Date:

LOCOMOTION

→ movement of a living organism from place to place either for sake of food or shelter

→ mostly shown by animals, plants do not locomote (those with stem etc.)

→ under the influence of movement of body parts

→ movement depending on 1). Skeleton 2). muscles

1). Skeleton

→ two types : (i°). Exoskeleton (ii°). Endosketeton

↳ structures present outside the body, eg/ feathers/shells/ scales/hair/spines (hedgehog)

· basic function is protection of the body from outside

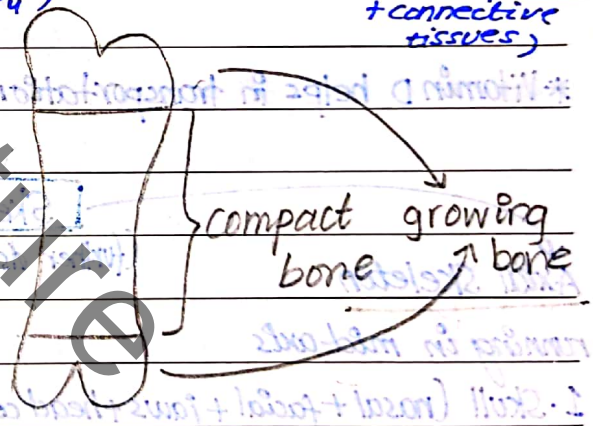
↳ · structures present inside the body

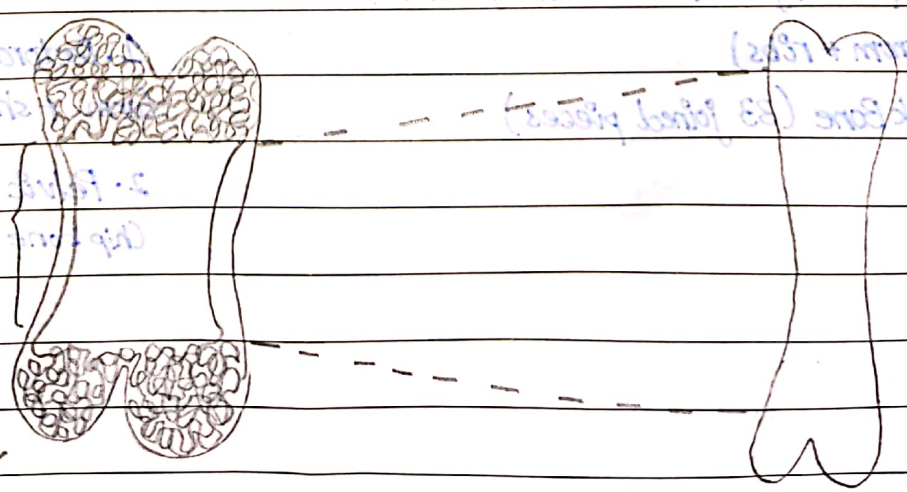
· comprising of 2 tissues (bones (hard solid structures) ↳ cartilages (type of bones with more connective tissue) giving it flexibility soft + flexible bones (elastic fibers + connective tissues))

· bones become hard b/c of calcium and phosphorus deposition (Ca^{+2}, PO_4^{-})

→ the growing ends divide and add on cells to the compact bone

→ basically, the compact bone increases in size





· compact b/c of deposition of Ca^{+2} & PO_4^{-}

DALMATIAN

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- Endoskeleton: structures present inside the body
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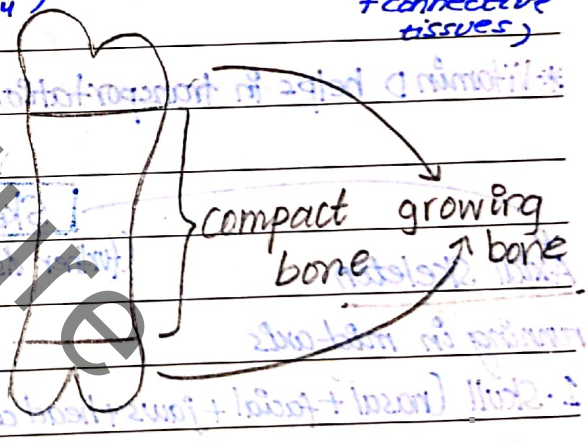

