

Lec. 1

2021/10/20

Bio. Sci. Dept

قسم علوم الحياة

2nd Stage

المرحلة الثانية

Plant Groups

المجموعات النباتية

المقرر الدراسي الأول

للحاصل الدراسي

2022/2021

المحاضرة: - 1 -

د. عواد طاهر
أ. المادة

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ كورس الجامع اليابانية التالي

* لغة اى عشرة محاضرة
* تقرير فمدهر (صفتين) يقدمه كل طالب في احد موضوع
الجامع اليابانية وباللغتين العربية والانكليزية (صفتين الا صفتين

لكل لغة 11 في موند امصاه 2021/12/11
يحدد كل موضوع لكل طالب (يزود به الطالب لاحقاً 11

الامتحانات التكميلية

1) الامتحان الاول يسجل 4 محاضرة الودك في موند
يحدد لاحقاً

2) الامتحان الثاني يسجل 5 محاضرة الودك في موند يحدد
لاحقاً

الامتحانات الاسبوعية 1) 2, 3, 4 والواجبات الاسبوعية
1) تحدد هواميد للامتحانات الاسبوعية (وتنضم واحد او

اثنين 11) 2) الواجبات الاسبوعية تشمل حلول اربعة نماذج للمأهلات
الاربعة الودك .

اجتابة درجة الودك
درجة الودك 40
* درجة النظرية 25 (22+3)

للضايات
* درجة العملي 15
40
المجموع

اجتابة درجة الامتحان الثاني

* درجة النظرية 50
* درجة العملي 15
المجموع 65
الدرجة النهائية
العملي + الامتحان الثاني
40 + 60 = 100

Plant Groups

المراجع النباتية

المصادر العلمية: تعتمد المصادر العلمية في هذا تكورس النباتية

أولاً: المصادر الإجنبية:

- 1- Bold, H.C., and M.J. Wynne - 1985. Introduction to the Algae. Structure and Reproduction. 2nd. ed. Englewood, Cliffs, Prentice - Hall, N.J.
- 2- Carr, N.G., and B.A. Whitten, eds. 1982. The Biology of Cyanobacteria. Berkeley Univ. of Calif. Press.
- 3- Holmes, S. 1983. Outline of Plant Classification and Importance. Harper, and Row Pub., N.Y.
- 4- Richardson, D.H.S. 1981. The Biology of Mosses. Wiley Publ. N.Y.

ثانياً: المصادر العربية

1- الموسوي، علي حسين عيسى 1987. علم تصنيف النبات. وزارة التعليم العالي والبحث العلمي. جامعة بغداد.

2- الهدي، حسين علي وعبدالله محمد الموسوي. 1990.

النبات العام - العلمي - وزارة للتعليم العالي والبحث العلمي - جامعة بغداد

3- مصطفى، عبد العزيز وآخرون. 1970. نباتات

العام. الطبعة الرابعة - مكتبة الانجلو الأمريكية - مصر

د. جواد كاظم
٣. المادة

Plant Groups

Lee. 1

المحاضرة - 1 -

المحاضرة : نسل

- * نشأة الحياة والجماع النباتية
- * عملية البناء الضوئي والطلاق غاز الأوكسجين O_2
- * التصنيف ودرجة تصنيف الجماع النباتية
- * المراتب التصنيفية
- * مملكة الطلائعيات *Protista*
- الكائنات - تقسيم الطلائعيات وفقاً لخصائصها
- * تنوع الطلائعيات
- * علم الطحالب *Phycology (Algology)*
- * اعتبار الطحالب * تصنيف الطحالب * مورفولوجيا الطحالب
- * أسئلة/واجبات

The Living Earth and the Major Plant Groups :

Introduction :

Life originated and became of the biosphere (البيوسفير) within the first billion years after the origin of the earth. Trace of organic chemicals, attributed to life processes have been found in the rocks (west Greenland), that dates back 3-8 billion years (Tabl 1).

Organisms resembling bacteria have been discovered in 3.4 billion years old sedimentary rocks in South Africa and Western Australia. Oxygen-evolving photosynthetic forms, similar to the blue green algae that exist today, came into being nearly 3 billion years ago.

The earliest forms of life that inhabited the earth were similar in organization today's bacteria and blue-green algae, both of which are prokaryotes (prokaryotes). The nuclear materials of prokaryotes is confined to an ill-defined nuclear region that is not bound by a membrane.

The eucaryotes, on the hand, possess a well defined membrane bound nucleus. Eucaryotes (Eukaryotes) similar to the modern unicellular algae have been found in 1.4 billion years old rocks. It is possible that eucaryotes

Plant Groups

cells originated long ago as 2 billion years. The eucaryotes cells are found in: Protista, Fungi, Plantae, and Animalia Kingdoms.

((What are basic differences between Prokaryotes and Eucaryotes ??))
 ((Write 5 differences only)).

Table 1. Fossil Evidence of Primitive Life

Approx. Age Billion years	Location	Evidence of Life
4.6	origin of the earth and the Solar systems	
3.8	West Greenland	Traces of O. Compounds
3.2	Zimbabwe	Bacteria, spores, blue green algae
2.0	Ontario, Canada	Blue-green algae
1.4	Alberta, Canada	Eucaryotic Chrystophyta like algae
1.0	Central Australia	Blue-green algae, eucaryotes, Chrystophyta like algae

Photosynthesis and Oxygen (O₂) evolution:

About [3] billions years ago a different kind of photosynthesis evolved, one that was to revolutionize the diversity of organisms. This was photosynthesis in which oxygen (O₂) was released.

Plant Groups

Continued photosynthesis increased the content of oxygen (O_2) in the atmosphere from about 0.2% by volume ((1.8 billion years ago)) to the 1% ((600 million years ago)) to the present

Value of 21%. Some of the oxygen combined in the upper atmosphere to produce a layer of ozone (O_3) that prevented the ultra violet (UV) rays from penetrating the earth atmosphere.

Plant Taxonomy and Systematics:

Theophrastus (371-288 B.C.) focused only on flowering plants. He classified plants as: herbs, shrubs, and trees.

Around the first century (B.C.), Dioscorides (The physician of Roman Emperor) wrote De Materia Medica, a description of the medicinal properties of 500 plants.

The Swiss-French botanist Augustin Pyrame de Candolle (1778-1841) introduced the term taxonomy as the science of naming and classifying plants.

The Sweden scientist Carlous Linnaeus (1707-1778) introduced Binomial Nomenclature, and grouped the plants known to him into 24 classes. Linnaeus followed a very artificial system of classification.

Plant Groups

This was the "Sexual system" that classified plants on the basis of the number, union and length of stamens

Taxa Ranks « تصنيف وتصنيف » -

As stipulated by the International Code of Botanical Nomenclature (ICBN), Scientific Names of plants and plant groups are given in Latin. The various taxonomic groups (Taxa) are ranked in hierarchical sequences with the rank of species occupying the basal positions -

Kingdom - Division (or phylum, phyla)
 Class - order - Family - Genus, species

Table 2. Traditional Names of Plant Groups -

A- Thallophytes :

- * Algae → different algal divisions (Monera and Protista Kingdoms)
- * Fungi (Fungi Kingdom)
- * Lichen (Ass. alge + Fungi)

B- Archegoniatae: (Plantae Kingdom)

- * Bryophyta
 - * Pteridophyta
- ↓
 cryptogams

- #### C- Phanerogams : Plantae Kingdom
- Gymnosperms : Ginkgo, Conifers (seedy plants)
 - Angiosperms : Dicotyledonae and Monocotyledonae (Dicots & Monocots.)

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Table 2.

Plant Groups

The major Groups of Plants
According to Whittaker and Margulis
1978.

- ① Plantae → Vascular plants: Angiosperms
Gymnosperms
Bryophytes, Pteridophytes
- ② Fungi → Lichens, Imperfect fungi - etc -
- ③ Protista → Algae and other organisms
- ④ Monera → Bacteria, Mycoplasmas
Blue-green algae
Prochloron.

Table 3. Approximate Number of Living
Species of :

Informal Group Name (Organism)	Value (No. of species)
Prokaryotes	3802
Fungi	100,000
Protists	extinct species
Algae	23200
Bryophytes	22850
Pteridophytes	10775
Gymnosperms	761
Angiosperms	260,000
* Monocots.	60,000
* Dicots.	200,000

Plant GroupsProtista Kingdom

Nearly 100,000 living and extinct species of protists have been described, including that are:

- * autotrophs as are algae (plants)
- * heterotrophs as are animals
- * saprotrophs as are fungi

Protists have more than 15 divisions (more than 15 phyla) which consist of algae, protozoans, slime fungi, and parasitists.

Protista Characters:

- * Eucaryotes
- * Sexual reproduction diverse
- * Asexual reproduction usual
- * Primarily unicellular
- * Metabolically diverse
- * Structurally complex

According to the nourishment basis, Protista are divided into:

- * Photoautotrophs: Divisions: Chlorophyta, Phaeophyta, Rhodophyta, etc.
- * Heterotrophs by ingestion or Parasitic
Rhizopoda (amoeboids)
Myxomycota (Slime molds)
- * Saprotrophs Oomycota (water molds)

Diversity of Protista :

Traditionally, the term algae refers to a diverse group of photosynthetic protists. At one time, botanists classified algae as plants because all of them have chlorophyll a and carry on photosynthesis within a membrane-bounded plastid. However, algae do not develop from an embryo, as do plants.

Phycology

Phycology (≡ Algology), the science is the study of algae. The word derives from Ancient Greek Phycos → "meaning" phycos (seaweeds) and Logia, "meaning" "the study of" or study or science.

Algae could grow at the snow conditions (0°C) (Psychrophilic or Cryophilic algae). However, some algae could be lived under hot conditions (over 70°C) (Thermophilic algae).

Alga have two kinds of cells that are

① Prokaryotic cell

example :

Cyanophyta

Blue-green algae

Monera Kingdom

② Eukaryotic cells

example :

Chlorophyta and

other divisions

Protista Kingdom

Algae Divisions

* Cyanophyta	* Rhodophyta	* Cryptophyta
* Chlorophyta	* Charophyta	* Euglenophyta
* Phaeophyta	* Pyrrophyta	* Chrysophyta
* est		

Algal Classification:

Algae classification is depended on major criteria, as:

- ① Type of morphology characters
- ② - Photosynthetic pigments
- ③ - Food storage products
- ④ - Kind of flagella
- ⑤ - Type of cell wall structure
- ⑥ - other criteria are related to the cell structure -

Algae Morphology:

① Unicellular : one cell can be -
 cocci or (amoebic),
motile such as
 Chlamydomonas
 or non-motile as

② Colonial or
 Chlorella
 aggregated cells,
 motile such as,
 Volvox
 and non-motile as,
 Hydrodictyon -

Plant Groups

③ Filamentous :

The filament means - trichome plus mucilaginous sheath.

The trichome in many vegetative cells and the mucilaginous sheath surrounded them.

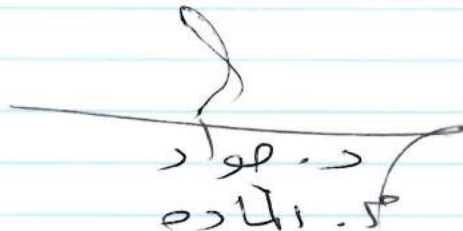
④ Siphonous

consist of thallus with many nuclei either with transverse septae and called cellular or without septae and

called a cellular or coenocytic

⑤ Parenchymatous :

It is like leaf such as Ulva or tabular such as Enteromorpha and this due to ways of cell divisions.





Universal Questions

Q₁: Define the following:

Candolle, Descurides, Cyanophyta
Filamentous, Lichen.

Q₂: Complete the following:

① - Eucaryotes cells are found in
_____, _____, _____, _____ Kingdoms

② - Protista are consisted of
_____, _____, _____, and _____.

③ - Monera Kingdom is consisted
1 - 2 - 3 - 4 -

④ - Protista criteria are
1 - 2 - 3 - 4 -

⑤ - According to the nourishment
basis, protista are divided
into 1 - 2 - 3 -

⑥ - Algae morphology can be divided
into 1 - 2 - 3 - 4 - 5 -

Q₃: Fill the following blanks

① - _____ who wrote De Materia
Medica book.

Plant Groups

- (2) _____ billion years ago, blue green algae were discovered in central Australia
- (3) Oxygen content in present time is _____ before _____ million years ago
- (4) _____ who classified plants as herbs, _____, and _____.
- (5) Linnaeus the first scientist introduced _____ and grouped plants into 24 classes
- (6) Parenchymatous is type of _____ morphology -

Q4: Put the word True or False

- (1) - Angiosperms have 200,000 species
- (2) - Bacteria have been discovered in 2.0 billion years ago
- (3) - The nuclear materials of prokaryotes confined to ill defined nuclear region
- (4) - Eucaryotes poss. ill defined membrane bound nucleus
- (5) - Eucaryotes have been found in 1.4 billion years ago
- (6) - Lichen is type of organism which is associated between algae and bacteria



Plant Groups

Qs: Choose the best (correct) answer:

① Phycology is the study of

- a) fungi b) plants c) animals d) algae

② - Algae are grown in $0^{\circ}C$, called

- a) heterotrophs b) psychrophilic
c) cyanophyta d) protista

③ Algae develop from () as do plants,

- a) embryo b) sexual reproduction
c) seeds d) tillers

④ - Cyanophyta is belonged to

- a) protista b) plantae c) Monera
d) eucaryotes

⑤ Algae division is

- a) Gymnosperms b) Cryptogams
c) Chlorophyta d) Angiosperms

⑥ Siphonous is one kind of algae,

- a) physiology b) nutritionally
c) heterotrophy d) morphology

1000-1000
1000-1000

Plant Groups

Q6 : Matching : select correct answer for column A from column B.

