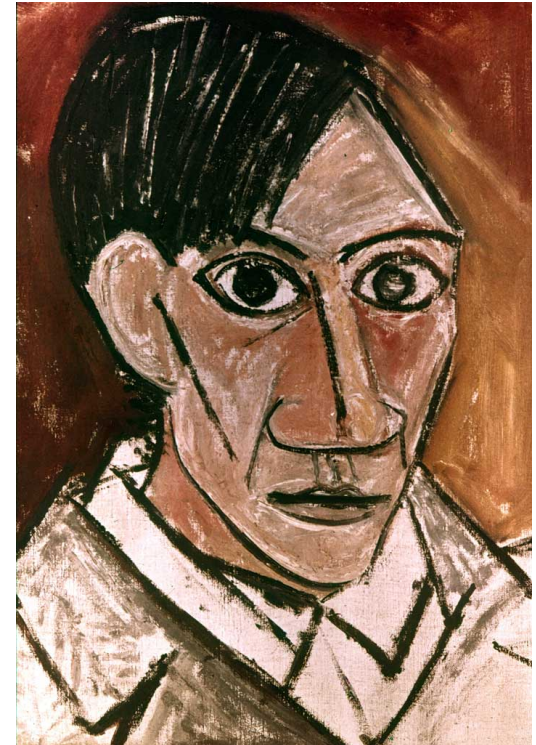


RECEPTORS AND EFFECTORS



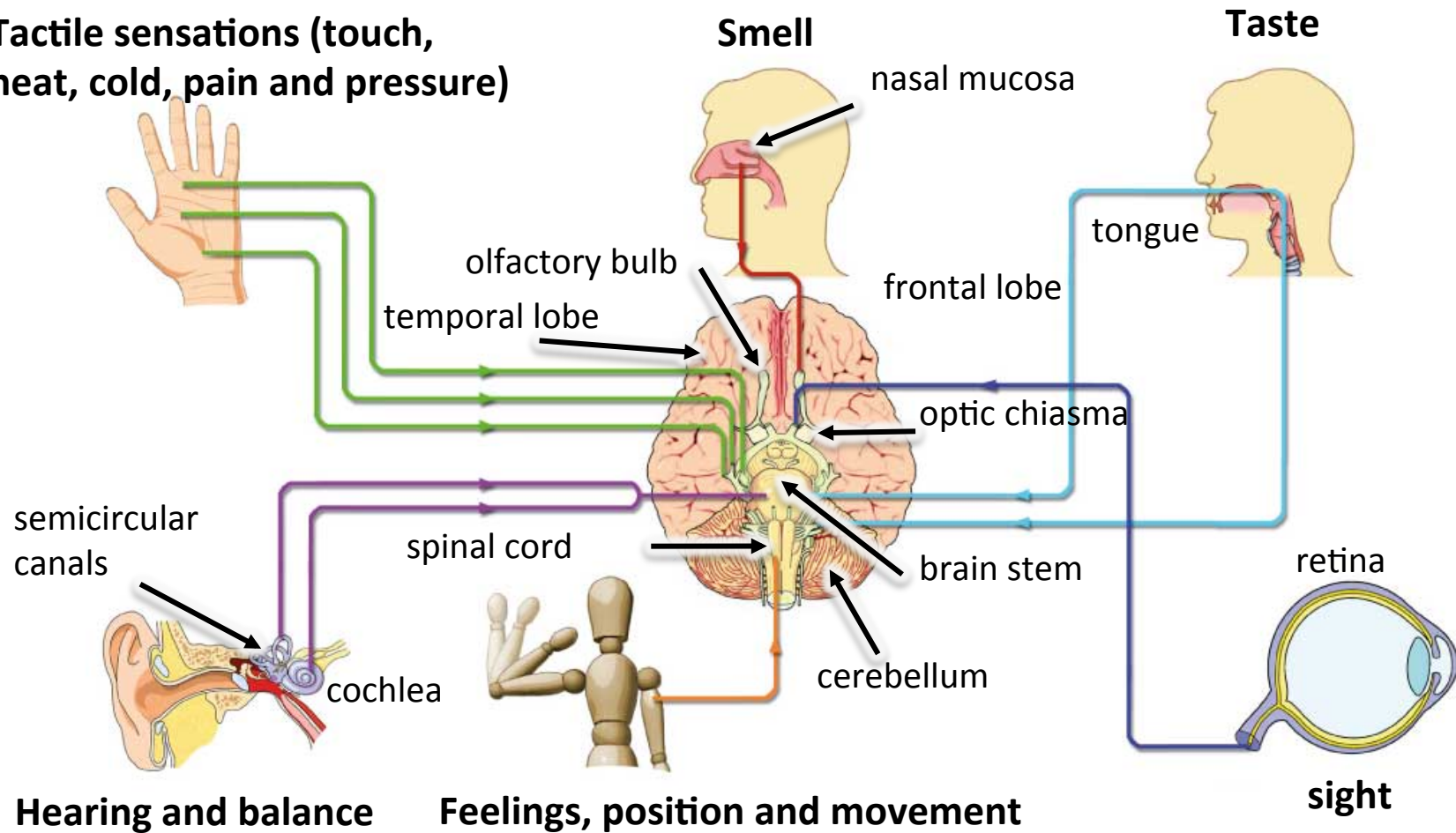
- Perception of stimuli. Sensory receptors.
- The eye. Anatomy.
- The eye. Functioning.
- The ear. Anatomy.
- The ear. Functioning.
- The skin.
- Taste and smell.
- Effectors. Bones.
- Effectors. Joints.
- Effectors. Muscles.
- Effectors. Muscle contractions.
- Effectors. Skeletal systems.
- Effectors. Muscle system.
- Health and illnesses of receptors and effectors.



PERCEPTION OF STIMULI. SENSORY RECEPTORS

Sensory receptors are responsible for perceiving information, which they convert into a nerve impulse. The nerve impulse travels to the brain and produces a **feeling**.

