

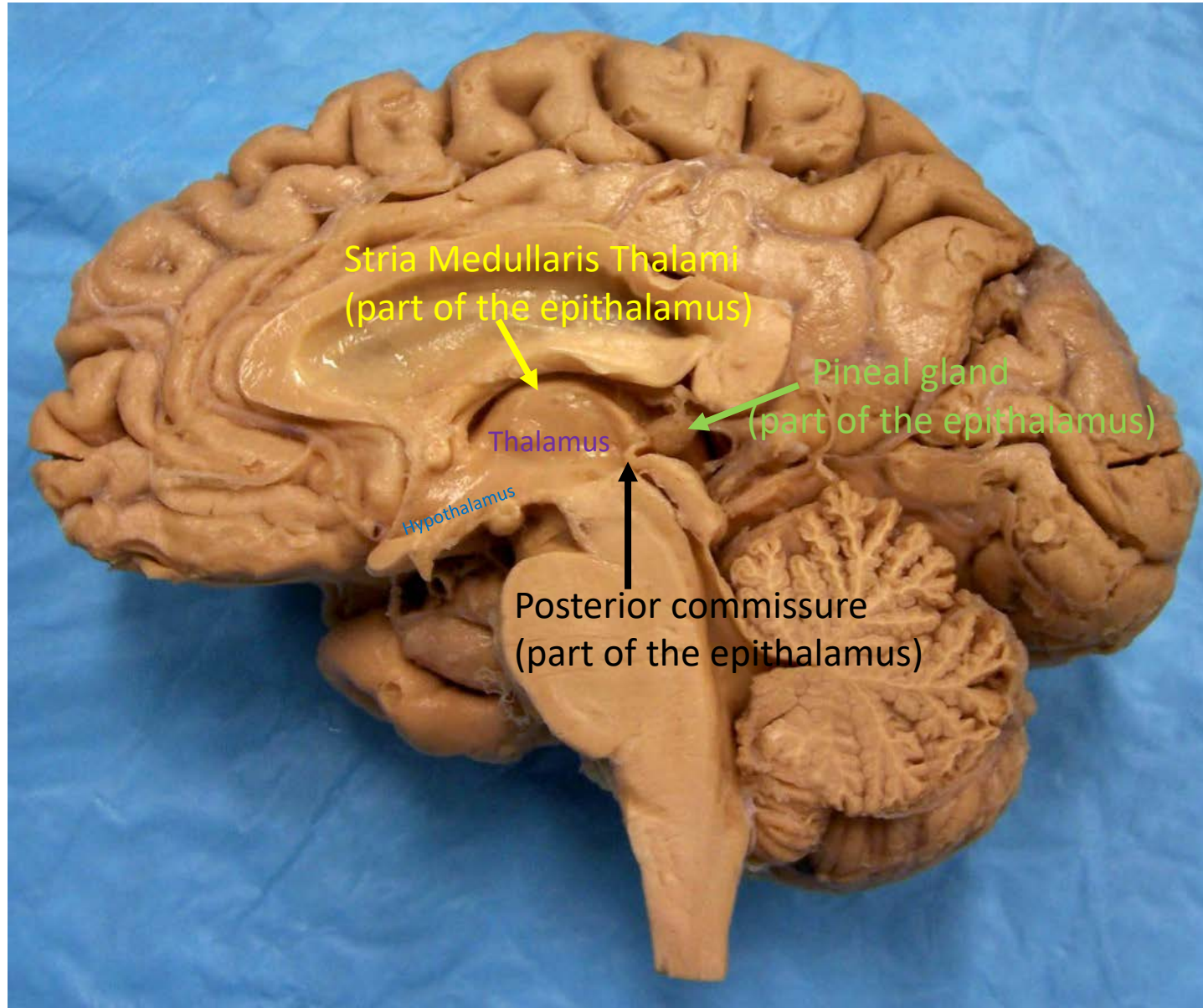
Diencephalon Lecture Review

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Diencephalon General Information

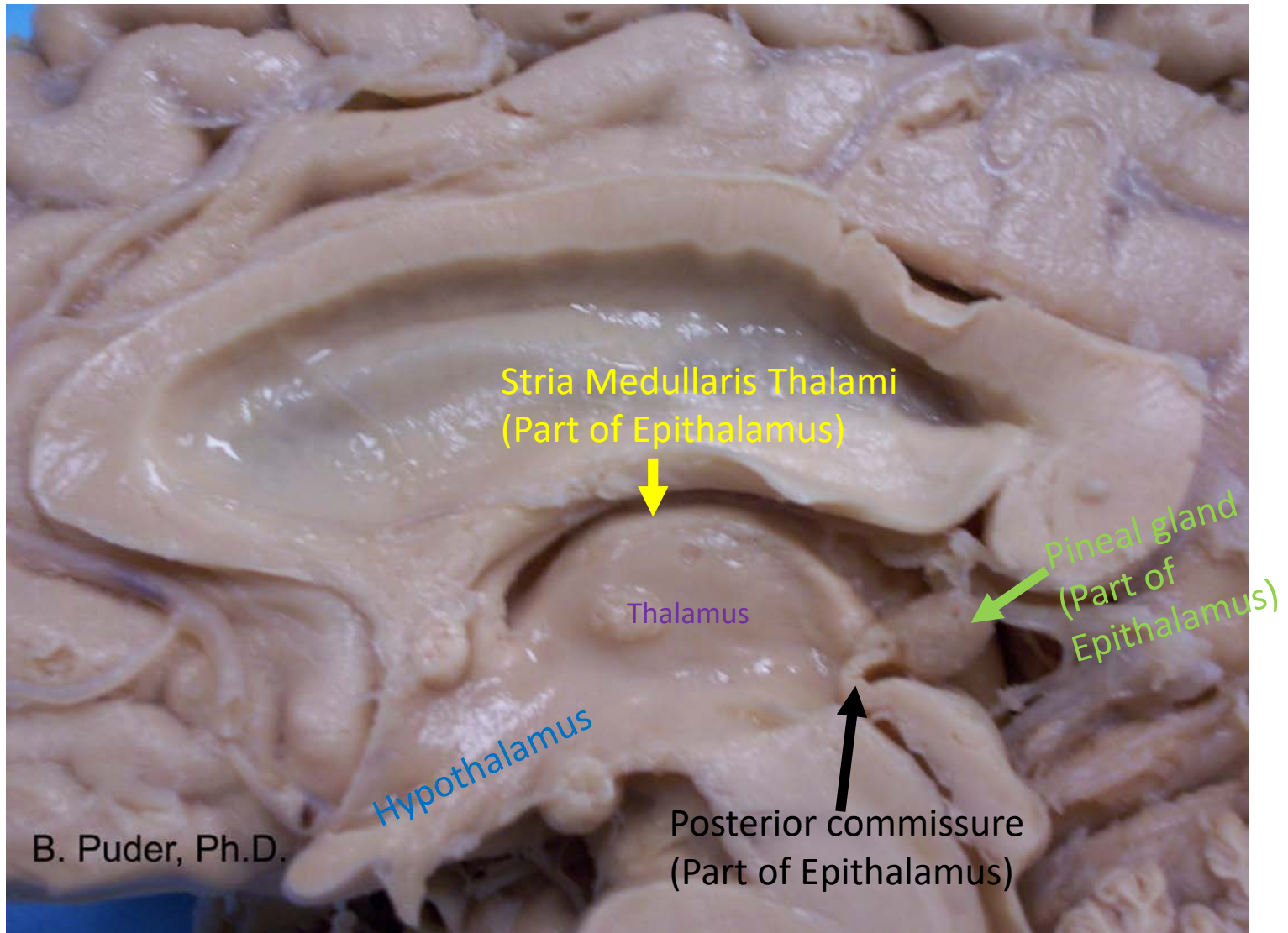
- 4 major components
 1. (Dorsal) thalamus
 2. Hypothalamus
 3. Subthalamus
 4. Epithalamus
 - a. Pineal gland
 - b. Posterior commissure
 - c. Stria Medullaris Thalami
 - d. Habenular nuclei and Habenular commissure