Homework - 1 (H-1)

ملاحظة: هذا السؤال هو واجب يسى (H-1) يقدم لإعتاد مع نفس السؤال في الامتحانات

القائمة مرجعاً

Column A

Column B

- | | |
|--------------------------|---------------------------|
| 1 - Holmes | a - Algae morphology |
| 2 - Bacteria age | b - phycos |
| 3 - Eucaryotes age | c - 200,000 species |
| 4 - O ₂ (21%) | d - 4.0 billion years ago |
| 5 - Linnaeus | e - reference |
| 6 - Archeoniate | f - 3.4 billion years ago |
| 7 - Angiosperms | g - 600 million years ago |
| 8 - Monocots (species) | h - Binomial nomenclature |
| 9 - blue green algae | i - Bryophytes |
| 10 - Chlorophyta | j - phanerogams |
| 11 - Colonial | k - 60,000 |
| 12 - Sea weeds | l - monera |
| | m - 6 billion years ago |
| | n - siphonous |
| | o - plantae |
| | p - cyanophyta |
| | q - protista |
| | r - 1.4 billion years ago |

2020 | 12 | 1

2021/10/27

المرحلة الثانية

قسم علم الحياة

الفصل الدراسي الأول

للسنة 2021 / 2022

جامعة بني سويف

Plant Groups

المحاضرة 2

أ. المادة: د. جواد

المحاضرة 2 :

المحالب Algae

* صفات البناء الضوئي وأنواعه
* التغذية التخزنية

* أنواع اللسوط السائفة

* أشكال البلاستيدات
* أنواع التكاثر

* دورات الحياة
* انتشارها في البيئة

* فوائدها واستخداماتها في نقل الإنسان

Algal Photosynthetic Pigments :

Algae have three kind pigments, there are :

- ①- Chlorophylls ②- Carotenoids ③- Biliproteins

The chlorophyll pigments compounds are easy to be dissolved in organic solvents such as chloroform. The chlorophyll quantity is depended on the following :

- | | |
|--------------------------|--------------------|
| ①- Environmental factors | ④- Nutrients |
| ②- pH | ⑤- light intensity |
| ③- Temperature | ⑥- cell age |

Algae have five chlorophylls type as, chl. a, chl. b, chl. c, chl. d, and chl. e.

Algal Chlorophylls :Chlorophyll

chl. a
chl. a, b
chl. a, c

chl. a, d
chl. a, e

Algae Division

Cyanophyta
Chlorophyta, ---
Phaeophyta, ---

Rhodophyta, ---
Xanthophyta

Algal Carotenoids (Carotens + Xanthophylls)

Carotenoids : Any of a group of fat-soluble, yellow, orange, red or purple pigments. They are subclassified into two groups :
Carotens and Xanthophylls

Plant Groups

Algal Carotenoids :

Type of Carotenoid:

- * α , β , and γ Carotenes
- * Lutein
- * Fucoxanthin
- * Zeaxanthin
- * Peridinin

Algae Division

- Chlorophyta
- Chlorophyta
- Phaeophyta, Chrysophyta
- Pyrrhophyta
(Dinophyta)

Algal Biliproteins

Biliprotein: a conjugated protein in which a strong colored pigment (the prosthetic group) is attached to the protein (example: phycocyanin [blue], and phycoerythrin [red])

Type of Biliprotein

- * C - phycocyanin
- * C - phycoerythrin
- * Allophycocyanin
- * phycocyanin
- * phycoerythrin } unknown types

Algae Division

- Cyanophyta
- Rhodophyta
- Cyanophyta
- Cryptophyta

Algal Food Storages

- * Floridean [starch, Glycogen like]
- * starch, Paramylum, Fructosan, Fucosan
- * Mannitol (Alcoholic sugar)
- * Leucosin, lipid
- * Sterols, Fucosterols

Note: Fucosan \rightarrow tannin like

Plant Groups

Algal Division Criteria :

<u>Division</u>	<u>Major Cell wall Component</u>
* Cyanophyta	Peptidoglycan, muramic acid, diamino Pelmic acid
* Chlorophyta	Cellulose, Xylan or Mannan or cell wall absent
* Euglenophyta	cell wall absent
* Rhodophyta	Cellulose, or Xylan, galactan
* Cryptophyta	cell wall absent
* Phaeophyta	Cellulose, Alginates
* Chrysophyta	Cellulose, or cell wall absent
* Pyrrophyta	= = = =

Algal Flagella

There are three types of flagella as follow :

① Acronematic (whiplas اَبْرَاقِي) : The flagella are smooth without hairs or scales (اَبْرَاقِي)

② Pantonematic (اَبْرَاقِي) = The flagella are rough due to the presence of thin hairs along the axis of the flagellum

Lec. 2

Plant Groups

- (3) The flagella are covered with minute hairs ((there are varied of Pantonematic)) with presence scales. This kind of flagella are called as Prasionate.

Algal Plastids Type ((shape))

<u>Type of plastid</u>		<u>Example (Genus)</u>
1 - Cup shaped	e.g.	Chlamydomonas
2 - Spiral =	e.g.	Spirogyra
3 - Discoid =	e.g.	Euglena
4 - plated =		Ribbon
5 - Stellate =	e.g.	Zyghema
6 - Reticulate =	e.g.	Cladophora

Algal Reproduction:

(1) Vegetative Reproduction

« Filament fragmentation »

(2) Asexual Reproduction ((various spore types))

(a) Zoospores: A motile (flagellated) spore are found in algae and fungi

(b) Aplanospores: A non flagellated spore

(c) Autospores: The spores are similar to mother cells

(d) Hyphenospores → Hyphenospores are surrounded by thick wall

(e) Sporangium: A structure in which spore are produced unicellular in algae and multicellular in bryophytes ((بَرِيَّاتِيَّة)) and ferns ((عَرَائِيَّة))

(3) Sexual Reproduction :

The algae sexual reproduction are happened in three ways as :

(a) Reproduction by isogametes (called isogamy)

Isogamy → The fusion (2.بیس) of two equal-sized, flagellated gametes that are morphological alike
(مورفولوجیکال لایک)

(b) Reproduction by heterogametes (called heterogamy)

(c) Reproduction by ova (called oogamy)

Oogamy → Fusion (2.بیس) of gametes in which female gamete is larger, nonflagellated, and nonmotile and the male gamete (is smaller and either motile (flagellated) or non motile.

Algal Life Cycles :

The number growth sequence during life called life cycle.

There are two life cycles as:

(1) somatic, morphological which concentrate on life cycles whether vegetative (stages) are similar or not.

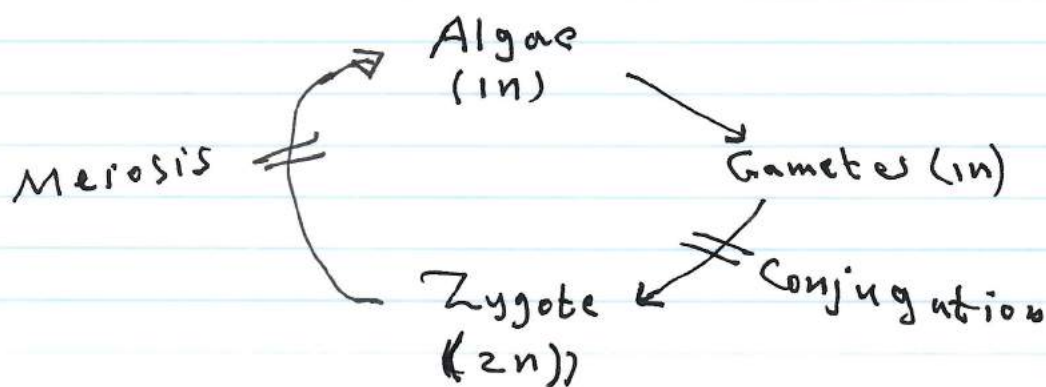
(2) cellularisid which concentrate on chromosomes number for each stage of life cycle.

Types of Life cycles in Algae;

- ① Haploid: It is simplest one which the vegetative stage has one set of chromosomes number - $(1n)$
- ② Diploid: In this type of life cycle of algae, the Zygote has two set of chromosomes number $(2n)$

There are three types of life cycles according to nuclear stages which are the following;

- ① Haplonts:
In this life cycle only the Zygote is $(2n)$ and meiosis usually happen.

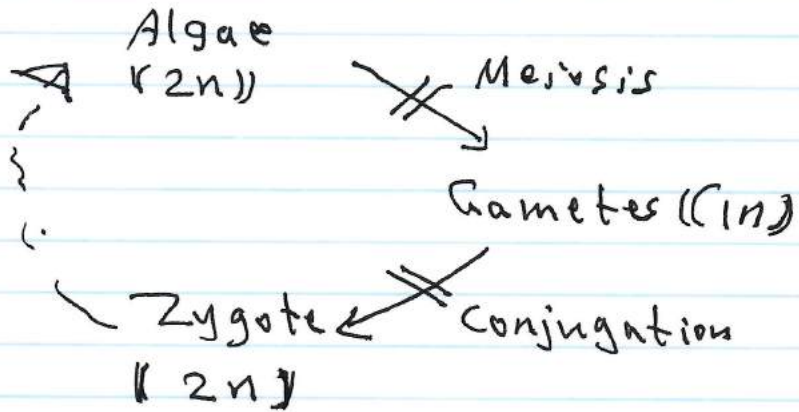


Haplonts → A life cycle in which the dominant structure is haploid gametophyte.

Plant Groups

② Diplonts :

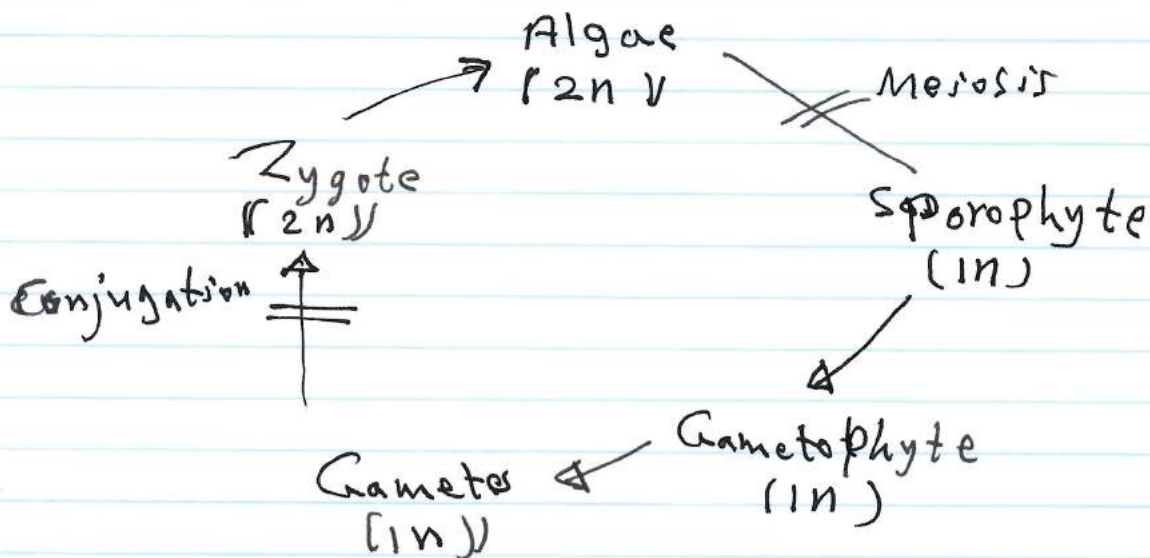
In this life cycle only the gametes ($1n$) chromosomes and meiosis usually happen during gametes formation



In this life cycle (Diplonts), the dominant stage is (2n) and gametes are (1n)

③ Diplohaplonts : or (called alternation of generate):

In this type life cycle, there is an alternation between (2n) chromosome stage and (1n) chromosome stage



Distribution of Algae :

Algal distribution can be classified as the following :

① Edaphic algae (pertaining to the soil)

It occur in soil

② Corticolous algae : It occur on tree stems .

③ Psychrophilic (cryophilic) algae :

It occur under snow environments

④ Thermophilic algae : It occur under hot environments

⑤ Neustonic algae : It occur on water surface (upper 1mm depth)

⑥ Benthic algae :

a - Those algae either live on rocks (called Epilithic algae)

b - It live on plants (called Epiphytic)

c - It live on animals bodies (called Epizoic algae)

d - It live in soil (called Epipellic algae)



Human Uses of Algae

[[Advantages of Algae]]

- ① uses as food, particularly in China and Japan
- ② uses as animals feeders (العلف الحيواني)
- ③ uses as soil conditioners
- ④ uses as soil fertilization as fertilizers
- ⑤ uses as energy sources in the production of methane (CH_4) under anaerobic digestive processes (anaerobic conditions)
- ⑥ uses as colloidal mucilaginous substances
- ⑦ uses as alginates in industrial and pharmacological purposes
- ⑧ Some algae groups (divisions) (for example Red and Brown algae) use a source of agar, carragennin and algin.

