

Glossary of Neuroanatomical Terms and Eponyms

The standard Latin forms of anatomical names are anglicized wherever this is possible without loss of euphony. Most anatomical terms have Latin origins, and most names related to diseases are derived from Greek words.

Abbreviations

Eng. *English*; Fr. *French*; Ger. *German*; Gr. *Greek*; L. *Latin*; O.E. *Old English*

Neuroanatomical terms

Abducens. L. *ab*, from + *ducens*, leading. Abducens (or abducent) nerve supplies the muscle that moves the direction of gaze away from the midline.

Abulia. Gr. *a*, without + *boule*, will. A loss of will power. (Also spelled **aboulia**.)

Accumbens. L. reclining. The nucleus accumbens is the ventral part of the head of the caudate nucleus, anterior and ventral to the anterior limb of the corpus callosum.

Adenohypophysis. Gr. *aden*, gland + *hypophysis* (which see). The part of the pituitary gland derived from the pharyngeal endoderm (Rathke's pouch). Its largest part is the anterior lobe of the pituitary gland.

Adiadochokinesia. *a*, neg. + Gr. *diadochos*, succeeding + *kinesis*, movement. Inability to perform rapidly alternating movements. Also called dysdiadochokinesia.

Ageusia. Gr. *a*, without + *geuein*, to taste. Loss of the sense of taste.

Agnosia. *a*, neg. + Gr. *gnosis*, knowledge. Lack of ability to recognize the significance of sensory stimuli (auditory, visual, tactile, etc. agnosia).

Agraphia. *a*, neg. + Gr. *graphein*, to write. Inability to express thoughts in writing owing to a central lesion.

Akinesia. *a*, neg. + Gr. *kinesis*, movement. Lack of spontaneous movement, as seen in Parkinson's disease.

Ala cinerea. L. wing + *cinereus*, ashen-hued. Vagal triangle in floor of fourth ventricle.

Alexia. *a*, neg. + Gr. *lexis*, word. Loss of the power to grasp the meaning of written or printed words and sentences.

Allocortex. Gr. *allos*, other + L. *cortex*, bark. Phylogenetically older cerebral cortex, usually consisting of three layers. Includes paleocortex and archicortex.

Allodynia. Gr. *allos*, other + **** Not in Stedman, Webster, Oxford!

Alveus. L. trough. Thin layer of white matter covering the ventricular surface of the hippocampus. The name seems quite inappropriate but has become an accepted part of anatomical terminology.

Amacrine. *a*, neg. + Gr. *makros*, long + *inos*, fiber. Amacrine nerve cell of the retina.

Ambiguus. L. changeable or doubtful. Nucleus ambiguus occupies an atypically ventral position for a cranial nerve nucleus, and its limits are somewhat indistinct.

Amoeboid. Gr. *amoibe*, change. Relating to a cell that continuously changes its shape and looks like an amoeba.

Ammon's horn. Hippocampus, which has an outline in cross section suggestive of a ram's horn. Also known as the cornu Ammonis. Ammon was an Egyptian deity with a ram's head.

Amygdala. L. *amygdalum*, from Gr. *amygdale*, almond. Amygdala or amygdaloid body in the temporal lobe of the cerebral hemisphere.

Aneurysm. Gr. *aneurysma*, dilation or widening. An abnormal widening of an artery. It can compress nearby structures and may burst.

Anopsia. *an*, neg. + Gr. *opsis*, vision. Defect of vision.

Ansa hypoglossi. L. *ansa*, handle + Gr. *hypo*, under + Gr. *glossa*, tongue. Loop of nerves containing axons of the first three cervical roots that encircles the common carotid artery and internal jugular vein in the neck. The fibers from C1 pass within the trunk of the hypoglossal nerve before joining the ansa. Also called the **ansa cervicalis**.

Antidromic. Gr. *anti*, against + *dromos*, race-course. Of impulses travelling in the opposite direction to what is usual in an axon.

Aphasia. *a*, neg. + Gr. *phasis*, speech. Defect of the power of expression by speech or of comprehending spoken or written language.

Apraxia. *a*, neg. + Gr. *prassein*, to do. Inability to carry out purposeful movements in the absence of paralysis.

Arachnoid. Gr. *arachne*, spider's web + *eidōs*, resemblance. Meningeal layer that forms the outer boundary of the subarachnoid space.

Archicerebellum. Gr. *arche*, beginning + diminutive of cerebrum. Phylogenetically old part of the cerebellum, functioning in the maintenance of equilibrium. Also spelled archeocerebellum.

Archicortex. Gr. *arche*, beginning + L. *cortex*, bark. Three-layered cortex included in the limbic system; located mainly in the hippocampus and dentate gyrus of the temporal lobe. Also spelled archeocortex.

Area postrema. Area in the caudal part of the floor of the fourth ventricle.

Arrector pili. L. *arrectus*, upright + *pilus*, hair. A cutaneous muscle that moves a hair.

Astereognosis. *a*, neg. + *stereos*, solid + *gnosis*, knowledge. Loss of ability to recognize objects or to appreciate their form by touching or feeling them.

Astrocyte. Gr. *astron*, star + *kytos*, hollow (cell). Type of neuroglial cell.

Asynergy. *a*, neg. + Gr. *syn*, with + *ergon*, work. Disturbance of the proper association in the contraction of muscles that ensures that the different components of an act follow in proper sequence, at the proper moment, and of the proper degree, so that the act is executed accurately.

Ataxia. *a*, neg. + Gr. *taxis*, order. Loss of power of muscle coordination, with irregularity of muscle action.

Atheroma. Gr. *athere*, porridge. Thickening of the lining of an artery caused by deposition of lipid material.

Athetosis. Gr. *athetos*, without position or place. Affliction of the nervous system caused by degenerative changes in the corpus striatum and cerebral cortex and characterized by bizarre, writhing movements of the fingers and toes, especially.

Atresia. *a*, neg. + Gr. *trēsis*, perforation. Absence of a passage caused by an error in

development. **Autoimmunity.** Gr. *Auto*, self + *im*, not + *munis*, serving. A condition in which antibodies or cells of the immune system attack a part of their own body.

Autonomic. Gr. *autos*, self + *nomos*, law. Autonomic system; the efferent or motor innervation of viscera.

Autoradiography. Gr. *autos*, self + L. *radius*, ray + Gr. *graphein*, to write. Technique that uses a photographic emulsion to detect the location of radioactive isotopes in tissue sections. Also called radioautography.

Axolemma. Gr. *axon*, axis + *lemma*, husk. Plasma membrane of an axon.

Axon. Gr. *axon*, axis. Efferent process of a neuron that conducts impulses to other neurons or to muscle fibers (striated and smooth) and gland cells.

Axon hillock. Region of the nerve cell body from which the axon arises; it contains no Nissl material.

Axon reaction. Changes in the cell body of a neuron after damage to its axon.

Axoplasm. Gr. *axon*, axis + *plasm*, anything formed or molded. Cytoplasm of the axon.

Ballism. See **hemiballismus**.

Baroreceptor. Gr. *baros*, weight + *receptor*, receiver. Sensory nerve terminal that is stimulated by changes in pressure, as in the carotid sinus and aortic arch.

Basis pedunculi. Ventral part of the cerebral peduncle of the midbrain on each side, separated from the dorsal part by the substantia nigra. Also called the crus cerebri.

Brachium. L. from Gr. *brachion*, arm. As used in the central nervous system, denotes a large bundle of fibers that connects one part with another (eg, brachia associated with the colliculi of the midbrain).

Bradykinesia. Gr. *brady*, slow + *kinesis*, movement. Abnormal slowness of movements.

Brain stem. In the mature human brain, denotes the medulla, pons, and midbrain. In descriptions of the embryonic brain, the diencephalon is included as well.

Bulb. Referred at one time to the medulla oblongata, but in the context of "corticobulbar tract," refers to the brain stem, in which motor nuclei of cranial nerves are located.

Bulbospongiosus muscle. L. *bulbus*, bulb or onion + *spongia*, sponge. Muscle surrounding the corpus spongiosus, the body of erectile tissue surrounding the urethra at the base of the penis.

Calamus scriptorius. L. *calamus*, a reed, therefore a reed pen. Refers to an area in the caudal part of the floor of the fourth ventricle that is shaped somewhat like a penpoint.

Calcar. L. spur, used to denote any spur-shaped structure. Calcar avis, an elevation on the medial aspects of the lateral ventricles at the junction of occipital and temporal horns. Also calcarine sulcus of occipital lobe, which is responsible for the calcar avis.

Cauda equina. L. horse's tail. Lumbar and sacral spinal nerve roots in the lower part of the spinal canal.

Caudal. L. tail. Along the axis of the central nervous system, towards the tail. In human anatomy, approximately equivalent in the brain stem and spinal cord to "inferior," and in the forebrain to "posterior". Opposite of rostral.

Caudate nucleus. Part of the corpus striatum, so named because it has a long extension or tail.

Cerebellum. L. diminutive of *cerebrum*, brain. Large part of the brain with motor functions situated in the posterior cranial fossa.

Cerebrum. L. brain. Principal portion of the brain, including the diencephalon and cerebral hemispheres, but not the brain stem and cerebellum.

Channel. A protein molecule in a cell membrane that allows the passage of a particular ion, such as sodium, calcium, potassium or chloride, into or out of the cell, following a concentration gradient. Channels typically are gated, meaning that they open and close in response to neurotransmitters or local changes in membrane potential.

Cholinergic. Gr. *chole*, bile (which contains choline) + L. suffix *-ine*, pertaining to + Gr. *ergon*, work. Using acetylcholine as a neurotransmitter.

Chordotomy. Gr. *chorde*, cord + *tome*, a cutting. Division of the spinothalamic and spinoreticular tracts for intractable pain (tractotomy). Also spelled cordotomy.

Chorea. L. from Gr. *choros*, a dance. Disorder characterized by irregular, spasmodic, involuntary movements of the limbs or facial muscles. Attributed to degenerative changes in the neostriatum.

Choroid. Gr. *chorion*, a delicate membrane + *eidos*, form. Choroid or vascular coat of the eye; choroid plexuses in the ventricles of the brain. Also spelled chorioid.

Chromatolysis. Gr. *chroma*, color + *lysis*, dissolution. Dispersal of the Nissl material of neurons after axon section or in viral infections of the nervous system.

Cinereum. L. *cinereum*, ashen-hued, from *cinis*, ash. Refers to gray matter, but limited in usage. Tuber cinereum (ventral portion of the hypothalamus, from which the neurohypophysis arises); tuberculum cinereum (slight elevation on medulla formed by spinal tract and nucleus of trigeminal nerve); ala cinerea (vagal triangle in floor of fourth ventricle).

