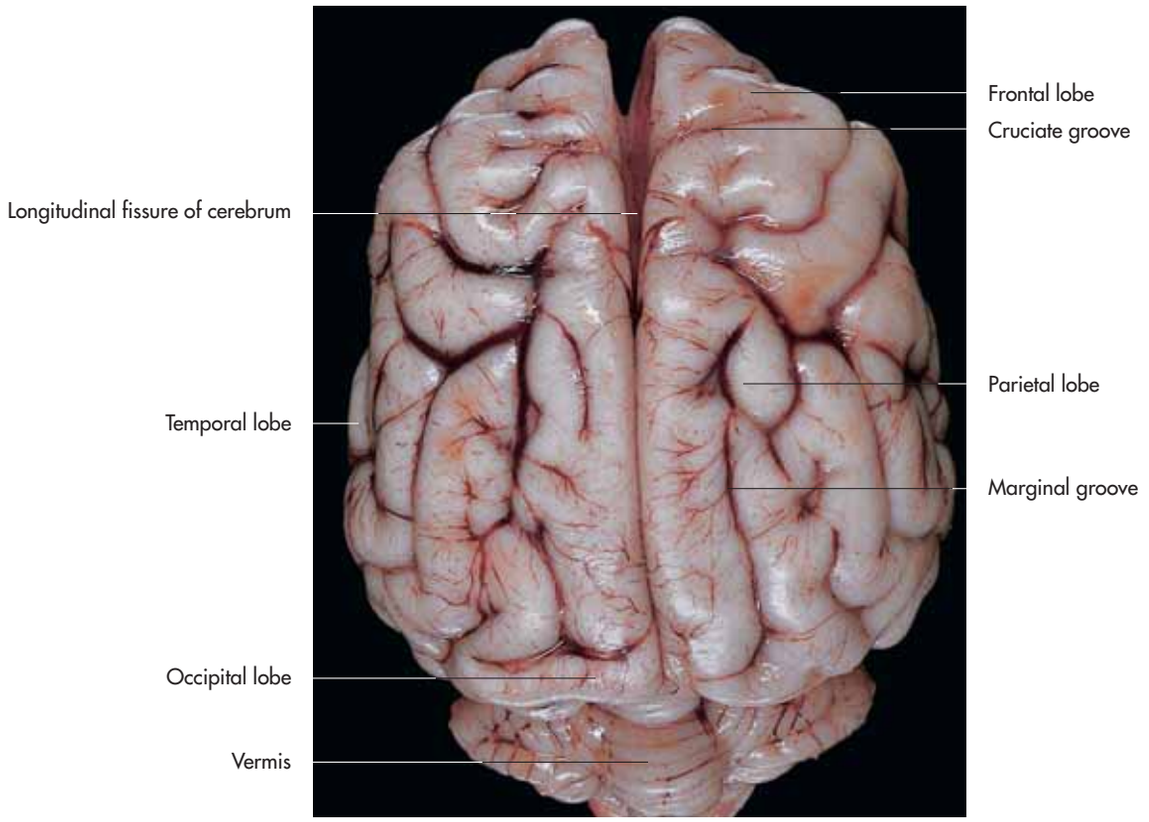

Fig. 14-11. Brain of a dog (dorsal aspect).

nerve fibres of the reticular formation occupy up to half of the pons on its transverse section. The pons also has a large number of ascending and descending nerve tracts, which proceed to the cerebellum as the middle cerebellar peduncle.

Cerebellum

The cerebellum constitutes the second largest part of the metencephalon and is located above the fourth ventricle. It is roughly globular and its surface features fissures that divide the grey mass into **lobes**, and smaller **fissures** that further subdivide the mass into **small lobules** and these into smaller units known as **folia**. In the cerebellum the bulk of the grey matter forms the **cortex** (cortex cerebelli) and encloses the **white matter** or **medulla** (corpus medullare). The white matter arises from the **peduncles** and radiates through the various lobules, resembling a tree. Because of this appearance, it is often referred to as the **tree of life** (arbor vitae). Additional grey matter forms several nuclei, termed basal nuclei, embedded within the medulla (Fig. 14-11). The cerebellum (Fig. 14-10, 11 and 15) can be divided into the:

- median sagittal ridge (vermis),
- lateral hemispheres (hemispheria cerebelli).