Objective Type Questions

Lec. 2

Q₁: Answer the following:

- ① Algae have three photosynthetic pigments as 1 - 2 - 3 -
- ② Main factors affected the chlorophyll quantity are 1 - 2 - 3 - 4 - 5 -
- ③ Algal chlorophylls type are 1 - 2 - 3 - 4 - 5 -
- ④ Algal carotenoids are 1 - 2 - 3 - 4 -
- ⑤ Algal biliproteins are 1 - 2 - 3 -
- ⑥ Algal Food storages are 1 - 2 - 3 - 4 - 5 -

Q₂: Define the following:

peridinin, Floridean, acronematic, haplonts, Isogamy. - - - -

Q₃: Put the word True or False:

- ① Acronematic flagellae are smooth with hairs
- ② Major cell wall of cyanophyta is Peptidoglycan.
- ③ Cup shaped is algal plastide type in algae
- ④ Filament Fragmentation in algae is vegetative reproduction
- ⑤ Zoospores are nonmotile spores
- ⑥ Corticolous algae are occurred on trees stem,

Plant Groups

Q4: Fill the following blanks:

- ① Smooth _____ without hairs are called as _____
- ② _____ are occurred under snow conditions.
- ③ _____ is type of algae life cycle.
- ④ - Algae spores are considered as _____ reproduction
- ⑤ - _____ is algal plastid type
- ⑥ - Leutin is kind of algal _____

Q5: Choose the correct answers

- ① Thermophilic algae occur under (condition) as
 a) wet b) humid c) cold d) hot
- ② Algae distributed on trees stems
 → are,
 a) psychrophilic b) thermophilic
 c) edaphic d) corticolons -
- ③ - Algae groups used as agar source are,
 a) blue green b) chlorophyta
 c) red d) brown and red.
- ④ - Algae foridean is,
 a) protein b) sugar c) starch d) fucosan

Plant Groups

- 5) Acronnetric flagella are smooth without,
- a) whiplash b) scales c) rough d) none of them
- 6) Algal carotenoids are consisted of,
- a) β carotens b) xanthophylls
 c) carotens + xanthophylls d) all of them

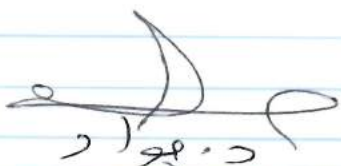
Q6 =

Homework - 2
 Lec-2

Select the correct answer of column-1 from column-2.

- Column-1
- 1 - Carotenoids
 - 2 - Chlorophyll a
 - 3 - Algal photosynthetic pigment
 - 4 - Biliproteins
 - 5 - Floridean
 - 6 - Allophycocyanin
 - 7 - Lectin
 - 8 - Cyanophyta
 - 9 - Discoid shaped
 - 10 - Heterogamy
 - 11 - Haplonts
 - 12 - Algal asexual reproduction

- column-2
- a - Algal plastids
 - b - Type life cycle
 - c - Fusion of two non equal s-z gametes
 - d - Zoospores
 - e - Fat-soluble
 - f - conjugated proteins
 - g - Glycogen like
 - h - biliproteins
 - i - Carotenoids
 - j - blue green algae
 - k - Cyanophyta
 - l - biliproteins
 - m - Edaphic
 - n - soil conditioners
 - o - Carrageenin
 - p - cup shaped
 - q - chl-b
 - r - phaeophyta



20/20/21

2021/11/13

قسم علوم الحياة
Bio. Sci. Dept.

المرحلة الثانية
Second Stage

الفضل الدراسي الأول
للعام

2022 / 2021

المجموع النباتية

Plant Groups

Lec/3

المحاضرة: 3

آ. المادة: د. جواد

Lec. 3 / Plant Group

المحاضرة الثالثة كوي :

- * تصنيف بطالك (بدائية، حقيقيّة، لنواة)
- * التصنيف العالمي ICBN
- * الطائفة الخضراء المزرقّة Cyanophyta (Division)

صنف (صف) Cyanophyceae (class)

* خصائص الطائفة الخضراء المزرقّة - توابعها - تعاقب

الذكائي مع المائتات الأخرى -

* المصداني يرس - تركيب الجدار الخلوي - صبغات

الكلوروفيل - الغذاء المخزون



Lec. 3

Plant Groups

Table 1. Classification of Prokaryotes and Protists

Informal Group Name	Basis of Grouping	Kingdom	Division Example	Class Example	Genus Example
Bacteria	Prokaryotes	Monera	i-Bacteria	Several classes Mycoplasmata	Nitrosomonas Rhizobium ---
Blue green algae (Cyanobacteria)	=	=	Cyanophyta	Cyanophyceae	Nostoc Anabaena
Algae	Eukaryotes	Protista	9 Divisions	Chlorophyta etc	---

ICBN

As stipulated (بموجب) by International Code of Botanical Nomenclature (ICBN), scientific names of plant groups (Plants) are given in Latin.

The various taxonomic groups (تصنيفات) are ranked in hierarchical sequence (ترتيب) with the rank of the species occupying the basal position (بأسفل الترتيب / القاعدة الهرمية).

Taxa	Suffix	Example
1- Kingdom	-a, ae	Monera, plantae
2- Division (Phylum)	-phyta	Cyano phyta
3- Class	-phyceae	Cyanophyceae
4- Order	-ales	Nostocales
5- Family	-aceae	Nostocaceae
6- Genus	-	Nostoc
7- Species	-	

Plant Groups

Blue Green Algae
Cyanobacteria

Division : Cyanophyta
Cyanophyta division includes a single class

class : Cyanophyceae (contains 8 orders))

Table 2. Orders Name of class ((Cyanophyceae))

Order Name	Family Name	Genus Name
1- <u>Nostocales</u>	<u>Nostocaceae</u>	Nostoc, Anabaena
2- <u>Chroococcales</u>	<u>Chroococcaceae</u>	Chroococcus
3- <u>Oscillatoriales</u>	<u>Oscillatoriaceae</u>	Oscillatoria
4- <u>Rivulariales</u>	<u>Rivulariaceae</u>	Rivularia
5- <u>Stigonematales</u>	<u>Stigonemataceae</u>	Fischerella

Also this class of cyanophyceae consisted of other orders such as :

Synechococcales, Chamaesiphonales, pleurocapsales

The blue green algae (Cyanophyta) have main features (criteria) by which they are characterized as

- ① Their cellular architecture is prokaryotic
- ② Flagella are completely absent

Plant Groups

- ③ Locomotion by gliding movement
- ④ Their photosynthetic pigments including : Chl. a, biliproteins, and carotenoids (myxoxanthin, -----)
- ⑤ Storage products includes the proteinaceous materials "Cyanophycin"

Also blue green algae have other Criteria as :

- * Their nuclei are not bounded by a nuclear double membrane
- * Their cell walls are containing : muramic acid, diaminopimelic acid, and Peptidoglycan
- * Don't have manifest (obvious) mitosis, meiosis.

Blue Green Algae Occurrence :

Blue green algae are found in :

- ①- Fresh water ②- marines ③- brackish waters
- Also found at
- ① snow (ice) ② bark ③ soil ④ rock surfaces
- ⑤ hot water springs ⑥ water ways
- ⑦ Water tanks

Cyanophyceae class has an ability to coexist in symbiotic association with Fungi, Gymnosperms (cycads), and Angiosperms plants.

Lec. 3

Plant Groups

Table 3: Nitrogen - Fixing Symbiotic Blue Green Algae

Eukaryotic Group	Eukaryotic Partner	Blue-Green Algae Partner
Fungi	8% of lichen ^{***} association , mostly Ascomycetes	Nostoc ✓
Algae	<u>Rhizosolenia spp</u> (Marine Diatoms)	Rhizelia
Psaridophyta	Azolla	Anabaena ✓
Gymnosperms	Cycas, cycads, and others	Nostoc
Angiosperms	Gunnera	Nostoc

*** A Lichen is a symbiotic association of a fungus with a photosynthetic prokaryote functioning as a composite organism.

Blue - Green Algae Morphological Structure.

The blue green algae are either

- (1) Coccoid
- (2) Filamentous

The coccoid species can occur as a single cell covered by a mucilaginous envelop (sheath) or as colonies of large masses of single cells within a mucilaginous envelope.

In filamentous species cells are arranged in rows (see). A row of cells without a sheath is called a trichome (Fig-1)

Plant GroupsBlue-Green Algal Cell wall:

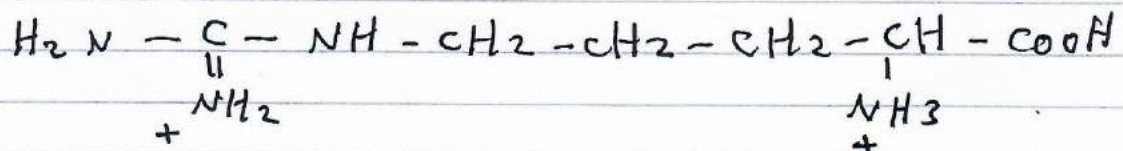
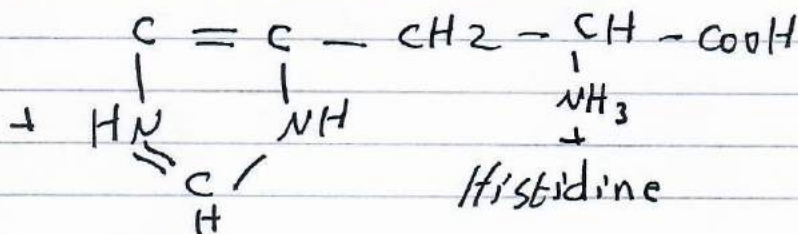
The cell wall of cyanophyceae class typically consisted of four layers surrounded by a slime layer

The cell wall is composed by peptidoglycan polymer, and contains muramic and diaminopimelic acids

Note:

Blue green algal DNA (Deoxyribonucleic acid) is not with histones*

* Histone: A protein found in chromosomes which on hydrolysis yields a basic amino acids (example Histidine and others) (eg. Arginine)



Arginine

Thallus structure in the blue green algae is presented in Fig.1 in next page.

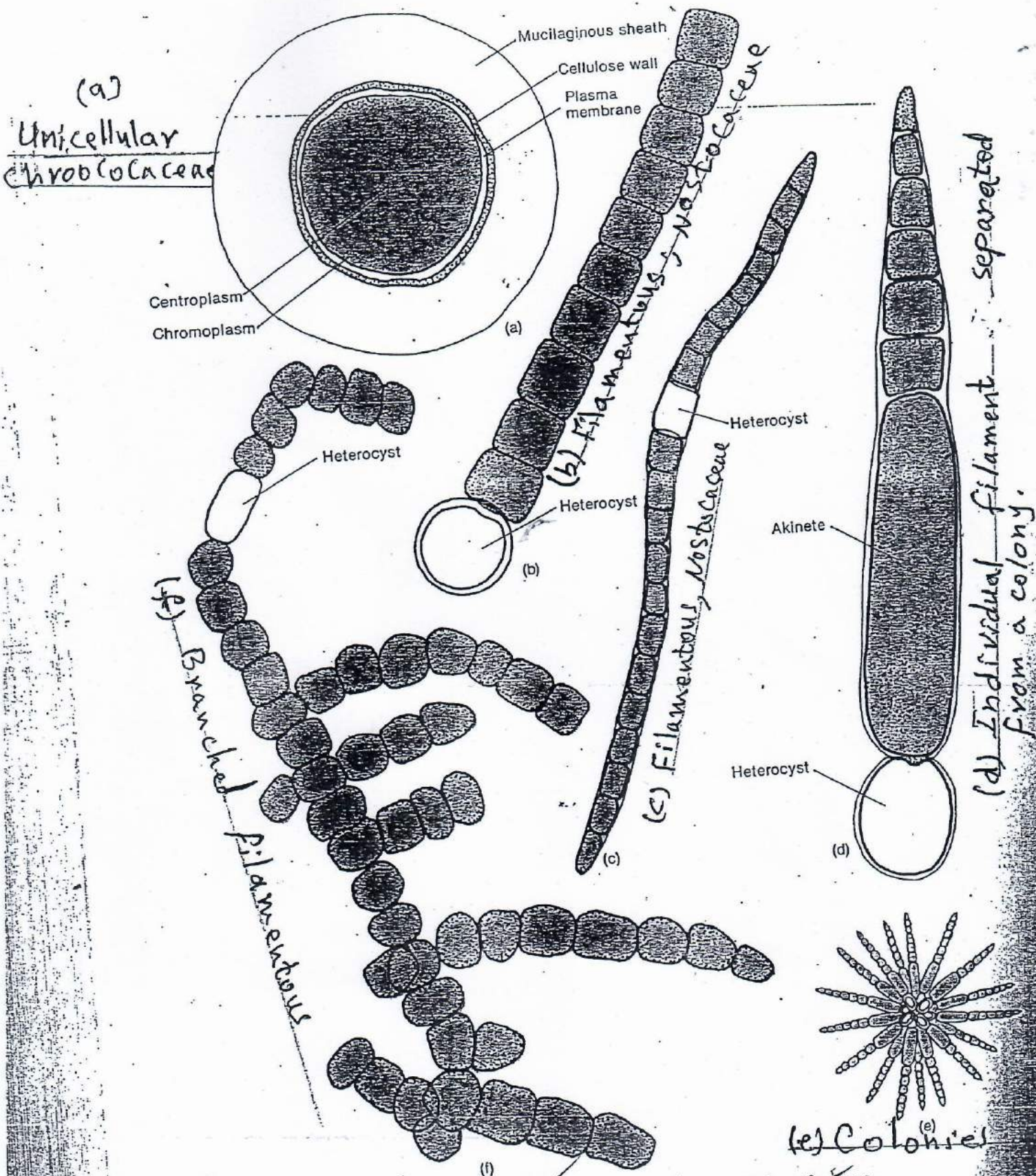


FIGURE Thallus structure in the blue-green algae. (a) Unicellular; Chroococcaeae, *Synechococcus*. (b) Filamentous; Nostocaceae, *Cylandrospermum*. (c) Filamentous; Nostocaceae, *Arabaena*. (d) Individual filament separated from a colony; Rivulariaceae, *Gloeotrichia*. (e) Colonial; Rivulariaceae, *Gloeotrichia*. (f) Branched filamentous; Stigonemaceae, *Fischeriella*.

lec.3

Accessory pigments of photosynthesis:

- ① chl. a ② - phycobili proteins
- ③ Phycoerythrins ④ - Phyco Cyanins
- ⑤ Allophycoyanins ⑥ Myxocyanin

Phycoerythrin which imparts a red color is presented in most but not in all blue green algae.