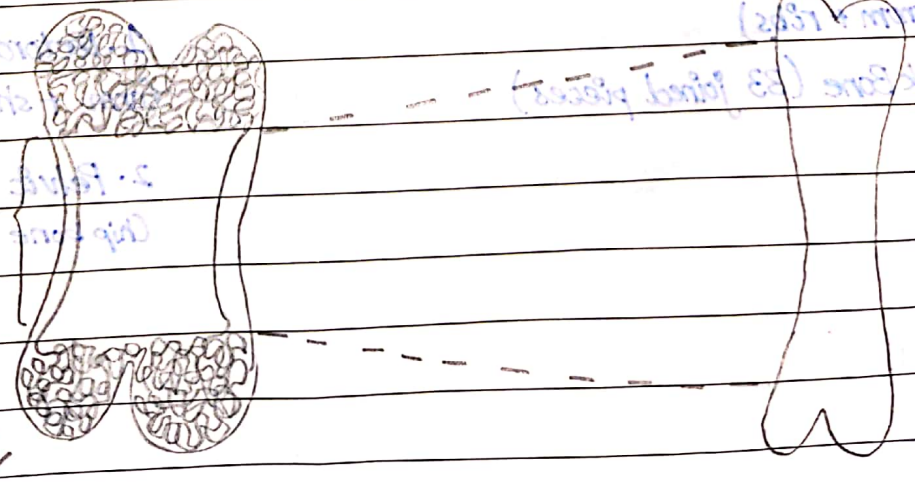

- compact b/c of deposition of Ca^{+2} & PO_4^{-}

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Function of EndoSkeleton

1. Protection of internal organs.

e.g./ - skull for brain
- vertebral (vertebra) column for spinal cord
- ribs for heart & lungs

2. Specific shape / Frame work

- if these'd be absent we'd be a cellular mass

3. Attachments of muscles

- facilitating movement of body parts

e.g./ - intercoastal or external intercoastals for ribcage movement (during breathing)
- face muscles for jaw movement

4. Growth

5. Bone Morrow

- the hollow space comprises of bone morrow that are stem cells (undifferentiation & capability) (make the blood cells)

*Vitamin D helps in transportation of Ca^{+2}, PO_4^-

Skeleton
(further sub-divisions)

Axial Skeleton

- running in mid-axis

1. Skull (nasal + facial + jaws + head covering bones)
2. Rib-cage (sternum + ribs)
3. Verterbra / Back Bone (33 joined pieces)

Appendicular

- present in limbs / appendages

1. Pectoral Girdle (arm + shoulder)
2. Pelvic Girdle (hip bone + leg bone)

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*medulla oblongata is connected to the spinal cord

Date:

[illegible] : yawn / [illegible]

involuntary: everything working b/c of an internal stimulus

• articulate at the back, no front attachment (with sternum)

Axial Skeleton

1. Skull

→ protective part for brain

→ includes cranium, facial bones, nasal bones, jaws (U+L)

cranium – for brain

• collection of number of pieces which are immovable joints

• not fixed before birth and after birth remain soft for upto 8-9 months (slide over)

nasal bones – cartillages

• little flexible

facial bones

• have space for eye sockets

jaws

• spaces for adjustment of teeth

• upper & lower jaw provide us limited movement (fixed)

2. Rib Cage

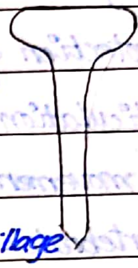
(chest cavity enclosed)

→ present in the ventral side, mid-axis

→ collective composed of one bone called sternum and the ribs

sternum – flat bone

• T-shaped



ribs — 12 pairs
- 1-7 pair (true ribs) · individual cartillage
- 8-10 pair (false ribs) · single cartillage
- 11-12 pair (floating ribs)

