

Hormones

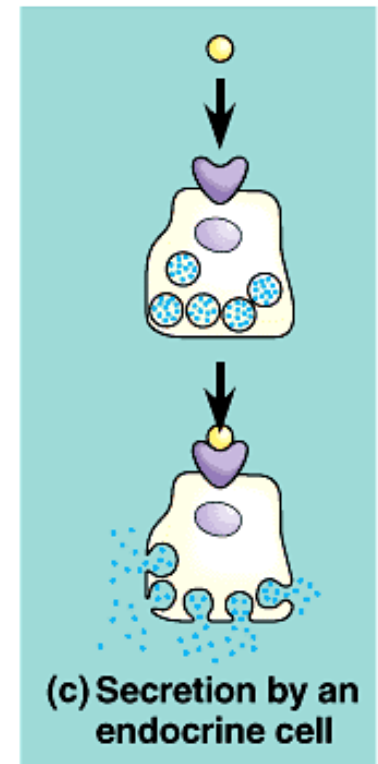
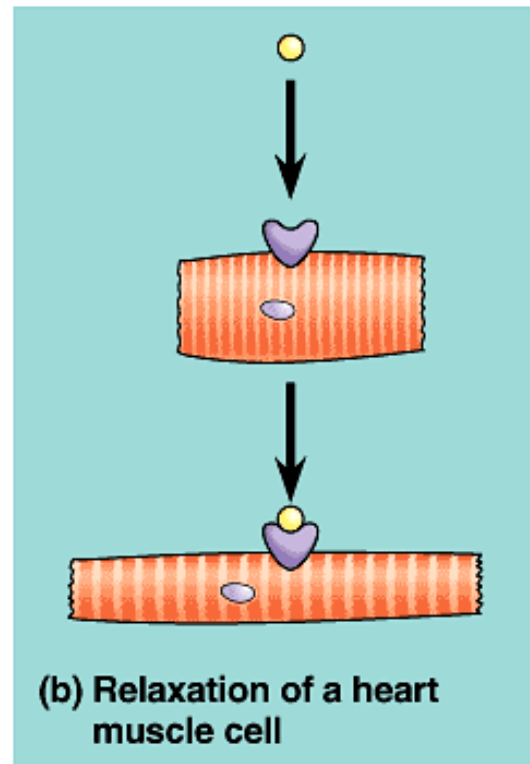
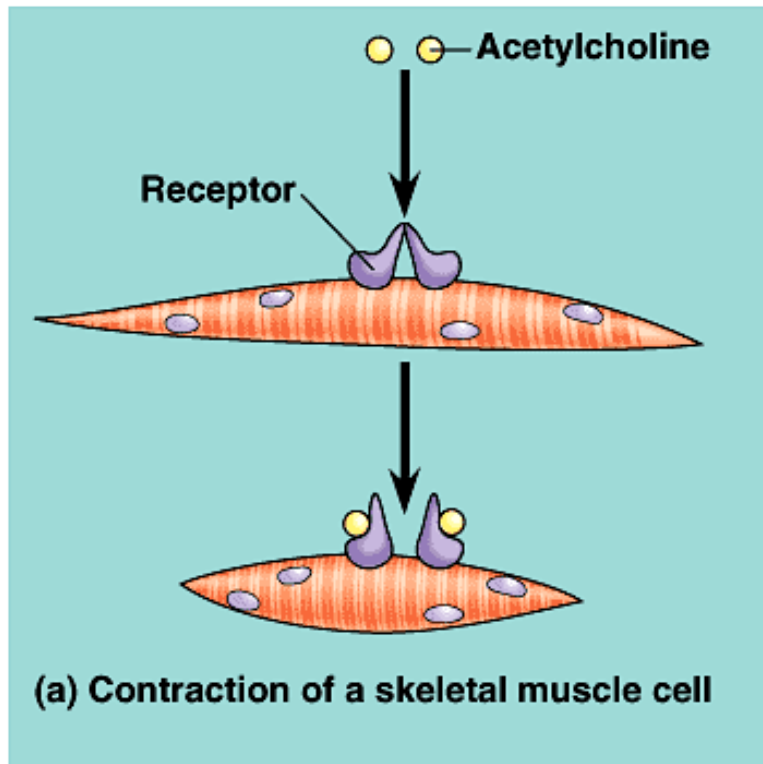
- chemical substances produced in small quantities in one part of an organism and then transported to another part of an organism where they bring about a physiological response