Diencephalon Anatomy



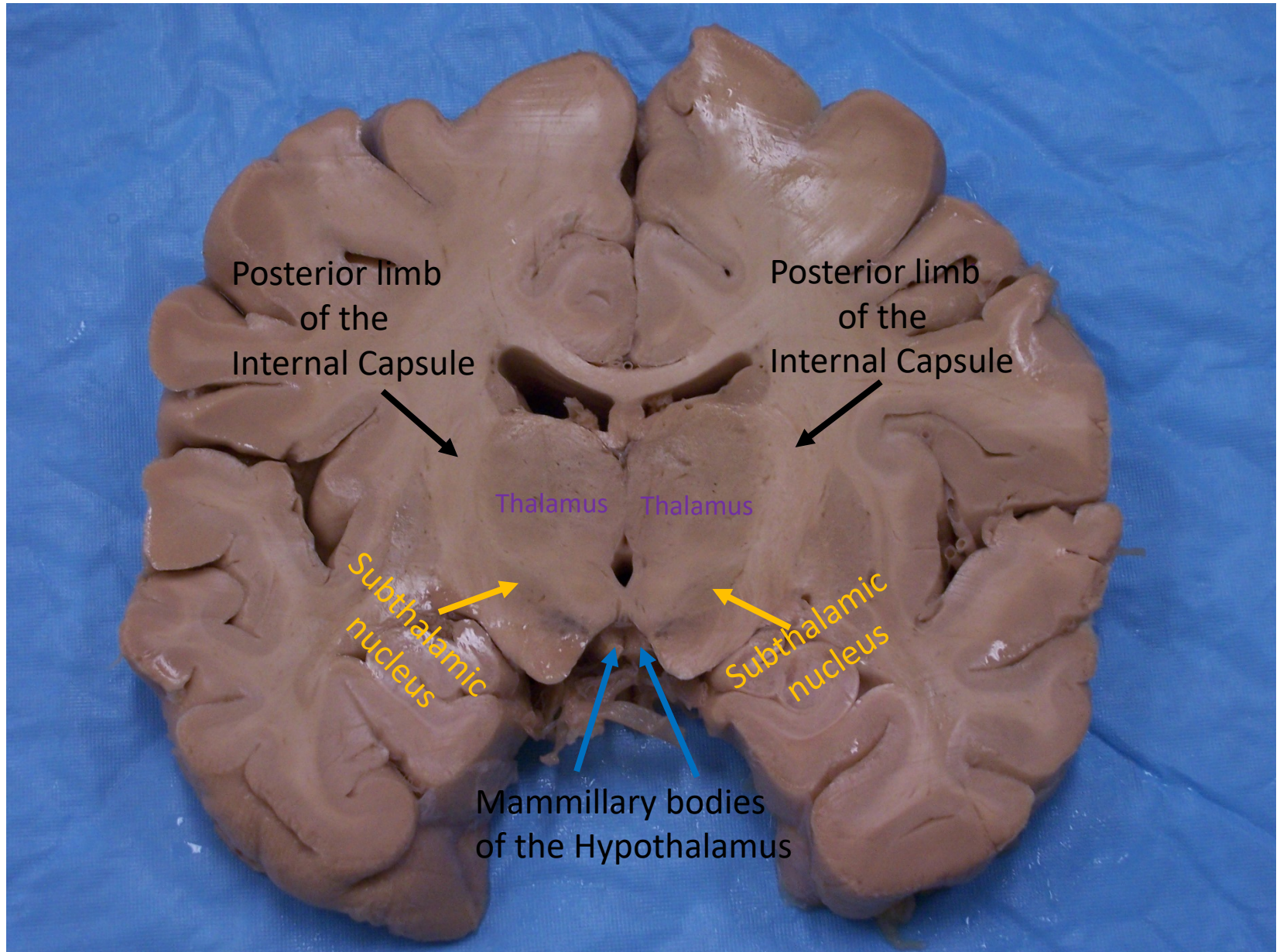
Mid-sagittal brain section depicting the medial aspect of right brain hemisphere

