# CONTROL & COORDINATION

CONTENTS



## CONTROL

Control is the power of restrain & regulation by which a process can be started, showed down or stopped.

## COORDINATION

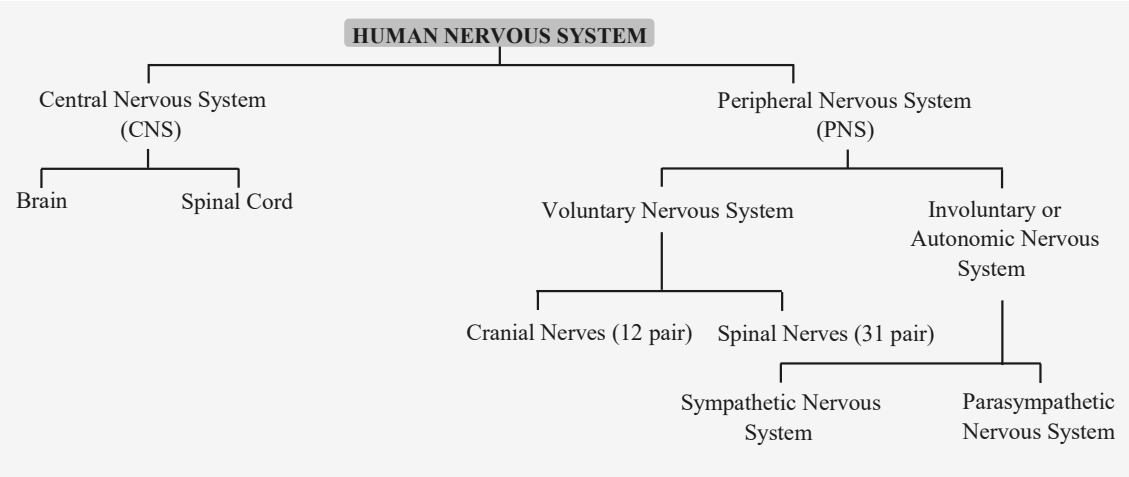
Coordination is orderly working of different but inter related parts to perform one or more activities very smoothly.

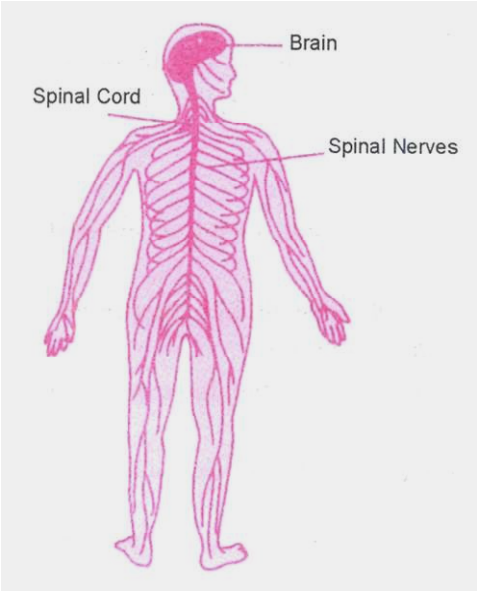
There are 2 modes of control & coordination, chemical & nervous. Plant do not have a nervous system. They possess only chemical controls & coordination.

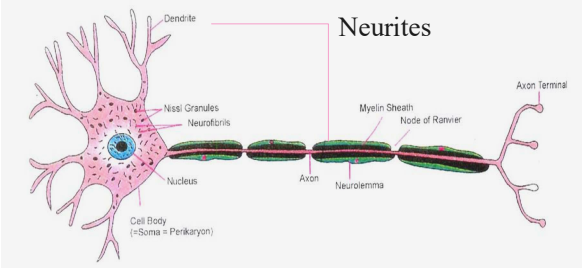
Animals have both chemical & nervous control & coordination.

## NERVOUS SYSTEM OF ANIMALS

It is the system of nervous organs, nerves & neurons that form a network throughout the body for conducting information via electrical impulses so as to coordinate & control activities of different parts as well as provide appropriate response to both internal & external stimuli.




### ◈ Structure of nerve cell :

- Neuron or nerve cell is a structural and functional unit of nervous system that is specialised to receive, conduct and transmit impulses. It is very long, sometimes reaching 90-100 cm. A neuron has three parts— cell body, dendrites and axon. The term neurites is used for both dendrites and axon.

