

DEVELOPMENTAL BIOLOGY HYPOTHALAMUS

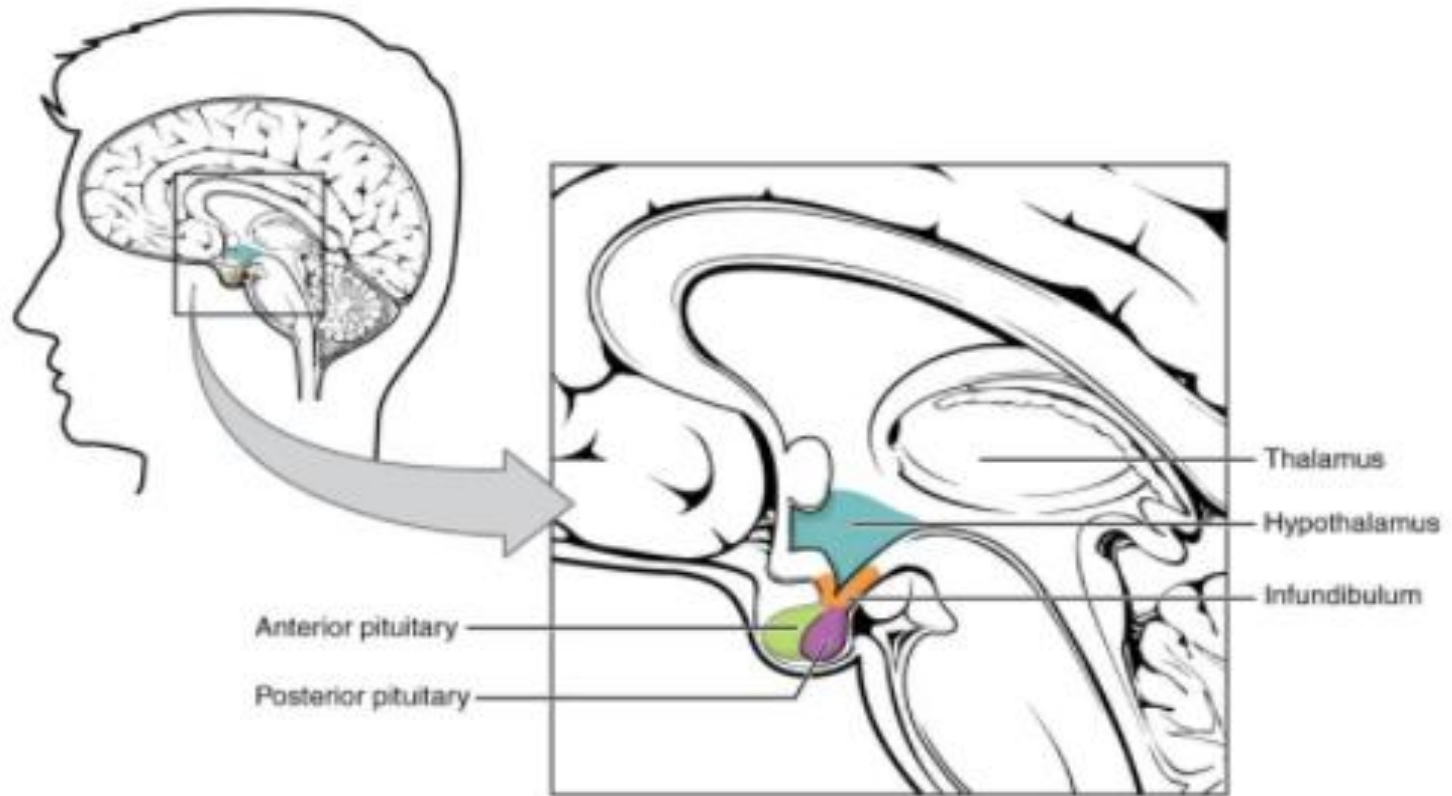
iii MSC ZOOLOGY

REMYA VARGHESE (ASSISTANT
PROFESSOR ON CONTRACT)

ANATOMY OF ENDOCRINE
GLANDS, STRUCTURE
, PHYSIOLOGICAL FUNCTIONS
AND CONTROL OF SECRETION OF
THEIR HORMONES AND
PATHOPHYSIOLOGY

HYPOTHALAMUS

- The hypothalamus is a small but important area of the brain formed by various nucleus and nervous fibers.



- Through its neuronal connections, it is involved in many complex functions of the organism such as vegetative system control, homeostasis of the organism, thermoregulation, and also in adjusting the emotional behavior.

- The hypothalamus is involved in different daily activities like eating or drinking, in the control of the body's temperature and energy maintenance, and in the process of memorizing.
- It also modulates the endocrine system through its connections with the pituitary gland.

MAJOR FUNCTIONS

- releasing hormones
- regulating body temperature
- maintaining daily physiological cycles
- controlling appetite
- managing of sexual behavior
- regulating emotional responses

Anatomy and function

- The hypothalamus has three main regions.
- Each one contains different nuclei. These are clusters of neurons that perform vital functions, such as releasing hormones.

- **Anterior region**
- This area is also called the **supraoptic region**. Its major nuclei include the **supraoptic and paraventricular nuclei**.
- There are several other smaller nuclei in the anterior region as well.

- The nuclei in the anterior region are largely involved in the secretion of various hormones. Many of these hormones interact with the nearby pituitary gland to produce additional hormones.

Some of the most important hormones produced in the anterior region include:

CRH

- **Corticotropin-releasing hormone (CRH)**. CRH is involved in the body's response to both physical and emotional stress
- It signals the pituitary gland to produce a hormone called adrenocorticotrophic hormone (**ACTH**). ACTH triggers the production of cortisol, an important stress hormone.

- **Thyrotropin-releasing hormone (TRH).** TRH production stimulates the pituitary gland to produce thyroid-stimulating hormone (TSH). TSH plays an important role in the function of many body parts, such as the heart, gastrointestinal tract, and muscles.

- **Gonadotropin-releasing hormone (GnRH).**
- GnRH production causes the pituitary gland to produce important reproductive hormones, such as follicle-stimulating hormone (FSH) and luteinizing hormone (LH).

- **Oxytocin.**
- This hormone controls many important behaviors and emotions, such as sexual arousal, trust, recognition, and maternal behavior. It's also involved in some functions of the reproductive system, such as childbirth and lactation.

- **Vasopressin.** Also called antidiuretic hormone (ADH), this hormone regulates water levels in the body.
- When vasopressin is released, it signals the kidneys to absorb water.

- **Somatostatin.**
- Somatostatin works to stop the pituitary gland from releasing certain hormones, including growth hormones and thyroid-stimulating hormones.

- The anterior region of the hypothalamus also helps **regulate body temperature** through sweat.
- It also **maintains circadian rhythms**. These are physical and behavioral changes that occur on a daily cycle.

- For example, being awake during the day and sleeping at nighttime is a circadian rhythm related to the presence or absence of light.

- **Middle region**
- This area is also called the **tuberal region**. Its major nuclei are the ventromedial and arcuate nuclei.

- The **ventromedial nucleus** helps control appetite, while the **arcuate nucleus** is involved in releasing growth hormone-releasing hormone (GHRH).
- GHRH stimulates the pituitary gland to produce growth hormone. This is responsible for the growth and development of the body.

- **Posterior region**
- This area is also called **the mammillary region.**
The posterior hypothalamic nucleus and mammillary nuclei are its main nuclei.

- **The posterior hypothalamic nucleus** helps regulate body temperature by causing shivering and blocking sweat production.
- The role of the **mammillary nuclei** is less clear. Doctors believe it's involved in memory function.