Diencephalon Anatomy



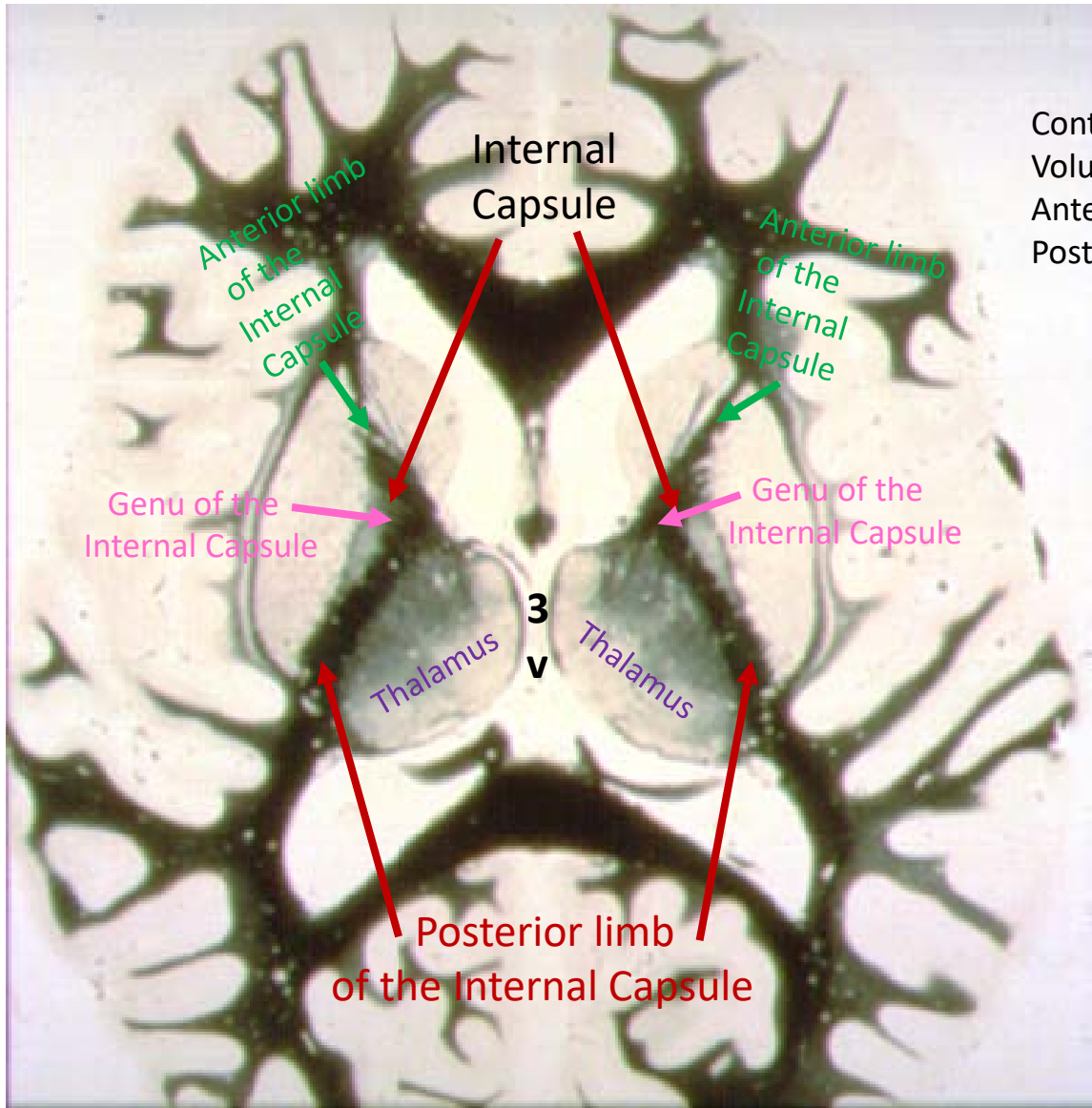
Mid-sagittal brain section depicting the medial aspect of right brain hemisphere

Diencephalon Anatomy



Coronal brain section depicting some components of the diencephalon

Diencephalon Anatomy



Posterior limb of the internal capsule:

Contains axons of the 3 major body pathways:
Voluntary motor pathway
Anterolateral system
Posterior columns/Medial lemniscus pathway

Lenticulostriate arteries are the blood supply to the internal capsule.

Contralateral body will display signs of: spastic paresis, loss of somatosensation (includes loss of pain/temperature, and loss of tactile/vibratory/position sense)

Genu of the internal capsule:

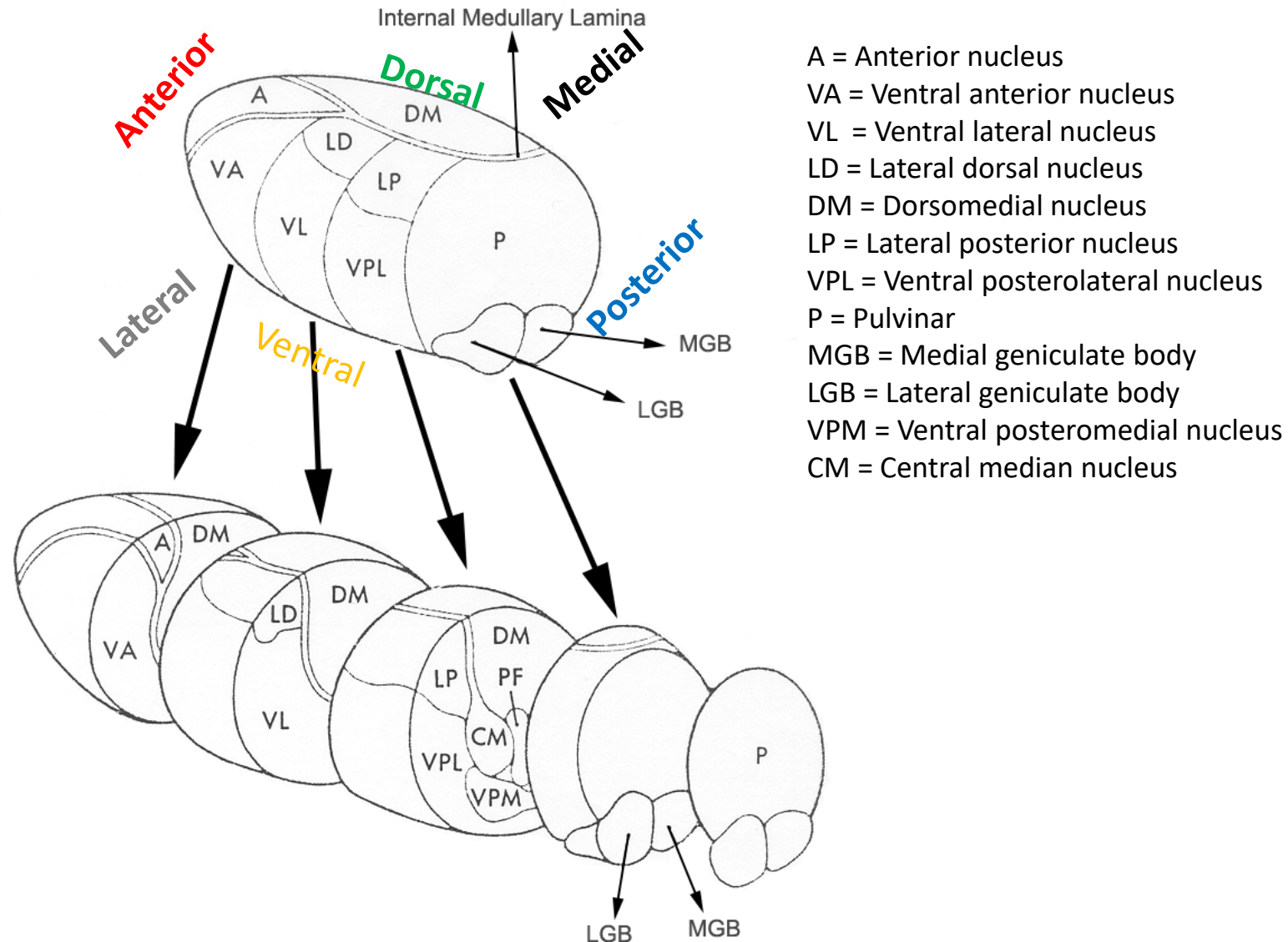
Contains axons of the major face pathways

