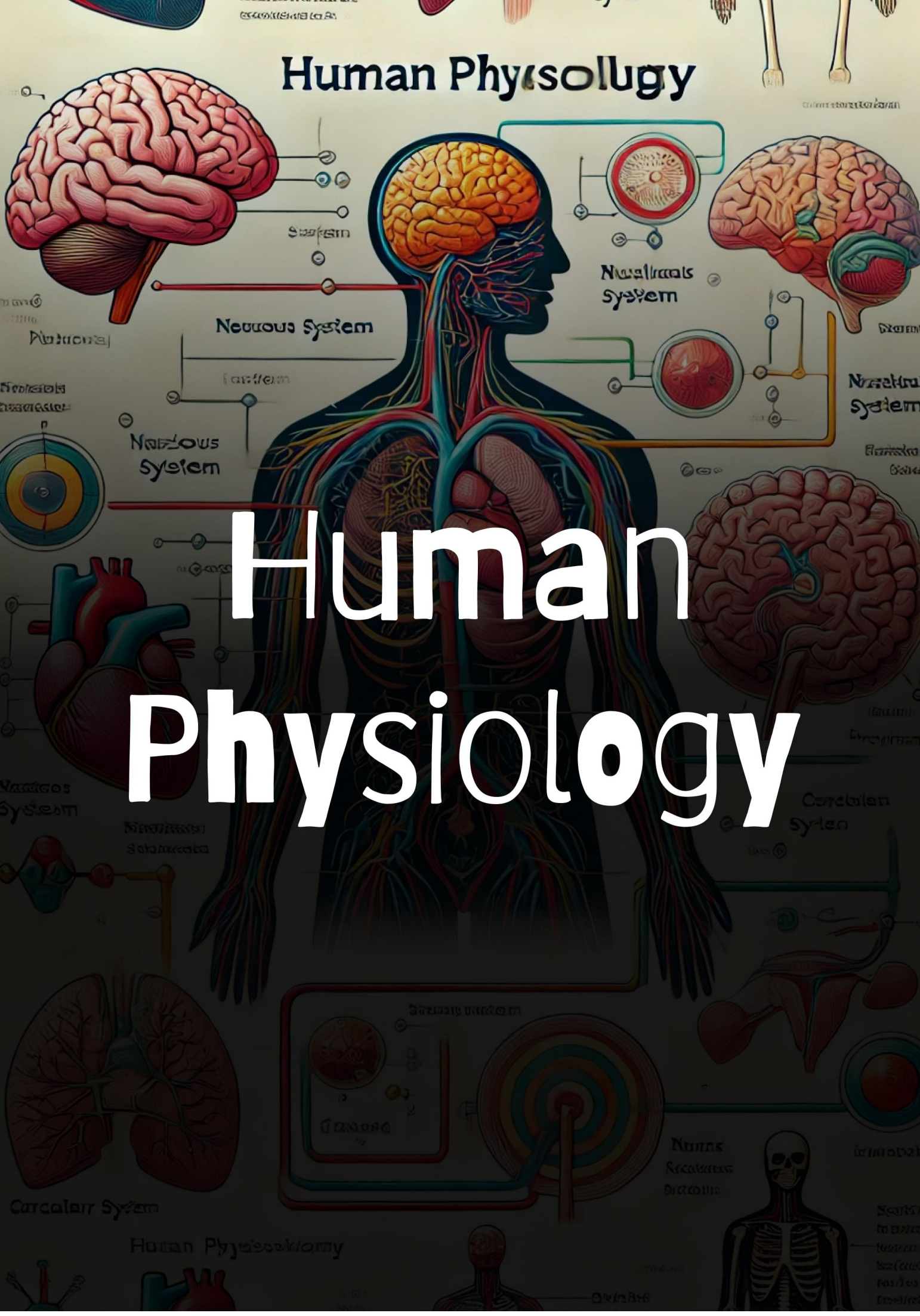



# Human Physiology

# SKELETAL SYSTEM

Total Bones 206

## Axial Skeleton (80)

Skull → 29

Sternum → 1

Ribs = 24

Vertebral Column → 26

## Appendicular Skeleton (126)

Bones of forelimbs (30+30) = 60

Pectoral girdle (2+2) = 4

Bones of Hindlimbs (30+30) = 60

Pelvic Girdle (1+1) = 2

## Axial Skeleton :-

### Skull and Associated Bone :-

⇒ Skull skeleton consists of 29 Bone.

Skull.

- **Cranium (8)**
  - frontal (1)
  - Temporal (2)
  - Parietal (2)
  - occipital (1)
  - Sphenoid (1)
  - Ethmoid (1)
- **facial (14)**
  - Vomar (1)
  - Mandible (1)
  - Maxillal (2)
  - Palatile (2)
  - Zygomotic (2)
  - Palatile (2)
  - Zygomatic (2)
  - Lacrimal (2)
  - Nasal bone (2)
  - Inferier Turbinals bones (2)
- **Ear Ossicles (6)**
  - Malleus (2) — Hinge
  - Incus (2)
  - Stapes (2)
- **Hyoid.**
  - U. Shaped.

Lower jaw is made up of mandible it is largest and strongest bone of skull. It is Articulate with temporal bone and form temporo-mandibular joint so mammals can show dianio styllic jaw suspension.

Sphenoid has a depression which is called sella turciaa in which pituatory gland present.

cranium is made up of Eight flat membranous bone which are connected by white fibre connective tissue this is immovable joint is called as Suture.

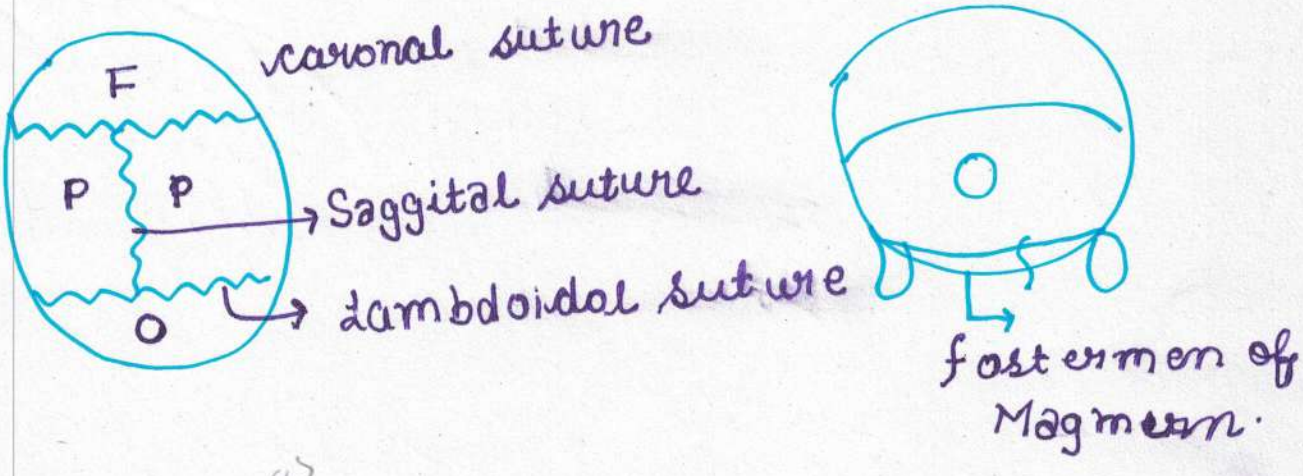
At base of cranium of foramen of Magnum present which is surrounded by two occipital candytes so human skull is dicondylic

Mammals Amphibians → Dicondylic

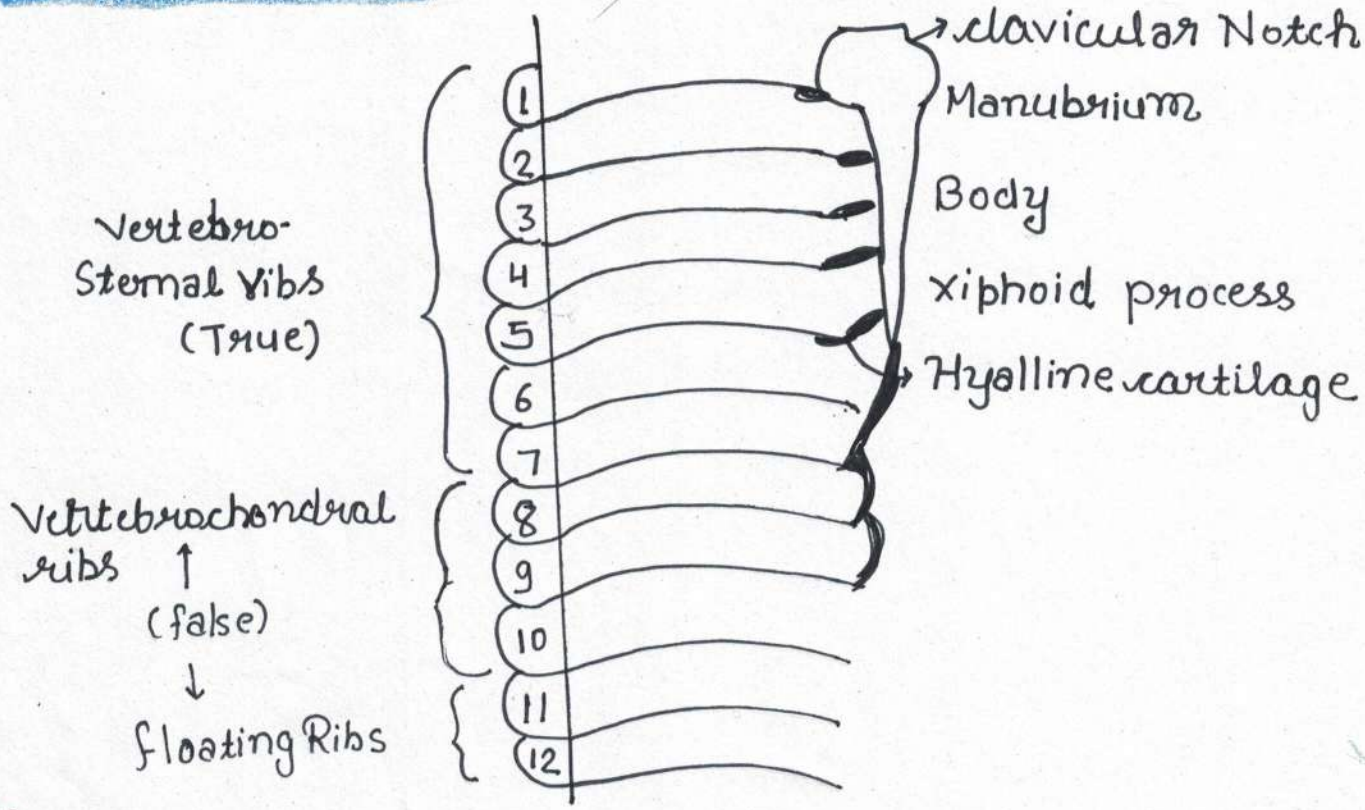
Birds, Reptiles → Monocondylic.

In new born baby a temporary space present between skull bones which is called fontannete

No. of Movable bone present in skull skeleton is seven (Mandible + Ear ossicles).



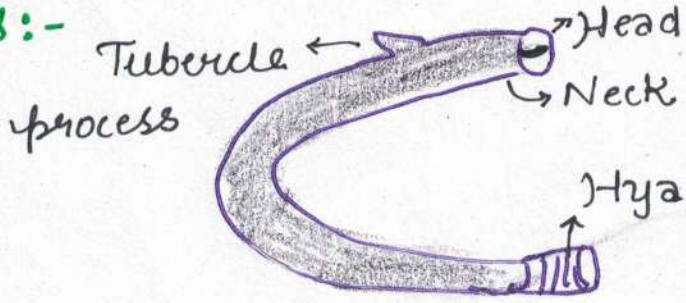
# Sternum :-



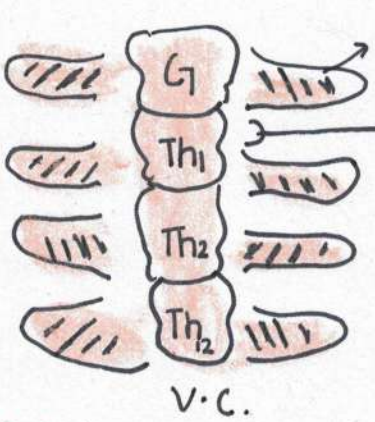

- Sternum is a single test flat bone which is present in mid-Ventral surface of body.
- first Seven pair of ribs and one pair of clavicle bone articrilate with it.
- Rib-cage or thoroic cage is formed by three types of bone sternum, ribs and Vertebral column

☞ Between Rib and sternum cartilegenous joint present.

## Ribs :-




(Dorsal End or Vertebrol End).