Target Cells

- have receptors that allow them to recognize the hormone and respond

Hormone Action

- Depends on :
 - Which hormone
 - the effect on the target cells
 - Can inhibit or stimulate



Site of Hormone Production

- In animals
 - usually produced in specialized tissue that serves only to produce hormones
- In plants
 - produced by tissue that is also used for some other function (in the apical meristem, in seeds, in fruits etc)

Auxin

- -increases the plasticity of cell walls and promotes elongation of stems
- -involved in the response of plants to light (phototropisms)

Figure 39.4 Early experiments of phototropism

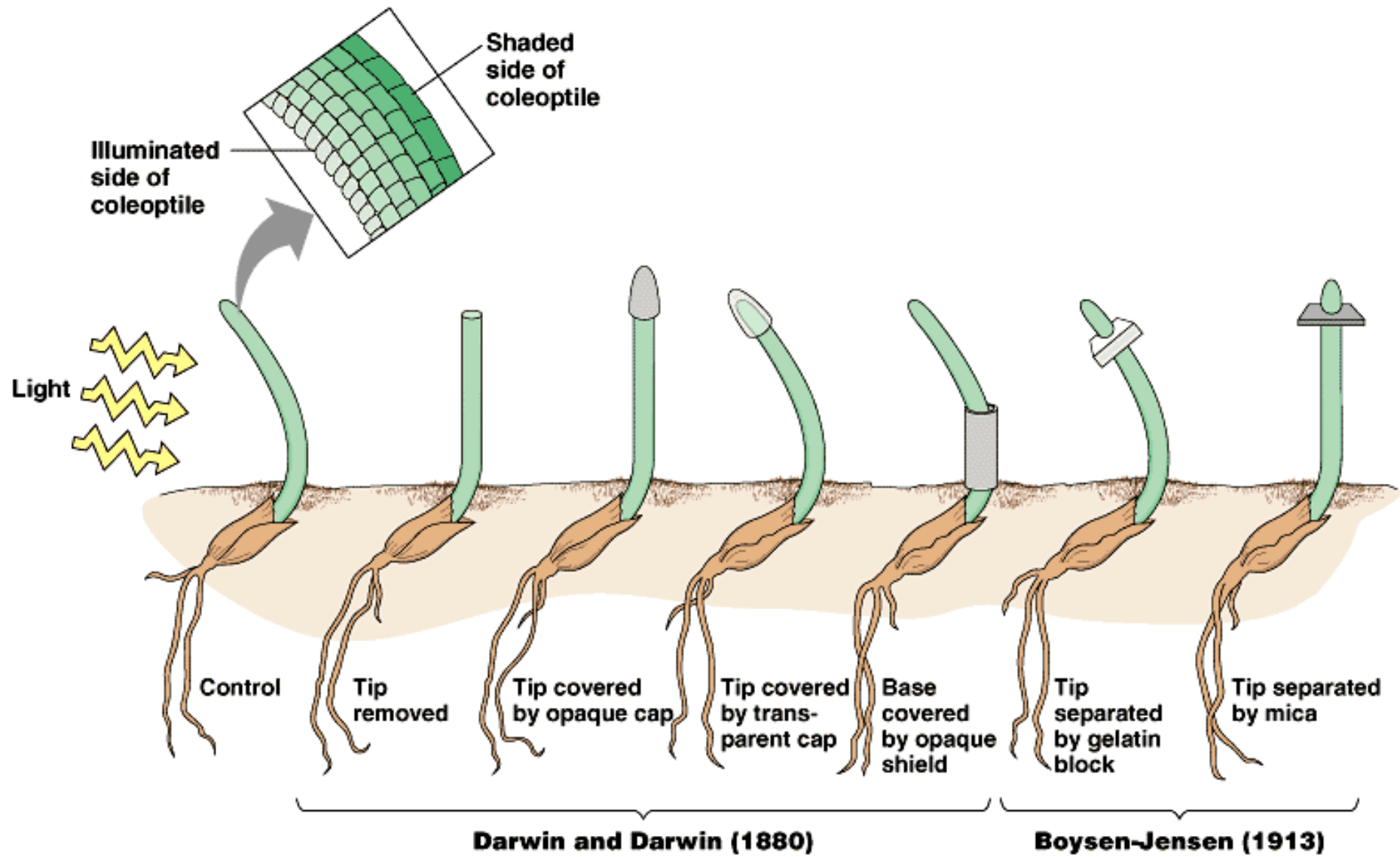
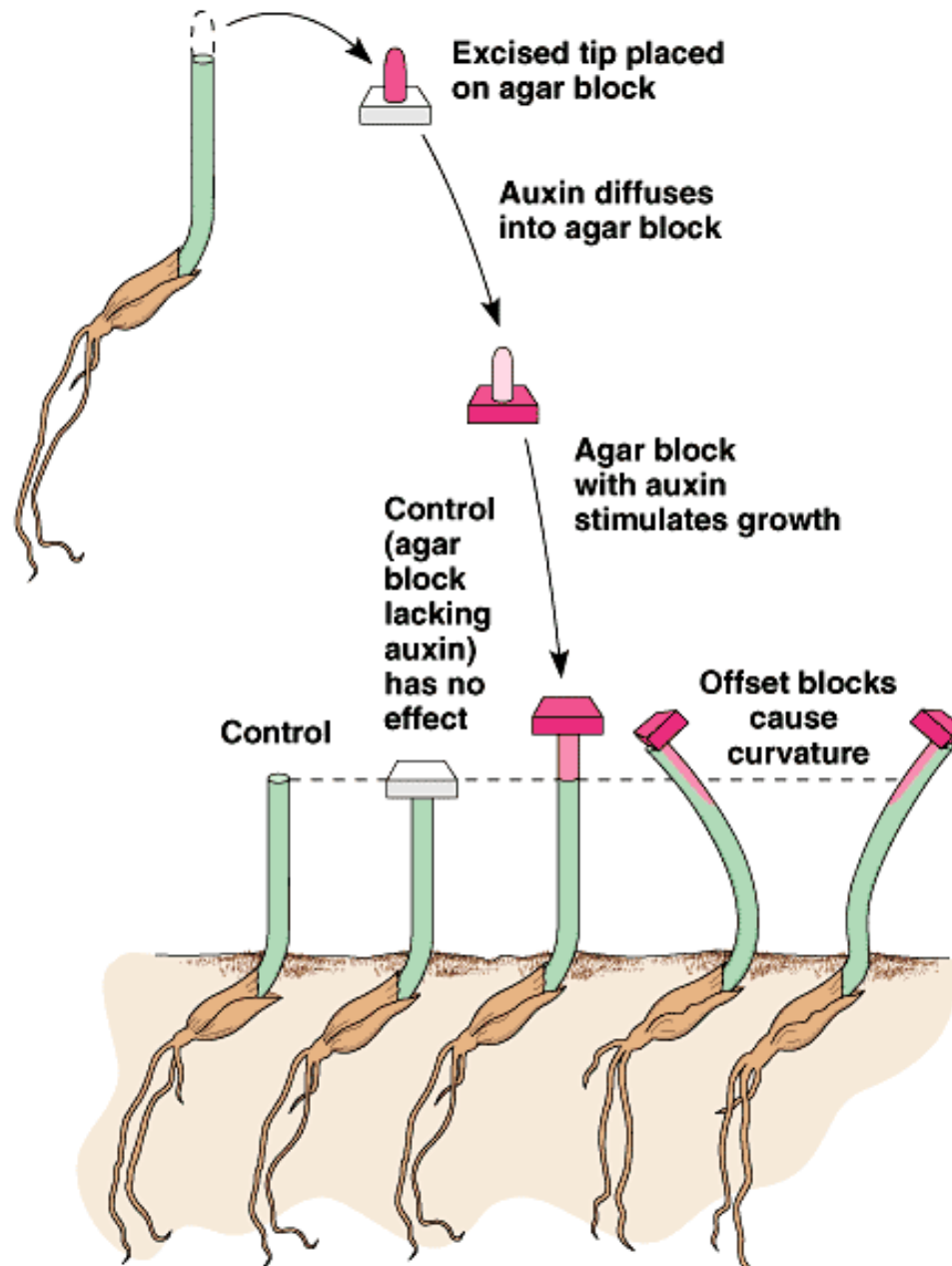


Figure 39.5 The Went experiments



Plant Hormones

Five major types:

- Typically work together to control various aspects of plant growth, reproduction and development

Plant Hormones

Five major types:

- 1. Auxins
 - promotes growth, stem elongation, cell division
 - Promotes lateral bud dormancy