Based on the phylogenetic development, the **vermis** (Fig. 14-15) can be further subdivided into **rostral** (archicerebellum), **caudal** (neocerebellum) **lobes**, and the **flocculonodular lobe** (palaeocerebellum) caudoventrally. The cerebellum is connected to the brain stem by **three peduncles** on each side. Rostrally it is attached to the **rostral medullary velum** by the **rostral cerebellar peduncles** (Fig. 14-11). The **caudal cerebellar peduncle** connects with the caudal medullary velum and the medulla oblongata. The **middle cerebellar** peduncles extend ventrolaterally to the pons. The functions of the cerebellum are reflected by its connections to other parts of the brain. The caudal peduncle is largely composed of afferent fibres with origins within the vestibular nuclei, the olivary nucleus and the reticular formation. The middle peduncle is also composed of afferent fibres, which arise from the pontine nuclei. The rostral peduncle is largely composed of efferent fibres dispatched towards the red nucleus of the midbrain, the reticular formation and thalamus. It also includes an afferent component from the spinal cord.

The **functions of the cerebellum** are concerned with **balance** and the **coordination of skeletal muscles** with regard to posture and locomotion. Balance is located in the flocculonodular lobe. The caudal lobe controls the **motor function**, the rostral lobe receives **proprioceptive information**. Deficits of cerebellar function results in cerebellar ataxia, clinically apparent as loss of balance and coordination.

Medullary vela (vela medullaria) and rhomboid fossa (fossa rhomboidea)

The **rostral** and **caudal medullary vela** (velum medullare rostrale et caudale) are thin medullary membranes that extend

