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Atlas of the HUMAN BRAIN

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Second Edition

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Preface

The great neuroanatomists of the first part of last century determined the structural plan of the human brain by investigating postmortem tissue with classic staining methods. Recent imaging techniques allow viewing the structure of the living brain and studying the workings of the brain. The ability to anneal the structural plan with imaging data led to dramatic progress in our understanding of the relationship between structure and function. The primary aim of this book is to relate the information from the classical neuroanatomical studies to the information obtained from magnetic resonance imaging (MRI), thus making available this wealth of detailed information to make the most of increasing resolution of imaging modalities. A further aim is to provide a myeloarchitectonic atlas of coronal sections of the human brain that will be of sufficient detail for the needs of those employing sensitive immunohistochemical and autoradiographic methods. Finally the atlas shall provide the basis for a 3-D brain model to be transformed to any individual brain.

This book consists of two major parts: (1) The Macroscopic Atlas presents three brains *in situ* sectioned in cardinal planes and (2) the Microscopic (Myeloarchitectonic) Atlas is comprised of 69 serial histological sections of one brain hemisphere with very detailed delineations. Both parts feature different aspects of brain morphology and topography. The surface anatomy of every brain is presented in a topometric space (a modified 3-D grid system defining the Talairach-Tournoux space, see below) together with the exact location of the sections.

The **Macroscopic Atlas** consists of serial macroscopic sections of three MRI-scanned human heads. Sectioning was made in the horizontal, coronal, and sagittal planes. The coronal section plane was angulated by –20°, such that the plane of the section is parallel to the brain stem axis and corresponds to the major ascending and descending fiber tracts. In each of these series the surface anatomy of the brain is presented, at first, together with a topometric grid. Further, the sections of the entire head are presented together with the brain *in situ.*The *in situ* sections ensure that no significant deformation of the brain occurred and allow correlation of bony landmarks, nerves, and blood vessels. In addition to the representation of macroscopic sections radiological images (X-ray from the same head and MR-images with different imaging parameters from a healthy volunteer) showing the same plane of the section are included. Structures seen in the skull/brain sections can be correlated with those clearly visible in MR-tomography.

The **Myeloarchitectonic Atlas** consists of 69 serial cross sections from a human brain that served in the past as the reference brain for many structural, immunohistochemical, and statistical studies. Altogether, more than 50 publications dealt with the anatomy of this particular brain, some of them are seminal cyto- and myeloarchitectonic works (Hassler, Brockhaus). In addition, numerous morphometric analyses of the main structures are also available for this particular brain (all publications are available on the accompanying CD-ROM in full text including original illustrations, figures, and morphometric data). It represents the first photographic and diagrammatic atlas of the human brain that has sufficient detail to be of value to the scientific community.

The photographs are facing line diagrams showing one entire hemisphere with gyri and sulci and all nuclei including subdivisions, delineated on the basis of a comprehensive structural analysis. (Serial sections between the represented levels used for delineations are made available on the accompanying CD-ROM). Preliminary versions of the line drawings have already been used in several published articles dealing with the structural and histochemical organization of the brain. Their suitability for the mapping of neurotransmitters, neuropeptides, receptors, and functional data has therefore been tested. Delineations can be followed from section to section enabling 3-D reconstruction of their confines and their neighborhood relations. Screen shots of several examples of 3-D reconstructions of subcortical structures are also provided.

Reproduction of Figures by Users of the Atlas

Please identify the figures you wish to use and allow approximately 4 weeks for your request to be processed. The authors would appreciate if users of the atlas would send reprints of publications (addressed directly to J.K. Mai) in which the atlas was used and which can shed light on the organization of regions.

Acknowledgements

The authors were fortunate to receive enduring assistance from a number of colleagues. We are particularly grateful to L. Lanta, who assisted in the description of the macroscopic sections, prepared the corresponding line drawings, and delineated the vasculatory territories of brain arteries and to H. Lange who made invaluable contributions to the macroscopic and microscopic delineation of

cortical areas. Significant improvements with respect to the definitions and delineations of particular forebrain structures were made thanks to the assistance and substantial contributions by Ferry Forutan (Thalamus), Christopher Hartz-Schütt (Striatum and pallidum), Ioury Koutcherov (Hypothalamus), Sybille Morres (Basal nuclear complex), and Armin Walter (Septal nuclei). We are indebted to U. Longerich and T. Sievert for making available their studies on the *in vivo / in vitro* correlation in magnetic resonance imaging. The brilliant work by T. Voß and J. Bongartz in converting the atlas data into electronic files is highly appreciated.

We are greatly endebted to many individuals, particularly Christiane Etzkorn, Gerrit Sütfels, Bojan Tomov and Dimiter Tzvetkov, for their invaluable and skilled help in the construction of image files and in image processing work. Christine Opfermann-Rüngeler is to be acknowledged for her illustrations of the surface views of the atlas brains.

Our special thanks go to those persons, who by their last will provided their bodies for educational and research purposes (in anatomy). We are grateful to H. Goslar and H. Hartwig for supporting the initiative of this study and for their allowance to use such cadavers. We are indebted to R. Wedemeier for the preparation and fixation and for his assistance during sectioning the cadaver heads. H. Tödter donated the macrotome, designed and constructed the cryosectioning and photographing devices. This and his endless help together with the invaluable assistance of E. Baseler and P. Sillmann were crucial to master the technical problems during the preparation of the first part of the atlas. Photographs of the archival section material used in this atlas were prepared with masterful excellence by A. Fahnenstich and Hong-Qin Wang.

This long lasting endeavor was only made possible by the initiatives, continued interest, and help of many persons. We owe special thanks to A. Hopf, former director of the C. and O. Vogt Institute who continuously supported this project and together with K. Zilles made possible the use of the archive material. We greatly appreciate the generous financial support for this project, which was provided by the C. and O. Vogt Society for Brain Research and also by a grant by the National Health and Medical Research Council of Australia. Finally, we are indebted to J. Menzel from Academic Press for his assistance and support at every phase of this edition.

Material and Methods

1.1 Macroscopic Atlas

1.1.1 Anatomical Preparations

Seventeen heads used for this study were from bodies donated to the Department of Anatomy, H.-Heine University of Duesseldorf. The studies were performed in accordance with established ethical standards. The cadavers were perfused via the radial veins first with physiological saline, then with fixative. The composition of the fixative changed as the study progressed. The heads were removed from the perfused cadavers within 36 hours after death and were placed in a wooden box with ear bars and head holders to allow exact positioning and fixing for subsequent sectioning. In this way the coordinates of the position box and the desired plane of anatomic sectioning were exactly aligned. The three heads presented in this atlas were perfused with a fixative containing 10% formalin, glycerol, and Incidin (Henkel, Duesseldorf). The heads were covered with linen and fixative to prevent the preparation from drying out between performance of the MRI and the freezing process.

1.1.2 Magnetic Resonance Imaging (MRI)

Pilot MRI Scans: Pilot MRI scans were performed with the heads in the wooden boxes to determine the effect of fixation and to detect pathological or artifactual changes. Out of 17 heads used for this part of the study, 4 showed severe neuropathological alterations, such as hemorrhage, focal lesions or tumor, which were not known before the MRI was performed. Five heads were excluded for technical reasons, namely: artifacts due to incomplete fixation, brain swelling or insufficient image resolution (MR imaging for this atlas started at 1984). Additionally two heads were later discarded from this study because of problems with cutting.

MR Scan Orientations: All heads were scanned in the horizontal, coronal, sagittal, and oblique coronal planes according to a standardized protocol The corresponding section planes were defined by (a) the intercommissural line and verticals intersecting this line in the center of the anterior and posterior commissures, and (b) the vertical to the brain stem axis (Meynert's plane). For defining additional planes, we used the cantho-meatal line and the orbital axis.

MR System and Scan Modes: For *in vitro* imaging and *in vivo / in vitro* correlation, scans and measurements were performed on a 0.15 Tesla superconductive magnet (Vista 2035, Picker International). For *in vitro* imaging we used a multislice double-echo sequence [spin-echo-sequence (SE) 5000/40/160] with four excitations to render proton (N(H))- and T2-weighted images. The slice thickness was 5 mm with a matrix of 256 x 256 and a field of view of 250 mm, resulting in a pixel size of 0.96 mm^2 and a voxel size of 4.8 mm^3. These scans are presented in the pages preceding the atlas figures of the horizontal, coronal, and sagittal sections (Sections, 2.1, 2.2 and 2.3, respectively). For *in vivo/in vitro* correlation, we used a single-slice technique with SE and inversion recovery (IR) sequences with the following parameters: SE (TR: 200, 800, 1600, 3200, 6400 ms combined with TE: 30, 40, 60, 80, 120, 160 ms) and IR (TR: 620, 1240, 2480 ms combined with TI: 32, 100, 150, 200, 300, 400, 500, 600, 700 ms). The slice thickness was 5 mm with a matrix of 256 x 256 and a field of view of 250 mm.

For *in vivo* imaging we used a 1.5 Tesla imager (Vista 2055 HPQ, Picker International) with standard protocols: SE 3000/100, resulting in proton- and T_2-weighted images; and IR 5000/600, resulting in T_1-weighted images, and multislice partial saturation (PS) sequence, PS 500/10 resulting in T_1-weighted images with partial fat suppression. The slice thickness was 5 mm with a matrix of 256 x 256 and a field of view of 250 mm. These images are presented in Sections 2.1 to 2.3 facing each macroscopic anatomical section.

1.1.3 MR Images: *In vivo / in vitro* Correlation

In autopsy brains, relaxation times, signal-to-noise ratio, and contrast are altered due to absence of the flow effect, cessation of metabolism, and fixation proce-

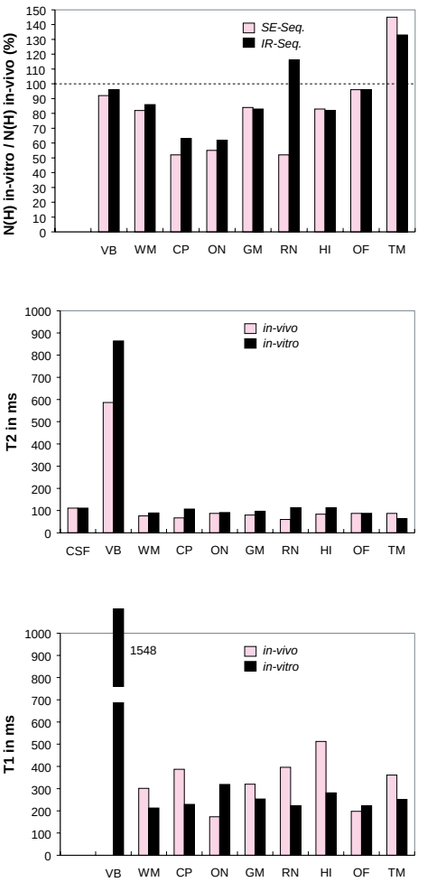


Figure 1. Comparison of T1 (spin-lattice relaxation) times, T2 (spin-spin relaxation) times, and N(H) values for different tissues between *in vivo* and *in vitro* conditions. The N(H) values are calculated from SE-sequences (red squares) and IR-sequences (black squares). They are presented as quotient of *in vitro* values to *in vivo* values in %. (Data from Longerich, 1989). Abbreviations: CSF: cerebrospinal fluid; VB: vitreous body; OF: orbital fat; ON: optic nerve; HI: hippocampus; WM: white matter; GM: gray matter, CP: cerebral peduncle; RN: red nucleus; TM: temporalis muscle.

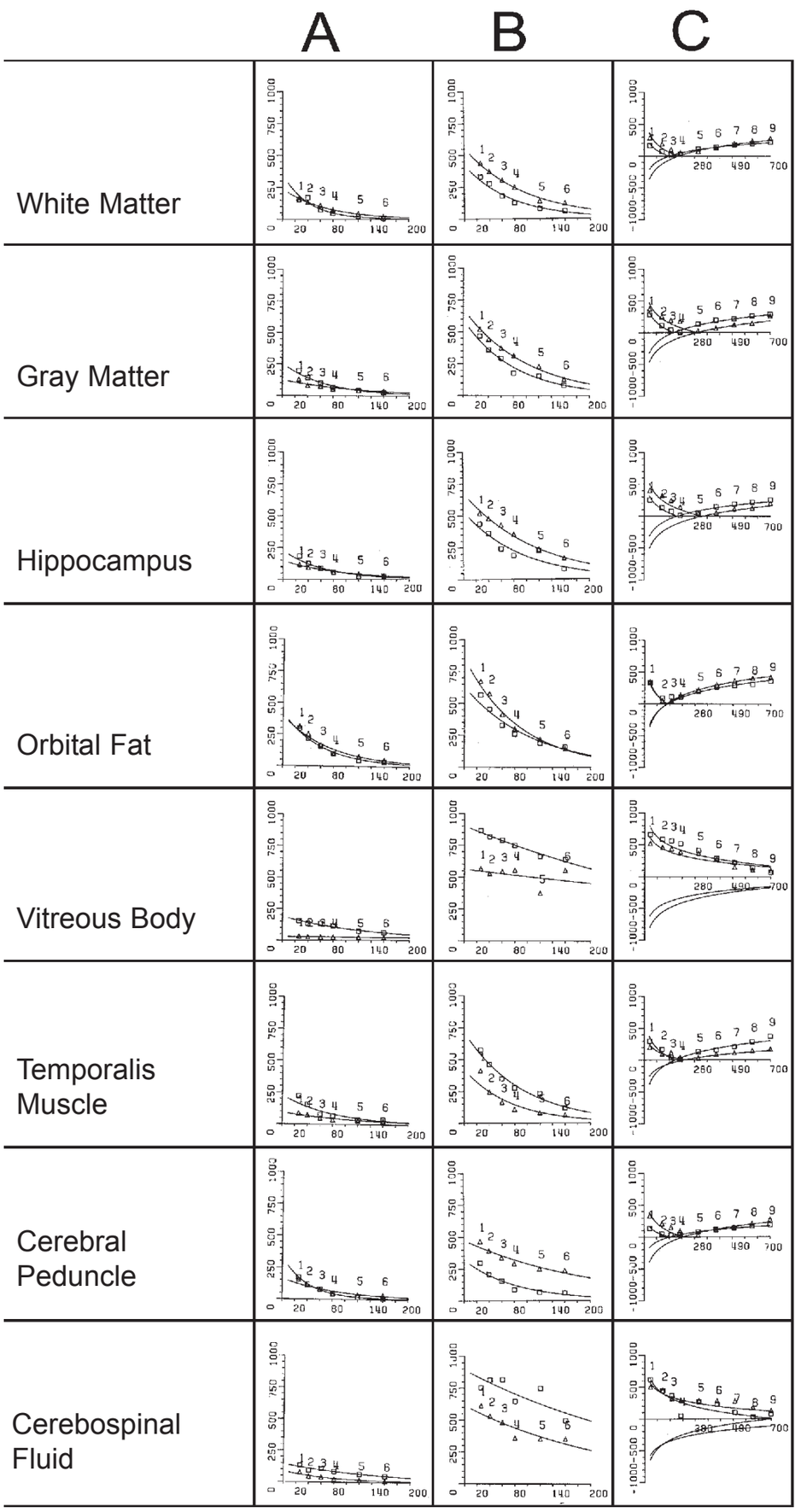


Figure 2. Regression curves of *in vivo* (open triangles) and *in vitro* (open squares) signal intensity measurements from 8 different tissues that show dependency of signal intensity (as gray values, Y-axis) from TE (in ms, X axis) and TI (in ms, X axis). A and B represent SE sequences with a TR of 200 ms (A) and 5000 ms (B). C represents IR-sequences with a TR of 2500 ms. T_1 and T_2 relaxation times are calculated from these curves.

dures. To perform comparative analysis between living and postmortem tissue the heads of two volunteers and of two cadaver heads were scanned with the same scanning parameters. T1 (spin-lattice) relaxation times, T_2 (spin-spin) relaxation times, and N(H) (proton density) values of the *in vivo* and *in vitro* tissues are represented in Fig. 1. Examples of regression curves of *in vivo / in vitro* measurements of signal intensities are shown in Fig. 2. Compared with the *in vivo* results, the *in vitro* tissues show large, nonlinear reduction in T1 relaxation times and N(H) values and small (negligible) changes in T2 relaxation times. A stable correlation exists between the *in vitro* and *in vivo* relaxation curves.

The different signal intensities were measured from the same tissue under *in vitro* and *in vivo* conditions and can be explained by the biophysical alterations in the different fractions of water ("three-fraction model") (Grösch and Noack, 1976) by temperature, formalin fixation, additives to fixation solution, and duration of tissue fixation (see Longerich, 1989).

These results show that the MR images of formalin-fixed cadaver heads not only are helpful in correlating *in vitro* tissue with the *in vivo* situation by means of structural gradients and contrast, but also can be used for quantitative image analysis. Estimation of the signal changes after formalin fixation may thereby aid characterization of human brain tissue by MRI before it is laminated and neuropathologically evaluated. Moreover, the addition of paramagnetic substances or shift reagents into the perfusion fluid can increase the regional contrast and demarcate boundaries of areas that are not evident in regularly performed scans. Prussian blue, for example, has been found to increase the signal in basal ganglia structures (see Mai et al., 1997).

1.1.4 Macroscopic Anatomy and Correlations between Skull and Brain

Preparation and Photography of 1cm Anatomical Sections: Immediately after the MR scans, the wooden box with the

head fixed by plastic ear bars was filled with Styropore and water and then cooled to -45°C. Both the position box and the fixed head were sectioned at the desired plane at 1-cm thickness (cryomacrotomy). The head sections were then freed from the surrounding material, cleaned, and photographed together with a scale bar. Then the sections were transferred into preservation fluid.

Radiographs and Visualization of Blood Vessels with Radiopaque Material: From the head slices, radiographs were prepared from single sections and from stacks of sections. Contrast media were then injected into cut ends of larger blood vessels and the radiographs were repeated.

Staining: After photography and radiologic examination, the sections were block-stained in either Sudan red or Sudan black B. Sections were incubated in 1% stain solution in 70% alcohol and differentiated on average of 3 months.

Dissection of Anatomical Slices and Interpretation of Cortical Gyri: Before dissection of the head and neck structures, the brain slices were removed from the skull. The single brain sections were mounted according to their *in vivo* situation and photographs were then made to document the gyrification pattern. After the individual gyri and sulci were named, the brain was represented diagrammatically, taking into account the loss of tissue due to cutting.

Documentation of Gross Morphological Features: Drawings were based on enlarged photographs of the anatomical slices. Additional information revealed by the radiographs and during the process of dissection were later incorporated.

1.1.5 Preparation of 100 µm Thick Frozen Histological Brain Sections

After removal from the skull case and photography of the assembled brain slices, the slices were immersed for 48 hours in a fixative containing 4% formalin and 30% sucrose. Each slice was then

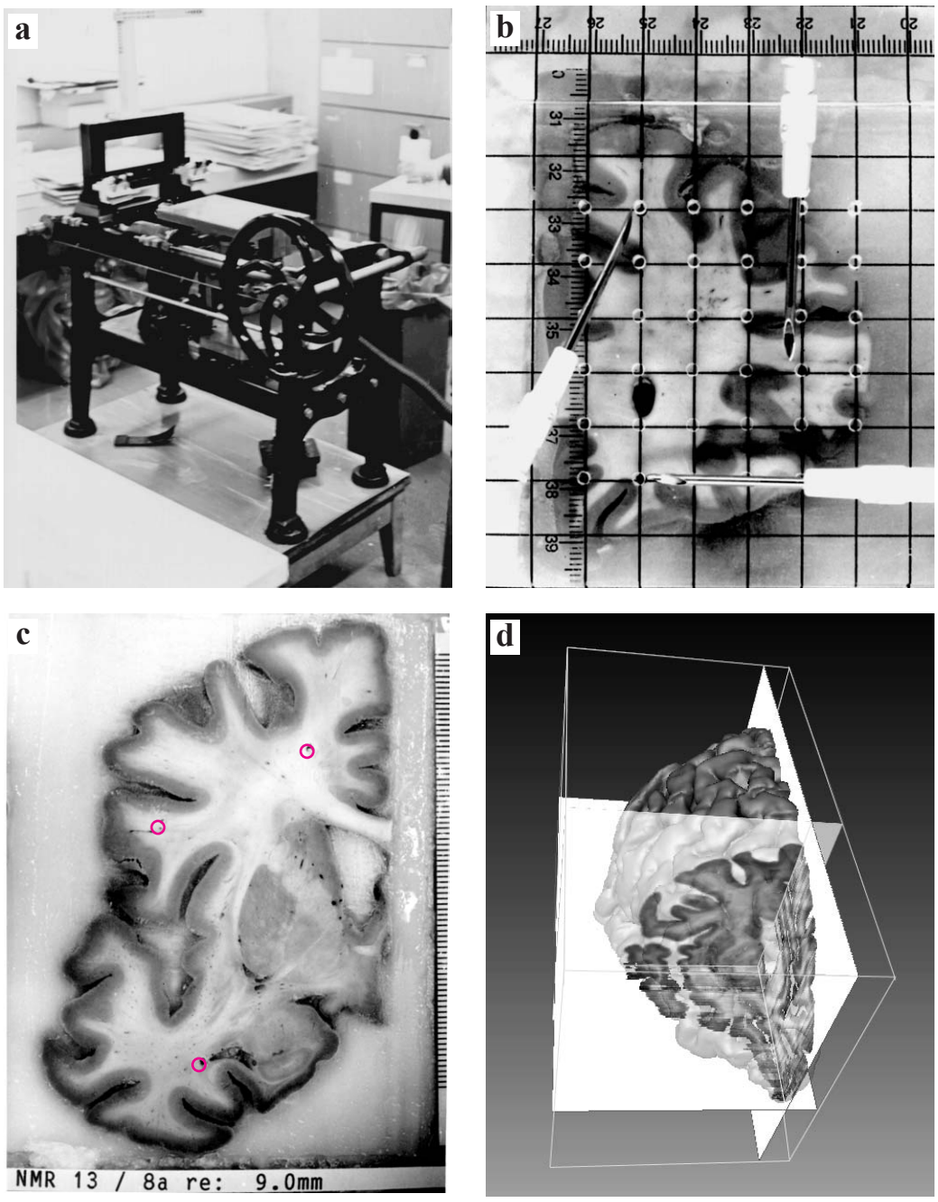


Figure 3. (a) Cryosectioning device consisting of the Tetrander ("Pantomikrotom") (see Vogt, 1905), freezing table, photograph stand, and tube holder for dry ice. (**b**) Frozen tissue block with matrix for perpendicular orientation of canulas used for punch marking. (**c**) Fixed slice of the hemisphere (represented in Section 2.2) embedded in methylcellulose and showing section surface with scales and punchmarks (fiducial marks used later for topographic adjustment of sections). (**d**) Reconstruction made from serial sections of one slice.

brought in a mold to a freezing table, 30 x 20 cm in size. The mold, containing one single brain slice, was then filled with methylcellulose (dissolved in water and stained with various chromogens) and cooled down to -20°C. Before sectioning fiducial marks were made (Fig. 3b). Every section was photographed together with a scale bar (Fig. 3c).

The sections were then transferred into individual containers filled with phosphate-buffered saline (plus 30% sucrose). Photographs taken from each section during the sectioning aided mounting of the sections. For some brains all sections were mounted. Cells were stained with either toluidine blue or cresyl violet; myelinated fibers were demonstrated with hematoxylin (procedures of Weigert or Spielmeyer) or with Sudan black B.

Within each section the outlines of the area encompassing the basal ganglia together with the contours demarcating major nuclei were drawn on a transparent sheet using a projection device with a magnification of x6.5. By means of fiducial marks the single sections were compiled in a sequence from rostral to caudal. 3-D reconstructions were made from such delineations (Fig. 3d).

1.1.6 Presentation of the Images

All head and brain slices (Sections 2.1 to 2.3) are mounted in the same way. Each series of sections begins with *in vitro* MR images of the unsectioned head. To provide a comprehensive view of the head, MR images are shown in all three orthogonal planes. This allows a better orientation in the 3-D space and aids in recognition of the topography of selected structures. Furthermore, comparisons between these *in vitro* and *in vivo* images presented next to the head and brain slices can be made. The following two pages within each series present surface views of the brains showing their gross morphology together with the delineation of the main gyri. Coloring on this page distinguishes between surface areas and differs from that applied in the sections. The drawings of the midsagittal views additionally provide the Talairach proportional grid system (Talairach and Szikla, 1967; Talairach and Tournoux, 1988). Every brain structure shown in the following sections can thus be adjusted to a spatial coordinate system. The main part of each macroscopic atlas section represents head and brain slices. These are mounted to show every section from both sides which allows visualization of any structure of interest throughout the series of sections. These figures are accompanied by the radiograph of the real section and the vasculatory territory within the brain and by two MR images from a healthy, 25-year-old volunteer in the corresponding plane.

1.2 Microscopic (Myeloarchitectonic) Atlas

1.2.1 Material

The Microscopic Atlas is based on the right hemisphere of a 24-year-old male (* 1905; + 1929). This brain belongs to the Vogt-collection in Duesseldorf (brain weight at autopsy: 1383 g; fresh volume: 1316.3 cm^3; cause of death: hypovolemic shock; death to fixation interval: 3 hours). The external morphology of the formalin-fixed brain was well documented (see pages 90 and 91; photographs of the brain were also published by Schulze, 1960). This brain was selected for presentation in this atlas because numerous researchers have analyzed and reported on its structure in the last 60 years (see Section 3.3).

1.2.2 Methods

Histological Procedures: The brain was cut into blocks oriented vertically to the intercommissural plane (Fig. 4a) and embedded in paraffin. The values of some linear measurements are given in Fig. 4b. Serial frontal sections of 20 µm were prepared. Most were stained with either cresyl violet or hematoxylin. Some additional sections were stained according to the technique of Holzer or remained unstained. Some of these unstained sections were used for immunohistochemistry (e.g., substance P) (see Mai et al., 1986). Since the first and last paraffin sections of each block were only partially recovered, we have drawn the approximate outlines of these sections by using photographs of the surface of the individual blocks, which were taken before sectioning.

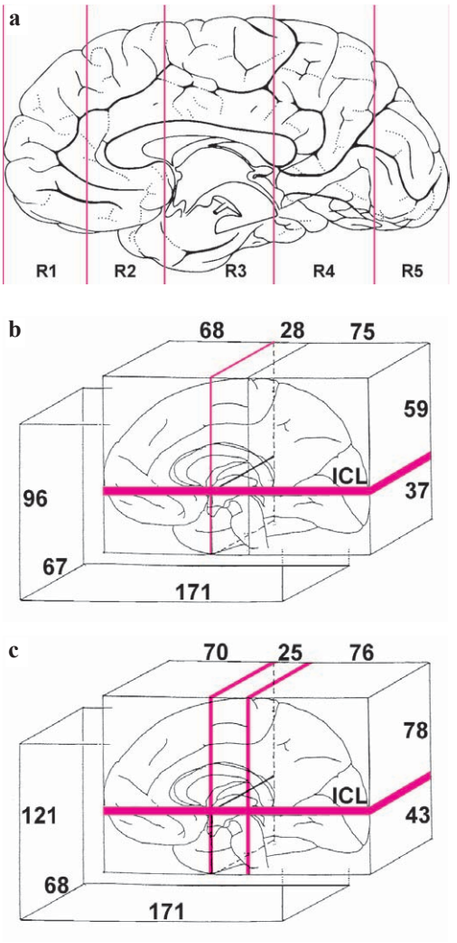


Figure 4. (a) Mediansagittal view of the right hemisphere of the brain used for the Myeloarchitectonic Atlas. The baseline shows the position where this hemisphere was cut into blocks (R1 - R5) before embedding. **(b)** Diagram showing the midsagittal view of the right hemisphere (A58) in the Talairach space. The measurements shown were taken from 1:1 photographs of the formalin-fixed brain. The cerebral space is defined by orthogonal horizontal, sagittal, an d verticofrontal reference planes. The intercommisural line (ICL) passes through the center of the anterior and posterior commissure respectively. The vertical line (VCA) passes through the center of the anterior commissure. **(c)** Graphic representation of the Talairach standard proportional grid system. The intercommisural line (ICL, CA-CP-line) passes through the superior edge of the anterior commissure and the inferior edge of the posterior commissure. The vertical line (VCA) passes through the posterior margin of the anterior commissure. Reference points are thus slightly different between figures b and c with consequences for the distance values between both commissures.

Estimates of Volume Changes: Volume changes in paraffin sections provide major obstacles in comparing these sections with the *in vivo* condition. Therefore, some efforts have been made to estimate tissue shrinkage and to transform the dimensions of this brain to the standard dimensions proposed by Talairach.

The volume changes due to formalin fixation could not be determined because the fresh volume is not known. Many researchers agree that the brain volume at an approximate fixation time of 3 to 4 weeks, the time when this specific brain became embedded, corresponds to the values determined at autopsy (see Longerich, 1989). It is therefore reasonable that the dimensions of the formalin-fixed brain (Fig.4b) represent the *in vivo* situation.

The volume deficit due to the histological preparation could be calculated. At the time this brain was processed, no efforts were made to control the morphometric situation of the material during the procedure. A separate determination of the degree of shrinkage that occurred during dehydration, paraffin embedding, cutting, and mounting of the sections therefore could not be made. The overall volumetric changes, however, could be calculated from differences in linear dimensions between the fixed, unembedded hemisphere (scaled photographs) and the serially sectioned hemisphere. Lange and Thörner (1974) and Sievert (1992) made such calculations available.

1.2.3 Past Histological, Morphometric, and Immunohistochemical Studies

Numerous descriptive and quantitative studies were performed on sections from the brain represented in the Microscopic Atlas. The relevant morphometric data (fresh volume, volume of serial sections, numeric cell density, volumetric cell density, and absolute cell numbers) have been compiled and are listed together with the references in Section 3.3.

1.2.4 Nomenclature

It is difficult to incorporate the current terminology into a logical hierarchical system. In the most commonly used nomenclature (Paxinos and Mai, 2003), abbreviations often start with attributes (anterior, superficial, magnocellular, etc.) that are already specific or that might designate parcellations not in common use. To alleviate the problem, we have listed all our abbreviations in the index (Section 4).

1.2.5 Presentation of Images of the Paraffin-Embedded Brain (Microscopic Atlas)

Photographs of Hematoxylin Stained Sections and Accompanying Diagrams: The photographs show the whole hemisphere at section levels where no relevant subcortical structures are recognized (magnification x4.63). The main body of the photographs depicts subcortical structures (magnification x7.9). The diagrams always show one entire hemisphere. The linear anterior-posterior and medio-lateral dimensions of the brain correspond to values of the Talairach grid system. The vertical dimension was, however, reduced (compare Figs. 4b and 4c). Therefore, we transformed the photographs and the diagrams into the vertical dimension of the Talairach space as described in Section 1.2.8. The vertical extension of the histological sections and drawings in the plates of the Macroscopic Atlas does therefore not provide the actual dimension of the paraffin section, but the calculated dimensions of the Talairach space. The position of every section along the anterior-posterior extension of the brain (Z-axis) is shown diagrammatically and also as distance from the center of the anterior commissure (point zero).

For the delineations in the diagrams we have always considered the results from the numerous cyto- and myeloarchitectonic studies that were previously performed on the represented brain (see section 3.3) and we have used as often as possible the original delineations provided by these earlier workers. Generally, the consistency of the drawings, section-to-section, was of higher importance than a precise correspondence between the photographs and the drawings. Nevertheless, several revisions of our delineations were made since the last edition. Some revisions were made in order to simplify the schemata, others derived from the analysis of developing human brains (Mai and Ashwell, 2003).

1.2.6 Three-Dimensional (3-D) Reconstructions

"Contour-lines" defining pial and ventricular surfaces, borderlines around distinguished nuclei and their subdivisions (striatum, amygdala, basal nuclear complex, and thalamus), and delineations of some compact fiber tracts (optic tract, anterior commissure) from 240 sections of one hemisphere were used for 3-D analysis. A few reconstructions are included in the printed version of the atlas.

1.2.7 Application of a Reference System (Topometry)

As stated earlier (Section 1.2.5), every section - and thus every brain structure - was adjusted into a defined spatial coordinate system. Our atlas uses the reference system of Talairach (Talairach and Szikla, 1967; and Talairach and Tournoux, 1988), with the modifications that (a) the intercommissural line (ICL) passes through the centers of the anterior and posterior commissures and (b) the brain space is defined metrically with the point zero (= point 0/0/0) for all three dimensions being the center of the anterior commissure (Fig. 4b). The morphologic data of the hemispheres therefore are handled as coordinate points in this 3-D (metric) grid as X- (mediolateral), Y- (vertical), and Z-coordinates (fronto-occipital) (Fig. 5). Scaling of the photographs and accompanying diagrams is accordingly provided in metric coordinates.

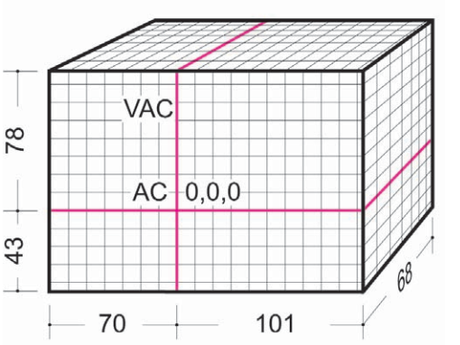


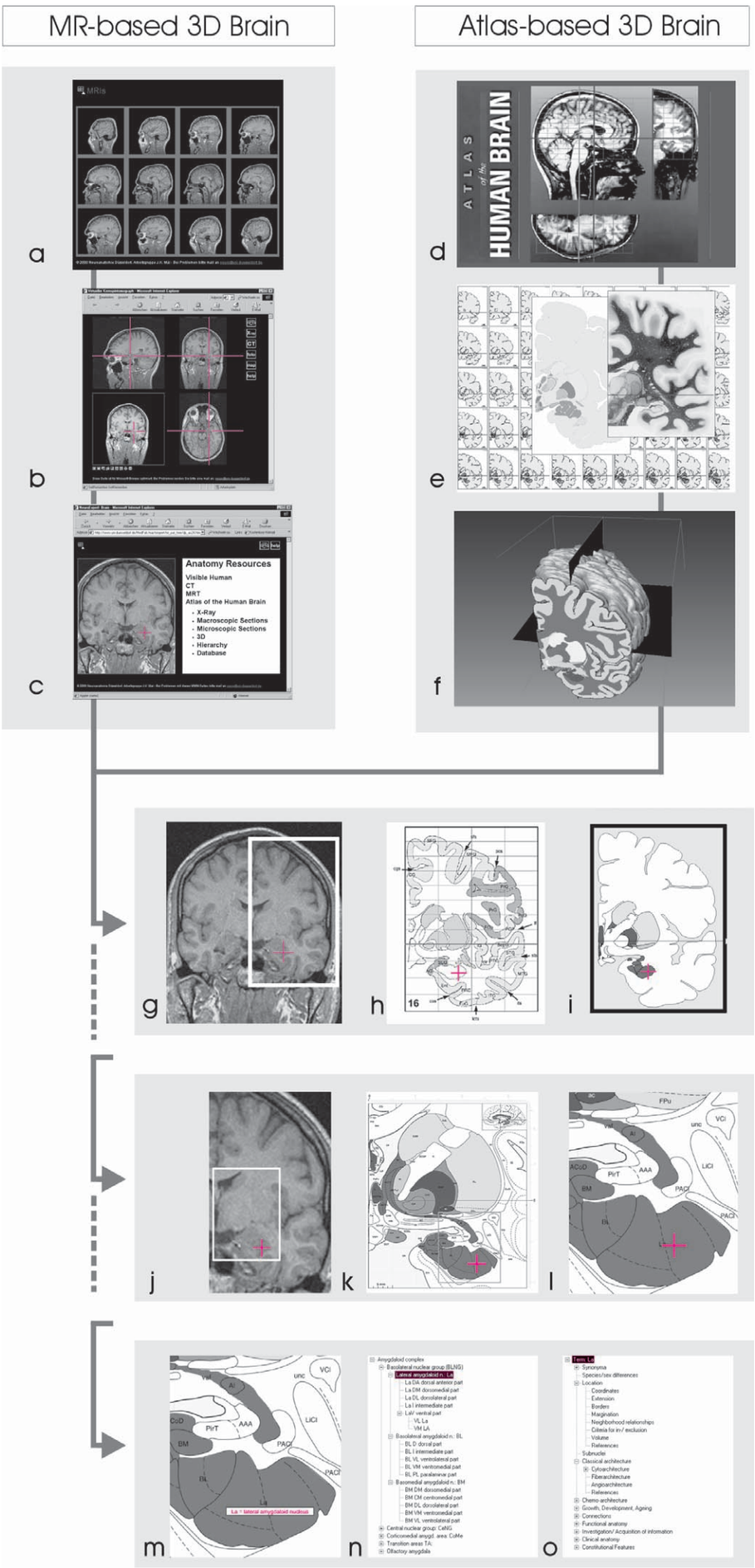
Figure 5. Metrically defined grid system with standard dimensions. The topography of image data within the brain space is defined by (stereotaxic) coordinate points. X, Y, Z -zero is located in the midpoint of the anterior commissure (AC-0,0,0). This grid model includes the advantage of (nonlinear) correlation of multiple image points because of metric scaling.

1.2.8. Standardization

For application as a reference brain, interindividual variability and shrinkage artifacts are the foremost variables that must be considered. The degree of shrinkage artifacts could be determined by correlating 1:1 scaled photographs of the fixed brain with the histological sections (Sievert, 1992). Transformation of the histological sections according to the shrinkage calculated revealed no appreciable nonlinear changes; therefore, we have directly transformed our image data to the dimensions of the Talairach space (Talairach and Tournoux, 1988). The resulting transformed photographs and corresponding drawings can then be directly correlated to "normalized" *in vivo* sections.

1.2.9. Application of the Standardized Microscopic Atlas for Interpretation of Individual *in-vivo* Brains

It is desirable that the atlas plates do not serve only as a template for comparison of structures identified either by their structural properties or their relationship to identifiable landmarks in two dimensions. Therefore, the 3-D organization of the major structures has to be considered and landmarks have to be defined which are suited as fulcrum for nonlinear trans-



formation. Selection of such landmarks will most probably derive from studies of developing brains. It is already possible to define in the developing human brain components and divisions which differentiate depending upon their spatial coordinates within the embryo. Such differentiation and maturation areas can be delineated by expression patterns of regulatory genes. Likewise migratory pathways of neurons can be followed from the proliferation area in the (sub-) ventricular zone to their homing area in the differentiating nuclei (see Mai and Ashwell, 2003). Border regions between differentiation areas and trajectories of migratory neurons are correlated with fundamental divisions of the brain. Demonstrations of such features will serve as useful landmarks for 3-D transformation procedures.

In summary, for the structural analysis of an individual (e.g., patient) brain we are not aiming at a probabilistic or statistical approach because it lowers the spatial resolution of the images. Instead we work on a transformation of the 3-D dataset of this atlas (model brain). The model brain is to be transformed interactively to the patient's brain using developmentally relevant landmarks. The fusion of the image sets will leave the patient's brain in its individual shape maintaining the high original resolution by MRI. The transformed image matrix from the model brain can be visualized and manipulated in an overlay fashion (Fig. 6). As the pro-

Figure 6. Concept of interpretation of an individual MR-based 3-D brain image data set by the integration with the recource provided by the *Atlas of the Human Brain*. **(a)** Serial sequence of a (patient) MR image data set. **(b)** Display of orthogonal sections in a web environment (upper row and lower right quadrant) and selection of a DICOM image of interest (here a coronal section, shown in the lower left quadrant). The DICOM image is embedded in the Web page using a Java Applet. Center and width are adjusted by moving the cursor over the DICOM image. **(c)** DICOM image with markings and annotations (left side). On the right side links to the image reference and interpretation sources, symbolized in **d to f** are shown. **(g)** DICOM image with region of interest indicated by the reticule. (**h** and **i)** Corresponding templates from the Atlas of the Human Brain fitting to the plane of sectioning. **j to l** Matching of high-detail diagrams. **(m)** The term of the marked subnucleus (here, La = lateral amygdaloid nucleus) is shown after clicking in the region of the reticule. **(n)** Indication of the position of the selected nucleus in the hierarchical level of categorization. **(o)** Portal to a database.

jection of the splines on the corresponding MR slices can be visualized as overlay, the degree of fitting becomes directly evident and can, if necessary, be adjusted. If the matching of patient images with the atlas templates has occurred, the location of any region of interest (ROI) (e.g., a focal lesion) can be mapped interactively. The area coordinates of the ROI in the patient MRI brain (Figs. 6a,b) are then mapped to the atlas coordinate system. There the terms of affected structures and the database information can be interactively retrieved. Location, neighborhood relations, annotations, etc. are then specified and can, if applicable, be transmitted together with the relevant patient images.

1.3 References

Grösch, L., and F. Noack. NMR relaxation investigation of water mobility in aqueous bovine serum albumin solutions. *Biochem Biophys Acta* 453:218–232 (1976).

Lange, H., and G. Thörner. Zur Neuroanatomie und Neuropathologie des Corpus striatum, Globus pallidus und Nucleus subthalamicus beim Menschen. Thesis, University Duesseldorf (1974).

Longerich, U. MRI-Untersuchungen an in-vivo und in-vitro Gehirngewebe: Einfluß von Fixierung und Temperatur auf das Relaxationsverhalten, die Protonendichte und das Kontrastverhalten. Thesis, University of Duesseldorf (1989).

Mai J.K., and K.W.S. Ashwell. Fetal Development. In: *The Human Nervous System*, 2nd ed., G. Paxinos and J.K. Mai, eds. Academic Press, San Diego, pp. 49-94, 2003.

Mai, J.K., J. Assheuer, and G. Paxinos. *Atlas of the Human Brain*. Academic Press, San Diego, 1997.

Mai, J.K., P. Stephens, A. Hopf, and A.C. Cuello. Substance P in the human brain. *Neuroscience*. 17, 709–739 (1986).

Paxinos, G., and J.K. Mai. *The Human Nervous System*, 2nd ed. Academic Press, San Diego, 2003.

Schulze, H.A. Zur individuellen cytoarchitektonischen Gestaltung der linken und rechten Hemisphäre des Lobulus parietalis inferior. *J Hirnforsch* 4, 486–534 (1960).

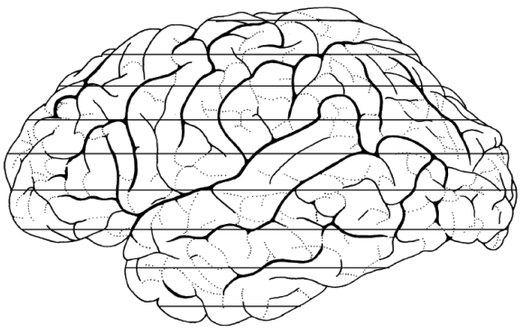
Sievert, T. Topometrie des menschlichen Gehirns: Evaluation eines Verfahrens zur Integration morphologisch-funktioneller Daten aus histologischen Schnitten in die klinische Diagnostik. Thesis, University of Duesseldorf (1992).

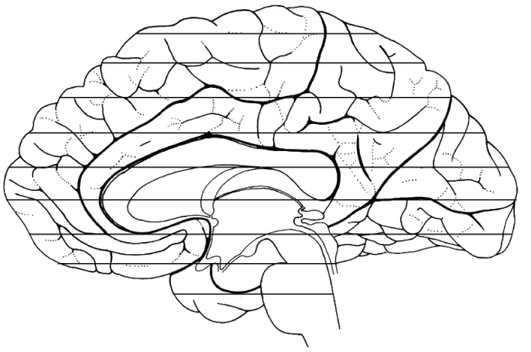
Talairach J., and G. Szikla. *Atlas d' Anatomie stereotaxique du Telencephale*. Masson & Cie. Paris, (1967).

Talairach J., and P. Tournoux. *Co-planar Stereotaxic Atlas of the Human Brain*. G. Thieme, Stuttgart, New York (1988).

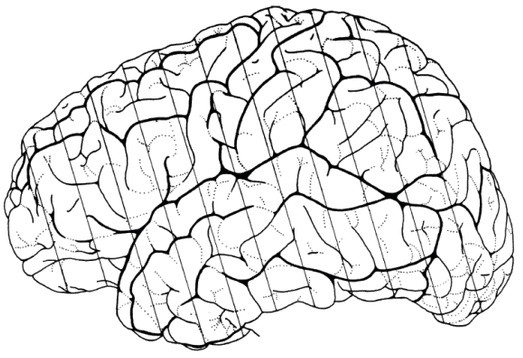
Macroscopic Atlas

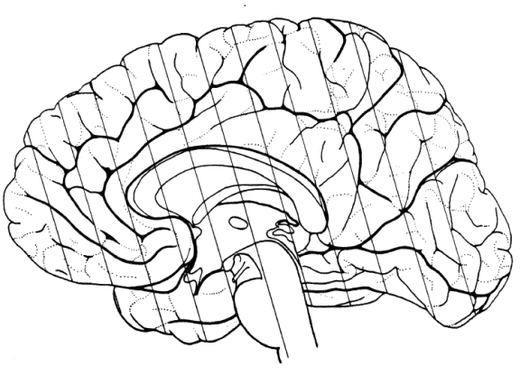
Horizontal Sections:



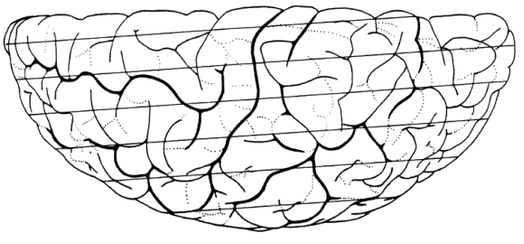


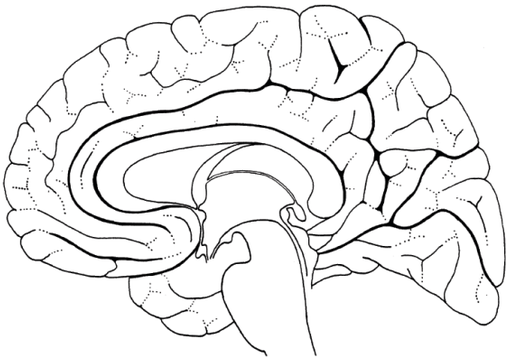
Coronal Sections:





Sagittal Sections:



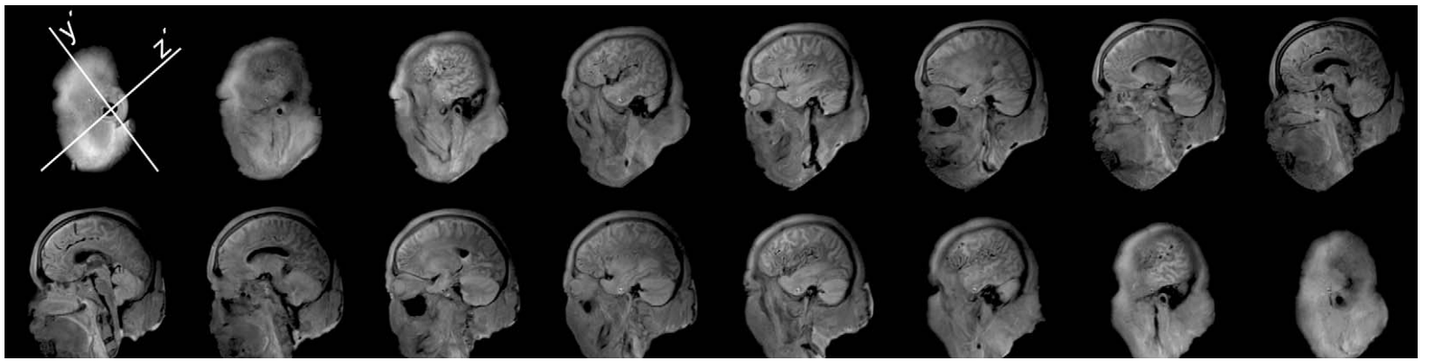


Presentation of the Images

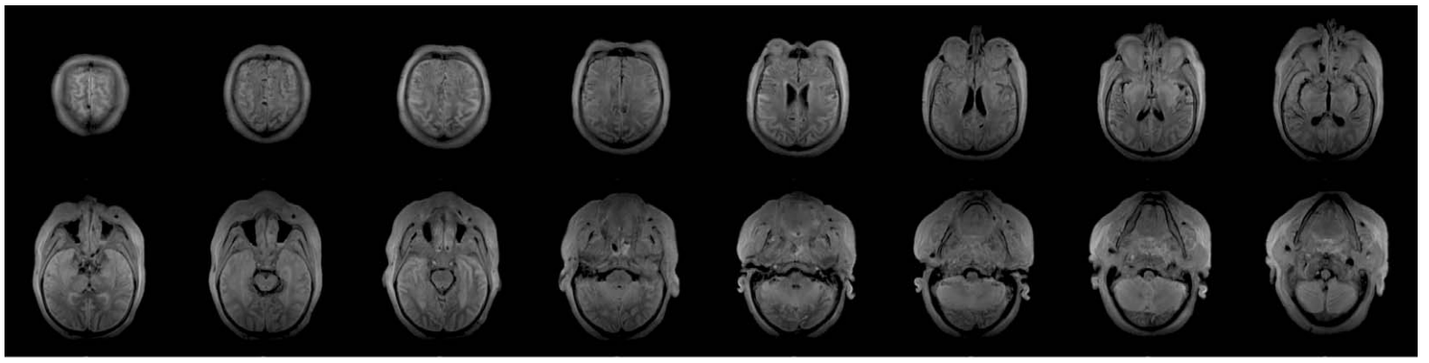
All representations of anatomical head and brain slices (chapters 2.1 to 2.3) are mounted in the same way. I) Each series of sections is headed by *in-vitro* MR-images of the head which were taken prior to sectioning. To provide a comprehensive view of the head, MR-images are shown in all three orthogonal planes. This allows a better orientation in the three-dimensional space and helps to recognize the topography of selected structures. II) The page following the MR-images presents two surface views of the brain which has been sectioned with the placement of sections indicated. III) The next page provides surface views of the brain with the most important gyri and sulci delineated. The midsagittal views depict the brain with the Talairach space. IV) The main part of each topographic and topometric atlas represents anatomical head and brain slices. These are mounted such that every section is seen from both sides. This allows the pursuit of any structure of interest throughout the series of sections. These representations are faced with two MR-images of the corresponding plane and (normally) two images showing the real section, the radiograph of the real section and/or the vasculatory territory within the brain section. MR-images were performed from a healthy, 25 year old volunteer. The MR-images differ with respect to T1, T2 and proton density (N(H)) contrast.

Horizontal Sections

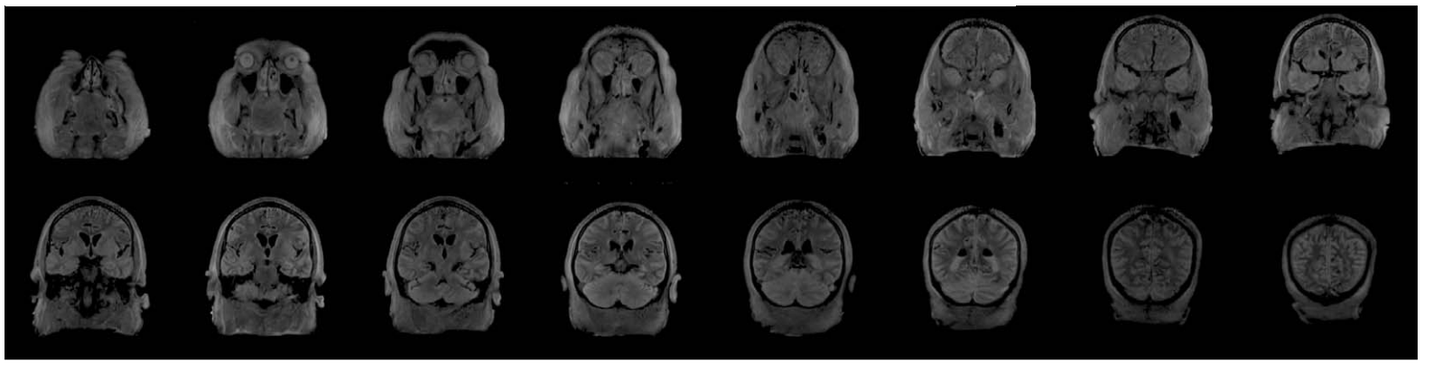
Sagittal plane:



y´- direction:

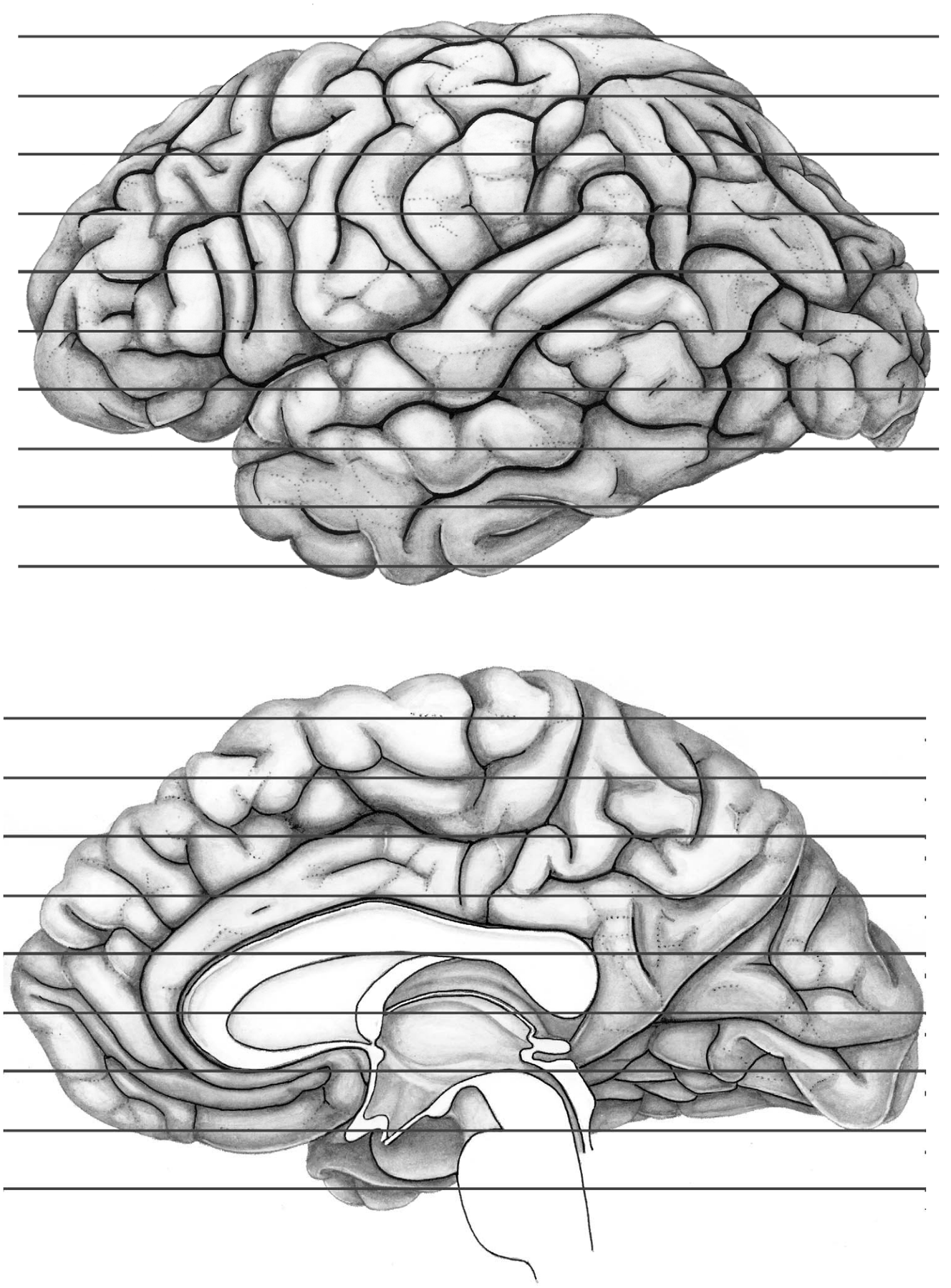


z´- direction:

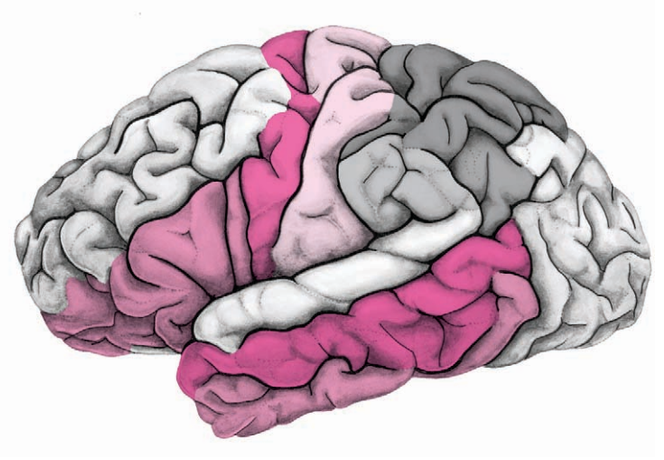


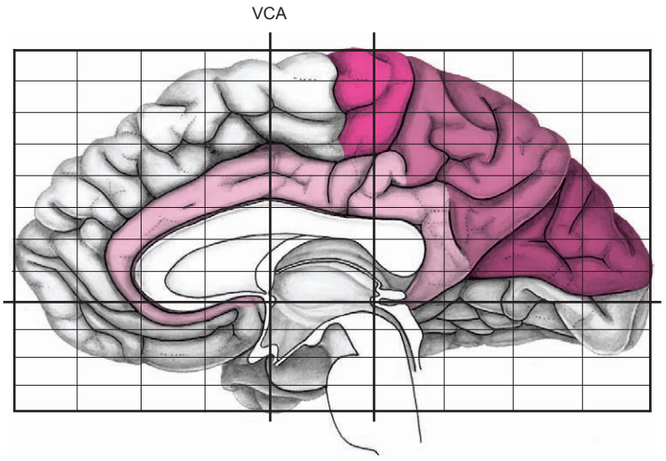
MR-images of the head shown on the following pages.

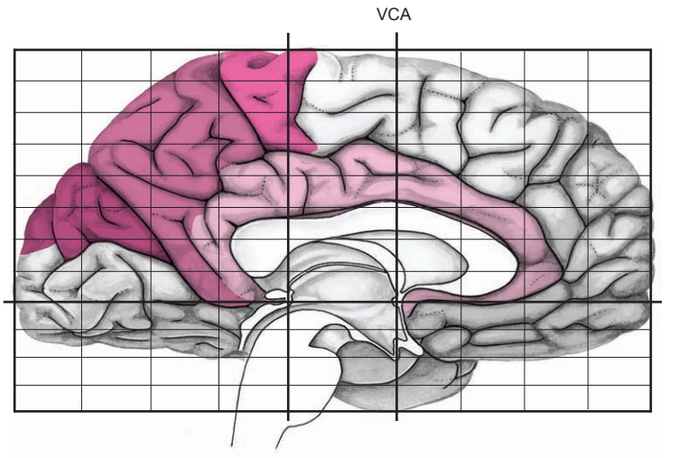
The head whose horizontal sections are depicted on pages 15-44 was imaged before sectioning. Parameters: 0.15 Tesla, matrix 256 x 256, field of view 25 cm, multi-slice, slice thikkness 5 mm, 4 excitations, sequence: 5000/40. The contrast of these images is poor since they are highly proton-density (N(H)) weighted. The top panel presents the sagittal MRIs and specifies the planes of sectioning of the middle and lower panel. As can be seen the angle of sectioning of the two latter panels is about 45° tilted against the plane of sectioning for the anatomic slices. This was aimed to provide a more comprehensive view of the head.

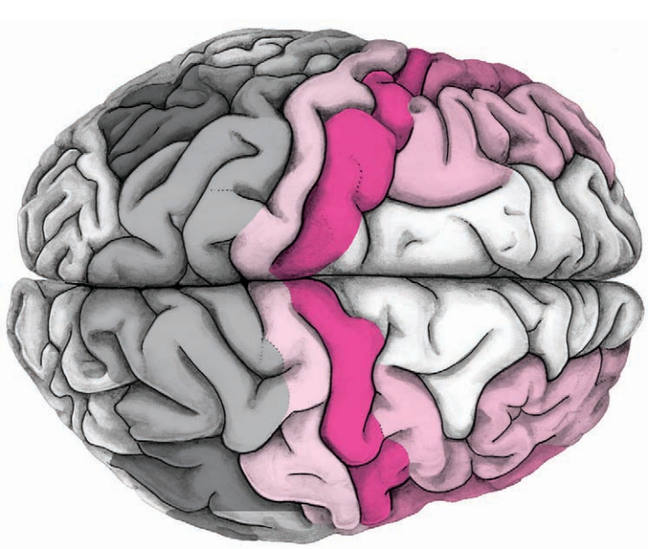


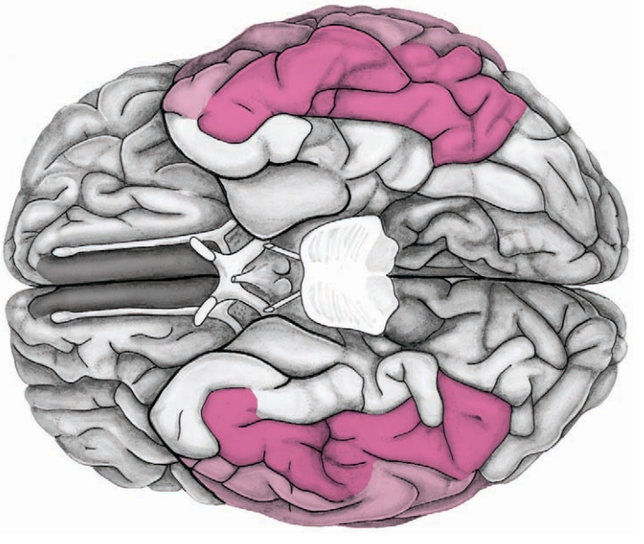
Surface views of the right hemisphere of the brain which has been sectioned in the horizontal plane as indicated. The drawing of the lateral aspect has been mirror-imaged in order to demonstrate the correspondence of section levels between convexity and midline structures.







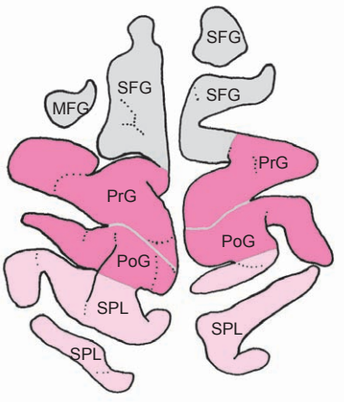




Surface views of the brain which is shown in the subsequent pages. The most important gyri are delineated.

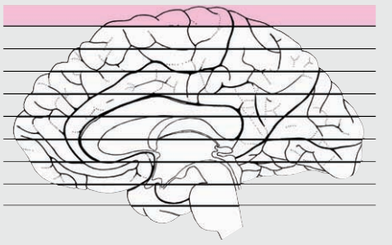
The midsagittal views depict the brain with the Talairach space (ICL: intercommissural line, VCA: plane which is vertical to the intercommissural line at the level of the anterior commissure).

10 mm



1

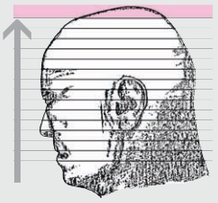
(dorsal view)

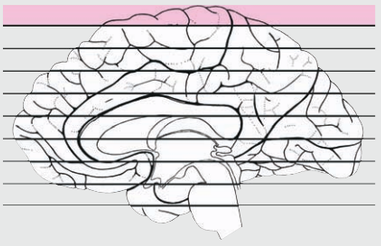


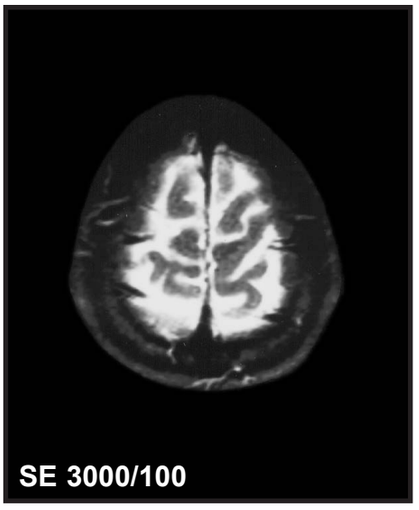
MFG	medial frontal gyrus
PoG	postcentral gyrus
PrG	precentral gyrus
SFG	superior frontal gyrus
SPL	superior parietal lobule

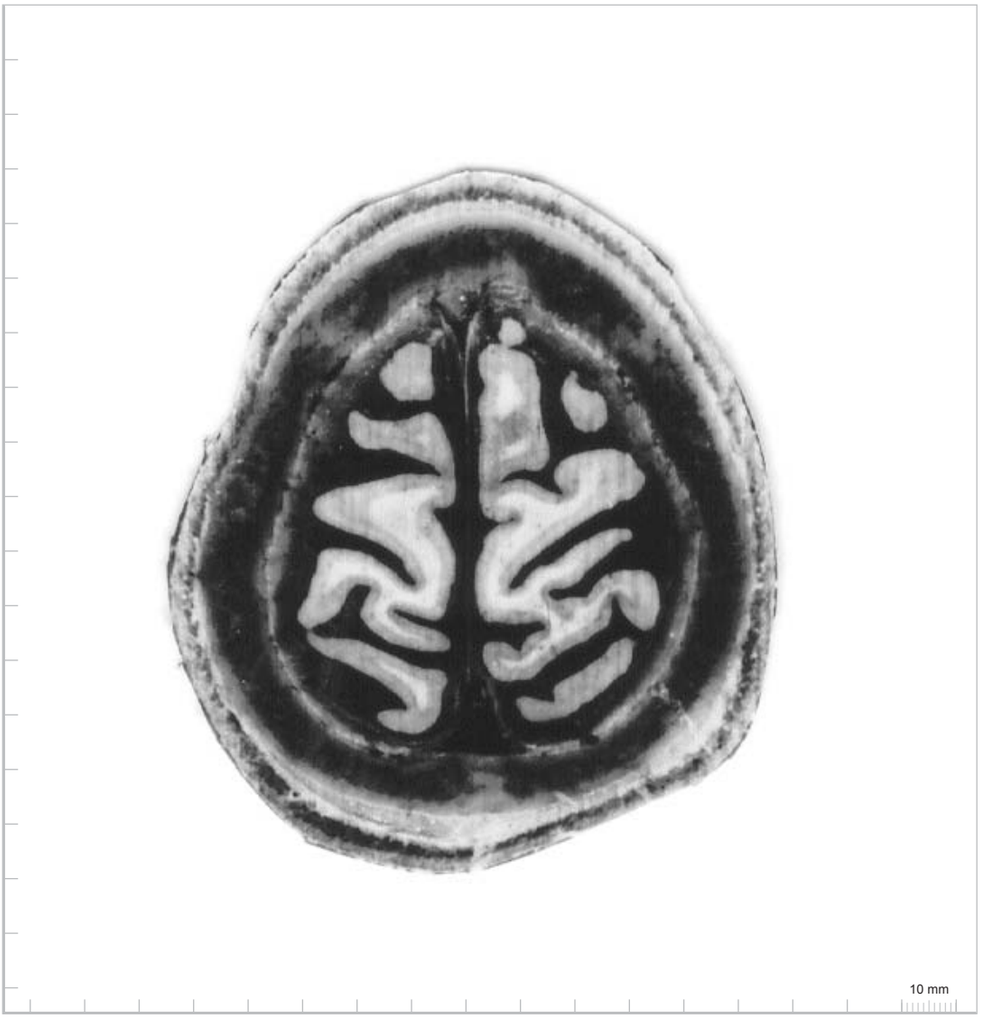
1

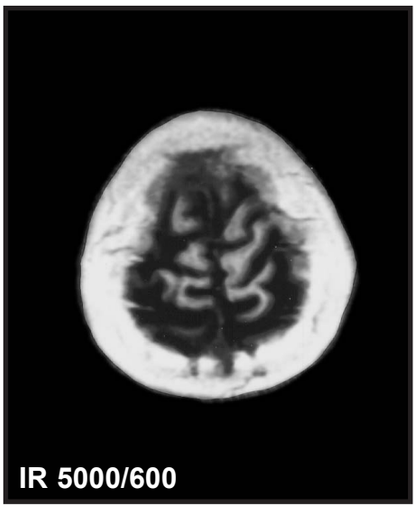
(ventral view)

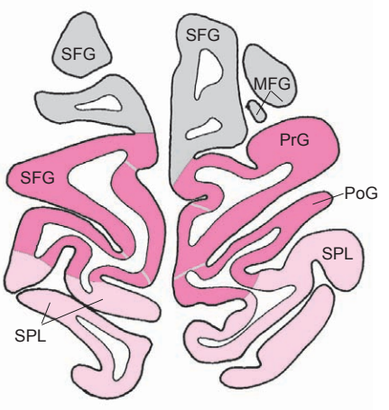


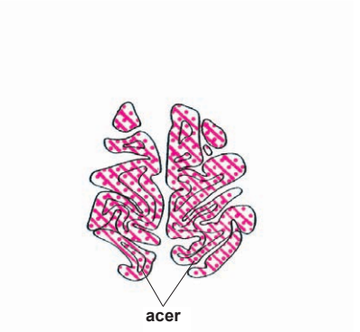












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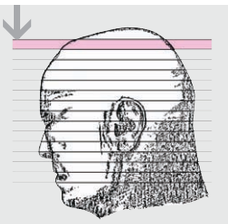
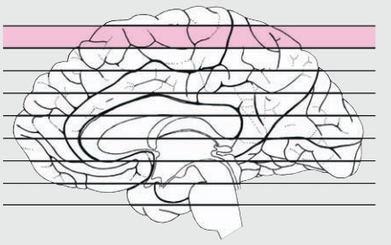
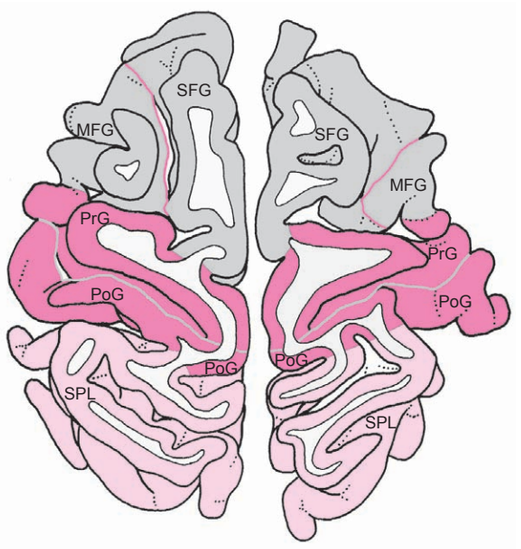


2

(dorsal view)

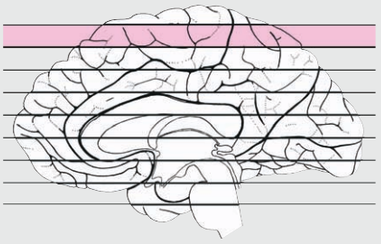


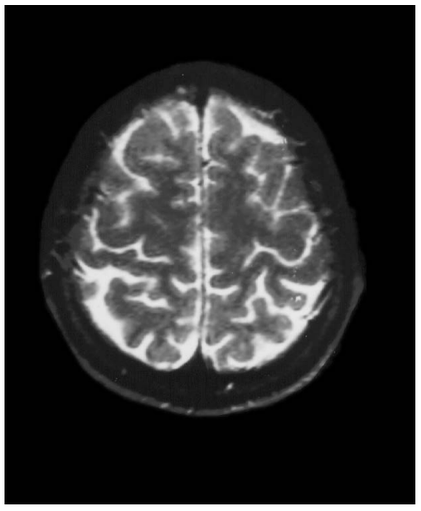
acer	anterior cerebral artery
MFG	medial frontal gyrus
PCL	paracentral lobule
PoG	postcentral gyrus
PrG	precentral gyrus
SFG	superior frontal gyrus
SPL	superior parietal lobule

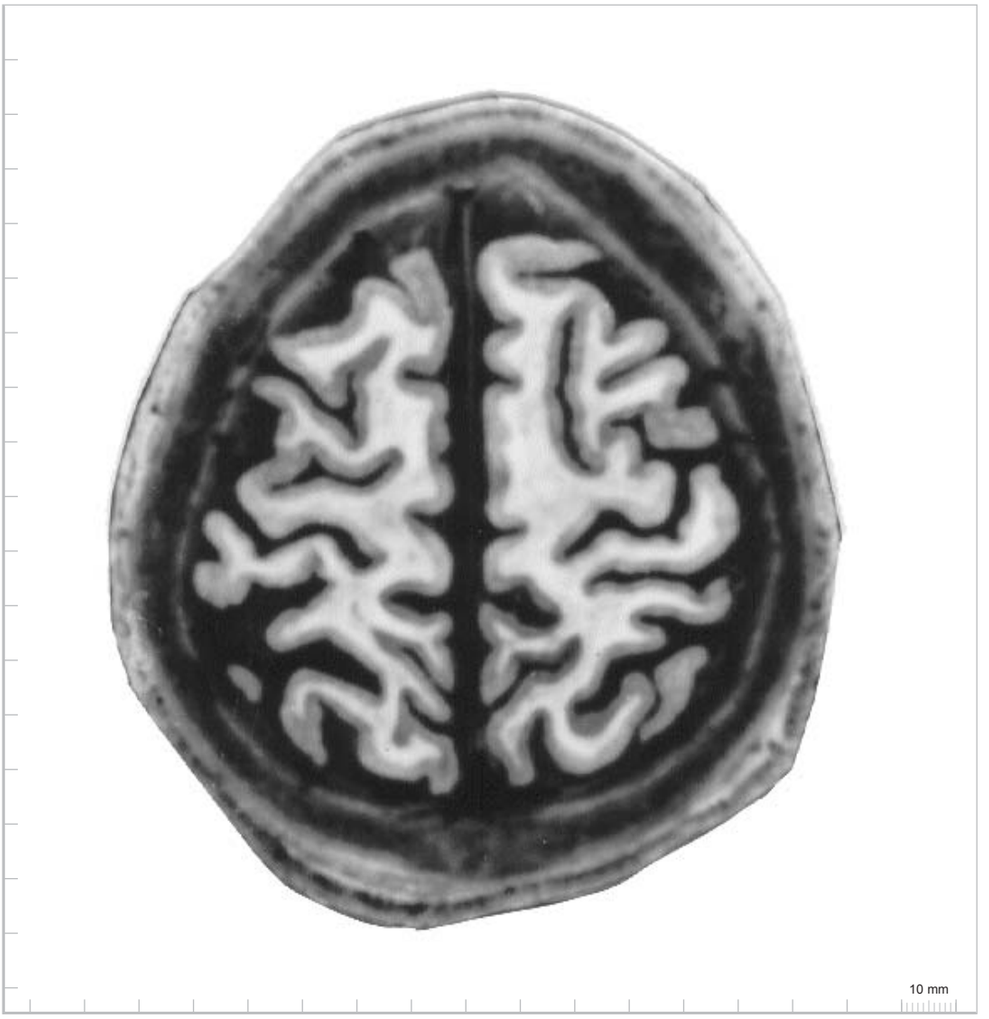


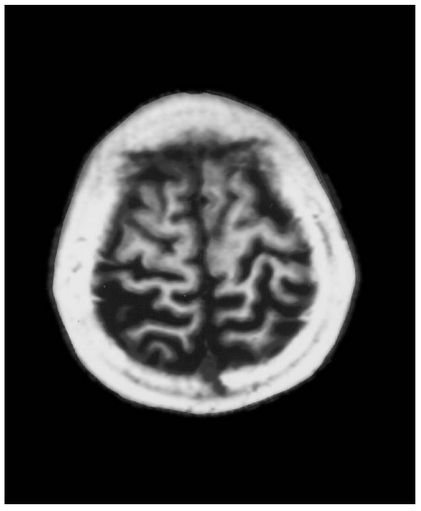
2

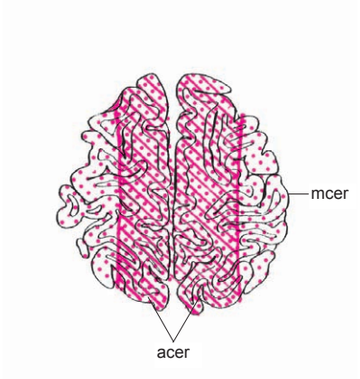
(ventral view)

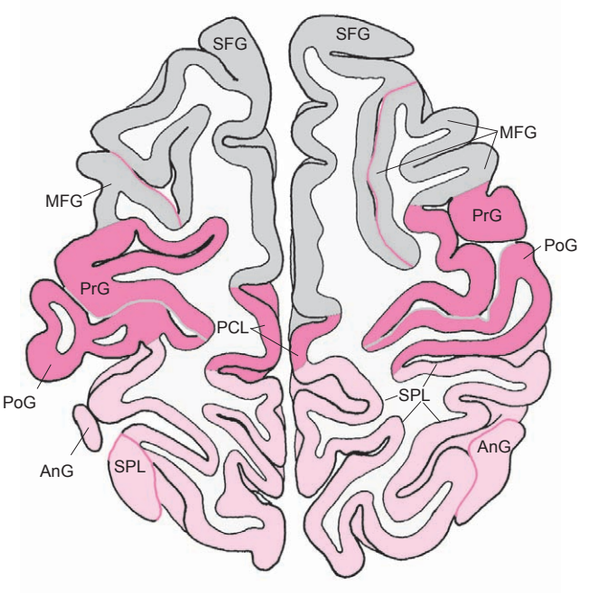


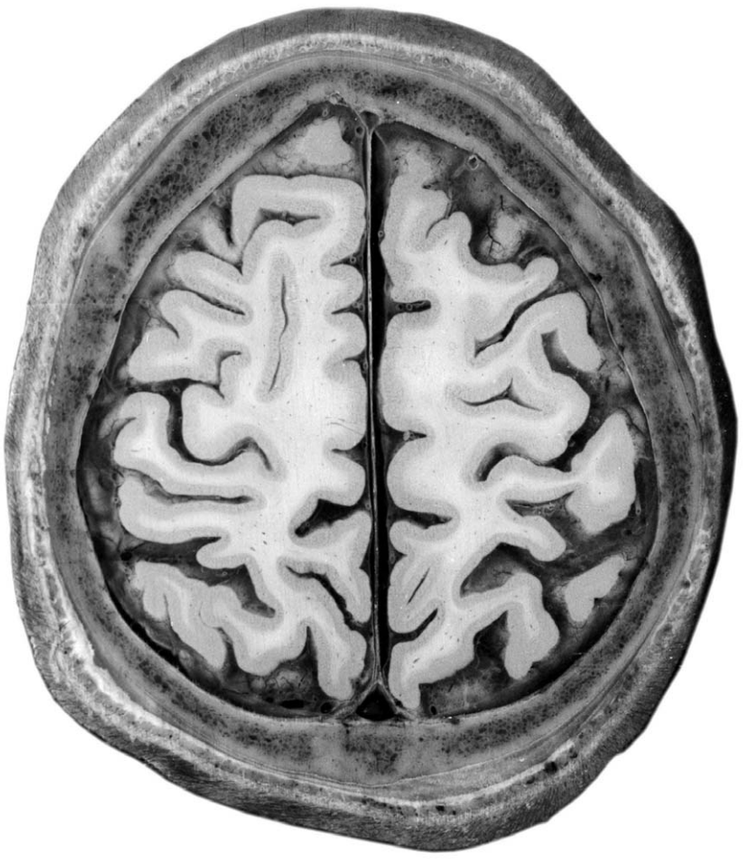












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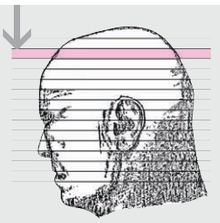
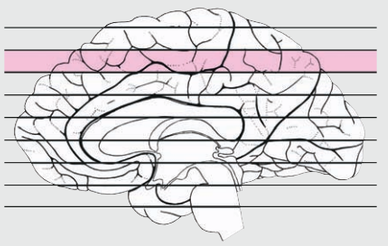
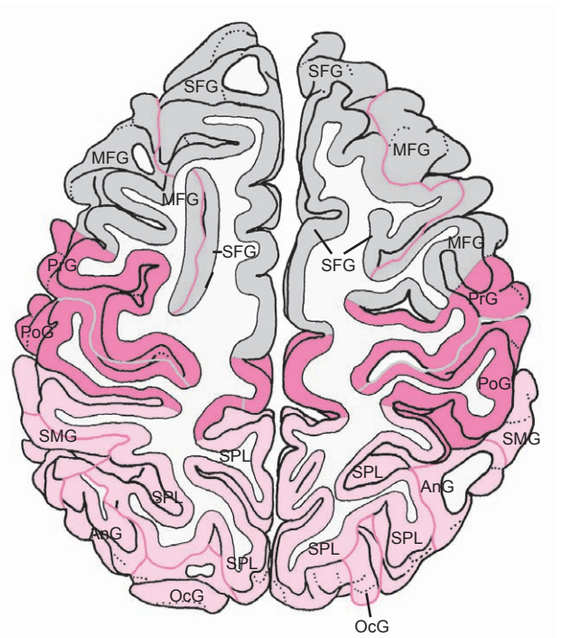


3

(dorsal view)

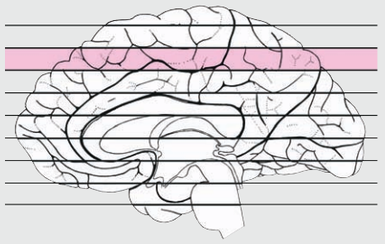


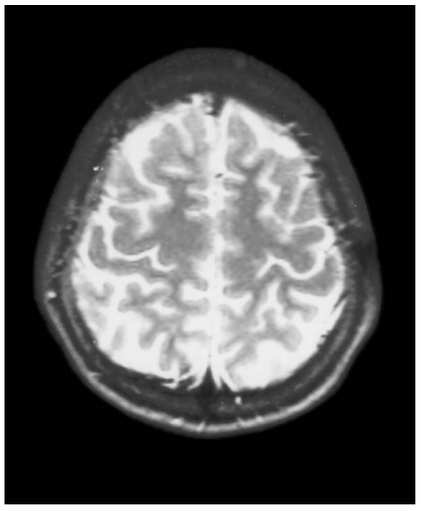
acer	anterior cerebral artery
AnG	angular gyrus
mcer	middle cerebral artery
MFG	medial frontal gyrus
OcG	occipital gyri
PCL	paracentral lobule
PoG	postcentral gyrus
PrG	precentral gyrus
SFG	superior frontal gyrus
SMG	supramarginal gyrus
SPL	superior parietal lobule

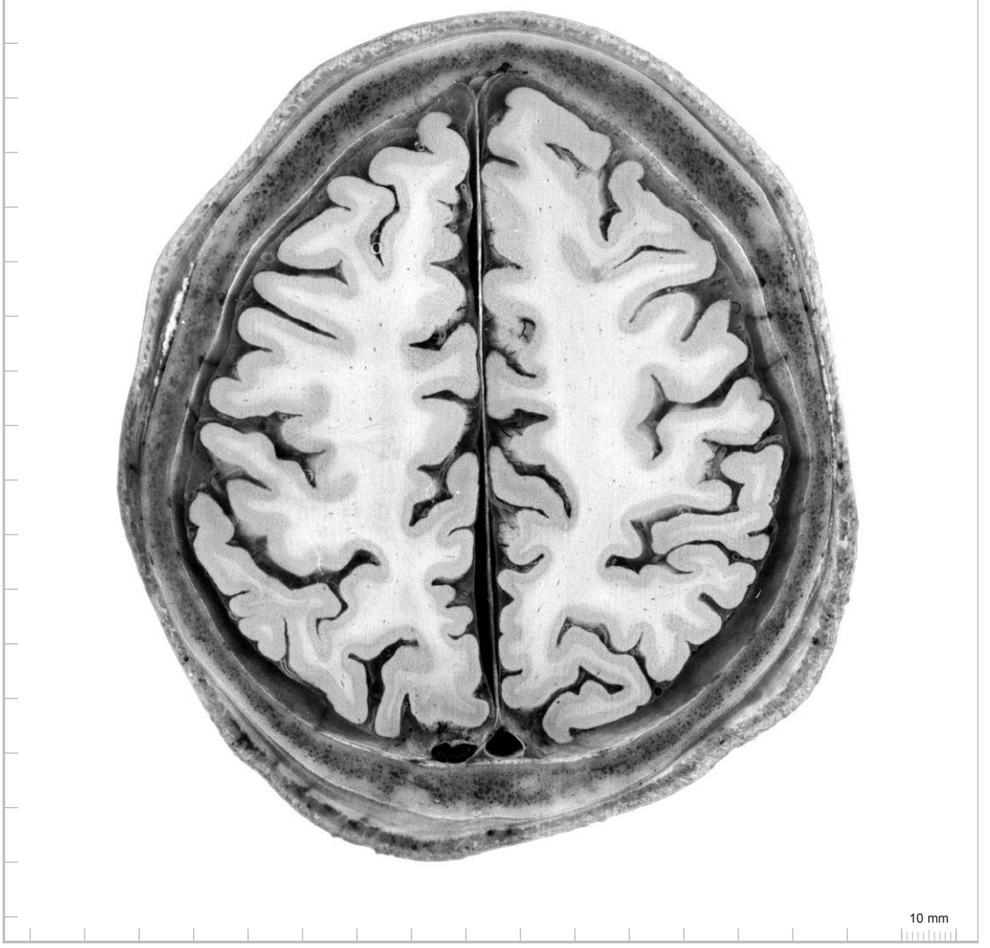


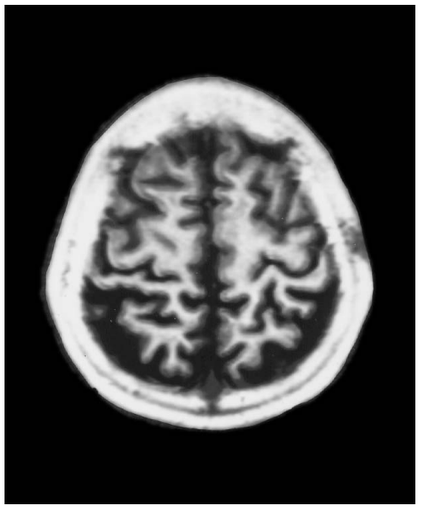
3

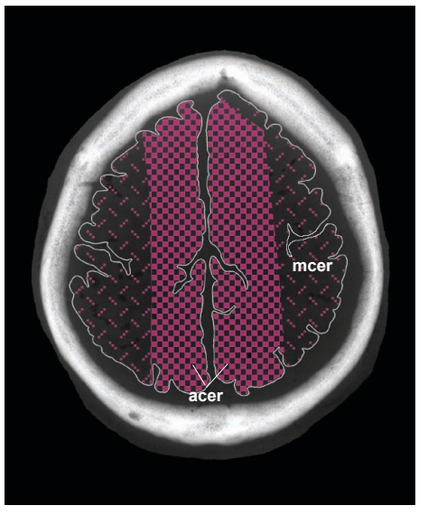
(ventral view)

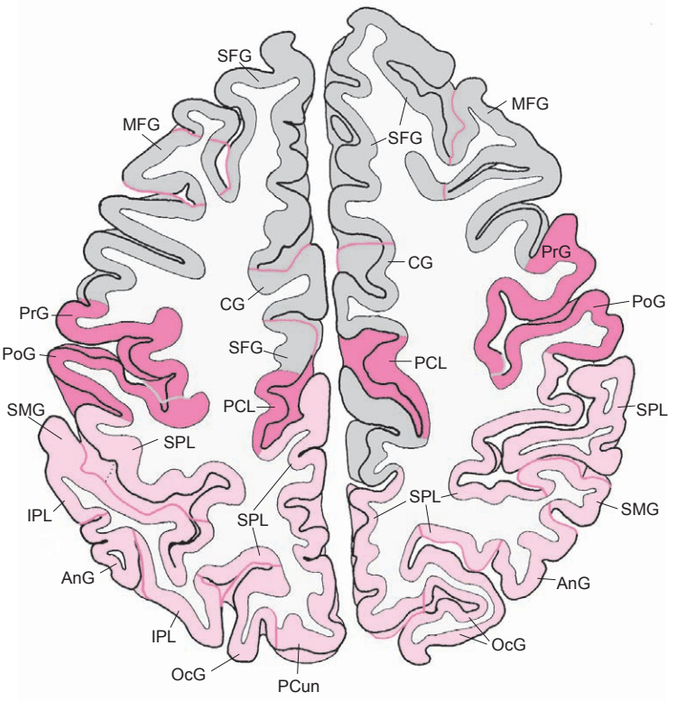


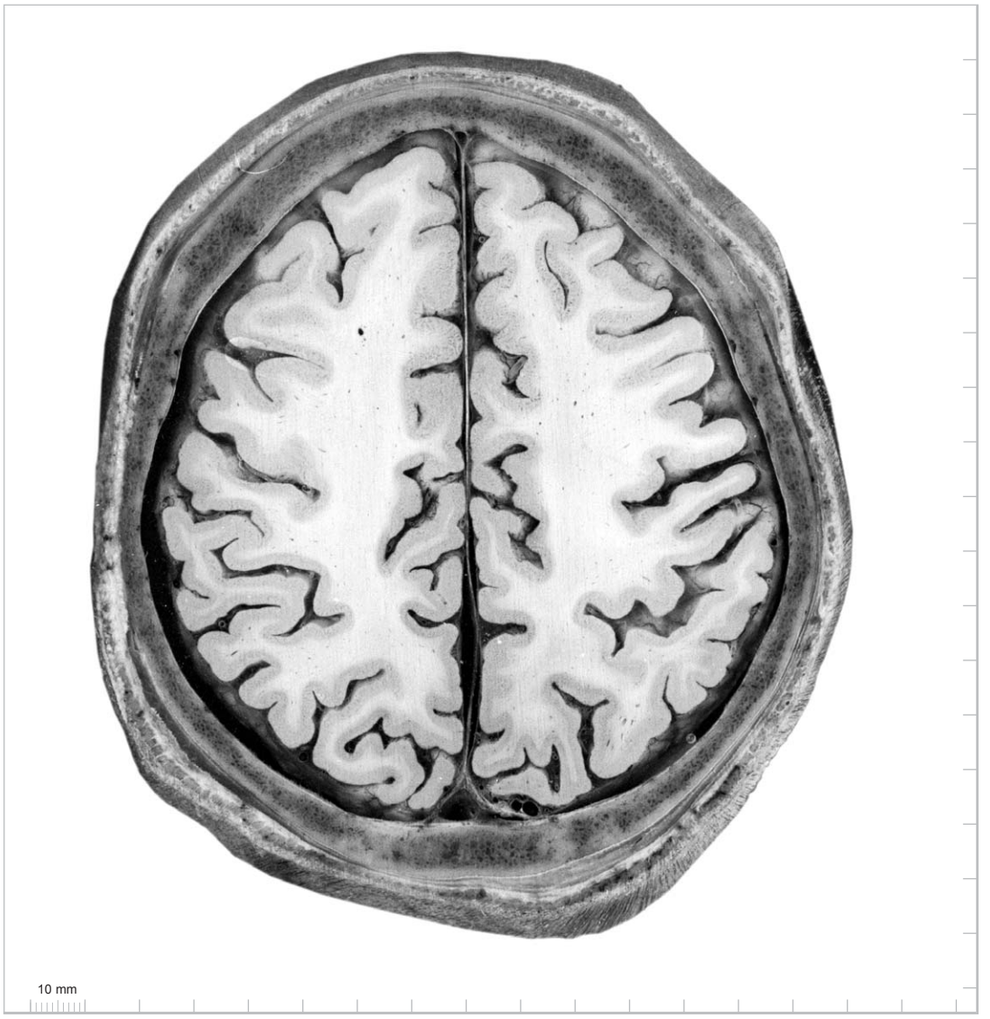


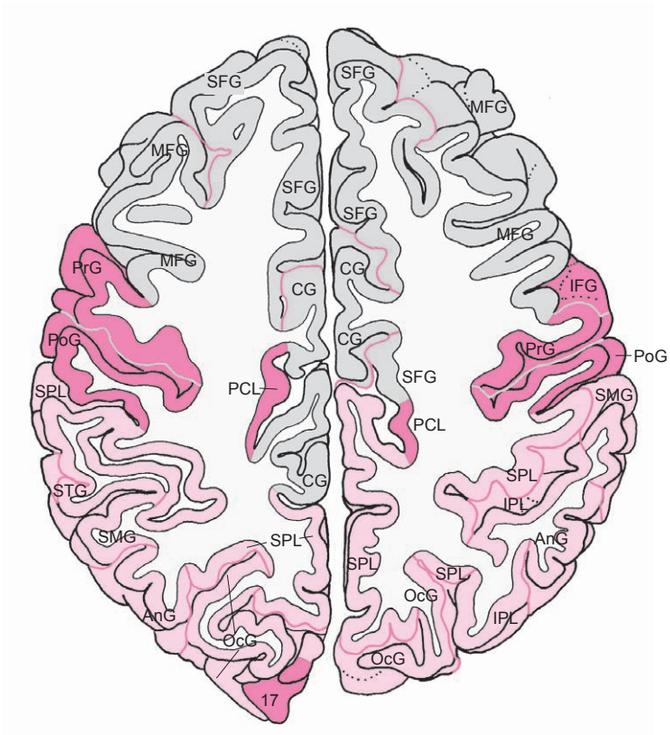


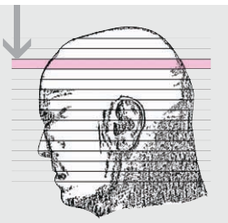






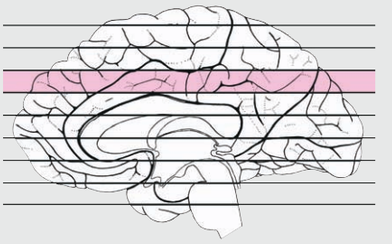






4

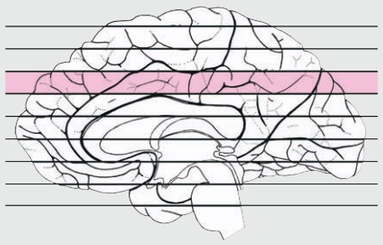
(dorsal view)

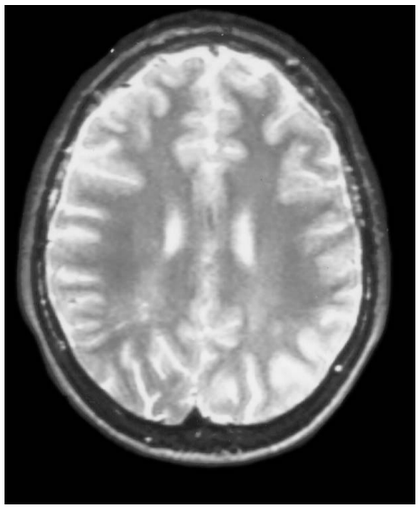


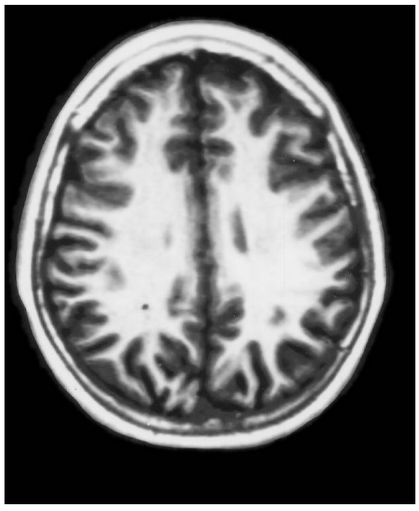
17	striate area
acer	anterior cerebral artery
AnG	angular gyrus
CG	cingular gyrus
IFG	inferior frontal gyrus, opercular part
IPL	inferior parietal lobule
mcer	middle cerebral artery
MFG	middle frontal gyrus
OcG	occipital gyri
PCL	paracentral lobule
PCun	precuneus
PoG	postcentral gyrus
PrG	precentral gyrus
SFG	superior frontal gyrus
SMG	supramarginal gyrus
SPL	superior parietal lobule
STG	superior temporal gyrus

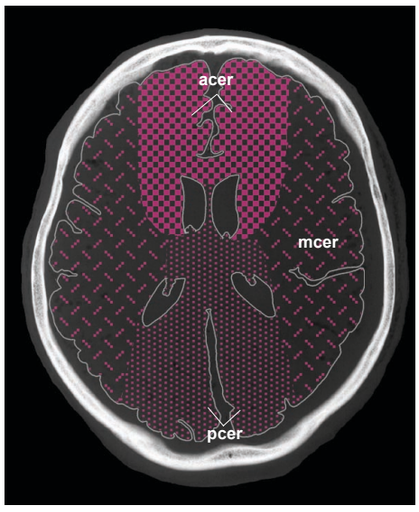
4

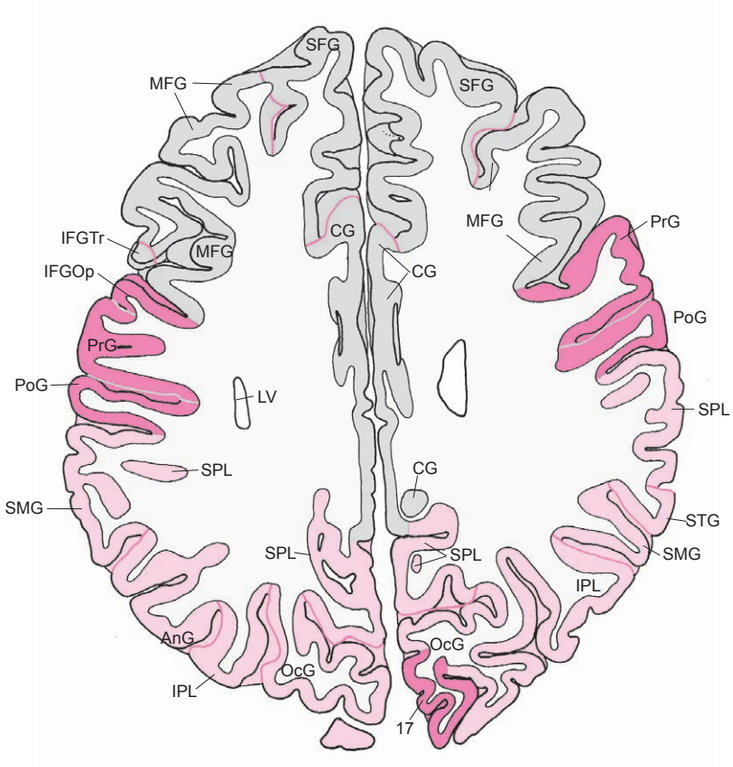
(ventral view)

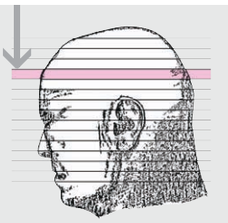






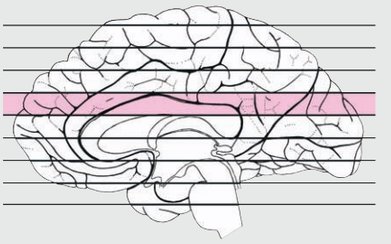




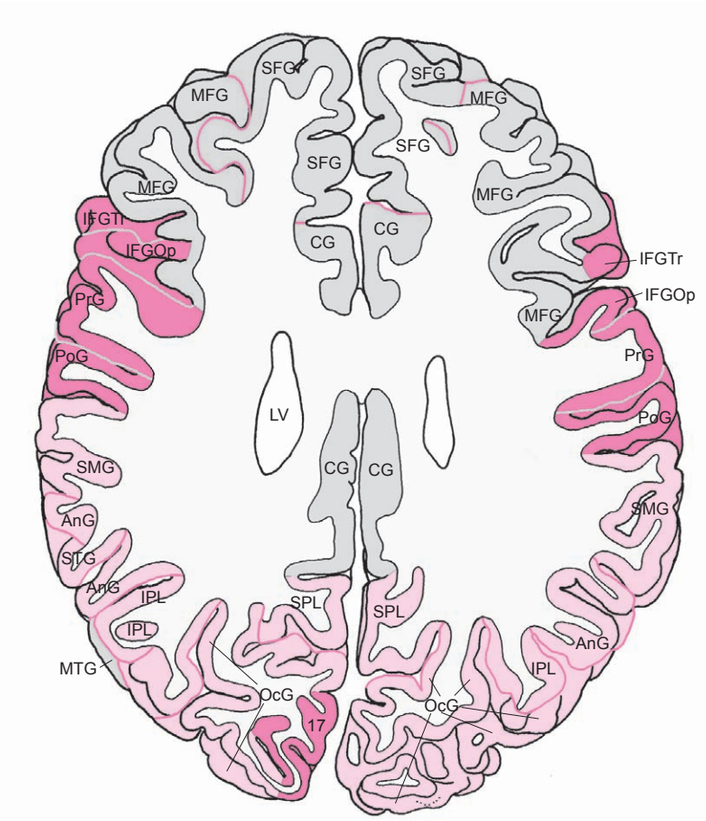


5

(dorsal view)

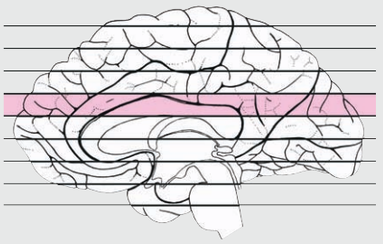


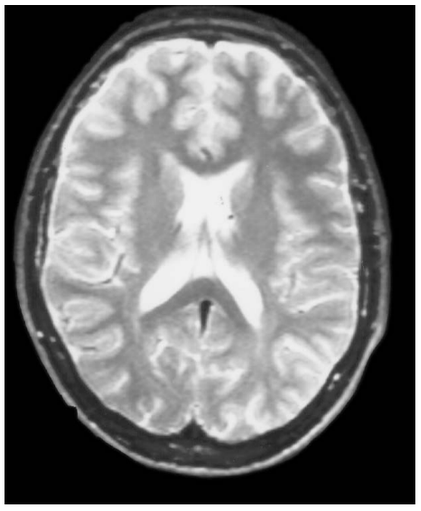
17	striate area
acer	anterior cerebral artery
AnG	angular gyrus
CG	cingular gyrus
IFGOp	inferior frontal gyrus, opercular part
IFGTr	inferior frontal gyrus, triangular part
IPL	inferior parietal lobule
LV	lateral ventricle
mcer	middle cerebral artery
MFG	middle frontal gyrus
MTG	middle temporal gyrus
OcG	occipital gyri
pcer	posterior cerebral artery
PoG	postcentral gyrus
PrG	precentral gyrus
SFG	superior frontal gyrus
SMG	supramarginal gyrus
SPL	superior parietal lobule
STG	superior temporal gyrus

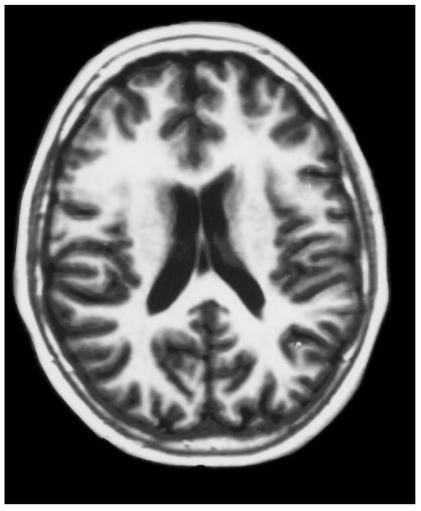


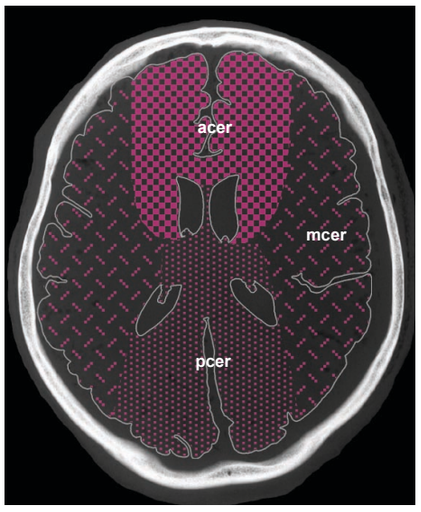
5

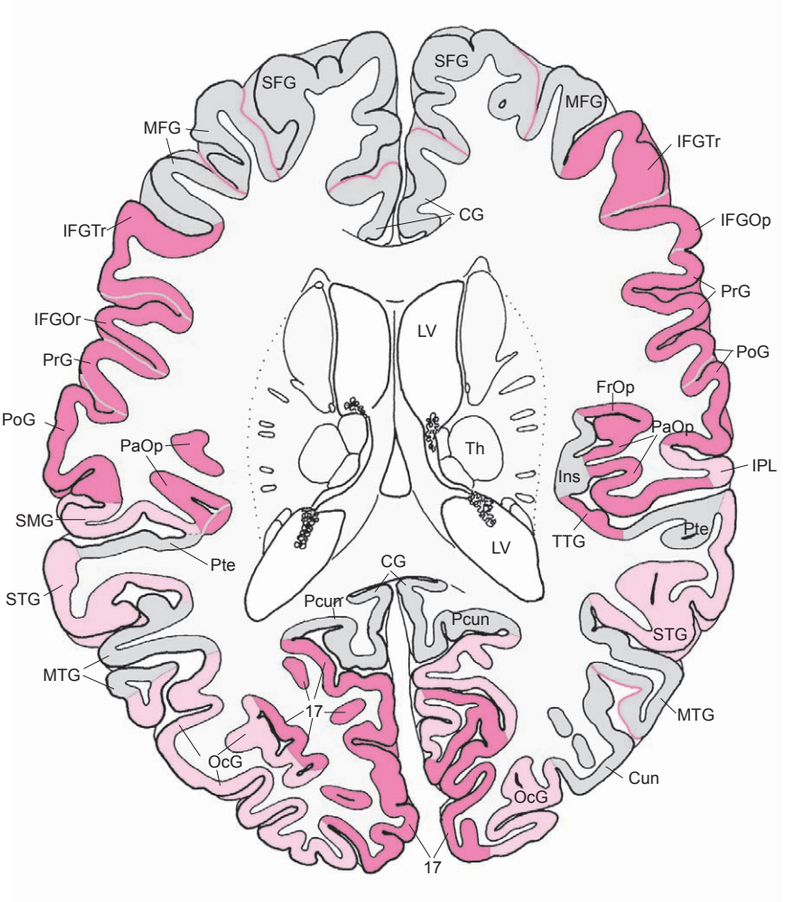
(ventral view)

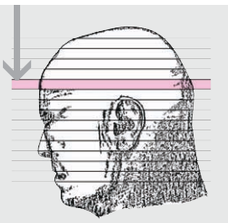






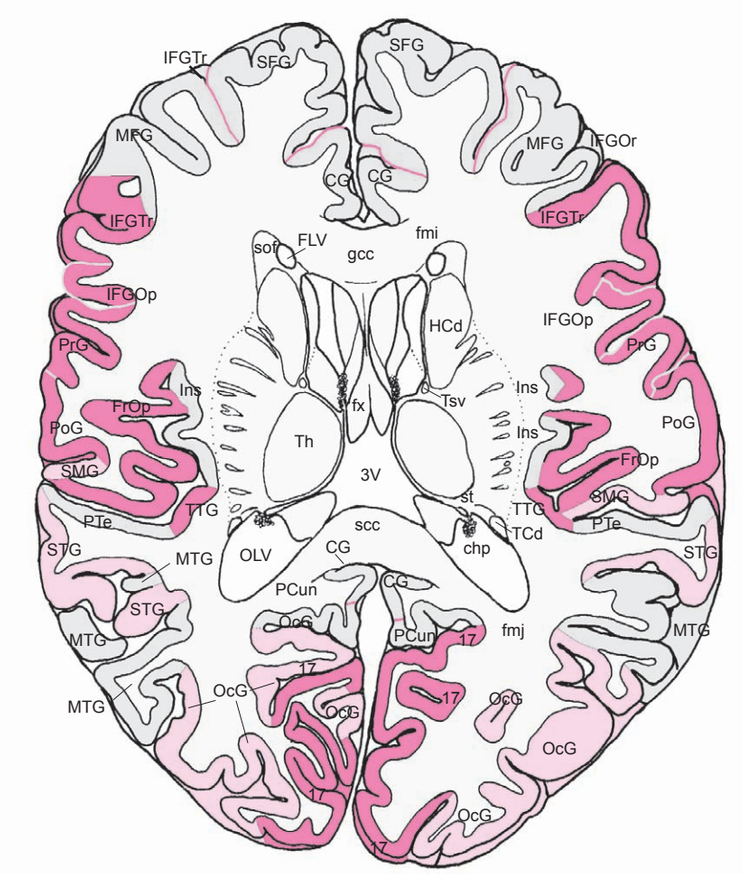






6

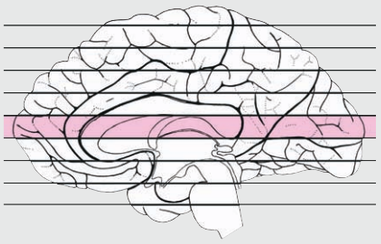
(dorsal view)

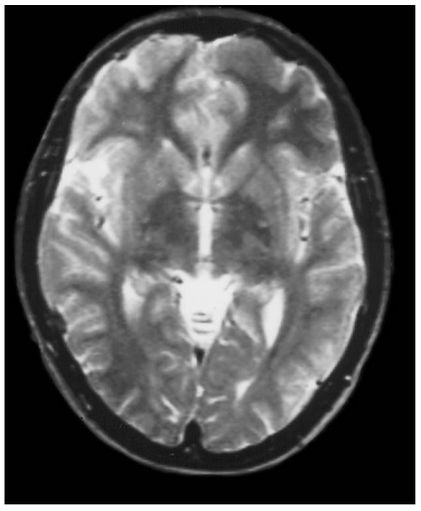


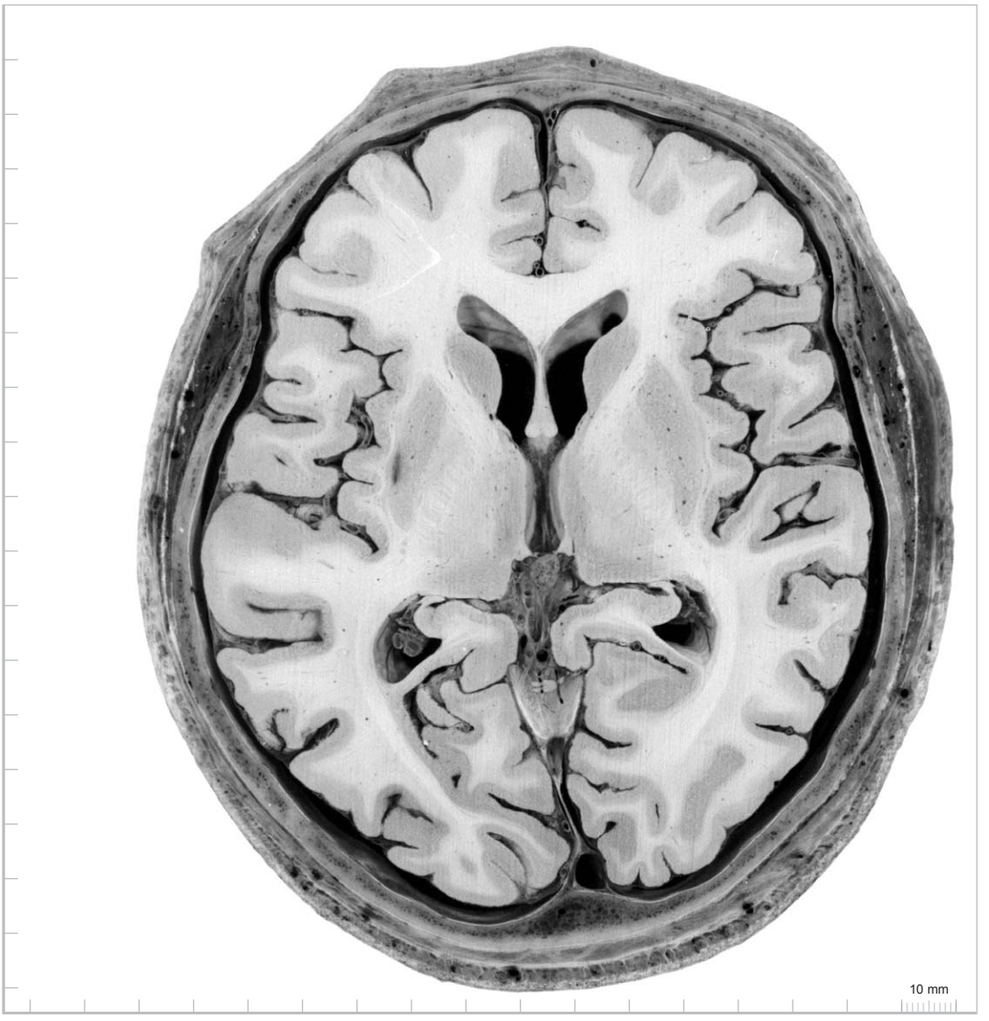
3V	third ventricle
17	striate area
acer	anterior cerebral artery
CG	cingular gyrus
chp	choroid plexus
Cun	cuneus
FLV	frontal horn of lateral ventricle
fmi	forceps minor of the corpus callosum
fmj	forceps major of the corpus callosum
FrOp	frontal operculum
fx	fornix
gcc	genu of the corpus callosum
HCd	head of caudate nucleus
IFGOp	inferior frontal gyrus, opercular part
IFGOr	inferior frontal gyrus, orbital part
IFGTr	inferior frontal gyrus, triangular part
Ins	insula
IPL	inferior parietal lobule
LV	lateral ventricle
mcer	middle cerebral artery
MFG	middle frontal gyrus
MTC	medial temporal gyrus
MTG	middle temporal gyrus
OcG	occipital gyri
OLV	occipital horn of lateral ventricle
PaOp	parietal operculum
pcer	posterior cerebral artery
PCun	precuneus
PoG	postcentral gyrus
PrG	precentral gyrus
PTe	planum temporale
scc	splenium of the corpus callosum
SFG	superior frontal gyrus
SMG	supramarginal gyrus
sof	superior occipitofrontal fascicle
st	stria terminalis
STG	superior temporal gyrus
TCd	tail of caudate nucleus
Th	thalamus
tsv	thalamostriate vein
TTG	transverse temporal gyri

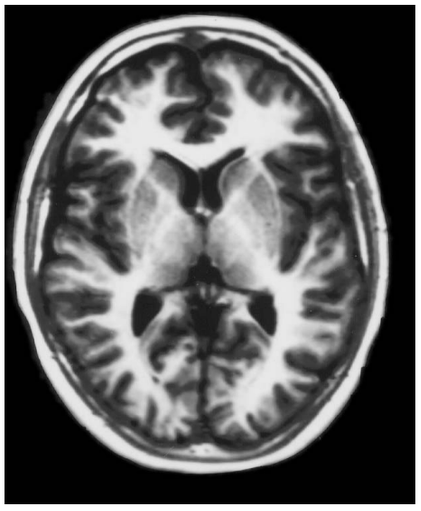
6

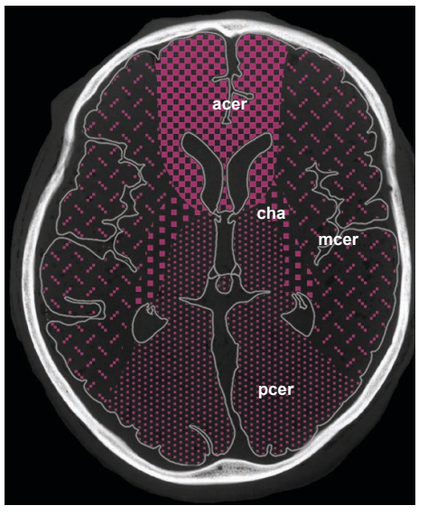
(ventral view)

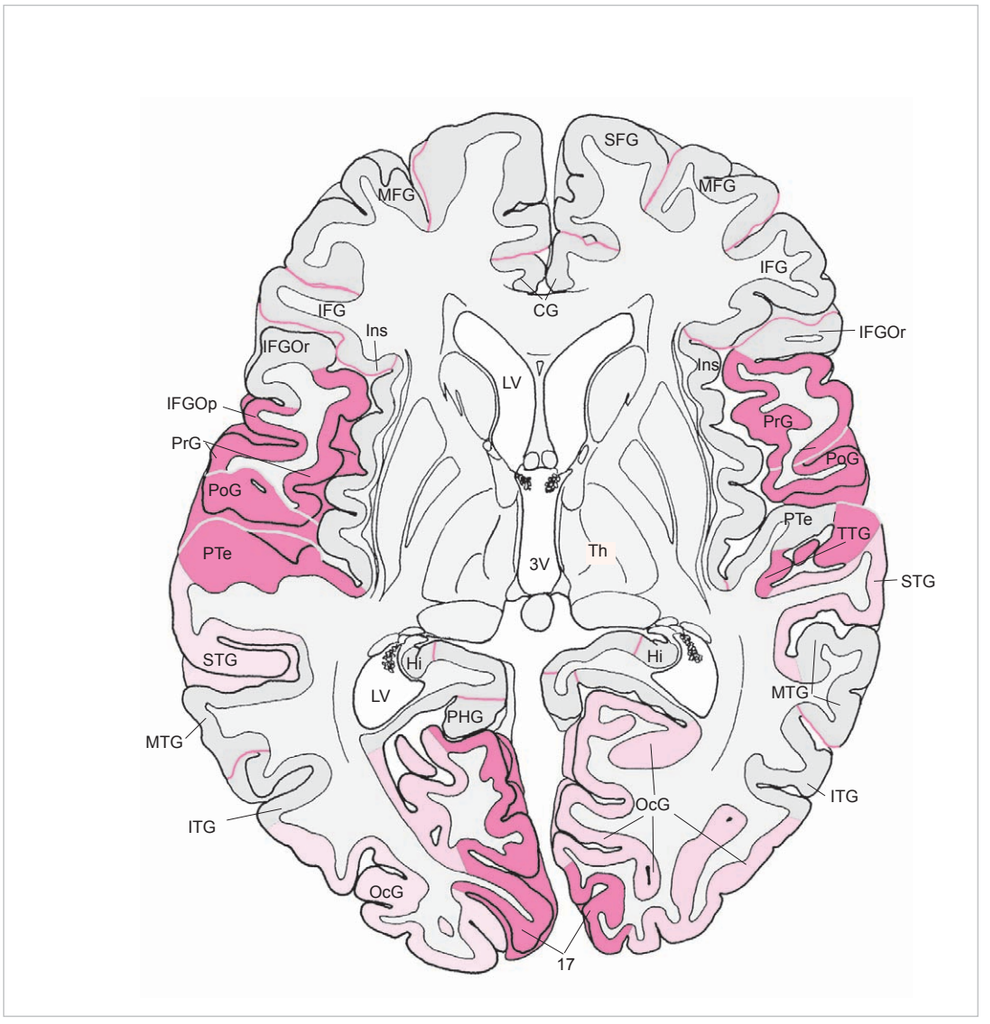


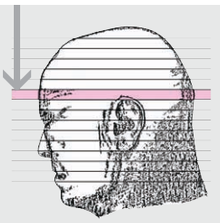






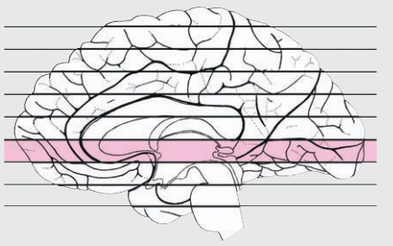






7

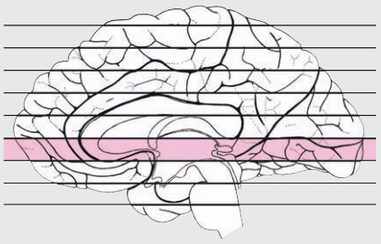
(dorsal view)

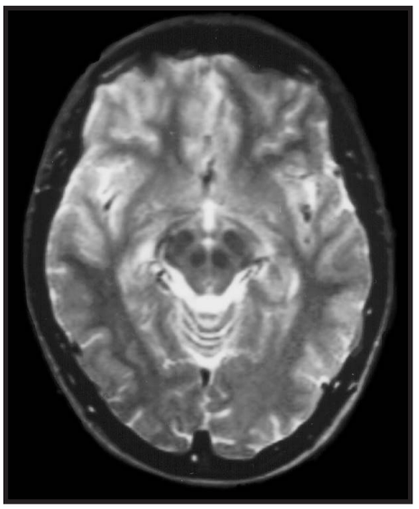


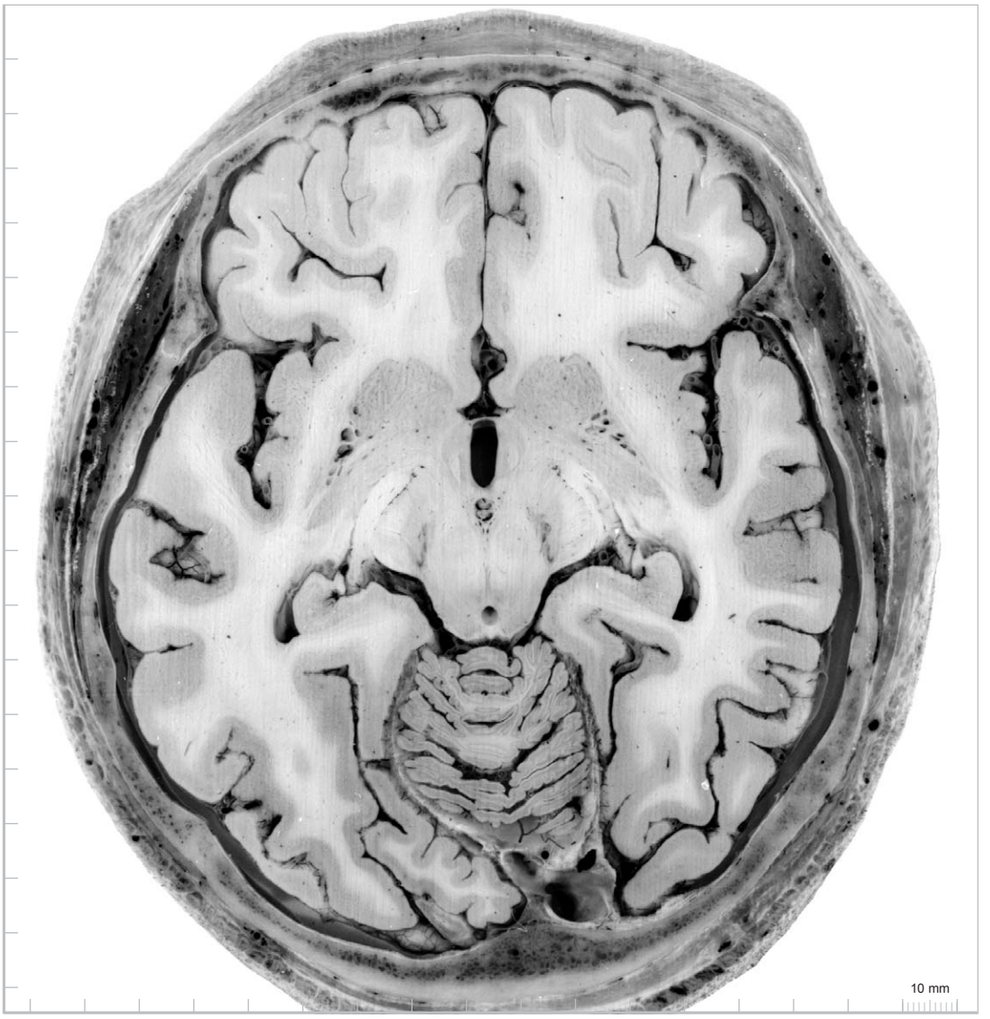
3V	third ventricle
17	striate area
acer	anterior cerebral artery
aic	anterior limb of the internal capsule
ATh	anterior thalamus
CG	cingular gyrus
cha	choroid artery
chp	choroid plexus
Cl	claustrum
ec	external capsule
exc	extreme capsule
fi	fimbria hippocampi
FLV	frontal horn of lateral ventricle
FuG	fusiform gyrus
fx	fornix
gcc	genu of the corpus callosum
gic	internal capsule, genu
GP	globus pallidus
Hb	habenular nuclei
HCd	head of caudate nucleus
Hi	hippocampus
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
IFGOr	inferior frontal gyrus, orbital part
IFGTr	inferior frontal gyrus, triangular part
Ins	insula
ITG	inferior temporal gyrus
LV	lateral ventricle
mcer	middle cerebral artery
MFG	middle frontal gyrus
MTG	middle temporal gyrus
OcG	occipital gyri
OLV	occipital horn of lateral ventricle
or	optic radiation
pcer	posterior cerebral artery
PCun	precuneus
PHG	parahippocampal gyrus
Pi	pineal gland
pic	posterior limb of the internal capsule
PoG	postcentral gyrus
PrG	precentral gyrus
PTe	planum temporale
Pu	putamen
Pul	pulvinar thalami
SFG	superior frontal gyrus
sm	stria medullaris of thalamus
st	stria terminalis
STG	superior temporal gyrus
TCd	tail of caudate nucleus
Th	thalamus
TTG	transverse temporal gyri
Ver	vermis of cerebellum

