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١٤٣٩.. النصف الدراسى الاول .. دفعة ١٨.. الدوري النهائي

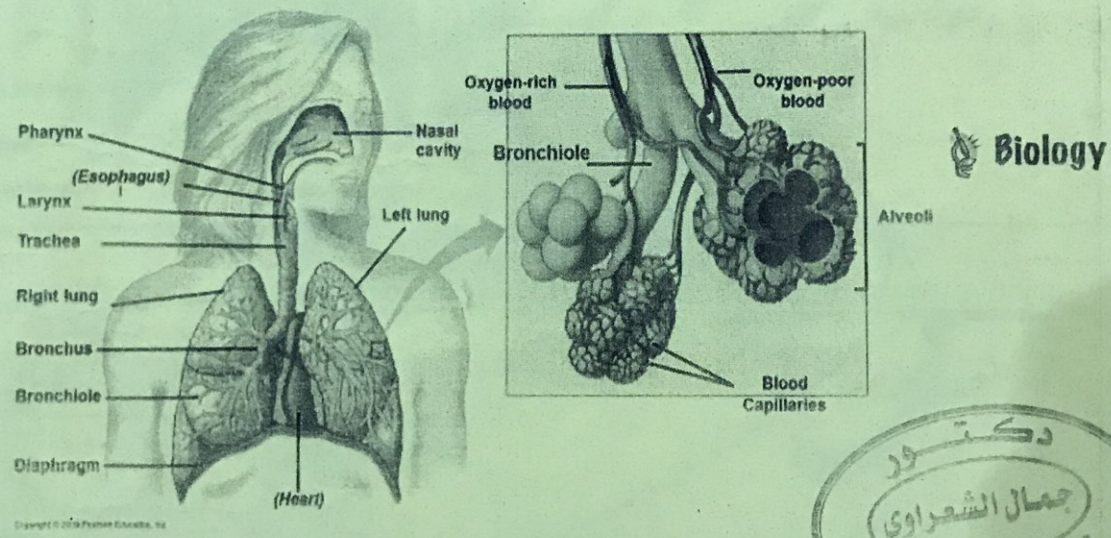
د. جمال الشعراوي

شابتر ٩ و ١٠

(تبادل الغازات)

جزء ١

Chapter (9):- Gas exchange



The anatomy of the human respiratory system (left) and details of the structure of alveoli (right)

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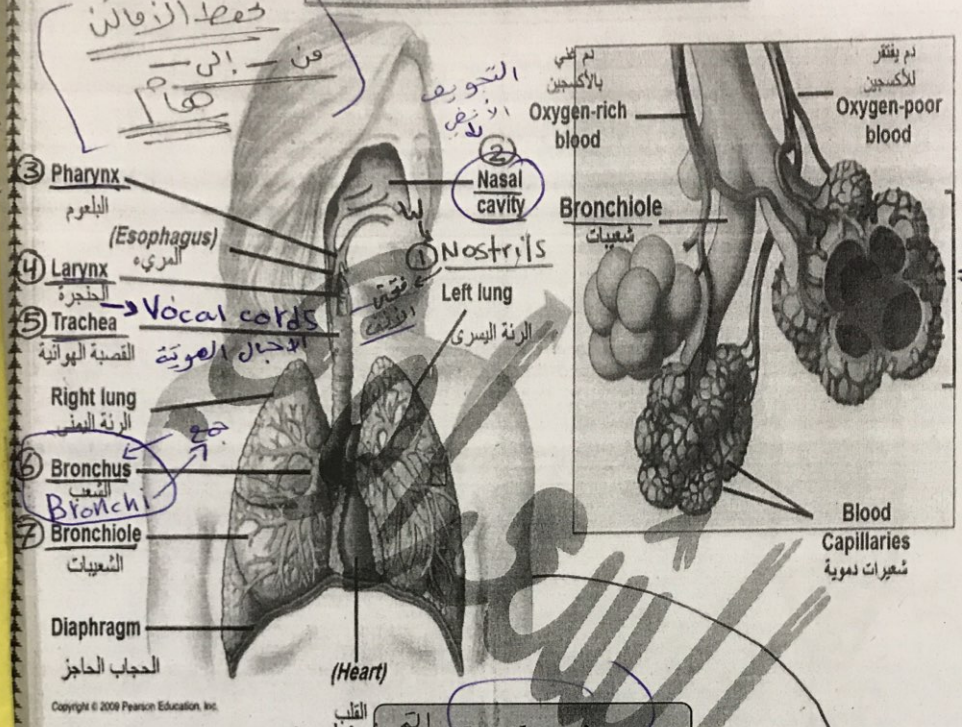
تركيب الجهاز التنفسى



Nasal cavity

- ✓ *In mammals, air is inhaled through the nostrils into the nasal cavity where:-*
  1) *Air is filtered by hairs & mucus surfaces*
  2) *Air is warmed and moisturized.*
  3) *Air is sampled for odors.*

Alveoli (Alveolus)

- ✓ *Surrounded by capillaries.*
- ✓ *Is the actual site of gas exchange*
- ✓ *Huge surface area (100 m^2 in humans)*
- ✓ *O_2 diffuses into the blood.*

ملحوظة

- ✓ *Bronchioles ends in grape like cluster of air sacs "bubbles" called (alveoli).*
- ✓ *In the human respiratory system, air passes from nasal cavity to pharynx*

* CO_2 out blood

انتقال O2 & CO2 بين الرئة والنسيج

During the transport of gases between alveoli and blood :-

- ✓ Gases in alveoli have more O_2 and less CO_2 than blood
- ✓ O_2 moves from alveoli of the lungs into blood
- ✓ CO_2 moves from blood into the alveoli of lungs

In the lungs, blood :-

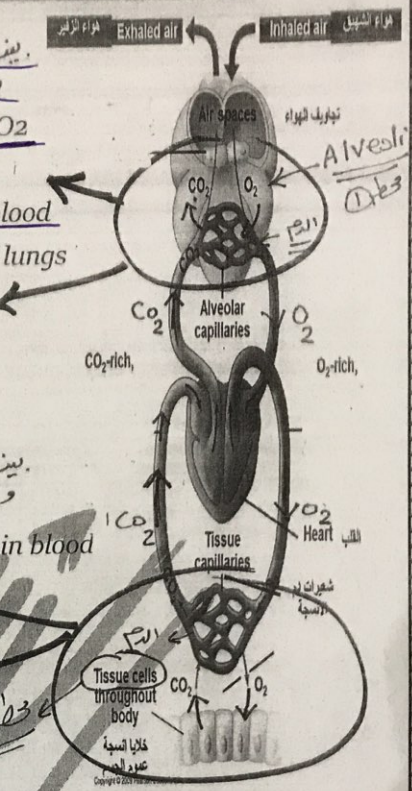
- ✓ Picks up O_2
- ✓ Drops off CO_2

During the transport of gases between blood and tissues :-

- ✓ Tissues have more CO_2 and less O_2 than in blood
- ✓ O_2 moves from blood into tissues
- ✓ CO_2 moves from tissues into blood

In the body tissues, blood :-

- ✓ Drops off O_2
- ✓ Picks up CO_2



حمل O2 & CO2 داخل الدم

- ✓ CO_2 in the blood is transported as bicarbonate ions in the plasma.
- ✓ Oxygen transport by binding to respiratory pigments:-

1) The iron-containing pigment (hemoglobin)

- ✓ is found in almost all vertebrates
- ✓ Is found in many invertebrates
- ✓ transports oxygen
- ✓ transports CO_2
- ✓ Buffers blood

2) The copper-containing pigment (hemocyanin) :-

- ✓ Is found in Arthropods (insects)
- ✓ is found in Mollusca

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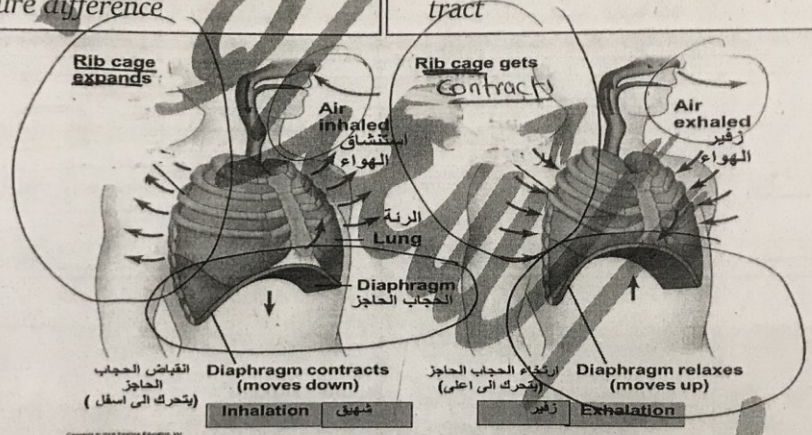
الشهيق والزفير

Inhalation occurs when

- ✓ The diaphragm moves downward
- ✓ The rib cage expands (rises)
- ✓ The volume of the chest cavity increases, lowering the air pressure around lungs
- ✓ Air rushes into lungs to equalize pressure difference

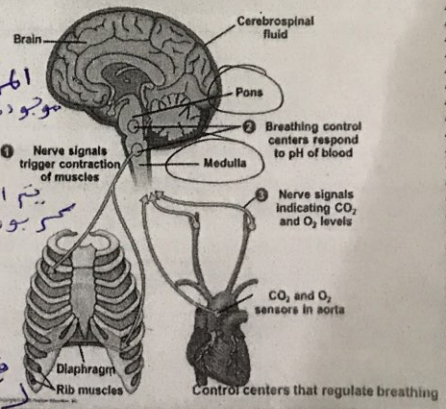
Exhalation occurs when

- ✓ The diaphragm moves upward
- ✓ The rib cage contracts
- ✓ The volume of the chest cavity decrease
- ✓ The pressure around lungs increases
- ✓ Air is forced out of the respiratory tract



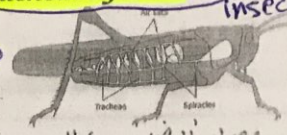
مراكز التحكم فى التنفس

- ✓ Breathing is usually under automatic control.
- ✓ It is controlled by two centers at the base of the brain, the pons and medulla oblongata.
- ✓ Breathing control centers in the brain sense and respond to CO_2 levels in the blood.
- ✓ A decrease in blood pH, increases the rate and depth of breathing
- ✓ Aorta and carotid arteries have O_2 sensors which signal the brain to increase breathing.