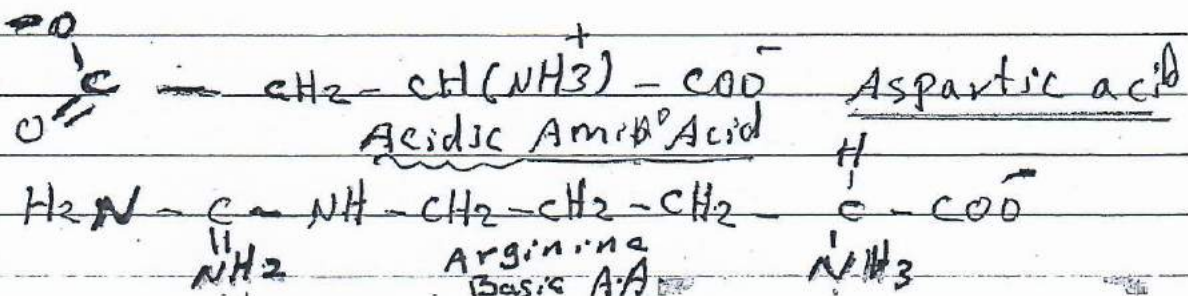
Storage products in Blue-Green Algae:

* A number of different storage granules are present within class Cyanophyceae cells.

* A polysaccharides similar to glycogen (occurs in Animalia Kingdom)

* Cyanophycin granules, which are storage proteins consisting of only two amino acids:

Aspartic, and arginine acids
a 1:1 ratio



Heterocyst: A highly differentiated cell in some filament blue-green algae that is a site of nitrogen fixation.

Division: A taxonomic subgroup of a Kingdom that is further divided into classes. Equivalent to the phylum of Zoologist.

meiosis: A specialized form of nuclear division that results in the production of four haploid gametes.

Nitrogen fixation:

The metabolic assimilation and conversion into ammonia of atmospheric nitrogen by blue green algae and soil microorganisms (either free-living or in association with host plant roots), making N available as usable nutrient to other organisms.

Genus (s) → Genera (P)

A taxonomic subgroup of a family that is further subdivided into species.

Species (s, p)

A taxonomic subgroup of a genus

Objective Type Questions

Q₁: Define the following: Lichens, Histone, Nostoc, Chroococcales, Binomial Nomenclature.

Q₂: A) Algal divisions followed Protista are 1-2-3-4-5-6-

B) All the plants can be classified into 1-2-

C) The phanerogams plants are divided as 1-2-

D) What are criteria of Cyanobacteria 1-2-3-4-5-

E) Enumerate the cyanophyta orders 1-2-3-4-

Q₃: Put the word True or False of the following sentences:

1) Bacteria is followed protista kingdom

2) Cyanophyceae class is belonged to cyanophyta.

3) Binomial Nomenclatures consisted Genus and species.

4) The suffix ales point out to the family according to ICBN.

5) Cyanophyceae have an ability to coexist in nonsymbiotic association with fungi or pteridophytes (Azolla).

Plant Groups

Q4: Select the correct answer:

① Anabaena is belonged to the order,
 a) Oscillatoriales b) Cyanophyceae c) Nostocales
 d) Nostocaceae.

② ^aCynophytia is,
 a) Eukaryotes b) prokaryotes c) both a and b
 d) None of them

③ Cyanobacteria cells walls are containing
 a) - muramic acid b) - malic acid
 c) molybdic acid d) - malvic acid

④ Pteridophytes as Azolla is symbiotic association with,
 a) Rhizobium b) Nostoc c) none of them
 d) ~~Chlorella~~
 Chlorella.

⑤ Aspartic acid is,
 a) fatty acid b) inorganic acid
 c) acidic amino acid d) basic amino acids

⑥ Bacteria and blue green algae are followed by,
 a) protista b) plantae c) fungi
 d) Monera (Kingdom)

⑦ Reproduction of the blue green algae is primarily,
 a) vegetative b) sexual c) asexual
 d) all of them (Lecture 4)

Q5: Fill the following blanks:

- ① Suffix _____ is considered as algae (or plants) division
- ② _____ suffix is pointed to order name of algae (plants)
- ③ Blue green algae is belonged to _____ kingdom
- ④ Mostur is followed to _____ family
- ⑤ Cyanophyta is _____ organisms
- ⑥ Cyanophyceae class has an ability to coexist with _____.
- ⑦ Human uses algae as source of energy by production of _____ gas.
- ⑧ Anabaena genus is belonged to _____ class
- ⑨ Carlous Linnaeus ^{was} introduced _____.
- ⑩ Heterocysts of blue green algae have _____ enzymes.

Plant GroupsHomework-3

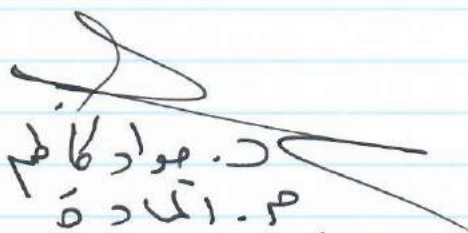
Q6: Select the correct items in
column-1 from column-2

Column-1

- 1- Cyanophycin
- 2- Blue green algae
cells walls are containing
- 3- Chl. a
- 4- Gliding movement
- 5- Lichen example
- 6- Cyanophyta followed
- 7- acceae
- 8- Rivulariales
- 9- Histone
- 10- Histidine
- 11- Heterocyst
- 12- Genus subgroup

Column-2

- a - species
- b - amino acid
- c - found in chromosomes
- d - N fixation
- e - Cyanophyceae
- f - monera
- g - Family
- h - Azolla - Genera
- i - Locomotion
- j - cyanophyta
- k - alginic acid
- l - chlorophyta
- m - species
- n - proteinaceous
- o - Anabaena - azolla
- p - genera
- q - protists
- r - order
- s - muramic acid



2021/11/3

2021 / 11 / 10

قسم علوم الحياة
المرحلة الثانية

الفصل الدراسي الأول

العام

2021 / 2022

الجامع الباسية

Plant Groups

المادة 4

أ. المادة : د. جواد

تتمثل المماثلة 4 التالي

- 1- تقاثر الطحالب الخضراء المزرقة
- 2- تثبيت النيتروجين الجوي في الكويصلات
- 3- انزيم *Nitrogenase* / فعالية تركيبه كيميائي
- 4- أهمية التعايش بين طحلب *Anabaena* و *Azolla*
- 5- فوطا تثبت النيتروجين الجوي
- 6- الشابه بين الطحالب الخضراء المزرقة والبكتريا
- 7- الاختلاف بين الطحالب الخضراء المزرقة والبكتريا
- 8- صنف *Cyanophyceae* : جنس *Nostoc*
- 9- انتشار وتواجدهم والبناء الريكيين والسمائي للطحالب الخضراء
لجنس *Nostoc* (كثمتان للطحالب الخضراء المزرقة //)
- 10- *Home work*

Plant Groups

Blue Green Algae Reproduction :

Reproduction of blue green algae is primarily asexual

① Fragmentation of trichome into small units results in segments, known as Hormogonia

Note: Hormogonia are motile and divide by simple fission to regenerate new filaments

② A vegetative cell functions as a resting spore, the akinetes (as in Nostocaceae and Rivulariaceae families)

An akinete can germinate into a new filament when conditions are favorable.

③ In some blue green algae, the protoplast may divide to form one or more endospore(s). Those endospores will germinate from the mother cells.

④ Some of blue green algae can produce bud off : exospores - Both endospores and exospores can germinate to produce new filament.

In recent years the possible existence of genetic recombination, similar to that observe in bacteria, has come to light. Genetic recombination has been reported in Anabaena and others genera, but the mechanism remain unknown.

Plant Groups

- ⑤ Nanocyte. The spores produce after the mother cells enlarged in sizes.

Type of Branching in Blue green Algae:

They are two types:

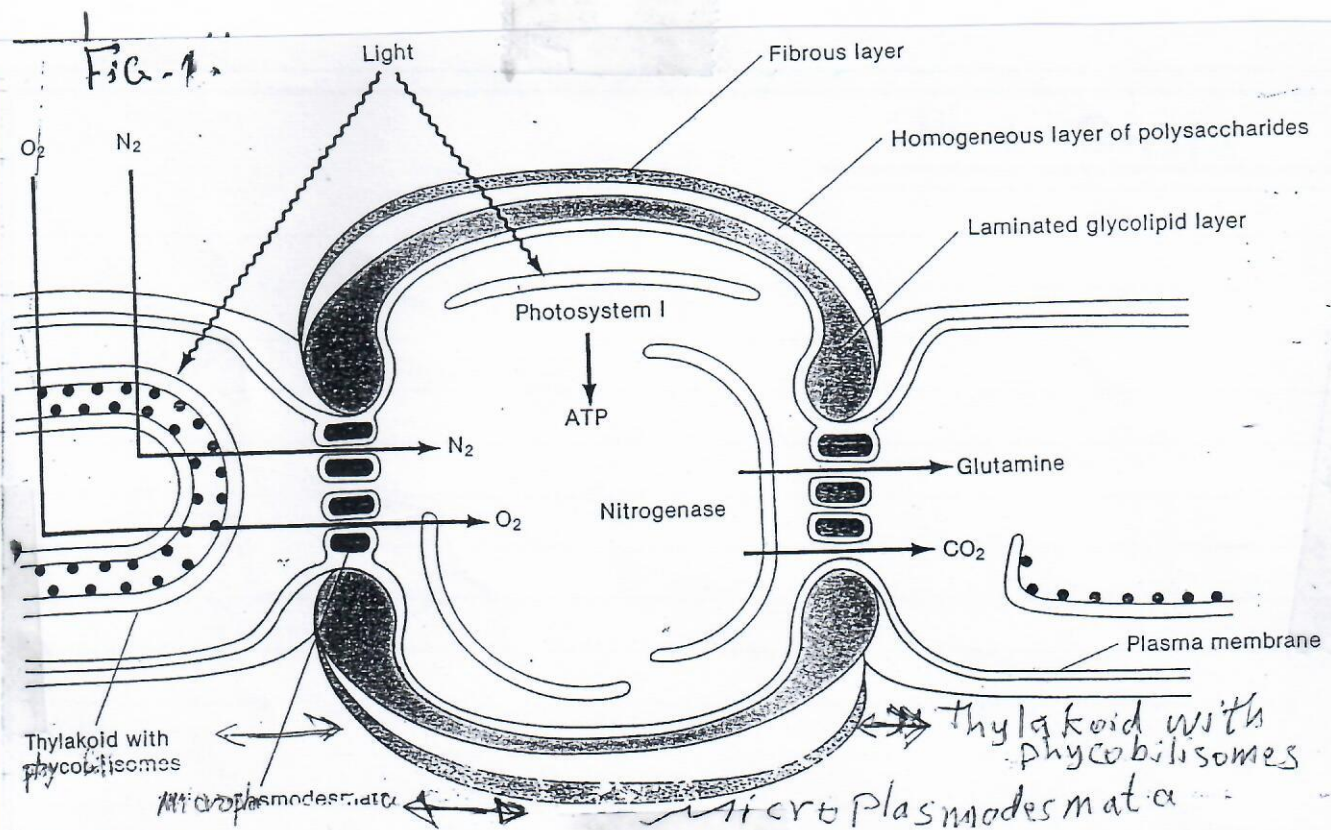
- ① True branching: In this type, the trichome (a row of cells without a mucilaginous sheath) branched and mucilaginous sheath surrounding them
- ② False branching: In this type, the trichome is not branched

Nitrogen Fixation and Heterocysts in Blue-Green Algae

About 125 species of blue green algae (also in some bacteria) can fix nitrogen gas (N_2) ($N \equiv N$) into usable forms. Nitrogen fixing by blue green algae are predominantly filamentous forms that posse

heterocysts (تكاثر) Fig-1

Fig-1. Illustrate the structure and function of heterocysts.



The heterocysts are highly specialized in structure and function

Nitrogenase is a key enzyme complex in nitrogen fixation process. ^{sensitive}

Nitrogenase enzyme is extremely sensitive to the oxygen (O₂). A thick wall of the heterocyst consisting of three layers which prevent diffusion process of atmospheric oxygen into the heterocyst.

Nitrogenase Enzyme

It is composed by two proteins, one of the two contains molybdenum element (Mo) in the molecule and has molecular weight (M-w) of about 200,000. The second protein hasn't molybdenum (Mo) and its molecular weight (M-w) of 60,000.

Lec. 4

Plant Groups

Both proteins of Nitrogenase contain iron (Fe).

In addition to the proteins, Nitrogenase activity, requires adenosine triphosphate (ATP) as a source of energy.

Photosystem I supplies the energy that need it for Nitrogen Fixation

Gaseous N is fixed (reduced) to ammonia (NH₃) or ammonium (NH₄⁺), ammonia converted into amino acids (Glutamine) and transported out of the heterocyst.

Beside N fixation by free living blue green algae a number of symbiotic association are known between blue green algae and other organisms.

