charopyta 1
- \* **Separate pages were prepared for each locality of the same taxon.**

# TURKISH FRESHWATER ALGAE IMAGE DATABASE (TÜBİTAK TBAG-Ç SEK/14 102T105)

- \* Algal taxa recorded in freshwater ecosystems have been gathered in a database with their;
- \* **systematics,**
- \* **synonyms,**
- \* **diagnostic features,**
- \* **Digital photographs**
- \* Seperate data page has been arranged for each taxon.

# TÜRKİYE TATLISU ALGLERİ RESİMLİ VERİ TABANI (TÜBİTAK TBAG-Ç SEK/14 102T105)

\* In Turkish Freshwater Algae Image Database;

\* Bacillariophyta 199

\* Chlorophyta 255

\* Chrysophyta 3

\* Cryptophyta 2

\* Cyanophyta 87

\* Dinophyta 12

\* Euglenophyta 61

\* Prasinophyta 1

\* Rhodopyta 1

\* Xanthopyta 3

\* ALGAE have been stored with most recognizable images.





# TÜRKİYE TATLISU ALGLERİ RESİMLİ VERİ TABANI ÖRNEK KAYITLAR

Ophiocytium arbuscula [Uyumluluk Modu] - Microsoft Word (Ürün Et...)

Tablo Araçları

Yapıştır Pano Yazı Tipi Paragraf Stiller Düzenleme

Times New Roman 12 Aa

AaÇçĞğİ AaÇçĞğİ AaÇçĞğİ AaÇçĞğİ AaÇçĞğİ

Alt Konu ... Başlık 1 Güçlü Konu Başl... 1 Normal

Stilleri Değiştir

Bul Değiştir Seç Düzenleme

Kingdom: **Plantae**  
Subkingdom: **Thallobionta**  
Division: **Xanthophyta**  
Class: **Xanthophyceae**  
Order: **Heterococcales**  
Suborder:  
Family:  
Genus: ***Ophiocytium* Nägeli 1849**

Species: ***Ophiocytium arbuscula*, (A. Braun) Rabenhorst**

Synonym(s): ***Sciadium arbuscula* A. Braun,  
*Sciadium balatonensis* Lemmermann**

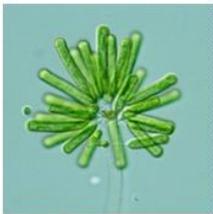
Description:  
Species: Cell body with a short projection at one end; terminus of the projection slightly swelled; daughter cells attached at opposite end of their mother cell (Illustrations of Japanese fresh-water algae, 1977).

Locality:  
İzmir, Barutçu L.

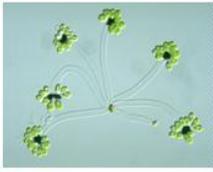
1



2



3



Sayfa: 1 / 1 Sözcük: 3 Türkçe

Başlat

veri tabanına nedeni... TÜRKİYE'DE YAPILAN... Microsoft Word Xanthophyta

14:45



# DATA PAGE

Microsoft Word (Ürün Etkinleş...) - Lemanea torulasa [Uyumluluk Modu]

Tablo Araçları

Dosya Giriş Ekle Sayfa Düzeni Başvurular Postalar Gözden Geçir Görünüm Tasarım Düzen

Yapıştır

Pano

Yazı Tipi

Paragraf

Stiller

Düzenleme

Kingdom: **Plantae**  
Subkingdom: **Thallobionta**  
Division: **Rhodophyta**  
Class:  
Order:  
Suborder:  
Family:  
Genus: ***Lemanea Bory* 1808**