Tactile sensations (touch, heat, cold, pain and pressure)



Hearing and balance

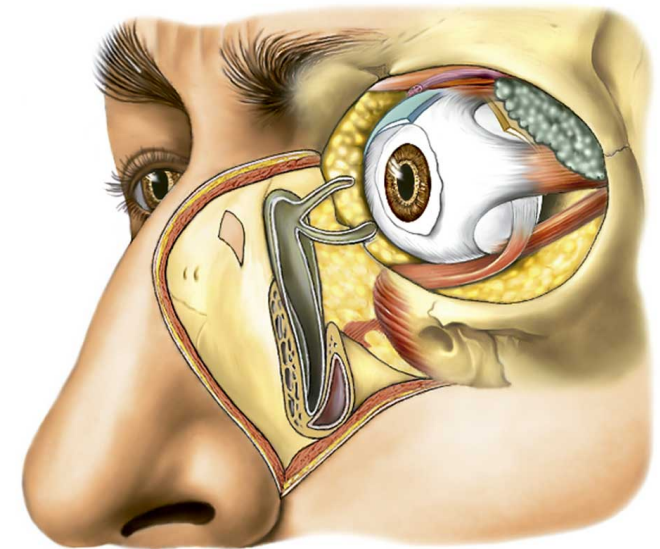
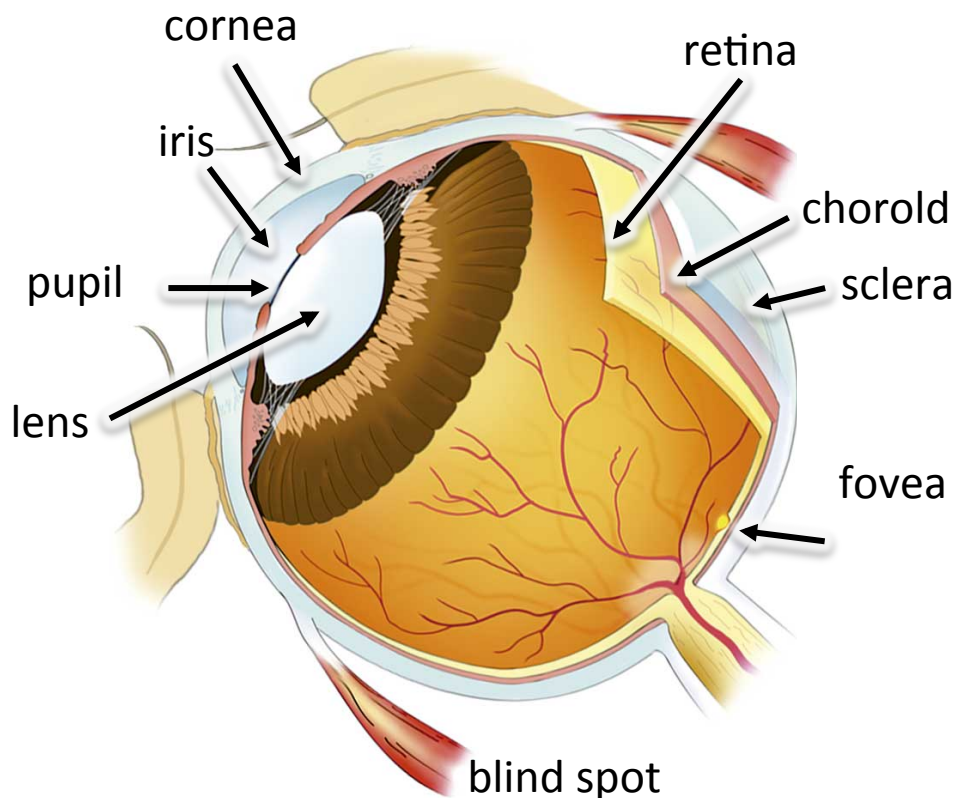
Feelings, position and movement

sight

THE EYE. ANATOMY

The **eye** is the organ where the sense of sight is located. It is a complex structure that receives light and carries it to the area where the photoreceptors are located.

The eye is formed by the **ocular globe** and a series of **accessory organs**.



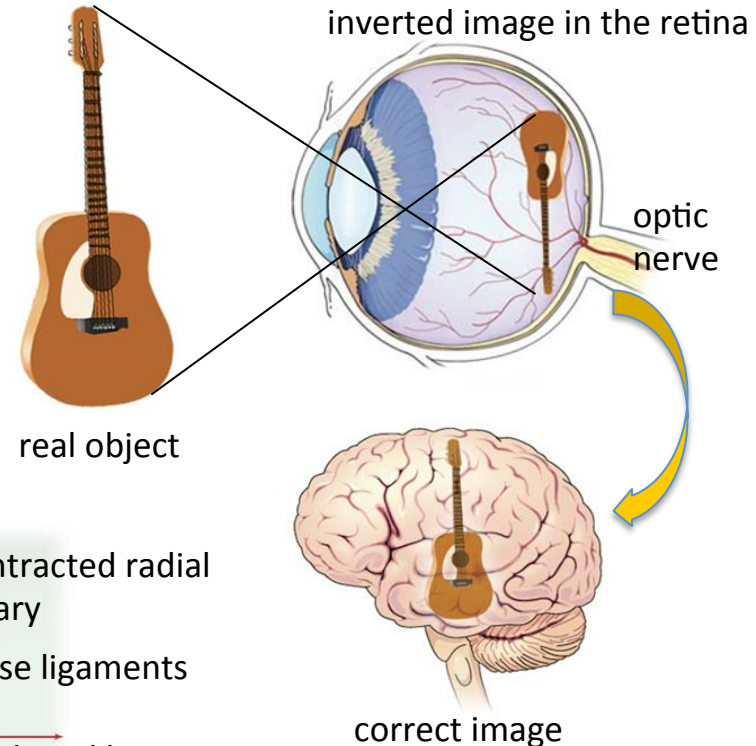
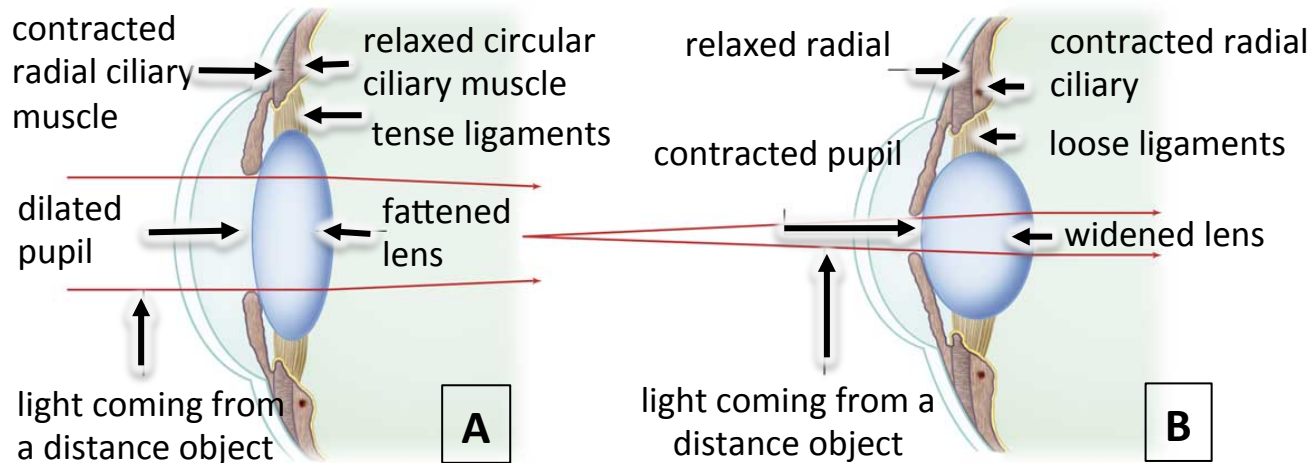
THE EYE. FUNCTIONING

