الصف الأول

Ch 1 - 2 - 3 - 4

أحياء / السنة التحضيرية

د. سعيد الرزاق

الفصل الدراسي ( ) للعام الدراسي( )

أحياء / السنة التحضيرية / سعيد الرزاق

1 - 2 - 3 - 4

Chapter "1" : The Chemistry of Organic Molecule

The organic molecules includes: carbohydrates , lipids , proteins and nucleic acids.

1- Carbohydrates: Have C : H : O ratio of 1:2:1 ($C_nH_{2n}O_n$)

a- monosaccharaides: the monomers of Carbohydrates, one ring.

Ex. : - Hexoses(six carbon atoms): Glucose , fructose and Galactose.($C_6H_{12}O_6$)

- pentose (five carbon atoms): Ribose and Deoxyribose.

=Function of Monosaccharaides : * Glucose is broken down during cellular respiration and produces ATP molecules . (ATP is a highly energy molecule).

* Ribose and Deoxyribose are found in the nucleic acids.(RNA and DNA).

b- Disaccharides : Two monosaccharaides joined during a dehydration reaction.

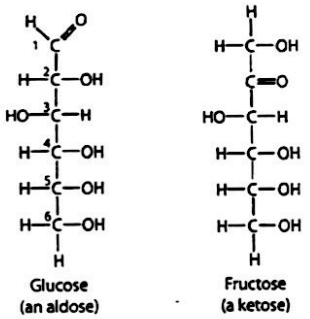
Ex.: - Maltose Formed from two glucose monomers.(Glucose + Glucose).

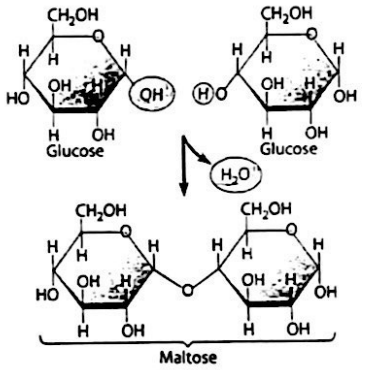
-Sucrose forms from: (Glucose + fructose) .

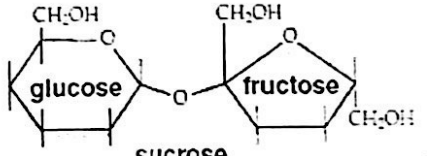
It is extracted from sugarcane or sugar beets.

- Lactose is found in milk (Glucose + Galactose).

c- Polysaccharides are polymers of monosaccharaides linked together by dehydration reactions. When an organism needs energy, the polysaccharide is broken down to release sugar molecules.







1- Storage molecules: جزيئات تخزينية

- Starch is a storage polysaccharide in plants. النشا في النبات سكاكر عديدة تخزينية
  (Potatoes and grains, such as wheat, corn, and rice, are the major sources of starch in the human diet). البطاطس الحبوب القمح الذرة الأرز مصادر رئيسة غذاء الإنسان
- Glycogen: is a storage polysaccharide in animal. Most of our glycogen is stored in our liver and muscle cells. الجليكوجين معظم الحيوان يخزن الكبد الخلايا العضلية

2- Structural molecules: جزيئات تركيبية

- Chitin, is used by insects and crustaceans to build their exoskeleton, الكيتين الحشرات القشريات لبناء هيكلها الخارجي Found in Fungi. الفطريات
- Cellulose encloses plant cells (cell wall). الجدار الخلوي خلايا النبات يغلف السيليلوز

الإجابات الصحيحة آخر الفصل

1) Glucose is the source of ..... For the cell. a- sugars b- ATP c- lipids d- proteins
2) Sucrose is extracted from stems of..... or the roots of..... a- sugar beet , sugar cane b- potato , sugar beet c- sugar cane , sugar beet)
3) Monosaccharide is the monomer of: a – Amino acid b – Nucleic acid c – Carbohydrates d – Portions
4) All of these are carbohydrates except : a – Wax b – Lactose c – Monosaccharide d – Lactose
5) Nucleic acid is formed from repeating unit of: a – Amino acid b – Nucleotide c – Carbohydrates d – Portions
6) Animals store sugar as: a – Starch b – Glycogen c – Glucose d – Cellulose
7) Maltose is produced from three glucose monomers. a – true b – false
8) Chitin is used by insects and crustaceans to build their exoskeleton. a – true b – false
9) Example of monosaccharide is: a – Starch b – Glycogen c – Glucose d – Maltose
10) Glucose is stored in plants in the form of glycogen. a – true b – false
11) Glucose is stored in our liver in the form of glycogen. a – true b – false

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12) Example of disaccharide is: a – Starch b – Glycogen c – Glucose d – Maltose

13) Carbohydrates as Cellulose is found in: a – Liver b – Plants c – Insects d – Skin

14) The majority of carbohydrates have a carbon to oxygen to hydrogen ratio of: a . 2:1:2 b .1:2:1 c . 2:2:1 d – 1:1:2

15) The carbon skeleton of fructose has.....carbon atoms. a . Six b . Seven c . Eight d – five

16) The function of carbohydrates is: a. Energy storage b. Repair tissues c. Build the body

17) The simple Carbohydrate (Monosaccharide) is made up of: a. One ring b. Two rings c. Three rings or more

18) The five carbon sugar is called: a. Pentose sugar b . Hexose sugar c. None

19) Starch is made of numerous repeating units of: a – Sucrose b – Fructose c – Glucose d – Maltose

20) Which carbohydrate is found in the cell walls of plants? a – Starch b – Glycogen c – Chitin d –Cellulose

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الأحماض الدهنية الدهون وحدة بناء الدهون

2- Lipids: Subunit of fat = fatty acids

1 gm of fat = 9 cal.
1 gm of Carb. = 4 cal.

الماء في لا تذوب لتخزين الطاقة

- insoluble in water,(Hydrophobic) , for energy storage,

نفس الوزن من الكربوهيدرات ضعف من أعلى طاقة تخزين دهن واحد جرام

- A gram of fat stores energy more than twice than carbohydrates.

C=C زيت زيتون زيت ذرة زيوت نباتية سائلة روابط مزدوجة دهون غير مشبعة

① ▪ **Unsaturated fats** : double bonds , liquid = plant oils. Corn oil, olive oil, and other vegetable oils.

-C-C- صلبة روابط مفردة دهون مشبعة الزبد

▪ **Saturated** : single bonds , solid = Most animal fats like Butter and beef,

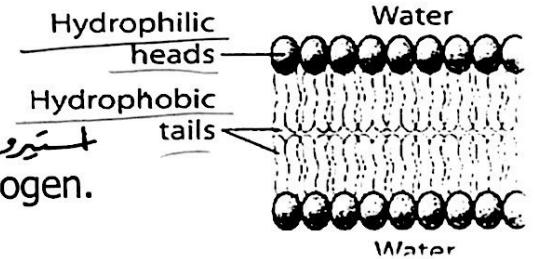
أمراض الجهاز الدوري تسهم قد الدهون المشبعة

- Saturated fats may contribute to cardiovascular disease.

② ▪ **Phospholipids**: in cell membranes. الأغشية الخلوية دهون مفسفرة

③ ▪ **Steroids are lipids** = four fused rings. Ex. : Cholesterol ,Testosterone ,Estrogen. الستيرويدات حلقات ملتحمة أربع كولسترول تستوستيرون استروجين

④ ▪ **Waxes** : for protection:(ear wax , bees wax and cuticles) الشموع للحماية شمع الأذن شمع النحل الأدمة



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21) All of these are correct for lipids except:

a – Long term energy storage b – Insoluble in water

c – Soluble in water d – Component of plasma membrane

22) Corn oil , olive oil, and other vegetable oils are unsaturated fats. a – true b – false

23) Steroid & Fat & Wax are: a – Carbohydrates b – Lipids c – Carbohydrates d – Portions

24) The subunit of fats is fatty acids. a – true b – false

25) Oils are example of: a-Unsaturated fats b-Saturated fats c- Proteins

26) Saturated fats are:

a. More common in plants than in animals.

b. Associated with cardiovascular disease.

c. liquid at room temperature.

27) Lipids contain:

a- More energy per gram than other biological molecules.

b- Less energy per gram than other biological molecules .

c -Equal energy per gram than other biological molecules.

28) Animal fats are: a-Unsaturated fats b-Saturated fats c- Both

29) Steroids are : a. Carbohydrates b. Proteins c. Lipids

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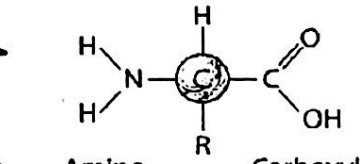
3- Proteins: Subunit of protein = amino acids

- A protein is formed of amino acid monomers linked by peptide bonds.



