Internal Brain Structures

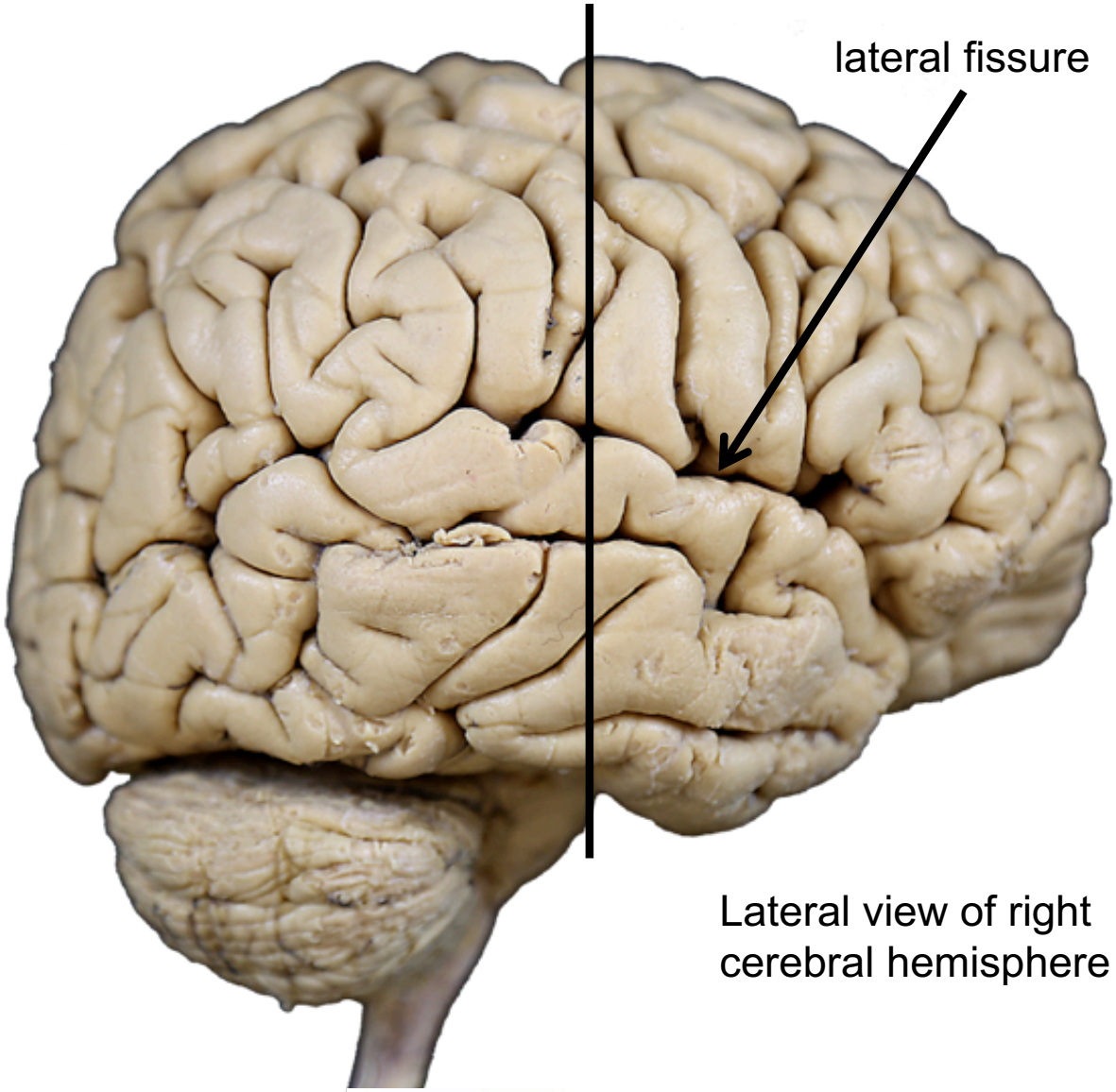
Objectives:

To identify internal structures of the forebrain on coronal and horizontal sections.

Specimens Required:

Coronal and horizontal brain sections

A coronal section through the forebrain reveals its internal structure.



