5-1: Cerebral hemispheres from above (meninges and blood vessels removed). In this view, the cerebrum conceals other parts of the brain.

The brain is ovoid, broader behind than in front. The longitudinal cerebral fissure is a narrow cleft that normally contains the falx cerebri (made of dura), arachnoid, pia, and cerebral arteries and veins, in particular the anterior cerebral vessels. The superolateral surface of each cerebral hemisphere is markedly convex and fits into the corresponding half of the skull vault. In this specimen, some atrophy of the cortex has resulted in separation of the gyri, so that the convolutions of the cerebral cortex are readily appreciated. There is considerable individual variation in the patterns of gyri, and even the two sides of a brain differ in the arrangement of their convolutions. Interlocking gyri belonging to the right superior frontal gyrus are seen on the right side of the brain. In the central sulcus of the left hemisphere, a short transverse gyrus is seen. Note: This specimen shows considerable atrophy, which enhances demonstration of the sulci.

5-2: Superolateral surface of right cerebral hemisphere, showing sulci and gyri


The stem of the lateral sulcus is a deep transverse furrow, from which the middle cerebral vessels have been removed. Above the temporal pole of the hemisphere, the posterior ramus of the lateral sulcus is a long cleft that runs backwards with an upwards inclination, and it enters the inferior parietal lobule where it may terminate in a T-shaped manner. The anterior horizontal and anterior ascending rami of the lateral sulcus are well developed, although in other specimens they may be less easy to identify. On the left side of the brain (in most individuals), the opercular and triangular parts of the inferior frontal gyrus are referred to as Broca's area, which is associated with motor elements of speech. The lower part of the precentral gyrus is very wide and incompletely subdivided by longitudinal sulci. To some extent the same applies to the lower portion of the
postcentral gyrus. The supramarginal and angular gyri are located respectively around the terminal parts of the posterior branch of the lateral sulcus and the superior temporal sulcus. The cortex of the angular gyrus is important because it is involved in relating visual impressions to stereognostic impressions (appreciation of the nature of objects by means of touch). Two temporal sulci divide the temporal lobe into three temporal gyri. The superior temporal gyrus is continued without interruption into the transverse temporal gyrus, these areas of cortex being regions for receiving and processing auditory sensations. Note: The atrophy in this specimen, especially in the frontal, parietal, and temporal lobes, emphasizes the appearance of the sulci.

5-3: Medial surface of the brain, with blood vessels removed


The cingulate sulcus begins below the rostrum of the corpus callosum and arches in front of the genu of the corpus callosum, about a finger's breadth distant from it. Above the splenium of the corpus callosum, the cingulate sulcus turns abruptly upwards to reach the superior margin of the hemisphere.

Where the precentral and postcentral gyri come together, the central sulcus cuts into the paracentral lobule. Voluntary control over defecation and micturition reflexes is ascribed to this lobule.

The cingulate gyrus is a long strip of cortex that curves around the corpus callosum. Posteriorly, it becomes very narrow under the splenium of the corpus callosum and is continuous with the isthmus, which separates the splenium from the calcarine sulcus or fissure. The cingulate gyrus has profuse reciprocal connections with the anterior thalamic nuclei and is an important constituent of the limbic system. Note the deep parieto-occipital sulcus, running downwards and forwards to the calcarine sulcus. The cuneus is a wedge of cortex enclosed by the parieto-occipital and the calcarine sulci and the superomedial margin of the hemisphere. It contains part of the center for vision. In
the brainstem, the medial longitudinal fasciculus is a well-defined white bundle, descending through the midbrain tegmentum, adjacent to the central gray matter. As it approaches the pontine region it gradually adopts a more dorsal position.

5-4: Medial surface of right cerebral hemisphere, with blood vessels removed


Most of this surface is separated from the left hemisphere by the falx cerebri (dura mater), but the subcallosal area (which is below the rostrum of the corpus callosum) is separated from that of the other side by pia-arachnoid only, so that the gyri of the two sides may interlock. The anterior part of the cingulate sulcus is somewhat foreshortened and narrow in this specimen, with a corresponding increase in the paracentral lobule. The paracentral lobule is cut very deeply by the central sulcus (of Rolando). The motor and sensory areas for the lower part of the left lower limb are, respectively, anterior and posterior to this (medial) segment of the central sulcus.

The paraterminal gyrus is closely applied to the anterior surface of the lamina terminalis, and is separated from the cingulate gyrus by a shallow furrow. Primitive in its cytoarchitecture, the thin cortex of the paraterminal gyrus extends on to the inferior surface of the rostrum of the corpus callosum, spreading out to form part of the indusium griseum, which is found on the superior surface of the corpus callosum and is widely regarded as a primitive cortex and a hippocampal vestige. Beneath the splenium of the corpus callosum, the parahippocampal gyrus bifurcates. The upper part extends over the isthmus to become the cingulate gyrus. The lower part expands backwards to become the lingual gyrus, which is the cortical area below the calcarine sulcus or fissure. The posterior part of the calcarine sulcus has been referred to as an "axial sulcus" because it runs longitudinally through the visual striate area and its margins contain much of the...
center for vision. The anterior part of the calcarine sulcus, after it has been joined by the parieto-occipital sulcus, has been referred to as a "limiting sulcus," because it separates the visual striate area from the cortex of the cingulate gyrus, which is believed to function in emotion.

5-5: Inferior surface of the brain with cranial nerve attachments, after removal of meninges and superficial blood vessels


The slightly concave inferior surfaces of the frontal lobes rest on the floor of the anterior cranial fossa. The irregularly arranged orbital gyri and sulci include well developed olfactory gyri, which adjoin the anterior (rostral) perforated substance. There is a clear view of the temporal lobes with their characteristic convolutional pattern. The center and posterior portions of the preparation are occupied by the ventral surfaces of the brain.
stem and cerebellum, respectively. Note the large bundles of pyramidal fibers decussating within the anterior median fissure.

5-6: Inferior surface of the brain after transection through lower midbrain and removal of cerebellum


The brainstem has been cut through the inferior (caudal) colliculi and the decussation of the superior (cranial) cerebellar peduncles. The inferior surfaces of the frontal lobes are separated from those of the temporal lobes by the lateral fissure. On each side, the gyrus rectus of the frontal lobe is well developed and the orbital gyri are arranged irregularly around the H-shaped orbital sulci. The parahippocampal gyri are separated laterally from the rest of the temporal lobe by the collateral sulci, and their medial margins bound the midbrain. The rhinal sulcus is not present as a separate sulcus in this specimen, but is represented as a direct continuation of the collateral sulcus. The rhinal
sulcus and the anterior part of the collateral sulcus separate olfactory and paleocortical areas on their medial side from neocortical regions of the temporal cortex on their lateral side. The parahippocampal gyrus continues backwards, uninterrupted, into the lingual gyrus. The isthmus of the cingulate gyrus is seen as a continuation of the parahippocampal gyrus only in the left hemisphere in this figure, where a small part of the isthmus projects inferior to the splenium of the corpus callosum.