$[NH_2-COOH]$

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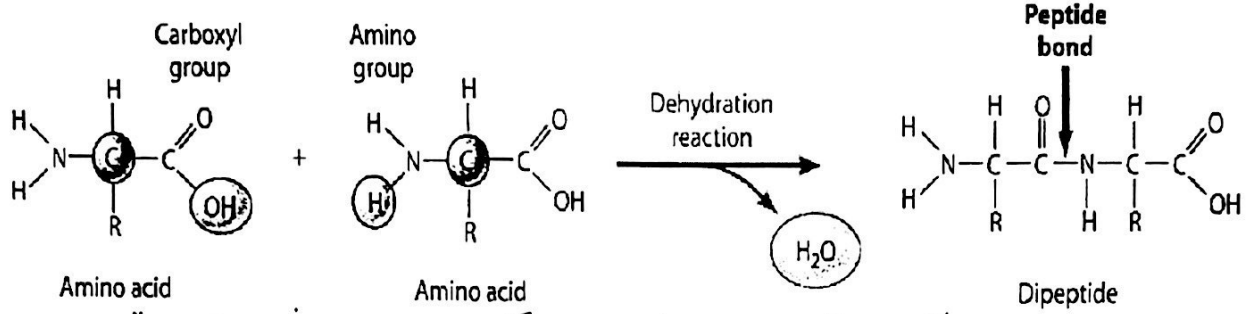
السلسلة المميزة في: احياء السنة التحضيرية



- Proteins are important to the structures of cells and organisms.
- The most important role for proteins is as enzymes.
- Hemoglobin is a transport protein that transports O_2 .
- There are 20 building blocks. Ex. :- glycine(The simplest), Leucine , Serine and Aspartic acid.

30) The subunit of a protein fatty acids. a – true b – false

31) In amino acid the bond between them is called:

a – Peptide bond b – A covalent bond

c – Ionic bond d – Both A and B are correct

32) Amino acids molecules are characterized by the presence of the atomic grouping: a . H - C b . NH2 —COOH c . H-C-OH

33) Which of these is not Protein? a . Amino acid b . Maltose c . Hemoglobin d – Enzymes

34) Amino acid subunits form: a. Carbohydrates b. Proteins c. Lipids

35) Proteins are made from amino acids linked by.....bond. a. phosphate b. ester c. peptide d. ionic

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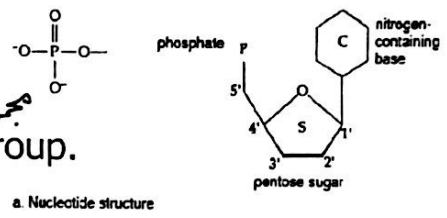
4- Nucleic acids: الأحماض النووية

المنوكليوتيدات

- The monomers that make up nucleic acids are nucleotides.
- Nucleotide is composed of pentose sugar, nitrogenous base and phosphate group.
  تتكون من — سكر خماسي — قاعدة نيتروجينية — مجموعة من فوسفات
- Nucleic acids are **DNA** (Deoxyribonucleic acid) and **RNA** (ribonucleic acid).
  الأحماض النووية



a. Nucleotide structure

	DNA	RNA
نوع السكر **The sugar**	Has **D**eoxyribose sugar	Has Ribose sugar
The nitrogenous bases	adenine (A), thymine (T), cytosine (C), guanine (G).	adenine (A), uracil (U), cytosine (C),guanine(G).
السلسلة **The strand**	مزدوجة Double stranded structure	مفردة Single strand
الأنواع **Types**	نوع واحد One type	• There are: ribosomal RNA (rRNA) ريبوسومي • transfer RNA(tRNA) ناقل • And messenger RNA (mRNA) مراسل
A ..... T C ..... G		

DNA في
رابطتين هيدروجينيتين بين T و A
ثلاث روابط هيدروجينية بين G و C

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36) RNA has the nitrogenous bases: a – T,C,G,U b – A,C,G,U c – A,T,C,G d – A,T,G,U

37) The sugar of RNA is Deoxyribose. a – true b – false

38) The unit of Nucleic acid structure is: a – Amino acid b – Nucleotide c – Cell d – fatty acid

39) The nitrogenous base that is not found in DNA is :

a. Adenine b. Guanine c. Uracil d – Thymine

40) The nitrogenous base that is not found in RNA is: a. Adenine b. Thymine c. Uracil d. Guanine

KEY ANSWERS													
	1)	B	2)	C	3)	C	4)	A	5)	B	6)	B	7)	B
	8)	A	9)	C	10)	B	11)	A	12)	D	13)	B	14)	D
	15)	A	16)	A	17)	A	18)	A	19)	C	20)	D	21)	C
	22)	A	23)	B	24)	A	25)	A	26)	B	27)	A	28)	B
	29)	C	30)	B	31)	D	32)	B	33)	B	34)	B	35)	C
	36)	B	37)	B	38)	B	39)	C	40)	B				

With my best wishes

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Chapter "2"

Cell Structure and Function

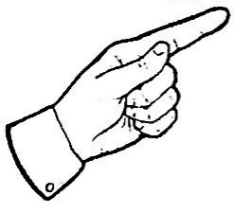
BIOLOGY (BIO 101)

السلسلة المميزة في :

أحياء السنة التحضيرية

أسئلة اختبارات سابقة
في كل قسم

The Second Semester (1439 – 1440)



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Chapter "2" : Cell Structure and Function

2.1 Cellular Level of Organization

- **The cell theory** is based upon the work of Schleiden, Schwann, and Virchow. It states that:
  1- All organisms are composed of cells.
  2- Cells are the basic units of structure and function in organisms.
  3- Cells come only from preexisting cells, because cells are self-reproducing.

- **There are two different types of cells :**

1- Prokaryotic cells:
lack a membrane bounded nucleus , found in Bacteria and Archaea. [have nucleoid]

2- Eukaryotic cells :
have a nucleus and organelles . found in animal cells, plant cells ,fungi and protests.

2.2 Prokaryotic cells: * Shapes of bacteria "Prokaryotes":

- ✓ A rod shaped bacterium = bacillus
- ✓ A Spherical shaped bacterium = coccus.
- ✓ A Spiral and rigid = Spirillum
- ✓ A Spiral and flexible = Spirochetes.

- Many bacteria also have an extrachromosomal piece of circular DNA : a plasmid.

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1) Eukaryotic cells are so named because they lack a membrane bounded nucleus. A.True B. False

2) Many bacteria have an extra chromosomal piece of circular DNA called: A. Ribosome B. Mitochondria C. Plasmid D. Lysosome

3) Cells that lack (do not have) membrane bound nucleus are: A. Prokaryotic cells B. Eukaryotic cells C. Both

4) Bacteria and Archaea have: A.Prokaryotic cells B. Eukaryotic cells C. Both

5) Plant cells, Animal cells, Fungi and many Protists have: A. Prokaryotic cells B. Eukaryotic cells C. Both

6) Eukaryotic cell : A. Has a nucleus B. Lack a membrane bound nucleus C. Both

7) A rod shaped bacterium is called: A. Coccus B .Bacillus C. Spirilla D. Spirochete

8) Spherical shaped' bacterium is : A. Coccus B .Bacillus C. Spirilla D. Spirochete

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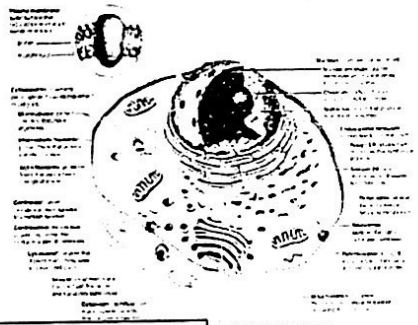
2.3 Introducing Eukaryotic Cells: Eukaryotic cells have compartments called organelles.

Animal cell الخلايا الحيوانية	Plant cell الخلايا النباتية
• Has centrosome. جسم مركزي • Has lysosomes أجسام محللة • No cell wall found. • No chloroplasts found.	• No centrosome found. • No lysosomes found. • Has cell wall جدار خلوي • Has chloroplasts. بلاستيدات خضراء



Animal cell

Plant cell

2.4 The Nucleus and Ribosomes

1- **The Nucleus**: (The command center of the cell)

- Some cells, such as skeletal muscle cells, can have more than one nucleus.
- The nucleus contains chromatin , that condenses into chromosomes.