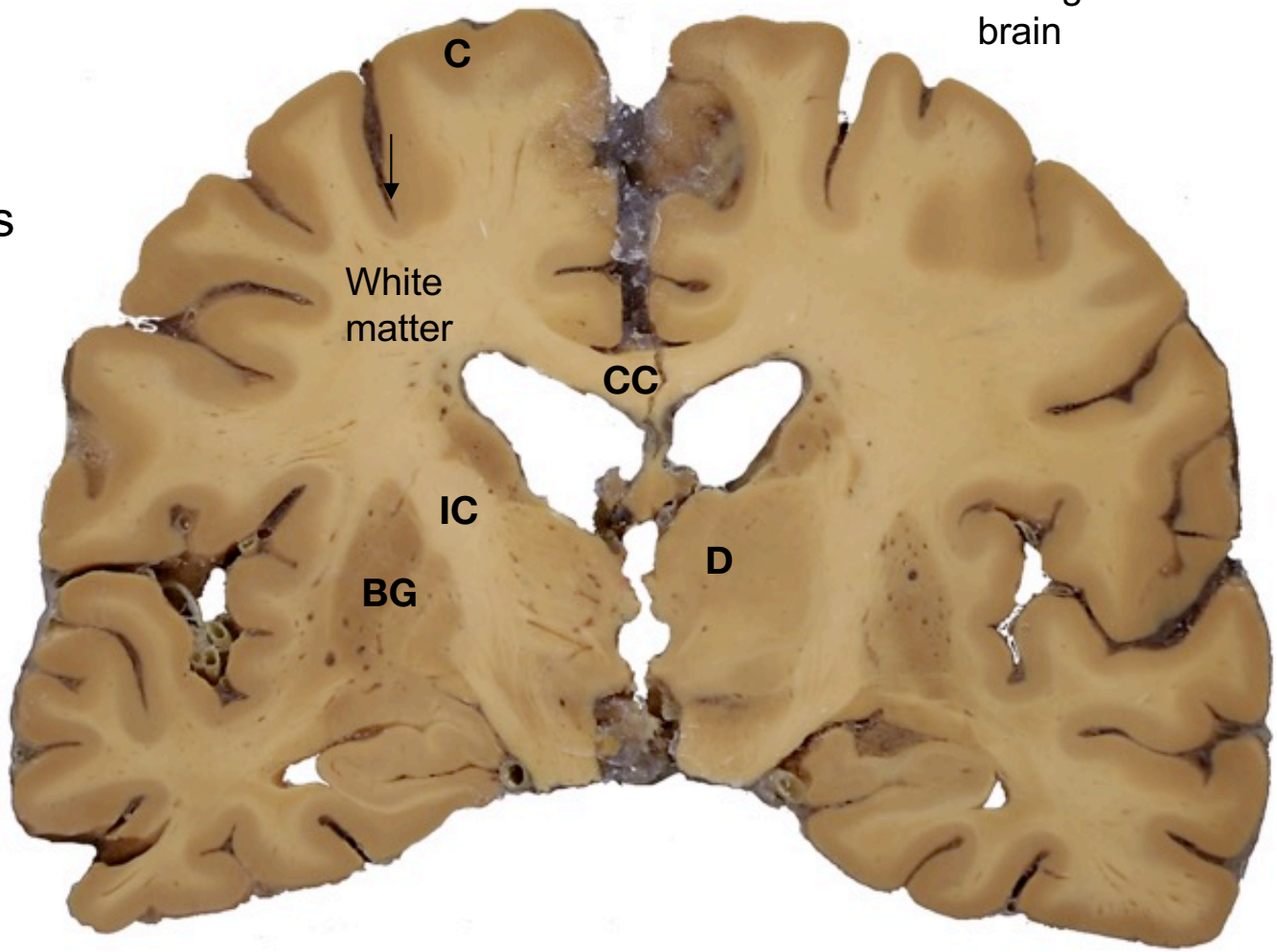
Lateral view of right cerebral hemisphere

Internal Brain Structures

The **c**erebral cortex forms the surface of each cerebral hemisphere. The subcortical white matter is contains axons connecting the cortex with other parts of the nervous system. Axons connecting the cortical areas of the two hemispheres through the **c**orpus **c**allosum while axons connecting the cortex to deeper structures are contained in the **i**nternal **c**apsule.

The **b**asal **g**anglia (nuclei) and **d**iencephalon are visible deep to the white matter.

medial surface of the right half of the brain

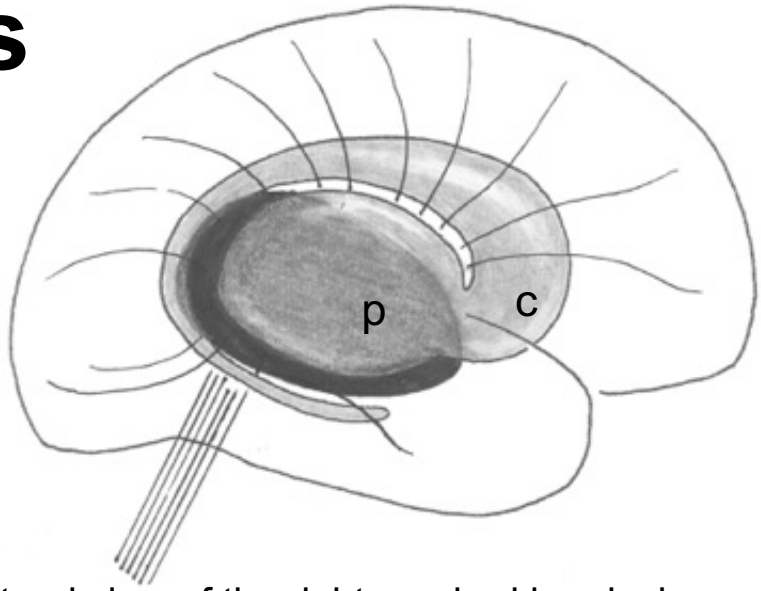


Internal Brain Structures

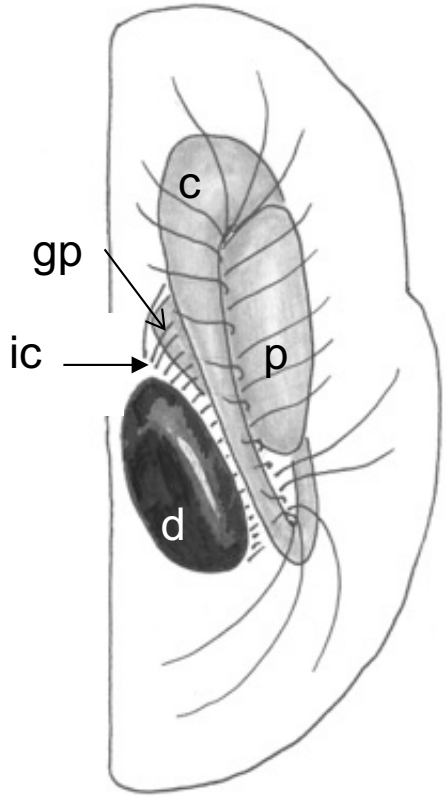
The telencephalon and diencephalon make up the forebrain. The telencephalon consists of the cerebral cortex and the deep telencephalic nuclei of the basal ganglia: the **c**audate (c) the **p**utamen and the **g**lobus **p**allidus nucleus.

The **d**iencephalon is located medial to the basal ganglia within the cerebral hemisphere (see dorsal view).

The internal capsule separates the **d**iencephalon and **c**audate (medially) from the **g**lobus **p**allidus and **p**utamen (laterally). Axons of the internal capsule connect the overlying cerebral cortex to areas of the basal ganglia, diencephalon, brain stem and spinal cord.