Plant Hormones

Five major types:

- 2. Cytokinins
 - promotes cell division (with auxin)
 - Promotes bud formation (lateral buds when auxin not present)



Plant Hormones

Five major types:

- 3. Gibberellins
 - promotes stem elongation
 - Speed seed germination



Plant Hormones

Five major types:

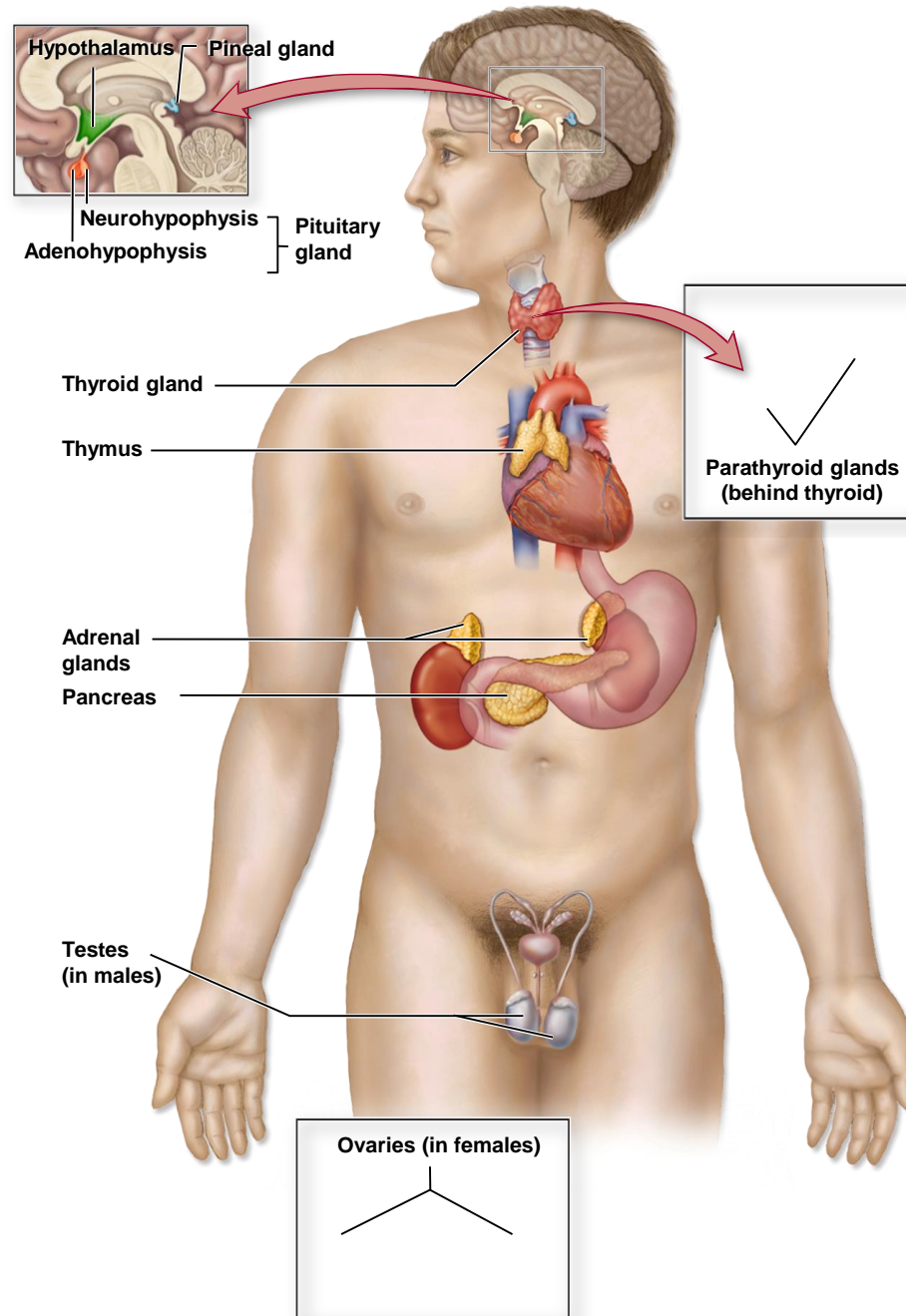
- 4. Ethylene
 - controls leaf, flower and fruit abscission and fruit ripening
- 5. Absciscic acid
 - promotes leaf senescence, controls stomatal closure and seed dormancy