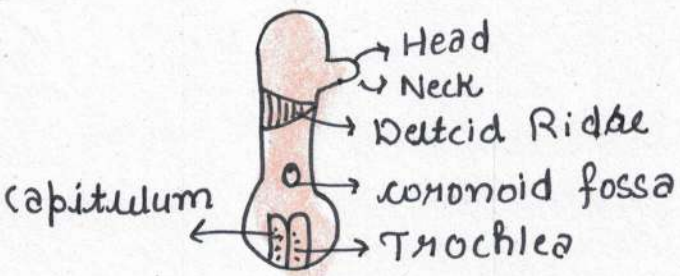



→ Each Rib is a Single flat bone

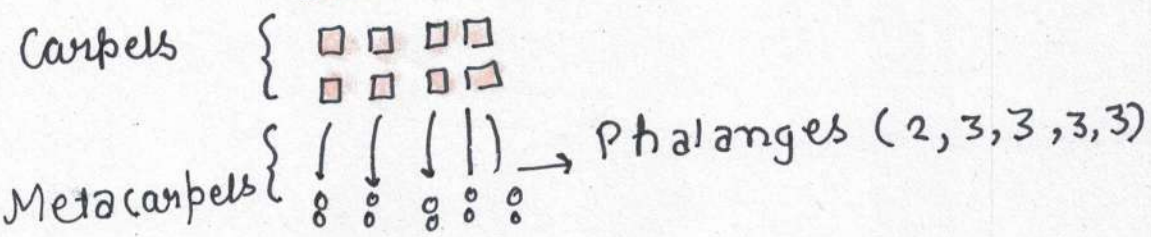
- At dorsal end rib has two articulation surface (head and tubercle process). so rib is bicephelic.
- On body of thoracic vertebrae demifacets are present for Articulation of rib head.
- Tubercle process articulate with transverse process of vertebrae.

## Appendicular Skeleton

### Bones of forelimbs:

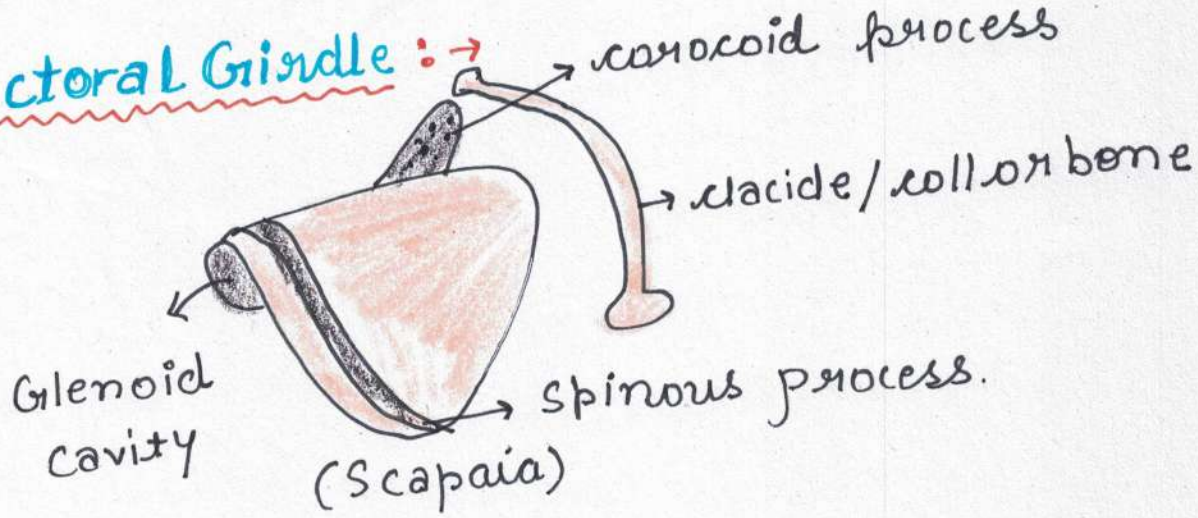






- Head of humerous fit into glenoid cavity of pectoral girdle and form ball and socket joint.
- on Shaft of humerous deltoid present for muscles attachment.
- Between humerous and radius, ulna hinge joint present due to presence of olacranon process.
- In human between radius and ulna pivot joint present. so, we can show supination and pronation stage of hand.
- Between Radius and carpel Ellipsoil joint.
- Between carpel gliding joint is present.
- Metacarpel of thumb articulate with trapazium to form saddle joint.
- Between metacarpel and phalanges Ellipsoid joint is present.
- Between phallanges hinge joint present

## Pectoral Girdle :→

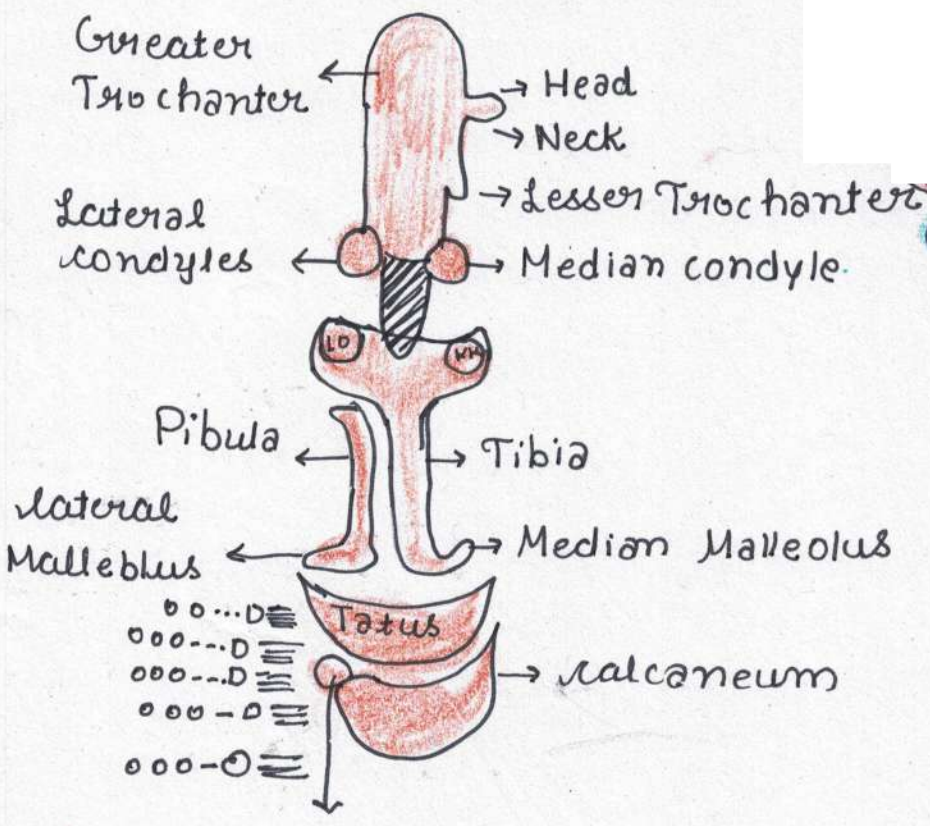


Pectoral girdle consist of two bones:-

- **Scapula** single, flat, triangular shape, bone.
- **Clavicle** weak, thin, cylendrical bone.

- Scapula has three process acromian process, cararoid process and spinous process
- Between clavicle and Sternum sterno-clavicular joint present (gliding joint)
- Between clavicle and Acromian acromio-clavicular joint is present (gliding point)

## Bones of Hindlimbs

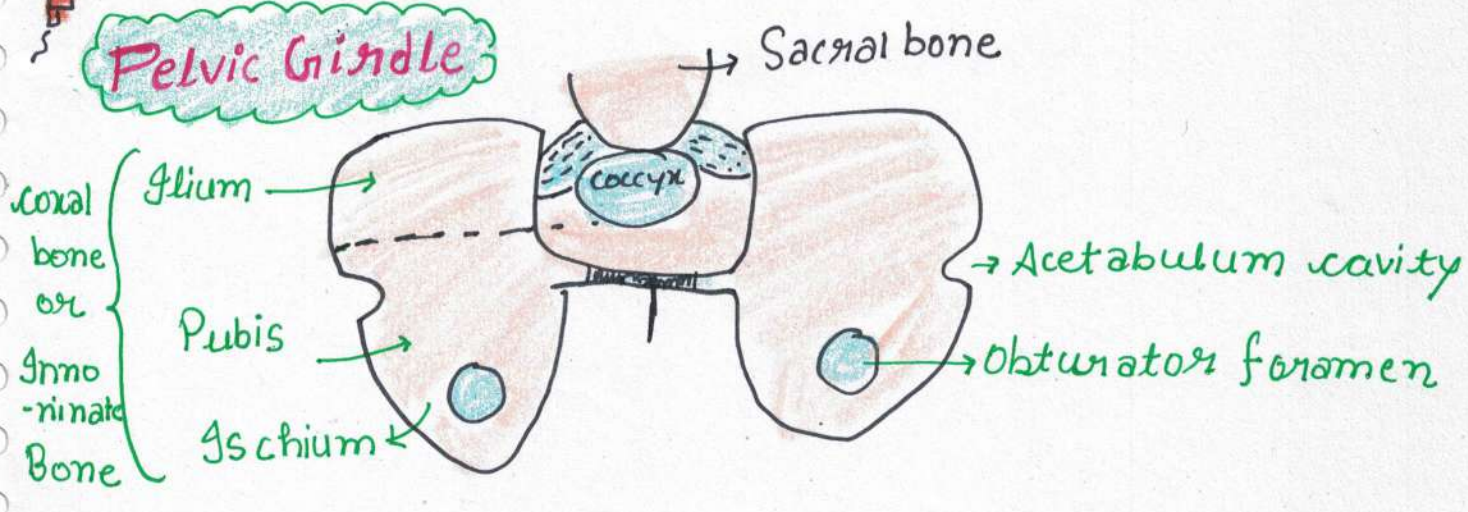



Proximal Row → Talus, Navicular, calcaneum.

Distal Row → 1st, 2nd, 3rd cuneiform, cuboid.

- Head of femure fit into Acetobulum cavity of pelvic girdle and form ball and Socket joint.
- On femur lesser and greater trochanter present for muscles attachment.
- Between femur and tibia condylar joint present (knee joint)
- Knee is covered by knee cap - It is single cup shape sesamoid bone. It Articulate with patellar surface of femur.
- Knee is formed by three types of bone tibia, femur and patella.
- Between tibia and fibula inferior tibio-fibular joint present. It is fibrous immovable joint.
- Between tibia, fibula and talus hinge joint is present (Ankle joint)
- Between tharsals gliding joint is present.
- Calcaneum is largest tarsals of Hinol limbs.

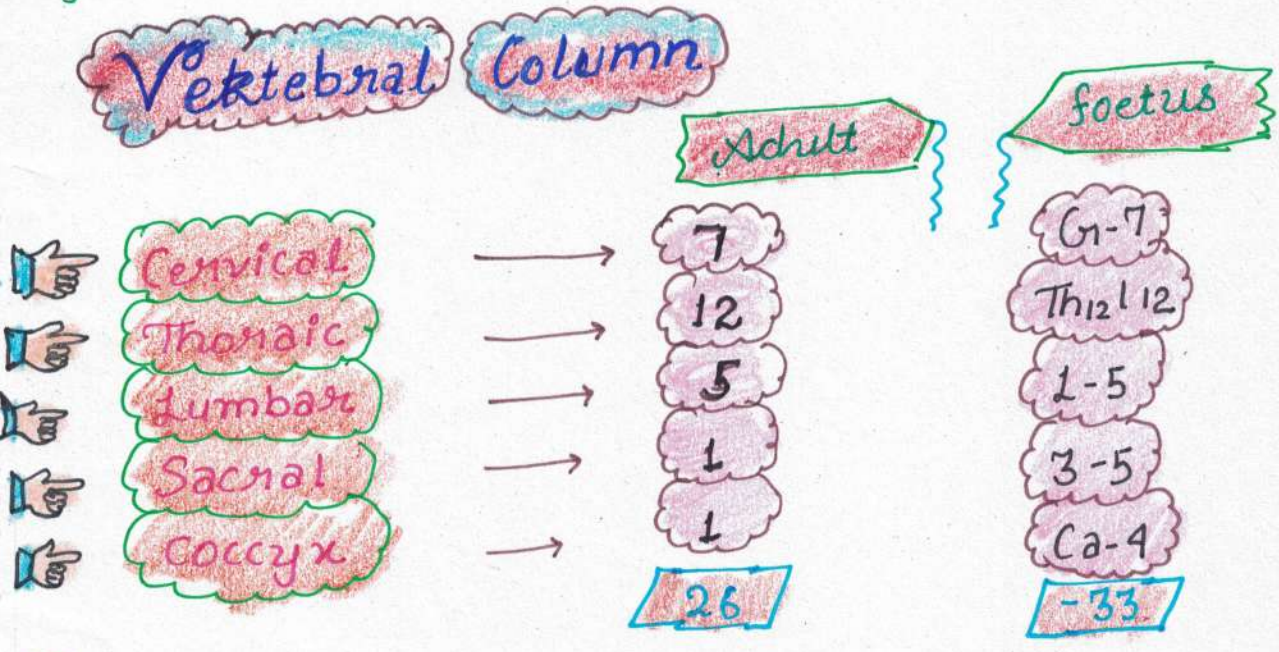
## Pelvic Girdle



- Pelvic girdle consist of two bone which is called coxal or innominate bone.
- Each coxal bone is formed by fusion of three bones Ilium, pubis, Ischium.
- Between Pubis and Ischium obtrator foramen present through which blood Vessels and nerve pass.
- At Ventral side both pubis connected by public symphysis. It is fibro-cartilage (W.F.C.T.)
- At dorsal side both Ilium connected to sacral bone to form Ilio-Sacral joint. It is movable joint (gliding)

