



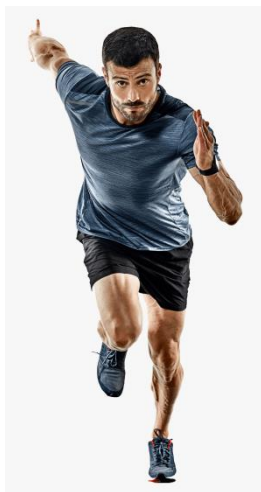
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## Theme: Locomotion in animals

### S3 New Curriculum Biology-Chapter 7– Locomotion in animals



**Locomotion** in biology refers to the ability of living organisms to move from one place to another. This movement is essential for survival, allowing organisms to find food, escape predators, search for mates, and adapt to their environment.

Different organisms exhibit various types of locomotion, including:

- **Walking, running, or jumping** (as seen in humans and land animals)
- **Swimming** (as in fish and other aquatic creatures)
- **Flying** (as in birds, insects, and bats)
- **Gliding** (as in flying squirrels and some reptiles)
- **Crawling** (as in worms and snakes)
- **Amoeboid movement** (as in single-celled organisms like amoebas)

For movement to be possible there must be a form of support. In animals it's the skeletal tissue.

#### The skeleton

There are three types of skeleton

##### (a) Hydrostatic skeleton

Here support is provided by a fluid under pressure and it is found in round worms, earthworm.



(b) **Exoskeleton**

It is made of a hard cuticle protecting inner delicate tissues and also provides attachment for muscles



**Advantage of exoskeleton**

- It minimize water loss by evaporation
- It protects the internal soft tissue
- It determine maximum size of the organism

**Disadvantage**

- It limits the rate of growth of the organism.

(c) **Endoskeleton**

It occurs in vertebrates, made of bone and cartilages.

It is internal and the muscles are outside

**Advantages**

- does not interfere with the rate of growth

**Disadvantage**

- Do not protect all soft tissue.

Importance of skeletons to animals

(i) Hydrostatic skeleton provides support form movement

(ii) **Exoskeleton**

- minimizes water loss by evaporation
- protects the internal soft tissue
- determines maximum size of the organism

(iii) Endoskeleton

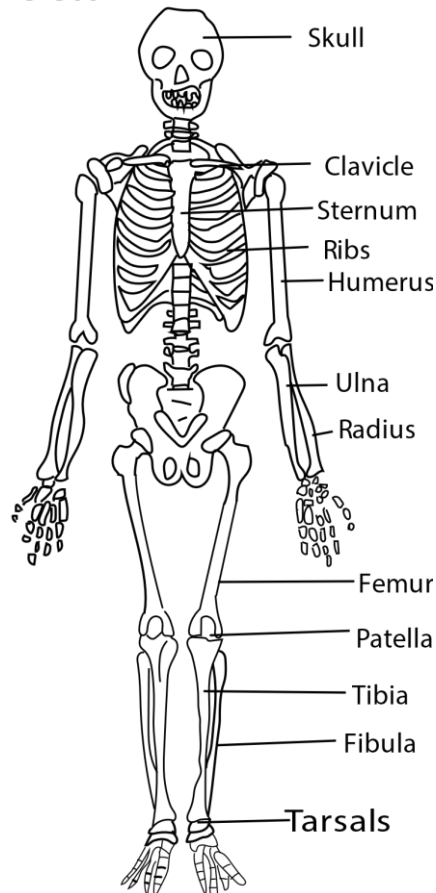
- Give body shape for easy identification and a streamline shape reduce resistance during movement.
- Provide support
- Protect delicate organs
- Store Minerals Ca,

- Make blood cells

### Human skeleton

is the framework of bone in the body

### Skeleton



The **axial skeleton** forms the central axis of the body and includes the **bones** of the skull, ossicles of the middle ear, hyoid bone of the throat, vertebral column, and the thoracic cage

The **appendicular skeleton** is the portion of the skeleton of vertebrates consisting of the bones that support the appendages. The appendicular skeleton includes the skeletal elements within the limbs, as well as supporting shoulder pectoral girdle and pelvic girdle. The word appendicular is the adjective of the noun *appendage*, which itself means a part that is joined to something larger.