أنواع الأسطح التنفسية

- The major site of gas exchange in fish is gills.
- The major site of gas exchange in arthropods are tracheal systems
- The major site of gas exchange in ____ are lungs



1. Tetrapods that live on land
2. ✓ Birds and Mammals → (More complex lungs due to higher metabolic rates)
3. ✓ Non bird Reptiles → (Simple lungs due to lower metabolic rates)

- Amphibians use ____ as the respiratory surface

1. ✓ Small lungs
2. ✓ Their body surfaces

- The skin is the major site of gas exchange in:-
  - ✓ Earthworms
  - ✓ Flatworms.
  - ✓ Sponges.
  - ✓ Jellies.

Gills

- ✓ Fish.
- ✓ Absorb oxygen.
- ✓ Release carbon dioxide.
- ✓ Are extensions of the body.
- ✓ Increase the surface area for gas exchange.
- ✓ Increase the surface to volume ratio.

ملحوظة

- ✓ Cellular respiration ($Glucose + O_2 \rightarrow CO_2 + H_2O$) requires a continuous supply of oxygen and the disposal of carbon dioxide
- ✓ Respiration taking up O_2 and giving up CO_2

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د . جمال الشعراوي

جزء ٢

Chapter (9):- Gas exchange

احياء كيمياء حيوية للكليات الطبية جدة

05568062264

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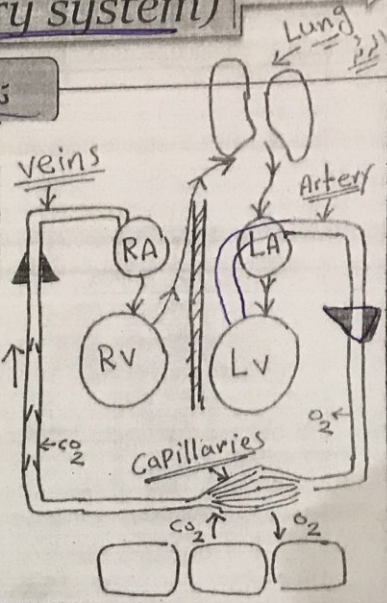
الجهاز الدوري (Circulatory system)

تركيب الجهاز الدوري

1 ، 2 ، 3

- **The heart** :→ القلب — عضو
  - ✓ Pumps blood through body
- **The blood vessels** :→ الأوعية الدموية — أنابيب مجوفة — شبكة
  - ✓ Are networks of hollow tubes
  - ✓ Transport blood throughout the entire body
- **The blood** :- ← الدم — سائل
  - ✓ Carries food through body
  - ✓ Carries oxygen through bo
  - ✓ Carry waste to body cells



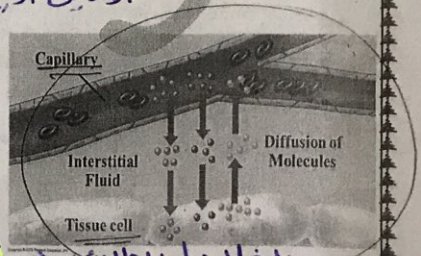
الأوعية الدموية (blood vessels)

- **Arteries** :- الشرايين — مخلفات
  - 1 ✓ Are under more pressure. — ضغط عالي
  - 2 ✓ Have thicker walls. — جدار قوي
  - 3 ✓ Carry blood away from the heart to body organs and tissues

30

- **Veins** : ← الأوردة — صمامات — صمام ذات طريق واحد
  - 1 ✓ Have one-way valves that restrict backward flow
  - 2 ✓ Force blood back to right heart atrium — الأذين الأيمن
  - 3 ✓ Have thin walls — جدار نحيف
  - 4 ✓ Are under less pressure — ضغط منخفض

- **Capillaries** : الشعيرات الدموية — ضيقة — ضيقة وتسير في صف واحد
  - 1 ✓ are narrow, blood cells flows in a single file
  - 2 ✓ composed of a single layer of epithelial cells — الخلايا الطلائية
  - 3 ✓ increases surface area for gas and fluid exchange
  - 4 ✓ exchange gas and other transfers in the capillary beds ← فرش الشعيرات
  - 5 ✓ Endocytosis & exocytosis across membrane & Diffusion based on electrochemical gradients → تدرج الكهروكيميائية



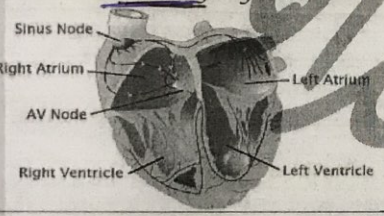
الغرف القلبية

Atria (Atrium)

- ✓ Two :- right and left atrium.
- ✓ Thin-walled.
- ✓ Move blood to ventricles.

Ventricles

- ✓ Two :- right and left atrium.
- ✓ Thick-walled.
- ✓ Pump blood to lungs and all other body regions.



In the four-chambered heart

- ✓ There are two atria and two ventricles
- ✓ The left side of the heart pumps blood from lungs to body
- ✓ The right side of the heart pumps blood from body to lungs
- ✓ Oxygen rich blood is completely separated from oxygen poor blood
- ✓ Two circuits that do not mix → much more efficient gas transport
- ✓ In Birds, mammals and crocodilians
- ✓ Needed in endothermic animals.

بعض التعريفات

The heart rate : →

- ✓ Defined as the number of beats/minute

The cardiac output : →

- ✓ Is the amount of blood / minute pumped into systemic circuit

The heart valves : →

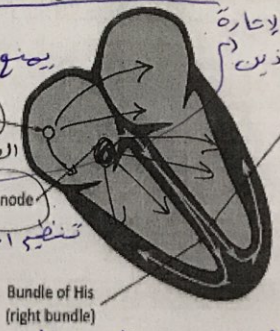
- ✓ Prevent the backflow of blood

The pacemaker (SA node) : →

- ✓ Generates electrical signals in atria
- ✓ Sets the rate of heart contractions

The AV node : →

- ✓ Relays electrical signals to the ventricles



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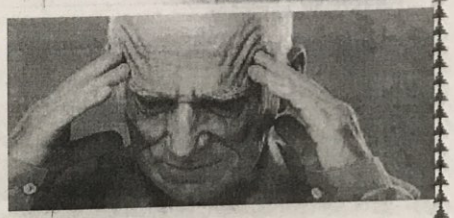
بعض الأمراض

A heart attack → السكتة القلبية

- ✓ The damage to cardiac muscle typically → تحطم القلب
  from a blocked coronary artery انسداد الشريان التاجي

Stroke → السكتة الدماغية

- ✓ Is the death of brain tissue تحطم الدماغ
- ✓ from blocked arteries in the head



The heart murmur :→ لفظ القلب

- ✓ Is a defect in one or more heart valves

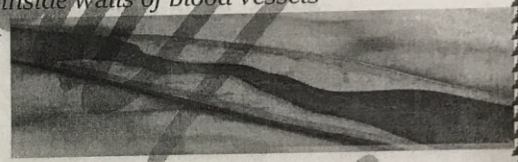
صمام السؤال

Atherosclerosis :→ تصلب الشرايين

مشكلة في الصمام

نمو النزر البيني

- ✓ Is the development of plaques inside walls of blood vessels
- ✓ Reduced the blood flow تقلل سريان الدم
- ✓ Narrows the blood vessels



تضيق الممر في الأوعية الدموية

The blood pressure :- ضغط الدم

قوة الدم على الجدار

1. ✓ Is defined as the force blood exerts on vessel walls
2. ✓ Highest in arteries and lowest in veins الضغط عالي في الشريان
3. ✓ Decreases as as blood moves away from heart. الضغط يقل كلما ابتعد عن القلب
4. ✓ Depends on cardiac output and resistance of vessels يعتمد على كمية ومرونة الوعاء
5. ✓ Increased during violent exercise يزداد مع التمرين القوي
6. ✓ Is measured as systolic (1) and diastolic (2) pressure يقاس بقراءتين

عالي بسبب الانقباض في البطين

- Systolic pressure: → high pressure caused by ventricular contraction.
- Diastolic pressure: → low pressure between heart contraction.

مكونات الدم (BLOOD)

A) Plasma (55%)

- ✓ Is liquid part of blood.
- ✓ is about 90% water and contains :-
  1) Various inorganic ions. 2) Proteins: (immunoglobulin).
  3) Nutrients. 4) Wastes, gases. 4) Hormones
- ✓ The immunoglobulin are proteins that help the body in Defense

B) Cellular elements (45%) (Red, white blood cells & platelets)

1) The Red ..... blood cells (erythrocytes):

- ✓ Transport O_2 bound to hemoglobin
- ✓ Transport carbon dioxide (CO_2)

Anemia:-

1- Abnormally low amounts of hemoglobin or red blood cells.

2- Causes fatigue due to lack of oxygen in tissues.

Erythropoietin hormone (EPO) Regulates red blood cell production.