The **function of the ocular globe** is to allow light to stimulate cones and rods in the retina. Then, the cones and rods will produce a nervous impulse that will be carried to the brain by the optic nerve.

Pupil regulates the amount of light that goes into the eye and the lens focuses images.

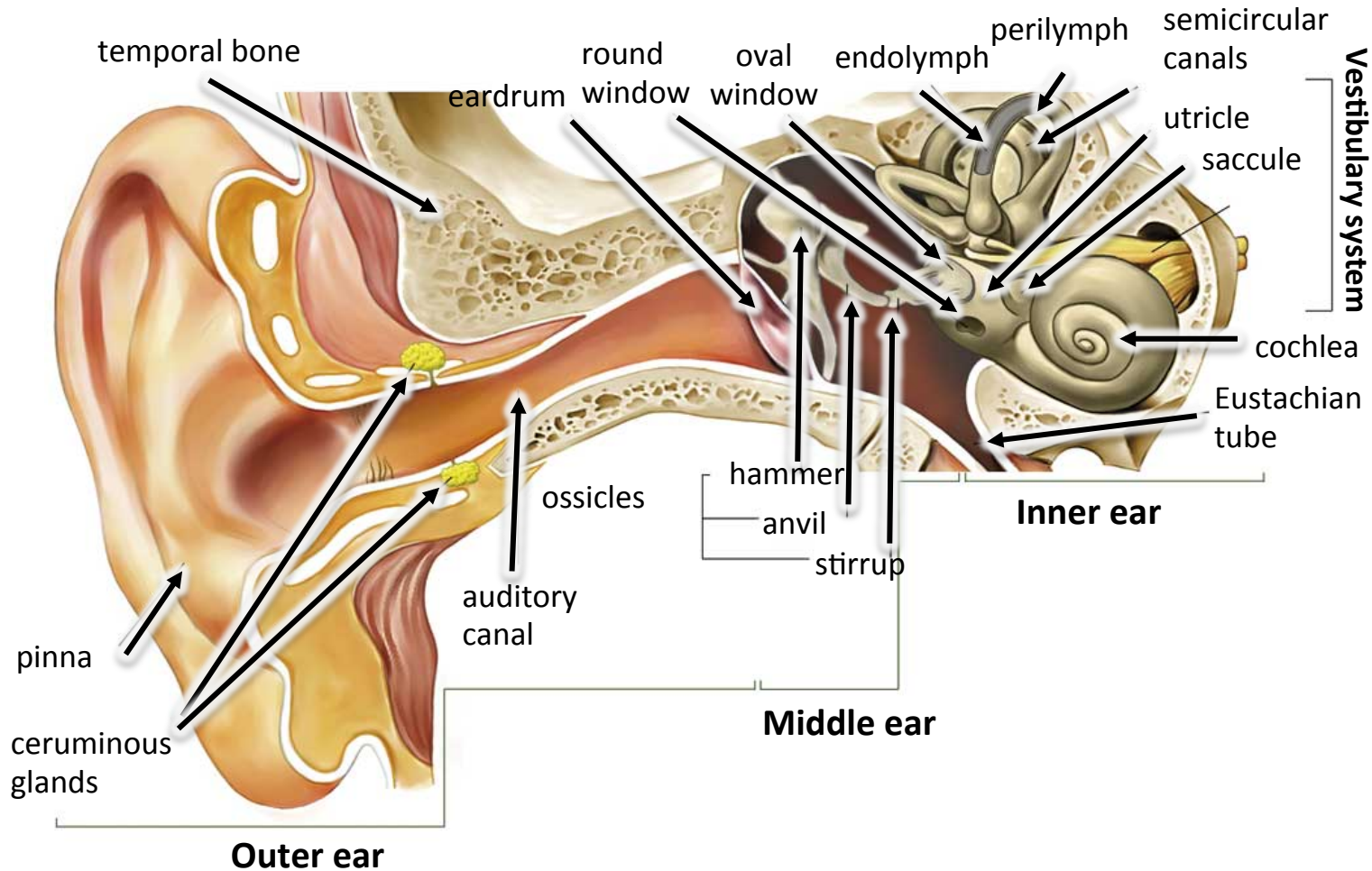
Sight in humans is **stereoscopic**, which means it can perceive objects in three dimensions, (1) their size, (2) their shape and (3) their distance away. This is possible because images proceeding from both eyes reach the brain and our brain makes them overlap, giving the sensation of three-dimensional space.