female Pelvic girdle wider than Male

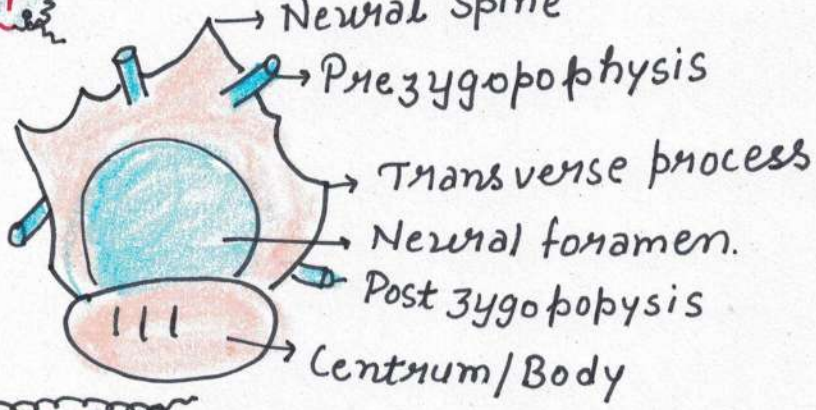
## Vertebral Column



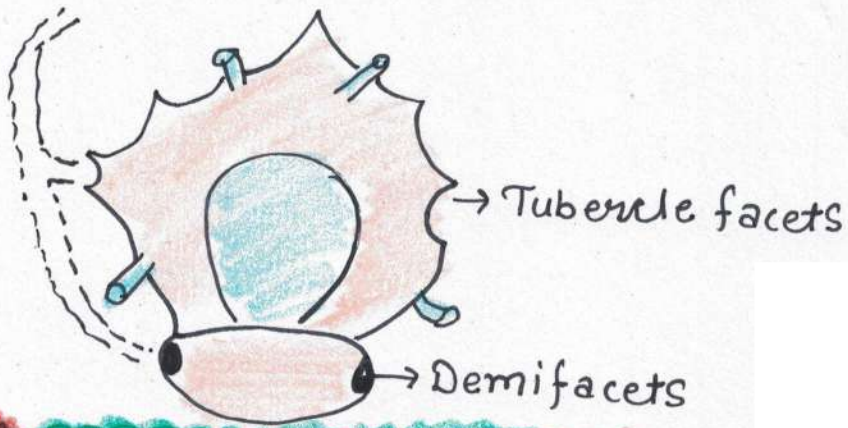

## Vertebral formula

$C_7 Th_{12} L_5 S_{(5)2} Co_{(4)1}$

## Lumbar




## Thoracic (12)

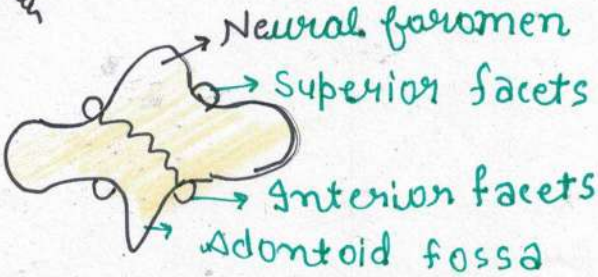



## CERVICAL (7)

$C_1$ = Atlas
$C_2$ = Axis
$C_3$ - $C_6$ = Typical Vertebrae.
$C_7$ = Bifid Neural Spin Absent
= Demifacets are present.

Atlas ($C_1$)

Axis ($C_2$)

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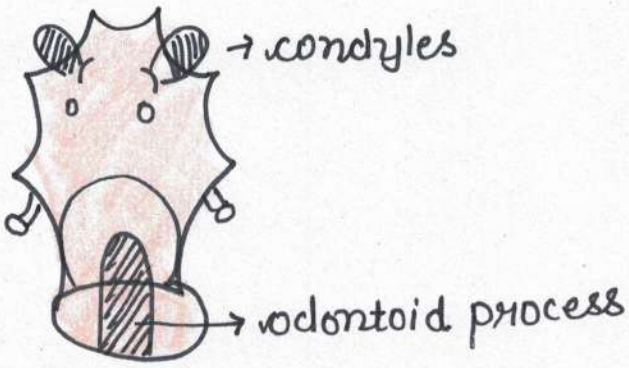
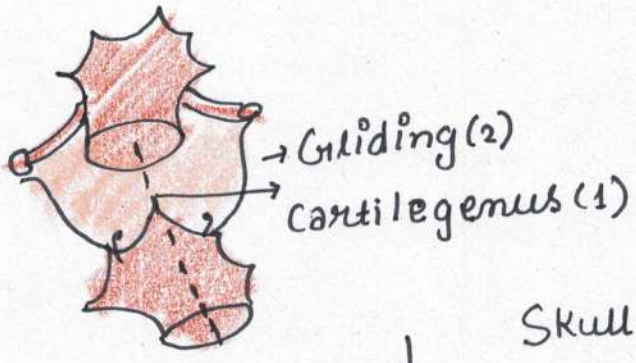
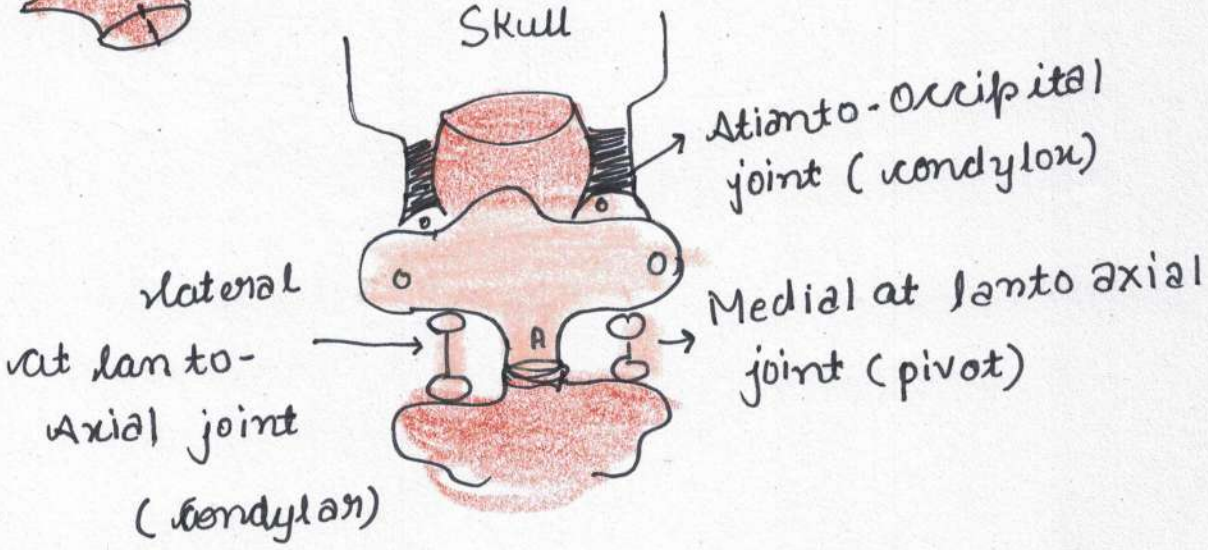



- Cervical is smallest Vertebrae it is specific feature of mammals.
- Lumbar is largest and heaviest Vertebrae.
- Mammalian Vertebrae are Amphiplatyon because both surface of Centrum are flat.

## Joints of Vertebral Column



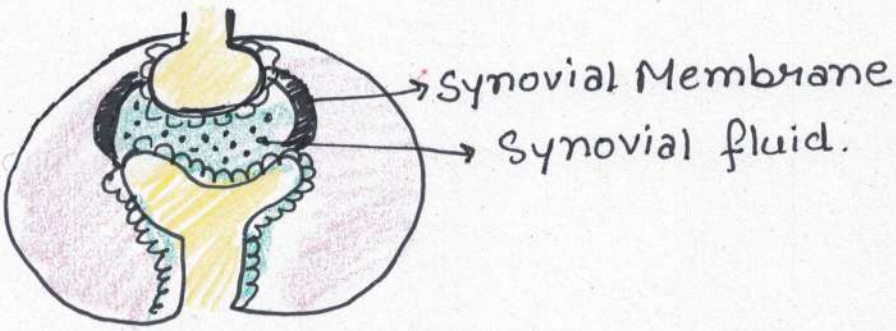
Between two Vertebrae intervertebral disc. present. It is fibro-cartilage.

★ Between two Vertebrae intervertebral disc. present. It is fibro-cartilage.

Between two Vertebrae two types of joint present.

- Gliding Between zygopophysis.
- cartilagenous Between Centrum.

## Synovial Joint




## Gout (गठीया)

- Due to Accumulation of uric Acid crystal at joint

## Osteoarthritis

- Due to degeneration of Articular cartilage.

## Rheumatoid Arthritis

- Synovial membrane get affected so more Amount of Synovial fluid.

## Oeostoporosis

- It is age related disorder. In this bone mass decrease so fracture chances increase.
- It is common cause decrease decrease level of Estrogen.
- It is also due to deficiency of Vitamin D and hyper secreation of PTH.


- Thumb is called as pollex.
- Pterygoid is a wing shape bone which is present in skull of Rabbit.

Malleus → Articular
Incus → Quardinate

- All locomotions are movement but all movement are not locomotion.
- All amoeboidal structures are irregular but all irregular structures are not amoeboidal

## Types of Movement

- Amoiboidal Movement :- By pseudopodial, Macrophage and Leucocyte

Ciliary Movement :- By cilia Eg:- fallopian tube, broncioles.

Muscular Movement

Study of Muscles → Myology and Sarcology

Mesodermal, Except, :- Iris, cilliony body & Myoepithelium (ecto)

40 to 50% of total weight (connective 30%)
Nervous and Epithelium 10-20%

Number - 639

character → Conductivity, Excitability, Elasticity.

## Types of Muscles

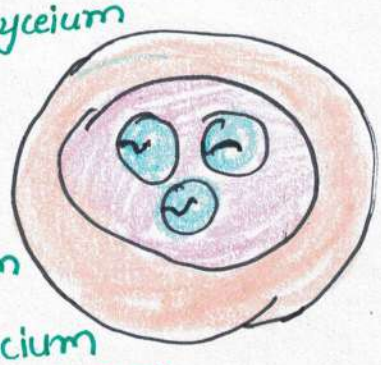
| Skeleton Muscle | Smooth Muscle | Cardiac Muscle |
|---|---|---|
| ★ Straighted + Voluntary | ★ unstrationed + Muduntary | ★ on the basis of function involuntary on the basis of structure Stratted. |
| ★ bar K + ligh + band | ★ Absent | ★ Present |
| ★ Intercalated dise Absent | ★ Absent | ★ Present. |
| ★ Multinucleated | ★ uninucleated | ★ uninucleated (but functionally Multi nu) |

ab

| | | |
|---|---|---|
| ★ cylinderical | ★ spindle | ★ cylindrical |
| ★ Unbranch | ★ unbranch | ★ Branch |
| ★ Contraction speed fastest | ★ Slow | ★ fast |
| ★ Blood supply more | ★ Blood supply less. | ★ Maximum |
| ★ control by us | ★ control by ANS | ★ Both CNS+ANS |
| ★ Somatic | ★ Visceral | |
| ★ fore limb, Hind limb, Abdominal wall. | ★ Ah detrusor muscle, Iris and Erector pilli | ★ Heart Muscles |

## Skeleton Muscles

- 400 in Number
- Mainly present in Back portion (180)
- contraction for short duration, so (fatique muscles) due to formation of Lactic acid.