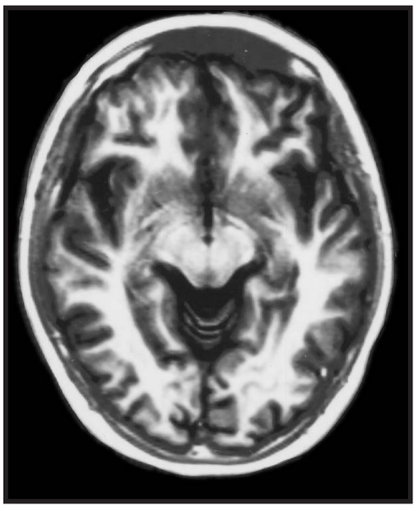
7

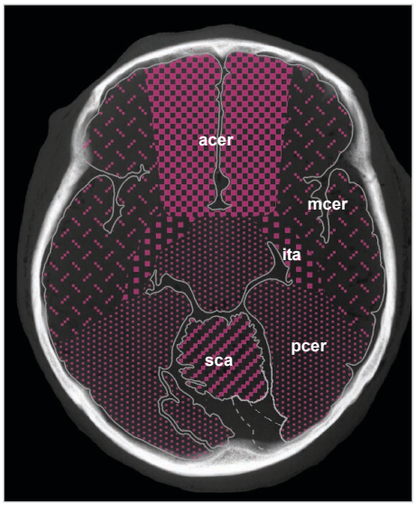
(ventral view)

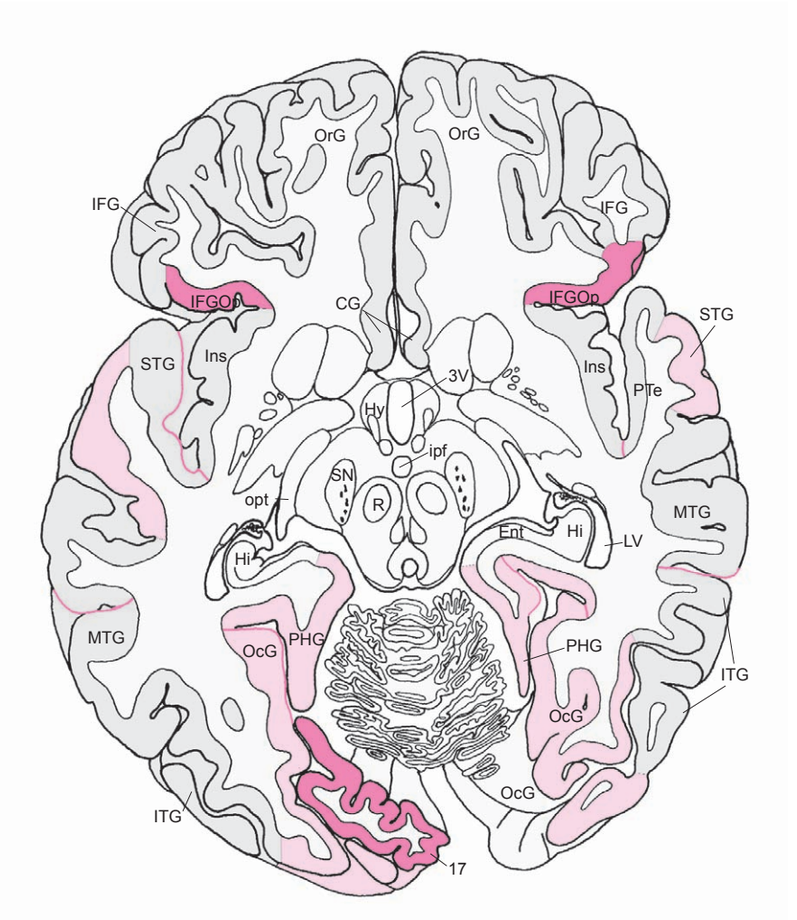


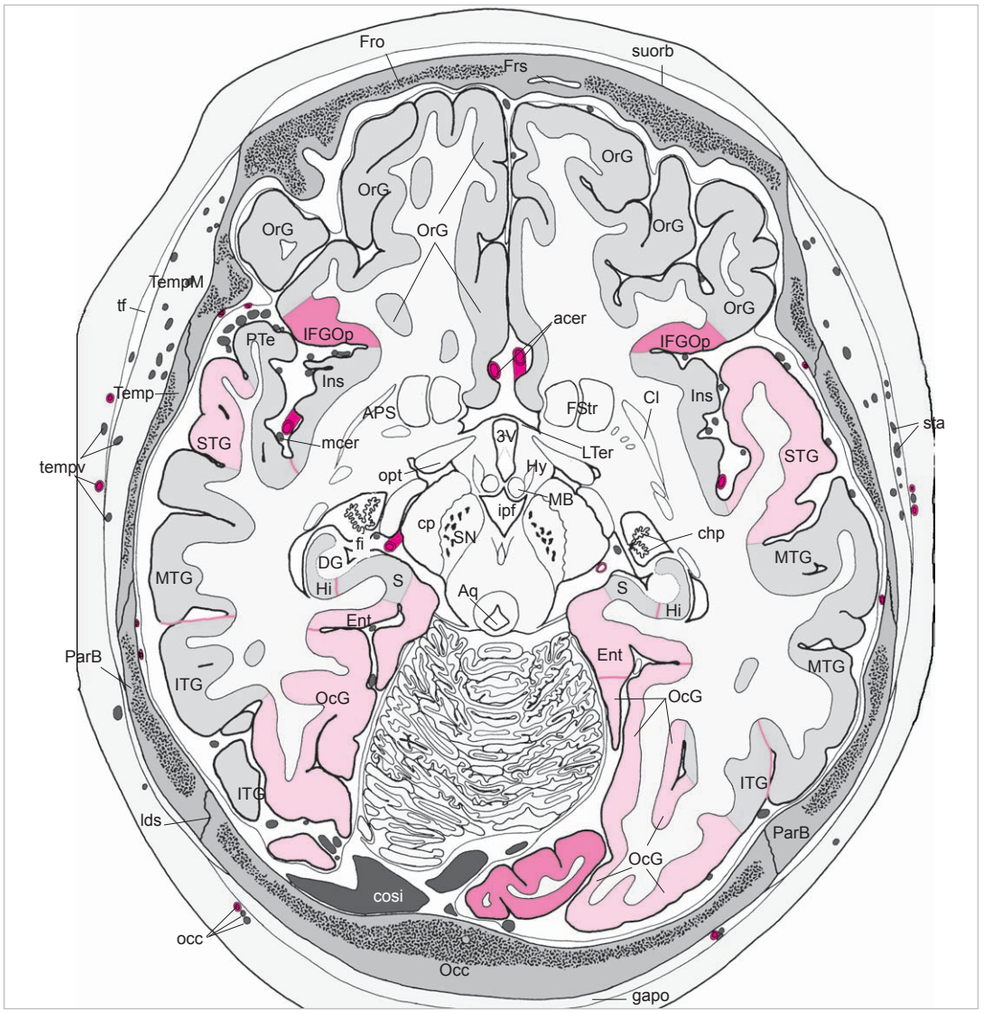


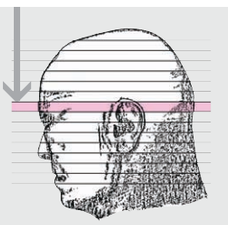






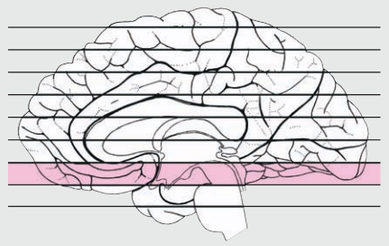






8

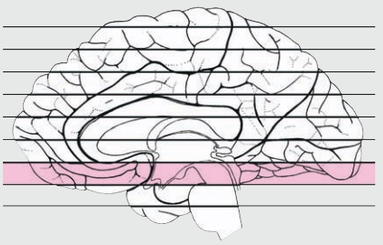
(dorsal view)

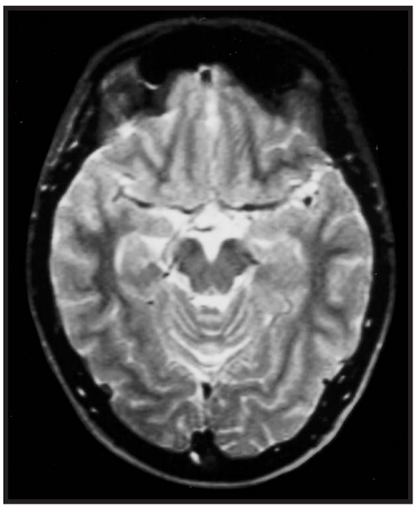


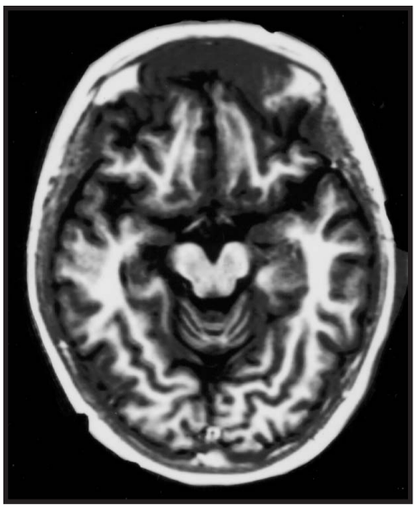
3V	third ventricle
17	striate area
acer	anterior cerebral artery
APS	anterior perforated substance
Aq	aqueduct
CG	cingulate gyrus
chp	choroid plexus
CI	claustrum
cosi	confluence of sinuses
cp	cerebral peduncle
DG	dentate gyrus
Ent	entorhinal cortex
Fro	frontal bone
FrS	frontal sinus
FStr	fundus striati
gapo	epicranial aponeurosis (galea aponeurotica)
Hi	hippocampus
Hy	hypothalamus
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
Ins	insula
ipf	interpeduncular fossa
ita	inferior temporal artery
ITG	inferior temporal gyrus
lds	lamboid suture
LTer	lamina terminalis
LV	lateral ventricle
MB	mammillary body
mcer	middle cerebral artery
MTG	middle temporal gyrus
Occ	occipital bone
occ	occipital artery, vein and nerve
OcG	occipital gyri
opt	optic tract
OrG	orbital gyri
ParB	parietal bone
pcer	posterior cerebral artery
PHG	parahippocampal gyrus
PTe	planum temporale
R	red nucleus
S	subiculum
sca	superior cerebellar artery
SN	substantia nigra
sta	superficial temporal artery and vein
STG	superior temporal gyrus
Temp	temporal bone
tempv	temporal veins
tf	temporal fascia

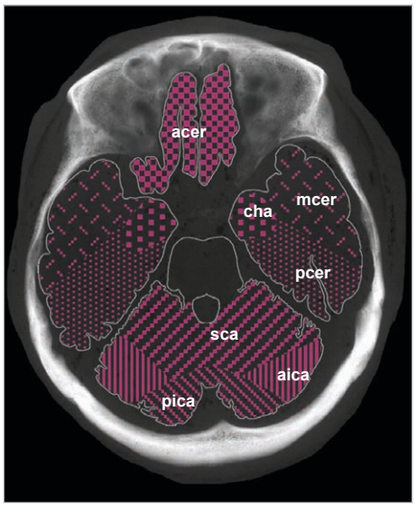
8

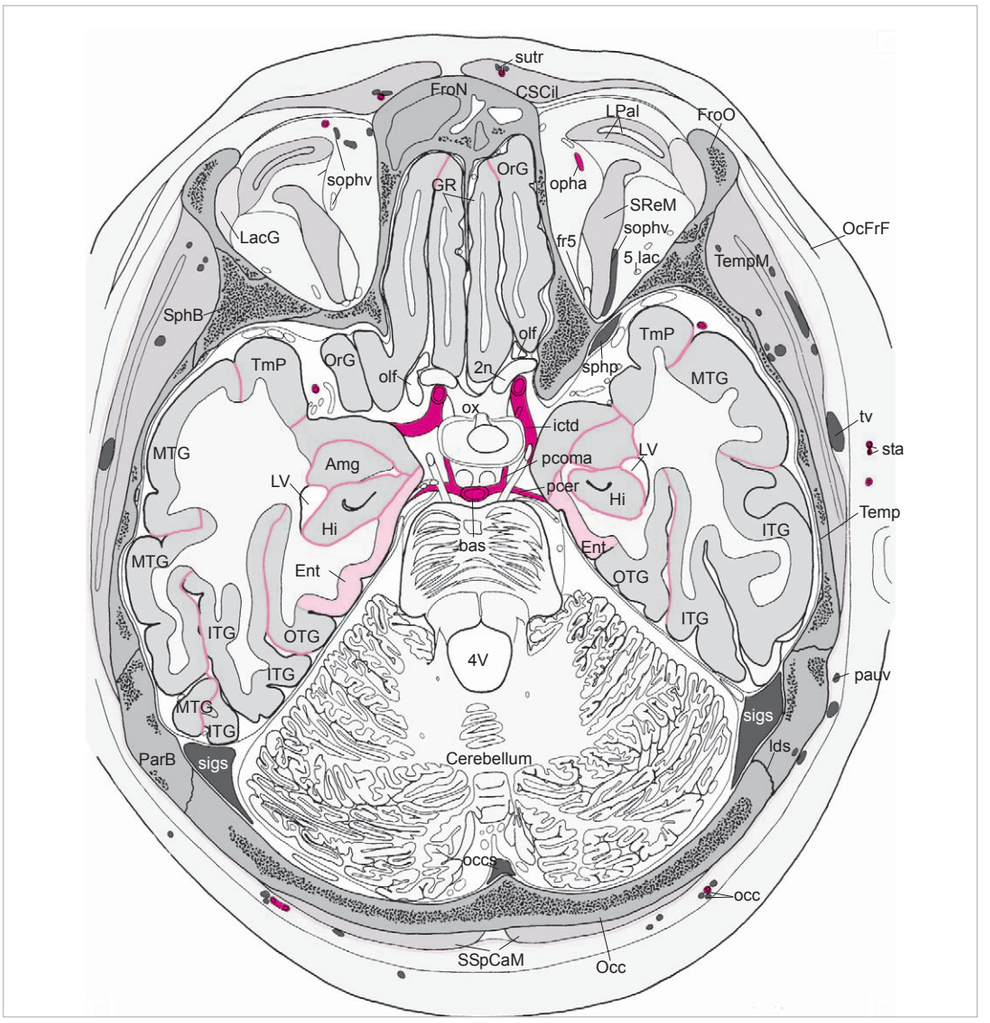
(ventral view)

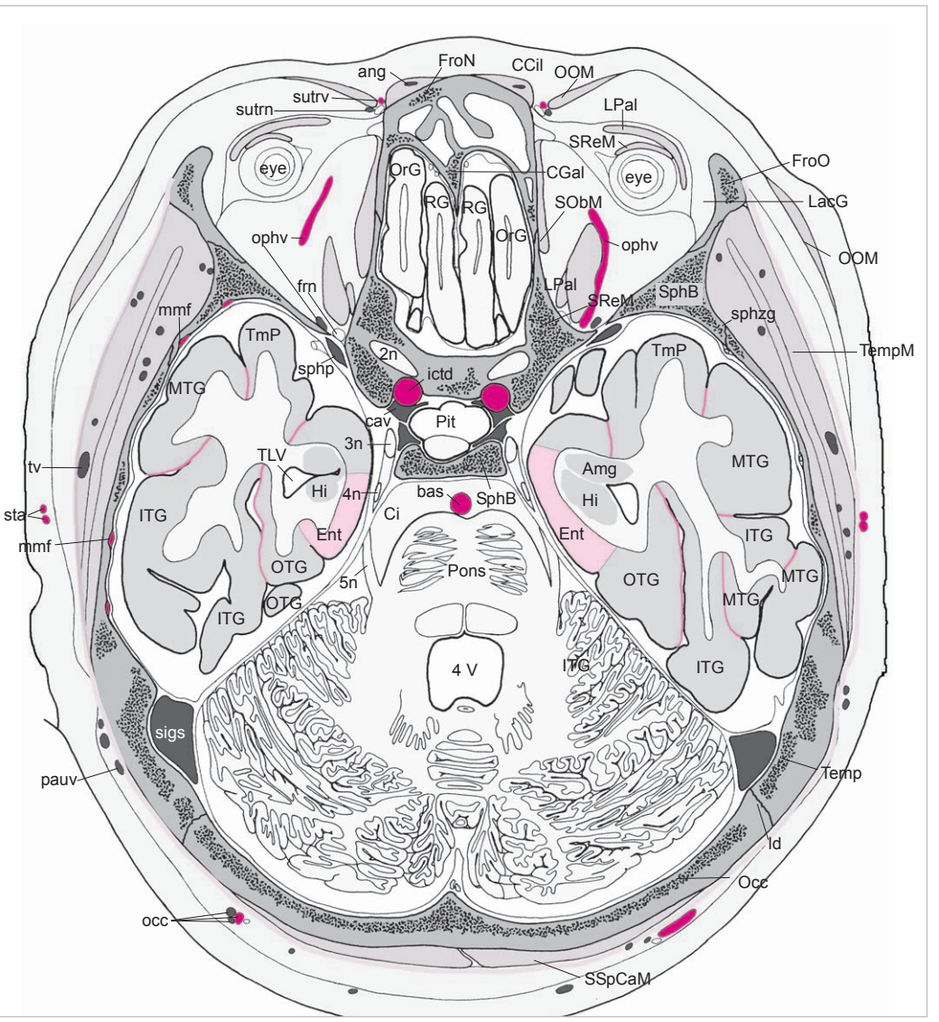


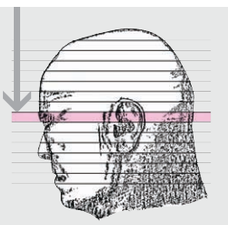






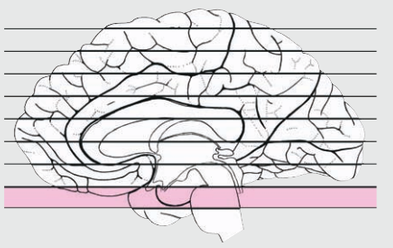






9

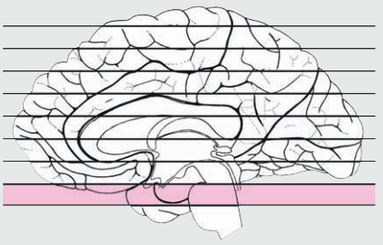
(dorsal view)

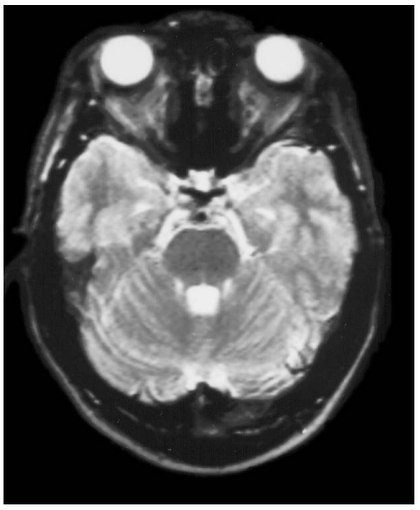


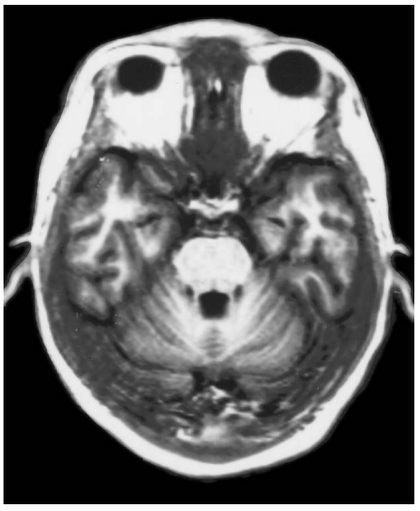
2n	optic nerve
3n	oculomotor nerve
4n	trochlear nerve
4V	fourth ventricle
5n	trigeminal nerve
5lac	lacrimal nerve
acer	anterior cerebral artery
aica	anterior inferior cerebellar artery
Amg	amygdala
ang	angular vein
bas	basilar artery
cav	cavernous sinus
CCil	corrugator supercilii muscle
CGal	crista galli
cha	choroid artery
Ci	cistern
CSCil	corrugator supercilii muscle
Ent	entorhinal cortex
frn	frontal nerve
FroN	frontal bone, nasal part
FroO	frontal bone, orbital part
GR	gyrus rectus
Hi	hippocampus
ictd	internal carotid artery
ITG	inferior temporal gyrus
LacG	lacrimal gland
ld	lambdoid suture
LPal	levator palpebrae superioris muscle
LV	lateral ventricle
mcer	middle cerebral artery
mmf	middle meningeal a., frontal branch
MTG	middle temporal gyrus
Occ	occipital bone
occ	occipital artery, vein and nerve
occs	occipital sinus
OcFrF	occipito-frontal muscle, frontal belly
olf	olfactory tract
OOM	orbicularis oculi muscle
opha/v	ophthalmic artery / vein
OrG	orbital gyrus
OTG	occipito-temporal gyrus
ox	optic chiasm
ParB	parietal bone
pauv	posterior auricular vein
pcer	posterior cerebral artery
pcoma	posterior communicating artery
pica	posterior inferior cerebellar artery
Pit	pituitary gland
Pons	pons
RG	rectus gyrus
sca	superior cerebellar artery
sigs	sigmoid sinus
SObM	superior oblique muscle
sophv	superior ophthalmic vein
SphB	sphenoid bone
sphp	sphenoparietal sinus
sphzg	spheno-zygomatic suture
SReM	superior rectus muscle
SSpCaM	semispinalis capitis muscle
sta	superficial temporal artery
sutr	supratrochlear artery and vein
sutrn	supratrochlear nerve
sutrv	supratrochlear vein
Temp	temporal bone
TempM	temporal muscle
TLV	temporal horn of lateral ventricle
TmP	temporal pole
tv	temporal vein

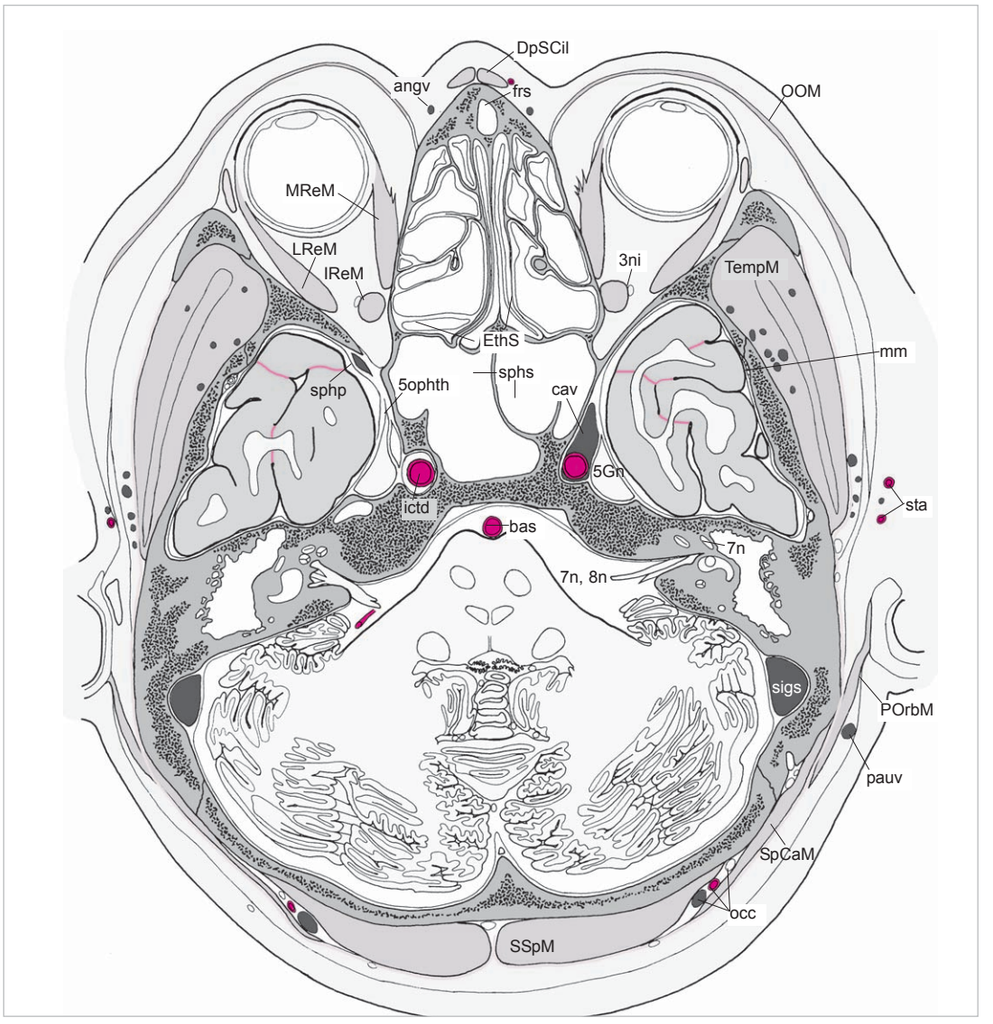
9

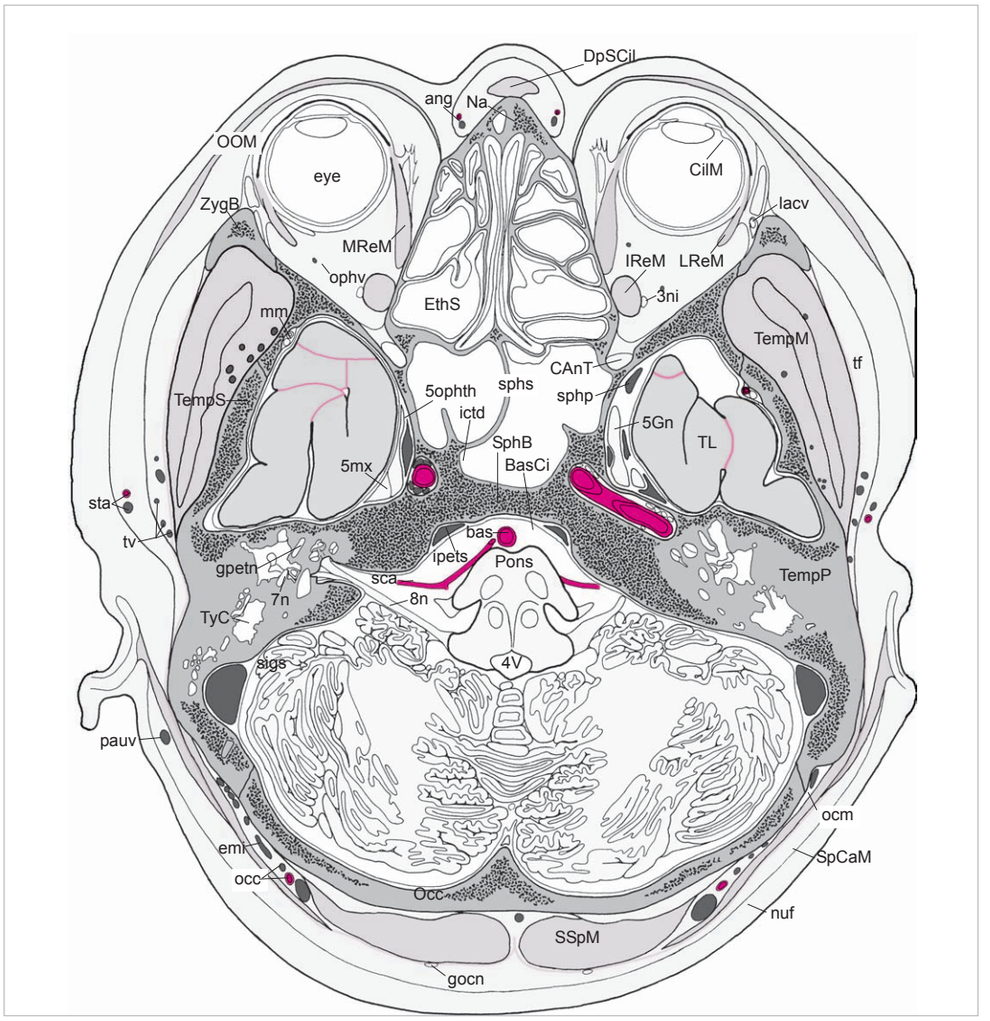
(ventral view)

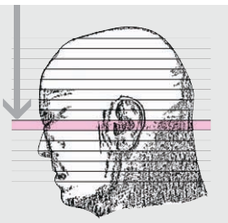












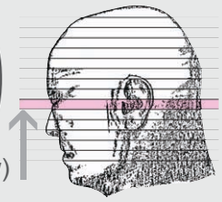
10

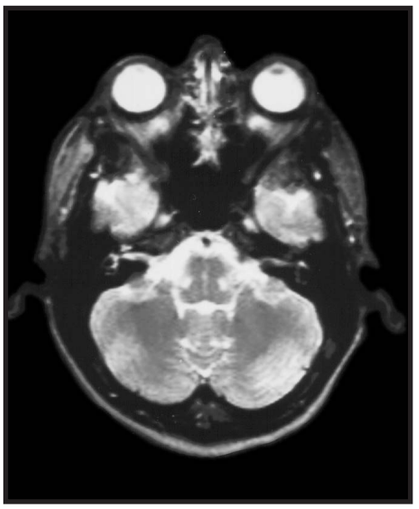
(dorsal view)

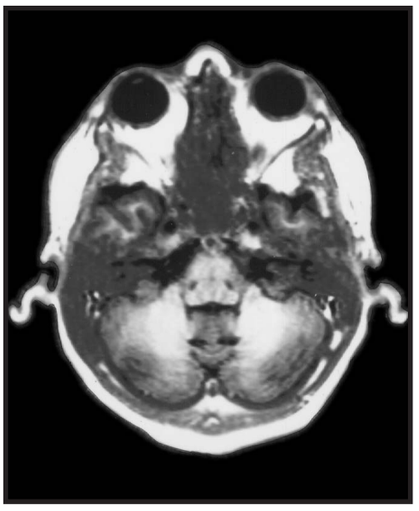
3ni	oculomotor nerve (inferior branch)
4V	fourth ventricle
5Gn	trigeminal ganglion (Gasseri)
5mx	maxillary nerve
5ophth	ophthalmic nerve
7n	facial nerve
8n	vestibulo-cochlear nerve
ang	angular artery and vein
angv	angular vein
bas	basilar artery
BasCi	basilar cistern
CAnT	common anular tendon
cav	cavernous sinus
CilM	ciliaris muscle
DpSCil	depressor supercilii muscle
emi	emissary vein
EthS	ethmoidal sinus (cells)
eye	eyeball
frs	frontal sinus
gocn	greater occipital nerve
gpetn	greater petrosal nerve
ictd	internal carotid artery
ipets	inferior petrosal sinus
IReM	inferior rectus muscle
lacv	lacrimal vein
LReM	lateral rectus muscle
mm	middle meningeal artery
MReM	medial rectus muscle
Na	nasal bone
nuf	nuchal fascia
Occ	occipital bone
occ	occipital artery, vein and nerve
ocm	occipito-mastoid suture
OOM	orbicularis oculi muscle
ophv	ophthalmic vein
pauv	posterior auricular vein
POrbM	posterior orbicularis muscle
sca	superior cerebellar artery
sigs	sigmoid sinus
SpCaM	splenius capitis muscle
SphB	sphenoid bone
sphp	spheno-parietal sinus
sphs	sphenoid sinus
SSpM	semispinalis capitis muscle
sta	superficial temporal artery and vein
TempM	temporalis muscle
TempP	temporal bone, petrosal part
TempS	temporal bone, squamous part
tf	temporalis fascia
TL	temporal lobe
tv	temporalis veins
TyC	tympanic cavity
ZygB	zygomatic bone

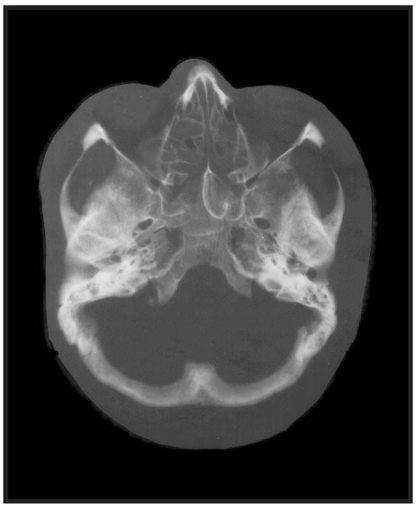
10

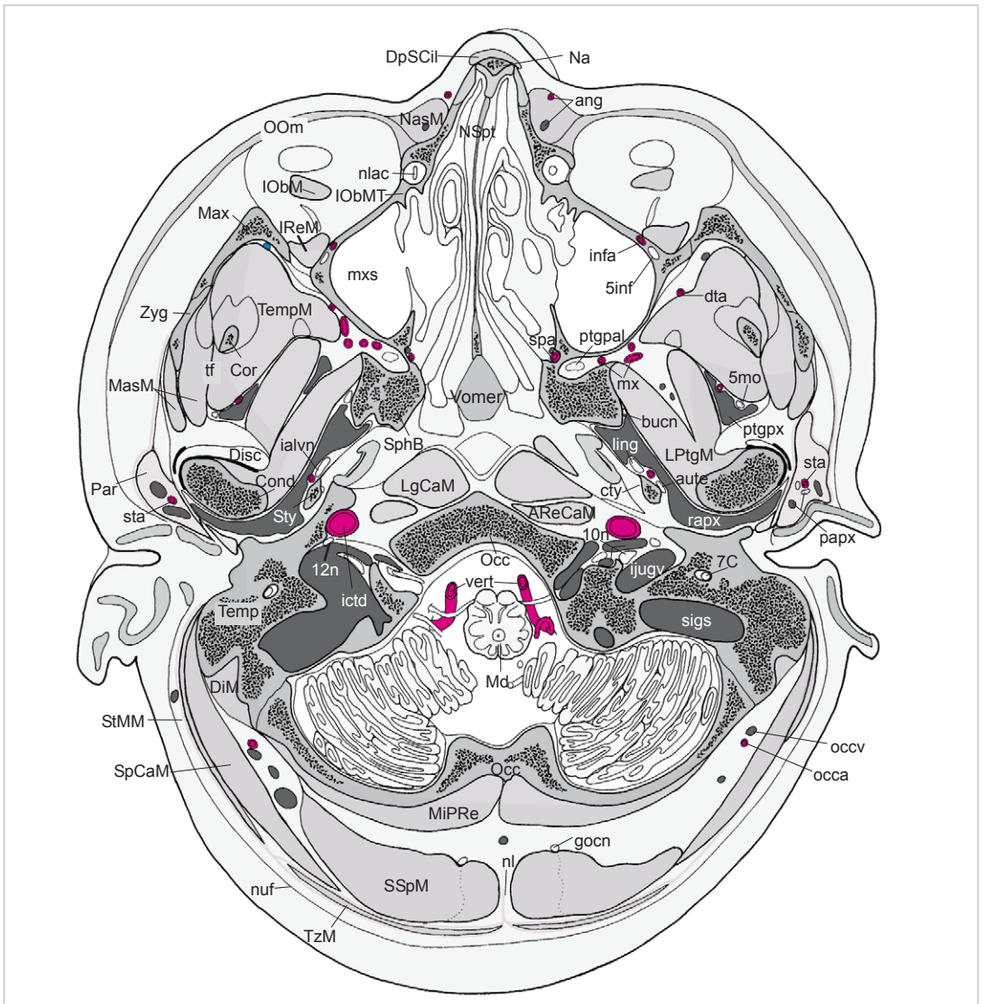
(ventral view)

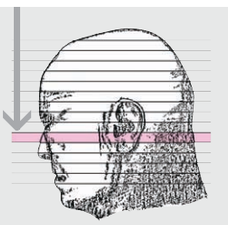












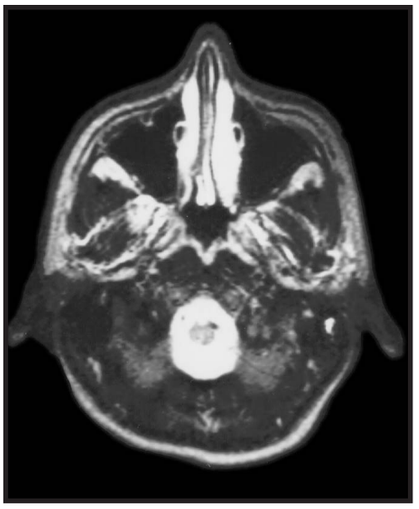
11

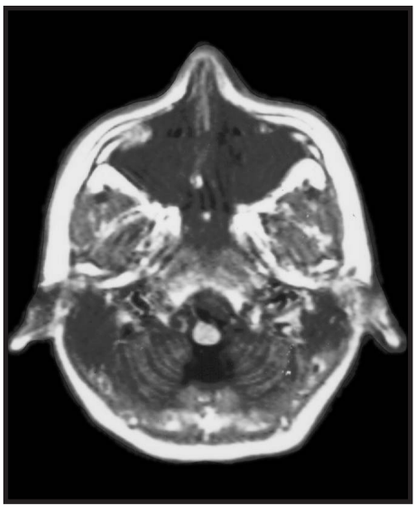
(dorsal view)

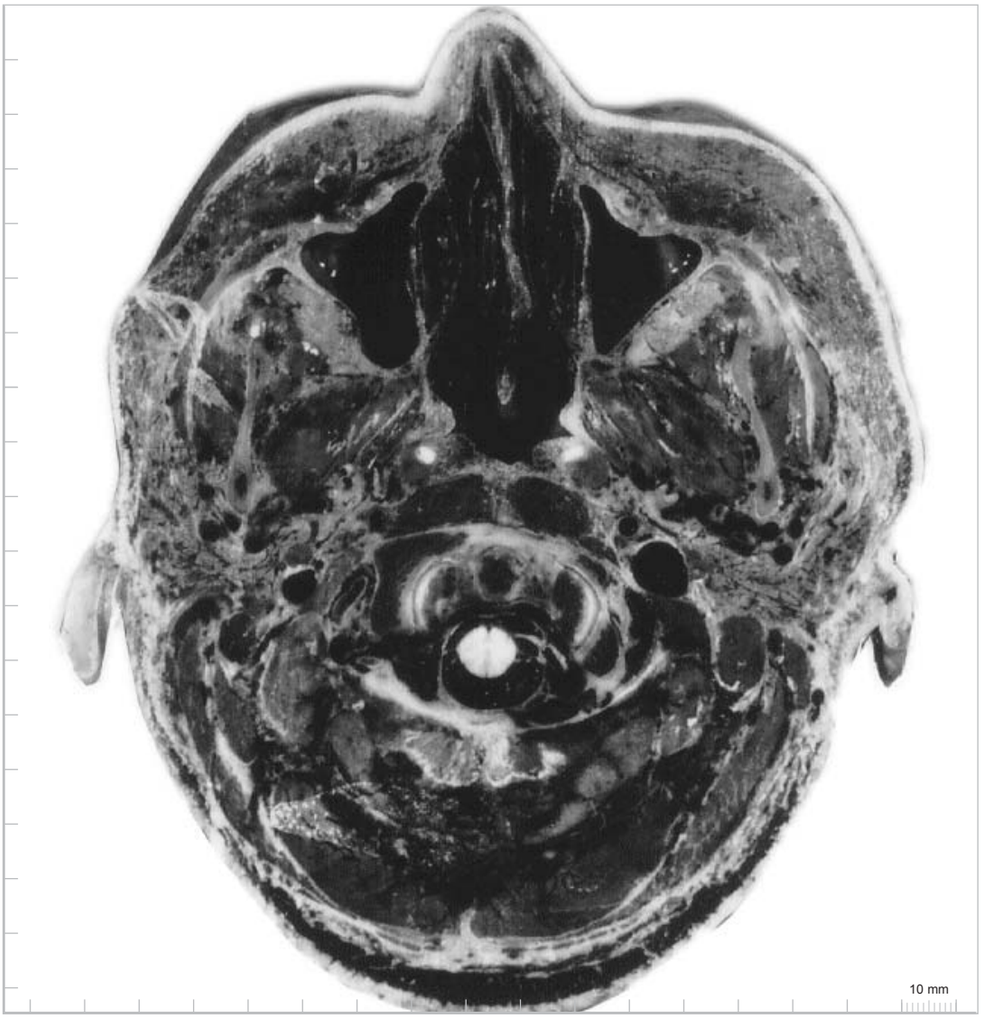
3ni	oculomotor nerve (inferior branch)
5inf	infraorbital nerve
5mo	motor root of trigeminal nerve
7C	facial nerve and canal
7n	facial nerve
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve
ang	angular artery and vein
AReCaM	anterior rectus capitis muscle
aute	auriculotemporal nerve
bucn	buccal nerve
Cond	condylar process of mandible
Cor	coronoid process of the mandible
cty	chorda tympani
DIM	digastric muscle
Disc	articular disc of temporo-mandibular joint
DpSCil	depressor supercilii muscle
dta	deep temporalis artery
gocn	greater occipital nerve
ialvn	inferior alveolar nerve
ictd	internal carotid artery
ijugv	internal jugular vein
infa	infraorbital artery
IObM	inferior oblique muscle
IObMT	inferior oblique muscle, tendon
IReM	inferior rectus muscle
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
ling	lingual nerve
LPtgL	lateral pterygoid muscle, lateral belly
LPtgM	lateral pterygoid muscle, medial belly
MasM	masseter muscle
Max	maxilla
maxs	maxillary sinus
Md	medulla oblongata
MiPRe	minor posterior rectus capitis muscle
mx	maxillary artery
mxs	maxillary sinus
Na	nasal bone
NasM	nasalis muscle
nl	nuchal ligament
nlac	nasolacrimal duct
NSpt	nasal septum
nuf	nuchal fascia
Occ	occipital bone
occ	occipital artery and vein
occa	occipital artery
occv	occipital vein
OOm	orbicularis oculi muscle
papx	parotid plexus
Par	parotid gland
PMiRe	posterior minor rectus capitis muscle
ptgpal	pterygopalatine ganglion
ptgpx	pterygoid plexus
rapx	retroarticular (venous) plexus
sigs	sigmoid sinus
spa	sphenopalatine artery
SpCaM	splenius capitis muscle
SphB	sphenoid bone
SphP	pterygopalatine ganglion
SSpM	semispinalis capitis muscle
sta	superficial temporal artery and vein
StMM	sternomastoid muscle
StMT	sternomastoid muscle, tendon
Sty	styloid process
Temp	temporal bone
TempM	temporalis muscle
tf	temporalis fascia
TzM	trapezius muscle
vert	vertebral artery
Vomer	vomer
Zyg	zygamatic bone

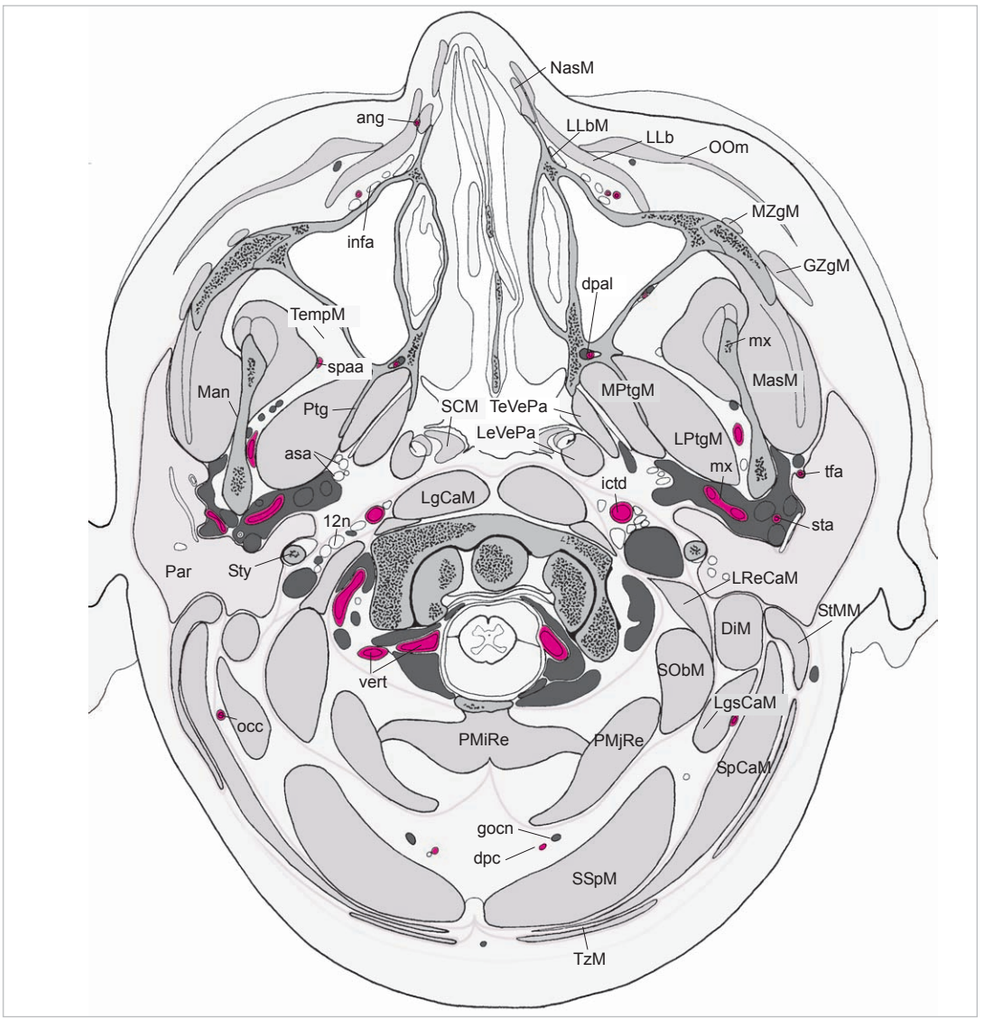
11

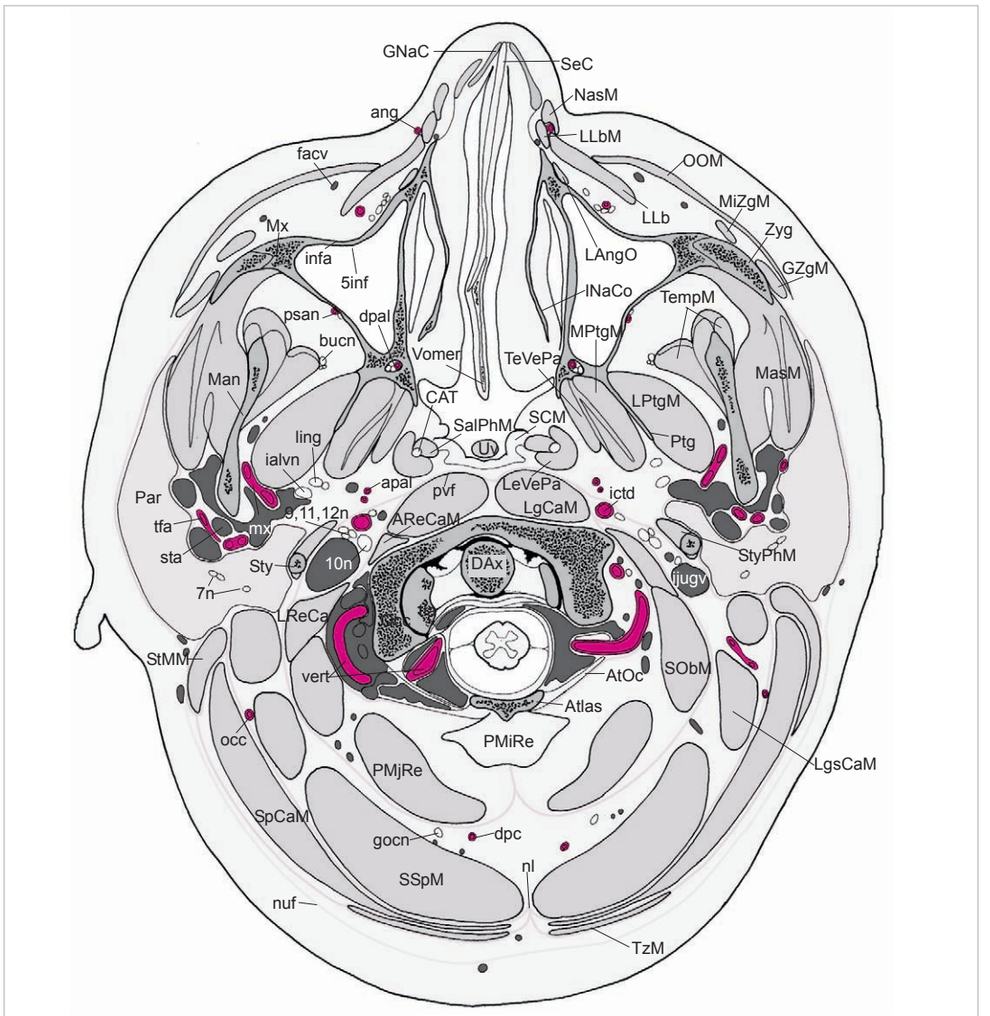
(ventral view)

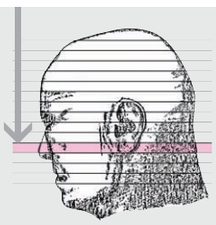












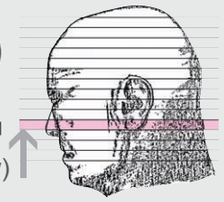
12

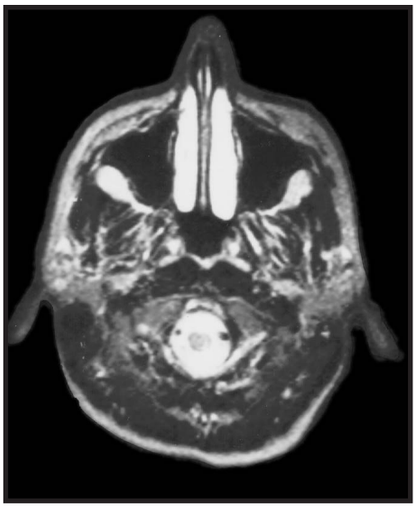
(dorsal view)

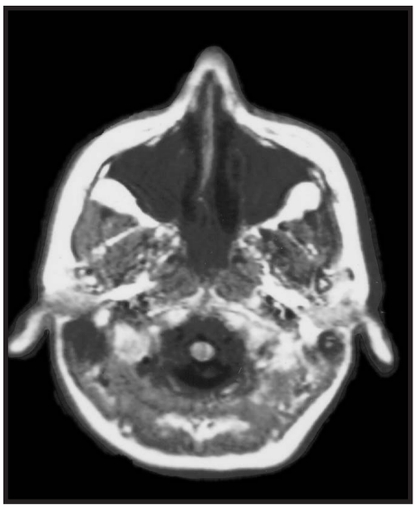
5inf	infraorbital nerve
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve
AMjC	ala major cartilage
apal	ascending palatine artery
Atlas	atlas
AtOc	atlanto occipital joint
BucM	buccinator muscle
bucn	buccal nerve
cern2	cervical nerve 2
DAx	dens axis
DiM	digastric muscle
dpc	deep cervical artery and vein
ectd	external carotid artery
fac	facial artery
facv	facial vein
GNaC	greater nasal cartilage
gocn	greater occipital nerve
GZgM	greater zygomatic muscle
HPtg	hamulus of the pterygoid bone
ialv	inferior alveolar artery, vein and nerve
ictd	internal carotid artery
ijugv	internal jugular vein
IObCpM	inferior oblique capitis muscle
ivvpx	internal vertebral venous plexus
LAngO	levator anguli oris muscle
LeVaPa	levator veli palatini muscle
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
LgsCaM	longissimus capitis muscle
ling	lingual nerve
LLb	levator labii sup. muscle
lObM	inferior oblique capitis muscle
Man	mandible
MasM	masseter muscle
MiZgM	minor zygomatic muscle
MPtgM	medial pterygoideus muscle
MScal	medial scalenus muscle, insertion of levator scapulae muscle
Mx	maxilla
NasM	nasalis muscle
nl	nuchal ligament
npal	nasopalatine artery, incisive canal
occ	occipital artery and vein
pal	greater palatine artery and vein
PalG	palatine glands
Par	parotid gland
pau	posterior auricular artery and vein
PMiRe	posterior minor rectus capitis muscle
PMjRe	posterior major rectus capitis muscle
ptdd	parotid duct
Ptg	pterygoid process
pvf	prevertebral fascia
rmv	retromandibular vein
SalPhM	salpingopharyngeus muscle
SArS	subarachnoid space
SCM	superior constrictor muscle
SeC	septal cartilage
SNaC	septum nasi cartilage
SobM	superior oblique muscle
SpAx	spinous process of axis
SpCaM	splenius capitis muscle
Spinal	spinal cord
SSpM	semispinalis capitis muscle
StMM	sternomastoid muscle
Sty	styloid process and styloglossus, stylopharyngeus, stylohyoid muscles
StyGlM	styloglossus muscle
StyHyM	stylohyoid muscle
StyPhM	stylopharyngeus muscle
TeVePa	tensor veli palatini muscle
TempM	temporalis muscle
TempT	temporalis muscle (tendon)
TrPAt	transverse process of the atlas
TzM	trapezius muscle
Uv	uvula
vert	vertebral artery
Vomer	vomer

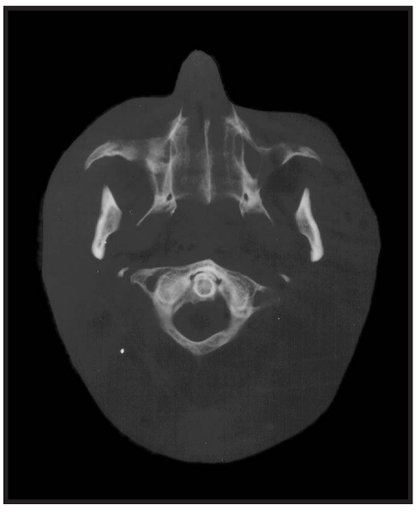
12

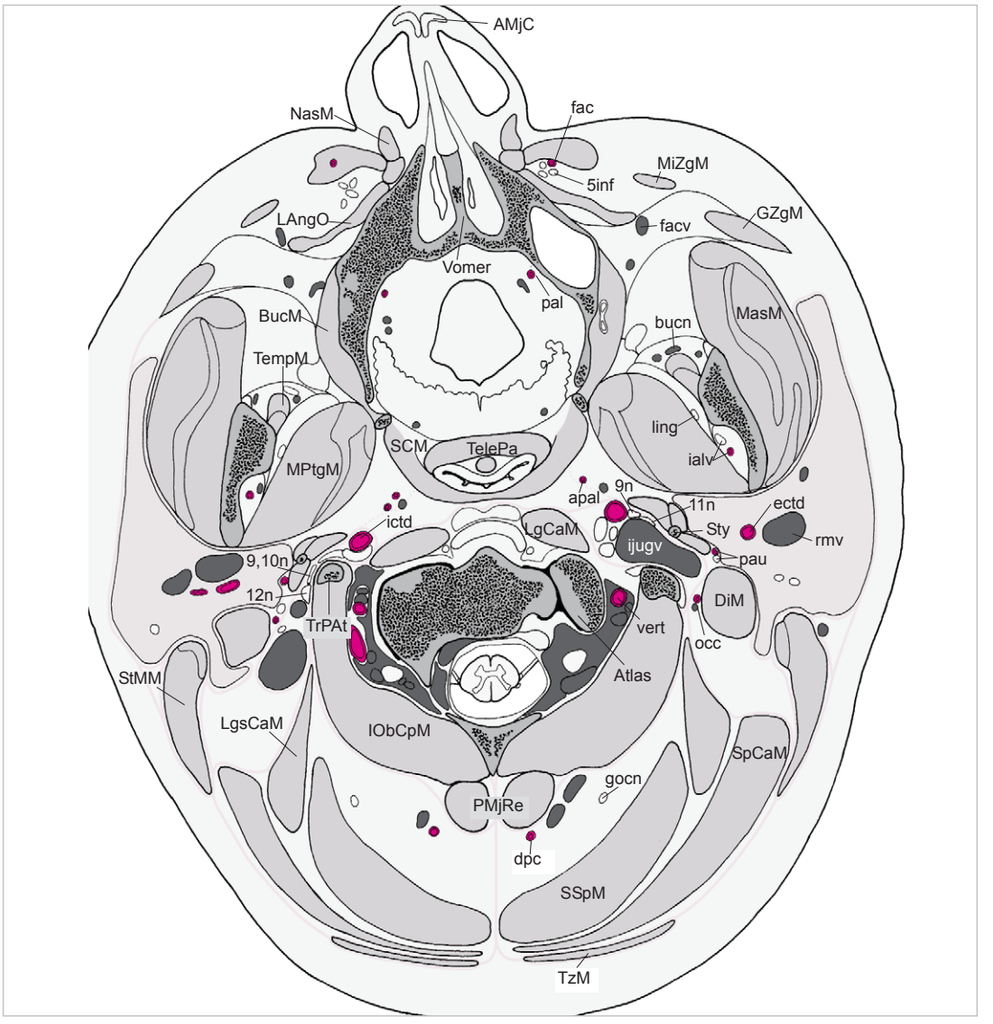
(ventral view)

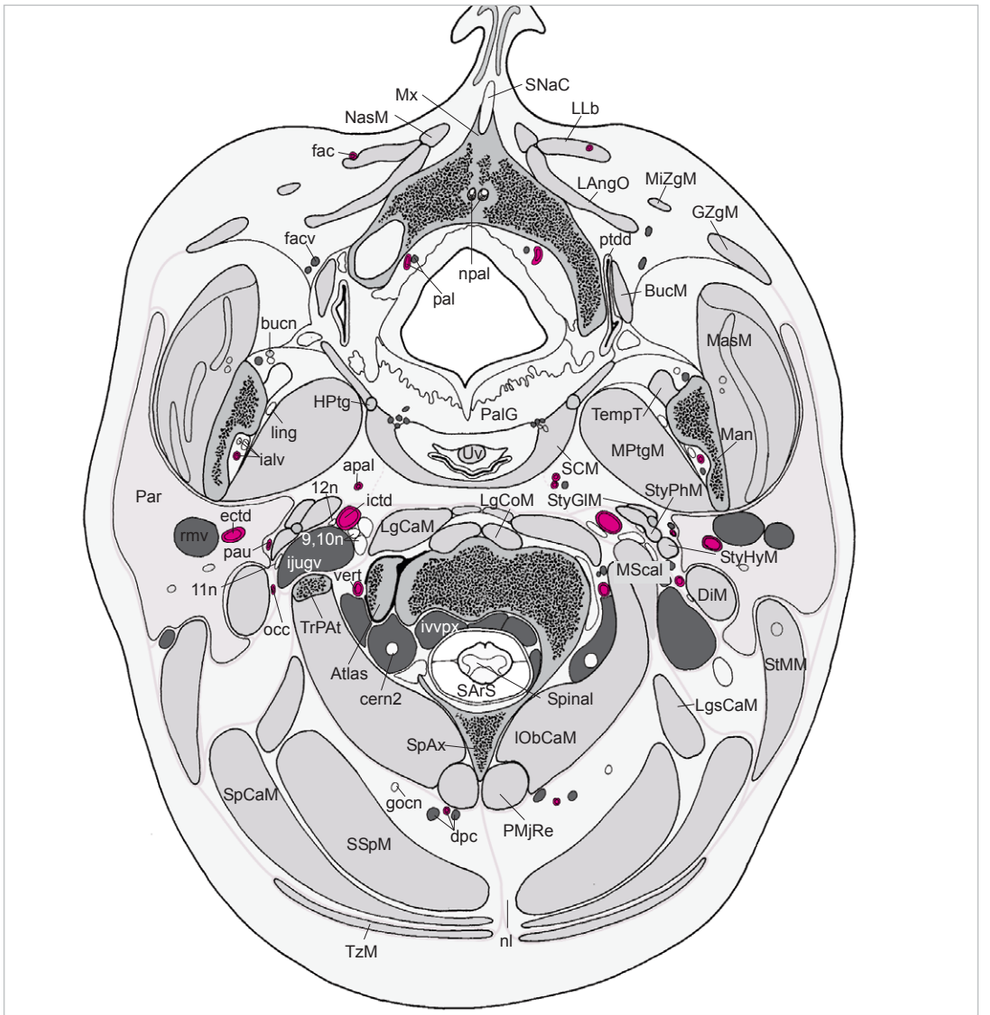


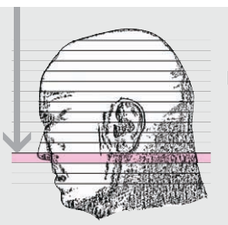












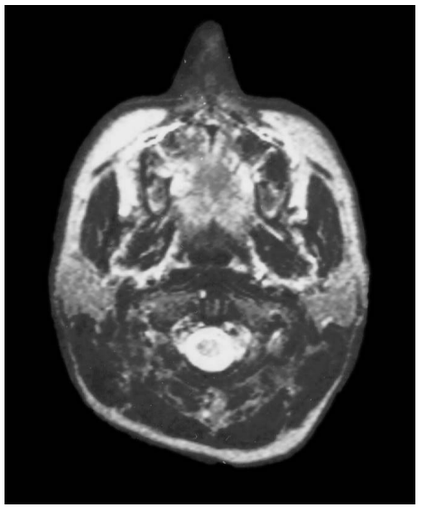
13

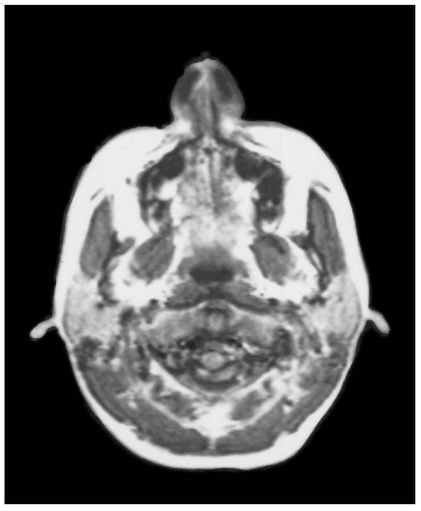
(dorsal view)

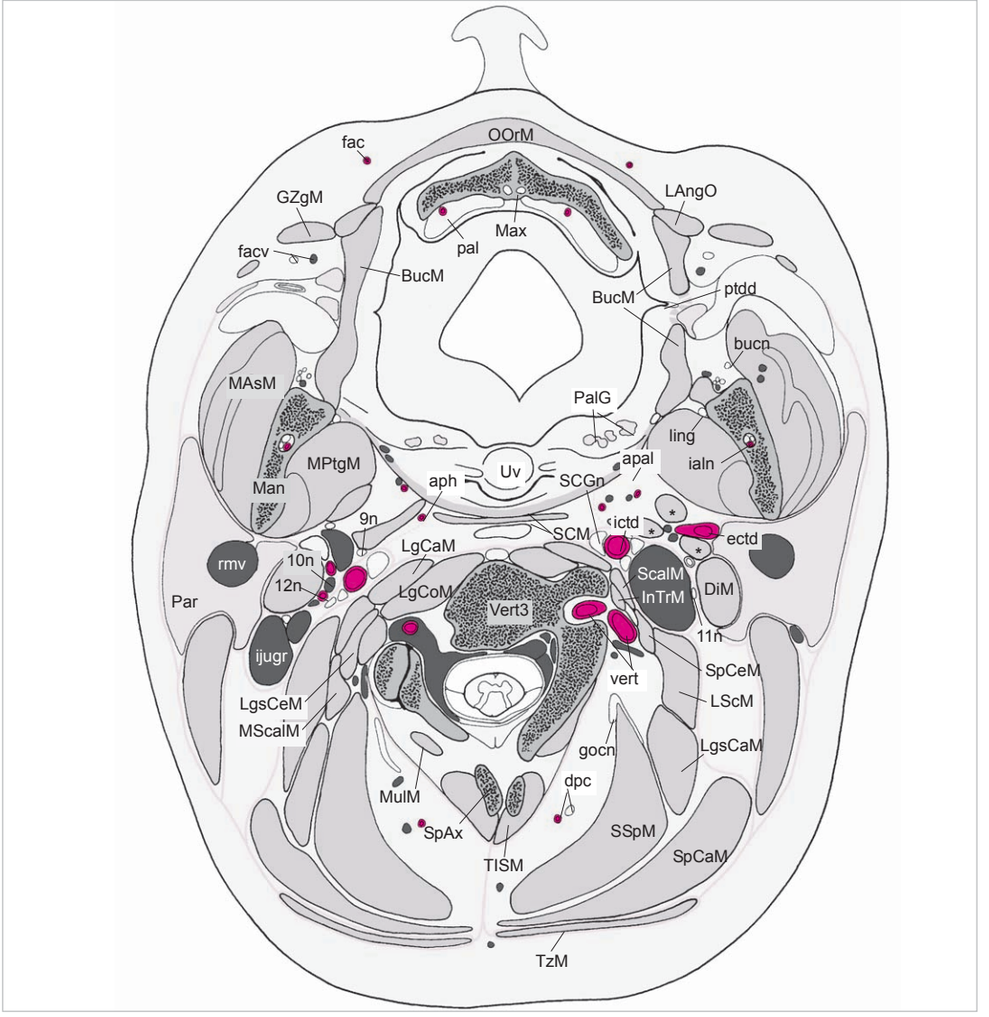
5inf	infraorbital nerve
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve
AMjC	alar major cartilage
apal	ascending palatine artery
Atlas	atlas
BucM	buccinator muscle
bucn	buccal nerve
cern2	cervical nerve 2
DiM	digastric muscle
dpc	deep cervical artery and vein
ectd	external carotid artery
fac	facial artery
facv	facial vein
gocn	greater occipital nerve
GZgM	greater zygomatic muscle
HPtg	hamulus of the pterygoid bone
ialv	inferior alveolar artery, vein, nerve
ictd	internal carotid artery
ijugv	internal jugular vein
IObCpM	inferior oblique capitis muscle
ivvpx	internal vertebral venous plexus
LAngO	levator anguli oris muscle
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
LgsCaM	longissimus capitis muscle
ling	lingual nerve
LLb	levator labii sup. muscle
Man	mandible
MasM	masseter muscle
MiZgM	minor zygomatic muscle
MPtgM	medial pterygoideus muscle
MScal	medial scalenus muscle, insertion of levator scapulae muscle
Mx	maxilla
NasM	nasalis muscle
nl	nuchal ligament
npal	nasopalatine artery, incisive canal
occ	occipital artery and vein
pal	greater palatine artery and vein
PalG	palatine glands
Par	parotid gland
pau	posterior auricular artery and vein
PMjRe	posterior major rectus capitis muscle
ptdd	parotid duct
rmv	retromandibular vein
SArS	subarachnoid space
SCM	superior constrictor muscle
SNaC	septum nasi cartilage
SpAx	spinous process of axis
SpCaM	splenius capitis muscle
Spinal	spinal cord
SSpM	semispinalis capitis muscle
StMM	sternomastoid muscle
Sty	styloid process and styloglossus, stylopharyngeus, stylohyoid muscles
StyGlM	styloglossus muscle
StyHyM	stylohyoid muscle
StyPhM	stylopharyngeus muscle
TelePa	tensor veli palatini muscle
TempM	temporalis muscle
TempT	temporalis muscle (tendon)
TrPAt	transverse process of the atlas
TzM	trapezius muscle
Uv	uvula
vert	vertebral artery
Vomer	vomer

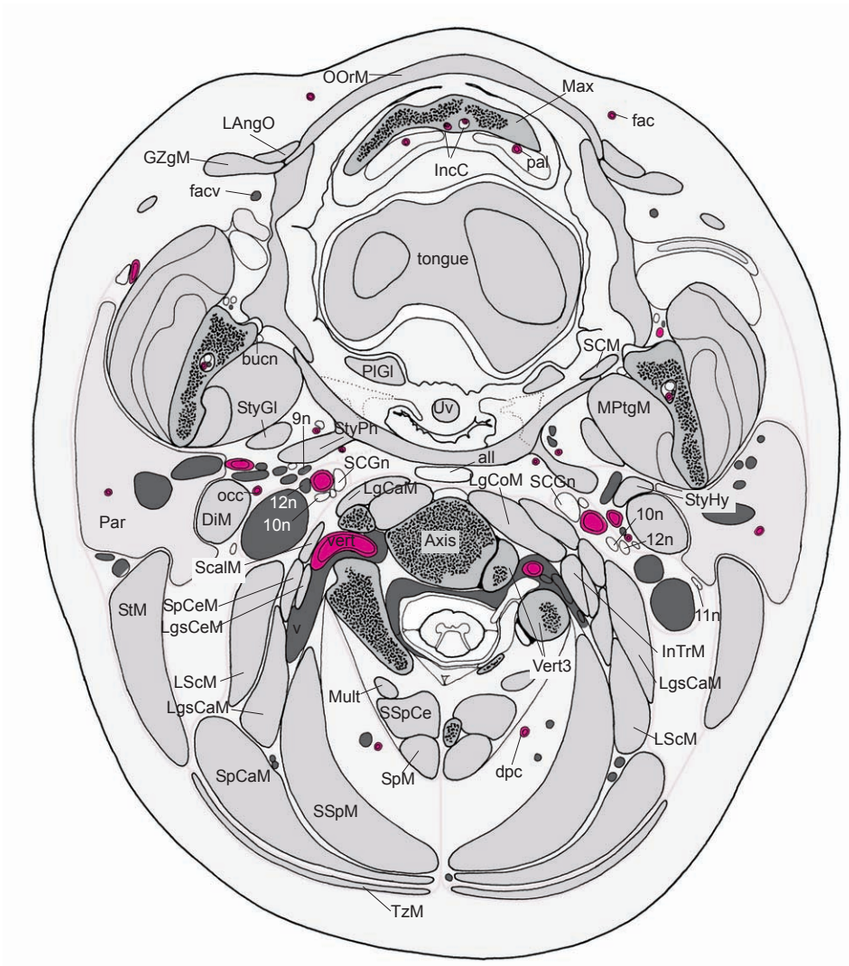
13

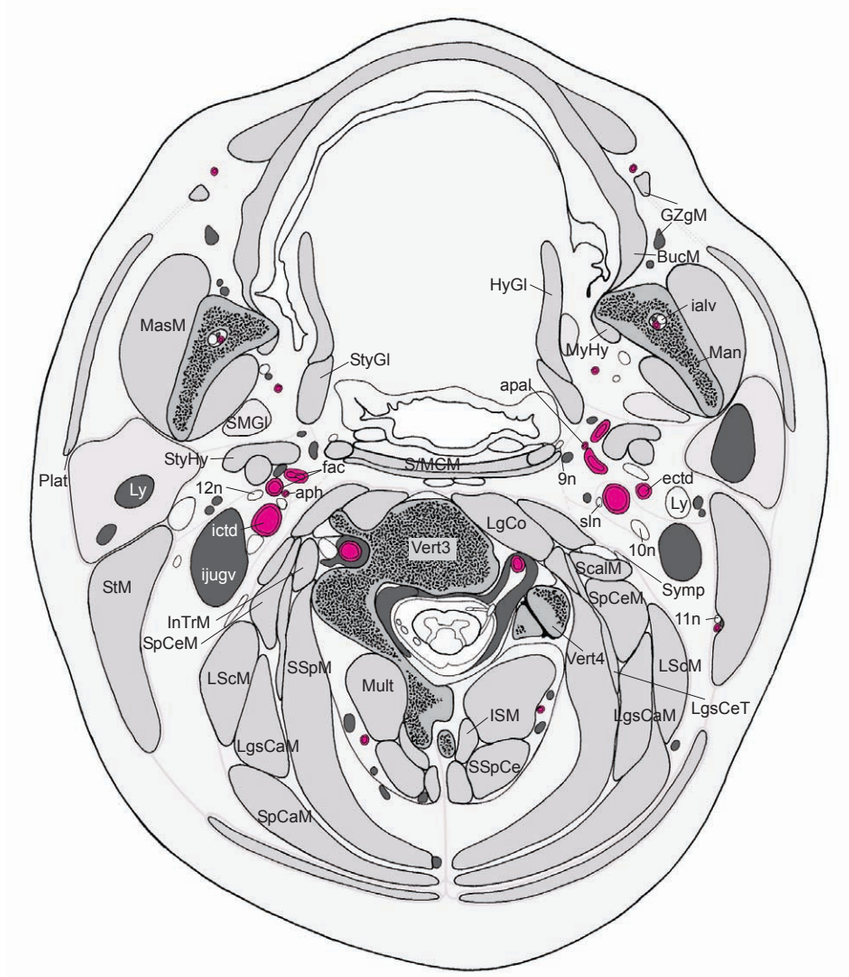
(ventral view)





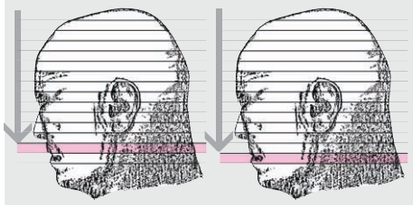






14 15

(dorsal view) (dorsal view)

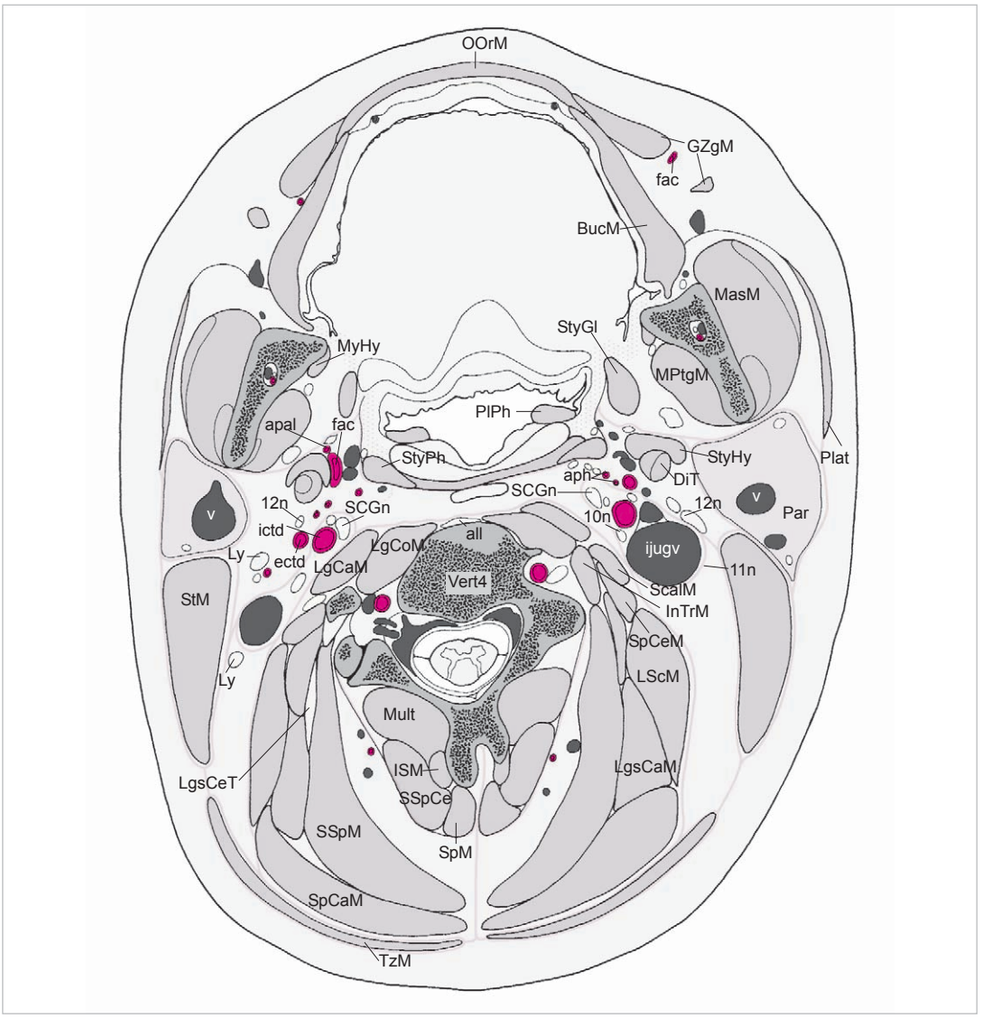


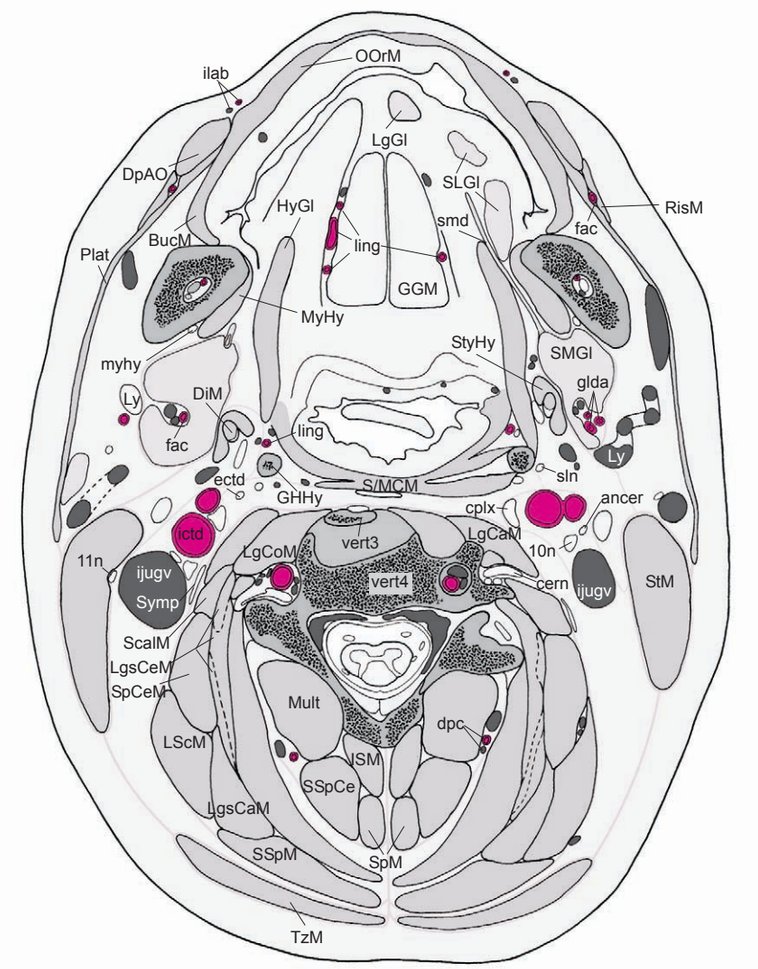
*	styloglossus, stylohyoideus, stylopharyngeus muscles
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve
all	anterior longitudinal ligament
apal	ascending palatine artery
aph	ascending pharyngeal artery
Axis	axis
BucM	buccinator muscle
bucn	buccal nerve
DiM	digastric muscle
dpc	deep cervical artery and vein
ectd	external carotid artery
fac	facial artery
facv	facial vein
gocn	greater occipital nerve
GZgM	greater zygomatic muscle
HyGl	hyoglossus muscle
ialn	inferior alveolar artery
ialv	inferior alveolar artery, vein, nerve
ictd	internal carotid artery
ijugv	internal jugular vein
IncC	incisive canal w. nasopalatine artery
InTrM	intertransversarii muscles
ISM	interspinalis muscle
LAngO	levator anguli oris muscle
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
LgsCaM	longissimus capitis muscle
LgsCeM	longissimus cervicis muscle
LgsCeT	longissimus cervicis muscle tendon
ling	lingual nerve
LScM	levator scapulae muscle
Man	mandible
MAsM	masseter muscle
Max	maxilla
MPtgM	medial pterygoideus muscle
MScalM	medial scalenus muscle
MulM	multifidus muscle
Mult	multifidus muscle
MyHy	mylohyoid muscle
nuf	nuchal fascia
occ	occipital artery
OOrM	orbicularis oris muscle
pal	palatine artery
PalG	palatine glands
papx	parotid plexus
Par	parotid gland
Plat	platysma
PlGl	palatoglossus muscle
ptdd	parotid duct
rmv	retromandibular vein
S/MCM	superior / middle constrictor muscle
ScalM	scalenus muscle
SCGn	superior cervical ganglion
SCM	superior constrictor of the pharynx
sln	superior laryngeal nerve
SMG	submandibular gland
SpAx	spinous process of axis
SpCaM	splenius capitis muscle
SpCeM	splenius cervicis muscle
sphn	superior pharyngeal nerve
SpM	spinalis muscle
SSpM	semispinalis capitis muscle
SSpCe	semispinalis cervicis muscle
StM	sternomastoid muscle
StyGl	styloglossus muscle
Vert3	vertebral 3

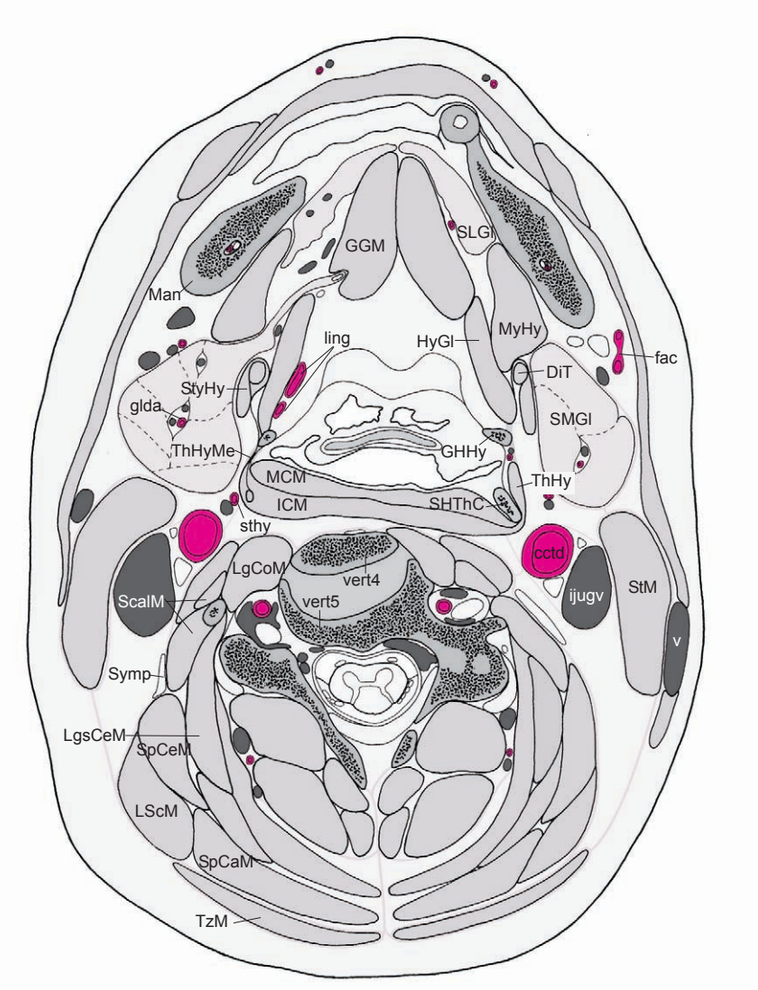
14 15

(ventral view) (ventral view)

9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve
all	
apal	ascending palatine artery
aph	ascending pharyngeal artery
BucM	buccinator muscle
bucn	buccal nerve
DiM	digastric muscle
DiT	digastric muscle, tendon
DpAO	depressor anguli oris muscle
dpc	deep cervical artery and vein
ectd	external carotid artery
fac	facial artery and glandular branches
GGM	genioglossus muscle
GHHy	greater horn of hyoid bone
GZgM	greater zygomatic muscle
HyGl	hyoglossus muscle
ialv	inferior alveolar artery and nerve
ictd	internal carotid artery
ijugv	internal jugular vein
InTrM	intertransversarii muscles
ISM	interspinalis muscle
ivvpx	internal vertebral venous plexus
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
LgsCaM	longissimus capitis muscle
LgsCeM	longissimus cervicis muscle
LgsCeT	longissimus cervicis muscle, tendon
ling	lingual artery
LScM	levator scapulae muscle
Ly	lymph node
MasM	masseter muscle
MPtgM	medial pterygoid muscle
Mult	multifidus muscle
MyHy	mylohyoid muscle
OOrM	orbicularis oris muscle
Par	parotid gland
Plat	platysma
PlPh	palatopharyngeus muscle
RisM	risorius muscle
rmv	retromandibular vein
S/MCM	superior and middle constrictor of the pharynx
ScalM	scalenus muscle
SCGn	superior cervical ganglion
sln	superior laryngeal nerve
SMGl	submandibular gland
SpCaM	splenius capitis muscle
SpCeM	splenius cervicis muscle
SpM	spinalis muscle
SSpM	semispinalis capitis muscle
SSpCe	semispinalis cervicis muscle
StM	sternomastoid muscle
StyGl	styloglossus muscle
StyHy	stylohyoid muscle
StyPh	stylopharyngeus muscle
symp	sympathetic trunk
TzM	trapezius muscle
v	vein
vert	vertebral artery
Vert4	fourth cervical vertebra







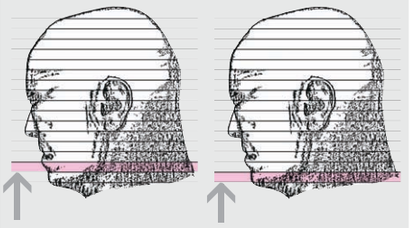
16 17

(dorsal view) (dorsal view)

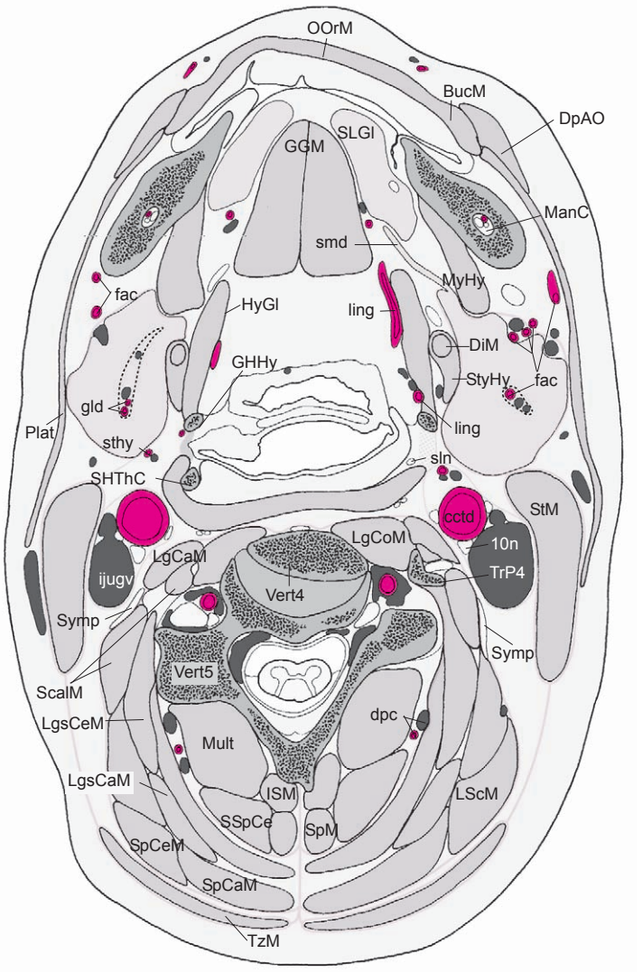
10n	vagus nerve
11n	accessory nerve
ancer	ansa cervicalis
BucM	buccinator muscle
cctd	common carotid artery
cern	cervical nerve
cplx	carotid plexus
DiM	digastric muscle
DiT	digastric muscle (tendon)
DpAO	depressor anguli oris muscle
dpc	deep cervical artery and vein
ectd	external carotid artery
fac	facial artery
GGM	genioglossus muscle
GHHy	greater horn of hyoid bone
glda	glandular branches of facial artery
HyGl	hyoglossus muscle
ICM	inferior constrictor of the pharynx
ictd	internal carotid artery
ijugv	internal jugular vein
ilab	inferior labial artery and vein
ISM	interspinalis muscle
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
LgsCaM	longissimus capitis muscle
LgsCeM	longissimus cervicis muscle
ling	lingual artery
LgGl	anterior lingual gland
LScM	levator scapulae muscle
Ly	lymph node
Man	mandible
MCM	middle constrictor of the pharynx
Mult	multifidus muscle
MyHy	mylohyoid muscle
myhy	mylohyoid nerve
OOrM	orbicularis oris muscle
Plat	platysma
RisM	risorius muscle
S/MCM	superior and middle constrictor of the pharynx
ScalM	scalenus muscle
SHThC	superior horn of thyroid cartilage
SLGl	sublingual gland
sln	superior laryngeal nerve
smd	submandibular duct
SMGl	submandibular gland
SpCaM	splenius capitis muscle
SpCeM	splenius cervicis muscle
SpM	spinalis muscle
SSpM	semispinalis capitis muscle
SSpCe	semispinalis cervicis muscle
sthy	superior thyroid artery
StM	sternomastoid muscle
StyHy	stylohyoid muscle
Symp	sympathetic trunk
ThHy	thyrohyoid muscle
ThHyMe	thyrohyoid membrane
TzM	trapezius muscle
v	vein
vert	vertebral artery
Vert3	third cervical vertebra
Vert4	fourth cervical vertebra

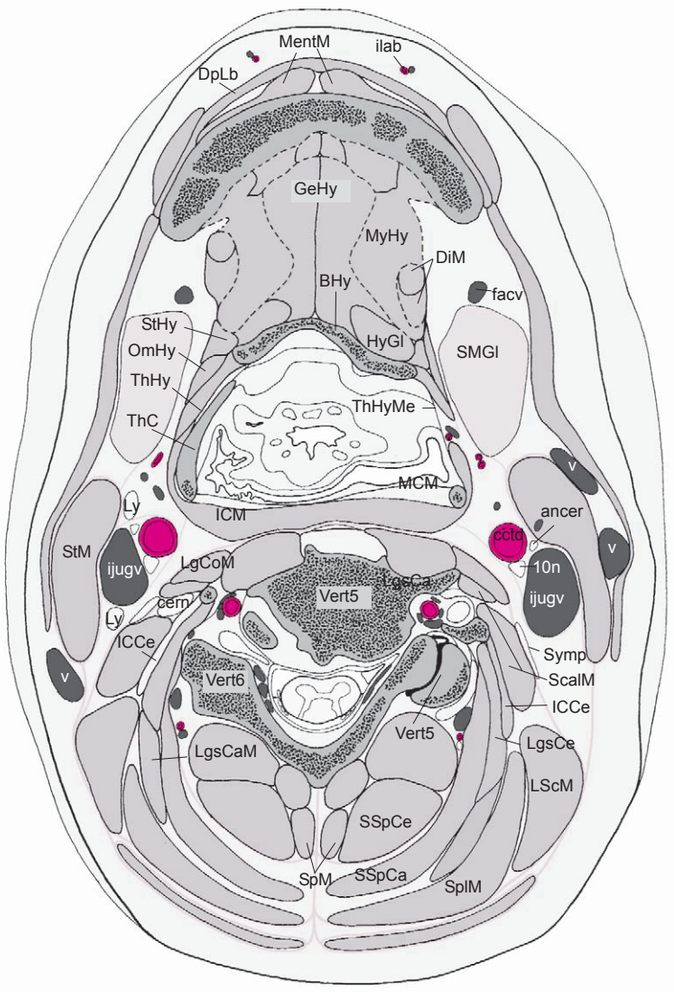
16 17

(ventral view) (ventral view)



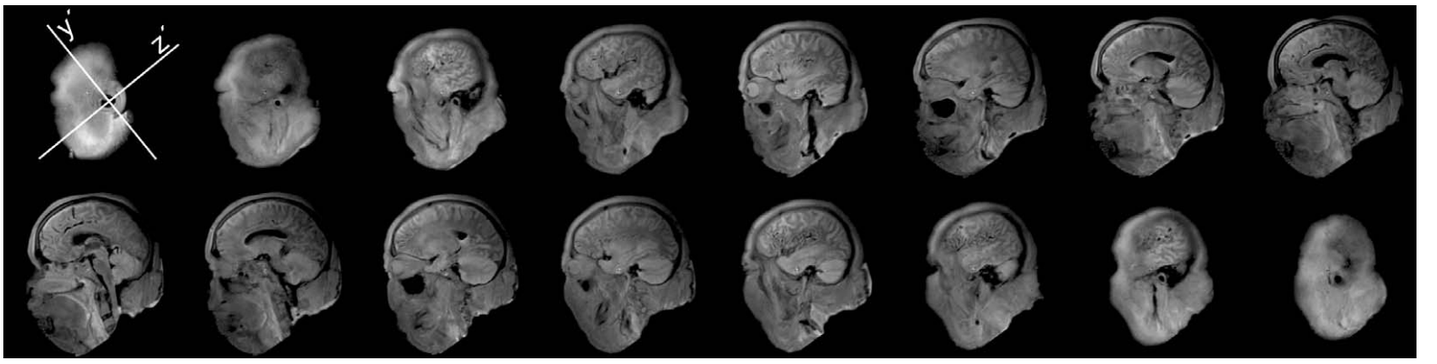
10n	vagus nerve
ancer	ansa cervicalis
BHy	body of hyoid bone
BucM	buccinator muscle
cctd	common carotid artery
cern	cervical nerve
DiM	digastric muscle
DpAO	depressor anguli oris muscle
dpc	deep cervical artery and vein
DpLb	depressor labii inferioris muscle
fac	facial artery
facv	facial vein
GeHy	geniohyoid muscle
GGM	genioglossus muscle
GHHy	greater horn of hyoid bone
gld	glandular branches of facial artery
HyGl	hyoglossus muscle
ICCe	iliocostalis cervicis muscle
ICM	inferior constrictor of the pharynx
ijugv	internal jugular vein
ilab	inferior labial artery and vein
ISM	interspinalis muscle
LgCaM	longus capitis muscle
LgCoM	longus colli muscle
LgsCaM	longissimus capitis muscle
LgsCeM	longissimus cervicis muscle
ling	lingual artery
LScM	levator scapulae muscle
Ly	lymph node
ManC	mandibular canal with inferior alveolar artery and nerve
MasM	masseter muscle
MCM	middle constrictor of the pharynx
MentM	mentalis muscle
Mult	multifidus muscle
MyHy	mylohyoid muscle
OmHy	omohyoideus muscle
OOrM	orbicularis oris muscle
Plat	platysma
ScalM	scalenus muscle
SHThC	superior horn of thyroid cartilage
SLGl	sublingual gland
sln	superior laryngeal nerve
smd	submandibular duct
SMGl	submandibular gland
SpCaM	splenius capitis muscle
SpCeM	splenius cervicis muscle
SplM	splenius capitis and cervicis muscle
SpM	spinalis muscle
SSpCa	semispinalis capitis muscle
SSpCe	semispinalis cervicis muscle
sthy	superior thyroid artery
StM	sternomastoid muscle
StyHy	stylohyoid muscle
Symp	sympathetic trunk
ThC	thyroid cartilage
ThHy	thyrohyoid muscle
ThHyMe	thyrohyoid membrane
TrP4	transverse process of fourth vertebra
TzM	trapezius muscle
v	vein
vert	vertebral artery
Vert4	fourth cervical vertebra
Vert5	fifth cervical vertebra
Vert6	sixth cervical vertebra



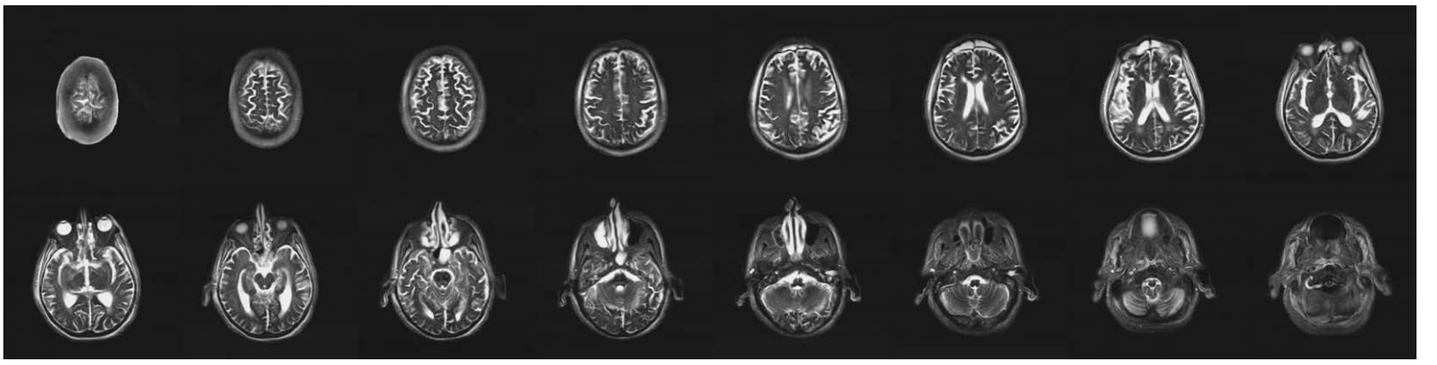


Coronal Sections

Sagittal plane:



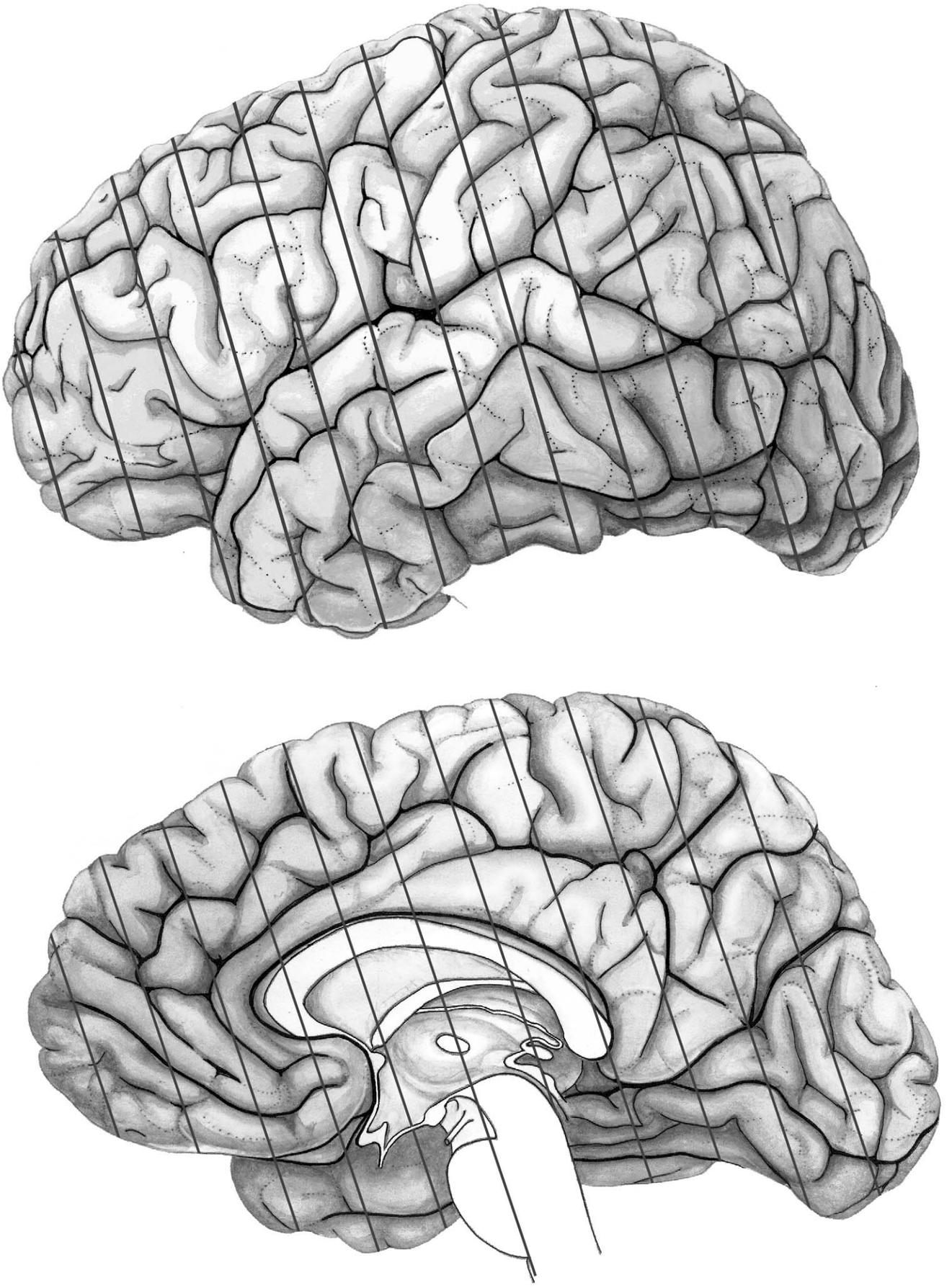
y´- direction:



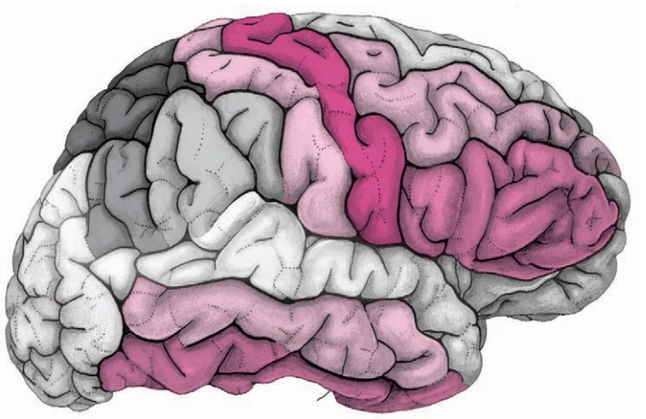
z´- direction:

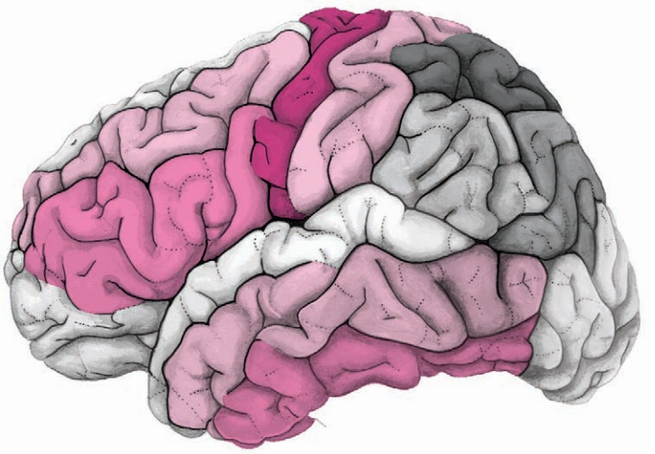
MR-images of the head which is represented on the following pages.

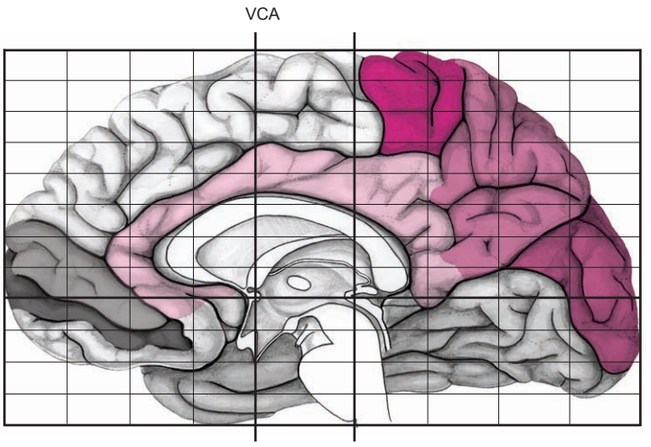
The head whose sections are depicted on the following pages was imaged in three orthgonal planes using the following parameters: 0.15 Tesla, matrix 256 x 256, field of view 25 cm, multislice, slice thickness 5 mm, 4 excitations, sequence: 5000/160. These heavy T2 weighted images highlight fluid-containing structures. Note that artificial fluid collections are visible in the nasal and paranasal cavities. The top panel presents the sagittal MRIs and specifies the planes of sectioning of the middle and lower panel. Orientation of these MRIs was based on the brainstem axis. Therefore the orientation of the coronal MRIs in the lower panel corresponds to the plane of cryo-sectioning of the head and direct comparisons can be made with photographs and diagrams of the following pages. The middle panel presents the horizontal MRIs from top to the bottom.



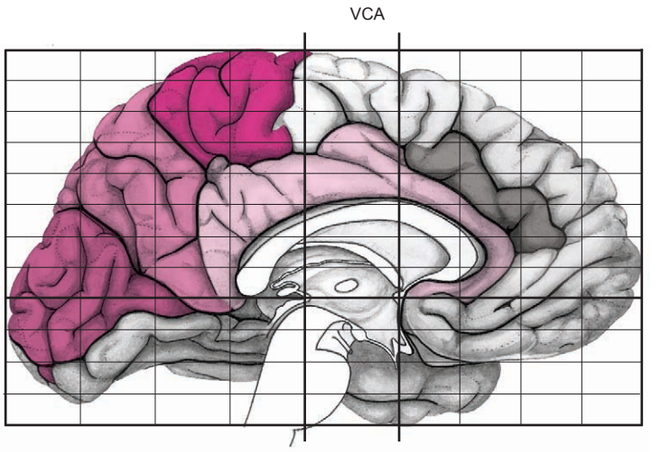
Surface views of the left hemisphere of the brain which has been sectioned in the coronal plane (-20° angulation) as indicated. The drawing of the midsagittal view has been mirror-imaged in order to help identifying structures which lie in the same plane of sectioning with regard to the lateral and median view.

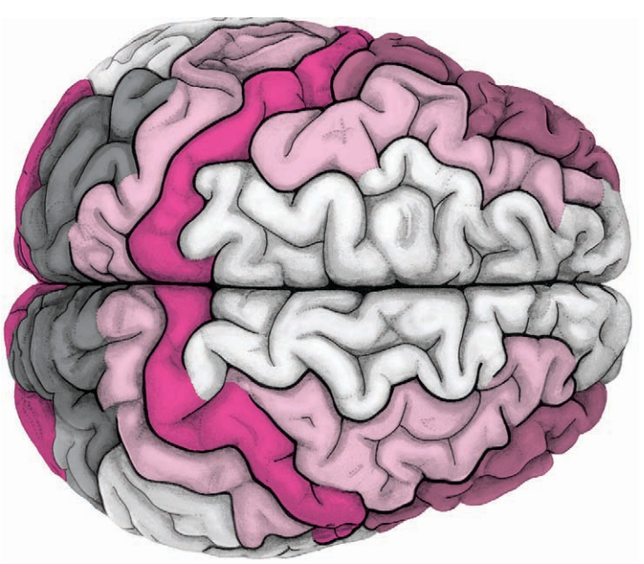


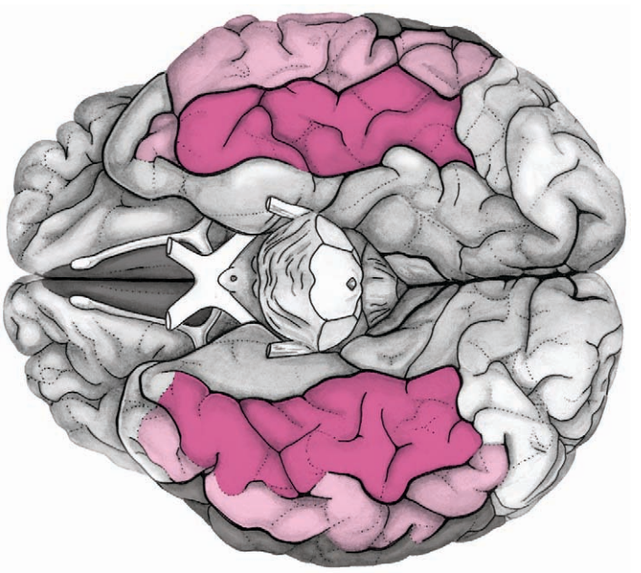




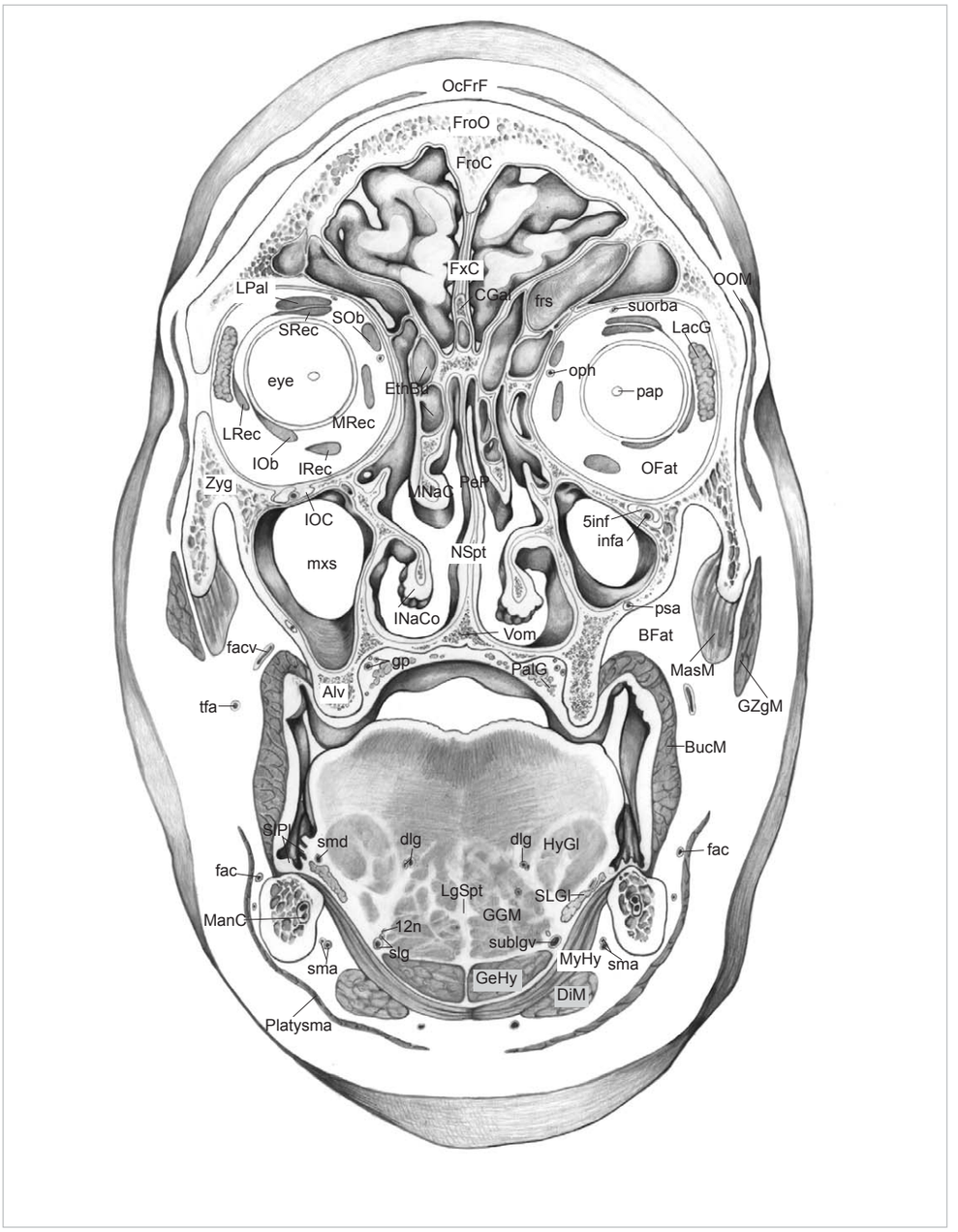
ICL

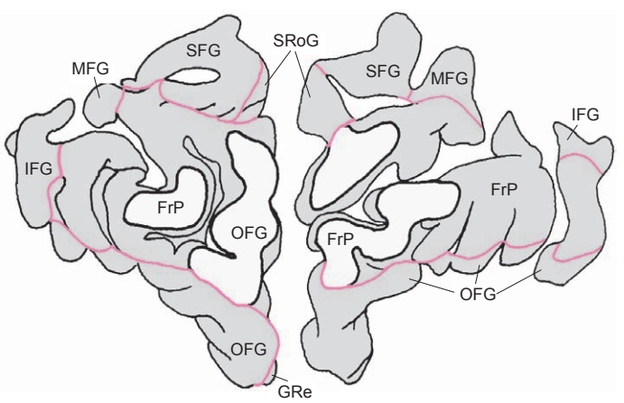






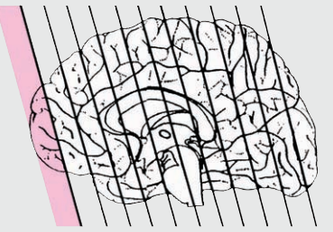
Surface views of the brain which is shown in the subsequent pages. The most important gyri are delineated. The midsagittal views depict the brain with the Talairach space.