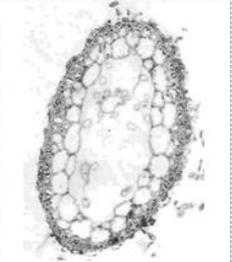
Species: ***Lemanea torulasa***

Status of name: ***Paralemanea torulosa* (Roth) Sheath & Sherwood**

**Synonym(s):**

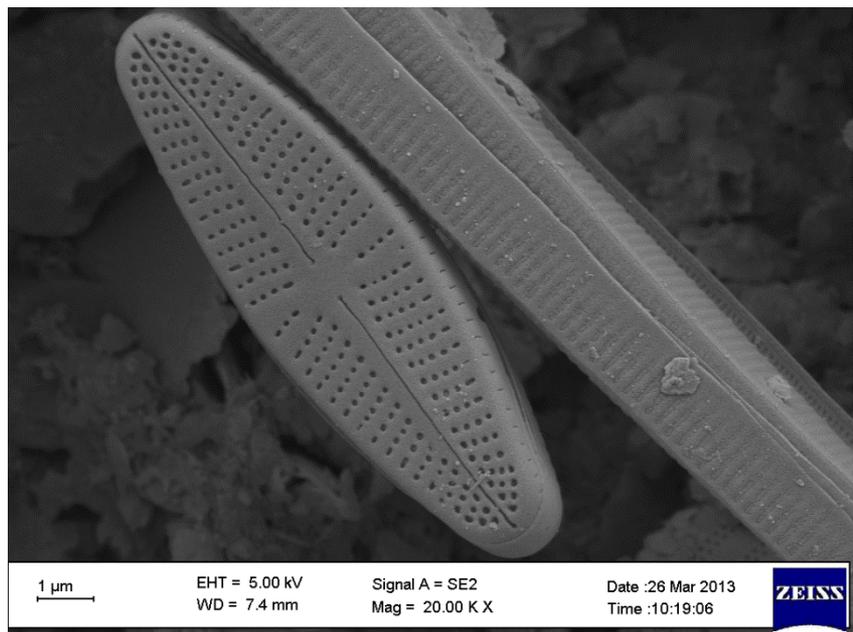
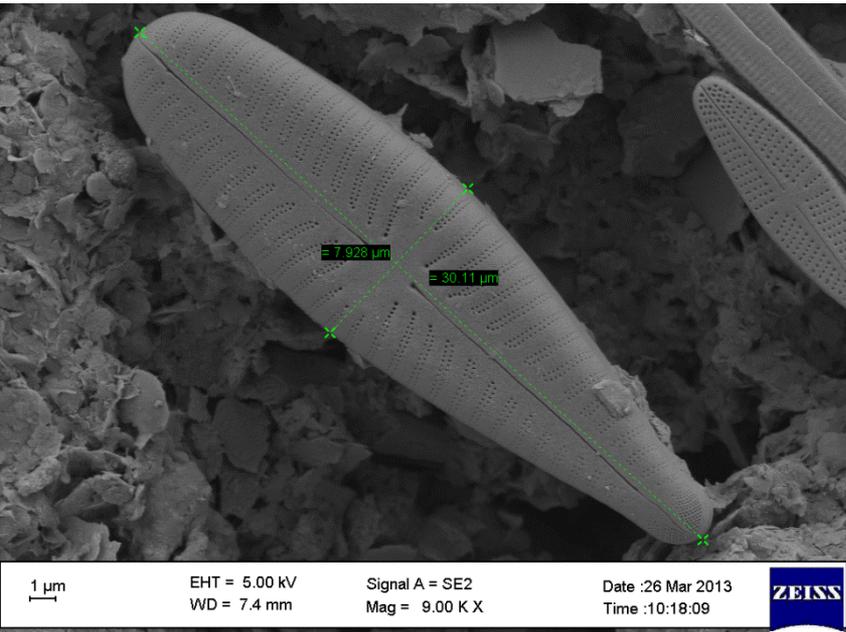
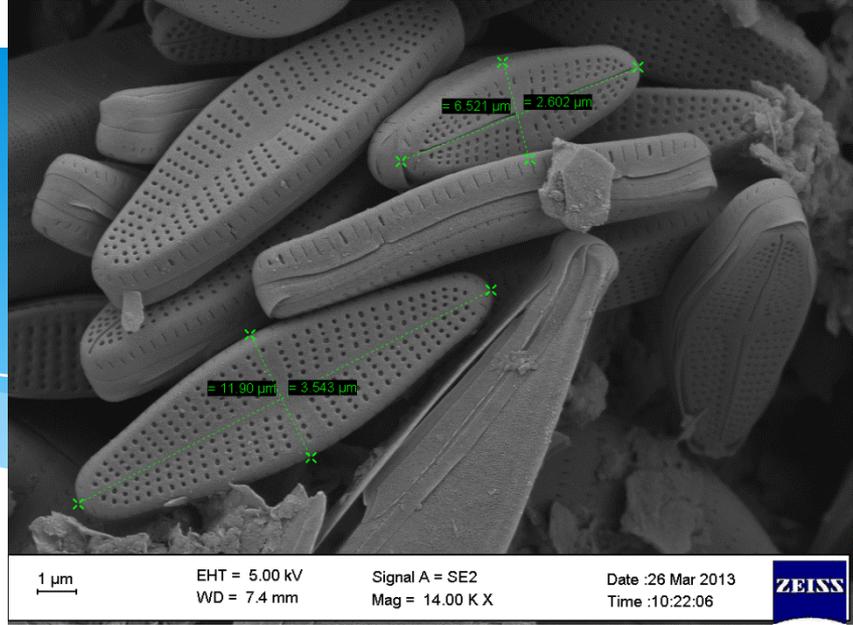
