

FIGURE 21.10 • Electron micrograph of rat posterior lobe. Neurosecretory granules and small vesicles are present in the terminal portions of the axonal processes of the hypothalamohypophyseal tract fibers. Capillaries with fenestrated endothelium are present in close proximity to the nerve endings. $\times 20,000$. (Courtesy of Drs. Sanford L. Palay and P. Orkland.)

PINEAL GLAND

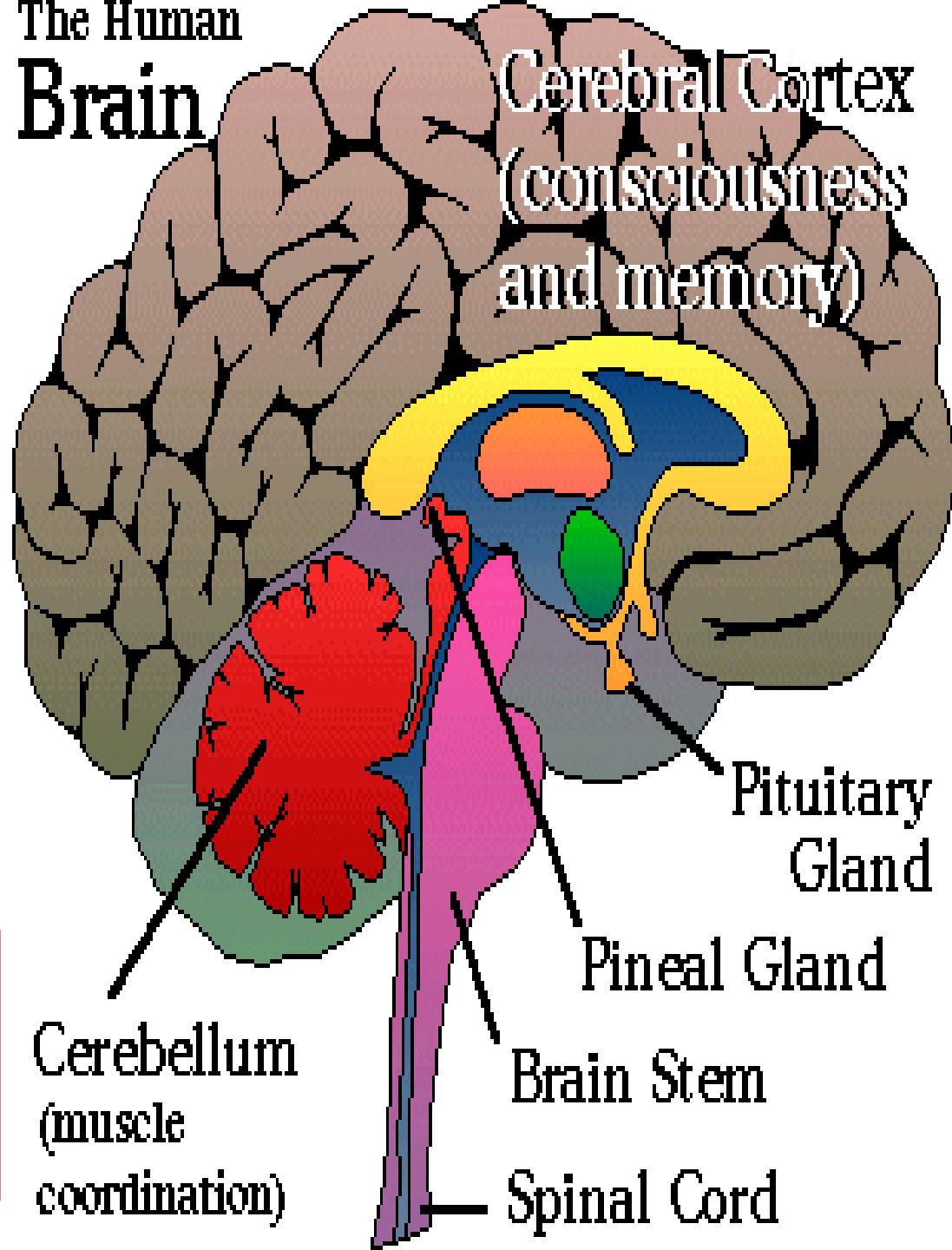
Also called pineal body, epiphysis cerebri is an endocrine or neuroendocrine gland that regulates daily body rhythm.

It develops from **neuroectoderm of the posterior portion of the roof of the diencephalon and remains attached to the brain by a short stalk.**

In humans, it is located at the posterior wall of the third ventricle near the center of the brain.

The pineal gland is a flattened, pine cone-shaped structure
It measures 5 to 8 mm high and 3 to 5 mm in diameter and weighs between 100 and 200 mg.

The Human Brain



The pineal gland contains two types of parenchymal cells:

Pinealocytes

Interstitial (glial) cells.

Pinealocytes are the chief cells of the pineal gland. They are arranged in clumps or cords within lobules formed by connective tissue septa that extend into the gland from the pia mater that covers its surface.