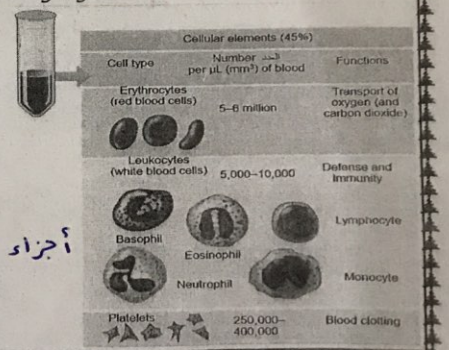
Some athletes artificially increase their red blood cell production by injecting erythropoietin

2) The white blood cells (leukocytes):

- ✓ Function inside and outside the circulatory system
- ✓ fight cancer
- ✓ fight infections
- ✓ Defense and Immunity

3) The platelets

- ✓ Are small fragments of cells
- ✓ Promote clotting



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Clotting (عملية التجلط)

تتحول الى

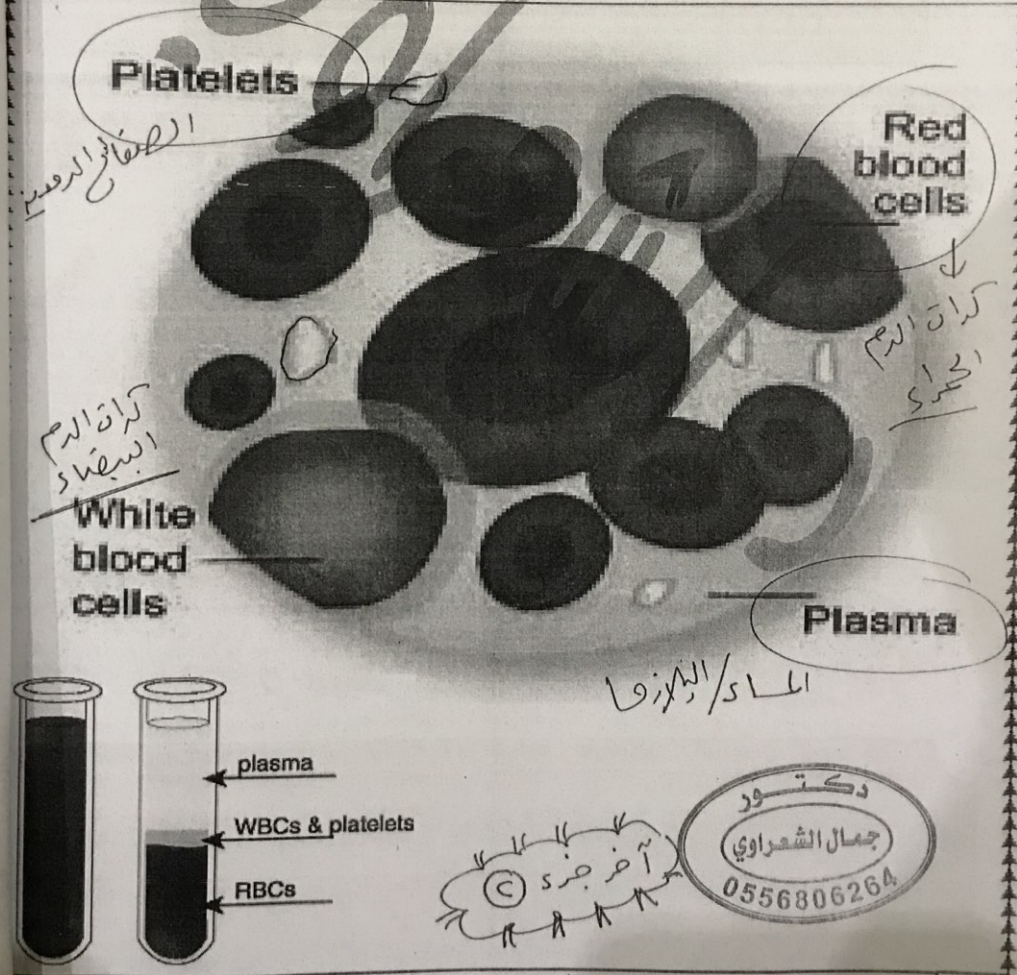
والتحويلة هاذي تسمى clotting

- Plasma contains fibrinogen, which is converted into fibrin that help in in blood clotting
  * عملية تحويل Fibrinogen إلى Fibrin تساعد عملية تجلط الدم
- When a blood vessel is damaged, Platelets help trigger the conversion of fibrinogen to fibrin which makes knit that forms a clot and plugs leak

  ينجرح الوعاء الدموي — تحول

  - ✓ Platelets adhere to exposed connective tissue.
  - ✓ Platelets form a plug.
  - ✓ A fibrin clot traps blood cells.

clotting — جلط



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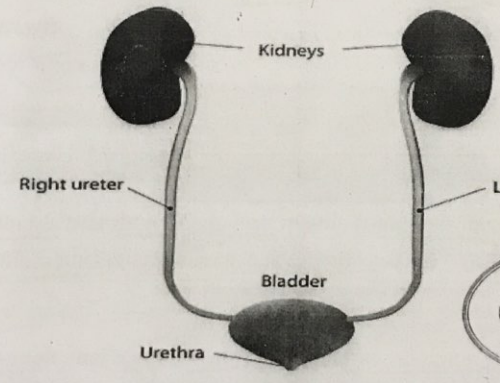
Chapter (10):- Excretion

الإخراج



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تعريفات

- The maintenance of steady internal conditions despite fluctuations in the external environment is called :→
  - ✓ Homeostasis ← الاتزان الحيوى
- The maintenance of internal temperature within narrow limits is called:→
  - ✓ Thermoregulation ← التوازن الحرارى
- The control of the gain and loss of water and solutes:→
- The active regulation of the osmotic pressure of an organism fluids :→
  - ✓ Osmoregulation ← التوازن الاسموزى
- The disposal of nitrogen-containing wastes:-
- Is the process by which waste products are eliminated from an organism.
  - ✓ Excretion ← الإخراج

التنظيم الحرارى

A) Endothermic Animals

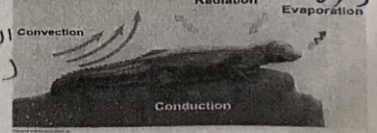
- ✓ Are Animals that derive body heat mainly from their metabolism
- ✓ Birds, mammals, many insects a few reptiles

B) Ectothermic Animals

- ✓ Are Animals that absorb heat from their surroundings
- ✓ Many fish, most amphibians, lizards, most invertebrates

Animals exchange heat with the environment by :-

- ✓ ① Conduction
- ✓ Convection
- ✓ Radiation
- ✓ Evaporation



تكيفات أو وسائل

The adaptations that promote the process of thermoregulation:-

1) Increased metabolic heat production:- إنتاج زيادة الأيض للتوازن الحراري

1✓ Hormonal changes boost metabolic rate in birds and mammals تغيرات هرمونية ← ضدات هرمونية

2✓ Shivering ارتعاش

3✓ Increased physical activity ← زيادة ← الرياضة

4✓ Honeybees cluster and shiver ← ارتعاش تجمع نحل العسل

2) Circulatory adaptations:- ← وسائل دورة دموية

1✓ Increased or decreased blood flow to skin by changing diameter of skin blood vessels ← تدفق الدم للجلد ← زيادة أو نقصان الدم في الجلد عن طريق الأوعية الدموية

2✓ Large ears in elephants الأذن الكبيرة للفيل

3✓ Countercurrent heat exchange ← تبادل حرارة بالعكس ساخن مع بارد

3) Insulation:- ← العزل

1✓ Hair ← الشعر

2✓ Feathers ← الريش

3✓ Fat layers ← طبقات الدهن

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4) Evaporative cooling :- ← التبريد بالتبخير

1✓ Sweating ← العرق

2✓ Panting ← اللهث

5) Behavioral responses ← إستجابة سلوكية

1✓ Used by endotherms and ectotherms

2✓ Examples: العرق الشمس الظل

- Moving to the sun or shade
- Migrating ← الهجرة
- Bathing ← السباحة

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التنظيم الأسموزي

تعريف في بداية التابر

A) Osmoconformers

متوافقة إسموزياً

- Have the same internal solute concentration as sea water
- Many marine invertebrates ← اللافقاريات البحرية

الملح الداخلي نفس ماء البحر

B) Osmoregulators

← تحمل تنظيم اسموزي

وإذا جت فرق بين هادي والخارجي

1) The freshwater fish ← سمك الماء العذب

1 – Excrete excess water

2 – Excrete excess water by urine ← تخرج الماء الزائد في البول

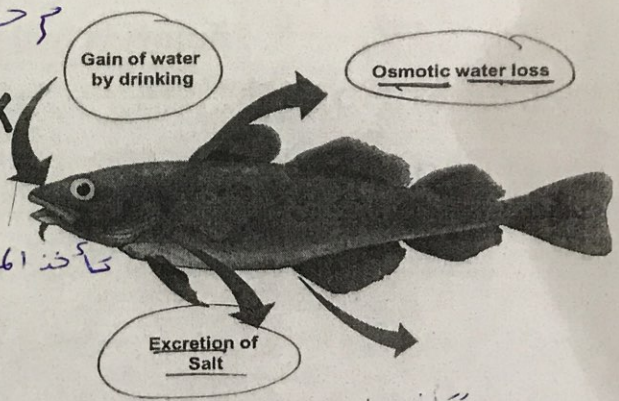
3 – Uptake salt across their gills ← تأخذ الملح

4 – Gain water by osmosis

لو تبقا تكسب ماء بـ Osmosis

2) The saltwater fish :→ ⊗ XX

سمك الماء المالح ← تم حذفه



1 – Pump out excess salt ← تخرجه ملح

2 – Drink seawater ← تأخذ الماء بـ Drink

3 – Lose water by osmosis ← تفقد الماء بـ Osmosis

تم حذفه من السلابيبس

3) The land animals conserve water using:→ ⊗ XX

الحيوانات الأرضية تحافظ

1 – Waterproof Skin ← الجلد المانع للماء

2 – Kidneys ← الكلى

3 – Behavior adaptations ← تصرف وسائل سلوكية

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الاخراج

التعريف موجود في بداية الفقاريات

☞ **In vertebrates the excretion is primarily carried out by :→** الإخراج في الفقاريات يتم بواسطة تعمل

✓ *Kidneys* ← الكلى

✓ *Skin* ← الجلد

* الجهاز الإخراجي يتضمن زوج من الكلى

الجهاز الإخراجي للثدييات — زوج من الكلى

☞ *The mammalian excretory system centers on paired kidneys, which are also the principal site of water balance and salt regulation.*

في الثدييات — تقصب — الحالبان — البول تصب

☞ **In mammals, the ureters drain urine into:→** * صح

✓ *urinary bladder* ← المثانة البولية

يطرد خارج الجسم

☞ **In mammals, the urine is expelled through :-*** صح

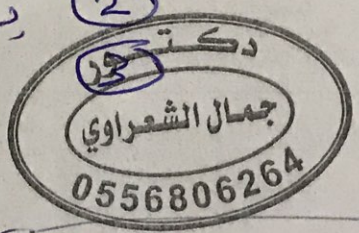
✓ *Urethra* ← قناة مجرى البول — البول يخرج من كل قناة عن طريق الحالب

☞ *Urine exits each kidney through a duct called the ureter* — الحالب

من كل على

☞ **The excretory system:-** ← الجهاز الإخراجي

1. ✓ *Expels wastes* — يخرج المخلفات
2. ✓ *Regulates water balance* — ينظم الماء
3. ✓ *Regulates ion balance* — " " الأيونات



☞ **Nephrons:→** (النفرون)

