LIFE SCIENCE
CLASS - X

Theme: Control and Coordination in Living Organisms

Sub-theme: Locomotion as a Type of Response in Animals

1. Explain the process of bipedal locomotion in humans.

Ans. Locomotion with the help of two legs is known as bipedal locomotion. It places humans at the highest position in the evolutionary ladder.

The following components act together to make bipedal locomotion possible:

a) Bones and bone joints. b) Muscles (Striated)

c) Ligaments and tendons d) Brain and internal ear

a) **Bone joints:** Movable joints are –

- Ball and socket joint – Between Pelvic girdle and Femur
- Hinge joint – Between Femur and Tibia – fibula
- Sliding joint – Ankle joint

b) **Muscles:** Striated muscles are –

- Flexor – Located in hands and legs. Helps to bring two bones closer. e.g. Biceps
- Extensor – Located in hands and legs. Helps two bones to get away from each other. e.g. Triceps.
- Abductor – Helps to move the bones or body parts away from the central axis of the body. e.g. Deltoid.
- Adductor – Helps to make the bones or body parts to come closer towards the central axis of the body .e.g. Latissimus dorsi.

c) **Ligaments and tendons :**

- Ligaments – Connective tissue which helps in attaching a bone with another bone.
- Tendons – Connective tissue which helps in attaching a bone with muscles.

d) **Cerebellum and internal ear** :

- Cerebellum – The cerebellum acts as the balancing centre of the body and acts by controlling the muscle tissue.
- Internal ear → Semi-circular canal → Vestibular nerve

→ **Process of bipedal locomotion:**

- Due to contraction of muscles, the heel of the foot that is going forward is raised above the ground and the knee bends.
- The total body weight rests on the other foot and the centre of gravity is shifted forward.
- To maintain balance the foot that is going forward is raised above the ground and after having a swing it comes down. The ankle first touches the ground and is followed by the sole of the foot.
- This phenomenon is repeated. Cerebellum and internal ear take part in maintaing body balance.
- Along with left leg the right hand and with right leg the left hand keeps advancing.

2. 'The mode of action of abductor and adductor muscle is antagonistic in nature' – explain.

Ans.

Abductor muscle	Adductor muscle
• Contraction of this muscle helps to move the bones or body parts away from the central axis of the body. This process is called abduction.	• Contraction of this muscle helps to make the bones or body parts to come closer towards the central axis of the body.This process is called adduction.
• Example – Deltoid or gluteus muscle	• Example:– Latissimus dorsi