How the lens focuses on (A) distant and (B) close objects



THE EAR. ANATOMY

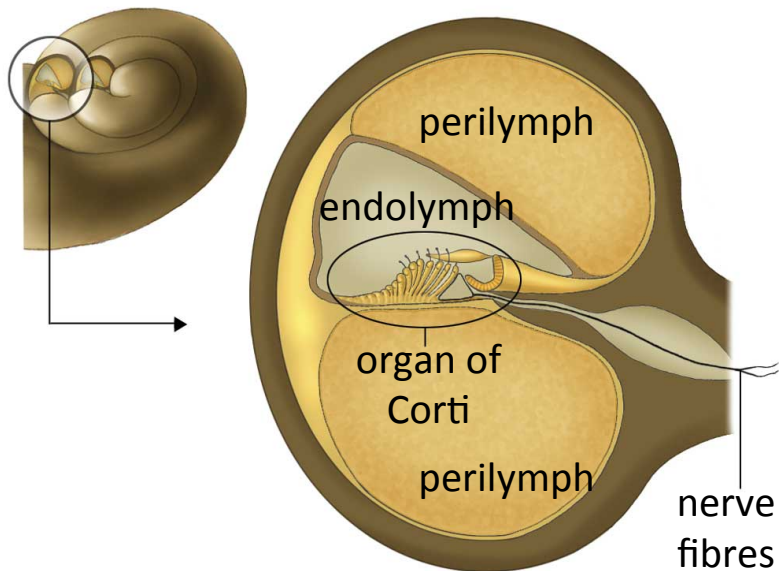
The **ears** are the sensory organs located inside the cavities of the temporal bones, which are found in areas on both sides of the head called the temple. These organs perceive two types of stimuli in two different areas: **sounds**, and **changes of body posture (balance)**.



THE EAR. FUNCTIONING

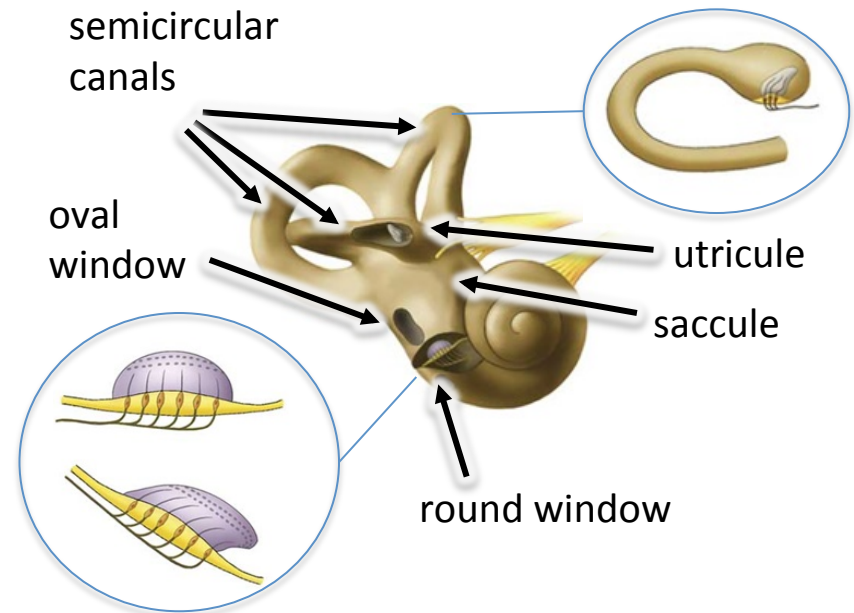
Hearing mechanism

The amount of vibration will increase or decrease according to the intensity of the sound. The last bone, the stirrup, transfers the vibration to the oval window causing the perilymph to vibrate. As a consequence certain cells (located inside the cochlea, forming the organ of Corti) are stimulated.



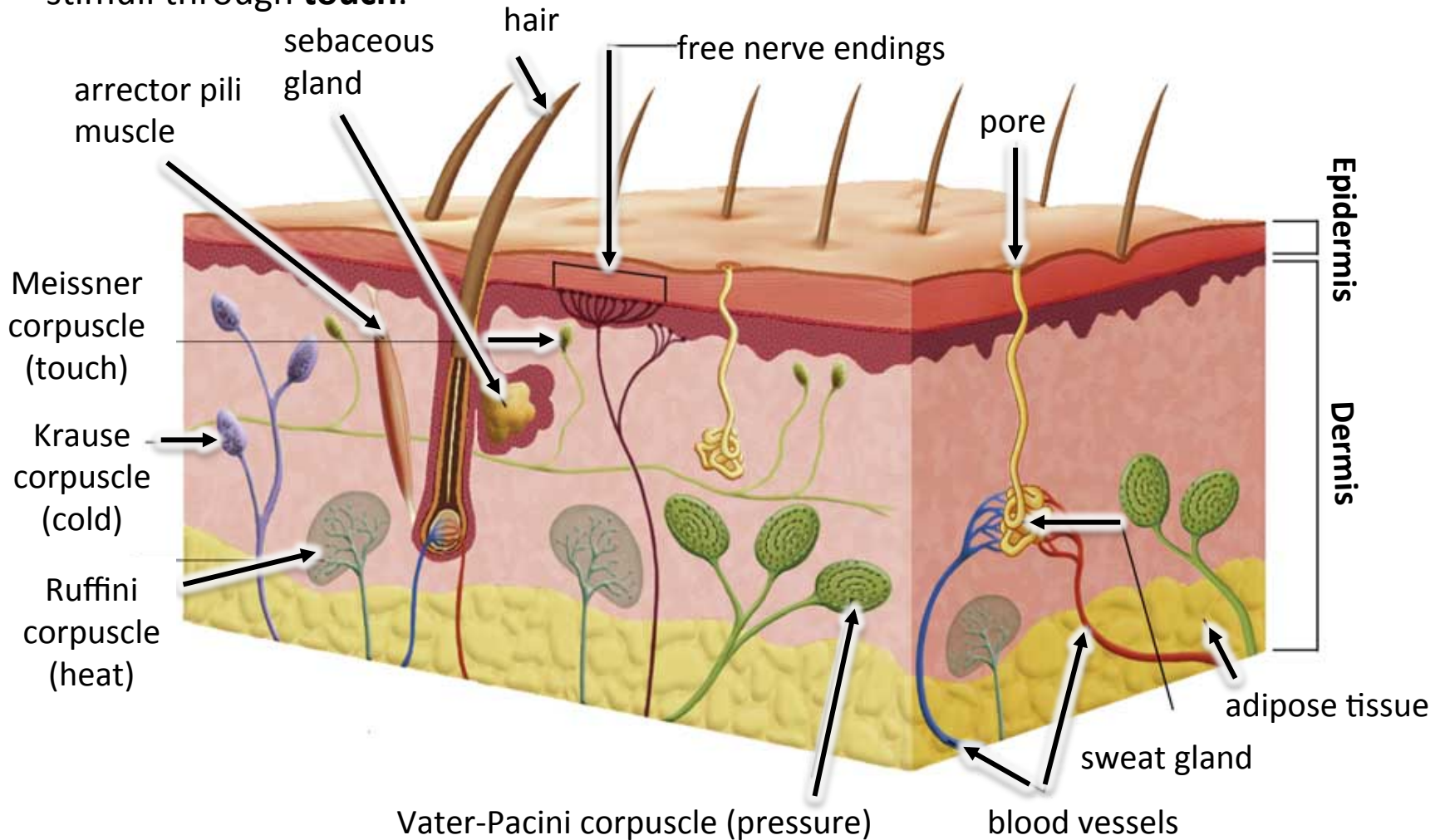
Balance mechanism

Knowledge of the body's position or perception of static balance: this occurs in the utricle and saccule when we're motionless (sitting, lying face up or face down, or in a straight or angled position...).