Hormones in Animals

- secreted by
 - specialized nerve cells called **neurosecretory cells**
 - neurons that receive signals from other neurons and respond by releasing hormones
 - specialized cells called **endocrine cells**
 - usually organized into an endocrine gland

Glands

- Secretory organs
- **Endocrine glands**
 - Produce hormones and secrete them into body fluids
 - Are ductless
- **Exocrine glands**
 - Produce variety of substance
 - Convey them directly to the target via ducts



Vertebrate Hormone Example

- Islets of Langerhans in the Pancreas
- Control of blood glucose levels...
 - Alpha cells produce glucagon (raises blood glucose level)
 - Beta cells produce insulin (takes glucose out of the blood)
- Insulin and glucagon are antagonistic hormones

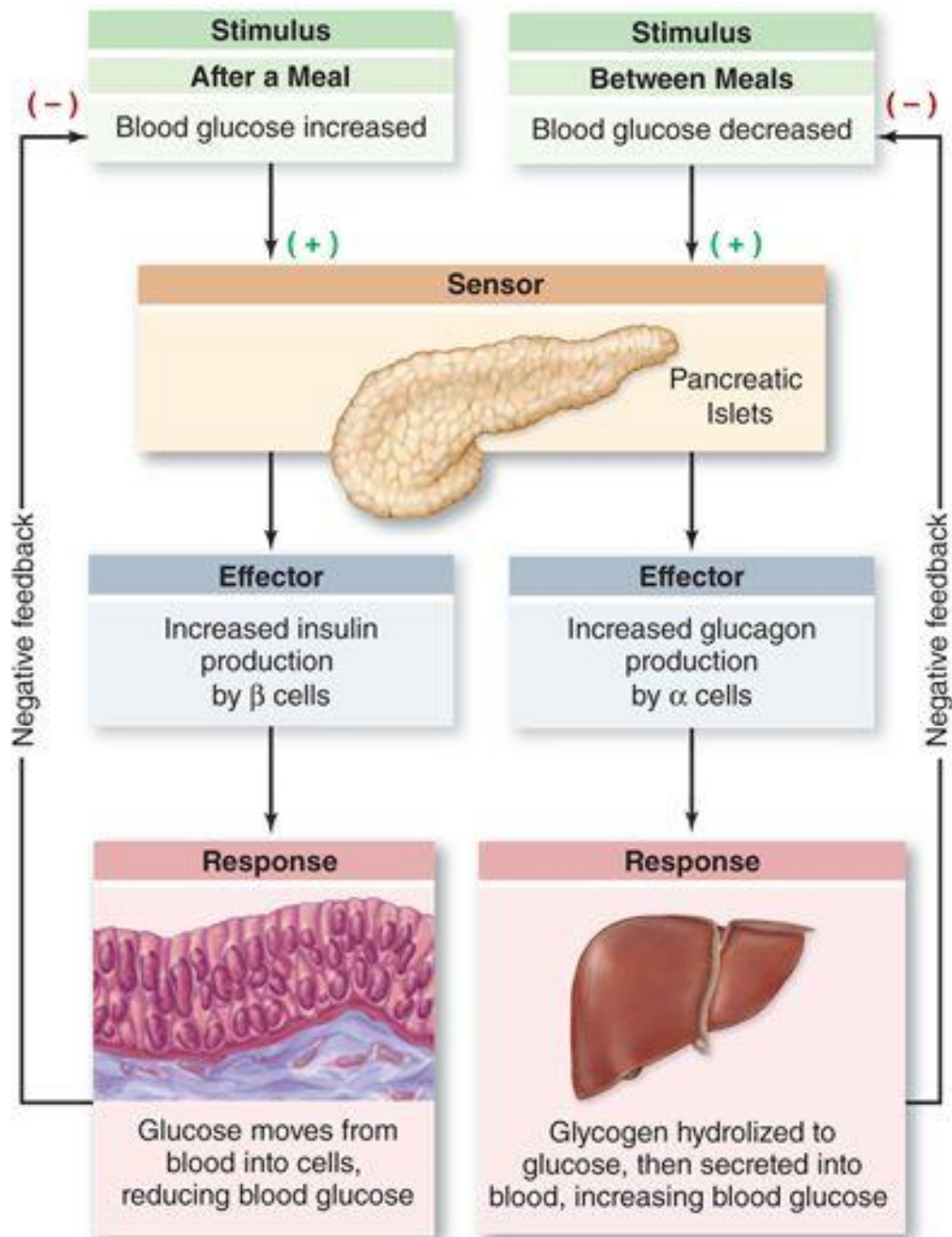
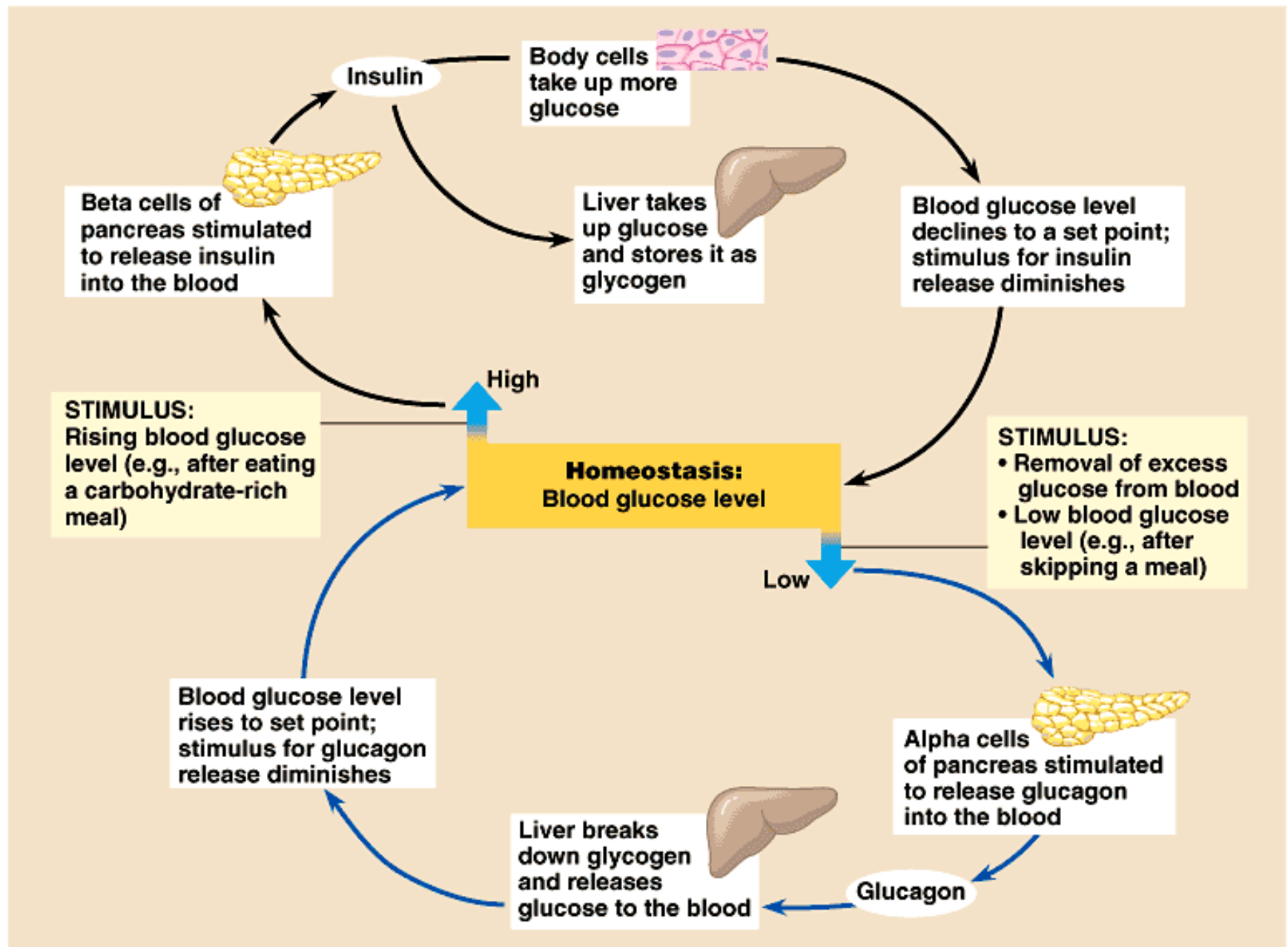