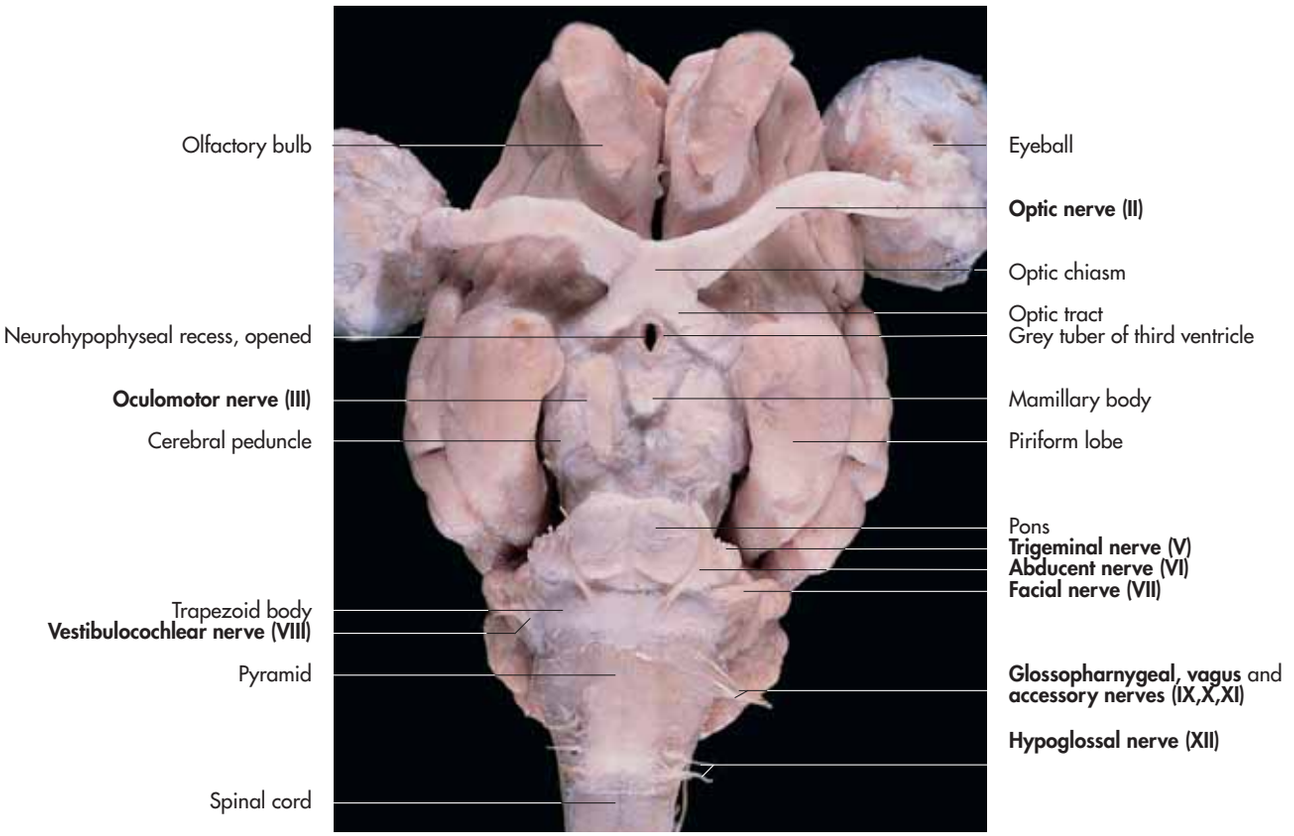

Fig. 14-12. Brain of a goat (ventral aspect); Schabel, 1984.

between the rhomboid fossa and the cerebellum like a tent (Fig. 14-11). Together with the cerebellum, they form the roof over the **fourth ventricle**. Closely related to the caudal medullary velum is the **tela choroidea** of the fourth ventricle.

The floor of the fourth ventricle is formed by the **rhomboid fossa** (Fig. 14-21). Gross visualisation of the rhomboid fossa requires the removal of the cerebellum and the medullary vela. Its rostral part belongs to the metencephalon, its caudal part, to the **myelencephalon**. It has a median sulcus and a bilateral sulcus limitans, marking the transition from floor to wall. Rostrally the sulcus limitans ends in the locus caerulus, which overlies the motor nucleus of the trigeminal nerve.

The walls of the rhomboid fossa are marked by a bilateral **eminence** (area acustica) formed by the underlying nuclei of the vestibulocochlear nerve. Another eminence is visible between the median sulcus and the sulcus limitans (eminentia medialis) marking the **nuclei of cranial nerves IX**, **X** and **XII**. The caudal end of the sulcus medianus is called the **obex** (Fig. 14-18 and 21).

Mesencephalon

The mesencephalon (Fig. 14-8, 9 and 16) can be divided into:

- tectum (tectum mesencephali), also termed tectal plate (lamina tecti) or quadrigeminal plate (lamina quadrigemina) dorsally,
- tegmentum (tegmentum mesencephali),
- cerebral peduncles (pedunculi cerebri) ventrally.

The **mesencephalon** or **midbrain** contains the **mesencephalic aqueduct**, a channel that extends between the fourth ventricle and the third ventricle (Fig. 14-20). It is covered by the **tectal plate**, which consists of paired caudal and rostral swellings, the colliculi, that serve as reflex centres for hearing and vision (Fig. 14-22). The **rostral colliculi** are joined to the lateral geniculate bodies of the diencephalon and are relay centres upon the visual pathways. The **caudal colliculi** are joined by a substantial commissure and are connected with the medial geniculate bodies. They are relay centres upon auditory pathways (Fig. 14-18).

The **tegmentum** constitutes the core of the midbrain between the tectal plate and the cerebral peduncles (Fig. 14-21). Much of it is formed by the **reticular formation** (Fig. 14-19). It contains the motor and parasympathetic nucleus of the **oculomotor nerve** (Fig. 14-14), the **trochlear nuclei** and the **red nucleus** (nucleus ruber).

Part of the trigeminal nucleus also extends into the tegmentum (Fig. 14-21). The **substantia nigra** is a prominent lamina underlying the red nucleus that can be identified in cross sections by its darker colour.