Cingulum. L. girdle. Bundle of association fibers in the white matter of the cingulate gyrus on the medial surface of the cerebral hemisphere.

Circumventricular organs. Small regions composed of atypical brain tissue in the walls of the third and fourth ventricles. These structures lack a blood-brain barrier and have chemoreceptor or neurosecretory functions.

Clastrum. L. a barrier. Thin sheet of gray matter of unknown function situated between the lentiform nucleus and the insula.

Colliculus. L. Small elevation or mound. Superior and inferior colliculi composing the tectum of the midbrain; facial colliculus in the floor of the fourth ventricle.

Commissure. L. a joining together. Bundle of nerve fibers that passes from one side to the other in the brain or spinal cord. Strictly, this term should be applied to tracts that connect symmetrical structures (cf. **decussation**).

Conjugate. L. *con-*, together + *jugum*, a yoke. Relating to coordinated movements of both eyes in the same direction.

Contracture. Persistent shortening, as in a muscle paralyzed for a long time.

Contralateral. L. *contra*, opposite + *lateris* of a side. Of the other (left or right) side of the body. Opposite of "ipsilateral."

Cornu. L. horn. See **Ammon's horn**. Horns of the lateral ventricle and of the spinal gray matter also are formally named as cornua.

Corona. L. from Gr. *korone*, a crown. Corona radiata (fibers radiating from the internal capsule to various parts of the cerebral cortex).

Corpus callosum. L. body + *callosus*, hard. Main neocortical commissure of the cerebral hemispheres.

Corpus luteum. L. body + *luteum*, yellow. Progesterone-secreting endocrine tissue that forms in the ovary after ovulation.

Corpus striatum. L. body + *striatus*, furrowed or striped. Mass of gray matter with motor functions at the base of each cerebral hemisphere.

Cortex. L. bark. Outer layer of gray matter of the cerebral hemispheres and cerebellum.

Crus. L. leg. Crus cerebri is the ventral part of the cerebral peduncle of the midbrain on each side, separated from the dorsal part by the substantia nigra. Also called the basis pedunculi. Crus of the fornix.

Cuneus. L. wedge. Gyrus on the medial surface of the cerebral hemisphere. Fasciculus cuneatus in the spinal cord and medulla; nucleus cuneatus in the medulla.

Cytosol. Gr. *kytos*, a hollow vessel + solution. Soluble portion of the cytoplasm, excluding all membranous and particulate components.

Decussation. L. *decussatio*, from *decussis*, the numeral X. Point of crossing of paired tracts. Decussations of the pyramids, medial lemnisci, and superior cerebellar peduncles are examples. A decussation connects asymmetrical parts of the nervous system.

Dendrite. Gr. *dendrites*, related to a tree. Process of a nerve cell on which axons of other neurons terminate. Sometimes also used for the peripheral process of a primary sensory neuron, although this has the histological and physiological properties of an axon.

Dentate. L. *dentatus*, toothed. Dentate nucleus of the cerebellum; dentate gyrus in the temporal lobe.

Diabetes. Gr. *diabetes*, a syphon. Disease with excessive production of urine. In **diabetes mellitus** (L. *mellitus*, sweet), the urine contains sugar, whereas in **diabetes insipidus** (L. *in*, not + *sapor*, flavor), the urine is watery and quite tasteless.

Diencephalon. Gr. *dia*, through + *enkephalos*, brain. Part of the cerebrum, consisting of the thalamus, epithalamus, subthalamus, and hypothalamus; the more caudal and medial part of the prosencephalon of the developing embryo.

Diplopia. Gr. *diploos*, double + *ops*, eye. Double vision.

Dura. L. *dura*, hard. Dura mater (the thick external layer of the meninges).

Dyskinesia. Gr. *dys*, difficult or disordered + *kinesis*, movement. Abnormality of motor function characterized by involuntary, purposeless movements.

Dysmetria. Gr. *dys*, difficult or disordered + *metron*, measure. Disturbance of the power to control the range of movement in muscle action.

Ectoderm. Gr. *ektos*, outside + *derma*, skin. Most dorsal layer of cells of the early embryo, which gives rise to the epidermis, neural tube, neural crest, etc.

Edema (oedema). Gr. *oidema*, swelling. Abnormal accumulation of fluid in a tissue.

Emboliform. Gr. *embolos*, plug + L. *forma*, form. Emboliform nucleus of the cerebellum.

Embolus. Gr. *embolos*, plug. Fragment of a thrombus that breaks loose and eventually obstructs an artery. **Endomysium.** Gr. *endo*, within + *myos (mys)*, muscle. The delicate connective tissue that surrounds and separates individual contractile fibers of a muscle.

Endoneurium. Gr. *endon*, within + *neuron*, nerve. Delicate connective tissue sheath surrounding an individual nerve fiber of a peripheral nerve. Also called the sheath of Henle.

Endoplasmic reticulum. Gr. *endo*, within + *a moulded form* (cytoplasm) + L. *reticulum*, small net. An array of membranes within a cell. Rough endoplasmic reticulum is associated with ribosomes, where protein molecules are assembled.

Engram. Gr. *en*, in + *gramma*, mark. Used in psychology to mean the lasting trace left in the brain by previous experience; a latent memory picture.

Entorhinal. Gr. *entos*, within + *rhis* (*rhin-*), nose. Entorhinal area is the anterior part of the parahippocampal gyrus of the temporal lobe adjacent to the uncus. It is included in the lateral olfactory area.

Ependyma. Gr. *ependyma*, an upper garment. Lining epithelium of the ventricles of the brain and central canal of the spinal cord.

Epineurium. Gr. *epi*, upon + *neuron*, nerve. Connective tissue sheath surrounding a peripheral nerve.

Epithalamus. Gr. *epi*, upon + *thalamos*, inner chamber. Region of the diencephalon above the thalamus; includes the pineal gland.

Estrogen (oestrogen). L. *oestrus*, gadfly or frenzy + *generator*, producer. Steroid hormones (estradiol, estrone, estriol) secreted by the ovary that stimulate the secondary sex organs, especially before ovulation.

Euphony. Gr. *eu*, well + *phone*, sound. Agreeable sound or easy pronunciation.

Exteroceptor. L. *exterus*, external + *receptor*, receiver. Sensory receptor that serves to acquaint the individual with his or her environment (exteroception).

Extrafusal. L. *extra*, outside + *fusulus*, spindle. Relates to the great majority of contractile fibers of a skeletal muscle, which are outside the sensory receptor organs known as neuromuscular spindles.

Extrapyramidal system. Vague and confusing term applied to motor parts of the central nervous system other than the pyramidal motor system.

Falx. L. sickle. Two of the dural partitions in the cranial cavity are the falx cerebri and the small falx cerebelli.

Fasciculus. L. diminutive of *fascis*, bundle. Bundle of nerve fibers.

Fastigial. L. *fastigium*, the top of a gabled roof. Fastigial nucleus of the cerebellum.

Fenestra. L. window. A hole. Fenestra rotunda (round) and fenestra ovale (oval) are between the middle and inner ear. Capillary blood vessels are fenestrated when their endothelial cells have pores, each closed by a diaphragm that does not prevent the egress of large molecules. Such vessels typically occur in endocrine organs.

Fimbria. L. *fimbriae*, fringe. Band of nerve fibers along the medial edge of the hippocampus, continuing as the fornix.

Fistula. L. pipe. Abnormal communication between two cavities or between a cavity and the surface of the body. In an arteriovenous fistula, blood is shunted directly from an artery into a vein or venous sinus. **Foramen** (plural, **foramina**) L. *forare*, to pierce. A hole.

Forceps. L. a pair of tongs. Used for the U-shaped configuration of fibers that constitute the anterior and posterior portions of the corpus callosum (forceps frontalis and forceps occipitalis).

Fornix. L. arch. Efferent tract of the hippocampal formation, arching over the thalamus and terminating mainly in the mamillary body of the hypothalamus.

Fovea. L. a pit or depression. Fovea centralis (depression in the center of the macula lutea of the retina).

Fundus. L. bottom. Rounded interior of a hollow organ. The ocular fundus is lined by the retina, with its blood vessels, the optic disk, and other landmarks visible through an ophthalmoscope.

Funiculus. L. diminutive of *funis*, cord. Area of white matter that may consist of several functionally different fasciculi, as in the lateral funiculus of white matter of the spinal

cord.

Fusiform. L. *fusus*, spindle + *forma*, shape. Widest in the middle and tapering at both ends
GABAergic. Describes a neuron that uses γ-aminobutyrate (GABA) as its principal synaptic transmitter.

Ganglion. Gr. knot or subcutaneous tumor. Swelling composed of nerve cells, as in cerebrospinal and sympathetic ganglia. Also used inappropriately for certain regions of gray matter in the brain (eg, basal ganglia of the cerebral hemisphere).

Gemmule. L. *gemma*, diminutive of *gemma*, bud. Minute projections on dendrites of certain neurons, especially pyramidal cells and Purkinje cells, for synaptic contact with other neurons.

Genu. L. *genu*, knee. Anterior end of corpus callosum; genu of facial nerve. Also geniculate ganglion of facial nerve and geniculate bodies of thalamus.

Glia. Gr. glue. Neuroglia, the interstitial or accessory cells of the central nervous system.

Glioblast. Gr. *glia*, glue + *blastos*, germ. Embryonic neuroglial cell.

Gliosis. Gr. *glia*, glue + *-osis*, suffix indicating a condition or occurrence. Formation of scar tissue, composed of reactive astrocytes, in the central nervous system.

Gliosome. Gr. *glia*, glue + *soma*, body. Granules in neuroglial cells, in particular astrocytes.

Globus pallidus. L. a ball + pale. Medial part of lentiform nucleus of corpus striatum. Also globose nuclei of cerebellum.

Glomerulus. Diminutive of L. *glomus*, ball of yarn. Synaptic glomeruli of the olfactory bulb and cerebellum.

Glomus. L. ball of yarn. Applied to various small organs, including the carotid and aortic bodies, and to one of their characteristic cell types.

Glycocalyx. Gr. *glycyx*, sweet + *kalyx*, cup. Outer coating of carbohydrate molecules on the surface of cells.

Golgi apparatus. An array of membranous compartments within the cytoplasm, where proteins combine with carbohydrates to form glycoproteins.