Contralateral face will display signs of: spastic paresis, loss of somatosensation (includes loss of pain/temperature, and loss of tactile/vibratory/position sense)

Anterior limb of the internal capsule: pathways that are part of the limbic system

Horizontal myelin stained brain section depicting the thalamus and internal capsule

The Thalamus “The Gateway to the Cortex”



The Thalamus “The Gateway to the Cortex”

Thalamic Nuclei Functions

Anterior and Lateral Dorsal nuclei =
part of the limbic system

Dorsomedial nucleus =
Moods, emotions, behaviors

Ventral anterior and Ventral lateral nuclei =
Cerebellar and Basal nuclei motor pathways

Ventral posterolateral nucleus =
3rd order cell bodies relaying
somatosensation
(pain/temp, tactile/vibration)
from the contralateral body

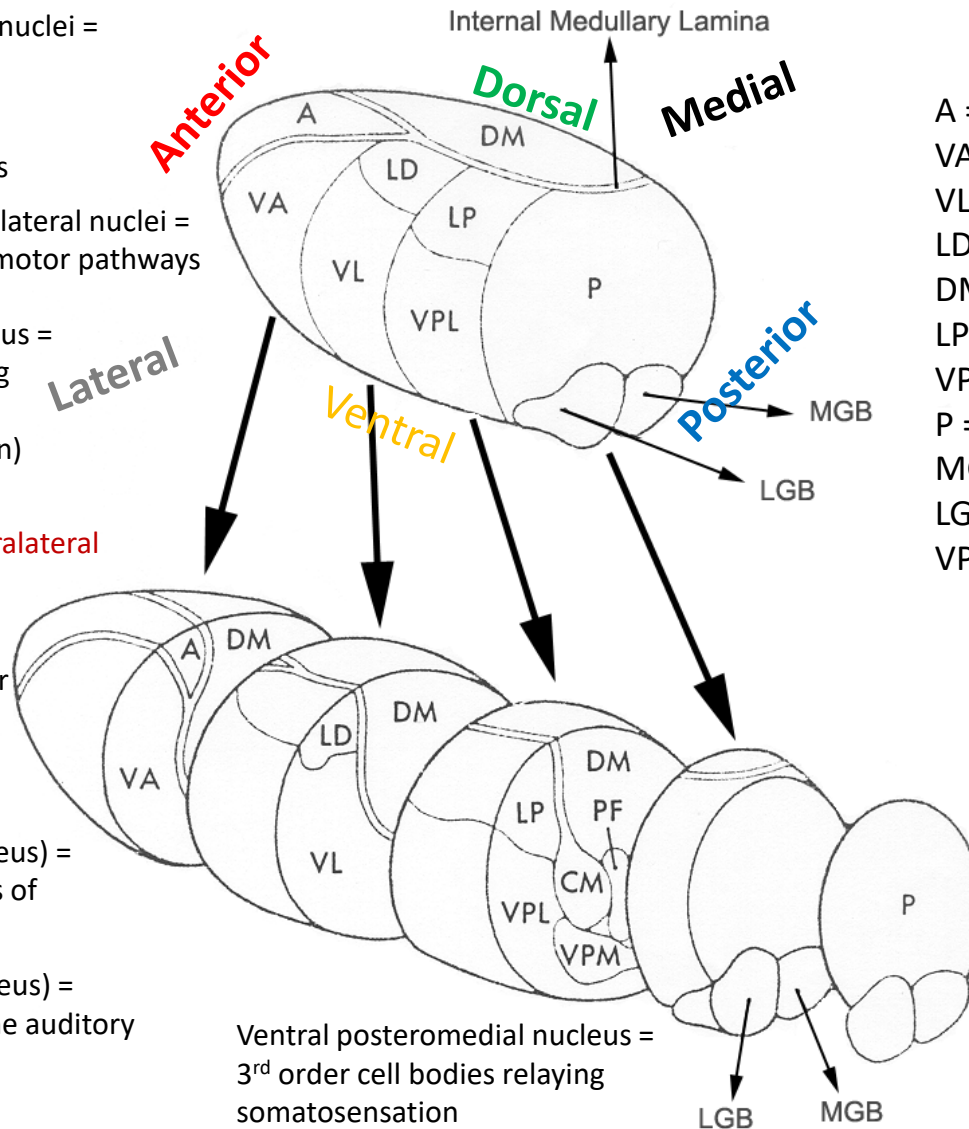
**Lesion to VPL results in contralateral
loss of somatosensation
from the body**

Pulvinar and Lateral posterior
nucleus =
Learning and interpreting
written symbols

Lateral geniculate body (nucleus) =
3rd order neuronal cell bodies of
the visual pathway

Medial geniculate body (nucleus) =
Cell bodies that are part of the auditory
pathway

Ventral posteromedial nucleus =
3rd order cell bodies relaying
somatosensation
(pain/temp, tactile/vibration)
from the contralateral face