The **cerebral peduncles** are visible on the ventral aspect of the brain caudal to the optic tract at the base of the brain. They are bound laterally by the piriform lobes and caudally by the pons (Fig. 14-14 and 16). They comprise descending fibre tracts from the **telencephalon**.

The **cerebral peduncles** flank the interpeduncular fossa, which contains the **mammillary body**, **hypophyseal infundibulum** and **pituitary gland** (Fig. 14-14). The oculomotor nerve emerges on the ventromedial aspect of the cerebral pe-

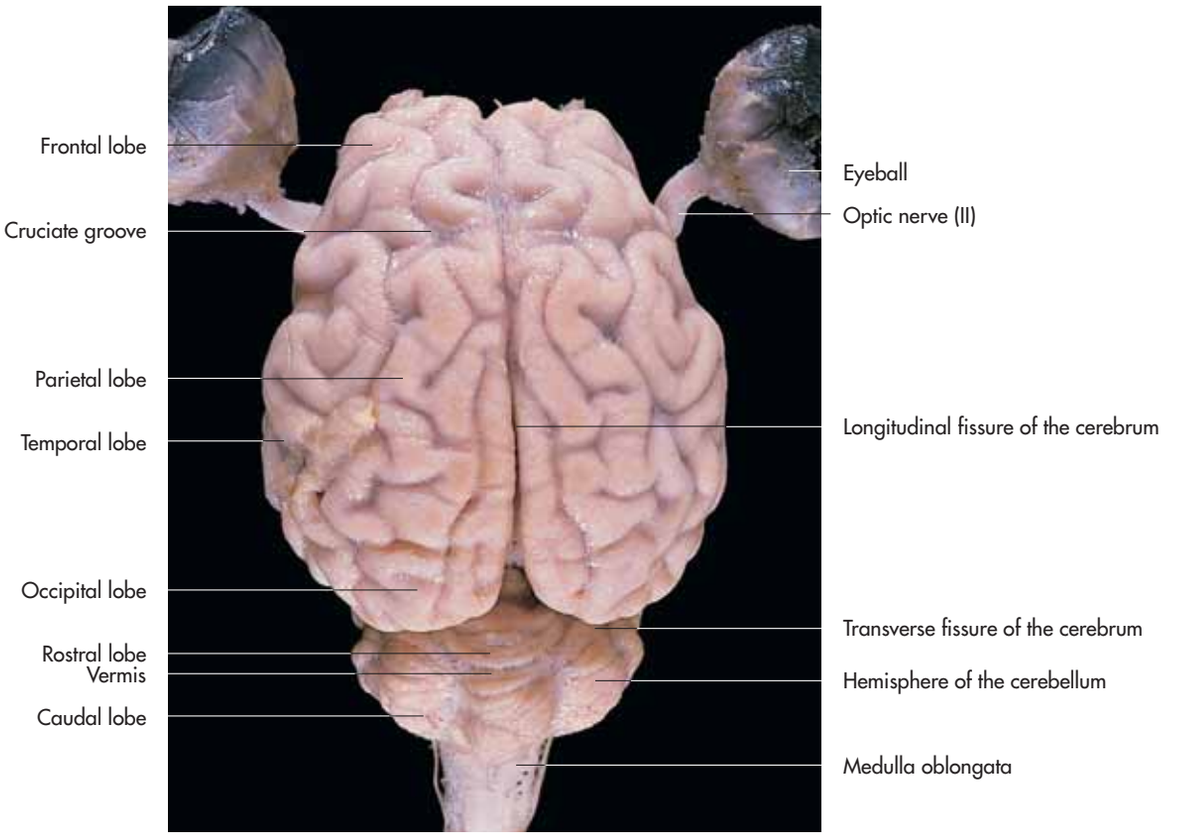

Fig. 14-13. Brain of a goat (dorsal aspect); Schabel, 1984.

duncles. The **trochlear nerve** leaves the midbrain dorsally, just caudal to the tectal plate.

The **functions of the midbrain** are determined by the nuclei of the **third** and **fourth cranial nerves** and the reflex centres for hearing and vision. It plays an important role in coordination of **voluntary motor function** controlled by higher centres. The red nucleus is important for **muscle tone**, **body posture** and **locomotion**. The substantia nigra is essential for the initial phase of fast movement.