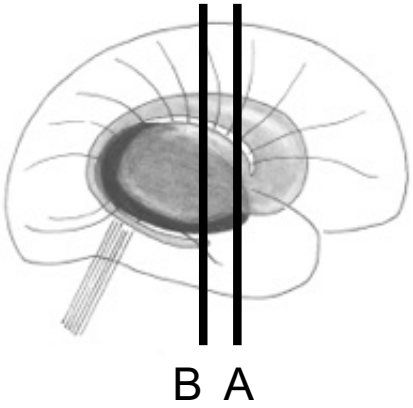


lateral view of the right cerebral hemisphere



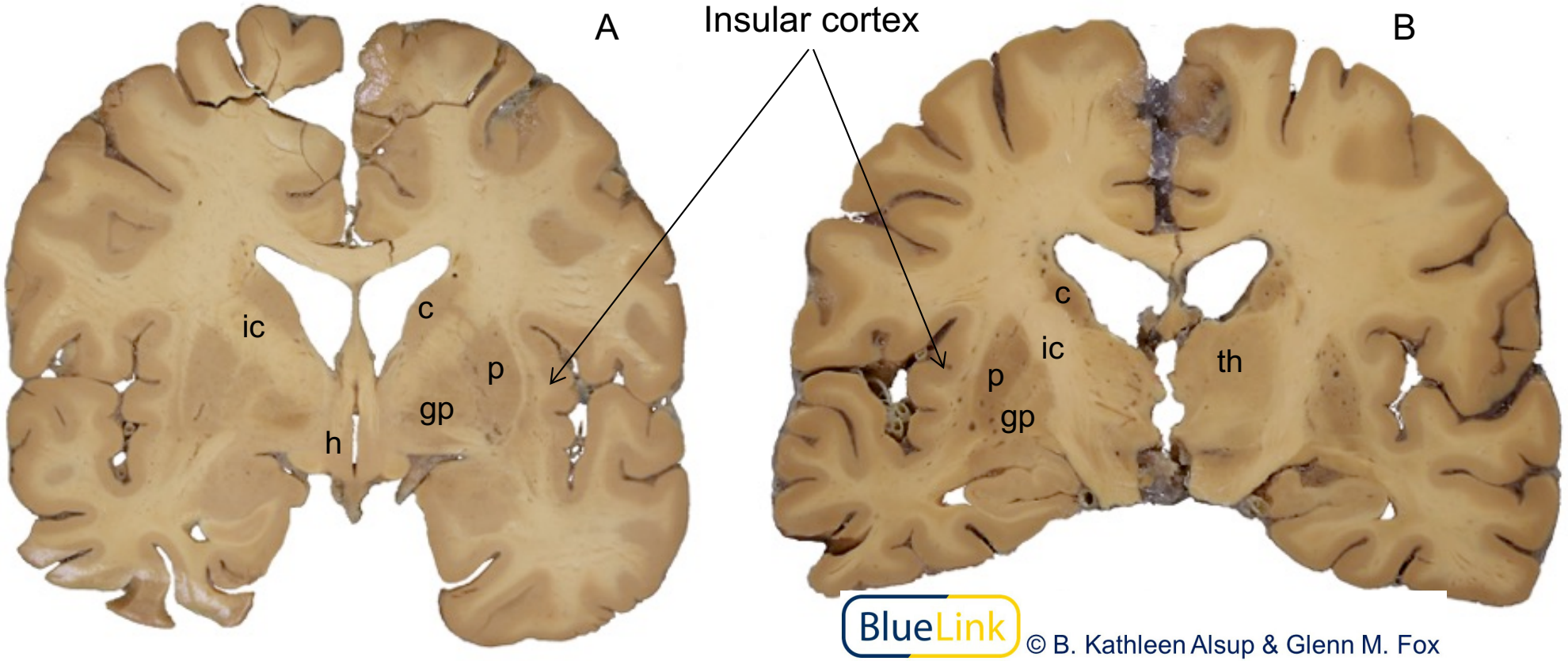
dorsal view of the right cerebral hemisphere

Internal Brain Structures

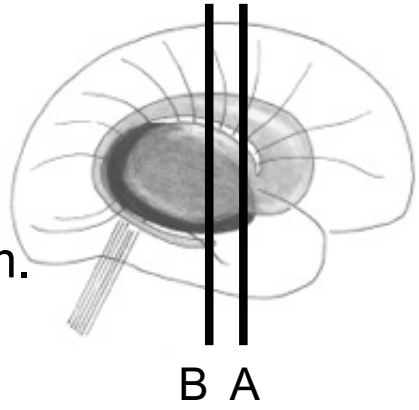


In a coronal section, the diencephalon and **c**audate nucleus are visible. The diencephalon includes the **th**alamus and **h**ypothalamus. The caudate nucleus and thalamus are always medial to the **i**nternal **c**apsule.