• attached with sternum infront by a cartillage

• the flexibility of cartillage allows it move

• each rib will articulate with the respective vertebra exactly parallel to the place infront

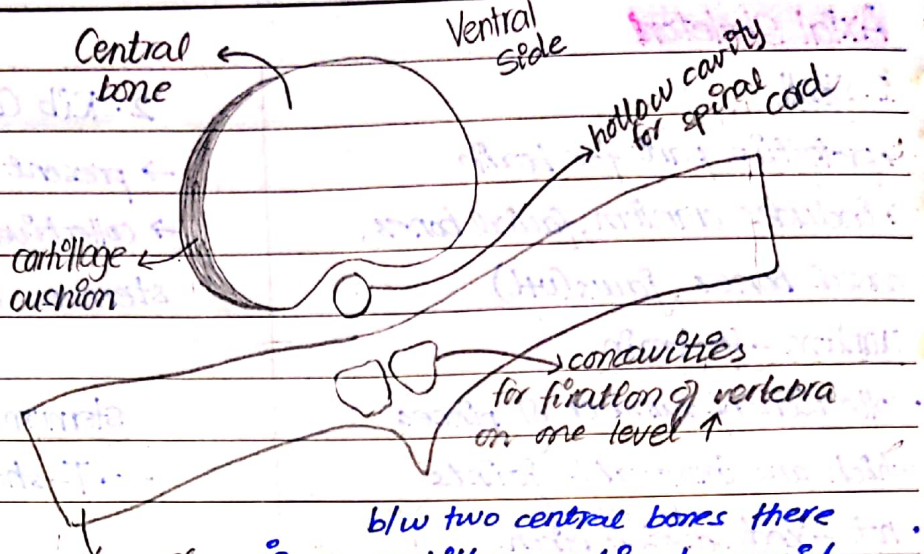
• articulation allows the rib to slide during respiration

• articulation (⊥) allowing sliding movement

Date:

3. Vertebral Column

→ 33 Vertebrae/Vertebra
↳ allowing us bending movement
↳ arranged to form s-shape
↳ dorsal and ventral side of the body
↳ protection of spinal cord
↳ articulation of ribs inturn giving us movement of ribcage



b/w two central bones there is a cartilage cution to avoid friction

→ Vertebrates are animals with
⊖ Central, Dorsal, Hollow and CNS presence
→ the transverse process in chest region : stronger + well developed (adjust other body organs)
→ " " " in abdomen : shorter/reduces & broder
→ (last 3) " " : fused
↳ (in animals with tails they extend to form the tail)

① Atlas & ② Axis joining the skull give us yes and no movement respectively

Appendicular

4. Pectoral Girdle

→ collection of shoulder bone + fore-limbs

scapula
- forming the shoulder joint with humerus

clavicle
- also known as the collar bone

humerus
- round head with a ridge
- upper arm

Radius
- shorter and then broader
- the bone towards the thumb / in line with thumb
- lower arm

Ulna
- forms the tip
- broader and then shorter
- involved in elbow joint
- lower arm