Prosencephalon

Diencephalon

The diencephalon (Fig. 14-10) is only visible on the ventral surface of the brain, where parts of it protrude between the cerebral peduncles. Some textbooks classify the diencephalon as being the most rostral part of the brainstem. It can be divided into the following parts in dorsoventral sequence:

- epithalamus,
- thalamus,
- metathalamus and
- hypothalamus.

The **epithalamus** comprises the **pineal gland** (glandula pinealis, epiphysis cerebri) (Fig. 14-10 and 23) and the **habenula** with its associated tracts. The pineal gland is a small median body that projects dorsally. It is an **endocrine gland** that secretes **melatonin** and other compounds which affect sexual activity.

The **habenula** consists of habenular nuclei, which receive fibres from the telencephalon and send fibres to the mesencephalon. It is an important part of the **olfactory pathway**. The habenula of the left and right sides are connected by the habenular commissure.

The **thalamus** is the largest part of the diencephalon and can be further subdivided into the **dorsal thalamus** and the **subthalamus**. The dorsal thalamus is composed of a large number of nuclei through which input to the cerebral cortex is channelled, including sensory information from afferent tracts from **gustatory**, **optic**, **acoustic** and **vestibular organs** (except olfaction) (Fig. 14-18 and 19).

The **subthalamus** is the rostral continuation of the tegmentum of the mesencephalon. It contains the subthalamic nuclei that act as relay stations in the **extrapyramidal motor** pathway. The **left** and **right thalamus** is connected by the **interthalamic adhesion**, which is encircled by the **annular third ventricle** (Fig. 14-18, 19, 21 and 23).

The **hypothalamus** (Fig. 14-22) forms the floor and the wall of the **third ventricle**. It consists of the **optic chiasm** rostrally, the **mammillary body** (Fig. 14-14) caudally and the grey tuber of the third ventricle **(tuber cinereum)** in between. The grey tuber gives rise to the infundibulum, which suspends the **hypophysis** (pituitary gland) (Fig. 14-23). The hypophysis consists of the **neurohypophysis**, the **adenohypophysis** and an **intermediate part**.