Gonadotrophic (also **gonadotropic**). Gr. *gone*, generation + *trephein*, to feed, or *trepein*, to turn. Gonadotrophic hormones are secreted by the anterior lobe of the pituitary gland, and in pregnancy by the placenta. They act upon the gonads (ovary or testis) and are essential for the functions of these organs.

Gracilis. L. slender. Fasciculus gracilis of the spinal cord and medulla; nucleus gracilis and gracile tubercle of the medulla.

Granule. L. *granulum*, diminutive of *granum*, grain. Used to denote small neurons, such as granule cells of cerebellar cortex and stellate cells of cerebral cortex. Hence granular cell layers of both cortices.

Habenula. L. diminutive of *habena*, strap or rein. Small swelling in the epithalamus adjacent to the posterior end of the roof of the third ventricle.

Haarscheibe. Ger. *haar*, hair + *scheibe*, disk. Small elevated area of skin that develops in association with specialized hair follicles and serves as a receptor for tactile stimuli.

Hemiballismus. Gr. *hemi*, half + *ballismos*, jumping. Violent form of motor restlessness that involves one side of the body, caused by a destructive lesion involving the subthalamic nucleus.

Hemiplegia. Gr. *hemi*, half + *plege*, a blow or stroke. Paralysis of one side of the body.

Herpes zoster Gr. *herpein*, to creep + *zoster*, waist-belt. Virus infection of neurons in a

sensory ganglion, causing painful inflammation with small blisters in the corresponding area of skin. (Also called *shingles*; systemic infection with the same virus causes chicken-pox.)

Hippocampus. Gr. *hippos*, horse + *kampos*, sea monster; also the zoological name for a genus of small fishes known as sea-horses. Rather inappropriate name given to a gyrus that constitutes an important part of the limbic system; produces an elevation on the floor of the temporal horn of the lateral ventricle.

Homeostasis. Gr. *homois*, like + *stasis*, standing. Tendency toward stability in the internal environment of the organism.

Hormone. Gr. *hormaein*, to stir up. A compound secreted into the blood, which exercises a specific physiological function elsewhere in the body.

Hydrocephalus. Gr. *hydror*, water + *kephale*, head. Excessive accumulation of cerebrospinal fluid.

Hyperacusis. Gr. *akousis*, a hearing. Abnormal loudness of perceived sounds.

Hypophysis. Gr. from *hypo*, under + *phyein*, to grow. The pituitary gland (considered as an attachment underneath the brain).

Hypothalamus. Gr. *hypo*, under + *thalamos*, inner chamber. Region of the diencephalon that serves as the main controlling center of the autonomic nervous system.

Induction. L. *inducere*, to bring in. In embryology, action of one population of cells on the development of another population nearby.

Indusium. L. a garment, from *induo*, to put on. Indusium griseum, thin layer of gray matter on the dorsal surface of the corpus callosum (gray tunic).

Infarction. L. *infarcire*, to stuff or fill in. Regional death of tissue caused by loss of blood supply.

Infundibulum. L. funnel. Infundibular stem of the neurohypophysis.

Insula. L. island. Cerebral cortex concealed from surface view and lying at the bottom of the lateral sulcus. Also called the island of Reil.

Interoceptor. L. *inter*, between + *receptor*, receiver. One of the sensory end organs within viscera.

Interstitial. L. *inter*, between + *statum*, placed. Within spaces. Interstitial cells of the testis are in the spaces between the seminiferous tubules.

Intrafusal. L. *intra*, within + *fusus*, spindle. Relates to the contractile muscle fibers within the capsule of a neuromuscular spindle.

Ipsilateral. L. *ipse*, itself + *lateris* of a side. Of the same side (left or right) of the body. Opposite of "contralateral."

Ischemia. Gr. *ischein*, to check + *haimos*, blood. Condition of tissue that is not adequately perfused with oxygenated blood.

Ischiocavernosus muscle. Gr. *ischion*, hip joint + L. *caverna*, cave or hollow. Paired muscle associated with the bodies of erectile tissue on either side of the base of the penis.

Isocortex. Gr. *isos*, equal + L. *cortex*, bark. Cerebral cortex having six layers (neocortex).

Kinesthesia. Gr. *kinesis*, movement + *aisthesis*, sensation. Sense of perception of movement.

Koniocortex. Gr. *konis*, dust + L. *cortex*, bark. Areas of cerebral cortex that contain large numbers of small neurons; typical of sensory areas.

Labyrinth. Gr *labyrinthos*, building with intricate passages. The cavities and canals of the inner ear within the temporal bone.

Lemniscus. Gr. *lemniskos*, fillet (a ribbon or band). Used to designate a bundle of nerve fibers in the central nervous system (eg, medial lemniscus and lateral lemniscus).

Lentiform. L. *lens* (*lent-*), a lentil (lens) + *forma*, shape. Lens-shaped. Lentiform nucleus, a component of the corpus striatum. Also called lenticular nucleus.

Leptomeninges. Gr. *leptos*, slender + *meninx*, membrane. Arachnoid and pia mater.

Lesion. L. *laesum*, hurt or wounded. Applied to any abnormality. In the nervous system, a lesion may be destructive (such as an infarct, injury, hemorrhage, or tumor), or it may stimulate neurons (as in epilepsy).

Limbus. L. a hem or border. Limbic lobe: C-shaped configuration of cortex on the medial surface of the cerebral hemisphere that consists of the septal area and the cingulate and parahippocampal gyri. Limbic system: limbic lobe, hippocampal formation, and portions of the diencephalon, especially the mamillary body and anterior thalamic nuclei.

Limen. L. threshold. Limen insulae: ventral part of the insula (island of Reil); included in the lateral olfactory area.

Locus coeruleus. L. place + *caeruleus*, dark blue. Small dark spot on each side of the floor of the fourth ventricle; marks the position of a group of nerve cells that contain melanin pigment.

Macroglia. Gr. *makros*, large + *glia*, glue. Larger types of neuroglial cells: astrocytes, oligodendrocytes, and ependymal cells.

Macrophage. Gr. *makros*, great + *phagein*, to eat. A type of white blood cell (monocyte) that has entered connective tissue and assumed phagocytic properties.

Macrosmatic. Gr. *makros*, large + *osme*, smell. Having the sense of smell strongly or acutely developed.

Macula. L. a spot. Macula lutea: spot at the posterior pole of the eye that has a yellow color when viewed with red-free light. Maculae sacculi and utriculi: sensory areas in the vestibular portion of the membranous labyrinth.

Mamillary. L. *mammilla*, diminutive of *mamma*, breast (shaped like a nipple). Mamillary bodies: swellings on the ventral surface of the hypothalamus. Also spelled mammillary. **Massa intermedia.** Bridge of gray matter that connects the thalami of the two sides across the third ventricle; present in 70% of human brains. Also called the interthalamic adhesion.

Medulla. L. marrow, from *medius*, middle. Medulla spinalis: spinal cord. Medulla oblongata: caudal portion of the brain stem. In current usage, "medulla" means the medulla oblongata.

Medulloblastoma. Malignant tumor of young children, usually in the midline of the cerebellum, enlarging into the fourth ventricle and spreading by way of the subarachnoid space to other parts of the central nervous system.

Mesencephalon. Gr. *mesos*, middle + *enkephalos*, brain. The midbrain; also its embryonic precursor, the part of the neural tube interposed between the forebrain and hindbrain.

Mesoderm. Gr. *mesos*, middle + *derma*, skin. Middle layer of cells of the early embryo, which gives rise to connective tissues, muscle, etc.

Metathalamus. Gr. *meta*, after + *thalamos*, inner chamber. Medial and lateral geniculate bodies (nuclei).

Metencephalon. Gr. *meta*, after + *enkephalos*, brain. Pons and cerebellum; the more rostral of the two divisions of the rhombencephalon or hindbrain.

Microglia. Gr. *mikros*, small + *glia*, glue. Type of neuroglial cell.

Microsmatic. Gr. *mikros*, small + *osme*, smell. Having a sense of smell, but of relatively poor development.

Microvillus. Gr. *mikros*, small + L. *villus*, wool. Hair-like projections of a cell, typically presenting a striated appearance in light microscopy, but individually resolved by the electron microscope.

Mimetic. Gr. *mimetikos*, imitative. Muscles of expression supplied by the facial nerve; sometimes referred to as mimetic muscles.

Miotic. Gr. *meiosis*, diminution. A drug causing constriction of the pupil of the eye.

Mitochondrion. Gr. *mitos*, thread + *chondros*, granule. A cytoplasmic organelle with distinctive ultrastructure, containing respiratory enzymes.

Mitral. L. *mitra*, a turban; later the tall, cleft hat (miter) of a bishop. Mitral cells of the olfactory bulb.

Mnemonic. Gr. *mneme*, memory. Pertaining to memory.

Molecular. L. *molecula*, diminutive of *moles*, mass. Used in neurohistology to denote tissue that contains large numbers of fine nerve fibers and that, therefore, has a punctate appearance in silver-stained sections. Molecular layers of cerebral and cerebellar cortices.

Mutism. L. *mutus*, silent or dumb. Inability to speak.

Myasthenia gravis. Gr. *myos*, muscle + *a*, without + *sthenos*, strength + L. *gravis*, heavy (severe). Disease in which there is failure of neuromuscular transmission.

Myelencephalon. Gr. *myelos*, marrow + *enkephalos*, brain. Medulla oblongata; the more caudal of the two divisions of the rhombencephalon or hindbrain.

Myelin. Gr. *myelos*, marrow. Layers of lipid and protein substances that form a sheath around axons.

Mydriatic. Gr. *mydriasis*, enlargement of the pupil. A drug causing dilation of the pupil of the eye.

Myoepithelial cell. Gr. *myos*, muscle + *epi*, upon + *thele*, nipple. Contractile cell that embraces a secretory unit (acinus or alveolus) of a gland, and propels the contents into a duct.

Myotrophic. Gr. *mys*, muscle + *trophein*, to nourish. Responsible for maintaining the structural and functional integrity of muscle. (Principally by chemical agents from motor neurons, hence the earlier but ambiguous term "neurotrophic.")

Neocerebellum. Gr. *neos*, new + diminutive of cerebrum. Phylogenetically newest part of the cerebellum present in mammals and especially well developed in humans. Ensures smooth muscle action in the finer voluntary movements.

Neocortex. Gr. *neos*, new + L. *cortex*, bark. Six-layered cortex, characteristic of mammals and constituting most of the cerebral cortex in humans.

Neostriatum. Gr. *neos*, new + L. *striatus*, striped or grooved. Phylogenetically newer part of the corpus striatum that consists of the caudate nucleus and putamen; the striatum.