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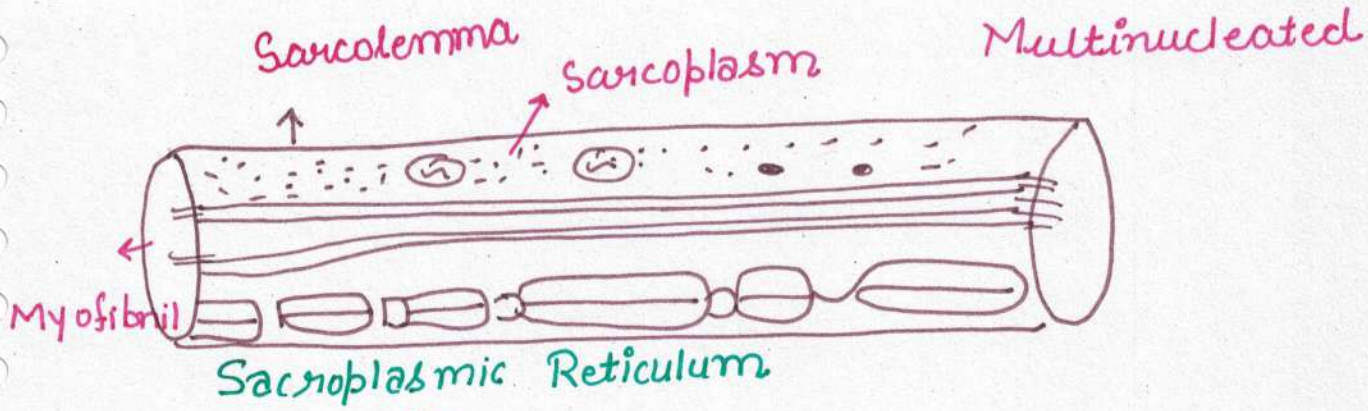
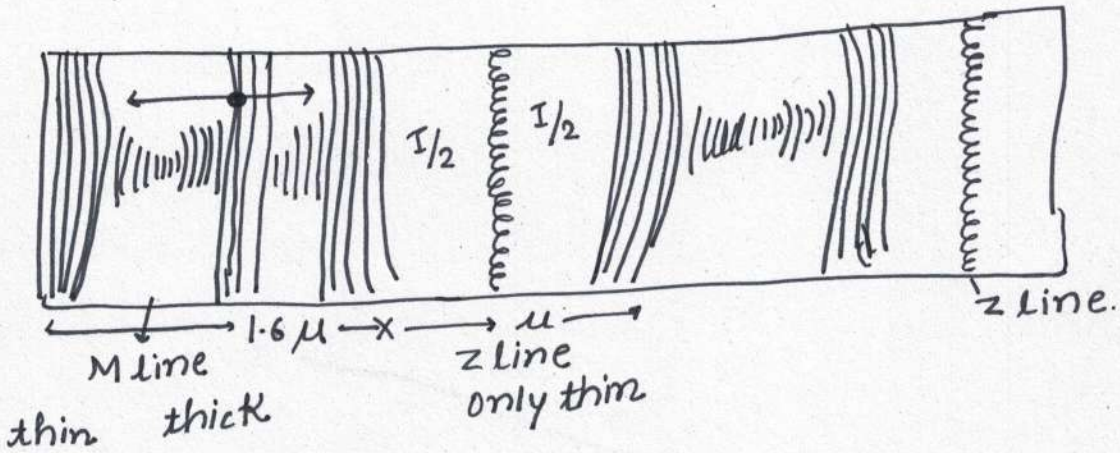



Sacroplasmic Reticulum

T-tubule
Impulse
conduction

L-Tubules
Store $Ca^{+2}$ (cisternae)




thin thick

Actin and Myosin

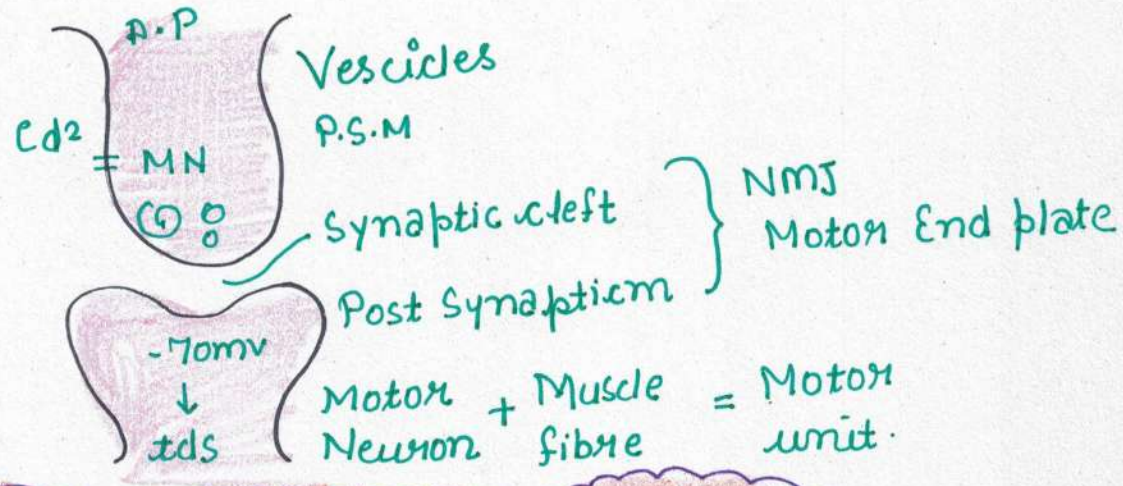
A-Band.

## Actin or thin filament

- At the time of Muscle contraction. I band decrease.
- A-Bond remain constant H-zone decrease -0.
- At the time of maximum muscle contraction H-zone will be disappear.
- Action and Myasin do not shorter only actin slide Over Myosin

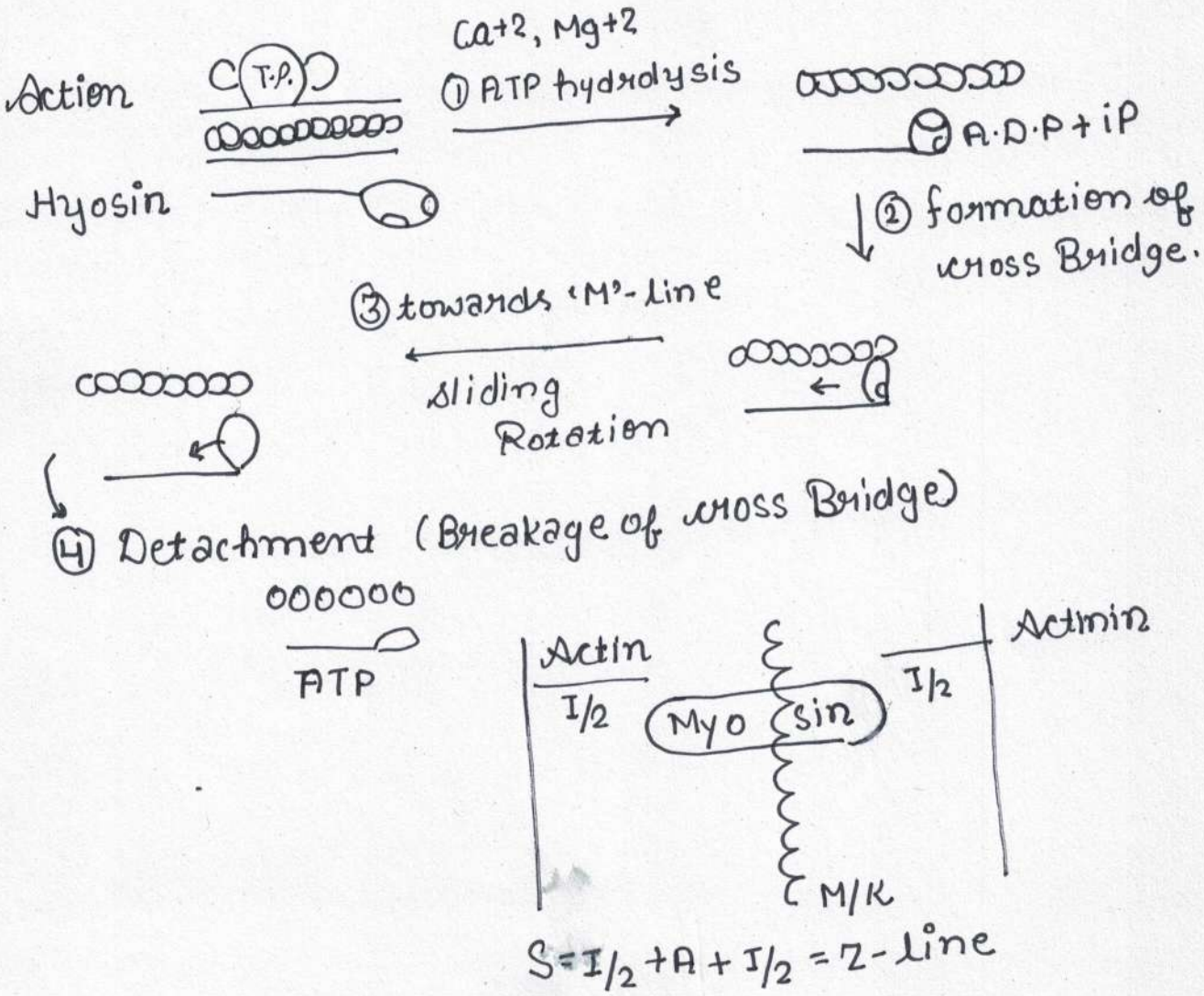
# Mechanism of Muscle Contraction

- $Ca^+$ and $Mg^+$
- If Edta injected (calcium bind) → Muscle contraction stop.
- Due to $K^+$ Muscle and Nervous Excitability reduce.
- Muscle contration → chemical Energy convert into mechanical Energy.




## Sliding Filament Theory

- Given by Huxley.
- At the time of Muscle contraction chemical Energy convert into Mechanical Energy.
- At the time of Musde, Relaxation
- $Ca^{+2}$ Return
- inactivation of Action
- breakage of cross Bridge




- structural protein → Actinin.
- contractile protein → Actin and Myosin.
- Regulatory protein → Tropomin, Tropomyosin.

## Red Muscle fibre

- Red in colour
- Mitochondria more
- Myoglobin more

## White Muscle fibre

- Yellow in colour
- Mitochondria less.
- Myoglobin less.

100

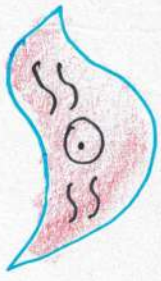
- Sacroplasmic Reticulum Less Extensive.
- Blood Supply more
- Muscle contraction slow
- Aerobic Respiration

- Sacroplasmic Reticulum more Extensive.
- Blood Supply less
- Muscle contraction fast
- Anaerobic respiration.

Eg:→ flight Muscles Of blinds
Back Muscles.

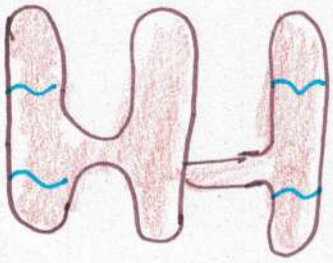
- Rigor Mortis → Stiffness in body after death.
- Sprain → Overstretching of ligament.

- Mysthenia gravis → Auto immune disorder → Ach receptor muscles mainly genetically.
- Muscular dystrophy → progressive degeneration of skeleton Muscles mainly genetically.
- contraction for short duration → Eyelids
- Papillary Muscles → functional unit myofibril.
- Smooth Muscles → functional unit myofibril.
  → Spindle or fusiform shape Attach with Crap function.
- T and L tubules less developed so depends on extracellular fluid for calcium.



Myofibril uninucleated.

# Cardiac Muscles...



Mitochondria more.
Intercodatal disc

## Special Points

choricycle in liver

Pynvic acid
↓
Lactic Acid
Liver (glycogein)
Musut glycogen
Blood Glucose

- Strongest Muscle → Jaw Muscle → Massetess.
- Largest Muscle → Sartorius.
- Largest Muscle → Glateus Maximus.
- Smallest Muscle → Stapedius.
- Longest Smooth Muscle → uterus of pregnant female.
- Shank Muscle → Gastrocerruminous muscle.
- Antagonis Muscle → Biceps and triceps (Extensor flexer).
- Adductor → Abductor

| towards body | away body |
|---|---|
| Lattissmus | Daltoid. |

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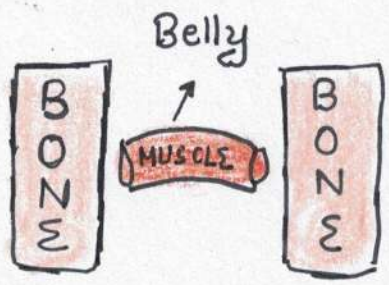
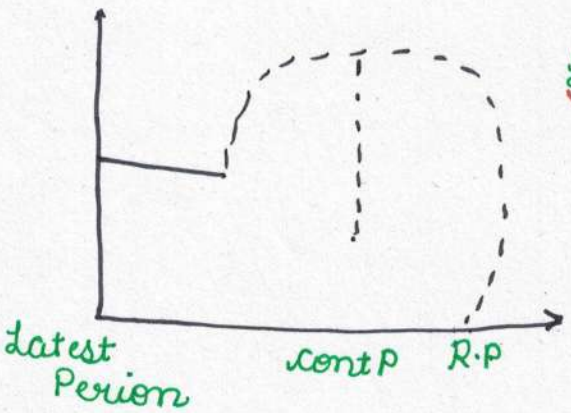



Proximal
fix
Origin

Distal
Movable
Insertion

Muscle Twitch → Single Isolated contraction.