5-7: Association tracts in the medial part of the cerebrum: right hemisphere


The cingulum is an association tract that commences below the rostrum of the corpus callosum in the region of the olfactory cortex, and arches around the entire corpus callosum. It has been dissected out from the inferior part of the cingulate gyrus in which, for the most part, it is embedded. After curving round the splenium of the corpus callosum, the bundle proceeds forward within the parahippocampal gyrus to reach the uncus and nearby cortical areas of the temporal lobe. A large proportion of fibers in the cingulum traverse only relatively short segments of this rather compact bundle, and this is due to arrival and departure of many fibers linking different cortical areas. The outer border of the cingulum has a rather irregular appearance. Between the cingulum and the periphery of the specimen, note the mingling of short and long association fibers with projection and commissural fibers.

5-8: Caudate nucleus, thalamus and upper brainstem structures: right side of brain, from the medial aspect

After the ependyma covering its ventricular surface is stripped away, the elongated caudate nucleus is exposed. Immediately above the anterior (rostral) perforated substance, the pear-shaped head of the caudate nucleus is confluent with the putamen of the lentiform nucleus. The lateral surface of the caudate nucleus is in contact with the closely packed bundles of the internal capsule. A well-defined bundle of nerve fibers occupies the furrow between the caudate nucleus and the thalamus. This is the stria terminalis, which arches along the course of the caudate nucleus, closely applied to its medial margin. In its anterior course it diverges slightly from the head of the caudate nucleus, passes beneath the ventral margin of the internal capsule, and--as the main efferent pathway from the amygdaloid nuclear complex--innervates septal nuclei, anterior hypothalamic nuclei, the anterior perforated substance, and the habenular nucleus (via the stria medullaris).

On the dorsal surface of the thalamus, a small portion of the dorsal lateral thalamic nucleus is located most laterally. The anterior nuclear group is situated more medially. Its anterior portion is thickened, and its tapering posterior part sweeps across the dorsal aspect of the thalamus. In partial view only are the medial thalamic nuclei, and (along their medial edge) the stria medullaris. The posterior thalamic or pulvinar nuclei project backwards over the superior (cranial) colliculi of the midbrain.

The stria medullaris is prolonged backwards as far as the habenular nuclei, thought to function in some olfactory reflexes. The habenulo-interpeduncular tract, the main outflow path from the habenular nuclei, descends across the medial surface of the red nucleus to terminate in the interpeduncular nucleus, situated in the midbrain tegmentum.
Anterolateral to the red nucleus is the oval subthalamic nucleus. The darkly pigmented substantia nigra is situated just dorsal to the basis pedunculi. A thin, transversely oriented ribbon of fibers, the medial lemniscus, ascends from the lower brainstem into the midbrain tegmentum where it occupies a ventrolateral position.

The column of the fornix has been divided a short distance above the anterior (ventral) commissure. The fibers of the mamillothalamic fasciculus (Vicq d’Azyr) arise from the mamillary body and travel upwards and backwards to the anterior, expanded part of the anterior nuclear group of the thalamus.

5-9 Thalamus and thalamic radiations in left cerebral hemisphere: medial view
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Peer Review Status: Internally Peer Reviewed


The thalamus is an important integrating center which receives sensory signals of various modalities, and transmits processed information to appropriate areas of the cerebral cortex. In this preparation the corpus callosum, caudate nucleus, and most brainstem structures have been removed. The thalamus is large and gray, and the constituent nuclei on its medial aspect are displayed. The anterior thalamic nuclear group arches across the dorsal thalamic surface and consists of the expanded anterior part and a narrow, attenuated posterior part, or tail. The delicate stria medullaris thalami can be traced backwards between the dorsal and medial surfaces of the thalamus.
towards the habenular trigone. In addition to the latter, the following components of the epithalamus can be distinguished: the habenular commissure, the pineal body, and the posterior (epithalamic) commissure. The posterior thalamic nucleus, known as the pulvinar, has been partially excised. Normally it extends caudally over the superior colliculi of the midbrain.

An extensive accumulation of axons connecting various thalamic nuclei to practically all cortical areas is seen in fan-like array and this, in three dimensions, reflects the profusion of the thalamic radiations. For descriptive purposes, different parts of the thalamic radiations are grouped into four thalamic peduncles. All known connections between thalamus and cerebral cortex are reciprocal, two-way radiations (thalamocortical and corticothalamic), and they contribute conspicuously to the formation of the internal capsule and corona radiata. Fibers that originate chiefly from the medial and anterior thalamic nuclei produce the anterior thalamic peduncle, which runs towards the anterior and inferior frontal cortical areas. Axons of the superior thalamic peduncle run more or less vertically to connect the thalamus with posterior frontal and parietal cortical areas. The posterior thalamic peduncle and the optic radiation plunge backwards together in a parasagittally-oriented stratum of axons that joins the thalamus to occipital and inferior parietal areas of cortex. The fibers designed as the inferior thalamic peduncle follow a ventrolaterally-oriented course towards the temporal lobe cortex. Fibers of the auditory radiation, which originate in the medial geniculate body and travel to the transverse temporal gyri, share with other thalamotemporal and temporothalamic fibers in the formation of the inferior thalamic peduncle. The temporal genu of the optic radiation is situated lateral to the inferior thalamic peduncle. The latter intersects various projection and commissural fibers, including those crossing to the opposite hemisphere in the anterior commissure.

5-10 Cortical projection systems of left cerebral hemisphere: medial aspect

Components of the corona radiata and internal capsule are displayed, showing the convergence of corticofugal fibers as they descend to brainstem levels. Almost the entire corpus callosum with its radiation has been removed. The splenium and a small part of the body are all that is left of the massive callosal system of commissural fibers. From the splenium, commissural fibers radiate towards the cortex, interdigitating with both projection and association fiber bundles. A compact bundle of fibers from the splenium sweeps backwards into the occipital lobe, forming the left half of the occipital forceps (forceps major). In front of and below the splenium is a small part of the body of the caudate nucleus, which receives an input of corticostriate fibers. More anterior and somewhat more deeply placed are bundles of the massive thalamic radiations, which have a particularly large component that links the thalamus to the sensory cortical areas in the postcentral gyrus.

Removal of the medial and part of the lateral thalamic nuclei has exposed a stalk of corticorubral tract fibers, converging upon the red nucleus from many cortical areas, including the frontal regions. The red nucleus has been cleaned so that its larger, spherical mesencephalic part can be distinguished from the more rostral, ovoid diencephalic part. Rostral and lateral to the red nucleus is the subthalamic nucleus which also possesses profuse cortical connections. Ventrolateral to the red nucleus and subthalamic nucleus is the substantia nigra, which is a thin, curved sheet of darkly pigmented tissue. The adjoining ventral region of the midbrain is represented by the basis pedunculi packed with groups of corticofugal fibers. Some of these white myelinated fiber bundles can be followed downwards through the ventral part of the pons. Ascending from the medulla and curving dorsolaterally into the tegmentum of the midbrain is the medial lemniscus, on its way to the thalamus.
The parts of the caudate nucleus and the amygdaloid body appear in relief after removal of the corpus callosum and brain stem. The striking rounded head of the caudate nucleus extends downwards and, immediately above the anterior (rostral) perforated substance, its gray matter continues uninterrupted as the putamen of the lentiform nucleus, which is concealed from view by the internal capsule. The body and tail of the caudate nucleus form an incomplete circle, the end of the tail widening as it sweeps forwards, into a footlike expansion that attaches to the amygdaloid body anteriorly and the putamen of the lentiform nucleus laterally. A ribbon of white fibers emerges from the posterior aspect of the amygdaloid body, and from the conjoined footlike expansion of the caudate tail. This ribbon becomes consolidated into a bundle of fibers-the stria terminalis-which is the main efferent pathway from the amygdaloid nuclear complex. The stria terminalis runs continuously alongside the medial border of the caudate nucleus, from tail to head. On approaching the anterior (rostral) commissure, the stria terminalis acquires a succession of small patches of gray matter (bed nucleus of the stria terminalis). The main postcommissural part of the stria terminalis descends in the direction of the anterior (rostral) perforated substance and ends in the septal nuclei, the anterior olfactory nucleus, and the habenular nuclei via the stria medullaris thalami.