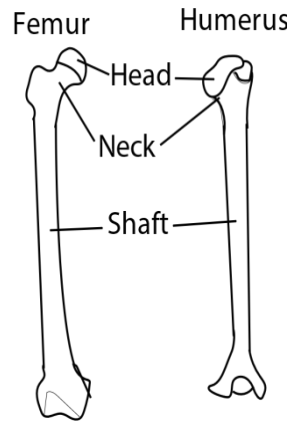
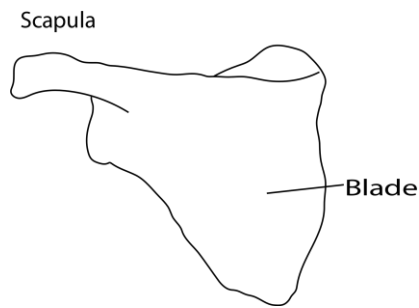
### Bones

Those are hard tissue that make up a skeleton

Functions of bone

- Give body shape for easy identification and a streamline shape reduce resistance during movement.
- Provide support
- Protect delicate organs
- Store Minerals Ca,
- Make blood cells

### Shape of common bones



### Differences between femur and humerus

Femur	Humerus
small head	Big head
Longer	shorter
Small well-defined neck	Neck not well defined
Found in thigh	Found in upper arm

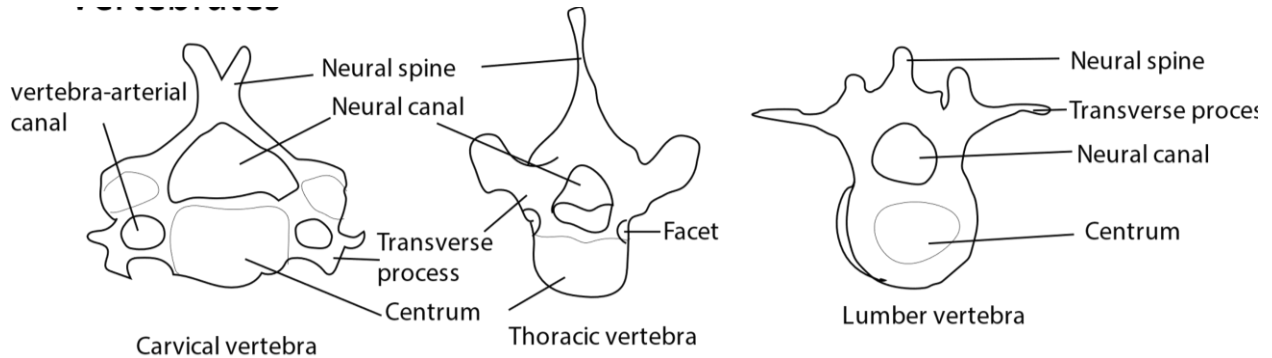
### Vertebrate

These are bone found on the vertebral column. These bones articulate with one another by small pads of cartilages called intervertebral discs.

The human vertebral column is made up of 33 vertebrates which are divided into 5 groups as shown in the table below

Name	Cervical	Thoracic	Lumber	Sacral	Caudal
Region	Neck	Chest	Abdomen	Pelvic	Tail (Coccyx)
Number	7	12	5	5	4

### Parts of vertebrates



### Differences between cervical and thoracic vertebrates

Cervical vertebra	Thoracic vertebra
Has vertebra-arterial canals	Lacks vertebra-arterial canals
Has short neural spine	Has long neural spine
Small body	Big body
Has no facets for ribs	Has facets for ribs

### Differences cervical vertebra and lumber vertebra

Cervical vertebra	Lumbar vertebra
Has vertebra-arterial canals	Lacks vertebra-arterial canals
Has transverse process	Has long transverse process
Small body	Big body

### Differences between lumbar and thoracic vertebra

Lumbar vertebra	Thoracic vertebra
Has vertebra-arterial canals	Lacks vertebra-arterial canals
Has Longs transverse process	Has short transverse processes
Has big body	Has small body
Lacks facets for ribs	Has facets for ribs

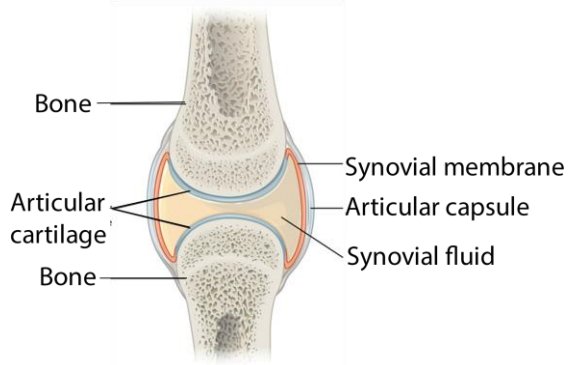
### Joints

A joint is a place where bones meet. Joints allow movement.