Threshoid Stimulus → Minimum Required structures (T·S·)

T·S·↓ → Sub threshoid stimulus → No muscle contraction

T·S·↓ → Supra threshold stimulus → As Normal.

All or None law

Paralysis → Motor Nerve impulse completely block.

Phosphogen → Highly Energetic Nitrogen base compound.

Vertebrates → certain phosphate

$$C \cdot P + A \cdot D \cdot P \underset{\text{at the time of Muscle contraction}}{\overset{\text{Rest}}{\rightleftharpoons}} C + A \cdot T \cdot P$$

Invertor

103

Invertebrates → Arginine Phosphate

Muscle tension → force produce during contraction.

- same length
- length same
- tone change
- work done zone
- false contraction
- Pushing immovable
- object.

- Same tone
- length change
- tone same
- work done non-zero
- The contraction
- Running.

⇒ $16O_2$, $3.6CO_2$

⇒ 3000 Millian, Meso → Endo

⇒ 40% → 20mm of Hg

⇒ RBC → WBC platelets count

✓ Thromboplastin : →, Accelerin, $Ca^{+2}$

✓ 49 ml → Rapid Inflow blood.

✓ Due to closing of tricuspid and bicuspid valve. → Spleen

✓ Any defect in conduction pathway ?
Heart block.

- falloplan tube, uterus.
- C- shape Ring, Nasal Vestiaulé.
- 6-8 RBC, Plate- 1.5 to 3.5, W.B.C → 5.5 billion

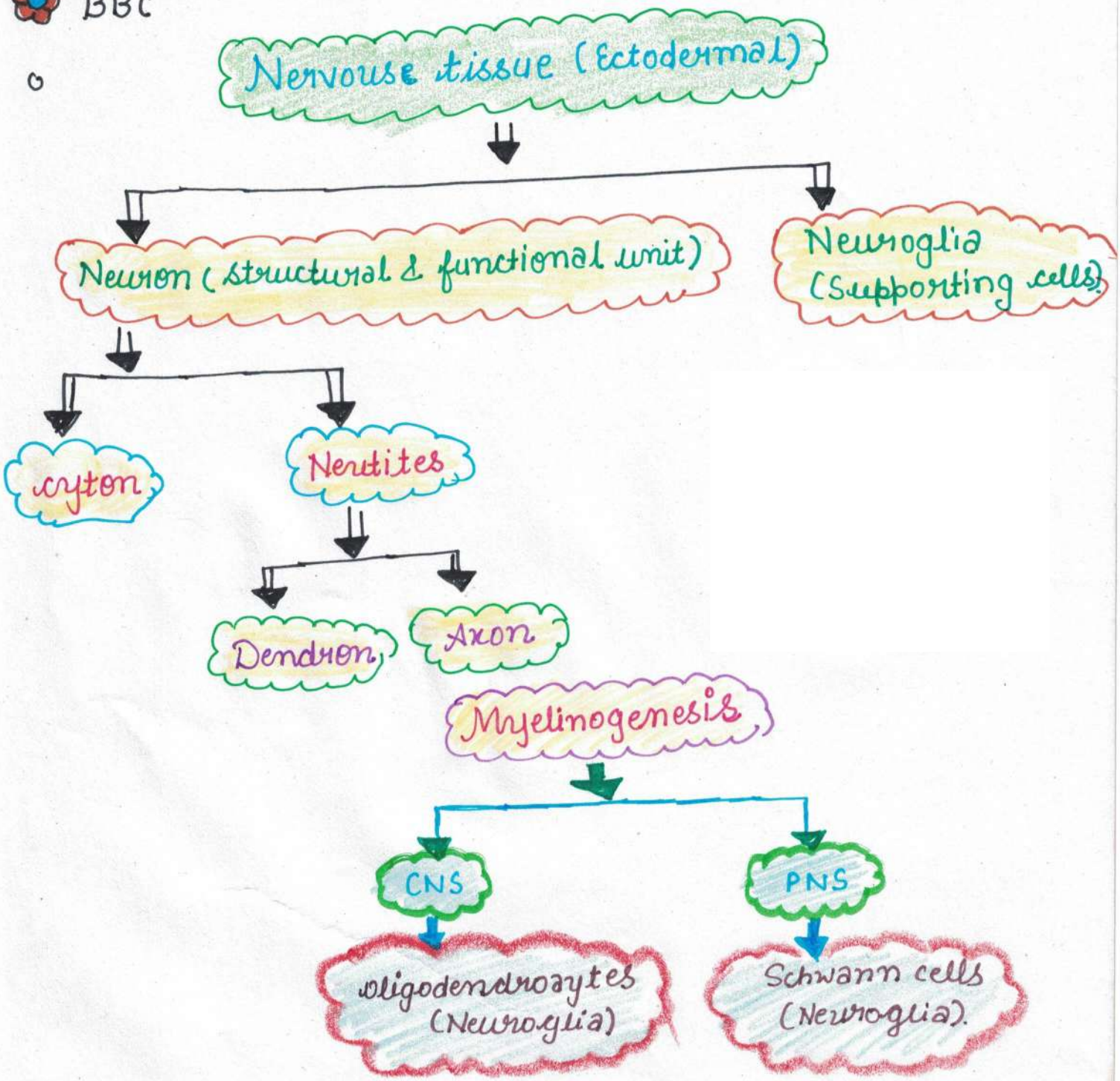
TMAO

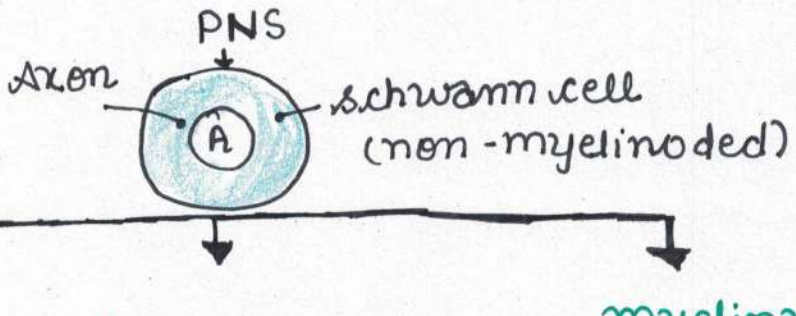
G·H·P=60, B·COP=32, CHP=20
E·F·R=? 60-C2=8

(Epiofodles)

Mucoid concutive tissue → Vitrous, umbtical cord, comb of cork.

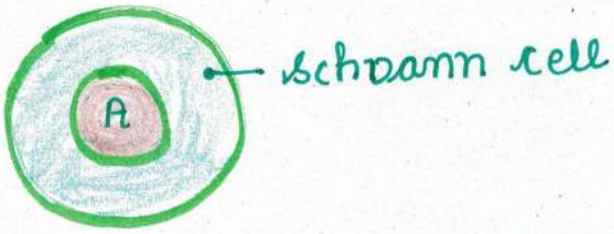
BBC

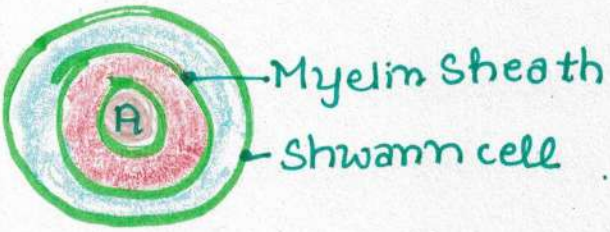




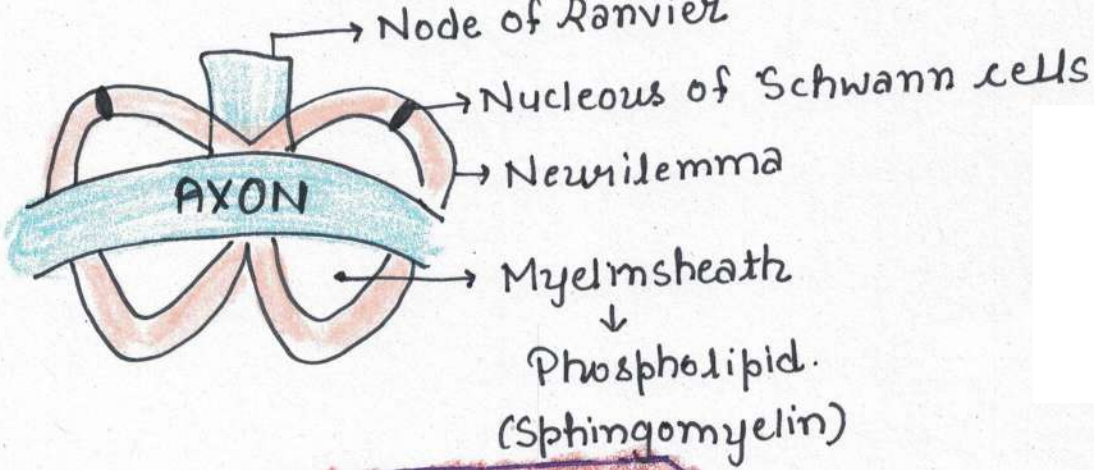

non-mylinated

myelinated




# MYALINATED AXON




Greay Matter

cyton

dendron

non-mylinated axon

White Matter (Myelin Sheath)

Myelinated Axon

CNS (cerebral cortex)

Sensory Area → Association Area → Motor Area

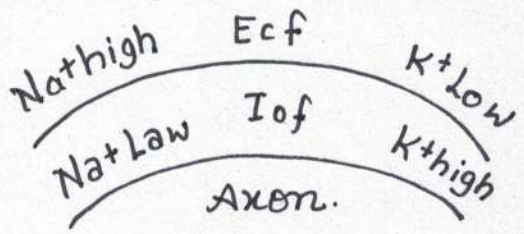
Sensory Area ↑ → Sensory Neuron → Receptor

Association Area ↑ formed by Interneuron

Motor Area ↑ → Motor Neuron → Muscle.

## Generation And Conditions of Nerve Impulse.

- Polarisation → (-ve) inside
- Depolarisation → (+ve) inside
- Repolarisation → (-ve) inside



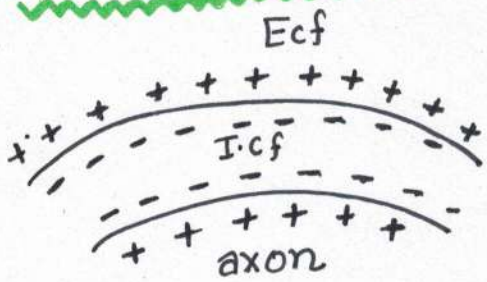

## Transport of ions

- Active
  - Low → high
  - Na+ - K+ pump (carrier proteins)
- Passive
  - High-Low
  - Ion channel (Permeability)
    - Na+
    - K+
  - VGIC
    - Na+
    - K+
    - Stimulus Induced Permeability.
  - Ligand channel
    - Open due to chemicals
    - Eg:- N.T

# Important Points :-

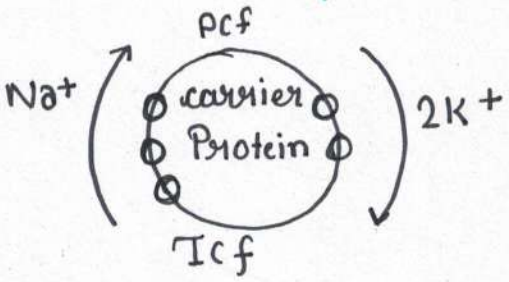
- Ion channels are always open.
- VGIC are closed during resting state with the help of $Ca^{++}$ ions.
- Not VGIC open during depolarisation.
- $K^+$ VGIC open during repolarisation.
- $Na^+$-$K^+$ pump closes during depolarisation

# Polarisation



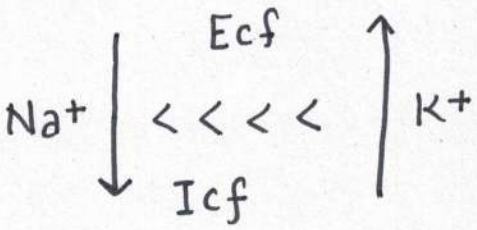

Resting Membrane potential
↓
-70mV
(-60 to -85mV)

## (i) $Na^+ - K^+$ pump




(3+2) = 1+ve loss
from inside creates
(-ve) inside

## (ii) Ion channels




loss of (+ve) ions more
from inside creates
(-ve) inside.