Figure 45.10 Glucose homeostasis maintained by insulin and glucagon



Diabetes Mellitus

- Diabetics cannot take up glucose from blood
- Type I (insulin-dependent diabetes)
 - Individuals lack insulin-secreting β cells
 - Treated by daily injections of insulin
- Type II (noninsulin-dependent diabetes)
 - Most patients have this form
 - Very low number of insulin receptors
 - Treated by diet and exercise

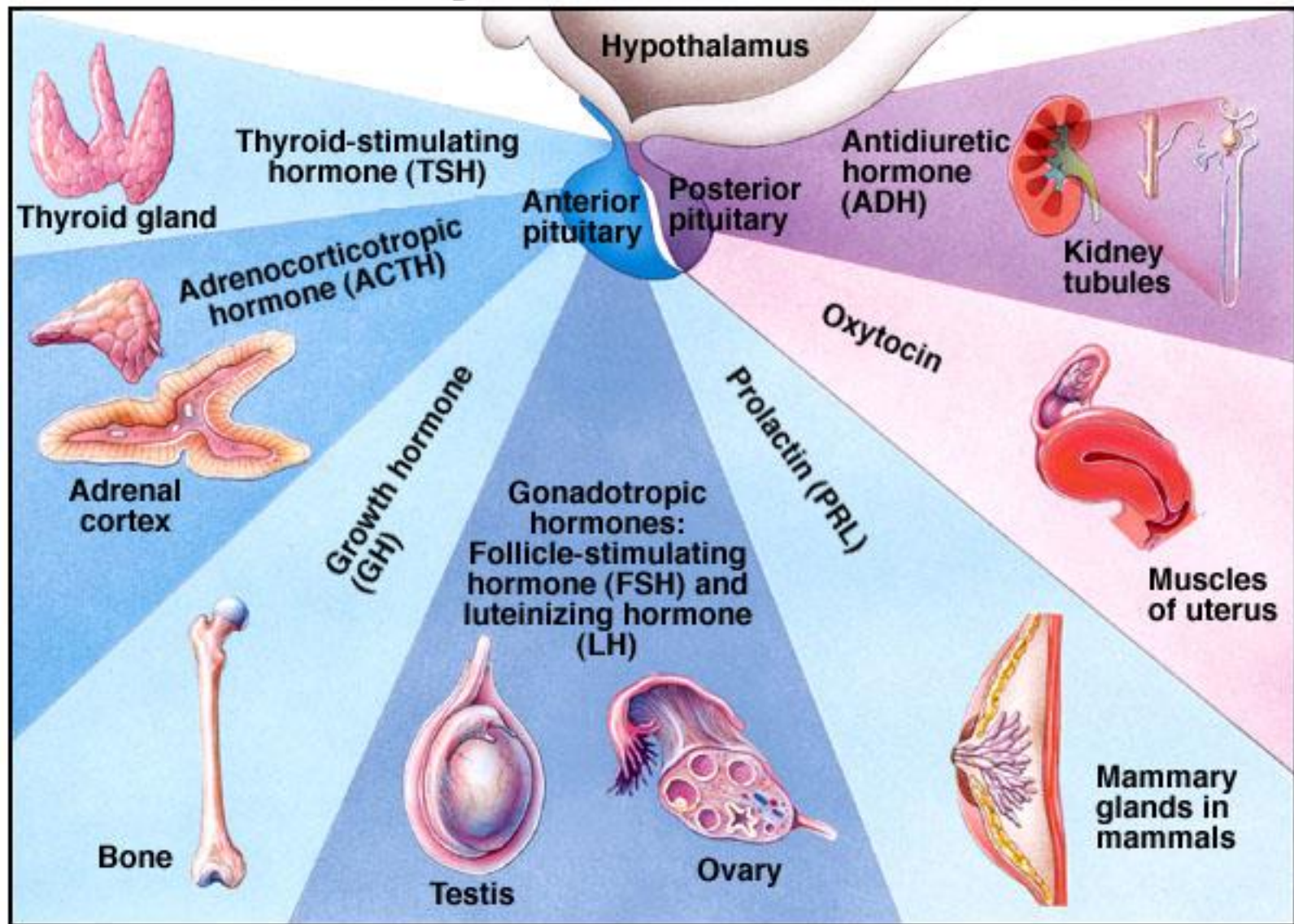
Interaction of Nervous System and Endocrine System