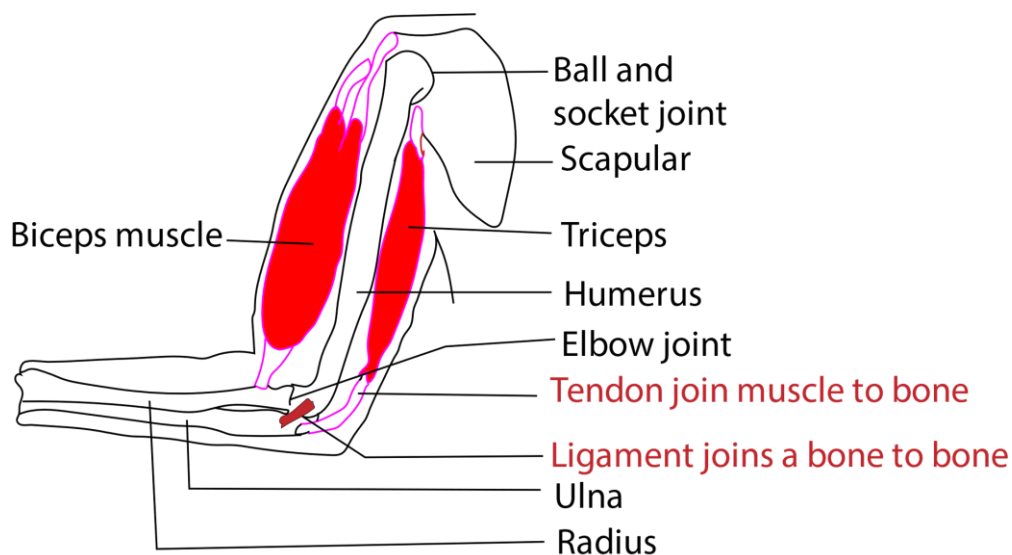
#### Types of Joint

1. **Pivot joint** allows rotation movement e.g. neck
2. **Hinge joint** allow movement of bone in two planes e.g. knee, elbow and finger joints
3. **ball and socket joints** at the shoulder and hip allow movement in many directions
4. **Saddle** is similar to hinge joints but allow more movements, e.g. thumb.
5. **Plane or gliding joints** are associated with small bones and allow movement in many directions e.g. ankle and wrist.
6. **Condyloid** between ulna and radius at the wrist.

### Structure of synovial joint



### Skeletal structures of the fore arm

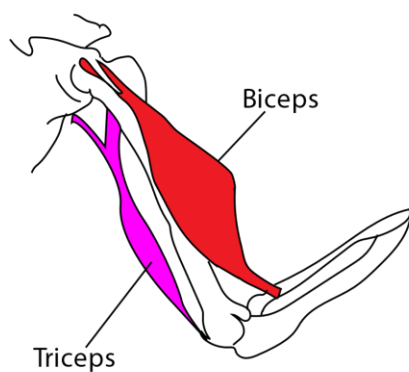


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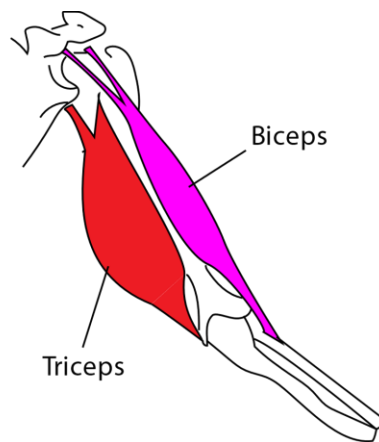
- (i) Tendons are tissues that join muscles to bones
- (ii) Ligaments are tissues that join bone to bone

## Antagonistic muscles

Antagonistic muscles are pairs of muscles that work in opposition to each other to produce movement. When one muscle contracts, the other relaxes, creating controlled and coordinated motion. For example, the **biceps** and **triceps** in the arm are antagonistic muscles. When the biceps contract to bend the elbow, the triceps relax. Conversely, when the triceps contract to straighten the elbow, the biceps relax as shown below