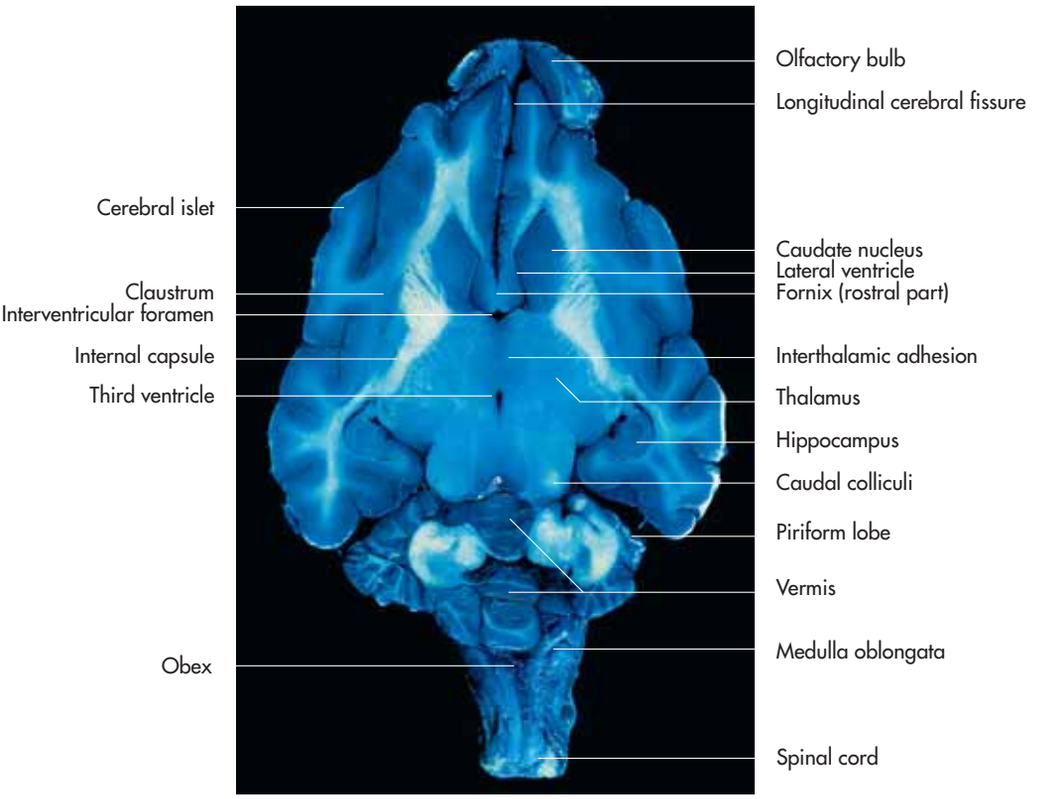

Fig. 14-14. Horizontal section of the brain of a dog at the level of the interventricular foramen (blue stain).

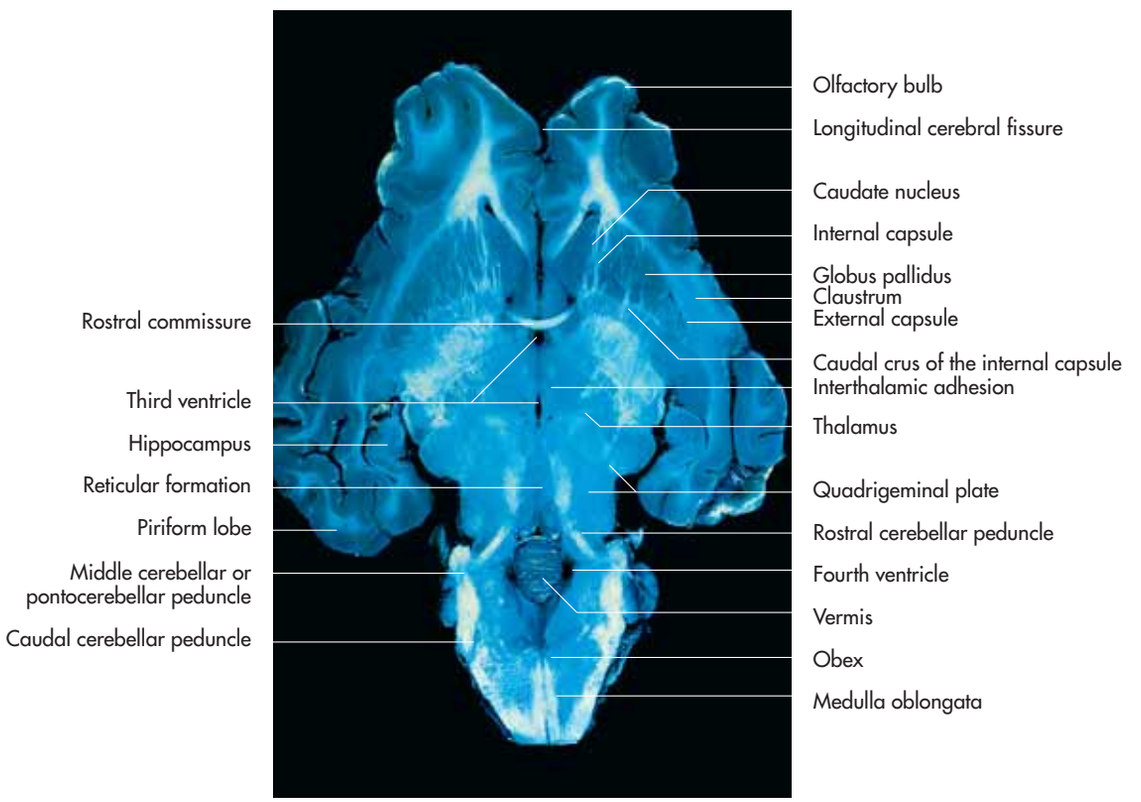

Fig. 14-15. Horizontal section of the brain of a dog at the level of the rostral commissure (blue stain).