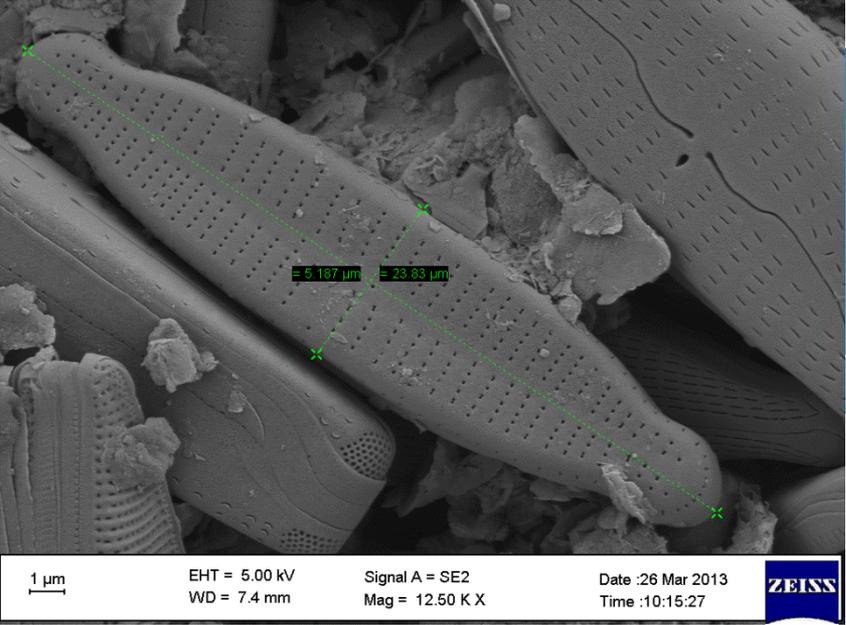
**Description:**  
Thallus (gametophyte) unbranched, pseudoparenchymatous, tubular, 3--10(–15) cm long, with a maximum diameter 500–650(–1000) µm at reproductive maturity, with no obvious stalk but having bands of spermatangia at regular intervals in regions of thallus swelling.