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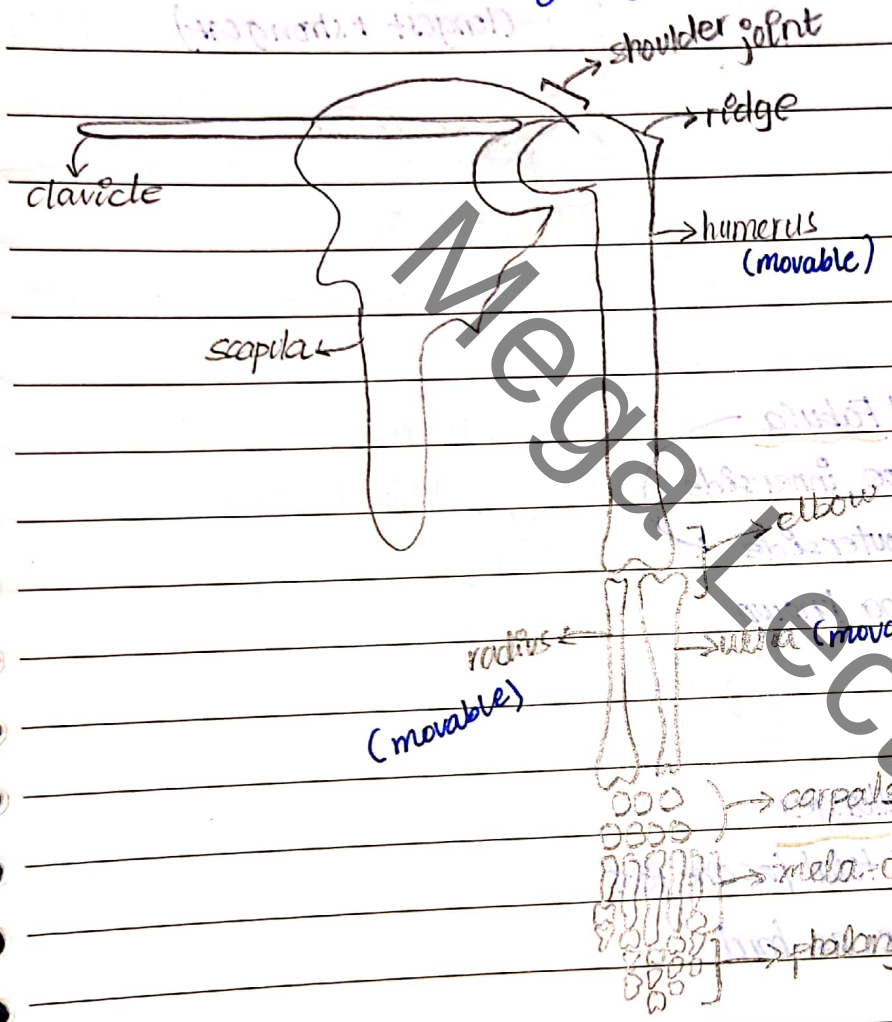
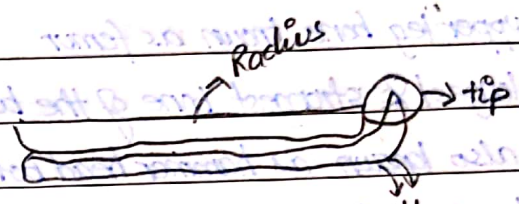
Carpals
- wrist joint
- 7 pieces