4

(anterior view)



Cerebral structures:

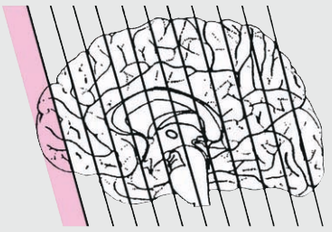
FrP	frontopolar cortex
GRe	gyrus rectus
iFG	inferior frontal gyrus
MFG	medial frontal gyrus
OFG	orbitofrontal gyri
SFG	superior frontal gyrus
SRoG	superior rostral gyrus

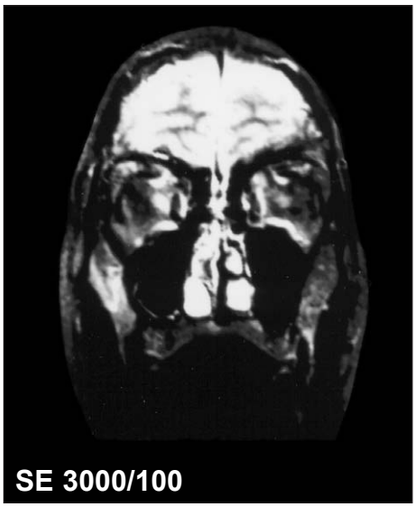
Peripheral structures:

12n	hypoglossal nerve (lingual branch)
5inf	infraorbital nerve
Alv	alveolar process of maxilla
BFat	buccal fat pad
BucM	buccinator muscle
CGal	crista galli
DiM	digastric muscle, ant. belly
dlg	deep lingual artery and vein
EthBu	ethmoidal bulla
fac	facial artery
facv	facial vein
FroC	frontal bone, crest
FroO	frontal bone, orbital part
frs	frontal sinus
FxC	falx cerebri
GeHy	geniohyoid muscle
GGM	genioglossus muscle
gpa/n/v	greater palatine artery, nerve, vein
GZgM	greater zygomatic muscle
HyGl	hyoglossus muscle
INaCo	inferior nasal concha
infa	infraorbital artery
IOb	inferior oblique muscle
IOC	infraorbital canal
IRec	inferior rectus muscle
LacG	lacrimal gland
LgSpt	lingual septum
LPal	levator palpebrae superioris muscle
LRec	lateral rectus muscle
ManC	mandibular canal
MasM	masseter muscle
MNaC	middle nasal concha
MRec	medial rectus muscle
mxs	maxillary sinus
MyHy	mylohyoid muscle
NSpt	nasal septum
OcFrF	occipito-frontal muscle, frontal belly
OFat	orbital fat pad
OOM	orbicularis oculi muscle
oph	ophthalmic artery
PalG	palatine glands
pap	optic papilla
PeP	perpendicular plate
psa	posterior superior alveolar artery
slg	sublingual artery and vein
SLGl	sublingual gland and duct
sma	submental artery
smd	submandibular duct
SOb	superior oblique muscle
SRec	superior rectus muscle
sublgv	sublingual vein
suorba	supraorbital artery
tfa	transverse facial artery
Vom	vomer
Zyg	zygomatic bone

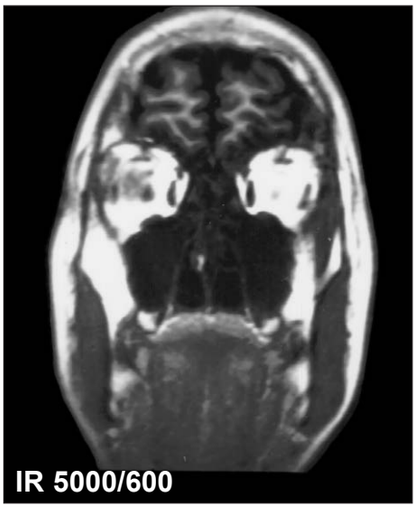
4

(posterior view)

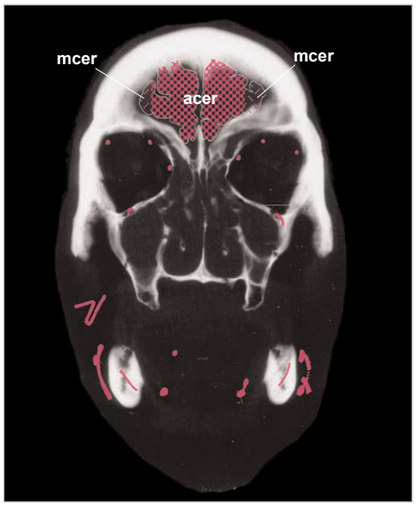


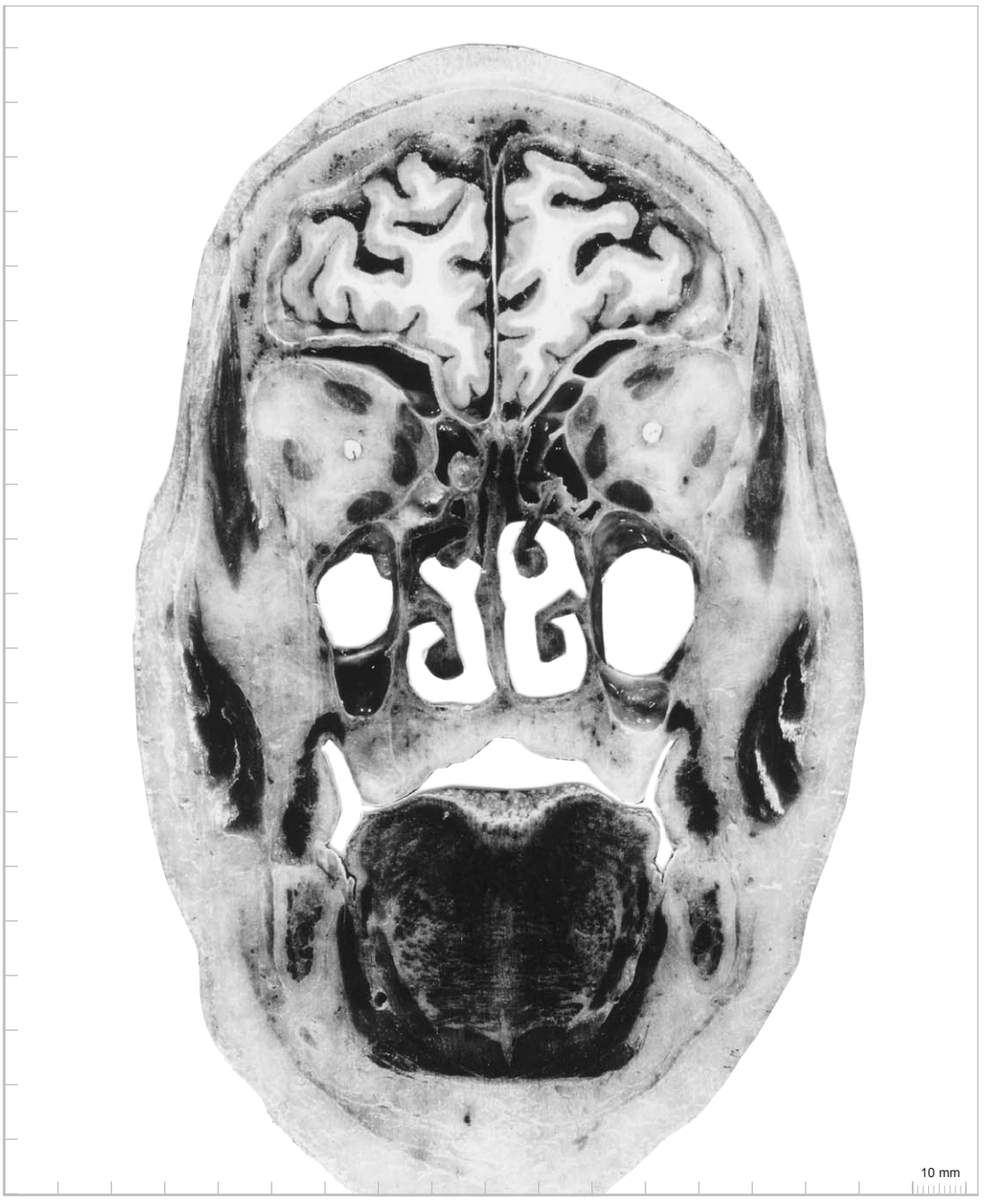


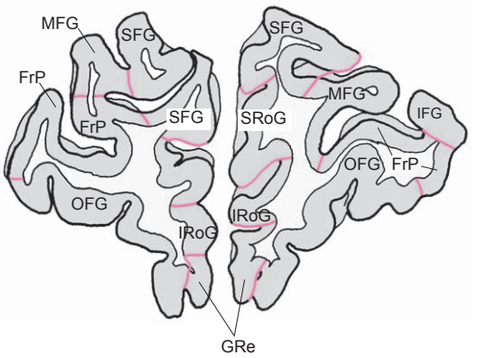
SE 3000/100

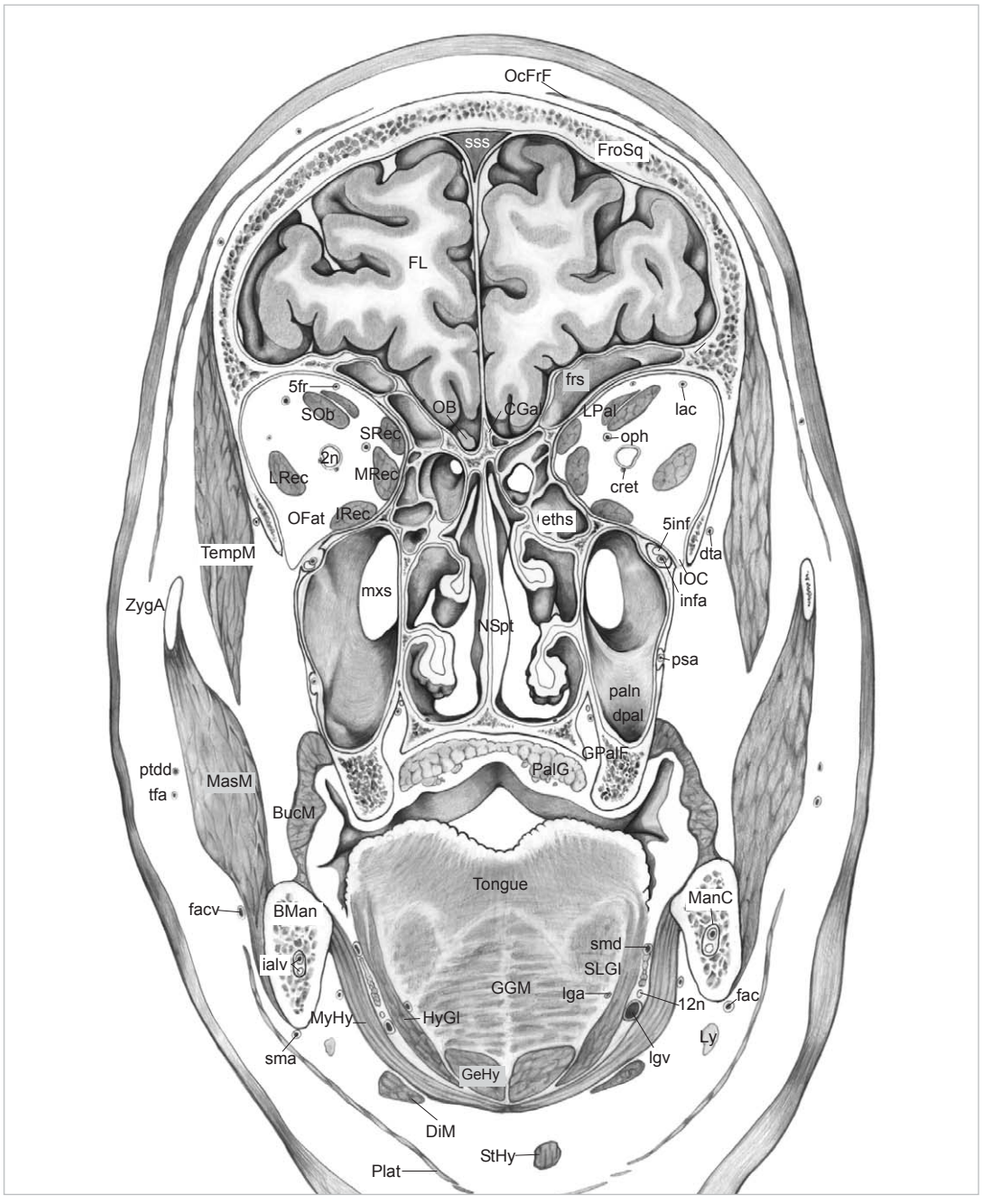


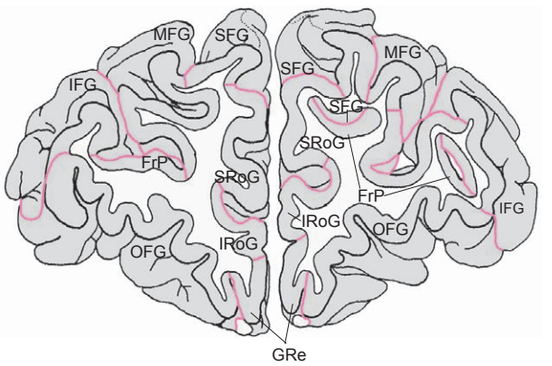
IR 5000/600





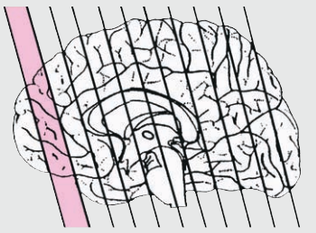






5

(anterior view)



Cerebral structures:

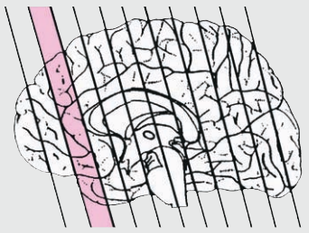
acer	anterior cerebral artery
FrP	frontopolar cortex
FL	frontal lobe
GRe	gyrus rectus
IFG	inferior frontal gyrus
IRoG	inferior rostral gyrus
mcer	middle cerebral artery
MFG	medial frontal gyrus
OB	olfactory bulb
OFG	orbitofrontal gyri
SFG	superior frontal gyrus
SRoG	superior rostral gyrus

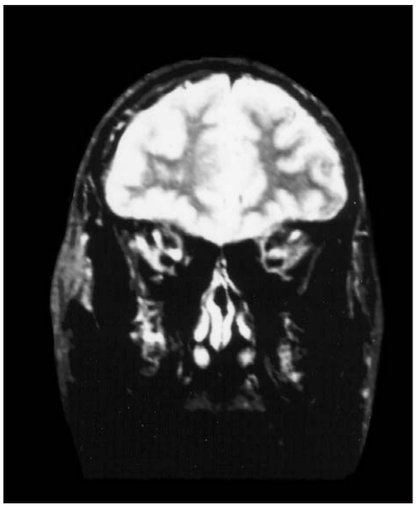
Peripheral structures:

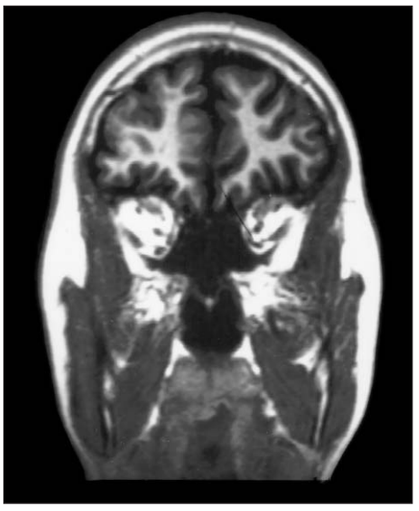
2n	optic nerve
5fr	frontal nerve of trigeminus
5inf	infraorbital nerve
12n	hypoglossal nerve or its root
BMan	body of mandible
BucM	buccinator muscle
cret	central artery of retina
DiM	digastric muscle, ant. belly
dpal	descending palatine artery
dta	deep temporal artery (arteries)
eths	ethmoidal sinus (cells)
fac/v	facial artery / vein
FroSq	frontal bone, squamosal part
frs	frontal sinus
GeHy	geniohyoid muscle
GGM	genioglossus muscle
GPalF	greater palatine foramen
HyGl	hyoglossus muscle
ialv	inferior alveolar artery, vein, nerve
infa	infraorbital artery
IOC	infraorbital canal
IRec	inferior rectus muscle
lac	lacrimal artery
lga/lgv	lingual artery / vein
LPal	levator palpebrae superioris muscle
LRec	lateral rectus muscle
Ly	submental lymph node
ManC	mandibular canal
MasM	masseter muscle
MRec	medial rectus muscle
mxs	maxillary sinus
MyHy	mylohyoid muscle
NSpt	nasal septum
OB	olfactory bulb
OcFrF	occipito-frontal muscle, frontal belly
OFat	orbital fat
oph	ophthalmic artery
PalG	palatine glands
paln	palatine nerve (s)
Plat	platysma
psa	posterior superior alveolar artery
ptdd	parotid duct
SLGl	sublingual gland
sma	submental artery
smd	submandibular duct
SOb	superior oblique muscle
SRec	superior rectus muscle
sss	superior sagittal sinus
StHy	sternohyoid muscle
TempM	temporalis muscle
tfa	transverse facial artery
ZygA	zygomatic arch

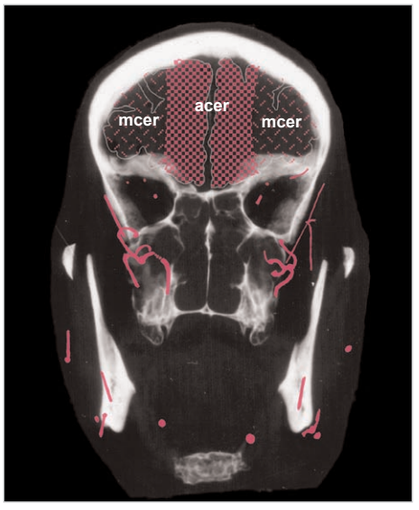
5

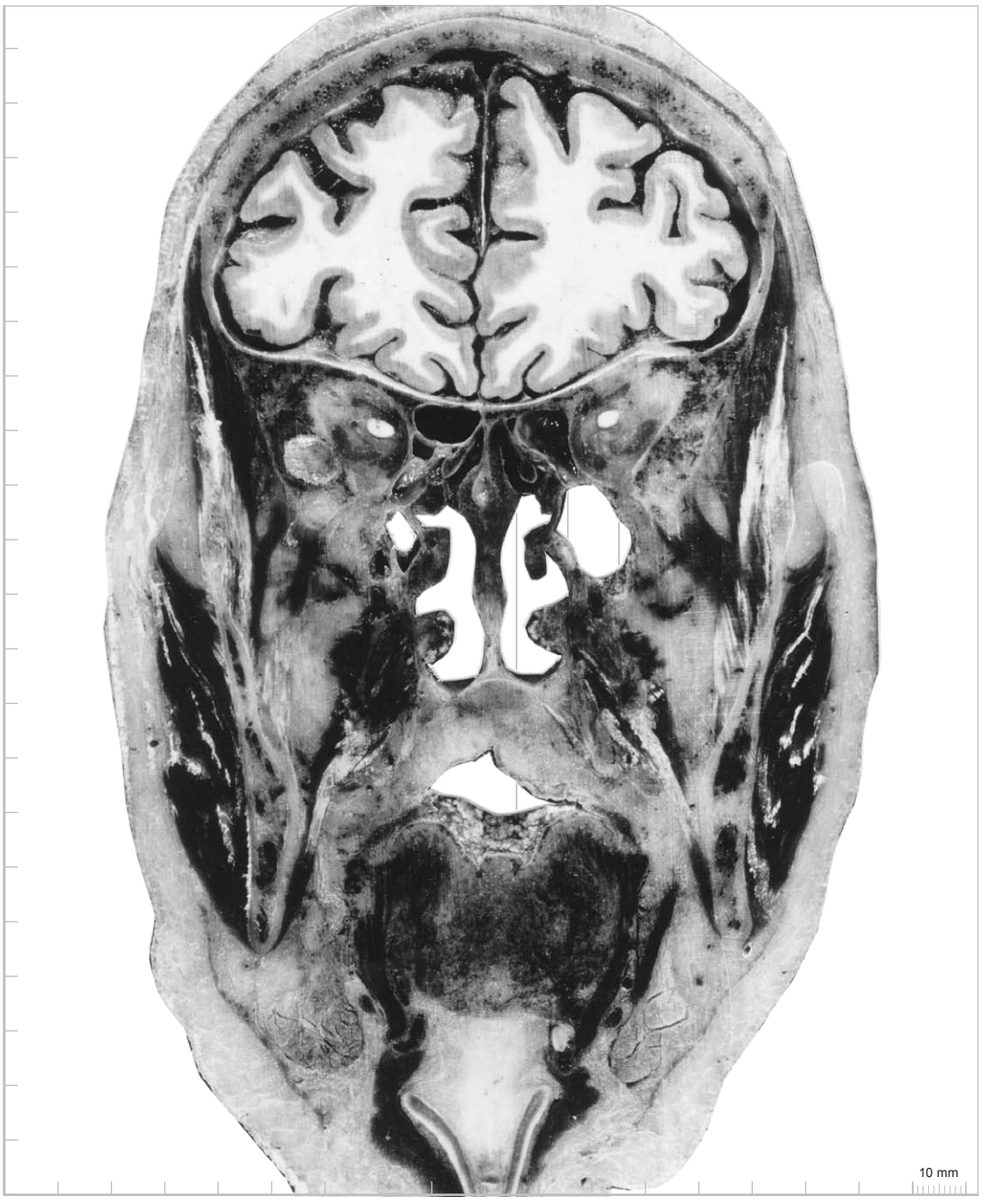
(posterior view)

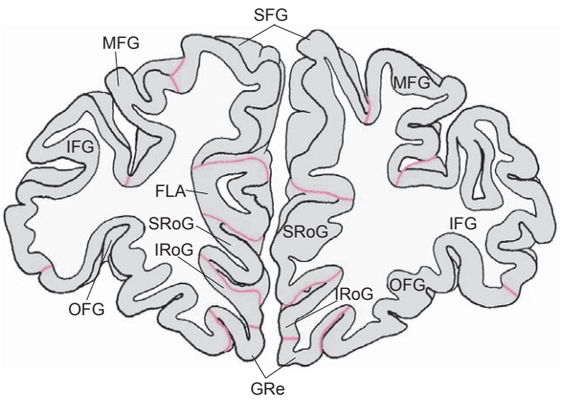


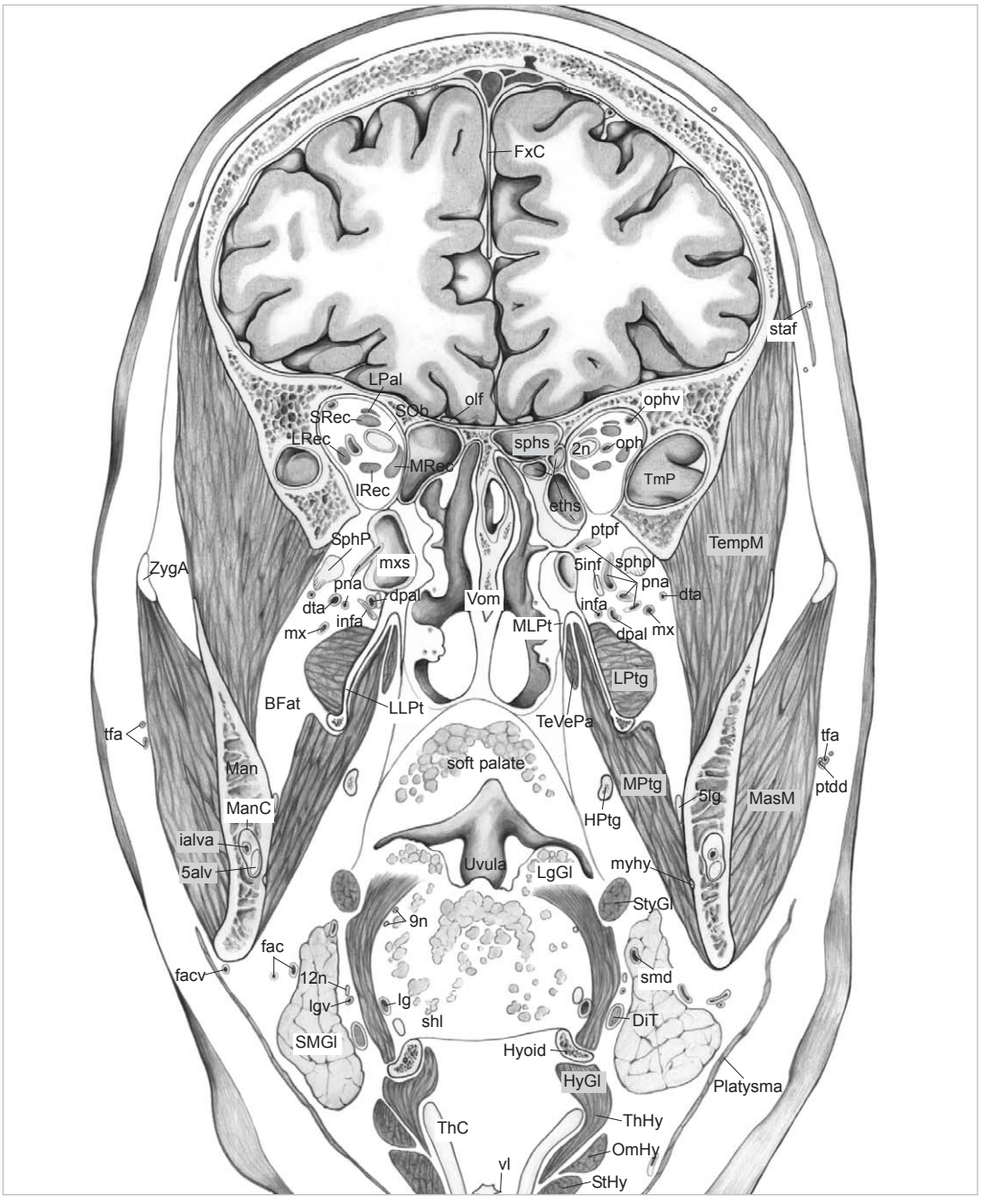


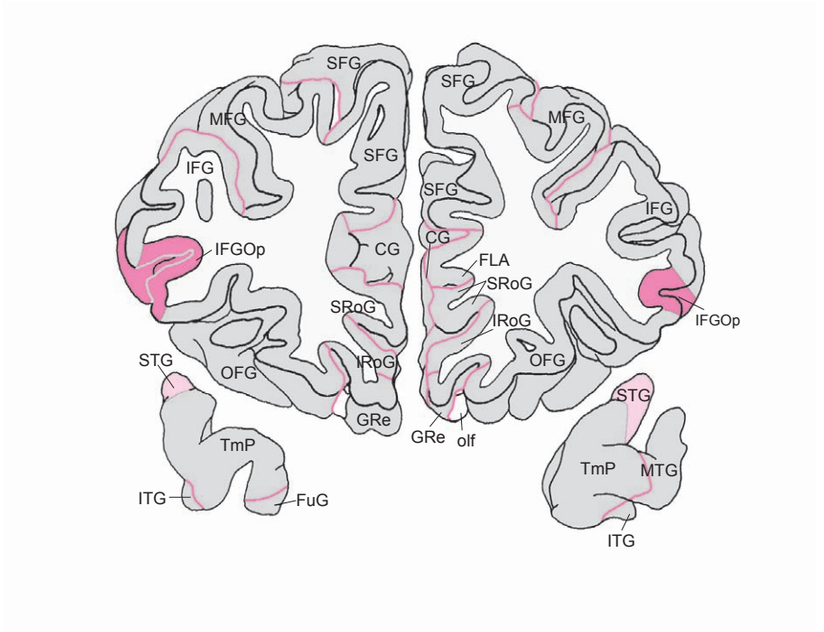






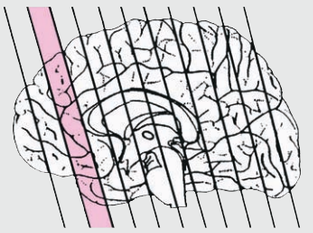






6

(anterior view)



Cerebral structures:

acer	anterior cerebral artery
CG	cingulate gyrus
FLA	frontal limbic area
FuG	fusiform gyrus
GRe	gyrus rectus
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
IRoG	inferior rostral gyrus
ITG	inferior temporal gyrus
mcer	middle cerebral artery
MFG	medial frontal gyrus
MTG	medial temporal gyrus
OFG	orbitofrontal gyri
olf	olfactory tract
SFG	superior frontal gyrus
SRoG	superior rostral gyrus
STG	superior temporal gyrus
TmP	temporal pole

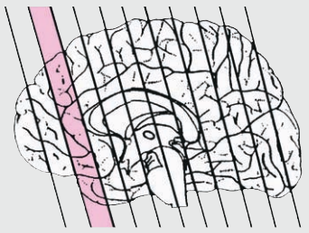
Peripheral structures:

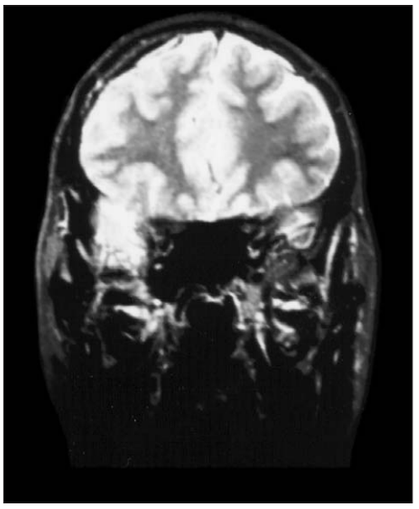
2n	optic nerve
5alv	inferior alveolar nerve
5inf	infraorbital nerve
5lg	lingual nerve
9n	glossopharyngeal nerve
12n	hypoglossal nerve
BFat	buccal fat pad
DiT	digastric muscle, tendon
dpal	descending palatine artery
dta	deep temporal artery (arteries)
eths	ethmoidal sinus, labyrinth and air cells
fac/v	facial artery / vein
FxC	falx cerebri
HPtg	hamulus of the pterygoid bone
HyGl	hyoglossus muscle
Hyoid	hyoid bone
ialva	inferior alveolar artery
infa	infraorbital artery
IRec	inferior rectus muscle
lg/lgv	lingual artery / vein
LgGl	lingual gland
LLPt	lateral lamina of pterygoid process
LPal	levator palpebrae superioris muscle
LPtg	lateral pterygoid muscle
LRec	lateral rectus muscle
Man	mandible
ManC	mandibular canal
MasM	masseter muscle
MLPt	medial lamina of pterygoid process
MPtg	medial pterygoid muscle
MRec	medial rectus muscle
mx	maxillary artery
mxs	maxillary sinus
myhy	mylohyoid nerve
OmHy	omohyoid muscle
oph/v	ophthalmic artery / vein
pna	posterior nasal artery
ptdd	parotid duct
ptpf	pterygopalatine fossa
shl	stylohyoid ligament
smd	submandibular duct
SMGl	submandibular gland
SOb	superior oblique muscle

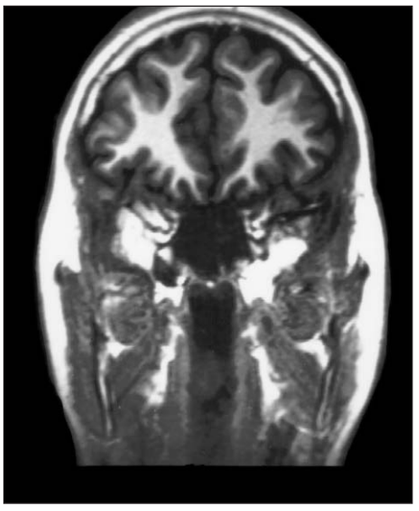
Remainder explained in Index of Abbreviations

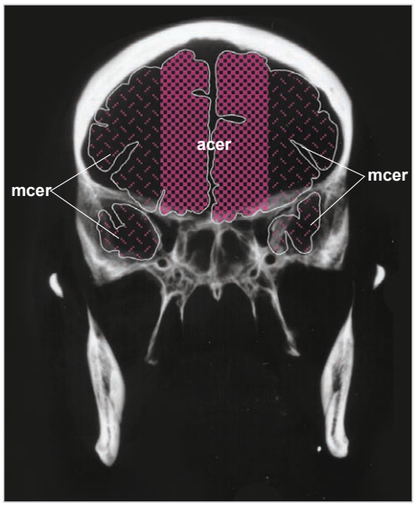
6

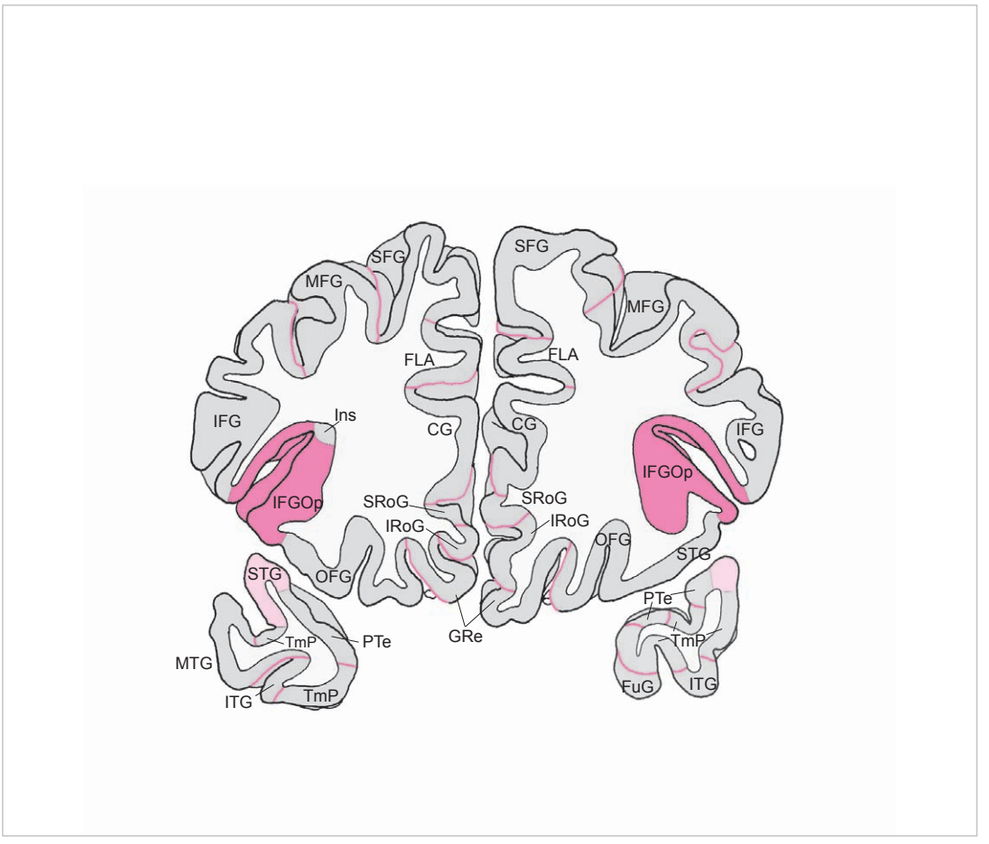
(posterior view)

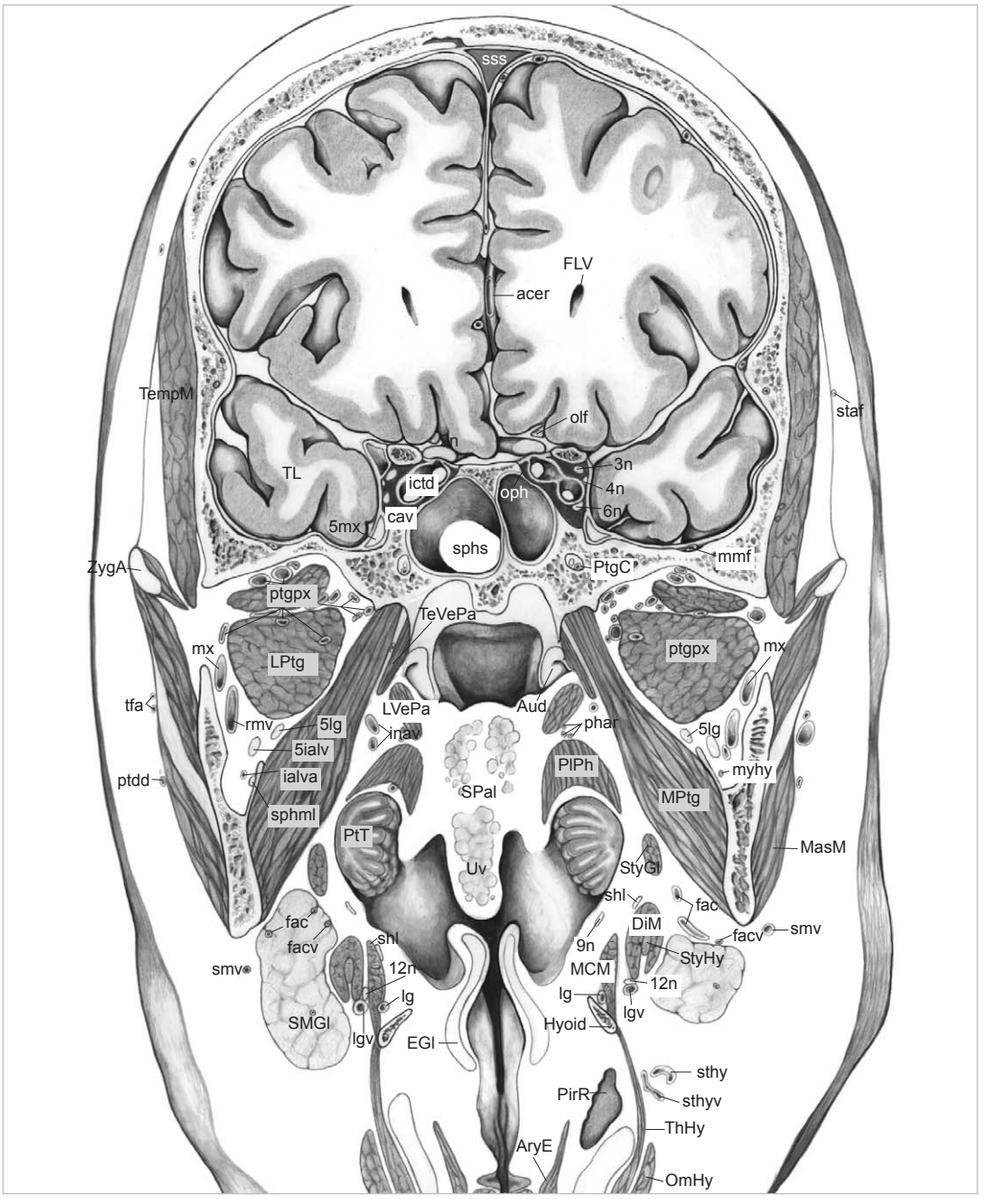


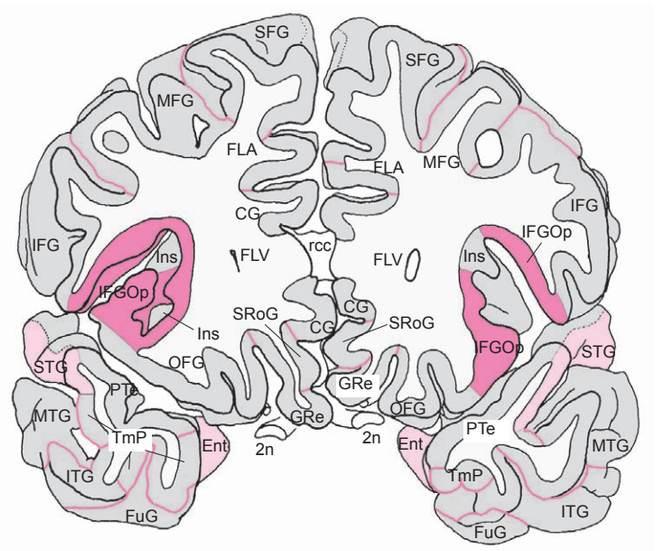






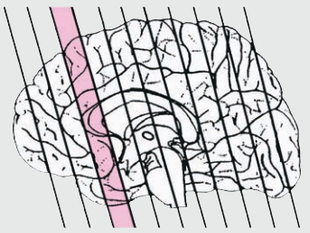






7

(anterior view)



Cerebral structures:

acer	anterior cerebral artery
CG	cingulate gyrus
FLA	frontal limbic area
FLV	frontal horn of lateral ventricle
FuG	fusiform gyrus
GRe	gyrus rectus
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
IRoG	inferior rostral gyrus
Ins	insula
ITG	inferior temporal gyrus
mcer	middle cerebral artery
MFG	medial frontal gyrus
MTG	medial temporal gyrus
OFG	orbitofrontal gyri
PTe	planum temporale
rcc	rostrum of corpus callosum
SFG	superior frontal gyrus
SRoG	superior rostral gyrus
STG	superior temporal gyrus
TmP	temporal pole

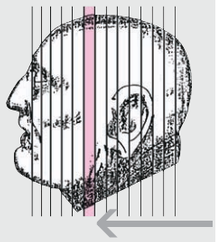
Peripheral structures:

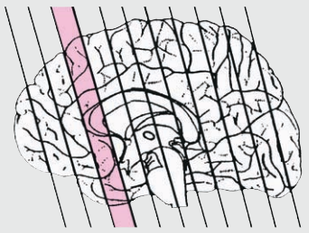
2n	optic nerve
3n	oculomotor nerve or its root
4n	trochlear nerve or its root
5ialv	inferior alveolar nerve
5lg	lingual nerve
5mx	maxillary nerve of the trigeminal
6n	abducens nerve or its root
9n	glossopharyngeal nerve
12n	hypoglossal nerve or its root
acer	anterior cerebral artery
AryE	aryepiglotticus muscle
Aud	auditory tube
cav	cavernous sinus
DiM	digastric muscle, post belly
EGl	epiglottis
Ent	entorhinal cortex
fac/v	facial artery / vein
Hyoid	hyoid bone
ialva	inferior alveolar artery
ictd	internal carotid artery
lg/lgv	lingual artery / vein
LPtg	lateral pterygoid muscle
LVePa	levator veli palatini muscle
MasM	masseter muscle
MCM	medial constrictor muscle
mmf	middle meningeal artery
MPtg	medial pterygoid muscle
mx	maxillary artery
myhy	mylohyoid nerve
OmHy	omohyoid muscle
phar	pharyngeal branches
PirR	piriform recess
PlPh	palatopharyngeus muscle
ptdd	parotid duct
PtgC	pterygoid canal
ptgpx	pterygoid plexus
PtT	palatine tonsil

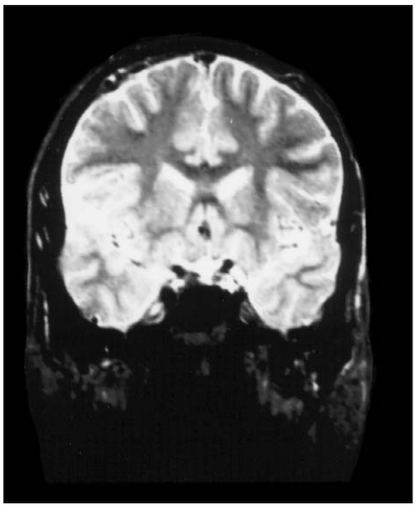
Remainder explained in Index of Abbreviations

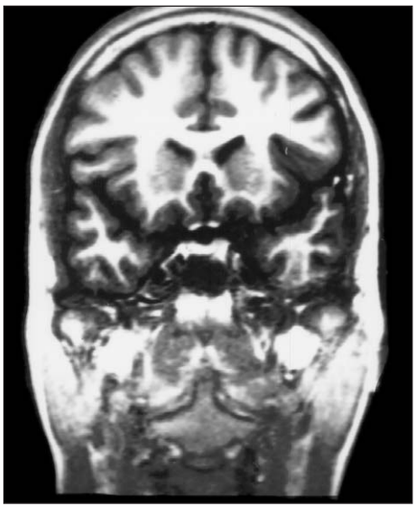
7

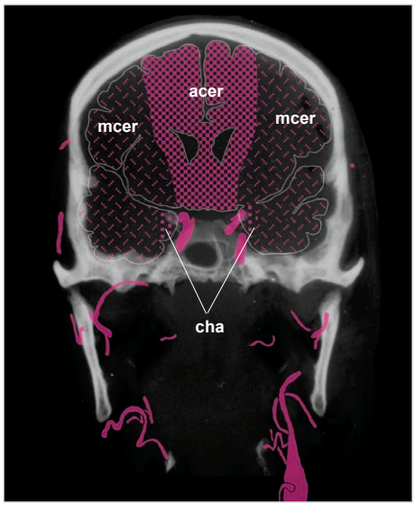
(posterior view)

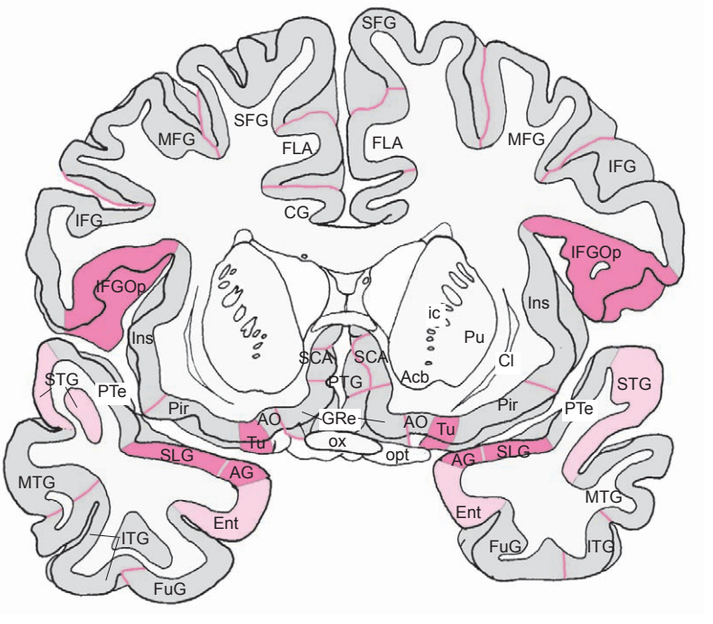


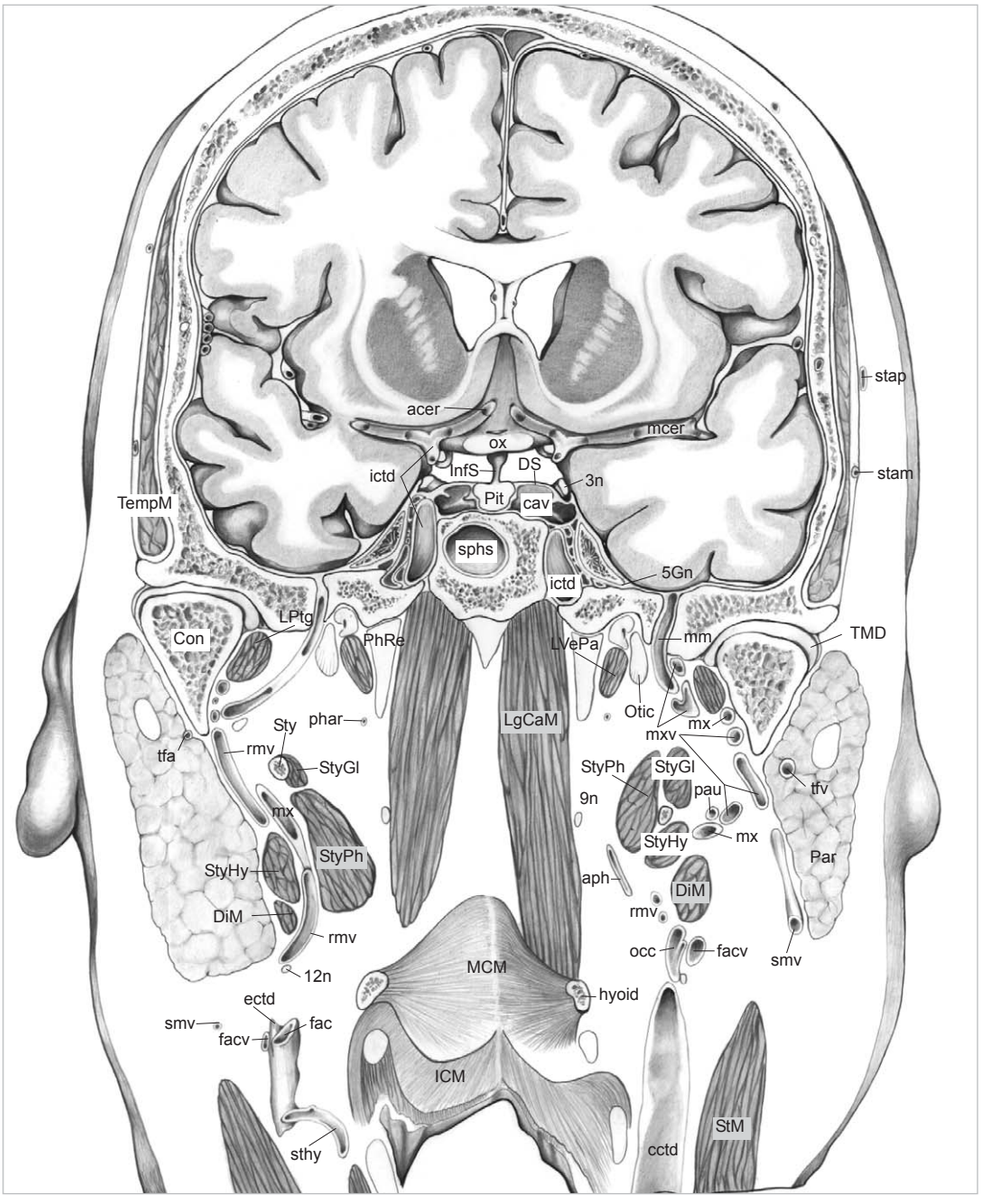


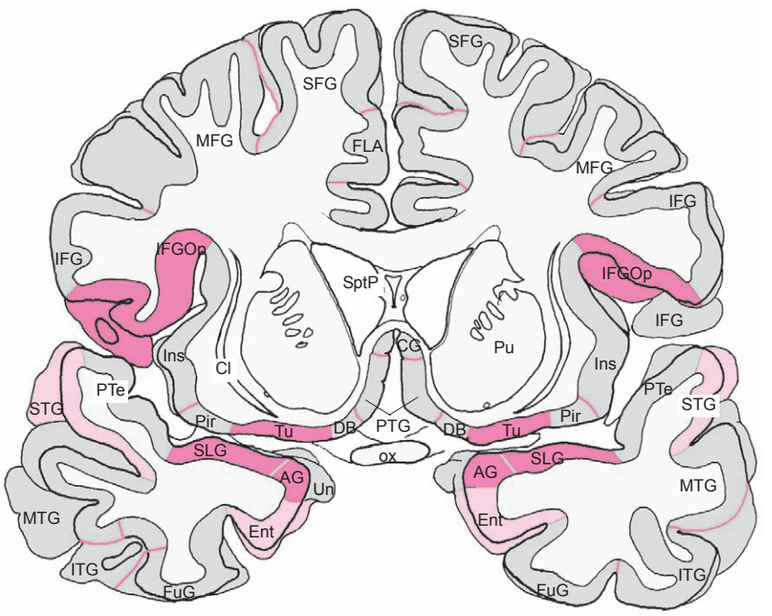


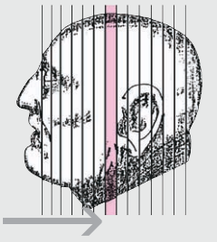












8

(anterior view)

Cerebral structure:

Acb	accumbens nucleus
acer	anterior cerebral artery
AG	ambiens gyrus
AO	anterior olfactory nucleus
CG	cingulate gyrus
cha	choroid artery
Cl	claustrum
DB	diagonal band nucleus
Ent	entorhinal cortex
FLA	frontal limbic area
FLV	frontal horn of lateral ventricle
FuG	fusiform gyrus
GRe	gyrus rectus
ic	internal capsule
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
IRoG	inferior rostral gyrus
InfS	infundibular stalk
Ins	insula
ITG	inferior temporal gyrus
mcer	middle cerebral artery
MFG	medial frontal gyrus
MTG	medial temporal gyrus
OFG	orbitofrontal gyri
ox	optic chiasm
PTe	planum temporale
rcc	rostrum of corpus callosum
Pir	piriform cortex
Pit	pituitary gland
PTG	paraterminal gyrus
Pu	putamen
SCA	subcallosal area
SFG	superior frontal gyrus
SLG	semilunar gyrus
SRoG	superior rostral gyrus
STG	superior temporal gyrus
TmP	temporal pole
Tu	olfactory tubercle
Un	uncus

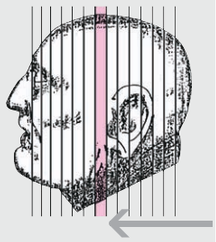
Peripheral structures:

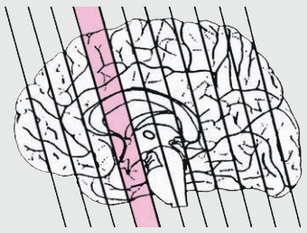
5Gn	trigeminal ganglion
9n	glossopharyngeal nerve
12n	hypoglossal nerve
3n	oculomotor nerve
aph	ascending pharyngeal artery
cav	cavernous sinus
cctd	common carotid artery
Con	condylar process of mandible
DiM	digastric muscle, post belly
DS	diaphragma sellae
ectd	external carotid artery
fac/v	facial artery / vein
ICM	inferior constrictor m. of pharynx
ictd	internal carotid artery
LgCaM	longus capitis muscle
LPtg	lateral pterygoid muscle
LVePa	levator veli palatini muscle
MCM	medial constrictor m. of pharynx
mm	middle meningeal artery
mx/v	maxillary artery / vein
occ	occipital artery
Otic	otic ganglion
Par	patotid gland
pau	posterior auricular artery

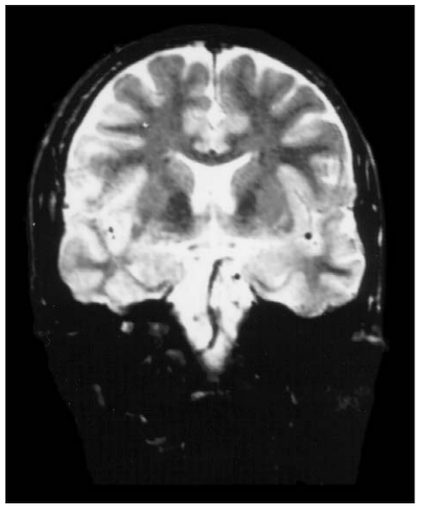
Remainder explained in Index of Abbreviations

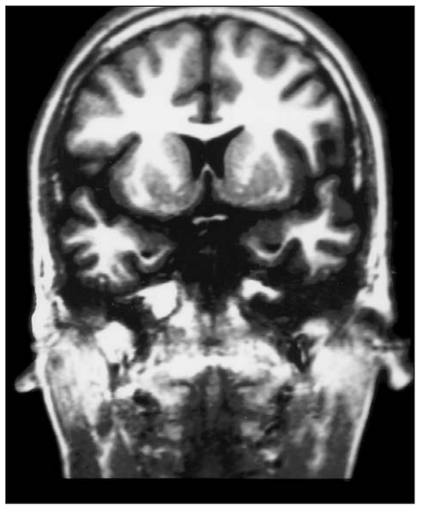
8

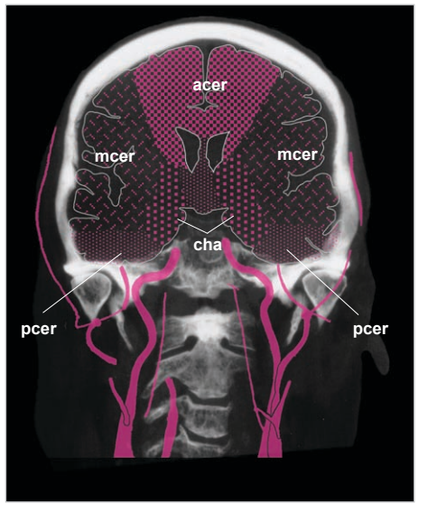
(posterior view)

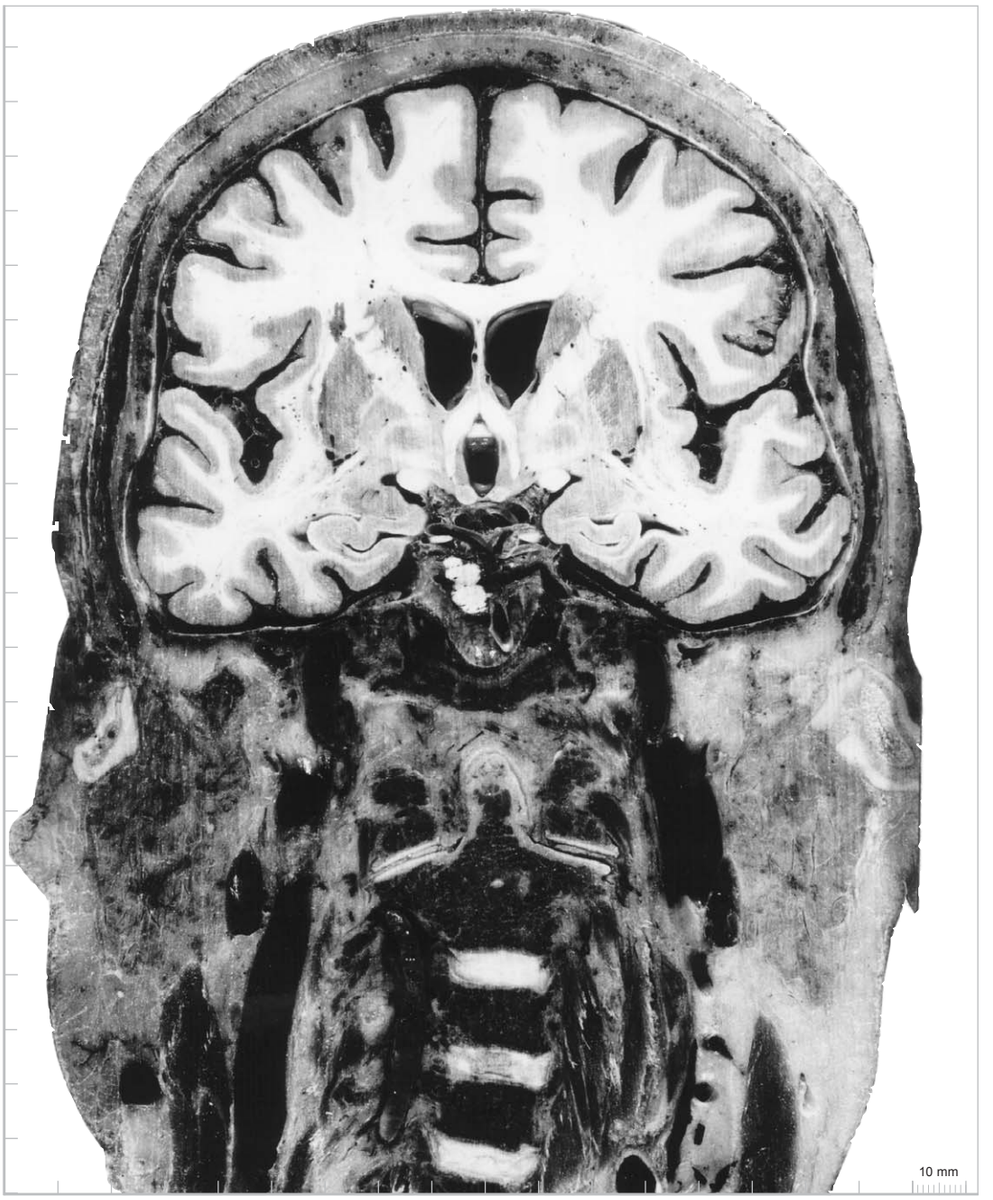


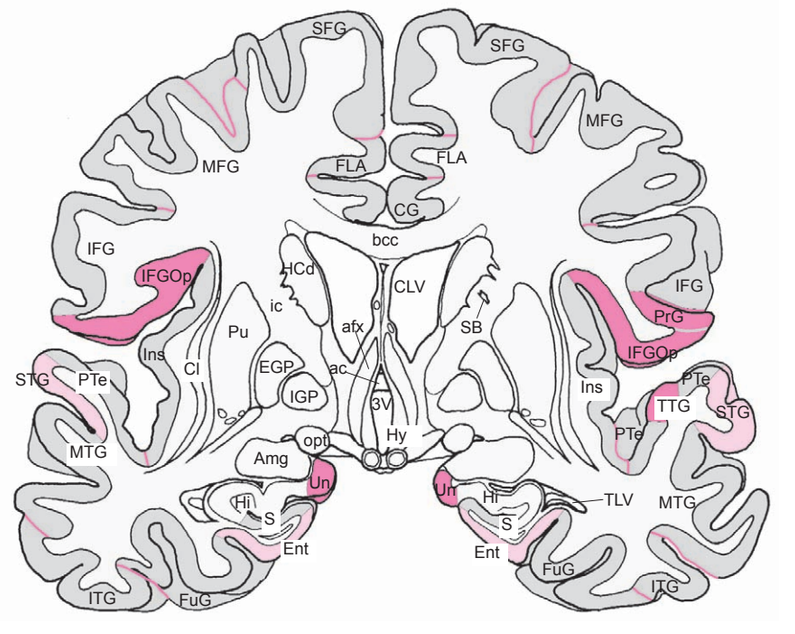


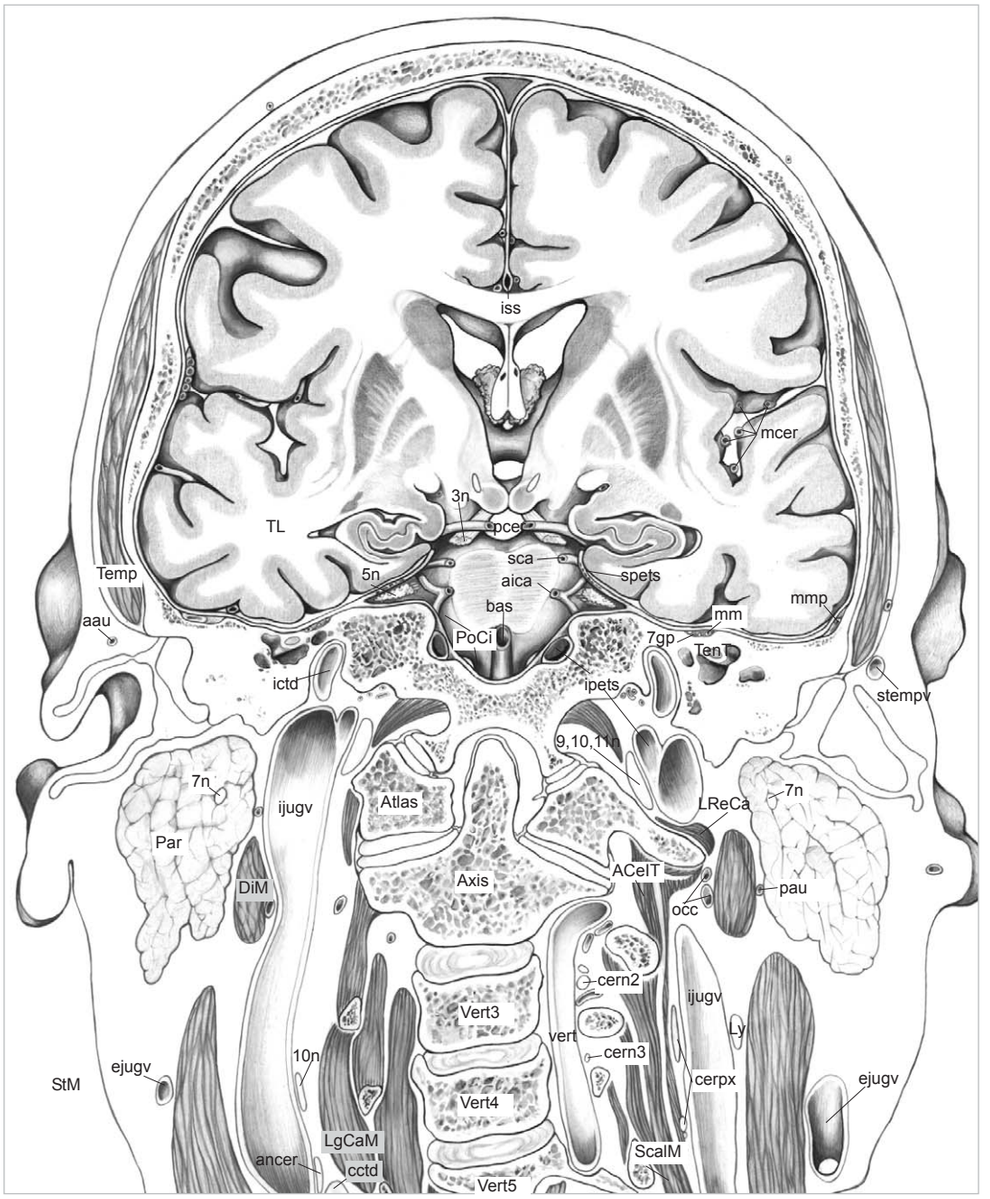


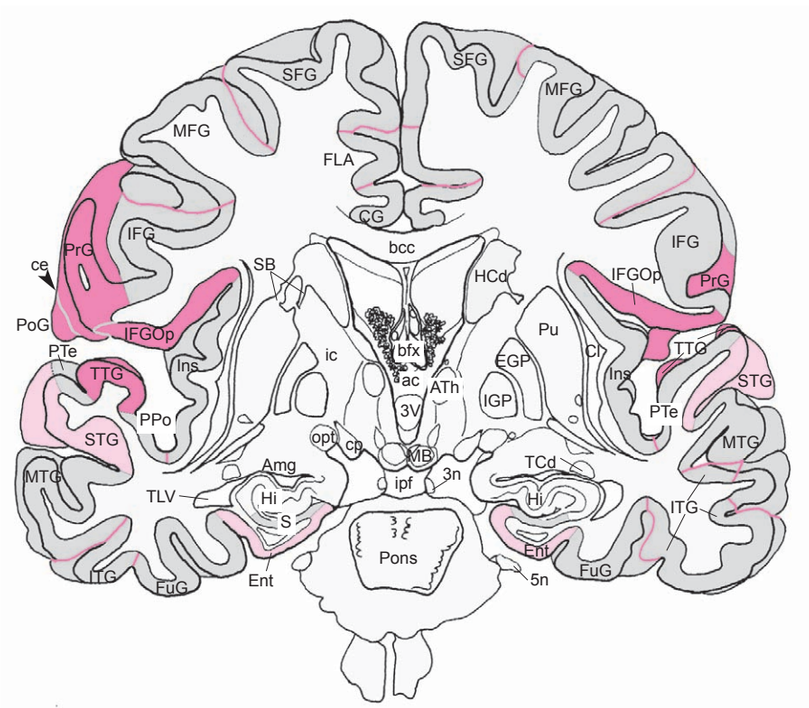


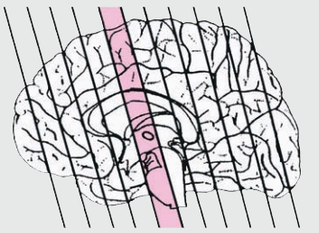












9

(anterior view)

Cerebral structures:

3V	third ventricle
ac	anterior commissure
acer	anterior cerebral artery
Amg	amygdala
ATh	anterior thalamic nucleus
bcc	body of corpus callosum
bfx	body of fornix
Cd	caudate nucleus
ce	central sulcus
CG	cingulate gyrus
cha	choroid artery
Cl	claustrum
cp	cerebral peduncle
EGP	external globus pallidus
Ent	entorhinal cortex
FLA	frontal limbic area
CLV	centrall part of lateral ventricle
FuG	fusiform gyrus
Hi	hippocampus
ic	internal capsule
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
IGP	internal globus pallidus
Ins	insula
ipf	interpeduncular fossa
iss	inferior sagittal sinus
ITG	inferior temporal gyrus
MB	mamillary body
mcer	middle cerebral artery
MFG	medial frontal gyrus
MTG	medial temporal gyrus
opt	optic tract
pcer	posterior cerebral artery
PoCi	pontine cistern
PoG	postcentral gyrus
Pons	pons
PPo	planum polare
PrG	precentral gyrus
PTe	planum temporale
PTG	paraterminal gyrus
Pu	putamen
S	subiculum
SB	striatal cell bridges
sca	superior cerebellar artery
SFG	superior frontal gyrus
SLG	semilunar gyrus
STG	superior temporal gyrus
TCd	tail of caudate nucleus
TL	temporal lobe
TLV	temporal horn of lateral ventricle
TTG	transverse temporal gyri
Un	uncus

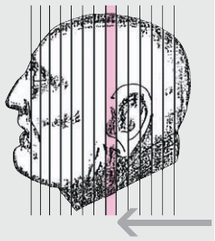
Peripheral structures:

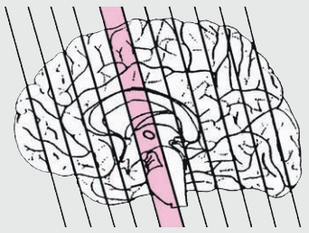
3n	oculomotor nerve or its root
3V	third ventricle
5n	trigeminal nerve
7gp	greater petrosal nerve
7n	facial nerve
9,10,11n	glossopharyngeal, vagus and accessory nerves
10n	vagus nerve
aau	anterior auricular artery
ancer	ansa cervicalis
cern2	cervical nerve 2

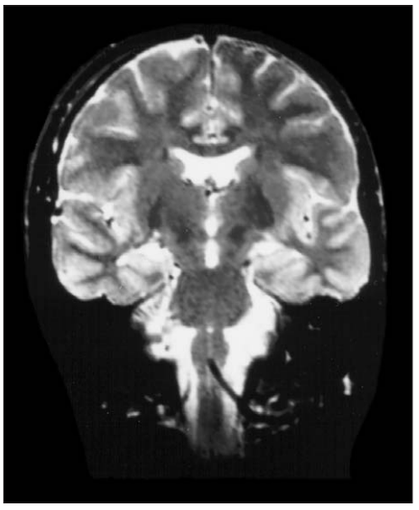
Remainder explained in Index of Abbreviations

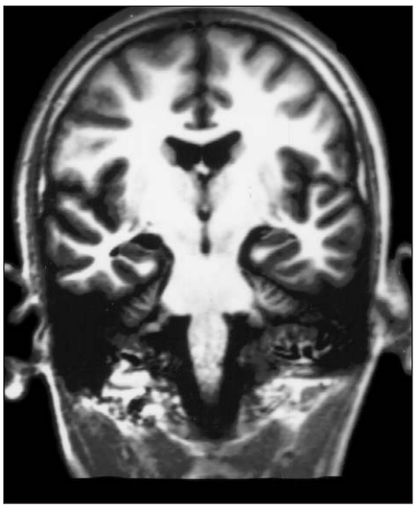
9

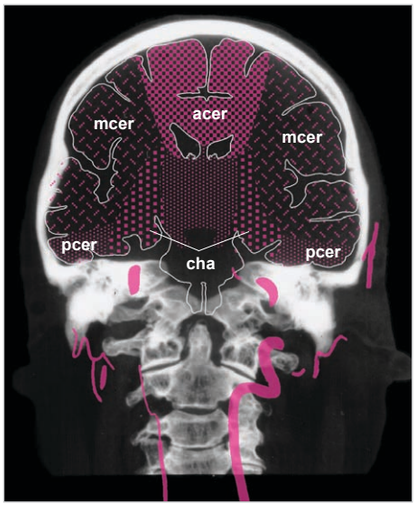
(posterior view)

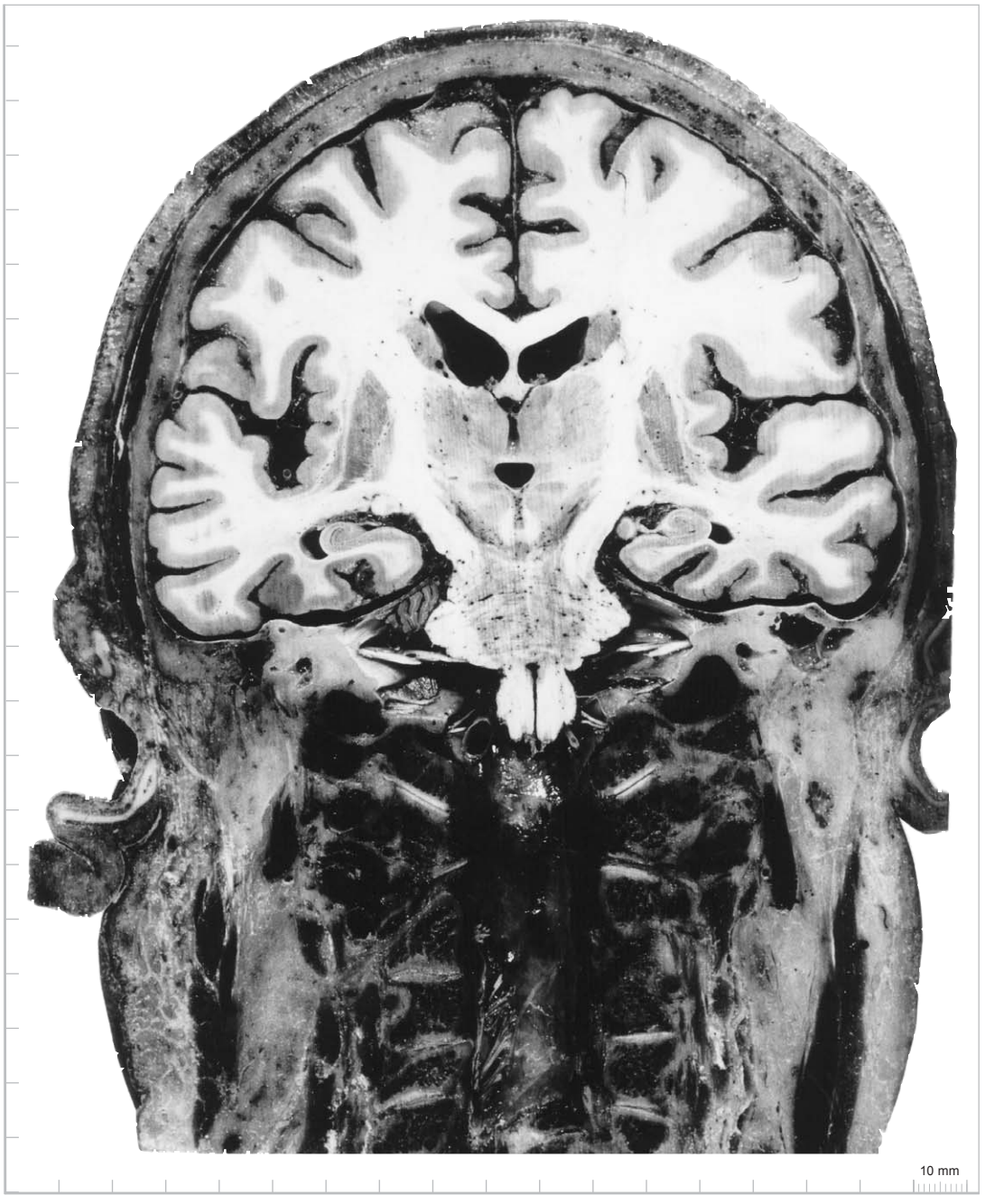


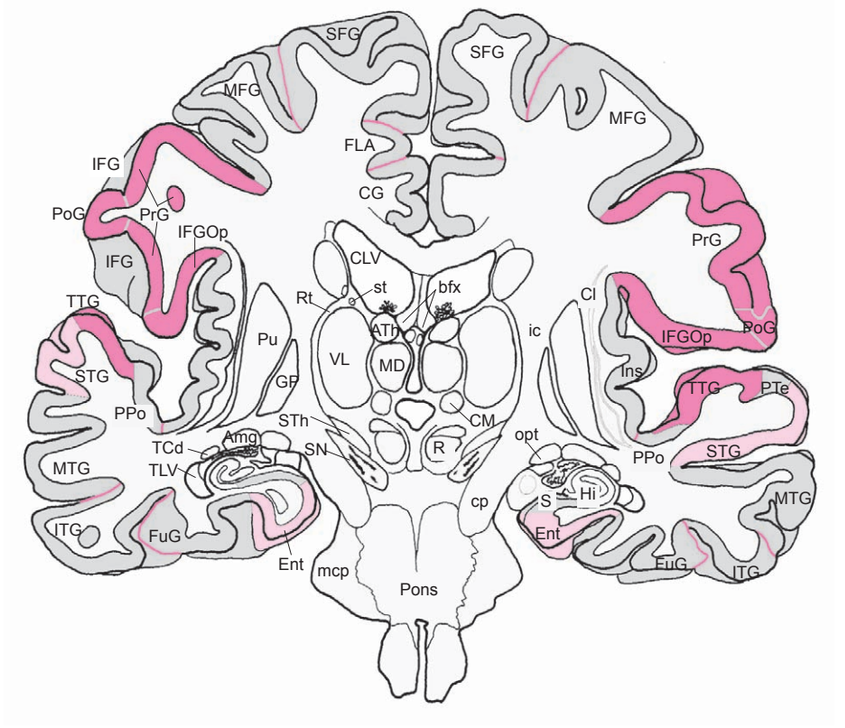


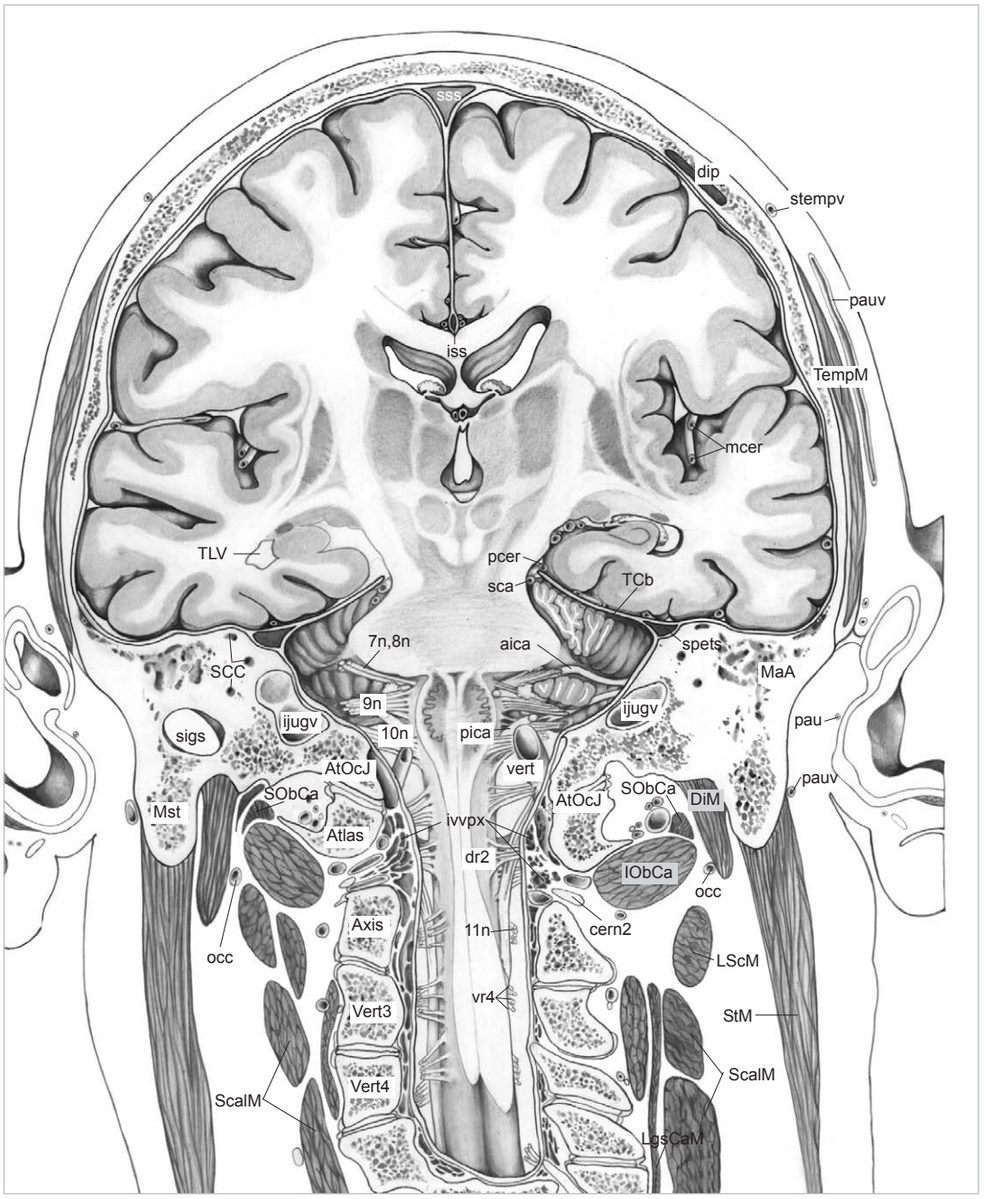


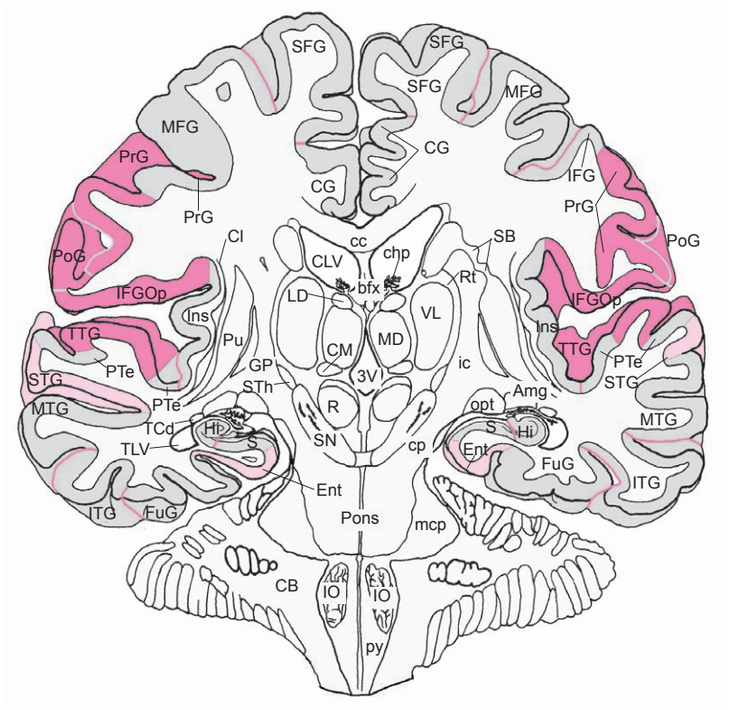






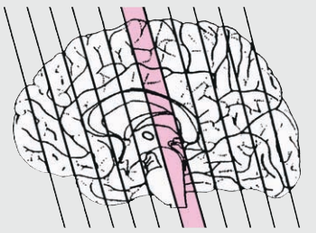






10

(anterior view)



Cerebral structures:

3V	third ventricle
ac	anterior commissure
acer	anterior cerebral artery
aica	anterior inferior cerebellar artery
Amg	amygdala
ATh	anterior thalamic nucleus
bfx	body of fornix
cc	corpus callosum
CG	cingulate gyrus
CH	cerebellar hemisphere
cha	choroid artery
chp	choroid plexus
Cl	claustrum
CM	central medial thalamic nucleus
cp	cerebral peduncle
dip	diploic vein
GP	globus pallidus
Ent	entorhinal cortex
FLA	frontal limbic area
CLV	central part of lateral ventricle
FuG	fusiform gyrus
Hi	hippocampus
ic	internal capsule
IFG	inferior frontal gyrus
IFGOp	inferior frontal gyrus, opercular part
ijugv	internal jugular vein, bulbus
Ins	insula
IO	inferior olive
iss	inferior sagittal sinus
ITG	inferior temporal gyrus
LD	lateral dorsal thalamic nucleus
MB	mamillary body
mcer	middle cerebral artery
mcp	middle cerebellar peduncle
MD	medial dorsal thalamic nucleus
MFG	medial frontal gyrus
MTG	medial temporal gyrus
opt	optic tract
pcer	posterior cerebral artery
pica	posterior inferior cerebellar artery
PoG	postcentral gyrus
PPo	planum polare
PrG	precentral gyrus
PTe	planum temporale
Pu	putamen
py	pyramidal tract
R	red nucleus
Rt	reticular thalamic nucleus
S	subiculum
SB	striatal cell bridges
sca	superior cerebellar artery
SCC	semicircular canals
SFG	superior frontal gyrus
sigs	sigmoid sinus
SLG	semilunar gyrus
SN	substantia nigra
spets	superior petrosal sinus
sss	superior sagittal sinus
STG	superior temporal gyrus
STh	subthalamic nucleus
TCb	tentorium cerebelli
TCd	tail of caudate nucleus
TLV	temporal horn of lateral ventricle
TTG	transverse temporal gyri
vert	vertebral artery
VL	ventral lateral thalamic nucleus

Remainder explained in Index of Abbreviations

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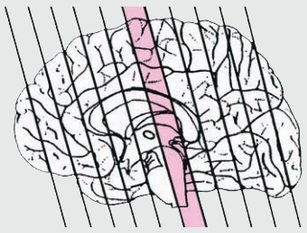
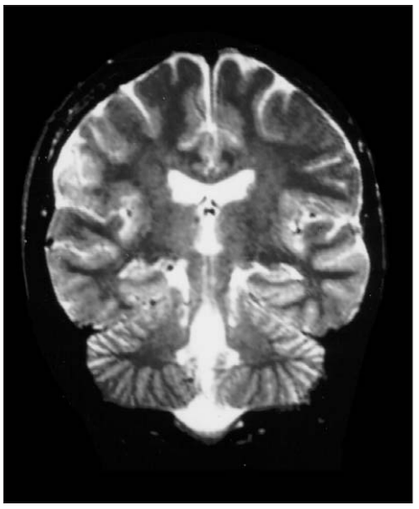
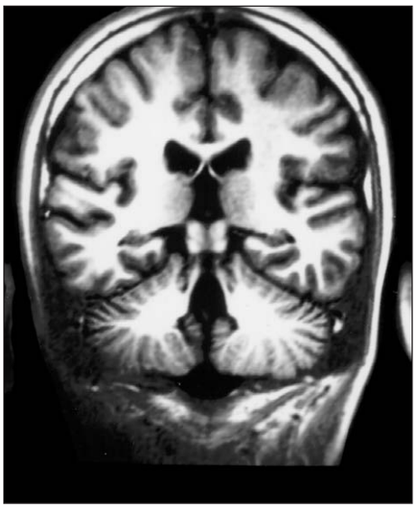
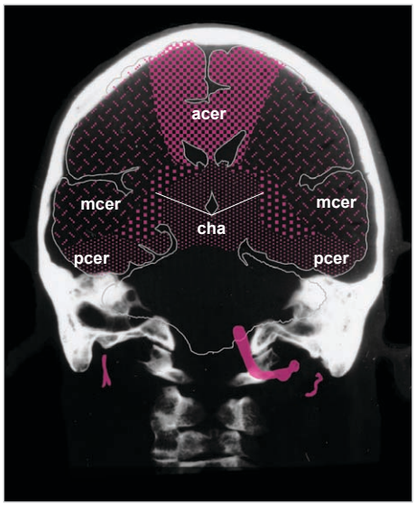
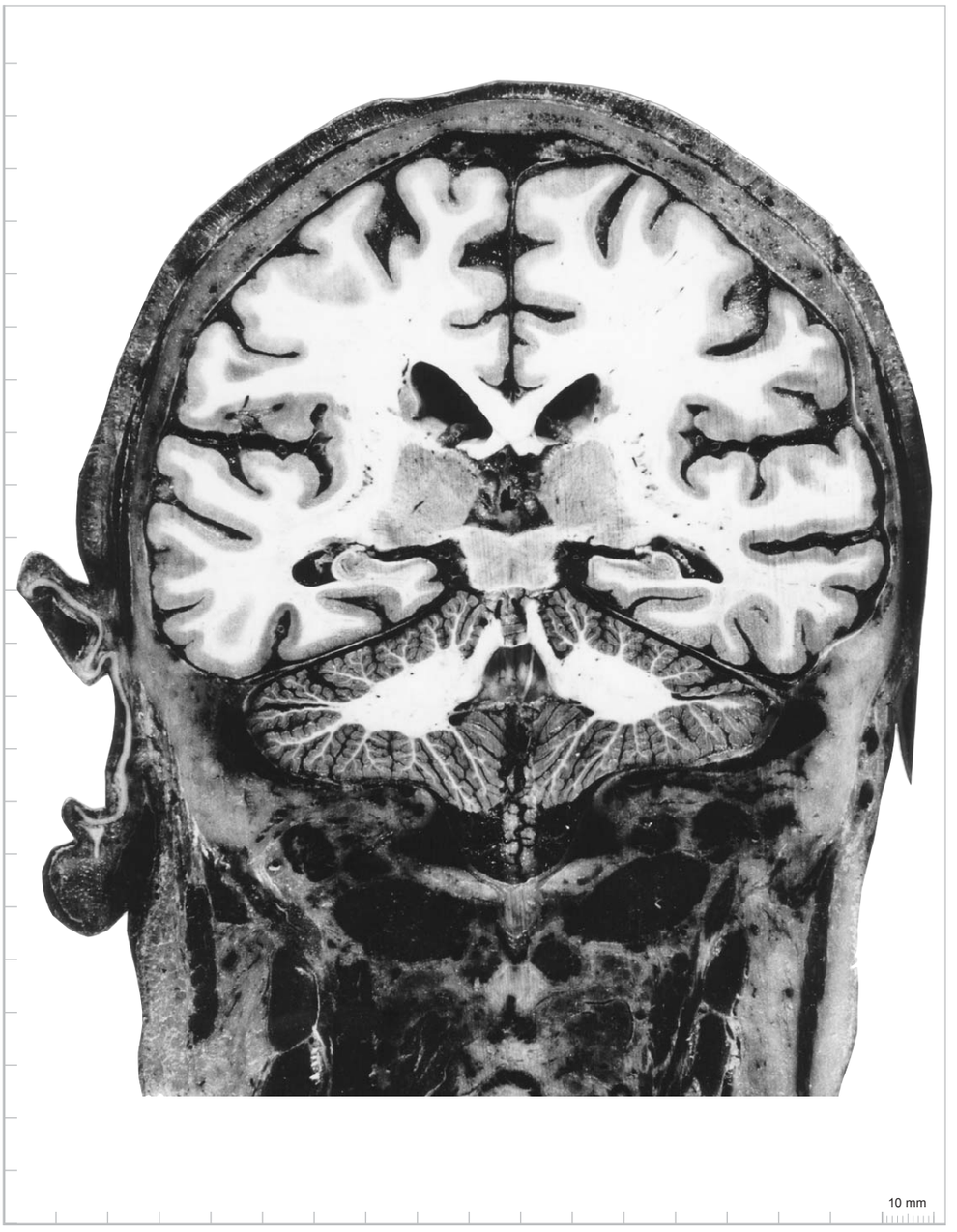
(posterior view)

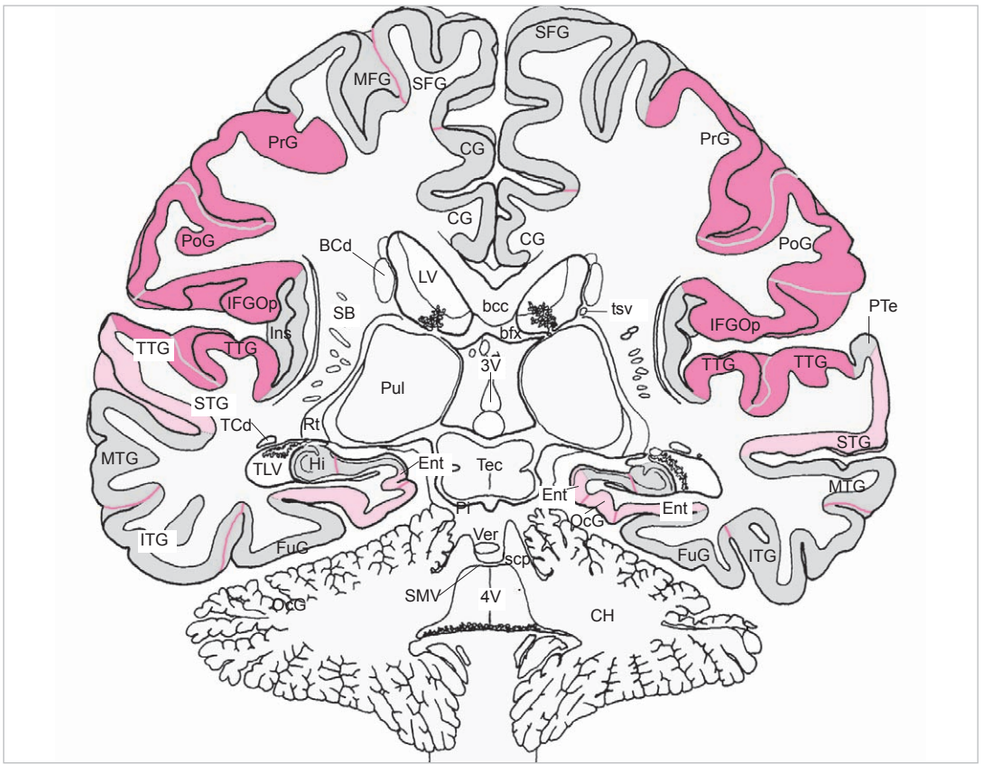


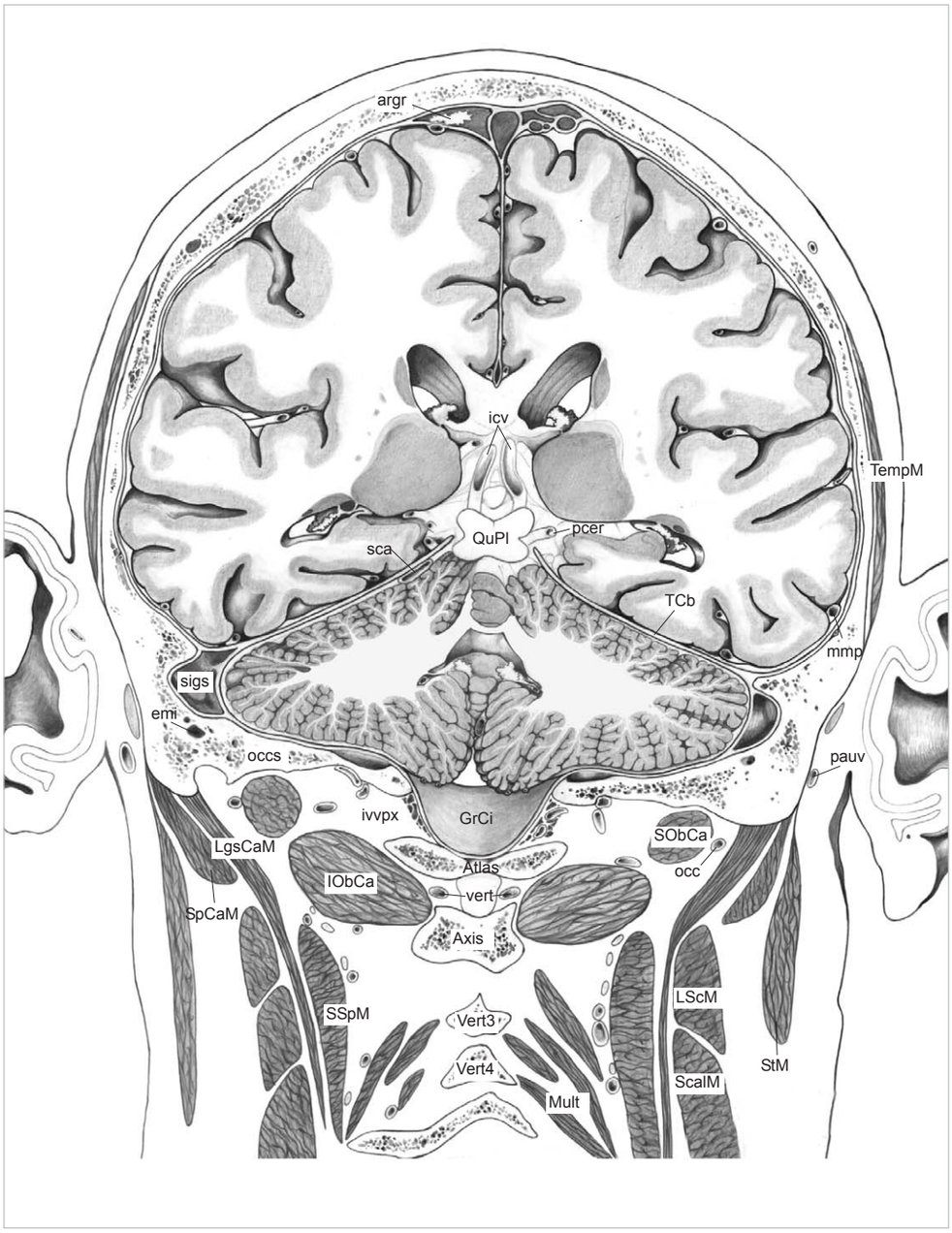


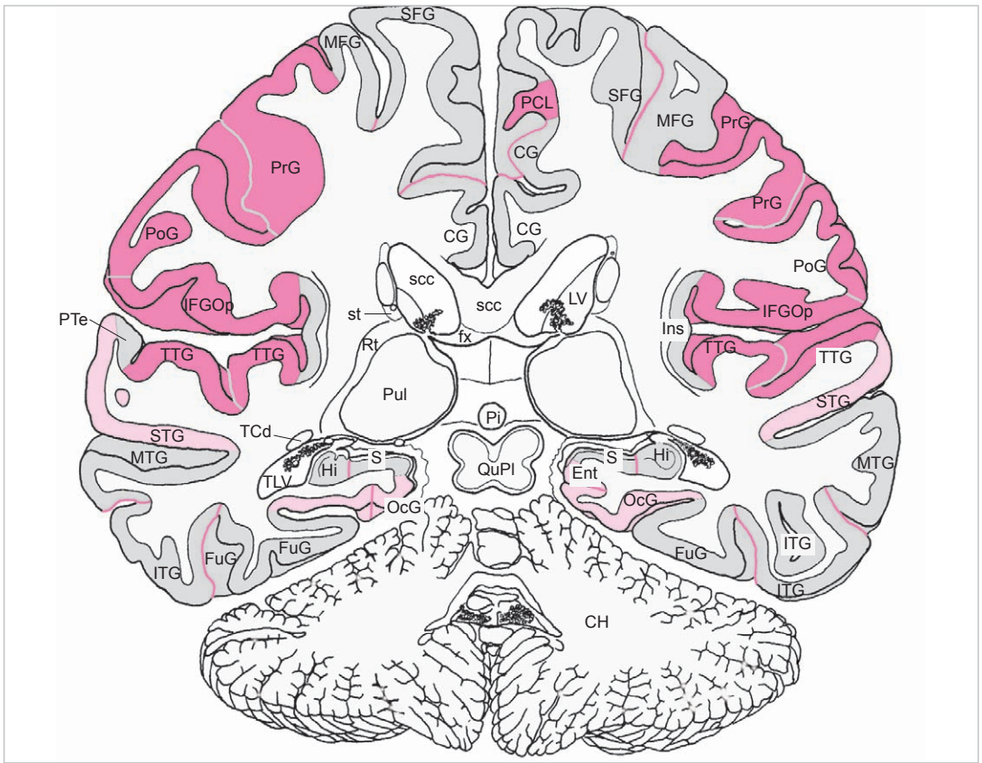






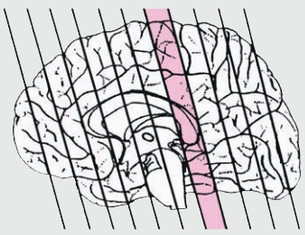






11

(anterior view)



Cerebral structures:

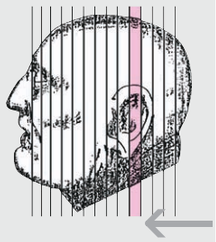
3V	third ventricle
acer	anterior cerebral artery
argr	arachnoid granulations
bfx	body of fornix
CG	cingulate gyrus
CH	cerebellar hemisphere
cha	anterior choroidal artery
Ent	entorhinal cortex
FuG	fusiform gyrus
fx	fornix
GrCi	great (cerebellomedullary) cistern
Hi	hippocampus
icv	internal cerebral vein
IFGOp	inferior frontal gyrus, opercular part
Ins	insula
IObCa	inferior oblique capitis muscle
ITG	inferior temporal gyrus
LV	lateral ventricle
mcer	middle cerebral artery
MFG	medial frontal gyrus
MTG	medial temporal gyrus
occs	occipital sinus
OcG	occipital gyri
pcer	posterior cerebral artery
PCL	paracentral lobule
Pi	pineal gland
PoG	postcentral gyrus
PrG	precentral gyrus
PTe	planum temporale
Pul	pulvinar thalami
QuPl	quadrigeminal plate
Rt	reticular thalamic nucleus
S	subiculum
SB	striatal cell bridges
scc	splenium of corpus callosum
SFG	superior frontal gyrus
scp	superior cerebellar peduncle
sigs	sigmoid sinus
st	stria terminalis
STG	superior temporal gyrus
TCb	tentorium cerebelli
TCd	tail of caudate nucleus
TLV	temporal horn of lateral ventricle
TTG	transverse temporal gyri

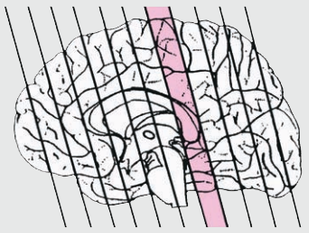
Peripheral structures:

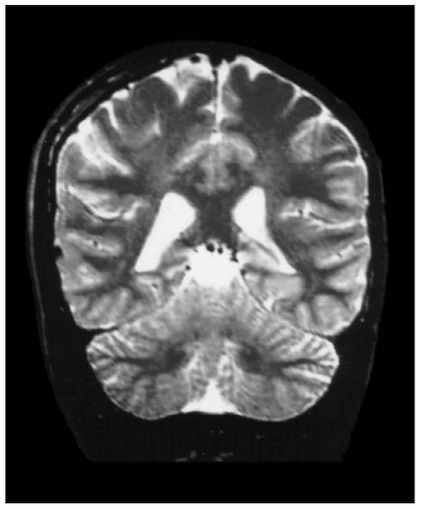
Atlas	atlas (C1 vertebra)
Axis	axis (C2 vertebra)
emi	emissary vein, (mastoid)
ivvpx	internal vertebral venous plexus
LgsCaM	longissimus capitis muscle
LScM	levator scapulae muscle
mmp	middle meningeal artery, parietal branch
Mult	multifidus muscle
occ	occipital artery
pauv	posterior auricular vein
ScalM	scalenus muscle
SObCa	superior oblique capitis muscle
SpCaM	splenius capitis muscle
SSpM	semispinal capitis muscle
StM	sternomastoid muscle
TempM	temporalis muscle
vert	vertebral artery
Vert3	vertebra 3
Vert4	vertebra 4

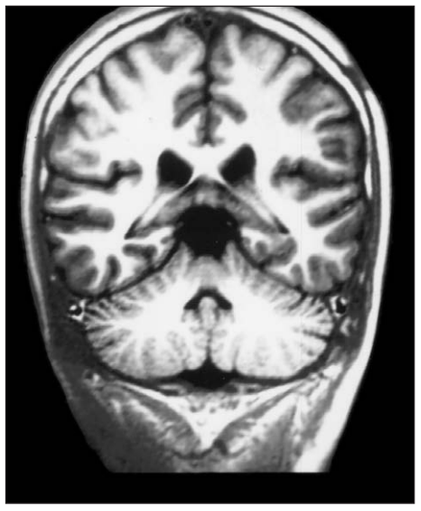
11

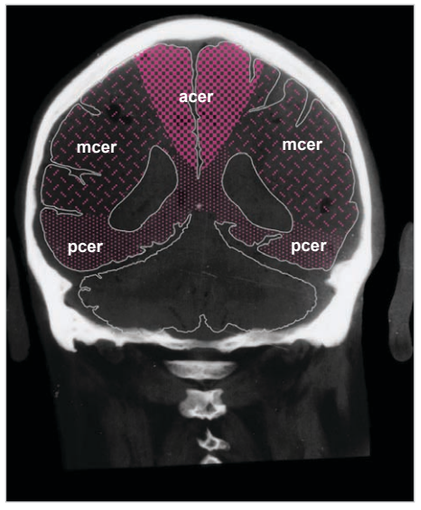
(posterior view)

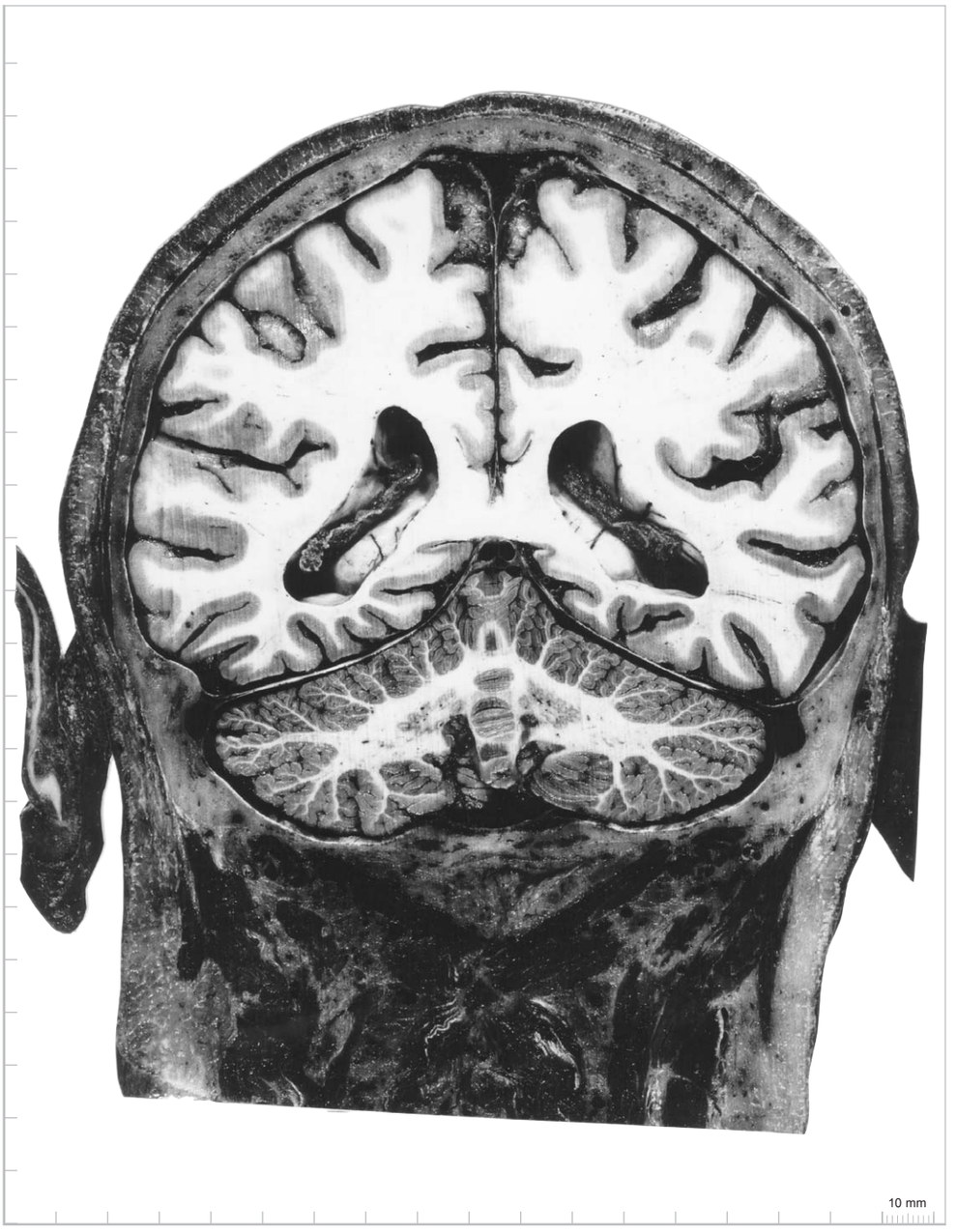


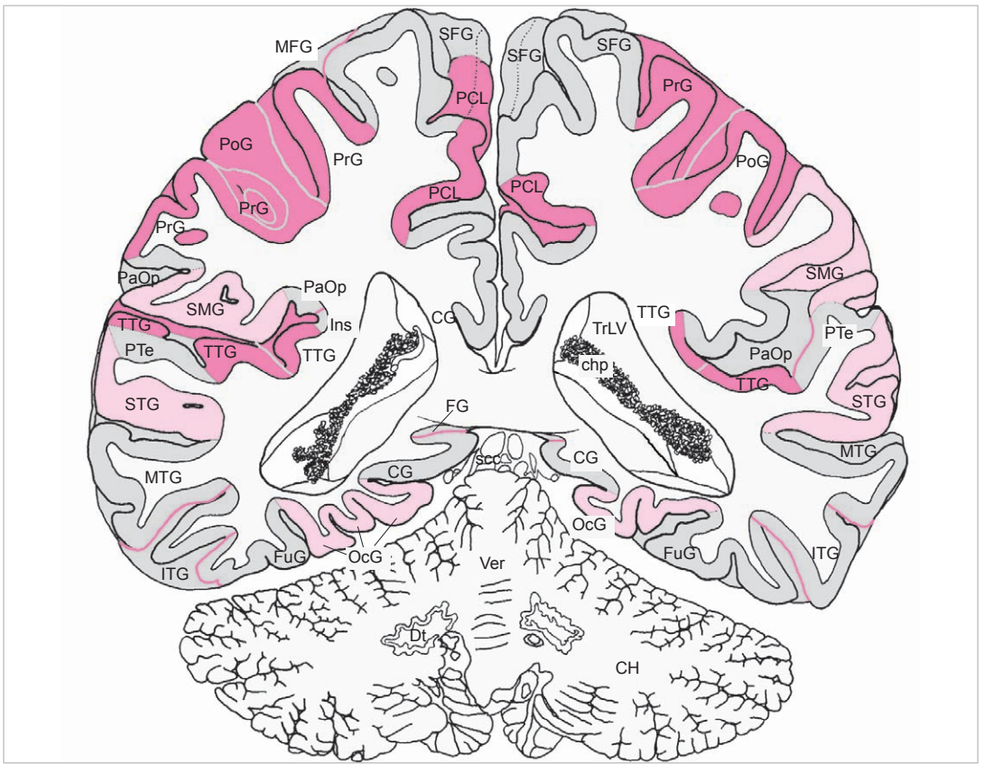


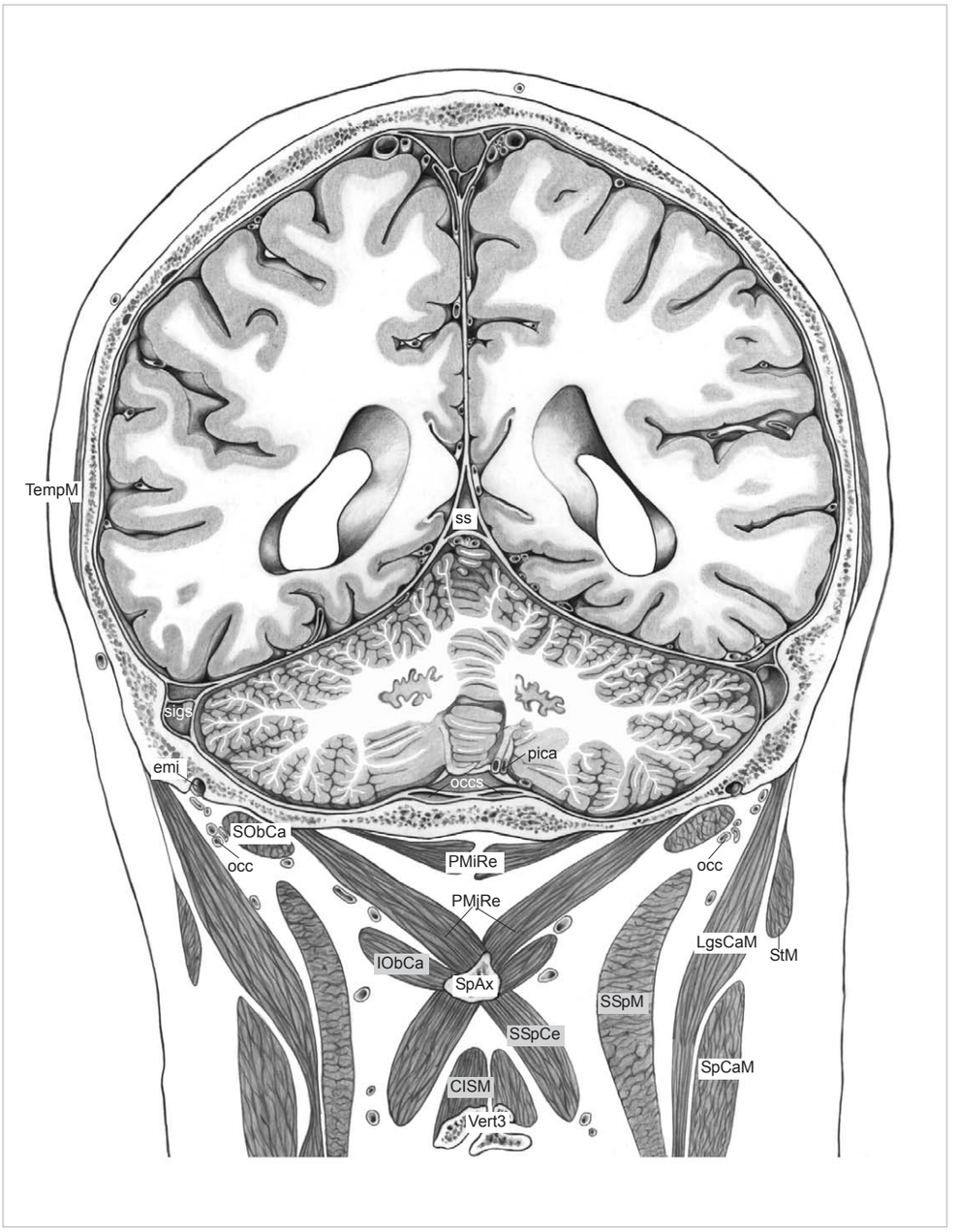


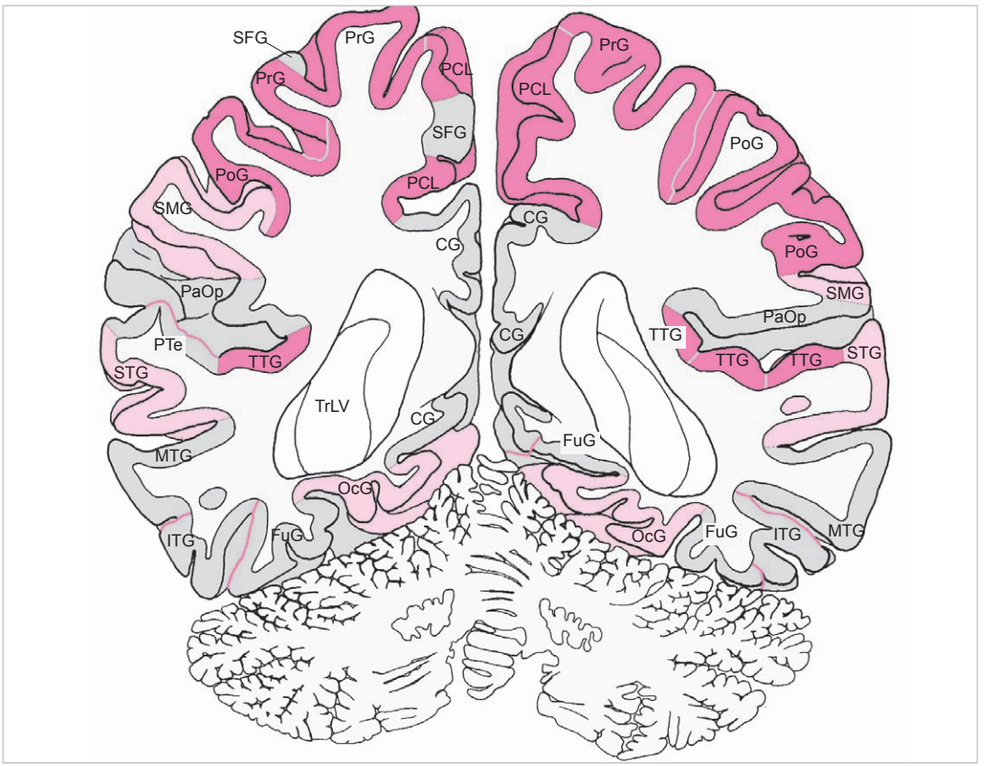






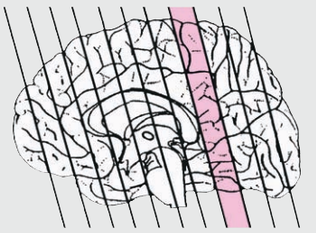






12

(anterior view)



Cerebral structures:

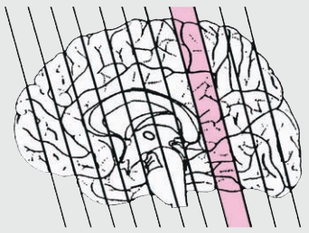
CG	cingulate gyrus
CH	cerebellar hemisphere
chp	choroid plexus
FG	fasciolar gyrus
FuG	fusiform gyrus
Ins	insular gyri
ITG	inferior temporal gyrus
MTG	medial temporal gyrus
OcG	occipital gyri
PaOp	parietal operculum
PCL	paracentral lobule
pica	posterior inferior cerebellar artery
PoG	postcentral gyrus
PrG	precentral gyrus
PTe	planum temporale
SFG	superior frontal gyrus
sigs	sigmoid sinus
SMG	supramarginal gyrus
STG	superior temporal gyrus
TrLV	trigone of lateral ventricle
TTG	transverse temporal gyrus (1,2,3)
Ver	vermis of cerebellum

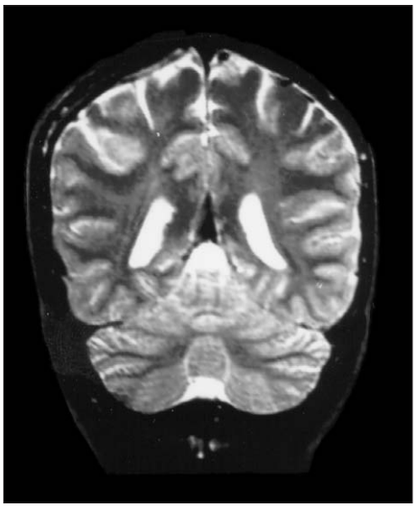
Peripheral structures:

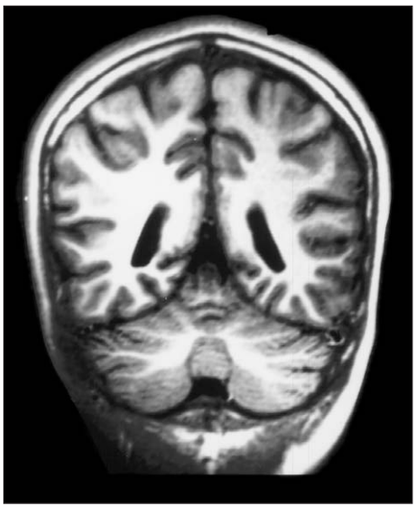
CISM	cervical interspinal muscle
emi	emissary vein, (mastoid)
IObCa	inferior oblique capitis muscle
LgsCaM	longissimus capitis muscle
occ	occipital artery
occs	occipital sinus
PMiRe	post. minor rectus capitis muscle
PMjRe	post. major rectus capitis muscle
SObCa	superior oblique capitis muscle
SpAx	spinous process of axis
SpCaM	splenius capitis muscle
ss	straight sinus
SSpM	semispinal capitis muscle
SSpCe	semispinal cervicis muscle
StM	sternomastoid muscle
TempM	temporalis muscle
Vert3	vertebra 3

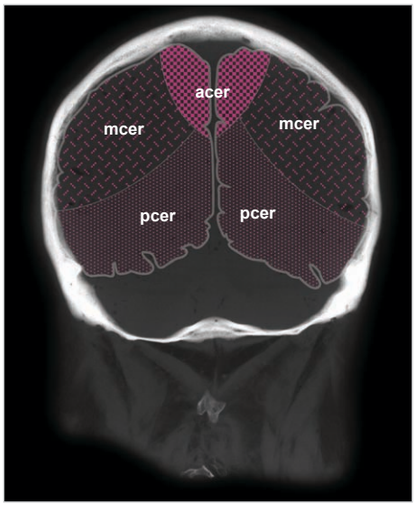
12

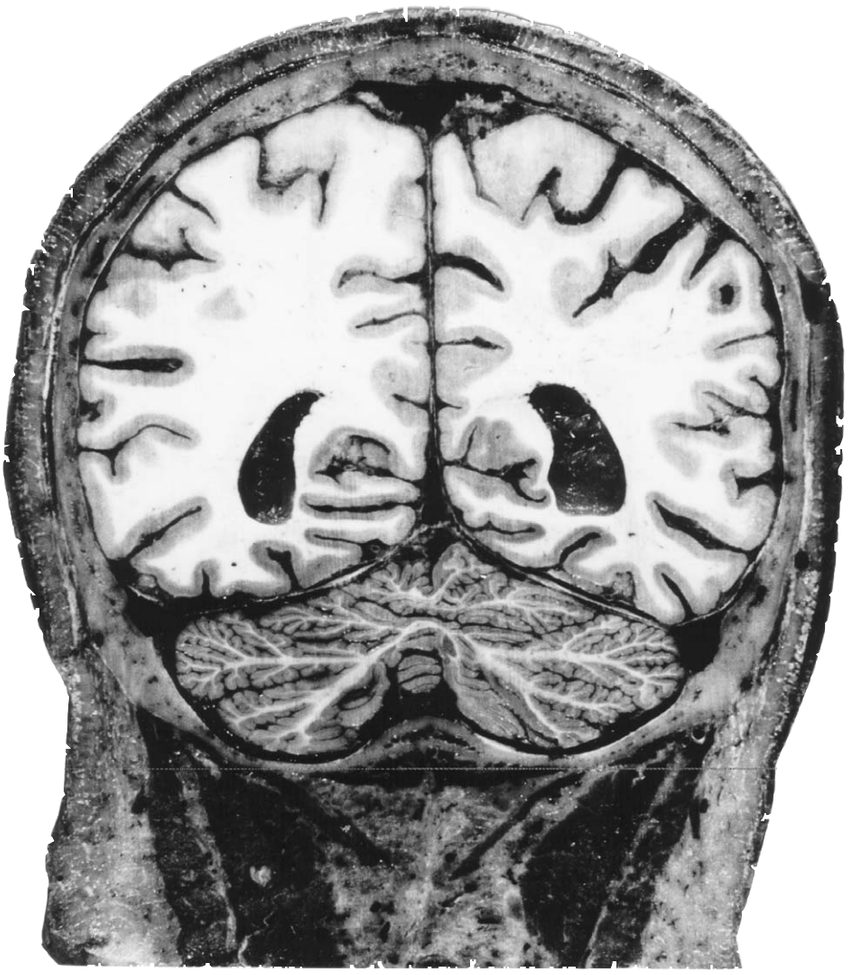
(posterior view)











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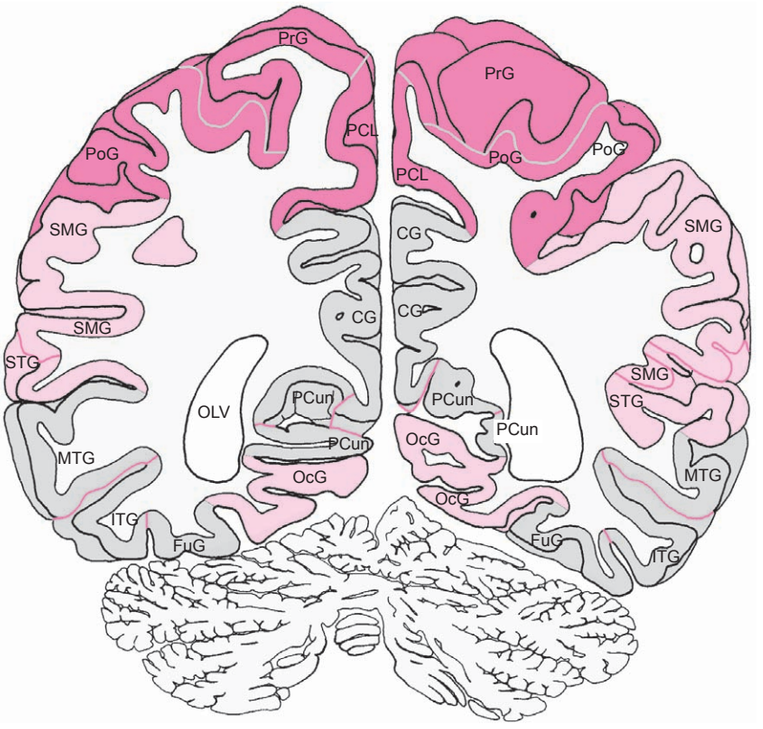
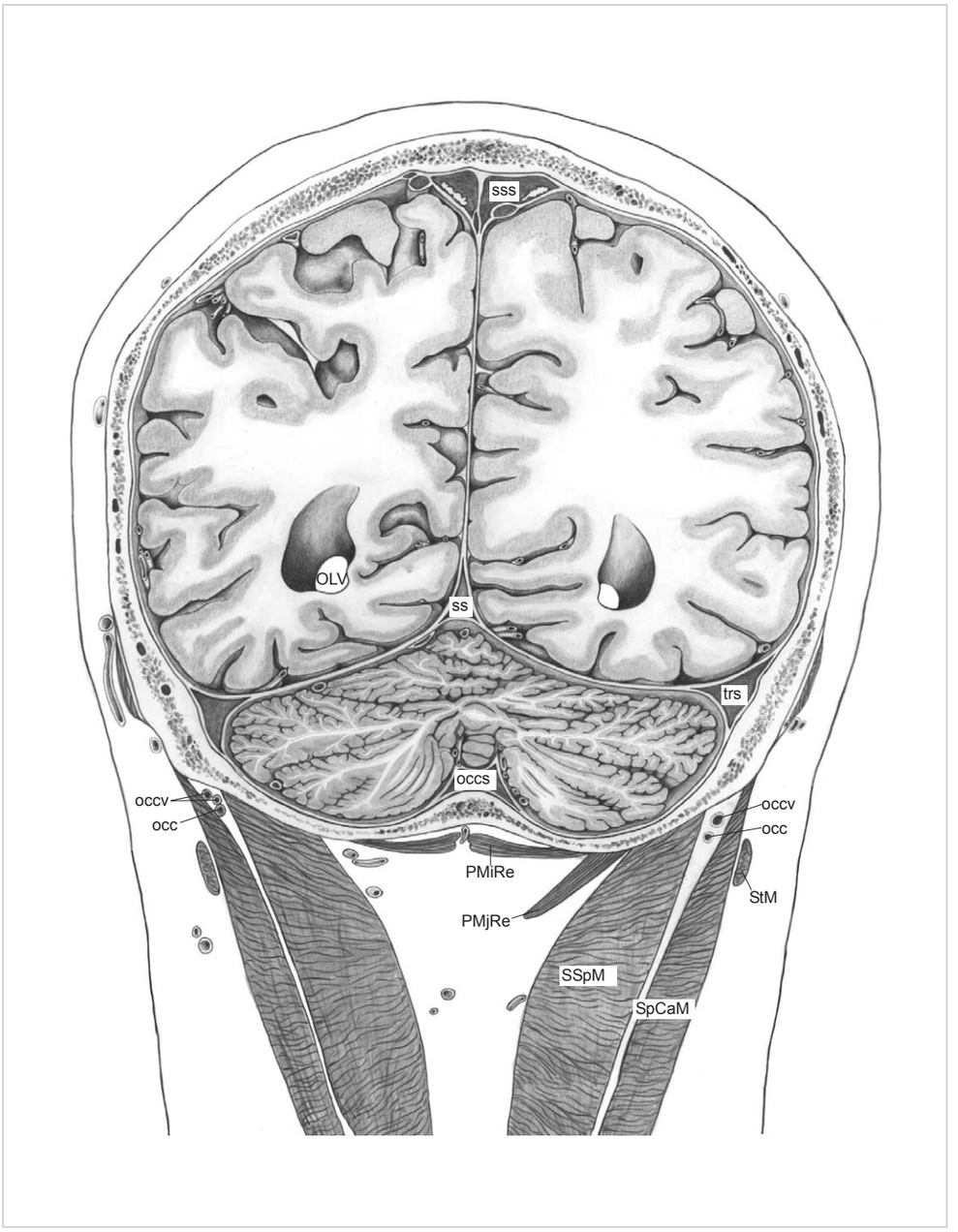
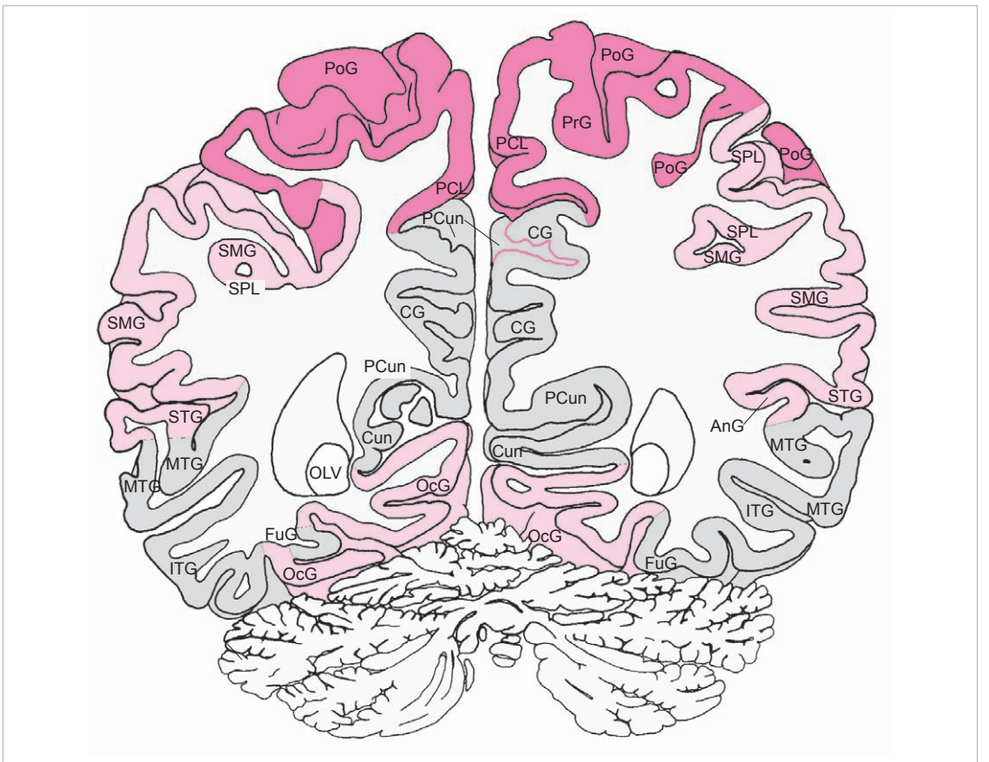
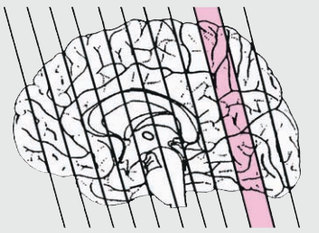