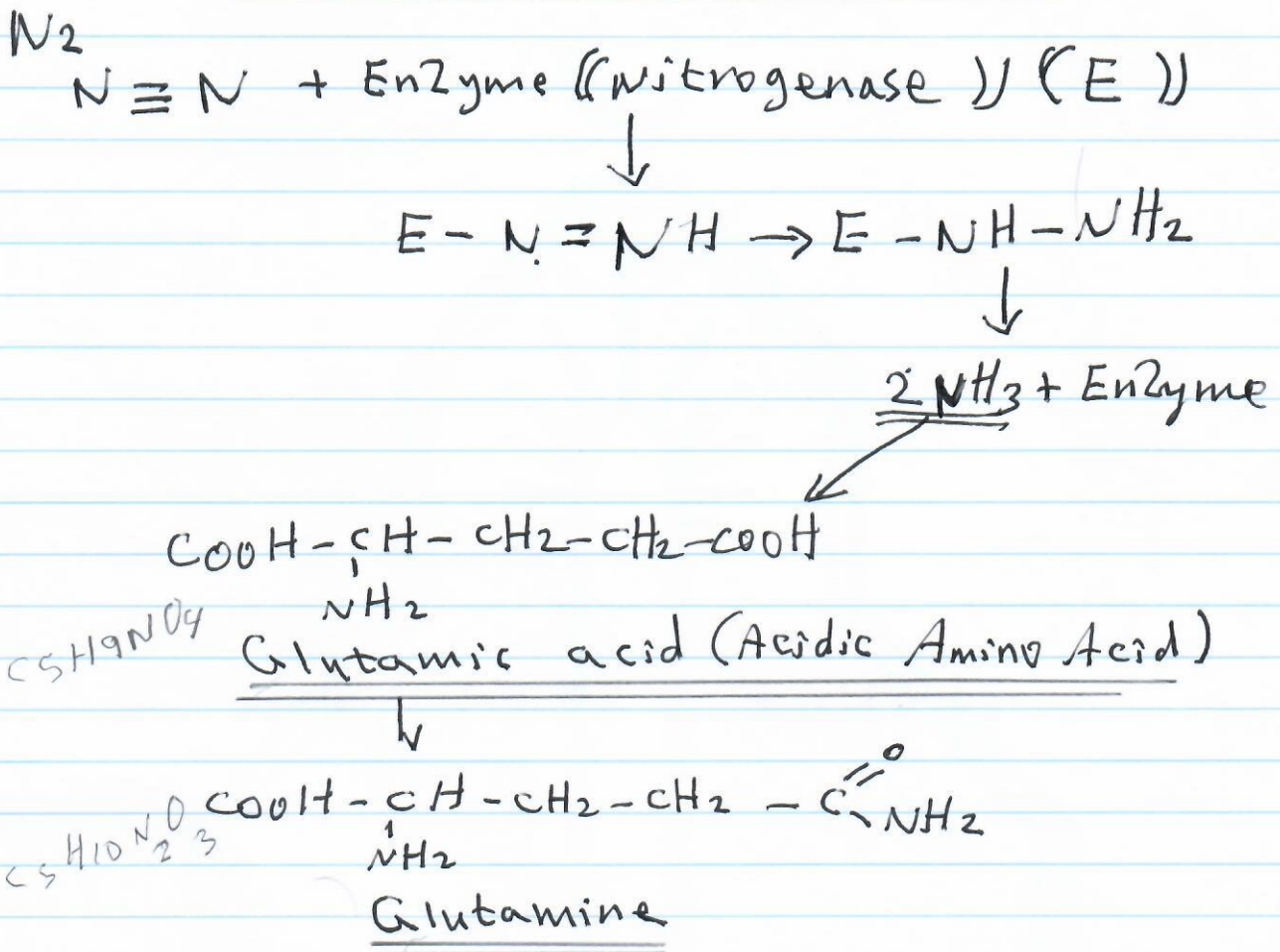
One of those, the Azolla-Anabaena complex, has great potential for enrich in agricultural lands with nitrogen especially in rice paddies. The farmers in Vietnam and China have utilized, this symbiotic complex for centuries to fertilize their rice fields (irrigation).

The relationship between the small floating water Fern Azolla (pteridophyta) and the blue green algae (Anabaena) can be used as a source of N

Plant Groups

fertilizer for temperate region.

N₂ Fixation Scheme



Genera of Blue-Green Algae N Fixers :

- * Anabaena
- * Nostoc
- * Fischerella
- * Stigonema
- * Calothrix
- * Oscillatoria

and others genera.

The Similarity Between Cyanophyta (Cyanobacteria) and Bacteria

1. They prokaryotic organisms
2. They have not sexual reproduction
3. Both of them are sensitive to antibiotics
4. Both of them are able to biosynthetic of ornithine
5. They have DNA (Deoxyribonucleic acid) without histone protein
6. Both of them as classes in Monera Kingdom
7. Their cell walls are a peptidoglycan polymer and containing muramic and diaminopimelic acids
8. Many strains of blue green algae and some bacteria can fix N gaseous into useable (usable) N forms
9. All blue green algae and few bacteria genera can fix CO_2 by photosynthetic process

The Difference Between Cyanobacteria and Bacteria

1. Cyanobacteria have not flagella
2. Cyanobacteria filaments are possibly branched but the bacteria are not.
3. Cyanobacteria are able to fix CO_2 (Photosynthesis)
4. Cyanobacteria have chlorophyll a

5 - Cyanobacteria could live with fungi and produce lichen in the environment.

Many other differences between them

Division : NOSTOC
Cyanophyta

Class : Cyanophyceae (Myxophyceae)

Order : Nostocales

Family : Nostocaceae

Genus : Nostoc

Nostoc Occurrence :

* Nostoc is a filamentous found in fresh water as well as in an terrestrial habitats.

* Some Nostoc species are present in moist soils, and on tree barks.

* Some Nostoc species associate with fungi to form lichens

Thallus Structure

* Nostoc filaments are unbranched

* Each filament consists of a row rounded cells or oval cells

* Nostoc cells have heterocysts

* Nostoc cells have not nucleus and chloroplasts.

Nostoc Reproduction:

Nostoc reproduction can be divided in

- 1- Fragmentation
- 2- Hormogonia
Hormogonia انقسام تكاثر
Endospores of
3. Akinetes (or arthrospores)
(Resting spores)
- 4- Heterocysts → Occasionally the heterocyst of nostoc function as reproductive organs.

Universal Questions

Lec. 3 & Lec. 4

Q₁ : put the word True or False

- ① - Phyta suffix is pointed out order rank
- ② - Phycene suffix is pointed out class rank
- ③ - Blue green algae is followed protista
- ④ - Blue green algae have flagella
- ⑤ - Cyanophyta locomotion are done by gliding movement
- ⑥ - Azolla - Anabaena complex is produced useful for improving corn.
- ⑦ - Nostoc species associate with fungi to form Anabaena

Universal Questions

Q₂: Select the correct answer

- ① - Acene suffix is indicated a,
a - species b - division c - Family d - order
- ② - Division a taxonomic subgroup of a,
a - class b - Kingdom c - order d - family
- ③ - Nostoc genus is belonged the order
as
a - Nostocaceae b - Chroococcaceae
c - Rivulariales d - Nostocales
- ④ - Class a taxonomic subgroup of a,
a - division b - Kingdom c - family
d - order

Q₃: Define in detailed the following:
Nitrogenase, Cyanophycin,
biliprotein, histone, Azolla, Akinete

Q₄: ① Cyanophyceae is consisted of the
following orders 1 - 2 - 3 - 4 -

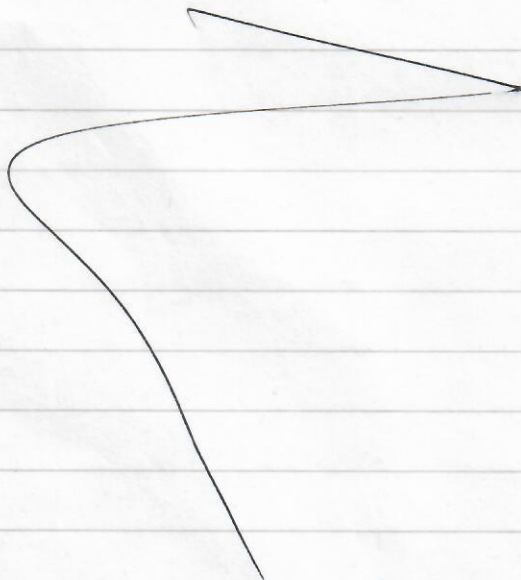
② ICBN is recommended the following
ranks as 1 - 2 - 3 - 4 - 5 - 6 -

③ Blue green algae are occurred in
1 - 2 - 3 - 4 - 5 -

④ Genera of blue green algae
Can fix N are 1 - 2 - 3 - 4 -

Q5: Answer the following questions:

- ① What are the main ~~resemblances~~ similarities between cyanobacteria and bacteria? (five only)
- ② What are the basic differences between blue green algae and bacteria (six only)
- ③ Write the scheme of nitrogen (N) fixation by blue green algae



Homework - 4

Q.6: Select the correct items for column-1 from column-2.

Column-1

- 1 - Akinetes
- 2 - Nostoc follows order
- 3 - Cyanobacteria and bacteria can fix
- 4 - Both of blue green algae and bacteria are
- 5 - Cyanobacteria haven't
- 6 - cyanophyta reproduction primarily
- 7 - Type branching of blue-green algae
- 8 - Blue green algae can fix
- 9 - Heterocysts having
- 10 - Cyanophyta reproduction by
- 11 - Nitrogenase required
- 12 - Nitrogenase composed by
- 13 - Nitrogenase is responsible for
- 14 - Glutamic acid
- 15 - Blue green algae genus

Column-2

- a - prokaryotes
- b - N gas
- c - true branching
- d - Chlorella
- f - CO₂
- g - three proteins
- h - Inorganic acid produced by N fixation
- i - asexual
- j - ~~Phosphatase~~
- k - Flagella
- l - Nitrogenase
- m - non-motile resting spores
- n - ATP
- o - Anabaena
- p - Ne gas
- q - two proteins
- r - N fixation
- s - amino acid produced by N fixation
- t - Nostocales
- u - Nostocaceae
- v - CO₂
- x - filament fragmentation

2021/11/10

2021/11/17

مسم علم ليابه
المرحلة الثانيه

الفصل الرئيسي الدرل
للعام

2021 / 2022

الجامع الثانيه

Plant Groups

المهاجرة : 5

أ. المادة : د. جواد كافي

جامعة بني سويف / م / الثانية
حاضرة ك
سس

تشر المحاضرة

Protista مقدمة عن الطليعات
Photoautotrophs الطلياع الذاتية التغذية

Chlorophyta الطلياع الخضراء
الخصائص - الخصائص

البنات الحلوى للطلياع الخضراء
Chlorophyceae (صنف)
والرنة والتابع له

المطر الخارجي - الخصائص - الأهمية

Chlamydomonas خلاصة جينات الطلياع الخضراء

البنات الحلوى - التواجد والانتشار - التغذية
- الذكائر وأنواعها

The Protista

The protista include an immense assortment of living things that vary in their

- * body form
- * life style
- * nutrition
- * locomotion, and
- * reproduction

Protista have more than fifteen divisions which consist of

- * algae (photoautotrophic)
- * Protozoans
- * Slime Fungi (heterotrophic)
- * and parasites.

Photoautotrophs

Photoautotrophs have many algae divisions (about nine divisions) that contain the following:

- 1- Chlorophyta
- 2- Rhodophyta
- 3- Phaeophyta
- 4- Prorhophyta (Dinophyta)
- 5- Xanthophyta
- 6- Cryptophyta
- 7- Chrysochyta
- 8- Euglenophyta
- 9- Charophyta -

Plant GroupsChlorophyta

|| Green algae ||

Nearly 10,000 species of green algae have been described. The green algae constitute an assemblage of diverse forms, from wall-less unicells to colonies, branched forms, and macroscopic multicellular or coenocytic species. All green algae, except about a hundred species possess chlorophylls.

Chlorophylls a and b and other pigments found in green algae are similar to those found in Plantae (Plant Kingdom).

However green algae are not always green, some possess pigments that give them an orange, red or rust color.

Plant Groups

Most of the green algae are photoautotrophs, meanwhile few of them are parasites.

The majority of green algae are unicellular, however, filamentous and colonial forms also exist. Some multicellular green algae are seaweeds that resemble lettuce leaves.

Green algae cell organelles

The green algae cells are containing familiar organelles

such as:

- * Plastids
- * Mitochondria
- * Golgi bodies
- * Endoplasmic reticulum
- * Ribosomes.

Each green algae cell has
the following structure :

① cell wall :

Cell wall of green algae is composed of cellulose, meanwhile, certain species of them have pectic (pectin) acid sheath around cell wall

② protoplasts :

Green algae consist mucilaginous cytoplasm and centrally located nucleus, and it contain the following :

(a) - cytoplasm (b) - nucleus

③ chloroplast

Cup shaped with a single pyrenoid

④ contractile vacuoles

Plant Groups

Division: Chlorophyta
 (Green algae)

Class: Chlorophyceae

This class (Chlorophyceae) comprising nine orders.

Table: Order, Family and Genus of Chlorophyceae

Order	Family Example	Genus Example
Volvocales	Chlamydomonadae	Chlamydomonas
Chlorococcales	EX. Chlorococcaceae	Chlorella
Ulotrichales	Ulotrichaceae	Ulothrix
Ulvales	Ulvaceae	Ulva

Other orders: Oedogoniales, Cladophorales
 Chaetophorales, Zygnematales
 Siphonales

Morphological Forms:

① Unicellular
 a - motile e.g. Chlamydomonas
 b - non motile 1 - Zoospores Production
 2 - Non Zoospore Production (Chlorella)

② Colonial
 a - motile e.g. Volvox
 b - non motile 1 - Zoospores Production
 2 - Non Zoospore Production

Plant Groups③ Filamentous

a - Zoosporic producers

① Unbranched eg. Ulothrix

② Branched eg. Cladophora

b - Nonzoosporic production

e.g. Spirogyra

④ Membranous e.g. UlvaGeneral Criteria of Green Algae:

① Contain chl. a and b.