A = Anterior nucleus

VA = Ventral anterior nucleus

VL = Ventral lateral nucleus

LD = Lateral dorsal nucleus

DM = Dorsomedial nucleus

LP = Lateral posterior nucleus

VPL = Ventral posterolateral nucleus

P = Pulvinar

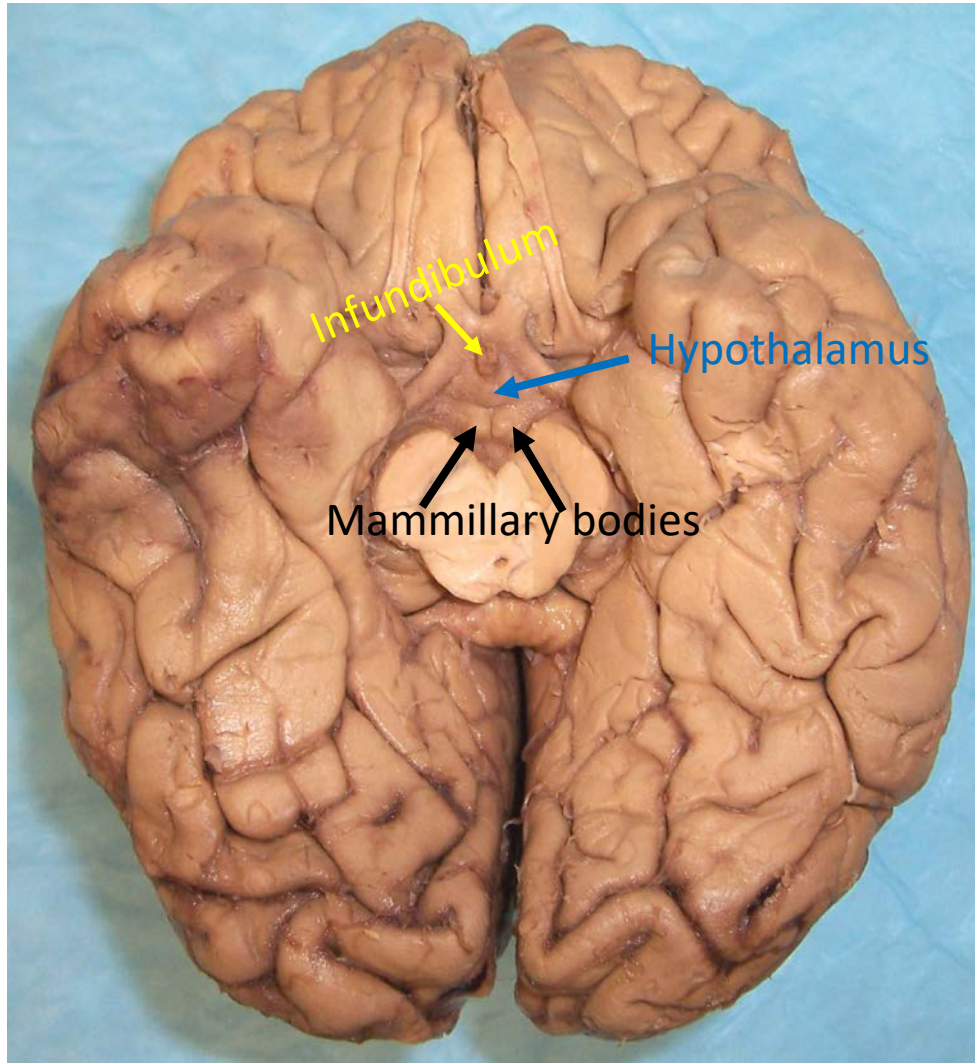
MGB = Medial geniculate body

LGB = Lateral geniculate body

VPM = Ventral posteromedial nucleus

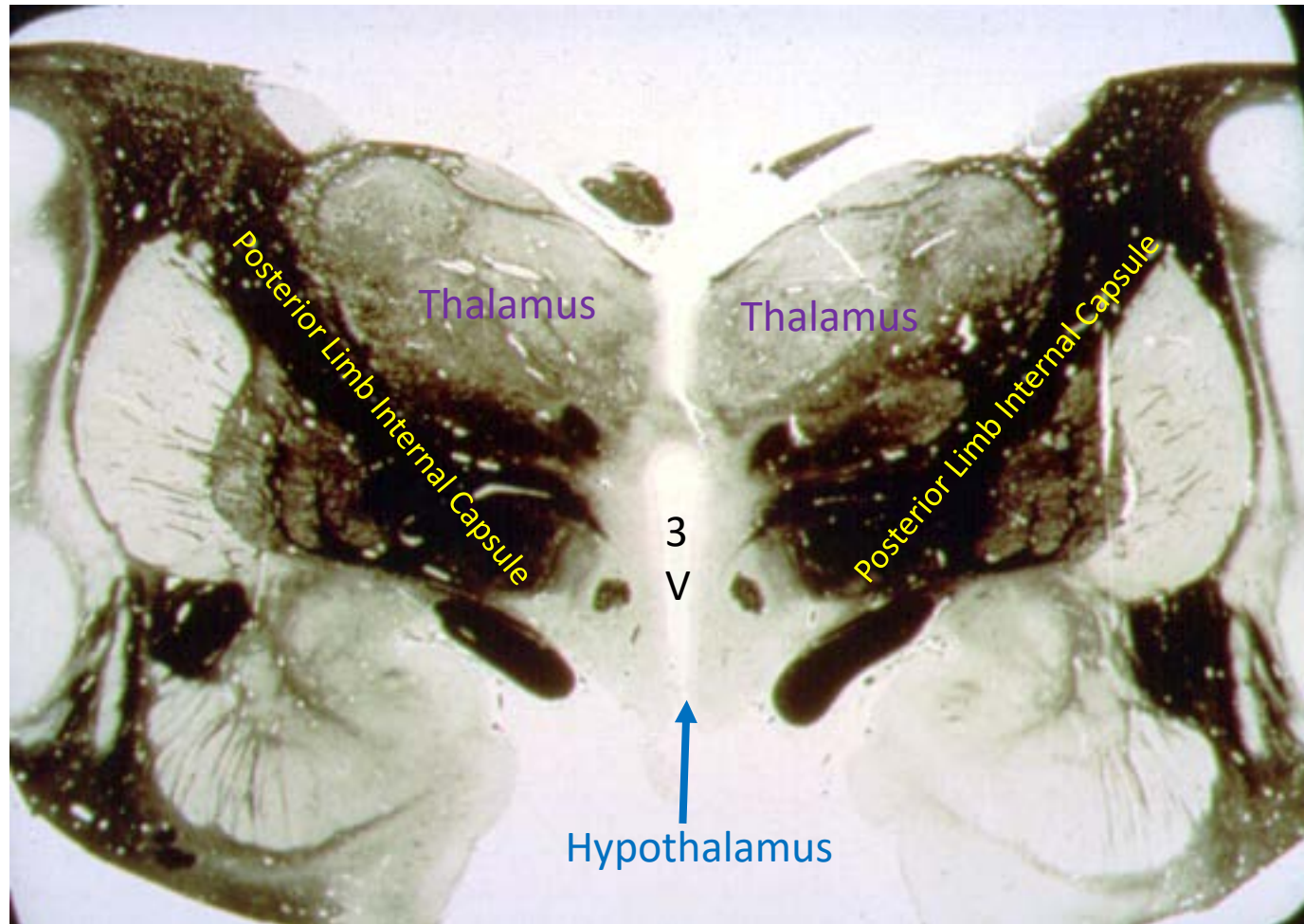
The Hypothalamus

Function of Hypothalamus = Homeostasis



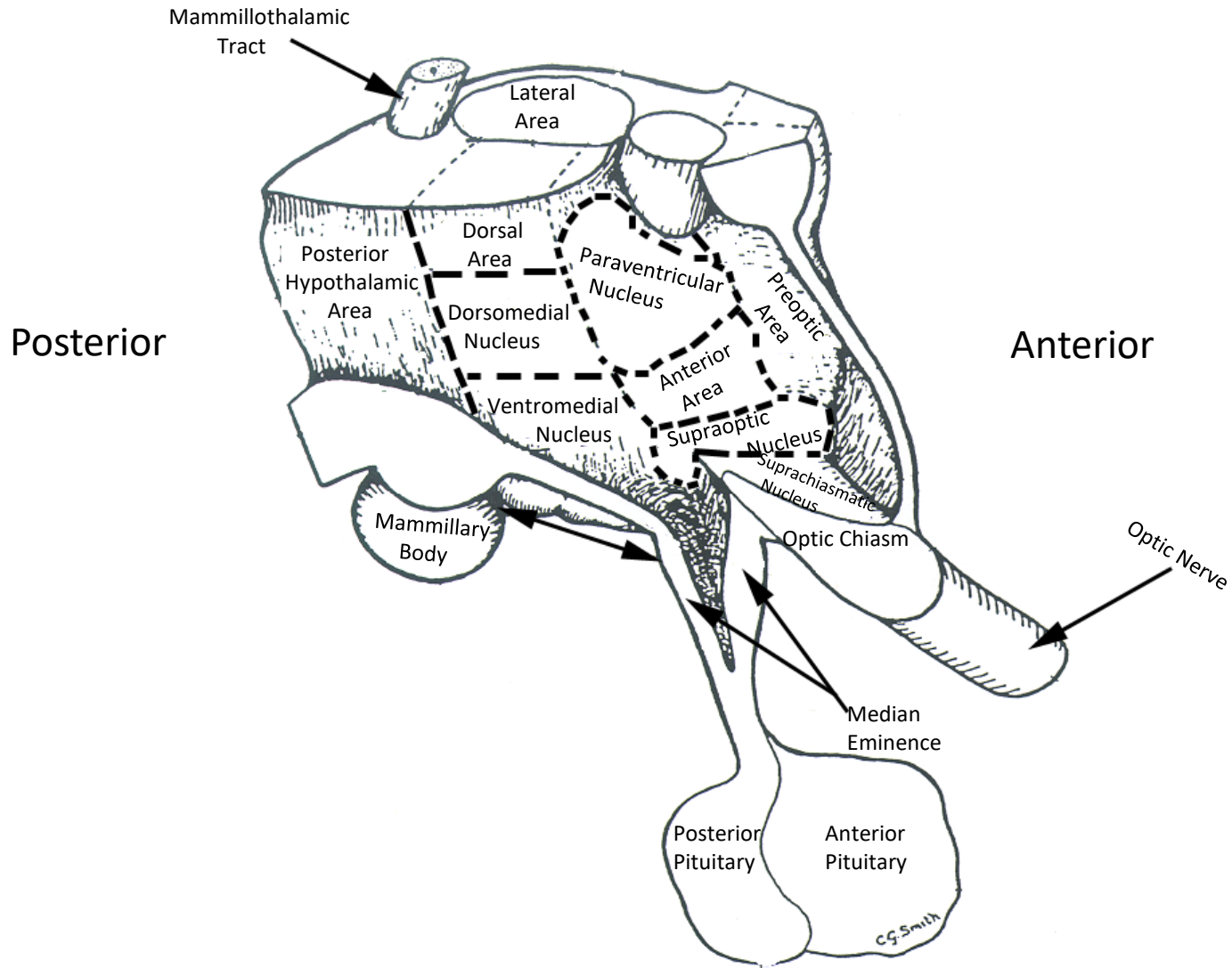
Inferior view of brain with cerebellum and lower brainstem removed

The Hypothalamus



Coronal Brain section depicting the hypothalamus

The Hypothalamus



Mid-sagittal section through hypothalamus depicting left side

Hypothalamic Nuclei/Areas and their Function

1. Control of Autonomic Nervous System

Anterior and Medial areas
of the Hypothalamus

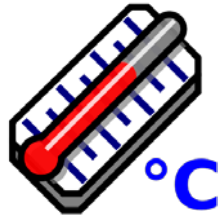
Control of Parasympathetic nervous system

Posterior and Lateral areas
of the Hypothalamus

Control of Sympathetic nervous system

2. Temperature Regulation

Anterior Hypothalamus



Heat Dissipation center

Posterior Hypothalamus

Heat Conservation center

3. Sleep/Wake cycles

Anterior Hypothalamus

Sleep cycle



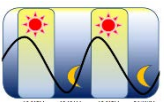
Posterior Hypothalamus
and Mammillary bodies

Wake cycle



Suprachiasmatic nucleus

Circadian rhythm (24 hour bio clock)