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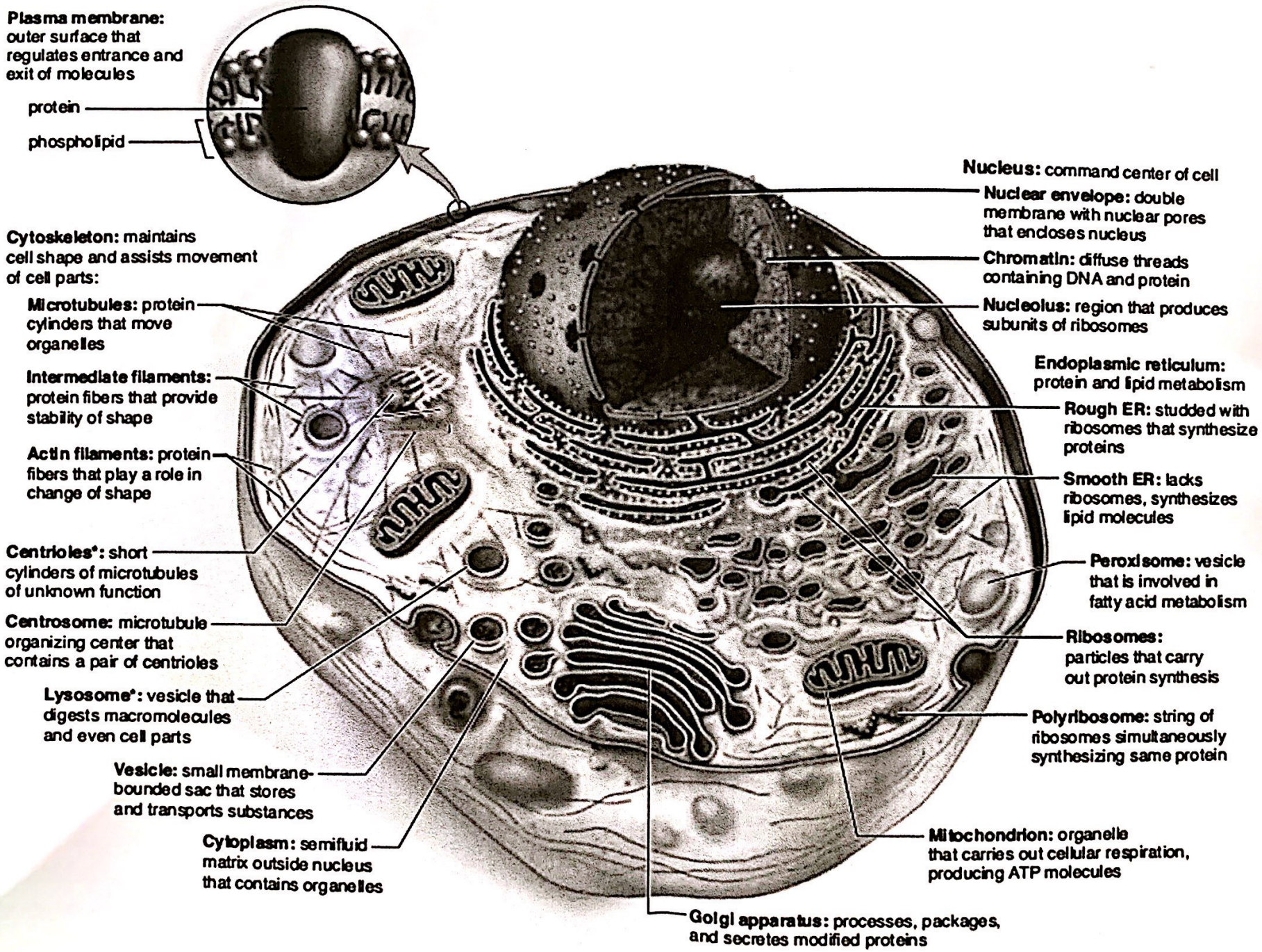
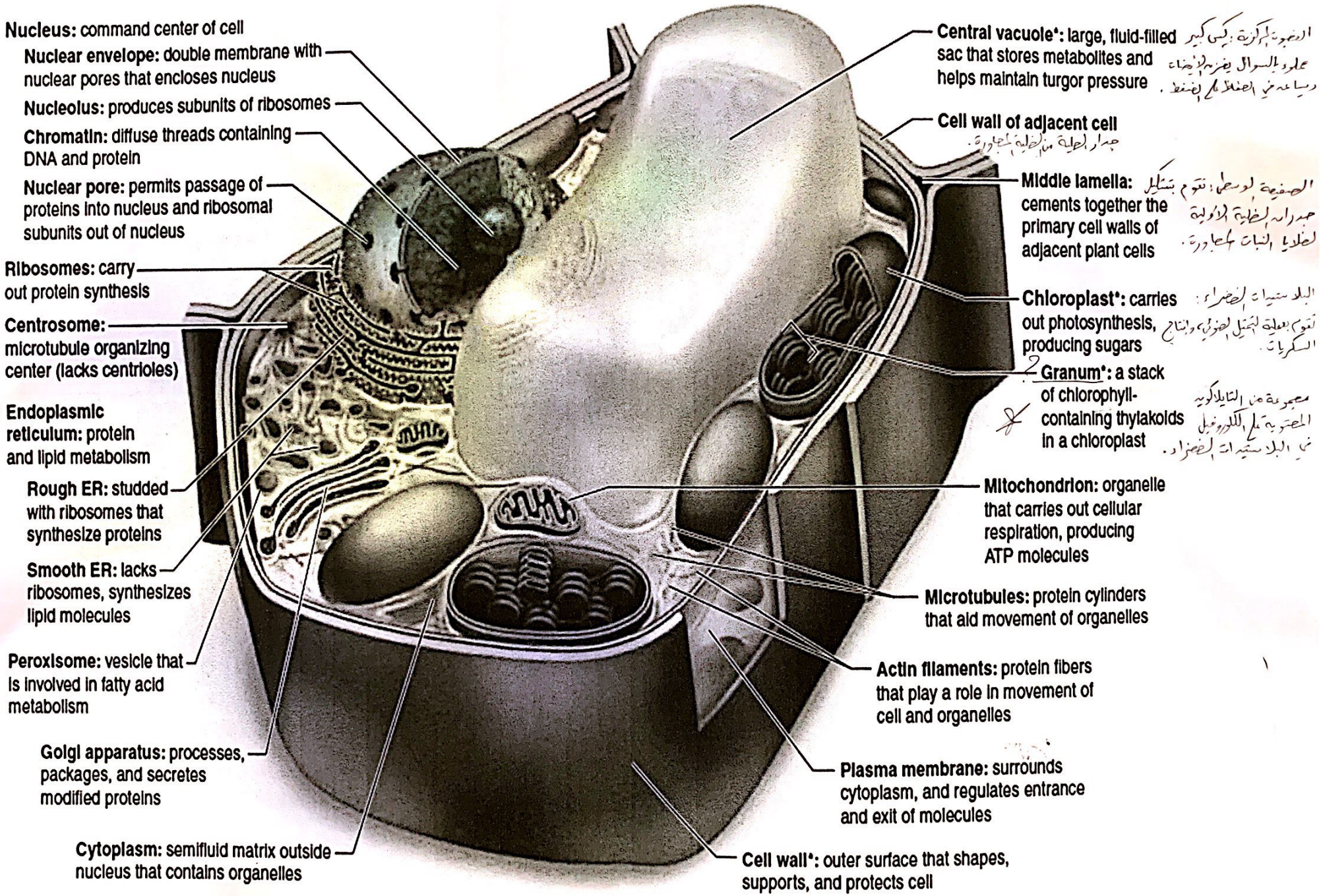
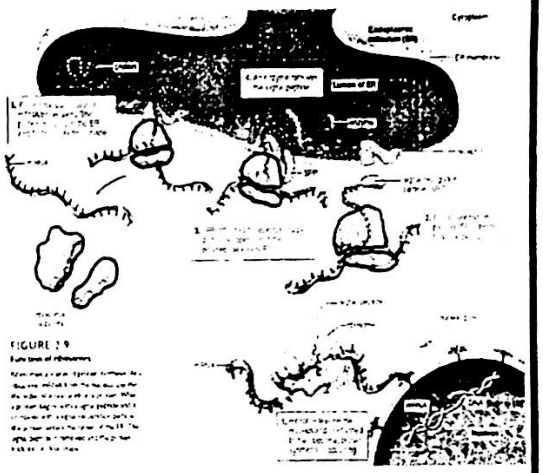




- The chromosomes are the carriers of genetic material . The egg and sperm, have half the chromosome number.
- The nucleus is separated from the cytoplasm by a double membrane , known as the nuclear envelope.
- The nucleolus a dark region which prodeces ribosomes.

2- The Ribosomes: (particles where protein synthesis occurs)

- They are composed of two subunits, one large and one small.
- The number of ribosomes in a cells depending on its functions.
- There are a Free and attached ribosomes , single , in groups" polyribosomes".



9) The ribosomes are particles where protein synthesis occurs: A. True B. False

10) Some cells, such as skeletal muscle cells, can have more than one nucleus: A. True B. False

11) The Command center or genetic control-center of the cell is : Lysosome B. Golgi apparatus C. Nucleus

12) The main function of ribosome is synthesis of: A. Carbohydrates B. Proteins C. Lipids

13) A Ribosome is made up of: A. One subunit B. Two subunits C. Three subunits

14) .....is the main center of the cell. A. Mitochondria B. Chloroplast C. Ribosome D. Nucleus

15) Eukaryotic cells have compartments called..... A. Organs B. Organelles C. Ribosomes D. Lysosomes

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2.5 The Endomembrane System

- The endomembrane system consists of : The nuclear envelope , the membranes of the endoplasmic reticulum The Golgi apparatus and several types of vesicles.

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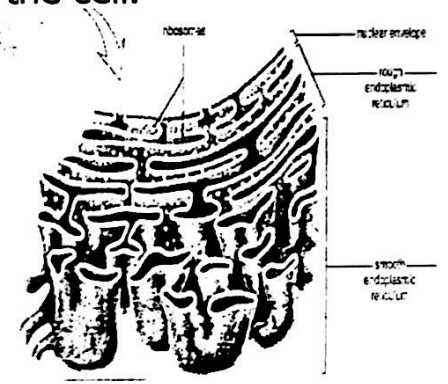
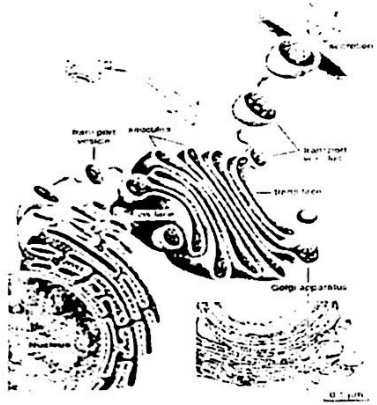
3- The endoplasmic reticulum: (ER)

- The ER consists of rough ER and smooth ER, transport molecules to other parts of the cell.
- **Rough ER** : Carries ribosomes , rough ER produce proteins and glycoproteins.
- **Smooth ER** : does not have ribosomes.
  - In the testes, smooth ER produces testosterone "lipids".
  - In the liver, smooth ER helps detoxify drugs.