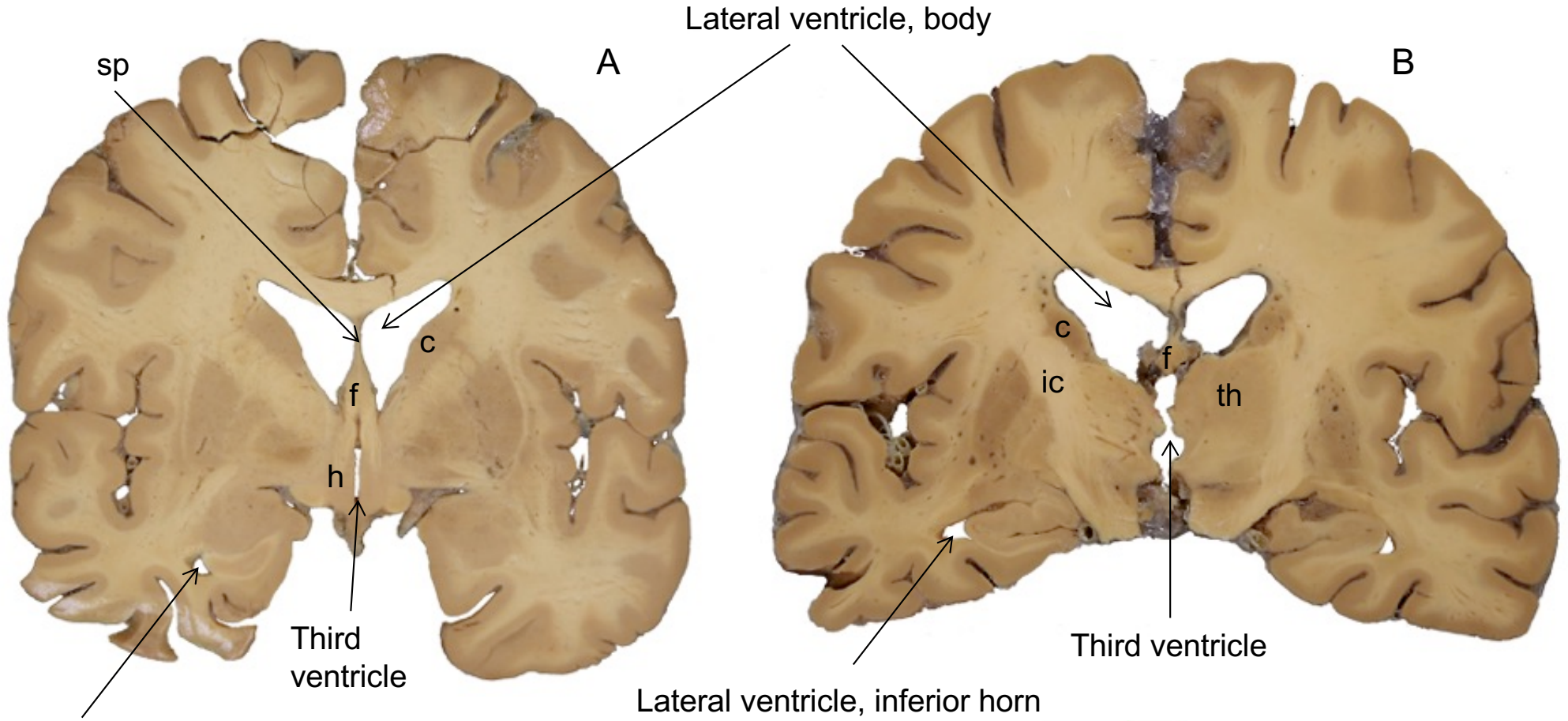
The lentiform nucleus is composed of the **p**utamen and the **g**lobus **p**allidus. These structures are always lateral to the internal capsule.



Internal Brain Structures

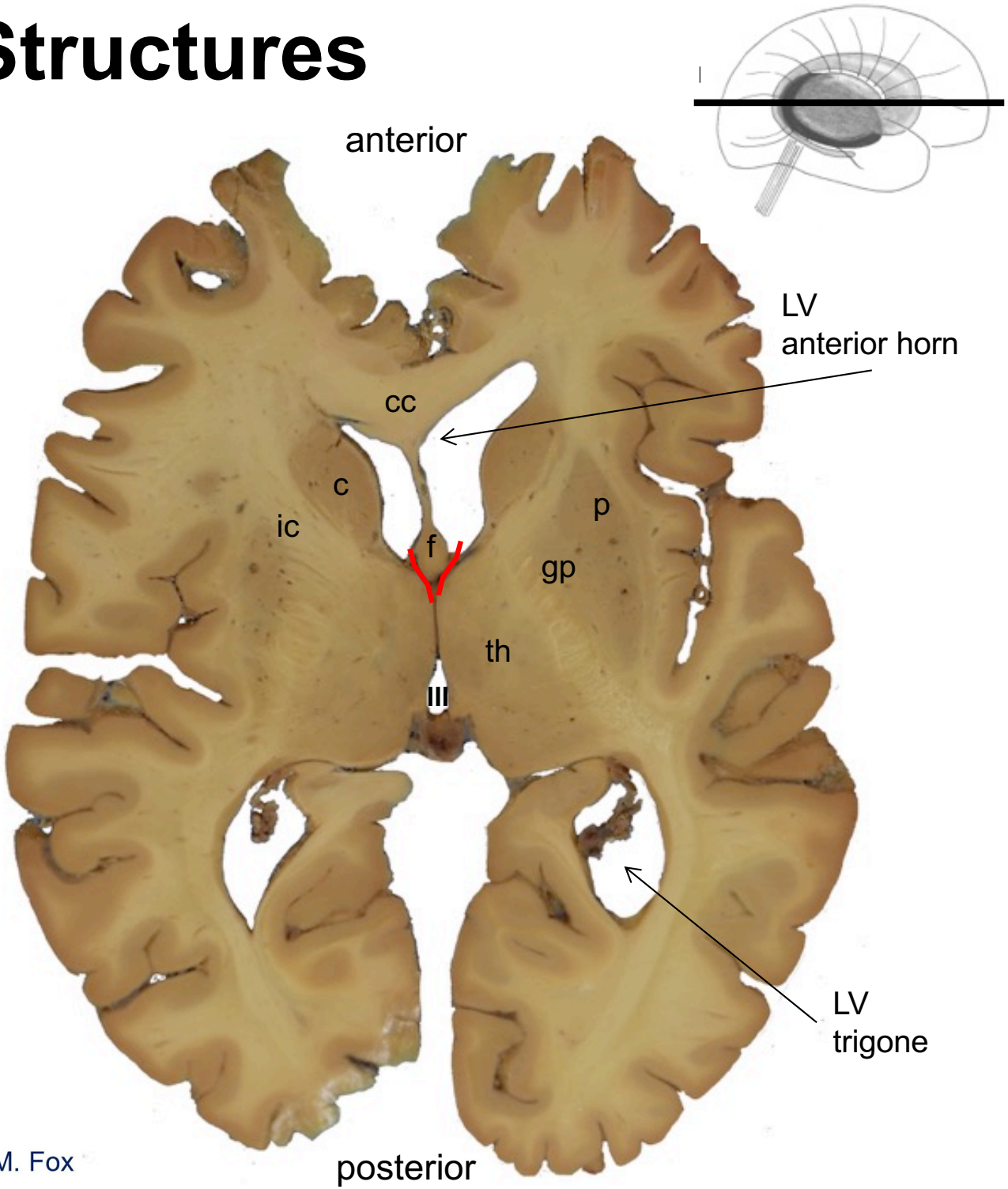


Coronal sections reveal the body and the inferior horns of the lateral ventricles (LV). The body of each LV is roofed by the **c**orpus **c**allosum. Its walls are the **c**audate and the septum pellucidum (sp). Its floor is the fornix (f). The walls of the third ventricle are formed by the **h**ypothalamus and **th**alamus



Internal Brain Structures

This horizontal section includes the **c**orpus **c**allosum, the **c**audate nucleus, the **p**utamen and **g**lobus **p**allidus. The lateral ventricles anterior horn and trigone are also visible. The interventricular foramen (if) on each side opens from the lateral ventricle into the third ventricle.