13

(anterior view)



Cerebral structures:

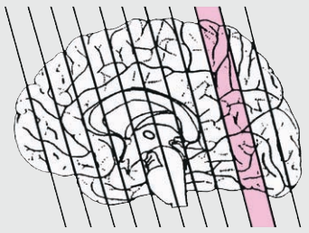
AnG	angular gyrus
CG	cingulate gyrus
Cun	cuneus
FuG	fusiform gyrus
ITG	inferior temporal gyrus
MTG	medial temporal gyrus
OcG	occipital gyri
OLV	occipital horn of lateral ventricle
PCL	paracentral lobule
PCun	precuneus
PoG	postcentral gyrus
PrG	precentral gyrus
SMG	supramarginal gyrus
SPL	superior parietal lobule
STG	superior temporal gyrus

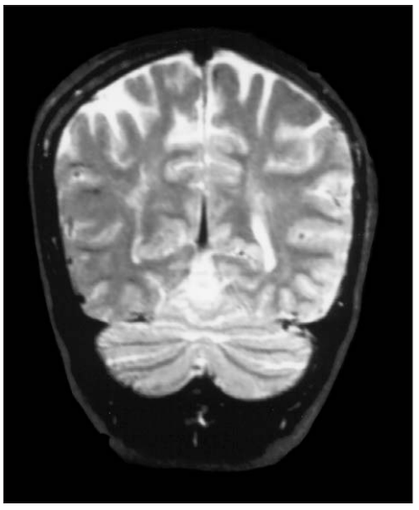
Peripheral structures:

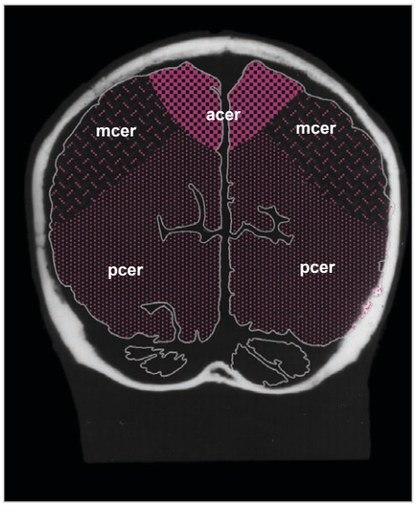
occ	occipital artery
occs	occipital sinus
occv	occipital vein
PMiRe	post. minor rectus capitis muscle
PMjRe	post. major rectus capitis muscle
SpCaM	splenius capitis muscle
ss	straight sinus
SSpM	semispinal capitis muscle
sss	superior sagittal sinus
StM	sternomastoid muscle
trs	transverse sinus

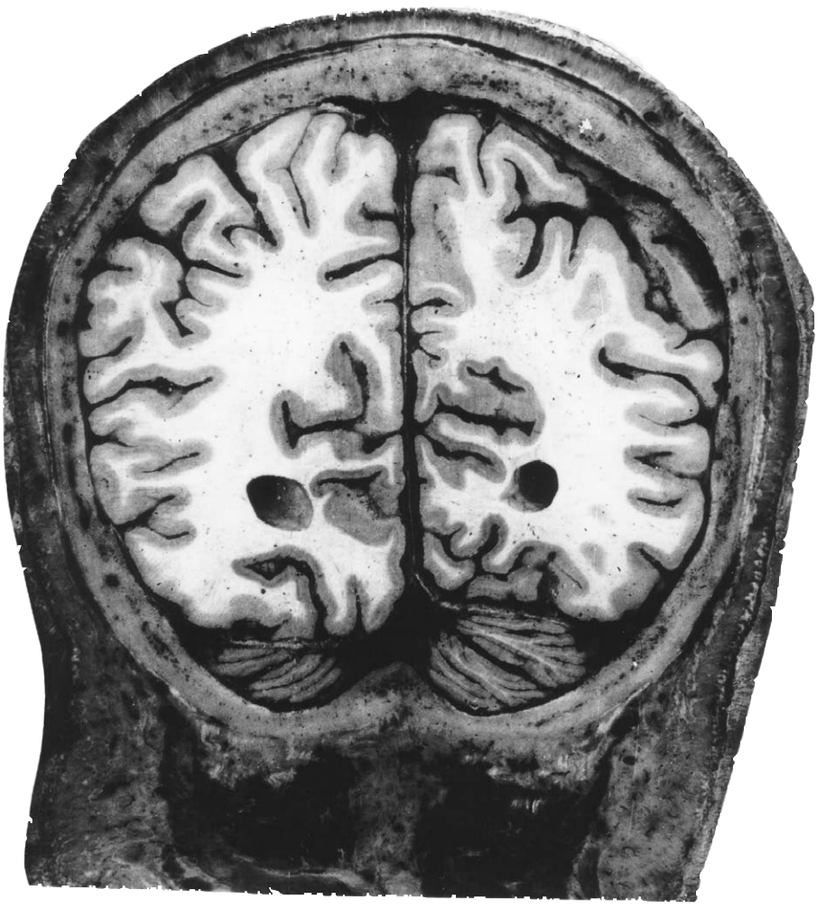
13

(posterior view)









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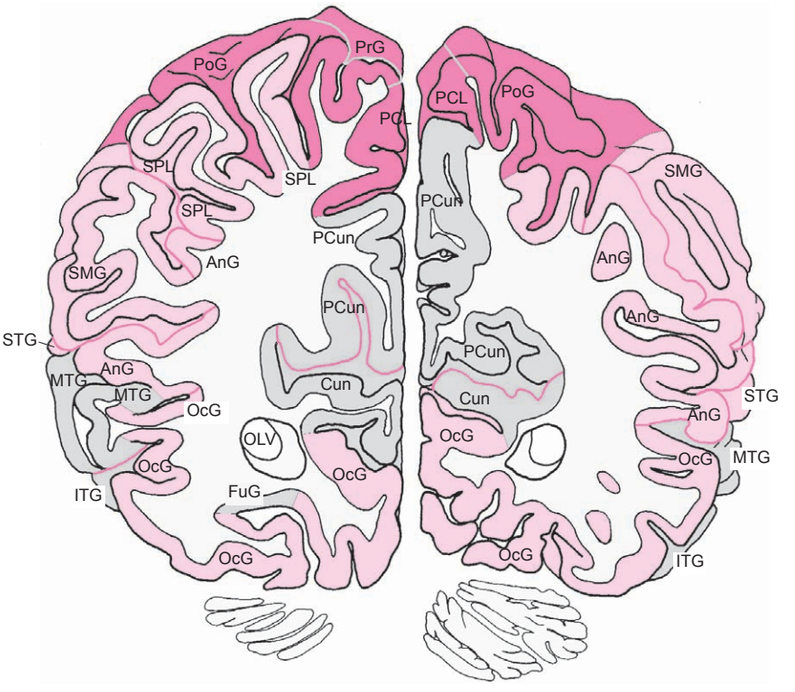
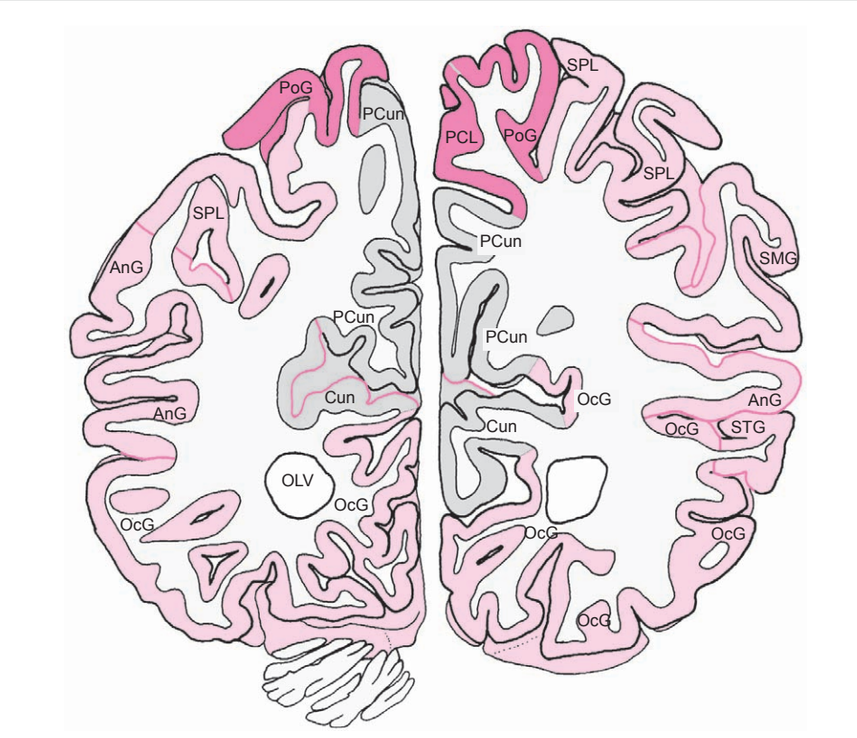
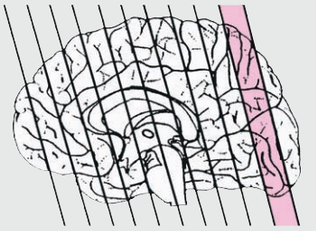




14

(anterior view)



Cerebral structures:

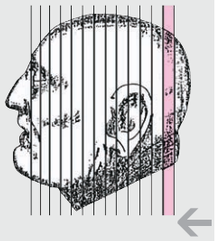
AnG	angular gyrus
Cun	cuneus
FuG	fusiform gyrus
ITG	inferior temporal gyrus
MTG	medial temporal gyrus
OcG	occipital gyri
OLV	occipital horn of lateral ventricle
PCL	paracentral lobule
PCun	precuneus
PoG	postcentral gyrus
PrG	precentral gyrus
SMG	supramarginal gyrus
STG	superior temporal gyrus

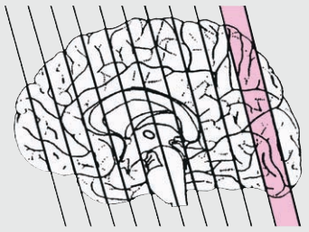
Peripheral structures:

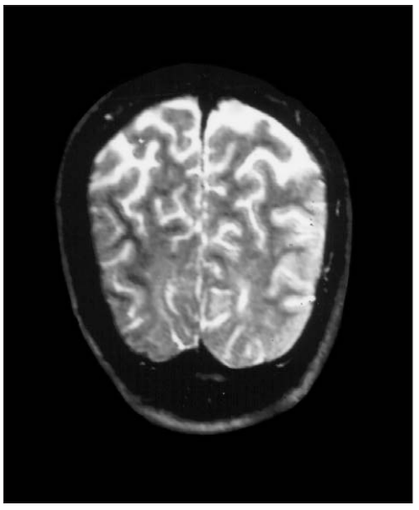
cosi	confluence of sinuses
occ	occipital artery
occv	occipital vein
OcFrO	occipito-frontal muscle, occipital belly
SpCaM	splenius capitis muscle
SPL	superior parietal lobule
SSpM	semispinal capitis muscle
TCb	tentorium cerebelli
trs	transverse sinus
TzM	trapezius muscle

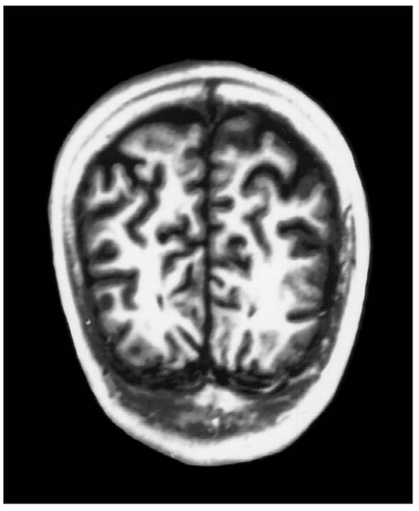
14

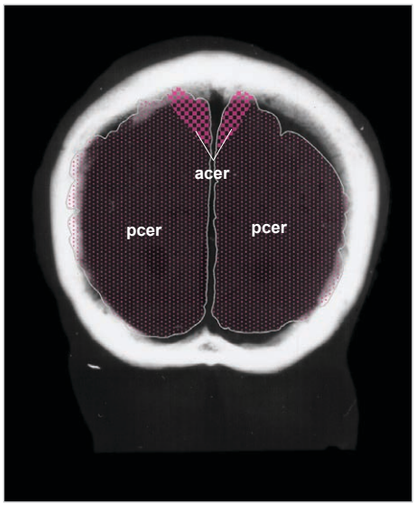
(posterior view)

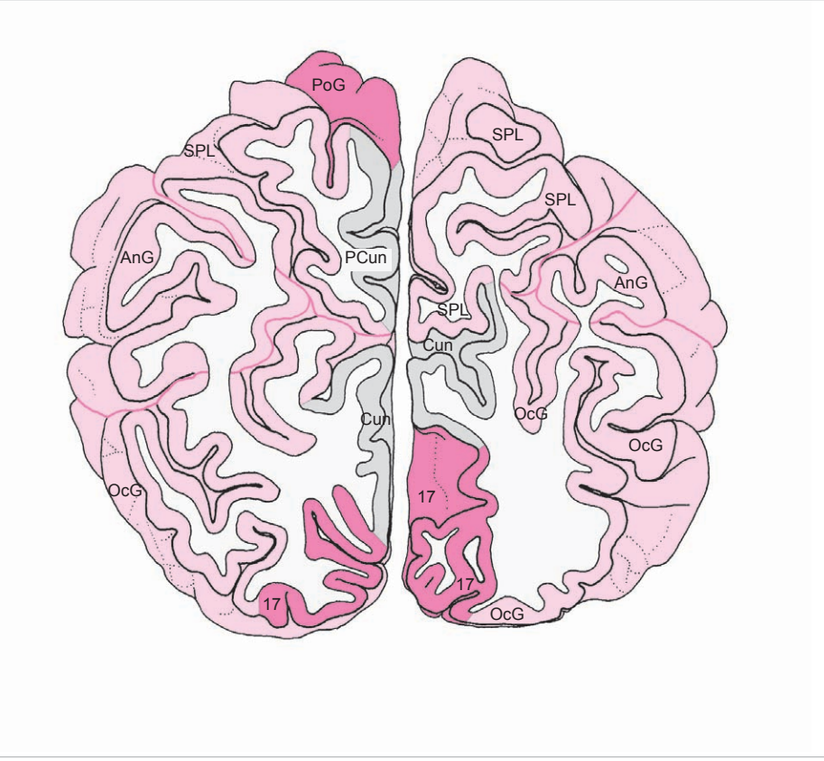


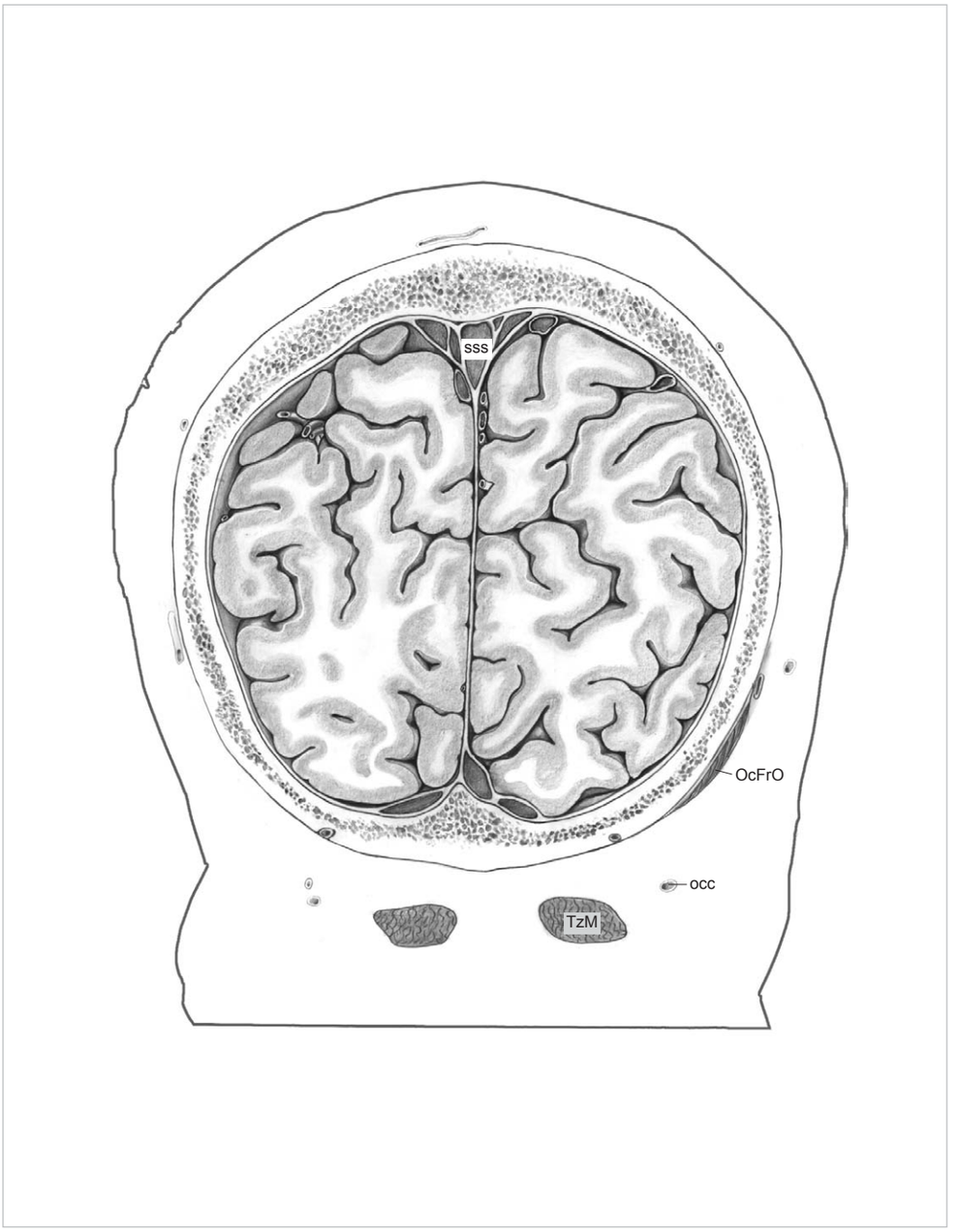


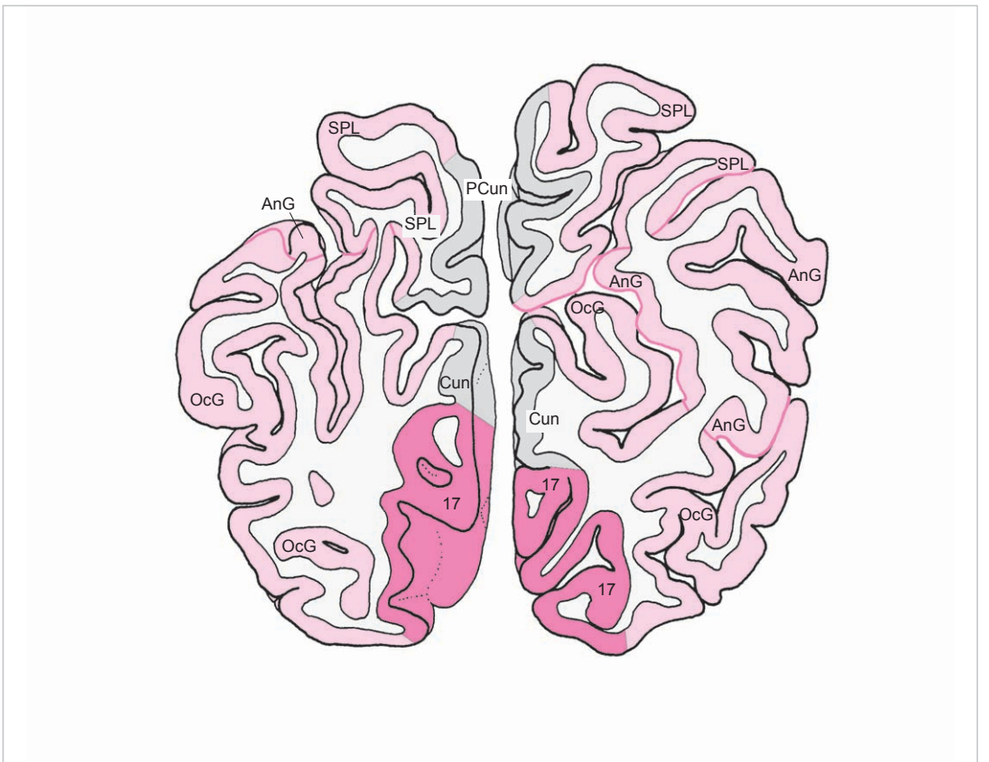






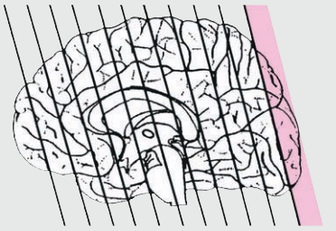






15

(anterior view)



Cerebral structures:

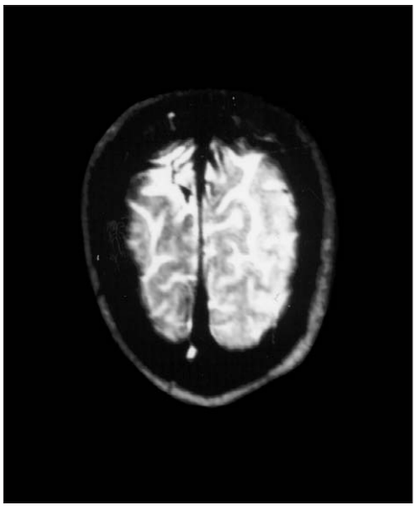
17	striate area
AnG	angular gyrus
Cun	cuneus
OcG	occipital gyri
PCun	precuneus
PoG	postcentral gyrus
SPL	superiorparietal lobule

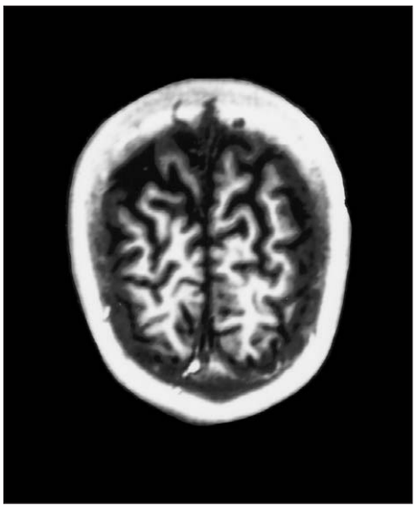
Peripheral structures:

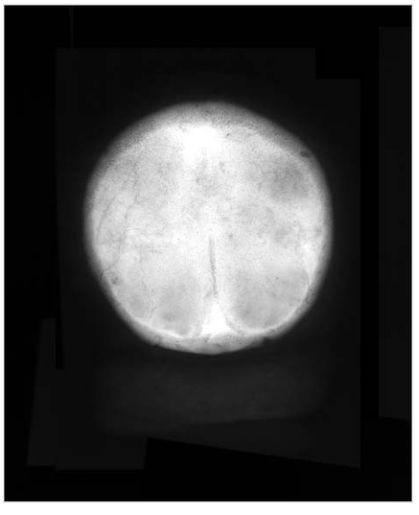
occ	occipital artery
OcFrO	occipito-frontal muscle, occipital belly
sss	superior sagittal sinus
TzM	trapezius muscle

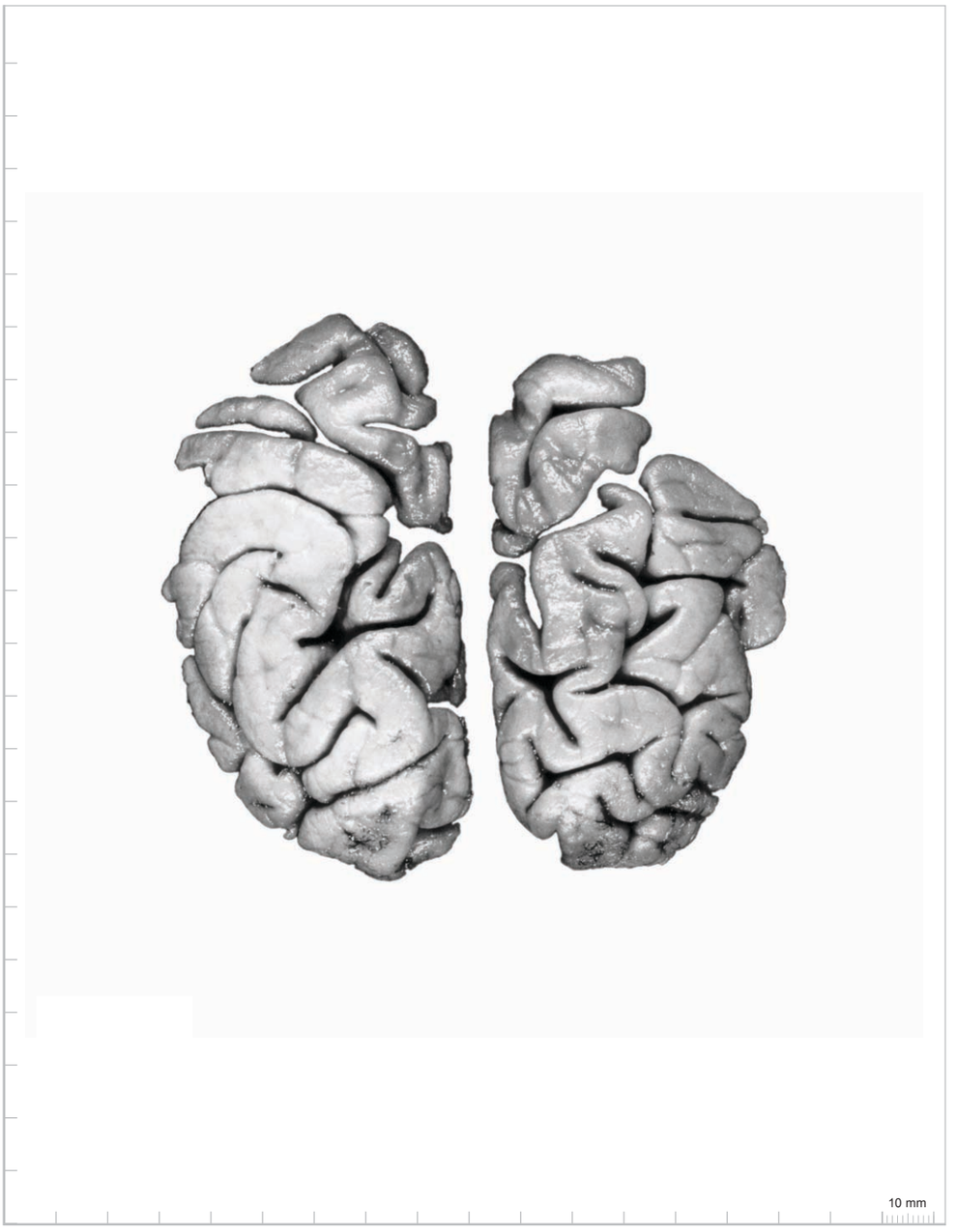
15

(posterior view)







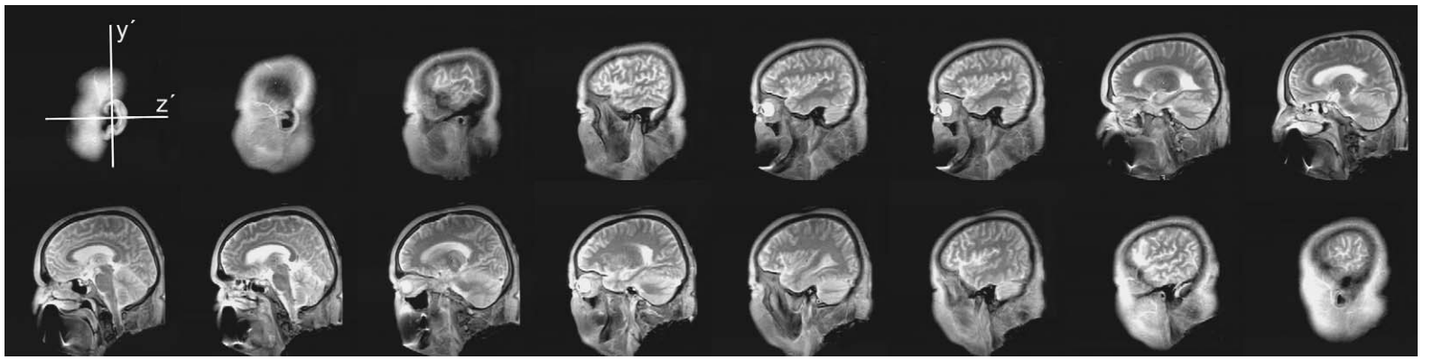


Sagittal Sections

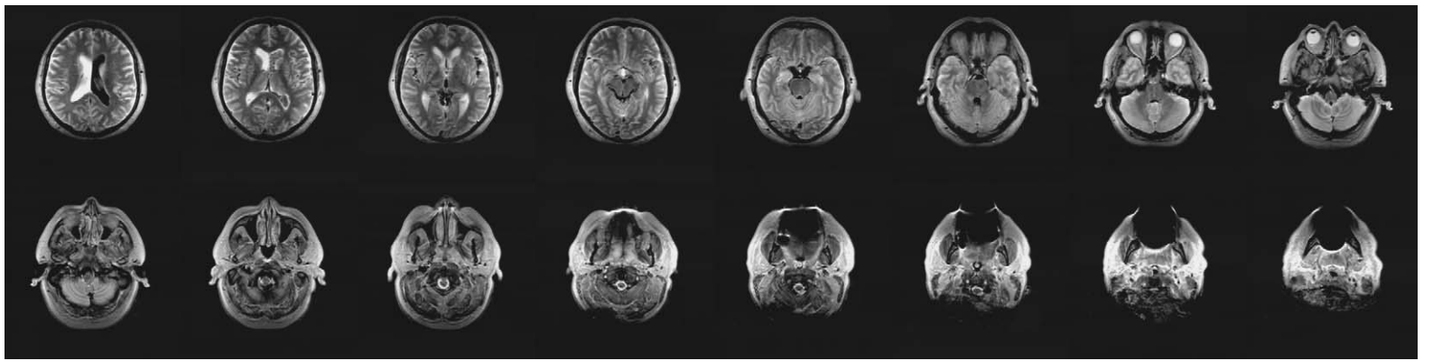
Cerebral structures:

17	striate area
AnG	angular gyrus
Cun	cuneus
OcG	occipital gyri
PCun	precuneus
PoG	postcentral gyrus
SPL	superiorparietal lobule

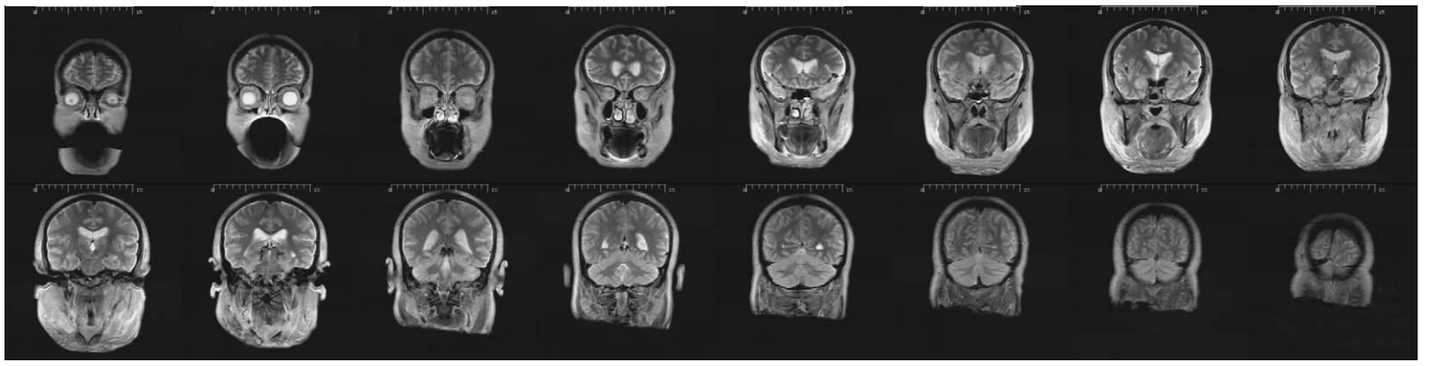
Sagittal plane:



y´- direction:

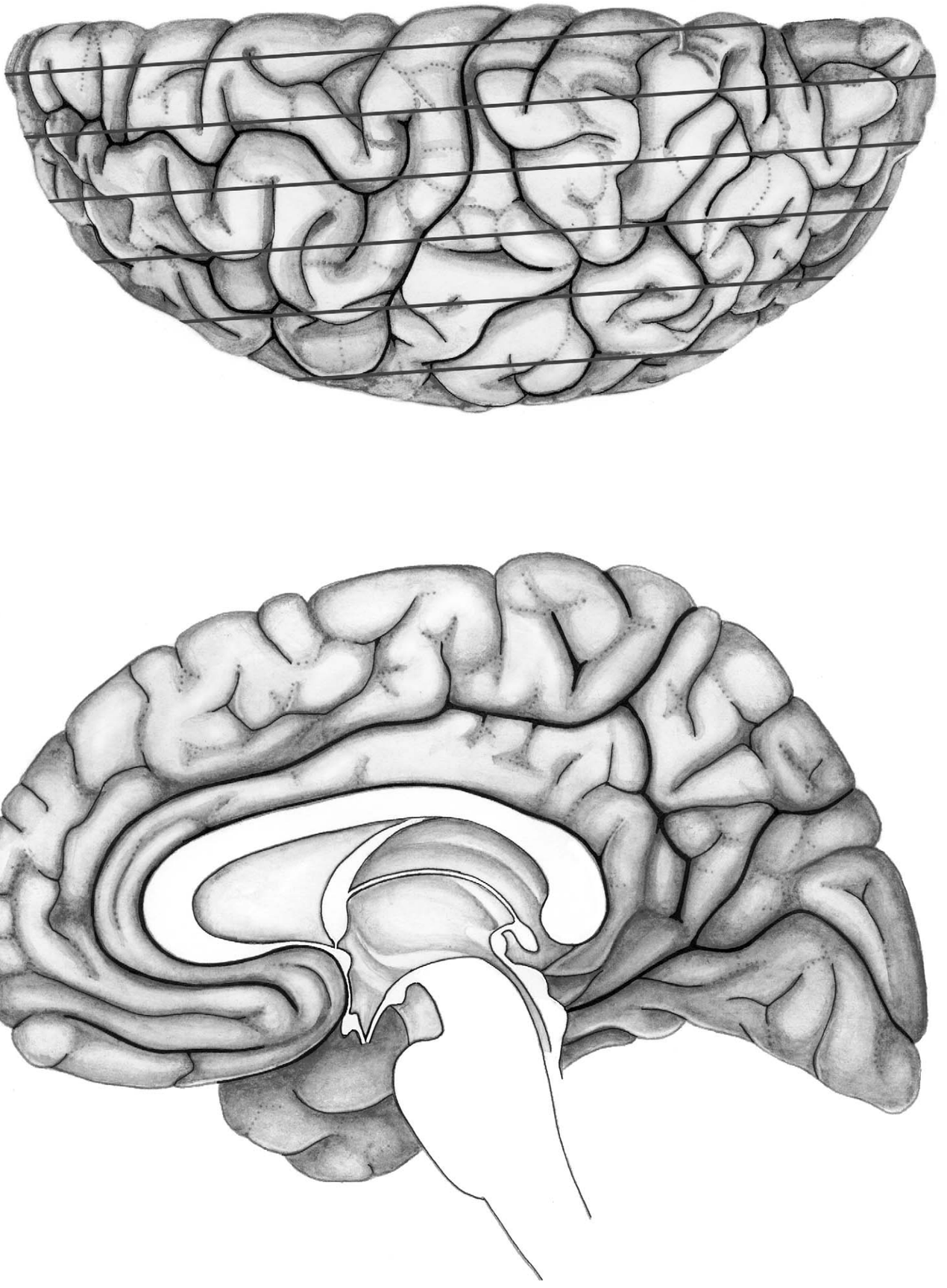


z´- direction:

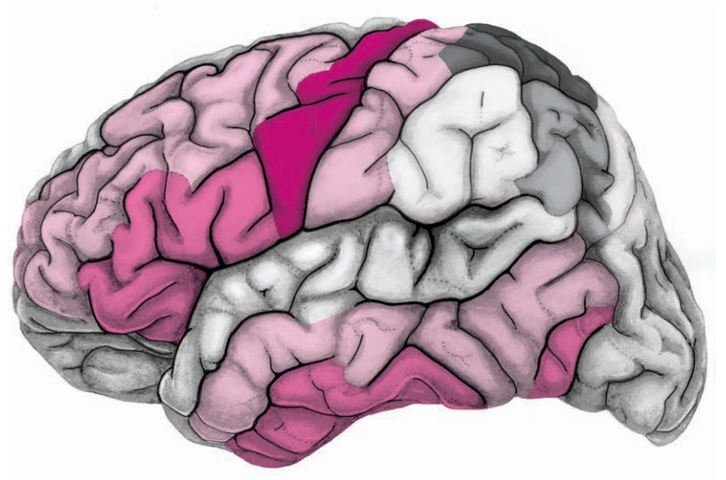


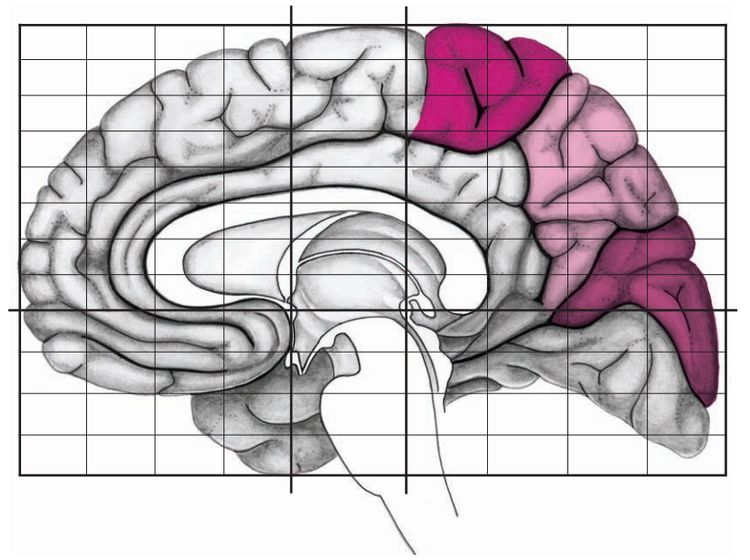
MR-sequences in three planes of the head from which one hemisphere is shown on the following pages.

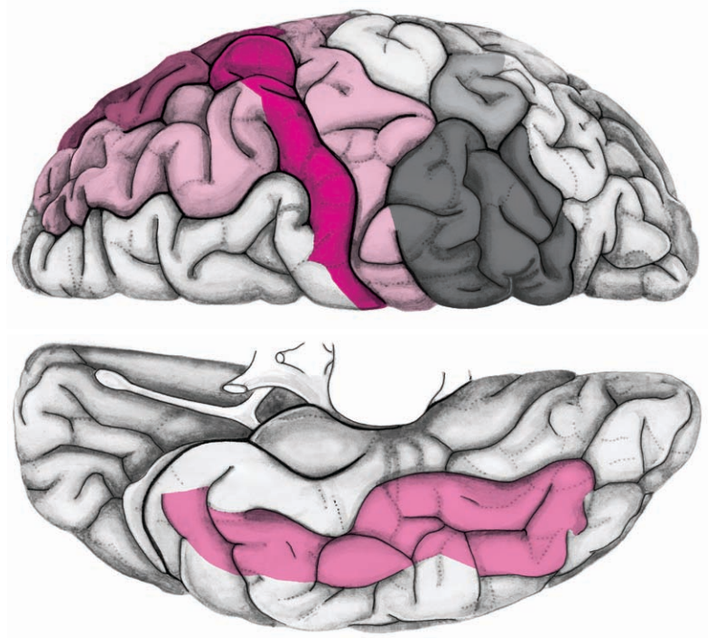
Parameters: 0.15 Tesla, matrix 256 x 256, field of view 25 cm, multi-slice, slice thickness 5 mm, 4 excitations, sequence: 5000/160. These heavy T2 weighted images highlight fluid-containing structures; uneven fluid collections (see lateral ventricles) are therefore visible. Note also that a dental prosthesis caused single void and deviation artefacts. The top panel presents the sagittal MRIs and specifies the planes of sectioning of the middle and lower panel. Orientation of these MRIs was based on the intercommissural line. Therefore the orientation of the horizontal MRIs in the middle panel corresponds to the plane of cryosectioning of the head shown in chapter 5.1 and direct comparisons can be made with in-vivo MRIs which accompany that series of sections. The lower panel presents the coronal MRIs.



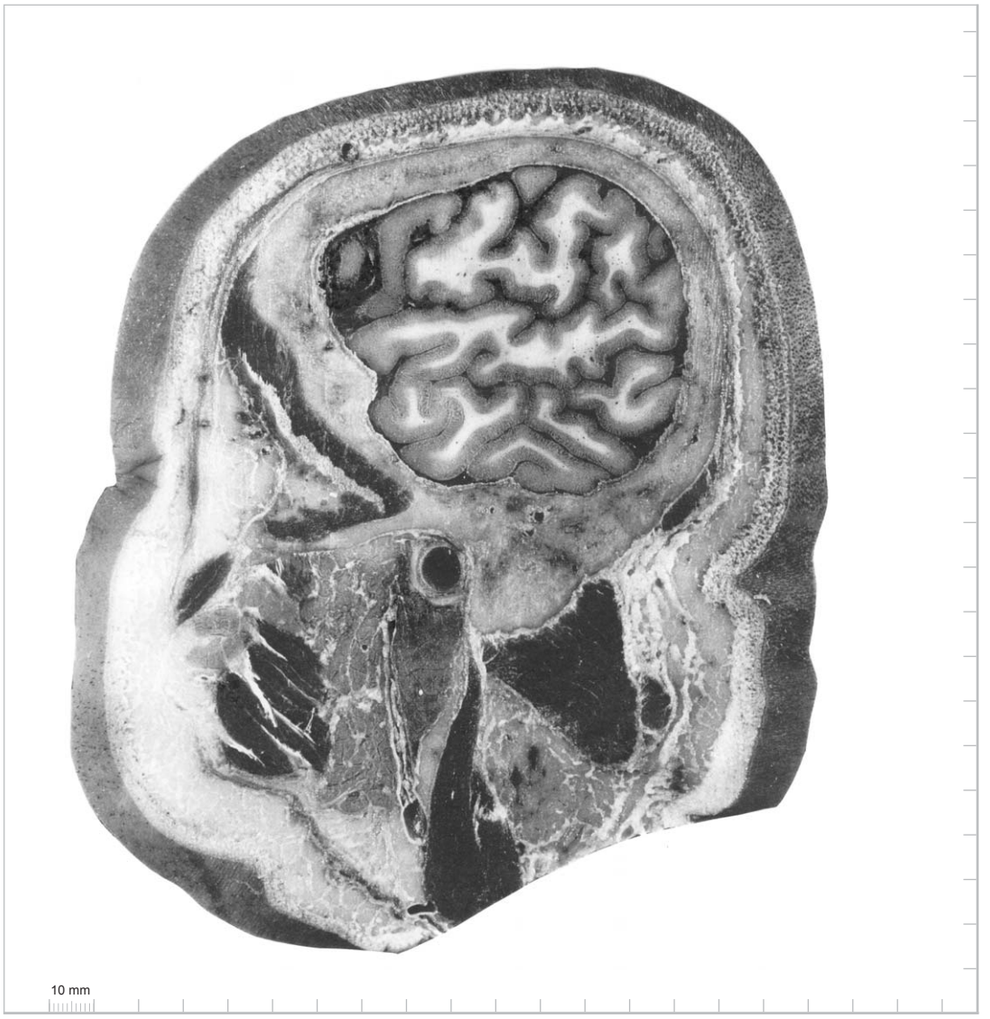
Surface views of the left hemisphere of the brain which has been sectioned in the sagittal plane as indicated. The drawing of the mid-sagittal view has been mirror -imaged.

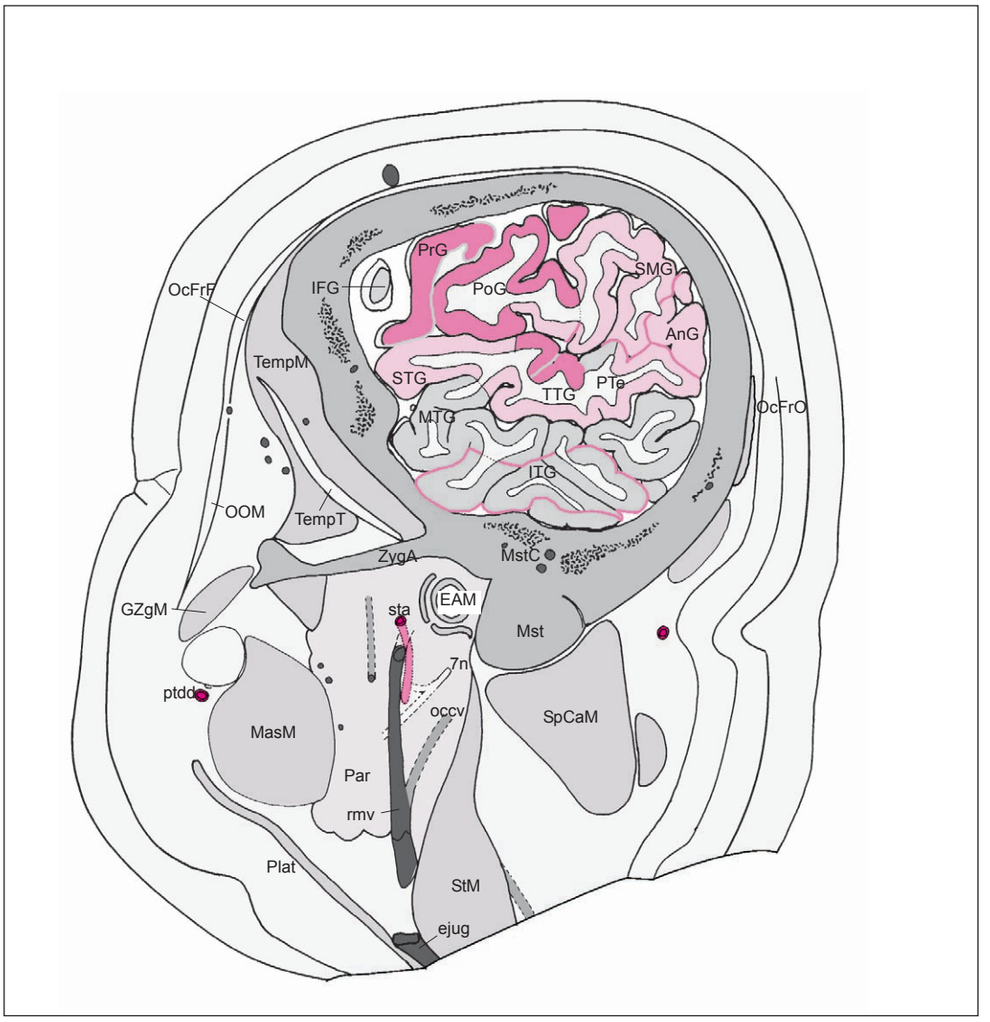






Surface views of the left hemisphere which is shown in the subsequent pages. The drawings of the hemisphere are arranged such that they always show the same anterior-posterior orientation. The most important gyri are delineated. The midsagittal view depicts the hemisphere with the Talairach space.





3

(lateral view)

Cerebral structures:

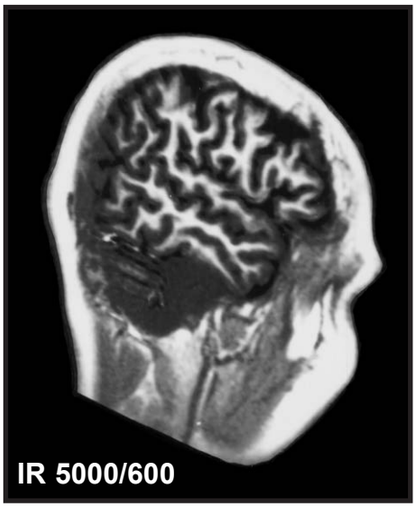
AnG	angular gyrus
IFG	inferior frontal gyrus
ITG	inferior temporal gyrus
MTG	medial temporal gyrus
PoG	postcentral gyrus
PrG	precentral gyrus
PTe	planum temporale
SMG	supramarginal gyrus
STG	superior temporal gyrus
TTG	transverse temporal gyri (I-II)

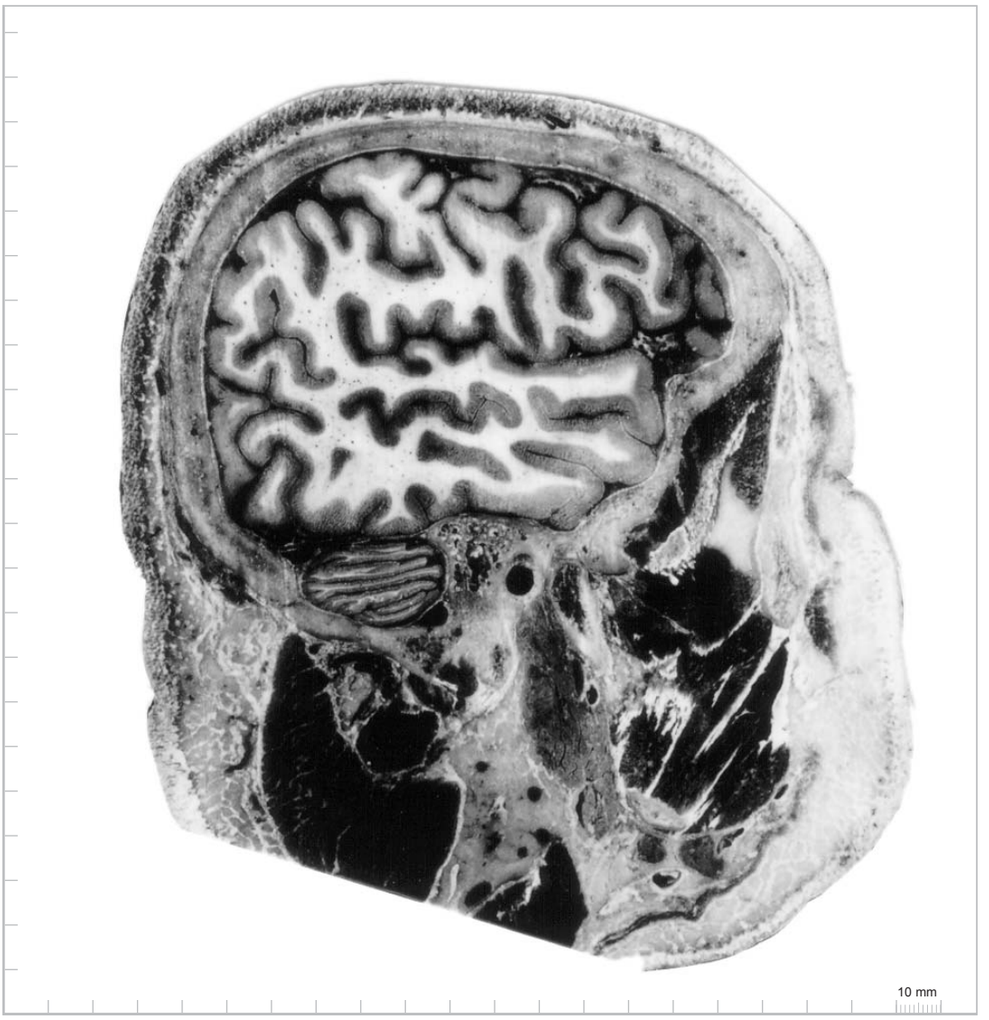
Peripheral structures:

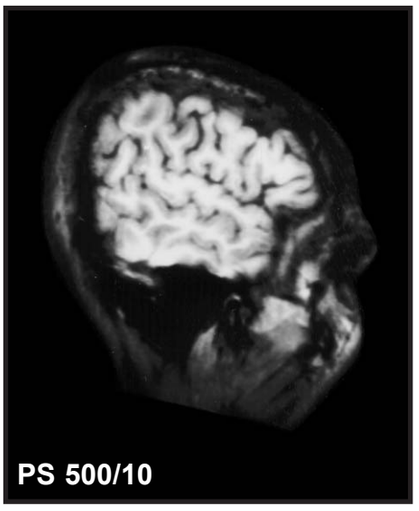
7n	facial nerve
EAM	external auditory meatus
ejug	external jugular vein
GZgM	greater zygomatic muscle
MasM	masseter muscle
Mst	mastoid process of temporal bone
MstC	mastoid cells
occv	occipital vein
OcFrF	occipito-frontal muscle, frontal belly
OcFrO	occipito-frontal muscle, occipital belly
OOM	orbicularis oculi muscle
Par	parotid gland
Plat	platysma
ptdd	parotid duct
rmv	retromandibular vein
SpCaM	splenius capitis muscle
sta	superficial temporal artery
StM	sternomastoid muscle
TempM	temporalis muscle
TempT	temporalis muscle, tendon
ZygA	zygomatic arch

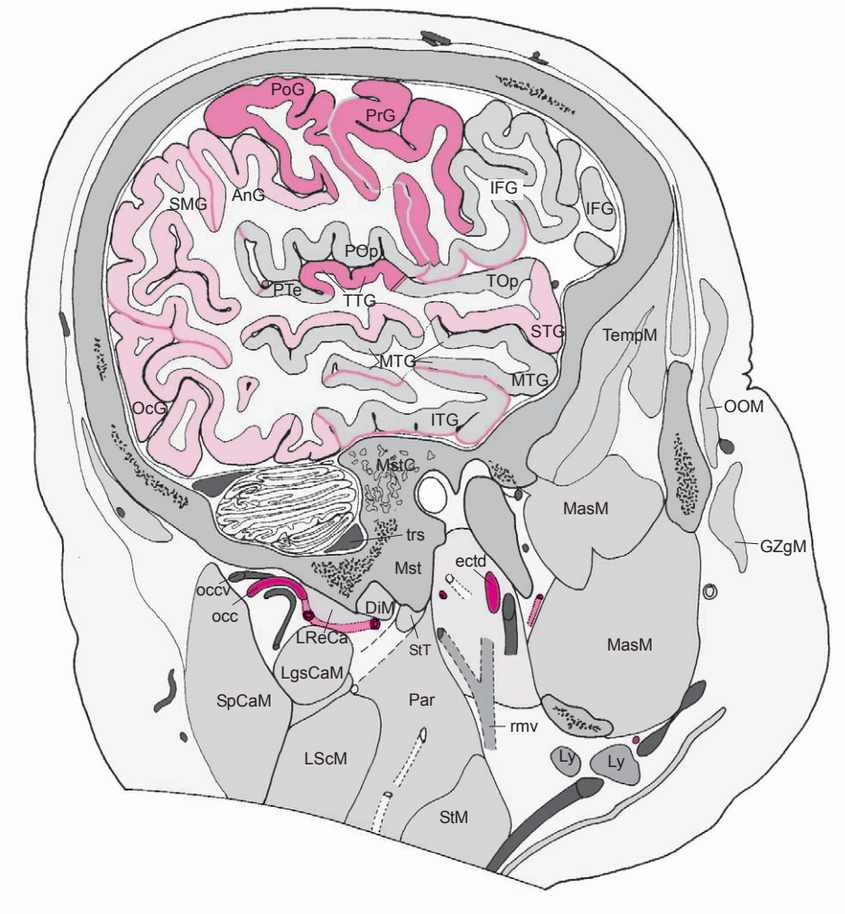
3

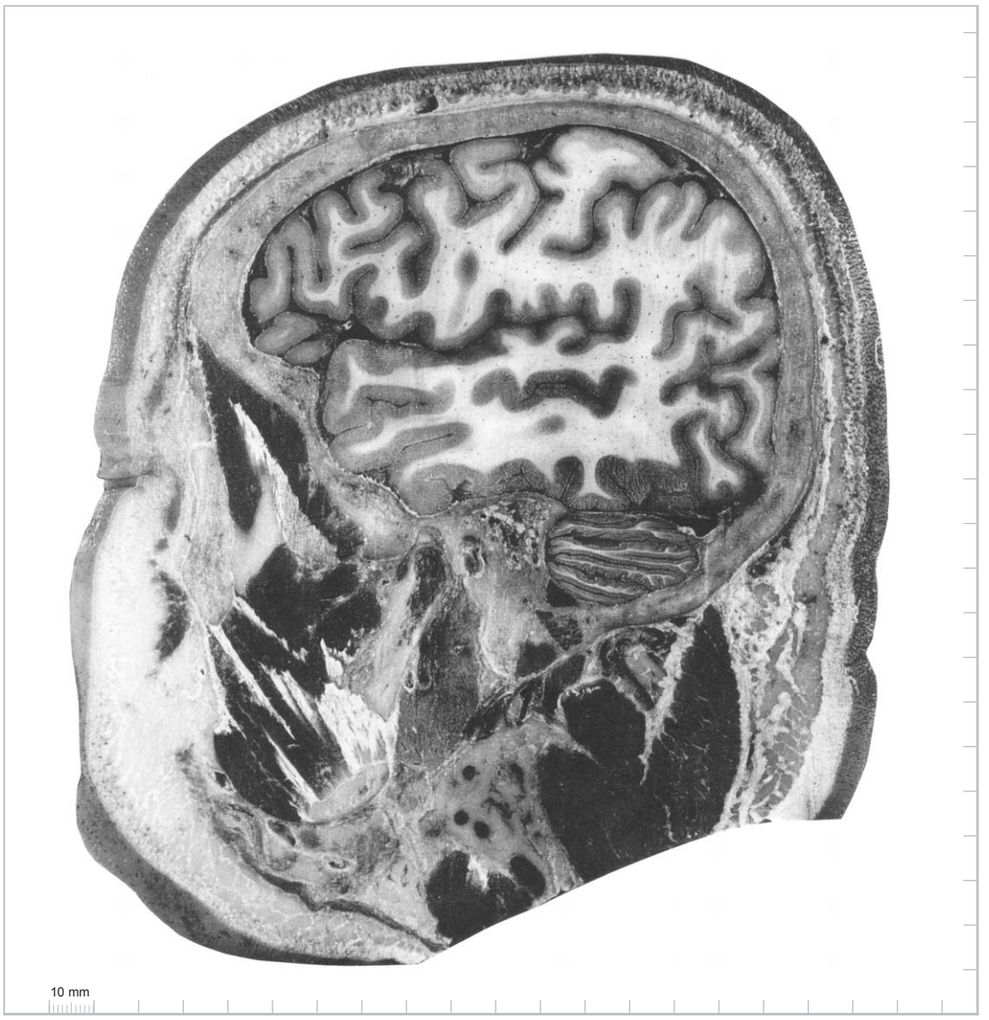
(medial view)











4

(lateral view)

Cerebral structures:

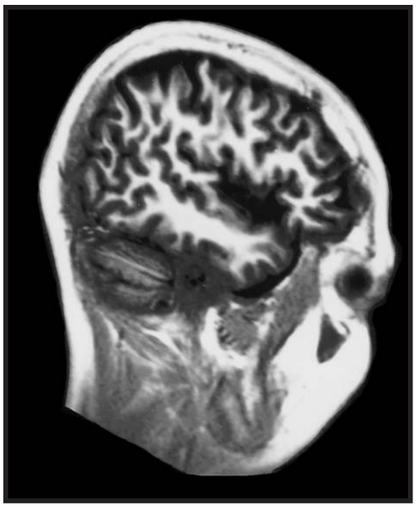
AnG	angular gyrus
FuG	fusiform gyrus
IFG	inferior frontal gyrus
ITG	inferior temporal gyrus
MTG	medial temporal gyrus
OcG	occipital gyri
PoG	postcentral gyrus
POp	parietal operculum
PrG	precentral gyrus
PTe	planum temporale
SMG	supramarginal gyrus
STG	superior temporal gyrus
TOp	temporal operculum
TTG	transverse temporal gyri (I-II)

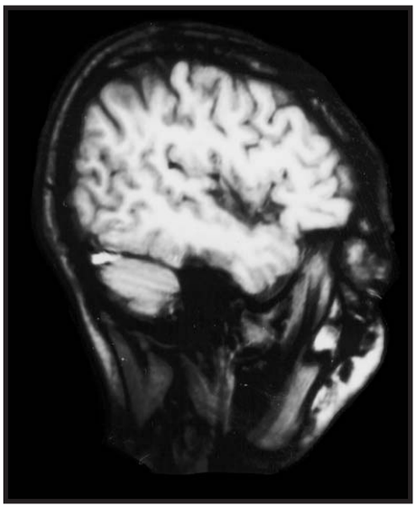
Peripheral structures:

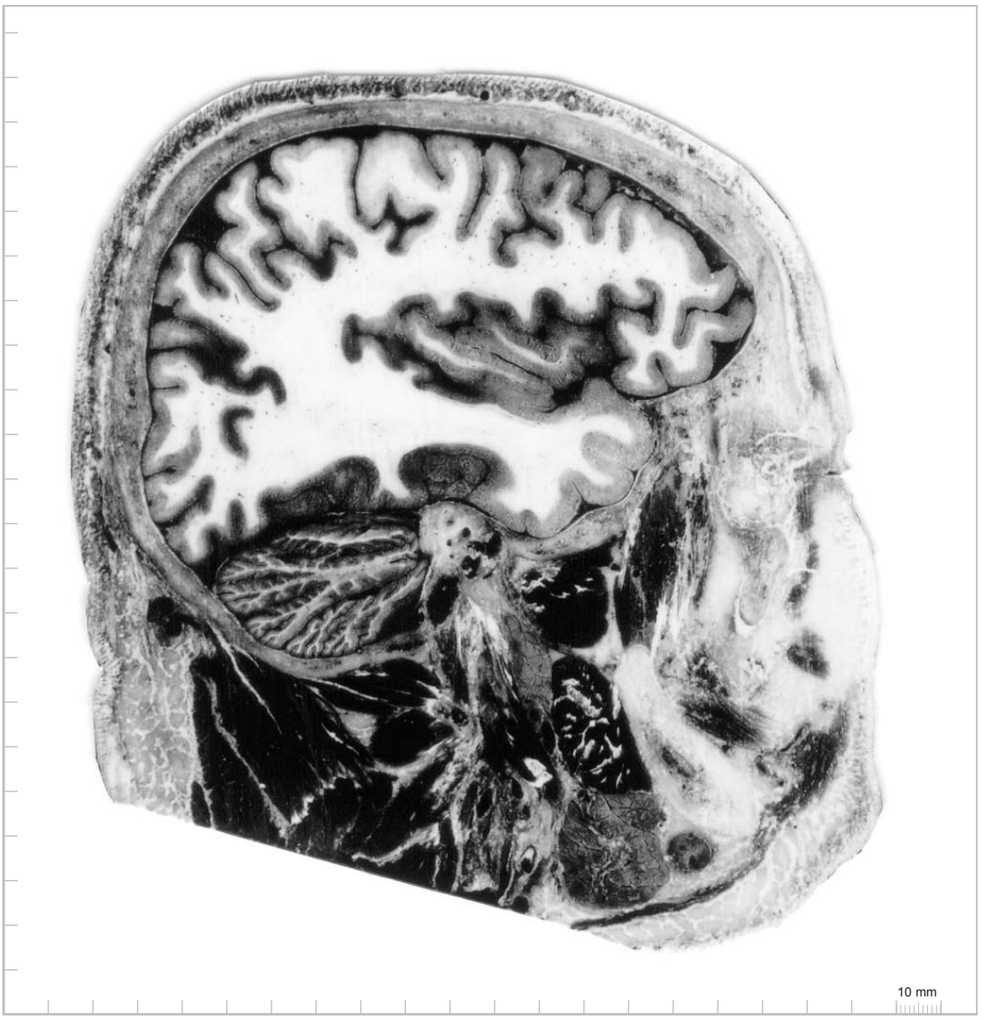
ATub	articular tubercle
DiM	digastric muscle
Disc	disk of temporo mandibular joint
EAM	external auditory meatus
ectd	external carotid artery
fac	facial artery
facv	facial vein
FroC	frontal bone, crest
GZgM	greater zygomatic muscle
ijugv	internal jugular vein
LgsCaM	longissimus capitis muscle
LReCa	lateral rectus capitis muscle
LScM	levator scapulae muscle
Ly	lymph node
Man	mandible
ManF	mandibular fossa
MasM	masseter muscle
Mst	mastoid process of temporal bone
MstC	mastoid cells
OcFrF	occipito-frontal muscle, frontal belly
OcFrO	occipito-frontal muscle, occipital belly
OOM	orbicularis oculi muscle
Par	parotid gland
Plat	platysma
ptdd	parotid duct
ptgpx	pterygoid plexus
rmv	retromandibular vein
sigs	sigmoid sinus
SMGl	submandibular gland
SpCaM	splenius capitis muscle
SphGW	sphenoid, greater wing
StM	sternomastoid muscle
StT	sternomastoid muscle, tendon
TempM	temporalis muscle
TempT	temporalis muscle, tendon
trs	transverse sinus
Zyg	zygomatic bone

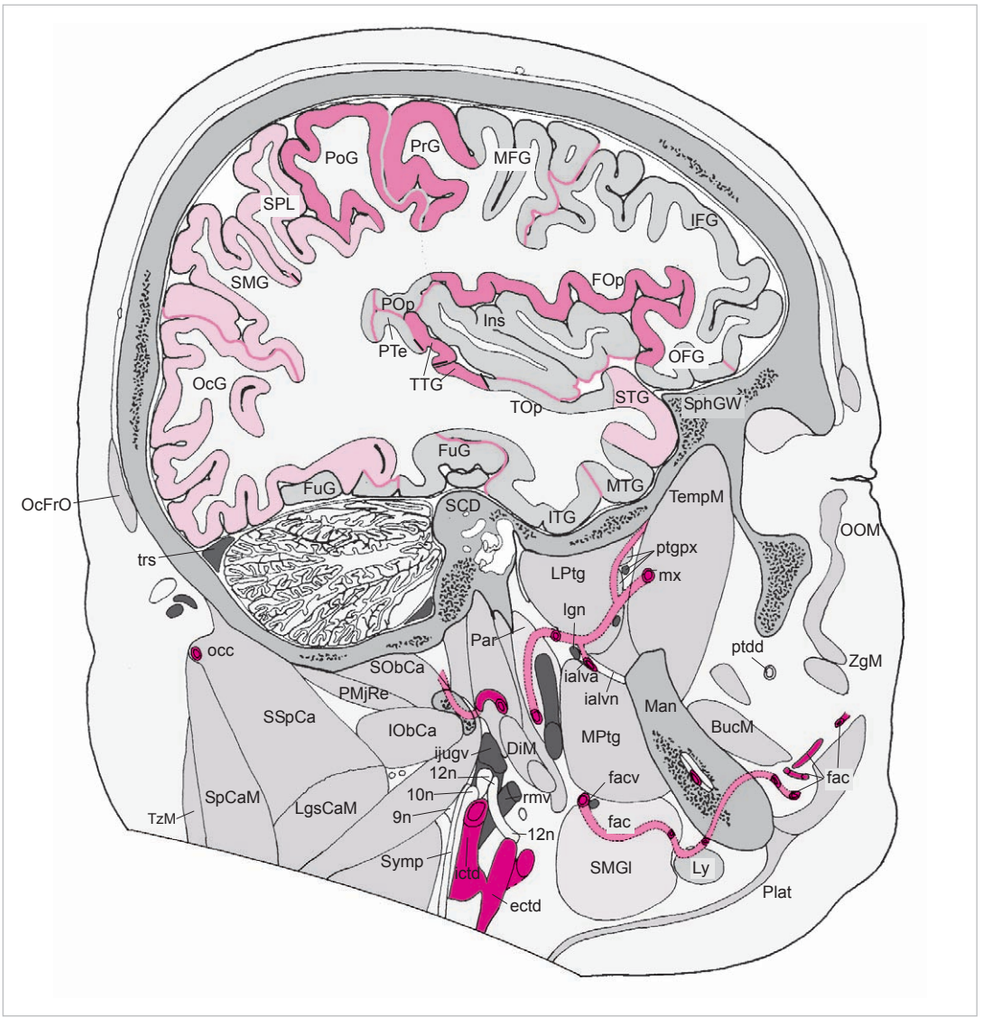
4

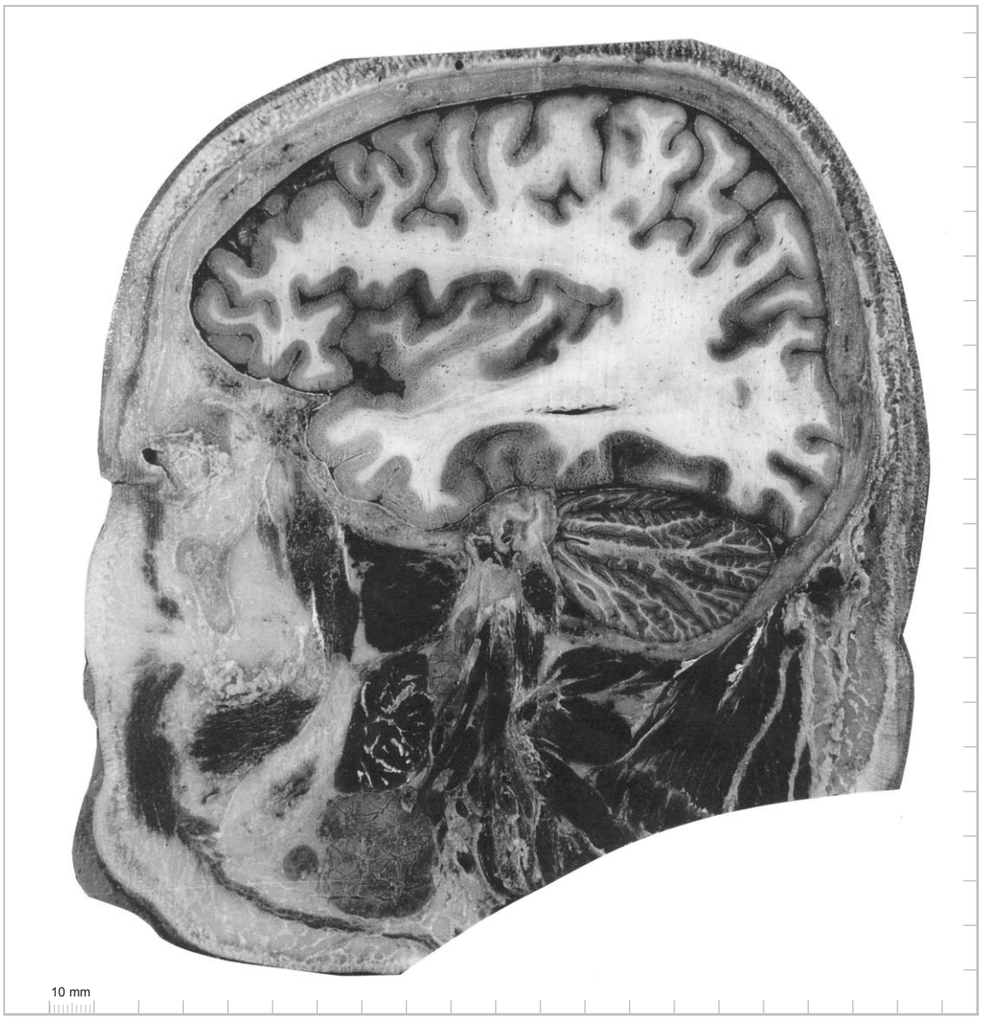
(medial view)











5

(lateral view)

Cerebral structures:

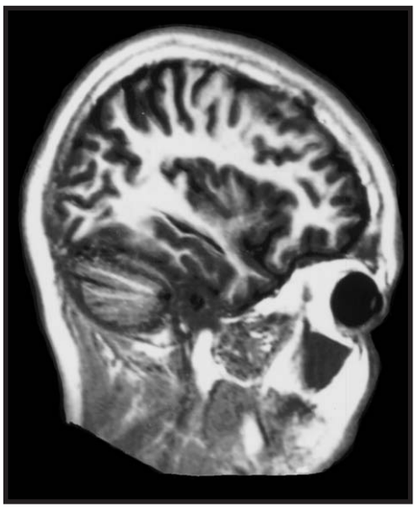
FOp	frontal operculum
FuG	fusiform gyrus
IFG	inferior frontal gyrus
Ins	insula
ITG	inferior temporal gyrus
mcer	middle cerebral artery in lateral sulcus
MFG	middle frontal gyrus
MTG	middle temporal gyrus
OcG	occipital gyri
OFG	orbitofrontal gyri
PoG	postcentral gyrus
POp	parietal operculum
PrG	precentral gyrus
PTe	planum temporale
SMG	supramarginal gyrus
SPL	superior parietal lobule
STG	superior temporal gyrus
TOp	temporal operculum
TTG	transverse temporal gyri

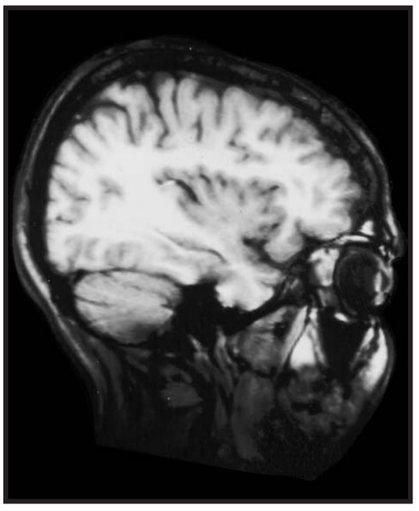
Peripheral structures:

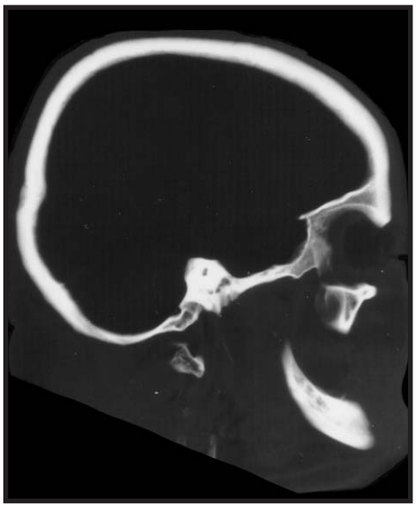
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve or its root
BucM	buccinator muscle
DiM	digastric muscle
ectd	external carotid artery
fac	facial artery
facv	facial vein
ialva	inferior alveolar artery
ialvn	inferior alveolar nerve
ictd	internal carotid artery
ijugv	internal jugular vein
IObCa	inferior oblique capitis muscle
ipets	inferior petrosal sinus
lgn	lingual nerve
LgsCaM	longissimus capitis muscle
LPtg	lateral pterygoid muscle
Ly	lymph node
Man	mandible
MPtg	lateral pterygoid muscle
mx	maxillary artery
Mx	maxilla
occ	occipital artery
OcFrF	occipito-frontal muscle, frontal belly
OcFrO	occipito-frontal muscle, occipital belly
OOM	orbicularis oculi muscle
OOrM	orbicularis oris muscle
Par	parotid gland
Plat	platysma
PMjRe	posterior major rectus capitis muscle
ptdd	parotid duct
ptgpx	pterygoid plexus
rmv	retromandibular vein
ScalM	scalenus muscle
SCD	semicircular ducts
SMGl	submandibular gland
SObCa	superior oblique capitis muscle
SpCaM	splenius capitis muscle
SpCe	splenius cervicis muscle
SphGW	sphenoid, greater wing
SSpCa	semispinalis capitis muscle
StyGl	styloglossus muscle
StyHy	stylohyoid muscle
StyPh	stylopharyngeus muscle
TempM	temporalis muscle
TrPAt	transverse process of atlas
trs	transverse sinus
TyC	tympanic cavity
TzM	trapezoid muscle
ZgM	zygomatic muscles

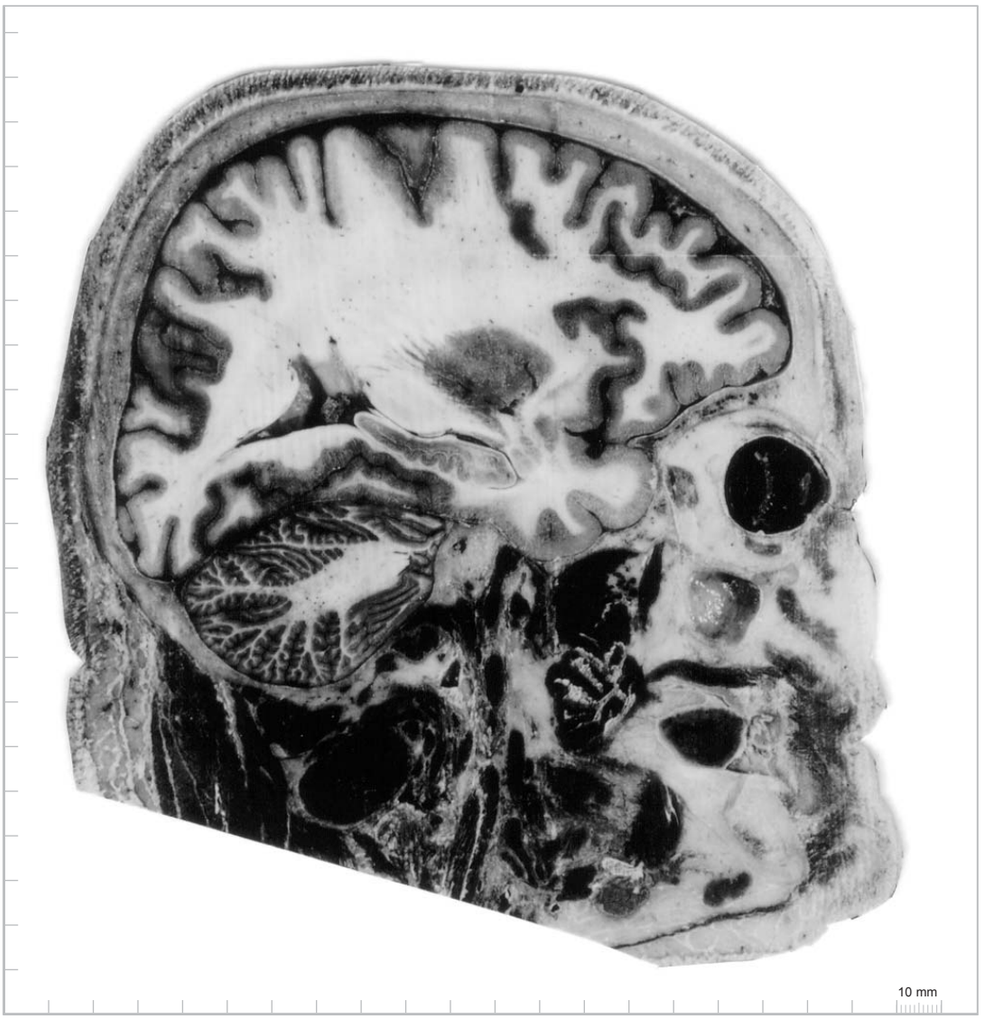
5

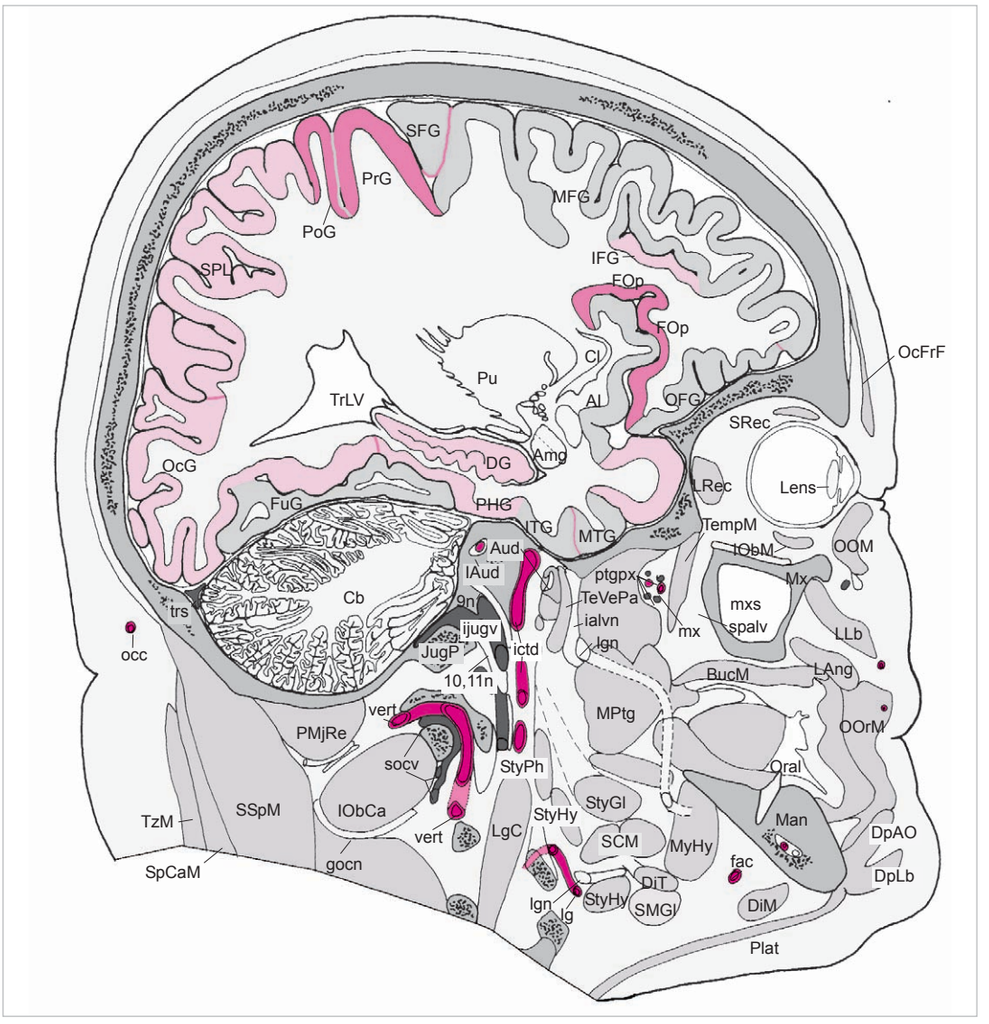
(medial view)

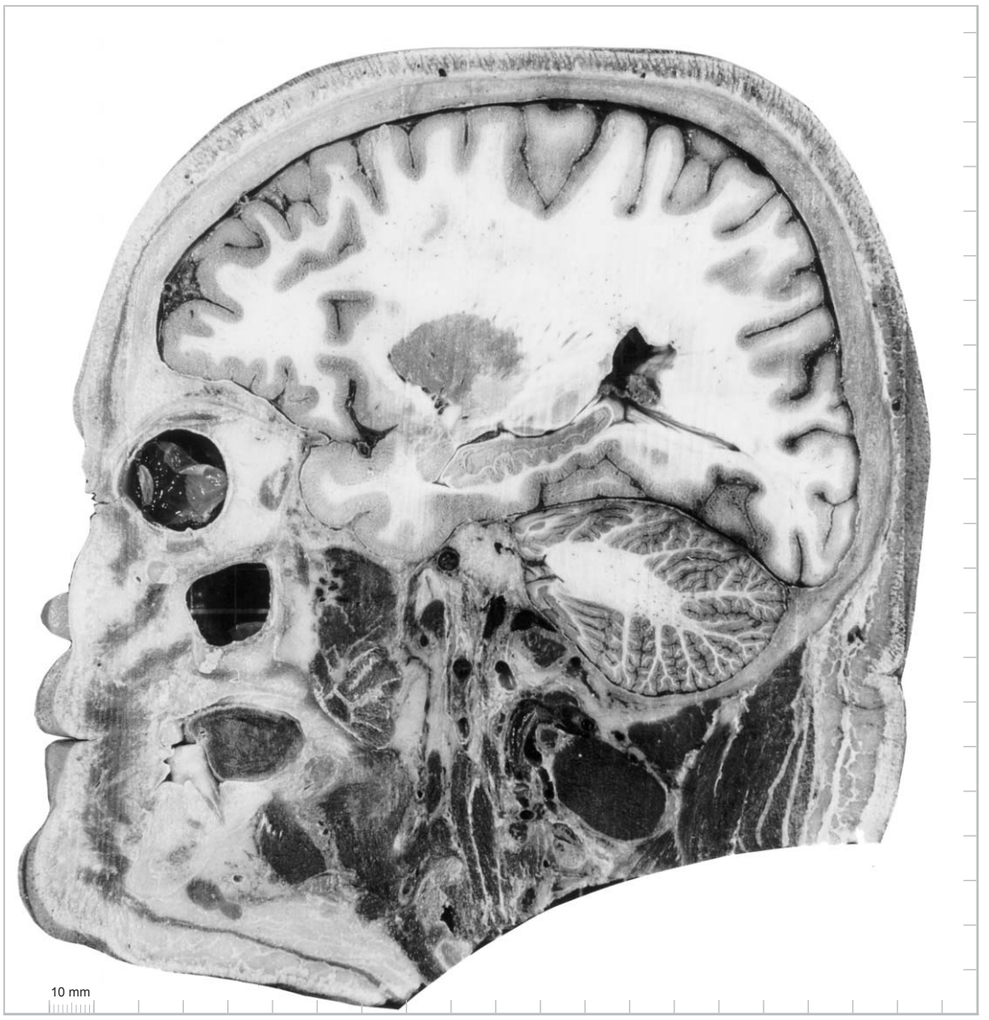


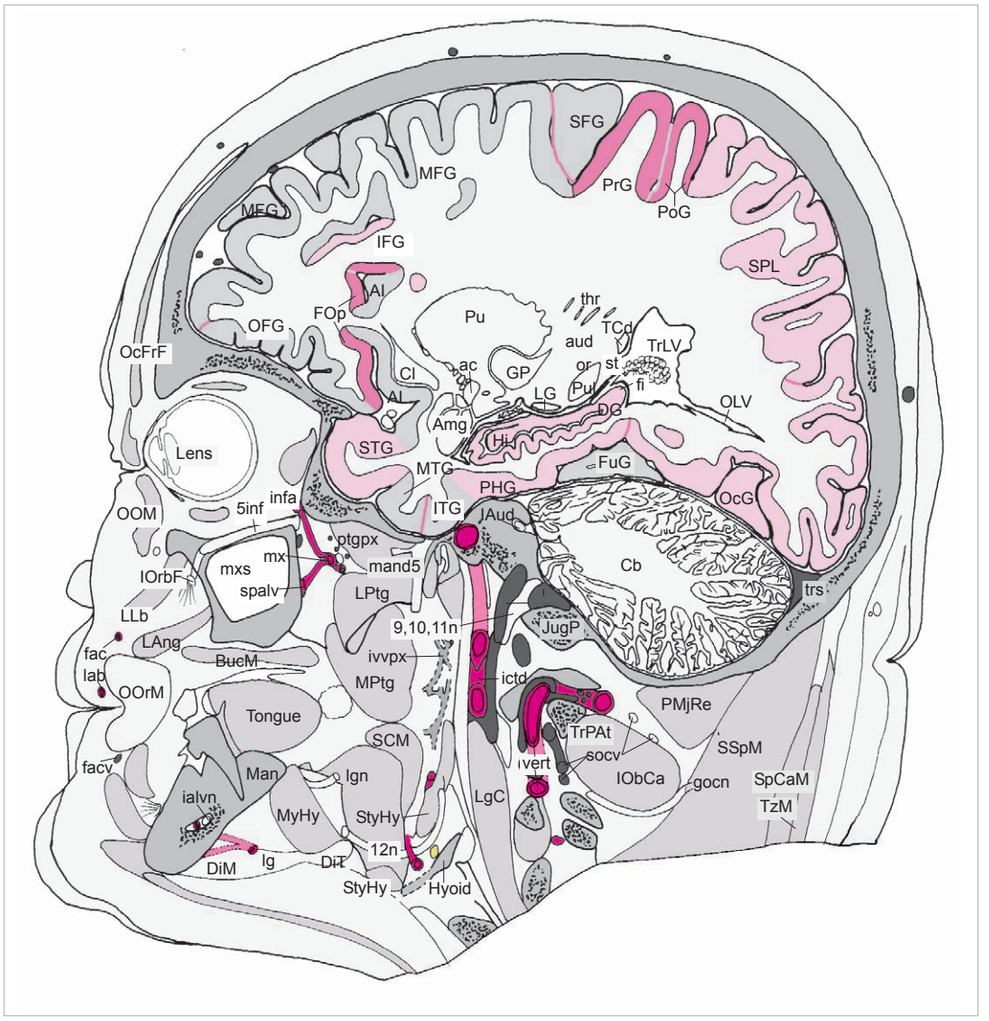


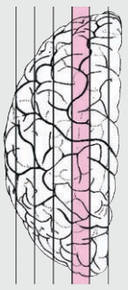












6

(lateral view)

Cerebral structures:

ac	anterior commissure
AI	agranular insular cortex (claustro-cortex insularis)
Amg	amygdala
aud	auditory radiation
Cb	cerebellum
Cl	claustrum
DG	dentate gyrus
fi	fimbria of the hippocampus
FOp	frontal operculum
FuG	fusiform gyrus
GP	globus pallidus
Hi	hippocampus
IFG	inferior frontal gyrus
ITG	inferior temporal gyrus
LG	lateral geniculate nucleus
MFG	medial frontal gyrus
MTG	medial temporal gyrus
OcG	occipital gyri
OFG	orbitofrontal gyri
OLV	occipital horn of lateral ventricle
or	optic radiation
PHG	parahippocampal gyrus
PoG	postcentral gyrus
PrG	precentral gyrus
Pu	putamen
SFG	superior frontal gyrus
SMG	supramarginal gyrus
SPL	superior parietal lobule
st	stria terminalis
STG	superior temporal gyrus
TCd	tail of caudate nucleus
thr	thalamic radiation (corona radiata)
TrLV	trigone of lateral ventricle

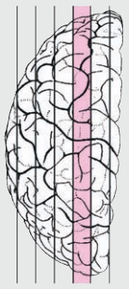
Peripheral structures:

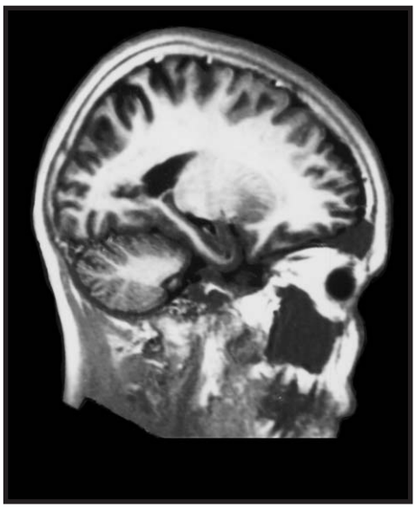
5inf	infraorbital nerve
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12n	hypoglossal nerve
Aud	auditory tube
AudC	auditory tube cartilage
BucM	buccinator muscle
Cb	cerebellum
DiM	digastric muscle
DiT	digastric muscle, tendon
DpAO	depressor anguli oris muscle
DpLb	depressor labii inferioris muscle
fac / v	facial artery / vein
gocn	greater occipital nerve
ialvn	inferior alveolar nerve
IAud	internal auditory meatus
ictd	internal carotid artery
ijugv	internal jugular vein & sigmoid sinus
infa	infraorbital artery
IObCa	inferior oblique capitis muscle
IObM	inferior oblique muscle
IOrbF	infraorbital foramen
ivvpx	internal vertebral venous plexus
JugF	jugular foramen
JugP	jugular process
lab	labial artery
LAng	levator anguli oris muscle
lg	lingual artery
LgC	longus capitis and colli muscles
lgn / v	lingual nerve/ vein
LgsCaM	longissimus capitis muscle
LLb	levator labii superioris muscle
LPal	levator palpebrae superioris muscle
LPtg	lateral pterygoid muscle
LRec	lateral rectus muscle
LReCa	lateral rectus capitis muscle

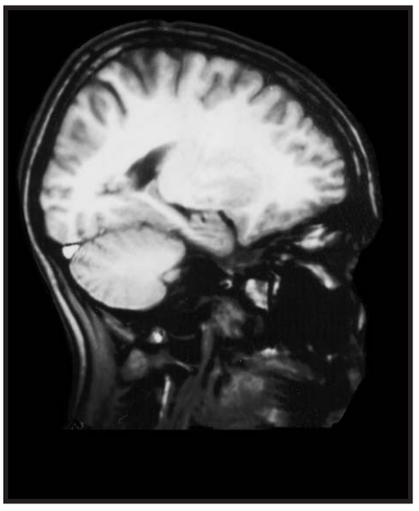
Remainder explained in Index of Abbreviations

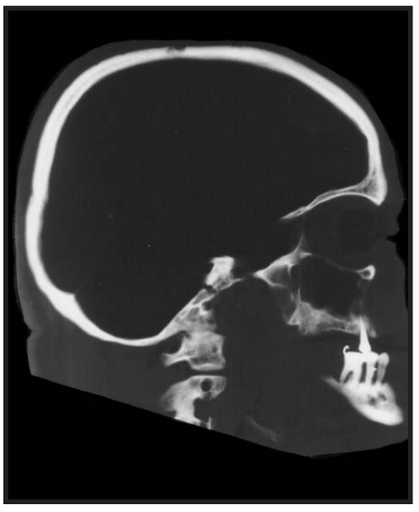
6

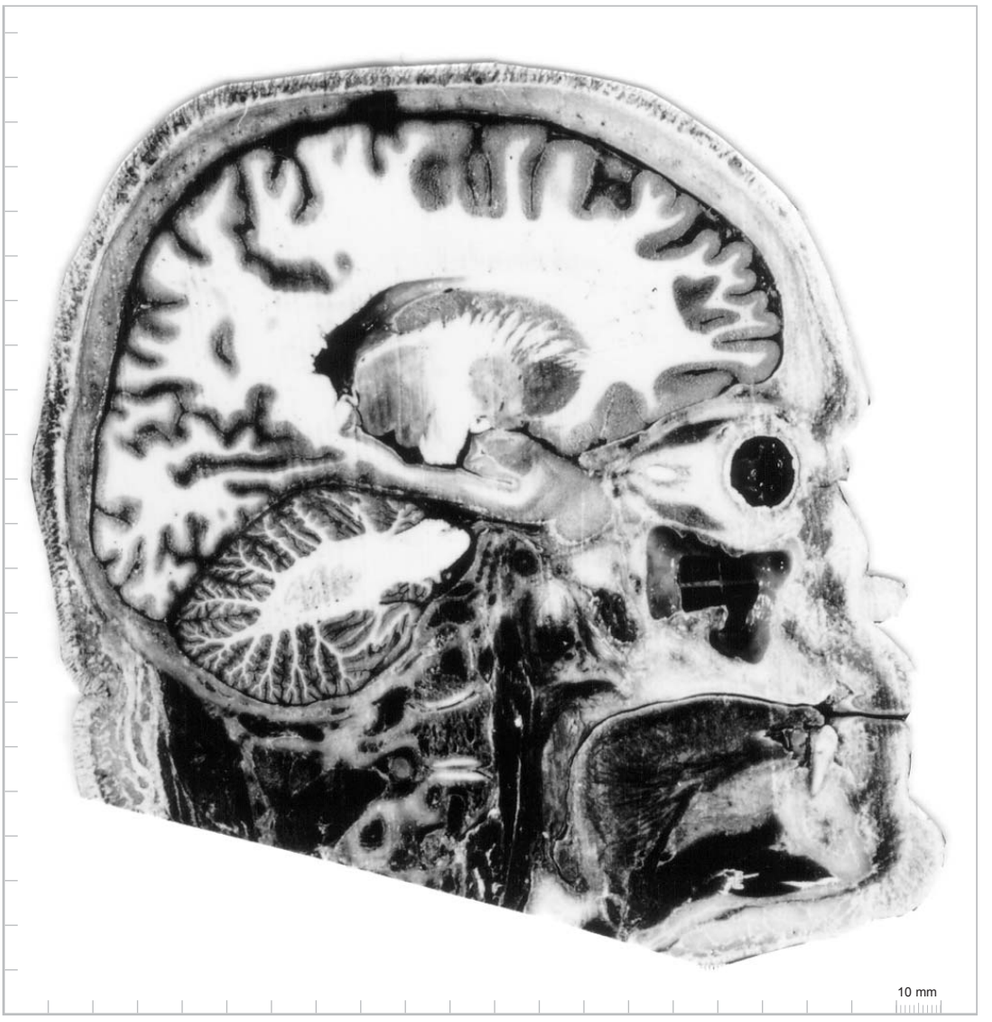
(medial view)

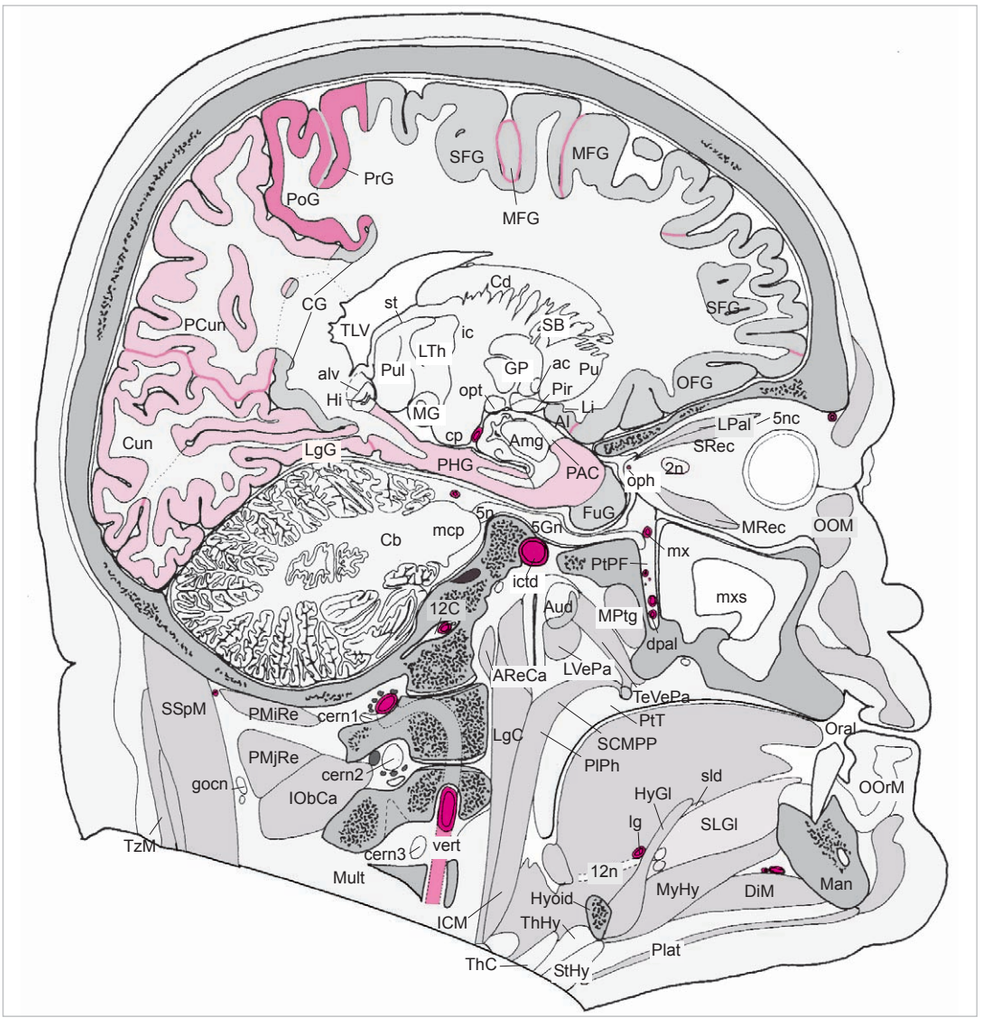


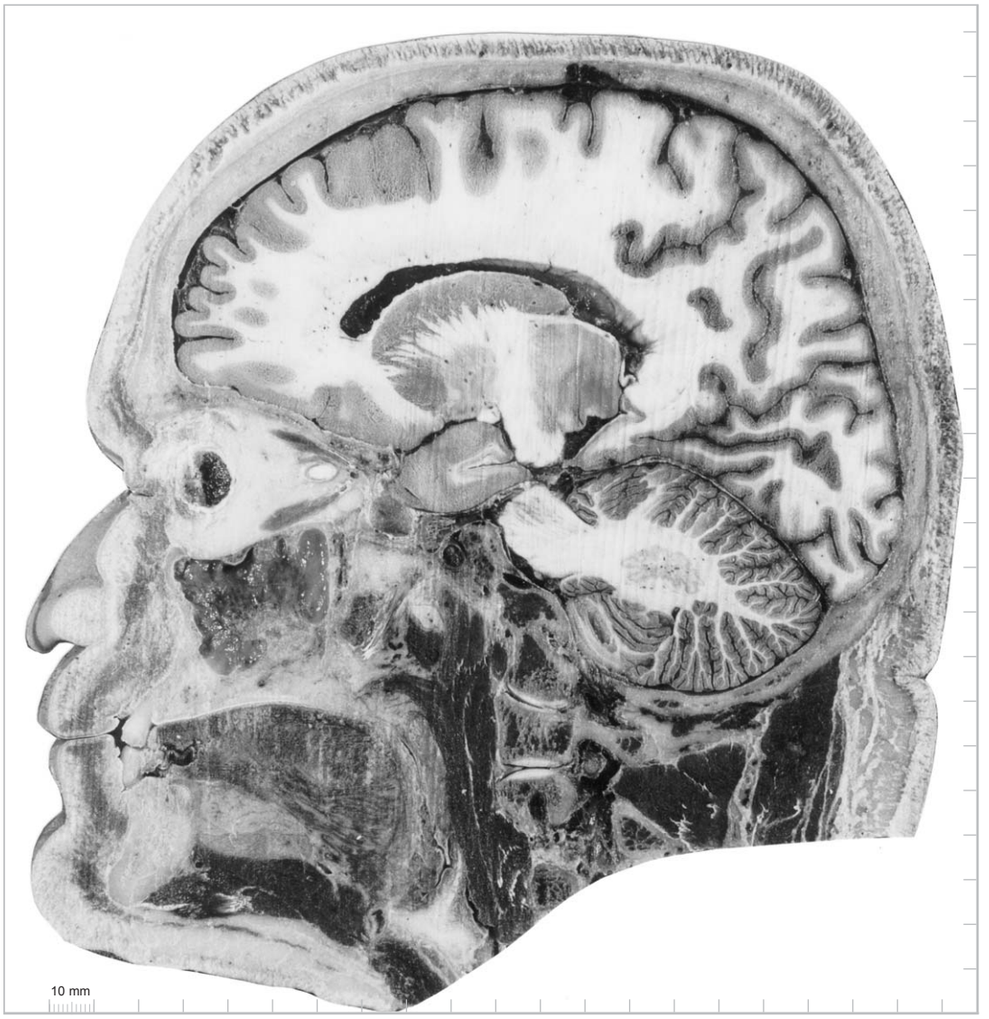


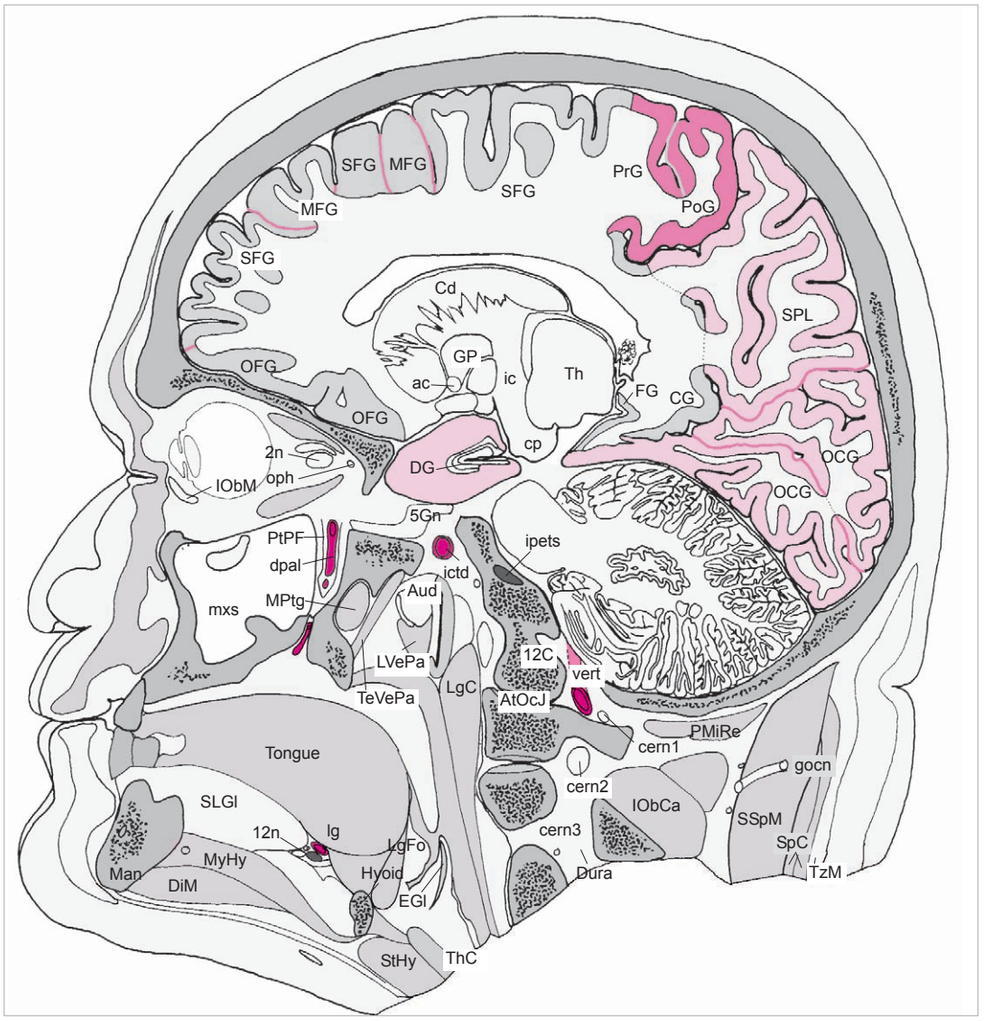












7

(lateral view)

Cerebral structures:

2n	optic nerve
ac	anterior commissure
AI	claustro-cortex insularis
alv	alveus of hippocampus
Amg	amygdala
Cb	cerebellum
Cd	caudate nucleus
CG	cingulate gyrus
cp	cerebral peduncle
Cun	cuneus
DG	dentate gyrus
FG	fasciolar gyrus
FuG	fusiform gyrus
GP	globus pallidus
Hi	hippocampus
ic	internal capsule
LgG	lingual gyrus
Li	limen insulae
LTh	lateral thalamic nuclear region
mcp	middle cerebellar peduncle
MFG	medial frontal gyrus
MG	medial geniculate nucleus
OcG	occipital gyri
OFG	orbitofrontal gyri
opt	optic tract
PAC	periamygdaloid cortex
PCun	precuneus
PHG	parahippocampal gyrus
Pir	piriform cortex
PoG	postcentral gyrus
PrG	precentral gyrus
Pu	putamen
Pul	pulvinar nucleus
SB	striatal cell bridges
SFG	superior frontal gyrus
SPL	superior parietal lobule
st	stria terminalis
Th	thalamus
TLV	temporal horn of lateral ventricle

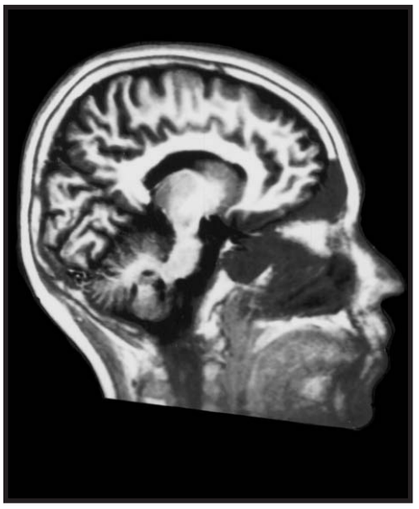
Peripheral structures:

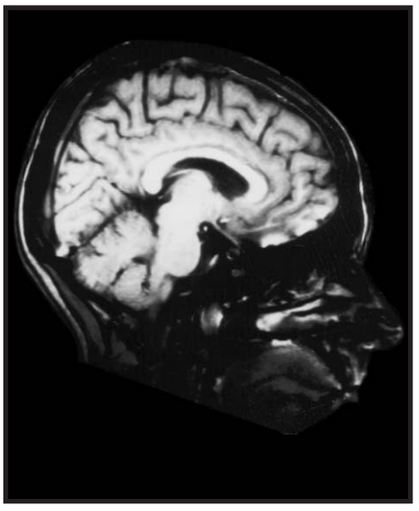
5Gn	trigeminal ganglion
5n	trigeminal nerve
5nc	nasociliary nerve
12C	hypoglossal canal
12n	hypoglossal nerve
AReCa	anterior rectus capitis muscle
AtOcJ	atlanto-occipital joint
Aud	auditory tube
cern (1-3)	cervical nerve (1-3)
DiM	digastric muscle, ant. belly
dpal	descending palatine artery
EGl	epiglottis
gocn	greater occipital nerve
HyGl	hyoglossus muscle
Hyoid	hyoid bone
ictd	internal carotid artery
IObCa	inferior oblique capitis muscle
IObM	inferior oblique muscle
ipets	inferior petrosal sinus
lg	lingual artery
LgC	longus capitis and colli muscles
LgFo	lingual follicle
LPal	levator palpebrae muscle
LVePa	levator veli palatini muscle
Man	mandible
mand5	mandibular nerve
MPtg	medial pterygoid muscle
MRec	medial rectus muscle
Mult	multifidus muscle
mx	maxillary artery
mxs	maxillary sinus

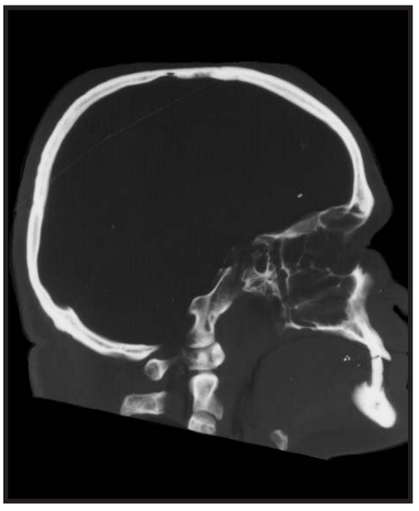
Remainder explained in Index of Abbreviations

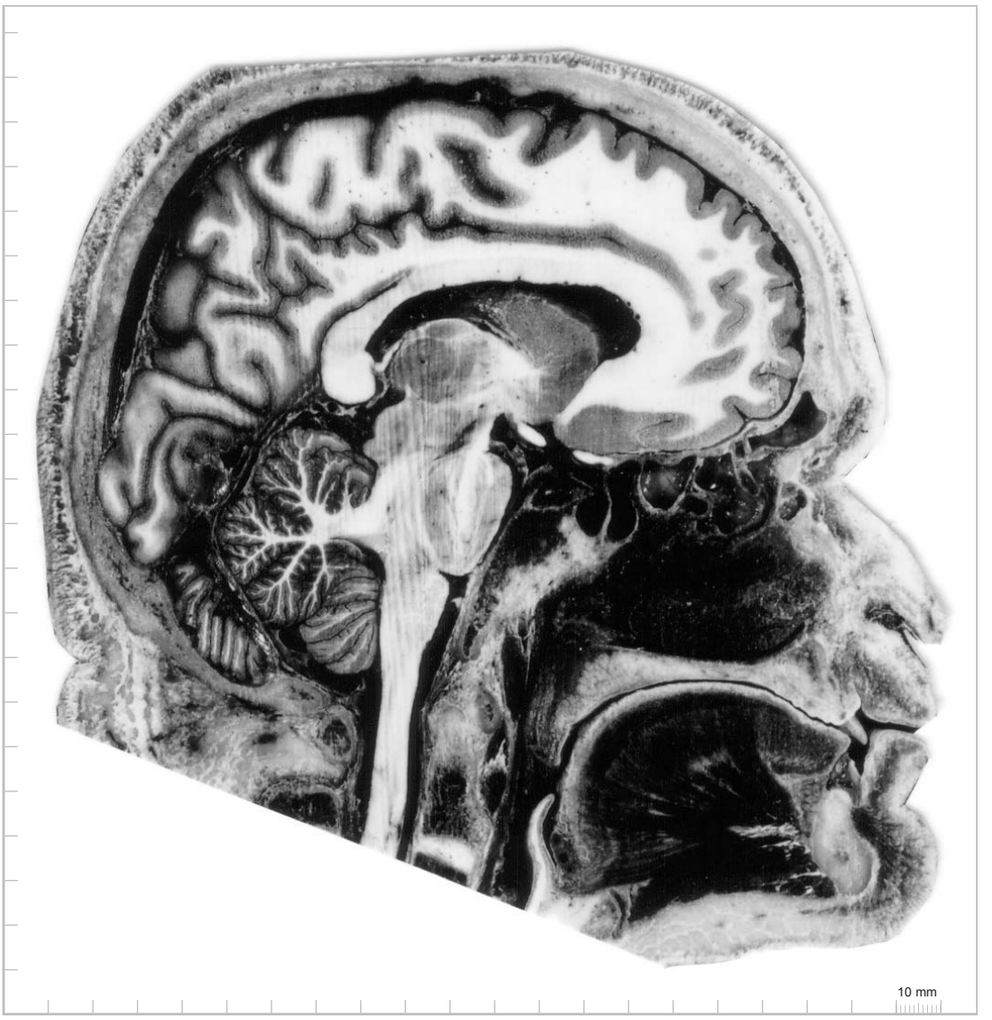
7

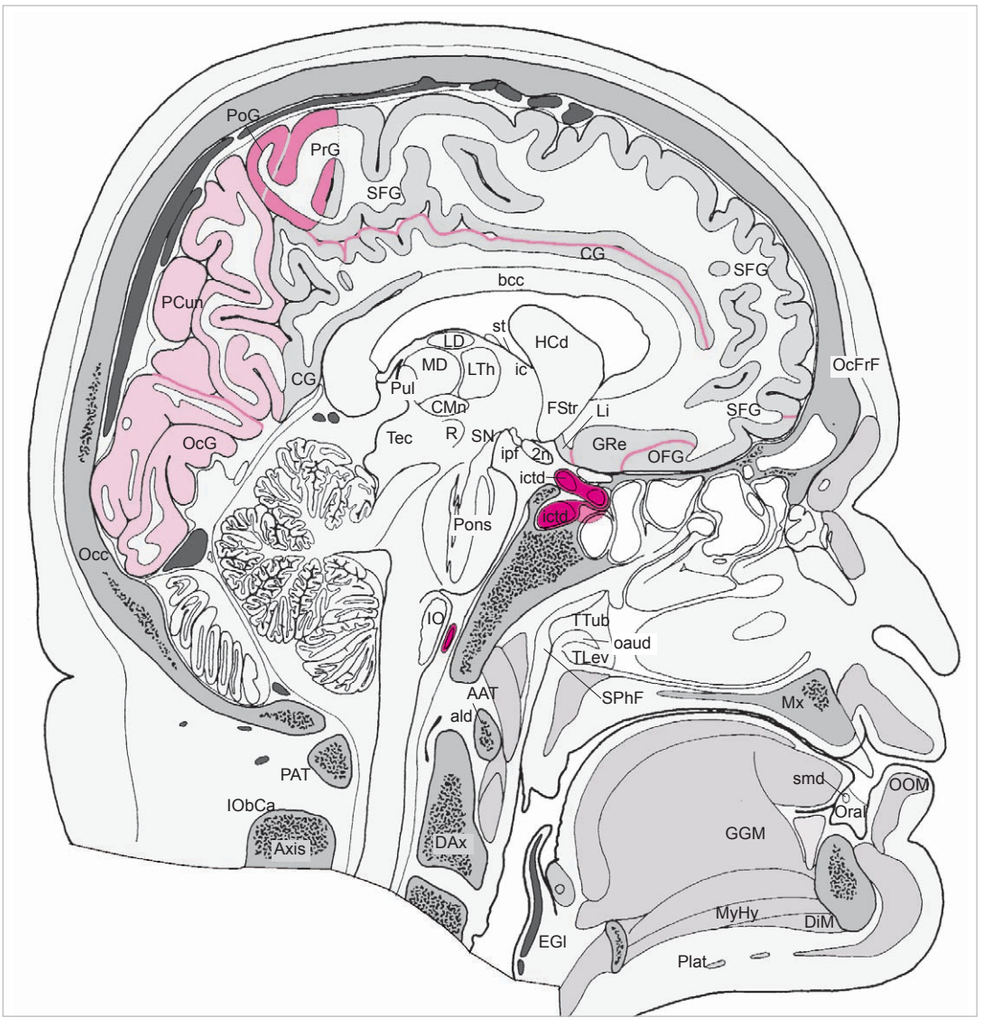
(medial view)

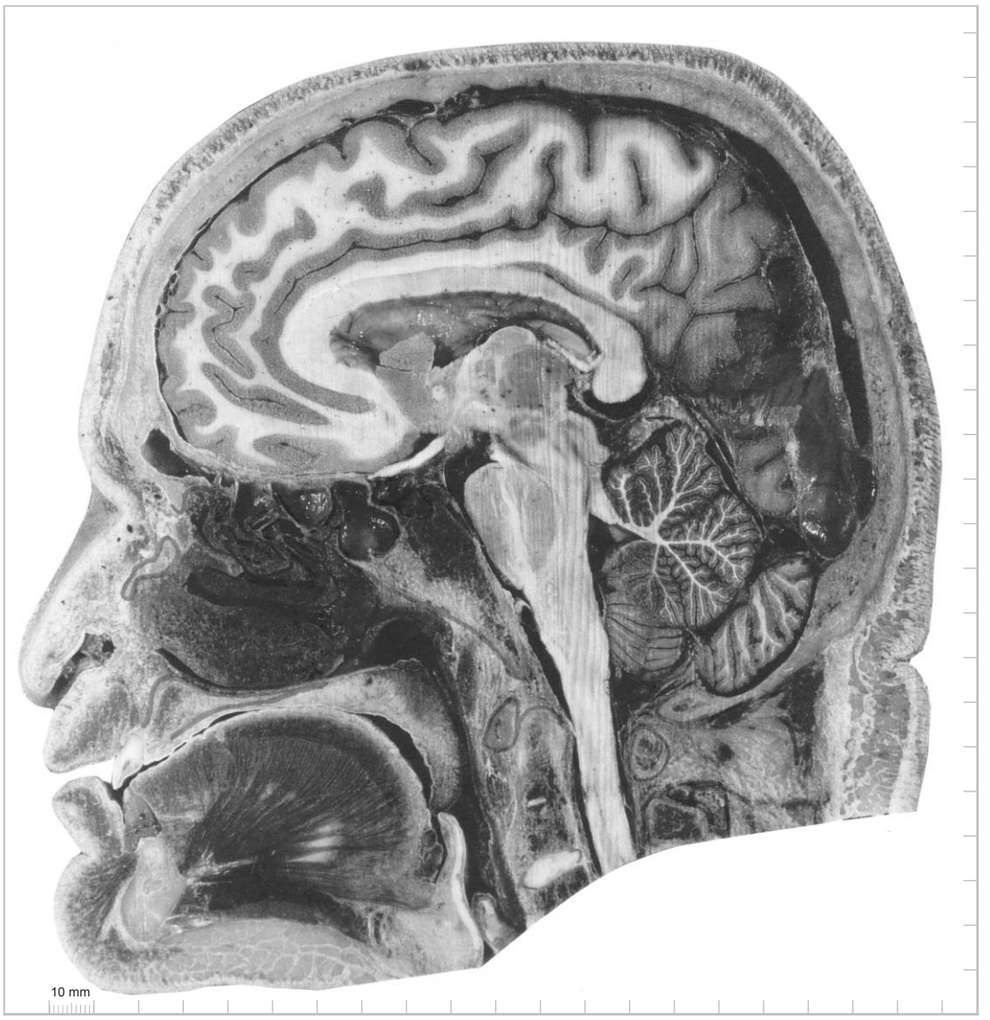


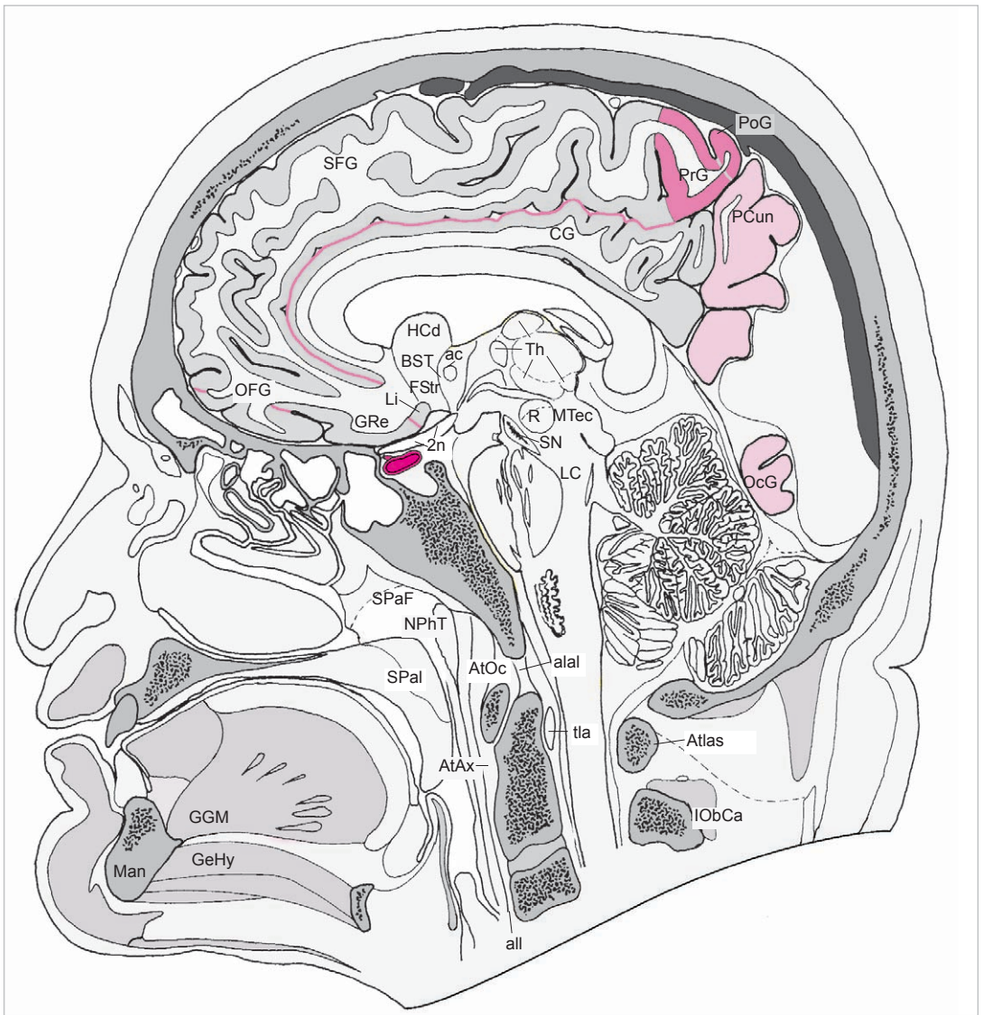












8

(lateral view)

Cerebral structures:

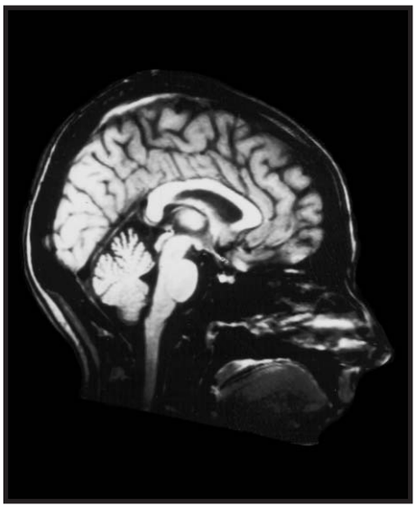
2n	optic nerve
ac	anterior commissure
bcc	body of corpus callosum
BST	bed nucleus of the stria terminalis
CG	cingulate gyrus
CMn	centrum medianum, parafascicular nucleus
FStr	fundus striati
GP	globus pallidus
GRe	gyrus rectus
HCd	head of caudate nucleus
ic	internal capsule
IO	inferior olive
ipf	interpeduncular fossa
LC	locus coeruleus
Li	limen insulae
LTh	lateral thalamic nuclear region and reticular nucleus
MD	mediodorsal thalamic nucleus
MTec	mesencephalic tectum
OcG	occipital gyri
OFG	orbitofrontal gyri
PCun	precuneus
PoG	postcentral gyrus
Pons	pons
PrG	precentral gyrus
Pul	pulvinar
R	red nucleus
SFG	superior frontal gyrus
SN	substantia nigra
st	stria terminalis
Tec	tectum
Th	thalamus

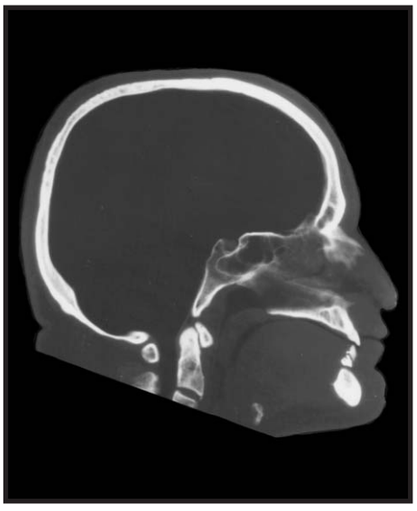
Peripheral structures:

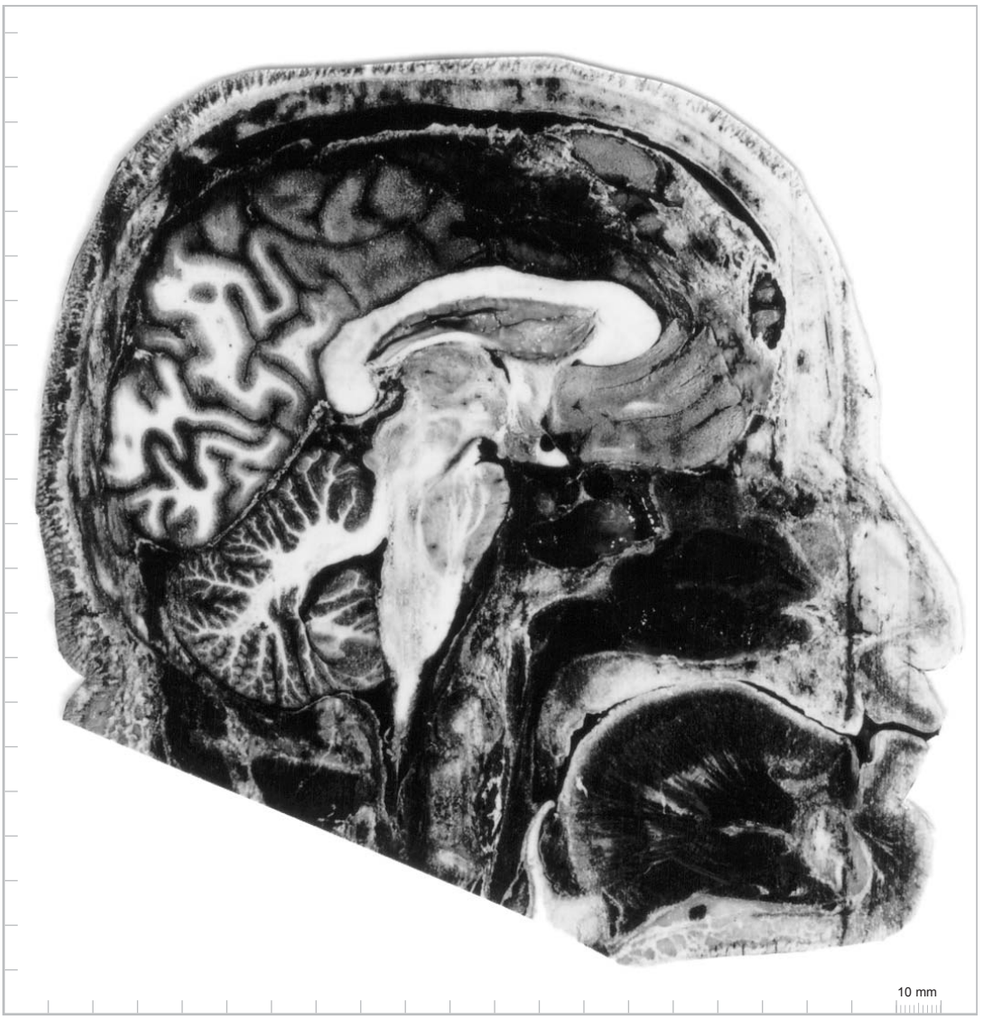
AAT	anterior arch of atlas
ald	apical ligament of dens
alal	alar ligament of dens
all	anterior longitudinal ligament
AtAx	altanto-axial membrane
Atlas	atlas
AtOc	atlanto-occipital membrane
Axis	axis
DAx	dens axis
DiM	digastric muscle
EGl	epiglottis
GeHy	geniohyoid muscle
GGM	genioglossus muscle
ictd	internal carotid artery
IObCa	inferior oblique capitis muscle
Man	mandible
Mx	maxilla
MyHy	mylohyoid muscle
NPhT	nasopharyngeal tonsil
oaud	opening of auditory tube
Occ	occipital bone
OcFrF	occipito-frontal muscle, frontal belly
OOM	orbicularis oculi muscle
Oral	oral cavity
PAT	posterior arch of atlas
Plat	platysma
smd	submandibular duct
SPaF	salpingopalatinal fold
SPal	soft palate
SPhF	salpingopharyngeal fold
tla	transverse ligament of atlas
TLev	torus levatorius
TTub	torus tubarius

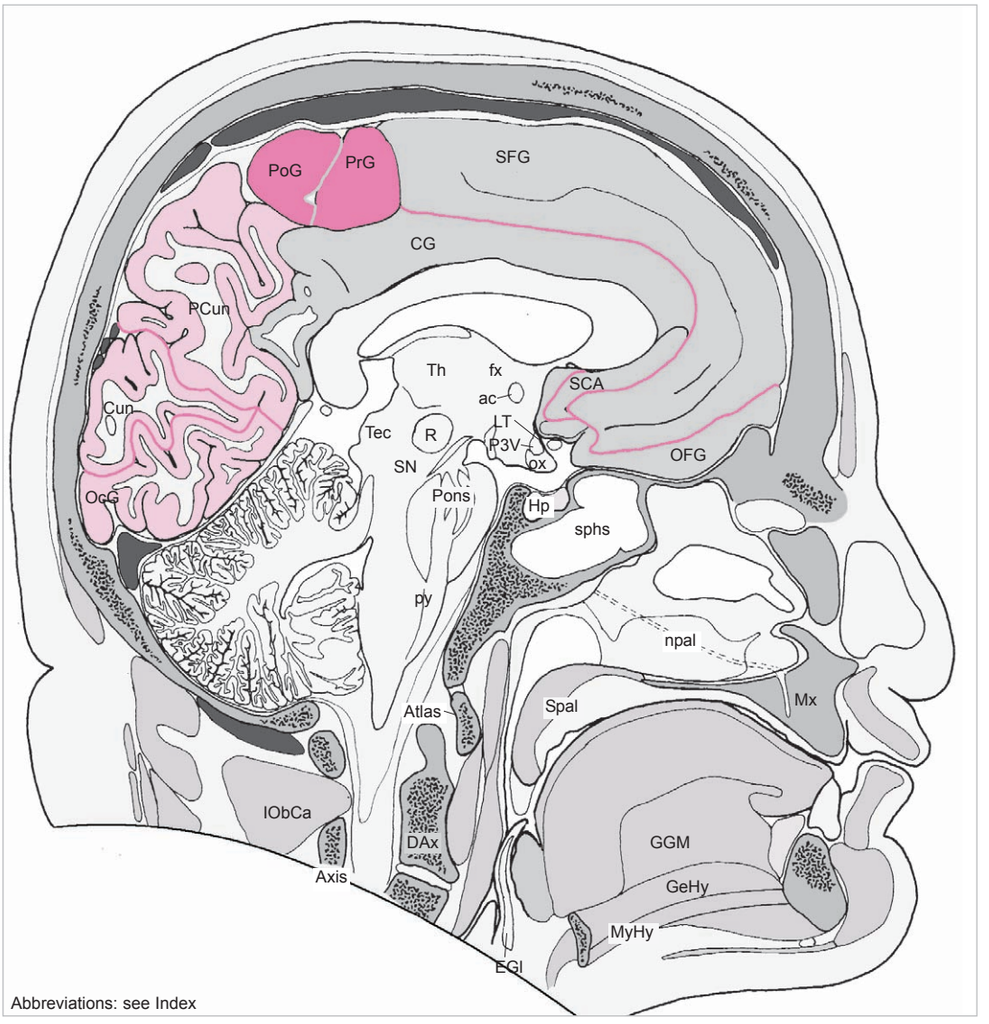
8

(medial view)





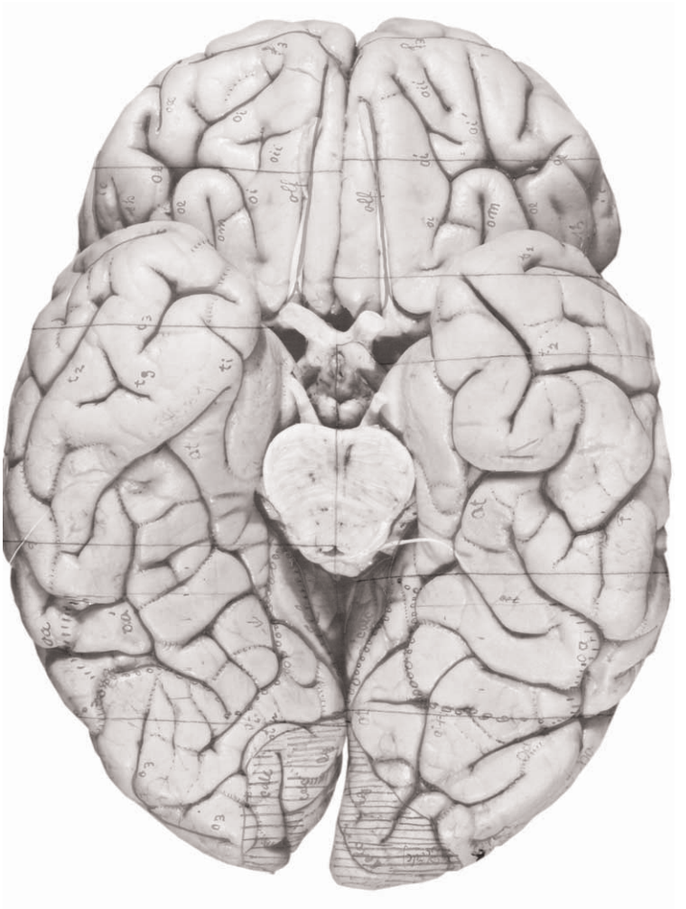




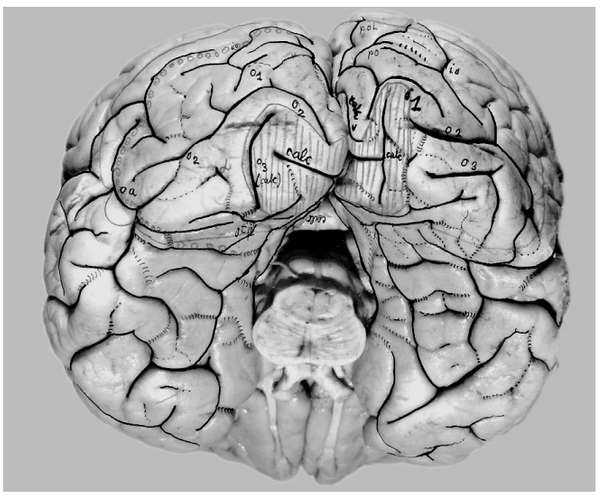
Abbreviations: see Index

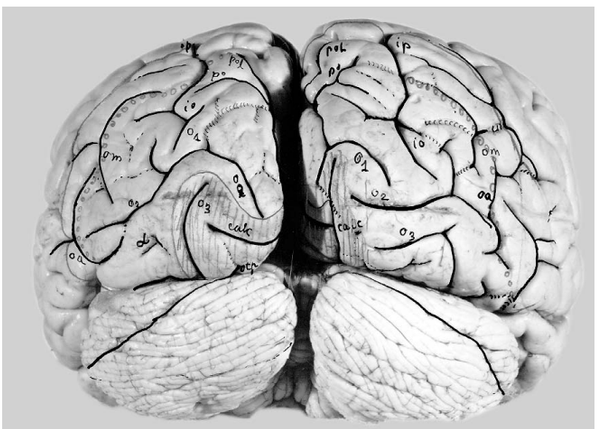
Microscopic Atlas

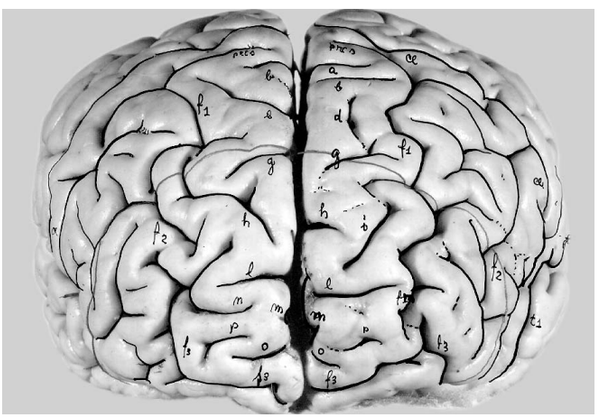
3.1 Surface Views of the Brain Prior to Sectioning.