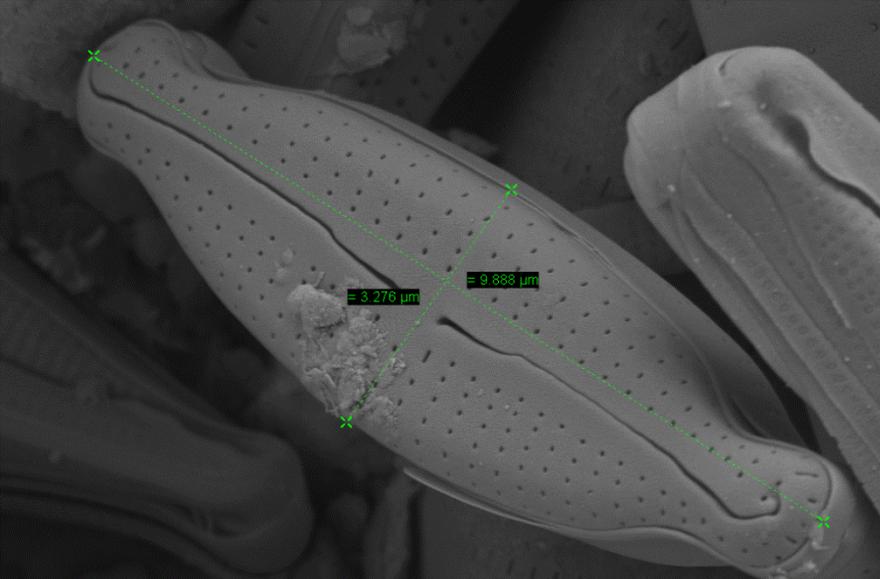
**Locality:**  
Elazığ, Hazar L



Sayfa: 1 / 1 Sözcük: 0 Türkçe

Başlat veri tabanına... TÜRKİYEDE... Veri Tabanı S... Glenodium... Belge2 - Mic... Lemanea tor... Rhodophyta 14:39