الوحدة الوظيفية للكلى هي النفرون

✓ *Functional units of the kidneys*

* غير موجودين التفاصيل ولا الست بانك

✓ *Extract a filtrate from the blood* — البول — استخلاص البول

✓ *Refine the filtrate to produce urine* — تكرير البول

البول

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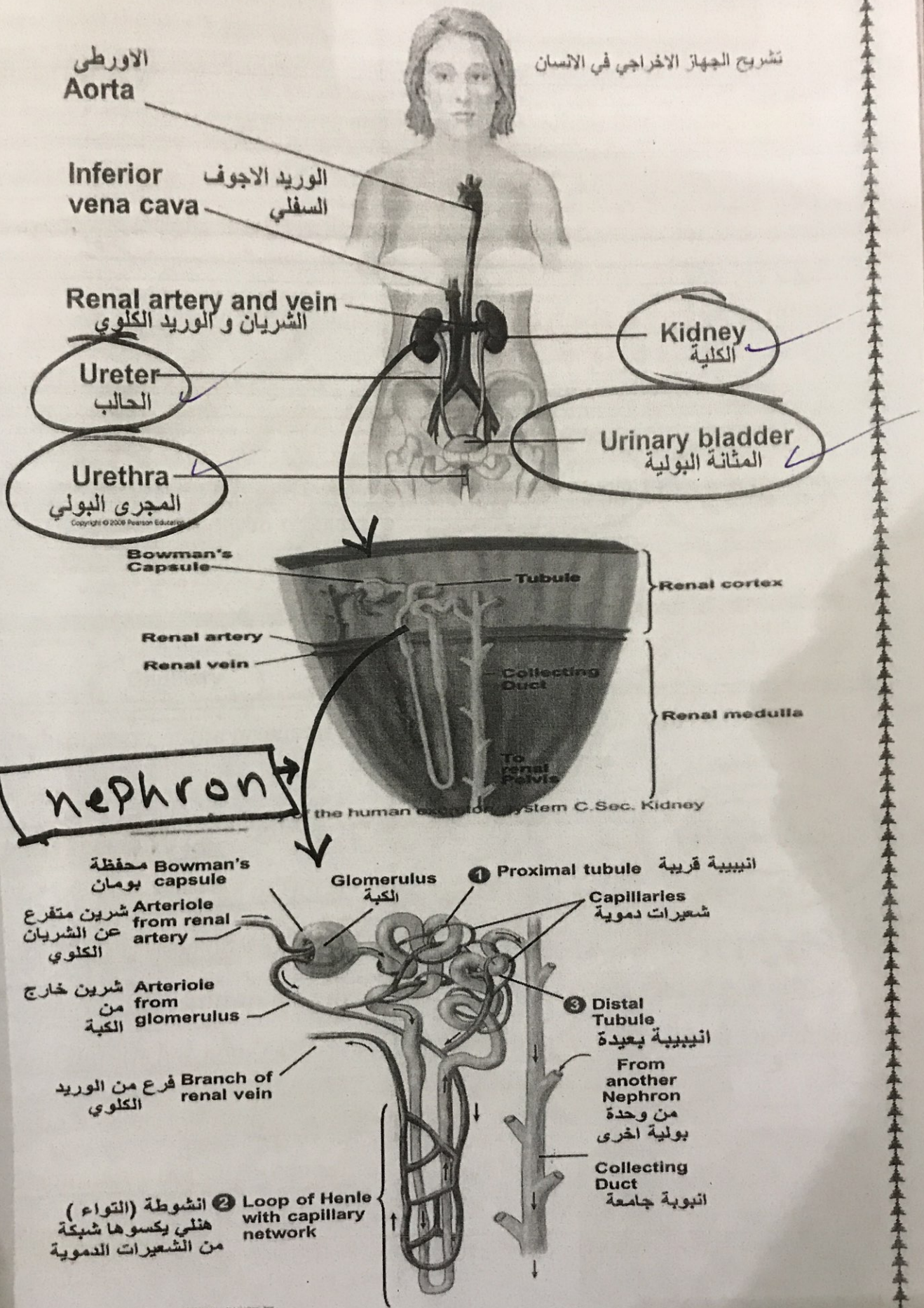
تشريح الجهاز الاخراجي في الانسان



ما هي العمليات الإخراجية التي تحدث في الجهاز البولي

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٤ The key excretory processes of the urinary system: (العمليات الإخراجية)

A) Filtration:- الترشيح في الجهاز البولي

- ✓ Blood pressure forces water and many small solutes into the nephron

ضغط الدم يدفع الماء والأشياء الصغيرة لتدخل في النفرون

B) Reabsorption:- إعادة الإمتصاص

- ✓ Valuable solutes are reclaimed from the filtrate

المعادة — المذابة — حاجة قيمة ترجع من البول

C) Secretion:- ← الإفراز

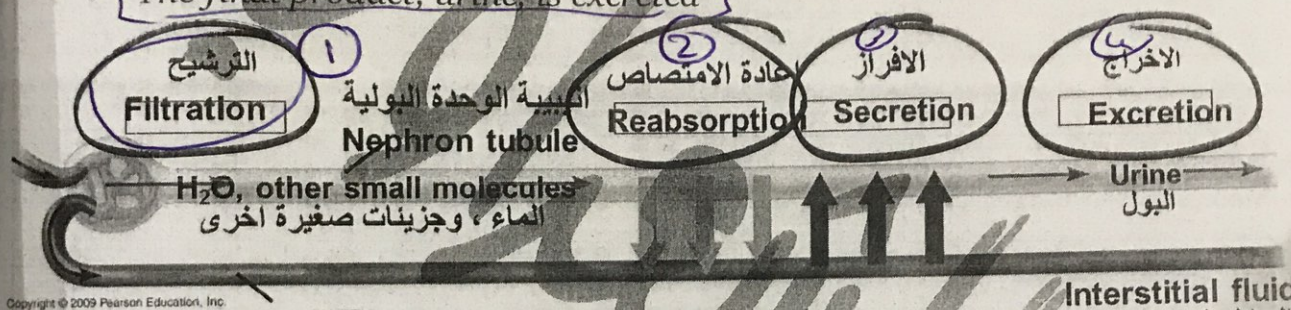
- ✓ Excess toxins and other solutes from the body fluids are added to filtrate

تضاف إلى البول

D) Excretion:- ← الإخراج النهائي

- ✓ The final product, urine, is excreted

المواد الزائدة ترجع للبول



- ☞ Reabsorption in the proximal and distal tubules removes Nutrients, Salt, Water

جوهرية

- ☞ pH is regulated by:- ← تنظم ← حموضة الدم

إضافة قاعدة

- ✓ ✓ Reabsorption of HCO3- ← إعادة إمتصاص قاعدة
- ✓ ✓ Secretion of H+ ← إفراز الحمض

يعيد الماء — الملح

- ☞ High NaCl concentration in the medulla promotes reabsorption of water.
- ☞ Antidiuretic hormone (ADH) regulates amount of water excreted by kidneys

ينظم — تُنقذ

هرمون مضاد لخروج الماء

The kidney dialysis can be a lifesaver by:- (غسيل الكلى)

على الملح يحافظ

- ✓ Maintaining the solute concentration in the blood
- ✓ Removing wastes from the blood

المخلفات تزيل

صح جداً

8 December 2017

تخلص الحيوانات من المخلفات النيتروجينية

☞ The nitrogenous wastes are toxic breakdown products of :-

1. Nucleic acids
2. Protein

☞ The animals dispose of nitrogenous wastes in the form of :-

1) Ammonia 2) Urea 3) Uric acid

1) Ammonia

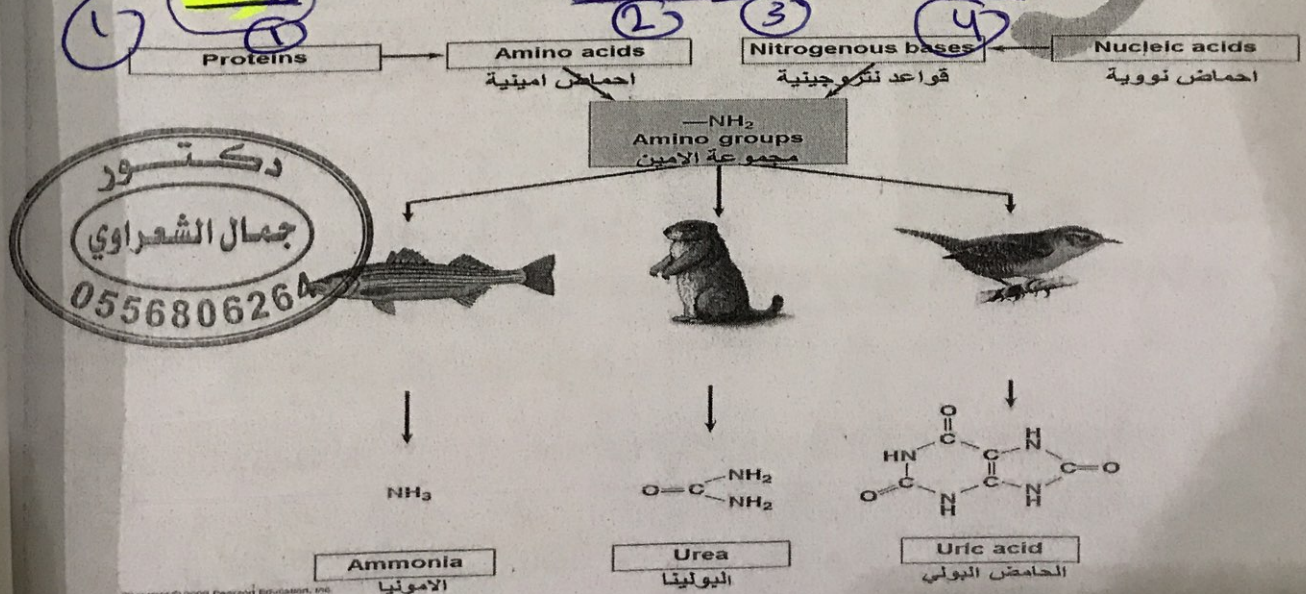
1. Poisonous
2. Soluble in water
3. Easily disposed of by aquatic animals