Neuralgia. Gr. *neuron*, nerve + *algein*, to suffer. Pain attributed to abnormal stimulation of sensory fibers in the peripheral nervous system.

Neurite. Gr. *neurites*, of a nerve. Cytoplasmic processes of neurons. The term embraces both axons and dendrites.

Neurobiotaxis. Gr. *neuron*, nerve + *bios*, life + *taxis*, arrangement. Tendency of nerve cells to move during embryological development toward the area from which they receive the most stimuli.

Neuroblast. Gr. *neuron*, a nerve + *blastos*, germ. Embryonic nerve cell.

Neurofibril. Gr. *neuron*, nerve + L. *fibrilla*, diminutive of *fibra*, fiber. Filaments in the cytoplasm of neurons.

Neuroglia. Gr. *neuron*, nerve + *glia*, glue. Accessory or interstitial cells of the nervous system; includes astrocytes, oligodendrocytes, microglial cells, ependymal cells, satellite cells, and Schwann cells.

Neurohypophysis. Gr. *Neuron*, nerve + *hypophysis* (which see). An endocrine organ that is a ventral protuberance of the hypothalamus, comprising the median eminence of the tuber cinereum, the infundibular stem (which is the nervous tissue of the pituitary stalk) and the neural lobe or infundibular process, which is the major part of the posterior lobe of the pituitary gland.

Neurokeratin. Gr. *neuron*, nerve + *keras* (*kerat-*), horn. Fibrillar material consisting of proteins that remains after lipids have been dissolved from myelin sheaths.

Neurolemma. Gr. *neuron*, nerve + *lemma*, husk. Delicate sheath surrounding a peripheral nerve fiber consisting of a series of neurolemma cells or Schwann cells. Also spelled neurilemma.

Neuroma. Gr. *neuron*, nerve + *-oma*, indicating a tumor. Swelling of a severed or otherwise injured nerve, containing a profusion of axonal sprouts that have failed to regrow usefully.

Neuron. Gr. a nerve. Morphological unit of the nervous system consisting of the nerve cell body and its processes (dendrites and axon).

Neuropil. Gr. *neuron*, nerve + *pilos*, felt. Complex net of nerve cell processes that occupies the intervals between cell bodies in gray matter.

Neurosecretion. The activity of a cell that has the signaling properties of a neuron and the secretory properties of an endocrine cell: a neuron that releases a hormone into the blood. **Nociceptive.** L. *noceo*, I injure + *capio*, I take. Responsive to injurious stimuli.

Nucleolus. Diminutive of *nucleus* (see below). An inclusion within the nucleus of a cell, composed of protein and RNA.

Nucleus. L. nut, kernel. (1) Body in a cell that contains, in the DNA of its chromosomes, the genetic information that encodes the amino acid sequences of proteins. (2) Collection of neuronal cell bodies, which may be large (like the caudate nucleus) or microscopic (like many nuclei in the brain stem).

Nystagmus. Gr. *nystagmos*, a nodding, from *nystazein*, to be sleepy. Involuntary oscillation of the eyes.

Obex. L. barrier. Small transverse fold overhanging the opening of the fourth ventricle into the central canal of the closed portion of the medulla.

Oligodendrocyte. Gr. *oligos*, few + *dendron*, tree + *kytos*, hollow (cell). Type of neuroglial cell. Forms the myelin sheath in the central nervous system in the same manner as the Schwann cell in peripheral nerves.

Olive. L. *oliva*. Oval bulging of the lateral area of the medulla. Inferior, accessory, and superior olivary nuclei.

Ontogeny. Gr. *ontos*, being + *genesis*, generation. Development of an individual. The adjective **ontogenetic**, which means much the same as "embryological" or "developmental," is used in contrast to "phylogenetic" (which see).

Operculum. L. a cover or lid, from L. *opertum*, covered. Frontal, parietal, and temporal opercula bound the lateral sulcus of the cerebral hemisphere and conceal the insula.

Oxytocin. Gr. *oxys*, sharp + *tokos*, birth. An octapeptide hormone of the neurohypophysis that

stimulates the smooth muscle of the uterus and the myoepithelial cells of the mammary glands.

Pachymeninx. Gr. *pachys*, thick + *meninx*, membrane. Dura mater.

Paleocerebellum. Gr. *palaaios*, old + diminutive of cerebrum. Phylogenetically old part of the cerebellum that functions in postural changes and locomotion.

Paleocortex. Gr. *palaaios*, old + L. *cortex*, bark. Olfactory cortex consisting of three to five layers.

Paleostriatum. Gr. *palaaios*, old + L. *striatum*, striped or grooved. Phylogenetically older and efferent part of the corpus striatum; the globus pallidus or pallidum.

Pallidofugal. Pallidum (see below) + L. *fugere*, to flee from. Describes the axons of neurons in the globus pallidus that conduct impulses to other parts of the brain.

Pallidum. L. *pallidus*, (-um), pale. Globus pallidus of the corpus striatum; medial portion of the lentiform nucleus comprising the paleostriatum.

Pallium. L. cloak. Cerebral cortex with subjacent white matter, but usually used synonymously with cortex.

Paralysis. Gr. *paralysis*, secret undoing; from *para*, beside + *lyein*, to loosen. Loss of the power of motion.

Paraplegia. Gr. *para*, beside or beyond + *plege*, a stroke or blow. Paralysis of both legs and lower part of trunk.

Parenchyma. Gr. *parenchein*, to pour in beside. Essential and distinctive tissue of an organ. (The name is from an early notion that internal organs contained material poured in by their blood vessels.) **Paresis.** Gr. *parienai*, to relax. Partial paralysis.

Pathway. Eng. Route within the central nervous system consisting of interconnected populations of neurons that serve a common function. A pathway often contains one or more tracts.

Perikaryon. Gr. *peri*, around + *karyon*, nut, kernel. Cytoplasm surrounding the nucleus. Sometimes refers to the cell body of a neuron.

Perineum. Gr. *perinaion*. Region consisting of the genitalia, the anus and the immediately surrounding and intervening region.

Perineurium. Gr. *peri*, around + *neuron*, nerve. Cellular and connective tissue sheath surrounding a bundle of nerve fibers in a peripheral nerve.

Pernicious anemia. L. *per*, through + *necis*, of murder + Gr. *an*, negative + *haimos*, blood. Disease caused by failure to absorb vitamin B₁₂ (cyanocobalamin). The vitamin deficiency results in defective production of red blood cells and degeneration in the central nervous system, including subacute combined degeneration in the spinal cord.

Pes. L. foot. *Pes hippocampi*: anterior thickened end of the hippocampus that slightly resembles a cat's paw.

Phagocyte. Gr. *phagein*, to eat + *kytos*, vessel (cell). A cell that can engulf and internalize smaller objects such as bacteria and fragments of dead cells.

Phalangeal. Gr. *phalanx*, a formation of soldiers. Phalangeal cells are in lines alongside the sensory cells of the organ of Corti.

Phylogeny. Gr. *phy-lon*, race + *genesis*, origin. Evolutionary history, typically as deduced from comparative anatomy.

Pia mater. L. tender mother. Thin innermost layer of the meninges attached to the surface of the brain and spinal cord; forms the inner boundary of the subarachnoid space.

Pineal. L. *pineus*, relating to the pine. Shaped like a pine cone (pertaining to the pineal gland).

Plexus. L. plaited, interwoven. Arrangement of interwoven and intercommunicating nerve trunks or fibers or of blood vessels.

Pneumoencephalography. Gr. *pneuma*, air + *enkephalos*, brain + *graphe*, a writing. Replacement of cerebrospinal fluid by air followed by x-ray examination (pneumoencephalogram); permits visualization of the ventricles and subarachnoid space. This technique has been replaced by computed tomography (CT scan).

Pons. L. bridge. Part of the brain stem that lies between the medulla and the midbrain; appears to constitute a bridge between the right and left halves of the cerebellum.

Portal. L. *porta*, gate. A portal vein drains a capillary bed, but instead of joining larger veins that lead to the heart, it ends by branching into capillaries elsewhere.

Positron. (From *positive electron*.) Subatomic particle with the same mass as an electron and equal but opposite charge. Positrons emitted by radioactive elements combine with electrons, with elimination of matter and emission of x-rays. Detection of the latter forms the basis of positron emission tomography (PET).

Postpartum. L. *post*, after + *parturire*, to bring forth. Describes the condition of a mother who has recently given birth.

Progesterone. Steroid hormone secreted by the corpus luteum and the placenta.

Projection. L. *proiectus*, thrown forwards. Applied to the axons of a population of neurons and their sites of termination. Often used when the axons do not constitute a circumscribed tract.

Proprioceptor. L. *proprius*, one's own + *receptor*, receiver. One of the sensory endings in muscles, tendons, and joints; provides information concerning movement and position of parts of the body (proprioception).

Prosencephalon. Gr. *pros*, before + *enkephalos*, brain. Forebrain, consisting of the telencephalon (cerebral hemispheres) and diencephalon (thalamus and nearby structures).

Prosopagnosia. Gr. *prosopon*, person or face + *agnosia* (*q.v.*). Inability to recognize previously familiar faces.

Psalterium. Gr. *psalterion*, an ancient stringed instrument like a zither. The name is sometimes given to the posterior part of the body of the fornix, including the hippocampal commissure.

Ptosis. Gr. *ptosis*, a falling. Drooping of the upper eyelid.

Pulvinar. L. a cushioned seat. Posterior projection of the thalamus above the medial and lateral geniculate bodies.

Pump. A molecular channel in a cell membrane associated with enzymes that enable it to move ions in or out of the cell against a concentration gradient, with expenditure of energy.

Punctate. L. *punctum*, pricked. Apparently composed of dots, as when many axons or dendrites are seen in transverse section.

Putamen. L. shell. Larger and lateral part of the lentiform nucleus of the corpus striatum.

Pyramidal system. Corticospinal and corticobulbar tracts. So-called because the corticospinal tracts occupy the fancifully pyramid-shaped area on the ventral surface of the medulla. The term pyramidal tract refers specifically to the corticospinal tract.

Pyriform. L. *pyrum*, pear + *forma*, form. Piriform area is a region of olfactory cortex consisting of the uncus, limen insulae, and entorhinal area; has a pear-shaped outline in animals with a well-developed olfactory system.

Quadriplegia. L. *quadri*, four + Gr. *plege*, stroke. Paralysis that affects the four limbs. Also called tetraplegia.

Ramus. L. branch. One of the first branches (*dorsal*, *ventral*) of a spinal nerve, or a communicating branch going to (*white*) or from (*gray*) a sympathetic ganglion. Some branches of cerebral sulci are named as rami.