4- The Golgi Apparatus:

- Consists of slightly curved, flattened saccules with visicles at the edgs.
- The Golgi apparatus sorts the modified molecules and packages them into vesicles.
- In animal cells, some of these vesicles are lysosomes.



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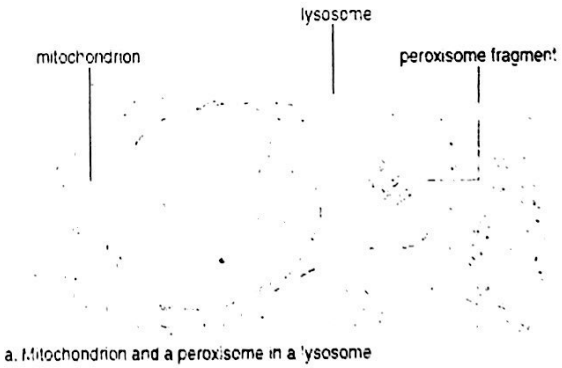
5- Lysosomes:

- In animal cell only .
- They are produced by the Golgi apparatus.
- They have a hydrolytic digestive enzymes.
  - They destroy non- functional organelles.
  - Digests bacteria in white blood cells.
  - Cellular digestion occurs in lysosomes.



a. Mitochondrion and a peroxisome in a lysosome

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16) Lysosomes act to.... : A. Produce proteins B. Carry ribosomes C. Destroy nonfunctional organelles D. Produce energy

17) The rough endoplasmic reticulum carries : A. Chromosomes B. Ribosomes C. Lysosomes D. Centrosomes

18) Lysosomes and Centrioles are not present (absent) in: A. Plant cells B. Animal cells C. Both

19) Intercellular digestion takes place in : A. Mitochondria B. Lysosomes C. Nucleus

20) Testosterone is a ..... Produced by ..... In the tests.

A. Lipid – smooth ER B. Lipid – rough ER C. Steroid hormone - ribosomes D. Steroid hormones – rough ER

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2.6 Other Vesicles and Vacuoles :

6- Peroxisomes :

- All peroxisomes contain enzymes whose actions result in hydrogen peroxide (H_2O_2).
- They are synthesizing and breaking down lipids. In the liver, some peroxisomes produce bile

7- Vacuoles :" In plant cell only "

- Plant vacuoles contain water, sugars, salts, pigments and toxins.
  - The pigments are responsible for the colors of flowers and some leaves.
  - The toxic substances protect a land plant from herbivorous animals.

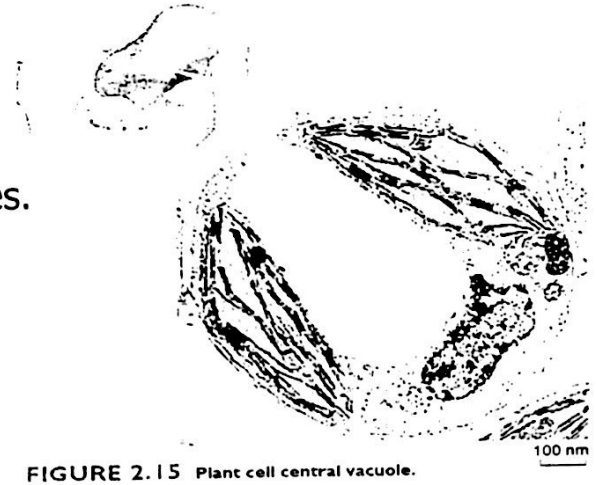

FIGURE 2.15 Plant cell central vacuole.

Plant Cell Central Vacuole:

- take up to 90% of the volume of the cell.
- Storage of both nutrients and waste products.
- It supports the cell and maintains hydrostatic pressure in plant cells.

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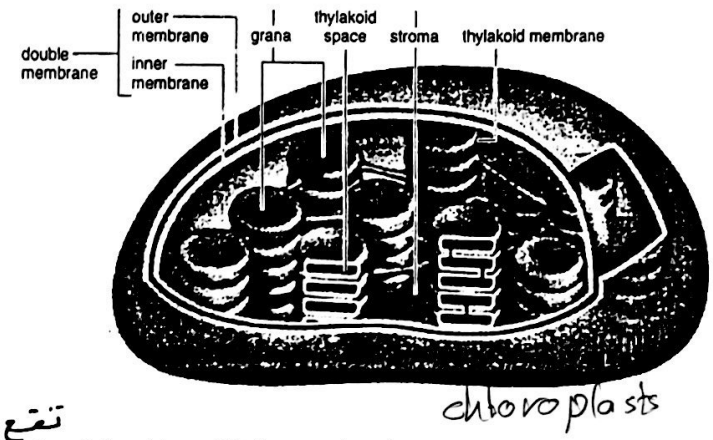
2.7 The Energy Related Organelles : عضيات مرتبطة بالطاقة



8 - Chloroplasts: " In plant cell only" البلاستيدات الخضراء

- Chloroplasts have a three membrane system. ثلاثة أغشية
- They are bounded by a double membrane which encloses: غشاء مزدوج محاطة
  - The semifluid stroma, which contains enzymes and thylakoids. ستروما سيبه سائلة تحتوي على إنزيمات ثايلاكويد
  - A stack of thylakoids is a granum. أكوام الثايلاكويد الجرانا
- Chlorophyll and the other pigments that capture Solar energy are located in the Chloroplasts الكلوروفيل الطاقة الشمسية تمتص التي الأصباغ بقية تقع
- **The function**: الوظيفة
  - Photosynthesis occurs in Chloroplast. تحدث عملية البناء الضوئي
  - Convevts solar energy to chemical energy(sugar). سكر طاقة كيميائية الطاقة الشمسية تحول
  - Photosynthesis requires water, cacbon dioxide and solar energy. ثاني أكسيد كربون ماء يتطلب

Other Types of Plastids : أنواع أخرى من البلاستيدات

- **Chromoplasts** : responsible for the color of autumn leaves, fruits, carrots, and some flowers. الأزهار بعض الجزر الثمار أوراق الخريف لون عن مسؤولة البلاستيدات الملونة
- **Leucoplasts** : colorless plastids that store starches and oils. الزيوت النشا تخزن بلاستيدات خضراء اللون البلاستيدات الشفافة

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9- Mitochondria : (The powerhouse of the cell) المسيوكوندريا بيت الطاقة

- Mitochondria have outer and inner membrane .The inner membrane forms a cristae . غشاء خارجي داخلي الغشاء الداخلي أعراف
  - The inner membrane encloses a semifluid matrix, which contains DNA and ribosomes.

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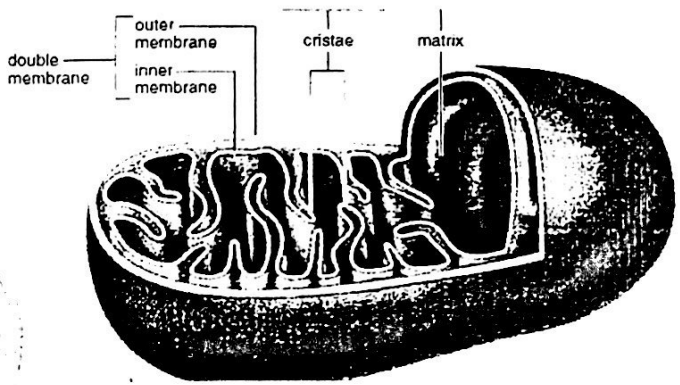
- The number of mitochondria depending on their activities.



The function:

- Mitochondria produce most of the ATP utilized by the cell.
- ATP is a highly energy molecule.
- Cellular respiration occurs in mitochondria .

21) Peroxisomes are membrane bounded vesicles that enclose enzymes whose actions result in hydrogen peroxide : A. True B. False

22) Chlorophyll and the other pigments that capture solar energy are located in: A. Vacuoles B. Chloroplasts C. Ribosomes D. Mitochondria

23) The number of mitochondria varies in cells depending on their shapes: A. True B. False

24) Chloroplast, central vacuole and cell wall are present only in : A .Animal cells B. Plant cells C. Both

25) The energy related organelles are: A. Nucleus and lysosome B. Mitochondria and chloroplasts C. Ribosome and endoplasmic reticulum

26) The cell organelle where photosynthesis takes place and convert solar energy to chemical energy of food is:

A. Mitochondria B. Chloroplast C. Ribosome

27) Stroma and thyllakoids are parts of : A. Mitochondria B. Chloroplast C. Nucleus

28) The Cellular Respiration takes place in: A. Mitochondria B. Endoplasmic reticulum C. Vacuole

29) The power houses of cell that produce most of the ATP needed by the cell are : A. Lysosome B. Peroxisome C. Mitochondria

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30) All of these are incorrect for the main source of energy in the cell except: A. Mitochondria B. Chloroplast C. Ribosome D. Nucleus

31) Chloroplast carries out : A. Photosynthesis B. Respiration C. Protein synthesis D. Lipid synthesis

32) ATP : A. Provides enzymes for metabolism B. has helical structure C. is a highly energy molecule D. Is an amino acid

33) The role of central vacuole in plant cell is to reserve: A. Toxic substances B. Pigments C. Water, salts, sugars D. All are correct

34) The toxic substances protect a land plant from herbivorous animals . A. True B. False

35) The attractive color of flower petals is due to the pigment in vacuole A. True B. False