The internal capsule and corona radiata have been exposed by removal of the corpus callosum, caudate nucleus, and diencephalon. The most striking feature of this preparation is the convergence of great masses of corticofugal fibers from extensive areas of cerebral cortex into the relatively narrow, but thick, basis pedunculi. Some torn fibers of the thalamic radiation can still be identified. At the anterior margin of the pons, groups of fibers from the frontal, parietal, occipital, and temporal lobes (corticopontine fibers), which traverse the medial and lateral parts of the basis pedunculi, terminate in the pontine nuclei. Most of the intermediate fibers of the crus (corticospinal and corticonuclear fibers) continue through the ventral part of the pons and medulla oblongata, giving off fibers that synapse in cranial nerve motor nuclei, and into the spinal cord as the corticospinal tracts. In the medulla, note the elongated gray olivary nucleus, with its slit-like hilus, directed dorsomedially. The olivary nucleus is larger and rounded at its upper end, whereas its lower portion is attenuated. The corrugated surface of the olivary nucleus is not apparent when viewed from this aspect.

5-13 Insula of right cerebral hemisphere
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The insula is a substantial portion of cerebral cortex that forms the floor of a fossa that can be opened up by removing the lips bounding the lateral sulcus and its rami. These lips are known as the frontal, parietal, and temporal opercula. After their excision, the insula appears as a triangular eminence that is marked by a number of sulci and gyri. The so-called circular sulcus surrounds the insula, except inferomedially where the cortex of the insula is continuous, at the limen insulae, with the cerebral cortex lateral to the anterior (rostral) perforated substance on the basal aspect of the brain. The insular cortex is indented by a number of sulci, one of which - the central sulcus of the insula - is deeper and more prominent than the rest. The central sulcus of the insula runs in an upwards and backwards direction, almost parallel to the cerebral central sulcus that delimits the frontal lobe from the parietal lobe. In front of the central sulcus of the insula, a few short gyri tend to radiate from the vicinity of the limen insulae. Behind the central sulcus one long gyrus of the insula is present in this specimen, partially divided by a shallow sulcus near its upper and posterior end.

The insular cortex has been exposed by removing the portions of cortex that bound the stem and three rami of the lateral sulcus. It is triangular in shape. The circular sulcus surrounds the insula, except anteroinferiorly where the insular cortex continues uninterrupted on to the inferior cerebral cortex via the limen insulae. The central sulcus of the insula runs upwards and backwards, dividing the insular cortex into a precentral lobule with short gyri and a postcentral lobule with one or two long gyri.

A thick bundle of long association fibers skirts the upper margin of the insula. This, the superior longitudinal fasciculus, is the largest association bundle, and connects frontal lobe cortex to the parietal, occipital, and temporal lobes. As it pursues its arched course, the superior longitudinal fasciculus gathers and sheds nerve fibers from various cortical areas, and so links them to each other. The inferior longitudinal fasciculus, together with the inferior occipitofrontal fasciculus, runs in the inferior part of the hemisphere. It becomes associated with descending fibers of the superior longitudinal fasciculus that, for the most part, end in the occipital cortex. Many arcuate or short association bundles can be seen near the cut margins of the hemisphere. Those connecting neighboring cerebral gyri are clearly seen. Additionally—but not visible in this preparation—short intracortical association fibers exist, linking parts of the same gyrus and sometimes remaining within the cortical gray matter.

5-15 Short and long association tracts: lateral aspect of right hemisphere

The superior longitudinal fasciculus is composed of fiber bundles of very different lengths. The longer fibers connect the cortical areas far removed from each other, but the majority are somewhat shorter axons that join the fasciculus (in multitudes, from overlying gyri) and mingle with the other fibers of this thick tract. Near the middle of the superior longitudinal fasciculus, some of its fibers - coming from both directions - turn abruptly upwards into the somatomotor and somatosensory areas of the cortex.

The long association fibers of the uncinate fasciculus connect the orbital and inferior frontal gyri of the frontal lobe to the cortex in the anterior part of the temporal lobe, and the fasciculus hooks around the bottom of the stem of the lateral sulcus to do so. The middle portion of the uncinate fasciculus is extensively interconnected with the bulky middle part of the inferior occipitofrontal fasciculus. The latter fans out in both directions, radiating on the one hand towards the frontal and parietal lobes, and on the other streaming into the occipital and temporal lobes. The posterior part of the inferior occipitofrontal fasciculus joins the inferior longitudinal fasciculus, and then both of them intermingle with the descending part of the superior longitudinal fasciculus. The fibers in these fasciculi form the lateral part of a vast stratum of white matter that connects the whole of the occipital cortex with the rest of the brain.

Close to the perimeter of the hemisphere, many bundles of short association, or arcuate, bundles run into the white matter where they intersect and exchange axons with long as well as other short association bundles. This intersecting and mingling is characteristic of association bundles, and contrasts with the orderly formation of projection tracts found in the internal capsule and crus cerebri.
5-16 Putamen of lentiform nucleus and corona radiata: right hemisphere from the lateral aspect


The long association bundles and external capsule have been removed to display the lateral aspect of the putamen, which appears as a dark gray oval mass with a slightly concave ventral margin. It is highly vascular, and the relatively large anterolateral and posterolateral central arteries (not shown) ascend in grooves over the lower part of the lateral surface of the putamen before piercing successively the lentiform nucleus, internal capsule, and caudate nucleus.

Narrow bridges of gray matter are present between nerve fiber bundles of the internal capsule and bring together the putamen and the head and body of the caudate nucleus, which--except for the bridges--are separated from the putamen by the internal capsule. The anterior commissure occupies a deep groove in the lower surface of the putamen. Its fiber bundles are twisted like a thick string. Below the anterior limb of the internal capsule, the most rostral part of the putamen becomes directly continuous with the head of the caudate nucleus.
Internal capsule fibers radiate via the corona radiata to practically all cortical areas. These projection fibers consist largely of ascending fibers of the thalamic radiation and descending corticofugal fibers. They intersect a major population of commissural fibers that traverse the corpus callosum and, closer to the cortex, they pass between the short association fibers. An extensive sheet of sagittally running fibers extends posteriorly and includes fibers of the posterior thalamic peduncle, anterior commissure, and optic radiation.