Raphe. Gr. seam. Anatomical structure in the midline. In the brain, several raphe nuclei are in the midline of the medulla, pons, and midbrain. Their names are partly latinized, as in nucleus raphes magnus (great nucleus of the raphe), etc.

Receptor. L. *receptus*, received. Word used in two ways in neurobiology: (a) Structure of any size or complexity that collects and usually also edits information about conditions inside or outside the body. Examples are the eye, the muscle spindle, and the free ending of the peripheral neurite of a sensory neuron. (b) Protein molecule embedded in the surface of a cell (or sometimes inside the cell) that specifically binds the molecules of hormones, neurotransmitters, drugs, or other substances that can change the activity of the cell.

Reticular. L. *reticularis*, pertaining to or resembling a net. Reticular formation of the brain stem.

Rhinal. Gr. *rhis*, nose, therefore related to the nose. Rhinal sulcus in the temporal lobe indicates the margin of the lateral olfactory area.

Rhinencephalon. Gr. *rhis* (rhin-), nose + *enkephalos*, brain. Obsolete term that referred to components of the olfactory system. In comparative neurology, structures incorporated in the limbic system (especially the hippocampus and dentate gyrus) were included.

Rhombencephalon. Gr. *rhombos*, a lozenge-shaped figure + *enkephalos*, brain. Pons and cerebellum (metencephalon) and medulla (myelencephalon).

Roentgenogram. After Wilhelm Konrad Roentgen (1845-1923), who discovered x-rays, + Gr. *gramma*, a letter or record. Picture made with x-rays; more often called an x-ray or a radiograph.

Rostral. L. beak. Along the axis of the central nervous system, towards the nose. In human anatomy, approximately equivalent in the brain stem and spinal cord to "superior," and in the forebrain to "anterior". Opposite of caudal.

Rostrum. L. beak. Recurved portion of the corpus callosum, passing backward from the genu to the lamina terminalis.

Rubro-. L. *ruber*, red. Pertaining to the red nucleus (nucleus ruber), as in rubrospinal and corticorubral.

Saccadic. Fr. *saccader*, to jerk. Saccadic or quick movements of the eyes in altering direction of gaze.

Satellite. L. *sattetes*, attendant. Satellite cells: flattened cells of ectodermal origin that encapsulate nerve cell bodies in ganglia. Also satellite oligodendrocytes adjacent to nerve cell bodies in the central nervous system.

Scotoma. Gr. *skotos*, darkness. A blind area in the field of vision, due to damage in the retina or central nervous system.

Septal area. Area ventral to the genu and rostrum of the corpus callosum on the medial aspect of the frontal lobe that is the site of the septal nuclei.

Septum pellucidum. L. partition + transparent. Triangular double membrane between the frontal horns of the lateral ventricles; it fills in the interval between the corpus callosum and the fornix.

Somatic. Gr. *somatikos*, bodily. Denoting the body, exclusive of the viscera (as in somatic

efferent neurons that supply the skeletal musculature).

Somatosensory. Having to do with somatic sensation. Synonymous with **Somesthetic** (which see).

Somatotopic. Gr. *soma*, body + *topos*, place. Representation of parts of the body in corresponding parts of the brain.

Somesthetic. Gr. *soma*, body + *aisthesis*, perception. Consciousness of having a body. Somesthetic senses are those of pain, temperature, touch, pressure, position, movement, and vibration. Also spelled somaesthetic.

Splenium. Gr. *splenion*, bandage. Thickened posterior extremity of the corpus callosum.

Squint. From Middle English *asquint*, with the eyes askew. See also **strabismus**.

Stellate. L. *stella*, star. Stellate neuron has many short dendrites that radiate in all directions.

Stenosis. Gr. *stenos*, narrow. Abnormal narrowing of a tube or passage.

Stereotaxic. Gr. *stereos*, solid + *taxis*, arrangement. Relating to a surgical procedure for introducing the tip of an electrode or other instrument into a predetermined position within the brain. The position is calculated from three-dimensional coordinates based on bony landmarks and supplemented by images obtained by CT or NMRI.

Strabismus. Gr. *strabismos*, a squinting. Constant lack of parallelism of the visual axes of the eyes. Also known as a **squint**. (This is the only correct usage of the word squint.)

Stria terminalis. L. a furrow, groove + boundary, limit. Slender strand of fibers running along the medial side of the tail of the caudate nucleus. Originating in the amygdaloid body, most of the fibers end in the septal area and hypothalamus.

Striatum. L. *striatus*, furrowed. Phylogenetically more recent part of the corpus striatum (neostriatum) consisting of the caudate nucleus and the putamen or lateral portion of the lentiform nucleus. In comparative anatomy, striatum refers to a region of the brain in fishes, amphibians, and reptiles that is comparable to the corpus striatum of mammals.

Subiculum. L. diminutive of *subex* (*subic-*), a layer. Transitional cortex between that of the parahippocampal gyrus and the hippocampus.

Substantia gelatinosa. Column of small neurons at the apex of the dorsal gray horn throughout the spinal cord.

Substantia nigra. L. black substance. Large nucleus with motor functions in the midbrain; many of the constituent cells contain melanin.

Subthalamus. L. under + Gr. *thalamos*, inner chamber. Region of the diencephalon beneath the thalamus, containing fiber tracts and the subthalamic nucleus.

Sudomotor. L. *sudor*, sweat + *motor*, mover. Applies to sympathetic neurons that stimulate secretion from sweat glands.

Synapse. Gr. *synapsis*, junction. Word introduced by Sherrington in 1897 for the site at which one neuron is excited or inhibited by another neuron.

Syndrome. Gr. *syndrome*, the act of running together or combining. Collection of concurring clinical symptoms and signs. A syndrome usually is due to a single cause. The word is often used incorrectly as a synonym for "disease."

Syringomyelia. Gr. *syrinx*, pipe, tube + *myelos*, marrow. Condition characterized by central cavitation of the spinal cord and gliosis around the cavity.

Tangential. L. *tangens*, touching. In the direction of a line or plane that touches a curved surface. Used in anatomy for a plane of section approximately parallel to the surface of an organ.

Tanycyte. Gr. *tanyo*, stretch + *kytos*, hollow (cell). Specialized type of elongated ependymal cell present in the floor of the third ventricle.

Tapetum. L. *tapete*, a carpet. Fibers of the corpus callosum sweeping over the lateral ventricle and forming the lateral wall of its temporal horn.

Tectum. L. roof. Roof of the midbrain consisting of the paired superior and inferior colliculi.

Tegmentum. L. cover, from *tego*, to cover. Dorsal portion of the pons; also the major portion of the cerebral peduncle of the midbrain, lying between the substantia nigra and the tectum.

Tela choroidea. L. a web + Gr. *chorioeides*, like a membrane. Vascular connective tissue continuous with that of the pia mater that continues into the core of the choroid plexuses.

Telencephalon. Gr. *telos*, end + *enkephalos*, brain. Cerebral hemispheres; the more lateral and rostral of the two divisions of the prosencephalon or forebrain.

Telodendria. Gr. *telos*, end + *dendrion*, tree. Terminal branches of axons.

Tentorium. L. tent. Tentorium cerebelli is a dural partition between the occipital lobes of the cerebral hemispheres and the cerebellum.

Tetraplegia. Gr. *tetra-*, four + *plege*, a blow or stroke. Paralysis that affects the four limbs. Also called quadriplegia.

Thalamus. Gr. *thalamos*, an inner chamber; also meant a bridal couch, so that the pulvinar (*q.v.*) was its cushion or pillow. Galen made up the word thalamus, and Willis was probably the first to use the word in its modern sense.

Threshold. O.E. *therswald*, a house's door sill or point of entry. In physiology, the point at which a stimulus brings about a response.

Thrombus. Gr. *thrombos*, clot. Clotted blood in a living blood vessel. Thrombosis occurs at sites of irregularity, typically due to atheroma in arteries.

Tomography. Gr. *tomos*, cutting + *graphein*, to write. Production of images of sections through a part of the body. Computed tomography with x-rays and nuclear magnetic resonance imaging are valuable diagnostic techniques.

Tone, tonus. Gr. *tonos*, pitch (sound), or tension. The normal state of firmness and elasticity of muscles caused by partial contraction of some of their fibers.

Tonofibril. Gr. *tonos*, or tension + L. *fibra*, thread. An intracellular filament that contributes to maintaining the shape and position of a cell.

Torcular. L. wine press, from *torquere*, to twist. Confluence of the dural venous sinuses at the internal occipital protuberance was formerly known as the torcular Herophili.

Tract. L. *tractus*, a region or district. Region of the central nervous system largely occupied by a population of axons that all have the same origin and destination (which often form the name, as in "spinothalamic tract").

Transducer. L. *transducere*, to lead across. Structure or mechanism for converting one form of energy into another; applied to sensory receptors.

Trapezoid body. Transverse fibers of the auditory pathway situated at the junction of the dorsal and ventral portions of the pons.

Trigeminal. L. born three at a time. Trigeminal nerve has three large branches or divisions.

Trochlear. L. *trochlea*, a pulley. Trochlear nerve supplies the superior oblique muscle, whose tendon passes through a fibrous ring, the trochlea. This ring changes the direction in which the muscle pulls.

Uncinate. L. hook-shaped. Uncinate fasciculus: association fibers connecting cortex of the

ventral surface of the frontal lobe with that of the temporal pole. Also a bundle of fastigiobulbar fibers (uncinate fasciculus of Russell) that curves over the superior cerebellar peduncle in its passage to the inferior cerebellar peduncle.