KEY ANSWERS												
1)	B	2)	C	3)	A	4)	A	5)	B	6)	A	7)	B
8)	A	9)	A	10)	A	11)	C	12)	B	13)	B	14)	D
15)	B	16)	C	17)	B	18)	A	19)	B	20)	A	21)	A
22)	B	23)	B	24)	B	25)	B	26)	B	27)	B	28)	A
29)	C	30)	A	31)	A	32)	C	33)	D	34)	A	35)	A

With my best wishes

Chapter "3"

The Cell Cycle and Cellular Reproduction

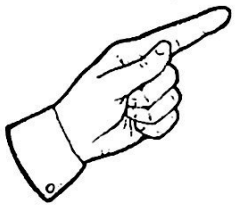
BIOLOGY (BIO 101)

السلسلة المميزة في :

أحياء السنة التحضيرية

أسئلة اختبارات سابقة في كل قسم

The Second Semester (1439 – 1440)



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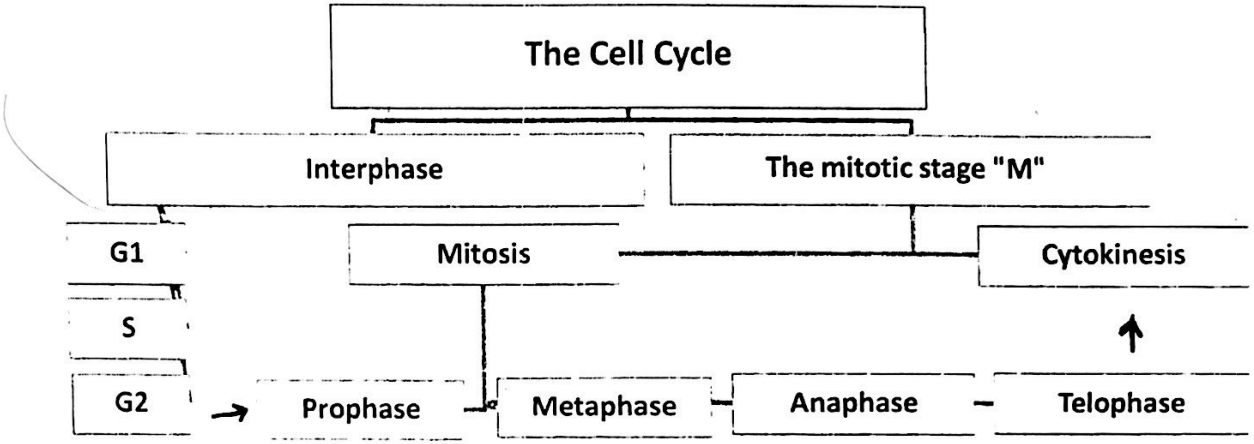
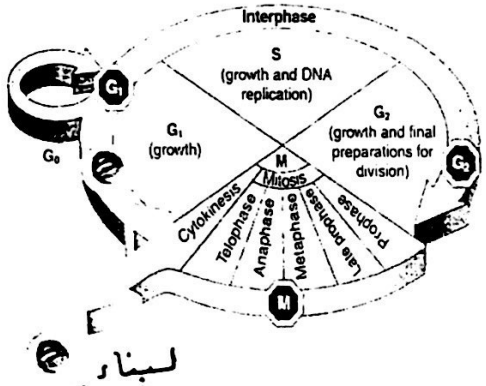
Chapter "3" : The Cell Cycle and Cellular Reproduction

3.1 The Cell Cycle:

- A set of stages takes place between two successive cell divisions.

- The two portions of the cell cycle are:
  - Interphase: :(G1 , S , G2)
  - The mitotic stage **"M"** :(Mitosis – Cytokinesis)





☒ **Interphase :**

- It takes about **90%** of the cell cycle, consists of three stages :

☒ **G1 - Stage**

- The cell increases in size, doubles its organelles, (such as mitochondria and ribosomes), and accumulates materials for DNA synthesis.
- Some cells, such **as nerve and muscle cells** do not complete the cell cycle and are arrested on (G_0).

☒ **S - Stage**: **DNA synthesis** or replication occurs.

☒ **G2 Stage**: the preparation of mitosis occurs.

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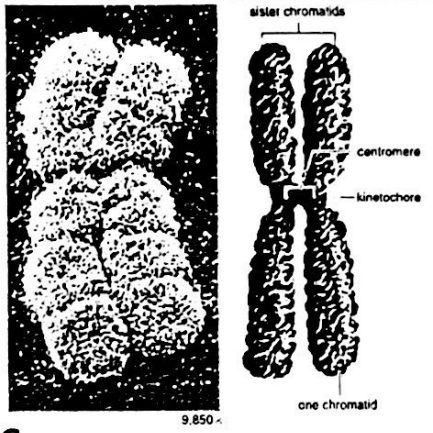
مرحلة الانقسام الخلوي [KaryoKinesis = nuclear division]

❖ **M (Mitotic) Stage:** إنقسام النواة (تضم) السيتوبلازم إنقسام

- Includes **mitosis** (nuclear division) and **cytokinesis** (division of the cytoplasm).

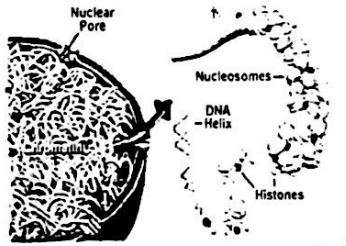


3.2 Mitosis and Cytokinesis

◈ **Mitosis division:**

◈ **Eukaryotic Chromosomes :** كروموسومات حقيقيات النواة

- The DNA in the chromosomes is associated with various proteins, including **histones .** مرتبطة بروتينات متنوعة
- When eukaryotic cell is not undergoing division, DNA is located within **chromatin** . الخلية الحقيقيات لا تكون في وضع انقسام
- Before mitosis begins, chromatin becomes highly coiled and condensed **chromosomes** قبل إنقسام النواة ملتف بشدة يصبح مكثفة
- Chromosome is composed of two sister **chromatids** held together at a **centromere.** مكونة كروماتيدين شقيقيين يرتبطا معاً



- Each species has a characteristic chromosome number. كل الأنواع مميز عدد
- **The full or diploid (2n) number** of chromosomes that is found in all cells of the individual. (in Human=46) الكامل العدد يوجد الذي الفرد
- The diploid number includes two chromosomes of each kind. نوع كل من
- Half the diploid number, called the **Haploid (n) number** of chromosomes, contains only one chromosome = **sperm and egg** cells (In Human = 23) نصف عدد يحتوي فقط الحيوان المنوي البويضة الإنسان

1) The cell cycle consists of: A. Interphase B. Mitosis C. Cytokinesis D. All
2) Which of the following represents a haploid stage during human life cycle? A. Egg cells B. Kidney cells C. Liver cells D. Brain cells
3) The Interphase lasts about: A. 5% of the cell cycle B. 10% of the cell cycle C. 90% of the cell cycle D. 45% of the cell cycle
4) Mitosis division takes place at cells of..... A. skin B. ovaries C. testes D. testes & ovaries

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5) Diploid number in human: A. 23 chromosomes B. 46 chromosomes C. 92 chromosomes D. 10 chromosomes

6) G1, S and G2 are parts of the: A. Prophase B. Metaphase C. Interphase

7) DNA synthesis or replication takes place during: A. G1 stage B. S stage C. G2,stage

8) The division of nucleus or nuclear division is: A. Mitosis B. Cytokinesis C. Both mitosis and cytokinesis

9) Cytokinesis is refered to the: A. Division of nucleus B. Division of cytoplasm C. None of these

10) The full or diploid number of chromosomes which includes two chromosomes of each kind that is found in all cells of the individual is :

A. 2n B. n C. None of these

11) Half of diploid number, which contains one chromosome of each kind, typically sperm and egg in animal cells is

A. Diploid (2n) B. Haploid (n) C. Both

12) The sister chromatids are attached at the point called: A. Histone B. Chromosome C. Centromere D. Centrosome

13) The Mitotic Stage (M) is composed of: A. Meiosis & cytokinesis B. G1 & cytokinesis C. Mitosis & cytokinesis D. All are correct

14) Mitosis takes place during: A. Sexual Reproduction B. Cell growth C. Division of bacteria D. None

15) The cell increases in size and doubles its organelles during : A. G1 stage B. S stage C. G2 stage D. G0 stage

16) Some cells, such as nerve and muscle cells do not complete the cell cycle and are permanently arrested during:

A. G1 stage B. S stage C. G2 stage D. G0 stage

17) Nuclear division will be done in: A. Interphase B. S stage C. Mitosis D. G2 stage

==========

الانقسام النووي مراحل

❖ **Phases of Mitosis**: Prophase, Prometaphase, Metaphase, Anaphase and Telophase

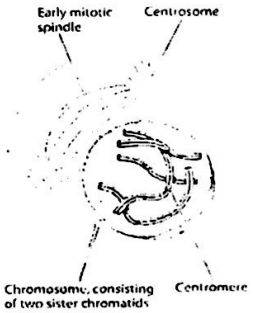
1- Prophase: الطور التمهيدي

الكروماتين يتكثف كروموسومات

- Chromatin has condensed to chromosomes .