5-17 Globus pallidus of lentiform nucleus, internal capsule, and corona radiata: left hemisphere from the lateral aspect


The putamen of the lentiform nucleus has been removed to expose the more medially situated globus pallidus, which is so named because it is paler than the putamen. The globus pallidus is a nuclear mass which is closely applied to the lateral surface of the internal capsule. Just anterior to the globus pallidus, the many narrow grooves between internal capsule fiber bundles are occupied by gray matter joining the putamen (removed) to the head of the caudate nucleus (covered by the anterior limb of the internal capsule). Just ventral to the globus pallidus the anterior (rostral) commissure, which is composed of twisted fiber bundles, intersects fibers of the optic radiation, before the commissural axons stream into the temporal and occipital lobes.

The corona radiata and its continuity with the internal capsule can be seen in this dissection, since the ends and upper margin of the putamen mark the junction of the internal capsule with the base of the corona. From this base, projection fiber bundles diverge towards cortical areas and intersect with commissural fibers of the corpus callosum. Near the periphery of the hemisphere there is also an intermingling of projection and commissural fibers with short association fibers. A contrasting appearance is afforded by the long, parallel, closely packed fibers of the sagittal stratum, the fibers of which remain rather discrete as they pursue their long and wavy course towards the occipital cortex.

5-18 Corona radiata, internal capsule, anterior (rostral) commissure, and some association tracts: left hemisphere from the lateral aspect
Examples of the three major classes of axons (projection, commissural, and association) in the white matter of the brain are seen here. A multitude of projection fibers are gathered together in the corona radiata, and can be followed as they converge and continue without interruption in the internal capsule and the basis pedunculi. The constituent parts (putamen and globus pallidus) of the lentiform nucleus have been removed, providing better exposure of the anterior (rostral) commissure seen in the lower part of the preparation. These commissural fibers connect parts of the cortex of the two hemispheres, in particular, the anterior and inferior portions of the temporal lobes.

Two association tracts are also displayed. The rounded bundle known as the uncinate fasciculus is named for its hooklike configuration as it curves beneath the stem of the lateral sulcus to connect areas of cortex in the lower frontal and anterior temporal regions. The long association fibers of the inferior occipitofrontal fasciculus mingle with the internal capsule and the corona radiata, and also with the anterior commissure and the temporal genu of the optic radiation.

The vertical extent of the inferior occipitofrontal fasciculus is considerable, and it is a major component of the sagittal stratum (which is a fiber sheet of great complexity). The sagittal stratum contains commissural fibers that have crossed from the opposite side of the anterior commissure, association fibers that extend anteroposteriorly in the inferior occipitofrontal fasciculus, and projection fibers belonging to the posterior thalamic peduncle, the optic radiation and the occipitopontine tract.

The extreme, external, and internal capsules have been dissected away to show the basal ganglia (caudate and lentiform nuclei and the amygdaloid nuclear complex), which are related to the various parts of the lateral ventricle. The irregular empty spaces between the putamen and the caudate nucleus were occupied by fiber bundles of the internal capsule. Bridges of gray matter pass across the internal capsule, producing the striped appearance from which the corpus striatum derives its name. The gray bridges connect the putamen with the head and, occasionally, the body of the caudate nucleus, reflecting through their conjoined structure in the adult that they arise as a single nuclear mass in development. In the evolutionary process, these neostriatal nuclear masses grow in association with expanding areas of neocortex and the increase in projection fibers converging on the internal capsule. The caudate nucleus has the form of a highly arched comma, and its head, body, and tail are related throughout to the curvature of the lateral ventricle. The pear-shaped head of the caudate nucleus bulges into the floor and lateral wall of the anterior horn, the body of the nucleus is in contact with the floor of the central part of the ventricle, and the tail of the nucleus is located in the roof of the inferior horn, just lateral to the stria terminalis. The gray matter of the tail of the caudate nucleus continues without interruption into the amygdaloid nuclear complex, and also into the gray substance of the lentiform nucleus by way of a small, horizontally placed connecting piece (the "foot" of the lentiform nucleus described by earlier anatomists). The pulvinar of the thalamus can be distinguished just posterior to the putamen.

Commissural fibers in the corpus callosum stream across the roof of the frontal horn and central part of the lateral ventricle. The medial wall of the occipital horn is marked by two swellings. The upper one, known as the bulb of the occipital horn, owes its existence to the white matter of the occipital forceps, consisting of fibers that cross in the splenium of the corpus callosum. The lower swelling, the calcar avis, is produced by the calcarine sulcus, located on the medial surface of the occipital lobe. The hippocampal sulcus invaginates most of the medial wall of the inferior horn of the lateral ventricle to produce the prominent curved elevation called the hippocampus. The blunt anterior part of the hippocampus (pes hippocampi) possesses characteristic digitations. The collateral
eminence and trigone are located in the floor of the inferior and posterior horns, produced by the collateral sulcus.

5-20 Superior view of the cerebrum, sliced horizontally above the corpus callosum
On the right is seen the large, medullary area of the cerebral hemisphere, surrounded by a layer of gray cortical matter. The medullary area is packed with myelinated nerve fibers which are arranged, according to their courses and connections, into commissural, association, and projection fibers. In the cut surface of the right hemisphere are a few bundles of commissural fibers which cross the midline in the corpus callosum.

The left hemisphere has been sliced at a slightly lower level. A rectangular piece of cerebrum adjacent to the midline has been removed to display part of the upper surface of the corpus callosum. The latter is covered by the indusium griseum, a thin sheet of rudimentary cortex containing (on each side) the delicate medial and lateral longitudinal striae. Lateral to the indusium griseum, densely packed, transversely running commissural fibers of the corpus callosum are apparent. In the posterior part of the left hemisphere, the commissural fibers of the splenium of the corpus callosum curve sharply backward to form the left part of the occipital forceps. The upper surface of the left superior temporal gyrus is visible in the floor of the posterior ramus of the lateral sulcus. The superior temporal gyrus is subdivided into two or more obliquely running, short, transverse temporal gyri. The anterior transverse temporal (Heschl's) gyrus and the adjacent part of the superior temporal gyrus together constitute the cortical auditory area which are subject to individual variation.

5-21 Corpus callosum, its radiation, and indusium griseum displayed from above

These structures have been exposed by partial removal of the cerebral hemispheres. The trunk, or intermediate, portion of the corpus callosum consists of closely packed bundles of transversely oriented commissural fibers. The anterior and posterior portions of the corpus callosum curve sharply downwards to form its genu and splenium, respectively. The commissural fibers traversing the genu and splenium form characteristic arches—the frontal and occipital forceps, respectively—in order to reach the anterior and posterior poles of the hemispheres. Traced laterally, the fibers of the corpus callosum become widely dispersed as they radiate towards the various lobes of the hemispheres, and difficulty is experienced in following callosal fibers more laterally because they interdigitate with association and projection fibers. To display the commissural fibers better, some of the projection fibers have been dissected away, their removal having enlarged the spaces between bundles of callosal fibers.

The upper surface of the intermediate portion of the corpus callosum is covered by a thin veil of gray substance—the indusium griseum. Two pairs of medial and lateral longitudinal striae of white matter are embedded within the gray matter of the indusium, creating four fine ridges. The lateral ridges are somewhat more prominent, and they demarcate the transition between the indusium griseum medially and the gray matter of the cingulate gyrus (which has been removed) laterally.