### ◈ Reflex action :

- A reflex may be defined as an immediate and rapid response given without our awarness by an effector organ on the arrival of some external or internal stimulus. Reflex actions may be of two types :

### ◈ Simple Reflex :

- It is an in born, inherited or unlearned response to a stimulus Ex. **Nest budding.**

### ◈ Conditioned Reflex :

- It is the response acquired as a result of training or experience to a stimulus that originally failed to evoke the reaction. Father is **I.P. Pavlov** Ex. Writing, Driwing etc.

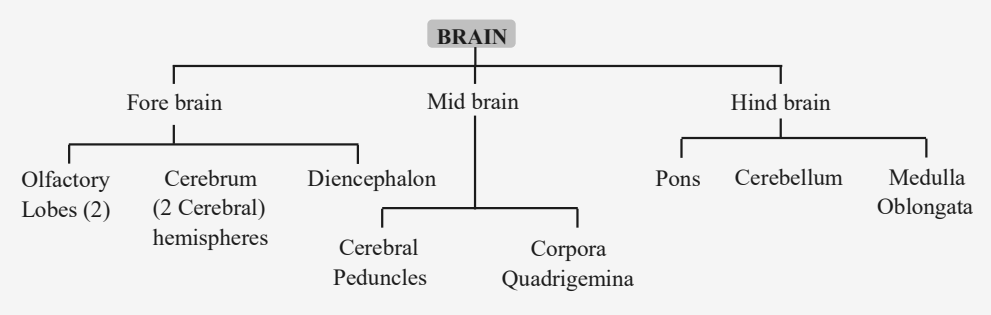
## ➢ SENSE ORGAN

Every organism has little or more awareness to the different factors of the environment mainly due to the presence of certain sensitive structures in the body called sense organs or receptors.

The sense organs are generally destined to receive only one kind of stimulus and not any other. The most common receptors are

- **Photoreceptor : Eye**
- **Phonoreceptor : Ear**
- **Guastatoreceptor : Tongue**
- **Tangoreceptor : Skin**
- **Olfactoreceptor : Nose**