2) Urea

1. Less toxic
2. Easier to store
3. In mammals, amphibians, sharks, and some bony fishes.

3) Uric acid

1. Birds and many other reptiles, insects, land snails



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الاخراج فى النبات

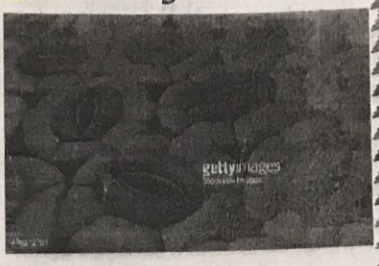
فائض

☞ *Excess of CO_2 or O_2 gases in the plant leaves exit through:-*

(1) ✓ Stomata ← الثغور (1)

(2) ✓ penetrating the external cell on surfaces

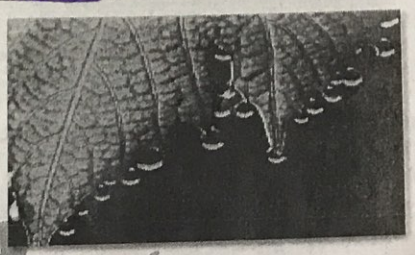
directly to the air ← السطح الخارجى مباشرة



(1) ☞ *Secretion of water and its solutes by hydathodes found in the leafs epidermis of some plants is called :-*

فتحات مائية ← الماء إفراز

✓ Guttation (الدموع)



(2) ☞ *The evaporation of water from the surface of leaves through stomata is called :-*

بتبخير الماء

الثغور ←

✓ Transpiration ← النتح

(3) ☞ *The halophytes excrete the excess salts outside their body by :-*

النبات الملحى

✓ Special salt glands ← غدد ملحية خاصة

(4) ☞ *In aquatic plants the excess of amino acids are converted to :-*

النبات المائى

يخرج النيتروجين على شكل (N_2)

(1) (2)

✓ Ammonia and keto acids

☞ *The terrestrial plants convert excess amino acids into :-*

النبات الأرضى

(1) (2)

✓ Uric acid and Keto acids

آخر شيء (10)

١٤٣٩.. النصف الدراسي الاول .. دفعة ١٨.. الدوري النهائي

د. جمال الشعراوي

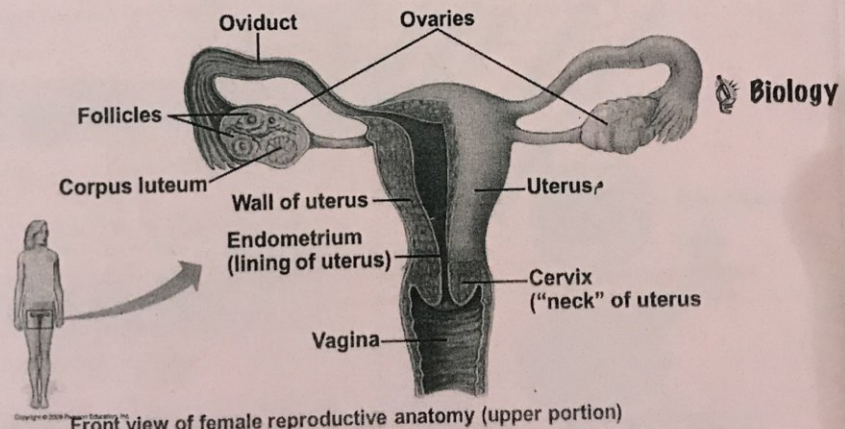
ملخص / عزوز

شابتر ١١ و12 (التكاثر)

Chapter (11):- Reproduction

ورقة ١٨ علم

Biology Biology Biology Biology Biology Biology

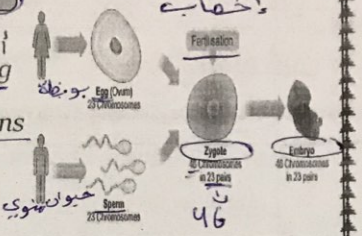


Front view of female reproductive anatomy (upper portion)

أنواع التكاثر

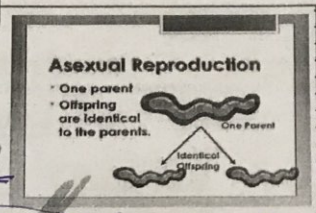
Sexual reproduction ← التكاثر الجنسي

- ✓ Slow reproduction بطيء
- ✓ two parents produces genetically different offspring أبوين مختلفين في الجينات أولاد
- ✓ Offspring are similar to parents, but show variations الأولاد تتابه فقط اختلافات
- ✓ inheritance of unique sets of genes from parents في الصفات مجموعات فريدة من الجينات من الوالدين لازم الوراثة



Asexual reproduction التكاثر اللاجنسي

- ✓ Very rapid reproduction سريع
- ✓ One parent produces genetically identical offspring طبق الأصل في الجينات
- ✓ Can proceed via Budding, Fission, and Fragmentation ① البرعم ② الانشطار ③ التجزئة



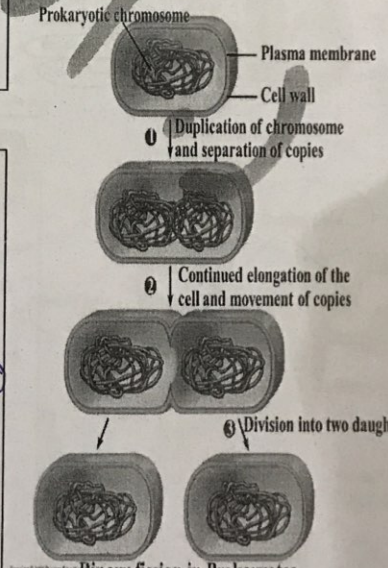
- ✓ Offspring Involves inheritance of all genes from one parent * كل الجينات من أب واحد فقط

Prokaryotes are reproduced by:- بدائية النوى

- ✓ asexually لاجنسياً تكاثر
- ✓ Binary fission ← الانشطار الثنائي

Binary fission

- ✓ means dividing in half انقسام نصفي
- ✓ Occurs in prokaryotic cells الخلايا البدائية
- ✓ produces two identical cells from one cell خليتين طبق الأصل من خلية واحدة
- ✓ resulted in duplication of a single circular chromosome تضاعف كروموسوم دائري واحد
- ✓ resulted in plasma membrane growth البلازما ينمو إلى inward
- inward at the midpoint to divide the cells



Binary fission in Prokaryotes

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الإخصاب هو اتحاد

تعريف الاخصاب وأنواعه

الإخصاب

Fertilization is the union of:-

- ✓ sperm and egg to form a di....ploid zygote

اتحاد الحيوان المنوي جنين ثنائي مع البويضة والناتج di Ploid Zygote

طريقتين للإخصاب

In Sexual reproduction , Sperm may be transferred to female by:-

1) External fertilization إخصاب خارجي

- ✓ Many fish and amphibian species.
- ✓ Eggs and sperm are discharged near each other. تقذف بالخارج

2) Internal fertilization إخصاب داخلي

- ✓ Some fish and amphibian species
- ✓ Nearly all terrestrial animals الحيوانات الأرضية
- ✓ Sperm is deposited in or near the female reproductive tract توضع القناة الأنثوية

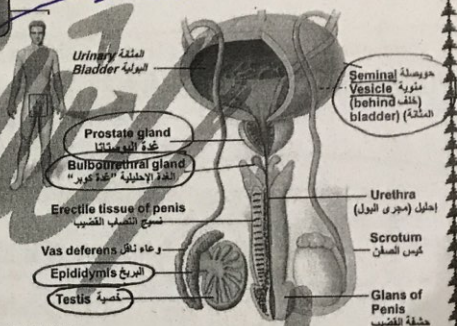
الجهاز التكاثري

الجهاز التكاثري الذكري

Human Male Reproductive anatomy

and hormones تفرز

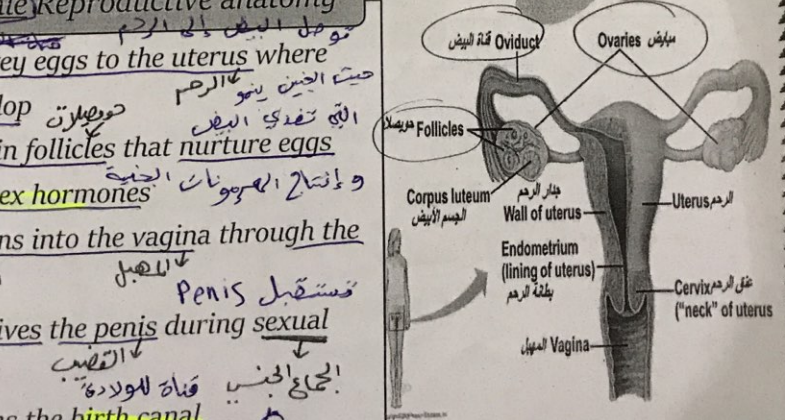
- ✓ Testes produce Sperm الخصية تنتج الحيوان المنوي
- ✓ Epididymis stores sperm as they develop further يخزن ينمو
- ✓ several glands contribute to semen غدد ملحقة تساهم السائل المنوي
  - ✓ Seminal vesicles ① حويصلة منوية
  - ✓ Prostate ② البروستاتا
  - ✓ Bulbourethral ③ غدة كوبر



الجهاز التناسلي الأنثوي

Human Female Reproductive anatomy

- ✓ Oviducts convey eggs to the uterus where embryos develop قناة البيض توصل البيض إلى الرحم حيث الجنين ينمو
- ✓ Ovaries contain follicles that nurture eggs and Produce sex hormones المبايض تحتوي البويضات التي تغذي البيض وإنتاج الهرمونات الجنسية
- ✓ An uterus opens into the vagina through the cervix الرحم يفتح للمهبل عنق الرحم
- ✓ A vagina Receives the penis during sexual intercourse المهبل يستقبل القضيب أثناء الجماع الجنسي
- ✓ A vagina Forms the birth canal قناة للولادة



Both sexes in humans:-

- A set of gonads where gametes (sperms & ovum) are produced
- Ducts for gamete transport
- Structures for copulation

Hermaphroditism

- One individual with male and female reproductive systems
- Easier to find a mate for animals less mobile or solitary.