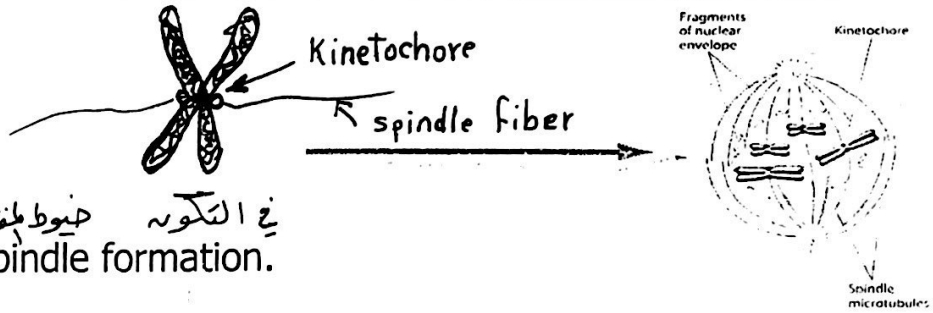
النووية تختفي النووي الغلاف يبتعد عنه

- The nucleolus disappears , the nuclear envelope fragments.



0559132475 عبدالرزاق .>

- In animal cells, an array of microtubules radiates toward the membrane from the centrosomes. These structures are called **asters.**

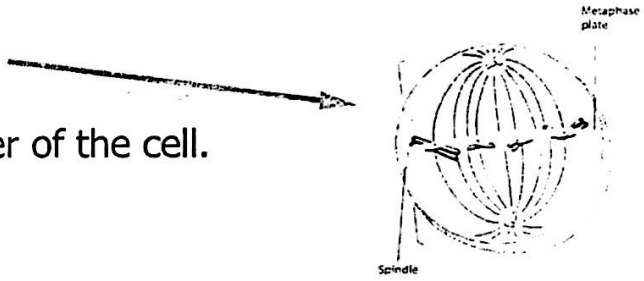


2- Prometaphase:

- Nuclear envelope disappears.
- **Kinetochore** appears on each chromatids, starts spindle formation.

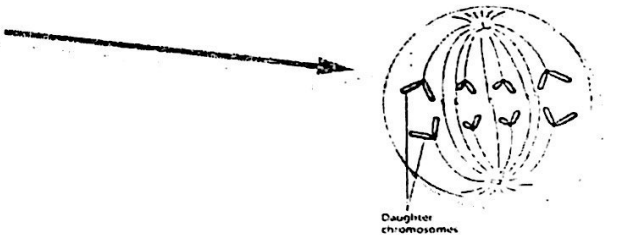
3- Metaphase:

- Spindle fibers complete .
- Centromeres of (Chromosomes) arrange at metaphase plate or center of the cell.



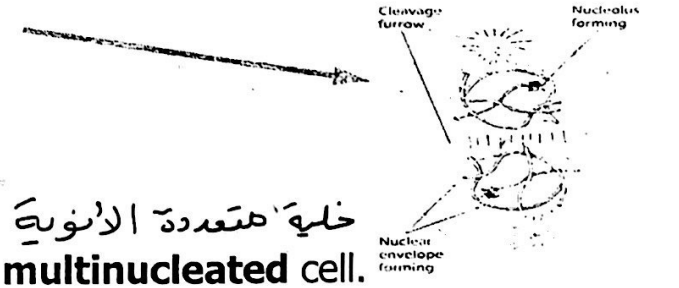
4- Anaphas :

- Sister Chromatids (separate) to become daughter Chromosomes, and move toward the spindle poles.



5- Telophase :

- Spindle disappears, but nuclear envelopes and nucleolus appears in each daughter cell .
- Cytokinesis occurs.



◈ **Cytokinesis**: Cytokinesis is the division of the **cytoplasm**.

- When mitosis occurs but cytokinesis doesn't occur, the result is **a multinucleated** cell.

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الانقسام السيتوبلازمي الخلايا الحيوانية تحصر

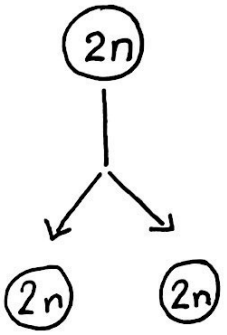
- **Cytokinesis in animal cells** : by **Cleavage Furrow** .

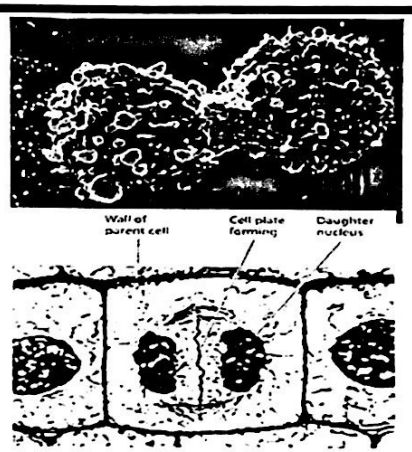
الخلايا النباتية صفيحة خلوية

- **Cytokinesis in Plant Cells** : by **Cell Plate.**

The new cell plate known as **primary cell walls**.

جدران خلوية أولية





الانقسام المتساوي وظائف

◈ **The Functions of Mitosis :**

تعويض الأنسجة النمو

- Mitosis permits **growth** and **repair**.

لتعطي تنقسم

- Cell division in which a diploid (2n) mother cell divides to produces two diploid (2n) daughter cells.

في الخلية الأم كما هو يظل ونوعها عدد الكروموسومات

- Chromosome number and kinds remains same as the original parent cell.

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انقسام الخلايا بدائية النواة

3.4 Prokaryotic Cell Division:

البكتريا النباتات مثل المخلوقات وحيدة الخلية

- Cell division in **unicellular** organisms, such as prokaryotes (Bacteria), produces **two** new individuals.

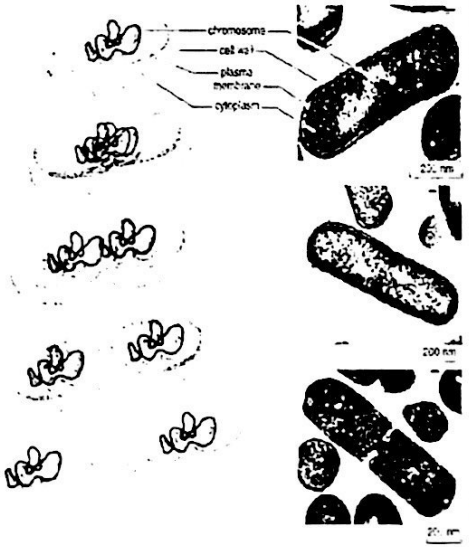
فرديين جديدين تنتج

تكاثر لاجنسي

- This is **asexual reproduction.**

نوع إنشطار ثنائي

The type of this **asexual reproduction** is called **Binary fission.**



18) If a parent cell has 14 chromosomes prior to mitosis, how many Chromosomes will each daughter cell have?

A. 28 chromosomes B. 14 chromosomes C. 7 chromosomes D . 21 chromosomes

19) In animal cells, cytokinesis occurs by a cleavage furrow followed by a slowly circular constriction appears between the two daughter cells.

A. True B. False

20) Mitosis permits: A. Reduction the number of cells. B. Growth and repair of tissues . C. Reduction the number of chromosomes .

21) The chromosomes move toward the spindle poles during : A. Prophase B. Metaphase C. Anaphase D. Telophase

22) The nucleolus disappear during: A. Prophase B. Metaphase C. Anaphase D. Telophase

23) Cytokinesis in plant cell takes place by formation of by Cell plate. A. True B. False

24) Cytokinesis on animal cells takes place by formation of : A. Cleavage furrow B. Cell plate C. Both cleavage furrow and cell plate

25) When mitosis occurs but cytokinesis doesn't occur, the result is a: A. Multinucleated cell B. Uninucleated cell C. Both

26) In animal cells, an array of microtubule radiate towards the plasma membrane from the centrosomes. These structures are called:

A. Cell plate B. Asters C. Nucleolus

27) The centromeres of the duplicated chromosomes are arranged at the metaphase plate or the center of the cell during:

A. Prophase B. Metaphase C. Anaphase

28) The sister chromatids separate and become daughter chromosomes that move towards the poles during :

A . Prophase B. Metaphase C. Anaphase

29) The diagram represents : A . Prophase B. Metaphase C. Anaphase

30) prokaryotes reproduces by asexual reproduction that is called Binary fission. A. True B. False

31) Mitosis require: A. One nuclear division. B. Two nuclear divisions. C. Three nuclear division. D. Four nuclear divisions.

32) Cells are making mitosis for:

A. Maintaining the chromosome number in all body cells. B. Formation of Gametes.

C. Growth and repair tissues. D. Both A and C are correct.

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33) The spindle fibers are attached to the chromosome at mitosis in : A . Prophase B. Metaphase C. Anaphase D. Prometaphase

34) The phases of Mitosis cell division are:

A. Prophase, Metaphase, Telophase , Anaphase
B. Metaphase, Telophase , Anaphase , Prophase
C. Prophase, Metaphase, Anaphase , Telophase
D. Prophase, Metaphase, Anaphase

35) During prophase stage , the .....disappears. A. Nuclear membrane B. DNA C. Centrosomes D. Nucleolus

36) Nuclear envelopes and nucleolus appears in each daughter cell during: A . Prophase B. Metaphase C. Anaphase D. Telophase

37) Cytokinesis in plant cells, involves the building of a.....between the daughter cells.