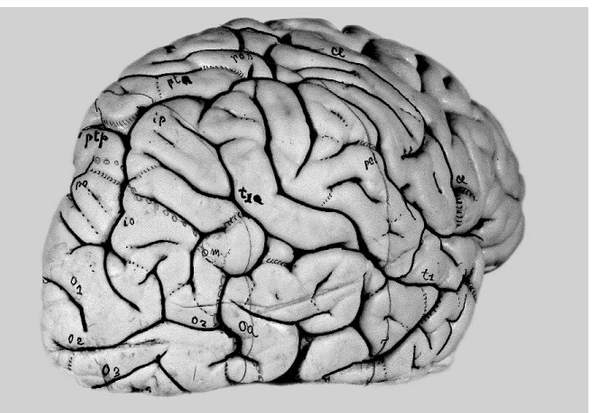


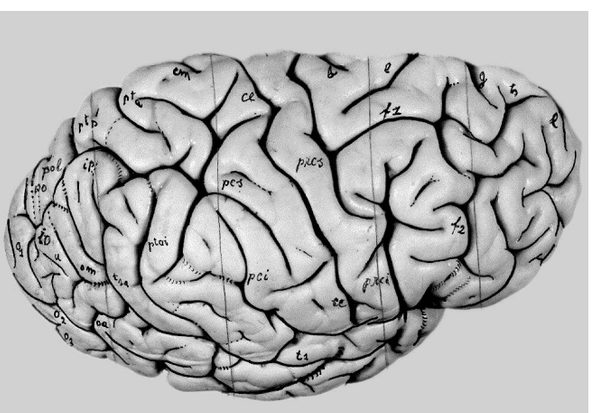
The photographs showing the external morphology of the formalin fixed brain and the following myelin-stained sections were taken from sections prepared from the brain of a 24 year old male (see section 1.2.1). This brain has been cut perpendicular to the intercommissural plane. Representation of complete sections through the entire (right) hemisphere is provided in a set of 69 diagrams. These show their approximate position in the topometric space and the location of each section in a key diagram. Because shading is used for discrimination between different gyri, it is not necessarily identical with the shading of the figures on page 92. The photographs of each section show the central, subcortical region of the brain in a resolution that permits high-detail recognition of morphological structures. Because the brain shown in this Microscopic (Myeloarchitectonic) Atlas was used by previous researchers, we have also compiled the results of their studies (Section 3.3). Delineations suggested in the previous works are not always identical to those shown in our Myeloarchitectonic Atlas.

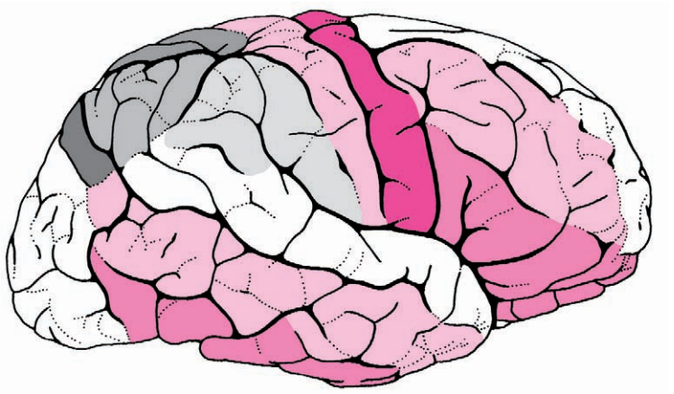


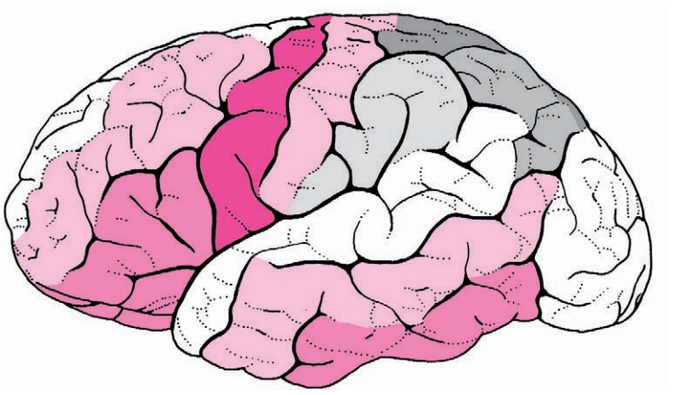


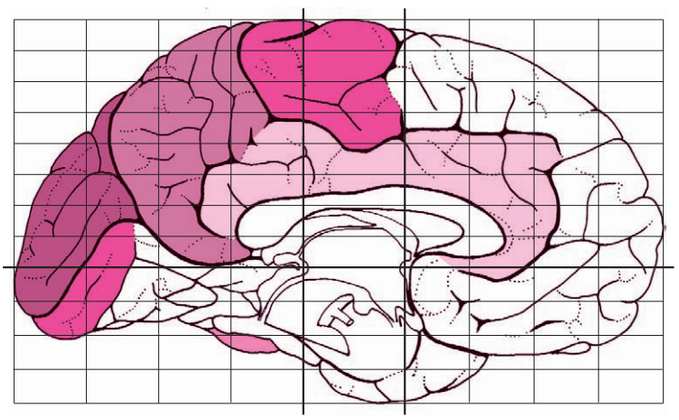


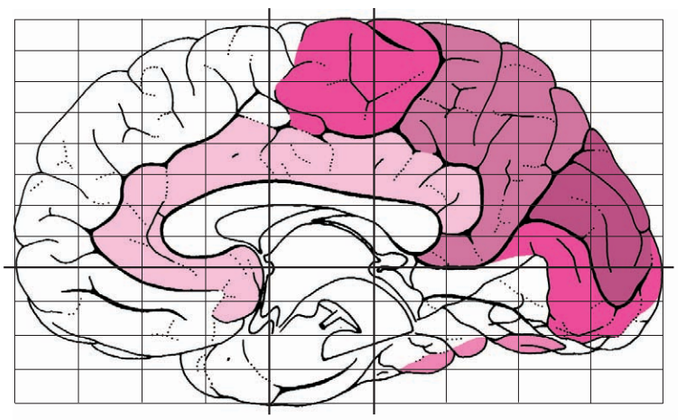


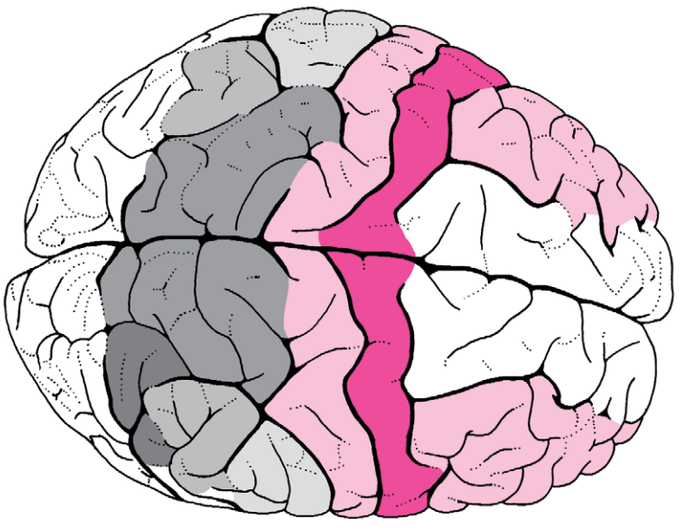


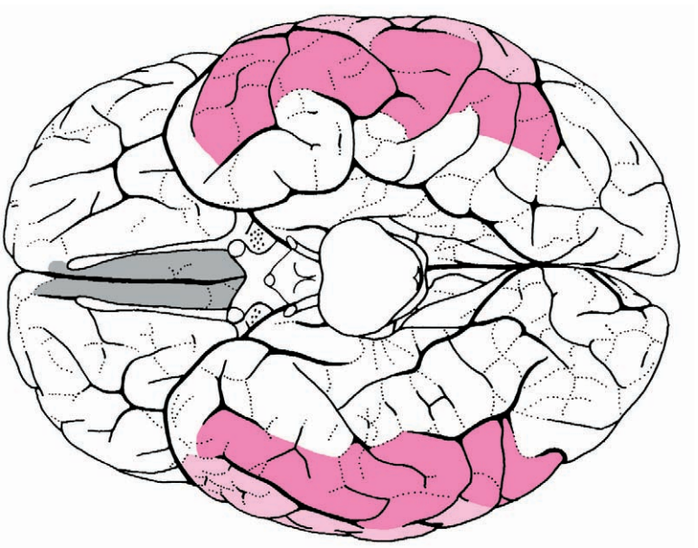




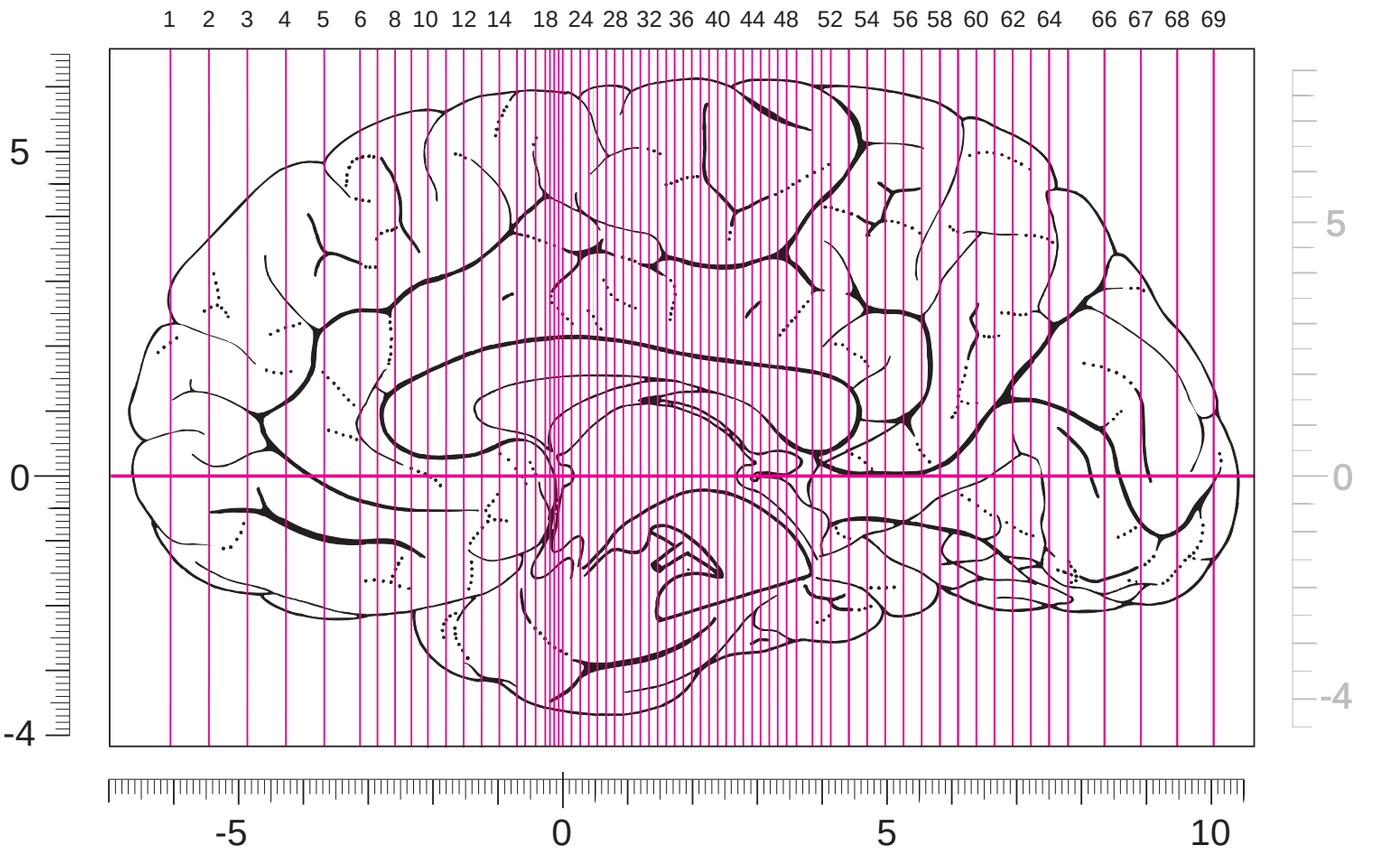




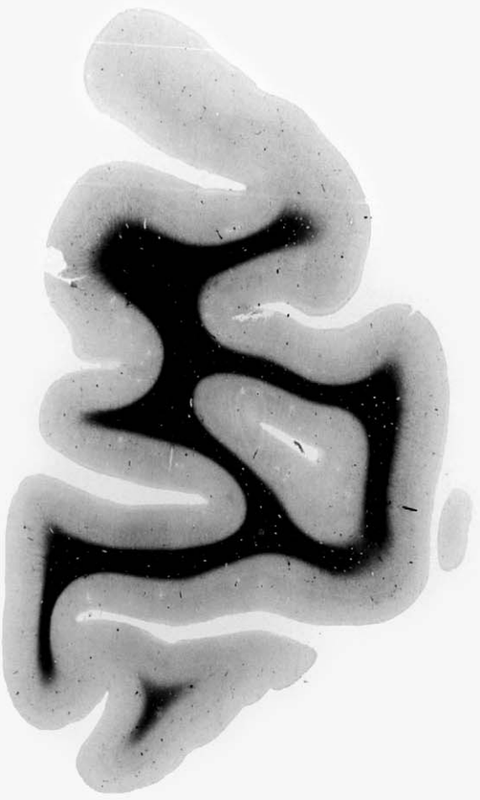




3.2 Photographs and Diagrams

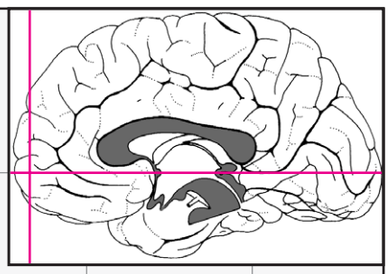


Location of the following 69 brain sections and accompanying high-detail diagrams. The diagram on this side shows the dimensions of the fixed unsectioned brain, corresponding to the right upper figure on page 91. The metric scale in the 69 diagrams of the following pages represents the dimensions of the sections transformed to the Talairach space (see section 1.2.8).



01

-60 mm

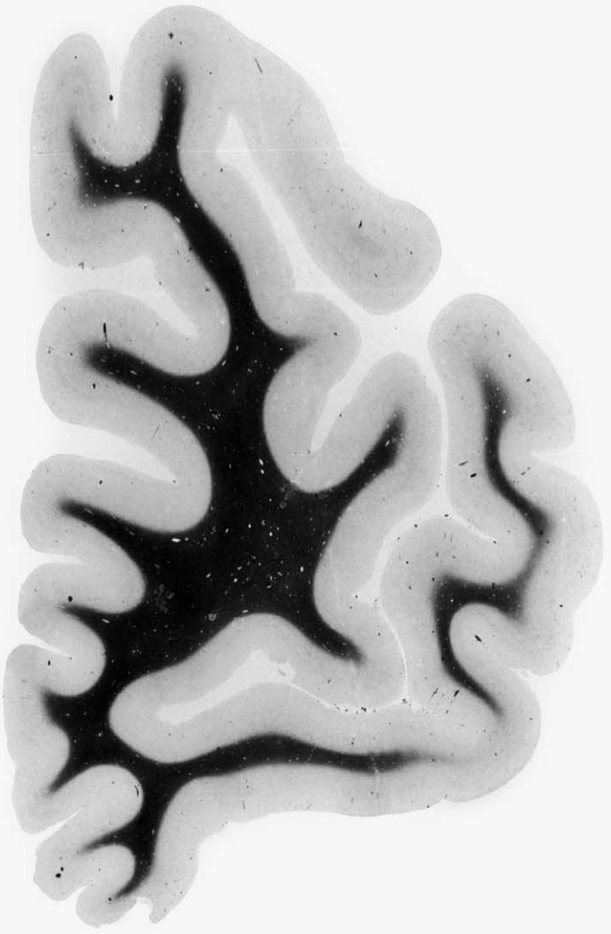


FMG frontomarginal gyrus
fms frontomarginal sulcus
MFG medial frontal gyrus
SFG superior frontal gyrus
sfs superior frontal sulcus
TFPGI inferior transverse frontopolar gyrus
TFPGM medial transverse frontopolar gyrus
TFPGS superior transverse frontopolar gyrus

SFG
TFPGS
sfs
MFG
TFPGM
TFPGI
fms
FMG

6
5
4
3
2
1
0
-1
-2
-3

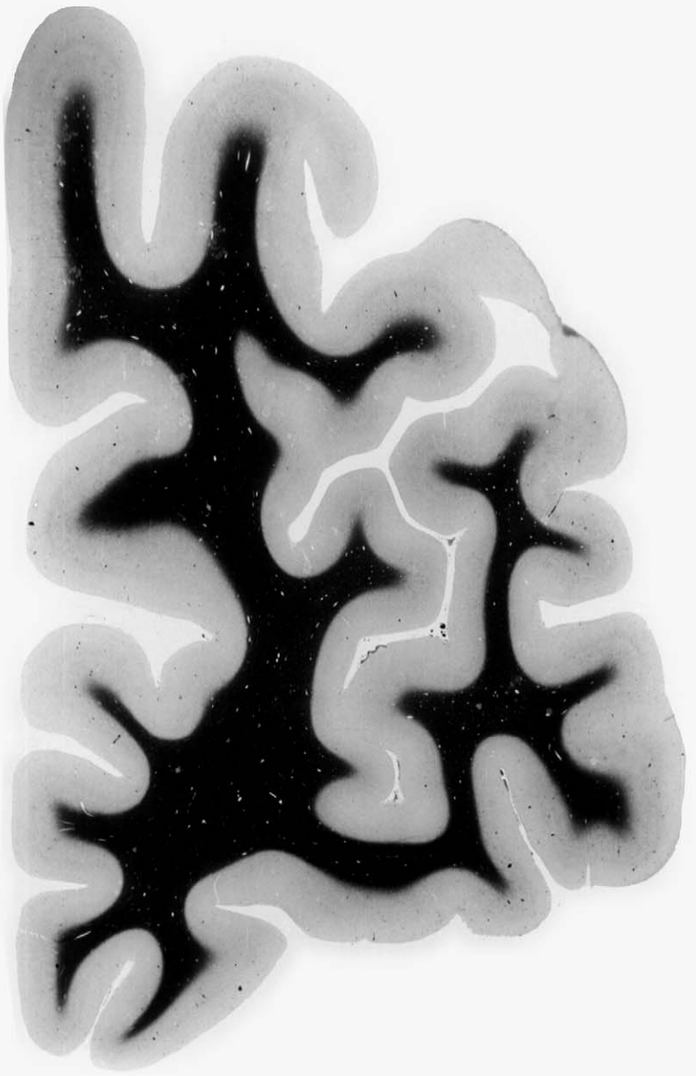
0 1 cm 1 2 3 4 5 6

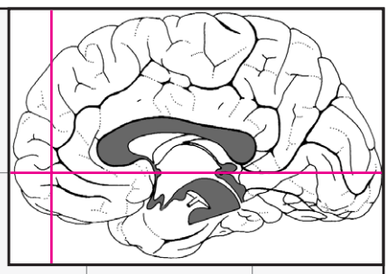


02

-54 mm

FMG frontomarginal gyrus
fms frontomarginal sulcus
GR gyrus rectus
ifs inferior frontal sulcus
IRoG inferior rostral gyrus
olfs olfactory sulcus
SFG superior frontal gyrus
sfs superior frontal sulcus
SRoG superior rostral gyrus
TFPGI inferior transverse frontopolar gyrus
TFPGS superior transverse frontopolar gyrus

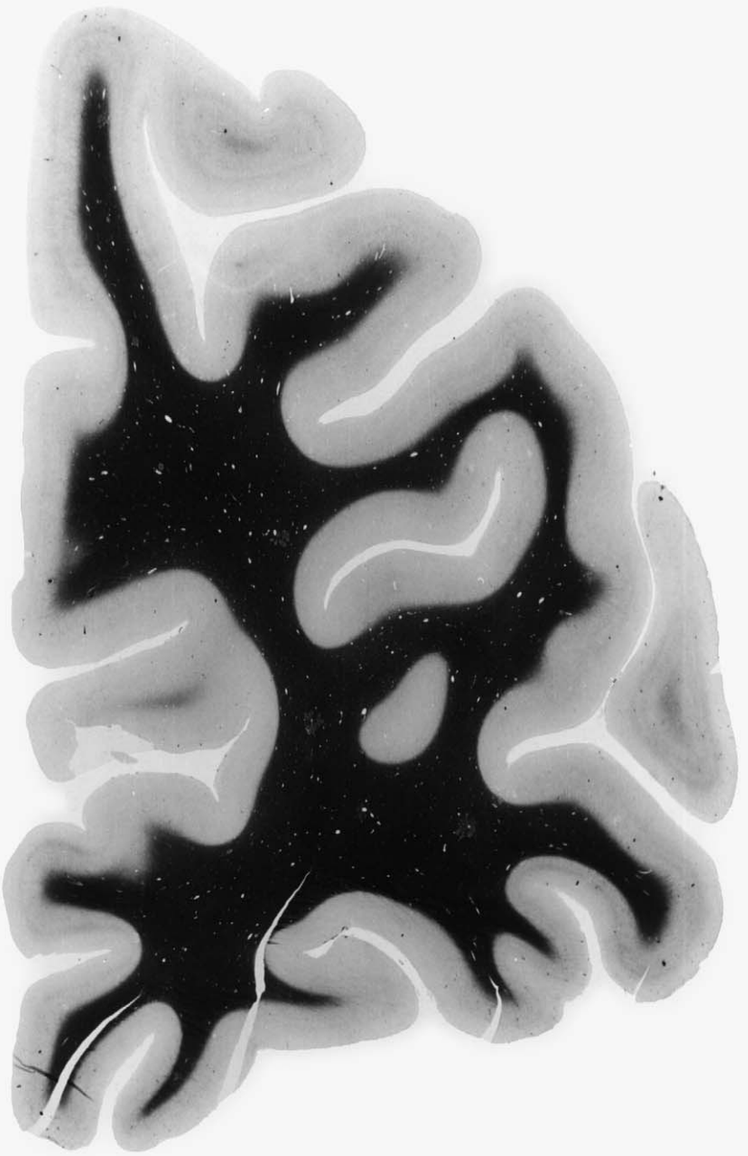


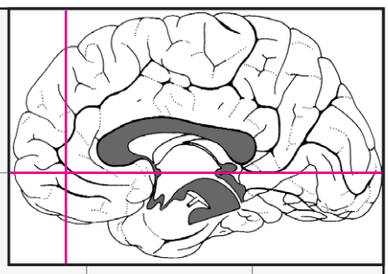


03

-48 mm

CG cingulate gyrus
cgs cingulate sulcus
FMG frontomarginal gyrus
GR gyrus rectus
IFGOr inferior frontal gyrus, orbital part
ifs inferior frontal sulcus
IRoG inferior rostral gyrus
MFG medial frontal gyrus
MOrG medial orbital gyrus
olfs olfactory sulcus
SFG superior frontal gyrus
sfs superior frontal sulcus
SRoG superior rostral gyrus
TFPGI inferior transverse frontopolar gyrus
TFPGM medial transverse frontopolar gyrus
TFPGS superior transverse frontopolar gyrus





04

-42 mm

CG cingulate gyrus
cgs cingulate sulcus
GR gyrus rectus
IFGOr inferior frontal gyrus, orbital part
ifs inferior frontal sulcus
IOrG intermediate orbital gyrus
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
MFG medial frontal gyrus
MOrG medial orbital gyrus
olfs olfactory sulcus
ors orbital sulcus
ros rostral sulcus
SFG superior frontal gyrus
sfs superior frontal sulcus
SRoG superior rostral gyrus

SFG
sfs
MFG
MFG
MFG
SFG
cgs
CG
cgs
SRoG
ifs
IRoG
ros
IFGOr
LOrG
ors
IOrG
ors
GR
MOrG
olfs

6
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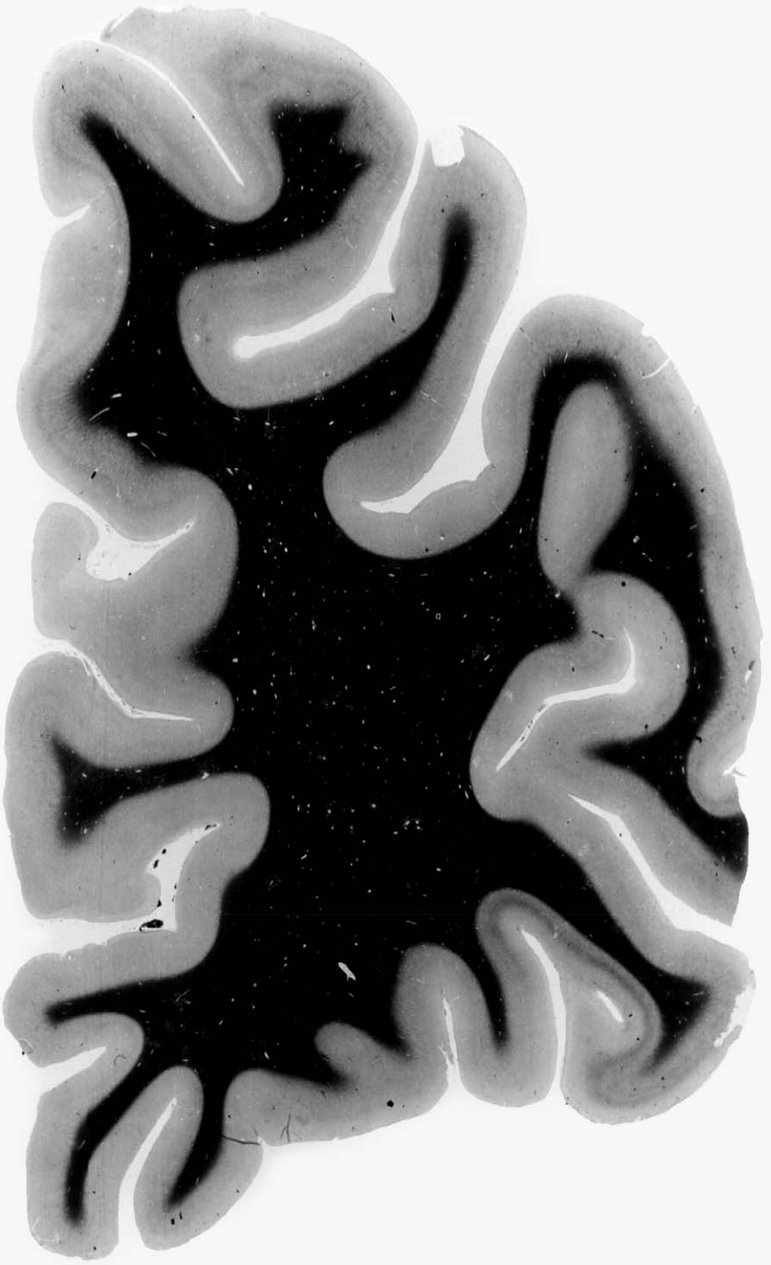
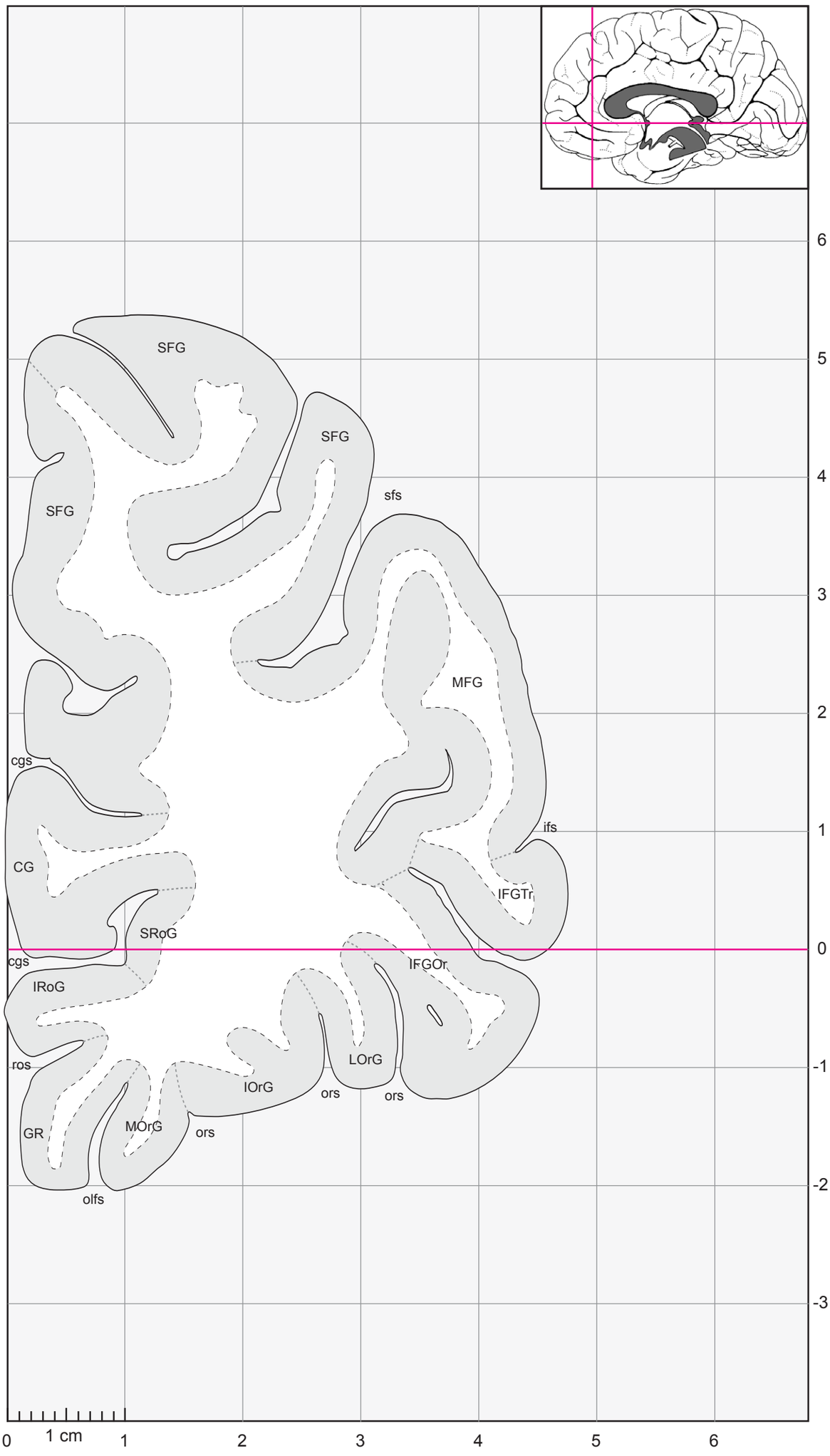
-2
-3

0 1 cm 1 2 3 4 5 6

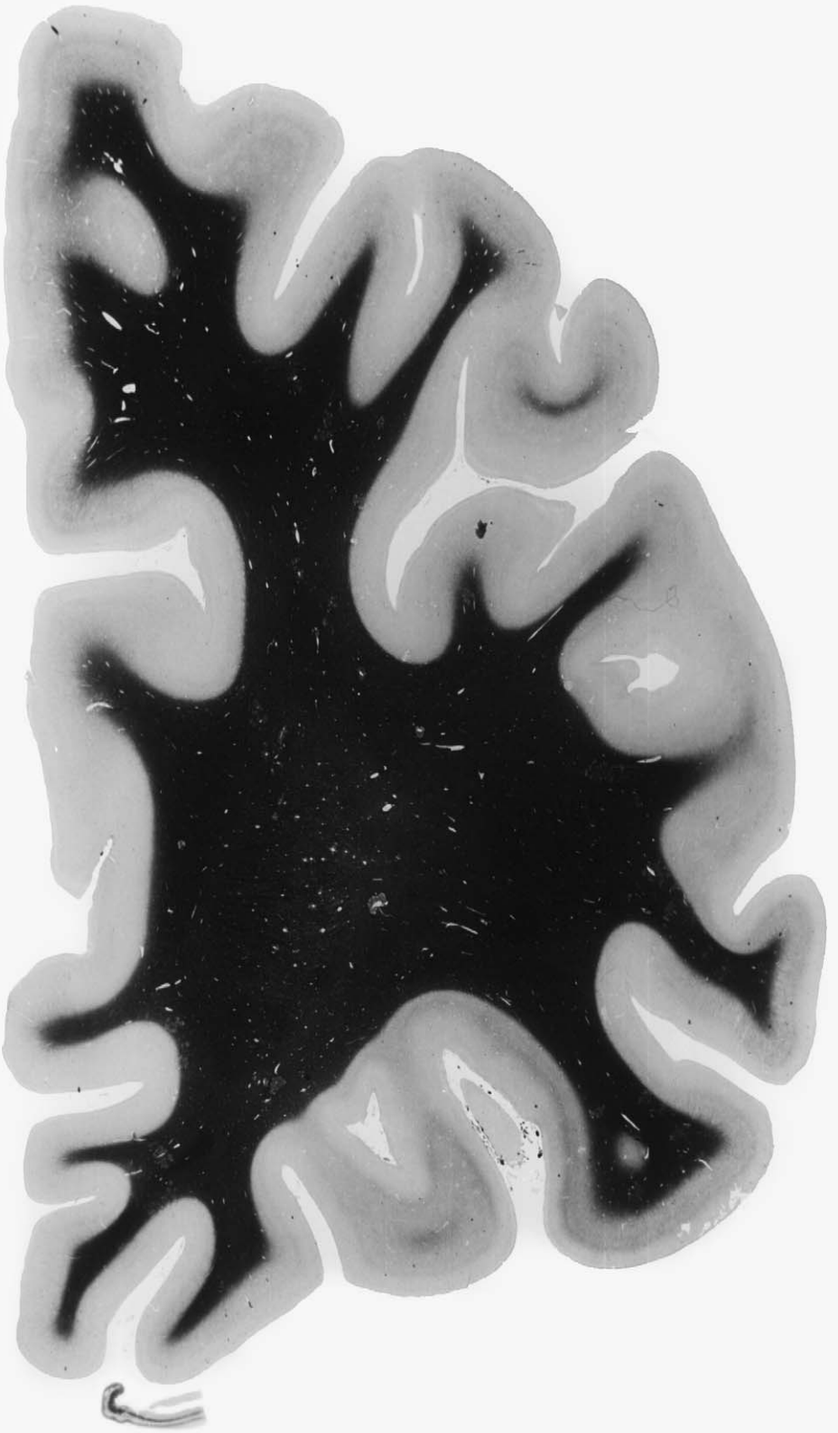


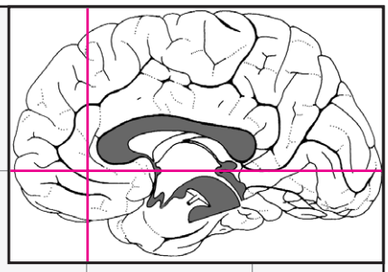


05

-36 mm

CG cingulate gyrus
cgs cingulate sulcus
GR gyrus rectus
IFGOr inferior frontal gyrus, orbital part
IFGTr IFG triangular part
ifs inferior frontal sulcus
IOrG intermediate orbital gyrus
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
MFG medial frontal gyrus
MOrG medial orbital gyrus
olfs olfactory sulcus
ors orbital sulcus
ros rostral sulcus
SFG superior frontal gyrus
sfs superior frontal sulcus
SRoG superior rostral gyrus

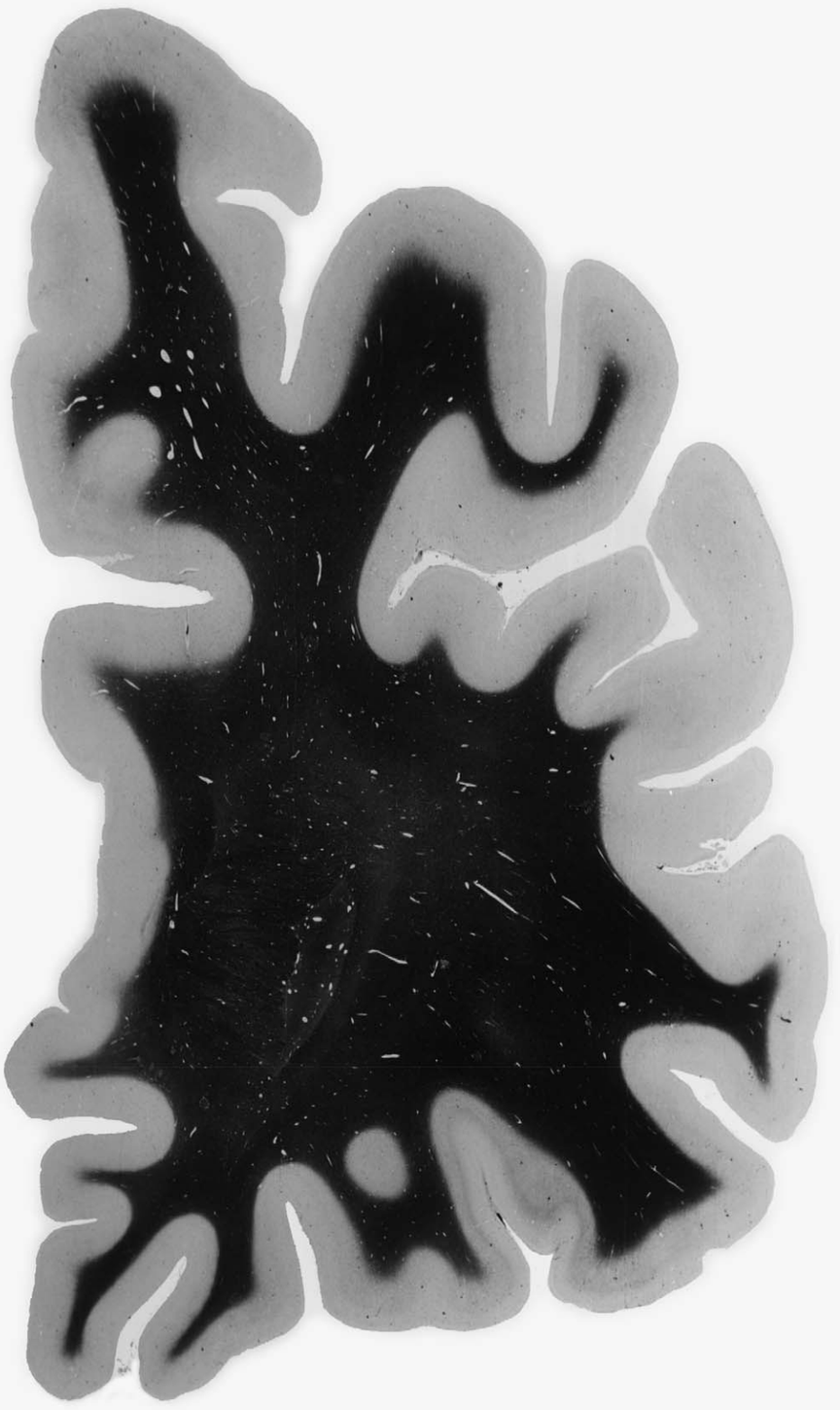


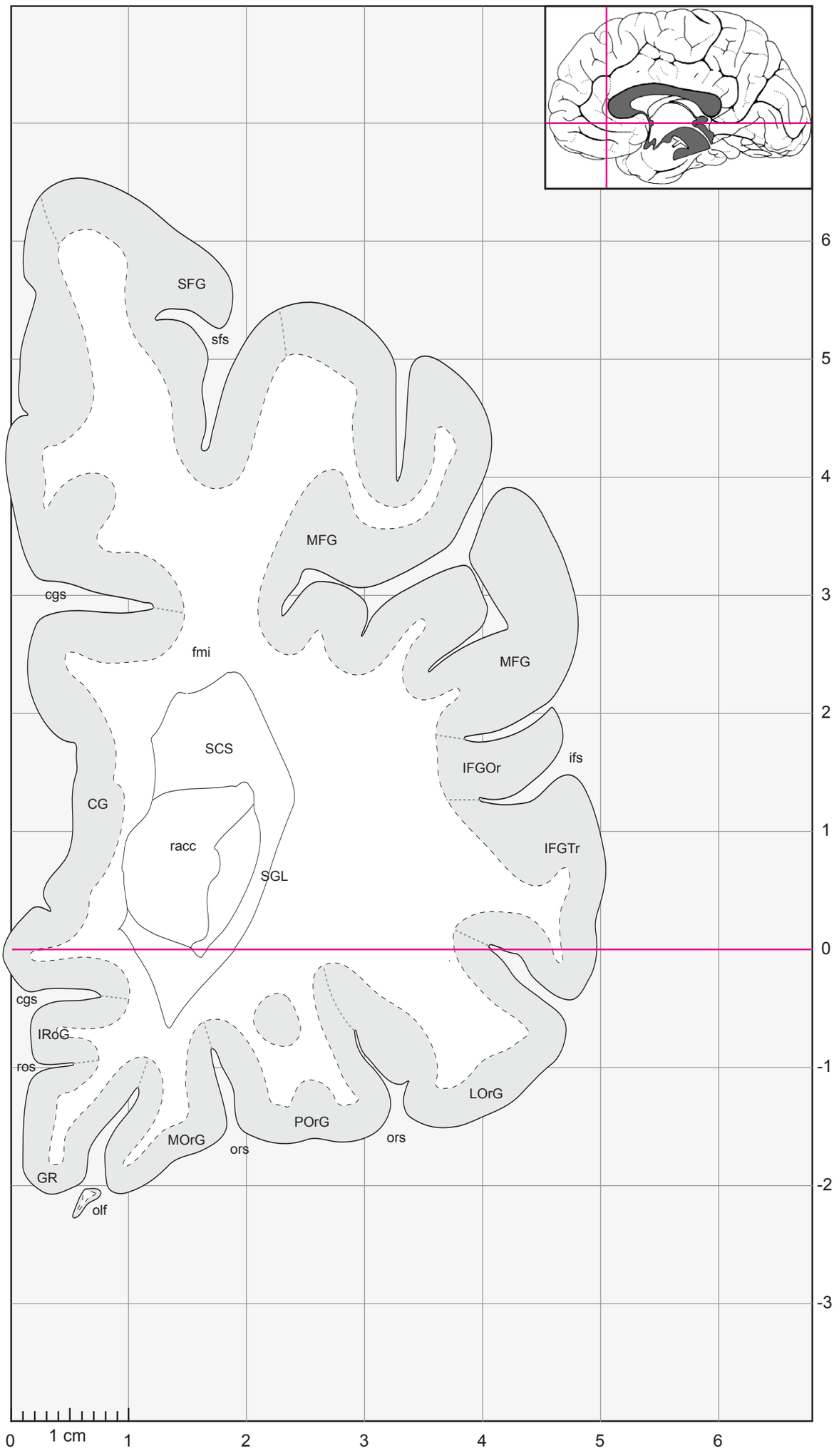


06

-30 mm

CG cingulate gyrus
cgs cingulate sulcus
GR gyrus rectus
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
imfs intermediate frontal sulcus
ifs inferior frontal sulcus
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
MFG medial frontal gyrus
MOrG medial orbital gyrus
olf olfactory tract
olfs olfactory sulcus
ors orbital sulcus
POrG posterior orbital gyrus
racc radiation of corpus callosum
ros rostral sulcus
SFG superior frontal gyrus
sfs superior frontal sulcus
SRoG superior rostral gyrus

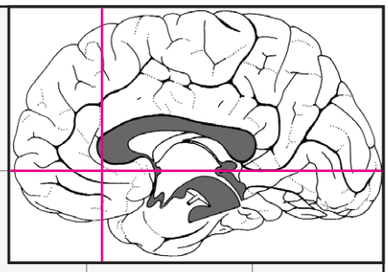




07

-27,5 mm

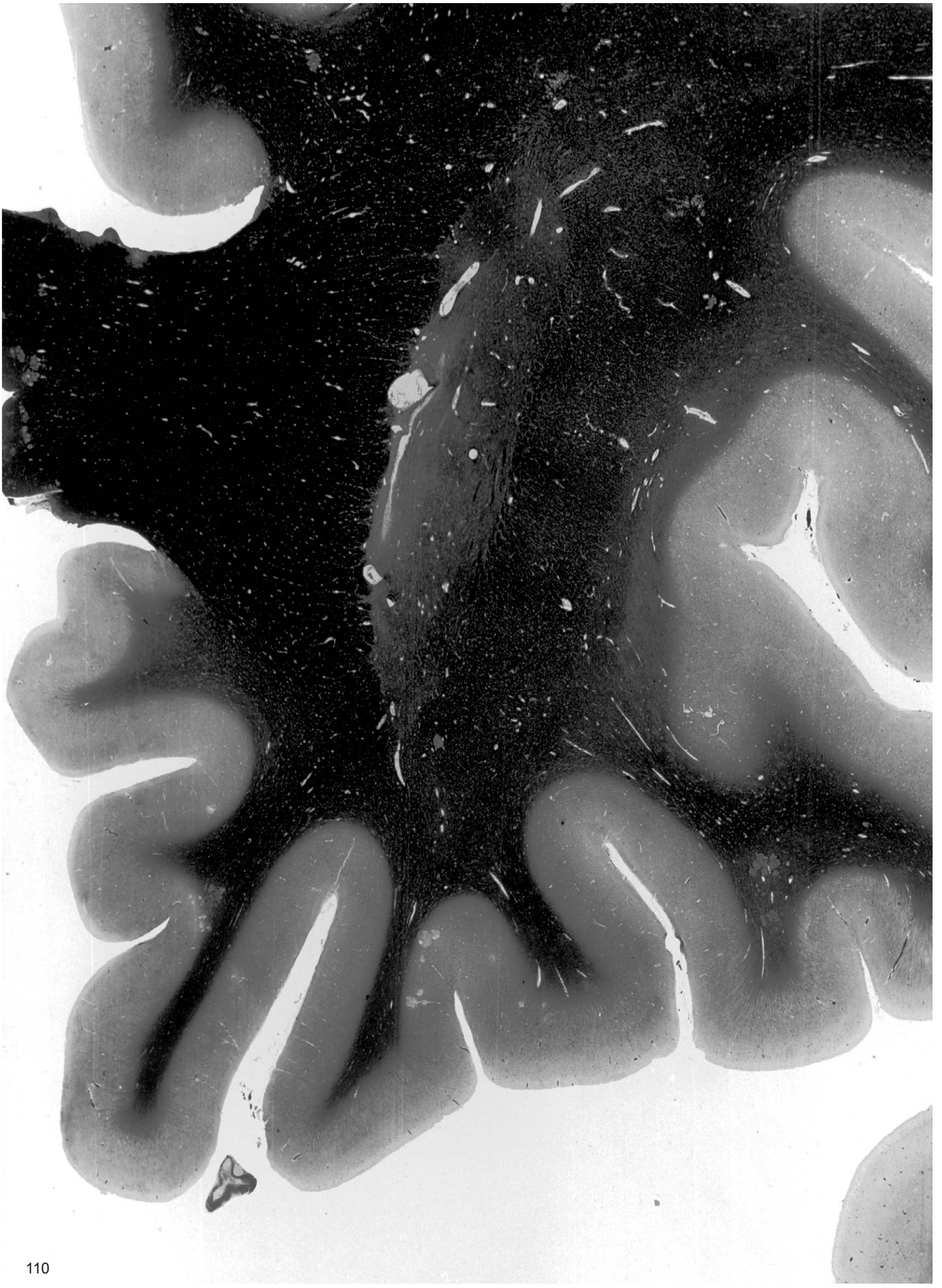
CG cingulate gyrus
cgs cingulate sulcus
fmi forceps minor of the corpus callosum
GR gyrus rectus
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
ifs inferior frontal sulcus
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
MFG medial frontal gyrus
MOrG medial orbital gyrus
olf olfactory tract
ors orbital sulcus
POrG posterior orbital gyrus
racc radiation of corpus callosum
ros rostral sulcus
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
SGL substantia gliosa (subependymal gray)



08

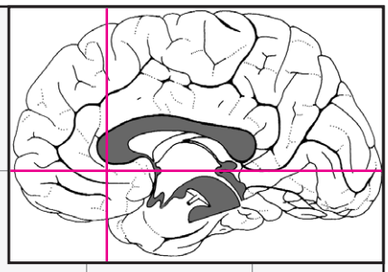
-25 mm

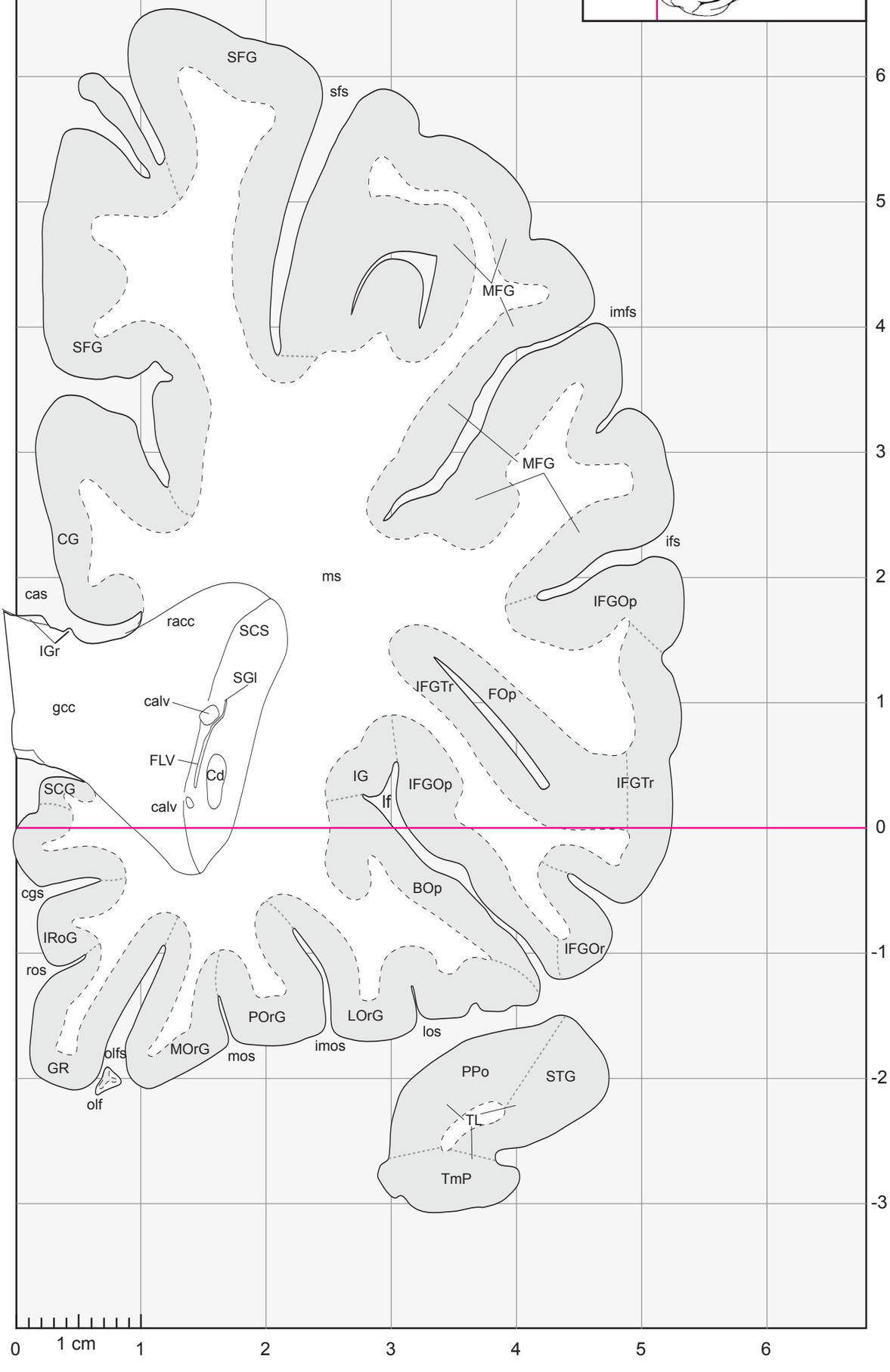
BOp basal operculum
cas callosal sulcus
CG cingulate gyrus
cgs cingulate sulcus
fmi forceps minor of the corpus callosum
FOp frontal operculum
gcc genu of the corpus callosum
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
ifs inferior frontal sulcus
imfs intermediate frontal sulcus
imos intermediate obirtal sulcus
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
los lateral orbital sulcus
MFG medial frontal gyrus
MOrG medial orbital gyrus
mos medial orbital sulcus
ms medullary substance of frontal lobe
olf olfactory tract
olfs olfactory sulcus
POrg posterior orbital gyrus
racc radiation of corpus callosum
ros rostral sulcus
SFG superior frontal gyrus
sfs superior frontal sulcus
SGI substantia gliosa
sv septal vein



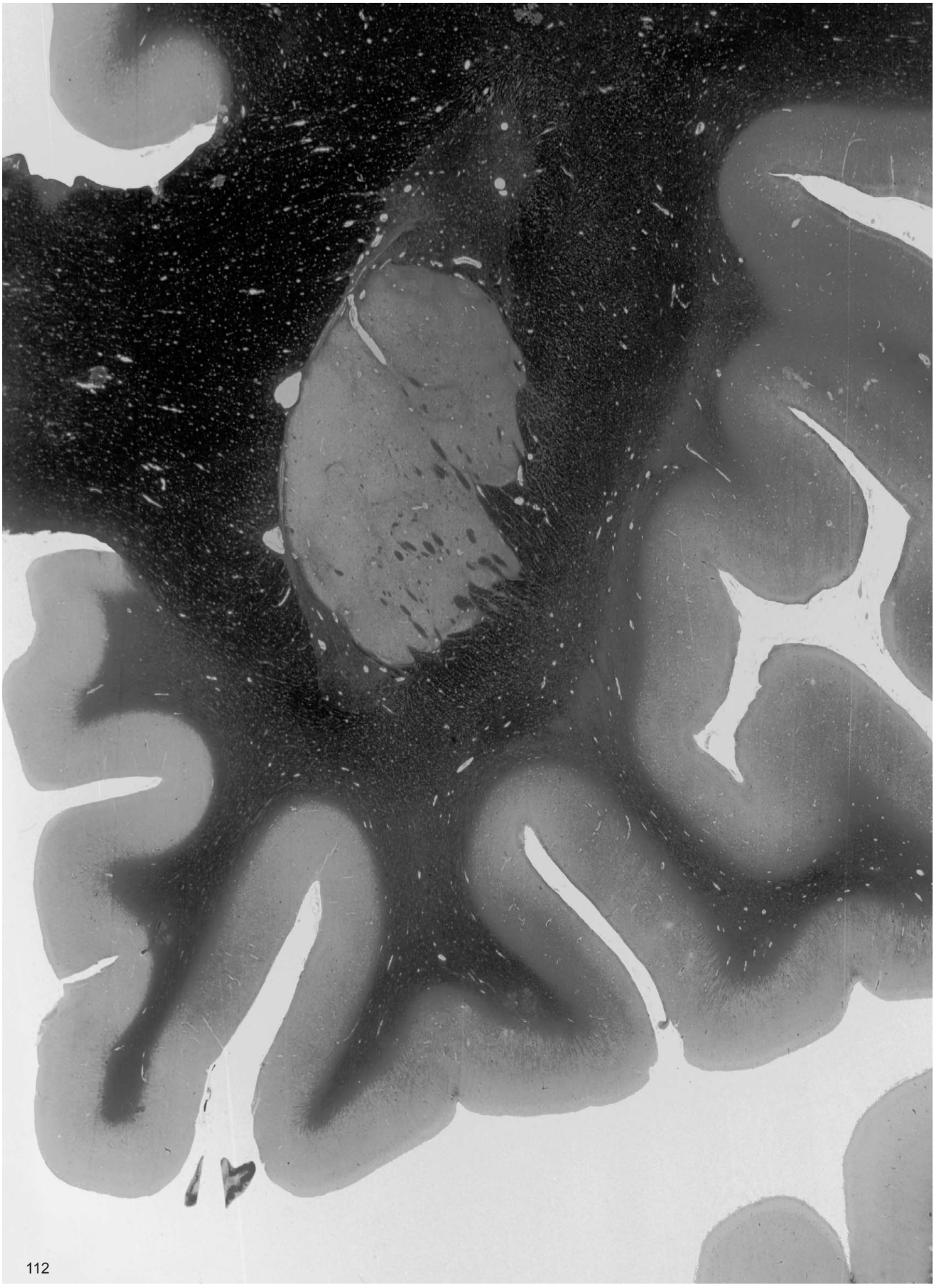
09

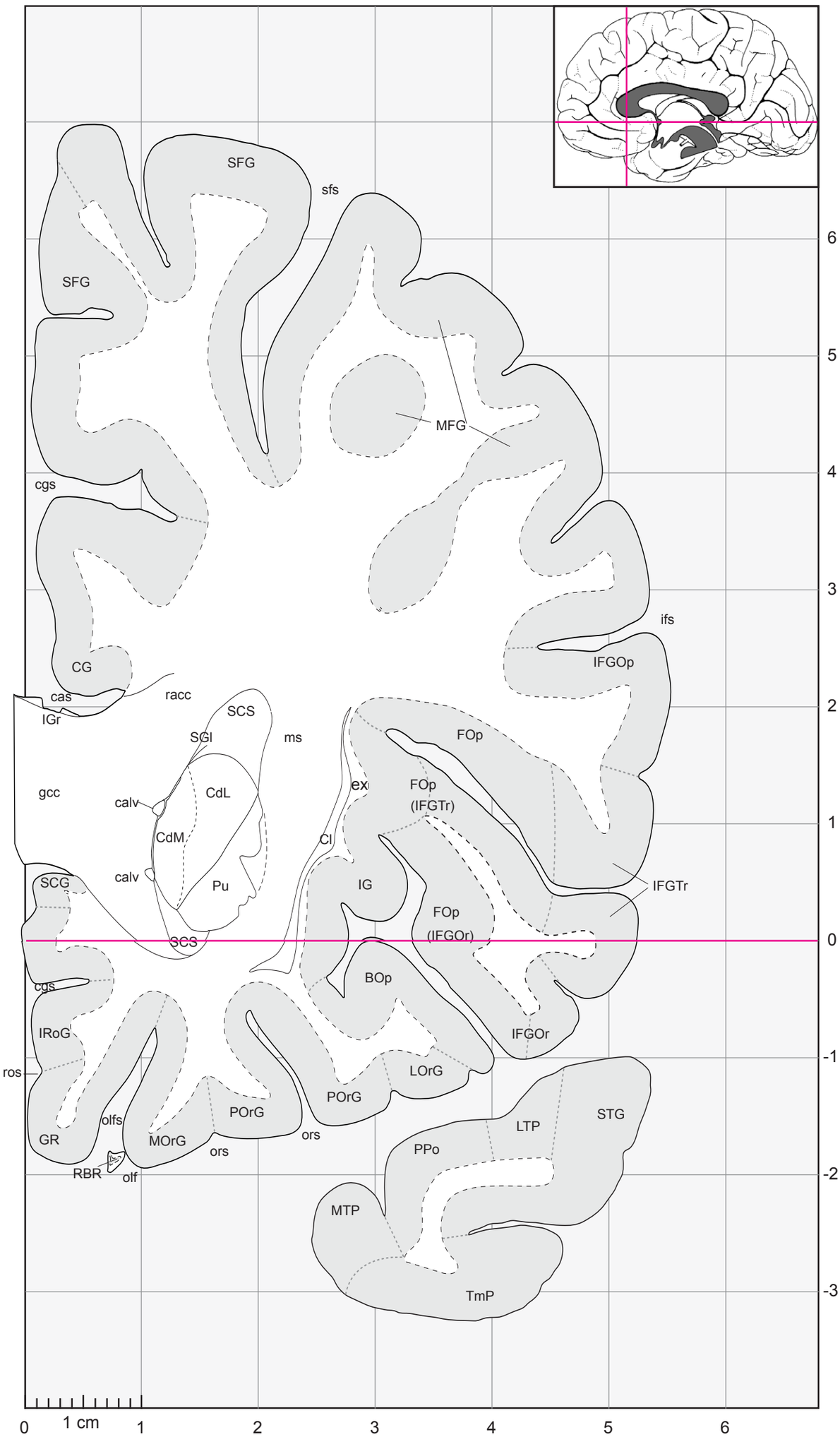
-22,5 mm





BOp basal operculum
calv callosal vein
cas callosal sulcus
Cd caudate nucleus
CG cingulate gyrus
cgs cingulate sulcus
FLV frontal horn of lat. ventricle
FOp frontal operculum
gcc genu of the corpus callosum
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
IG insular gyrus
IGr indusium griseum
ifs inferior frontal sulcus
imfs intermediate frontal sulcus
imos intermediate obirtal sulcus
IRoG inferior rostral gyrus
lf lateral fissure
LOrG lateral orbital gyrus
los lateral orbital sulcus
MFG medial frontal gyrus
MOrG medial orbital gyrus
mos medial orbital sulcus
ms medullary substance of frontal lobe
olf olfactory tract
olfs olfactory sulcus
POrG posterior orbital gyrus
PPo planum polare
racc radiation of corpus callosum
ros rostral sulcus
SCG subcallosal gyrus
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
SGl substantia gliosa
STG superior temporal gyrus
TL temporal lobe
TmP temporal pole

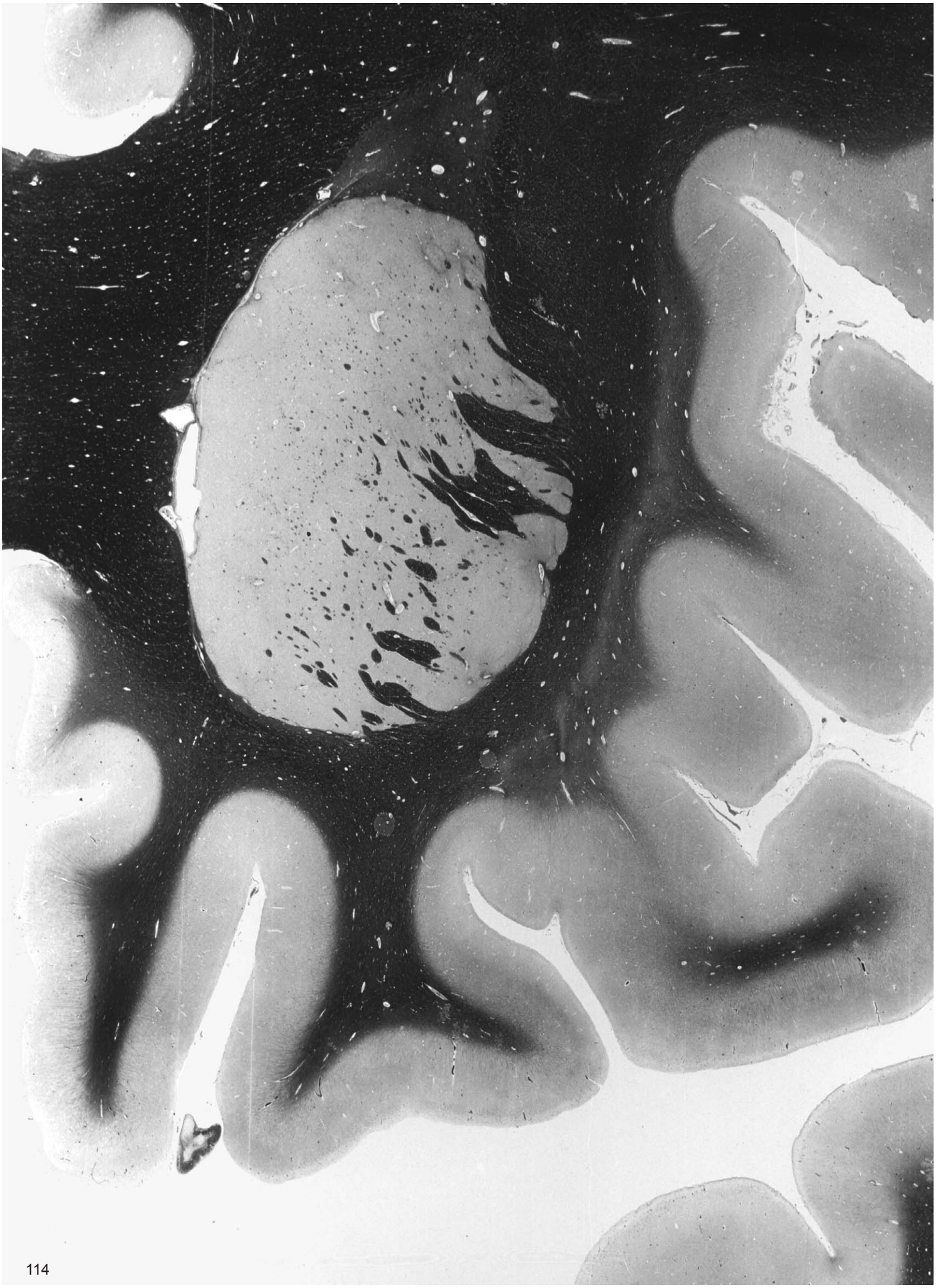


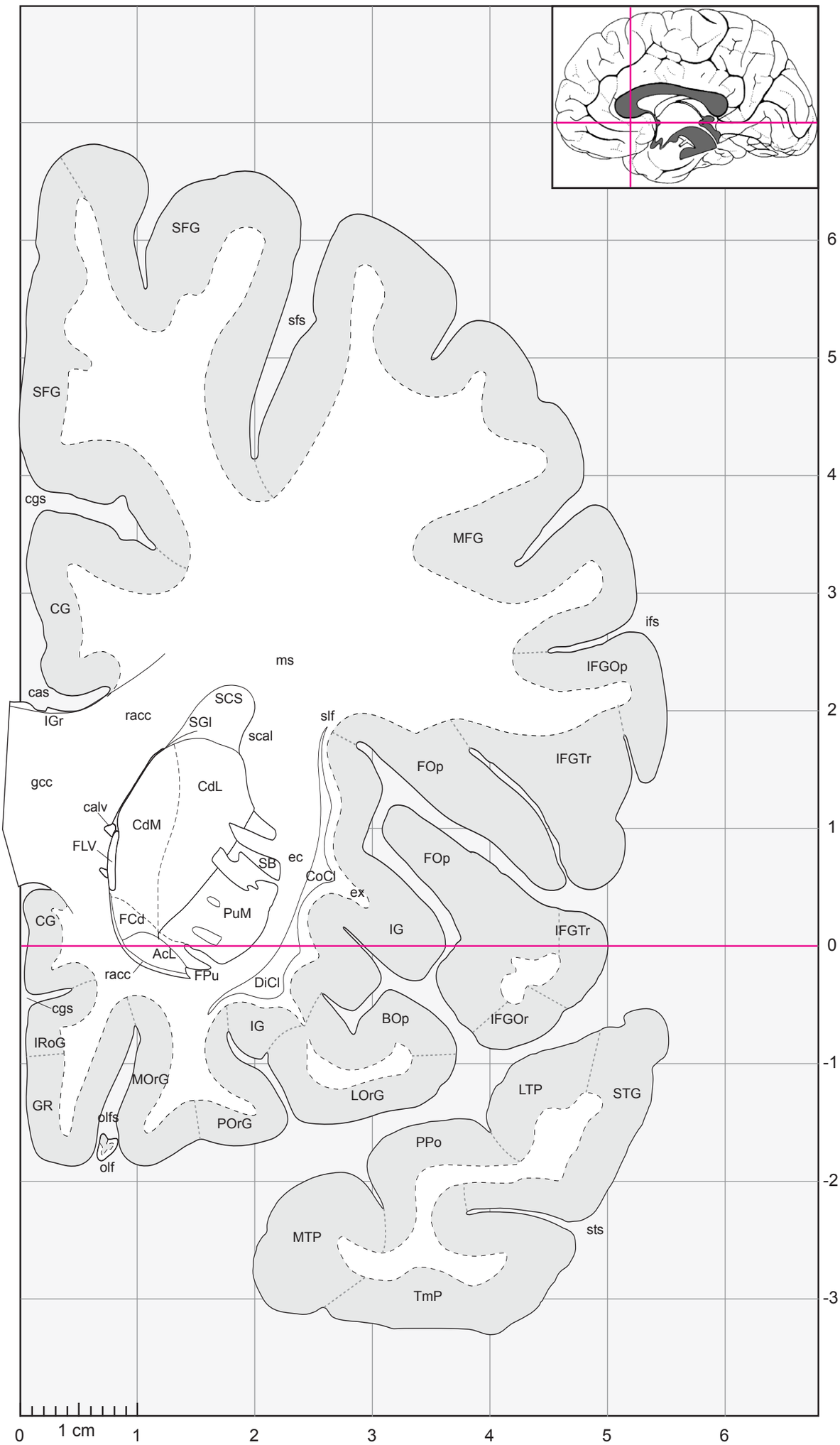


10

-20,0 mm

BOp basal operculum
calv callosal vein
cas callosal sulcus
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cgs cingulate sulcus
Cl claustrum
ex extreme capsule
FOp frontal operculum
gcc genu of the corpus callosum
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
ifs inferior frontal sulcus
IG insular gyrus
IGr indusium griseum
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
LTP lateral temporopolar region
MFG medial frontal gyrus
MOrG medial orbital gyrus
ms medullary substance of frontal lobe
MTP medial temporopolar region
olf olfactory tract
olfs olfactory sulcus
ors orbital sulcus
POrG posterior orbital gyrus
PPo planum polare
Pu putamen
racc radiation of corpus callosum
RBR retrobulbar region
ros rostral sulcus
SCG subcallosal gyrus
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
SGl substantia gliosa
STG superior temporal gyrus
TmP temporal pole

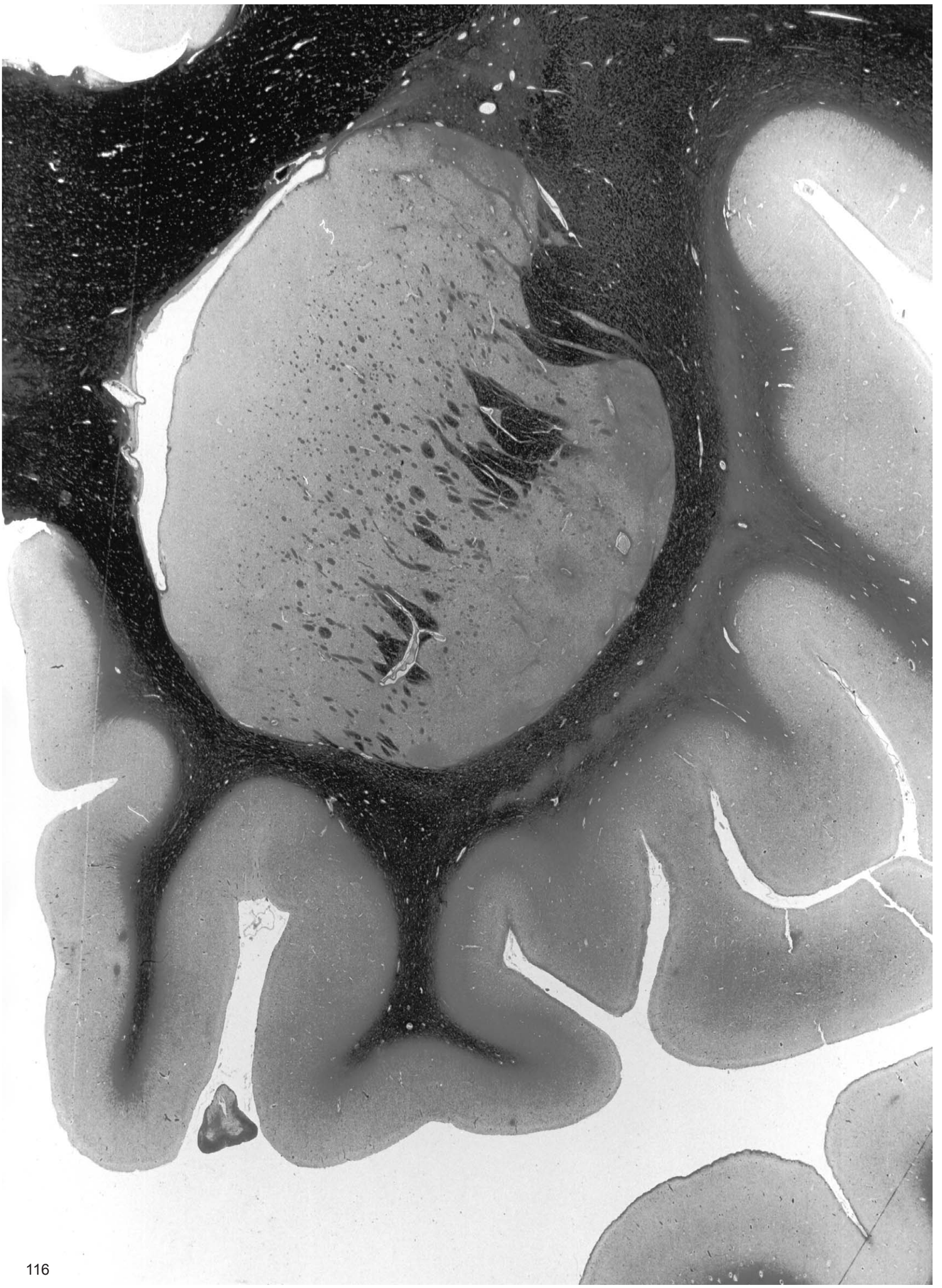


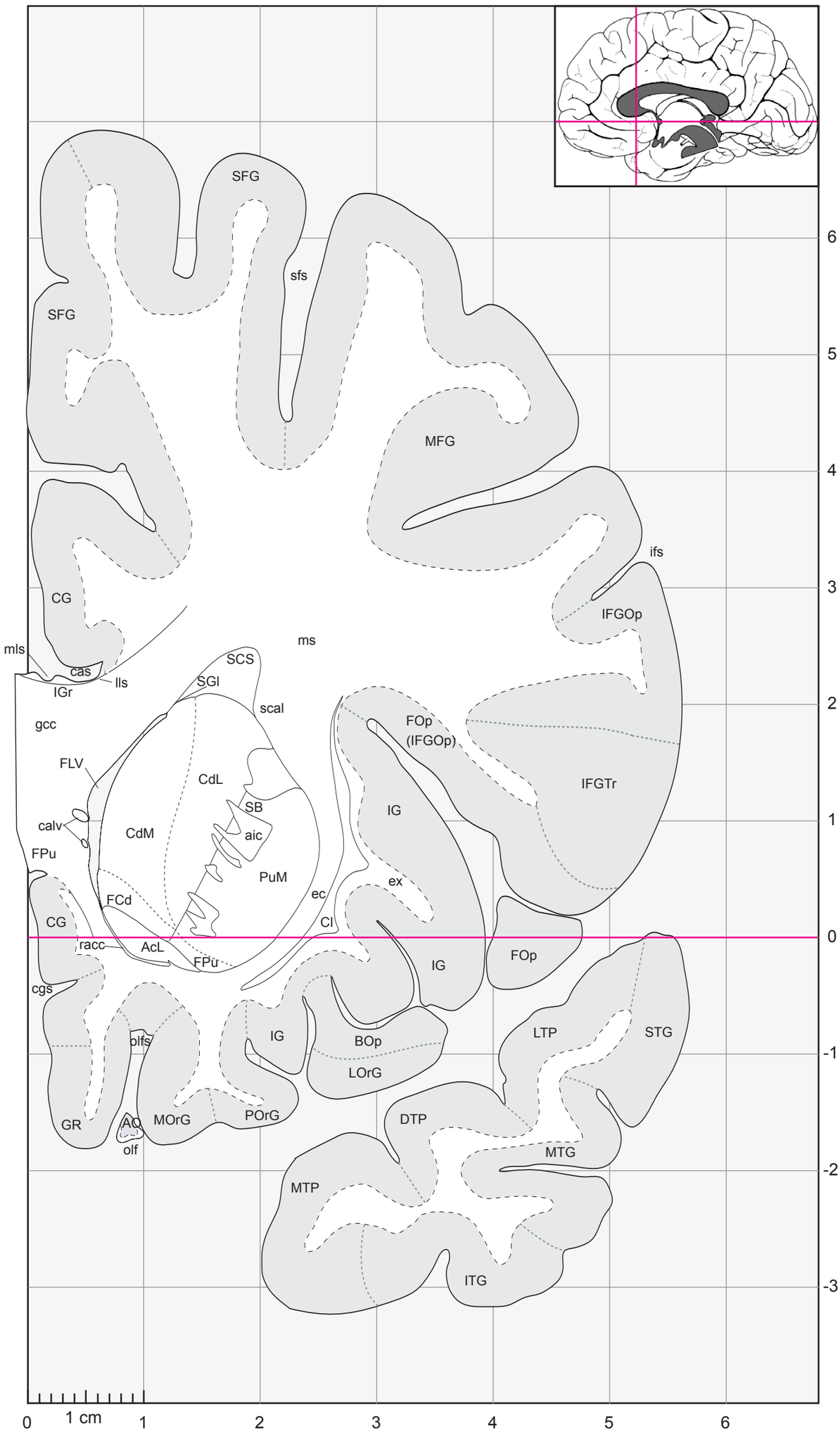


11

-17,5 mm

AcL accumbens nucl., lateral (subventricular) part (core)
BOp basal operculum
calv callosal vein
cas callosal sulcus
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cgs cingulate sulcus
CoCl compact insular claustrum
DiCl diffuse insular claustrum
ec external capsule
ex extreme capsule
FCd caudate fundus region
FLV frontal horn of lat. ventricle
FOp frontal operculum
FPu putaminal fundus region
gcc genu of the corpus callosum
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
ifs inferior frontal sulcus
IG insular gyrus
IGr indusium griseum
IRoG inferior rostral gyrus
LOrG lateral orbital gyrus
LTP lateral temporopolar region
MFG medial frontal gyrus
MOrG medial orbital gyrus
ms medullary substance of frontal lobe
MTP medial temporopolar gyrus
olf olfactory tract
olfs olfactory sulcus
POrG posterior orbital gyrus
PPo planum polare
PuM medial putamen
racc radiation of corpus callosum
SB striatal cell bridges
scal subcallosal fasciculus
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
SGI substantia gliosa
slf superior fronto-occipital fasciculus
STG superior temporal gyrus
sts superior temporal sulcus
TmP temporal pole

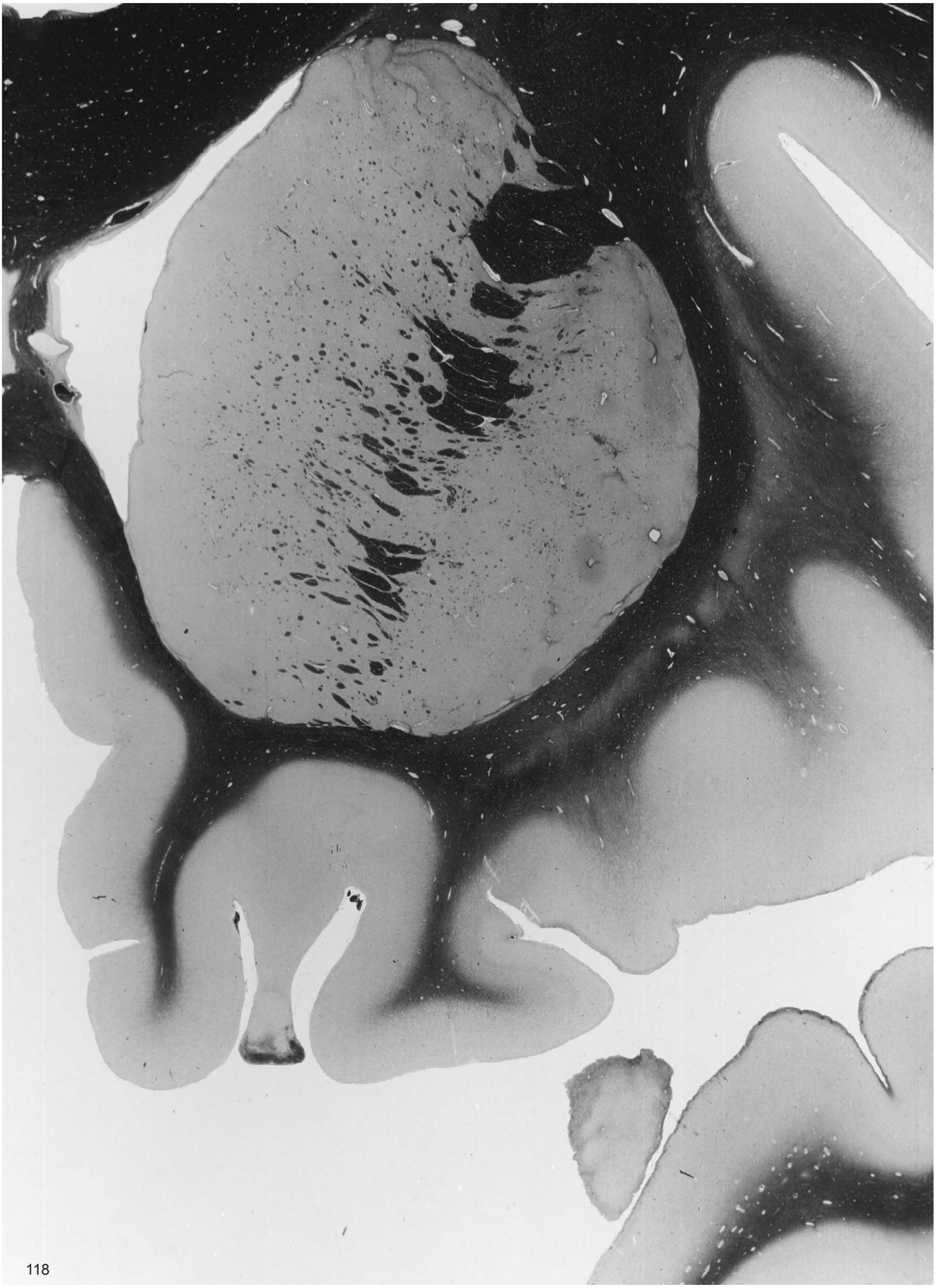


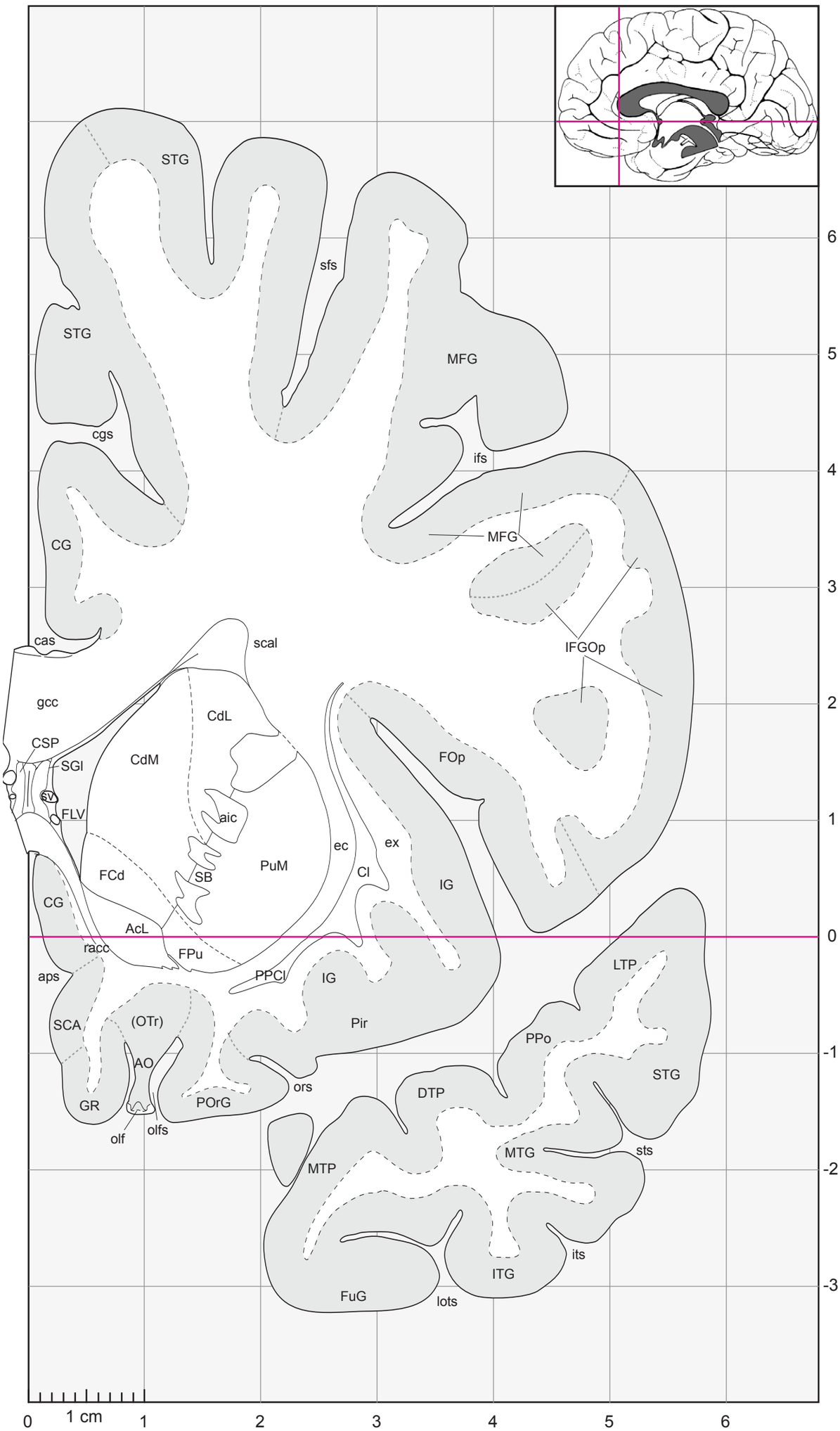


12

-15,0 mm

AcL accumbens nucl., lateral (subventricular) part (core)
aic ant. limb of internal capsule
AO anterior olfactory nucleus (retrobulbar region)
BOp basal operculum
calv callosal vein
cas callosal sulcus
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cgs cingulate sulcus
Cl claustrum
DTP dorsal temporopolar region
ec external capsule
ex extreme capsule
FCd caudate fundus region
FLV frontal horn of lat. ventricle
FOp frontal operculum
FPu putaminal fundus region
gcc genu of the corpus callosum
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IFGTr inferior frontal gyrus, triangular part
ifs inferior frontal sulcus
IG insular gyrus
IGr indusium griseum
ITG inferior frontal gyrus
lls lateral longitudinal stria
LOrG lateral orbital gyrus
LTP lateral temporopolar region
MFG medial frontal gyrus
mls medial longitudinal stria
MOrG medial orbital gyrus
ms medullary substance of frontal lobe
MTG medial temporal gyrus
MTP medial temporopolar gyrus
olf olfactory tract
olfs olfactory sulcus
POrG posterior orbital gyrus
PuM medial putamen
racc radiation of corpus callosum
RBR retrobulbar region
SB striatal cell bridges
scal aubcallosal fasciculus
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
SGI substantia gliosa
STG superior temporal gyrus

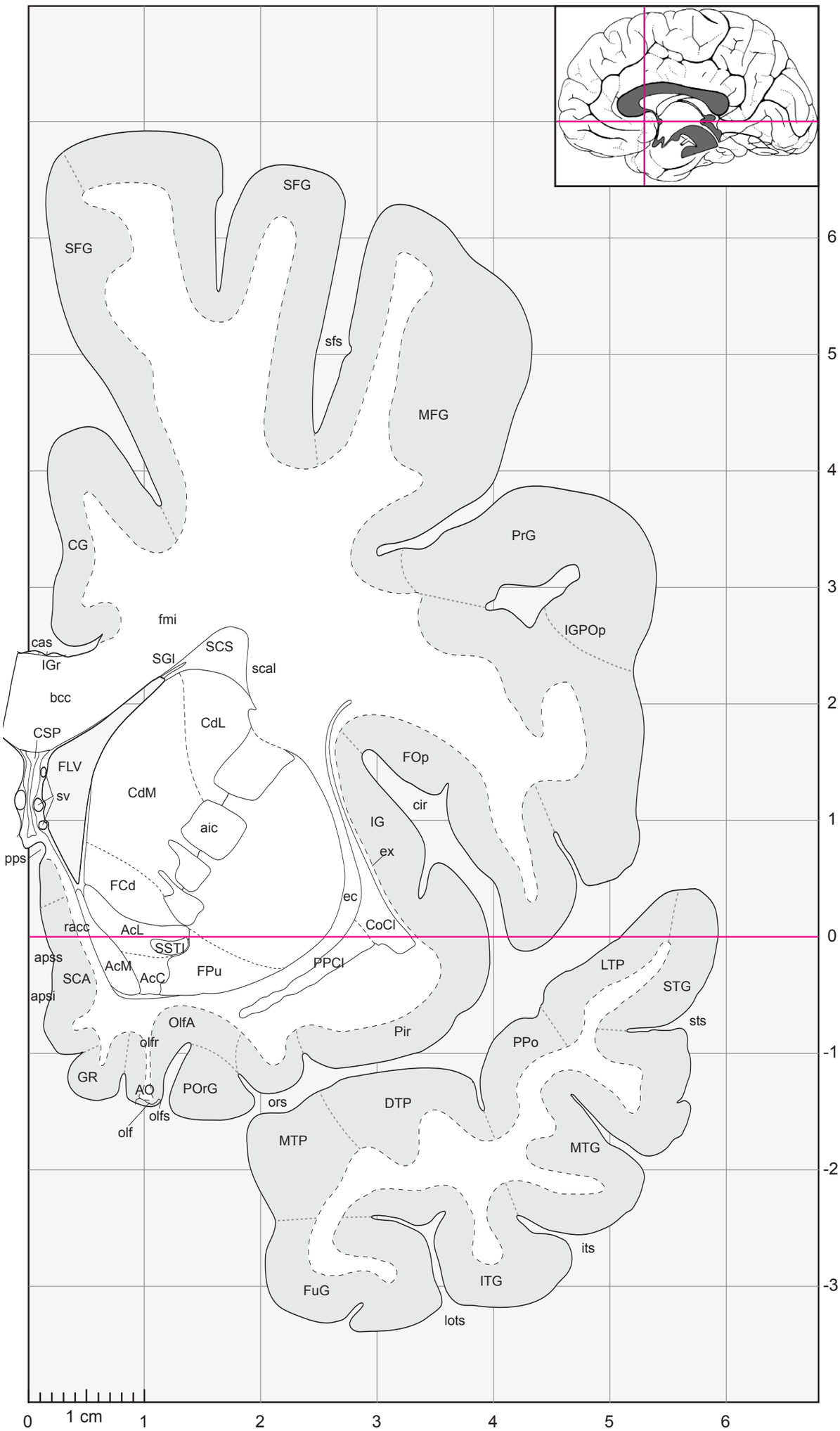




13

-12,5 mm

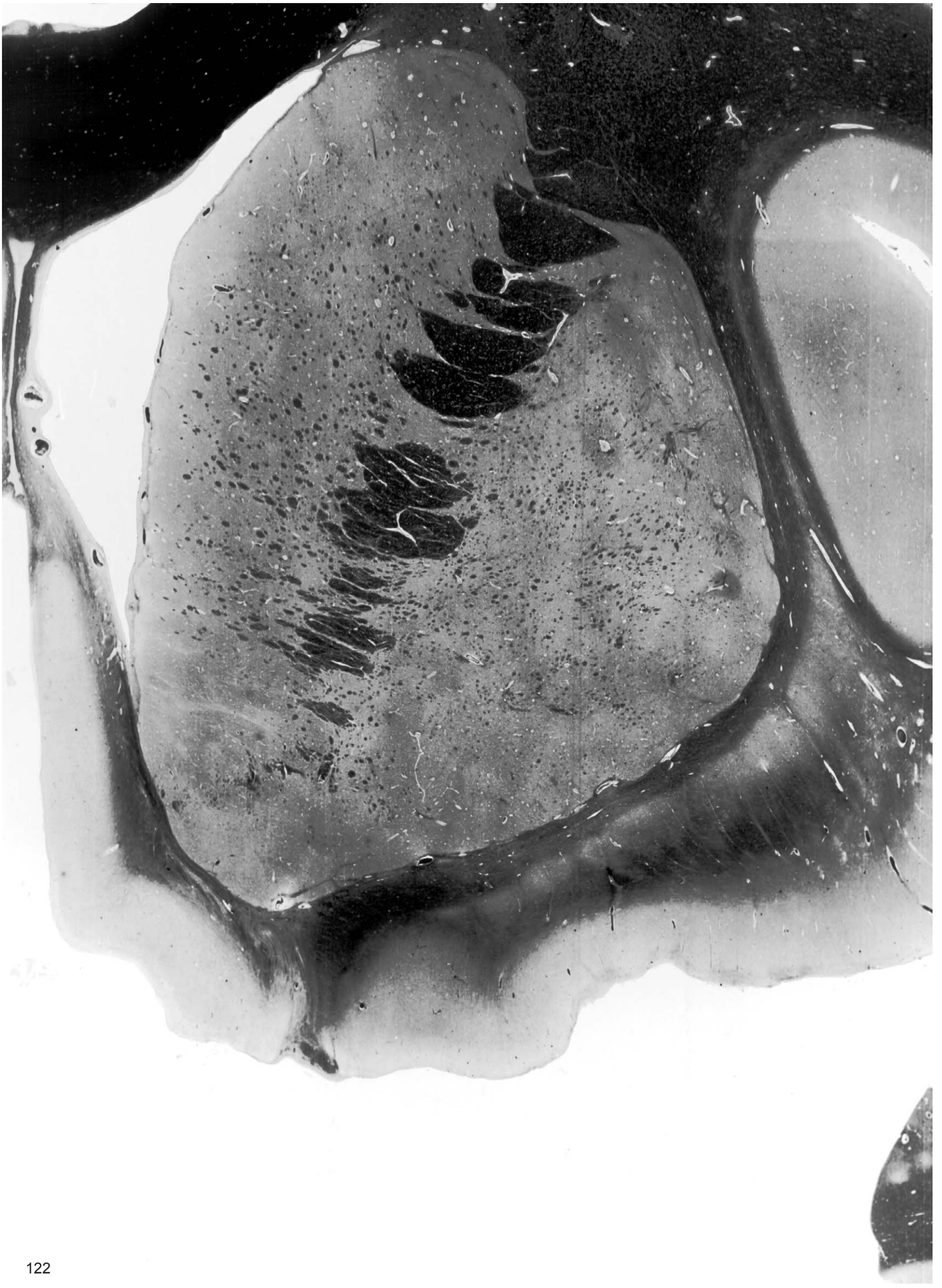
AcL accumbens nucl., lateral (subventricular) part (core)
aic ant. limb of internal capsule
AO anterior olfactory nucleus (retrobulbar region)
aps anterior parolfactory sulcus
cas callosal sulcus
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cgs cingulate sulcus
Cl claustrum
DTP dorsal temporopolar gyrus
ec external capsule
ex extreme capsule
FCd caudate fundus region
FLV frontal horn of lat.l ventricle
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
gcc genu of the corpus callosum
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
ifs inferior frontal sulcus
IG insular gyrus
ITG inferior frontal gyrus
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
LTP lateral temporopolar region
MFG medial frontal gyrus
MTG medial temporal gyrus
MTP medial temporopolar region
olf olfactory tract
olfs olfactory sulcus
ors orbital sulcus
OTr olfactory trigone
Pir cortex (pre-)piriformis
POrG posterior orbital gyrus
PPCl prepiriform claustrum
PPo planum polare
PuM medial putamen
racc radiation of corpus callosum
SB striatal cell bridges
SCA subcallosal area
scal subcallosal fasciculus
SGI substantia gliosa
SFG superior frontal gyrus
sfs superior frontal sulcus
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein

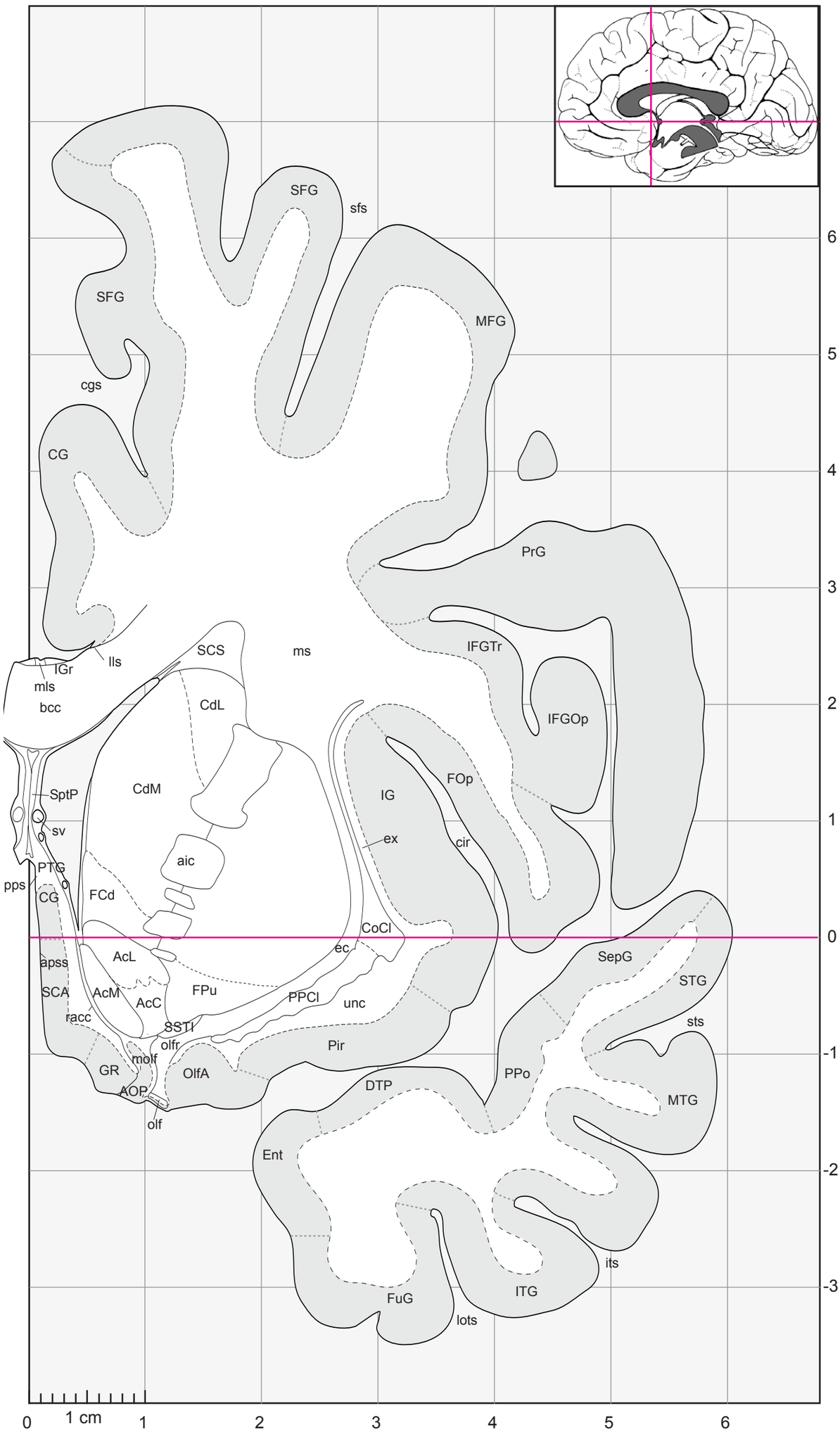


14

-10,0 mm

AcC accumbens nucleus, central (subventricular) part (core)
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aic ant. limb of internal capsule
AO anterior olfactory nucleus
apsi anterior parolfactory sulcus, inf. branch
apss anterior parolfactory sulcus, superior branch
bcc body of the corpus callosum
cas callosal sulcus
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl compact insular claustrum
CSP cavity of septum pellucidum
DTP dorsal temporopolar region
ec external capsule
ex extreme capsule
FCd caudate fundus region
FLV frontal horn of lat. ventricle
fmi forceps minor of the corpus callosum
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IG insular gyrus
IGr indusium griseum
ITG inferior frontal gyrus
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
LTP lateral temporopolar region
MFG medial frontal gyrus
MTG medial temporal gyrus
MTP medial temporopolar region
olf olfactory tract
OlfA olfactory area
olfr olfactory radiation
olfs olfactory sulcus
ors orbital sulcus
Pir cortex (pre-)piriformis
POrG posterior orbital gyrus
PPCl prepiriform claustrum
PPo planum polare
pps posterior parolfactory sulcus
racc radiation of corpus callosum
SCA subcallosal area
scal aubcallosal fasciculus
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
SGI substantia gliosa
SSTI substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein

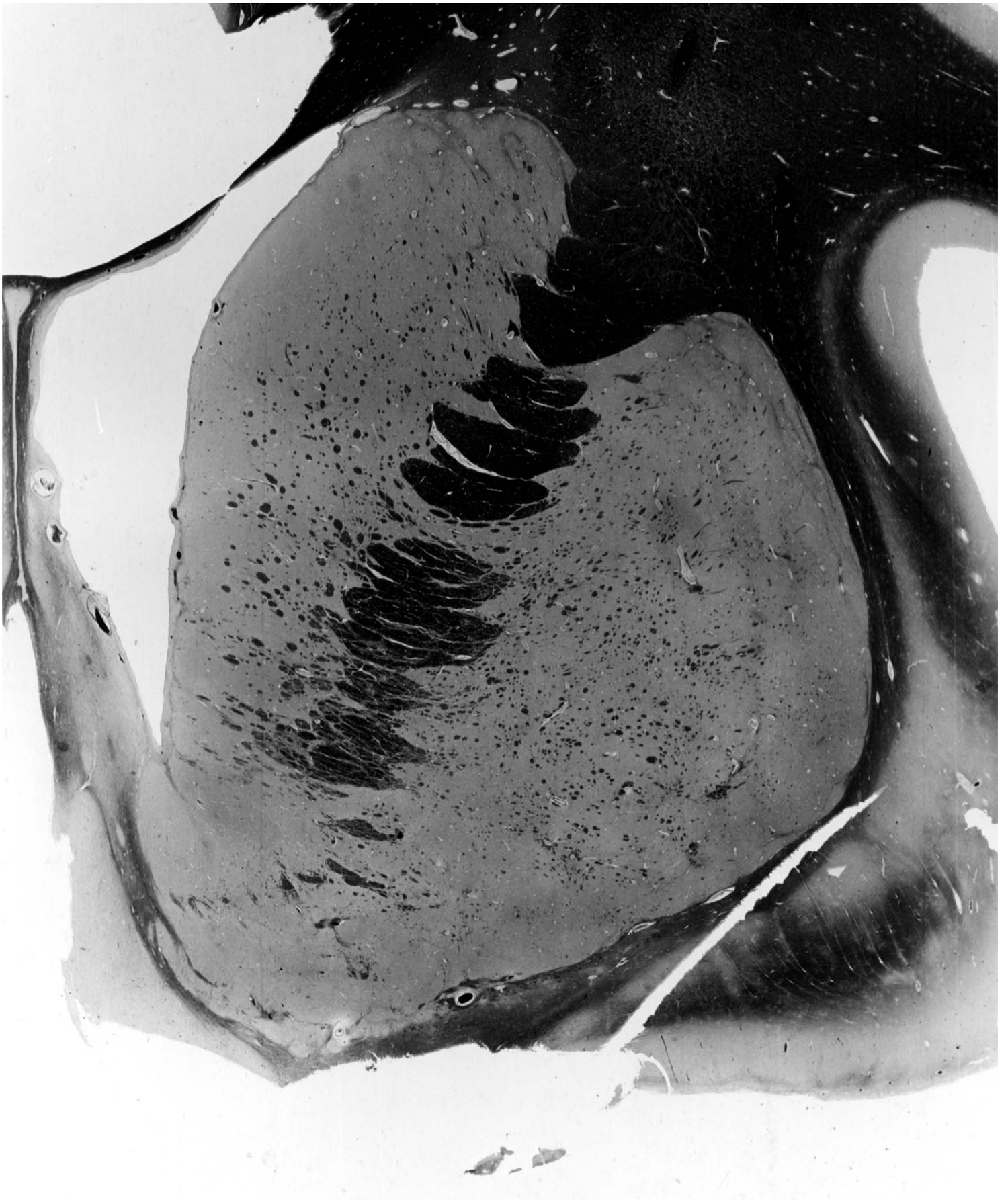




15

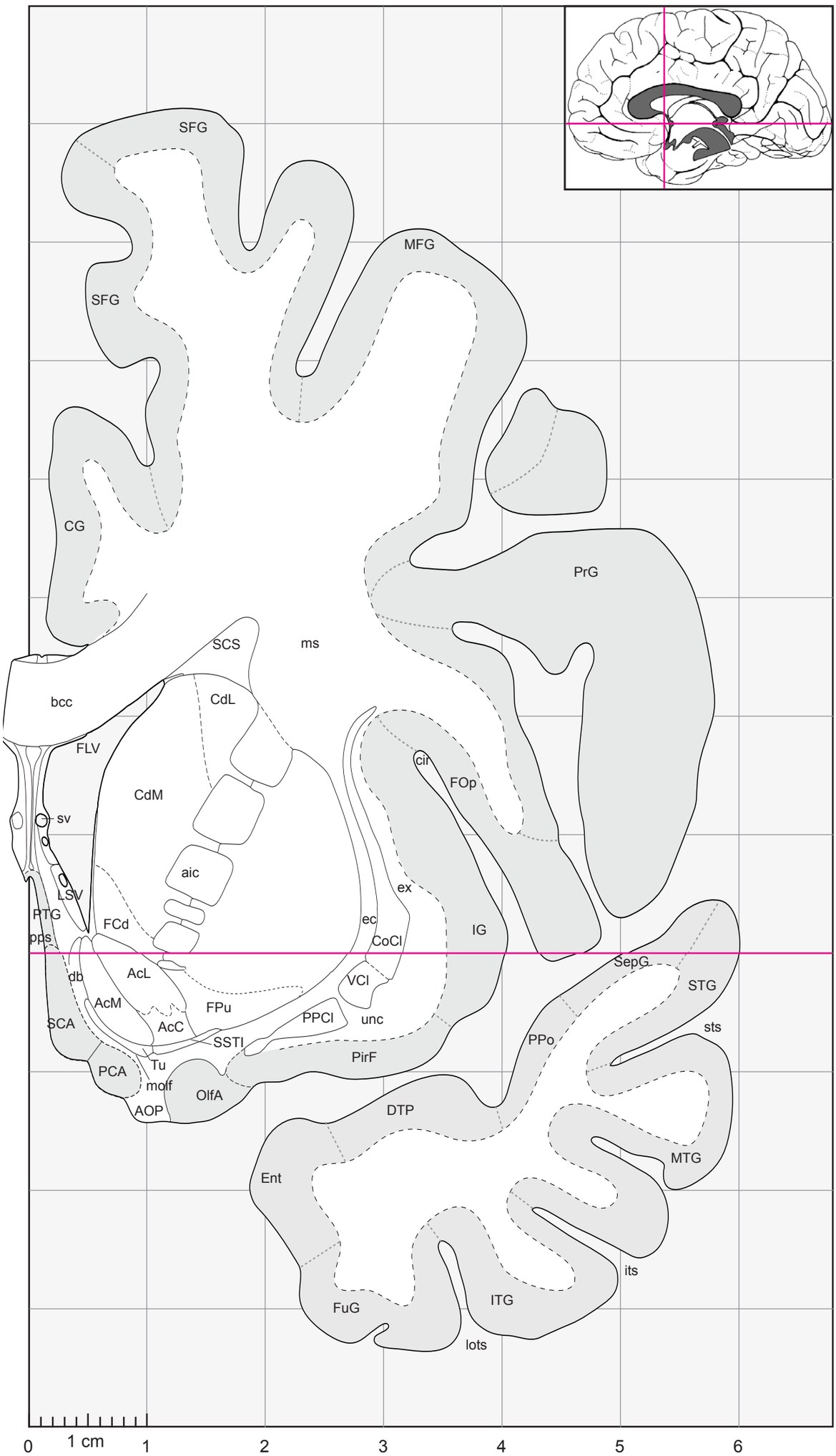
-7,5 mm

AcC accumbens nucleus, central (subventricular) part (core)
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aic ant. limb of internal capsule
AOP anterior olfactory nucleus, posterior part
apss anterior parolfactory sulcus, superior branch
bcc body of the corpus callosum
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cgs cingulate sulcus
cir circular insular sulcus
CoCl compact insular claustrum
DTP dorsal temporopolar region
ec external capsule
Ent entorhinal cortex
ex extreme capsule
FCd caudate fundus region
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
GR gyrus rectus
IFGOp inferior frontal gyrus, opercular part
IFGTr inferior frontal gyrus, triangular part
IG insular gyrus
IGr indusium griseum
ITG inferior frontal gyrus
its inferior temporal sulcus
lls lateral longitudinal stria
lots lateral occipitotemporal sulcus
MFG medial frontal gyrus
mls medial longitudinal stria
molf medial olfactory radiation
ms medullary substance of frontal lobe
MTG medial temporal gyrus
olf olfactory tract
OlfA olfactory area
olfr olfactory radiation
Pir cortex (pre-)piriformis
PPCl prepiriform claustrum
PPo planum polare
pps posterior parolfactory sulcus
racc radiation of corpus callosum
SCA subcallosal area
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
sfs superior frontal sulcus
SptP septum pellucidum
SSTI substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein
unc uncinate fasciculus