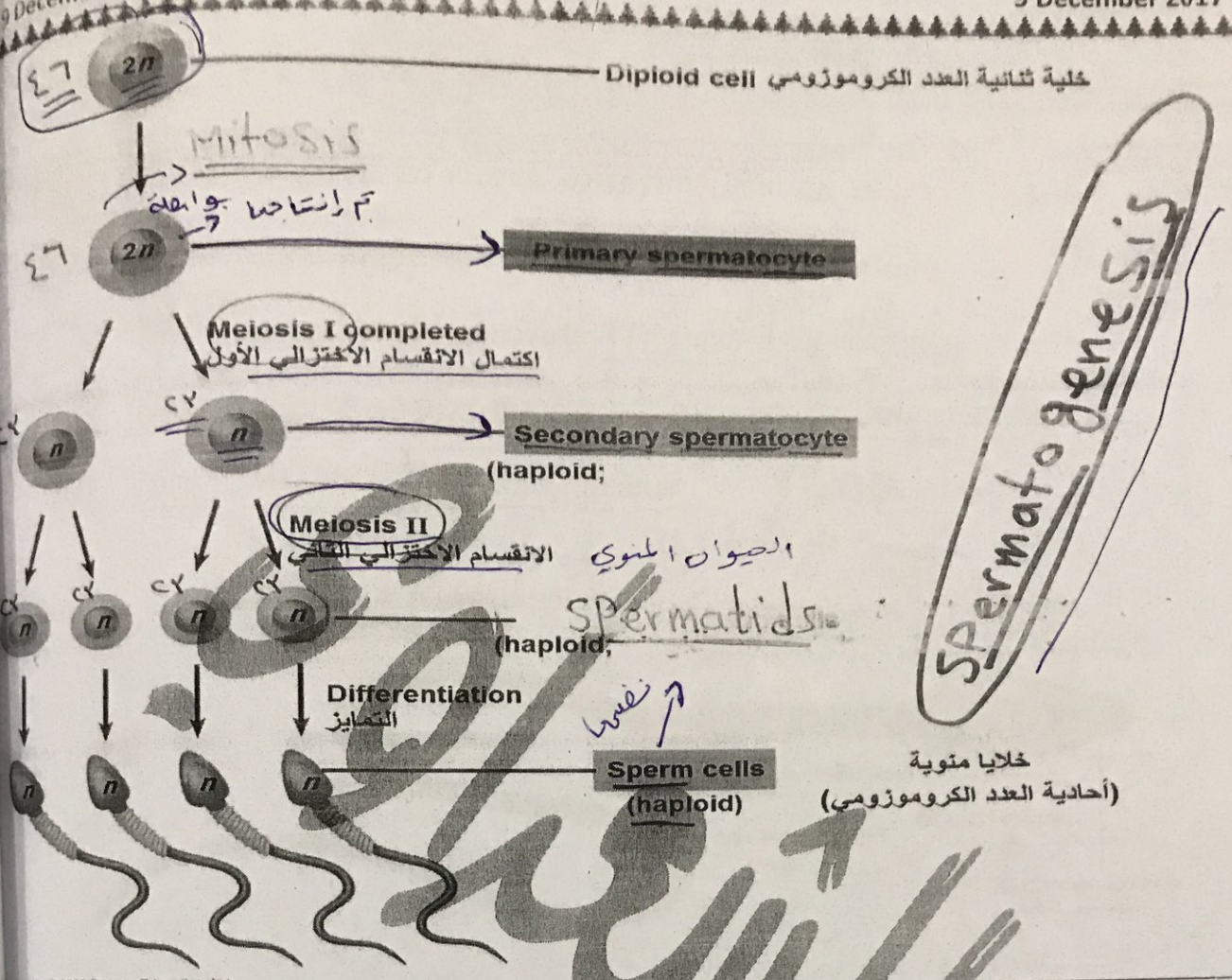
تكوين الحيوانات المنوية والبويضات

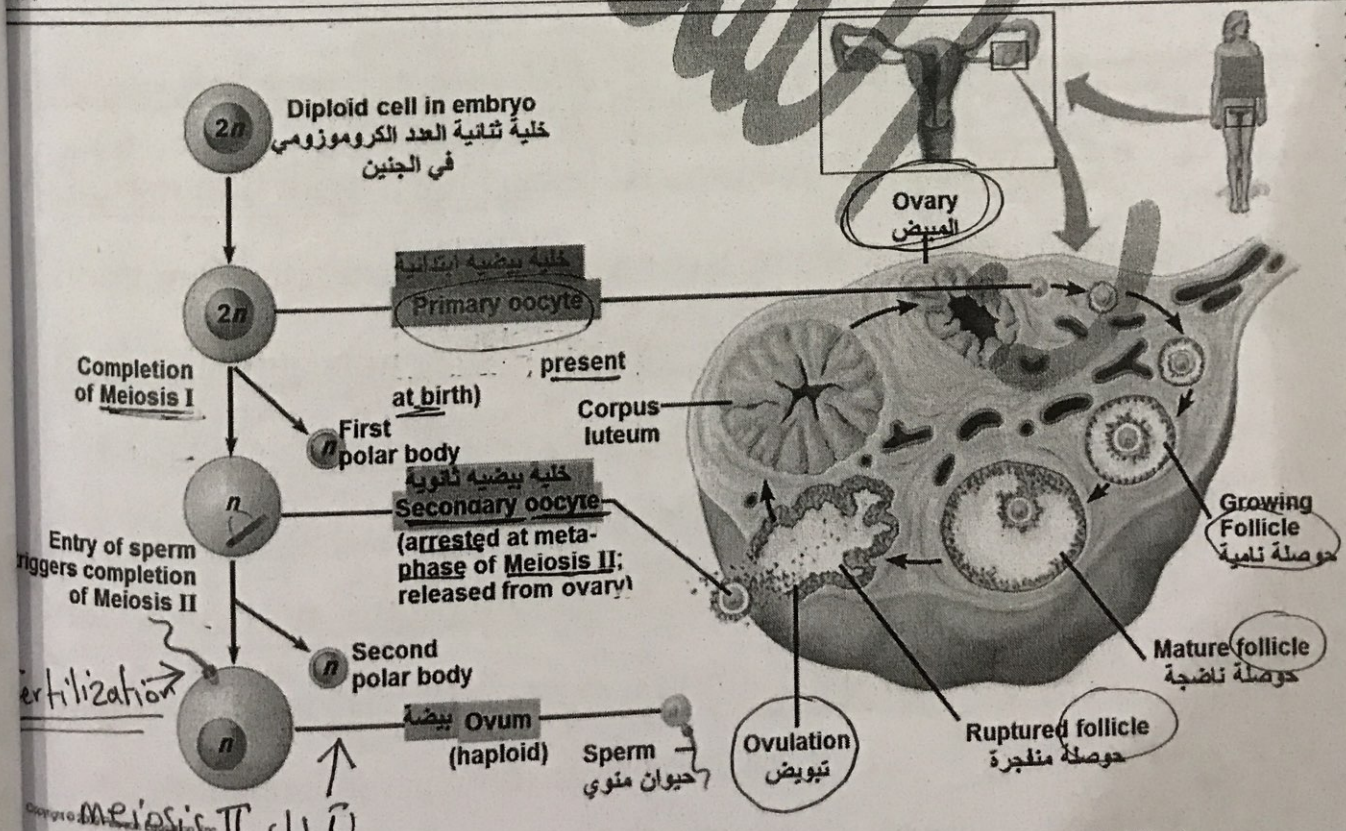
Spermatogenesis

- Is (the sperm formation) occurs in seminiferous tubules in testes
- Primary spermatocytes formed by mitosis.
- Primary spermatocytes divide by meiosis I to produce secondary spermatocytes
- Secondary spermatocytes divide by meiosis II to produce spermatids.
- Round spermatids differentiate into elongate sperm.

Oogenesis

- Is (the egg formation) Occurs in ovaries
- Begins before birth: diploid cells start meiosis and stop.
- Each month about one primary oocyte resumes meiosis.
- A secondary oocyte arrested at metaphase of meiosis II is ovulated
- Meiosis of the ovum is completed after fertilization





Oogenesis and the development of an ovarian follicle
عملية تكوين البيض ونضوج حوصلة مبيضية

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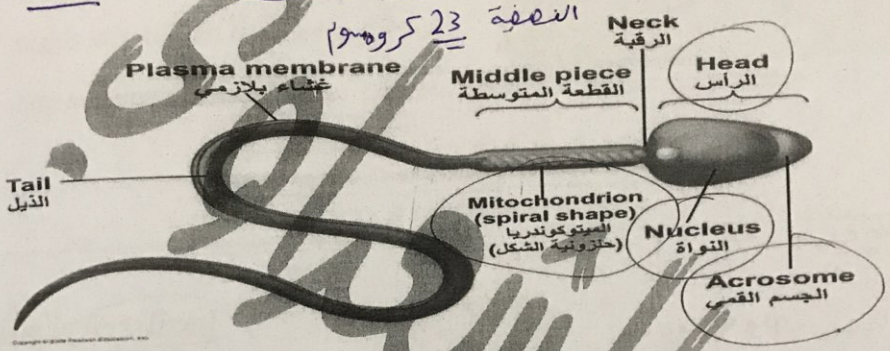
تركيب الحيوان المنوي

* تكيفات الحيوان المنوي للوصول إلى البويضة وتخصيبها

Sperm are adapted to reach and fertilize an egg via :-

1. ✓ Streamlined shape moves more easily through fluids
2. ✓ More ..... mitochondria provide ATP for tail movements
3. ✓ Head contains an acrosome containing penetrating enzymes
4. ✓ Head contains a haploid nucleus



الدورة الشهرية والمبيضية

Ovarian and menstrual cycles occur about every 28 days.

Hormones synchronize cyclic changes in the ovary and uterus

Hypothalamus signals the anterior pituitary to secrete:-

- ✓ Follicle-stimulating hormone (FSH):- Growth of a follicle
- ✓ Leuteinizing hormone (LH):- Ovulation

After ovulation, empty ovarian follicle becomes corpus luteum

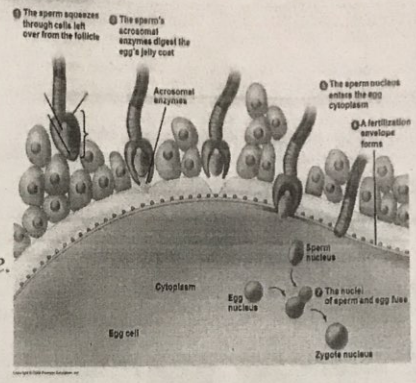
Corpus luteum secretes estrogen and progesterone hormones which:-

- ✓ Stimulate the endometrium to thicken
- ✓ Prepare the uterus for implantation of the embryo
- ✓ Inhibit hypothalamus, reducing FSH and LH secretion

أحداث الاخصاب

Fertilization events: →

- ✓ Sperm squeeze past follicle cells.
- ✓ Acrosomal enzymes pierce egg's coat.
- ✓ Sperm binds to vitelline layer.
- ✓ Sperm and egg plasma membranes fuse.
- ✓ Egg is stimulated to develop further.
- ✓ Egg and sperm nuclei fuse.