The corpus callosum and its overlying indusium griseum exhibit striking developmental and functional contrasts. The latter is a thin sheet of gray matter representing a vestigial cerebral convolution and is a residue of the primitive archipallial cortex. The corpus callosum is a typical neocortical development; in man it is a highly developed commissure that reciprocally interconnects the neopallial cortex of the two hemispheres.
5-22 Tela choroidea of third and lateral ventricles, viewed from above


A fold of the pia mater enters the brain to produce the tela choroidea of the 3rd ventricle. Arteries carried in with the pial fold provide the choroid plexuses of the 3rd and lateral ventricles. The upper parts of both cerebral hemispheres, the body of the corpus callosum, and most of the fornix have been removed. The tela choroidea of the 3rd ventricle is located immediately beneath the body of the fornix. It is a double fold of highly vascular pia mater and triangular in outline. Its anterior angle approaches the columns of the fornix, adjacent to the interventricular foramina, and its broad base is beneath the splenium of the corpus callosum. Each lateral margin of the tela choroidea contains the highly vascularized choroid plexus of the body of the corresponding lateral ventricle. Thus the choroid plexuses of the lateral ventricles are in fact only lateral expansions of the tela choroidea of the 3rd ventricle, and they extend into the lateral ventricles by way of the choroid fissures.

The choroid fissure is a potential slit only, located between the fornix and the lamina affixa on the dorsal side of the thalamus. The choroid fissure also follows the curve of the fimbria and the stria terminalis, between which the choroid plexus gains entry into
the inferior horn of the lateral ventricle. The choroid plexus of the lateral ventricle therefore continues uninterruptedly from the interventricular foramina backwards within the central part of the ventricle. Then, after sweeping round the posterior end of the thalamus, the plexus extends downwards and forwards in the temporal horn of the lateral ventricle. The choroid plexus does not extend into the frontal and occipital horns of the lateral ventricles. The choroid plexus of the 3rd ventricle is much smaller and bulges downward from the tela choroidea into the ventricles.

Each internal cerebral vein is formed at the anterior angle of the tela choroidea by the union of the thalamostriate vein, the choroid vein (which issues from the choroid plexus) and the vein of the septum pellucidum. Numerous tributaries from the thalamus and caudate nucleus converge upon the thalamostriate vein, which is partially obscured by the stria terminalis. The two veins of the septum pellucidum are of small caliber and emerge from between the two laminae of the septum pellucidum. The two internal cerebral veins join beneath the splenium of the corpus callosum to form the great cerebral vein, but the site of union is not visible in this preparation.

5-23 Internal features of cerebellum, midbrain, diencephalon, and telencephalon: ventral aspect of dissected brain

The deep cerebellar nuclei have been dissected out. The large dentate nuclei are deeply fissured and subdivided into toothlike agglomerations of gray matter, the longest ones being near the middle of each nucleus. From each subdivision arise fine bands of white fibers which together contribute the greater part of the superior cerebellar peduncle. The fastigial nucleus is the most medially placed cerebellar nucleus. It is a small, slightly elongated gray mass situated in the roof of the 4th ventricle. A small fiber bundle issuing from its rostral part runs alongside the medial margin of the superior cerebellar peduncle and then disappears from view (heading for the ipsilateral vestibular nuclear complex and reticular formation). There are two globose nuclei in each cerebellar hemisphere, the anterior one just dorsolateral to the fastigial nucleus and the posterior one attached to the emboliform nucleus. Slender bundles arising from the globose and emboliform nuclei traverse the main part of the superior cerebellar peduncle.

Due to removal of the basis pedunculi, substantia nigra, and greater part of the midbrain tegmentum, the decussation of the superior cerebellar peduncles can be seen. This decussation occurs in the midbrain tegmentum at the level of the inferior (caudal) colliculi. After crossing, these efferent fibers from the cerebellar nuclei pursue two courses. Many from the globose and emboliform nuclei terminate in the red nucleus, which in this preparation appears as a large, rounded nuclear mass. Fibers predominantly from the contralateral dentate nucleus bypass the red nucleus and head directly for the ventral lateral thalamic nucleus. It may be noted that the rostral end of the red nucleus receives the substantial corticorubral tract.

Lateral to the midbrain are the medial and lateral geniculate bodies. The former is rounded, whereas the lateral geniculate body resembles an inverted cup. The ventrally placed notch in the lateral geniculate body is readily seen, with optic tract fibers terminating on both sides of this deep ventral groove. Lateral to the geniculate bodies, sharply curved fibers of the optic radiation make their diversion into the temporal lobes. (This is shown to better advantage on the right side of the illustration). A little lateral to the posterior end of the optic tract, the thick, slightly curved, highly vascular putamen is seen with the smaller globus pallidus on its medial side. Fibers of the external capsule and the lateral and medial medullary laminae have been removed to display the putamen and medial and lateral divisions of the globus pallidus.

5-24 Visual pathway from optic chiasma to occipital lobes, viewed from the basal aspect

Each optic tract can be traced backwards and laterally, its initial segment passing between the anterior (rostral) perforated substance laterally and the tuber cinereum and mamillary body medially. After arching across the basis pedunculi, it terminates in the lateral geniculate body which has a distinct notch in its ventral surface. The larger part of the lateral geniculate body is lateral to this notch, and is responsible for the swelling seen ventral to the pulvinar of the thalamus. The medial part of the lateral geniculate body is commonly confused with the medial root of the optic tract. (The ventral notch in the lateral geniculate body was filled with optic tract fibers and these have been removed to show the nucleus.) Many optic tract fibers proceed in a medial direction as the brachium of the superior (cranial) colliculus, destined for the pretectal area and the superior (cranial) colliculus.
The fibers of the optic radiation, or geniculocalcarine projection, emerge from the dorsal surface of the lateral geniculate body and can be traced as part of a sagittal stratum of white fibers that runs forwards and downwards into the temporal lobe. Subsequently, optic radiation fibers sweep backwards and terminate in the region of the calcarine sulcus. More dorsally placed fibers of the optic radiation (not seen) pursue a shorter and more direct path to the visual cortex. Note that the anterior (rostral) commissure, and the inferior occipitofrontal fasciculus form, with the optic radiation, the sagittal stratum of white fibers that consists of both afferent and efferent connections to the occipital cortex.

The medial geniculate body is located dorsomedial to the lateral geniculate body. The midbrain has been cut at the level of the inferior (caudal) colliculi. The cut surfaces of the decussating superior cerebellar peduncles are more ventral. Two small white areas found in the dorsal tegmentum are the medial longitudinal fasciculi. On each side, the ventral aspect of the claustrum and the subdivisions of the lentiform nucleus (putamen, medial and lateral parts of globus pallidus) are seen lateral to the optic tracts. The claustrum is a layer of gray matter that lies on the medial aspect of the insular cortex, from which it is separated by a sheet of white fibers known as the extreme capsule (not displayed here). Only a narrow interval separates the anteroventral parts of these basal ganglia from the anterior (rostral) perforated substance. The medial and lateral olfactory striae define the anterior limit of the anterior perforated substance.

The cerebellum, brainstem, thalamus, and most of the basal ganglia have been removed. Hippocampal structures can be examined on both sides. The fornix, mamillary bodies, and part of the anterior (rostral) commissure can also be seen.