I.C.F contains
(-ve) proteins and $PO_4^{-3}$

- Proteins remain inside axon due to large size and creates (-ve) inside.

# Depolarisation

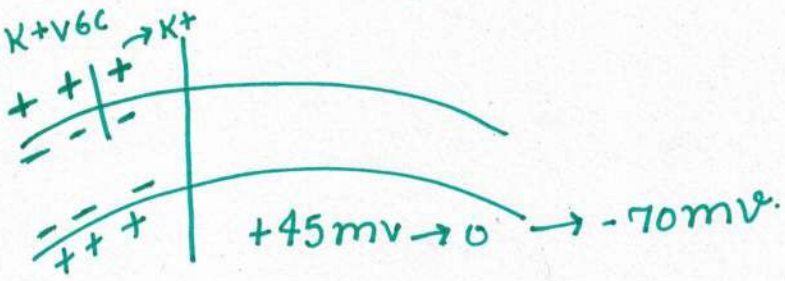
Stimulus
↓
Dendrite → Axon Hillock (A.H.)
↓
Graded potential (G.P.)


→ 60 m.v = Threshold potential
+10 m.v. = Threshold stimulus.

# Repolarisation

-70mv → -60mv → 0 → +45mv → Action potential
↓
Ranze ⇒ +30mv to +45mv.

(-70mv → -60mv: Slow; 0 → +45mv: Rapid)

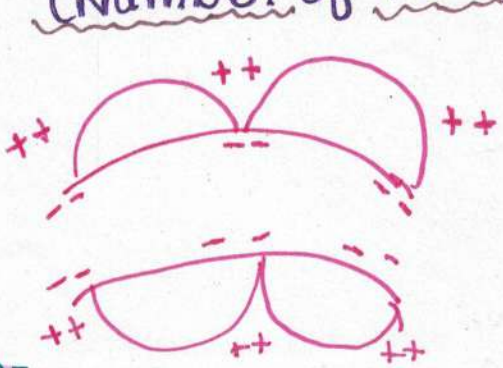


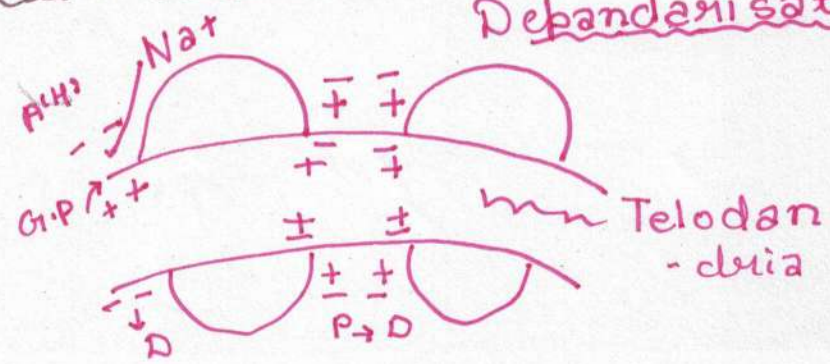

## Saltatory Conduction

- This type of conduction takes place in myelinted axons only.
- This conduction is very rapid.

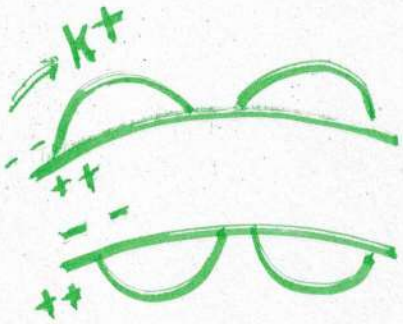
Energy is considered during this conduction (Number of Na+ pump and K+ pump is less)

Depandarisation





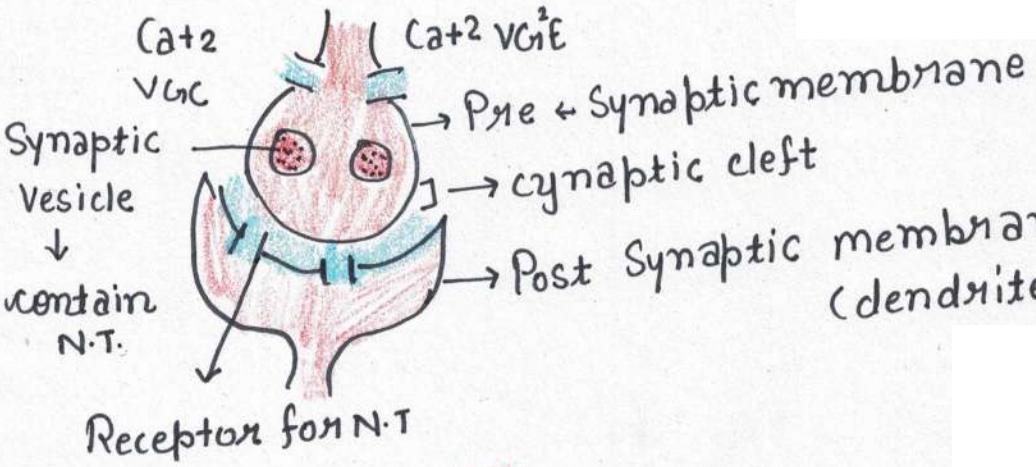
# Polarisation




Repolarisation

# Synapse

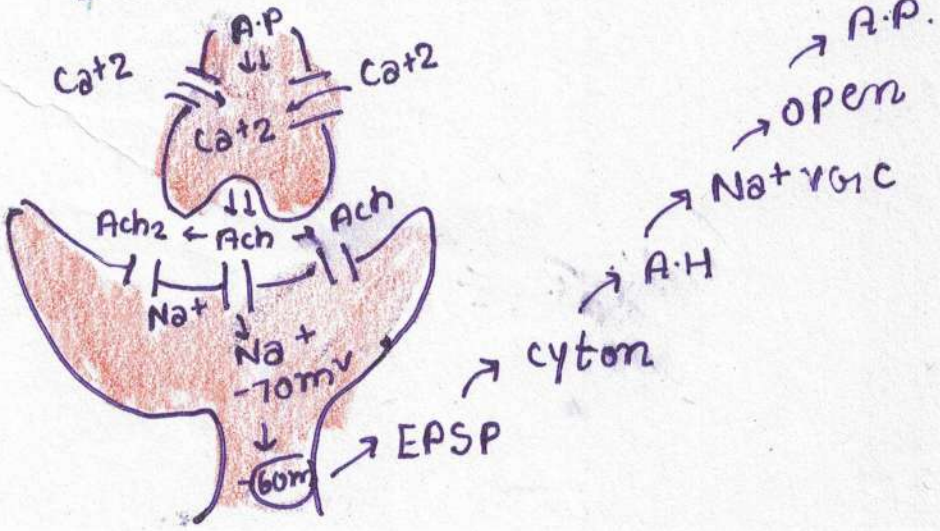
## (1) Chemical Synapse



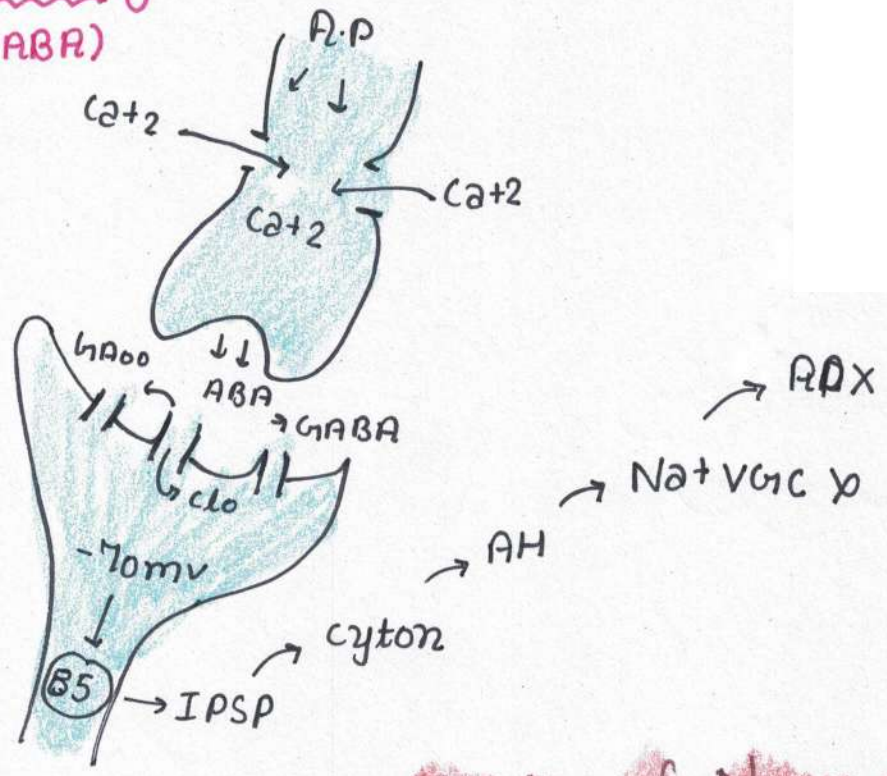

## (2). Electrical Synapse

Protoplasmic connection (GAP function)

# SYNAPTIC TRANSMISSION



## Inhibitory :→ (GABA)




## factors Affecting Velocity of Nerve Impulse

(i) Factors which increase Velocity :-

★ formation of Myelin Sheath
★ Heat
★ Increase in diameter of Axon.

(ii) factors which decrease Velocity :-

★ cold
★ Increase in pressure.

(iii) Factors which do not Affect Velocity :-

★ Increase in length of Axon.

→ chloroform and Ether stops contraction because they block Na+ VGC.

PNS

Cranial Nervous

Nature

- Sensory (1,2,8)
- Motor (3,4,6,11,12)
- Mixed (5,7,3,10)

## Origin

2(1,2) Same as name
2(3,4) Mid brain
4(5,6,7,8) Pons
4(9,10,11,12) Medulla Oblongata

} Brain stem

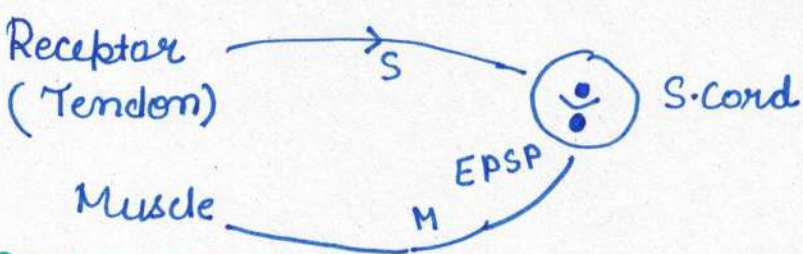
## Functions

1,2,8 — Same as name
3,4,6 — movement of Eyeball
7,4,12 — Related to tongue

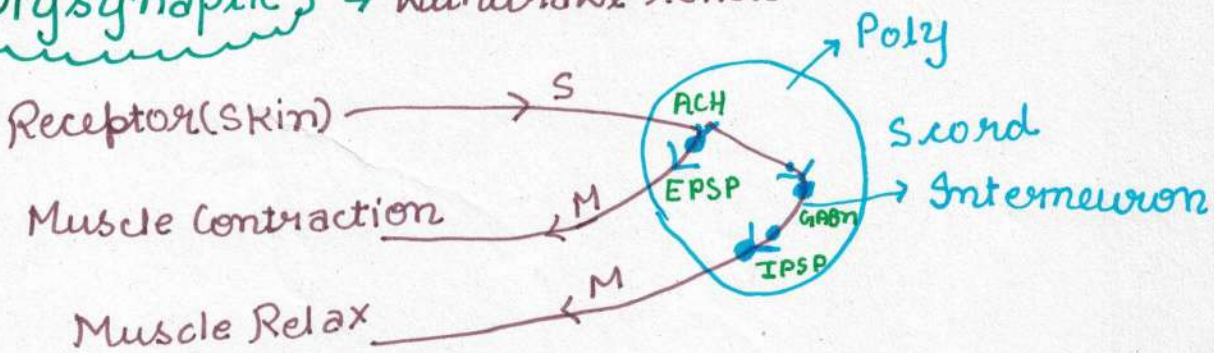
## Reflex Action

Types of Reflex Action on the basis of number of synapse.

Monosynaptic → Stretch reflex
Eg:- knee jerk reflex.