Meta Carpels
- 5 in number
- palm
- length may vary

Phalanges
- 3 per finger, 2 per thumb
- joints





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5. Pelvic Girdle

→ bones of hip and hind limbs
- hip bone

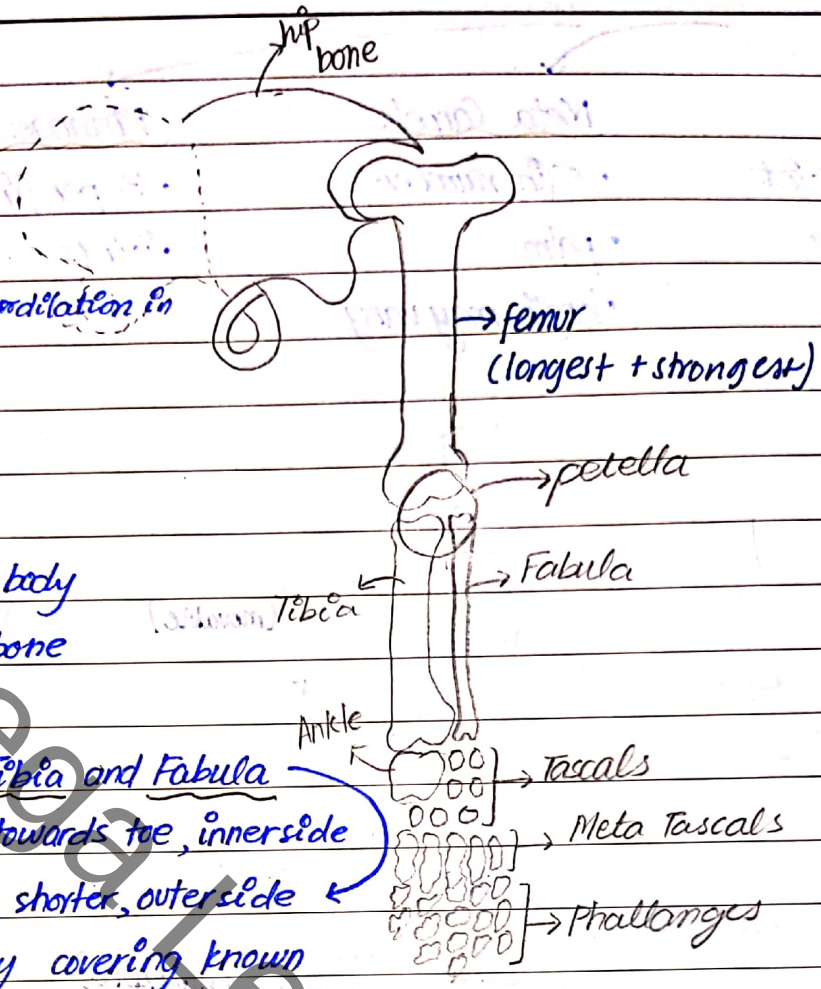
→ fused in males and not fused in females (front say) → for dilation in labour

→ pair in every body
- hind limb

→ upper leg bone known as femur
→ longest & strongest bone of the body
→ also known as hammer head bone
→ hammer shape head

→ lower leg bone comprises of Tibia and Fabula
towards toe, innerside
width is shorter, outerside

→ knee joint has a cap like bony covering known as petella or knee cap



Tarsals
- 8 in number
- ankle-bone

Meta-Tarsals
- 5 in number

Phallanges
- 14 total for one foot
- same as hand

Maxilla - Upper Jaw
Mandible - lower Jaw

2). Joints : also called articulation

→ immovable joint — fixed but can't move
e.g/ skull — cranium

→ slightly movable joint — limited movement
e.g/ lower jaw — mandible

Date:

→ movable joints — allows movement

1). Ball & Socket Joint
- one fixed and one movable

e.g (scapula — humerus) : shoulder joint
(the socket — the ball)

(hipbones — femur) : hip joint
(the socket — the ball)