The two halves of the cerebrum have been dissected from below to different depths, to allow study of the dentate gyrus (left side of illustration) and the upper cortical layer of the parahippocampal gyrus (right side) which covers the inferior aspect of the dentate gyrus. On the right side the superficial gray matter and medullary white substance of the parahippocampal gyrus have been cleaned away to expose cortical substance on the deep aspect of the gyrus. Fine digitations are characteristic of this deep cortical substance. The cut edge of the alveus can also be seen. Note the hook or uncus of the parahippocampal gyrus. On the smooth inferior surface of the uncus is the delicate, transversely running tail of the dentate gyrus that runs into the cleft of the uncus. More anterior is the amygdaloid body.

On the left side of the illustration (right side of the specimen), the parahippocampal gyrus has been removed to expose the dentate gyrus. Note the characteristic, toothlike appearance of the inferior surface of the dentate gyrus. Traced backwards around the splenium of the corpus callosum, the dentate gyrus is continuous with the gyrus fasciolaris (or subsplenial gyrus) which continues on the superior surface of the corpus callosum.
callosum as the indusium griseum. Anteriorly, the dentate gyrus abruptly turns, medially and posteriorly, thereby forming the tail of the dentate gyrus. Two gray elevations located anterior and anteromedial to the tail of the dentate gyrus are parts of the deep cortex of the uncus. Note the broad white sheet of the alveus and, just medial to the dentate gyrus, the fimbria of the hippocampus, a thick white bundle of axons that runs first backwards, then forwards and superiorly to form the highly arched crus of the fornix.

Between the two crura of the fornix is a white, triangular lamina, known as the fornical commissure. Follow the body and the columns of the fornix to observe that most of their fibers travel to the mamillary bodies. Anterior and dorsal to the mamillary bodies, find the transversely oriented cylindrical white band which is the anterior (rostral) commissure. In the depths of the specimen it is possible to see the inferior surface of the corpus callosum, to which the body of the fornix is firmly attached.

5-26 Dentate gyri, amygdaloid bodies
A study of these structures has been made possible by removing the cerebellum, most of the brain stem, and the parahippocampal gyrus of each side, together with the subiculum (through which the hippocampus is continued into the cortex of the parahippocampal gyrus). At its anterior end, the dentate gyrus, named for the supposed resemblance of its notched medial margin to a row of teeth, turns abruptly in a posterior and medial direction to become the tail of the dentate gyrus. The fimbria of the hippocampus is a longitudinal band of white fibers which constitutes the efferent pathway from the hippocampus, including the dentate gyrus. Beneath the splenium of the corpus callosum, the dentate gyrus becomes flattened and smooth and continues on to the dorsal surface of the corpus callosum as the thin gyrus fasciolaris. The latter is continuous with the indusium griseum, which covers the dorsal surface of the corpus callosum.

Lateral to the dentate gyrus, the temporal horn of the lateral ventricle has been opened to expose its choroid plexus, which is involved in the production of cerebrospinal fluid.
The amygdaloid body is an ovoid gray nuclear mass, oriented transversely and with a slight posterior concavity. Lateral to the optic tract are the anterior (rostral) perforated substance, olfactory trigone, and olfactory striae. On the right side of the illustration the intermediate olfactory stria stands out clearly.

The midbrain has been transected at the level of the inferior (caudal) colliculi. The ventral aspect of the midbrain is nearer the front of the brain; the dorsal aspect of the midbrain is closer to the occipital lobes. Dorsomedial to the substantia nigra are the superior cerebellar peduncles and their decussation, and the medial longitudinal fasciculi lie dorsal to the previously mentioned decussation. The trochlear nerve nuclei are located ventral to the mesencephalic (cerebral) aqueduct. The root fibers arising from the trochlear nuclei form a decussation dorsal to the mesencephalic aqueduct, and they are the only cranial nerves that cross completely and that leave the dorsal aspect of the brain stem. Dorsolateral to the superior cerebellar peduncles are the somewhat dispersed fibers of the central tegmental tracts. The lateral portion of the tegmentum contains four lemnisci and has been referred to as the "sensory angle." Here the medial lemniscus is most ventral, the lateral lemniscus dorsal, and the intermediate area is occupied by the spinal and trigeminal lemnisci.

The pulvinar of the thalamus is seen dorsolateral to the midbrain, and the medial geniculate body can be recognized on the ventral surface of the pulvinar. A short segment of the crus of the fornix is visible just medial to the pulvinar.

5-27 Horizontal section through the dorsal lateral nucleus of the thalamus

The head of the caudate nucleus bulges into the frontal horn of the lateral ventricle, which is lined by ependyma. The groove between the caudate nucleus and the thalamus accommodates the thalamostriate vein and the stria terminalis. The septum pellucidum stretches across the interval between the genu of the corpus callosum and the columns of the fornix, separating the frontal horns of the two lateral ventricles. The thalamus has been cut at the level of its dorsal lateral nucleus. Although the lentiform nucleus is situated at a level inferior to this section, narrow bands of gray matter that interconnect the caudate nucleus and the putamen are readily seen, separated by fascicles of the internal capsule. As can be seen in the left hemisphere, the choroid plexus protrudes into the central part of the lateral ventricle, and the route of entry of the plexus is via the choroid fissure, between the fornix and the lamina affixa. Traced caudally, the vascular tissue of the choroid plexus expands to form the choroid glomus. Here the temporal horn commences its downwards and lateral sweep around the posterior end of the thalamus.

In observing the white matter of the hemisphere, it is possible to follow the paths of various fiber systems because they are accompanied by numerous blood vessels. Close to the midline, note the divided anterior part of the corpus callosum with the fibers of the frontal forceps curving forwards from it, and, more posteriorly, the divided splenium of the corpus callosum with some fibers of the occipital forceps curving backwards from it.

5-28 Horizontal section through middle of thalamus

This preparation permits recognition of the main nuclear masses of the thalamus. The internal medullary lamina is a well-defined white band within the gray matter of the thalamus. This lamina is curved, with a pronounced medial concavity, and it separates the medial thalamic nuclei from the ventrolateral and posterior nuclei. Anteriorly it bifurcates to enclose the anterior thalamic nuclear group. Posteriorly it also bifurcates and surrounds another nuclear mass of the thalamus, the centromedian nucleus. The ventrolateral thalamic nucleus is penetrated by numerous white fibers of the thalamic radiation. Its gray matter merges with that of the posterior nucleus, or pulvinar, which extends backwards.

Close to the midline, the habenular nucleus is connected anteriorly to the stria medullaris thalami. The putamen, a dark, ovoidal nuclear mass, is separated from the head of the caudate nucleus and the thalamus by the internal capsule. The retrolenticular part of the internal capsule, seen more clearly on the right side, is displaced laterally by the temporal horn of the lateral ventricle. Protruding into this horn of the lateral ventricle, through the choroid fissure, is the choroid plexus of the temporal horn, lying just lateral to the fimbria of the hippocampus. The configuration of white and gray matter of the dentate gyrus and hippocampus is distinctive.