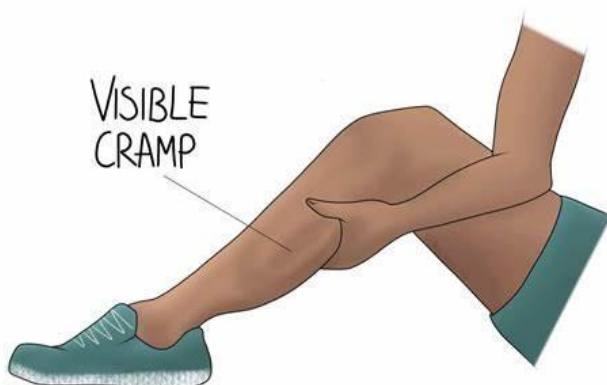


When the biceps contract it bends and curls the arm



When the triceps contract it straightens the arm

## Muscle cramps



Muscle cramps are sudden, involuntary contractions of a muscle that can be quite painful. They often occur in the legs, especially the calf muscles, but can affect any muscle in the body. Cramps can last from a few seconds to several minutes and may leave the muscle feeling sore afterward.

## Causes of Muscle Cramps

Muscle cramps can be triggered by various factors, including:

- **Dehydration** – Lack of water and electrolytes like potassium, calcium, and magnesium can cause muscle spasms.
- **Overuse or Strain** – Exercising intensely or using a muscle for an extended period without proper rest can lead to cramping.
- **Poor Circulation** – Reduced blood flow to muscles, such as when sitting in one position for too long, can cause cramps.
- **Mineral Deficiency** – Low levels of essential minerals disrupt normal muscle function.
- **Nerve Compression** – Conditions like spinal issues or pinched nerves can lead to cramps.
- **Certain Medications** – Some drugs, including diuretics, can increase the likelihood of cramping.

## How to Relieve Muscle Cramps

- **Stretch the affected muscle** – Gently stretching and massaging the muscle can help it relax.
- **Stay hydrated** – Drinking water or electrolyte-rich fluids helps prevent cramps.
- **Apply heat or cold** – A warm compress can relax tight muscles, while ice can reduce pain and inflammation.
- **Improve blood circulation** – Moving around or massaging the muscle can help restore normal function.
- **Maintain a balanced diet** – Eating foods rich in potassium, magnesium, and calcium (like bananas, dairy products, and leafy greens) supports healthy muscle function.

If cramps occur frequently or severely, it may indicate an underlying condition requiring medical attention.

## Revision exercise

1. (a) Describe the structure of different types of skeletons in animals giving example in each case (09marks)  
(b) Explain how the vertebra column in mammal is adapted to its function (06marks)
2. (a) Explain why a skeleton is necessary in human body  
(b) With the aid of a diagram describe how a human arm can bend and straighten.

## Suggested answers

1. (a) Types of skeletons  
(i) hydrostatic skeleton provide support by a liquid under pressure e.g. earthworm

- (ii) exoskeleton is made of a hard cuticle protecting inner delicate tissue and providing support for attachment of muscles e.g. insects
- (iii) Endoskeleton is made framework of bones to protect delicate tissues and provide support for muscles

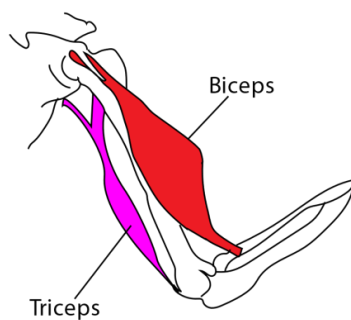
(b) Adaptation of vertebra column

- (i) vertebra have processes for attachment of muscle
- (ii) vertebra have neural canal for passage and protection of spinal cord
- (iii) cervical vertebrate have vertebra-arterial canal for protection of arteries
- (iv) Jointed for flexibility
- (v) strong bones for support

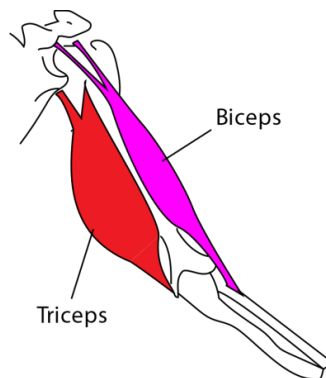
2. (a) Functions of bone

- (i) Give body shape for easy identification and a streamline shape reduce resistance during movement.
- (ii) Provide support
- (iii) Protect delicate organs
- (iv) Store Minerals Ca,
- (v) Make blood cells

(b) In human arm when the biceps flex and the triceps extend the arm out.



When the biceps contract it bends and curls the arm



When the triceps contract it straightens the arm

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Thanks

Dr. Bbosa Science