- allows free rotational movement

2). Hinge joint
- two movable bones

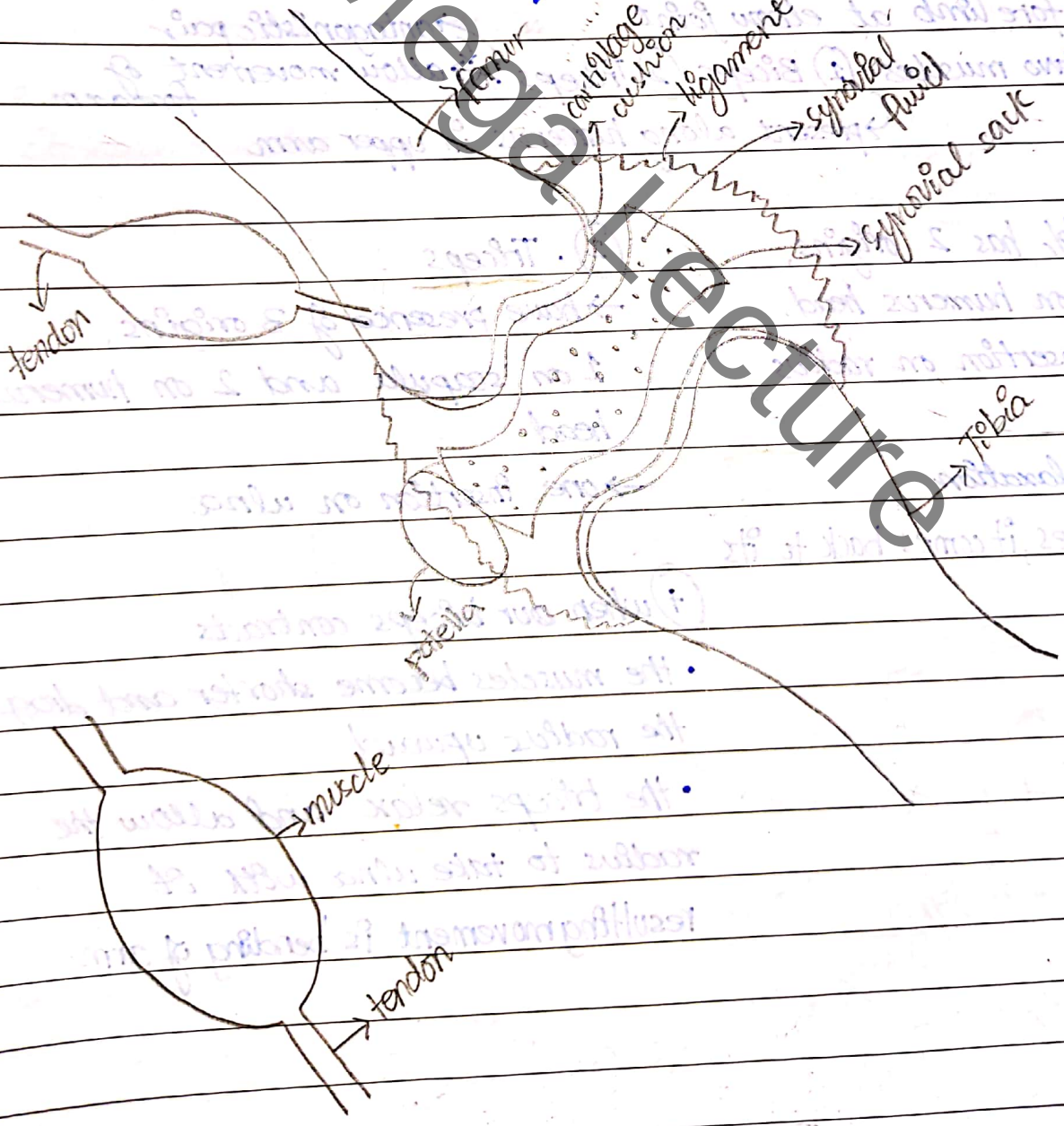
e.g (bending forward & straightening) : elbow joint

(bending backward & straightening) : knee joint

- on one plain

(flexing upward & downward of toes) : ankles

→ specific general characteristics of all joints :



Date:

- synovial fluid
  → friction reduction
  → lubrication
- cartillage cushion
  → avoiding friction
  → making movement easies
  (soft spongy connective tissue)

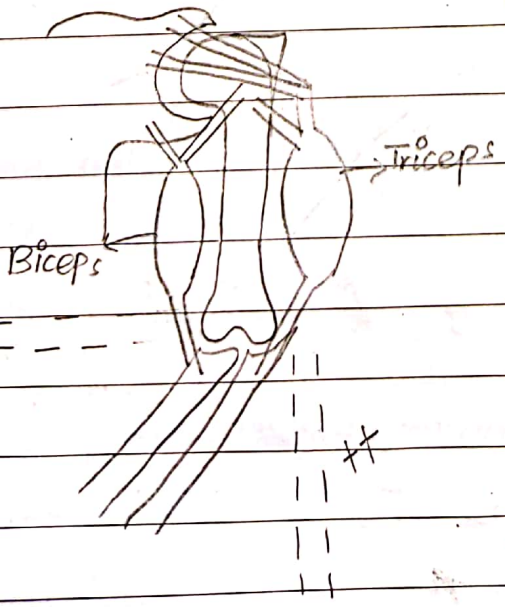
- ligament (tough, fiberous connective tissues)
  → bone to bone connection → can absorb shock
  → when weakens, joint pain begins
- tendons
  → muscle to bone attachment
  → known as Origin — tendon attached on fixed bone
  Insertion — tendon attached on a movable bone