200 nm

EHT = 5.00 kV  
WD = 7.4 mm

Signal A = SE2  
Mag = 30.00 K X

Date :26 Mar 2013  
Time :10:24:48

ZEISS



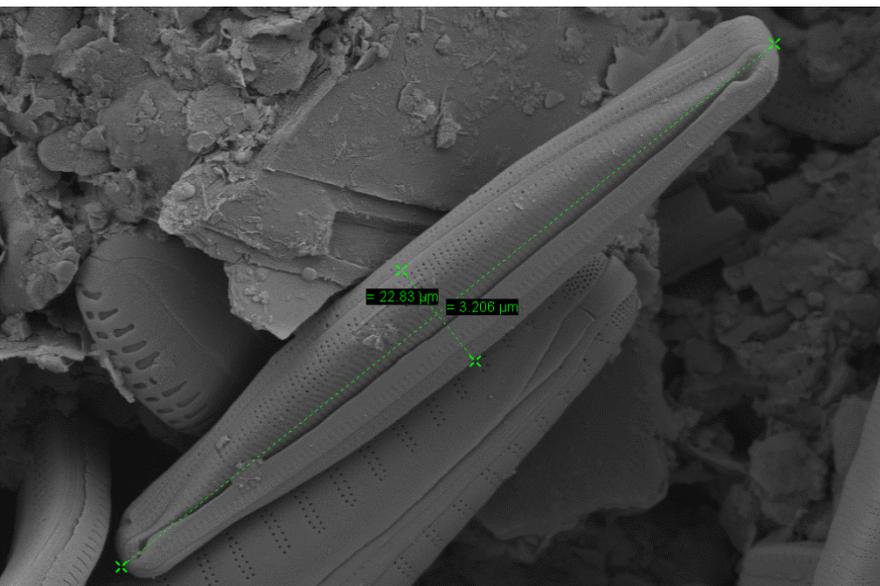
1 μm

EHT = 5.00 kV  
WD = 7.3 mm

Signal A = SE2  
Mag = 7.00 K X

Date :26 Mar 2013  
Time :10:48:42

ZEISS



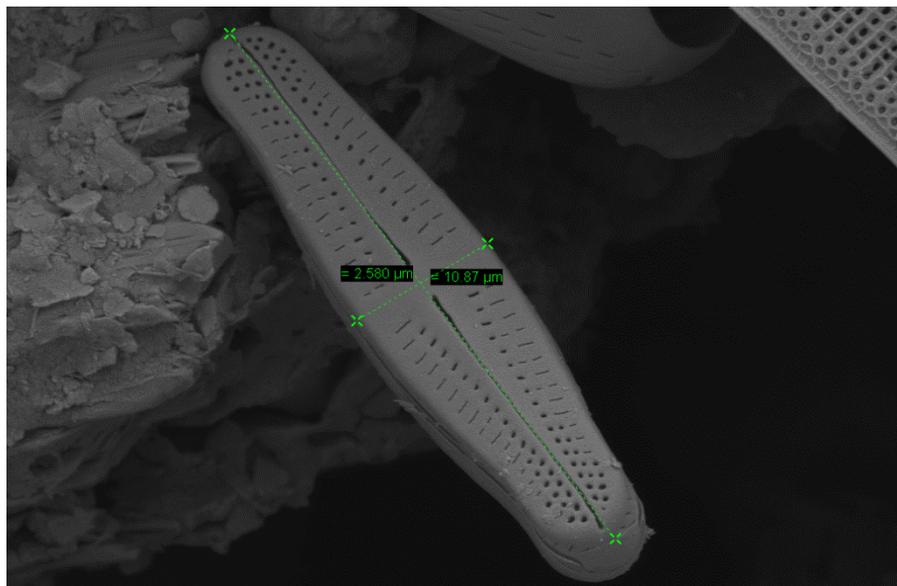
1 μm

EHT = 5.00 kV  
WD = 7.4 mm

Signal A = SE2  
Mag = 12.50 K X

Date :26 Mar 2013  
Time :10:46:02

ZEISS



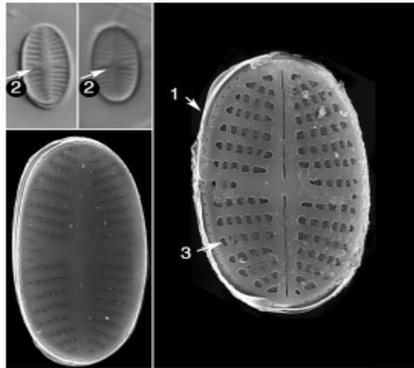
1 μm

EHT = 5.00 kV  
WD = 7.4 mm

Signal A = SE2  
Mag = 20.00 K X

Date :26 Mar 2013  
Time :10:26:43

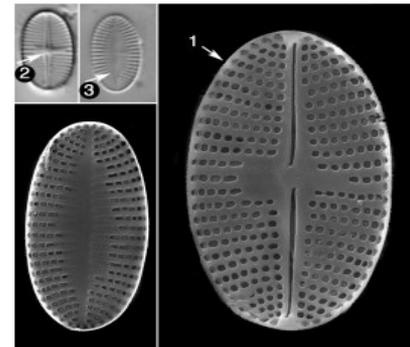
ZEISS



***Psammothidium curtissimum***

1. Valves elliptical to linear-elliptical
2. Central areas on both valves small
3. Striae radiate

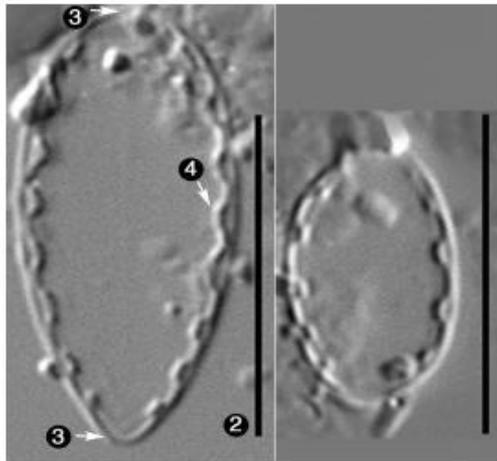
Valves are elliptical to linear-elliptical. Valves very small, less than 10  $\mu\text{m}$  in length. Both valves have small transversely elongated central areas. The raphe is straight, without terminal fissures. Striae are radiate on both valves, 27-31 in 10  $\mu\text{m}$ .