The oval, dark gray head of the caudate nucleus bulges into the frontal horn of the lateral ventricle and is separated from the putamen by the internal capsule (anterior limb). The elongated putamen is equally dark, whereas the globus pallidus appears as a smaller, wedge-shaped, pale mass, contiguous with the genu of the internal capsule. The dark appearance of the caudate nucleus and putamen is attributable to their content of blood vessels and neuronal cell bodies. Numerous myelinated fibers traversing the globus pallidus make it much paler.

This section passes through the inferior part of the thalamus and only a small part of the medial nucleus is visible, together with the ventrolateral thalamic nuclear group. Note the very long retrolenticular portion of the internal capsule containing fibers of the optic radiation; these fibers curve around the lateral wall of the temporal horn of the lateral ventricle on their way to be distributed to occipital lobe cortex.

The Human Brain: Chapter 5: The Cerebral Hemispheres
5-30 Coronal section through the anterior part of the corpus striatum


The septum pellucidum is a midline structure, separating the two frontal horns of the lateral ventricles. The septum is attached superiorly to the genu and body and inferiorly to the rostrum of the corpus callosum. Note that the gray matter of the caudate nucleus continues uninterrupted into the putamen, through a prolongation just inferior to the internal capsule (anterior limb). Also note the gray bridges between the caudate nucleus and the putamen, which interrupt the fasciculi of the anterior limb of the internal capsule. Putamen and caudate are one mass of gray matter, incompletely separated by these internal capsule fibers.

5-31 Coronal section through the anterior (rostral) commissure and optic chiasma

The solid, median part of the anterior commissure is most clearly visible below the columns of the fornix. Both columns of the fornix are found, together with the median part of the anterior commissure, in the anterior wall of the 3rd ventricle with a small triangular recess between them. The lower margin of the septum pellucidum is attached to the columns of the fornix. The lateral part of the anterior commissure traverses the inferior part of the corpus striatum. On both sides note the vascular channels that pass from the anterior (rostral) perforated substance into the gray substance of the corpus striatum. These are important striate branches of the middle cerebral artery, destined for the corpus striatum, internal capsule and associated structures.

5-32 Coronal section through the tuber cinereum and lentiform nucleus


This section passes through the central part of the lateral ventricle, close to its extension forwards as the frontal horn. In the floor of the lateral ventricle, close to the midline, is the anterior thalamic nuclear group, bounded on both sides by the internal medullary lamina of the thalamus. Just medial to the body of the caudate nucleus is the conspicuous thalamostriate vein, its medial edge overlapped by the stria terminalis. There is continuity between the choroid plexuses of the 3rd and the lateral ventricles. The 3rd ventricle is a vertically oriented slit which has a small ventral extension (the
Infundibular recess). Lateral to the internal capsule (genu) are the three parts of the lentiform nucleus, namely the internal and external parts of the globus pallidus and the putamen. These three are separated from each other by the medial and lateral medullary laminae of the globus pallidus. The dark putamen contrasts sharply with the globus pallidus.

5-33 Coronal section through mamillary bodies

<table>
<thead>
<tr>
<th>Number</th>
<th>Structure</th>
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<tbody>
<tr>
<td>1</td>
<td>Body of corpus callosum</td>
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<tr>
<td>2</td>
<td>Body of caudate nucleus</td>
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<td>3</td>
<td>Central part of lateral ventricle</td>
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<tr>
<td>4</td>
<td>Septum pellucidum</td>
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<td>5</td>
<td>Choroid plexus of lateral ventricle</td>
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<td>6</td>
<td>Columns of fornix</td>
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<td>7</td>
<td>Anterior thalamic nuclear group</td>
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<td>8</td>
<td>External capsule</td>
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<td>9</td>
<td>Lateral thalamic nuclear group</td>
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<tr>
<td>10</td>
<td>Medial thalamic nuclei</td>
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<td>11</td>
<td>Putamen</td>
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<td>12</td>
<td>Lateral medullary lamina</td>
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<td>13</td>
<td>Internal capsule</td>
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<td>14</td>
<td>Reticular nucleus of the thalamus</td>
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<td>15</td>
<td>Interthalamic adhesion</td>
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<td>16</td>
<td>Lateral part of globus pallidus</td>
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<td>17</td>
<td>Medial medullary lamina</td>
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<td>18</td>
<td>Mamillothalamic fasciculus</td>
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<tr>
<td>19</td>
<td>H1 field of Forel</td>
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<td>20</td>
<td>Zona incerta</td>
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<td>21</td>
<td>H2 field of Forel</td>
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<td>22</td>
<td>Claustrum</td>
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<td>23</td>
<td>Medial part of globus pallidus</td>
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<td>24</td>
<td>3rd ventricle</td>
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<td>25</td>
<td>Hypothalamic nucleus</td>
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<td>26</td>
<td>Optic tract</td>
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<td>27</td>
<td>Amygdaloid body</td>
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<tr>
<td>28</td>
<td>Mamillary body</td>
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<tr>
<td>29</td>
<td>Basis pedunculi</td>
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</table>

The hypothalamus can be divided into an anterior supraoptic zone, an intermediate infundibulotuberal zone and a posterior mamillary zone (through which this section passes). A number of thalamic nuclei can be recognized in this section, separated from each other by the internal medullary lamina, which accommodates the mamillothalamic fasciculus as the latter passes from the prominent medial nucleus of the mamillary body to the anterior thalamic nuclear group. The latter nuclear group is lodged within the cranial bifurcation of the internal medullary lamina. The medial thalamic nuclei are small, circumscribed gray masses situated adjacent to the lateral wall of the 3rd ventricle. The lateral thalamic nuclear group is much larger. Immediately lateral to this nuclear group is a relatively indistinct layer of intermingled gray and white matter termed the reticular nucleus of the thalamus. It merges ventromedially with a small collection of gray matter called the zona incerta. Note the white areas above and below the zona incerta, sometimes referred to as the H1, H2, and H3 fields (or areas) of Forel, respectively. Forel's fields contain—though not exclusively—discharge pathways from the globus pallidus to the thalamus. Immediately below the H2 field of Forel is the subthalamic nucleus, which is prominent only in primates, including man. A lesion of one subthalamic
nucleus may result in hemiballismus, which is characterized by sudden, violent movements of one or both limbs on the side opposite the lesion. Components of the lentiform nucleus (internal and external parts of the globus pallidus, and the putamen) are seen lateral to the posterior limb of the internal capsule.

In the temporal lobe the large, oval gray mass, the amygdaloid body, receives its name from its supposed resemblance to an almond. Its ventral and lateral aspects are well demarcated by white matter. More dorsally there is incomplete separation of the amygdaloid body from the putamen and globus pallidus; and the optic tract is immediately adjacent. The best known outflow tract of the amygdaloid body, the stria terminalis, emerges from the caudal end of the amygdala and follows the medial edge of the tail of the caudate nucleus backwards, upwards and then forwards. In this section it occupies the shallow groove that separates the body of the caudate nucleus from the thalamus.