A. Cell plate B. Septum C. Cleavage furrow D. Division of cytoplasm

38) The diagram represents: A . Prophase B. Metaphase C. Anaphase D. Telophase

للاختبارات الالكترونية / اختبارات السمستر الأول + العام الماضي ١٤٢٨-١٤٢٩ ـــ ٠٥٥٩١٣٢٤٧٥

١٤٢٩ - ١٤٤٠

KEY ANSWERS													
	1)	D	2)	A	3)	C	4)	A	5)	B	6)	C	7)	B
	8)	A	9)	B	10)	A	11)	B	12)	C	13)	A	14)	B
	15)	A	16)	D	17)	C	18)	B	19)	A	20)	B	21)	C
	22)	A	23)	A	24)	A	25)	A	26)	B	27)	B	28)	C
	29)	C	30)	A	31)	A	32)	C	33)	D	34)	C	35)	D
	36)	D	37)	A	38)	B								

With my best wishes

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Chapter "4"

Meiosis and Sexual Reproduction

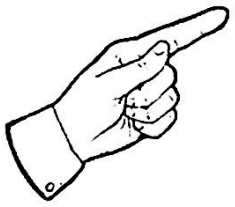
BIOLOGY (BIO 101)

السلسلة المميزة في :

أحياء السنة التحضيرية

أسئلة اختبارات سابقة في كل قسم

The Second Semester (1439 – 1440)



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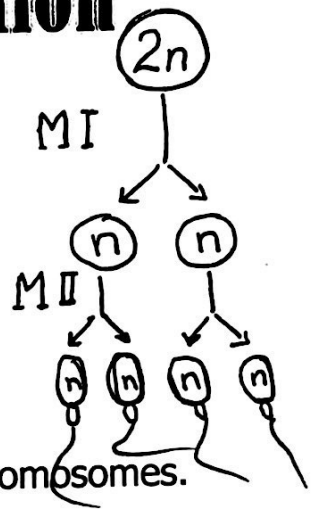
Chapter "4":Meiosis and Sexual Reproduction

4.1 : Halving the Chromosome Number



Meiosis is the type of nuclear division that reduces the chromosome number from the diploid (2n) number to the haploid (n) number.

- The **diploid (2n) number** refers to the **total** number of chromosomes.
- The **haploid (n) number** of chromosomes is **half** the diploid number.
  - In humans, the diploid number of 46 is reduced to the haploid number: (23).
  - **Gametes** (reproductive cells, the sperm and egg) have the **haploid** number of chromosomes.
  - Fusion of gametes form a cell called a **zygote** which has the diploid (2n) number of chromosomes.
  - Meiosis requires two nuclear divisions and produces four haploid daughter cells, each having half the total number of chromosome.

1) Meiosis requires ..... A. One nuclear division B. Two nuclear divisions C. Three nuclear divisions D. Four nuclear divisions
2) Fusion of gametes (sperm and egg) form a cell called..... A. Eosinophil B. Lymphocyte C. Zygote D. Red blood cell
3) Meiosis requires two nuclear division and produces four haploid cells. A. True B. False
4) In humans, the diploid number of chromosomes is ..... A. 44 B. 23 C. 46 D. 22
5) In human, meiosis occurs only in ..... A. Liver B. Skin C. Kidney D. Testes
6) If a parent cell has 46 chromosomes, after meiosis each daughter cell has.....
A. 38 chromosomes B. 46 chromosomes C. 92 chromosomes D. 23 chromosomes

د. عبدالرزاق ٠٥٥٩١٣٢٤٧٥ .

7) The..... number refers to the total number of chromosomes. A. Diploid B. haploid C. Diploid and haploid

8) The .... number refers to the half number of chromosomes. A. Diploid B. haploid C. Diploid and haploid

9) The haploid number in humans is..... A. 23 B. 47 C. 46

10) The .....have the haploid number. A. Egg and sperm B. gametes C. Both of them

11) The ..... have the diploid number. A. Zygote B. gametes C. Alleles

12) The meiosis produces .....daughters. A. Two diploid B. four haploid C. Four diploid

==========

أزواج الكروموسومات المتماثلة

☒ Homologous Pairs of Chromosomes

كروموسومات متماثلة تسمى أزواج في توجد خلايا الجسم

* In diploid body cells, the chromosomes occur in pairs which are called **Homologous chromosomes.**

عوامل تسمى الجين من البدائل المتقابلة

* Alternate forms of a gene are called **alleles.**

والآخر من الكروموسوم الواحد الزوج المماثل موروث الأب

* One member of a homologous pair was inherited from the male parent, and the other was inherited from the female parent by way of the gametes.

المؤنث

الخلايا الجرثومية مصير

☒ Fate of Daughter Cells

لتصبح تنمو أبواغ تصبح الخلايا الجرثومية دورة حياة النبات

* In the plant life cycle, the daughter cells become **haploid spores** that germinate to become a haploid generation" Gametophyte". This generation produces the gametes by mitosis.

جيل نصفي جيل مشيجي هذا الجيل يتكون أمشاج من طريق الانقسام الميوزي

* In the animal life cycle, the daughter cells become **the gametes** either **sperm** or **eggs**.

البويضات الحيوان المنوي أمشاج تصبح الخلايا الجرثومية دورة حياة الحيوان في

عبدالرزاق ٠٥٥٩١٣٢٤٧٥ .

4.2: Genetic Variation : التنوع الوراثي

* Meiosis provides a way to keep the chromosome number constant generation after generation.
الانقسام الاختزالي — لحفظ الطريقة — عدد الكروموسومات — ثابت — جيل بعد جيلاً

* Meiosis brings about genetic variation in a way which is called: **Crossing over**.
يعمل على — التنوع الوراثي — عمه طريقه — العبور الوراثي

* **Crossing over**: Exchange of genetic material between non-sister chromatids of a bivalent.
العبور الوراثي — تبادل — الوراثية — المادة — كروماتيدات غير شقيقة — بينه — (زوج الكروموسومات المتماثلة)

* Significance of Genetic Variation :

The amount of genetic variation achieved through meiosis is important to the survival of a species.
كمية — التنوع الوراثي — المتحصله — من خلال — قام — لحفظ حياة — الأنواع

13) Which is correct?

A. Homologous pair was inherited from one parent.
B. Homologous chromosomes occur in pairs.
C. Homologous chromosomes differ completely from each others.
D. All answers are correct.

14) Alternate forms of a gene are called..... A. Alleles B. Sister chromatids C. Non sister chromatids D. Homologous chromosomes

15) The spores of the plant cells become..... generation. A. haploid B. diploid C. Both

16) Exchange of genetic material between non-sister chromatids of a bivalent during meiosis called .

A. Crossing over B. Independent assortment of homologous C. both

17) Meiosis takes place during.....

A. asexual reproduction B. formation of gametes C. cell growth and repair D. none

18) Fusion between male and female gamete give rise to..... A. haploid cell B. oogenesis C. zygote D. none

19) Crossing over is an exchange of genetic material between sister chromatids of a bivalent. A. True B. False

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4.3 The Phases of Meiosis:

- Consist of two nuclear divisions (Meiosis-I & Meiosis-II).

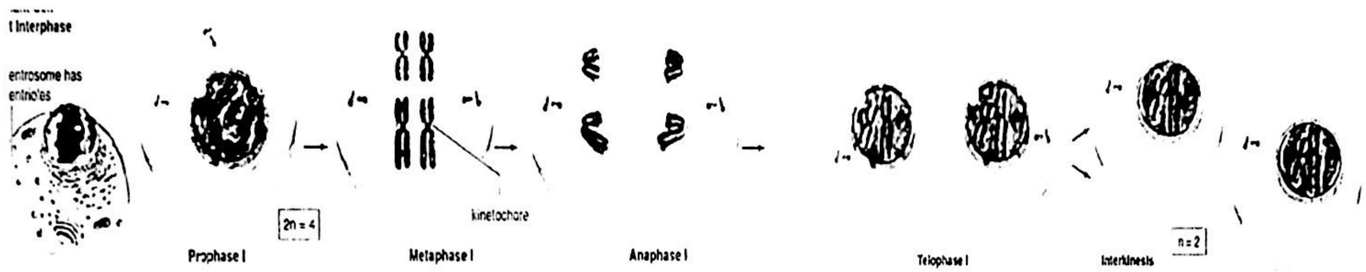
Meiosis I : (Chromosomes becomes half, from diploid to haploid)

1- Prophase-I: Chromosomes duplicated, bivalents form and crossing over takes place.

2- Metaphase-I: Homologous pairs align at metaphase plate.

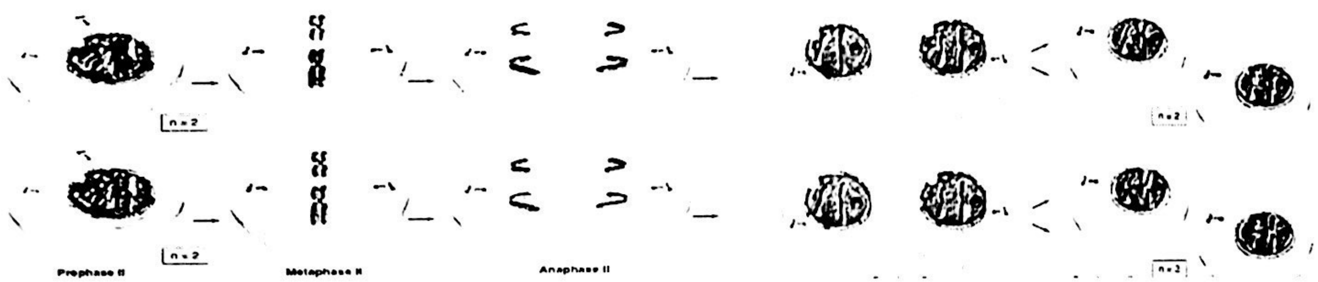
3- Anaphase-I: Homologous chromosomes separate and move towards opposite poles.

4- Telophase -I : Spindle disappears, nucleolus and nuclear membrane reappears.