- Uncus.** L. a hook. Hooked-back portion of the rostral end of the parahippocampal gyrus of the temporal lobe, constituting a landmark for the lateral olfactory area.
- Uvula.** L. little grape. A part of the inferior vermis of the cerebellum.
- Vagus.** L. wandering. Tenth cranial nerve is so named on account of the wide distribution of its branches in the thorax and abdomen.
- Vallecula.** L. diminutive of *vallis*, valley. Midline depression on the inferior aspect of the cerebellum.
- Varicosity.** L. *varix*, a varicose vein. In the nervous system, one of many dilations along the course of a neurite.
- Vasopressin.** L. vessel + pressure. An octapeptide hormone of the neurohypophysis. Large doses increase blood pressure by constricting small arteries. The alternative name of *antidiuretic hormone* describes its physiological action on the kidney.
- Velate.** L. *velum*, sail, curtain, veil. Velate or protoplasmic astrocytes have flattened processes.
- Velum.** L. sail, curtain, veil. Membranous structure. Superior and inferior medullary vela forming the roof of the fourth ventricle.
- Ventricle.** L. *ventriculus*, diminutive of *venter*, belly. Lateral, third, and fourth ventricles of the brain.
- Vergence.** L. *vergere*, to bend or incline. Relating to coordinated movements of both eyes in opposite directions, either medially (*convergence*) or laterally (*divergence*).
- Vermis.** L. worm. Midline portion of the cerebellum. Its ventral surface looks a little like a folded earthworm.
- Vestibular.** L. *vestibulum*, forecourt or entrance hall. Relating to the equilibratory sense organs of the inner ear, which are connected with a common cavity, the vestibule of the labyrinth.
- Zona incerta.** L. *zona*, belt + uncertain. Gray matter in the subthalamus representing a rostral extension of the reticular formation of the brain stem.
- Zonula occludens.** L. diminutive of *zona*, belt + occluding. Also known as a tight junction. Form of continuous close apposition of the membranes of neighboring cells, impermeable to macromolecules.

Eponyms

- Adamkiewicz, Albert (1850-1921)** Polish pathologist who described the blood supply of the human spinal cord (an anterior radicular artery supplying the lumbar region of the spinal cord known as the artery of Adamkiewicz).
- Adie, William John (1886-1935)** English clinical neurologist. The Holmes-Adie pupil is large and reacts slowly to light.
- Alzheimer, Alois (1884-1915)** German neuropsychiatrist who also made important contributions to neuropathology. Studied presenile and senile dementia, describing in 1907 the condition now known as Alzheimer's disease.
- Argyll Robertson, Douglas Moray Cooper Lamb (1837-1909)** Scottish ophthalmologist. The Argyll Robertson pupil includes, among other signs, pupillary constriction in

accommodation, but not in response to light.

Auerbach, Leopold (1828-1897) German anatomist. Auerbach's plexus (myenteric plexus) in the gastrointestinal tract; end bulbs of Held-Auerbach (synaptic terminals or boutons terminaux).

Babinski, Joseph François Félix (1857-1932) French clinical neurologist of Polish origin. The Babinski sign, which consists of up-turning of the great toe and spreading of the toes on stroking the sole, is characteristic of an upper motor neuron lesion.

Baillarger, Jules Gabriel François (1806-1891) French psychiatrist. The lines of Baillarger consist of two transverse strata of nerve fibers in the cerebral cortex.

Bainbridge, Francis Arthur (1874-1921) British physiologist who found that an increase of pressure on the venous side of the heart accelerates the heart rate.

Balint, Rezsoe (1874-1929) Hungarian clinical neurologist and psychiatrist. The Balint syndrome is a combination of visual disorientation, ocular apraxia and optic ataxia, due to bilateral destructive lesions in the superior parts of the occipital and parietal lobes.

Beevor, Charles Edward (1854-1908) English clinical neurologist who contributed to our knowledge of neurology, especially with respect to localization of function in the cerebral cortex.

Bell, Sir Charles (1774-1842) Scottish anatomist, clinical neurologist, and surgeon. Bell's palsy is a form of facial paralysis caused by interruption of conduction by the facial nerve. The Bell-Magendie law states that dorsal spinal roots are sensory, whereas ventral roots are motor.

Bernard, Claude (1813-1878) French physiologist and one of the great investigators of the 19th century. Established experimental physiology as an exact science. One of his contributions was the demonstration of vasomotor mechanisms.

Betz, Vladimir A. (1834-1894) Russian anatomist. Betz discovered and described the giant pyramidal cells (Betz cells) in the motor area of the cerebral cortex.

Bielschowsky, Max (1869-1940) German neuropathologist and clinical neurologist who developed Bielschowsky's silver staining method for nerve cells and fibers.

Bodian, David (1910-1992) American anatomist who developed a stain for nerve cells and fibers, using the organic silver compound protargol.

Bowman, Sir William (1816-1892) English anatomist and ophthalmologist. His name is associated with glands in the olfactory mucosa, the capsule of the renal glomerulus, and a layer in the cornea.

Breuer, Josef (1842-1925) Austrian physician and psychologist who contributed to our knowledge of reflexes controlling respiratory movements.

Broca, Pierre Paul (1824-1880) French pathologist and anthropologist. Broca localized the cortical motor speech area in the inferior frontal gyrus; also described a band of nerve fibers (the diagonal band of Broca) in the anterior perforated substance on the ventral surface of the cerebral hemisphere.

Brodal, Alf (1910-1988) Norwegian neuroanatomist who made numerous contributions to knowledge of the reticular formation, cranial nerves, cerebellum, and other aspects of neuroanatomy, including the nucleus Z of Brodal and Pompeiano (in the medulla). One of his most famous papers was, "Self-observations and neuro-anatomical considerations after a stroke," (*Brain* 96:675-694, 1973).

Brodmann, Korbinian (1868-1918) German neuropsychiatrist. Brodmann's cytoarchitectural map of the cerebral cortex is used frequently when referring to specific regions of the

cortex.

Brown-Séquard, Charles Edouard (1817-1894) Physiologist and clinical neurologist. Born in the Crown Colony of Mauritius of American and French parents, he retained British citizenship even though his professional life was spent in several countries. The Brown-Séquard syndrome consists of the sensory and motor abnormalities that follow hemisection of the spinal cord.

Bruch, Karl Wilhelm Ludwig (1819-1884) German anatomist. Bruch's membrane is the innermost layer of the choroid of the eye, separating the capillary layer of the choroid from the retina.

Bucy, Paul Clancy (1904-1992) American neurosurgeon. The Klüver-Bucy syndrome is caused by extensive bilateral lesions of the temporal lobes. He also found that selective corticospinal tract lesions did not cause hemiplegia.

Büngner, Otto von (1858-1905) German clinical neurologist who described the endoneurial tubes containing modified Schwann cells in the distal portion of a sectioned peripheral nerve (bands of von Büngner).

Cajal See Ramón y Cajal.

Cannon, Walter Bradford (1871-1945) American physiologist who contributed much to our understanding of autonomic regulation of visceral functions. Among other contributions he demonstrated the "fight or flight" reaction to stress.

Chiari, Hans (1851-1916) Czech physician, after whom the Chiari malformation (medulla and cerebellar tonsils in the upper cervical spinal canal) is named.

Clark, Sir Wilfrid Edward Le Gros (1895-1971) English anatomist who made important contributions to comparative neuroanatomy, especially of sensory systems, and to primate paleontology.

Clarke, Jacob Augustus Lockhard (1817-1880) English anatomist and clinical neurologist. Among numerous contributions, Clarke described the nucleus dorsalis (thoracicus) of the spinal cord, known as Clarke's column.

Corti, Marchese Alfonso (1822-1888) Italian histologist who described the sensory epithelium of the cochlea (organ of Corti).

Cushing, Harvey (1869-1939) Pioneer American neurosurgeon. Cushing contributed to many basic aspects of neurology, including the function of the pituitary gland, pituitary tumors, tumors of the eighth cranial nerve, and classification of brain tumors.

Darkschewitsch, Liverij Osipovich (1858-1925) Russian clinical neurologist who discovered the nucleus of Darkschewitsch, one of the accessory oculomotor nuclei in the midbrain.

de Egas Moniz, António Caetano de Abreu Friere (1874-1955) Portuguese physician who was awarded the Nobel Prize for Medicine and Physiology in 1949 for demonstration of the therapeutic value of prefrontal leukotomy. He introduced the technique of cerebral angiography in 1927.

Deiters, Otto Friedrich Karl (1834-1863) German anatomist. The lateral vestibular nucleus, which is the origin of the vestibulospinal tract, is known as Deiters' nucleus.

Dusser de Barenne, Johannes Gregorius (1885-1940) Dutch neurophysiologist who studied cortical function and introduced the technique of physiological neuronography.

Edinger, Ludwig (1855-1918) German neuroanatomist and clinical neurologist. An outstanding teacher of functional neuroanatomy and a pioneer in comparative neuroanatomy. The Edinger-Westphal nucleus is the parasympathetic component of the oculomotor nucleus.

Eustachio, Bartolemeo (1524-1574) Italian physician, surgeon, and anatomist. The auditory tube bears his name.

Ferrier, Sir David (1843-1928) Scottish neuropathologist, neurophysiologist, and clinical neurologist, best known for his studies of the motor and sensory areas of the cerebral cortex.

Foerster, Otfried (1873-1941) German clinical neurologist and neurosurgeon. Otfried made important contributions to the study of epilepsy, pain, the dermatomes, brain tumors, and the cytoarchitecture and functional localization of the cerebral cortex; he also introduced the chordotomy (tractotomy) operation for intractable pain.

Forel, Auguste Henri (1848-1931) Swiss neuropsychiatrist who described certain fiber bundles in the subthalamus, which are known as the fields of Forel. The ventral tegmental decussation of Forel in the midbrain consists of crossing rubrospinal fibers. Forel proposed the Neuron Theory on the basis of the response of nerve cells to injury.

Fritsch, Gustav Theodor (1838-1927) German anthropologist and anatomist. With Hitzig, he studied localization of motor function in the dog's cerebral cortex by electrical stimulation.

Frölich, Alfred (1871-1953) Austrian pharmacologist and clinical neurologist who described the adiposogenital syndrome, which is caused by a lesion involving the hypothalamus.

Galen, Claudius (130-200) Hellenistic physician, who practiced mainly in Rome and Pergamon. Galen was the leading medical authority of the Christian world for 1400 years. His name is attached to the great cerebral vein.

Gasser, Johann Laurentius Austrian anatomist of the 18th century. The sensory ganglion of the trigeminal nerve was named for him by one of his students, A.B.R. Hirsch, in 1765. **Gennari, Francesco (1750-1796?)** Italian physician who described the white line in the visual cortex, now known as the line of Gennari, while he was a medical student in Parma, Italy.

Golgi, Camillo (1843-1926) Italian histologist who introduced a silver staining method that provided the basis of numerous advances in neurohistology. Described type I and type II neurons and the tendon spindles, and the organelle now called the Golgi apparatus. Awarded the Nobel Prize for Medicine and Physiology in 1906 (with Ramón y Cajal).

Gray, Edward George (b. 1924) English biologist who has made numerous contributions to an appreciation of the ultrastructure of the nervous system. Gray's type I and type II synapses are named for him.

Grünbaum, Albert S.F. (later Leyton, A.S.F.) (1869-1921) British bacteriologist and physiologist who worked with Sir Charles Sherrington on functional localization of the cerebral cortex.