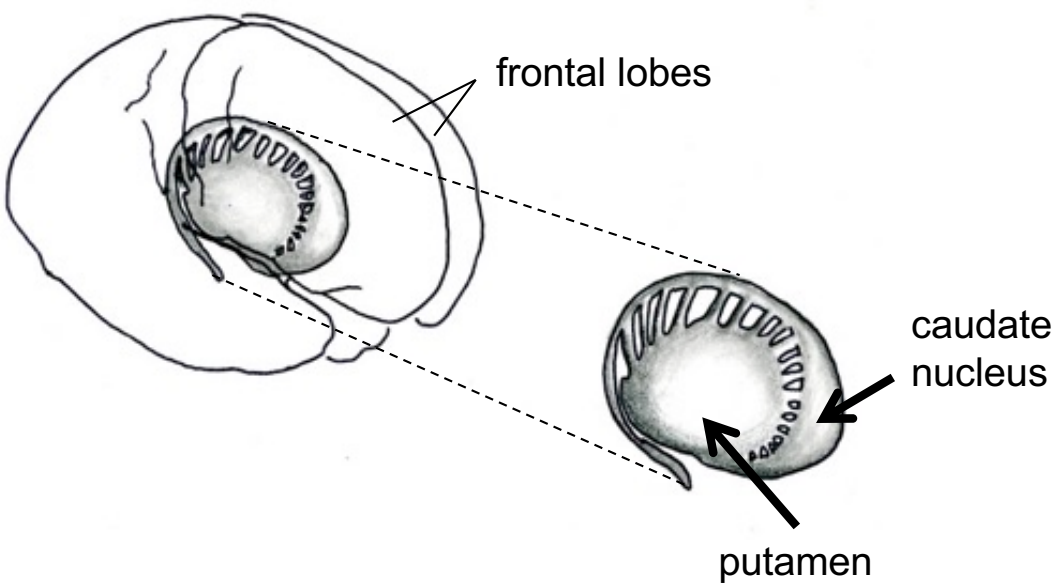


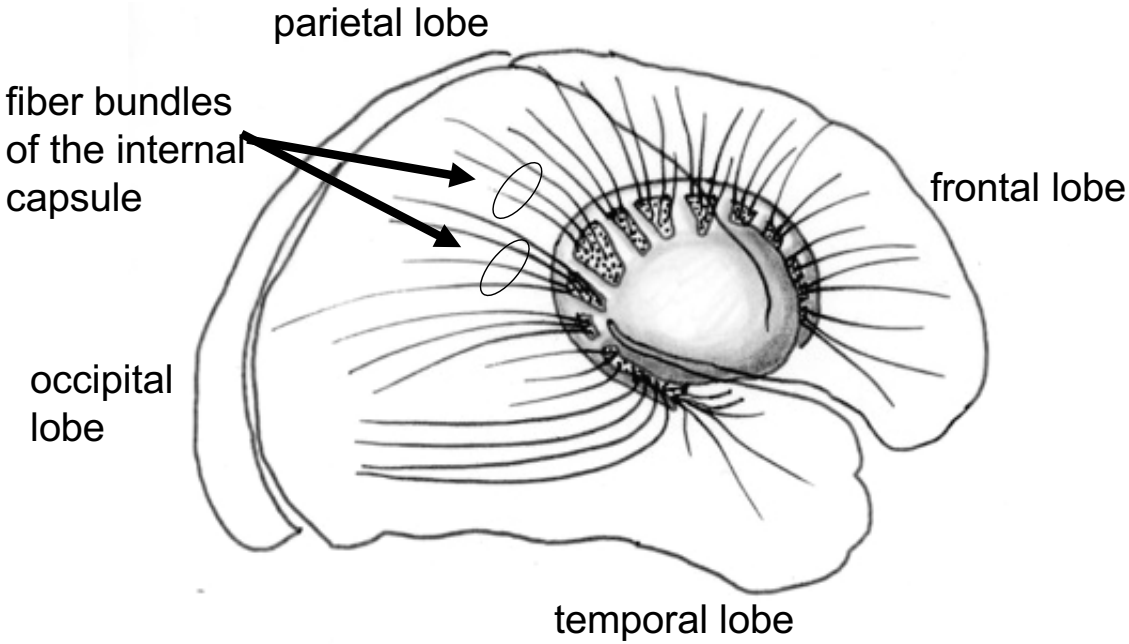
Internal Brain Structures

The caudate nucleus and the putamen of the basal ganglia are connected by narrow cell bridges.

Fiber bundles that pass between these cellular collectively make up the internal capsule. (All of the fibers illustrated here are part of the internal capsule.)

Axons of the internal capsule connect the overlying cerebral cortex to areas of the basal ganglia, diencephalon, brain stem and spinal cord.