Meiosis II : (No change in chromosomes number, from haploid to haploid)

Prophase II Metaphase II Anaphase II Telophase II



4.4 Meiosis Compared to Mitosis : الإنقسام الاختزالي مقارنةً بالإنقسام المتساوي

	Mitosis	Meiosis
1	Occurs in all tissues "somatic cells" الخلايا الجسدية الأنسجة كل يحدث	Occurs only in the reproductive organ" gonads"" testis and ovary" الأعضاء التناسلية فقط يحدث المبيض الخصية
2	For growth and repair النمو تعويض الأنسجة	Produces the gametes " sperms and eggs " For genetic variation. الأمشاج ينتج التنوع الوراثي
3	Requires only one nuclear division إنقسام نووي واحد	Requires two nuclear divisions يحتاج إنقسامين نوويين
4	Produces two diploid daughter cells ينتج خليتين	Produces four haploid daughter cells ينتج ٤ خلايا نصفية
5	The daughter cells are genetically identical to each other. الخلايا الجديدة متطابقة وراثياً	The daughter cells are neither genetically identical to each other. الخلايا الجديدة غير متطابقة وراثياً.
6	------	During prophase I, bivalents form and crossing-over occurs تكوين الأزواج العبور يحدث
7	During metaphase in mitosis, individual chromosomes align at the metaphase plate. عروية	During metaphase I of meiosis, bivalents independently align at the metaphase plate. تصطف الأزواج من الكروموسومات في المركز
8	During anaphase of mitosis, sister chromatids separate. الانفصالي الكروماتيدات الشقيقة تنفصل	During anaphase I of meiosis, homologues of each bivalent separate. أثناء

?

20) This diagram illustrates.....

A. Prophase I B. Metaphase I C. Anaphase I D. Telophase I

21) Crossing over occurs during..... A. Prophase I B. Metaphase I C. Anaphase I D. Telophase I

22) This diagram represents the .....

A. Metaphase of meiosis -II B. Anaphase of meiosis II

C. Metaphase of meiosis -I D. Anaphase of meiosis –I

23) In diploid body cells, the chromosomes occur in pairs which are called: A. homologues. B. gametes C. None of them

24) Homologous chromosomes separate and move toward the poles : A. Prophase I B. Metaphase I C. Anaphase I

25) Sister chromatids separate and move toward the poles in..... A. Prophase II B. Metaphase II C. Anaphase II

26) The reductive division that occur in gonads is..... A. meiosis B. mitosis C. Interphase

27) After meiosis, the daughter cells are neither genetically identical to each other. A. True B. False

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دورة حياة الإنسان

4.5 :The Human Life Cycle :

الجيل الذي يليه إلى جيل ما تحدث التي الأحداث التناسلية كل

◈ **Life cycle** : all the reproductive events that occur from one generation to the next generation.

الحيوانات في والانسان الفرد 2n ينتج الأمشاج

- In animals, including humans, the individual is always diploid, and meiosis produces the gametes **(gametogenesis)**, the only haploid phase of the life cycle.

إنتاج الأمشاج الطور النصف الوحيد دورة الحياة

الخصيتين تحدث عملية إنتاج الحيوانات المنوية الذكور في تنتج الحيوانات المنوية

- In males, **spermatogenesis** occurs in **the testes** and produces **sperm**s.

المبيضين تحدث عملية إنتاج البويضات الإناث في تنتج البويضات

- In females, **oogenesis** occurs in **the ovaries** and produces **eggs**.

الحيوان المنوي البويضة الاخصاب يكوّن اللاقحة تستعيد العدد الكامل

- A sperm and egg join at fertilization and form **a zygote**(2n) ,which restoring the diploid chromosome number.

الولادة بعد الجنين تكوّن ينمو الطفل

- Zygote by mitosis forms fetus. After birth, mitosis permits the growth of the child.

النباتات نصفي جيل يُعرف الجيل المشيجي كامل العدد جيل الجيل البوغي

- **Plants** have a haploid generation , known as **gametophyte,** and diploid generation called **sporophyte.**

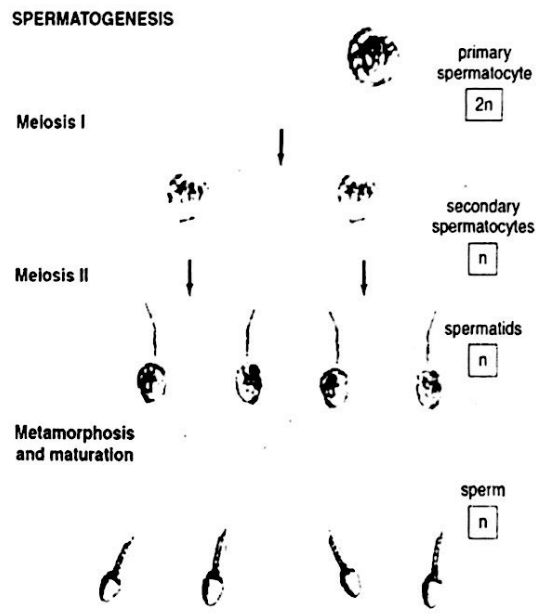
أرضية الغابات الصخور ينمو العفن

- **Mosses** growing on bare rocks and forest floors are the haploid generation, and the diploid generation is short-lived. قصير العمر

- In most **fungi** and **algae**, the zygote is the only diploid portion of the life cycle, and it undergoes meiosis. Therefore, the black mold that grows on bread and the green scum are haploid.
- The majority of **plant species**, including pine, corn, and sycamore, are usually diploid, and the haploid generation is short-lived.

• Spermatogenesis and Oogenesis in Humans

- In human males, **spermatogenesis** occurs within the **testes**, and in females, **oogenesis** occurs within the **ovaries**.



• The testes :

spermatogonia "stem cells" (46 Chr.) ⟶ primary spermatocytes (46 Chr.)
meiosis I ⟶ two secondary spermatocytes(23 Chr.) ⟶ meiosis II

four spermatids (23 Chr.) ⟶ (spermatozoa) "Sperm"(23 Chr.)

The ovaries :

contain stem cells called **oogonia** that produce many **primary oocytes** (46 chromosomes) during fetal development. They even begin oogenesis, but only a few continue when a female is sexually mature.

The result of meiosis I is **two haploid cells** (23 chromosomes).

معظم تستقبل خلايا بيضية ثانوية

- One of these cells, termed the **secondary oocyte** receives almost all the cytoplasm.

الثانية جسم قطبي تتحلل تنقسم مرة أخرى

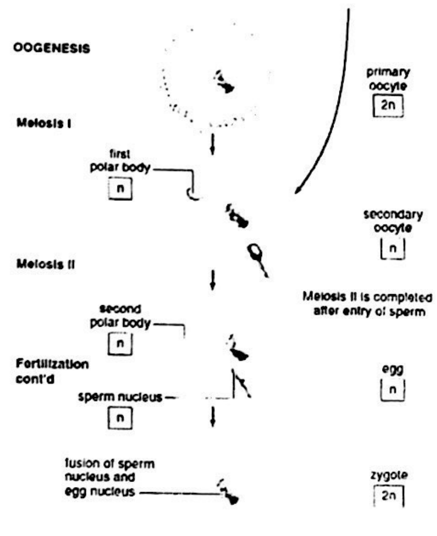
- The other is a **polar body** that may either disintegrate or divide again.

تبدأ تتوقف

The **secondary oocyte** begins meiosis II but stops at metaphase II.

تترك المبيض قناة البيض

Then the secondary oocyte leaves the ovary and enters an **oviduct**.



28) Spermatogenesis produces ....

A. Skin cells B. Sperms C. Eggs D. Brain cells

29) .... is involved in the growth of the child and repair of tissues. A. Meiosis I B. Meiosis I C. Mitosis

30) The testes of human male contains stem cells called.......while the ovaries contain.......... A. spermatogonia – Oogonia B. Oogonia – spermatogonia

31) Primary spermatocyte is ....while Secondary spermatocyte is.......... A. diploid --- haploid B. haploid – diploid

32) Primary oocyte is ....while Secondary oocyte is............ A. diploid --- haploid B. haploid – diploid

33) ....receives almost all the cytoplasm after meiosis I of primary oocyte. A. Secondery oocyte B .Polar body

34) In human male spermatogenesis occurs within.............. A. sperm B. ovaries C. testes D. egg

35) In human Female oogenesis occurs within.............. A. sperm B. ovaries C. testes D. egg

36) The egg leaves the ovary and enters an oviducts after: A. Metaphase -I B. Metaphase-II C. Prophase-I D. Prophase-II

37) Plants have a haploid generation , known as the sporophyte, and diploid generation called the gametophyte. A.True B. False

38) Cells are making mitosis for:

A. Maintaining the chromosome number in all body cells.

B. Formation of Gametes.

C. Growth and repair tissues.

D. Both A and C are correct.

KEY ANSWERS													
	1)	B	2)	C	3)	A	4)	C	5)	D	6)	D	7)	A
	8)	B	9)	A	10)	C	11)	A	12)	B	13)	B	14)	A
	15)	A	16)	A	17)	B	18)	C	19)	B	20)	C	21)	A
	22)	C	23)	A	24)	C	25)	C	26)	A	27)	A	28)	B
	29)	C	30)	A	31)	A	32)	A	33)	A	34)	C	35)	B
	36)	B	37)	B										

With my best wishes

د. عبدالرزاق ٠٥٥٩١٣٢٤٧٥ .