THE SKIN

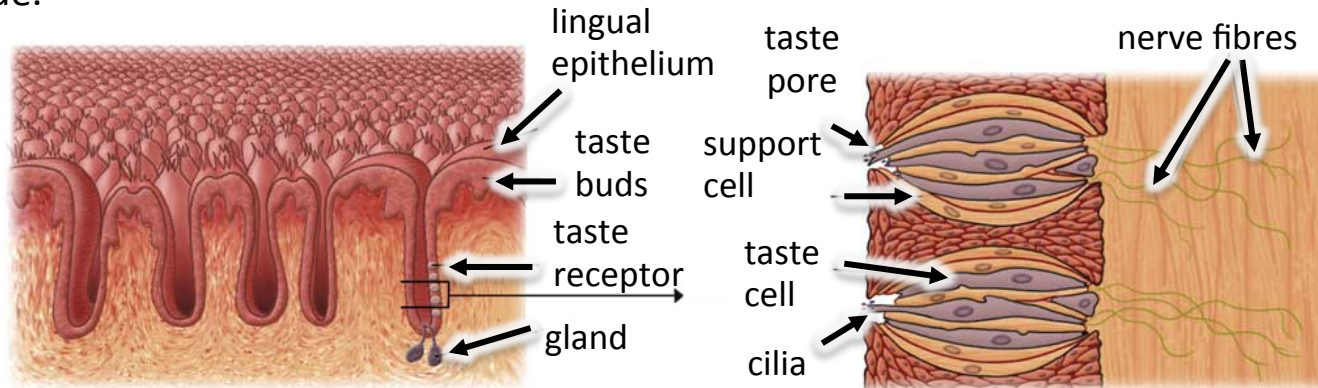
The **skin** is an organ that has sensory receptors that perceive very diverse stimuli through **touch**.



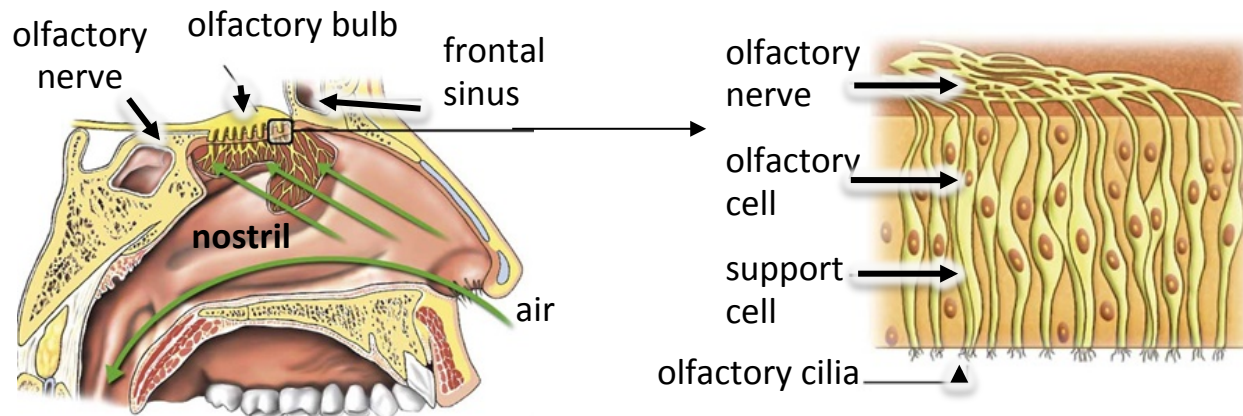
TASTE AND SMELL

Taste allows us to detect chemical substances from foods as they dissolve in our saliva. The sensations produced are the different tastes.

Taste receptors are cells that group in **taste buds**, which are located inside the mouth, especially on the tongue.



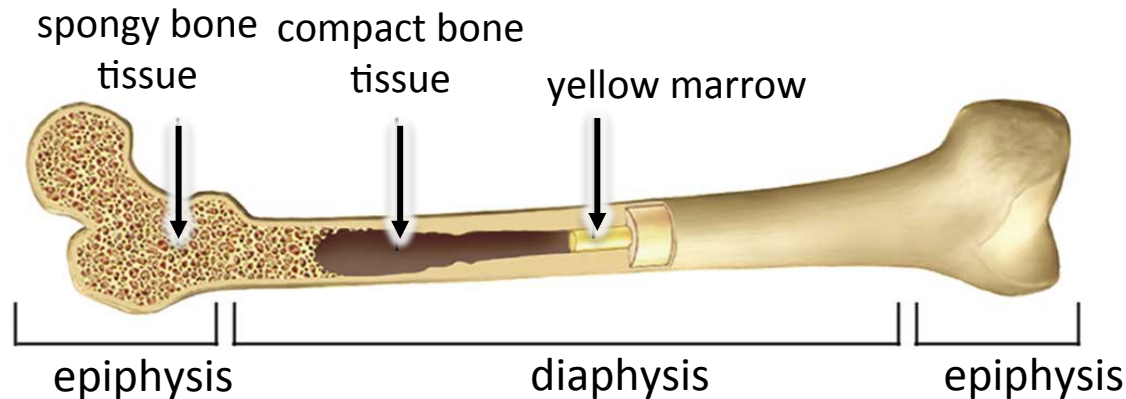
In the interior of the nasal passages, there is an area called **yellow pituitary** where the **olfactory receptor cells** group, forming the **olfactory bulb**. When smell olfactory receptor cells are stimulated, we can detect an **odour**.