⇒ Movement of fore limb at elbow joint
- involvement of two muscles (1) Biceps (2) Triceps → antagonistic pair → allow movement of forearm
  → present along humerus in upper arm

(1) Biceps
→ known as biceps b/c has 2 origins, 1 on scapula, 1 on humerus head
→ also has one insertion on radius

(2) Triceps
→ have presence of 3 origins, 1 on scapula and 2 on humerus head
→ one insertion on ulna

Recovery phase : relaxation
* when muscle relaxes, it comes back to its original size, does not elongate.



(+) when our biceps contracts
- the muscles become shorter and drags the radius upward
- the triceps relax and allow the radius to take ulna with it

resulting movement is bending of arm

Date:

(++) Triceps contract
· biceps relax and allow ulna to take radius with
resulting movement is straightening of the arm

To raise the forearm – biceps contract and triceps relax (e.g. biceps curl) (mere biceps check more) (radius dragged upward first)

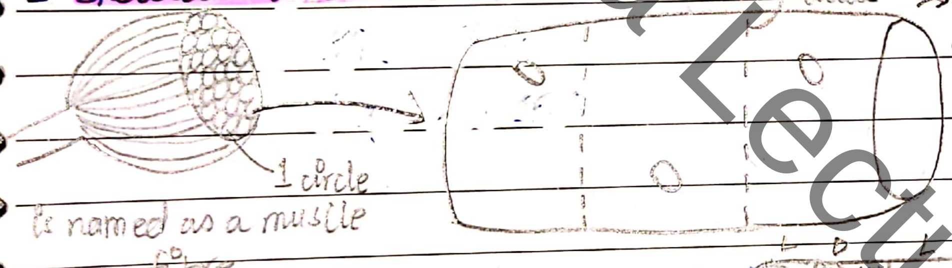
To lower forearm – triceps contract and biceps relax (ulna dragged first)

*. These are skeletal muscles as they are attached to our skeleton and they are voluntary, ↑ mentioned are skeletal

MUSCLES

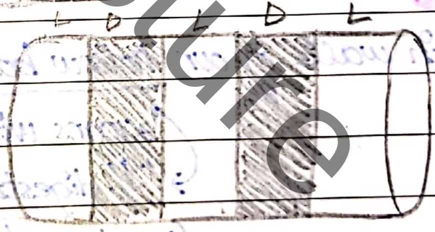
→ indirectly involved in locomotion
→ 3 main types : 1. Skeletal Muscles 2. Smooth Muscles 3. Cardiac Muscle

1. Skeletal Muscles

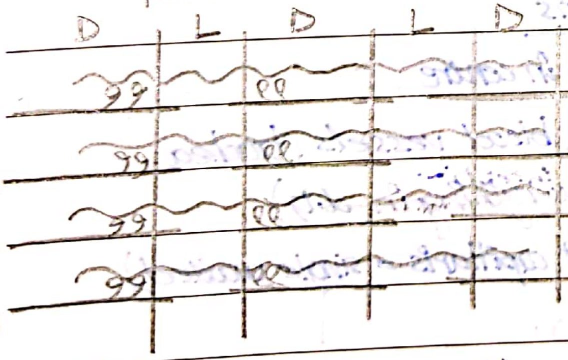


absence of cross walls

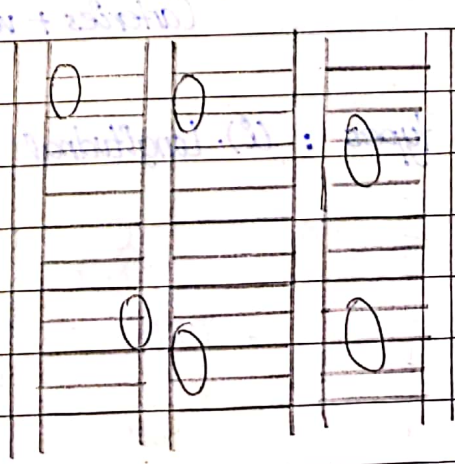
→ length wise arrangement of cells
→ absence of cross walls giving us appearance of a multi-nuclead condition