Hypothalamic Nuclei and Areas and their Function

4. Food Intake

Ventromedial nucleus

Satiety center

Lateral hypothalamic area

Feeding center



5. Water balance

Supraoptic and paraventricular nuclei

Produces ADH (anti-diuretic hormone) to control water balance



6. Regulation of Pituitary and Hormone release

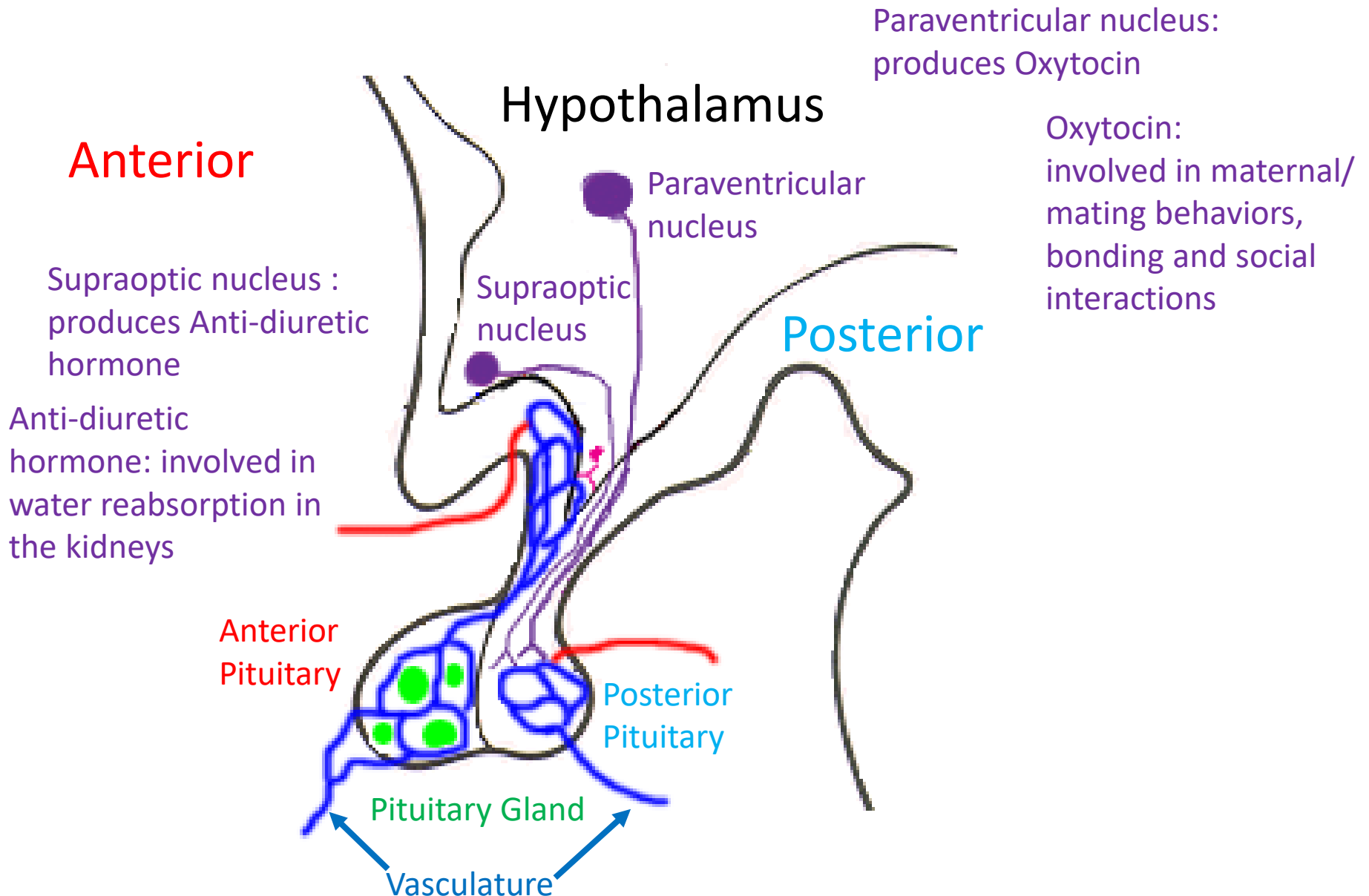
Median eminence

Controls female cyclicity and onset of puberty

Preoptic nucleus

Regulates reproductive hormones (LH/FSH)

Hypothalamus and Hormone Producing Neurons



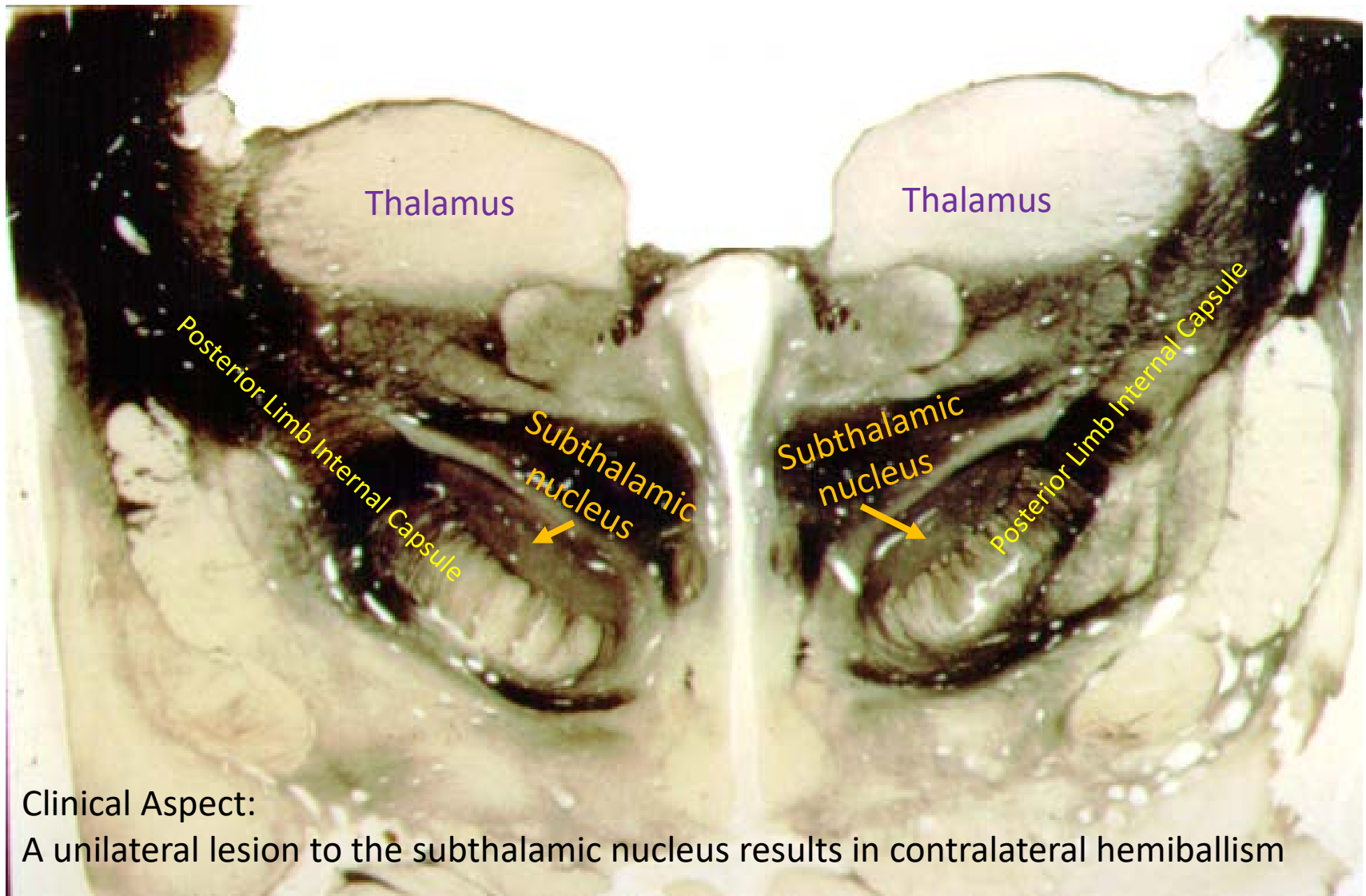
Clinical Aspect: Pituitary Tumor

Pituitary tumors usually originate in the anterior pituitary.