EFFECTORS. BONES

The **muscles** are responsible for changing the position of bones and, creating **movement**.

Longitudinal section of a **long bone**



Short bones: these are rounded and mostly made up of spongy bone tissue (inside), with a thin outer layer of compact bone tissue.



Flat bones: these are plate-shaped. They are formed by an inner layer of bone tissue surrounded by two layers of compact bone tissue. The function of this bone type is protective.

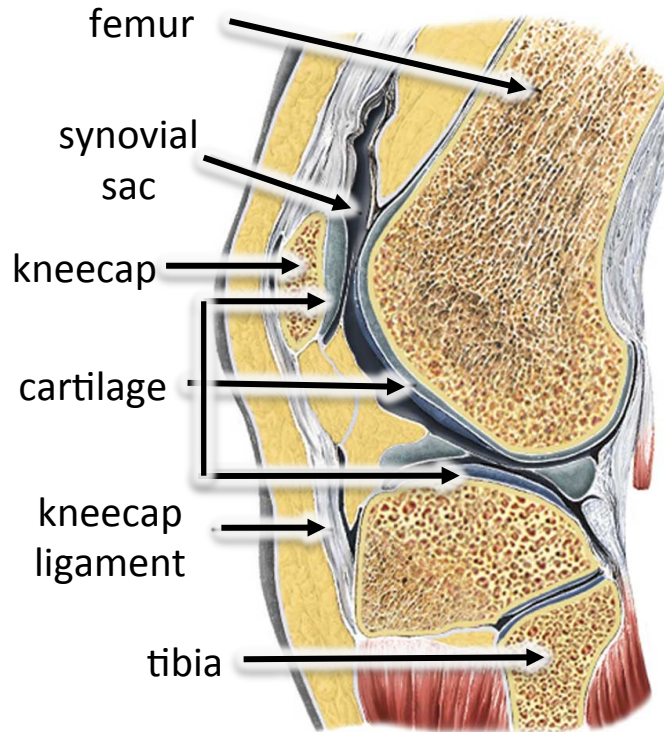


EFFECTORS. JOINTS

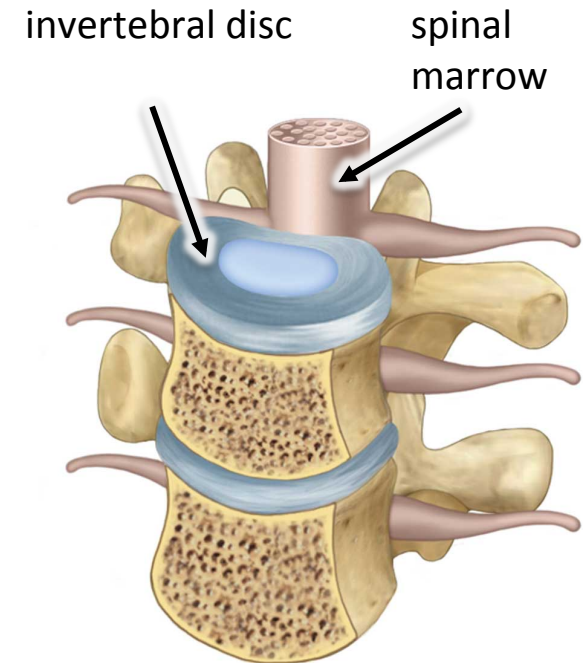
Bones join together forming **joints** that can be of three types: fixed, mobile and semi-mobile joints.



Fixed joint
(cranium)



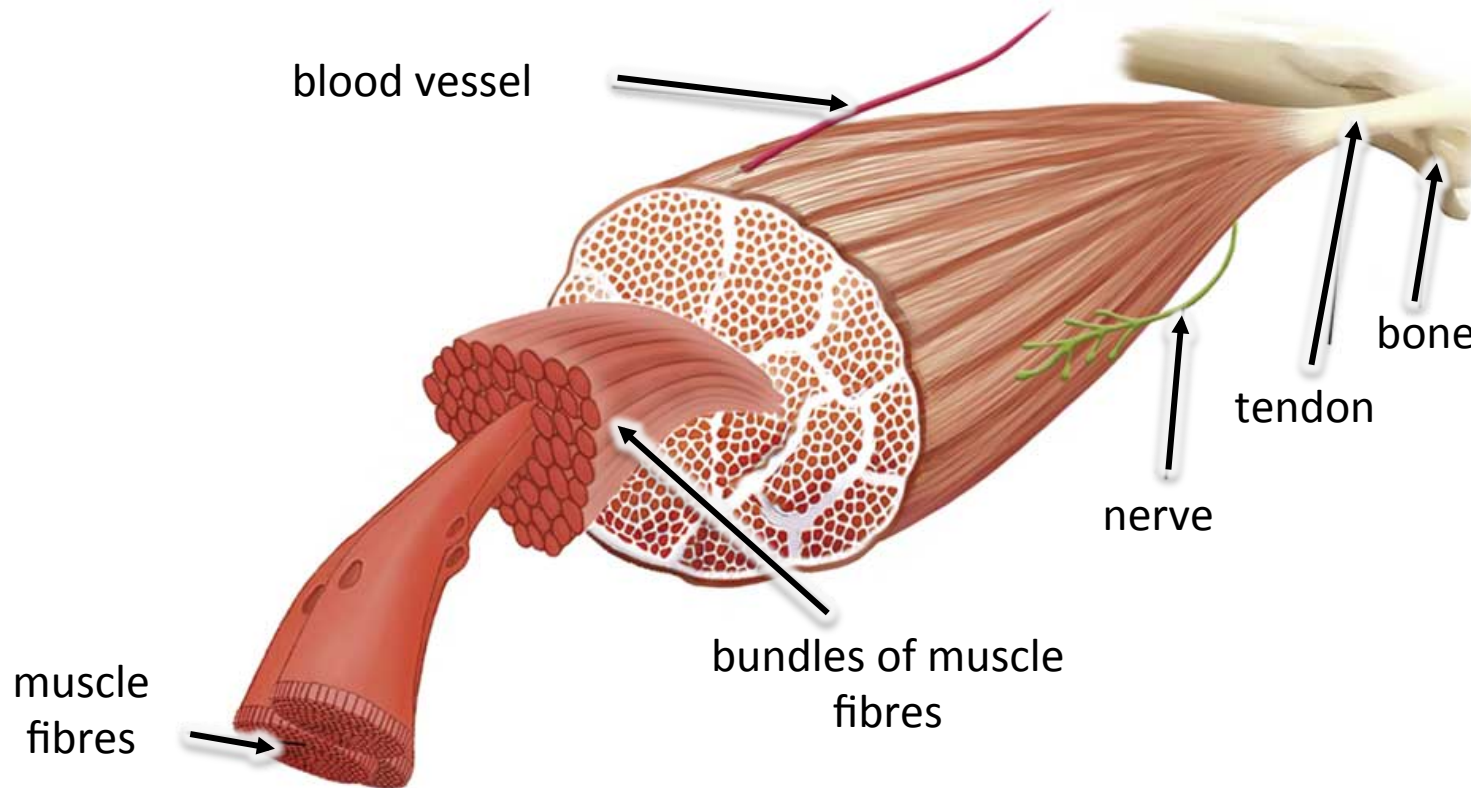
Mobile joint (knee)