② Contain other pigments (Carotenes, Xanthophylls)

③ Starch as storage food product.

④ Have 2 to 4 acronematic flagella
except genus: Spirogyra⑤ Cells wall have polysaccharide and
Fat (polysaccharid eg. cellulose)

⑥ could be harmful to human

⑦ Their flagella are smooth (simple whiplash)

Green Algae Harmful① Block water filters through water
purification ② Have it sort (kind)
of toxins (e.g. Chlorellin)The Important Role of Green Algae

① Major part of food for animals

② Major food for human especially in
southeast of Asia (e.g. Ulva)

③ could be used as water purification

④ Release O₂ (oxygen) gas and get rid off
CO₂ ⑤ Increase soil fertility⑥ Precipitate salts as Ca²⁺ salts on sea rocks

Division : Chlorophyceae, Order, Family,
Genus, example

Order
Family

Volvocales
Chlamydomonadaceae

Genus

Chlamydomonas
(Gr. Chlamydo → cloak ; Monas → single)

Chlamydomonas Genus has about

500 species :

Thallus structure of Chlamydomonas

- * Unicellular, biflagellate
- * Spherical, ellipsoidal shape

Chlamydomonas occurrence :

It found generally in

- * waters of ponds,
- * pool ditches
- * moist soils
- * abundance in water rich in ammonium ions (NH_4^+)

Chlamydomonas Nutrition:

- ① It is able to synthesize organic food through photosynthesis.
- ② It is autotrophic organisms.
- ③ Most of their species can also obtain some organic compounds and are hence mixotrophic.

Chlamydomonas Reproduction:

① Asexual reproduction:

It takes place by the following methods:

(a) Zoospores:

This method of reproduction occurs during favourable conditions in the growing season.

(b) Aplanospores and hypnospores

Both are nonmotile spores.

Aplanospores are thin-walled, meanwhile hypnospores are more thick-walled.

(c) Palmella stage

Under unfavourable conditions, the daughter cells formed due to several divisions.

Sexual reproduction:

The sexual reproduction is variable and ranges from:

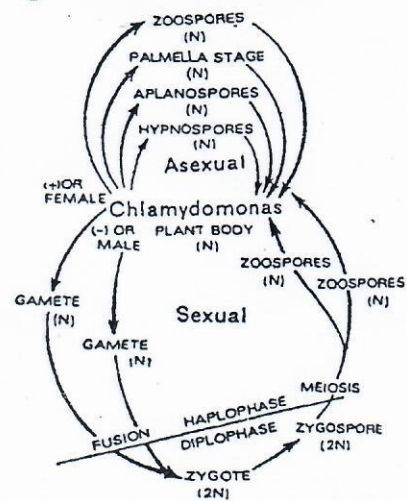
Isogamy to anisogamy and Oogamy.

At the time of sexual reproduction the protoplast of a cell divides into 16, 32 or 64 biflagellate gametes.

Germination of Zygote:

The zygote secretes a thick stellate wall and can tide over the period of drought. Before germination the diploid nucleus undergoes a meiotic division forming four haploid daughter protoplasts, which are liberated when the zygote wall ruptures, and start leading their independent life.

Chlamydomonas life cycle is show in the following figure.



Chlamydomonas. Graphic life cycle.

Objective Type Questions

- Q₁: Put the word True or False: all
- * Autotrophs are as plants, algae and bacteria
 - * Heterotrophs are as animals, and most bacteria
 - * Saprotrophs are as fungi and algae
 - * Chlamydomonas genus is unicellular biciliate
 - * Chloroplast in green algae is cup shaped
 - * Chlamydomonas is able to synthesis organic compounds through respiration.
 - * Chlorophylls a and b and other pigments found in green algae.

Q₂: Answer the following:

- ① Algae photoautotrophs divisions are belonged to protista are 1-2-3-4-5-
- ② Protista are consisted of 1-2-3-4-
- ③ Green algae cells organelles are ~~consisted~~ 2-3-4-
- ④ Chlorophyceae class are consisted 1-2-3-4 orders
- ⑤ Morphological forms of chlorophyta 1-2-3-
- ⑥ Green algae harmful are 1-2-

Q₃: select the correct answer

- ① Chlorophyta have sort (kind) of toxins, a) ribosome b) flagella c) chlorellin d) none of them
- ② - which order name is belonged to chlorophyceae class,
a) ulva b) chlorallaceae c) chroococales
d) Volvocales

③ Chlorophyceae class have orders
a) 13 b) 9 c) 7 d) none of them

④ Cyanophyta division is belonged to,
a) monera b) protista c) plantae d) animalia

⑤ Protista photoautotrophs division is,
a - charophyta b) cyanophyta c) slime fungi
d) parasites -

Q4: ① Compare between Anabaena and Chlamydomonas (five only)

② What are the important roles of green algae (five only)

③ what are general criteria of green algae (five only)

Q5:

Define the following in brief.

* Volvocales

* Zoospores

* Isogamy

* anisogamy - -

Q6 Fill the following blanks:

1 - _____ of Chlamydomonas is asexual reproduction type.

2 - _____ is order followed Chlorophyceae

3. Chlamydomonas abundance in water is rich in _____ ions.

Homework - 5

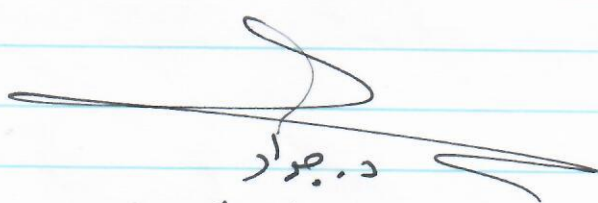
Q7: Select the correct answer for Column-a from column-b

Column - a

- 1 - Toxins
- 2 - Heterotrophs
- 3 - Cellulose
- 4 - Flagella
- 5 - Chlamydo
- 6 - Monas
- 7 - chlorophyceae
- 8 - Zoospore
- 9 - Isogamy
- 10 - Ribosomes
- 11 - cup shaped
- 12 - Rhodophyta
- 13 - colonial
- 14 - Ulvales
- 15 - cyanophyta
- 16 - Ulothrichales
- 17 - hypnosporous

Column - b

- a - Polysaccharide
- b - Cocomotion
- c - chlorophyta
- d - Nutrition
- e - Simple saccharide
- f - chlorophyta
- g - Anabaena
- h - Lichens
- i - clock
- j - single
- k - morphological criteria
- l - Ulothrix
- m - Chlorella
- n - spirogyra
- o - Asexual reproduction
- p - Sexual reproduction
- q - Chlorophyllin
- r - alga
- s - Plasmids
- t - photoautotrophs
- u - unicellular
- v - Non motile spores
- w - Monera
- x - Peptin



2021/11/17

-c-

مجموعه النباتات

2021 / 11 / 24

الرحلة النباتية

الجزء الرئيسي من الأدلة
للوقت

2021 / 2020

المجموع النباتية

Plant Groups

المجموعة: 6



"Unicellular Green Algae"

Ex. Spirogyra

Spirogyra Classification:

Class: Chlorophyceae

Division: Chlorophyta

Order: Zygnematales

Family: Zygnemataceae

Occurrence: In freshwaters

Criteria:

- * unbranched filamentous algae
- * secretes mucilage materials
- * Individual cells are uninucleate.
- * possess one or more helically arranged ribbon shaped chloroplasts.
- * In chloroplasts distribute Pyrenoids (starch centers)

Spirogyra Reproduction:

- * Vegetative Rep. (Fragmentation of the filaments is the only means of asexual reproduction.)
- * Sexual Rep.

Multicellular Green Algae

Biologists have long suggested that plants are most closely related to the green algae. For example, both groups have a cell wall that contains:

cellulose, Chl. a and b (11.10.15), and store reserve food as starch.

united

Example Ulva

Ulva Classification:

Class: Chlorophyceae

order: Ulvales

Family: Ulvaceae

Ulva occurrence:

Found it in * ponds * ditches

* shallow puddles (فجوات العشب)

Criteria:

* Multicellular * called sea lettuce

(leafy appearance)

* Their thallus is thick

* Alternation of generation life cycle like that of plants, except that both generations look exactly alike and the gametes all look the same.

Ulva Reproduction:

1) An asexual colony includes both somatic (vegetative) cells, which do not reproduce, and large, non-motile Gonidia, which produce new colonies through repeated division.

2) Sexual reproduction

Two types of gametes are produced

Colonial Green Algae

Genus: Volvox

Volvox Classification

Class : Chlorophyceae

Order : Volvocales

Family : Volvocaceae

Volvox Reproduction:

Volvox species can be ~~x~~ monoecious or dioecious.

Male colonies release numerous sperm packets, while in female colonies single cells enlarge to become oogametes or eggs.

Volvox is facultatively sexual and can reproduce both sexually and asexually.

The switch from asexual to sexual reproduction dependent upon:

Environmental conditions

Production of a sex-inducing pheromone (sex hormone)

Volvox has specialized physiological cells:

- 1 - somatic cells (Locomotion, nutrition)
- 2 - Gonidia cells (Asexual Reproduction)
- 3 - Antheridia (spec. for yield male gametes)
- 4 - Oogonia (spec. for yield female gametes called ova)

Green algae genera (Pl. of genus) are divided according to their motility:

- ① Motile green algae Genera
- * Chlamydomonas ✓
 - * Eudorina ✓
 - * Pandorina ✓
 - * Gonium ✓
 - * Volvox ✓

- ② Non-motile green algae Genera
- * Cladophora ✓
 - * Ulothrix ✓
 - * Chlorella ✓
 - * Hydrodictyon ✓
 - * Scenedesmus ✓
 - * Pedrastrum ✓

Cladophora

Classification :

Class : Chlorophyceae
 Order : Cladophorales
 Family : Cladophoraceae

Occurrence :

* Fresh waters * Marines

* Note -

Cladophora need it high contents of nitrate ion ($\text{NO}_3\text{-N}$) and phosphate ion (as orthophosphate H_2PO_4^-) for promotion their growth.

Thallus Structure :

- ① Thallus attach to the substratum by means of branch separate filaments
- ② Each cell is multinucleate and many pyrenoids
- ③ Has chloroplast and vacuoles

- ④ Their cell has three layers of walls
Such as :
Outer → Chitinous layer
middle → pectic substance
Inner → Cellulose

Cladophora Reproduction -

- ① Vegetative Reproduction
a - Fragmentation b - stolons
c - tuber (storage cells)
- ② Asexual Reproduction =
a - Zoospores (swarm spores)
b - Resting cells (Akinetes)
- ③ Sexual Reproduction =
It is brought by gametes.

Note: Cladophora filaments are monoecious or well dioecious

Chrysophyta (Diatoms and Golden Algae)

Charysophyta division has the following
Classes:

- ① - Bacillariophyceae (Diatoms)
- ② - Chrysophyceae (Golden-Brown algae)

Class: Bacillariophyceae

orders:

Pennales, Centrales

Diatoms Criteria:

① The cell wall is saturated with silica ($\text{SiO}_2 \cdot n\text{H}_2\text{O}$).

- Comprise of two layers
- * external layer ($\text{SiO}_2 \cdot n\text{H}_2\text{O}$)
 - * internal layer (pectins)

Also cell wall compose two parts:

- 1 - Epitheca العنبر العلوي
- 2 - Hypotheca العنبر السفلي

② photosynthetic pigments:

consisted of:

- * Chl. a, c, e
- * Fucoxanthine
- * xanthophyll
- * Carotenoids

③ Main food storage product: Chrysolaminarine
(B 1,3 linked polymer of glucose)

④ The motile stages have one Pantoneumatic flagellum (Rough to the presence of thin hairs along the axis of the flagellum)

⑤ Unicellular companion with the other algal groups

Diatoms Morphology:

① Bilateral symmetry:

All diatoms belong to [[Pennales]] order are motile, and have it plenty plastids and non-motile gametes.

② Radial Symmetry:

All diatoms (as radial symmetry) are belonged to (Centrales order) are non motile, less plastids and motile gametes.

Diatoms Occurrence:

In: Marines and Fresh waters
Benthic, rocks, sands, muds,
Phytoplankton in the open sea

Class: Chrysophyceae
(Golden-Brown algae)

Order Vaucheriales

Chrysophyceae Criteria:

- ① The cell walls are encrusted with iron (Fe) or silicon (Si) compounds
- ② Most of this algae are unicellular, but some of them have a tendency to form colonies
- ③ Photosynthetic pigments:
 - * Chl. a, b, e
 - * Fucoxanthin
 - * carotenes
- ④ Discoid plastid shape
- ⑤ Food storage product:
 - Lucosin (Lipids)

Other Criteria:

- * Some of golden-brown algae secrete chitinous polysaccharide
- * Formation resting spores (known as statospores)
 - * A sexual reproduction (produce zoospores, and also produce gametes, thus produce a diploid zygote (2n).)
- * Sexual reproduction is rare (not)

Example: Genus: Vaucheria

Vaucheria Occurrence:

In * Waters * In terrestrial

Thallus Structure:

- ① Thallus is yellowish green.
- ② Tabular aseptate filaments
- ③ Branching is monopodial and spiral
- ④ Cell walls are thicker (especially found in ^{terrestrial})
- ⑤ Aquatic ones, cell walls have two layers
 - a - Inner layer composed of cellulose
 - b - Outer layer composed of pectose.