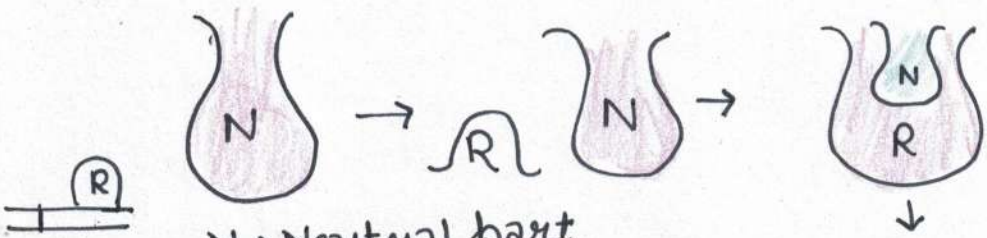



Polysynaptic → Withdrawl reflex

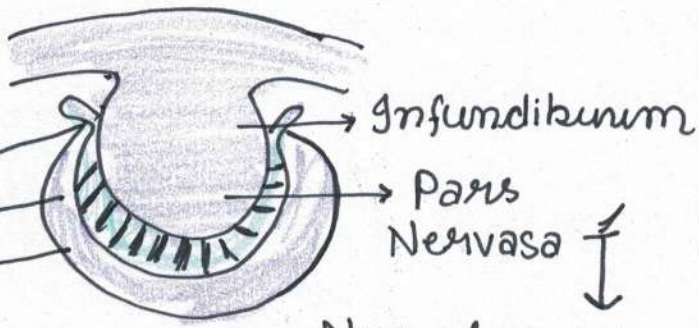


# Endocrine System

## Development of Pituitary Gland




N → Neutral part
R → Rathke's part




Adenohypophysis
- Pars tuberalis
- Pars Intemedia
- Pars distalis

## HORMONES

### Growth Harmone (GH)

- Growth
  - Bone → Elogation
  - cartilage
  - soft tissue
    - organ → Stimulate mitosis
    - Muscle → Deposition of collagen Protein
- Metabolism
  - fat → Catabolism
  - protein → Anaebolism
  - carbohydrate → Blood Glucose ↑↑↑

### GH (Disorders)

- Hypo → Dwarfism → Ateliosis → Midgets
- Hyper
  - childhood → Gigantism
  - Adulthood → Aeromegaly.

# HORMONES OF ANTERIOR PITUITORY

- **TSH** (+) → Thyroid Gland
- **ACTH** (+) → Adernal cortex
- **GTH** → FSH, LH → (+) Ganads
- **Prodactin** (+) → Mammay gland
- **G.H.**

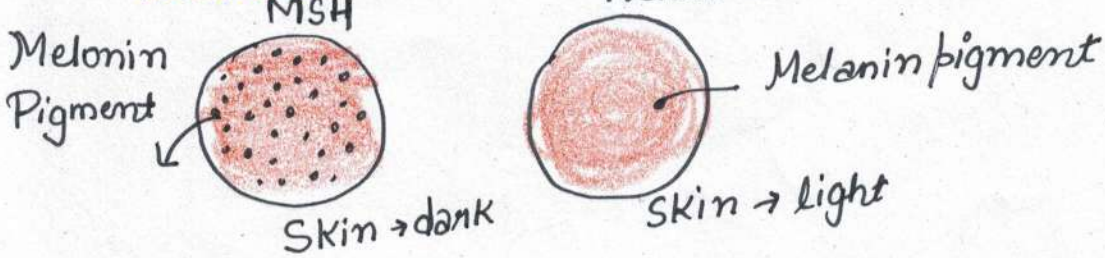
## FSH (Gametokinetic factor)

- **Male** → Stimulate Spermatogenesis
- **female** → Stimulate Oogenesis, development of gaffian follicle, Stimulate → Estrogen graffian follicle

## LH- (Genetic Releasing factor)

- **Male (ICSH)** → Stimulate Leyding cells → To release testosterone
- **female** → Ovulation → Stimulate → progrestenone → To release
  - corpus
  - leuteum

## Metacrosis



ADH → water reabsorption

↓

Nephron

Blood Volume ↑↑

Urine ↓↓

## Diabetes Insipidus

- ADH ↓↓
- Water Reabsorption ↓↓
- Blood Volume ↓↓ (B.P) ↓↓
- Urine ↑↑ (polyuria)
- Thirst ↑↑ (polydipsin)

## ADH ↑↑

- Water Reabsorption ↑↑
- Blood Volume ↑↑ (B.P ↑↑)
- Urine ↓↓

## Control of Anterior Pituitory

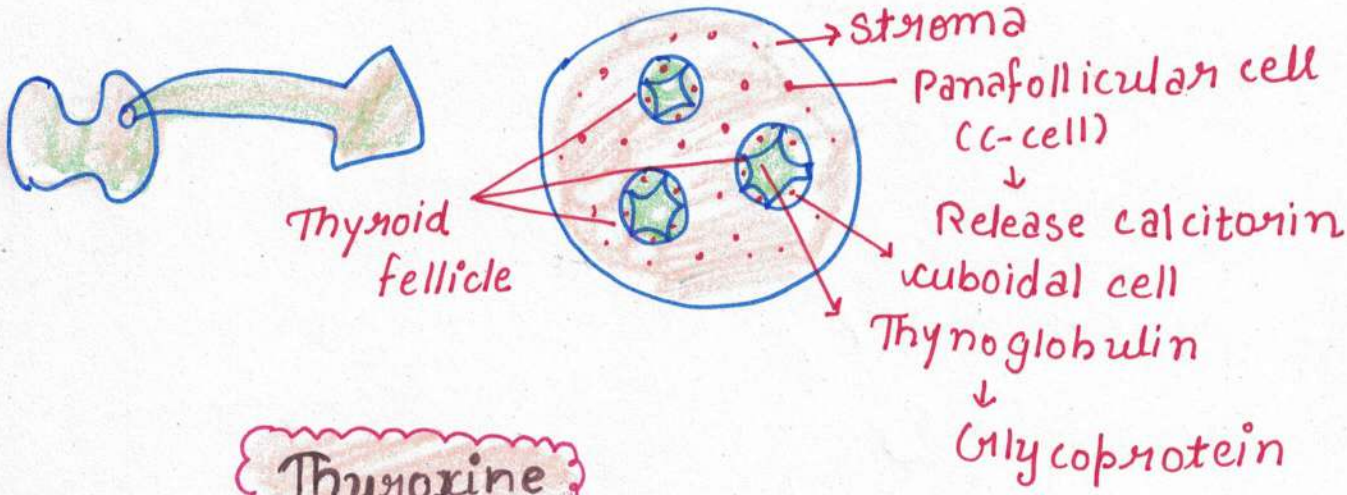
**Stimulatory (Releasing)**

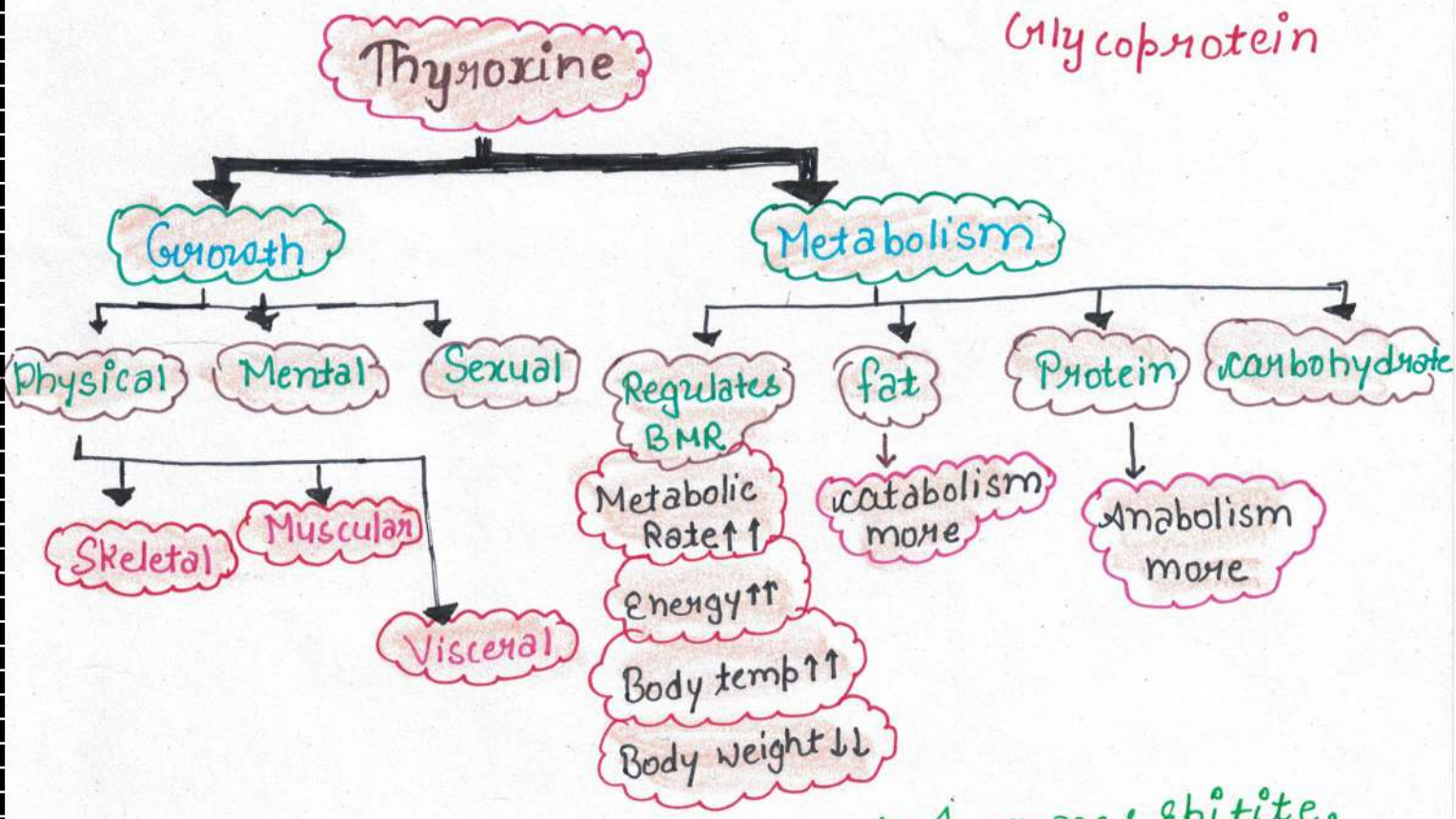
- GnRH (+) → FSH, LH
- TRH (+) → TSH
- CRH (+) → ACTH

**Inhibitory**

- Somatostatin (-) → GH, TSH
- Dopamine (-) → Prolactin

# Internal Structure of Thyroid Gland




carbohydrate → Blood glucose ↑↑ → It increases Epitite, it converts glycogen into glucose.

Harmones which increase metabolic rate also increase the production of RBC.

# Thyroxine (Disorder)

- Hypo
  - childhood → Cretinism
  - Adulthood → Myxoedema
  - Simple goitre → Hashimoto disease
- Hyper
  - Grave's disease → Auto Immune disorder
  - Plummer's diseases → formation of module

## Grave's Disease

TSH Antibody (+)

TSH (+)

Anterior Pituitary → Thyroid → Thyroxine

−ve feed back

## Calcium Metabolism

- calcitonin
  - decrease $Ca^{+2}$ in blood
  - Blood $\xrightarrow[\text{Osteoblast}]{Ca^{+2}}$ Bone
  - Blood $\xrightarrow{Ca^{+2}}$ urine
- Parathormone (PTH) (dec. $PO_4^{-3}$ in blood)
  - increase $Ca^{+2}$ in blood
  - Bone $\xrightarrow[\text{osteoblast}]{Ca^{+2}}$ Blood
  - Intestine $\xrightarrow{Ca^{+2}}$ Blood
  - Nephon $\xrightarrow{Ca^{+2}}$ Blood.

★ Vitamin D ⇒ It stimulates absorption of calcium from intestine and deposites it on Bones.

## Disorder of Parathormone

- Hypo → Tetany
- Hyper → Osteoporosis, Renal Stone

### Aldosterone (Salt Retaining hormone)

- Reabsorption of $Na^+$, Cl and $HCO_3^-$
- Excreation of $K^+$ and $PO_4^{3-}$
- Activation of $Na^+$-$K^+$ pump.