→ presence of two muscle protein responsible for contraction
① Actin
② Myosin



↳ overlapping gives us the dark and light colours
↳ alternate arrangement
↳ when muscles contract the g touches th
↳ requires ATP



→ unbranched muscle fibres
→ appearing multi nuclead

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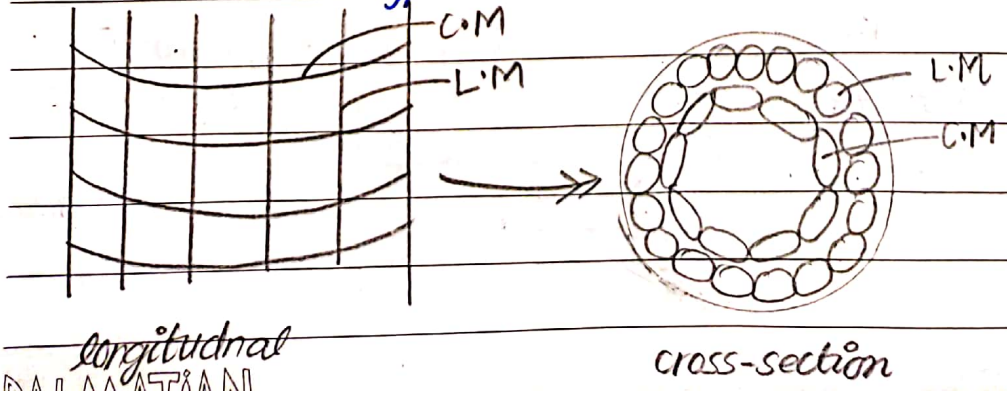
Date:

(1). multi-nucleated condition.
(2). absence of cross walls.
(3). two muscle proteins — Actin, Myosin
(4). striated cells.
(5). unbranched
(6). overlapping gives the light and dark colours
(7). length wise arrangement of muscle cells
↑ muscle fibre (1).

→ there can not be 2 consecutive contractions/relaxations, recovery phase zaroori hai
→ voluntary muscles and their movement is dependant on our will
→ present along bones
→

2. Smooth Muscles
→ always present in walls of our hollow body organs
(organs with cavity in centre
e.g. digestive track, blood vessels, trachea
(oesophagus / stomach / intestines (small+l))
(arteries + veins) (not capillaris = single walled)

→ divided into two types : (i). Longitudnal (ii). Circular



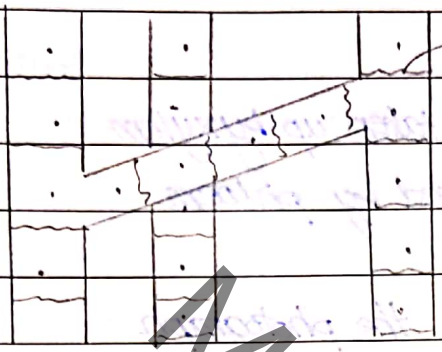
longitudnal cross-section

Date:

3. Cardiac Muscles

→ have branched muscle fibres

→ presence of cross walls septum : Interclated disks



→ mono-nucleld condition

→ absence of striated cells / non-striateel condition

↳ becomes involuntary in nature

→ generate contraction currents on their own (no need of outer stimulu

↳ only require a trigger

↳ pacemaker

Cardiac Muscles

Skeletal Muscles

Smooth Muscles