5-34 Coronal section through thalamus, temporal horn of lateral ventricle, and posterior limb of internal capsule


Certain thalamic nuclei can be distinguished in this section, separated from each other by the curved internal medullary lamina. The medial thalamic nucleus is dark and circumscribed, whereas the lateral nuclear group is much paler. The anterior thalamic nuclear group is small and flattened, and is situated more laterally on the dorsal surface of the thalamus. The reticular nuclei of the thalamus can be identified, but the zona incerta is difficult to see on this section. The H1 field (or area) of Forel, containing the ansa lenticularis, is a rather large zone of white matter. The ansa lenticularis contains a multitude of axons which stream out and end in the ventral anterolateral thalamic nucleus (which can also be seen in this section). The subthalamic nucleus is an identifiable nodule of gray matter that lies dorsal to the substantia nigra.
Corticofugal fibers at the base of the corona radiata pass directly into the basis pedunculi via the posterior limb of the internal capsule. Fibers of the optic and auditory radiations are interposed between the lentiform nucleus above and the temporal horn of the lateral ventricle below. Other structures seen in the roof of the temporal horn of the lateral ventricle are the tail of the caudate nucleus and the stria terminalis.

5-35 Coronal section through thalamus, choroid fissure, basis pedunculi, and ventral part of pons


The fornix is seen touching the corpus callosum. The lentiform nucleus is present only on the left side of the illustration. The anterior thalamic nuclear group in this section is located more laterally than in a more anterior slice (Fig. 5-34). The anterior thalamic nuclear group can be distinguished by its location within a dorsal bifurcation of the internal medullary lamina. The ventral bifurcation of the internal medullary lamina envelops the centromedian nucleus of the thalamus. The choroid plexus of the 3rd ventricle is united with the choroid plexus of the lateral ventricle via the choroid fissure between thalamus and fornix. Note the two large internal cerebral veins in the tela choroidea of the 3rd ventricle.

The red nuclei appear as large, spherical portions of gray matter, related to the concavity of the substantia nigra. Lateral to the red nucleus, the medial, spinal, and trigeminal lemnisci show as a white area. The medial and spinal lemnisci terminate in the ventral posterolateral thalamic nucleus, and the trigeminal lemnisci terminate in the ventral posteromedial thalamic nucleus. On each side the basis pedunculi, containing corticospinal and corticopontine projection fibers, can be identified.
5-36 Coronal section through posterior (epithalamic) commissure


The section is slightly oblique and shows the disposition of many important structures. 1) In the midline, below the crura of the fornix, is the small posterior part of the 3rd ventricle together with its tela choroidea and its vascular fringed choroid plexus, which projects downwards as an invagination of the roof of the 3rd ventricle, on each side of the midline. 2) The thalami are sectioned at the level of the posterior thalamic nucleus (pulvinar). 3) The preparation shows both habenular and posterior commissures, with the pineal recess between them. On the right side of the illustration, medial and lateral geniculate bodies—which together constitute the metathalamus—can be recognized. It may be observed that the lateral geniculate body is organized in alternating gray and white laminae. 4) The oculomotor nuclei, together with their parasympathetic accessory nuclei (of Edinger-Westphal), are located ventral to the mesencephalic (cerebral) aqueduct and dorsal to the superior cerebellar peduncles. 5) The surfaces of the cerebral hemispheres show complex cerebral convolutions of the parietal and temporal lobes. Insular cortex is visible also, particularly on the left side of the illustration. The hippocampus and associated structures abut the medial and inferior surface of the temporal horn of the lateral ventricle.

The Human Brain: Dissections of the Real Brain

Bibliography
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Peer Review Status: Internally Peer Reviewed


The septum pellucidum is a midline structure, separating the two frontal horns of the lateral ventricles. The septum is attached superiorly to the genu and body and inferiorly to the rostrum of the corpus callosum. Note that the gray matter of the caudate nucleus continues uninterrupted into the putamen, through a prolongation just inferior to the internal capsule (anterior limb). Also note the gray bridges between the caudate nucleus and the putamen, which interrupt the fasciculi of the anterior limb of the internal capsule. Putamen and caudate are one mass of gray matter, incompletely separated by these internal capsule fibers.
Human, 10% formalin, Weigert's hematoxylin (Loyez), 1 x.

http://www.vh.org/Providers/Textbooks/MicroscopicAnatomy/Section17/Plate17361.html

Ventral lateral (thalamic) nucleus: One of the lateral group of thalamic nuclei. Note the heavy bundle of myelinated fibers traversing the nucleus. Receives fibers from the cerebellum via the brachium conjunctivum. Has reciprocal connections with the primary motor cortex. Plays a role in motor control.

Caudate nucleus: One of the basal ganglia nuclei. Note its characteristic bulge into the cavity of the lateral ventricle. Concerned with motor control. This section shows in addition the putamen and globus pallidus.

Internal capsule (genu): The part of the internal capsule between the anterior and posterior limbs. Contains corticobulbar fibers, which terminate upon motor nuclei of the brain stem.

Internal capsule (anterior limb): Separates the caudate nucleus and putamen.

Globus pallidus: One of the basal ganglia nuclei. Characterized by heavily myelinated bundles of nerve fibers coursing through it. Note the difference in appearance between globus pallidus and both the caudate and putamen. Both components of the globus pallidus are shown in this section, the lateral (outer) and the medial (inner) segments. Concerned with motor control.

Putamen: Another of the basal ganglia nuclei. Similar in structure to caudate nucleus. Together with caudate and globus pallidus, it constitutes the corpus striatum.
Internal capsule (posterior limb): This part of the internal capsule separates the thalamus from the basal ganglia. The posterior limb of the internal capsule contains corticospinal, corticorubral, corticothalamic, and thalamocortical fibers.

Substantia innominata (nucleus basalis of Meynert): Located ventral to internal capsule and anterior commissure. The substantia innominata contains the nucleus basalis of Meynert, the neurons of which are rich in acetylcholine. Neurons in this nucleus project diffusely to the cerebral cortex and are believed to be involved in Alzheimer's disease. Alzheimer was a nineteenth-century German neurologist.

Optic tract: Carrying fibers from the retinæ to the lateral geniculate nucleus and the pretectal area.

Cerebellum: Located ventral to the posterior part of the cerebral hemisphere.

Dentate nucleus: The largest of the deep cerebellar nuclei. Receives fibers from the Purkinje neurons in the hemispheres of the cerebellum and projects to the thalamus via the dentatorubrothalamic fiber system. Purkinje was a nineteenth-century Bohemian anatomist and physiologist.

Medial geniculate nucleus: One of the thalamic nuclei. Concerned with audition. Receives auditory fibers from the brain stem and projects to the primary auditory cortex in the temporal lobe.

Ventral posterior lateral (thalamic) nucleus: One of the lateral group of thalamic nuclei. Receives fibers of the medial lemniscus and spinothalamic tract. Reciprocally connected with the primary somesthetic cortex.

Fornix (fimbria): Axons of hippocampal neurons, continuous with the crus of the fornix. The fornix connects the hippocampus with several brain regions, including the mamillary body, anterior thalamic nucleus, septal nuclei, and cingulate gyrus.

Pulvinar: One of the lateral group of thalamic nuclei. Reciprocally connected with the medial and lateral geniculate bodies caudally and the association parietal, temporal, and occipital cortices rostrally. Involved in several neural functions, including vision, audition, speech, and pain.

Lateral posterior (thalamic) nucleus: One of the lateral group of thalamic nuclei. The borderline between this nucleus and the pulvinar is vague; the term pulvinar-lateral posterior complex has been used to refer to this nuclear complex.