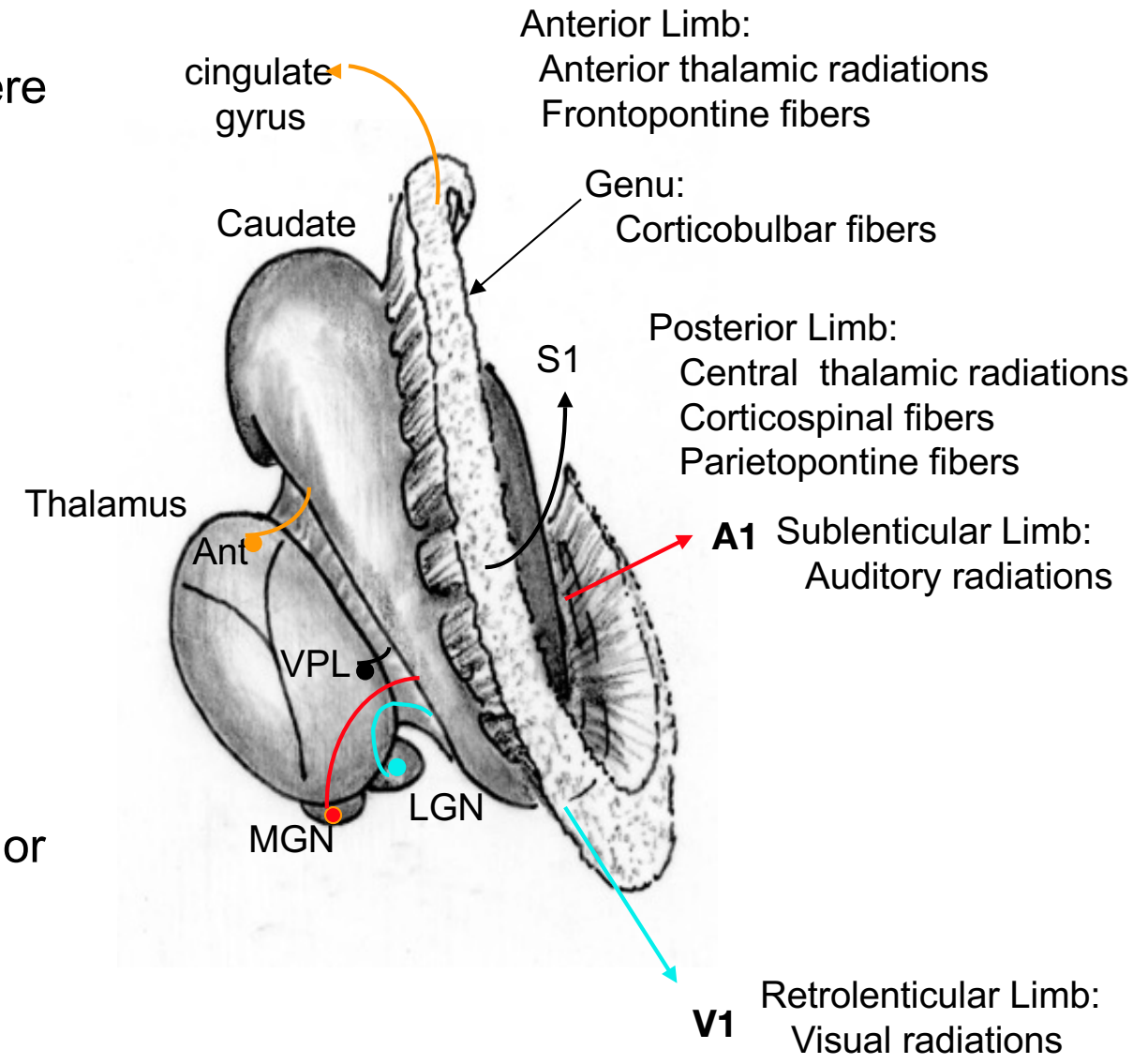


Internal Brain Structures

Examples of specific thalamocortical projections (or thalamic radiations) are shown here in the anterior, posterior, sublenticular, and retrolenticular limbs of the internal capsule.

NOTE:
In addition to to the thalamic radiations illustrated here, the internal capsule contains:

- corticopontine fibers connecting the cortex to the cerebellum
- corticobulbar fibers in the genu
- corticospinal fibers in the posterior limb.