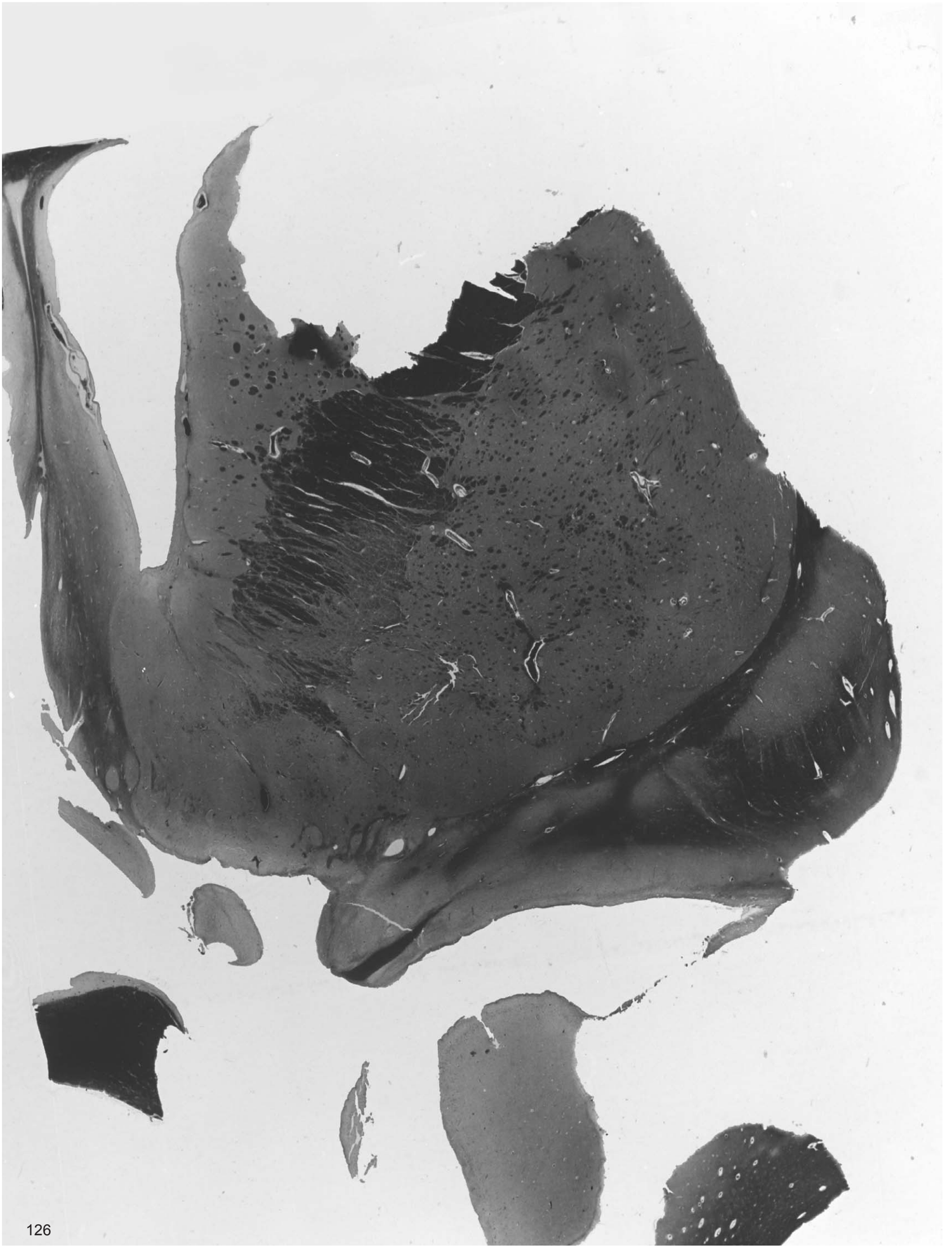


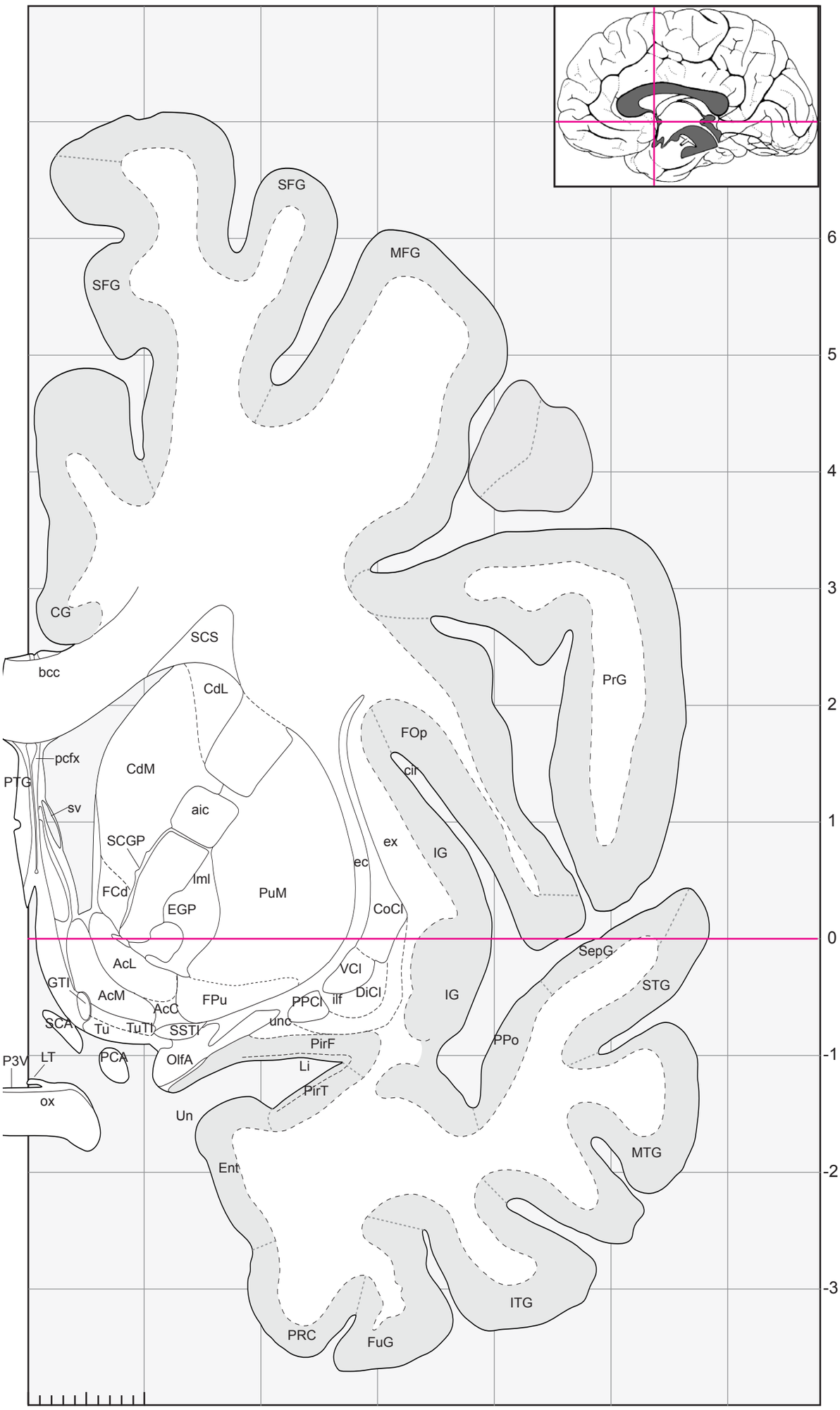
16

-5,8 mm



AcC accumbens nucleus, central (subventricular) part (core)
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aic ant. limb of internal capsule
AOP anterior olfactory nucleus, posterior part
bcc body of the corpus callosum
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl (compact) insular claustrum
db diagonal band
DTP dorsal temporopolar gyrus
ec external capsule
ex extreme capsule
FCd accumbens n., caudate fundus region
FLV frontal horn of lat. ventricle
FOp frontal operculum
FPu accumbens n., putaminal fundus region
FuG fusiform gyrus
IG insular gyrus
ITG inferior frontal gyrus
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
LSV ventrolateral septal nucleus
MFG medial frontal gyrus
MTG medial temporal gyrus
molf medial olfactory radiation
ms medullary substance of frontal lobe
OlfA olfactory area
PCA precommissural archicortex
PirF (pre-)piriform cortex, frontal area
PPCl prepiriform claustrum
PPo planum polare
pps posterior parolfactory sulcus
SCA subcallosal area
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
SSTI substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein
Tu olfactory tubercle
unc uncinate fasciculus
VCl ventral claustrum

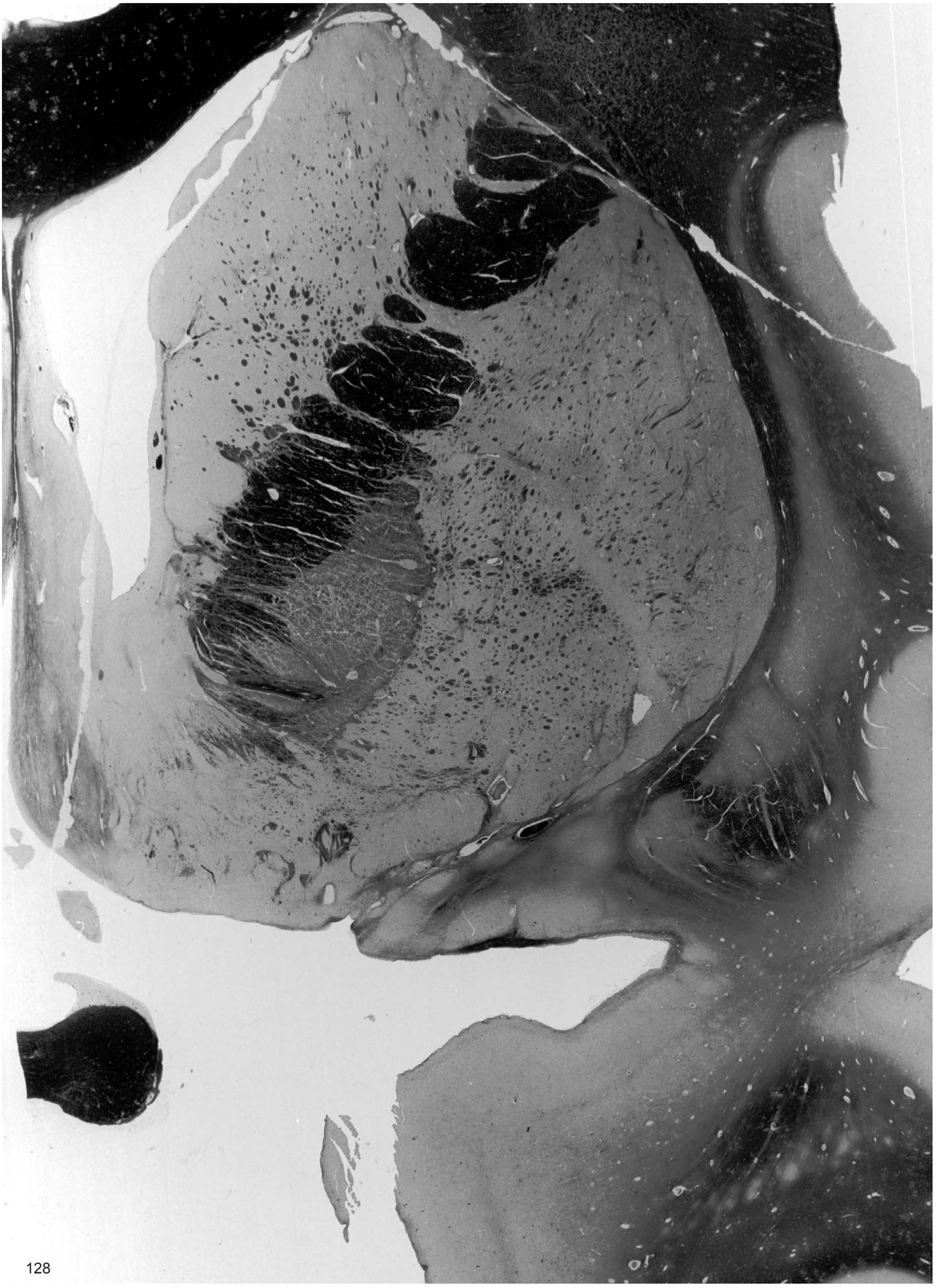


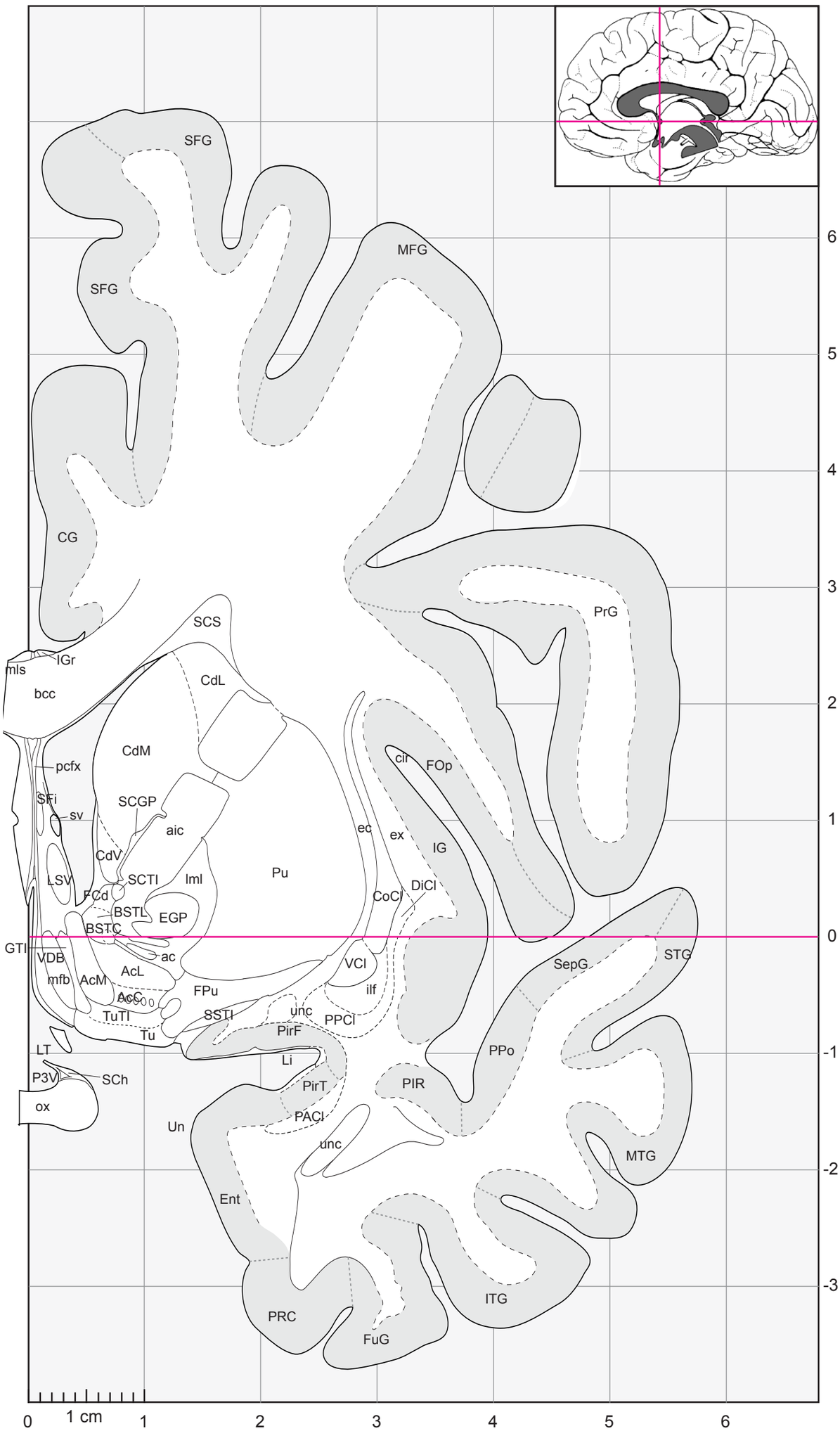


17

-4,2 mm

AcC accumbens nucleus, central (subventricular) part (core)
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aic ant. limb of internal capsule
bcc body of the corpus callosum
CdL lateral caudate nucleus
CdM medial caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl (compact) insular claustrum
DiCl diffuse insular claustrum
ec external capsule
EGP external globus pallidus
Ent entorhinal cortex
ex extreme capsule
FCd accumbens nucleus, caudate fundus region
FOp frontal operculum
FPu accumbens nucleus, putaminal fundus region
FuG fusiform gyrus
GTI great terminal island
IG insular gyrus
ilf inferior longitudinal fasciculus
ITG inferior frontal gyrus
Li limen insulae
lml lateral medullary lamina of the globus pallidus
LT lamina terminalis
MFG medial frontal gyrus
MTG medial temporal gyrus
OlfA olfactory area
ox optic chiasm
P3V preoptic recess of the third ventricle
PCA precommissural archicortex
pcfx precommissural fornix
Pir (pre-)piriform cortex
PPCl prepiriform claustrum
PPo planum polare
PRC perirhinal cortex
PuM medial putamen
SCA subcallosal area
SCGP supracapsular part of the globus pallidus
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
SSTI substriatal terminal island
STG superior temporal gyrus
sv septal vein
Tu olfactory tubercle
TuTI tubercular terminal island(s)
Un uncus
unc uncinate fasciculus
VCl ventral claustrum

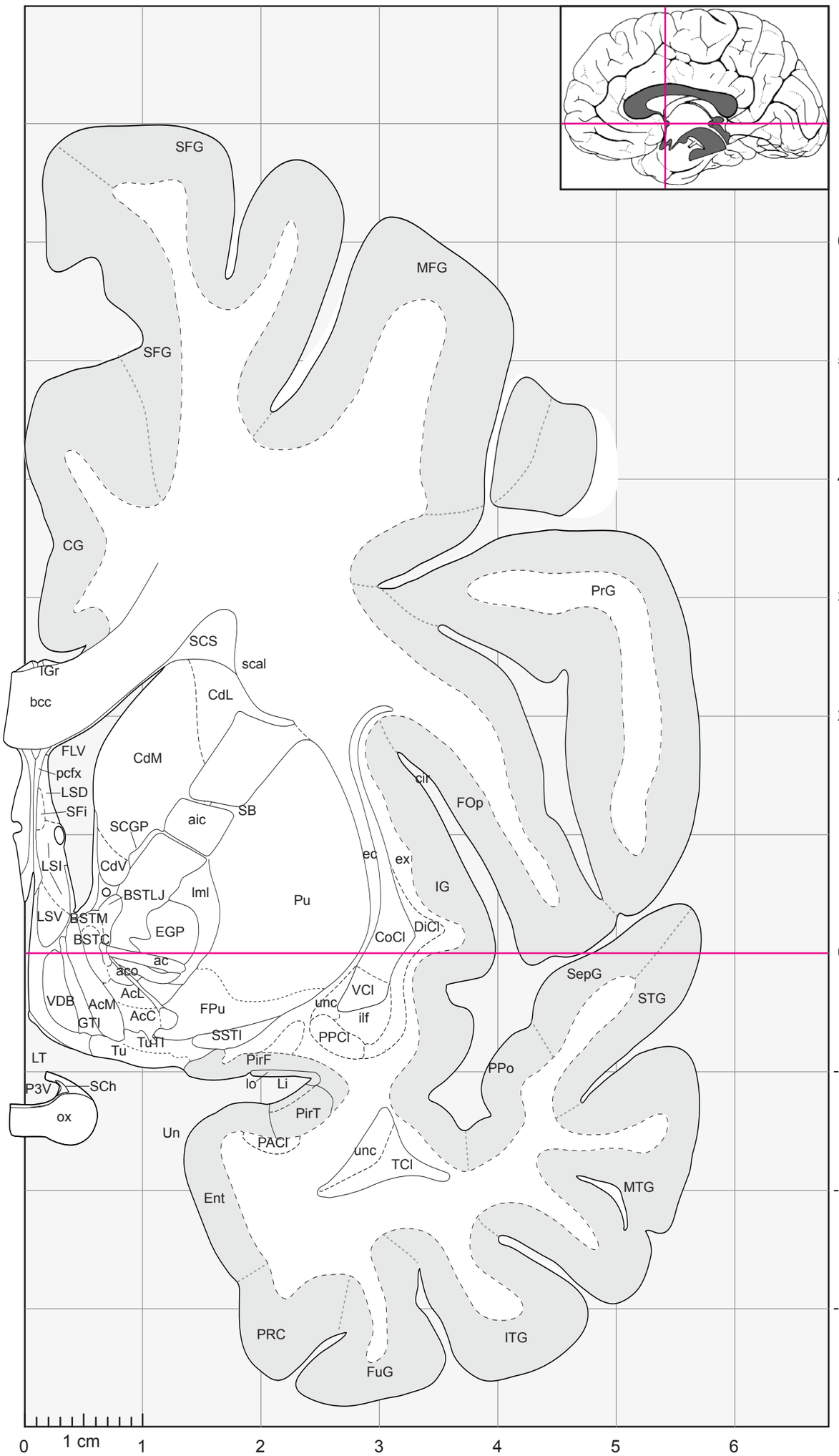




18

-2,7 mm

ac anterior commissure
AcC accumbens nucleus, central (subventricular) part (core)
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aic ant. limb of internal capsule
bcc body of the corpus callosum
BSTC bed nucleus of the stria terminalis, central division
BSTL bed nucleus of the stria terminalis, lateral division
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl (compact) insular claustrum
DiCl diffuse insular claustrum
ec external capsule
EGP external globus pallidus
Ent entorhinal cortex
ex extreme capsule
FCd caudate fundus region
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
GTI great terminal island
IG insular gyrus
IGr indusium griseum
ilf inferior longitudinal fasciculus
ITG inferior frontal gyrus
Li limen insulae
lml lateral medullary lamina of the globus pallidus
LSV ventrolateral septal nucleus
LT lamina terminalis
mfb medial forebrain bundle
MFG medial frontal gyrus
mls medial longitudinal stria
MTG medial temporal gyrus
ox optic chiasm
P3V preoptic recess of the third ventricle
PACl preamygdalar claustrum
pcfx precommissural fornix
PIR parainsular region
PirF (pre-)piriform cortex, frontal area
PirT (pre-)piriform cortex, temporal area
PPCl prepiriform claustrum
PPo planum polare
PRC perirhinal cortex
Pu putamen
SCGP supracapsular part of the globus pallidus
SCh suprachiasmatic nucleus
SCS subcallosal stratum
SCTI subcaudate terminal island
SepG separans gyrus
SFG superior frontal gyrus
SFi septofimbrial nucleus
SLG semilunar gyrus
SSTI substriatal terminal island
STG superior temporal gyrus
sv septal vein
Tu olfactory tubercle
TuTI tubercular terminal island(s)
Un uncus
unc uncinate fasciculus
VCl ventral claustrum
VDB vertical limb of the diagonal band

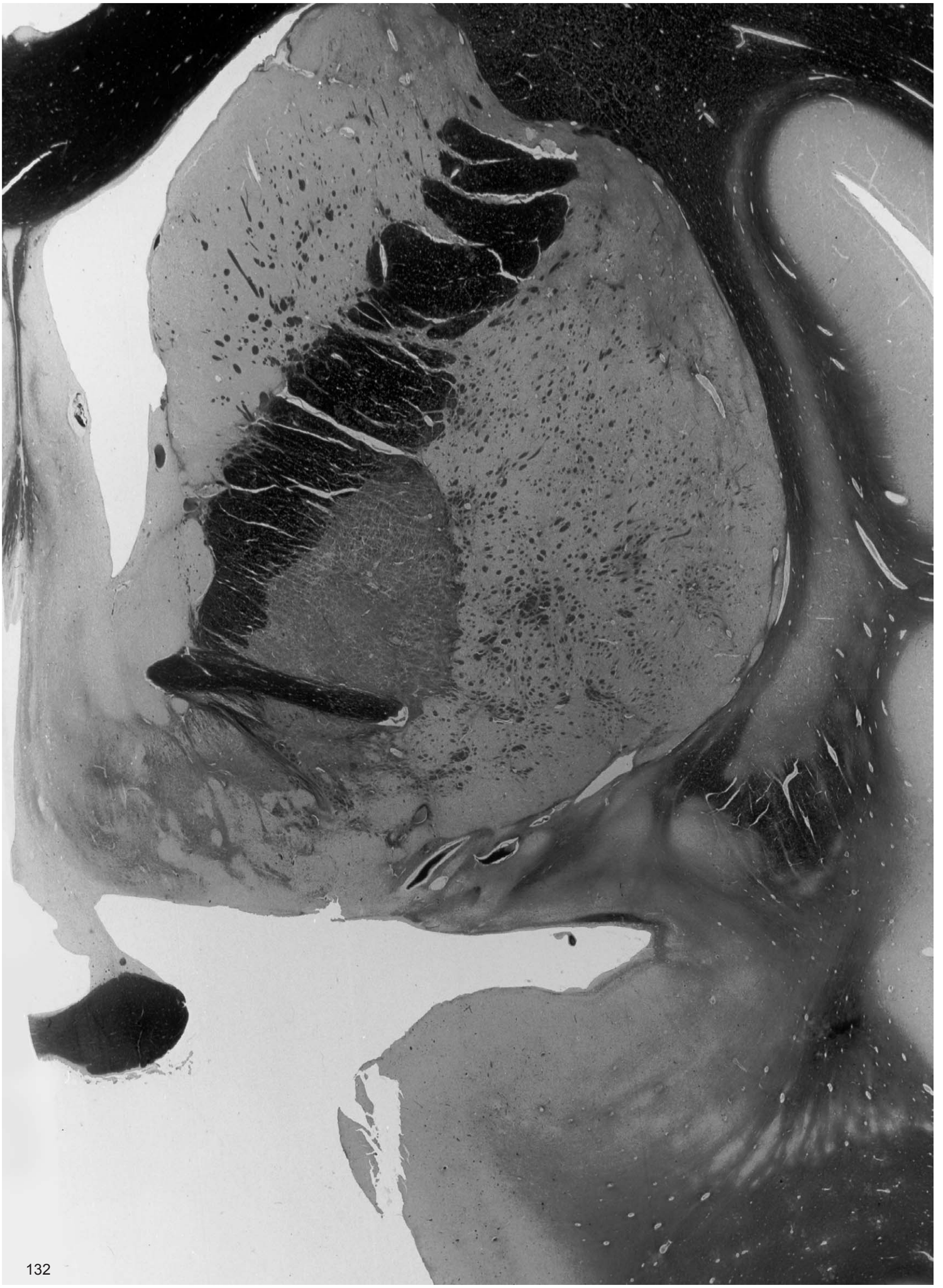


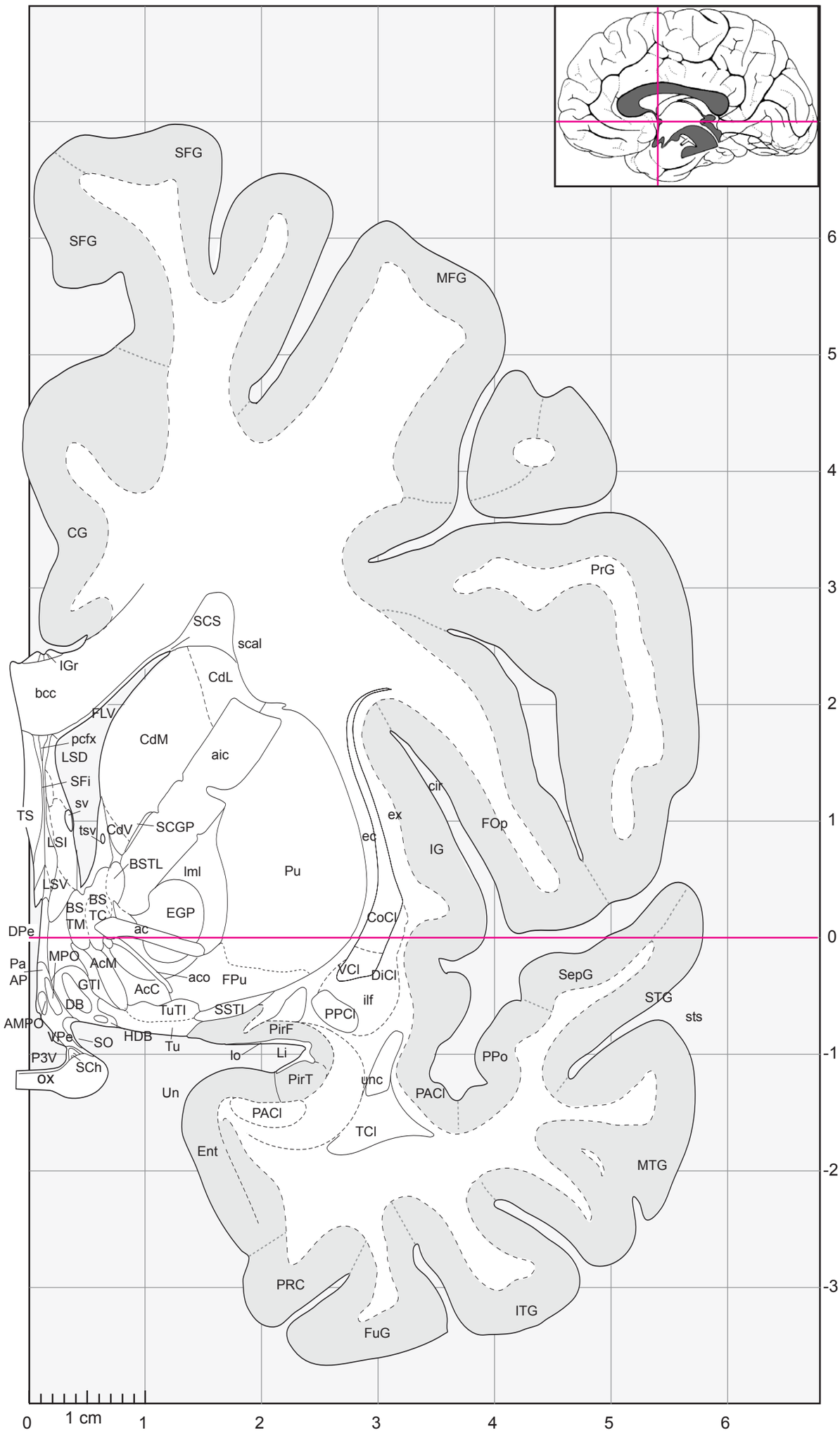
19

-2,0 mm

ac anterior commisure
AcC accumbens nucleus, central (subventricular) part (core)
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aco anterior commissure, olfactory limb
AcSV accumbens nucleus, subventricular part
aic ant. limb of internal capsule
bcc body of the corpus callosum
BSTC bed nucleus of the stria terminalis, central division
BSTLJ bed nucleus of the stria terminalis, lateral division, juxtacapsular part
BSTM bed nucleus of the stria terminalis, medial division
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl (compact) insular claustrum
DiCl diffuse insular claustrum
ec external capsule
EGP external globus pallidus
Ent entorhinal cortex
ex extreme capsule
FLV frontal horn of lat. ventricle
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
GTI great terminal island
IG insular gyrus
IGr indusium griseum
ilf inferior longitudinal fasciculus
ITG inferior frontal gyrus
Li limen insulae
lml external medullary lamina of the globus pallidus
lo lateral olfactory tract
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LSV ventrolateral septal nucleus
LT lamina terminalis
MFG medial frontal gyrus
MTG medial temporal gyrus
ox optic chiasm
P3V preoptic recess of the third ventricle
PACl preamygdalar claustrum
pcfx precommissural fornix
PirF (pre-)piriform cortex, frontal area
PirT (pre-)piriform cortex, temporal area
PPCl (pre-)piriform claustrum
PPo planum polare
PRC perirhinal cortex
Pu putamen
SB striatal cell bridges
scal subcallosal bundle
SCGP supracapsular part of the globus pallidus
SCh suprachiasmatic nucleus
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
SFi septofimbrial nucleus
SLG semilunar gyrus
SSTI substriatal terminal island
STG superior temporal gyrus
TCl temporal claustrum
Tu olfactory tubercle
TuTI tubercular terminal island(s)
Un uncus
unc uncinate fasciculus
VCl ventral claustrum
VDB vertical limb of the diagonal band

Some unexplained abbreviations on the following pages are listed in the Index of Abbreviations.

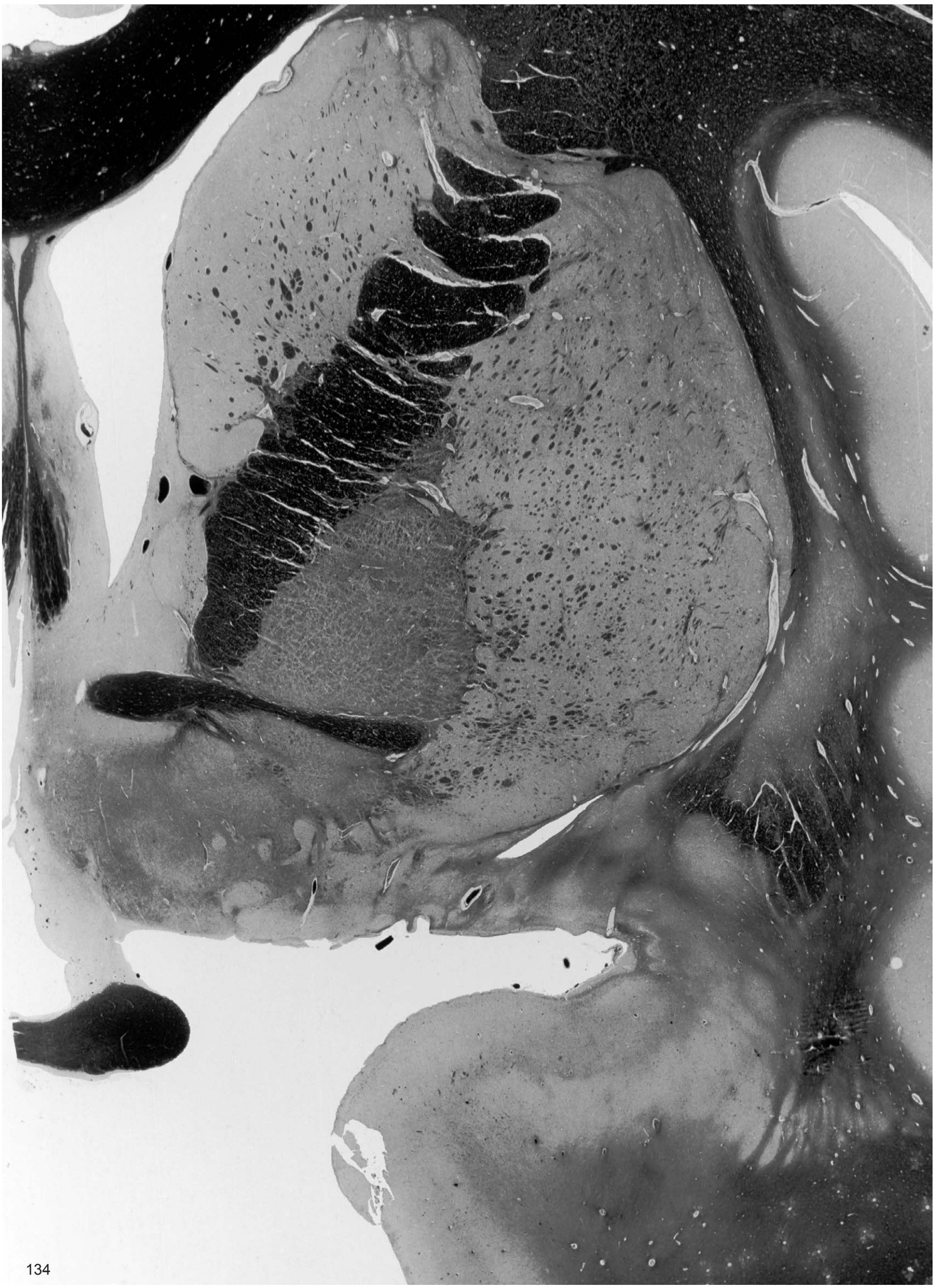


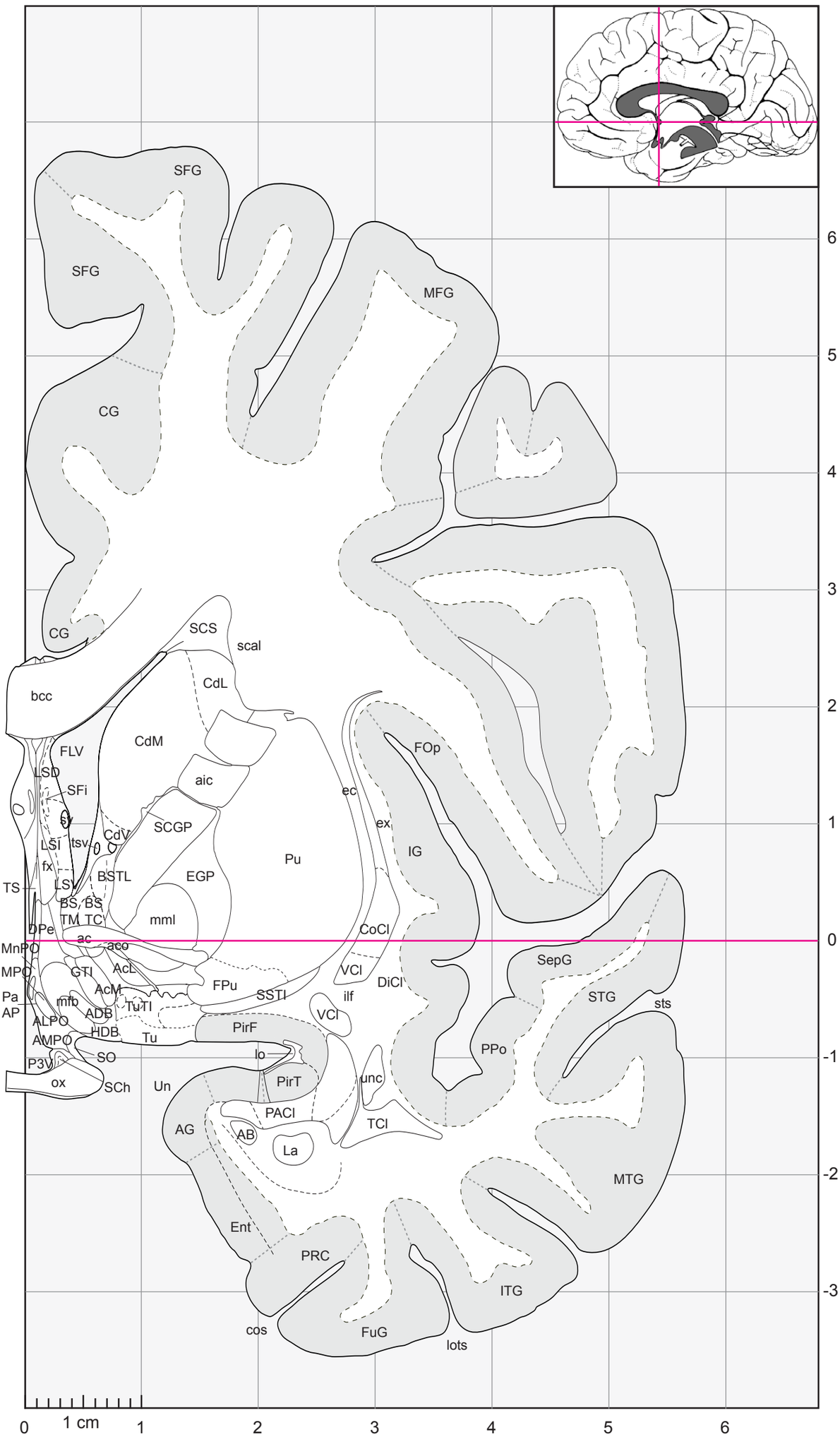


20

-1,3 mm

ac anterior commissure
AcC accumbens nucleus, central (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aco ant. commissure, olfact. limb
aic ant. limb of internal capsule
AMPO ant. medial preoptic nucl.
bcc body of the corpus callosum
BSTC bed nucleus of the stria terminalis, central division
BSTL bed nucleus of the stria terminalis, lateral division
BSTM bed nucleus of the stria terminalis, medial division
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl compact insular claustrum
DB nucleus of the diagonal band
DiCl diffuse insular claustrum
DPe dorsal periventricular hypothalamic nucleus
ec external capsule
EGP external globus pallidus
Ent entorhinal cortex
ex extreme capsule
FLV frontal horn of lat. ventricle
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
GTI great terminal island
HDB horizontal limb of the diagonal band
IG insular gyrus
ilf inferior longitudinal fasciculus
ITG inferior frontal gyrus
Li limen insulae
lml external medullary lamina of the globus pallidus
lo laterao olfactory tract
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LSV ventrolateral septal nucleus
MFG medial frontal gyrus
MPO medial preoptic nucleus
MTG medial temporal gyrus
ox optic chiasm
P3V preoptic recess of the third ventricle
PaAP paraventricular hypothalamic n., ant. parvocellular part
PACl preamygdalar claustrum
pcfx precommissural fornix
PirF (pre-)piriform cortex, frontal area
PirT (pre-)piriform cortex, temporal area
PPCl prepiriform claustrum
PPo planum polare
PRC perirhinal cortex
Pu putamen
SCGP supracapsular part of the globus pallidus
SCh suprachiasmatic nucleus
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
SFi septofimbrial nucleus
SLG semilunar gyrus
SO supraoptic nucleus
SSTl substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein
TCl temporal claustrum
TS triangular septal nucleus
tsv thalamostriate vein
Tu olfactory tubercle
TuTl tubercular terminal island(s)
Un uncus
unc uncinate fasciculus
VCl ventral claustrum
VPe ventral periventricular hypothalamic nucleus

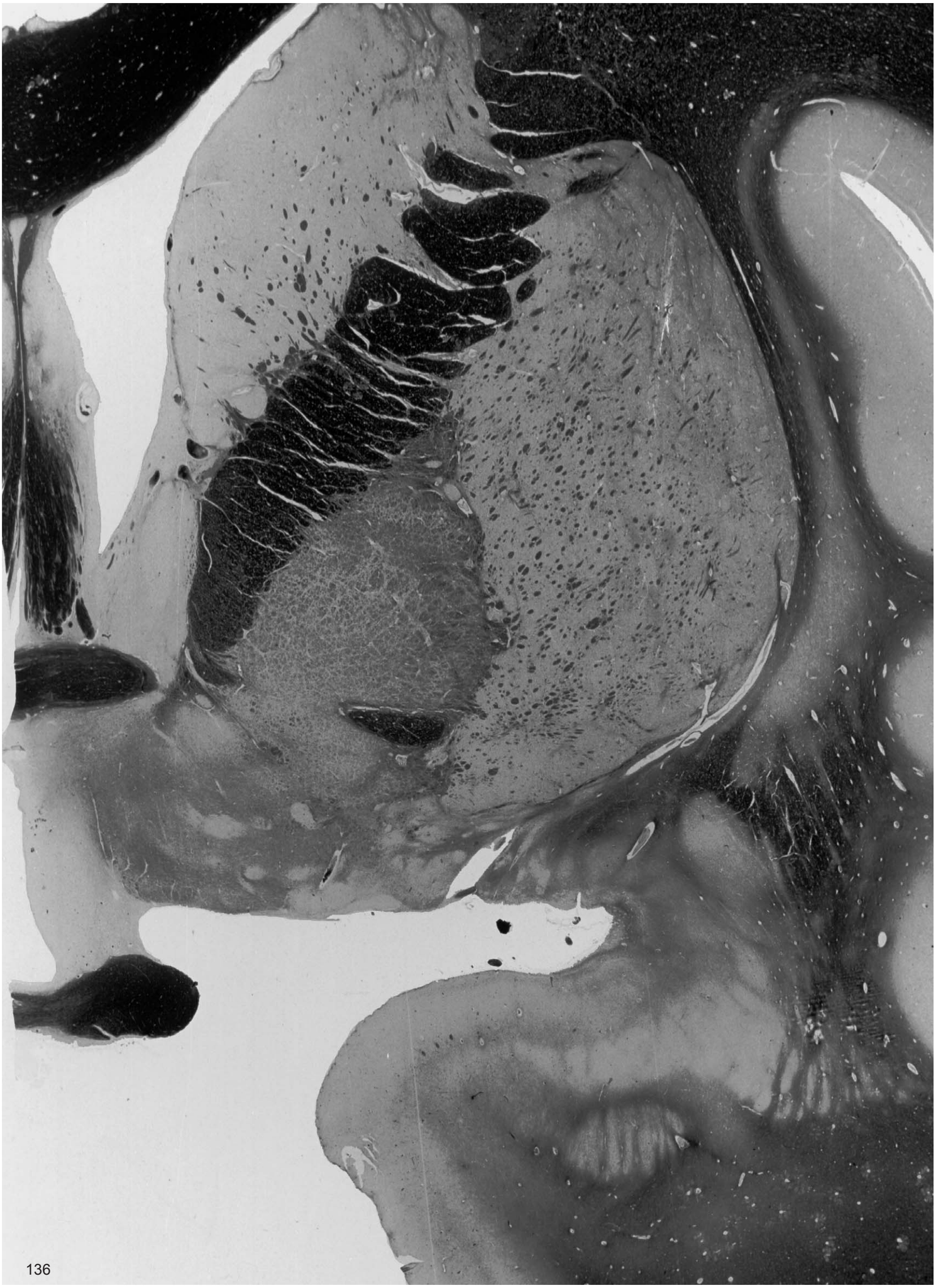


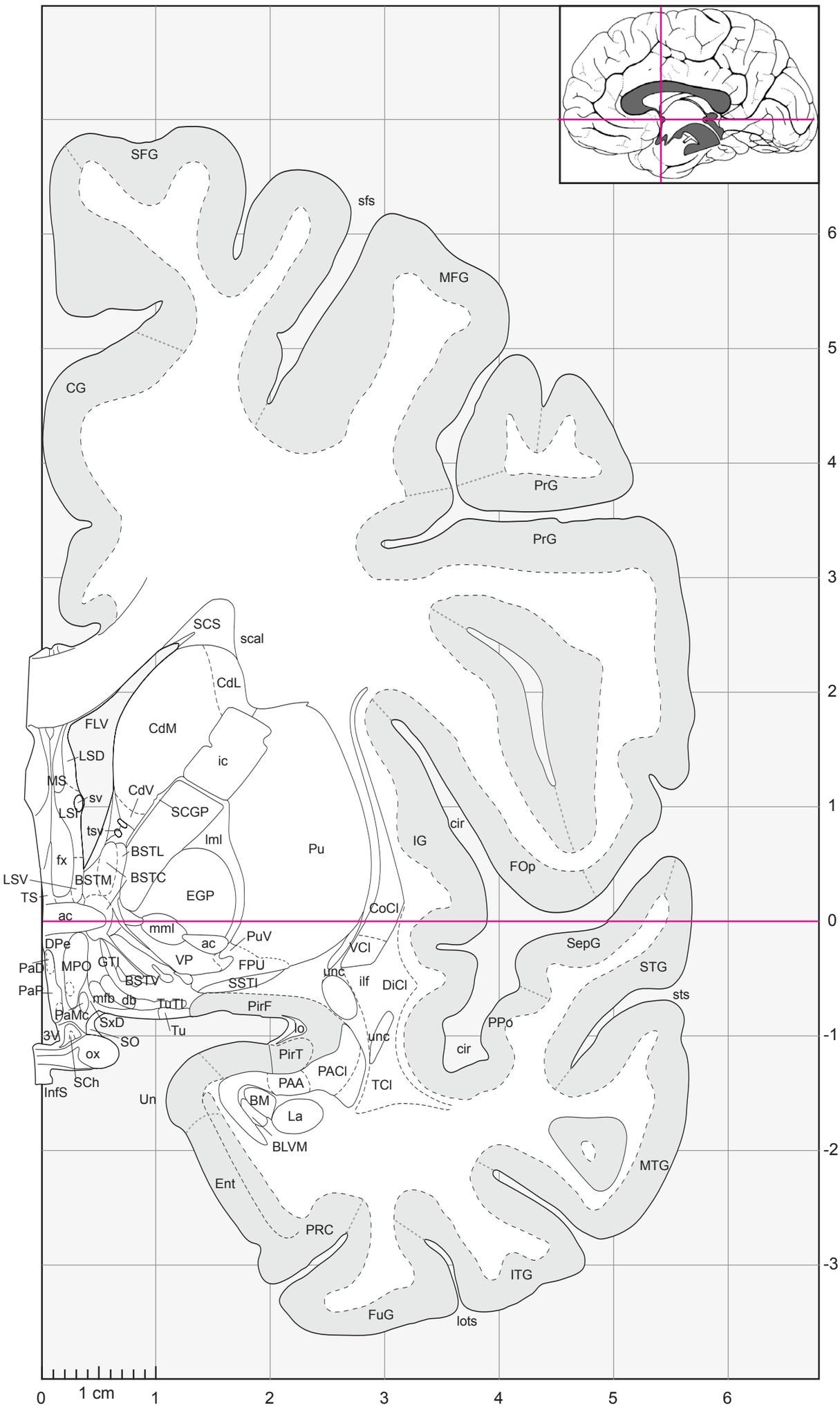


21

-0,6 mm

AB access. basal amygdaloid ncl.
ac anterior commissure
AcL accumbens nucl., lateral (subventricular) part (core)
AcM accumbens nucl., medial (subventricular) part (shell)
aco anterior commissure, olfactory limb
ADB nucleus of the diagonal band, angular part
AG ambiens gyrus
aic ant. limb of internal capsule
ALPO ant. lateral preoptic nucl.
AMPO ant. medial preoptic nucl.
bcc body of the corpus callosum
BM basomedial amygdaloid nucl.
BSTC bed nucleus of the stria terminalis, central division
BSTL bed nucleus of the stria terminalis, lateral division
BSTM bed nucleus of the stria terminalis, medial division
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
CoCl compact insular claustrum
cos collateral sulcus
DiCl diffuse insular claustrum
DPe dorsal periventricular hypothalamic nucleus
ec external capsule
EGP external globus pallidus
Ent entorhinal cortex
ex extreme capsule
FLV frontal horn of lat. ventricle
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
fx fornix longus
GTI great terminal island
HDB horizontal limb of the diagonal band
ilf inferior longitudinal fasciculus
ITG inferior frontal gyrus
La lateral amygdaloid nucleus
lo lateral olfactory tract
lots lateral occipitotemporal sulcus
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LSV ventrolateral septal nucleus
mfb medial forebrain bundle
MFG medial frontal gyrus
mml medial medullary lamina
MnPO median preoptic nucleus
MPO medial preoptic nucleus
MTG medial temporal gyrus
ox optic chiasm
P3V preoptic recess of 3rd ventr.
PaAP paraventricular hypothalamic n., ant. parvocellular part
PACl preamygdalar claustrum
PirF piriform cortex, frontal area
PirT piriform cortex, temporal area
PPo planum polare
PRC perirhinal cortex
scal subcallosal bundle
SCGP supracapsular part of the globus pallidus
SCh suprachiasmatic nucleus
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
SFi septofimbrial nucleus
SLG semilunar gyrus
SO supraoptic nucleus
SSTI substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein
TCl temporal claustrum
TS triangular septal nucleus
tsv thalamostriate vein
Tu olfactory tubercle
TuTI tubercular terminal islands
Un uncus
unc uncinate fasciculus
VCl ventral claustrum

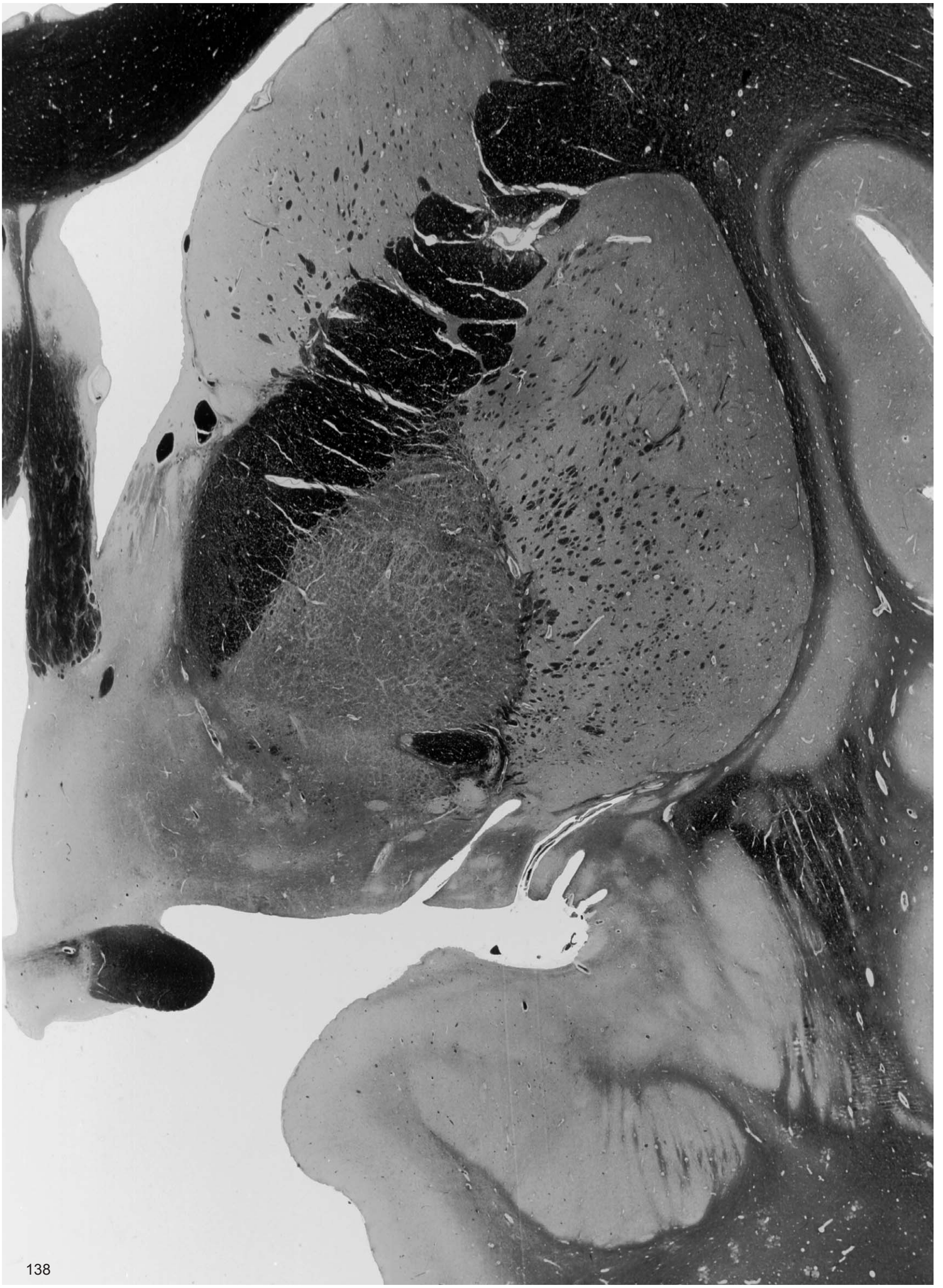


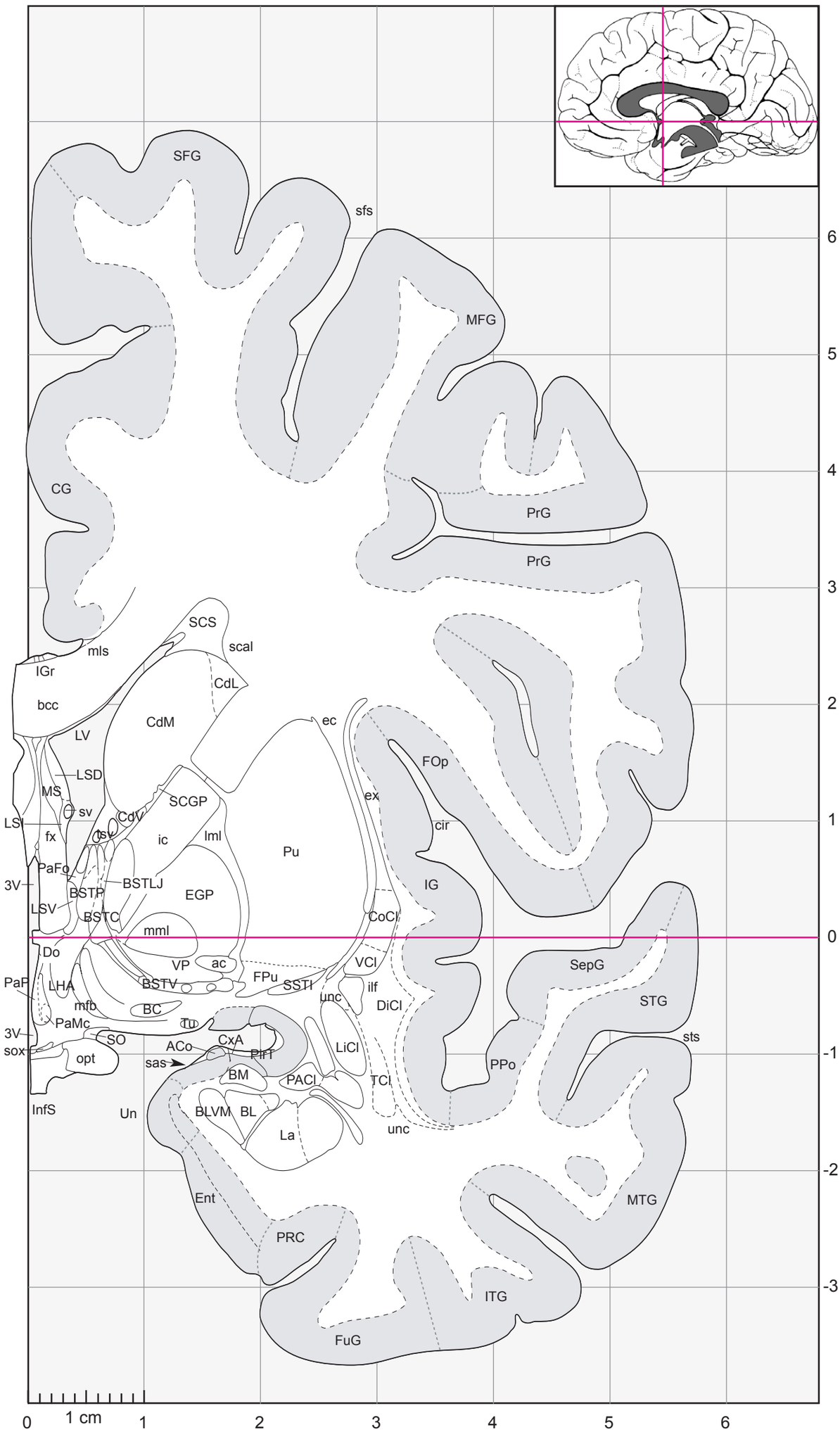


22

0,0 mm

3V third ventricle
ac anterior commissure
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
BSTC bed nucleus of the stria terminalis, central division
BSTL bed nucleus of the stria terminalis, lateral division
BSTM bed nucleus of the stria terminalis, medial division
BSTV bed nucleus of the stria terminalis, ventral division
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
CG cingulate gyrus
CoCl compact insular claustrum
db diagonal band
DiCl diffuse insular claustrum
DPe dorsal periventricular hypothalamic nucleus
EGP external globus pallidus
Ent entorhinal cortex
FLV frontal horn of lat.l ventricle
FOp frontal operculum
FPu putaminal fundus region
FuG fusiform gyrus
fx fornix
GTI great terminal island
ic internal capsule
IG insular gyrus
ilf inferior longitudinal fasciculus
InfS infundibular stalk
ITG inferior frontal gyrus
La lateral amygdaloid nucleus
lml external medullary lamina of the globus pallidus
lo lateral olfactory tract
lots lateral occipitotemporal sulcus
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LSV ventrolateral septal nucleus
mfb medial forebrain bundle
MFG medial frontal gyrus
mml medial medullary lamina of the globus pallidus
MPO medial preoptic nucleus
MS medial septal nucleus
MTG medial temporal gyrus
ox optic chiasm
PAA periamygdalar area
PACl preamygdalar claustrum
PaD paraventricular nucleus, dorsal part
PaMc paraventricular nucleus, magnocellular part
PaP paraventricular nucleus, parvocellular part
PirF piriform cortex, frontal area
PirT piriform cortex, temporal area
PPo planum polare
PRC perirhinal cortex
PrG precentral gyrus
Pu putamen
PuV ventral putamen
scal subcallosal bundle
SCGP supracapsular part of the globus pallidus
SCh suprachiasmatic nucleus
SepG separans gyrus
SFG superior frontal gyrus
sfs superior frontal sulcus
SO supraoptic nucleus
SSTI substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein
SxD sexual dimorphic ncl.
TCl temporal claustrum
TS triangular septal nucleus
tsv thalamostriate vein
Tu olfactory tubercle
TuTl tubercular terminal island(s)
Un uncus
unc uncinate fasciculus
VCl ventral claustrum

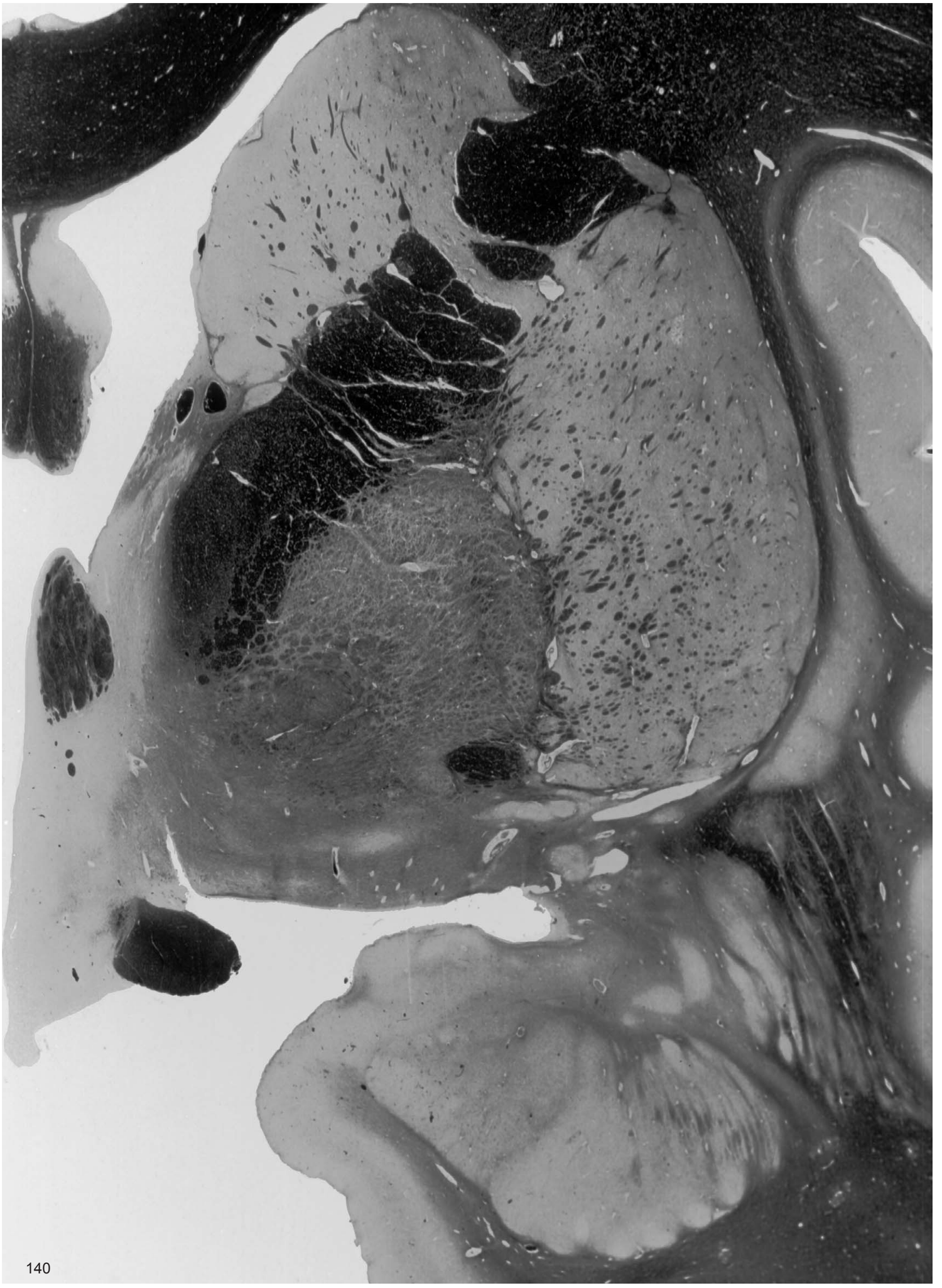




23

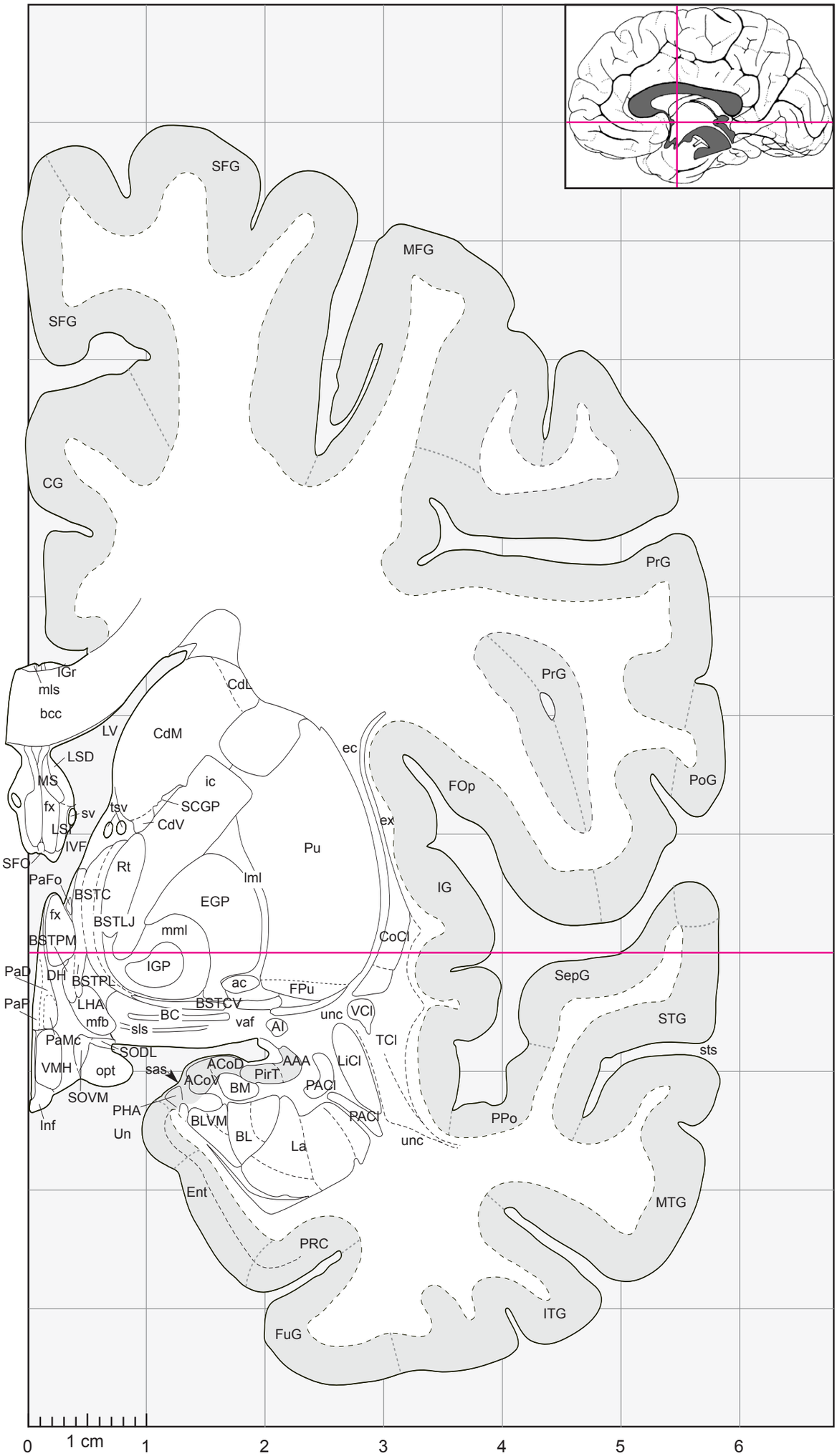
1,3 mm

3V third ventricle
ac anterior commissure
ACo ant. cortical amygdaloid nucl.
BC basal nucleus, compact part
bcc body of the corpus callosum
BL basolateral amygdaloid nucl.
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
BSTC bed nucleus of the stria terminalis, central division
BSTLJ bed nucleus of the stria terminalis, lateral division, juxtacapsular part
BSTP bed nucleus of the stria terminalis, posterior part
BSTV bed nucleus of the stria terminalis, ventral division
CdV ventral caudate nucleus
CG cingulate gyrus
cir circular insular sulcus
CoCl compact insular claustrum
DiCl diffuse insular claustrum
Do dorsal hypothalamic nucleus
ec external capsule
EGP external globus pallidus
Ent entorhinal cortex
ex extreme capsule
FOp frontal operculum
FPu putaminal fundus
FuG fusiform gyrus
fx fornix
ic internal capsule
IG insular gyrus
IGr indusium griseum
ilf inferior longitudinal fasciculus
InfS infundibular stalk
ITG inferior frontal gyrus
La lateral amygdaloid nucleus
LHA lateral hypothalamic area
LiCl limitans claustrum
lml external medullary lamina of the globus pallidus
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LSV ventral septal nucleus
LV lateral ventricle
mfb medial forebrain bundle
MFG medial frontal gyrus
mls medial longitudinal stria
mml medial medullary lamina of the globus pallidus
MS medial septal nucleus
MTG medial temporal gyrus
opt optic tract
PACl preamygdalar claustrum
PaD paraventricular nucleus, dorsal part
PaFo paraventricular nucleus, fornical part
PaP paraventricular nucleus, parvocellular part
PirT piriform cortex, temporal area
PPo planum polare
PRC perirhinal cortex
PrG precentral gyrus
PuV ventral putamen
sas semiannular sulcus
scal subcallosal bundle
SCGP supracapsular part of the globus pallidus
SCS subcallosal stratum
SepG separans gyrus
SFG superior frontal gyrus
sfs superior frontal sulcus
SO supraoptic nucleus
sox supraoptic commissure
SSTl substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
sv septal vein
TCl temporal claustrum
tsv thalamostriate vein
Tu olfactory tubercle
Un uncus
unc uncinate fasciculus
VCl ventral claustrum

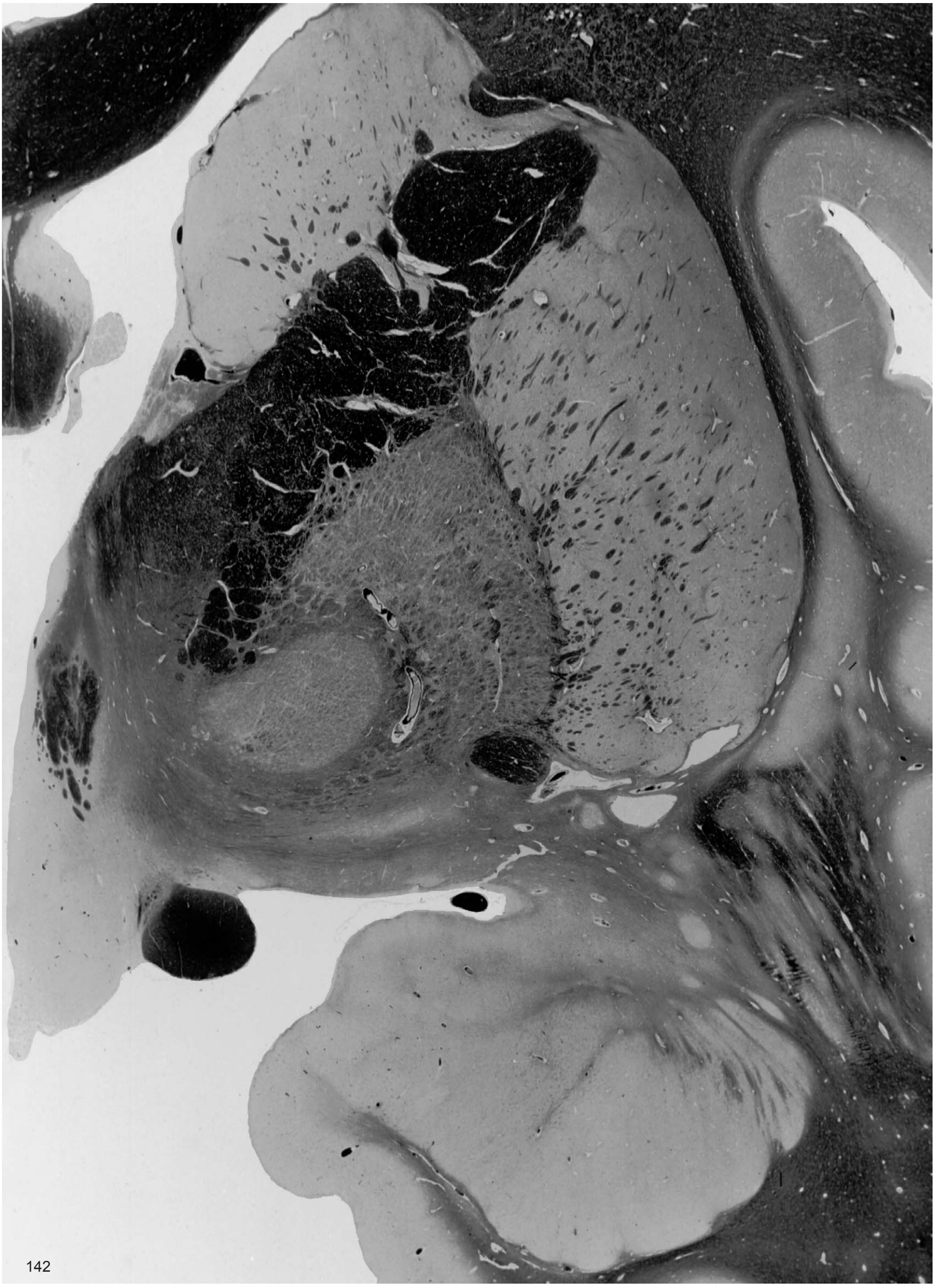


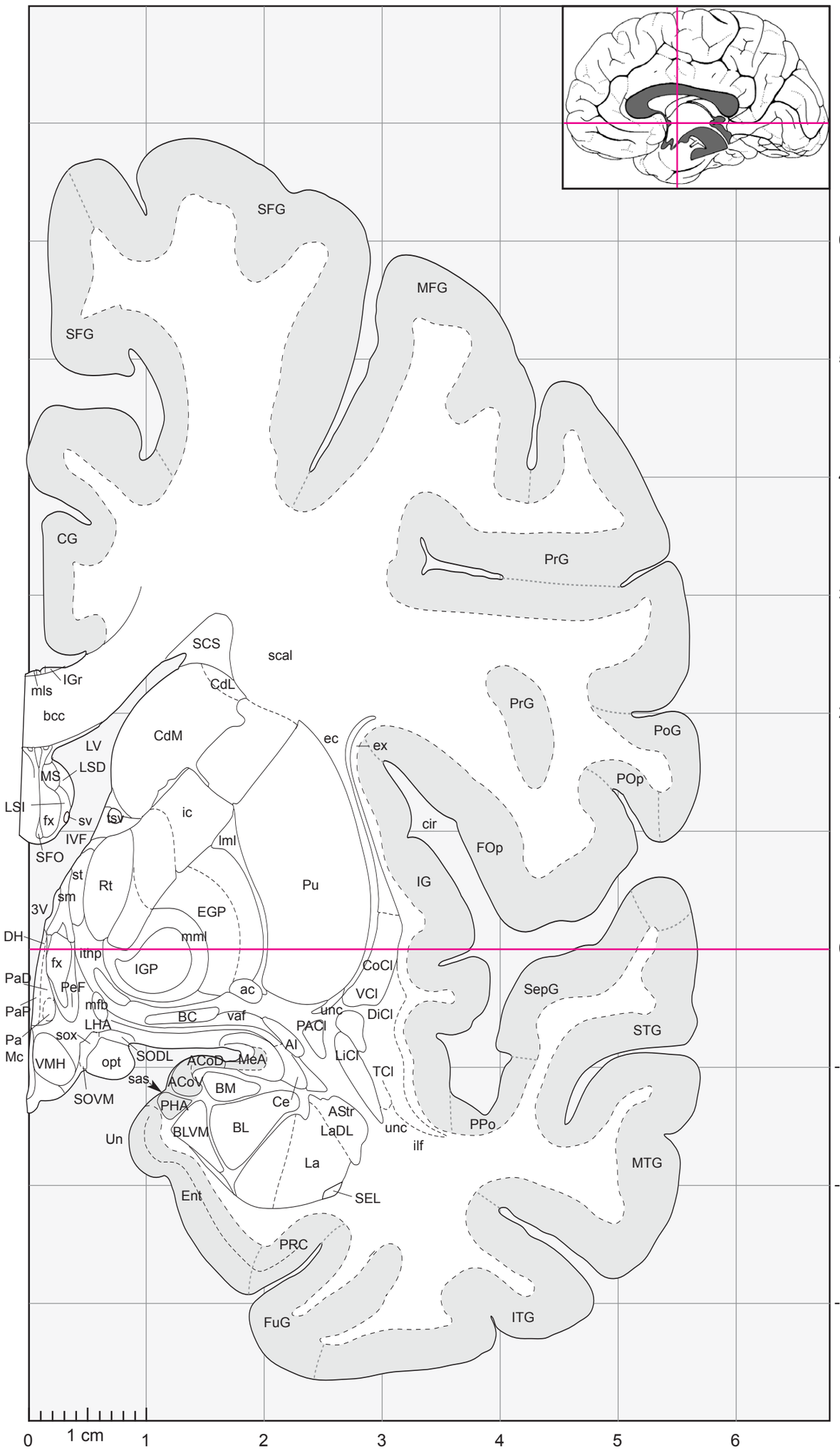
24

2,7 mm



AAA anterior amygdaloid area
ac anterior commissure
ACoD anterior cortical amygdaloid nucleus, dorsal part
ACoV anterior cortical amygdaloid nucleus, ventral part
BC basal nucleus, compact part
bcc body of the corpus callosum
BL basolateral amygdaloid nucl.
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
BSTC bed nucleus of the stria terminalis, central division
BSTLJ bed nucleus of the stria terminalis, lateral division, juxtacapsular part
BSTP bed nucleus of the stria terminalis, posterior part
BSTV bed nucleus of the stria terminalis, ventral division
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
CoCl compact insular claustrum
DH dorsal hypothalamic area
EGP external globus pallidus
Ent entorhinal cortex
FOp frontal operculum
FPu putaminal fundus
FuG fusiform gyrus
fx fornix
IGP internal globus pallidus
IGr indusium griseum
Inf infundibular nucleus
La lateral amygdaloid nucleus
LHA lateral hypothalamic area
LiCl limitans claustrum
lml external medullary lamina of the globus pallidus
LSD dorsolateral septal nucleus
LSI lateral septal nucleus, intermediate part
LV lateral ventricle
mfb medial forebrain bundle
mls medial longitudinal stria
mml medial medullary lamina of the globus pallidus
MS medial septal nucleus
opt optic tract
PACl preamygdalar claustrum
PaD paraventricular nucleus, dorsal part
PaFo paraventricular nucleus, fornical part
PaMc paraventricular nucleus, magnocellular part
PaP paraventricular nucleus, parvocellular part
PHA parahippocampal-amygdaloid transition area
PirT piriform cortex, temporal area
PoG postcentral gyrus
PPo planum polare
PRC perirhinal cortex
PrG precentral gyrus
Rt reticular thalamic nucleus
sas semiannular sulcus
sls sublenticular stria
SCGP supracapsular part of the globus pallidus
SepG separans gyrus
SFO subfornical organ
SODL supraoptic nucleus, dorsolateral part
SOVM supraoptic nucleus, ventromedial part
sox supraoptic decussation
sts superior temporal sulcus
sv septal vein
TCl temporal claustrum
tsv thalamostriate vein
Un uncus
unc uncinate fasciculus
vaf ventral anygdalofugal pathway
VCl ventral claustrum
VMH ventromed. hypothalamic n.

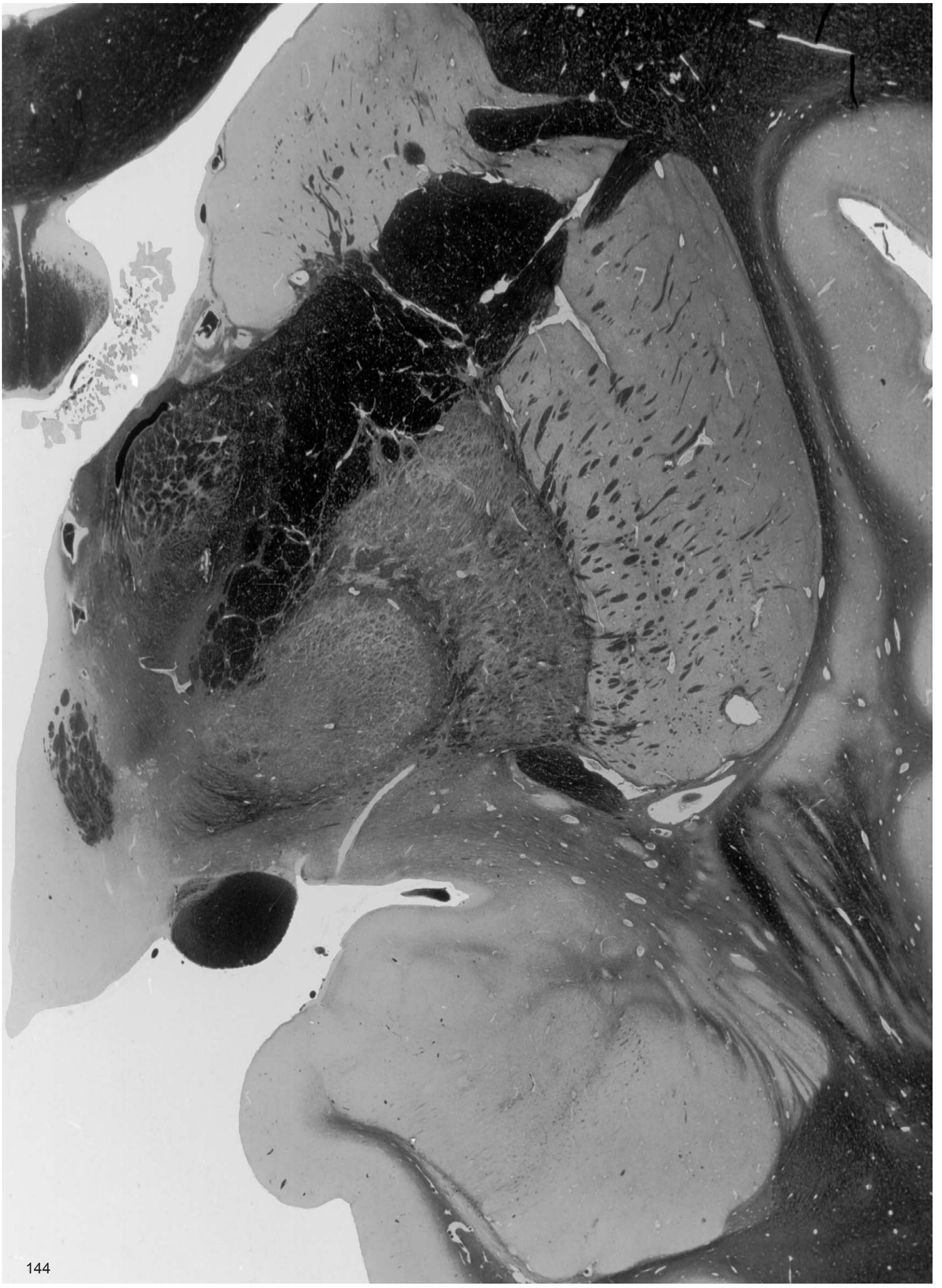




25

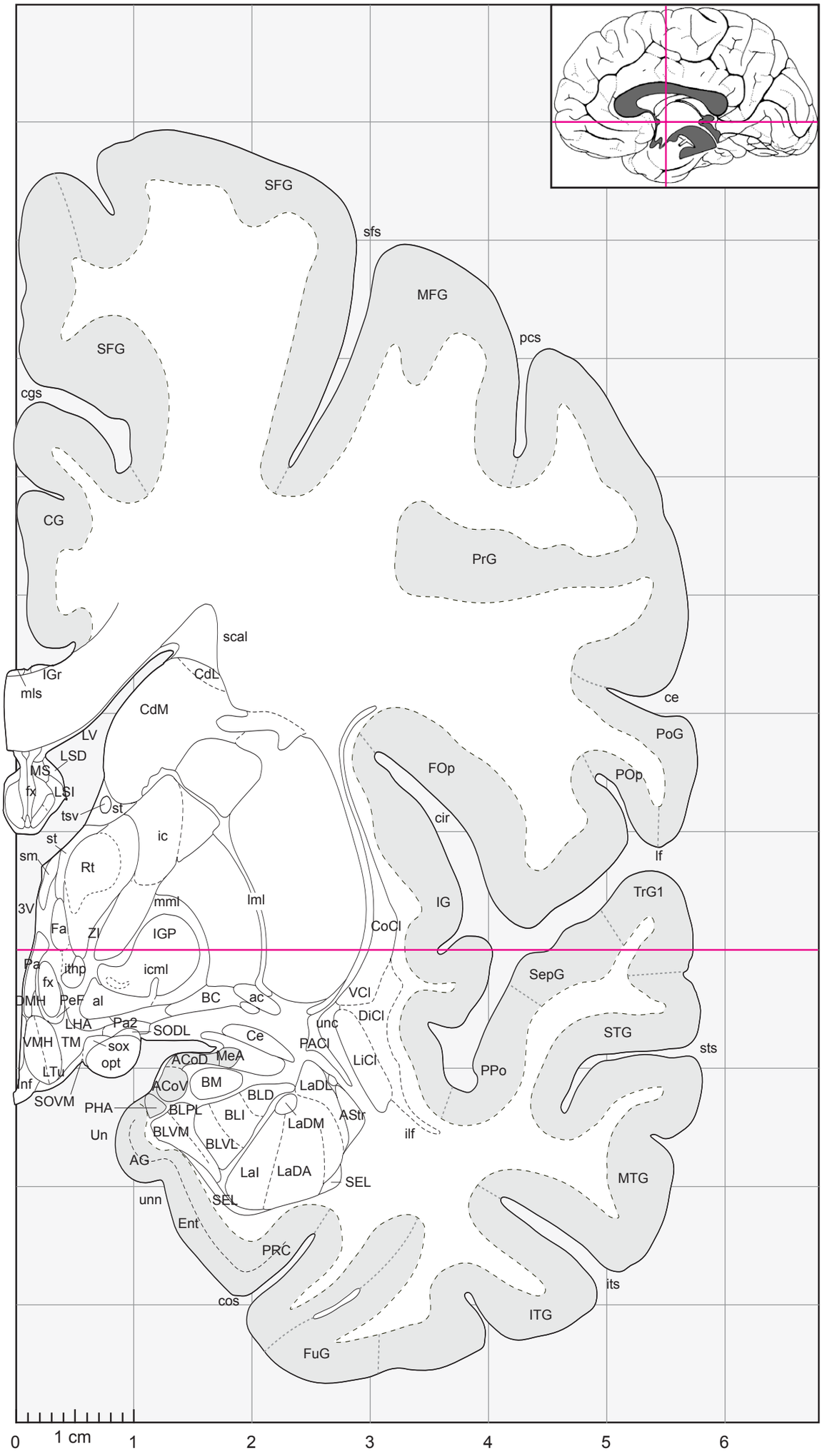
4,0 mm

3V third ventricle
ac anterior commissure
ACoD anterior cortical amygdaloid nucleus, dorsal part
ACoV anterior cortical amygdaloid nucleus, ventral part
AI amygdaloid island
AStr amygdalostriatal transit. area
BC basal nucleus, compact part
bcc body of the corpus callosum
BL basolateral amygdaloid nucl.
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
CdL lateral caudate nucleus
CdM medial caudate nucleus
Ce central amygdaloid nucleus
CG cingulate gyrus
CoCl compact insular claustrum
DH dorsal hypothalamic area
DiCl diffuse insular claustrum
EGP external globus pallidus
Ent entorhinal cortex
FOp frontal operculum
FuG fusiform gyrus
fx fornix
IG insular gyrus
IGP internal globus pallidus
IGr indusium griseum
ilf inferior longitudinal fasciculus
ithp inferior thalamic peduncle
IVF interventricular foramen
La lateral amygdaloid nucleus
LaDL lateral amygdaloid nucleus, dorsolateral part
LHA lateral hypothalamic area
LiCl limitans claustrum
lml external medullary lamina of the globus pallidus
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LV lateral ventricle
MeA medial amygdaloid nucleus, anterior part
mfb medial forebrain bundle
MFG medial frontal gyrus
mls medial longitudinal stria
mml internal medullary lamina of the globus pallidus
MS medial septal nucleus
opt optic tract
PACl preamygdalar claustrum
PaD paraventricular nucleus, dorsal part
PaMc paraventricular nucleus, magnocellular part
PaP paraventricular nucleus, parvocellular part
PeF perifornical nucleus
PHA parahippocampal-amygdaloid transition area
PoG postcentral gyrus
POp parietal operculum
PPo planum polare
PRC perirhinal cortex
PrG precentral gyrus
Rt reticular thalamic nucleus
sas semiannular sulcus
SepG separans gyrus
SEL subependymal layer
SFG superior frontal gyrus
SFO subfornical organ
sm stria medullaris of thalamus
SODL supraoptic n., dorsolat. part
SOVM supraoptic nucleus, ventromedial part
sox supraoptic decussation
sv septal vein
TCl temporal claustrum
tsv thalamostriate vein
Un uncus
unc uncinate fasciculus
vaf ventral anygdalofugal pathway
VCl ventral claustrum
VCo ventral cortical nucleus
VMH ventromedial hypothalamic nucleus

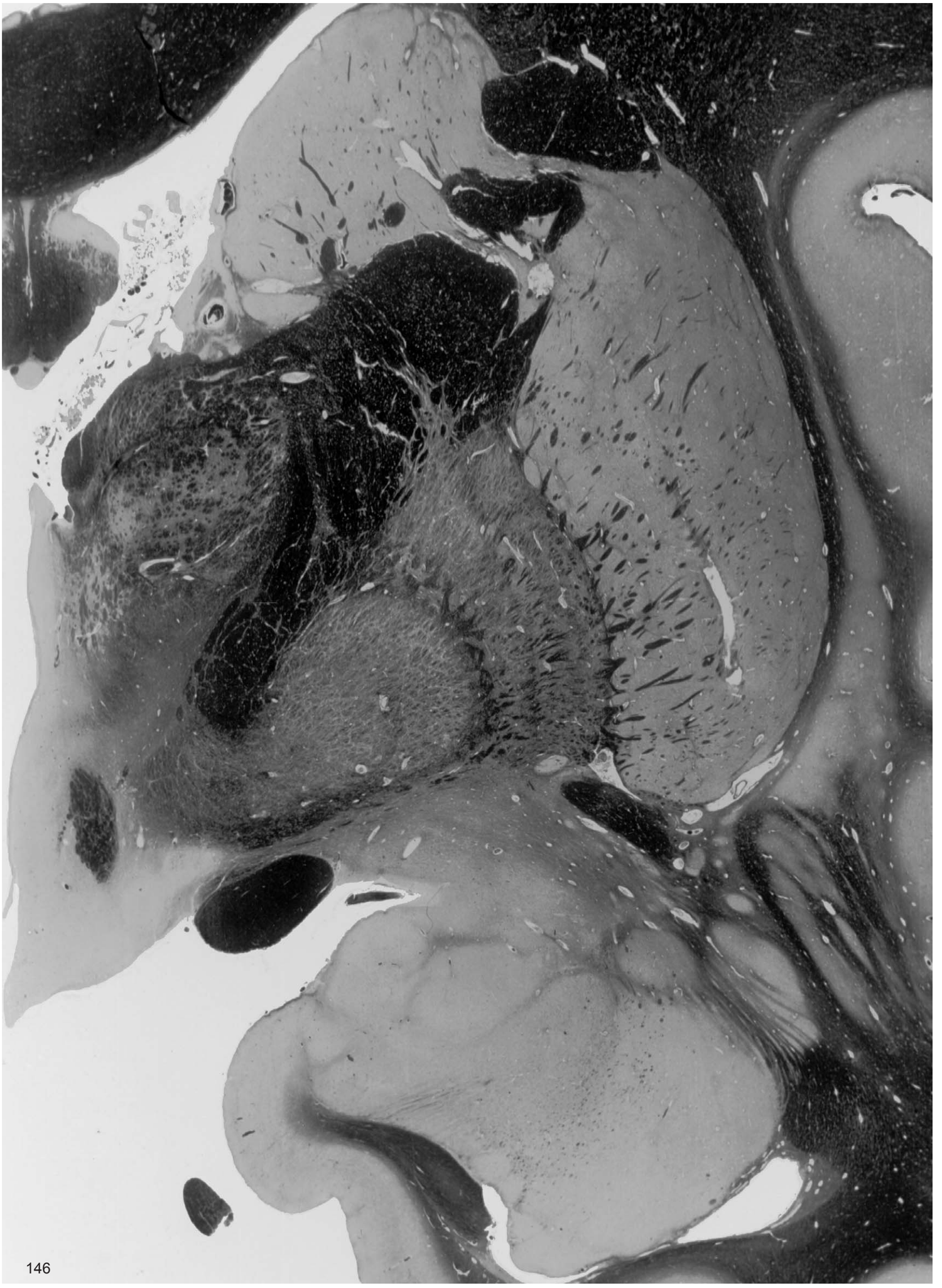


26

5,4 mm

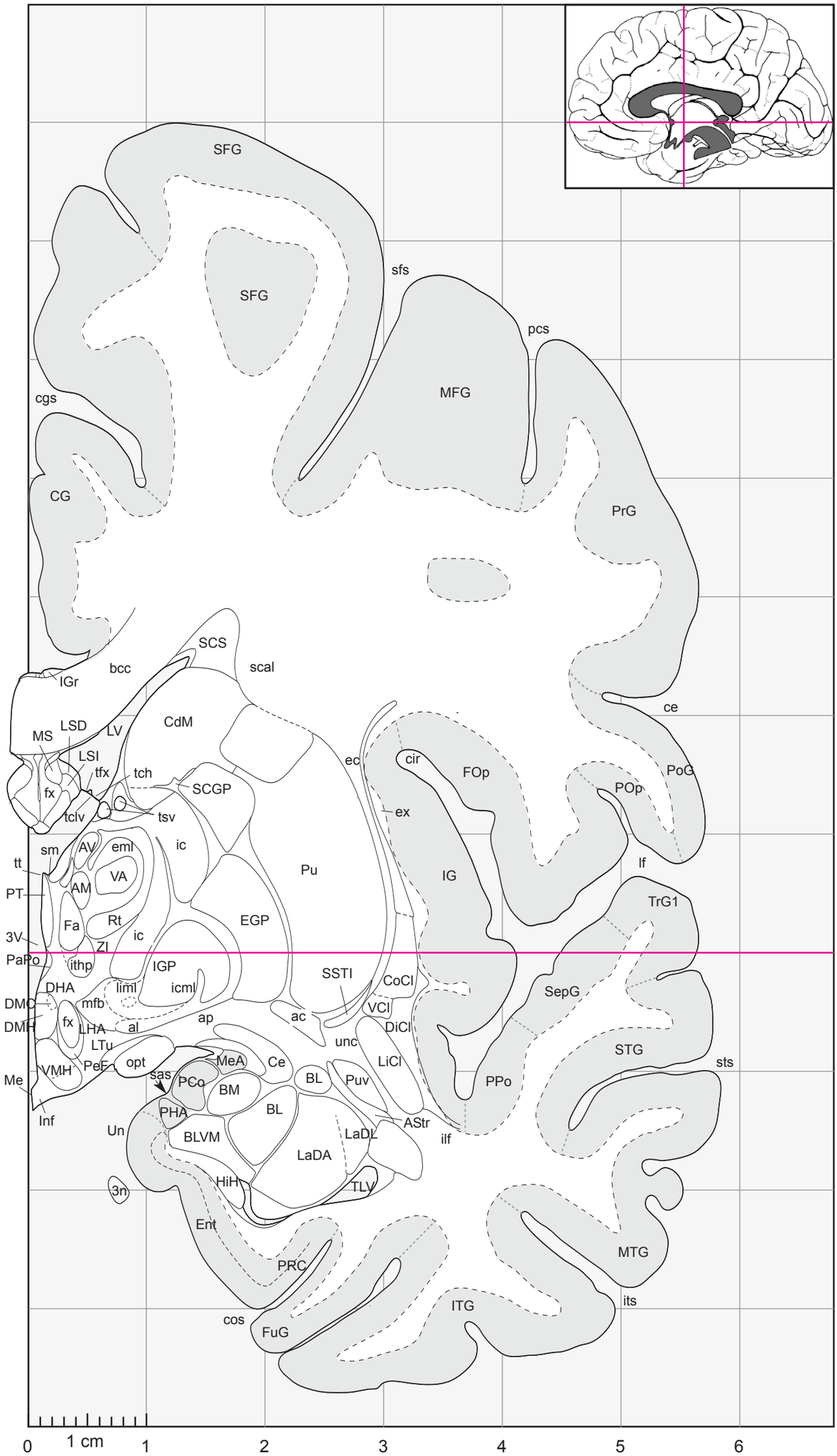


3V third ventricle
ac anterior commissure
ACo ant. cortical amygdaloid nucl.
AG ambiens gyrus
al ansa lenticularis
BC basal nucleus, compact part
BLD basolateral amygdaloid nucl., dorsal (magnocellular) part
BLI basolateral amygdaloid nucleus, intermediate part
BLPL basolateral amygdaloid nucleus, paralaminar part
BLVL basolateral amygdaloid nucleus, ventrolateral part
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
ce central fissure
Ce central amygdaloid nucleus
CoCl (compact) insular claustrum
DiCl diffuse insular claustrum
DMH dorsomed. hypothalamic n.
Fa fasciculosus nucleus
fx fornix
ic internal capsule
icml incomplete medullary lamina of the globus pallidus
IGP internal globus pallidus
IGr indusium griseum
ilf inferior longitudinal fasciculus
Inf infundibular nucleus
ithp inferior thalamic peduncle
La lateral amygdaloid nucleus
LaDL lateral amygdaloid nucleus, dorsolat. part
LaDM lateral amygdaloid nucleus, dorsomedial part
LaI lateral amygdaloid nucleus, intermedial part
lf lateral fissure
LHA lateral hypothalamic area
LiCl limitans claustrum
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LTu lateral tuberal nucleus
MeA medial amygdaloid nucleus, anterior part
mfb medial forebrain bundle
MFG medial frontal gyrus
mls medial longitudinal stria
mml internal medullary lamina of the globus pallidus
MS medial septal nucleus
MTu medial tuberal nucleus
Pa2 paraoptic nucleus
PAA periamygdalar area
Pa paraventricular hyperthalamic nucleus
PACl preamygdalar claustrum
pcs precentral sulcus
PHA parahippocampal-amygdaloid transition area
PoG postcentral gyrus
POp parietal operculum
PPo planum polare
PrG precentral gyrus
Rt reticular thalamic nucleus
SepG separans gyrus
SEL subependymal layer
SFG superior frontal gyrus
sfs superior frontal sulcus
sm stria medullaris of thalamus
SO supraoptic nucleus
sox supraoptic decussation
SPF subparafascicular thalamic n.
st stria terminalis
TCl temporal claustrum
TrG1 anterior transverse temporal gyrus
tsv thalamostriate vein
Un uncus
unn uncal notch, intrarhinal sulcus
unc uncinate fasciculus
VA ventral anterior thalamic nucl.
VCl ventral claustrum
VCo ventral cortical nucleus
ZI zona incerta

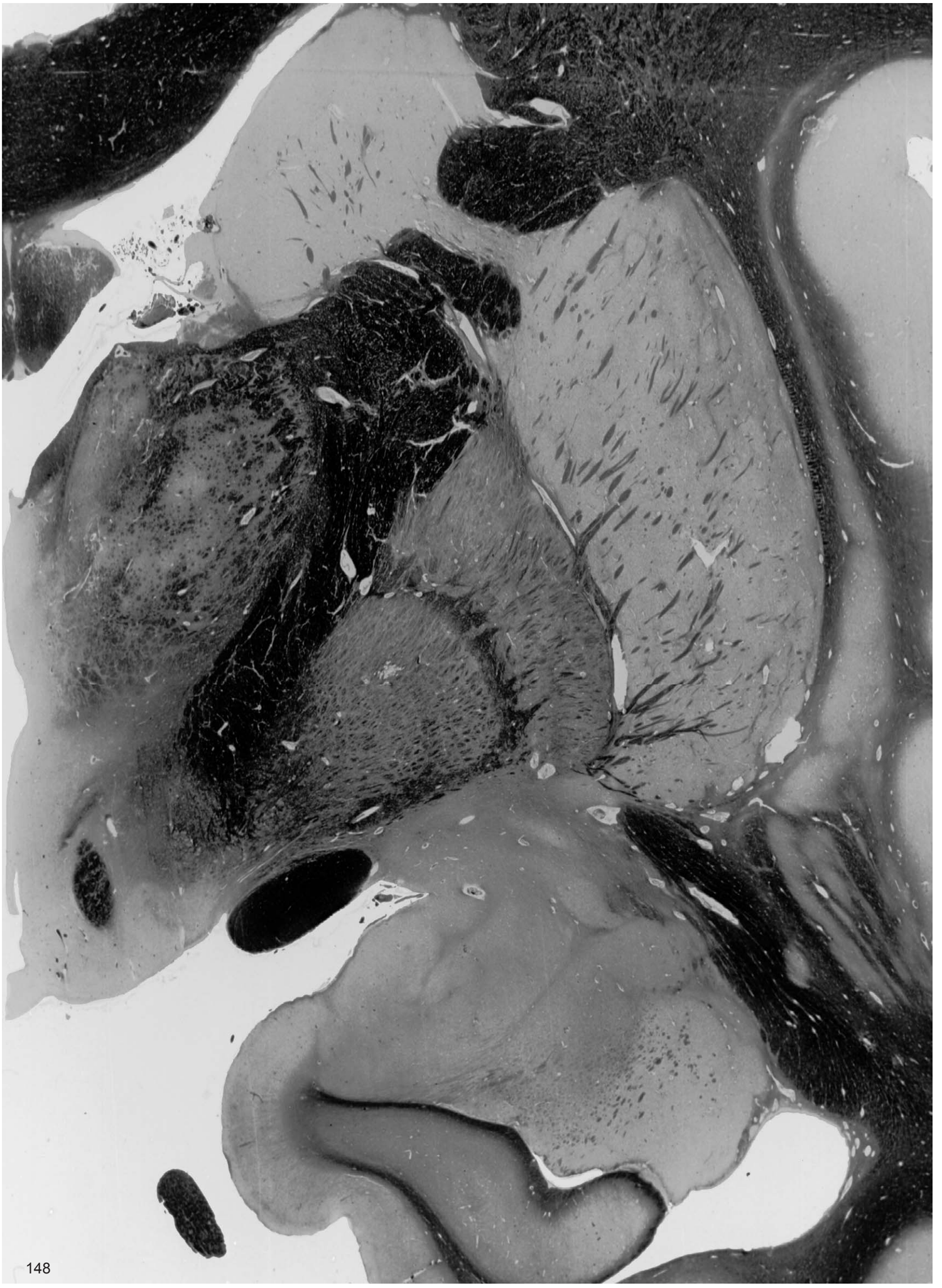


27

6,7 mm

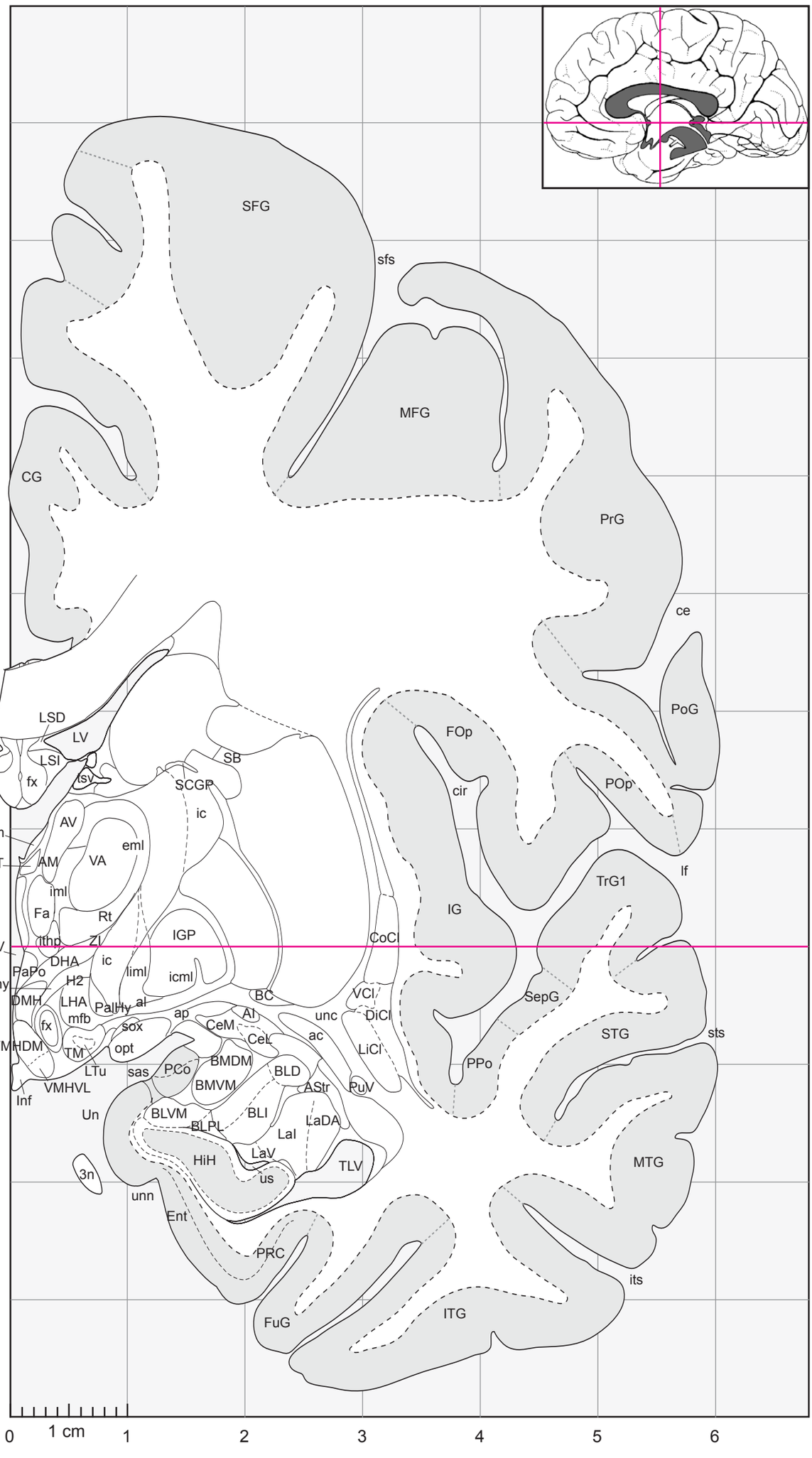


3n oculomotor nerve
3V third ventricle
ac anterior commissure
ACo ant. cortical amygdaloid nucl.
al ansa lenticularis
AM anteromedial thalamic nucl.
ap ansa peduncularis
AStr amygdalo-striatal transit.area
AV anteroventral thalamic nucleus
BL basolateral amygdaloid nucl.
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
CdM medial caudate nucleus
ce central fissure
Ce central amygdaloid nucleus
cgs cingulate sulcus
CoCl (compact) insular claustrum
DHA dorsal hypothalamic area
DiCl diffuse insular claustrum
DMC dorsomedial hypothalamic nucleus, compact part
DMH dorsomed. hypothalamic n.
eml external medullary lamina
Fa fasciculosus nucleus
FOp frontal operculum
FuG fusiform gyrus
fx fornix
HiH hippocampal head
icml incomplete medullary lamina of the globus pallidus
IG insular gyrus
Inf infundibular nucleus
ITG inferior frontal gyrus
ithp inferior thalamic peduncle
its inferior temporal sulcus
LaDA lateral amygdaloid nucleus, dorsal anterior part
LADL lateral amygdaloid nucleus, dorsal lateral part
LHA lateral hypothalamic area
LiCl limitans claustrum
liml limiting medullary lamina of the globus pallidus
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LTu lateral tuberal nucleus
LV lateral ventricle
Me median eminence
MeA medial amygdaloid nucleus, anterior part
mfb medial forebrain bundle
MS medial septal nucleus
MTG medial temporal gyrus
opt optic tract
PaPo paraventricular hypothalamic nucleus, posterior part
PCo post. cortical amygdaloid n.
PeF perifornical nucleus
PHA parahippocampo-amygdaloid transition area
PoG postcentral gyrus
POp parietal operculum
PPo planum polare
PRC perirhinal cortex
PrG precentral gyrus
PT paratenial thalamic nucleus
PuV ventral putamen
Rt reticular thalamic nucleus
sas semiannular sulcus
SCGP supracapsular part of the globus pallidus
SSTI substriatal terminal island
STG superior temporal gyrus
sts superior temporal sulcus
tch tenia of choroid plexus
tclv tela choroides of lat. ventricle
TLV temporal horn of lat. ventricle
tfx tenia of fornix
TrG1 ant. transverse temp. gyrus
tsv thalamostriate vein
tt tenia thalamus
unc uncinate fasciculus
VA ventroanterior thalamic nucl.
VCl ventral claustrum
VMH ventromedial hypoth. nucl.
ZI zona incerta

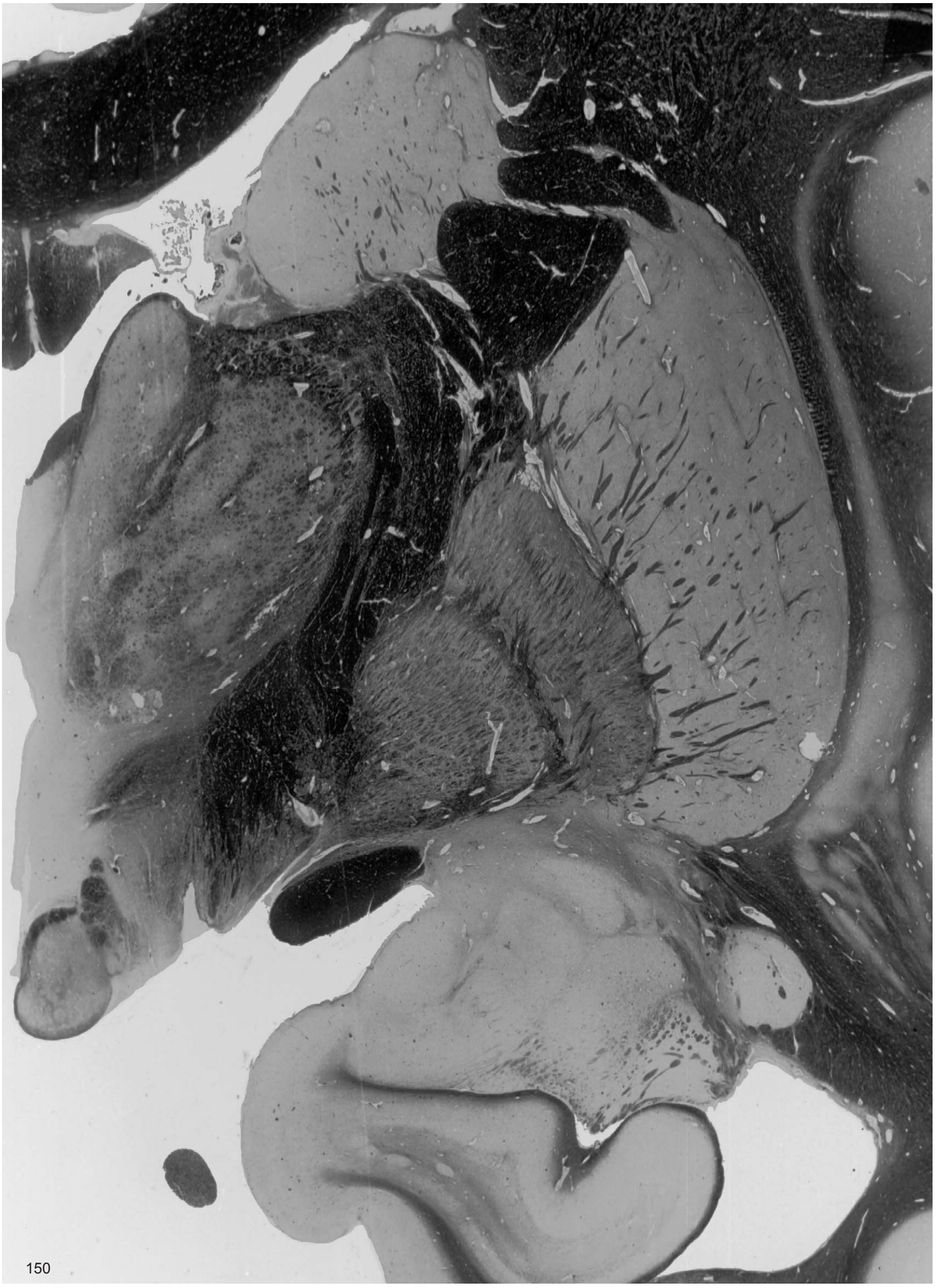


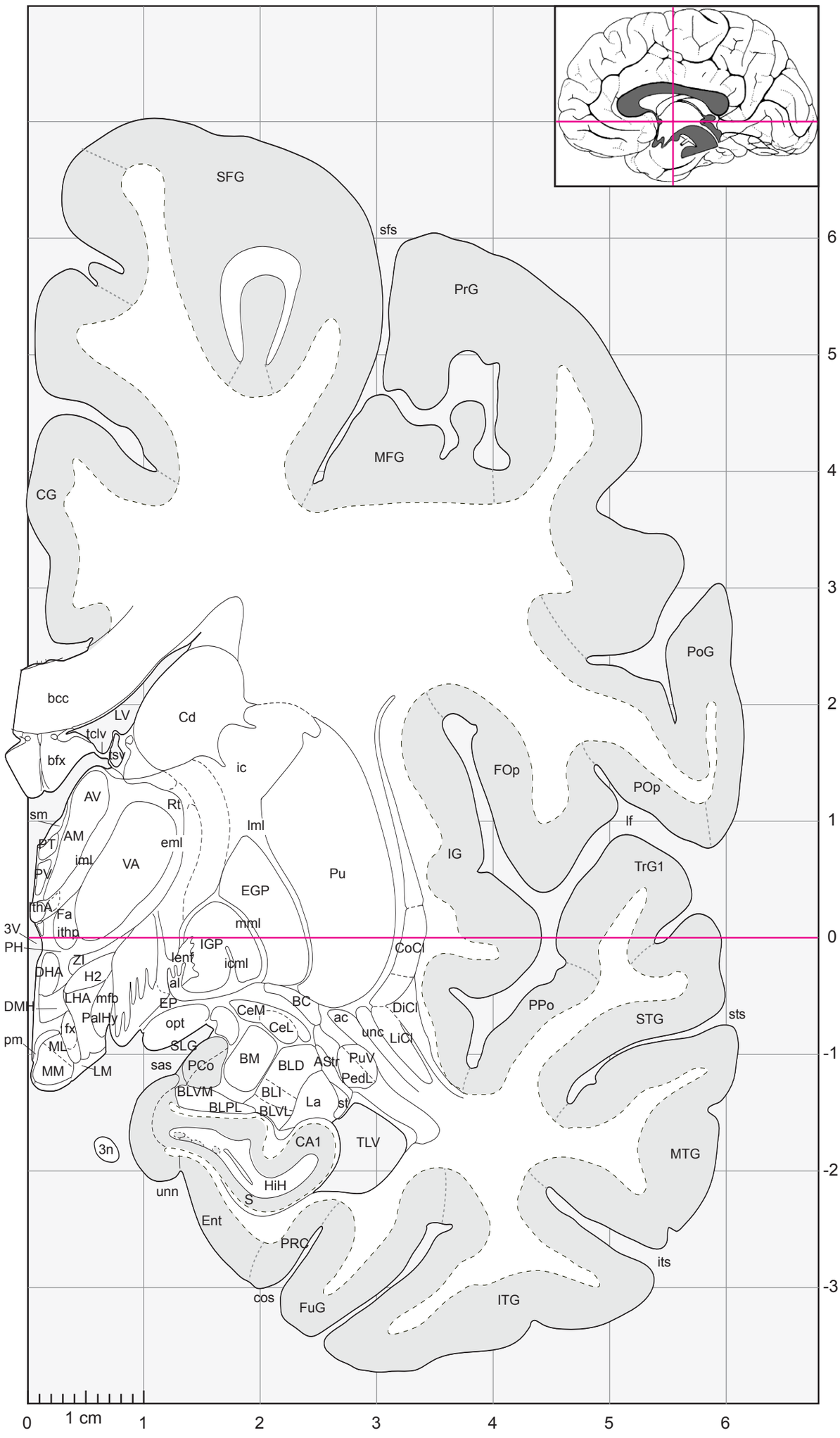
28

8,0 mm



ac anterior commissure
AD anterodorsal thalamic nucleus
al ansa lenticularis
AM anteromedial thalamic nucl.
ap ansa peduncularis
AV anteroventral thalamic nucleus
AStr amygdalo-striatal transit.area
BC basal nucleus, compact part
BLD basolateral amygdaloid nucl., dorsal part
BLI basolateral amygdaloid nucleus, intermediate part
BLPL basolateral amygdaloid nucleus, paralaminar part
BLVM basolateral amygdaloid nucleus, ventromedial part
BMDM basomedial amygdaloid nucleus, dorsomedial part
BMVM basomedial amygdaloid nucleus, ventromedial part
ce central fissure
CeL centr. amygd. n., lateral part
CeM centr. amygd. n., medial part
DHA dorsal hypothalamic area
DMH dorsomedial hypothal. nucl.
eml external medullary lamina
Fa fasciculosus nucleus
FOp frontal operculum
H2 lenticular fasciculus (field H2)
HiH hippocampal head
icml incomplete medullary lamina of the globus pallidus
IGP internal globus pallidus
iml internal medullary lamina of the thalamus
inf infundibular nucleus
ithp inferior thalamic peduncle
LaDA lateral amygd. nucl., dorsal anterior part
LaI lateral amygdaloid nucleus, intermediate part
LaV lateral amygdaloid nucleus, ventral part
lf lateral fissure
LHA lateral hypothalamic area
liml limiting medullary lamina of globus pallidus
LSD dorsolateral septal nucleus
LSI intermediolateral septal nucl.
LTu lateral tuberal nucleus
LV lateral ventricle
mfb medial forebrain bundle
MFG medial frontal gyrus
opt optic tract
PaPo paraventricular hypothalamic nucleus, posterior part
PCo post. cortical amygdaloid n.
phy pallidohypothalamic fibers
PalHy pallidohypothalamic nucl.
PoG postcentral gyrus
POp parietal operculum
PPo planum polare
PrG precentral gyrus
PuV ventral putamen
PT paratenial thalamic nucleus
Rt reticular thalamic nucleus
sas semiannular sulcus
SB striatal cell bridges
SCGP supracapsular part of globus pallidus
SepG separans gyrus
SFG superior frontal gyrus
sfs superior frontal sulcus
sm stria medullaris of the thalamus
sox supraoptic decussation
sts superior temporal sulcus
TM tuberomammillary nucleus
tsv thalamostriate vein
unn uncal notch
us uncal sulcus
VA ventral anterior thalamic nucl.
VCl ventral claustrum
VMHDM ventromedial hypothalamic nucleus, dorsomedial part
VMHVL ventromedial hypothalamic nucleus, ventrolateral part
ZI zona incerta