Gudden, Bernhard Aloys von (1824-1886) German neuropsychiatrist who described the partial crossing of nerve fibers in the optic chiasma together with certain small commissural bundles adjacent to the chiasma. He studied connections in the brain by observing changes subsequent to lesions made in the brains of young rabbits (the Gudden method). His pupils included Forel, Meynert, Monakow and Nissl. Gudden provided medical evidence that removed the mad king Ludwig II from the throne of Bavaria. He was allegedly murdered by his royal patient, who then committed suicide.

Gunn, Robert Marcus (1850-1909) English ophthalmologist. The Marcus Gunn pupil is a sign of impaired function of the retina or optic nerve. When a light is shone alternately in both eyes, the pupil of the affected side dilates or constricts only slightly.

Hamburger, Viktor (b. 1900) American (originally German) experimental embryologist,

famous for his studies on neuronal death in the developing nervous system.

Harris, Geoffrey Wingfield, (1913-1971) British anatomist who proved that the hypophysial portal system was a functional neurovascular link between the hypothalamus and the anterior lobe of the pituitary gland.

Head, Sir Henry (1861-1940) English clinical neurologist. Studied the dermatomes (Head's areas), cutaneous sensory physiology, and particularly the sensory disturbances and aphasia following cerebral lesions.

Held, Hans (1866-1942) German anatomist who made extensive studies of interneuronal relationships (axonal synaptic terminals or end bulbs of Held-Auerbach).

Henle, Friedrich Gustav Jacob (1809-1885) German anatomist and pioneer in histology. The endoneurial sheath surrounding individual fibers of a peripheral nerve is known as either the sheath of Henle or sheath of Retzius.

Hensen, Victor (1835-1924) German embryologist and physiologist who studied the anatomy and physiology of the sense organs (cells of Hensen in the organ of Corti).

Hering, Heinrich Ewald (1866-1948) German physiologist, best known for his study of the reflex that initiates expiration.

Herophilus (ca. 300-250 BC) Greek physician in Alexandria. Herophilus made early observations on the anatomy of the brain and other organs. The confluence of the dural venous sinuses at the internal occipital protuberance is known as the torcular Herophili.

Herrick, Charles Judson (1868-1960) American neuroanatomist who made many contributions to the embryology and comparative anatomy of the nervous system. Herrick was editor for 54 years of the *Journal of Comparative Neurology*, which was founded by his brother Clarence.

Herrick, Clarence Luther (1858-1904) American geologist and experimental zoologist. He conducted some of the first studies of functional localization in the motor cortex, in a variety of mammals, and founded the *Journal of Comparative Neurology*.

Heschl, Richard (1824-1881) Austrian anatomist and pathologist who described the anterior transverse temporal gyri (Heschl's convolutions), which serve as a landmark for the auditory area of the cerebral cortex.

Heubner, Johann Otto Leonhard (1843-1926) German pediatrician who described the recurrent branch of the anterior cerebral artery.

Hilton, John (1804-1878) English surgeon. Hilton's law states that the nerve supplying a joint also supplies the muscles that move the joint and the skin covering the articular insertions of those muscles.

His, Wilhelm (1831-1904) Swiss anatomist and a founder of human embryology. Proposed the Neuron Theory on the basis of his embryological studies of the development of nerve cells.

Hitzig, Eduard (1838-1907) German physiologist and clinical neurologist. Hitzig studied localization of motor function in the cerebral cortex of dogs and monkeys by electrical stimulation.

Holmes, Gordon Morgan (1876-1965) English clinical neurologist. His contributions include mapping of the visual cortex from clinical studies of patients with gunshot wounds of the brain during the First World War. The Holmes-Adie pupil, caused by death of neurons in the ciliary ganglion, is enlarged and reacts slowly to light.

Holmes, William British zoologist of the 20th century. Developed a silver staining method for axons. He also contributed to knowledge of axonal regeneration and comparative histology

of the peripheral nervous system.

Horner, Johann Friedrich (1831-1886) Swiss ophthalmologist who described Horner's syndrome, caused by interruption of the sympathetic innervation of the eye, which includes pupillary constriction and ptosis of the upper eyelid.

Horsley, Sir Victor Alexander Haden (1857-1916) A founder of neurosurgery in England. Horsley studied the motor cortex and other parts of the brain by electrical stimulation and introduced the Horsley-Clarke stereotaxic apparatus.

Hubel, David Hunter (b. 1926) American neurophysiologist (born and educated in Canada), who with T.N. Wiesel mapped the columnar organization of the monkey's visual cortex. Hubel shared the Nobel Prize for Medicine and Physiology with Sperry and Wiesel in 1981.

Hunter, John (1728-1793) British anatomist and pioneer surgeon of the 18th century. His collection of anatomical and pathological specimens formed the basis of the Hunterian Museum of the Royal College of Surgeons.

Huntington, George Sumner (1850-1916) American general medical practitioner. Huntington described a hereditary form of chorea resulting from neuronal degeneration in the corpus striatum and the cerebral cortex.

Inouye, Tatsuji (1881-1976) Japanese ophthalmologist who mapped the human visual cortex by plotting the visual fields of soldiers with gunshot wounds of the brain incurred in 1905 during the Russo-Japanese war.

Jackson, John Hughlings (1835-1911) English clinical neurologist and pioneer of modern neurology. Jackson gave a thorough description of focal epilepsy (jacksonian seizures), resulting from local irritation of the motor cortex.

Kallmann, Franz Josef (1897-1965) German (later American) psychiatrist. Kallmann's syndrome of hypogonadism and anosmia is now attributed to failure of migration of cells from the olfactory placode into the brain.

Kappers, C.U. Ariens (1878-1946) Dutch neuroanatomist and Director of the Central Brain Institute in Amsterdam. His many contributions include the theory of neurobiotaxis, anthropological studies of the brain, and cytoarchitectonics of the cerebral cortex.

Key, Ernst Axel Henrik (1832-1901) Swedish histologist. The lateral apertures of the fourth ventricle are sometimes called foramina of Key and Retzius.

Klüver, Heinrich (1897-1979) American psychologist. The Klüver-Bucy syndrome is caused by bilateral lesions of the temporal lobes.

Kölliker, Rudolf Albert von (1817-1905) German physiologist and comparative anatomist. Initially an opponent and later a supporter of the neuron doctrine. The Kölliker-Fuse nucleus is in the medial group of parabrachial nuclei.

Korsakoff, Sergei Sergeievich (1854-1900) Russian psychiatrist. Korsakoff's psychosis or syndrome, which is usually a sequel of chronic alcoholism, includes a memory defect, fabrication of ideas, and polyneuritis.

Krause, Wilhelm Johann Friedrich (1833-1910) German anatomist who described sensory endings in the skin, including the end bulbs of Krause.

Labbé, Léon (1832-1916) French surgeon. Studied the veins of the brain (lesser anastomotic veins of Labbé).

Lancisi, Giovanni Maria (1654-1720) An Italian physician whose patients included three successive Popes. The longitudinal striae in the indusium griseum are known as the striae of Lancisi.

Langley, John Newport (1852-1925) English physiologist best known for his studies of the autonomic nervous system, a term that he introduced in 1898.

Lanterman, A. J. American anatomist of the 19th century who described the incisures of Schmidt-Lanterman in myelin sheaths of peripheral nerve fibers.

Lewis, Sir Thomas (1881-1945) British physician noted for studies of human physiology, especially as related to the heart and blood vessels, and of referred pain.

Leydig, Franz von (1821-1908) German anatomist. Discovered the interstitial cells of the testis, which are now known to secrete androgenic steroid hormones, notably testosterone.

Lissauer, Heinrich (1861-1891) German clinical neurologist who described the dorsolateral fasciculus of the spinal cord (Lissauer's tract or zone).

Luschka, Hubert von (1820-1875) German anatomist. Among other contributions to anatomy, Luschka described the lateral apertures of the fourth ventricle (foramina of Luschka; also called the foramina of Key and Retzius). **Luys, Jules Bernard (1828-1895)** French clinical neurologist who described the subthalamic nucleus (nucleus of Luys), whose degeneration causes hemiballismus, and the thalamic *centre médian* or centromedian nucleus.

Magendie, François (1783-1855) French physiologist and pioneer of experimental physiology. The sensory function of dorsal spinal nerve roots and motor function of ventral roots constitute the Bell-Magendie law. Magendie also described the median aperture of the fourth ventricle (foramen of Magendie).

Marchi, Vittorio (1851-1908) Italian physician and histologist who developed the Marchi staining method for tracing the course of degenerating myelinated fibers.

Martinotti, Giovanni (1857-1928) Italian physician and student of Golgi who described a type of neuron known as the cell of Martinotti in the cerebral cortex.

Mazzoni, Vittorio Italian physician of the 19th century. The Golgi-Mazzoni ending is a type of sensory receptor.

Meckel, Johann Friedrich (1714-1774) German anatomist especially known for his careful description of the trigeminal nerve. The trigeminal ganglion is situated in an extension of the meninges called Meckel's cave.

Meissner, Georg (1829-1905) German anatomist and physiologist. His name is associated with touch corpuscles in the dermis and the submucous nerve plexus of the gastrointestinal tract.

Ménière, Prosper (1801-1862) French otologist who described the syndrome characterized by episodes of vertigo, nausea, and vomiting occurring in some diseases of the internal ear.

Merkel, Friedrich Siegmund (1845-1919) German anatomist who described tactile endings in the epidermis, known as Merkel's disks.

Meyer, Adolph (1866-1950) American psychiatrist. The fibers of the geniculocalcarine tract that loop forward in the temporal lobe constitute Meyer's loop.

Meynert, Theodor Hermann (1833-1892) Austrian neuropsychiatrist. The habenulointerpeduncular fasciculus is also called the fasciculus retroflexus of Meynert. The dorsal tegmental decussation of Meynert in the midbrain consists of crossing tectospinal fibers. The nucleus basalis of Meynert is in the substantia innominata of the forebrain.

Monakow, Constantin von (1853-1930) Neurologist of Russian birth who lived in Switzerland. Monakow made fundamental contributions to the knowledge of the thalamus and brain stem. The dorsolateral region of the medulla is known as Monakow's area.

Moniz See de Egas Moniz.

Monro, Alexander (1733-1817) Scottish anatomist, also known as Alexander Monro (Secundus). Including tenure by his father (Primus) and son (Tertius), the Chair of Anatomy in the University of Edinburgh was occupied by Alexander Monros for over a century. The interventricular foramen between the lateral and third ventricles is known as the foramen of Monro.

Müller, Heinrich (1820-1864) German anatomist. Müller's orbital muscle and cells of Müller are in the retina.