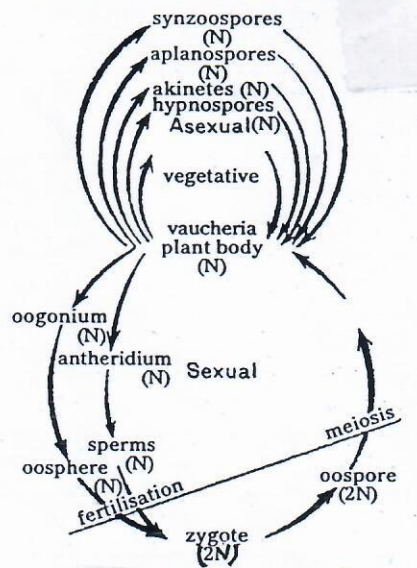
Vaucheria Criteria

- * Food storage product: amyllum (starch)
- * Photosynthetic pigments:
 - 1-* chl. a, e and trace of chl. b
 - 2-* β -carotene
 - 3-* xanthophyll

Vaucheria Reproduction:

- ① vegetative Rep. by fragmentation which any part of thallus gives new thallus (plant)
- ② A sexual Rep.
 - a - Zoospores
 - b - Aplanospores
 - c - Akinetes
 - d - Hypnospores.
- ③ Sexual Reproduction well developed male and female organs of reproduction as
 - a - Antheridium (Pl. Antheridia, Male)
 - b - Oogonium (Pl. Oogonia, Female)

The thallus (plants) are monoecious for most Vaucheria species. Figure as below is illustrated life cycle of vaucheria



. Vaucheria. Graphic life cycle.

Objective Type
Questions

Plant Groups

Q₁ = Define in brief:
Ulva, Lycosin, Akinete,
Antheridium, Zoogonium

Q₂ = Select the best answer:

① Chlamydomonas genus is:
a) nonmotile b) motile c) flagella d) none of them

② Chlorella genus is,
a) motile b) flagellate c) non motile
d) none of them

③ Spirogyra possess chloroplasts as
a) Discoid b) spiral c) ribbon
d) all of them

④ Sexual reproduction in Volvox is:
a) obligate b) Zoospores c) Facultative
d) none of them

5) Volvox species can be,
a) monoecious b) dioecious
c) Monocots d) monoecious ~~and~~ or
dioecious.

Q₃ - Put the word True or False

① Ulothrix is nonmotile green algae.

② Chlorella is motile green algae

③ Diatoms cell wall is saturated with $MnO_2 \cdot 2H_2O$

Q₄ = Answer the following:

1) Chlorella are occurred as:
1 - 2 - 3 -

2) Chlorella reproduction are
1 - 2 - 3 -

3- Diatoms cell wall comprise of two layer as 1- 2-

4- Diatoms occurrence are ⁱⁿ 1- 2- 3- 4-

5- Vaucheria criteria are 1- 2- 3-

Q4 What are main differences between *Noctua* and *Spirogyra*

(2) what are basic differences between *Chlorella* and *Anabaena* -

Q5 Fill the following blanks

(1) _____ is fusion of two equal sized flagellated gametes

(2) _____ genus is followed chlorophyceae as (unicellular green algae).

(3) _____ is belonged to ulvales order

(4) Volvocaceae is consisted _____ genus

(5) _____ need it high content of nitrate ion, and phosphate -

(6) *Chlorella* is a genus belonged _____ order -

Plant Groups

⑥ yields male gametes are -----

Q6: Select (choose) the best answer for column-1 from column-2

Column-1

Column-2

- | | |
|-------------------------------------|---------------------------------|
| 1- Chrysophyceae | a - aplanospores |
| 2- Chrysophyceae plastids | b - amyllum (starch) |
| 3- Volvox reproduction | c - Bacillariophyceae |
| 4- Volvocaceae is belonged to | d. carbohydrates |
| 5- Lucoisins | e - filamentous green algae |
| 6- Zygnematales | f. Pennates |
| 7 Ulvaceae | g - cellulose |
| 8- Colonial green algae | h - Resting cells |
| 9- Antheridia | i - cladophorales |
| 10 - Oogonia | j - female gametes |
| 11 - Cladophora | k - male gametes |
| 12 - Akinetes | l - Volvox |
| 13 - Dinoms | m - Ulva |
| 14 - Vaucheria food storage | n - Sprogyra |
| 15 - Vaucheria asexual reproduction | o - lipids |
| | p - Chrysophyceae |
| | q - both sexually and asexually |
| | r - Discoid shape |
| | s - golden-brown algae |

قسم علوم الحياة

2021/12/8

المرحلة الثانية

الفصل الدراسي الثاني
للسنة

2022 / 2020

الجامعة الإسلامية

Plant Groups

المادة 7

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Plant Groups

المجموعة 7 تحمل النبات

* علم الطحالب البنية (Brown algae) phaeophyta

وصف هذه الطحالب وبعض الرتبة المهمة التابعة له

* بعض صفات الطحالب البنية، تواجدها، انتشارها

في المياه والبيئات ودرجة حياتها

* الطحالب الحمراء Rhodophyta

* بعض رتبة الطحالب الحمراء والفوائد الاقتصادية

المهمة

* أهمية وصلتها، انتشار الطحالب الحمراء

* أكلة الطحالب الحمراء

Division: PhaeophytaClass: Phaeophyceae

Some orders (7) and example of brown algae are belong to class phaeophyceae are shown in the following Table.

Order	Example						
Ectocarpales	Ectocarpus						
Sphacelariales	Sphacelaria						
Dictyotales	Dictyota						
Limnariales	Laminaria						
Other orders	<table border="0"> <tr> <td>Fucales</td> <td><u>Example</u> Fucus</td> </tr> <tr> <td>Desmartiiales</td> <td>Desmarestia</td> </tr> <tr> <td>Dictyosiphonales</td> <td>Anthocoladia</td> </tr> </table>	Fucales	<u>Example</u> Fucus	Desmartiiales	Desmarestia	Dictyosiphonales	Anthocoladia
Fucales	<u>Example</u> Fucus						
Desmartiiales	Desmarestia						
Dictyosiphonales	Anthocoladia						

Brown Algae Criteria:

- ① Photosynthetic pigments contain: Chl. a and chl. c and Xanthophylls and others [Carotenoid pigments (Fucoxanthin)].
- ② Cell wall consists two layers internal and external gelatinous and contain high (Algin) Percentage.
- ③ Laminarin and mannitol are found as food storage products.
- ④ Cell wall contain Alginic acid and Fucoidin
- ⑤ Have two flagella
- ⑥ There are two types of flagella as:
 - Acronematic: smooth without hairs or scales
 - Pantonematic: rough due to thin hairs along the axis of the flagellum
- ⑦ Most of these algae are usually lived in marine

Note: The brown algae, or phaeophytes, are also known as the Fucophytes.

Brown Algae Occurrence:

- * Predominantly marine
- * Five Genera only are known to live in fresh water -

Brown Algal Cell:

Brown algal cell has the following:

- * Central nucleus
- * many chloroplasts
- * vacuoles
- * other organelles
- * Plastids contain large amounts of fucoxanthin (tannins like)

Importance of Brown Algae.

Brown algae have: ⊗ Alginate acid and fucoidin [fucoidin → A gum composed of L-fucose ($C_6H_{12}O_5$) and sulfate acid ester groups obtained from Fucus genus ~~and~~ species and other brown algae]

⊗ Algin is used in the preparation of: creams, jellies, soap, toothpaste, lotions, hair dyes, and others -

Life Cycle of Phaeophyta:

- ① Isomorphic alternation of generation (Isogenera)
- ② Hetero alternation of generation (Heterogenera)
- ③ only the vegetative stage is $(2N)$ chromosomes and the gametes only $(1N)$ chromosomes (known Cyclosporeae) eg. Fu

Order: Ectocarpales

Example: Genus: Ectocarpus (Gr. Ekto = external)
Isogamete Carpus = Fruit

Ectocarpus Criteria:

- ① Has two System (Scheme 1): prostrate and erect system (Page 4).
- ② Erected system is separated
Prostrate system is apical
- ③ Has plated Plastids

Ectocarpus Reproduction:① Asexual Reproduction:

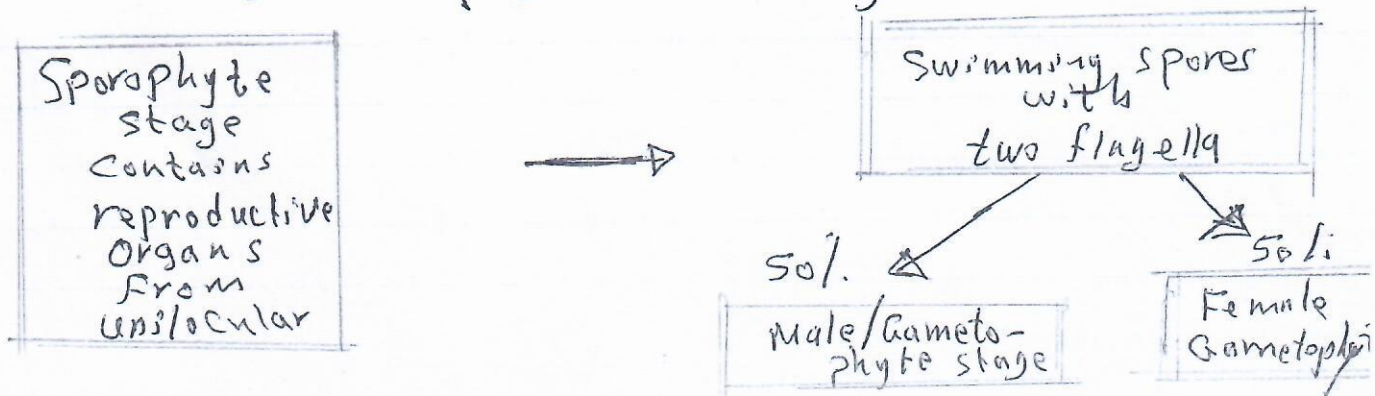
The swimming spores in this kind of reproduction are initiated in:

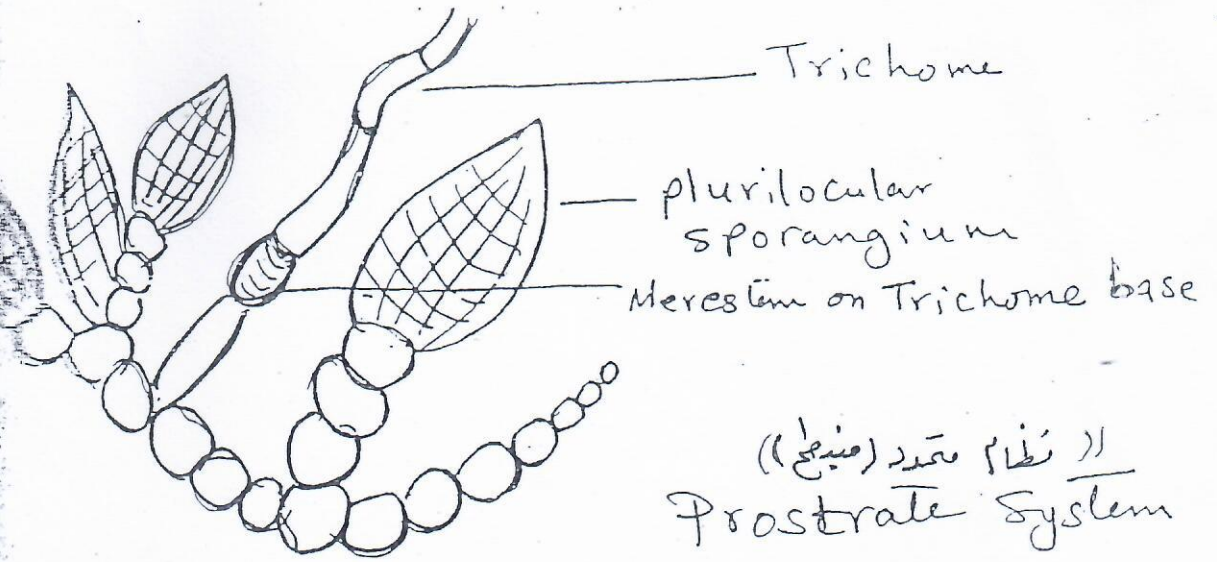
- 1 - Unilocular sporangia (2n)
- 2 - Plurilocular sporangia (2n)

These spores after 3-5 hr start to grow new thallus (plant).

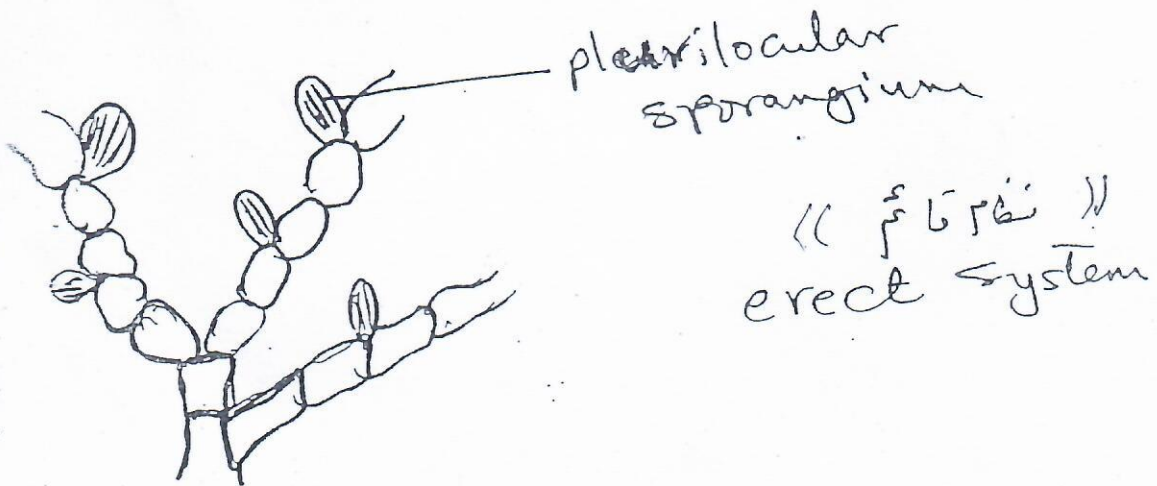
② Sexual Reproduction

Isogamous is the sexual reproduction
Ectocarpus Life Cycle.