Semi-mobile joint
(vertebrae)

EFFECTORS. MUSCLES

Muscles are in charge of maintaining the posture of the body and performing its movements (the movement of bones as well as internal organs). They work using a lever connected with the bones, to which they are joined by **tendons**.



EFFECTORS. MUSCLE CONTRACTIONS

Muscles contract by widening and shortening their fibres. In order to create this movement a motor neuron needs to send the order to the muscle. Then, the muscle cells produce the necessary energy.

Muscles along with joints and bones produce movement. This system works as a **lever**.

Remember that all levers need three different elements:

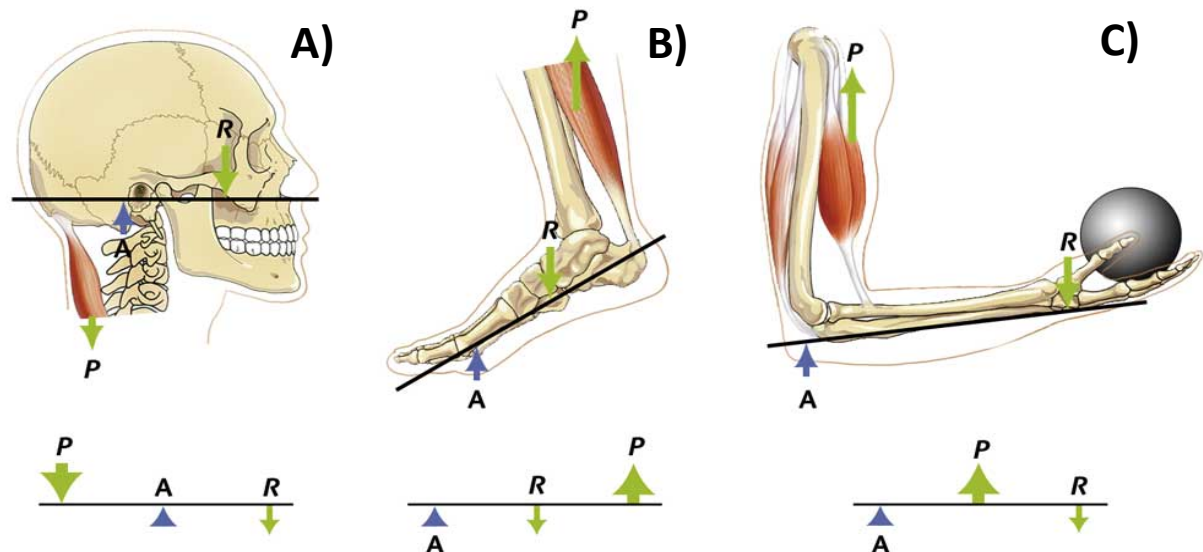
- The **fulcrum**(F): where the lever rests in order for the two opposing forces to act.
- The **effort** (E): the point where the force is applied in order to favour movement.
- The **load** (L): where the force that is opposing movement is applied.

There are three types of level systems:

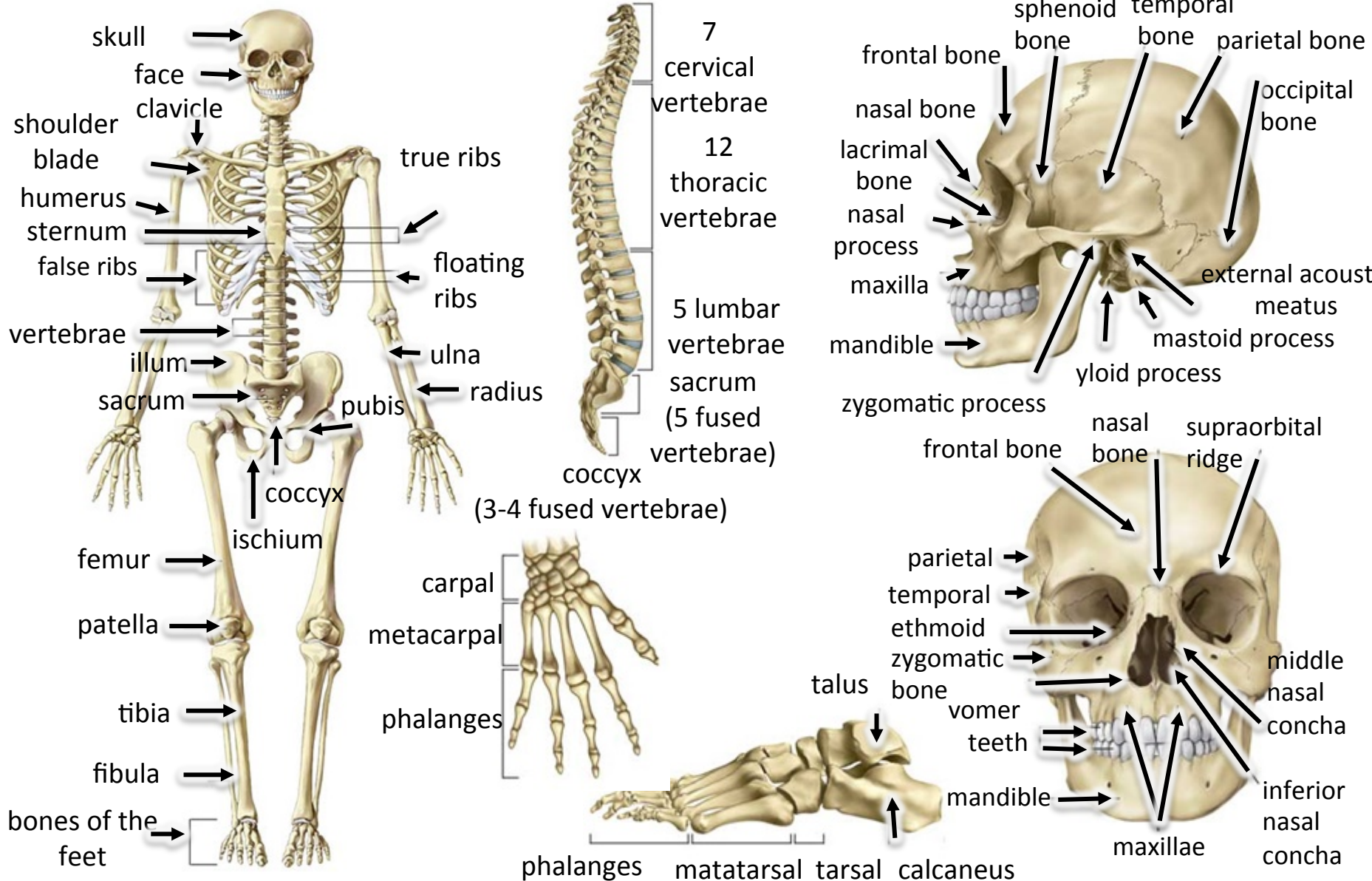
A) First class lever

B) Second class lever

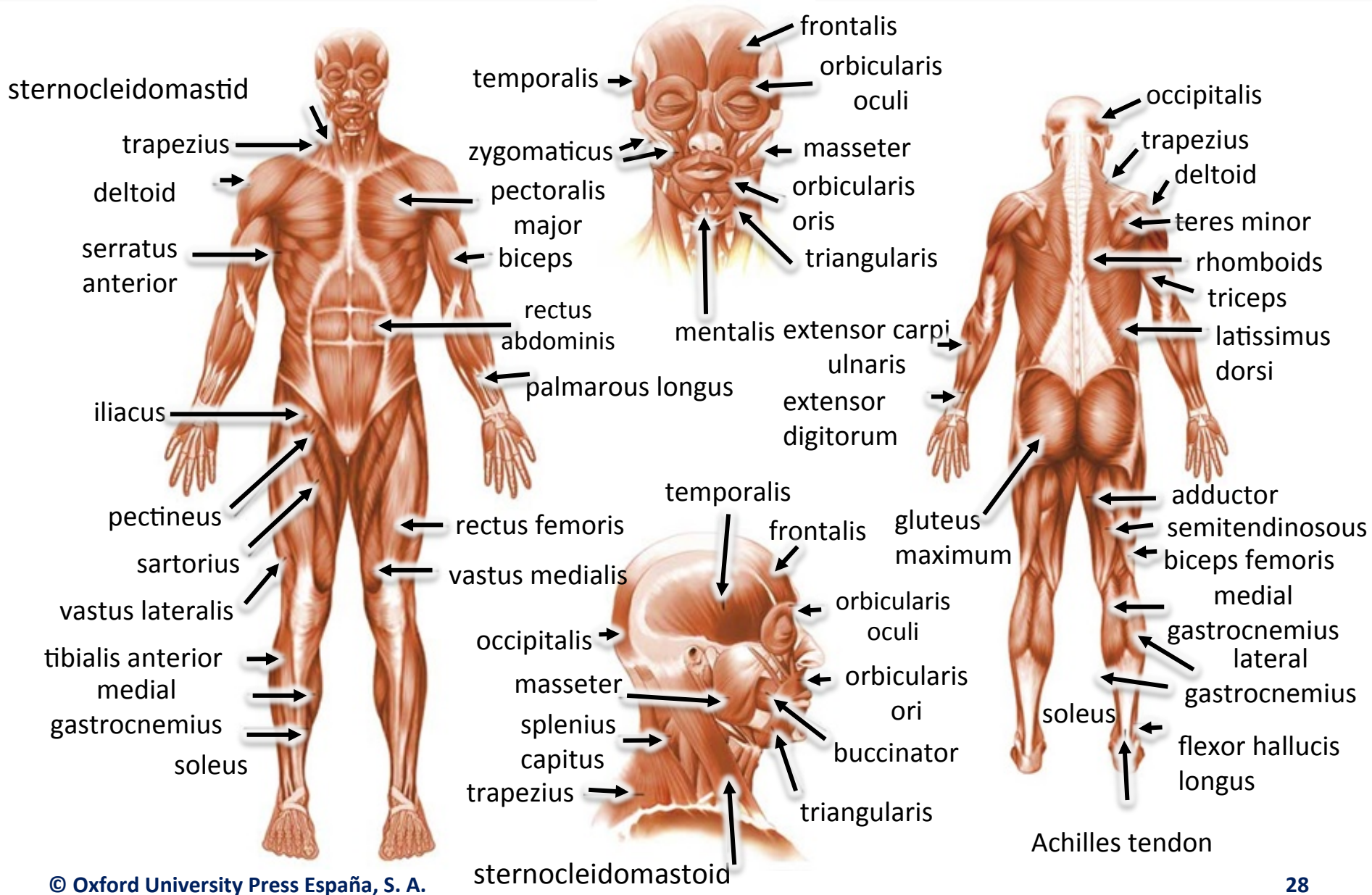
C) Third class lever



EFFECTORS. THE SKELETAL SYSTEM



EFFECTORS. MUSCLE SYSTEM



HEALTH AND ILLNESSES OF RECEPTORS AND EFFECTORS

Healthy habits are an essential way to ensure that we perceive our environment properly and that we produce adequate responses to the changes that occur in it.

Some **recommendations to take care of the sense organs** are:

- Use sunglasses
- Visit the ophthalmologist regularly
- Avoid loud noises
- Avoid being exposed to direct sunlight during prolonged periods of time
- Do not smoke

Some **recommendations to take care of the locomotor system** are:

- Exercise regularly
- Always try to have a good posture
- Do not overexert your body
- Do not eat too much meat