***Psammothidium levanderi***

1. Valves elliptic to linear-elliptic
2. Raphe valve with small, asymmetric central area
3. Rapheless valve with rhomboid axial area

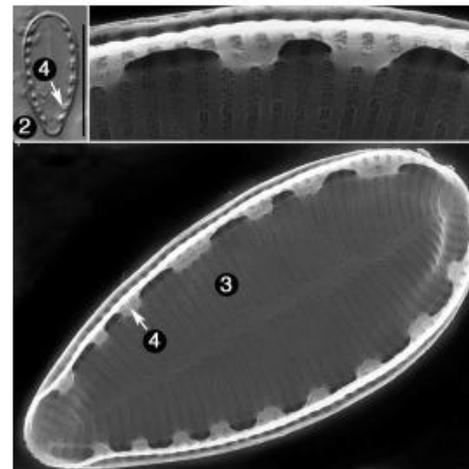
Valves are elliptical to linear-elliptic. The raphe valve has a linear axial area and a small asymmetric central area. The rapheless valve has a rhomboid axial area, which often has an irregular border. The central area on rapheless valve is usually not differentiated from the axial area. Striae are slightly radiate in the center and strongly radiate at the apices of both valves, 25-31 in 10  $\mu\text{m}$ . Areolae are often visible in LM.



### *Surirella atomus*

1. Keel low, alar wings absent
2. Valves small
3. Valves heteropolar
4. Fibulae broad and short
5. Costae and central line not visible in LM

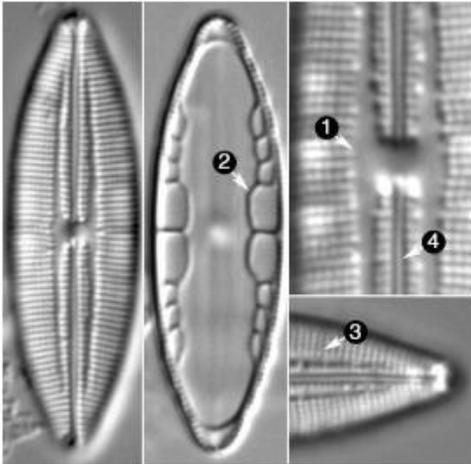
Valves are small and heteropolar, 8-19  $\mu\text{m}$  long by 5-8  $\mu\text{m}$  wide. Headpole is broadly rounded and footpole is cuneately rounded. Fibulae are broad and short, 8-10 in 10  $\mu\text{m}$ . Costae and center line are not visible in the LM.



### *Surirella stalagma*

1. Valves small
2. Valves heteropolar
3. Costae not visible in LM
4. Fibulae short, wide
5. Low keel, wider than the mantle

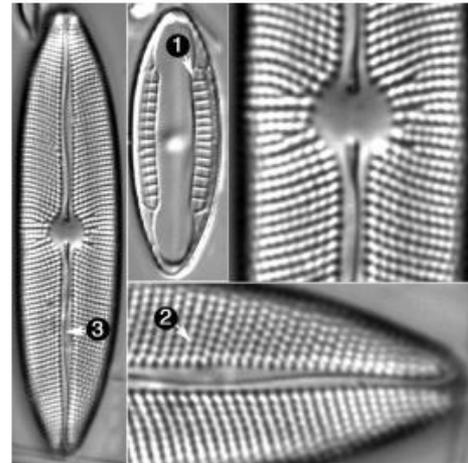
Valves are small and heteropolar, 11-16  $\mu\text{m}$  long by 5-7  $\mu\text{m}$  wide. The foot-pole is capitate, while the head-pole is rounded. The costae are numerous, 55 in 10  $\mu\text{m}$ , so they are only visible in SEM. The fibulae are short and wide, with a density of 8-10 in 10  $\mu\text{m}$ . The keel is low, and broad compared to the mantle.



### *Mastogloia pumila*

1. Lateral sterna present
2. Central partecta larger than distal partecta
3. Striae uniseriate
4. Raphe straight

Valves are linear-lanceolate to elliptic-lanceolate with subtly protracted and broadly rounded apices, lateral sterna, and partecta of two different sizes. The striae are uniseriate and the raphe is straight, rather than sinuous.



### *Mastogloia elliptica*

1. Partecta all of same size
2. Striae uniseriate
3. Raphe branches sinuous

Valves are elliptic to linear-elliptic with bluntly rounded ends. Partecta are all the same size. Striae consist of single rows of coarse areolae. Raphe branches are sinuous (not straight).