If egg is fertilized ← إذا تم إخصاب البويضة

1. ✓ Embryo releases hormones that maintain the uterine lining
2. ✓ Menstruation does not occur

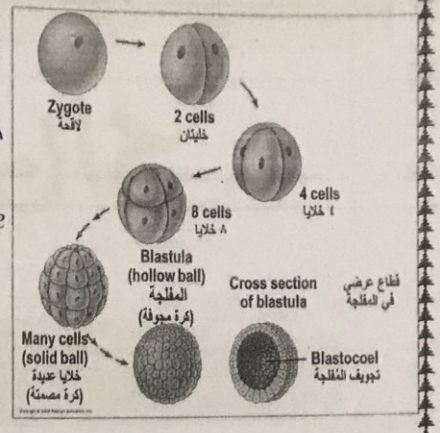
If egg is not fertilized ← إذا لم يتم إخصاب البويضة

1. ✓ Drop in LH shuts down corpus luteum and its hormones
2. ✓ Menstruation is triggered ← تحدث
3. ✓ Hypothalamus and pituitary stimulate development of a new follicle

مراحل التطور الجنيني

A) Cleavage :→ الإنقسامات — المرحلة الأولى

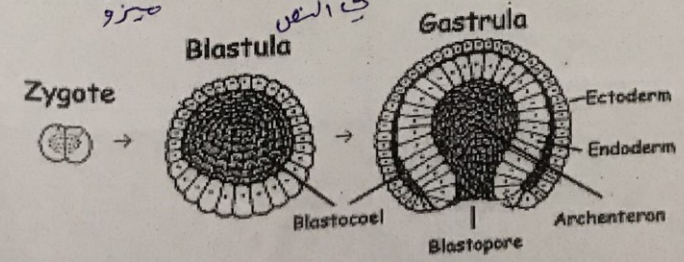
1. ✓ First
2. ✓ is a rapid series of cell divisions — انقسام سريع
3. ✓ produces a ball of cells from the zygote — كرة من خلايا
   called blastula ← اسمها كذا
4. ✓ new cells are smaller in size
5. ✓ Embryo is not getting larger — الجنين



☞ The blastula (ball of similar cells(resulted from cleavage) go to gastrulation ← كرة من الخلايا راحة للمرحلة الجاية

B) Gastrula :→ (جنين ذو ثلاث طبقات)

1. ✓ Second
2. ✓ Produces a three-layered embryo
   - ✓ 1) Ectoderm (outside):- becomes skin and nervous systems — جلد عصبي
   - ✓ 2) Endoderm (inside):- becomes digestive tract. ← قناة هضمية
   - ✓ 3) Mesoderm (in middle):- muscle and bone. — عضلات، عظام



آخر شابتر (11)

10 December 2017

١٤٣٩.. النصف الدراسي الاول .. دفعة ١٨.. الدوري النهائي

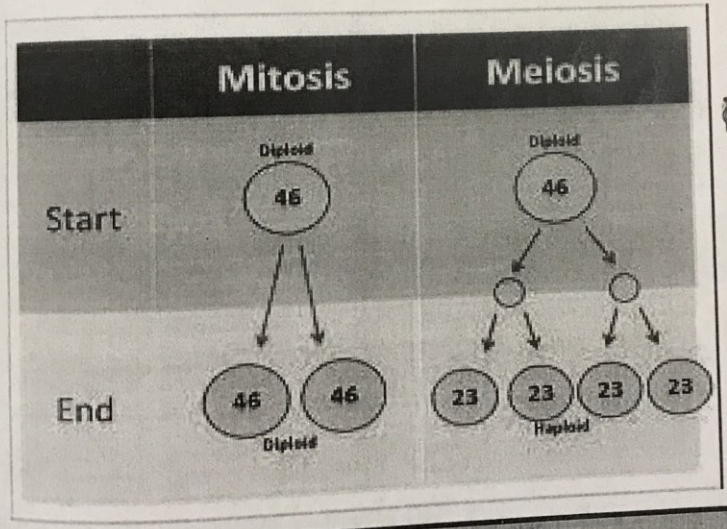
د. جمال الشعراوي

جزء ١

Chapter (12):- Genetics

ورقات

Biology Biology Biology Biology Biology Biology



أنواع الكروموسومات

Pairs of autosomes: → الكروموسومات الجسدية

Homologous chromosomes are: →

1. Matched in Length تتوافق الطول
2. matched in Gene locations
3. matched in Centromere position
4. The same size
5. have the same genetic information

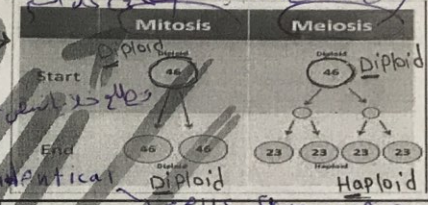
Sex chromosomes are : →

1. different in Length
2. different in Gene locations
3. Different in Centromere position
4. have different size

انقسام الخلايا الحقيقية

Eukaryotic Cell Division includes: →

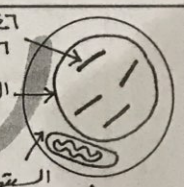
1. Mitosis الانقسام المتساوي
2. Meiosis الانقسام الأختزالي



تضاعف الخلية قبل الانقسام

The Interphase (G1, S, G2) ← الطور البيني التضاعفي

- G1 :- first gap phase, growth and prepares for S-phase
- S :- DNA synthesis phase, duplication of chromosomes, each becomes two sister chromatids
- G2 :- second gap phase, growth and preparation for division



Duplicated chromosome is made of: →

- Two Sister chromatids
- Two identical DNA molecules

Sister chromatids are joined at a narrow region called the centromere

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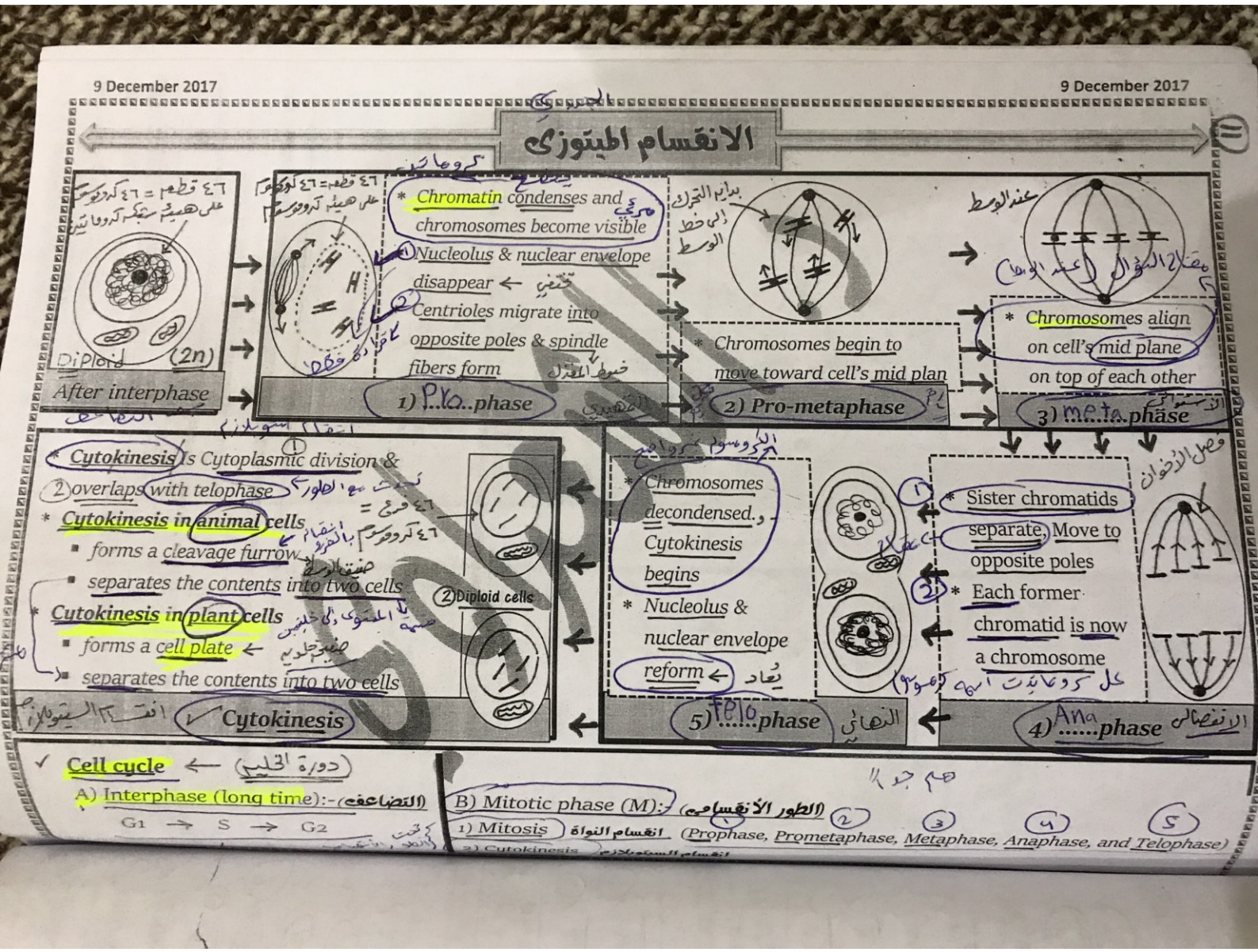
الانقسام الميتوزي



✓ Cell cycle ← (دورة الخلية)

A) Interphase (long time):- (التضاعف)

G1 → S → G2

B) Mitotic phase (M):- (الطور الانقسامي)

1) Mitosis انقسام النواة (Prophase, Prometaphase, Metaphase, Anaphase, and Telophase)

2) Cytokinesis

Meiosis I
After interphase
Prophase I
Metaphase I
Anaphase I
Meiosis II
Telophase II & Cytokinesis
Anaphase II
Metaphase II
Prophase II
Telophase I & Cytokinesis
4 Haploid cells
2 Haploid cells
Sister chromatids of each chromosome separate to produce four haploid cells.
Chromosomal number remains the same
Synapsis
Homologous chromosomes come together as pair with four chromatids, is called a tetrad
Crossing over:- Non sister chromatids exchange genetic materials
Homologous chromosomes separate
produce two haploid cells
Chromosomal number is reduced by half
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Synapsis :→ التقارب