### Cortisol (Life Saving hormone)

- Metabolism
  - fat → catabolism (Lipolysis)
  - Protein → catabolism (Proteolysis)
  - carbohydrate → Blood Glucose ↑↑ (Glyconeogenesis)
- Anti-Inflammatory Action
- Immuno suppressive Action

### Thymus

- Cortex → Dark Staining, contains lymphocytes
- Medulla → Light Staining, contain lymphocytes & phagocytes, Hassall's Corpuscles

## Thymosin

- CMI (T-lymphocytes)
- Humoral immunity (B-lymphocytes)
- Anti-Ageing Effect

## Pineal Gland

(Biological clock)

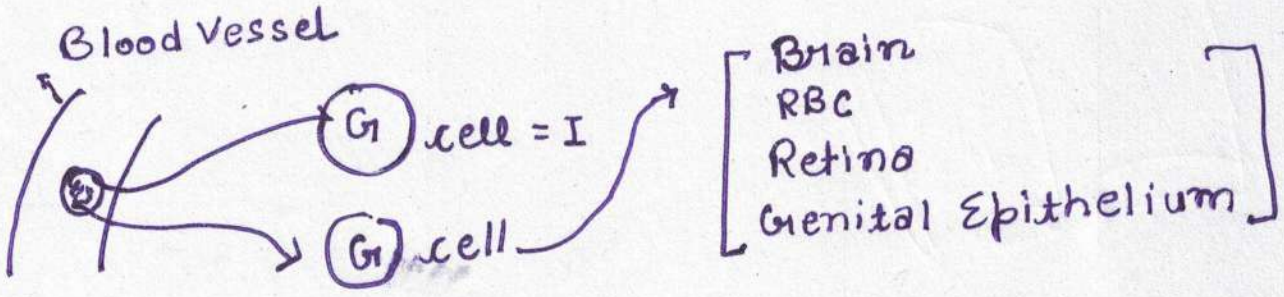
- Melatonin
  - Sleep Wake cycle
  - Pigmentation
  - Menstrual cycle
  - Defence
  - Metabolism
- Anti-gonadial harmone
  - Inhibits Sexual Maturation

## Insulin

Increase permeability of cells for glucose

Except →
Brain, RBC, retina, and genital Epithelium.

Metabolism
- fat
- Protein → Anabolism
- carbohydrate → Blood Glucose ↑↑↑



# Sensory Organs

## Movement of Eyeball (Muscle-6)

- Rectus
  - Superior → up
  - Inferior → down
  - Lateral → towards Ear
  - Medial → towards Nose
- Oblique
  - Superior → down
  - Inferior → up

| Muscles → | All | SO | LR |
|---|---|---|---|
| Cranial Nervous → | 3 | 4 | 6 |

SO → Superior oblique
LR → Lateral Rectus

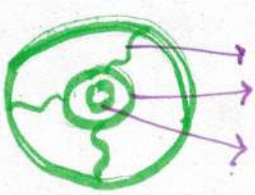
## Internal Structure of Eye ball

- Fibrous Tunic
  - Sclera
  - Cornea
- Vascular Tunic
  - choroid
  - ciliary body
  - Iris
- Nervo Sensory Tunic
  - Pars Indica
  - Pars cillaris
  - Pars optica (Retina)

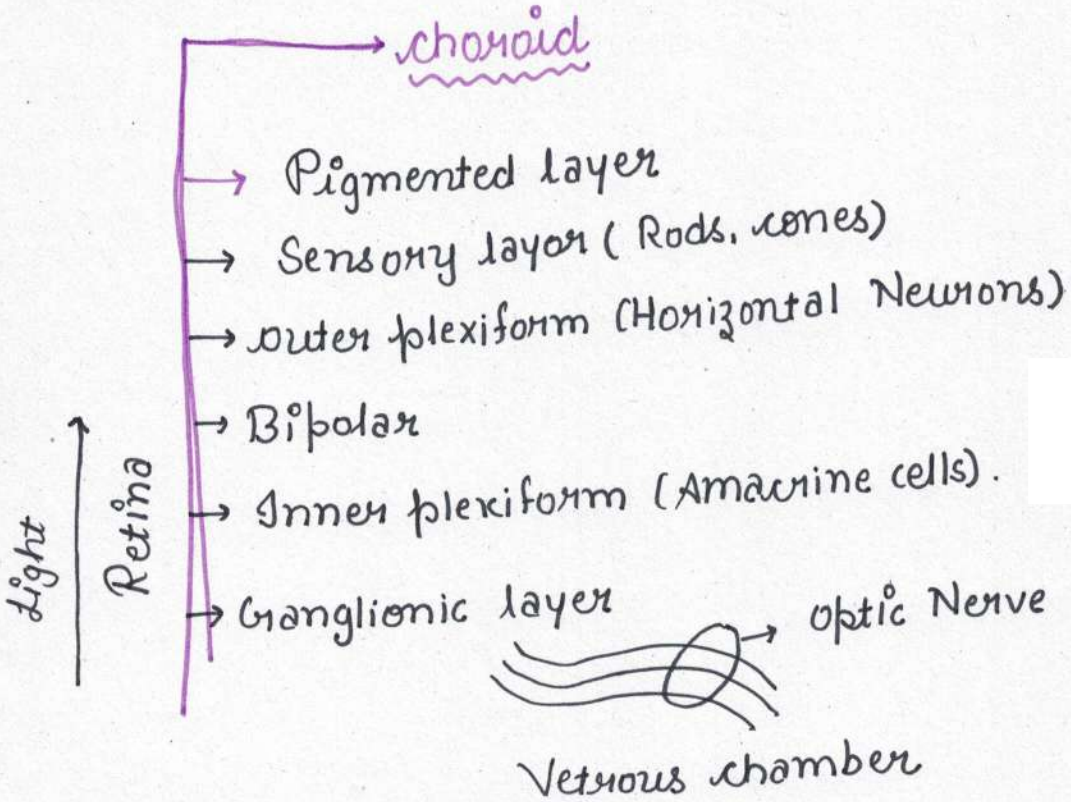
## Muscles of Iris (Ectodermal)

Radial dilatory Muscle
↓
Increase diameter of pupil
[Myadriasis]

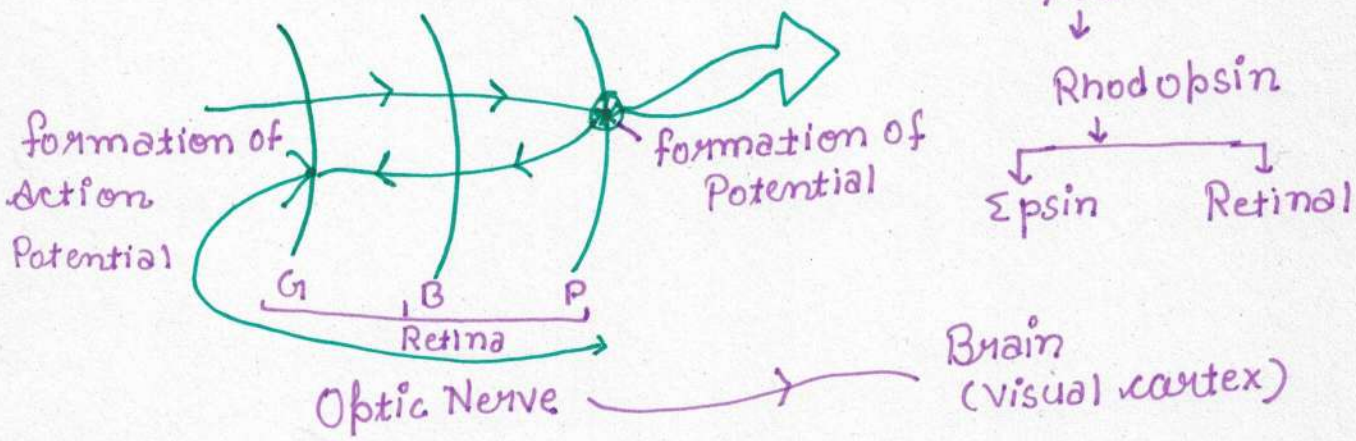
circular sphincter Muscle
↓
decrease diameter of Pupil
[Miosis]



Radial dilatory Muscle.
circular sphincter Muscle
Pupil



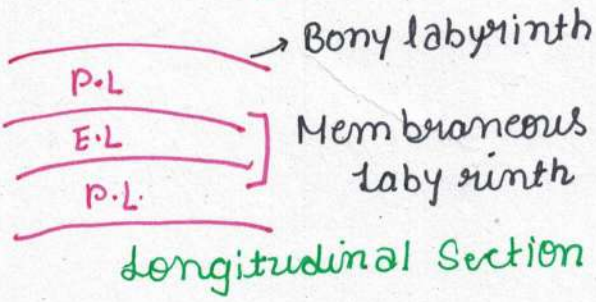

## Chemical Explanation of Vision

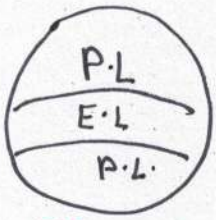



## Internal Ear

Labyrinth (Internal Ear)

- Bony (outer)
- Membranous (Inner).

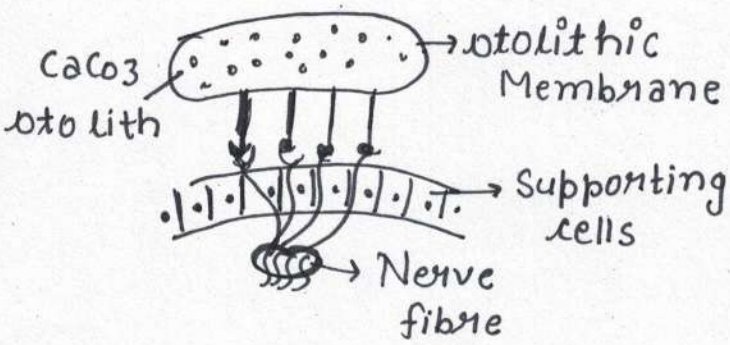


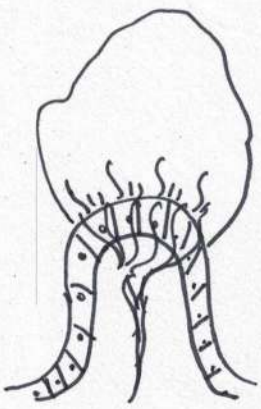



# Vestibular Apparatus (Balancing)

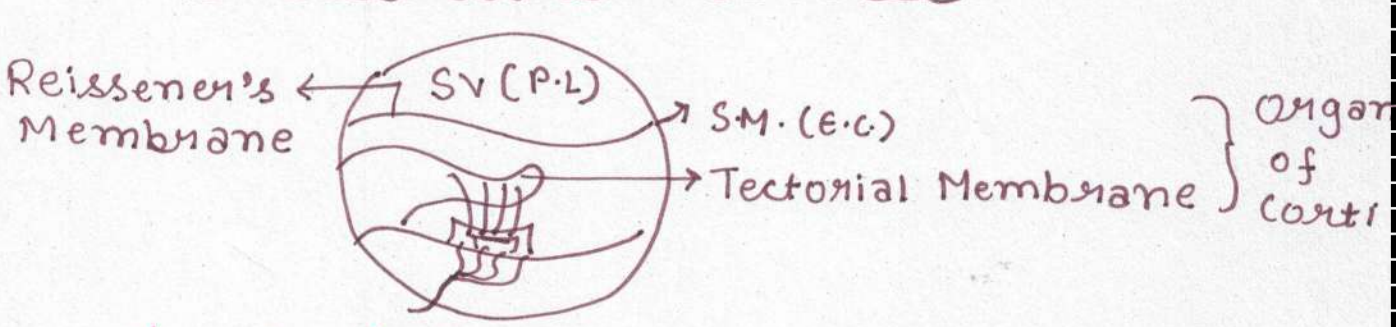
Otolith Organ
↓
Sacucle — Utricle
↓
Ridge present Inside
↓
Macula
(Static Equillibrium)

3-Semicircular canal
↓
Ampulia
↓
Ridge present in side
↓
Crista Ampullaris
↓
(Dynamis Equilibrium)

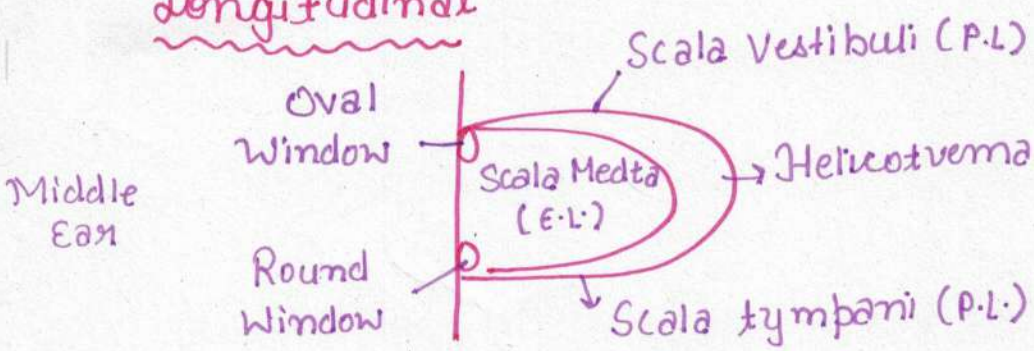


## Internal Structure of Cochiea




### Longitudinal




Oval window → fenestra Ovalis
Round window → fenestra rotundus.

# Sensory layer

During dark

$Na^+$ channels are open

↓

-30mv (Partial depolarisation)

↓

Sensory layer release glutamate (inhibitary N.T)

↓

Inhibits Bipolar layer.

During Light

$Na^+$ channels are closed

↓

Hyperpolarisation of sensory layer

↓

Release of glutamate stops.