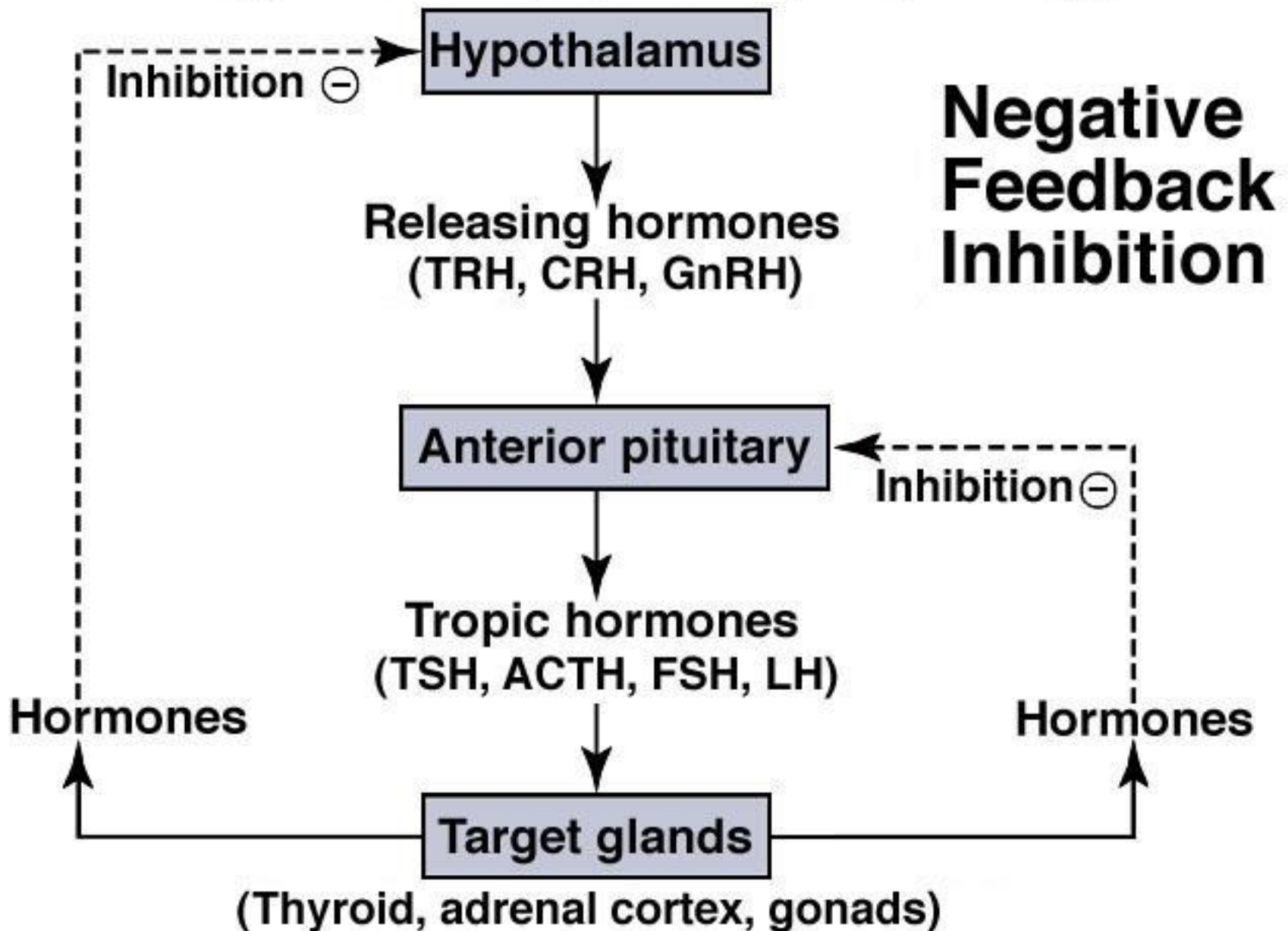
- often cooperate and interact to maintain homeostasis of the individual
- some endocrine glands are controlled by the nervous system

Anterior Pituitary Gland

- “master gland”
- Controlled by hypothalamus of the brain
- Many tropic hormones
 - That stimulate growth in their target organs

Pituitary Gland Hormones





Nervous System

- More structurally complex
- Network of neurons branching throughout the body
- Neurons conduct electrical signals directly to the target
- Very fast conduction of signal

Endocrine System

- less complex
- organized into glands
- hormones released into the blood and travel throughout the body but only affect target
- may take minutes to hours to days for response to occur