- ✓ Meiosis I
- ✓ Prophase of meiosis I

Tetrads :→ تكون الرباعى

- ✓ Meiosis I
- ✓ Prophase of meiosis I

Crossing over :→ العبور الجينى

- ✓ Meiosis I
- ✓ Prophase of meiosis I

homologous chromosomes separate:→ القطع تنفصل

- ✓ Meiosis I
- ✓ Anaphase of meiosis I

Sister chromatids separate :→

- ✓ Mitosis
- ✓ Anaphase
- ✓ Meiosis II

During meiosis I :→

1. ✓ The chromosome number is reduced by half
2. ✓ Homologous chromosomes separate
3. ✓ Haploid cell is produced

During meiosis II:

1. ✓ chromosome number remains the same
2. ✓ sister chromatids separate
3. ✓ haploid cell is produced

Meiosis :→

1. ✓ has ~~two~~ one interphases
2. ✓ has two devisions
3. ✓ has one S phase
4. ✓ has two cytokimesis
5. ✓ occurs in the ovaries
6. ✓ occurs in the testis
7. ✓ occurs in the sex organs

1. ✓ converts diploid nuclei to haploid nuclei
2. ✓ produces haploid cells
3. ✓ produces sperm
4. ✓ produces egg
5. ✓ produces sex cell
6. ✓ produces gametes

ما فوجئت في الاختبار لكن ممكن يجي

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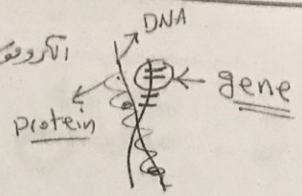
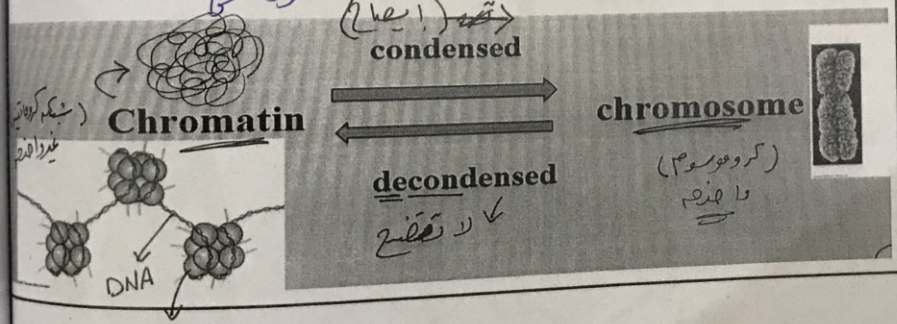
- **Mitosis** preserves chromosome number in eukaryotic cell
  - Mitosis: محفوظة
  - preserves: حافظ
  - number: يحافظ على العدد

- **Eukaryotic chromosomes** ← الكروموسومات
  - ✓ carry the genetic information.
  - ✓ Contain DNA and protein



- When cells are not dividing, the genetic material is decondensed and is called **chromatin**
  - ليس إنقسام
  - المادة الوراثية غير واضحة
  - حالة الإنقسام
  - عندما لا تنقسم تكون كروماتين

- When cells are dividing, the genetic material is condensed and is called **chromosome**
  - واضحة
  - عندما ينقسم
  - كروموسوم



آخر جزء ① شابتر ⑰

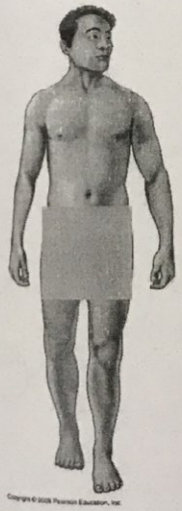
بالتوفيق والنجاح

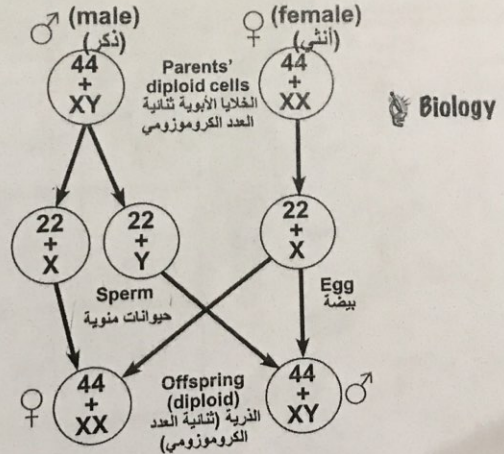
10 December 2017

د. جمال الشعراوي

جزء ٢

Chapter (12):- Genetics





X-Y system
نظام X-Y

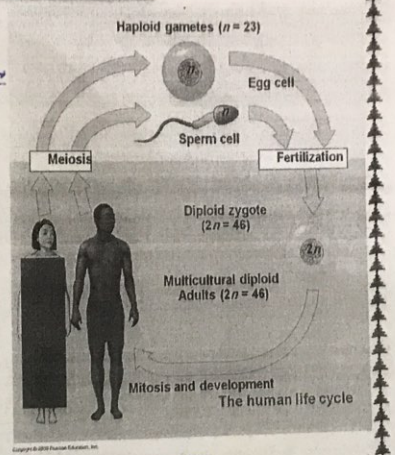
يوجد نوعين من الخلايا فى جسمنا

Haploid cells :- (خليه نصفيه)

1. Are sex cells (sperm or egg) خلايا جنسية — يوجد في الحيوان المنوي
2. have one set of chromosomes (1n) = 23
3. Produced by meiosis ينتج بـ

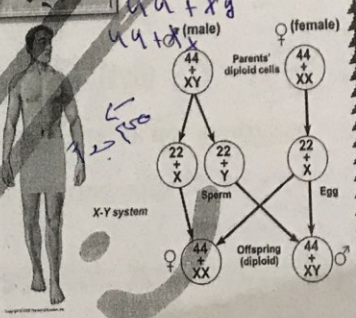
Diploid cells :- (خليه مزدوجه)

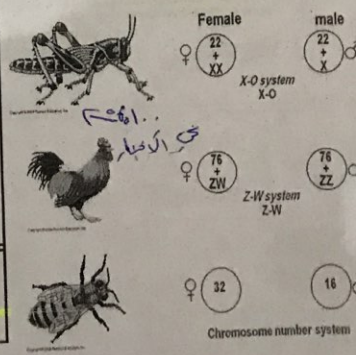
1. Are mainly somatic cells خلايا جسدية
2. have two homologous sets of chromosomes(2n) = 46
3. Produced by mitosis division ينتج بـ



تحديد نوع الجنس فى الكائنات الحية

الكائنات الحية	Sex chromosome system	Female	Male
mammals ثدييات fruit flies ذباب الفاكهة	X-Y	XX	XY
Grasshopper الجراد Roaches الصراصير	X-O	XX	XO
in birds الطيور butterflies الفراشات some fishes	Z-W	ZW	ZZ
ants and bees النمل والنحل	Chromosome number	Di..ploid (32)	ha..ploid (16)

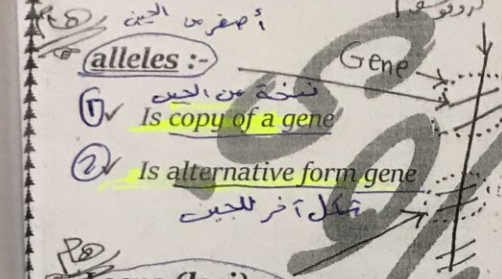




الجين وانواع الأليلات

Genes:-
- ✓ information units in chromosomes

alleles :-
1. ✓ Is copy of a gene
2. ✓ Is alternative form gene



Locus (loci) :-
- ✓ Site of a gene on the chromosome

☞ Each trait = 1 gene = 2 alleles

☞ One allele from each parent

☞ Each gamete (sperm or egg) has only one allele.

Homo .....zygous:-
- ✓ Two identical alleles
- ✓ e.g. AA or aa.

hetero → hetero .....zygous :-
- ✓ Two different alleles
- ✓ e.g. Aa, ab, AB

Dominant allele:-
- ✓ Alleles that is expressed in the heterozygous
- ✓ masks expression of a recessive allele

Recessive allele :-
- ✓ Alleles that is not expressed in heterozygous

A pedigree

- ✓ Shows the inheritance of a trait in a family through multiple generations
- ✓ Can also be used to deduce genotypes of family members.
- ✓ Important in genetic counseling

	Female	Male
الرمز	Circle	Square
Affected	Filled (closed) ●	Filled (closed) ■
(Normal) Unaffected	Open ○	Open □

9 December 2017

قواعد مندل

- Gregor Mendel discovered principles of genetics in experiments with the garden pea
- In Mendel experiment, the heritable factors is now known as genes

P	TT (homo)(Purple)	tt (homo)(white)
F1 الجيل ١	Tt (Purple) (Dominant only)	

الجيل ٢ F2	T	t
T	TT	Tt
t	Tt	t t Recessive (white)

- F1
  - ✓ dominant appear
  - ✓ recessive disappear
- F2
  1. ✓ dominant appear
  2. ✓ recessive appear
  3. ✓ 50% heterozygous (dominant) (purple)
  4. ✓ 50% homozygous (1 dominant-purple-TT) (1 recessive-white-tt)
  5. ✓ 1 recessive-white because both parents are heterozygous purple.
  6. ✓ Phenotypic ratio (3 purple:1white) & genotypic ratio (1TT:2Tt:1tt)

ملحوظة: Phenotypic is appearance & genotypic is genetic constitution

Exception (Variations) to Mendels Laws

1) **Co-dominance :-**
   - ✓ Heterozygote expresses phenotypes of both homozygotes
2) **Incomplete dominance :-**
   - ✓ is referred to as Heterozygote has intermediate phenotype
   - ✓ Neither allele is dominant over the other
3) **Multiple alleles :-**
   - ✓ is referred to as three or more alleles in a population for same locus.
4) **Polygenes :-**
   - ✓ is referred to as Multiple independent pairs of genes may have similar and additive effects on the phenotype
5) **Pleiotropy :-**
   - ✓ is referred to as the phenomenon of one gene mutation being responsible for or affecting more than one phenotypic characteristic