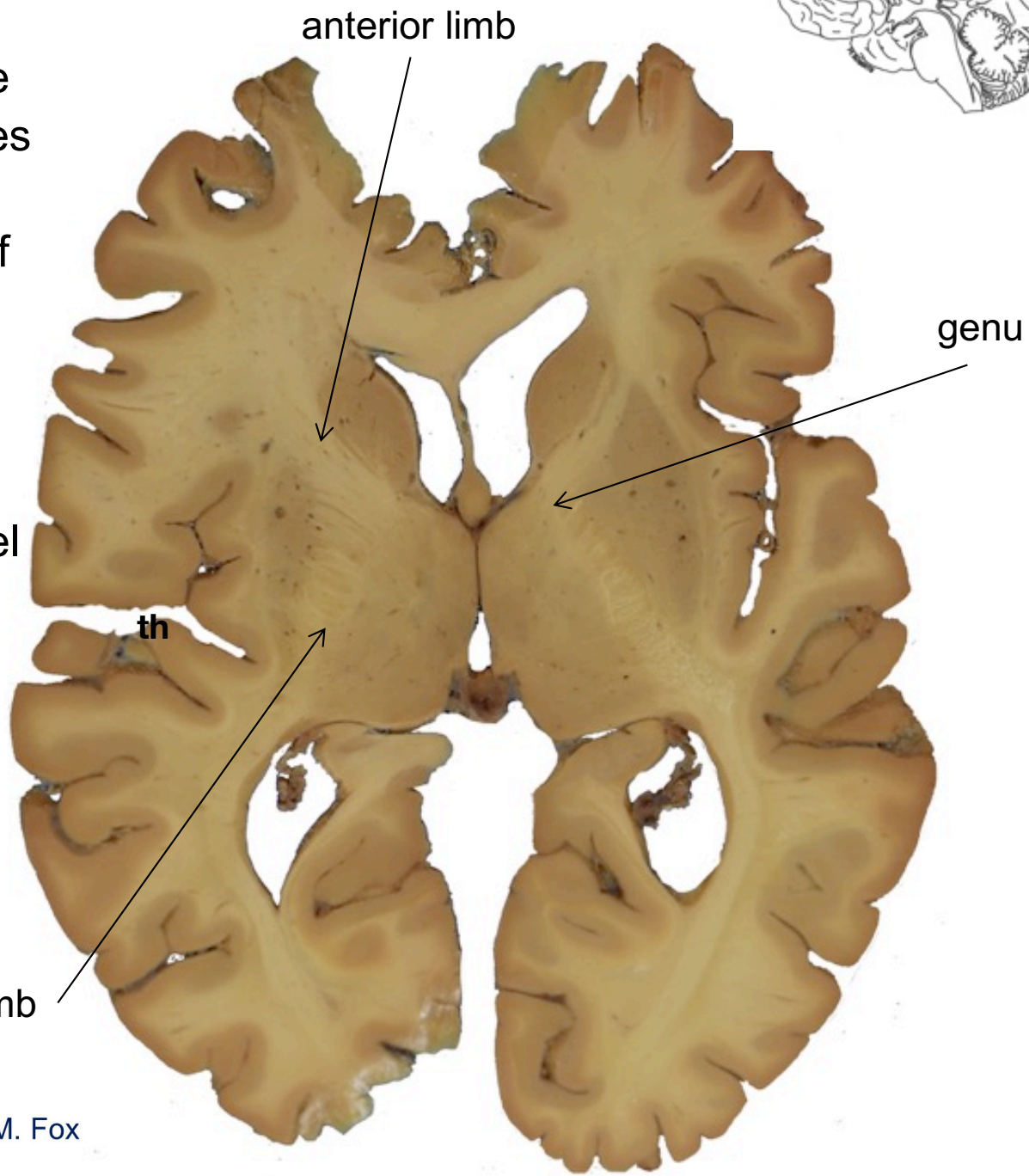


Lenticular refers to the relative position to the lentiform nucleus (globus pallidus + putamen.
Retrolenticular = behind the lenticular nucleus, Sublenticular = below the lenticular nucleus

Internal Brain Structures

The genu of the **i**nternal **c**apsule is the bundle of fibers that passes adjacent to the interventricular foramen at the anterior border of the **th**alamus.

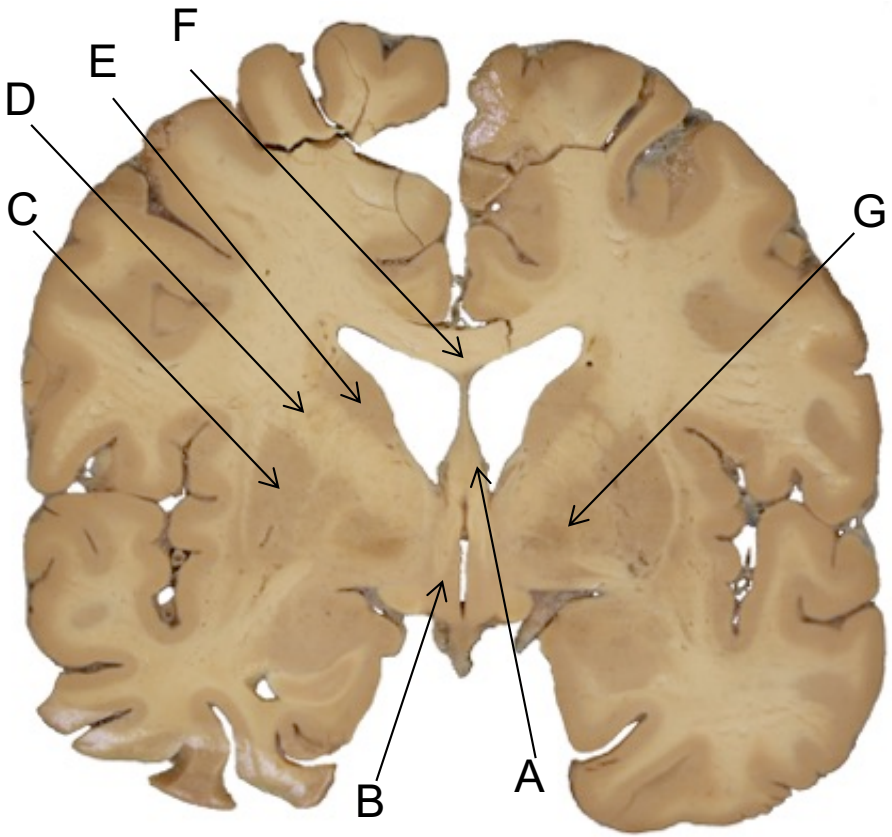
Corticobulbar (corticonuclear) axons that innervate the motor nuclei of the cranial nerves travel in the genu.