As the tumor grows, it impedes the release of hormones from the pituitary resulting in panhypopituitarism.

Neighboring neuroanatomical structures (optic chiasm and tracts and CN III, IV, V) can also be affected.

The Subthalamus

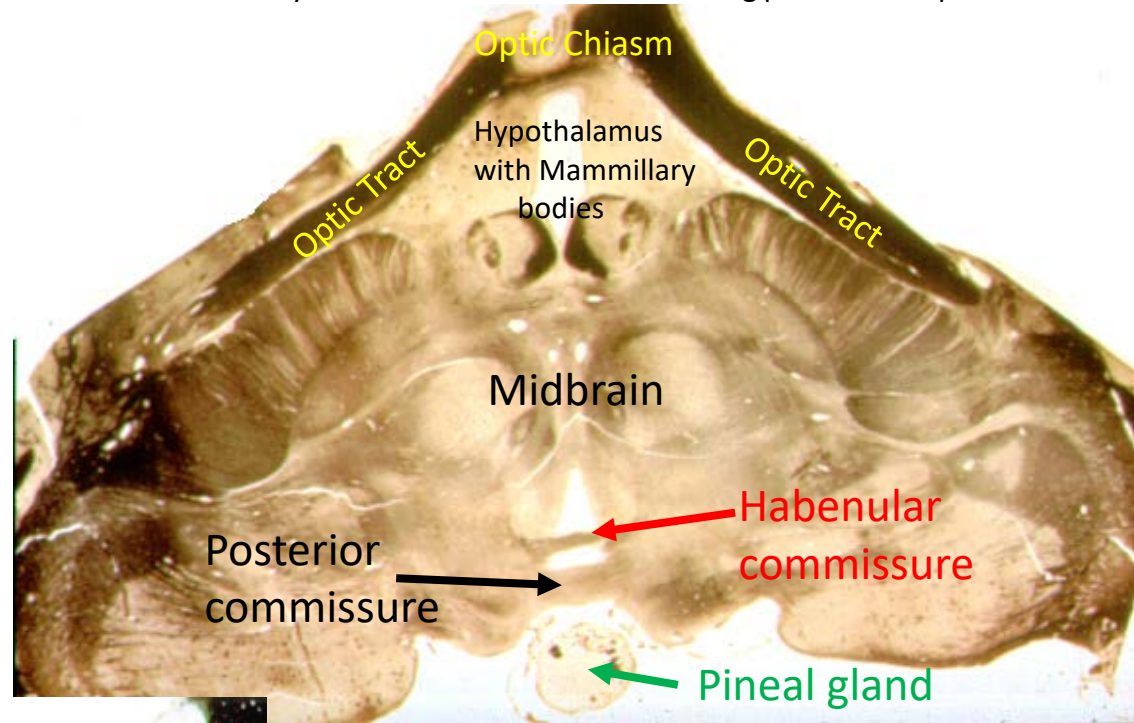


Coronal myelin-stained brain section featuring the subthalamic nucleus

The Epithalamus

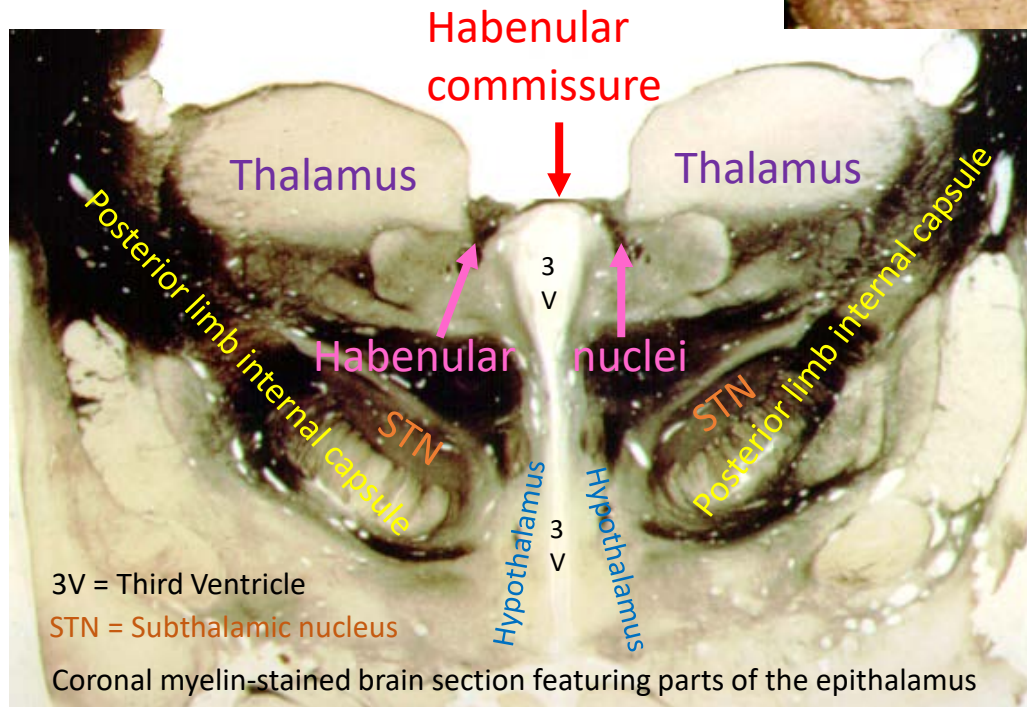
1. Pineal gland
2. Posterior commissure
3. Stria Medullaris thalami
4. Habenular nuclei
5. Habenular commissure

Horizontal myelin-stained brain section featuring parts of the epithalamus



Pineal gland functions:

1. Converts serotonin into melatonin
2. Anti-gonadotrophic
3. Calcium deposits accumulate after puberty



Blood Supply to the Diencephalon

Thalamus = Choroidal arteries (which are branches of middle and posterior cerebral arteries)

Hypothalamus = Branches off of the circle of Willis

Internal capsule = Lenticulostriate (lateral striate) arteries which are branches of the middle cerebral artery



Clinical Aspects:

Lenticulostriate artery stroke will result in a lesion to the posterior limb of the internal capsule: Contralateral spastic paresis, loss of somatosensation to the body

Thalamic syndrome: A vascular lesion that affects the VPL/VPM of the thalamus. Can result in constant pain sensation to the contralateral body(VPL) or face (VPM)