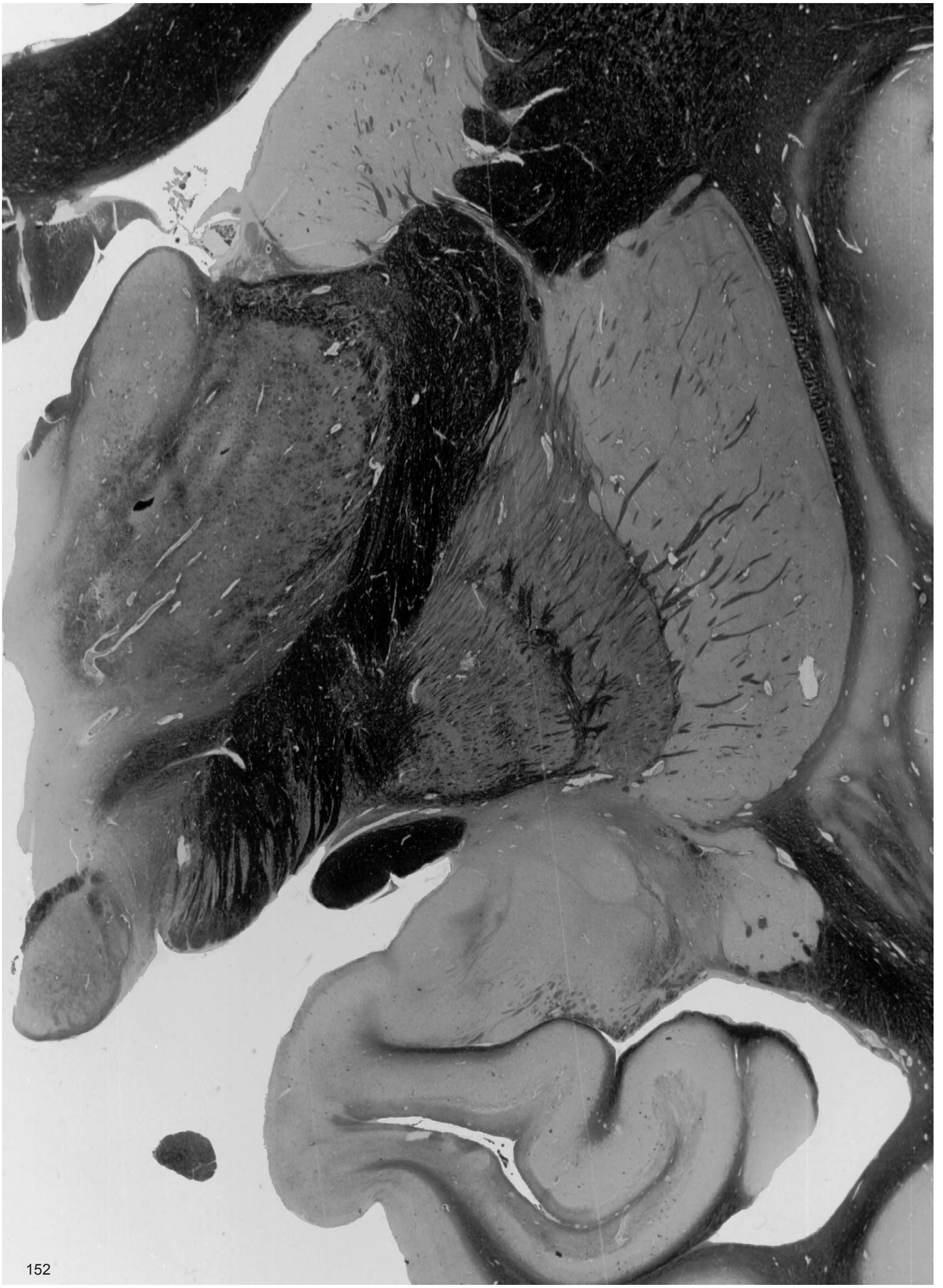


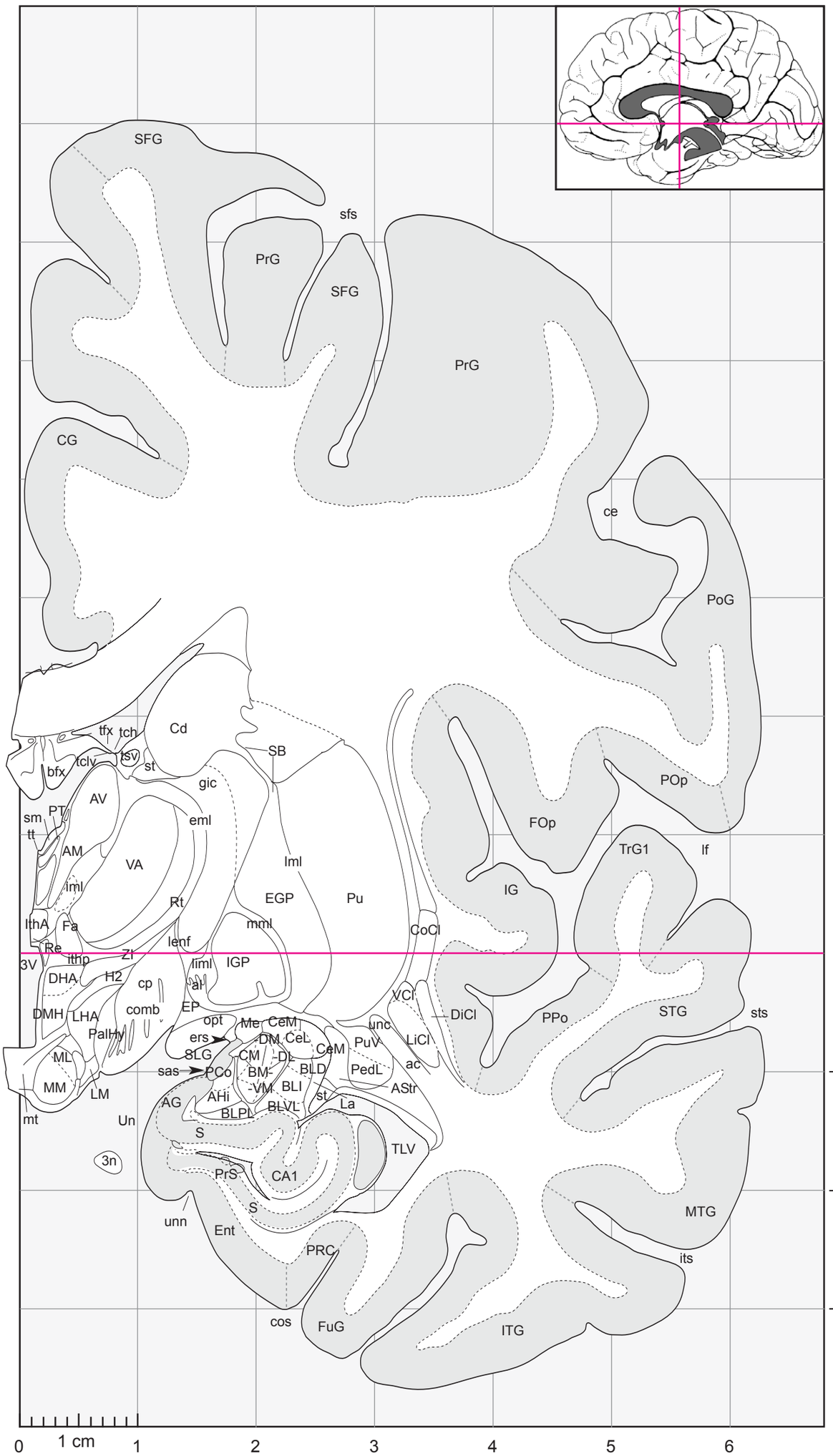


29

9,3 mm

ac anterior commissure
al ansa lenticularis
AM anteromedial thalamic nucl.
ap ansa peduncularis
AV anteroventral thalamic nucleus
BC basal nucleus, compact part
bfx body of fornix
BLD basolateral amygdaloid nucleus, dorsal part
BLI basolateral amygdaloid nucleus, intermediate part
BLPL basolateral amygdaloid nucleus, paralaminar part
BLVL basolateral amygdaloid nucleus, ventrolateral part
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucl.
CA1 CA1 field of hippocampus
Cd caudate nucleus
CeL central amygdaloid nucleus, lateral part
CeM central amygdaloid nucleus, medial part
CG cingulate gyrus
DHA dorsal hypothalamic area
DMH dorsomed. hypothalamic n.
EGP external globus pallidus
eml external medullary lamina
Ent entorhinal cortex
EP entopeduncular nucleus
Fa fasciculosus nucleus
H2 lenticular fasciculus (field H2)
HiH hippocampal head
ic internal capsule
icml incomplete medullary lamina of the globus pallidus
IGP internal globus pallidus
iml internal medullary lamina of thalamus
ITG inferior frontal gyrus
IthA interthalamic adhesion
ithp inferior thalamic peduncle
its inferior temporal sulcus
lf lateral fissure
LHA lateral hypothalamic area
LiCl limitans claustrum
liml limiting medullary lamina of globus pallidus
lml lateral medullary lamina of globus pallidus
La lateral amygdaloid nucleus
lenf lenticular fasciculus
LM lateral mammillary nucleus
ML medial mammillary nucleus, lateral part
MM medial mammillary nucleus, medial part
mfb medial forebrain bundle
MFG medial frontal gyrus
mml medial medullary lamina of globus pallidus
MTG medial temporal gyrus
opt optic tract
PaF parafornical nucleus
PalHy pallidohypothalamic nucl.
PedL peduncle of lentiform nucl.
PCo post. cortical amygdaloid n.
pm principal mammillary fasciculus
PuLi limitans putamen
PT paratenial thalamic nucleus
PV paraventricular thalamic nucl.
Rt reticular thalamic nucleus
sas semianular sulcus
sfs superior frontal sulcus
SLG semilunar gyrus
sm stria medullaris of thalamus
st stria terminalis
STG superior temporal gyrus
sth subthalamic fascicle
TCd tail of caiudate nucleus
tclv tela choroides of lat. ventricle
tsv thalamostriate vein
unc uncinate fasciculus
unn uncal notch
VA ventroanterior thalamic nucl.
ZI zona incerta

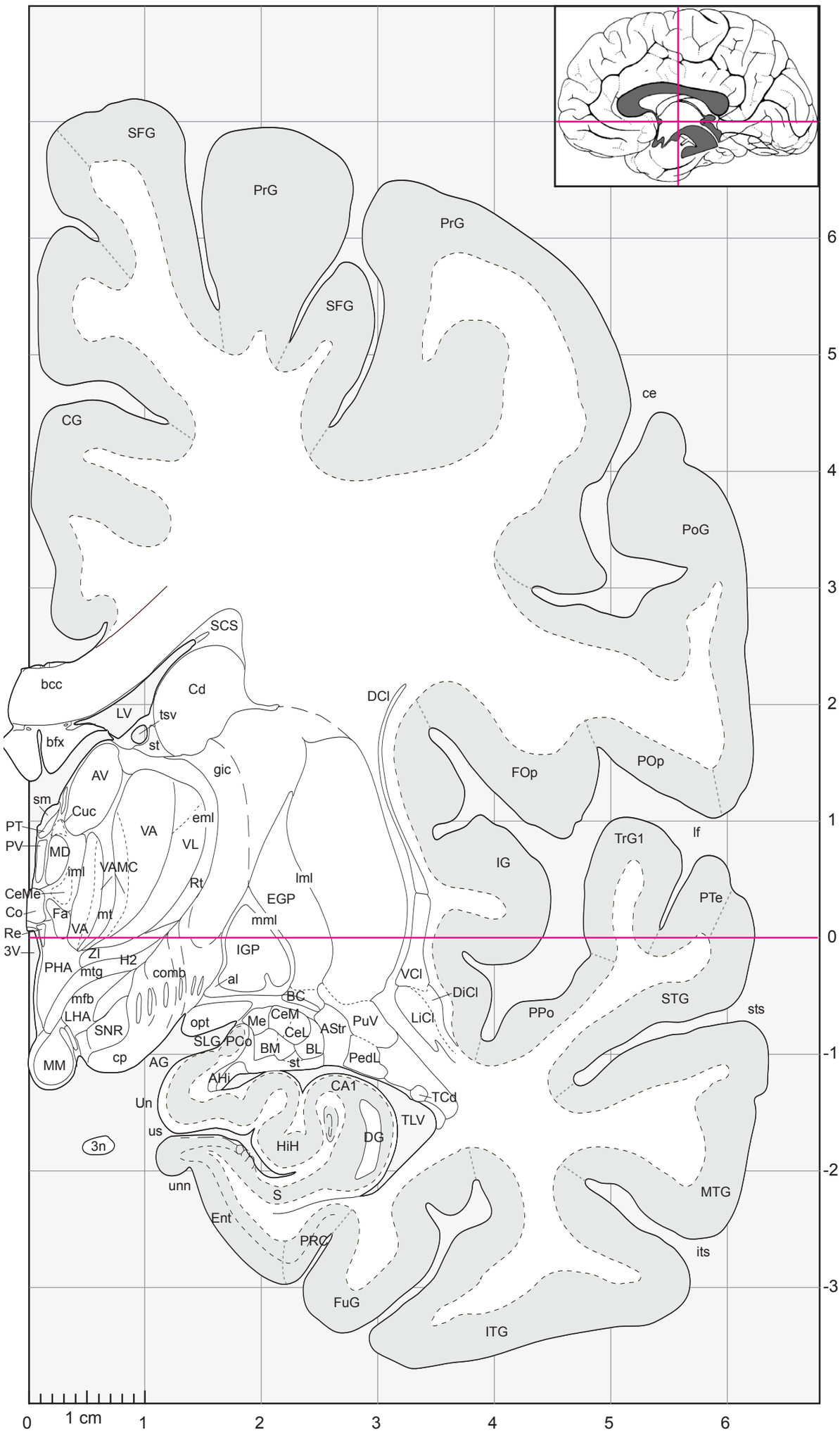




30

10,7 mm

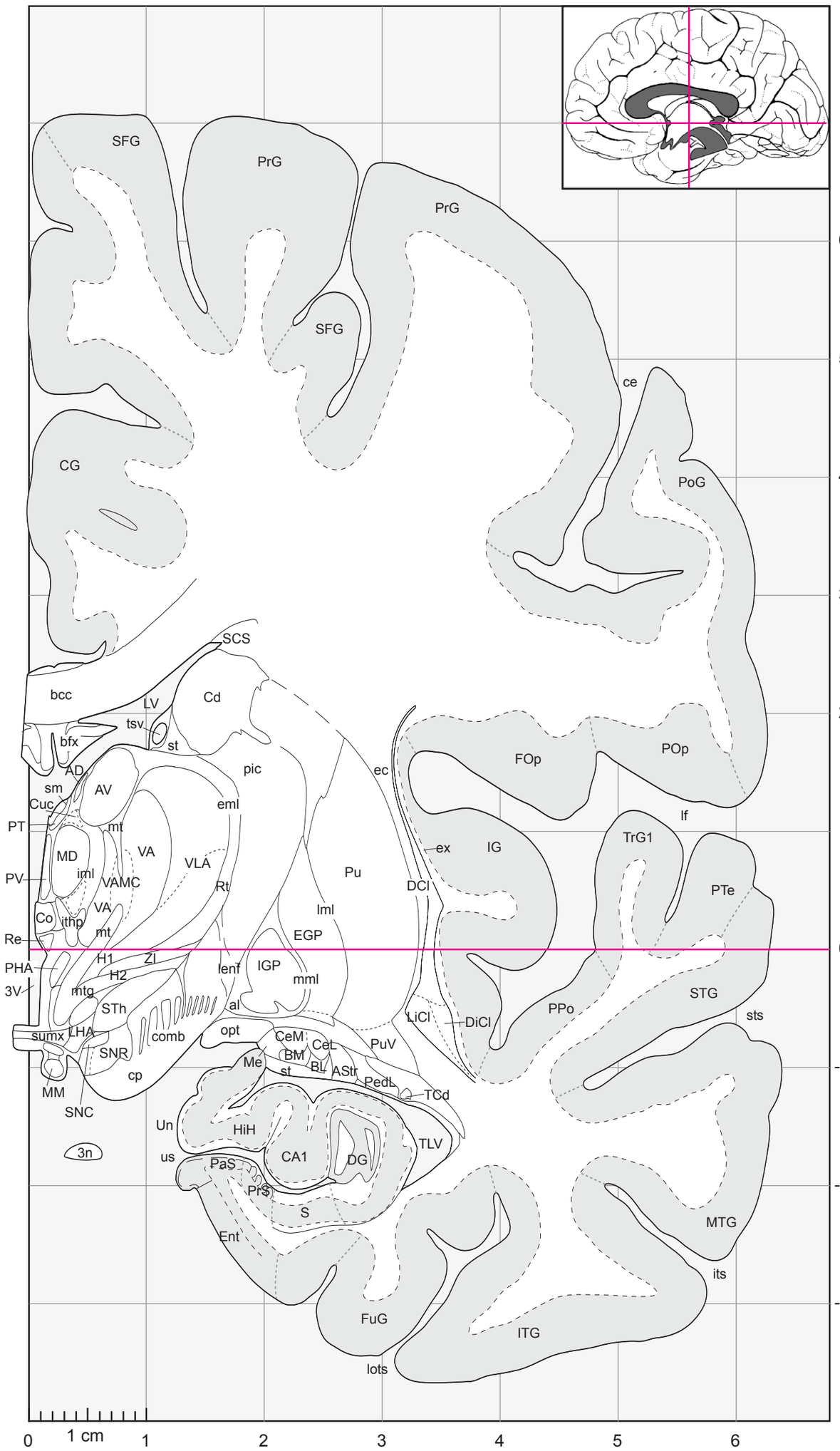
ac anterior commissure
AG ambiens gyrus
AHi amygdalohippocampal area
al ansa lenticularis
AM anteromedial thalamic nucl.
AStr amygdalostriatal transit. area
AV anteroventral thalamic nucl.
bfx body of fornix
BLD basolateral amygdaloid nucleus, dorsal part
BLI basolat. amygdaloid nucleus, intermedial part
BLPL basolateral amygdaloid nucleus, paralaminar part
BLVL basolateral amygdaloid nucleus, ventrolateral part
BMCM basomedial amygdaloid nucleus, centromedial part
BMDL basomed. amygdaloid nucleus, dorsolateral part
BMDM basomedial amygdaloid nucleus, dorsomedial part
BMVM basomedial amygdaloid nucleus, ventromedial part
CA1 CA1 field of hippocampus
Cd caudate nucleus
ce central fissure
CeL central amygdaloid nucleus, lateral part
CeM central amygdaloid nucleus, medial part
comb comb system
cp cerebral peduncle
DHA dorsal hypothalamic area
DMH dorsomedial hypothalamic n.
EGP external globus pallidus
eml external medullary lamina
EP entopeduncular nucleus
ers endorhinal sulcus
Fa fasciculosus nucleus
gic genu of the internal capsule
H2 lenticular fasciculus (field H2)
IGP internal globus pallidus
iml internal medullary lamina of thalamus
IthA interthalamic adhesion
ithp inferior thalamic peduncle
La lateral amygdaloid nucleus
lenf lenticular fascicle
LHA lateral hypothalamic area
LiCl limitans claustrum
liml limiting medullary lamina of globus pallidus
LM lateral mammillary nucleus
lml lateral medullary lamina of the globus pallidus
Me medial amygdaloid nucleus
ML medial mammillary nucleus, lateral part
MM medial mammillary nucleus, medial part
mml medial medullary lamina of the globus pallidus
mt mammillo-thalamic tract
PalHy pallidohypothalamic nucl.
PCo post. cortical amygdaloid n.
PedL peduncle of lentiform nucl.
PrS presubiculum
PT paratenial thalamic nucleus
PuV ventral putamen
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
sas semiannular sulcus
SB striatal cell bridges
sfs superior frontal sulcus
SLG semilunar gyrus
sm stria medullaris of thalamus
st stria terminalis
tch tenia of choroid plexus
tclv tela choroides of lat. ventricle
tfx tenia of fornix
tsv thalamostriate vein
tt tenia thalamus
unc uncinate fasciculus
unn uncal notch (Duvernoy)
VA ventroanterior thalamic nucl.
ZI zona incerta



31

12,0 mm

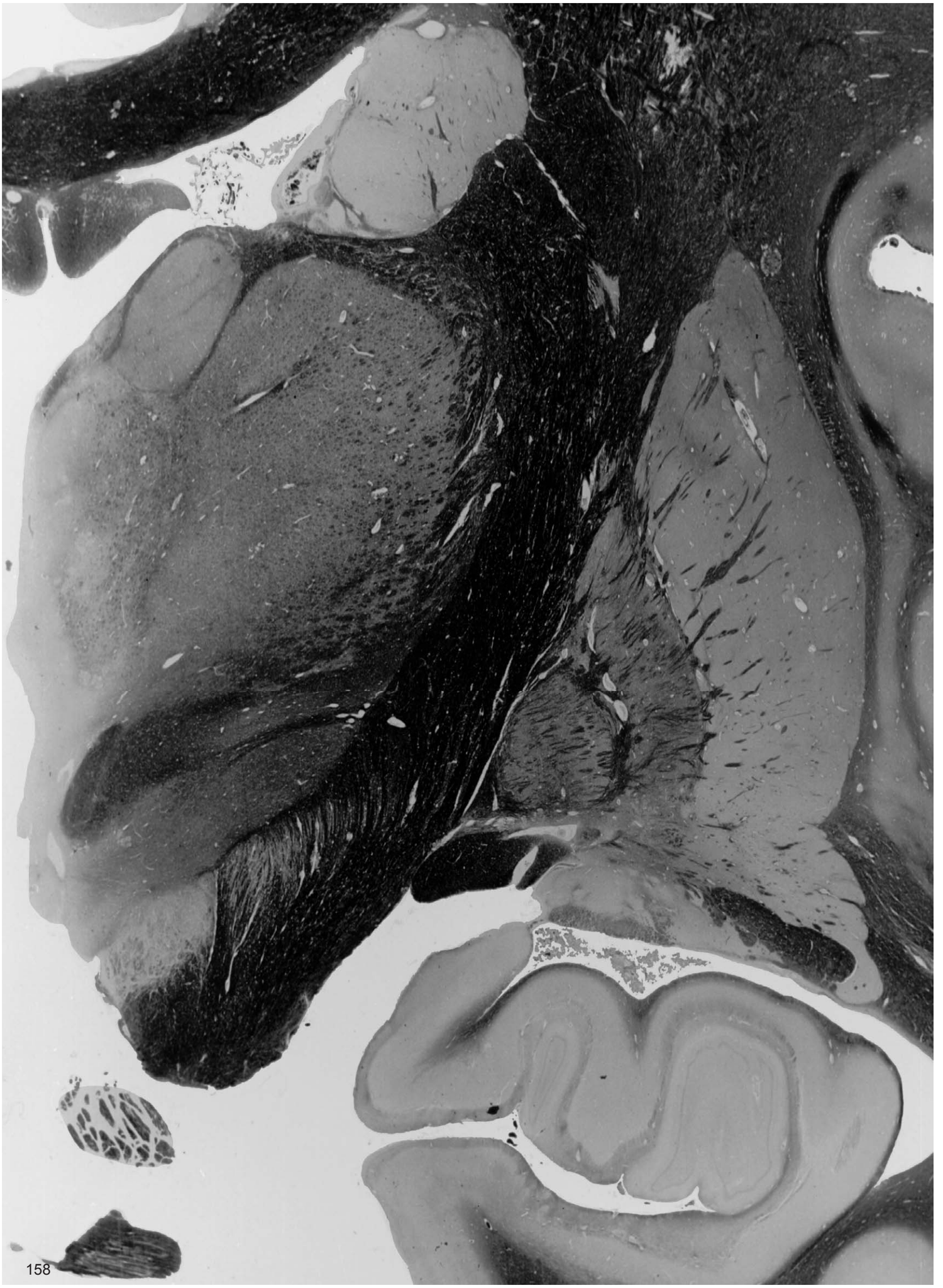
3n oculomotor nerve
3V third ventricle
AG ambiens gyrus
AHi amygdalohippocampal area
al ansa lenticularis
AV anteroventral thalamic nucl.
AStr amygdalostriate transit. area
BC basal nucleus, compact part
bcc body of the corpus callosum
bfx body of fornix
BL basolateral amygdaloid nucl.
BM basomedial amygdaloid nucl.
CA1 CA1 field of hippocampus
Cd caudate nucleus
ce central fissure
CeL central amygdaloid nucleus, lateral part
CeM central amygdaloid nucleus, medial part
CeMe central medial thalamic n.
CG cingulate gyrus
Co commissural nucleus
comb comb system
cp cerebral peduncle
Cuc cucullaris nucleus
DCl dorsal claustrum
DG dentate gyrus
DiCl diffuse insular claustrum
EGP external globus pallidus
eml external medullary lamina (thalamus)
Ent entorhinal cortex
Fa fasciculosus nucleus
FOp frontal operculum
FuG fusiform gyrus
gic genu of the internal capsule
H2 lenticular fasciculus (field H2)
HiH hippocampal head
IGP internal globus pallidus
iml internal medullary lamina
LHA lateral hypothalamic area
LiCl limitans claustrum
lml lateral medullary lamina of the globus pallidus
MD medial dorsal thalamic nucl.
Me medial amygdaloid nucleus
mfb medial forebrain bundle
MM medial mammillary nucleus, medial part
mml medial medullary lamina of the globus pallidus
mt mammillo-thalamic tract
mtg mammillo-tegmental tract
MTG medial temporal gyrus
opt optic tract
PCo post. cortical amygdaloid n.
PedL peduncle of lentiform nucl.
PHA posterior hypothalamic area
PoG postcentral gyrus
POp parietal operculum
PRC perirhinal cortex
PrG precentral gyrus
PT paratenial thalamic nucleus
PTe planum temporale
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
S subiculum
SCS subcallosal stratum
SFG superior frontal gyrus
SLG semilunar gyrus
sm stria medullaris of thalamus
SNR substantia nigra, reticular p.
st stria terminalis
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
tsv thalamostriate vein
Un uncus
unn uncal notch
us uncal sulcus
VA ventroanterior thalamic nucl.
VAMC ventroanterior thalamic nucleus, magnocellular part
VCl ventral claustrum
VL ventral lateral thalamic nucl.
ZI zona incerta

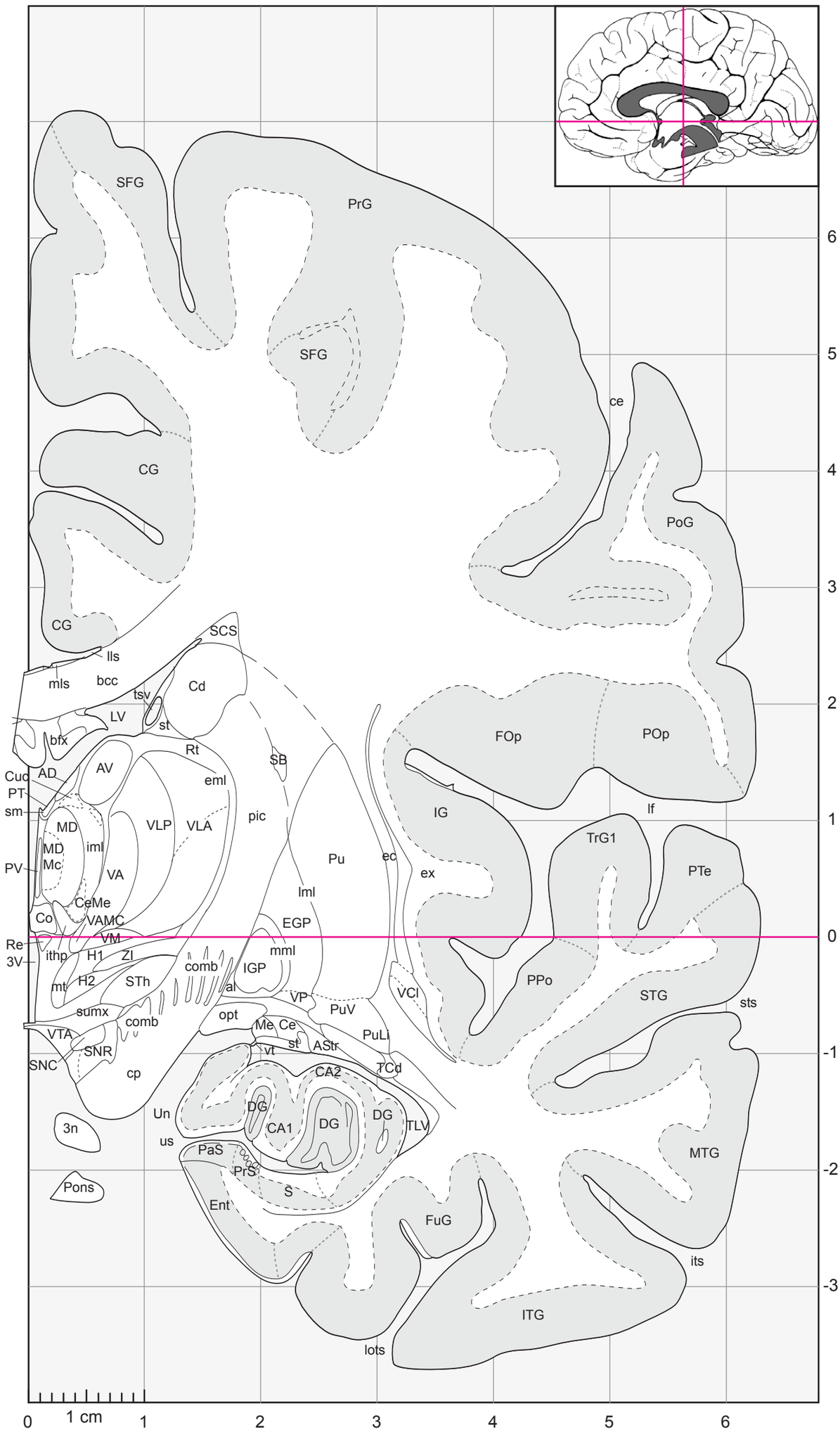


32

13,3 mm

3n oculomotor nerve
AD anterodorsal thalamic nucleus
al ansa lenticularis
AStr amygdalostriate transit. area
AV anteroventral thalamic nucl.
bcc body of corpus callosum
bfx body of fornix
BL basolateral amygdaloid nucl.
BM basomedial amygdaloid nucl.
CA1 CA1 field of hippocampus
Cd caudate nucleus
ce central fissure
CeL central amygdaloid nucleus, lateral part
CeM central amygdaloid nucleus, medial part
CG cingulate gyrus
Co commissural nucleus
comb comb system
cp cerebral peduncle
Cuc cucullaris nucleus
DCl dorsal claustrum
DG dentate gyrus
DiCl diffuse insular claustrum
ec external capsule
EGP external globus pallidus
eml external medullary lamina (thalamus)
Ent entorhinal cortex
ex extreme capsule
FOp frontal operculum
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
H2 lenticular fasciculus (field H2)
HiH hippocampal head
IGP internal globus pallidus
iml internal medullary lamina with cell clusters (thalamus)
ITG inferior frontal gyrus
ithp inferior thalamic peduncle
its inferior temporal sulcus
lenf lentiform fibers
lf lateral fissure
LHA lateral hypothalamic area
LiCl limitans claustrum
lml lateral medullary lamina of the globus pallidus
lots lateral occipitotemporal sulcus
MD medial dorsal thalamic nucl.
Me medial amygdaloid nucleus
MM medial mamillary nucleus
mml medial medullary lamina of the globus pallidus
mt mammillo-thalamic tract
mtg mammillo-tegmental tract
MTG medial temporal gyrus
PaS parasubiculum
PedL peduncle of lentiform nucl.
PHA posterior hypothalamic area
pic post. part of the intern.capsule
PPo planum polare
PoG postcentral gyrus
PrG precentral gyrus
PrS presubiculum
PT paratenial thalamic nucleus
PTe planum temporale
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
sm stria medullaris of thalamus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
STh subthalamic nucleus
sts superior temporal sulcus
sumx supramamillary commissure
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
VA ventroanterior thalamic nucl.
VAMC ventroanterior thalamic nucleus, magnocellular part
VLA ventrolateral anterior thalamic nucleus
VCl ventral claustrum
ZI zona incerta

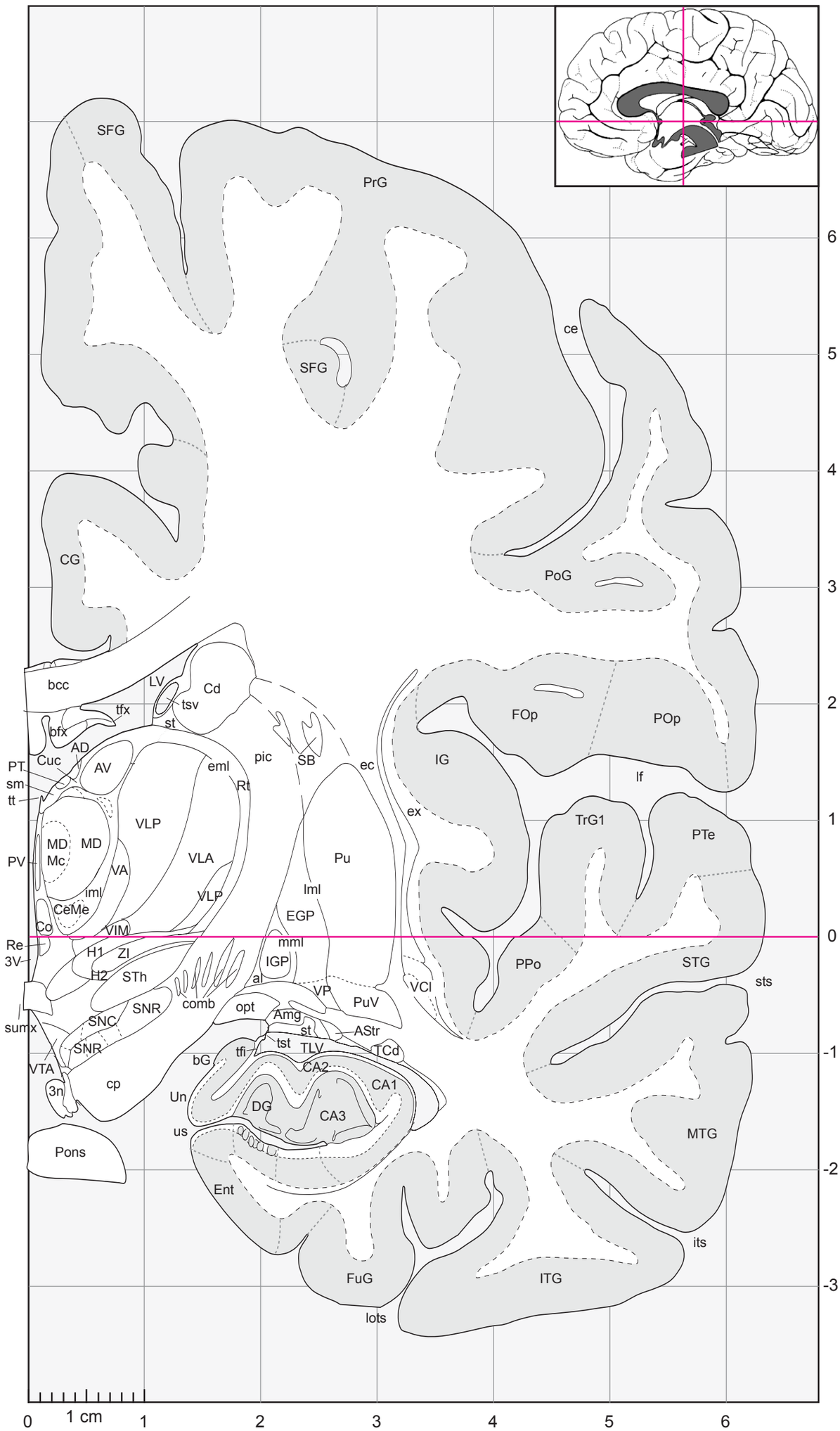




33

14,6 mm

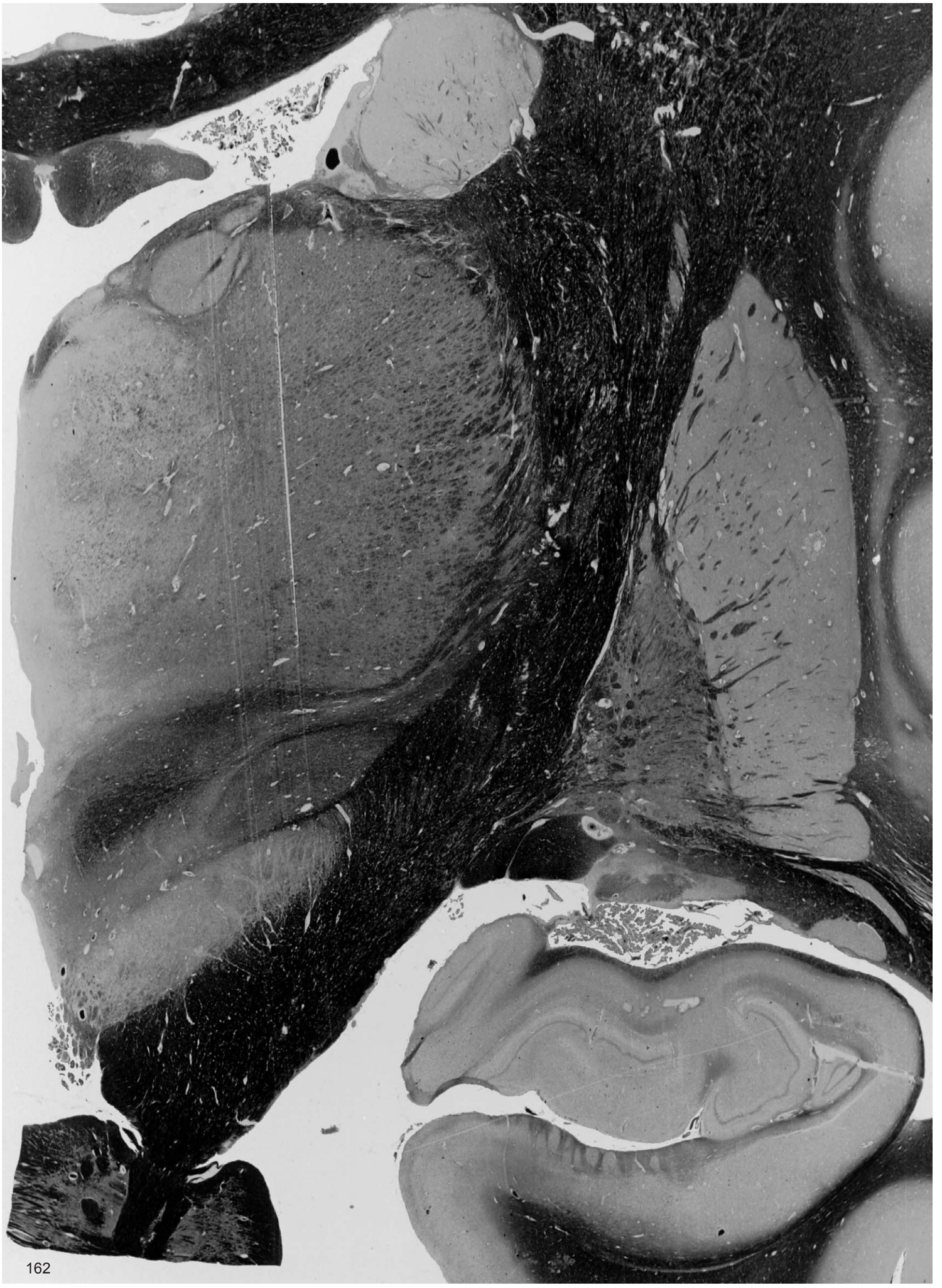
AD anterodorsal thalamic nucleus
al ansa lenticularis
AStr amygdalostriate transit. area
AV anteroventral thalamic nucl.
bfx body of fornix
bG band of Giacomini
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
Cd caudate nucleus
ce central fissure
Ce central amygdaloid nucleus
CeMe central medial thalamic n.
Co commissural nucleus
comb comb system
cp cerebral peduncle
Cuc cucullaris nucleus
DG dentate gyrus
ec external capsule
EGP external globus pallidus
eml external medullary lamina of thalamus
Ent entorhinal cortex
ex extreme capsule
FOp frontal operculum
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
H2 lenticular fasciculus (field H2)
IG insular gyrus
IGP internal globus pallidus
iml internal medullary lamina with intralaminar cell clusters
ITG inferior frontal gyrus
ithp inferior thalamic peduncle
lf lateral fissure
lls lateral longitudinal stria
lml lat. medull. lamina of globus p.
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
Me medial amygdaloid nucleus
mls medial longitudinal stria
mml med. medull. lamina of globus pallidus
mt mammillo-thalamic tract
MTG medial temporal gyrus
opt optic tract
PaS parasubiculum
pic post. part of internal capsule
POp parietal operculum
PPo planum polare
PrS prosubiculum
PT paratenial thalamic nucleus
PTe planum temporale
Pu putamen
PuLi limitans putamen
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
SB striatal cell bridge
SCS subcallosal stratum
SFG superior frontal gyrus
sm stria medullaris of thalamus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STh subthalamic nucleus
STG superior temporal gyrus
sumx supramamillary commissure
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
tsv thalamostriate vein
Un uncus
us uncal sulcus
VA ventroanterior thalamic nucl.
VAMC ventroanterior thalamic nucleus, magnocellular part
VCl ventral claustrum
VLA ventrolateral ant. thalamic n.
VLP ventrolateral post. thal. nucl.
VM ventromedial thalamic nucl.
VP ventral pallidum
vt velum terminale
VTA ventral tegmental area
ZI zona incerta

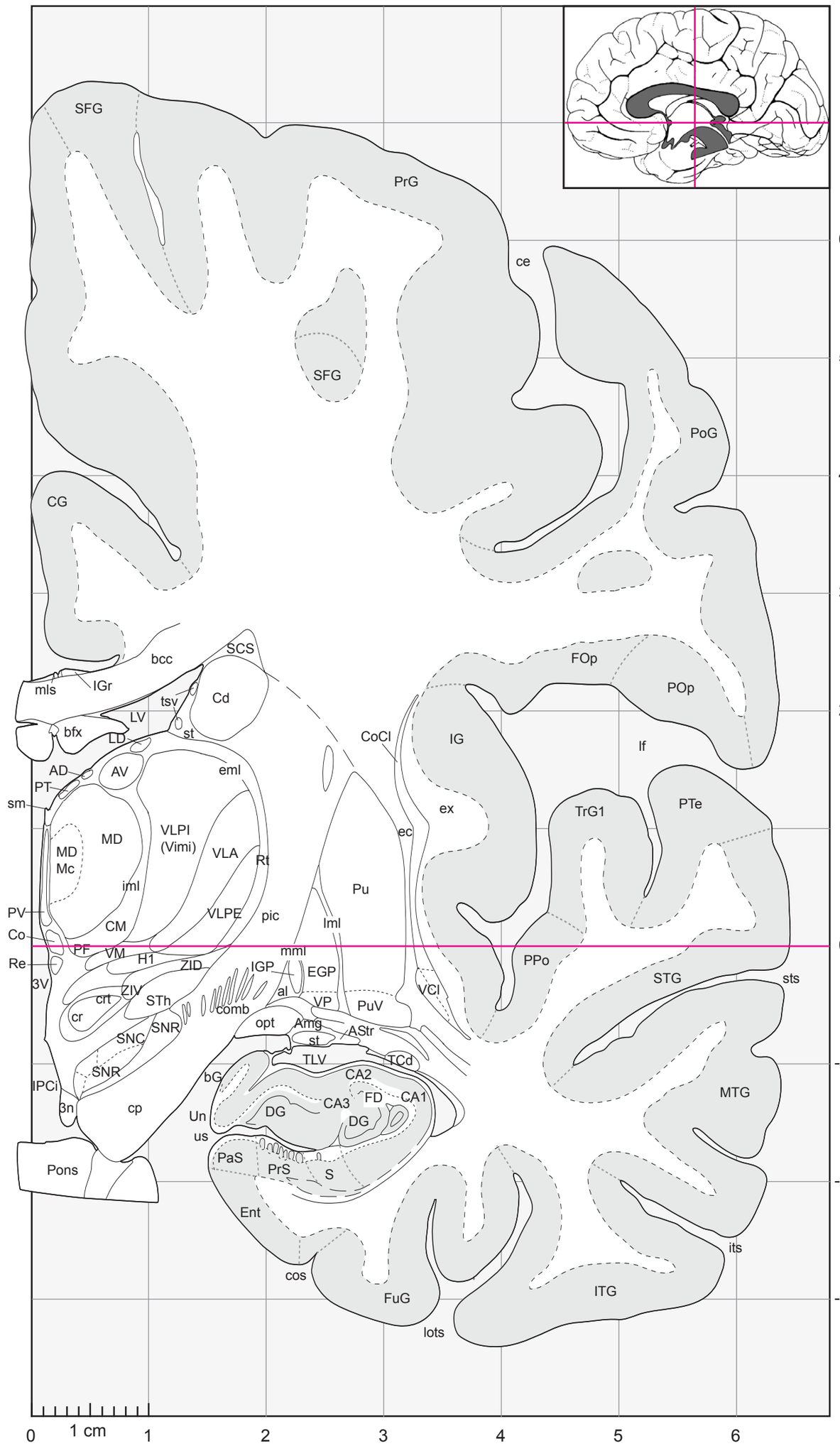


34

16,0 mm

3n oculomotor nerve
3V third ventricle
AD anterodorsal thalamic nucleus
al ansa lenticularis
Amg amygdala
AV anteroventral thalamic nucleus
AStr amygdalostriate transit. area
bcc body of the corpus callosum
bfx body of fornix
bG band of Giacomini
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CeMe central medial thalamic n.
CG cingulate gyrus
Co commissural nucleus
comb comb system
cp cerebral peduncle
Cuc cucullaris nucleus
DG dentate gyrus
EGP external globus pallidus
eml external medullary lamina of thalamus
Ent entorhinal cortex
FOp frontal operculum
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
H2 lenticular fasciculus (field H2)
IG insular gyrus
IGP internal globus pallidus
iml internal medullary lamina of thalamus
its inferior temporal sulcus
lf lateral fissure
lml lateral medullary lamina of the globus pallidus
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
mml medial medullary lamina of the globus pallidus
opt optic tract
pic post. part of internal capsule
PoG postcentral gyrus
Pons pons
POp parietal operculum
PPo planum polare
PrG precentral gyrus
PT paratenial thalamic nucleus
PTe planum temporale
Pu putamen
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
SB striatal cell bridge
SFG superior frontal gyrus
sm stria medullaris of thalamus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STh subthalamic nucleus
sts superior temporal sulcus
sumx supramamillary commissure
TCd tail of caudate nucleus
tfi tenia of fimbria
tfx tenia of fornix
TLV temporal horn of lat. ventricle
TrG1 anterior transverse temporal gyrus
tst tenia of stria terminalis
tsv thalamostriate vein
tt tenia of thalamus
Un uncus
us uncal sulcus
VA ventroanterior thalamic nucl.
VCl ventral claustrum
VIM ventrointermedius nucleus
VLA ventrolateral ant. thalamic n.
VLP ventrolat. post. thalamic n.
VP ventral pallidum
VTA ventral tegmental area
ZI zona incerta

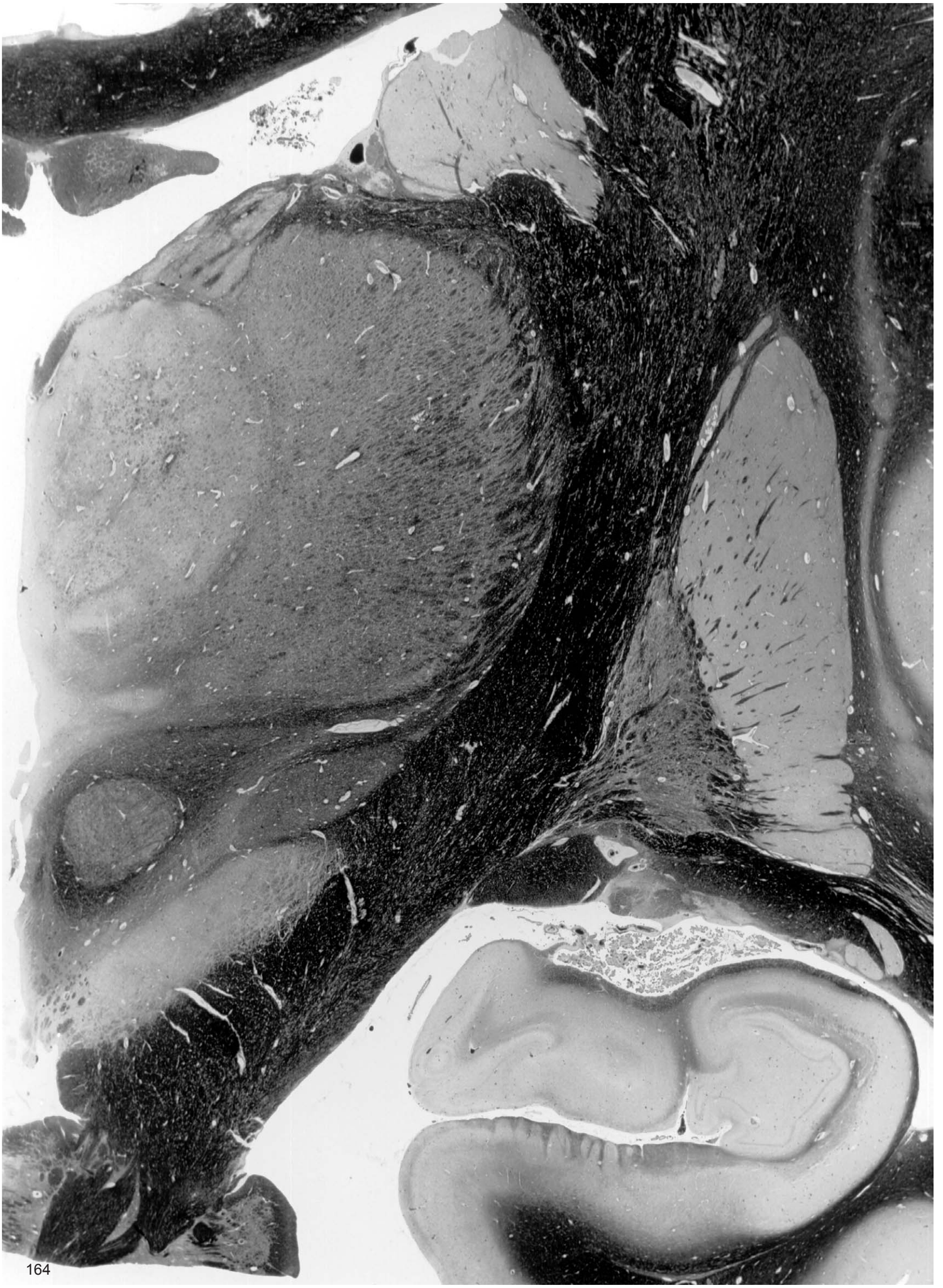


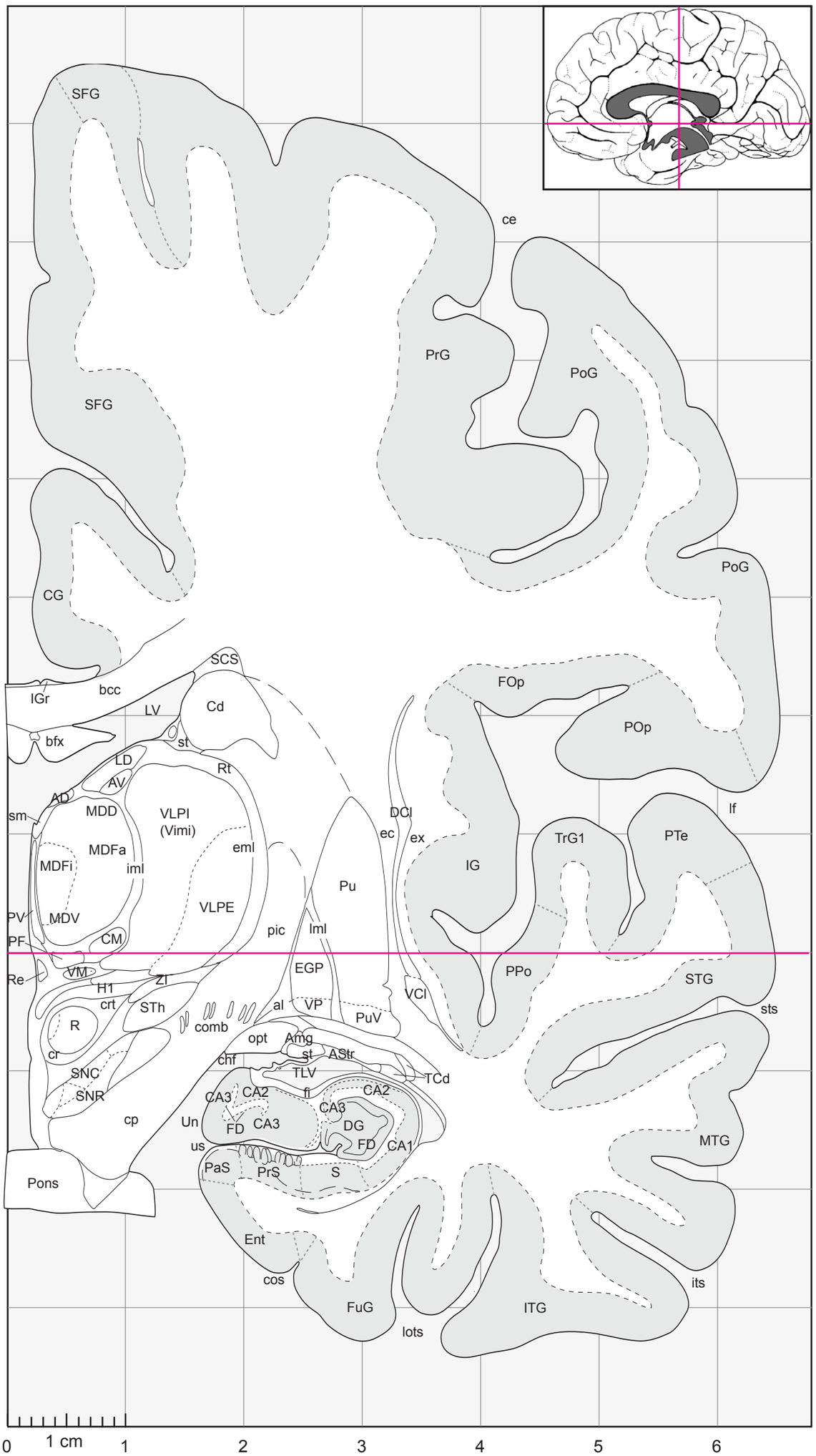


35

17,2 mm

3n oculomotor root
AD anterodorsal thalamic nucleus
al ansa lenticularis
Amg amygdala
AStr amygdalostriate transit. area
AV anteroventral thalamic nucleus
bfx body of fornix
bG band of Giacomini
CA1-3 fields of hippocampus
CM centromedian thalamic nucl.
Co commissural nucleus
CoCl (compact) insular claustrum
comb comb system
cos collateral sulcus
cp cerebral peduncle
cr capsule of red nucleus
crt cerebello-rubro-thalamic fibers
DG dentate gyrus
ec external capsule
EGP external globus pallidus
eml external medullary lamina of thalamus
Ent entorhinal cortex
ex extreme capsule
FD fascia dentata
FOp frontal operculum
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
IGP internal globus pallidus
iml internal medullary lamina of thalamus
IPCi interpeduncular cistern
its inferior temporal sulcus
LD laterodorsal nucleus
lf lateral fissure
lml lateral medullary lamina
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD mediodorsal thalamic nucleus
MDMc mediodorsal thalamic nucleus, magnocellular part
mls medial longitudinal stria
mml medial medullary lamina
MTG medial temporal gyrus
opt optic tract
PaS parasubiculum
PF parafascicular thalamic nucl.
pic posterior part of the internal capsule
PoG postcentral gyrus
POp parietal operculum
PrG precentral gyrus
PrS presubiculum
PPo planum polare
PrG precentral gyrus
PT paratenial thalamic nucleus
PTe planum temporale
Pu putamen
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
S subiculum
SCS subcallosal stratum
SFG superior frontal gyrus
sm stria medullaris of thalamus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
STh subthalamic nucleus
sts superior temporal sulcus
TCd tail of caudate nucleus
tsv thalamostriate vein
us uncal sulcus
VCl ventral claustrum
VLA ventrolateral ant. thalamic n.
VLPE ventrolateral posterior thalamic nucleus, external part
VLPl ventrolateral posterior thalamic nucleus, internal part
VM ventromedial thalamic nucl.
VP ventral pallidum
VPLA ventral posterolateral thalamic nucleus, anterior part
ZID zona incerta, dorsal part
ZIV zona incerta, ventral part

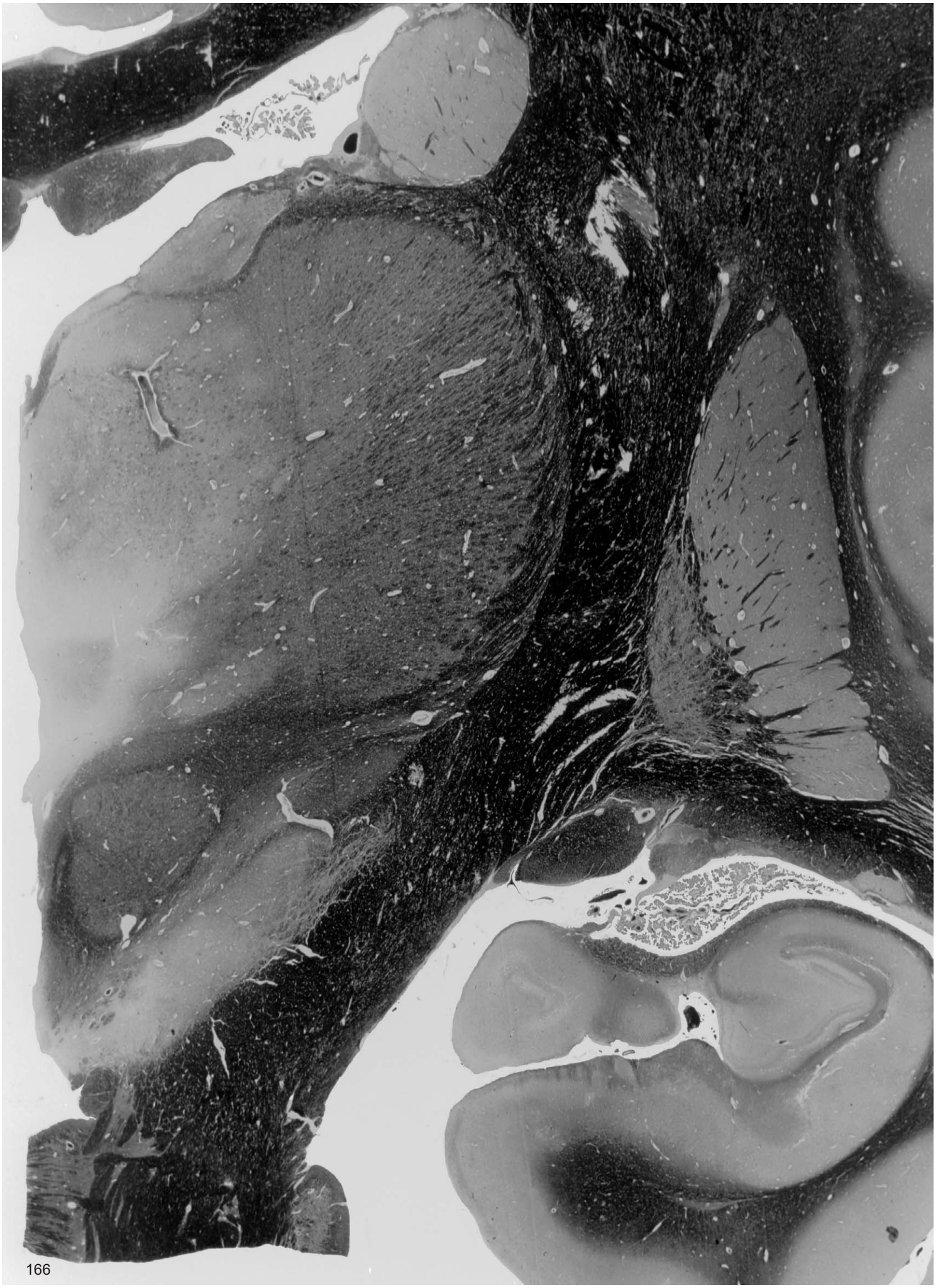




36

18,6 mm

AD anterodorsal thalamic nucleus
al ansa lenticularis
Amg amygdala
AStr amygdalostriate transit. area
AV anteroventral thalamic nucleus
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
chf choroidal fissure
CM centromedian thalamic nucl.
comb comb system
cos collateral sulcus
cp cerebral peduncle
cr capsule of red nucleus
crt cerebello-rubro-thalamic fibers
DCl dorsal claustrum
DG dentate gyrus
ec external capsule
EGP external globus pallidus
eml external medullary lamina of thalamus
Ent entorhinal cortex
ex extreme capsule
FD fascia dentata
fi fimbria of the hippocampus
FOp frontal operculum
H1 thalamic fasciculus (field H1)
IG insular gyrus
IGr indusium griseum
iml internal medullary lamina of thalamus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
lml lateral medullary lamina of the globus pallidus
lots lateral occipitotemporal sulcus
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
MTG middle temporal gyrus
opt optic tract
PaS parasubiculum
PF parafascicular thalamic nucl.
pic post. part of internal capsule
PoG postcentral gyrus
Pons pons
POp parietal operculum
PPo planum polare
PrG precentral gyrus
PT paratenial thalamic nucleus
PTe planum temporale
PuV ventral putamen
PV paraventricular thalamic nucl.
R red nucleus
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
SCS subcallosal stratum
sm stria medullaris of thalamus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
STh subthalamic nucleus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 anterior transverse temporal gyrus
Un uncus
us uncal sulcus
VCl ventral claustrum
VLPE ventrolateral posterior thalamic nucleus, external part
VLPI ventrolateral posterior thalamic nucleus, internal part
VM ventromedial thalamic nucl.
VP ventral pallidum
ZI zona incerta



37

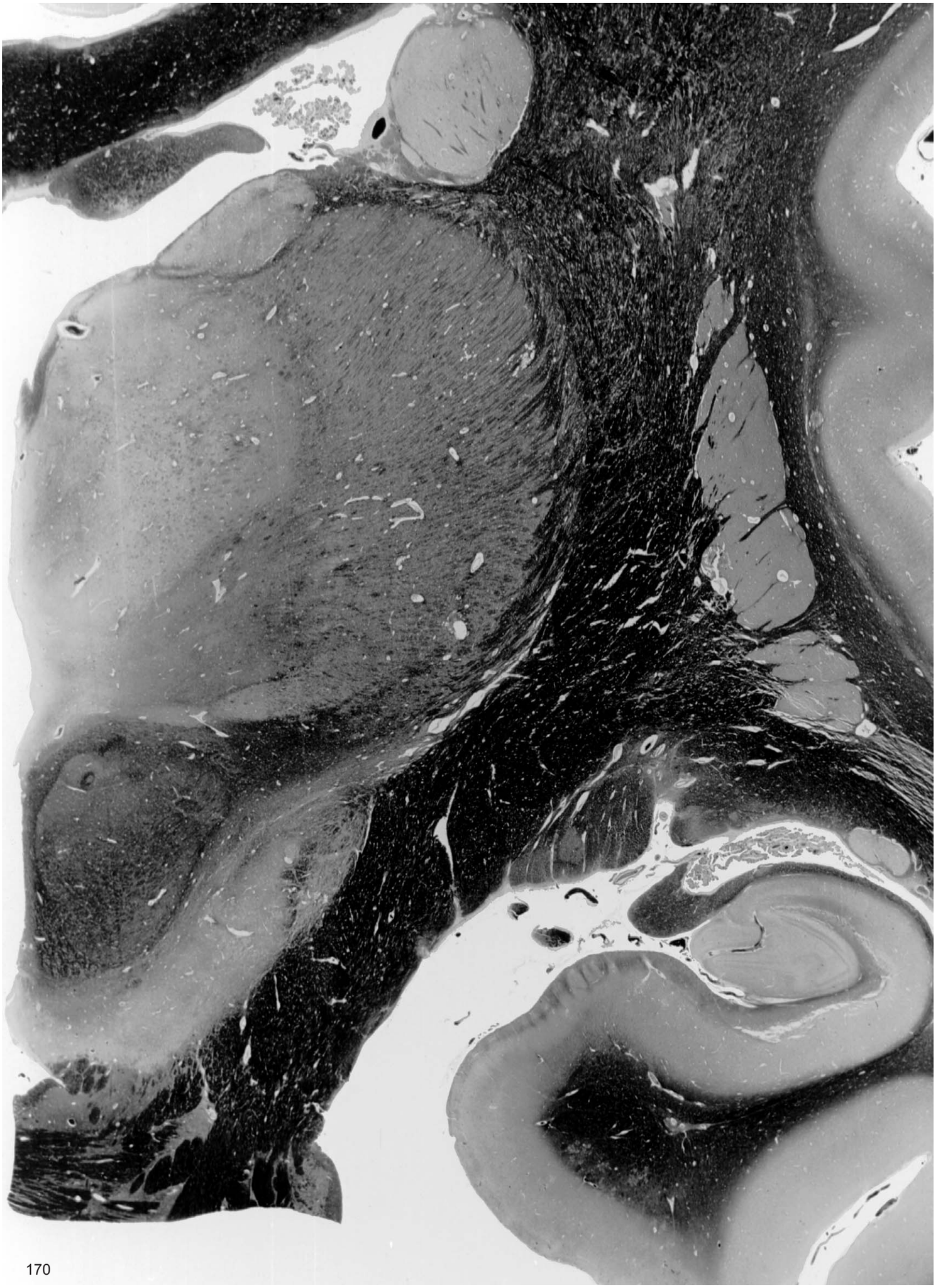
19,9 mm

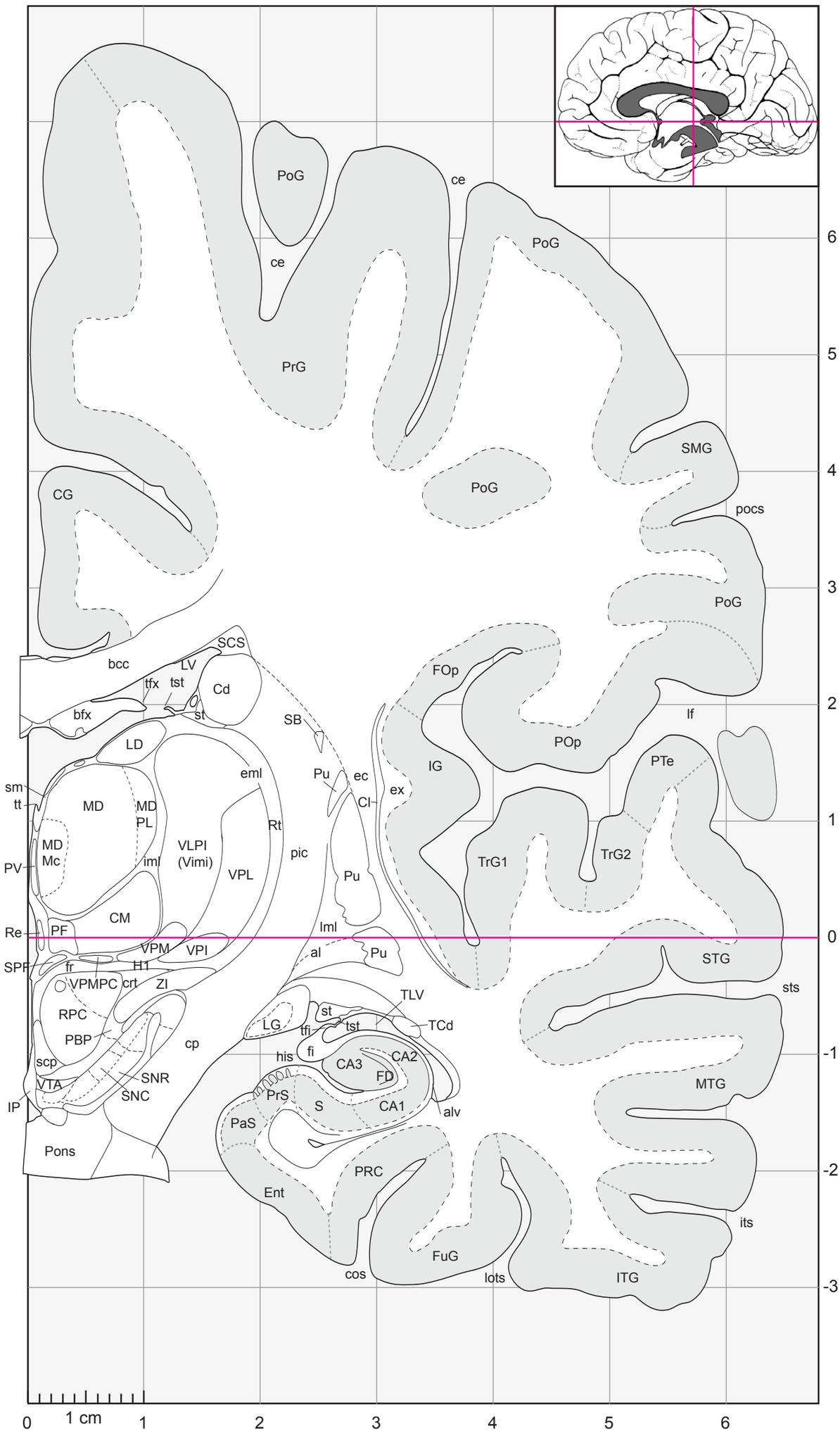
al ansa lenticularis
alv alveus of the hippocampus
AStr amygdalostriate transition area
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
Cl claustrum
CM centromedian thalamic nucl.
cp cerebral peduncle
cr capsule of red nucleus
crt cerebello-rubro-thalamic fibers
DG dentate gyrus
ec external capsule
EGP external globus pallidus
eml external medullary lamina of thalamus
Ent entorhinal cortex
ex extreme capsule
FD fascia dentata
fi fimbria of the hippocampus
FOp frontal operculum
fr fasciculus retroflexus
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
IG insular gyrus
IGr indusium griseum
ITG inferior temporal gyrus
iml internal medullary lamina of thalamus
LD lateral dorsal thalamic nucleus
lml lateral medullary lamina of the globus pallidus
LV lateral ventricle
MD mediodorsal thalamic nucleus
MDMc mediodorsal thalamic nucleus, magnocellular part
opt optic tract
PaS parasubiculum
PF parafascicular thalamic nucl.
pic posterior part of the internal capsule
PPo planum polare
PoG postcentral gyrus
PrG precentral gyrus
PrS presubiculum
PT paratenial thalamic nucleus
PTe planum temporale
Pu putamen
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
RPC red nucl., parvocellular part
Rt reticular thalamic nucleus
S subiculum
SB striatal cell bridges
SCS subcallosal stratum
sm stria medullaris of thalamus
SNC substantia nigra, pars compacta
SNR substantia nigra, pars reticulata
st stria terminalis
STG superior temporal gyrus
STh subthalamic nucleus
TCd tail of caudate nucleus
tclv tela choroides of lat. ventricle
tfi tenia of fimbria
TLV temporal horn of lat. ventricle
tst tenia of stria terminalis
tsv thalamostriate vein
Un uncus
us uncal sulcus
VLPE ventrolateral posterior thalamic nucleus, external part
VLPl ventrolateral posterior thalamic nucleus, internal part
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
ZI zona incerta

38

21,2 mm

al ansa lenticularis
AStr amygdalostriate transit. area
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
Cl claustrum
CM centromedian thalamic nucl.
cos collateral sulcus
cp cerebral peduncle
cr capsule of red nucleus
crt cerebello-rubro-thalamic fibers
DG dentate gyrus
EGP external globus pallidus
eml external medullary lamina of thalamus
Ent entorhinal cortex
FD fascia dentata
fi fimbria of the hippocampus
FOp frontal operculum
fr fasciculus retroflexus
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
his hippocampal sulcus
IG insular gyrus
iml internal medullary lamina of thalamus
ITG inferior frontal gyrus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
LDSF laterodorsal n., superf. part
lf lateral fissure
lml lateral medullary lamina of the globus pallidus
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
MDPL medial dorsal thalamic nucleus, paralamellar part
MTG medial temporal gyrus
opt optic tract
PaS parasubiculum
PBP parabrachial pigmented nucl.
PF parafascicular thalamic nucl.
pic post. part of the int. capsule
pocs postcentral sulcus
PoG postcentral gyrus
POp parietal operculum
PrG precentral gyrus
PrS presubiculum
PT paratenial thalamic nucleus
PTe planum temporale
PuV ventral putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
RPC red nucl., parvocellular part
Rt reticular thalamic nucleus
S subiculum
SCS subcallosal stratum
SFG superior frontal gyrus
sfs superior frontal sulcus
sm stria medullaris of thalamus
SMG supramarginal gyrus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
tsv thalamostriate vein
Un uncus
VLPI ventrolateral posterior thalamic nucleus, internal part
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
VTA ventral tegmental area
ZI zona incerta

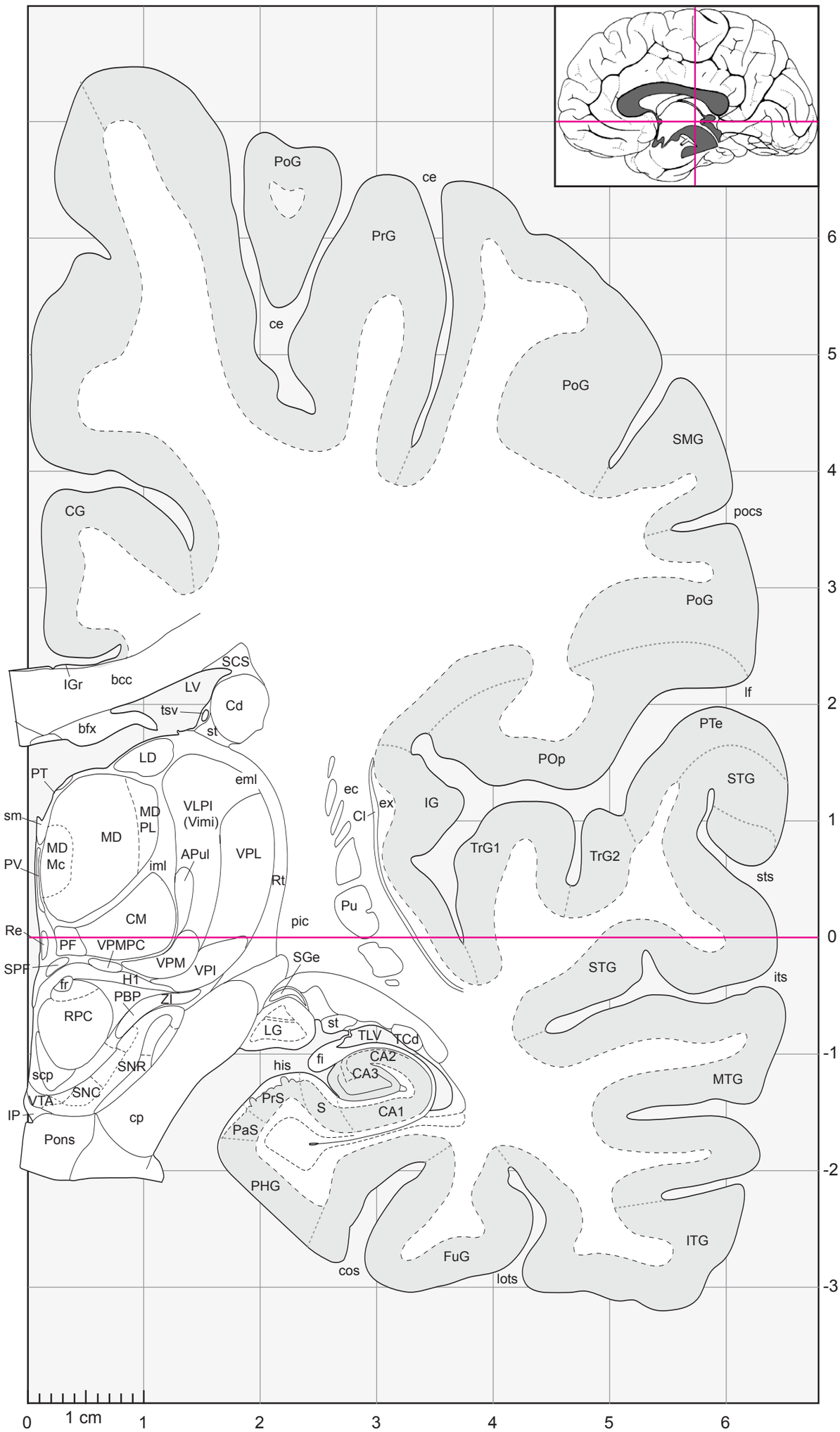




39

22,6 mm

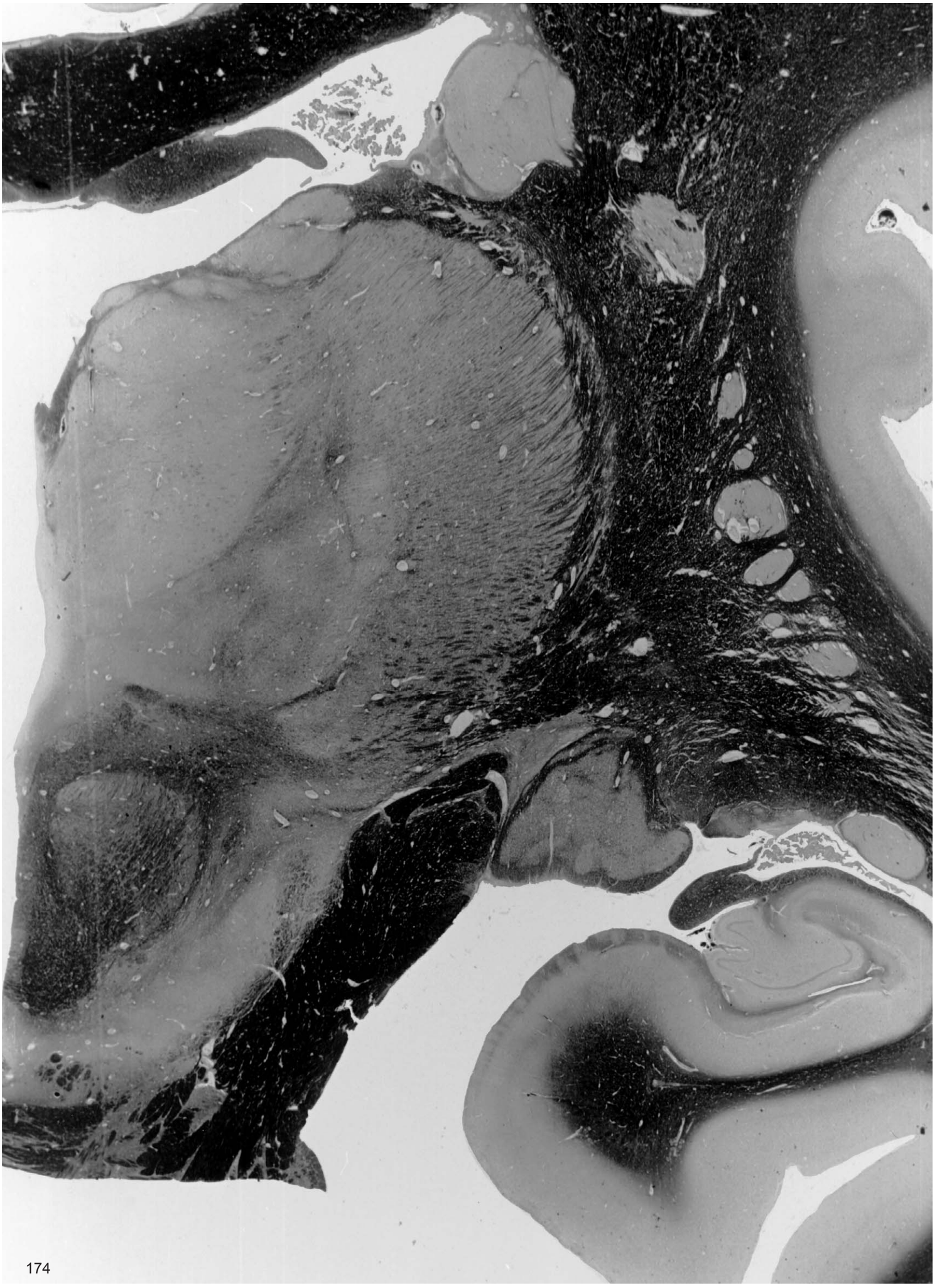
al ansa lenticularis
alv alveus of the hippocampus
bcc body of the corpus callosum
bfx body of fornix
CA1-3 fields of hippocampus
Cd caudate nucleus
ce central fissure
Cl claustrum
CM centromedian thalamic nucl.
cos collateral sulcus
cp cerebral peduncle
crt cerebello-rubro-thalamic fibers (superior cerebellar peduncle)
ec external capsule
eml external medullary lamina of thalamus
Ent entorhinal cortex
ex extreme capsule
FD fascia dentata
fi fimbria of the hippocampus
FOp frontal operculum
fr fasciculus retroflexus
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
his hippocampal sulcus
IG insular gyrus
iml internal medullary lamina of thalamus
IP interpeduncular nucleus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
LG lateral geniculate body
lml lateral medullary lamina (globus pallidum)
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
MDPL medial dorsal thalamic nucleus, paralamellar part
MTG medial temporal gyrus
PaS parasubiculum
PBP parabrachial pigmented nucl.
PF parafascicular thalamic nucl.
pic post. part of internal capsule
pocs postcentral sulcus
PoG postcentral gyrus
Pons pons
POp parietal operculum
PrG precentral gyrus
PrS presubiculum
PTe planum temporale
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
RPC red nucl., parvocellular part
Rt reticular thalamic nucleus
SB striatal cell bridge
scp superior cerebellar peduncle
SCS subcallosal stratum
sm stria medullaris of thalamus
SMG supramarginal gyrus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
SPF subparafascicular thalamic n.
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
tfi tenia of fimbria
tfx tenia of fornix
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
tst tenia of stria terminalis
tt tenia of thalamus
VLPl ventrolateral posterior nucleus, internal part
VPl ventroposterior inferior nucl.
VPMPC ventroposterior medial nucleus, parvocellular part
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
VTA ventral tegmental area
ZI zona incerta

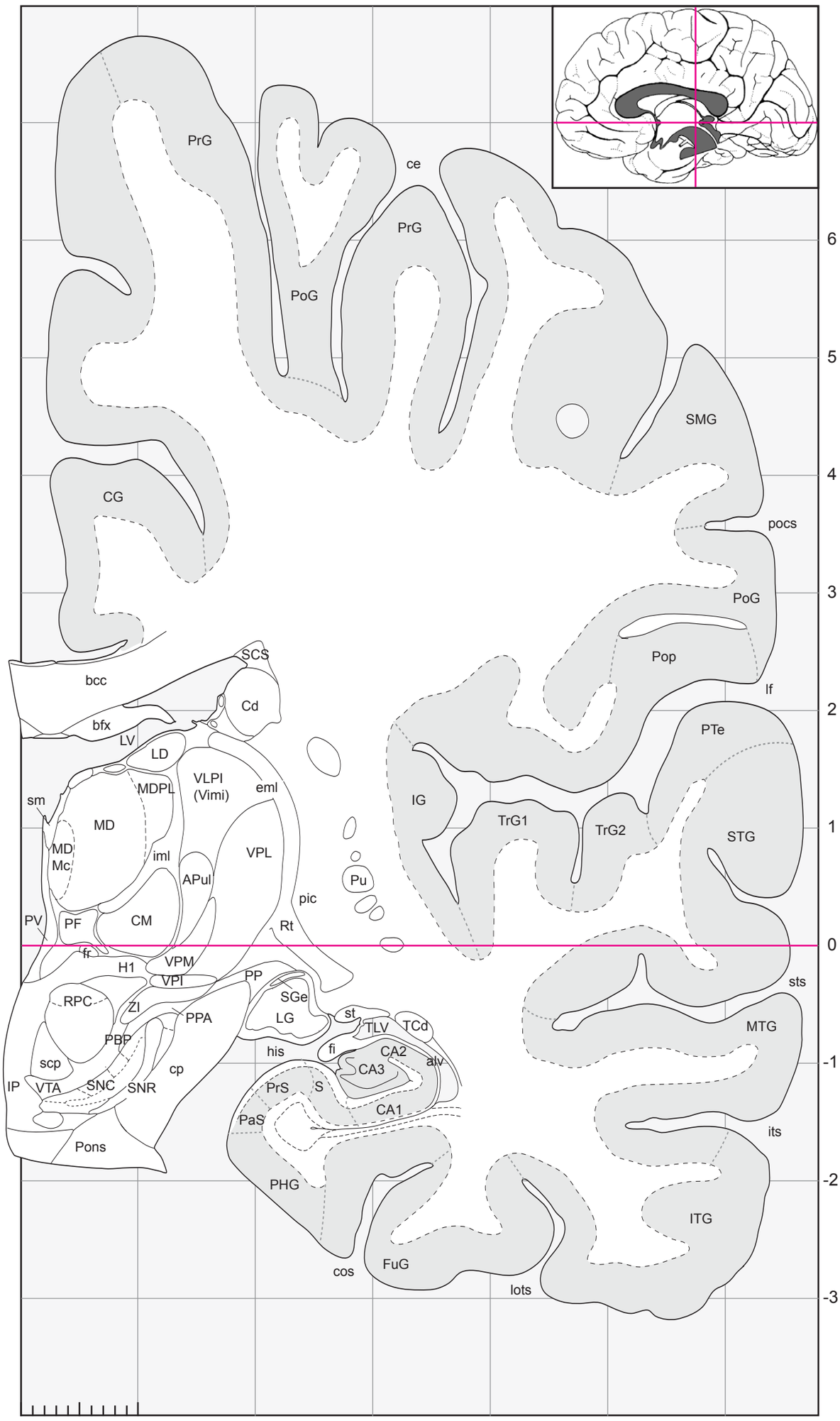


40

23,9 mm

APul anterior pulvinar
bcc body of the corpus callosum
bfx body of fornix
CA1-3 fields of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
Cl claustrum
CM centromedian thalamic nucl.
cos collateral sulcus
cp cerebral peduncle
ec external capsule
eml external medullary lamina of thalamus
ex extreme capsule
fi fimbria of the hippocampus
fr fasciculus retroflexus
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
his hippocampal sulcus
IG insular gyrus
IGr indusium griseum
iml internal medullary lamina of thalamus
IP interpeduncular nucleus
ITG inferior frontal gyrus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
lf lateral fissure
LG lateral geniculate nucleus
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
MDPL medial dorsal thalamic nucleus, paralamellar part
MTG medial temporal gyrus
PaS parasubiculum
PBP parabrachial pigmented nucl.
PF parafascicular thalamic nucl.
PHG parahippocampal gyrus
pic post. part of internal capsule
pocs postcentral sulcus
PoG postcentral gyrus
Pons pons
POp parietal operculum
PrG precentral gyrus
PrS presubiculum
PT paratenial thalamic nucleus
PTe planum temporale
Pu putamen
PV paraventricular thalamic nucl.
Re reuniens thalamic nucleus
RPC red nucleus, parvocellular p.
Rt reticular thalamic nucleus
S subiculum
scp superior cerebellar peduncle
SCS subcallosal stratum
SGe suprageniculate nucleus
sm stria medullaris of thalamus
SMG supramarginal gyrus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
SPF subparafascicular thalamic n.
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
tsv thalamostriate vein
VLPI ventrolateral posterior nucleus, internal part
VPI ventroposterior inferior nucl.
VPMPC ventroposterior medial nucleus, parvocellular part
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
VTA ventral tegmental area
ZI zona incerta

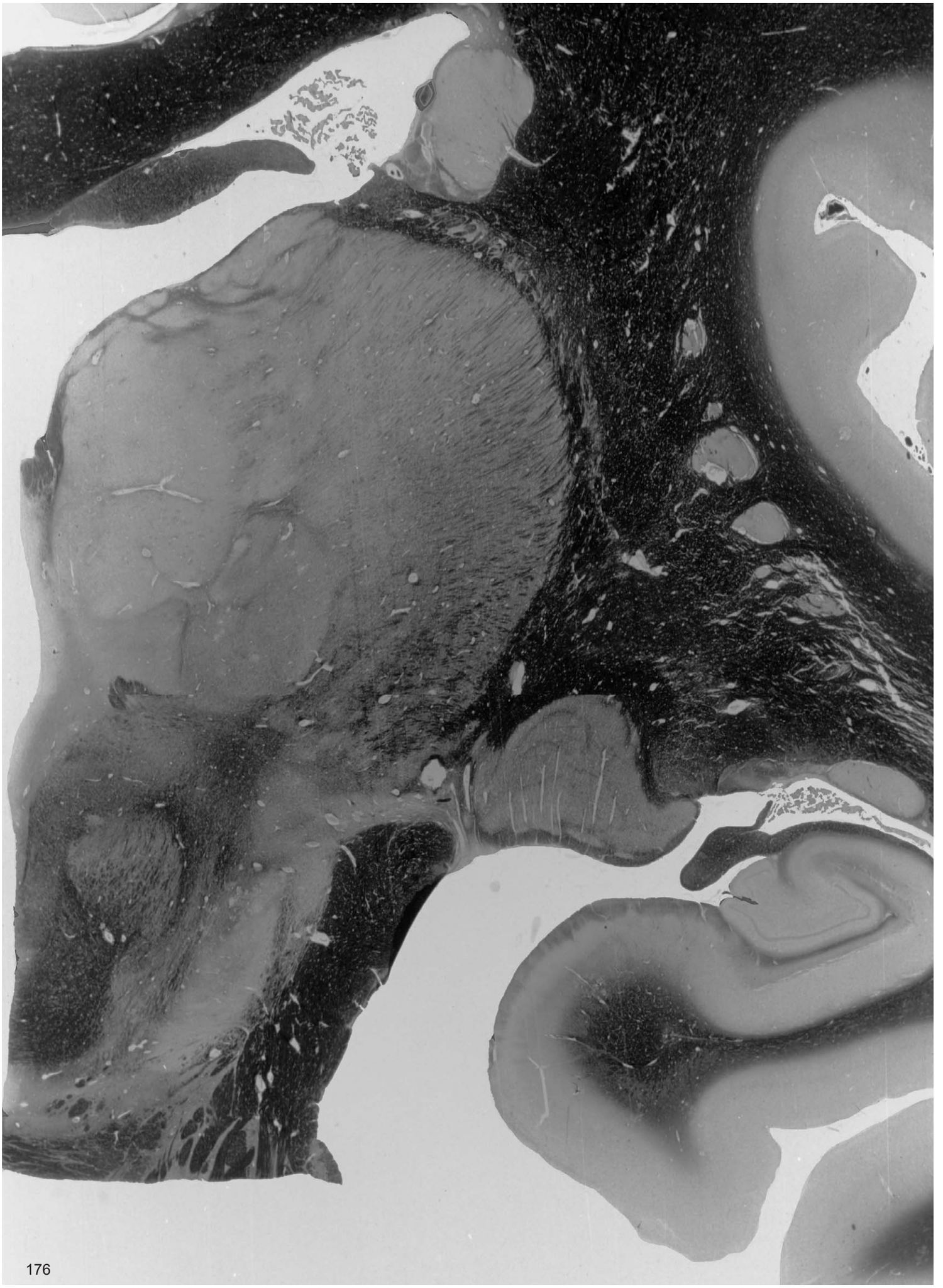


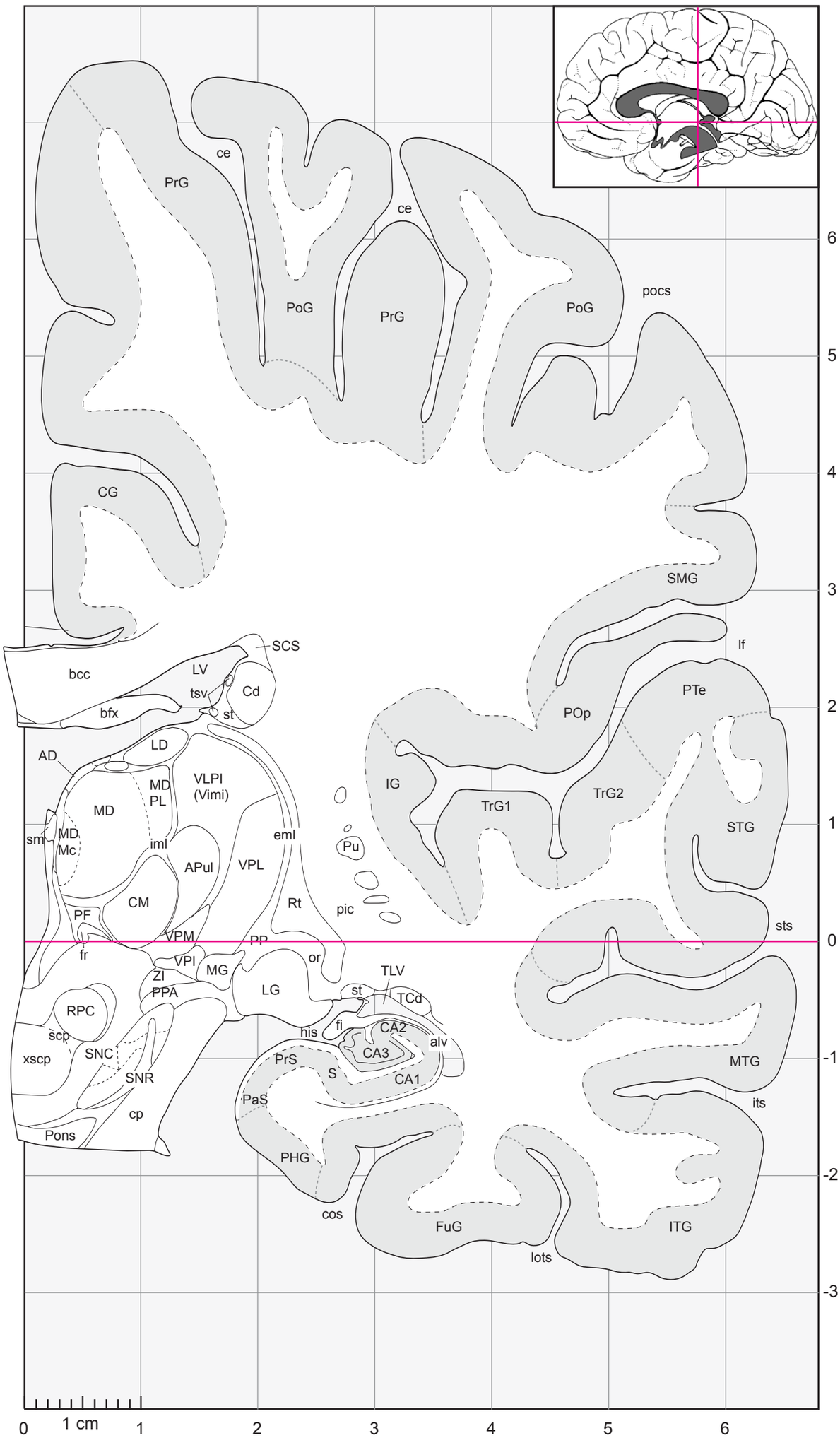


41

25,2 mm

alv alveus of the hippocampus
APul anterior pulvinar
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
CM centromedian thalamic nucl.
cos collateral sulcus
cp cerebral peduncle
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
fr fasciculus retroflexus
FuG fusiform gyrus
H1 thalamic fasciculus (field H1)
his hippocampal sulcus
IG insular gyrus
iml internal medullary lamina of thalamus
IP interpeduncular nucleus
ITG inferior frontal gyrus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
LDSF laterodorsal n., superfic. p.
lf lateral fissure
LG lateral geniculate nucleus
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
MDPL medial dorsal thalamic nucleus, paralamellar part
MTG medial temporal gyrus
PaS parasubiculum
PBP parabrachial pigmented nucl.
PF parafascicular thalamic nucl.
PHG parahippocampal gyrus
pic posterior part of the internal capsule
pocs postcentral sulcus
PoG postcentral gyrus
Pons pons
POp parietal operculum
PPA peripeduncular area
PrG precentral gyrus
PrS presubiculum
PTe planum temporale
Pu putamen
PV paraventricular thalamic nucl.
RPC red nucl., parvocellular part
Rt reticular thalamic nucleus
S subiculum
scp superior cerebellar peduncle
SCS subcallosal stratum
SGe suprageniculate nucleus
sm stria medullaris of thalamus
SMG supramarginal gyrus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
VLPI ventrolateral posterior nucleus, internal part
VPI ventroposterior inferior nucl.
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
VTA ventral tegmental area
ZI zona incerta

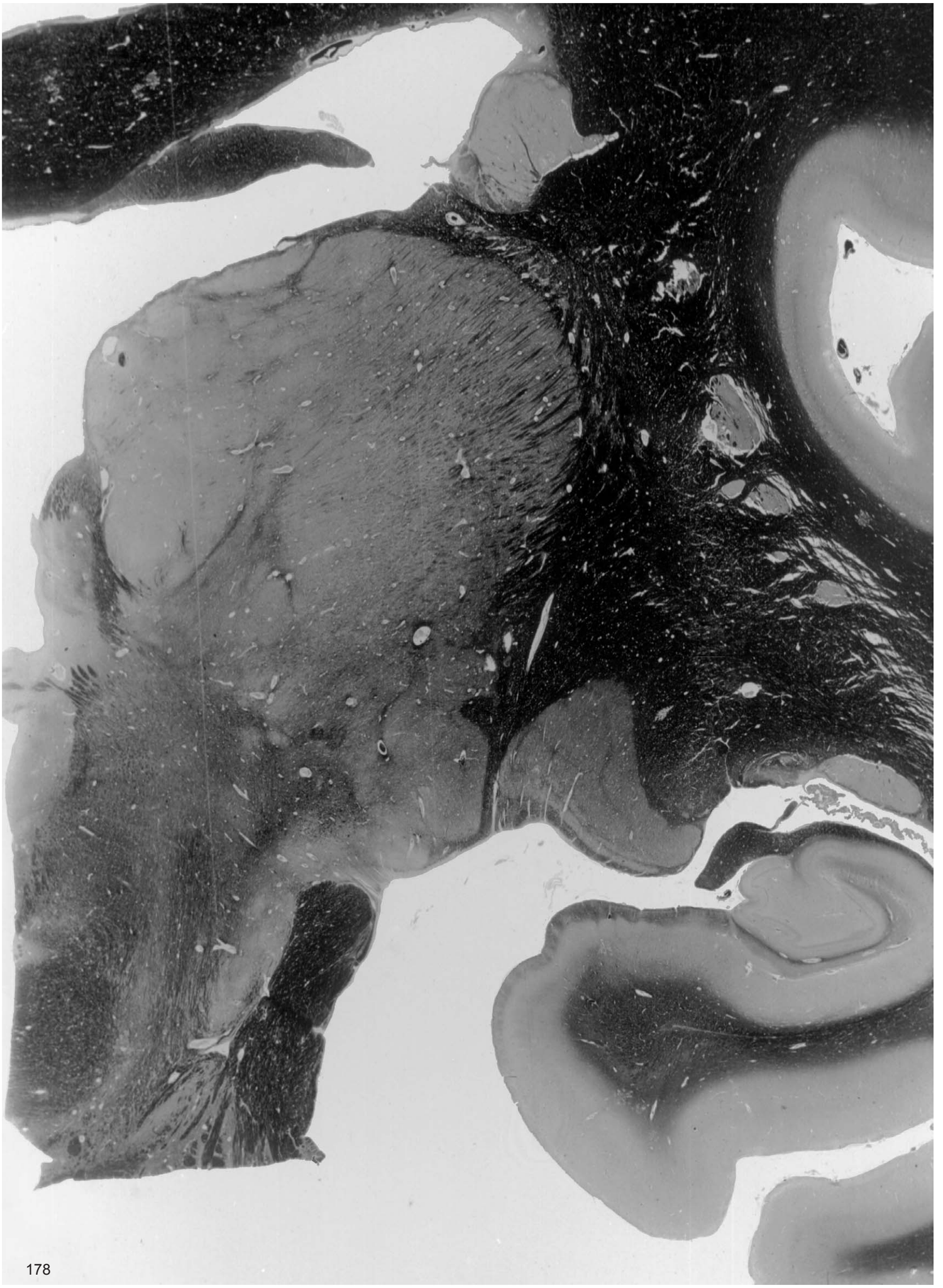


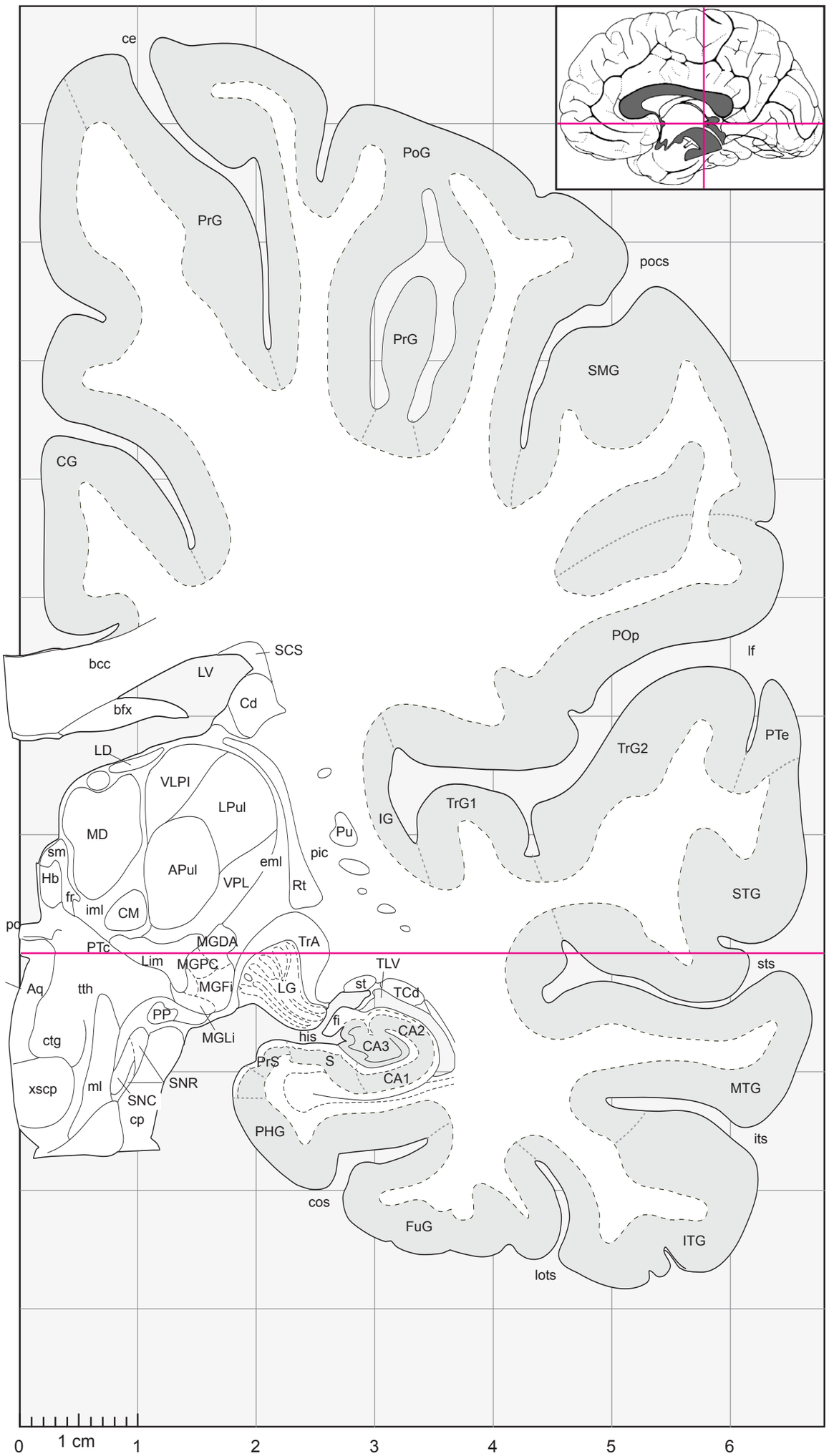


42

26,5 mm

AD anterodorsal thalamic nucleus
alv alveus of the hippocampus
APul anterior pulvinar
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
CM centromedian thalamic nucl.
CMMC centromedian thalamic n., magnocelular part
cos collateral sulcus
cp cerebral peduncle
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
fr fasciculus retroflexus
FuG fusiform gyrus
his hippocampal sulcus
IG insular gyrus
iml internal medullary lamina of thalamus
ITG inferior frontal gyrus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
LDSF laterodorsal nucleus, superficial part
lf lateral fissure
LG lateral geniculate nucleus
lots lateral occipitotemporal sulcus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MDMc medial dorsal thalamic nucleus, magnocellular part
MDPL medial dorsal thalamic nucleus, paralamellar part
MG medial geniculate nucleus
MTG medial temporal gyrus
or optic radiation
PaS parasubiculum
PF parafascicular thalamic nucl.
PHG parahippocampal gyrus
pic posterior part of the internal capsule
pocs postcentral sulcus
PoG postcentral gyrus
Pons pons
POp parietal operculum
PPA peripeduncular area
PrG precentral gyrus
PrS presubiculum
PTe planum temporale
Pu putamen
RPC red nucl., parvocellular part
Rt reticular thalamic nucleus
S subiculum
scp superior cerebellar peduncle
SCS subcallosal stratum
sm stria medullaris of thalamus
SMG supramarginal gyrus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
tsv thalamostriate vein
VLPI ventrolateral posterior nucleus, internal part
VPI ventroposterior inferior nucl.
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
xscp decussation of the superior cerebellar peduncle
ZI zona incerta

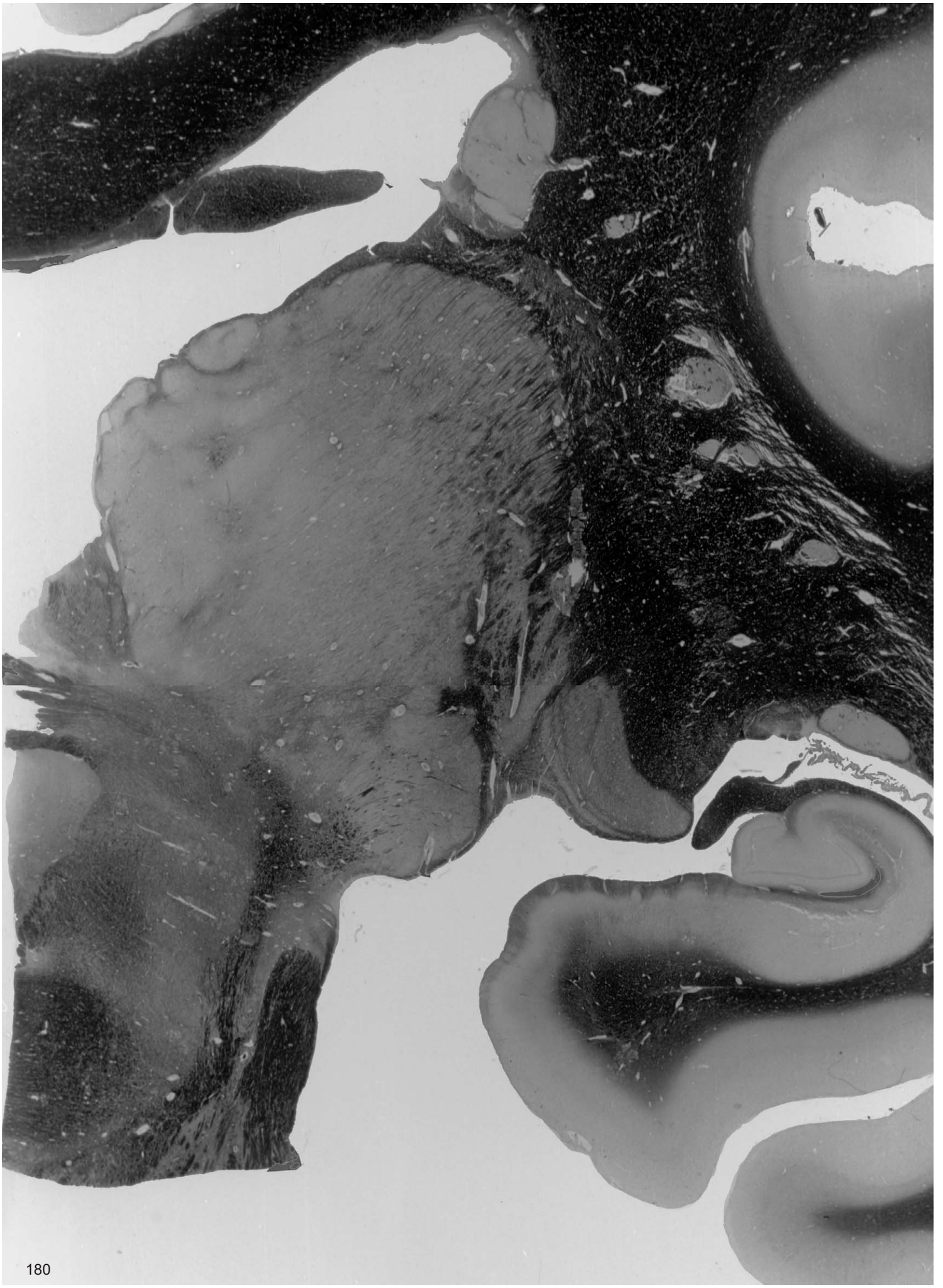


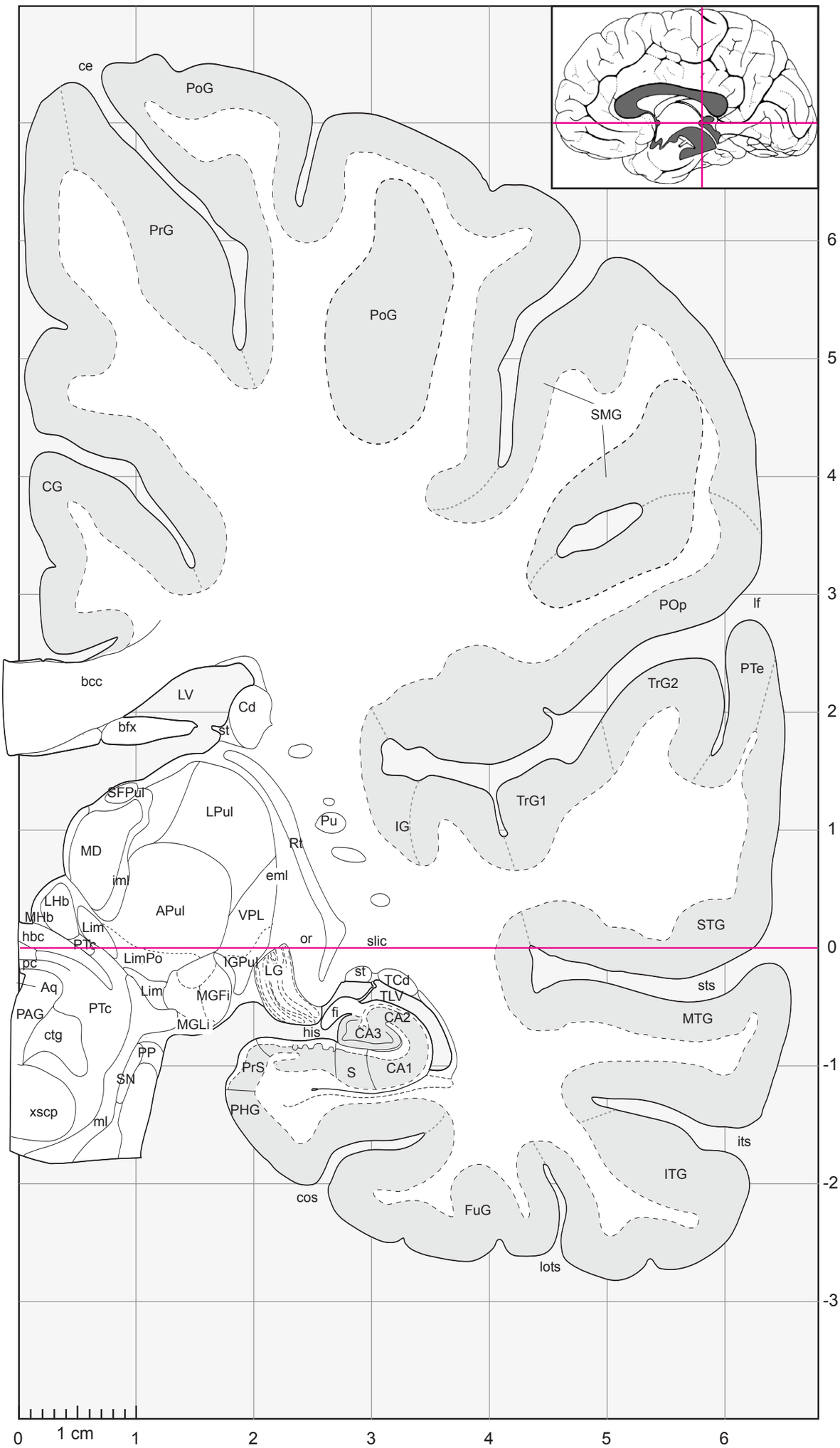


43

27,8 mm

APul anterior pulvinar nucleus
Aq cerebral aqueduct (Sylvius)
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
CM centromedian thalamic nucl.
cos collateral sulcus
cp cerebral peduncle
ctg central tegmental tract
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
fr fasciculus retroflexus
FuG fusiform gyrus
Hb habenular nucleus
his hippocampal sulcus
IG insular gyrus
iml internal medullary lamina of thalamus
ITG inferior frontal gyrus
its inferior temporal sulcus
LD lateral dorsal thalamic nucleus
LDSF laterodorsal nucleus, superficial part
lf lateral fissure
LG lateral geniculate nucleus
Lim limitans nucleus
lots lateral occipitotemporal sulcus
LPul lateral pulvinar nucleus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MGDA medial geniculate nucl., dorsoant. (magnocellular) part
MGDP medial geniculate nucleus, dorsoposterior part
MGFi medial geniculate nucleus, fibrosus part
MGLi medial geniculate nucleus, limitans part
MGPC medial geniculate nucleus, parvocellular part
ml medial lemniscus
MTG medial temporal gyrus
pc posterior commissure
PHG parahippocampal gyrus
pic posterior part of the internal capsule
pocs postcentral sulcus
PoG postcentral gyrus
POp parietal operculum
PP peripeduncular nucleus
PrG precentral gyrus
PrS presubiculum
PTc pretectal area
PTe planum temporale
Pu putamen
Rt reticular thalamic nucleus
S subiculum
SCS subcallosal stratum
sm stria medullaris of thalamus
SMG supramarginal gyrus
SNC substantia nigra, p.compacta
SNR substantia nigra, p. reticulata
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
SubH subhabenular nucleus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrA triangular area (Wernicke)
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
tth dorsal trigemino-thalamic tract
VLPl ventrolateral posterior nucleus, internal part
VPI ventroposterior inferior nucl.
VPL ventroposterior lateral thalamic nucleus
VPM ventroposterior medial thalamic nucleus
xscp decussation of the superior cerebellar peduncle

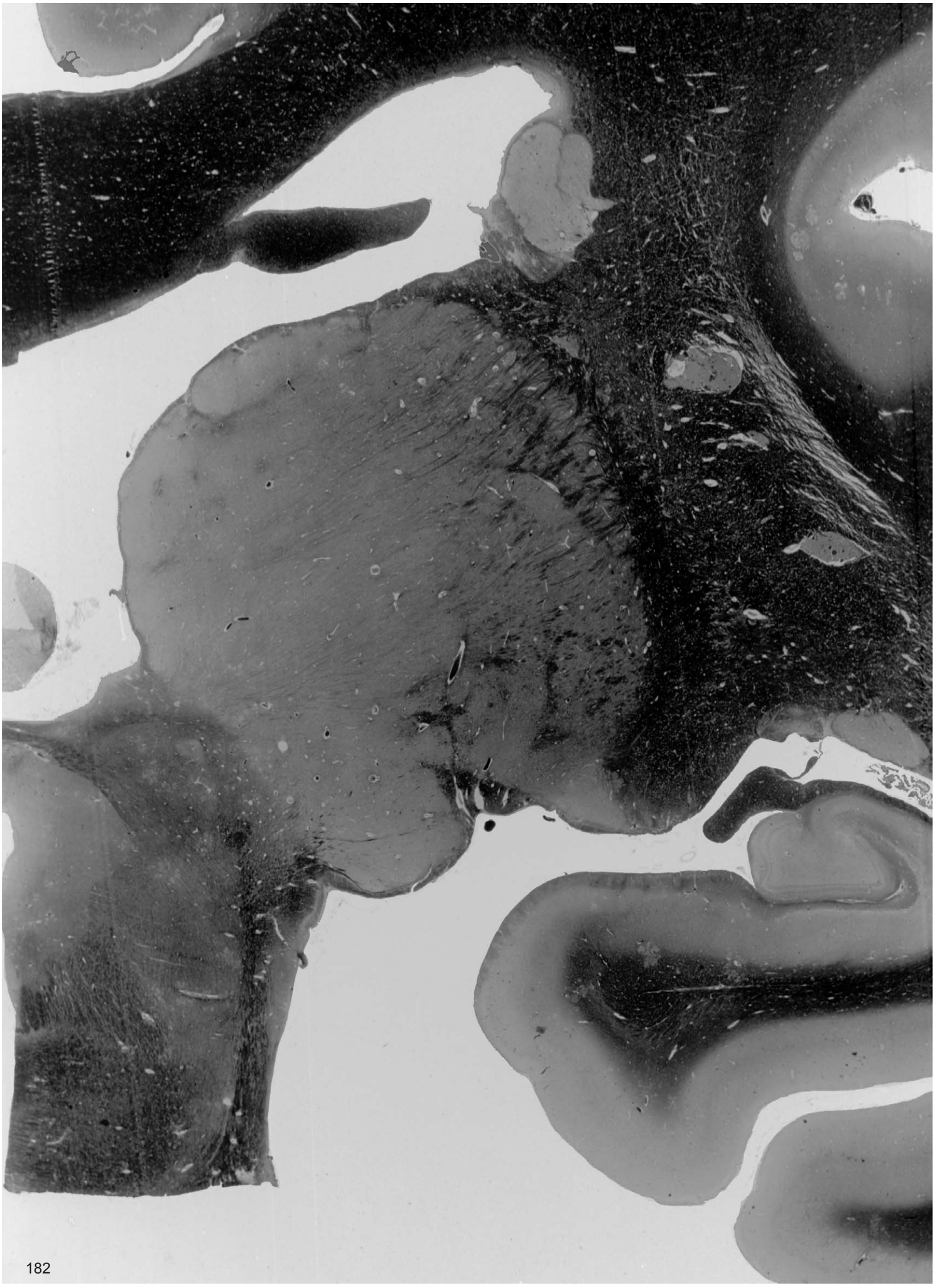




44

29,2 mm

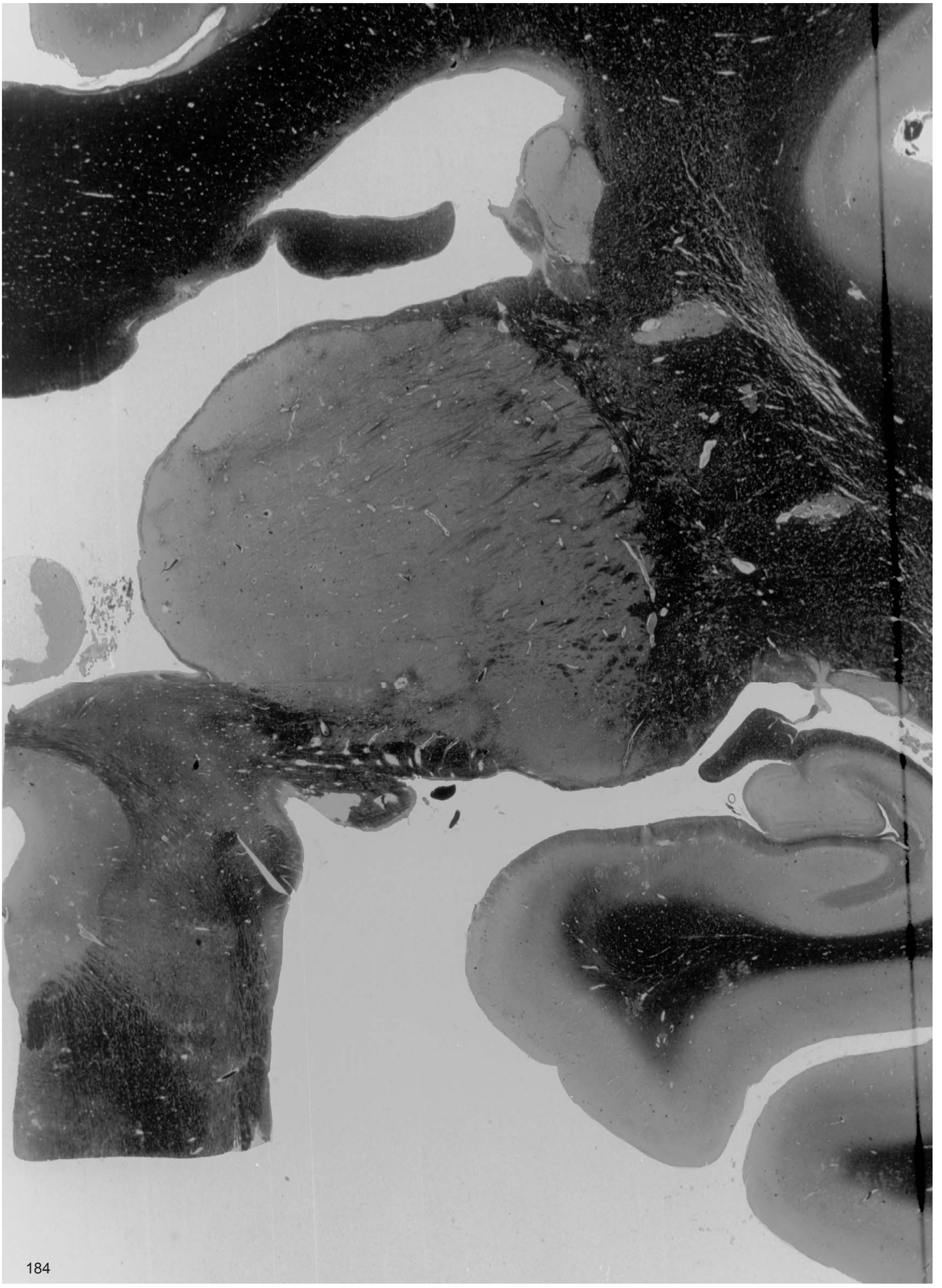
APul anterior pulvinar nucleus
Aq cerebral aqueduct (Sylvius)
bcc body of the corpus callosum
bfx body of fornix
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
cos collateral sulcus
ctg central tegmental tract
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
FuG fusiform gyrus
hbc habenular commissure
his hippocampal sulcus
IG insular gyrus
IGPul intergeniculate pulvinar
iml internal medullary lamina of thalamus
ITG inferior frontal gyrus
its inferior temporal sulcus
lf lateral fissure
LG lateral geniculate nucleus
LHb lateral habenular nucleus
Lim limitans nucleus
LimPo limitans portae
lots lateral occipitotemporal sulcus
LPul lateral pulvinar nucleus
LV lateral ventricle
MD medial dorsal thalamic nucl.
MGDA medial geniculate nucleus, dorsoant. (magnocellular) part
MGDP medial geniculate nucleus, dorsoposterior part
MGFi medial geniculate nucleus, fibrosus part
MGLi medial geniculate nucleus, limitans part
MHb medial habenular nucleus
ml medial lemniscus
MTG medial temporal gyrus
or optic radiation
PAG periaqueductal gray
pc posterior commissure
PHG parahippocampal gyrus
PoG postcentral gyrus
POp parietal operculum
PP peripeduncular nucleus
PrG precentral gyrus
PrS presubiculum
PTc pretectal area
PTe planum temporale
Pu putamen
Rt reticular thalamic nucleus
S subiculum
SFPul superficial pulvinar
slic sublenticular part of internal capsule
SMG supramarginal gyrus
SN substantia nigra
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
VPL ventral posterolateral thalamic nucleus
xscp decussation of the superior cerebellar peduncle