FIGURE 21.11 • Photomicrograph of infant pineal gland. This H&E-stained section is from a median cut through the pine cone-shaped gland. The conical anterior end of the gland is at the top of the micrograph. The arrows indicate the part of the gland that connects with the posterior commissure. The gland is formed by an invagination of the posterior portion of the roof of the third ventricle (diencephalon). The dark areas indicated by asterisks are caused by bleeding within the gland. $\times 25$.

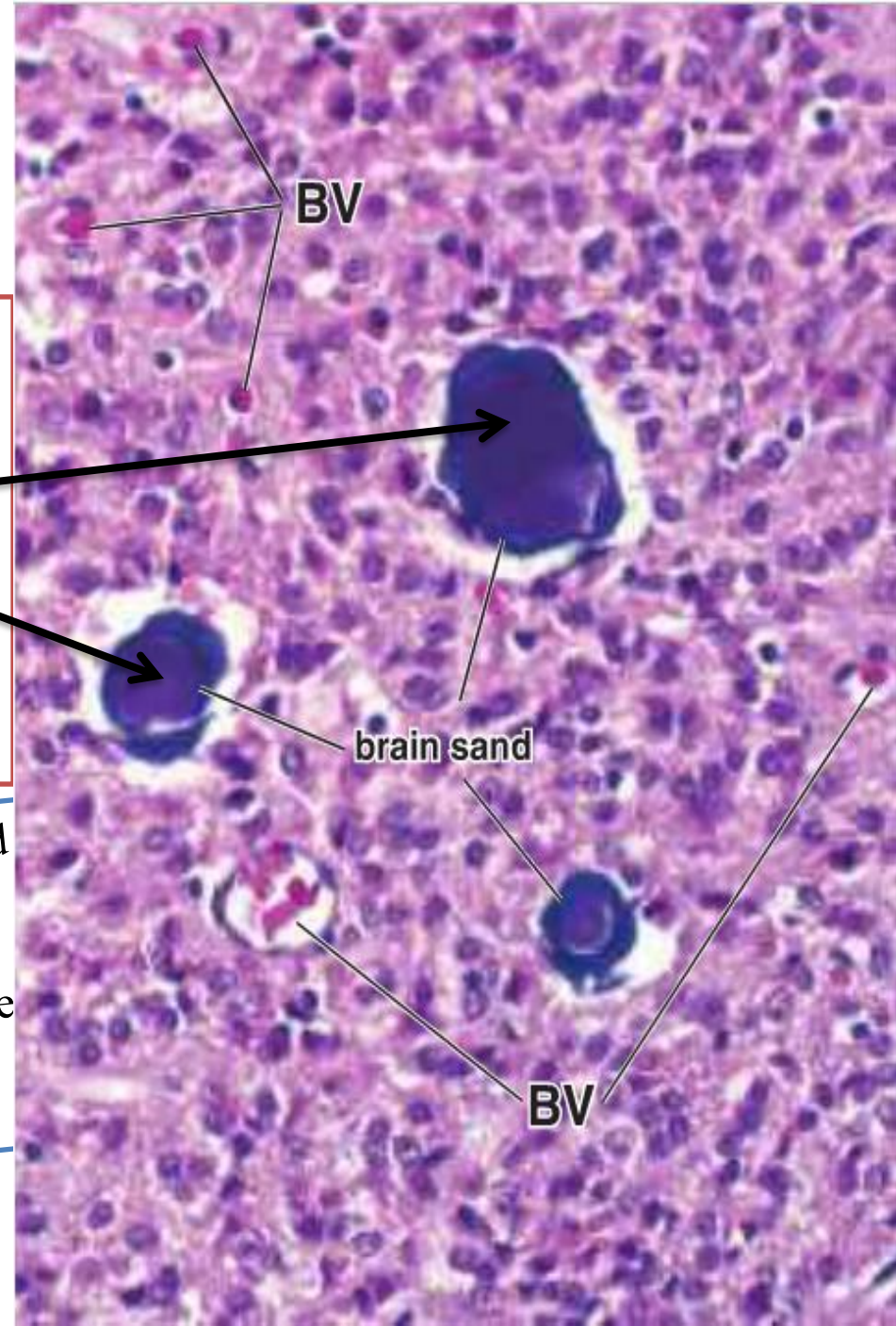
The interstitial (glial) cells constitute about 5% of the cells in the gland.

In addition to the two cell types,
the human pineal gland is characterized
by the presence of calcified concretions called

brain sand

It appears to be derived from precipitation of calcium phosphates and carbonates on carrier proteins that are released into the cytoplasm when the pineal secretions are exocytosed

The concretions are recognizable in childhood and increase in number with age.
Because they are opaque to X-rays and located in the midline of the brain, they serve as convenient markers in radiographic and computed **tomography (CT) studies**



Hormone	Composition	Source	Major Functions
Melatonin	Indolamine (<i>N</i> -acetyl-5-methoxytryptamine)	Pinealocytes	Regulates daily body rhythms and day/night cycle (circadian rhythms); inhibits secretion of GnRH and regulates steroidogenic activity of the gonads particularly as related to the menstrual cycle; in animals, influences seasonal sexual activity

The pineal gland is a photosensitive organ and an important time keeper and regulator of the day/night cycle (circadian rhythm). It obtains information about light and dark cycles from the retina via the **retinohypothalamic tract**