## HUMAN BRAIN



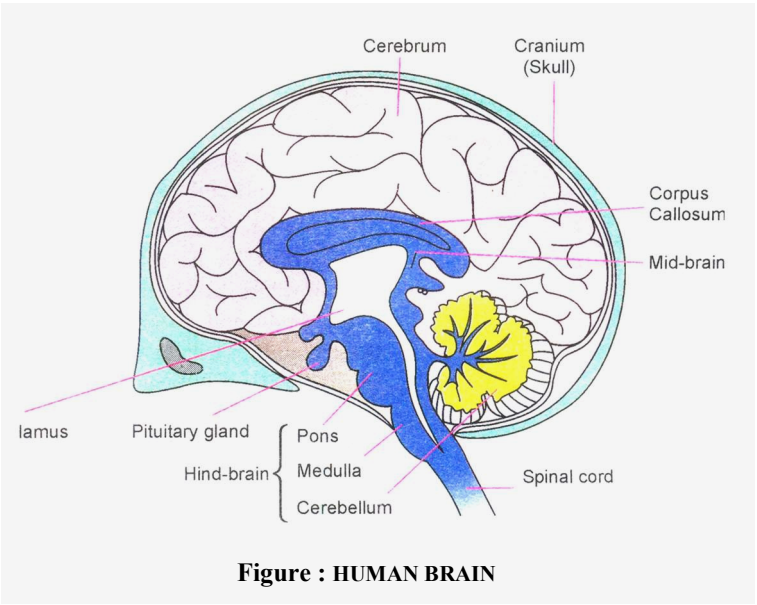




**Figure : HUMAN BRAIN**

## ENDOCRINE SYSTEM

| Glands | Secretion | Functions |
|---|---|---|
| **1. Pitutary** | | |
| (A) Adenohypophysis | (i) GH or STH | Controls growth of somatic cells influences protein, carbohydrate and metabolisms |
| | (ii) TSH | Regulates the growth of thyroid gland and secretion of thyroxine |
| | (iii) ACTH | Stimulates adrenal contex to grow and secrete its hormones |
| | (iv) FSH | Stimulates growth of ovarian follicles in ovary of female and controls spermatogenesis in males |
| | (v) ICSH or LH | Stimulates ovary to produce estrogen in female and testis to produce androgens in male |
| | (vi) Prolactine | Controls development of mammary glands and stimulates corpus luteium to secrete progestrone |
| | (vii) MSH | Stimilate melanocytes |
| (B) Neuro hypophysis | (i) Oxytocin | Controls uterine contraction during parturition, stimulates lactation to increase milk secretion |
| **2. Thyroid** | | |
| | (i) Thyroxine | Controls metabolism |
| | (ii) Thyrocalcitonin | Deposit calcium over bones. |
| **3. Parathyroid** | PTH | Maintain blood calcium. |
| **4. Adrenal** | | |
| (A) Cortex | Mineralocorticoid (Aldosterone) | Salt retention |
| (B) Medulla | Adrenaline | Emergency hormone |
| **5. Gonads** | | |
| (A) Testis (Cells of leydig) | Androgens (Testosteron) | Controls spermatogenesis and development of secondary sexual charaters of males |
| (B) Ovaries | | |
| (a) Graafian follicle | (i) Estrogen | Development of female sexual organs. |
| (b) Corpus luteum | (i) Progesterone | Maintain pregnancy |
| **6. Thymus** | Thymosin | Strenthens immune system |
| **7. Pineal** | Melatonin | Control skin colour. |

## ➢ COORDINATION IN PLANTS

◈ **Plant Hormones:**

◈ **Auxins**

Auxions take part in a number of plants processes. Some are as follow :

- Auxin Promote apical daninance.
- Auxin participates in molecular reaction
- Affects osmotic pressure by increasing solutes
- Affects enzyme action
- Affects nucleic acid activities
- Stimulates respiration
- Promotes root formation
- Helps in inhibition of leaf and fruit abscission

### ◈ Gibberellins :

- These hormones were first identified in studies of a disease of rice in Japan, the bakanal (foolish seedling) disease caused by Gibberella fujikuroi.
- These are second important growth hormones found in plants. Normally gibberellins causes increased growth, especially in height of stem. So gibberelline are defined as the growth hormones which causes cell elongations.

### ◈ Cytokinins :

- Cytokinins are defined as compounds having a highly specific hydrophilic group or adenine and one nonspecific lipophilic group.
- Name of some cytokinins are :-
- Kinetin, dihydrozeation, methylthiozeation and riboxylzeatin.

### ◈ Abscisic Acid (ABA) :

- Acts as growth inhibitor and induces dormancy of buds towards the approach of winter.
- **Inhibition of cambium activity -** Towards the approach of winter, the activity of combium is inhibited due to the formation of abcisic acid.
- **Abscission** - Abscisic acid promotes discission of flowers and fruits.
- **Senescene** - It stimulates senescence of leaves.
- **Closure of stomata** - The normal causes closure of stomata (by inhibiting $K^+$ uptake.
- **Inhibition of germination** - Abscisic acid inhibits sprouting of cereal grains.
- **Resistance** - Abscisic acid increases resistance of plant to cold.
- **Flowering** - ABA delays flowering in long day plants.
- **Tubarization in potato** - ABA helps in tuber formation in potato.
- **Rootning** - ABA promotes root initiation in stem cutings of some plants e.g. Ivy, Poinsettia.

### ◈ Ethylene ($CH_2 = CH_2$) :

- Functions of ethylene are -
- **Transverse growth** - Stimulates transverse growth so that stem looks swollen.
- **Inhibition of geotropism** - Ethylene nullifies geotropism.
- **Fruit ripening** - Ethylene is a ripening agent, such fruits as apple, banana, mango, citrus etc, Ethylene is used for artificial ripening of these fruits.
- **Apical dominance** - Ethylene inhibits the growth lateral buds and thus cause apical dominance.
- **Root initiation -** In low concentration, ethylene stimulates root initiations.
- **Abscission -** Ethylene acclerates abscission of leaves, flowers and fruits.
- **Senescence** - Ethylene is associated with the process of senescene (ageing) of leaves and flowers.
- **Breaking of dormancy -** Ethylene breaks dormancy of storage organs

### ◈ Uses of Ethylene :

- **Ripening of Fruits -** Ethylene lamps are used for colour development and ripening of certain flashy fruits (e.g.- apple, banana, mango etc)