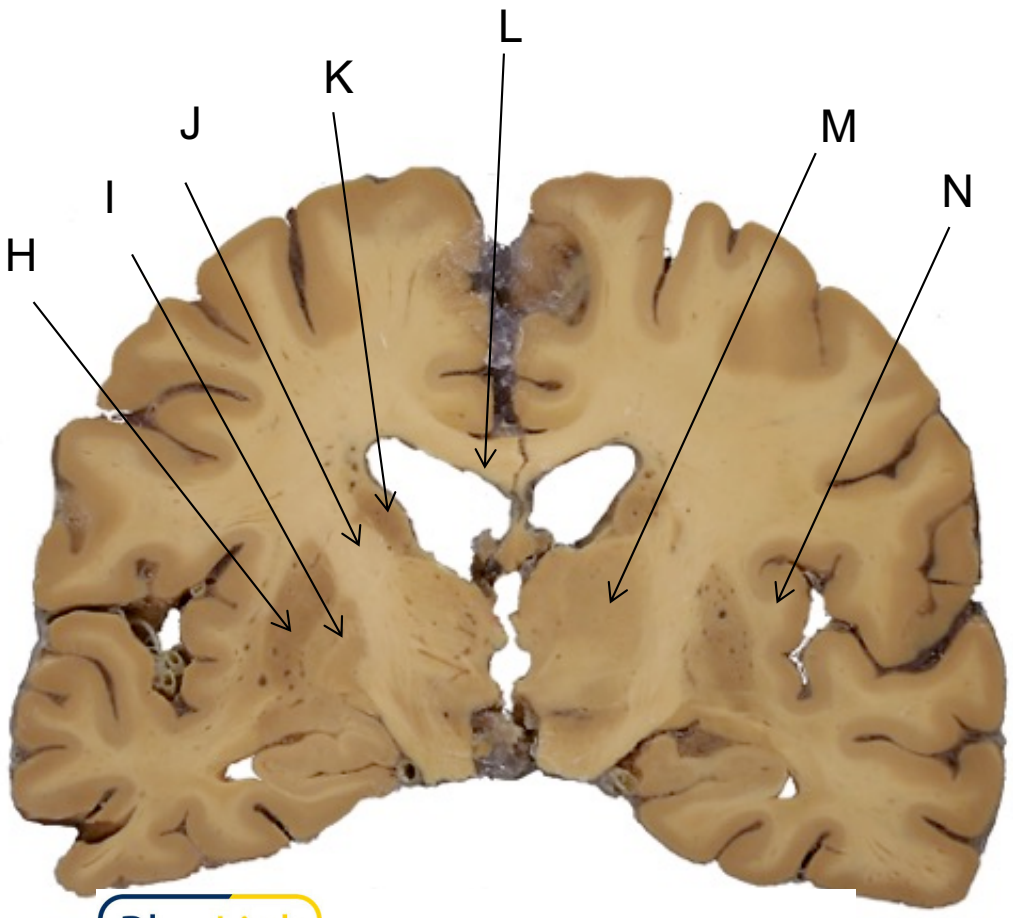


Question 1

Match each of the terms below (1 - 9) with the appropriate structure (A – M) on the coronal brain sections. (You will use the letters more than once)

1. Caudate nucleus
2. Corpus callosum
3. Fornix
4. Globus pallidus
5. Hypothalamus
6. Insular cortex
7. Internal capsule
8. Putamen
9. Thalamus

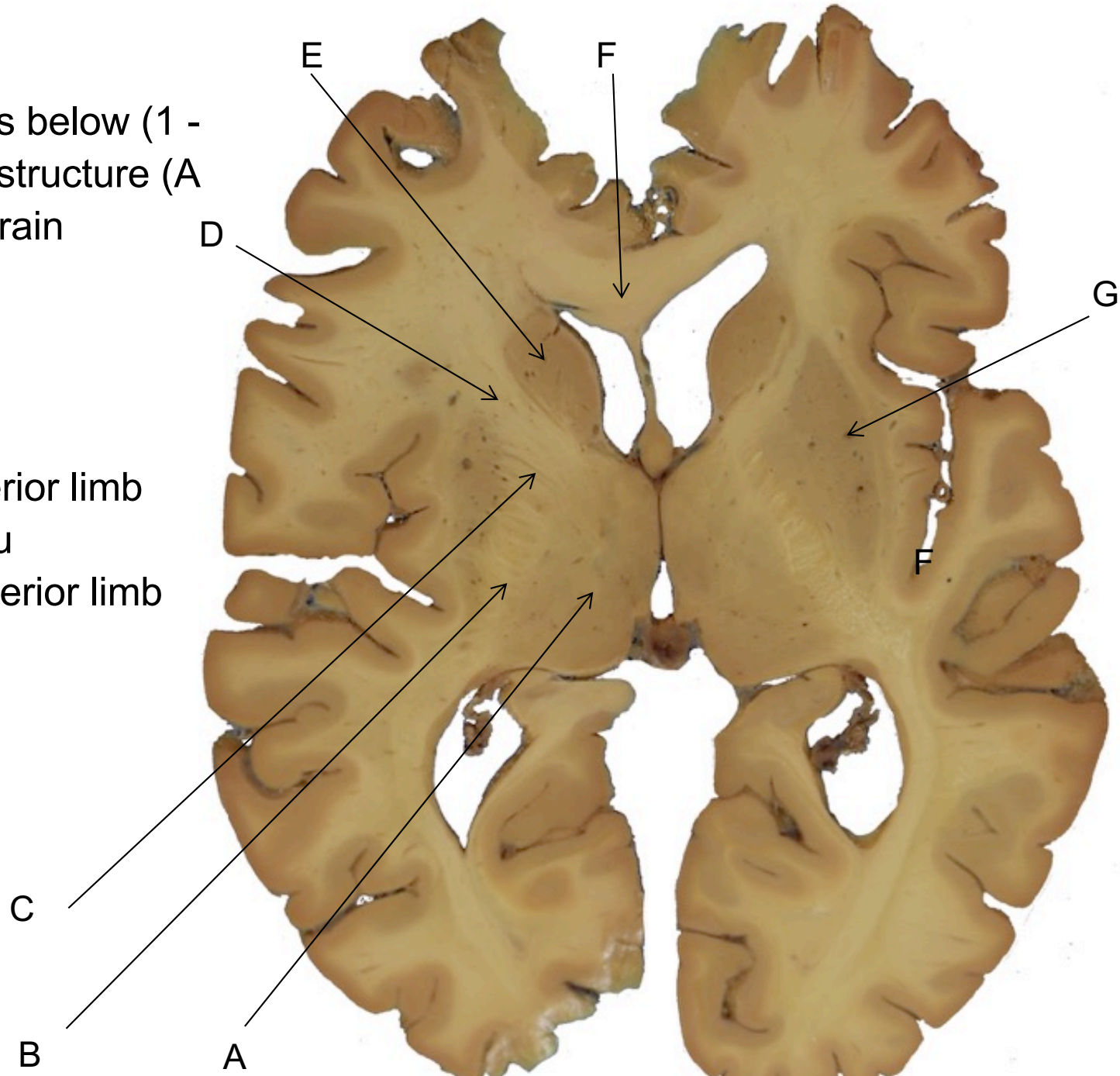




Question 2

Match each of the terms below (1 - 6) with the appropriate structure (A – F) on the horizontal brain section.

1.Caudate nucleus
2.Corpus callosum
3.Internal capsule, anterior limb
4.Internal capsule, genu
5.Internal capsule, posterior limb
6.Putamen
7.Thalamus



Answers

Question 1

1. E, K
2. F, L
3. A
4. G, I
5. B
6. N
7. D, J
8. C, H
9. M

Question 2

1. E
2. F
3. D
4. C
5. B
6. G
7. A