Ectocarpus coniferoides



Ectocarpus reptans

Lec. 7

The female gametes excrete some compounds with sugar and odors named ectocarpin to attract the male gametes.

Fig. 2. is shown the graphic life cycle of Genus Ectocarpus

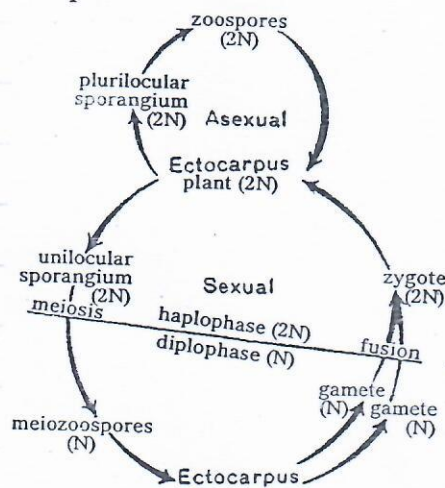


Fig. 2. Ectocarpus. Graphic life cycle.

Division = Rhodophyta « Red Algae »

Rhodophyta (Red algae) division comprise 8 classes, and many subclasses, orders, families, Genera, and species. An important class is that Rhodophyceae.

Rhodophyceae consist two famed orders as shown in following Table.

Order	Family	Genus
* Bangiales	Bongiaceae	Porphyra
* Ceramiales	Rhodomelaceae	Polysiphonia

Red Algae Occurrence :

- * Distribute in tropics and subtropics and others.
- * Grow in both marine and freshwater.
- * Found in warmer and deep water.
- * Also found in humid soils
- * 98% of the 6500 species of red algae are marine.
- * Generally found attached to rocky stones

Importance of Red Algae :

Red algae are economically important. Some red algae genera can be used for many technological, medical, industrial, and Laboratory purposes (Table below)

Genus	Extracted Compound	Purpose	Example
* Gelidium * Gracilaria	Agar	* Medically * Industrially * Laboratory	* capsules for vitamins and drugs * material for making dental impressions * cosmetics * bacterial culture media
* Chondrus	Carrageenan	* Industrially	emulsifying agent for production cosmetics
* Porphyra			is the basis of a billion-dollar aquaculture industry in Japan.

Rhodophyta Criteria :

- ① Unicellular, colonial, filamentous forms. Most of the red algae are multicellular.
- ② Majority of the red algae are branched filamentous form
- ③ Haven't flagella
- ④ Photosynthetic pigments :
* Chl. a, d * biliproteins * Phycoerythrin
* Phycoerythrin * Allophycocyanin
- ⑤ Floridian (starch, like glycogen) and galactoside find as food storage.
- ⑥ Cell wall have polysulphate esters compounds and cellulose.
- ⑦ Also cell wall consist Mannans and Xylans

Red Algae Reproduction :

The reproduction of Rhodophyta is oogamous
 [[Oogamous → Sexual reproduction kind,
 its characterized by fusion of a motile sperm with an oogamete]]

Note : Oogamete :

A large, non motile femal gamete containing reserve materials.

The eggs are produced on separate haploid plants (thylakus) (~~1n~~ chromosomes) cells known as Carpogonia

Rhodophyta Adaptation

The red algae have an ability to live in surface and benthic water. In benthic live site, the phycoerythrin (kind of biliproteins) (red color) will be increased, and so it will be decreased on the surface water due to the light intensities which that the algae can not absorb.

This phenomena called

Chromatic adaptation

(اللونية التكيفية)

Note = ملاحظة

Aquaman (extract of red algae) add to Glucosamine and Lysine are medically used as food supplement for Healthier bones (Chondroitinase) مكمل غذائي

Q4 : Fill the following blanks :

- 1 - Brown algae have _____ flagella
- 2 - _____ is the sexual reproduction ectocarpus life cycle
- 3 - Genus porphyra is followed _____ order
- 4 - Rhodophyceae class consist _____ orders.
- 5 - Genus _____ have _____ which medically used
- 6 - Rhodophyta can be used as _____

Q5 : Complete the following :

- 1 - Brown algae criteria 1 - 2 - 3 -
- 2 - Red algae criteria 1 - 2 - 3 -
- 3 - Photosynthetic pigments in red algae are 1 - 2 - 3 -
- 4 - Cell wall of red algae consist 1 - 2 - 3 - 4 -

Q6 : ① what are mainly differences between Gelidium and Ectocarpus

② what are basic differences between Porphyra and Spirogyra

Q7 : Matching

Choose the correct answer for column-1 from column-2

Column-1

Column-2

- | | |
|--|------------------------------------|
| 1 - Gelidium contains | a - Pantonematic |
| 2 - Gelidium genus
is followed | b - Ehlvrella |
| 3 - Gracilaria is
used as | c - Siz. ml/20 |
| 4 - Rhodophyta havit | d - Discoid plastids |
| 5 - Food storage in
red algae | e - ectocarpus |
| 6 - chl. a and d. | f - Bangiaceae |
| 7 - Brown algae
have a genus | g - agar |
| 8 - chl. a and chl. c | h - rhodophyta |
| 9 - Cell walls of
phaeophyceae have | i - cosmetics |
| 10 - Acronematic | j - galactoside |
| 11 - Brown algae have | k - Red algae Red algae |
| 12 - Ectocarpus has | l - Lingella |
| 13 - Rhodophyceae
has an order | m - Cerminler |
| | n - Dictyeta |
| | o - alginic acid |
| | p - without hair |
| | q - fucoxanthin |
| | r - plated plastids |
| | s - phaeophyta |

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مجموعه علوم الحياة

المرحلة النهائية

المقرر الدراسي الأول

للسنة

2022 /

2021

الجامعة اللبنانية

Plant Groups

المادة : 8

Division: Charophyta

Class :- Charophyceae (Stoneworts)
 الطحالب البحرية (الطحالب البحرية)

Order :- Charales

Family :- Characeae

Charophyta Criteria

- ① - Highly specialized algae
 - ② - possess a number of green algae criteria
 - ③ - Have it chl. a and chl. b
 - ④ - Stoneworts are included in one family: Characeae
 - ⑤ - Chloroplasts and storage products typical of land plants (أرضية، خضروات)
 - ⑥ - Known genera are: * Chara ✓
 ✓ * Nitell and others
 - ⑦ - The reproductive organ parts is complicated
 - ⑧ - They are branched multicellular algae
- Stoneworts Occurrence:
- * In
 - * Fresh waters
 - * Brackish waters
 - * Ponds -

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Thallus Structure:

- ① consists of an erect axis.
- ② Differentiated into nodes and internodes and is attached to substratum by means of rhizoids
- ③ The rhizoids are characterized by the presence of oblique septa.
- ④ Several species accumulate calcium carbonate (CaCO_3) in their cell.

Stoneworts Reproduction:

- * Reproduction in stoneworts is oogamous
- * Unlike all other algal species and like the land plants.

Example for stoneworts (Charophyceae).

Genus Chara.

Chara Description (occurrence and others)

- * Chara look like rooted, aquatic plants.
- * Prefers alkaline, hard water ponds
- * Branches on Chara are ridged (ribbed)
- * Chara are encrusted (coated) with CaCO_3

Chara Cell structure:

- ① The cell wall is composed of cellulose
- ② The cell wall bears deposition of silica and lime (CaCO_3)
- ③ It contains many small elongated chloroplasts.

Chara Reproduction

Chara reproduces by two methods -

- ① vegetative ② sexual.

A sexual reproduction (spores) is completely absent in the chara life history.

① Vegetative Reproduction:

There are three methods as

a- Tubers and bulbs

They are multicellular

b- Amylum stars:

They are star-shaped multicellular

c- Secondary protonema

Secondary protonema reproductive cells

grow quicker than the primary protonema.

* A secondary protonema can arise from several places:

- ① rhizodial node of primary protonema
- ② basal node of primary rhizoid
- ③ nodal cells of the axis.

A secondary protonema gives rise to a new plant just like the primary one.

Chara Sexual Reproduction:

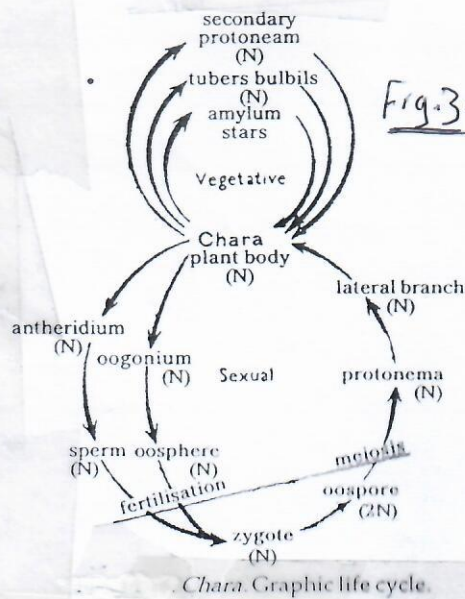
* It is oogamous type.

* The male sex organ is a globular or spherical body (termed as globule) (Antheridium)

* The female ^{sex} organ is large oval structure (Oogonium)

Alternation of Generation in Chara:

The thallus (plant) body of Chara is haploid ($1n$ chromosomes). The diploid condition is found only in oospore*. The life of Chara is thus of haploid ($1n$) predominant type (Fig. 3).



* Oospore: A dormant spore with a thick wall that is produced in many organisms (water mold and downy mildew fungi)

Division: Cryptophyta [[Cryptomonads]]

Cryptophyta criteria:

- * Cell wall absent in general
- * The primary storage product is starch (Homopolysaccharides).
- * They are flagellates (They have 2 flagella)
- * Some Botanists consider them to be protozoans.
- * They have Chls. a and e
- * They have two chloroplasts
- * It possess two phycobiliproteins, Phycocyanin and Phycoerythrin.

Division: Pyrrophyta

((Dinophyta))

Division Pyrrophyta ((Dinophyta)) consists of approximately 4000 species of aquatic and marine unicellular organisms known dinoflagellates.

Dinophyta Criteria:

- * Their cells are bounded by protective cellulose plates with silicates ((SiO₂))

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Dinophyta Criteria

- * They have two flagella
- * It have one chloroplast
- * Have it cils, a and c
- * Usually reproduce asexually
- * Occur in marine environments.
- * Have it condensed chromosomes without histone (kind of protein, define it)
- * Sexual reproduction is known in some dinoflagellates as isogamous type, and may be haplontic or diplontic
- * Some dinophyta species are parasitic organisms also known
- * Primary storage product(s) starch & lipids.
- * They have it carotenoids as peridinin.
- * Number of membranes around chloroplast of dinophyta is one.

Division: Euglenophyta (أولوية النبات)

or « Euglenoids »

Class: Euglenophyceae

Order: Euglenophyciales

Family: Euglenaceae

Euglenoids Criteria:

- * ① It ~~are~~ containing two kinds of organisms: animals and plants as a criterion.
- * ② Pigments: Have it * chls a, and b * Xanthophylls * Carotens
- ③ Unicellular flagellates
- ④ Their reproduction occur by mean of cell division (تكاثر, انقسام)
- ⑤ They have not meiosis or any other form of sexual reproduction
- ⑥ Some scientists consider the euglenoids to be more closely related to protozoans than to any algal groups.

Example = Euglena

Euglena Criteria (أولوية النبات)

- * Their cells havnt clear cell wall
- * Have chloroplastids. * Have photosynthetic. Product: Paramylon (type of carbohydrates)

Universal Questions

Q₁ : Put the word True or False

- ① - Chlorophyta algae have chl. a and chl. c
- ② - Chara genus is belonged to charophyta
- ③ - The order Charales is followed charophyta
- ④ - Chara genus prefers fresh water ponds

Q₂ = Fill the following blanks :

- ① _____ is family followed _____ order of stoneworts
- ② - Chara cells are encrusted with _____
- ③ - Chara cell wall is composed of _____
- ④ - _____ type is chara sexual reproduction.

Q₃ = Choose the correct answer :

- ① - Sexual reproduction of chara is,
 - a) filamentous
 - b) Zoospore
 - c) oogamous
 - d) none of them
- ② The kind of vegetative reproduction of chara is,
 - a) tuber
 - b) bulbs
 - c) tubers and bulbs
 - d) oogamous -

Plant Groups

③ The life of chara is,

- a) haploid b) diplod c) haploid and diploid
- d) none of them

④ Cryptophyta is followed,

- a) monera b) protista c) plantae d) all of them

⑤ Pyrrophyta can be called as,

- a) cyanophyta b) charophyta c) dinophytes
- d) chlorophyta

Q4: Define the following in brief:

- * Phycocyanin , * Mitell * Homopolysaccharides
- * Paramylon

Q5: choose the correct answer for column-1 from column-2

Column-1

column-2

* Charles followed the class

a - chlorophyta

* Stoneworts occurrence in

b - MNO 2

* Stoneworts reproduction

c - diploid

* Chara cell wall consisted of

d - two chloroplasts

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Plant Groups

Column-1

Column-2

* Chara is

f. Chara

* Pyrrophyta
is called

g. Isogamy

* Dinophyta has

h. Chroophyceae

* Storage products
in dinophyta

i. Ponds

* Euglenophyta
is called

j. Oogamous

* Paramylon

k. Silica and lime

l. Haploid

m. Dinophyta

n. One chloroplast

p. Starch, lipid

q. Euglenoids

r. Euglena



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