Nissl, Franz (1860-1919) German neuropsychiatrist who made important contributions to neurohistology and neuropathology. Nissl introduced a method of staining gray matter with cationic dyes to show the basophil material (Nissl bodies) of nerve cells. **Pacchioni, Antonio (1665-1726)** Italian anatomist. The arachnoid villi become hypertrophied with age and are then known as arachnoid granulations or pacchionian bodies.

Pacini, Filippo (1812-1883) Italian anatomist and histologist. Described the sensory endings known as the corpuscles of Vater-Pacini.

Papez, John Wenceslas (1883-1958) American anatomist who made important contributions to comparative neuroanatomy and in 1937 postulated the involvement of the circuitry of the limbic system in emotional feeling and expression.

Parinaud, Henri (1844-1905) French ophthalmologist. His syndrome of paralysis of upward gaze (with sparing of convergence) is due to a lesion of the midbrain, typically due to pressure from a pineal tumor.

Parkinson, James (1775-1824) English physician, surgeon, and paleontologist. Parkinson described "shaking palsy" or paralysis agitans, which is more frequently called Parkinson's disease.

Penfield, Wilder Graves (1891-1976) Canadian neurosurgeon who made fundamental contributions to neurocytology and neurophysiology, including functions of the cerebral cortex, speech mechanisms, and pathological changes underlying epilepsy.

Perroncito, Aldo (1882-1929) Italian histologist who described whorls of regenerating axons (spirals of Perroncito) in the central stump of a sectioned peripheral nerve.

Pompeiano, Ottavio (b. 1927) Italian physiologist who has contributed to knowledge of the physiology of the cerebellum and vestibular nuclei. Nucleus Z was first described in the cat's medulla (by Brodal and Pompeiano) and later recognized in the human brain.

Purkinje, Johannes (Jan) Evangelista (1787-1869) Bohemian physiologist, pioneer in histological techniques, and an accomplished histologist. He described the Purkinje cells of the cerebellar cortex and Purkinje fibers in the heart, among others.

Ramón y Cajal, Santiago Felipe (1852-1934) Spanish histologist, who is foremost among neurohistologists. He was awarded the Nobel Prize for Medicine and Physiology (with Camillo Golgi) in 1906. Among innumerable contributions, Cajal vigorously championed the Neuron Doctrine on the basis of his observations with silver staining methods.

Ranvier, Louis-Antoine (1835-1922) French histologist and a founder of experimental histology. Ranvier described the nodes of Ranvier in the myelin sheaths of nerve fibers.

Rasmussen, Grant Litster (b. 1904) American neuroanatomist. His numerous contributions to neuroanatomy include description of the olivocochlear bundle (of Rasmussen).

Rathke, Martin Heinrich (1793-1860) German physiologist, pathologist, zoologist and anatomist. Rathke's pouch is the outgrowth of the embryonic pharynx that becomes the adenohypophysis.

Reil, Johann Christian (1759-1813) German physician. The insula, lying in the depths of the lateral sulcus of the cerebral hemisphere, is known as the island of Reil.

Reissner, Ernst (1824-1878) German anatomist. The vestibular membrane of the cochlea is known as Reissner's membrane.

Remak, Robert (1815-1867) German physician who described "gray nerve fibers" in peripheral nerves. A Remak fiber is a Schwann cell with included unmyelinated axons. **Renshaw, Birdsey (1911-1948)** American neurophysiologist. Certain interneurons in the ventral gray horn of the spinal cord are called Renshaw cells.

Retzius, Magnus Gustaf (1842-1919) Swedish histologist. The lateral apertures of the fourth ventricle are sometimes called foramina of Key and Retzius. In peripheral nerves the sheath of Retzius (also called sheath of Henle or sheath of Key & Retzius) is the endoneurial connective tissue that invests each nerve fiber.

Rexed, Bror (b. 1914) Swedish neuroanatomist who divided the gray matter of the spinal cord into regions (laminae of Rexed) on the basis of differences in cytoarchitecture.

Rio Hortega, Pio del (1882-1945) Spanish histologist who worked in his later years in England and Argentina. He is best known for his studies of neuroglial cells, especially the microglia.

Robin, Charles Philippe (1821-1885) French anatomist. The perivascular spaces of the brain are known as Virchow-Robin spaces.

Rolando, Luigi (1773-1831) Italian anatomist. Among various contributions to neurology, Rolando described the central sulcus of the cerebral hemisphere and the substantia gelatinosa of the spinal cord.

Roller, Christian Friedrich Wilhelm (1802-1878) German psychiatrist. One of the perihypoglossal nuclei is known as the nucleus of Roller.

Romberg, Moritz Heinrich (1795-1873) German clinical neurologist. Romberg's sign of impaired proprioceptive conduction in the spinal cord consists of abnormal unsteadiness when standing with the feet together and the eyes closed.

Rosenthal, Friedrich Christian (1779-1829) German anatomist who studied the veins of the brain (basal vein of Rosenthal).

Ruffini, Angelo (1864-1929) Italian anatomist who described sensory endings, especially those known as the end bulbs of Ruffini.

Russell, James Samuel Risien (1863-1939) British physician and clinical neurologist. Russell published on diseases of the nervous system and described the uncinata fasciculus of efferent cerebellar fibers.

Scarpa, Antonio (1747-1832) Italian anatomist and surgeon who made numerous contributions to anatomy, including a description of the vestibular ganglion.

Schäffer, Max (1852-1923) German clinical neurologist. The Schäffer collaterals are branches of the axons of hippocampal pyramidal cells. They synapse with the dendrites of other pyramidal cells. Schäffer's reflex (dorsiflexion of the big toe when Achilles' tendon is pinched) is similar to the Babinski reflex.

Schmidt, Henry D. (1823-1888) American anatomist and pathologist. Schmidt described the incisures of Schmidt-Lanterman in myelin sheaths of peripheral nerve fibers.

Schütz, H. German anatomist of the 19th century who described the dorsal longitudinal fasciculus of the brain stem in 1891.

Schwann, Theodor (1810-1882) German anatomist who formulated the Cell Theory (with M. J. Schleiden) and described the neurolemmal cells (Schwann cells) of peripheral nerve

fibers.

- Sherrington, Sir Charles Scott (1856-1952)** English neurophysiologist and a major contributor to basic knowledge of the function of the nervous system. His researches included studies of reflexes, decerebrate rigidity, reciprocal innervation, the synapse, and the concept of the integrative action of the nervous system.
- Sömmering, Samuel Thomas von (1755-1830)** German anatomist and surgeon who recognized the difference between gray matter and white matter and gave the cranial nerves the numbers that are still used.
- Sperry, Roger Wolcott (1913-1994)** American neurobiologist. Sperry made major contributions to the knowledge of development of specific connections in the brains of fishes and amphibians, and of the functions of the human corpus callosum. He received the Nobel Prize for Medicine and Physiology, 1981, which he shared with Hubel and Wiesel.
- Sydenham, Thomas (1624-1689)** English physician, known as the English Hippocrates. Described the form of chorea to which his name is attached.
- Sylvius, Francis De La Boe (1614-1672)** French anatomist who gave the first description of the lateral sulcus of the cerebral hemisphere.
- Sylvius, Jacobus (also known as Jacques Dubois) (1478-1555)** French anatomist who described the cerebral aqueduct of the midbrain (aqueduct of Sylvius).
- Tinel, Jules (1879-1952)** French clinical neurologist. Tinel's sign, elicited by percussion in the region of a regenerating nerve, consists of a tingling sensation in the field of sensory distribution.
- Trolard, Paulin (1842-1910)** French anatomist who described the venous drainage of the brain (greater anastomotic vein of Trolard).
- Vater, Abraham (1684-1751)** German anatomist. Among other contributions, Vater described the sensory endings known as the corpuscles of Vater-Pacini.
- Vicq D'Azyr, Felix (1748-1794)** French anatomist and a leading comparative anatomist. The mamillothalamic fasciculus bears his name.
- Virchow, Rudolph Ludwig Karl (1821-1902)** German pathologist and founder of modern (or cellular) pathology. The perivascular spaces of the brain are known as Virchow-Robin spaces.
- Waldeyer, Heinrich Wilhelm Gottfried (1836-1921)** German anatomist who popularized the Neuron Doctrine on the basis of studies by Cajal, Forel, His, and others. Waldeyer cells in the dorsal horn of the spinal cord are named for him.
- Walker, A. Earl (b. 1907)** American neurosurgeon (born and educated in Canada) who made contributions to cerebellar and cerebral cortical physiology, anatomy and physiology of the thalamus, and various clinical topics.
- Wallenberg, Adolf (1862-1949)** German physician who described the lateral medullary syndrome.
- Waller, Augustus Volney (1816-1870)** English physician and physiologist who described the degenerative changes in the distal portion of a sectioned peripheral nerve, known as wallerian degeneration.
- Warwick, Roger (1912-1991)** British anatomist. Among other contributions, Warwick described the organization of the oculomotor nucleus with respect to the ocular muscles that it supplies.
- Weber, Sir Hermann David (1823-1918)** English physician who described the midbrain lesion causing hemiparesis and ocular paralysis.

- Weigert, Karl (1843-1905)** German pathologist who introduced several staining methods, including a stain for myelin in sections of nervous tissue.
- Wiesel, Torsten Nils (b. 1924)** Swedish neurobiologist who, with Hubel, discovered the columnar organization of the visual cortex of the monkey. He shared the Nobel Prize for Medicine and Physiology with Hubel and Sperry in 1981.
- Wernicke, Carl (1848-1905)** German neuropsychiatrist who made a special study of disorders in the use of language. Wernicke's sensory language area and Wernicke's aphasia are named for him.
- Westphal, Karl Friedrich Otto (1833-1890)** German clinical neurologist. Among other contributions to neurology, Westphal described the Edinger-Westphal nucleus in the oculomotor complex.
- Willis, Thomas (1621-1675)** English physician who was one of the dominant figures in medicine of the 17th century and a founder of the Royal Society. Among numerous contributions to the anatomy of the brain, he described the arterial circle that bears his name. Willis also named the thalamus as the destination of the optic tract, though his intention may have been to apply the name to the lateral ventricle rather than to a solid structure.
- Wilson, Samuel Alexander Kinnier (1878-1937)** British clinical neurologist who described hepatolenticular degeneration, known as Wilson's disease.
- Wrisberg, Heinrich August (1739-1808)** German anatomist. Among other contributions to anatomy, Wrisberg described the sensory root of the facial nerve (nervus intermedius of Wrisberg).
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