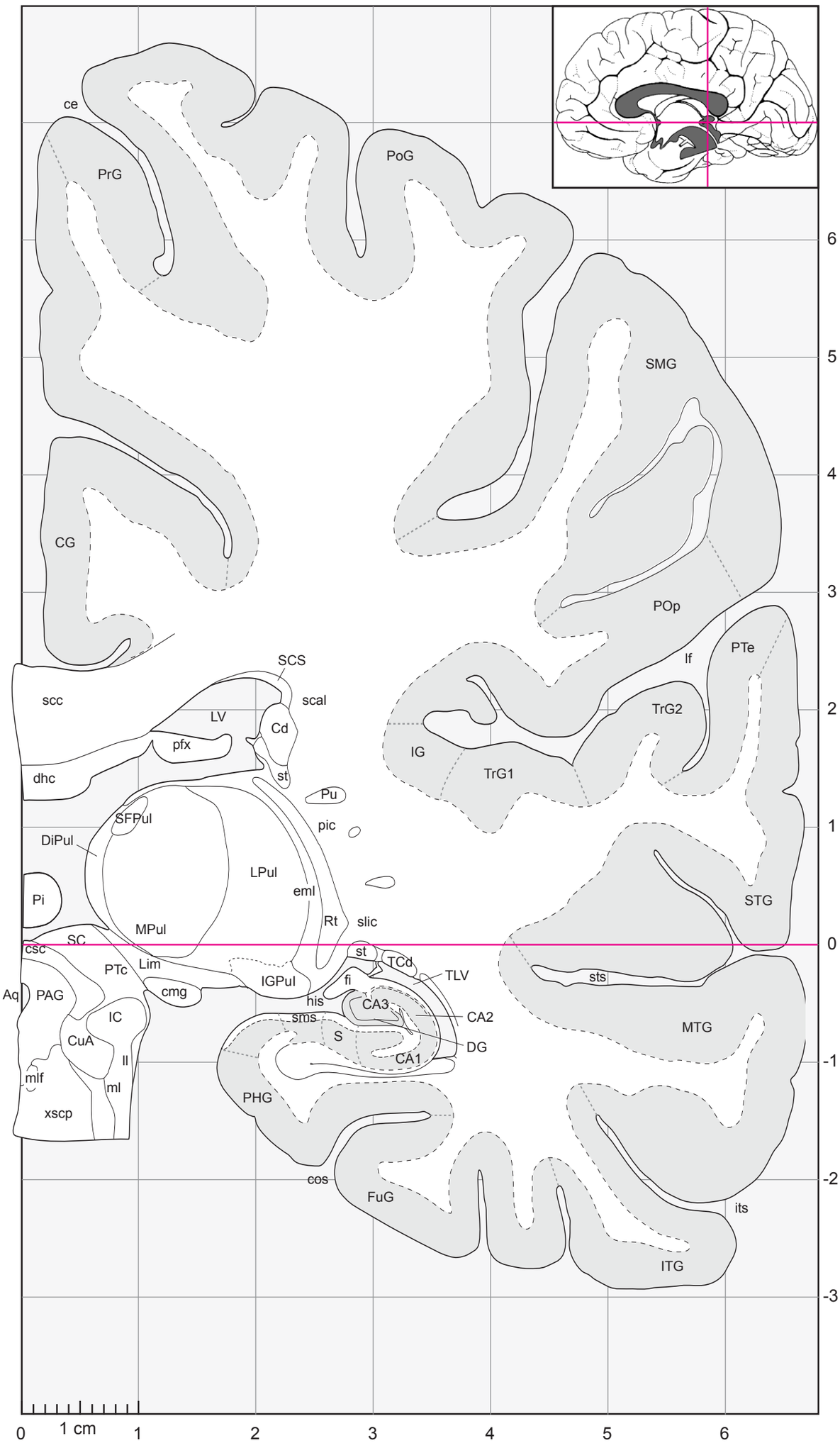


45

30,5 mm

Aq cerebral aqueduct (Sylvius)
bcc body of the corpus callosum
bic brachium of the inf. colliculus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
cos collateral sulcus
csc commissure of the superior colliculi
ctg central tegmental tract
DG dentate gyrus
dhc dorsal hippocampal commissure
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
FuG fusiform gyrus
IG insular gyrus
IGPul intergeniculate pulvinar
iml internal medullary lamina of thalamus
ITG inferior frontal gyrus
its inferior temporal sulcus
lf lateral fissure
LG lateral geniculate nucleus
Lim limitans nucleus
LPul inferior pulvinar nucleus
LV lateral ventricle
MD mediodorsal thalamic nucleus
MDe margo denticulatus
MGDP medial geniculate nucleus, dorsoposterior part
MGFi medial geniculate nucleus, fibrosus part
MGLi medial geniculate nucleus, limitans part
ml medial lemniscus
mlf medial longitudinal fasciculus
MPul medial pulvinar nucleus
MTG medial temporal gyrus
or optic radiation
PAG periaqueductal gray
pc posterior commissure
pfx post. column (crus) of fornix
PHG parahippocampal gyrus
Pi pineal gland
pic post. part of internal capsule
PoG postcentral gyrus
POp parietal operculum
PrS presubiculum
PTc pretectal area
PTe planum temporale
Pu putamen
Rt reticular thalamic nucleus
S subiculum
SC superior colliculus
scal subcallosal bundle
SFPul superficial pulvinar nucleus
slic sublenticular part of internal capsule
SMG supramarginal gyrus
sms superficial medullary stratum
spth spino-thalamic tract
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus
VPL ventral posterolateral thalamic nucleus
xscp decussation of the superior cerebellar peduncle

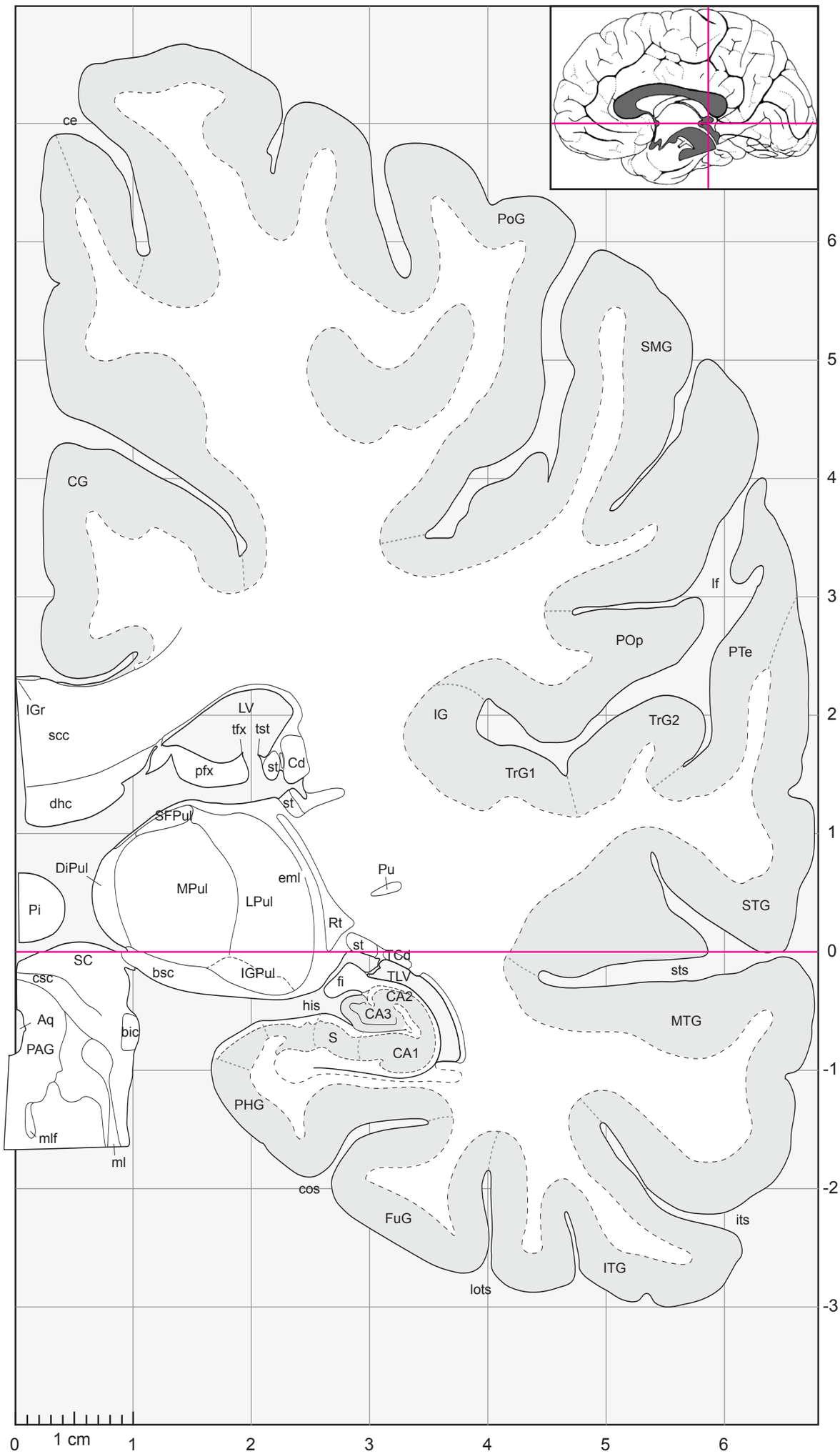




46

31,9 mm

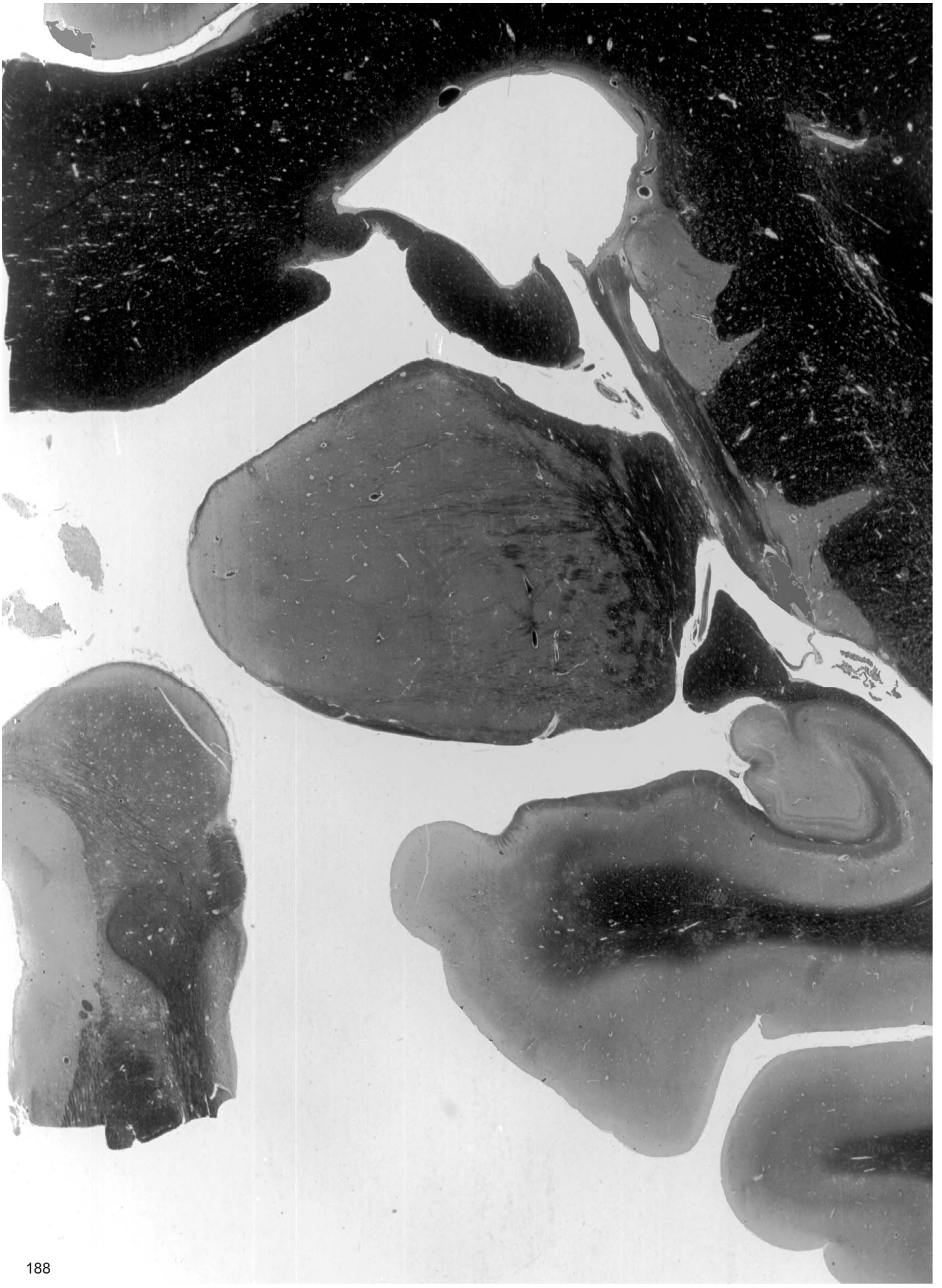
Aq cerebral aqueduct (Sylvius)
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
cmg capsule of medial geniculate nucleus
cos collateral sulcus
csc commissure of the superior colliculi
CuA cuneiform area
DG dentate gyrus
dhc dorsal hippocampal commissure
DiPul diffuse pulvinar nucleus
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
FuG fusiform gyrus
his hippocampal sulcus
IC inferior colliculus
IG insular gyrus
IGPul intergeniculate pulvinar
ITG inferior frontal gyrus
its inferior temporal sulcus
lf lateral fissure
Lim limitans nucleus
ll lateral lemniscus
LPul lateral pulvinar nucleus
LV lateral ventricle
ml medial lemniscus
mlf medial longitudinal fasciculus
MPul medial pulvinar nucleus
MTG medial temporal gyrus
PAG periaqueductal gray
pfx posterior column (crus) of fornix
PHG parahippocampal gyrus
Pi pineal gland
pic posterior part of internal capsule
PoG postcentral gyrus
POp parietal operculum
PrG precentral gyrus
PTc pretectal area
PTe planum temporale
Pu putamen
Rt reticular thalamic nucleus
S subiculum
SC superior colliculus
scal subcallosal bundle
scc splenium of the corpus callosum
SCS subcallosal stratum
SFPul superficial pulvinar nucleus
slic sublenticular part of internal capsule
SMG supramarginal gyrus
sms superficial medullary stratum
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 anterior transverse temporal gyrus
TrG2 posterior transverse temporal gyrus
xscp decussation of the superior cerebellar peduncle



47

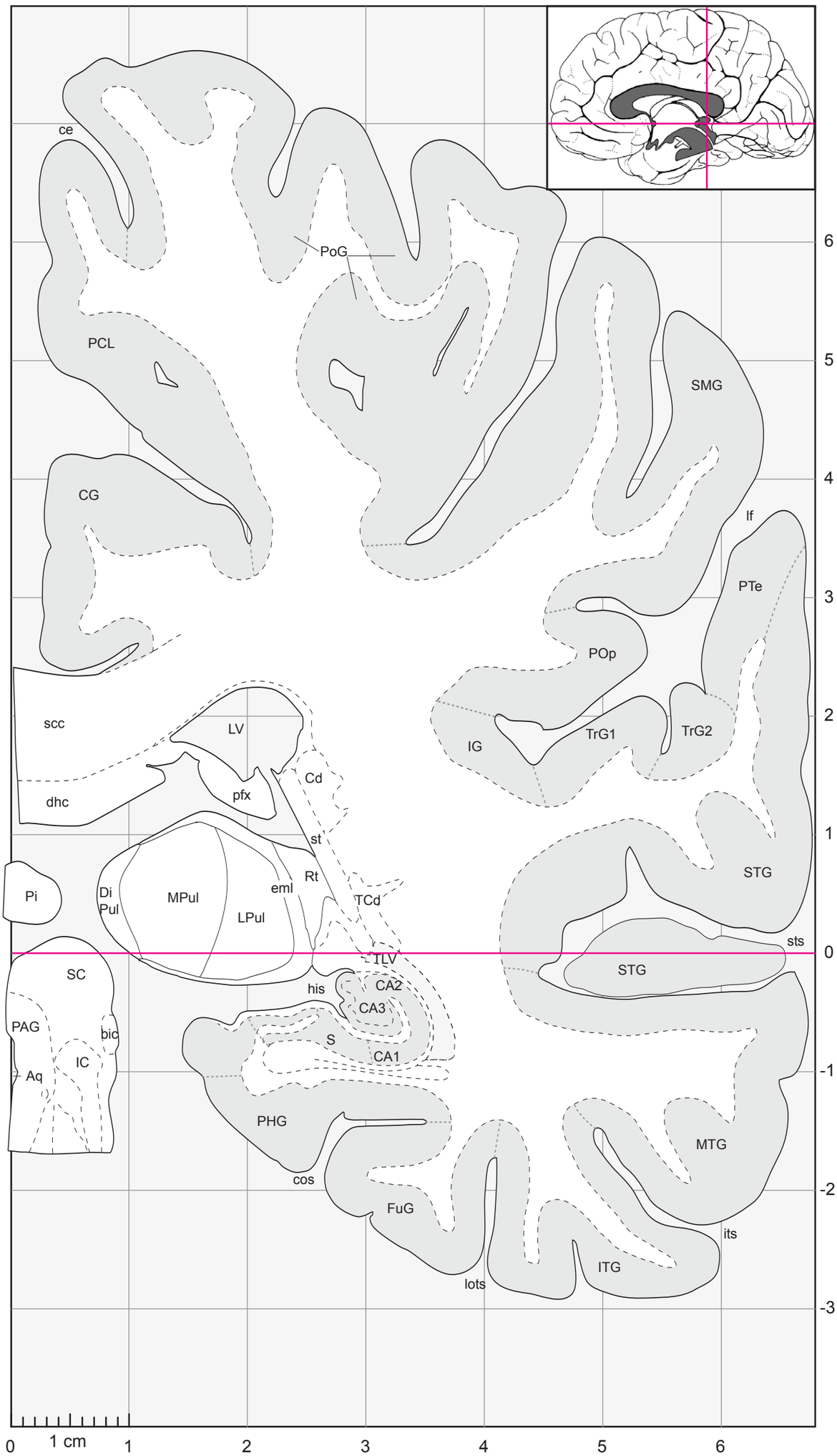
33,1 mm

Aq cerebral aqueduct (Sylvius)
bic brachium of the inferior colliculus
bsc brachium of the superior colliculus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
cos collateral sulcus
csc commissure of the superior colliculi
dhc dorsal hippocampal commissure
DiPul diffuse pulvinar nucleus
eml external medullary lamina of thalamus
fi fimbria of the hippocampus
FuG fusiform gyrus
his hippocampal sulcus
IG insular gyrus
IGPul intergeniculate pulvinar
IGr indusium griseum
ITG inferior frontal gyrus
its inferior temporal sulcus
lf lateral fissure
lots lateral occipitotemporal sulcus
LPul lateral pulvinar nucleus
LV lateral ventricle
ml medial lemniscus
mlf medial longitudinal fasciculus
MPul medial pulvinar nucleus
MTG medial temporal gyrus
PAG periaqueductal gray
pfx posterior column (crus) of fornix
PHG parahippocampal gyrus
Pi pineal gland
PoG postcentral gyrus
POp parietal operculum
PTe planum temporale
Pu putamen
Rt reticular thalamic nucleus
S subiculum
SC superior colliculus
scc splenium of the corpus callosum
SFPul superficial pulvinar nucleus
SMG supramarginal gyrus
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
tfx tenia of fornix
TLV temporal horn of lateral ventricle
TrG1 anterior transverse temporal gyrus
TrG2 posterior transverse temporal gyrus
tst tenia of stria terminalis (of choroid plexus)

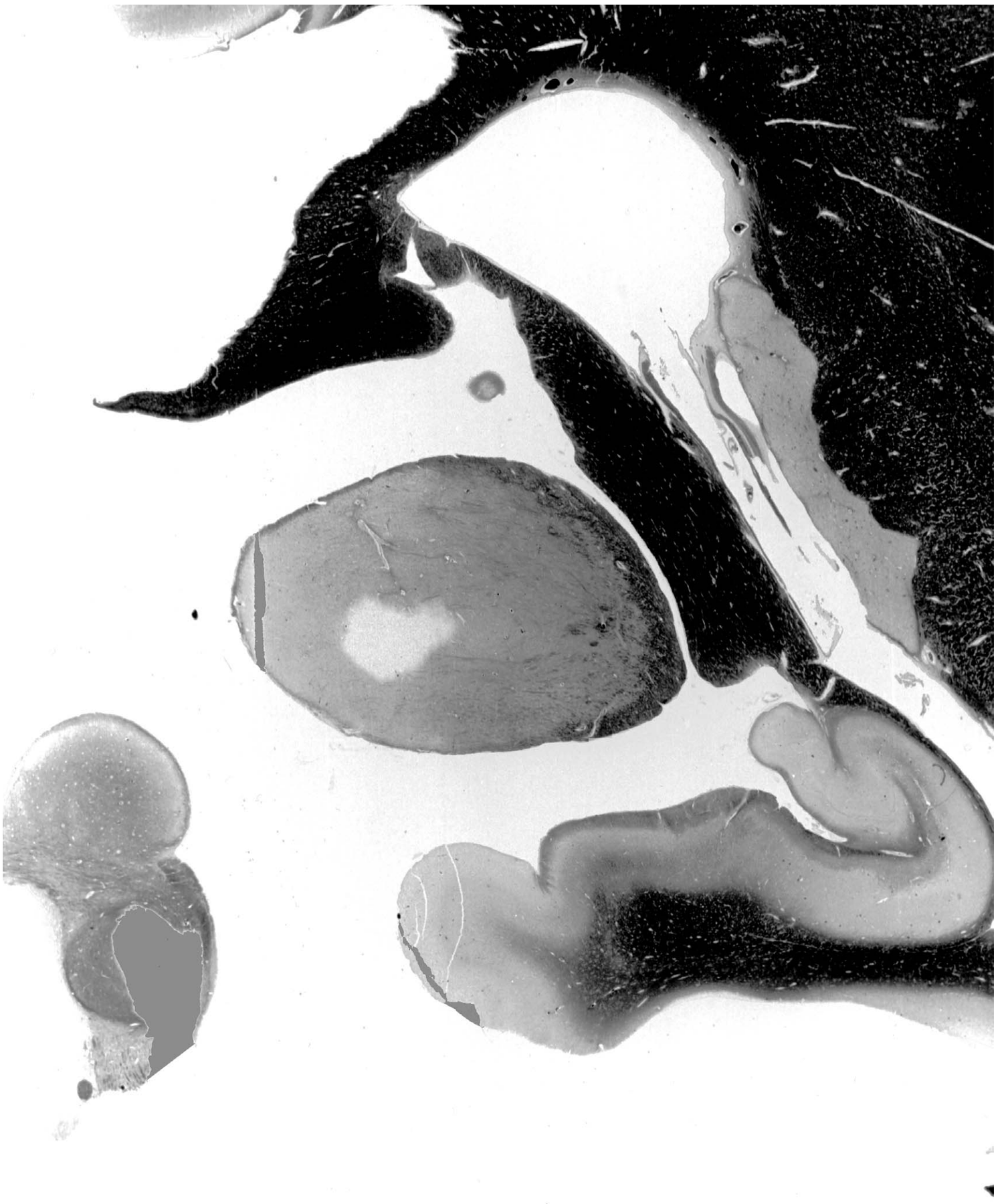


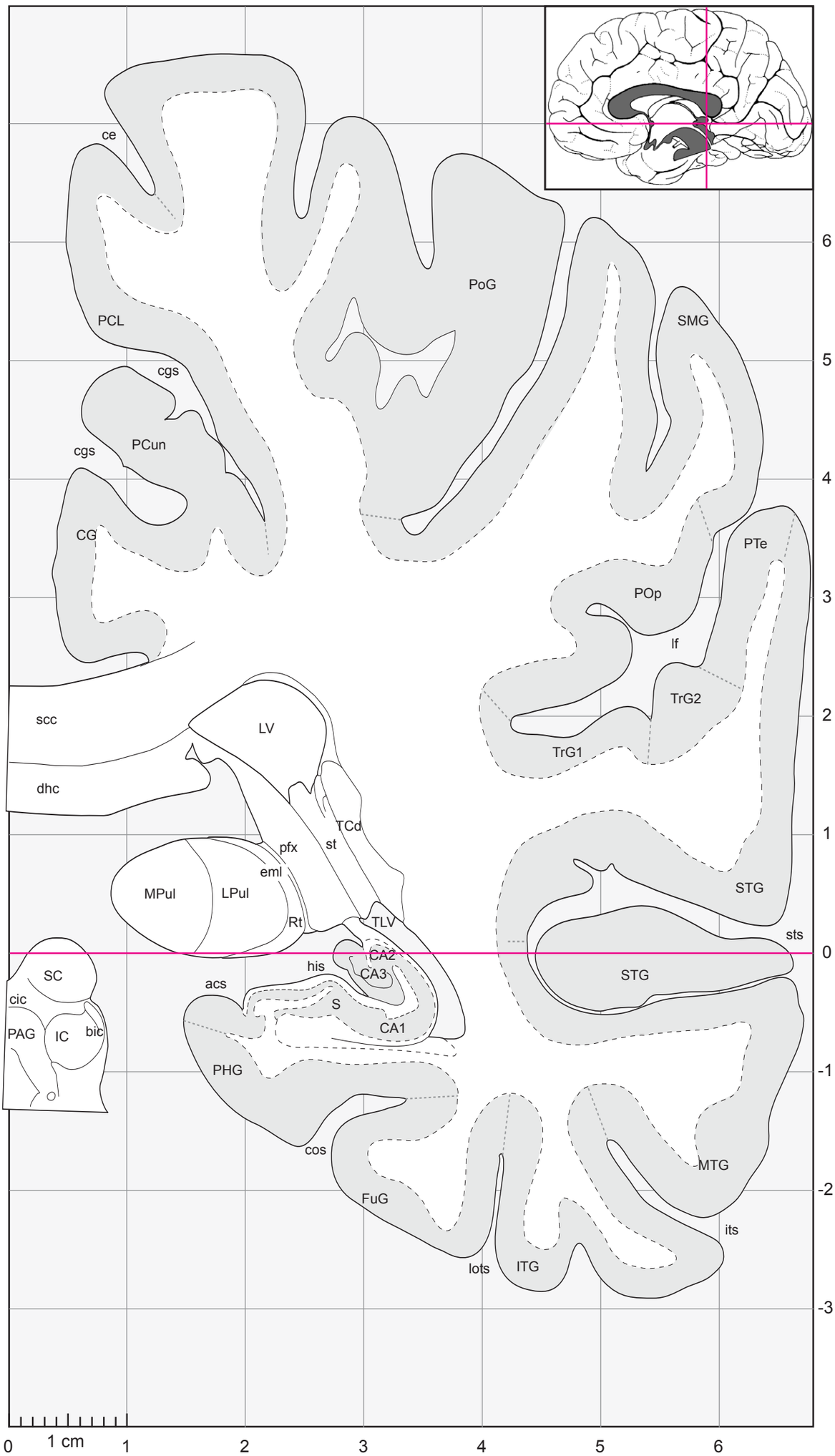
48

34,6 mm



Aq cerebral aqueduct (Sylvius)
bic brachium of the inferior colliculus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
Cd caudate nucleus
ce central fissure
CG cingulate gyrus
cos collateral sulcus
dhc dorsal hippocampal commissure
DiPul diffuse pulvinar nucleus
eml external medullary lamina of thalamus
FuG fusiform gyrus
his hippocampal sulcus
IC nucleus of inferior colliculus
IG insular gyrus
ITG inferior frontal gyrus
its inferior temporal sulcus
lf lateral fissure
lots lateral occipitotemporal sulcus
LPul lateral pulvinar nucleus
LV lateral ventricle
MPul medial pulvinar nucleus
MTG medial temporal gyrus
PAG periaqueductal gray
PCL paracentral lobule
pfx posterior column (crus) of fornix
PHG parahippocampal gyrus
Pi pineal gland
PoG postcentral gyrus
POp parietal operculum
PTe planum temporale
Rt reticular thalamic nucleus
S subiculum
SC superior colliculus
scc splenium of the corpus callosum
SMG supramarginal gyrus
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lat. ventricle
TrG1 ant. transverse temp. gyrus
TrG2 post. transverse temp. gyrus





49

36,0 mm

aca anterior calcarine sulcus
bic brachium of the inferior colliculus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
ce central fissure
CG cingulate gyrus
cgs cingulate sulcus
cic commissure of the inferior colliculi
cos collateral sulcus
dhc dorsal hippocampal commissure
DiPul diffuse pulvinar nucleus
eml external medullary lamina of thalamus
FuG fusiform gyrus
his hippocampal sulcus
IC inferior colliculus
ITG inferior frontal gyrus
its inferior temporal sulcus
lf lateral fissure
lots lateral occipitotemporal sulcus
LPul lateral pulvinar nucleus
LV lateral ventricle
MPul medial pulvinar nucleus
MTG medial temporal gyrus
PAG periaqueductal gray
PCL paracentral lobule
PCun precuneus
pfx posterior column (crus) of fornix
PHG parahippocampal gyrus
PoG postcentral gyrus
POp parietal operculum
PTe planum temporale
Rt reticular thalamic nucleus
S subiculum
SC superior colliculus
scc splenium of the corpus callosum
SMG supramarginal gyrus
st stria terminalis
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TLV temporal horn of lateral ventricle
TrG1 anterior transverse temporal gyrus
TrG2 posterior transverse temporal gyrus

50

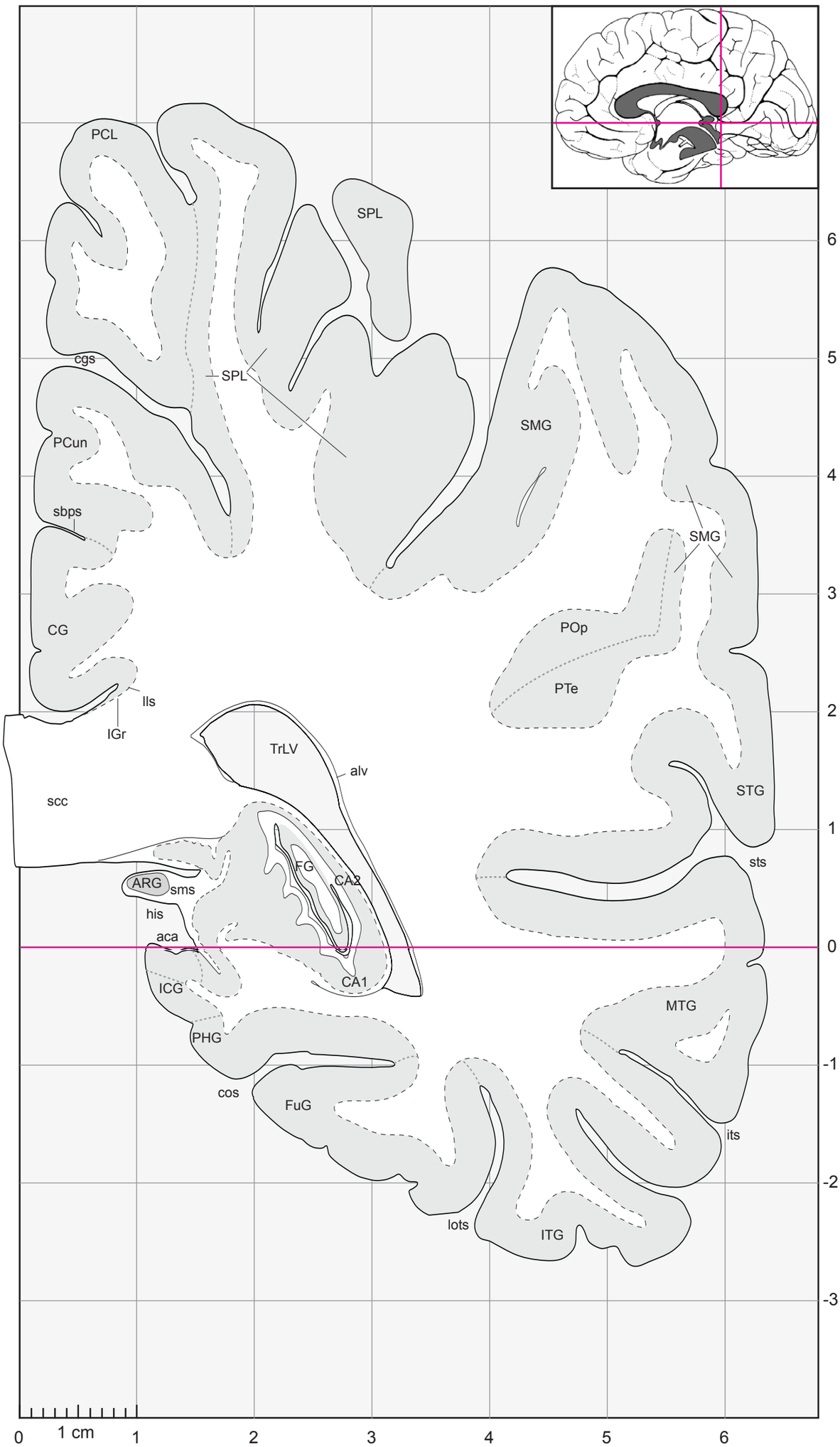
39,5 mm

aca anterior calcarine sulcus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
ce central fissure
CG cingulate gyrus
cgs cingulate sulcus
cos collateral sulcus
FG fasciolar gyrus
FuG fusiform gyrus
ICG isthmus of cingulate gyrus
IG insular gyrus
IGr indusium griseum
ITG inferior frontal gyrus
lf lateral fissure
MTG medial temporal gyrus
PCL paracentral lobule
PCun precuneus
pfx posterior column (crus) of fornix
PHG parahippocampal gyrus
PoG postcentral gyrus
POp parietal operculum
PTe planum temporale
S subiculum
scc splenium of the corpus callosum
SMG supramarginal gyrus
sms superficial medullary stratum
STG superior temporal gyrus
sts superior temporal sulcus
TCd tail of caudate nucleus
TrG1 anterior transverse temporal gyrus
TrG2 posterior transverse temporal gyrus
TrLV trigone of lateral ventricle

51

40,8 mm

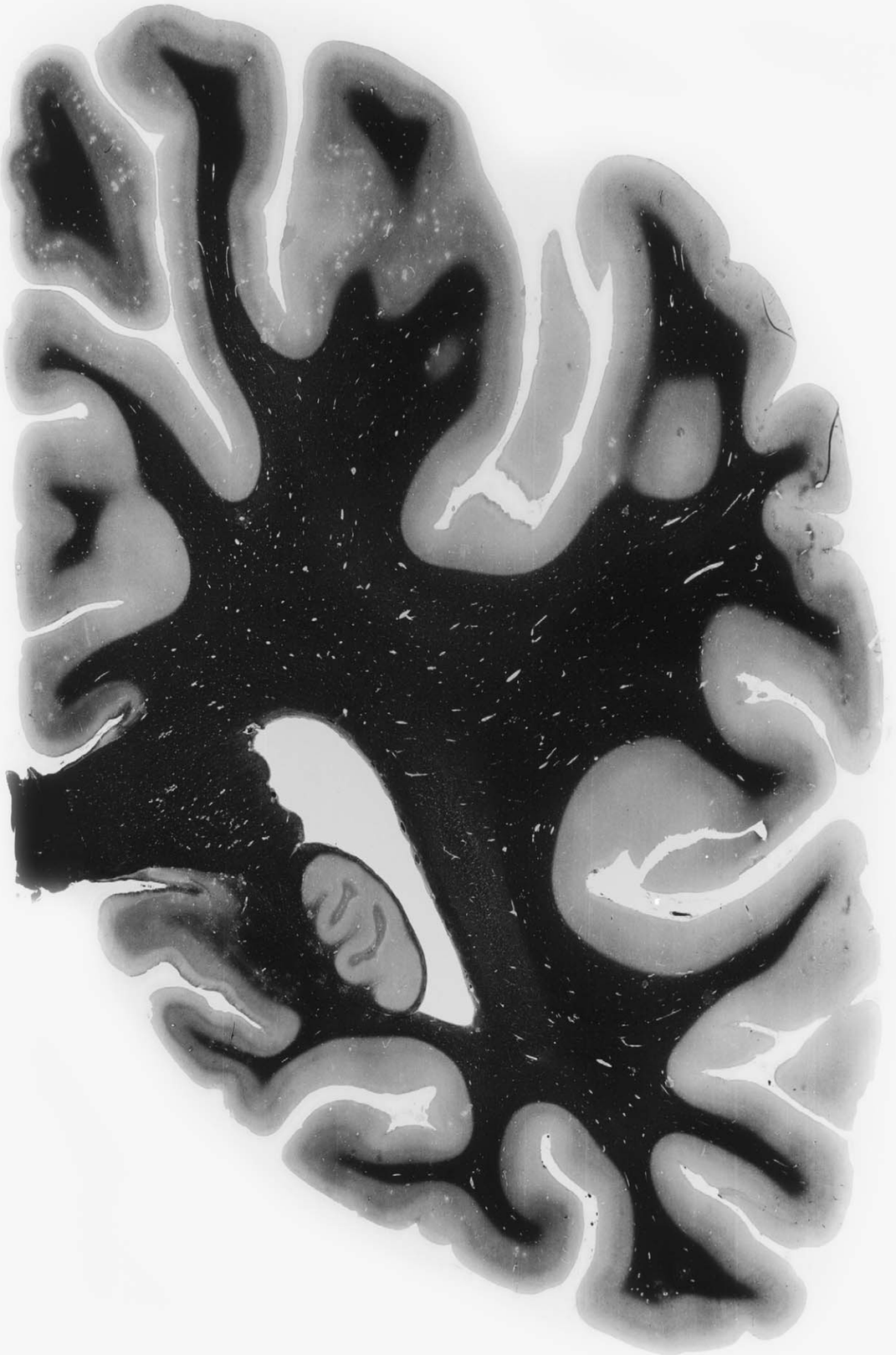
aca anterior calcarine sulcus
ARG Andreas Retzius gyrus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
cfx crus of the fornix
CG cingulate gyrus
cgs cingulate sulcus
cos collateral sulcus
FG fasciolar gyrus
FuG fusiform gyrus
his hippocampal sulcus
ICG isthmus of cingulate gyrus
IGr indusium griseum
ITG inferior frontal gyrus
its inferior temporal sulcus
lls lateral longitudinal stria
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus
PCL paracentral lobule
PCun precuneus
PHG parahippocampal gyrus
pocs postcentral sulcus
PoG postcentral gyrus
POp parietal operculum
PTe planum temporale
S subiculum
sbps subparietal sulcus
scc splenium of the corpus callosum
SMG supramarginal gyrus
sms superficial medullary stratum
SPL superior parietal lobule
STG superior temporal gyrus
sts superior temporal sulcus
TrLV trigone of lateral ventricle

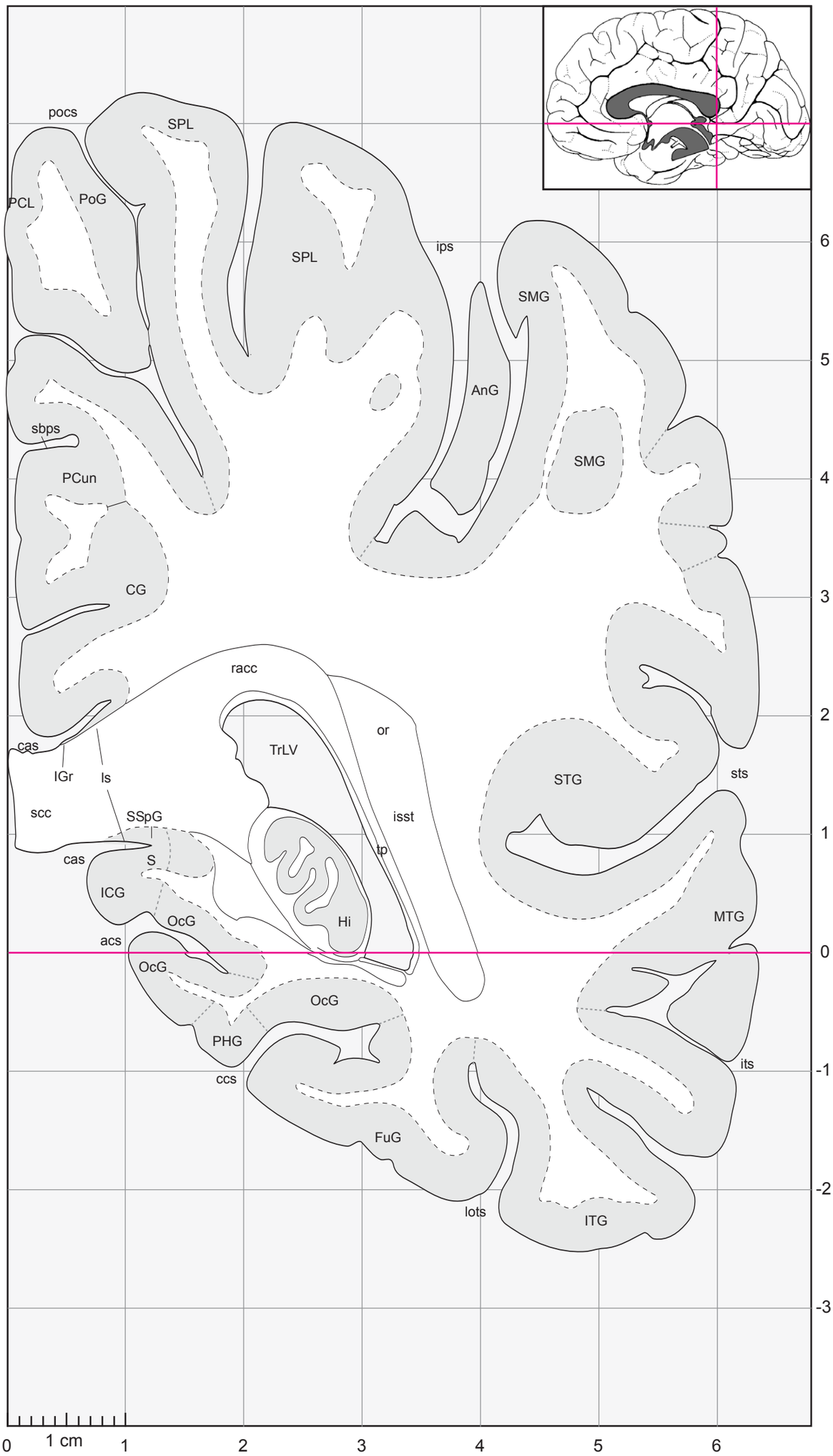


52

42,2 mm

aca anterior calcarine sulcus
alv alveus of the hippocampus
ARG Andreas Retzius gyrus
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
cfx crus of the fornix
CG cingulate gyrus
cos collateral sulcus
FG fasciolar gyrus
FuG fusiform gyrus
his hippocampal sulcus
ICG isthmus of cingulate gyrus
IGr indusium griseum
ITG inferior frontal gyrus
its inferior temporal sulcus
lls lateral longitudinal stria
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus
PCL paracentral lobule
PCun precuneus
PHG parahippocampal gyrus
POp parietal operculum
PTe planum temporale
sbps subparietal sulcus
scc splenium of the corpus callosum
sms superficial medullary stratum
SMG supramarginal gyrus
SPL superior parietal lobule
STG superior temporal gyrus
sts superior temporal sulcus
TrLV trigone of lateral ventricle

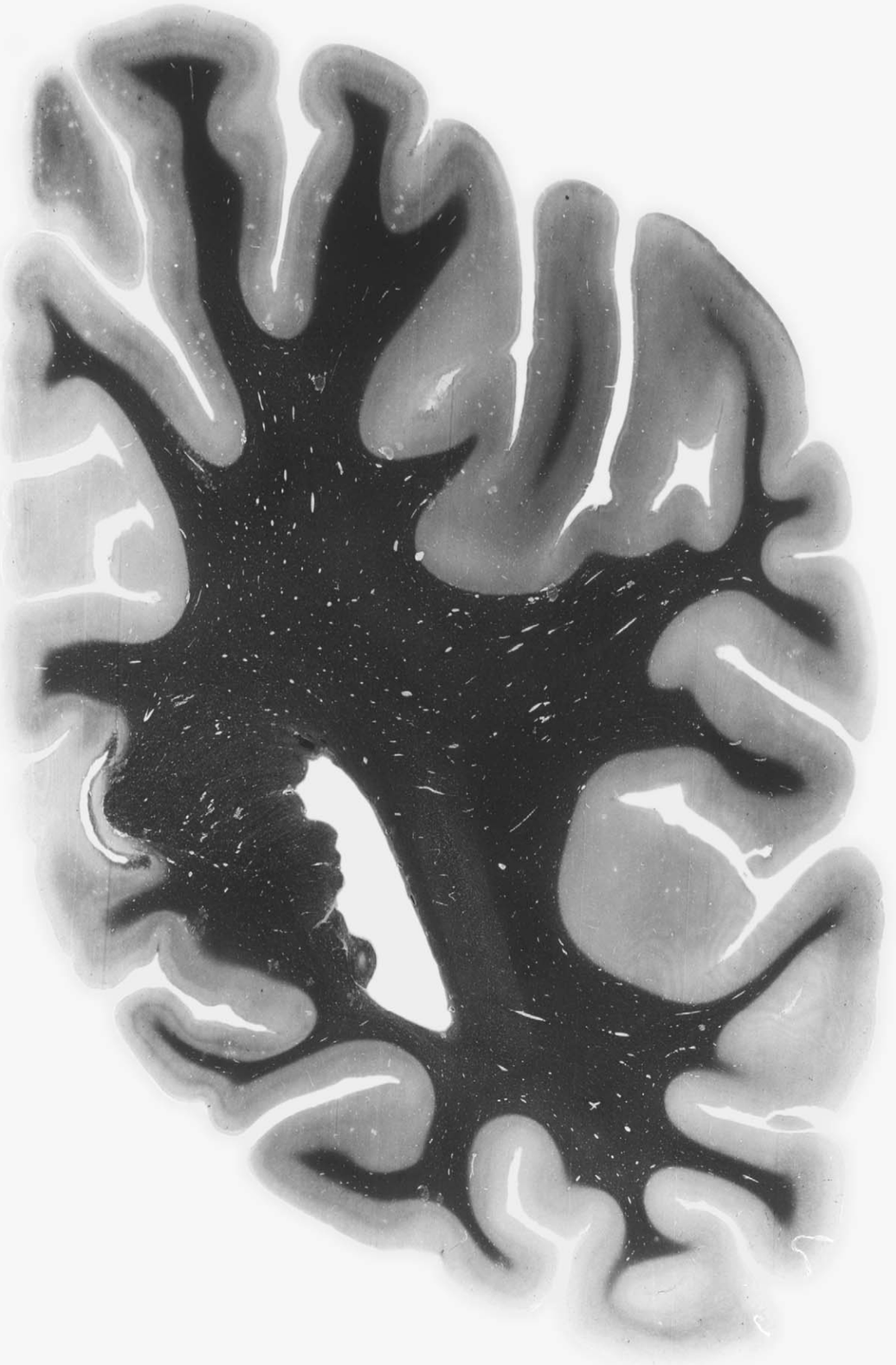


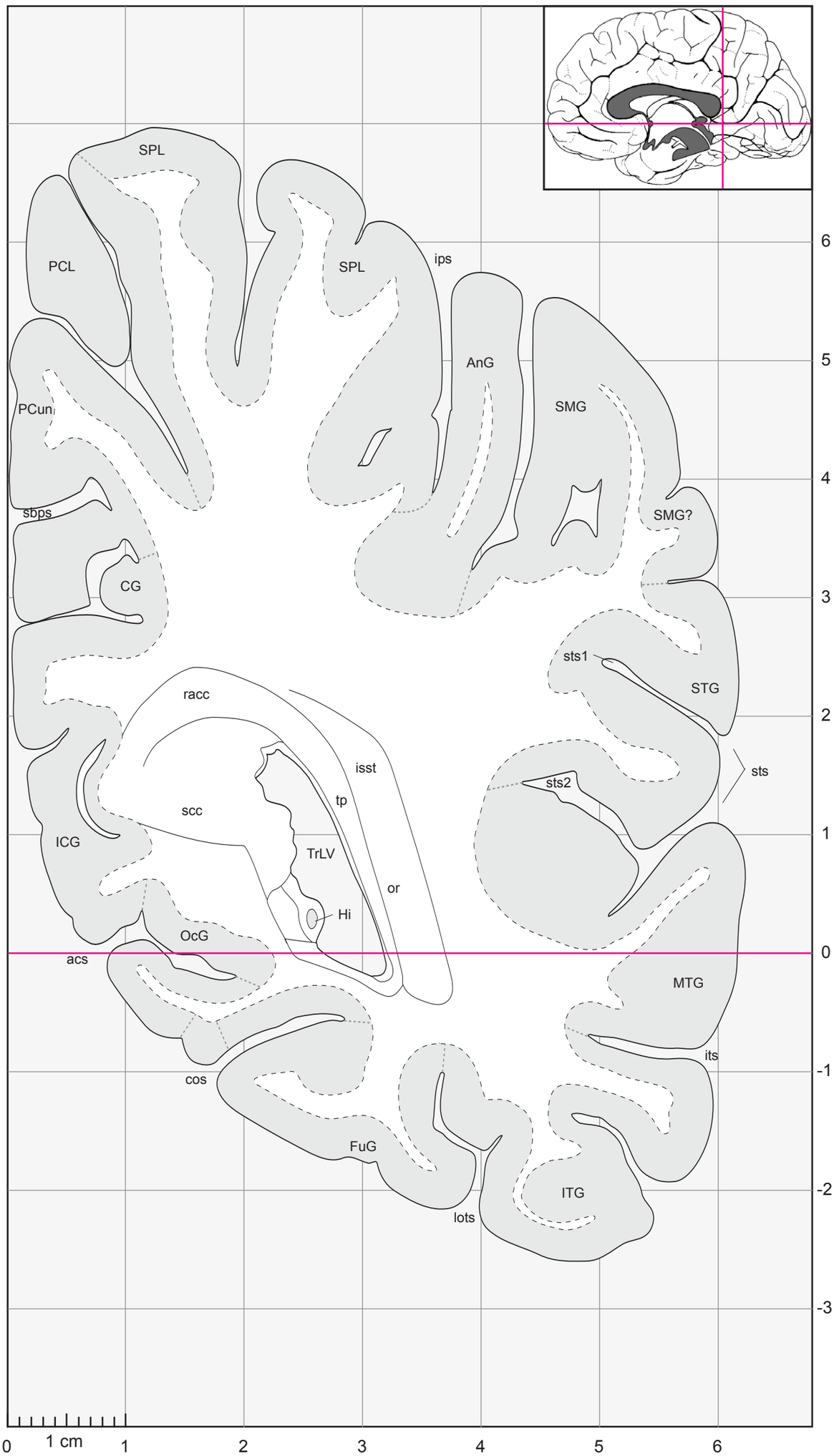


53

44,9 mm

acs anterior calcarine sulcus
AnG angular gyrus
cas callosal sulcus
ccs calcarine sulcus
CG cingulate gyrus
FuG fusiform gyrus
H hippocampus
ICG isthmus cinguli
ICG isthmus of cingulate gyrus (gyrus fornicatus)
IGr indusium griseum
ips intraparietal sulcus
isst internal sagittal stratum
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
ls longitudinal stria
MTG medial temporal gyrus,T2
OcG occipital gyri
or optic radiation
PCL paracentral lobule
PCun precuneus
PHG parahippocampal gyrus
PoG postcentral gyrus
racc radiation of the corpus callosum
S subiculum
scc splenium of the corpus callosum
SCS subcallosal stratum
SMG supramarginal gyrus
SPL superior parietal lobule
SSpG subsplenial gyrus
STG superior temporal gyrus,T1
sts superior temporal sulcus
tp tapetum
TrLV trigone of lateral ventricle

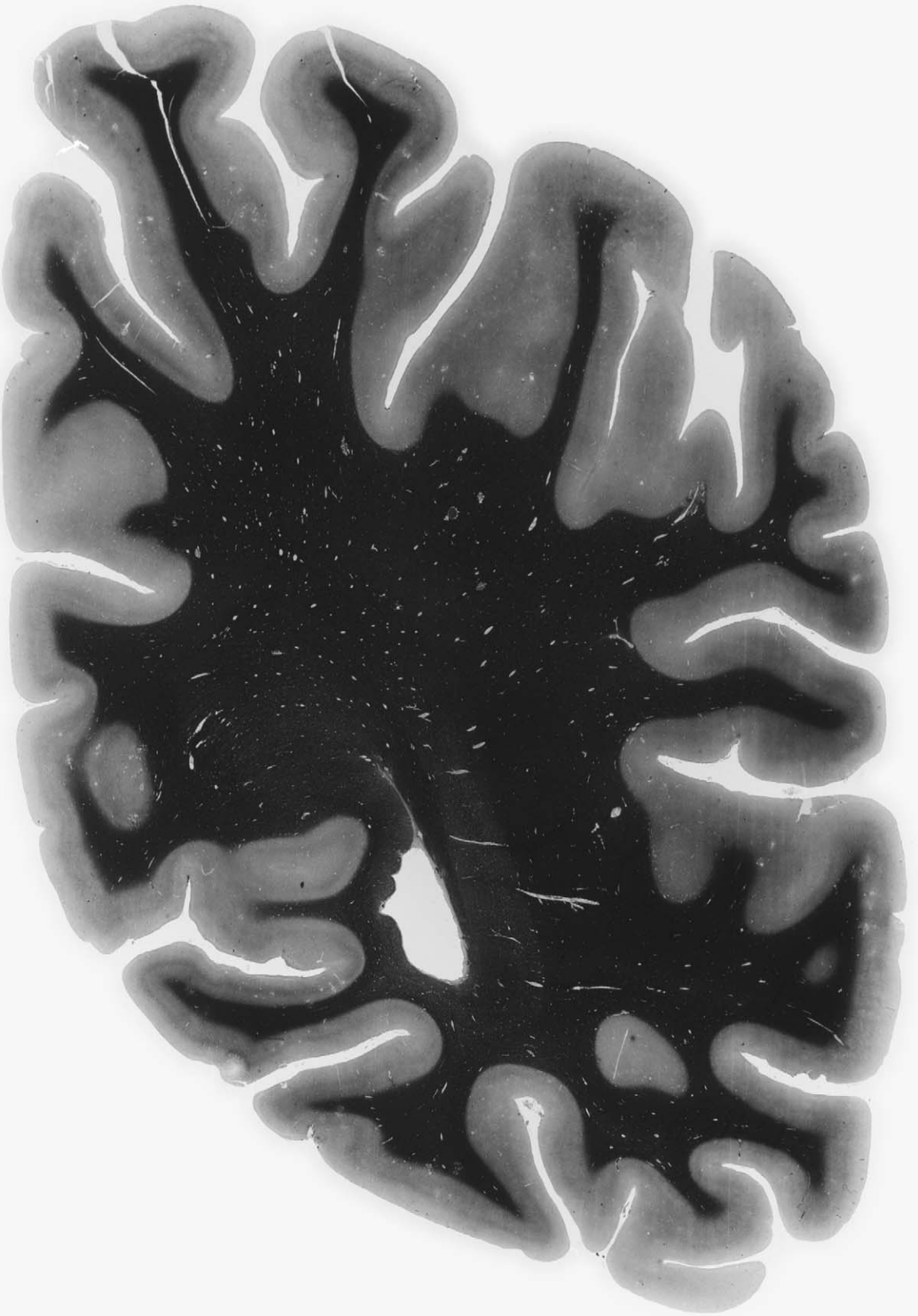




54

47,6 mm

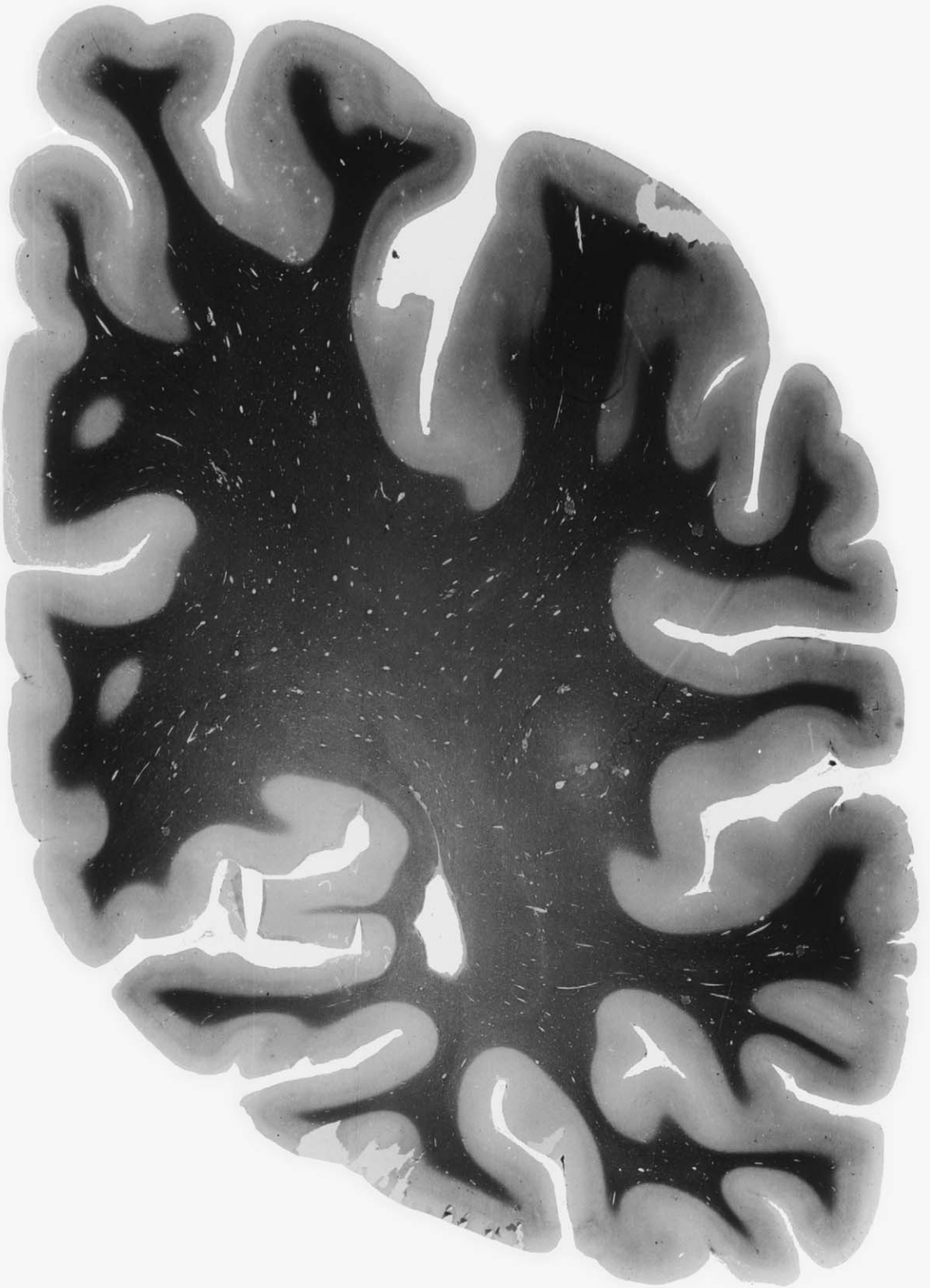
acs anterior calcarine sulcus
AnG angular gyrus
CG cingulate gyrus
cos collateral sulcus
FuG fusiform gyrus
Hi hippocampus
ICG isthmus of cingulate gyrus (gyrus fornicatus)
ips intraparietal sulcus
isst internal sagittal stratum
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
or optic radiation
PCL paracentral lobule
PCun precuneus
racc radiation of the corpus callosum
sbps subparietal sulcus
scc splenium of the corpus callosum
SMG supramarginal gyrus
SMG? part of STG according to Busch, 1960
SPL superior parietal lobule
STG superior temporal gyrus,T1
sts superior temporal sulcus
sts1 superior temporal sulcus, superior branch
sts2 superior temporal sulcus, inferior branch
tp tapetum
TrLV trigone of lateral ventricle



55

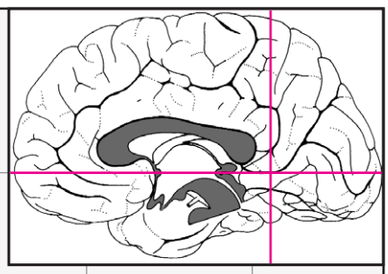
50,3 mm

acs anterior calcarine sulcus
AnG angular gyrus
cal calcar avis
CG cingulate gyrus
cgs cingulate sulcus
cos collateral sulcus
FuG fusiform gyrus
ICG isthmus of cingulate gyrus (gyrus fornicatus)
ips intraparietal sulcus
isst internal sagittal stratum
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
OLV occipital horn of lateral ventricle
or optic radiation
PCun precuneus
racc radiation of the corpus callosum
sbps subparietal sulcus
scc splenium of the corpus callosum
SMG supramarginal gyrus
SMG? part of STG ?
SPL superior parietal lobule
STG superior temporal gyrus,T1
sts1 superior temporal sulcus, superior branch
sts2 superior temporal sulcus, inferior branch
tp tapetum

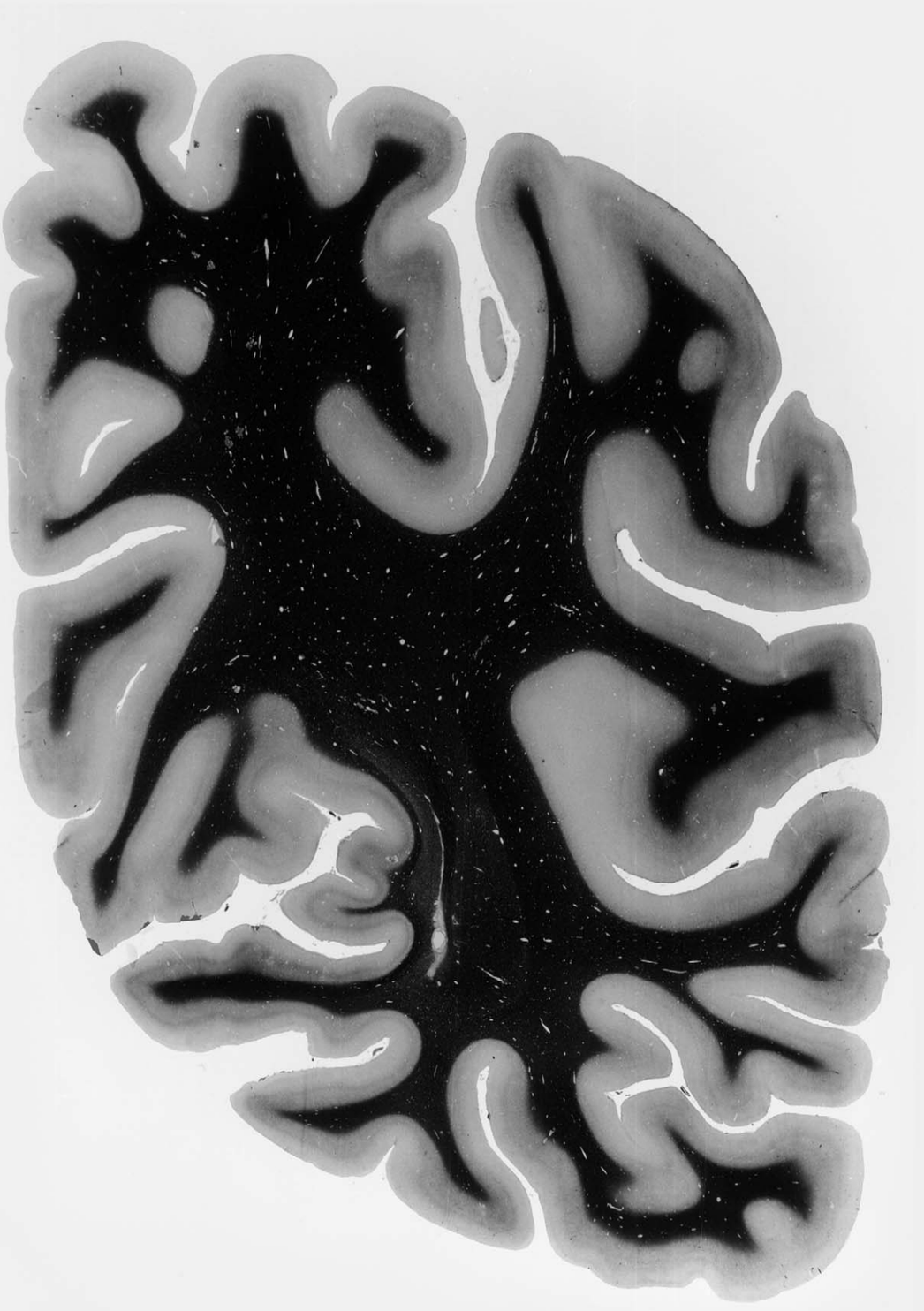


56

53,0 mm

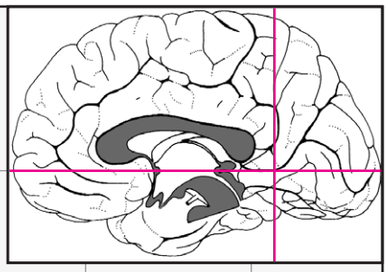


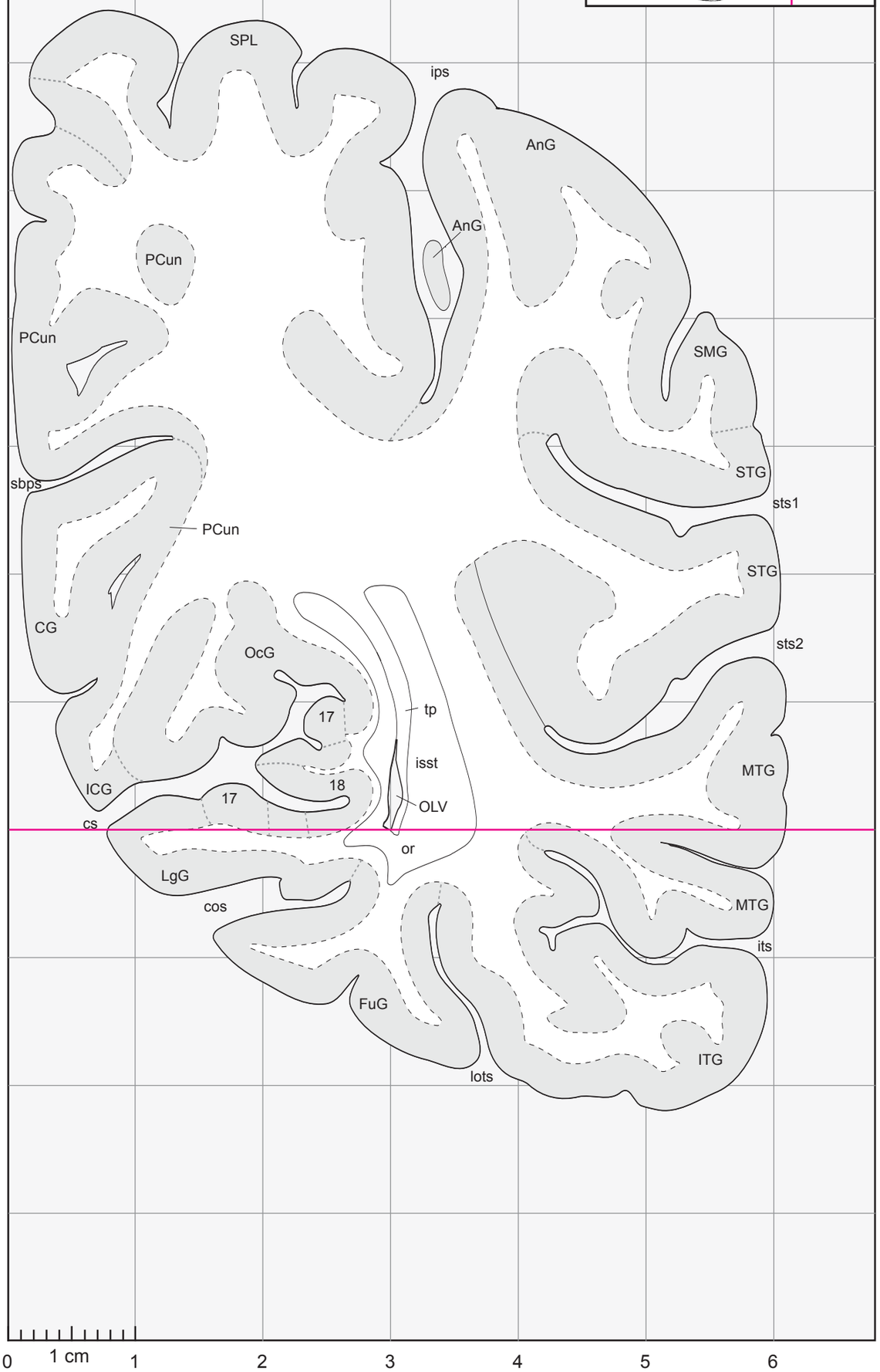
acs anterior calcarine sulcus
AnG angular gyrus
CG cingulate gyrus
cgs cingulate sulcus
cos collateral sulcus
FuG fusiform gyrus
ICG isthmus of cingulate gyrus (gyrus fornicatus)
ips intraparietal sulcus
isst internal sagittal stratum
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
OLV occipital horn of lateral ventricle
or optic radiation
PCun precuneus
sbps subparietal sulcus
SMG supramarginal gyrus
SPL superior parietal lobule
STG superior temporal gyrus,T1
sts1 superior temporal sulcus, superior branch
sts2 superior temporal sulcus, inferior branch
tp tapetum



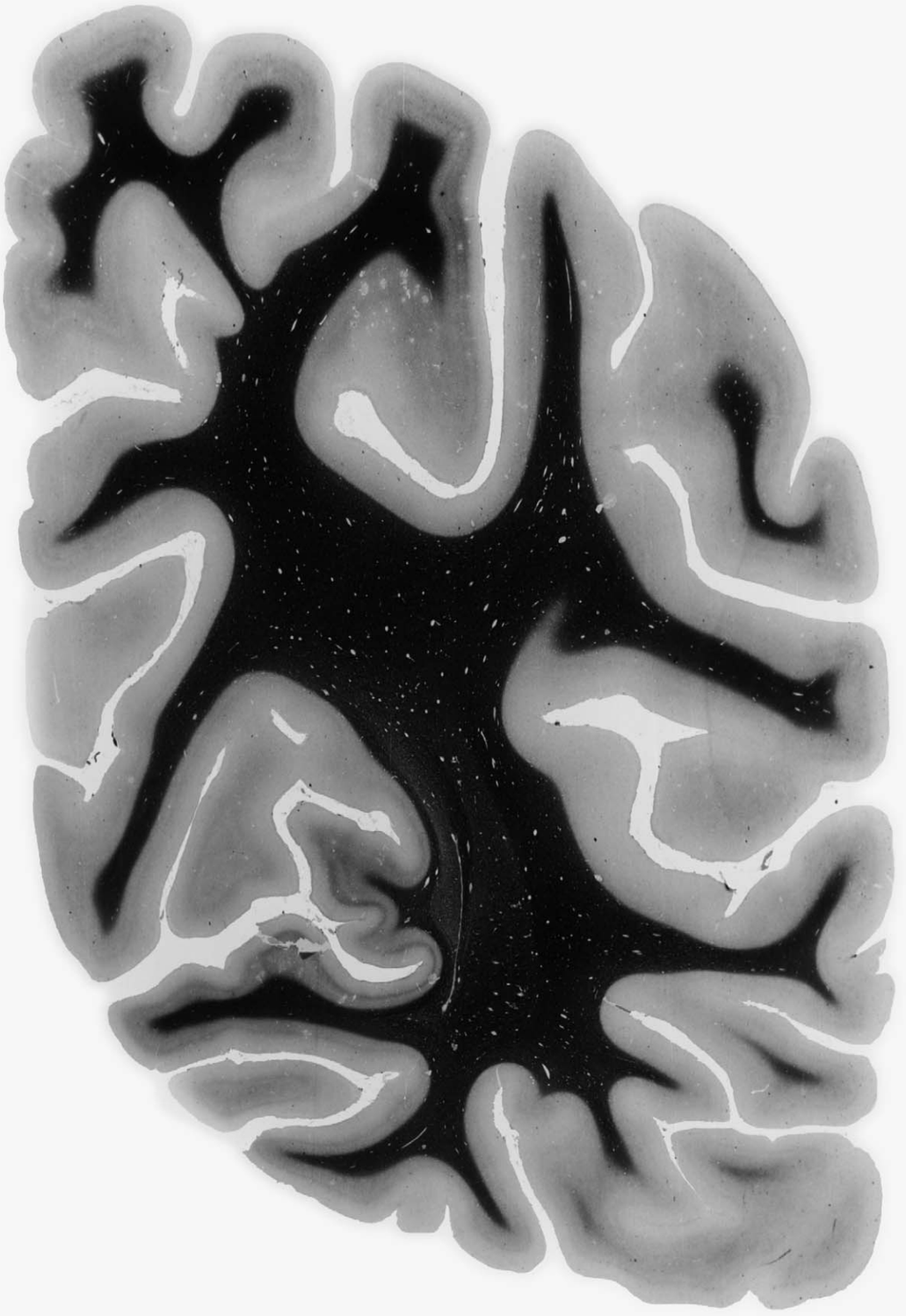
57

55,7 mm



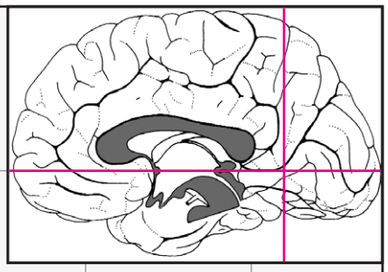


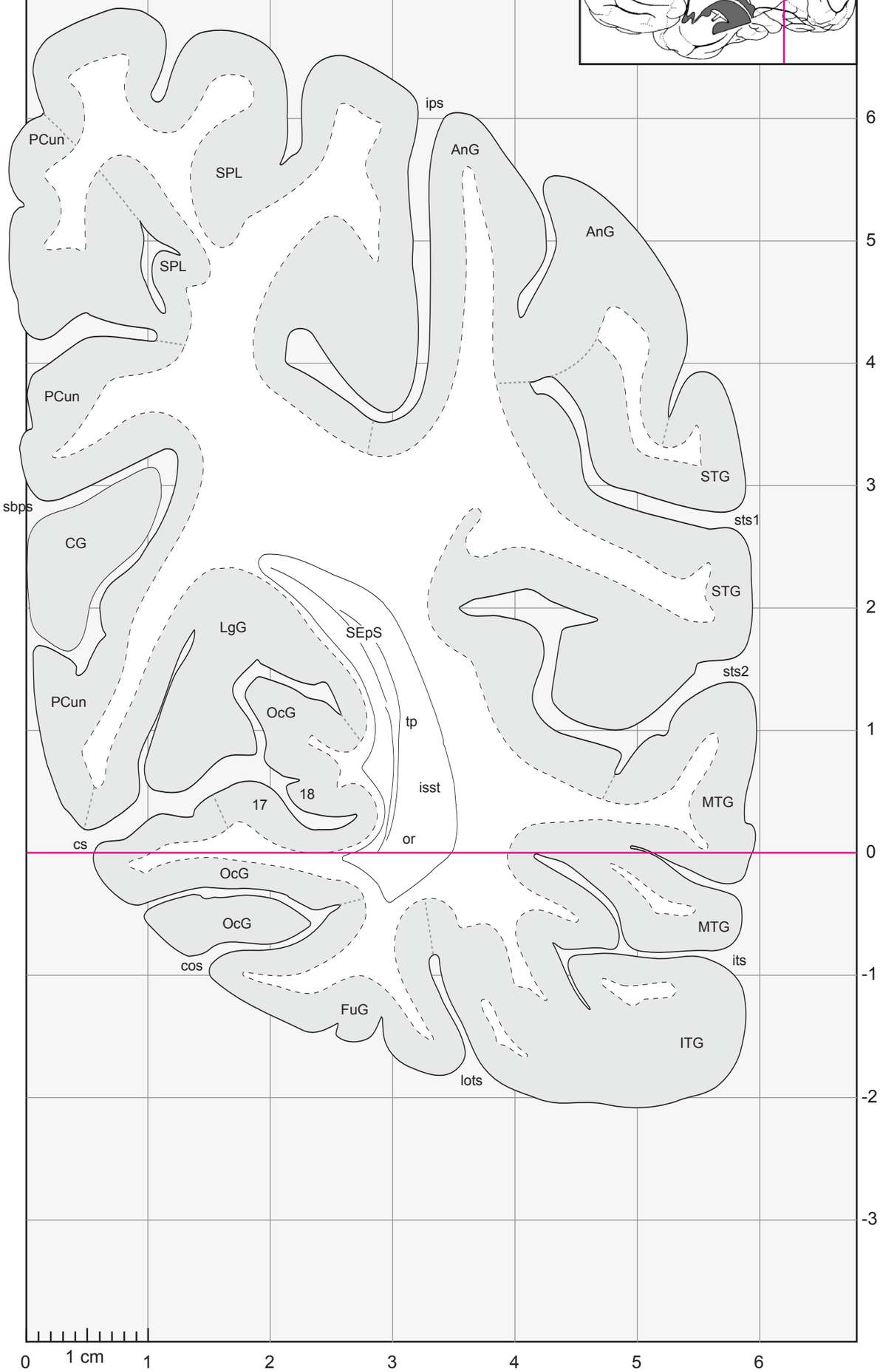
17 striate area
18 area 18
AnG angular gyrus
CG cingulate gyrus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ICG isthmus of cingulate gyrus (gyrus fornicatus)
ips intraparietal sulcus
isst internal sagittal stratum
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
OLV occipital horn of lateral ventricle
or optic radiation
PCun precuneus
sbps subparietal sulcus
SMG supramarginal gyrus
SPL superior parietal lobule
STG superior temporal gyrus,T1
sts1 superior temporal sulcus, superior branch
sts2 superior temporal sulcus, inferior branch
tp tapetum



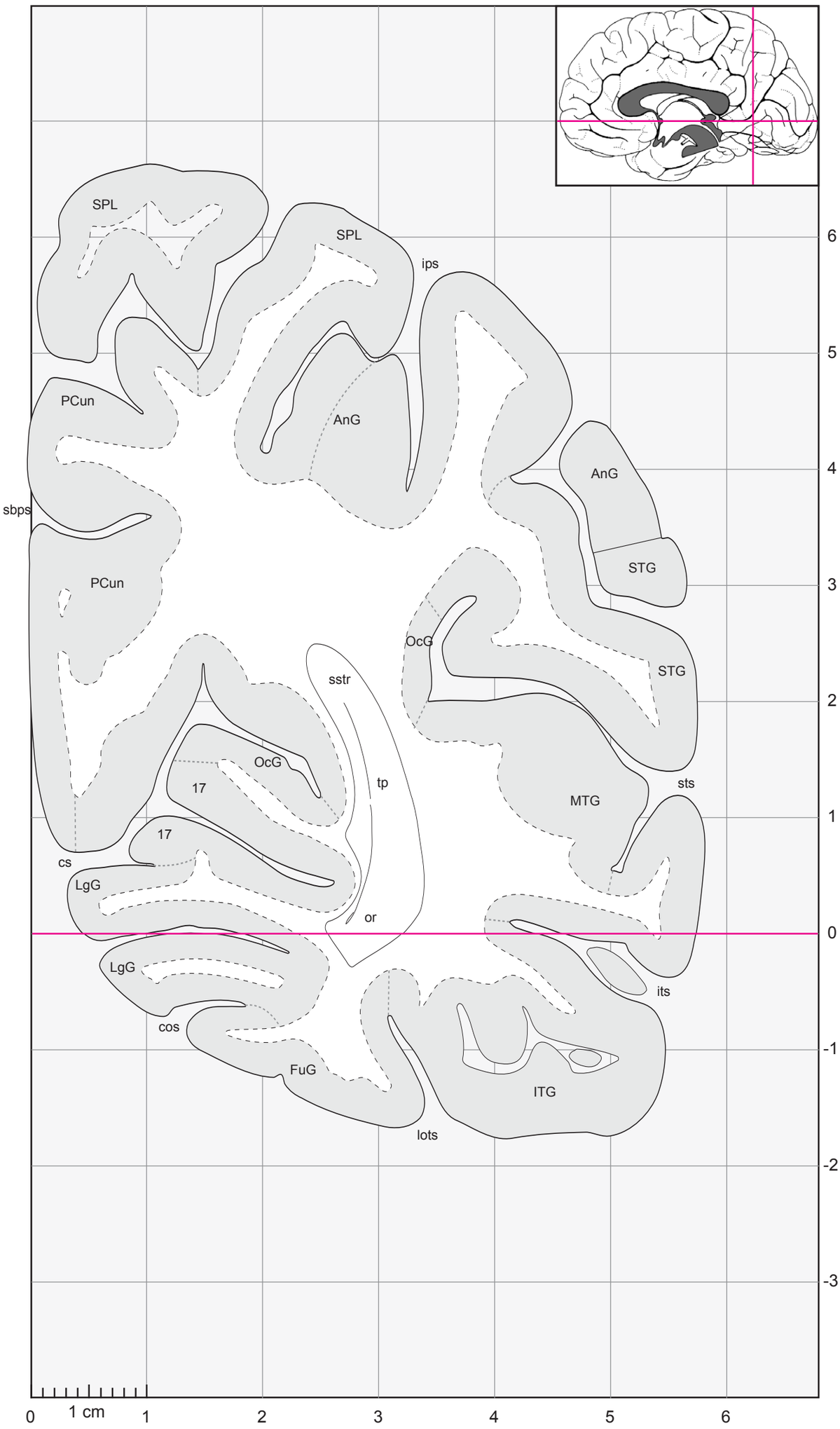
58

58,4 mm





17 striate area
18 area 18
AnG angular gyrus
CG cingulate gyrus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ips intraparietal sulcus
isst internal sagittal stratum
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
or optic radiation
PCun precuneus
sbps subparietal sulcus
SPL superior parietal lobule
STG superior temporal gyrus,T1
sts1 superior temporal sulcus, superior branch
sts2 superior temporal sulcus, inferior branch
tp tapetum
SEpS subependymal stratum
cgs cingulate sulcus



59

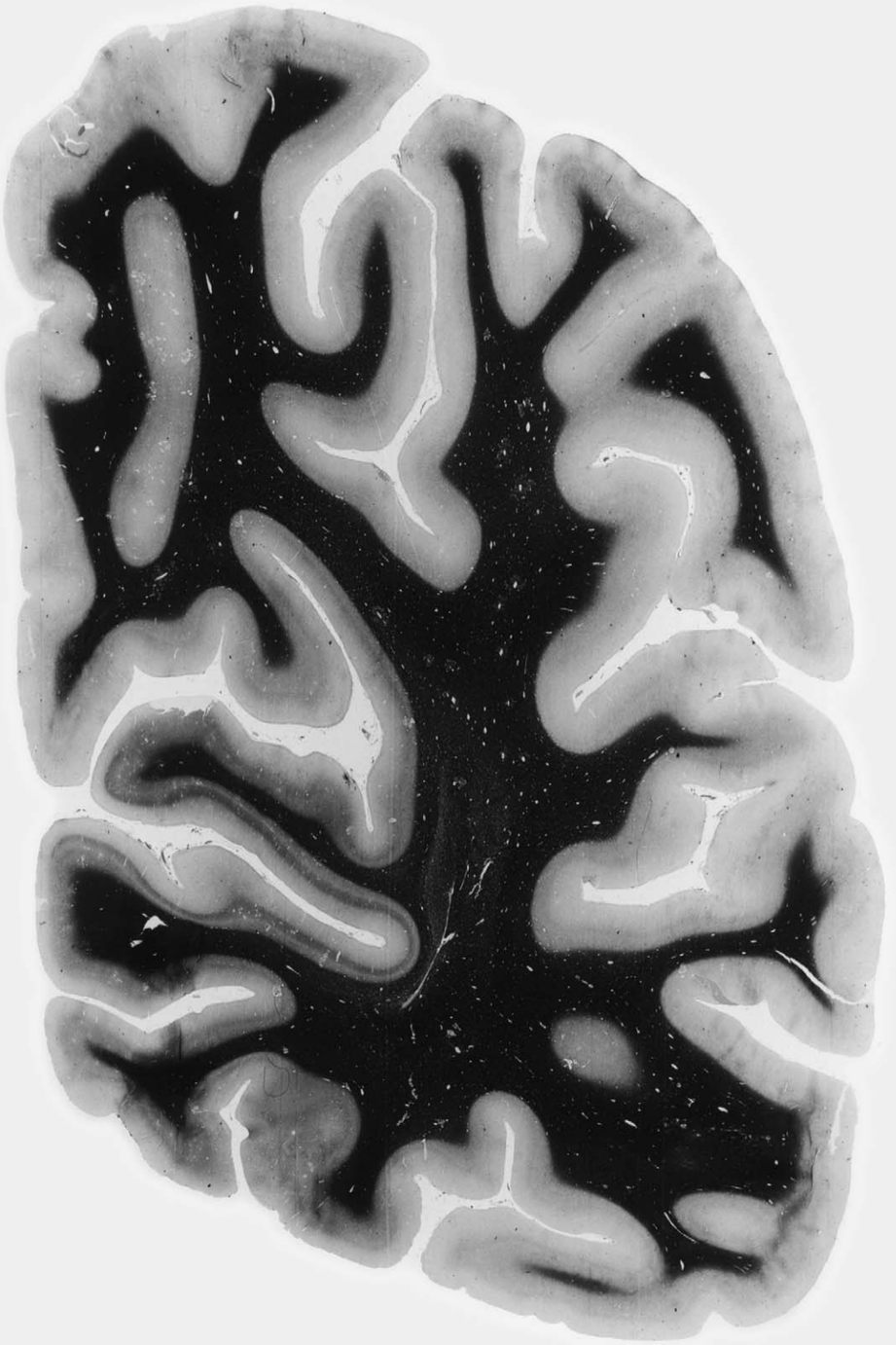
61,1 mm

17 striate area
AnG angular gyrus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
or optic radiation
PCun precuneus
sbps subparietal sulcus
sstr sagittal stratum
STG superior temporal gyrus,T1
sts superior temporal sulcus
tp tapetum

60

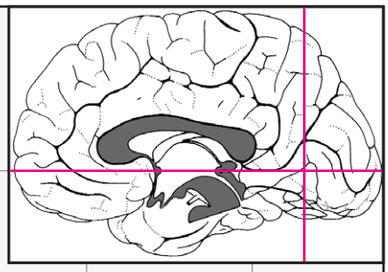
63,8 mm

17 striate area
AnG angular gyrus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
PCun precuneus
sbps subparietal sulcus
SPL superior parietal lobule
sstr sagittal stratum
STG superior temporal gyrus,T1
sts superior temporal sulcus

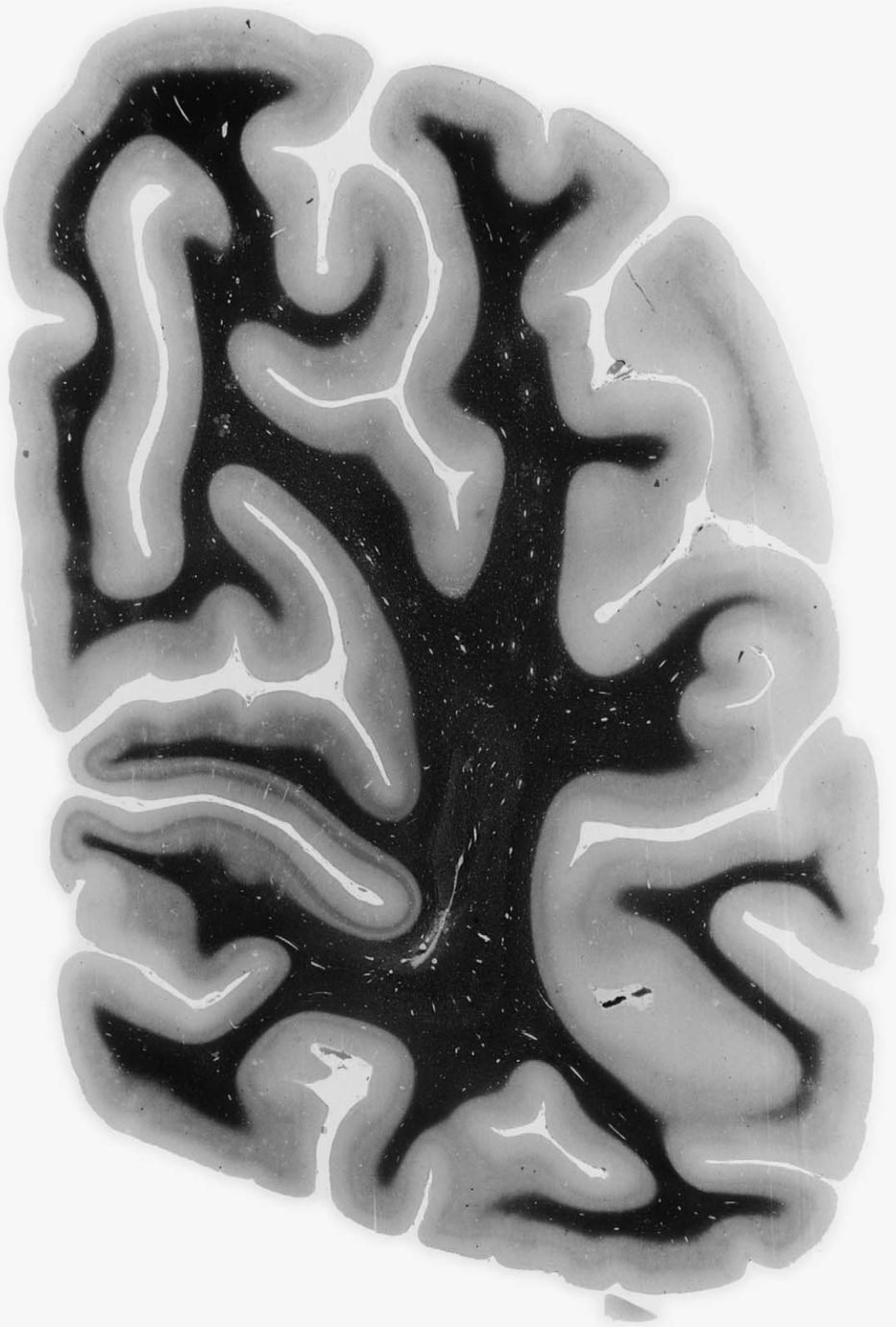


61

66,5 mm

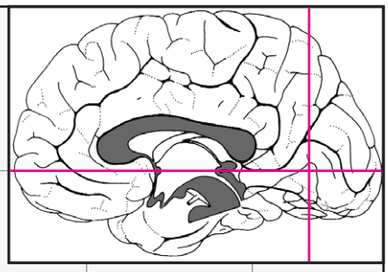


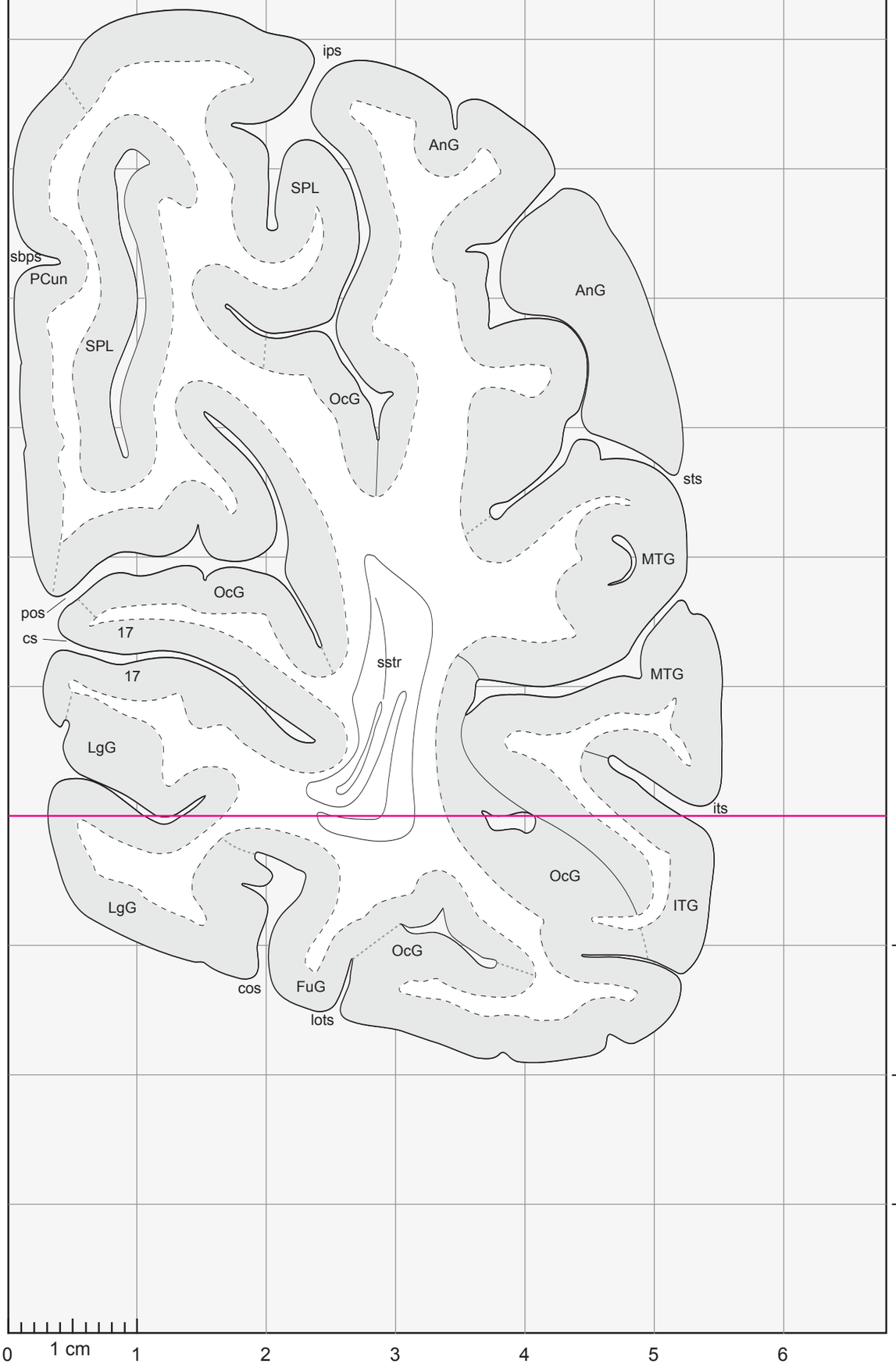
17 striate area
AnG angular gyrus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
PCun precuneus
sbps subparietal sulcus
sstr sagittal stratum
STG superior temporal gyrus,T1
sts superior temporal sulcus



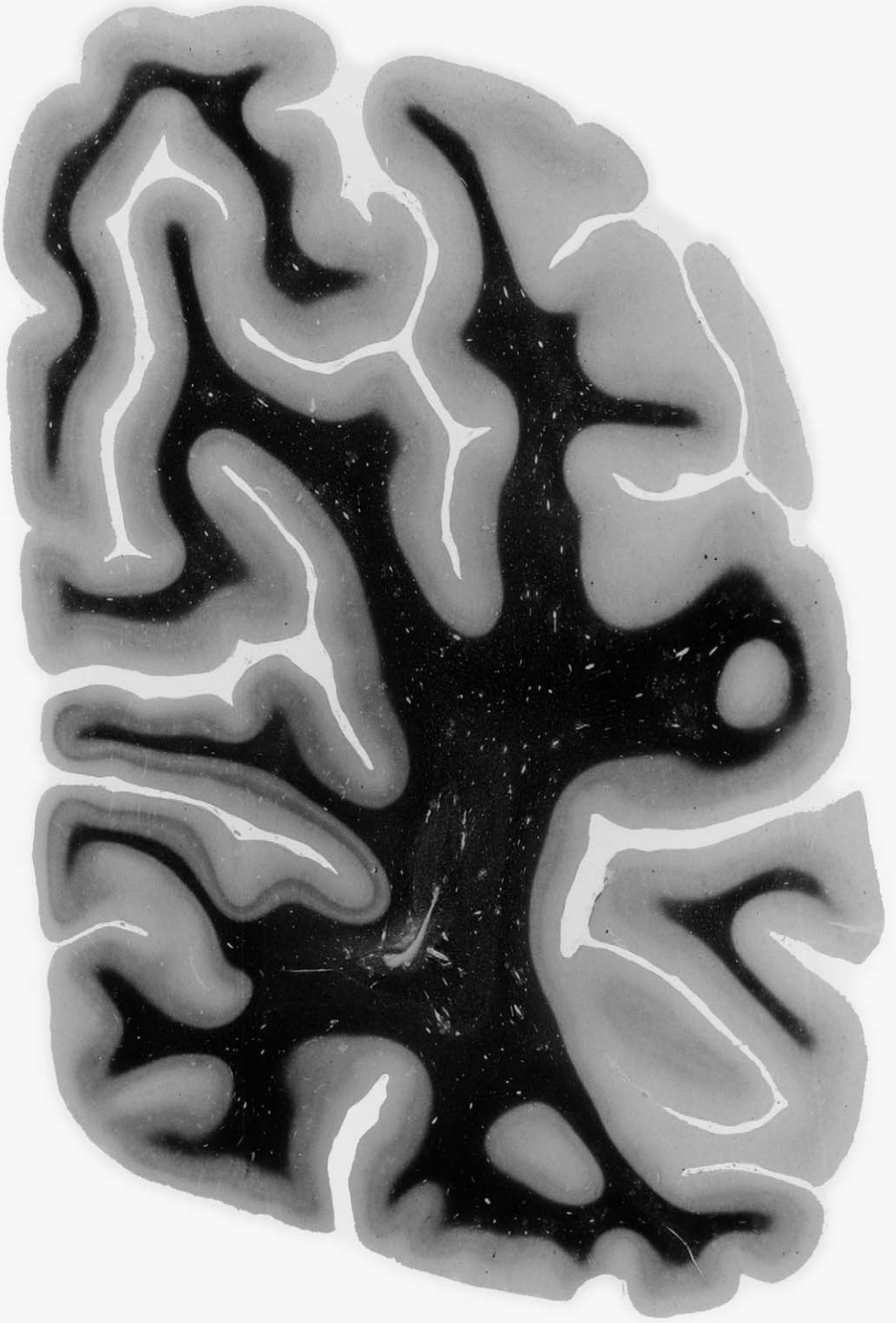
62

69,2 mm



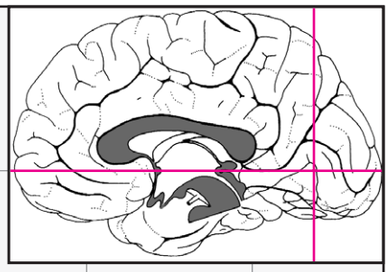


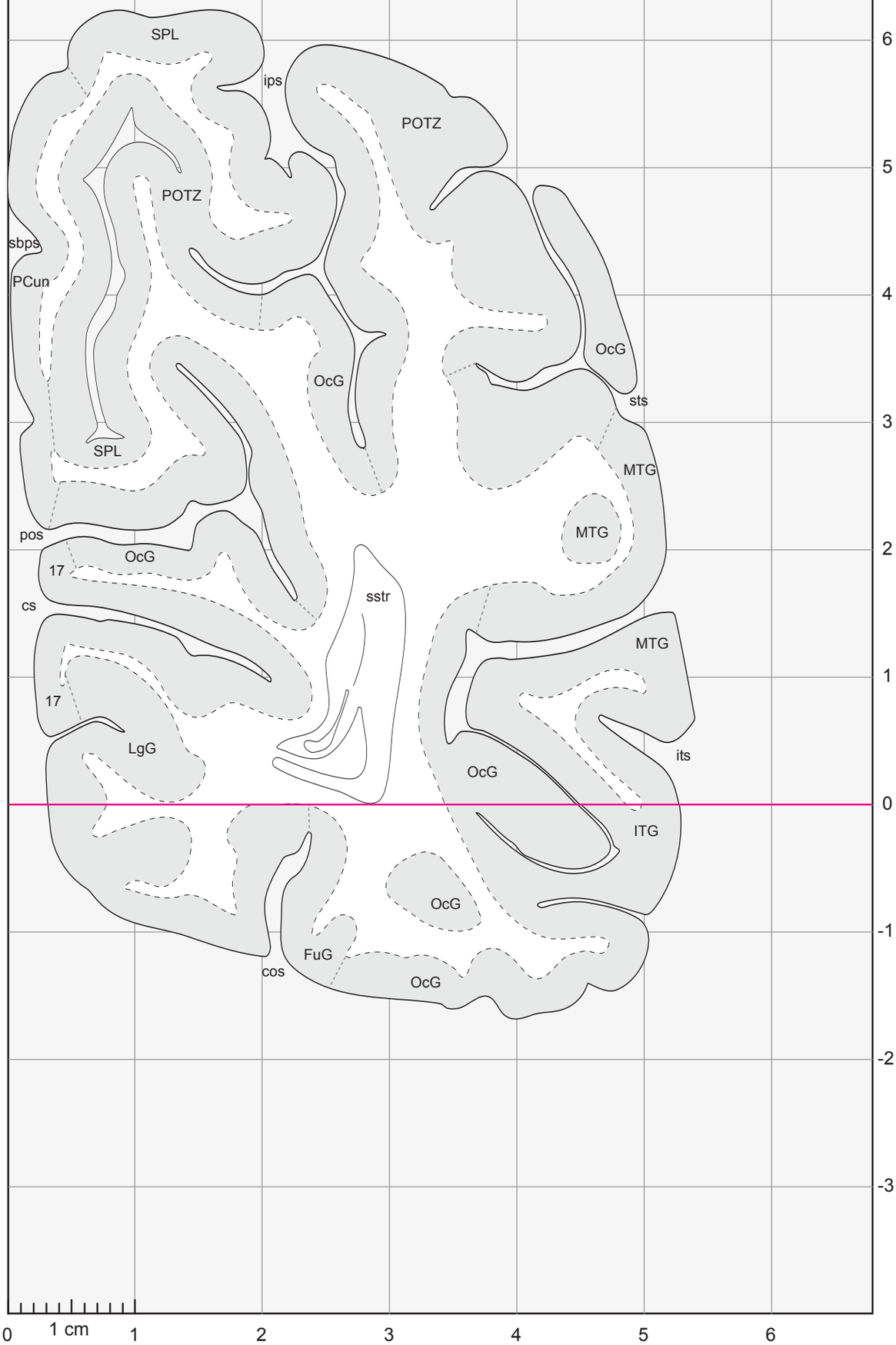
17 striate area
pos parietooccipital sulcus
AnG angular gyrus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
lots lateral occipitotemporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
PCun precuneus
sbps subparietal sulcus
SPL superior parietal lobule
sstr sagittal stratum
STG superior temporal gyrus,T1
sts superior temporal sulcus



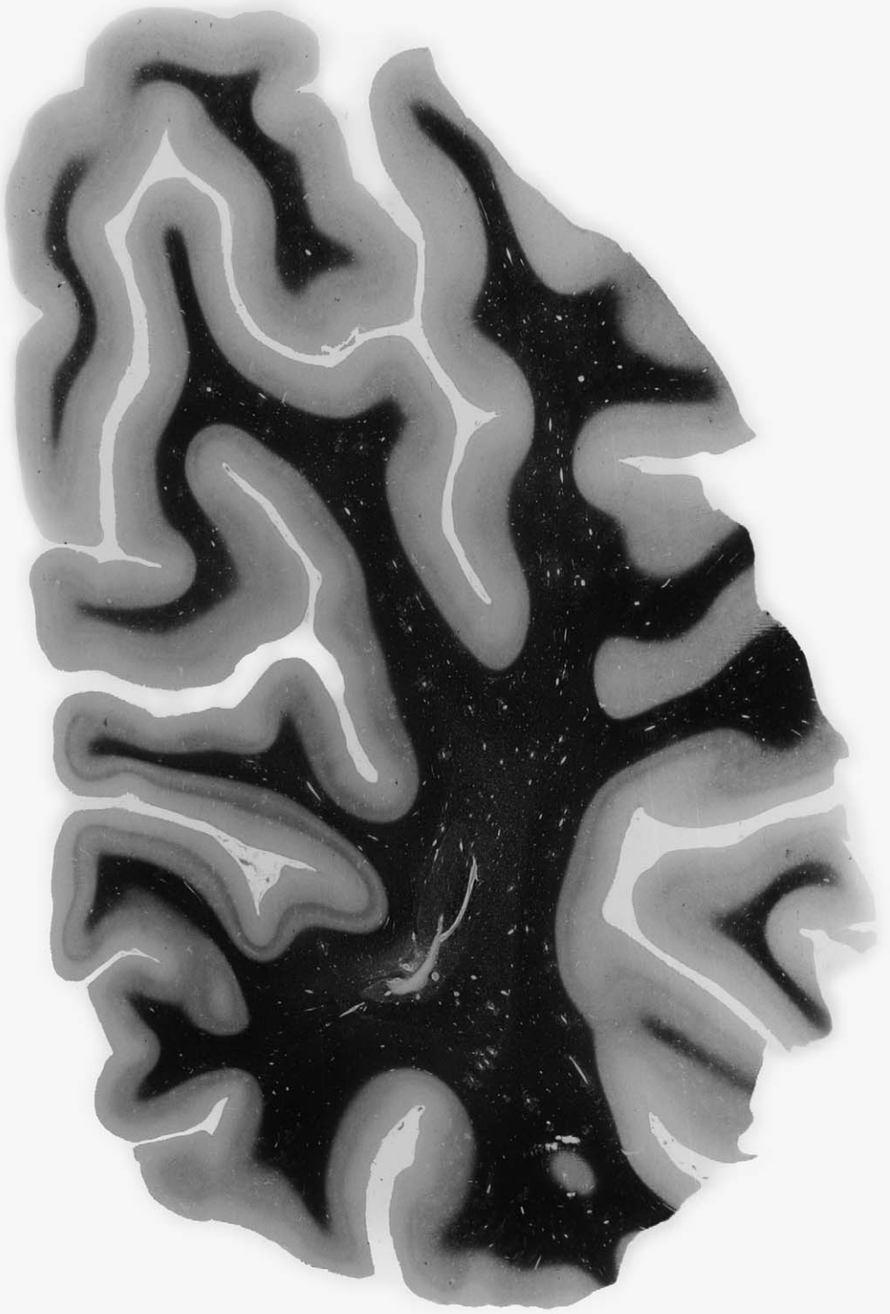
63

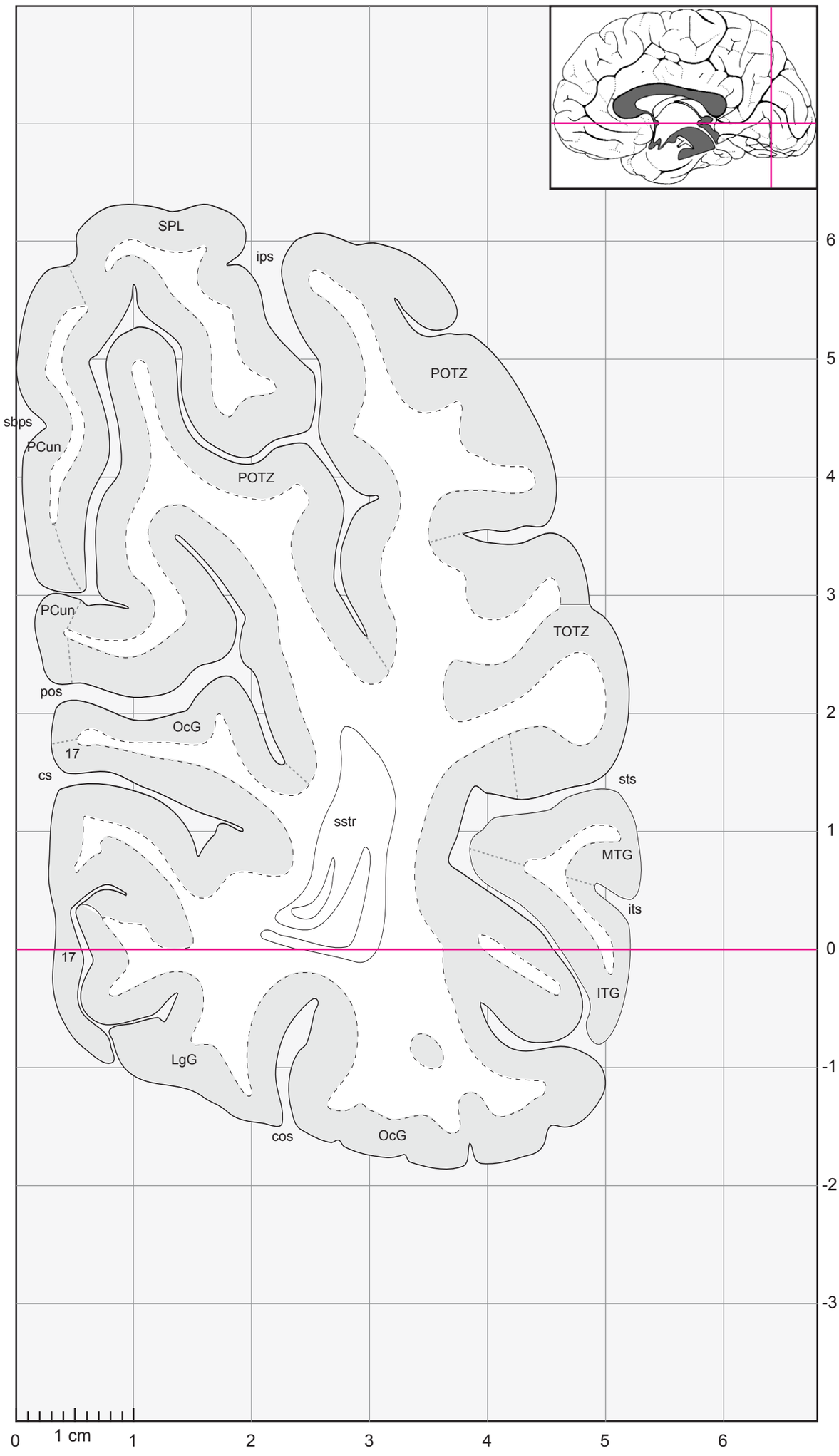
71,9 mm





17 striate area
pos parietooccipital sulcus
cos collateral sulcus
cs calcarine sulcus
FuG fusiform gyrus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
MTG medial temporal gyrus,T2
OcG occipital gyri
PCun precuneus
POTZ parietooccipital transition area
sbps subparietal sulcus
SPL superior parietal lobule
sstr sagittal stratum
sts superior temporal sulcus

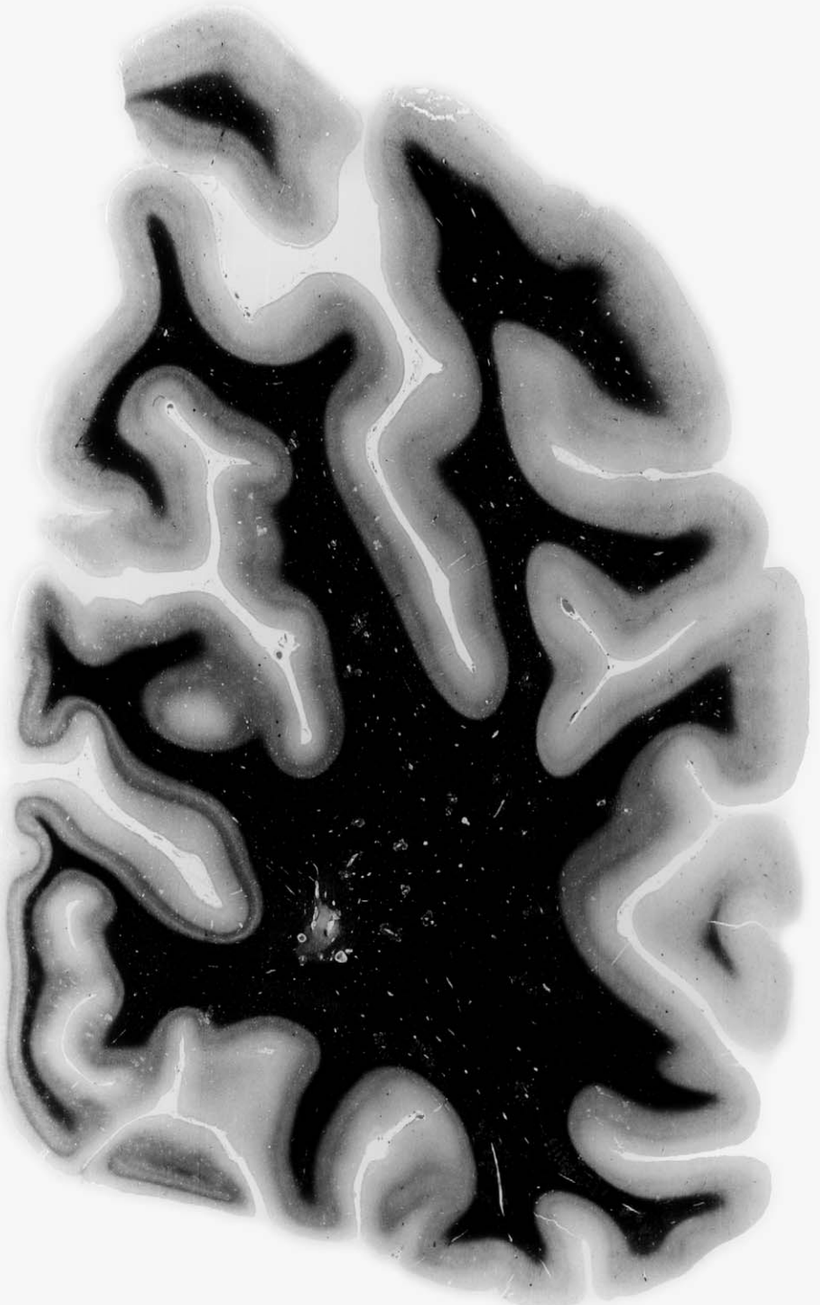


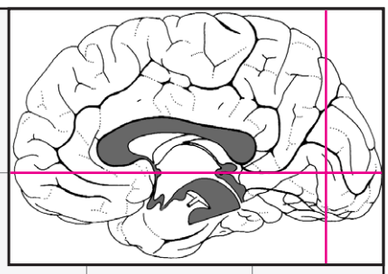


64

74,6 mm

17 striate area
cos collateral sulcus
cs calcarine sulcus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
LgG lingual gyrus (O5)
MTG medial temporal gyrus,T2
OcG occipital gyri
PCun precuneus
pos parietooccipital sulcus
POTZ parietooccipital transition zone
sbps subparietal sulcus
SPL superior parietal lobule
sstr sagittal stratum
STG superior temporal gyrus,T1
sts superior temporal sulcus
TOTZ temporooccipital transition zone

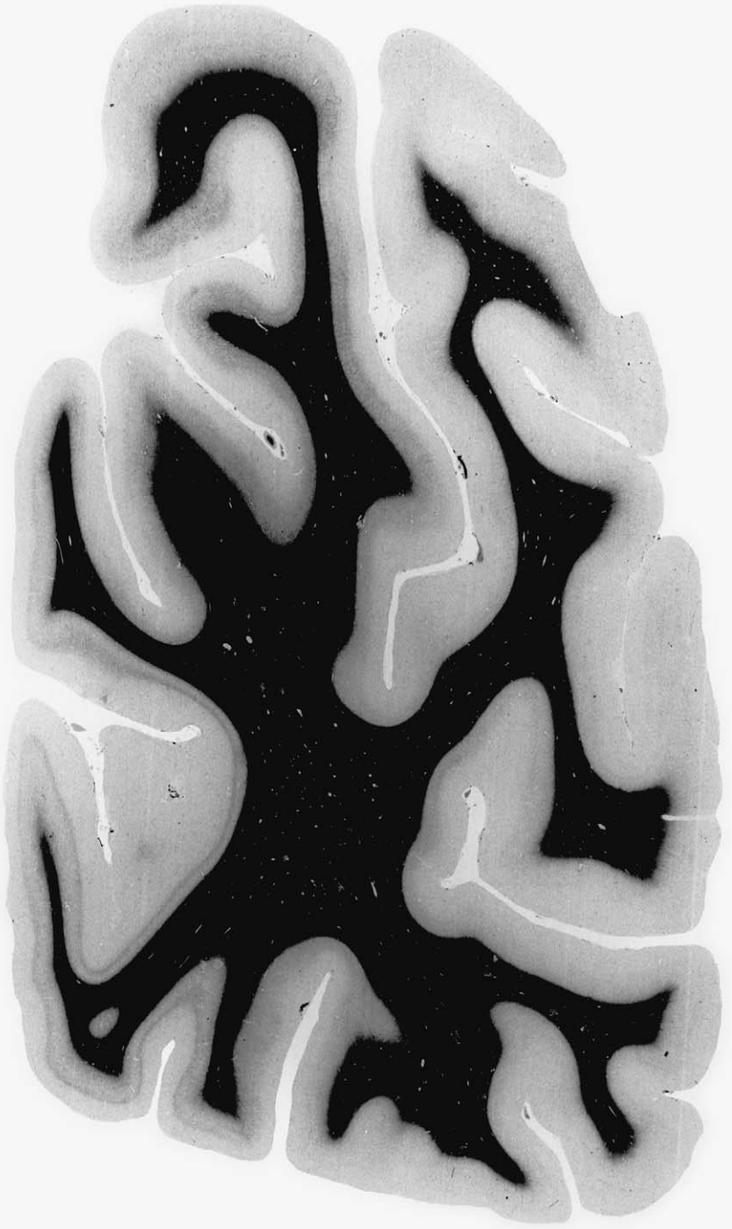




65

80,0 mm

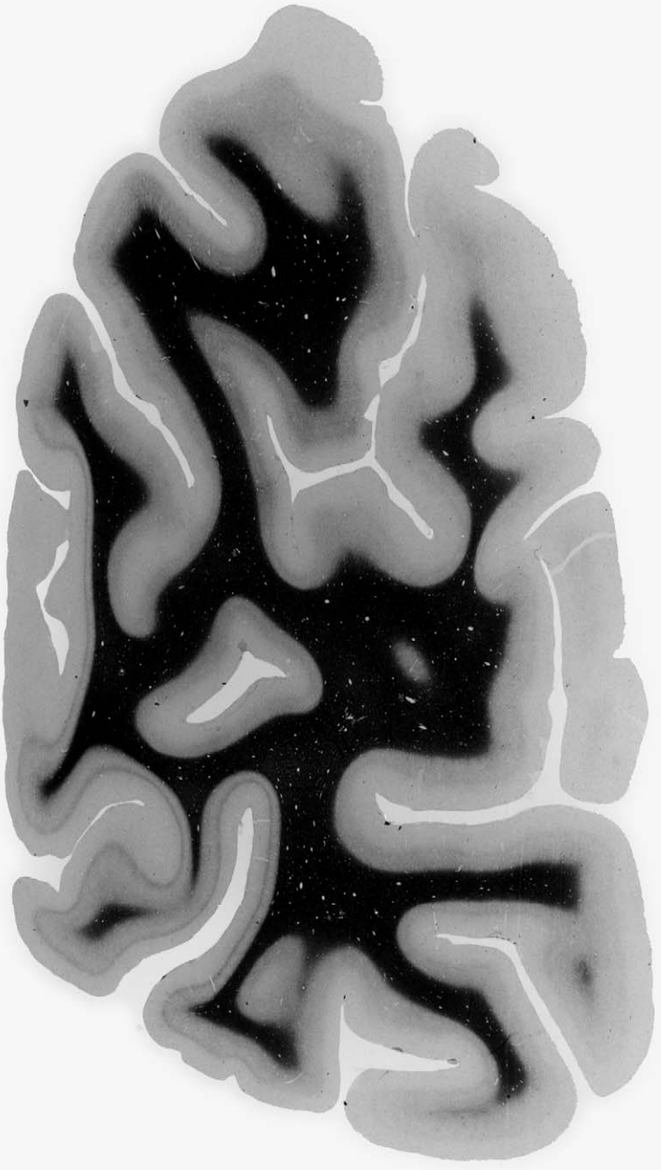
17 striate area
18 area 18
cos collateral sulcus
cs calcarine sulcus
ips intraparietal sulcus
ITG inferior temporal gyrus, T3
its inferior temporal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
PCun precuneus
pos parietooccipital sulcus
POTZ parietooccipital transition zone
sbps subparietal sulcus
SPL superior parietal lobule
sstr sagittal stratum
TOTZ temporooccipital transition zone



66

85,0 mm

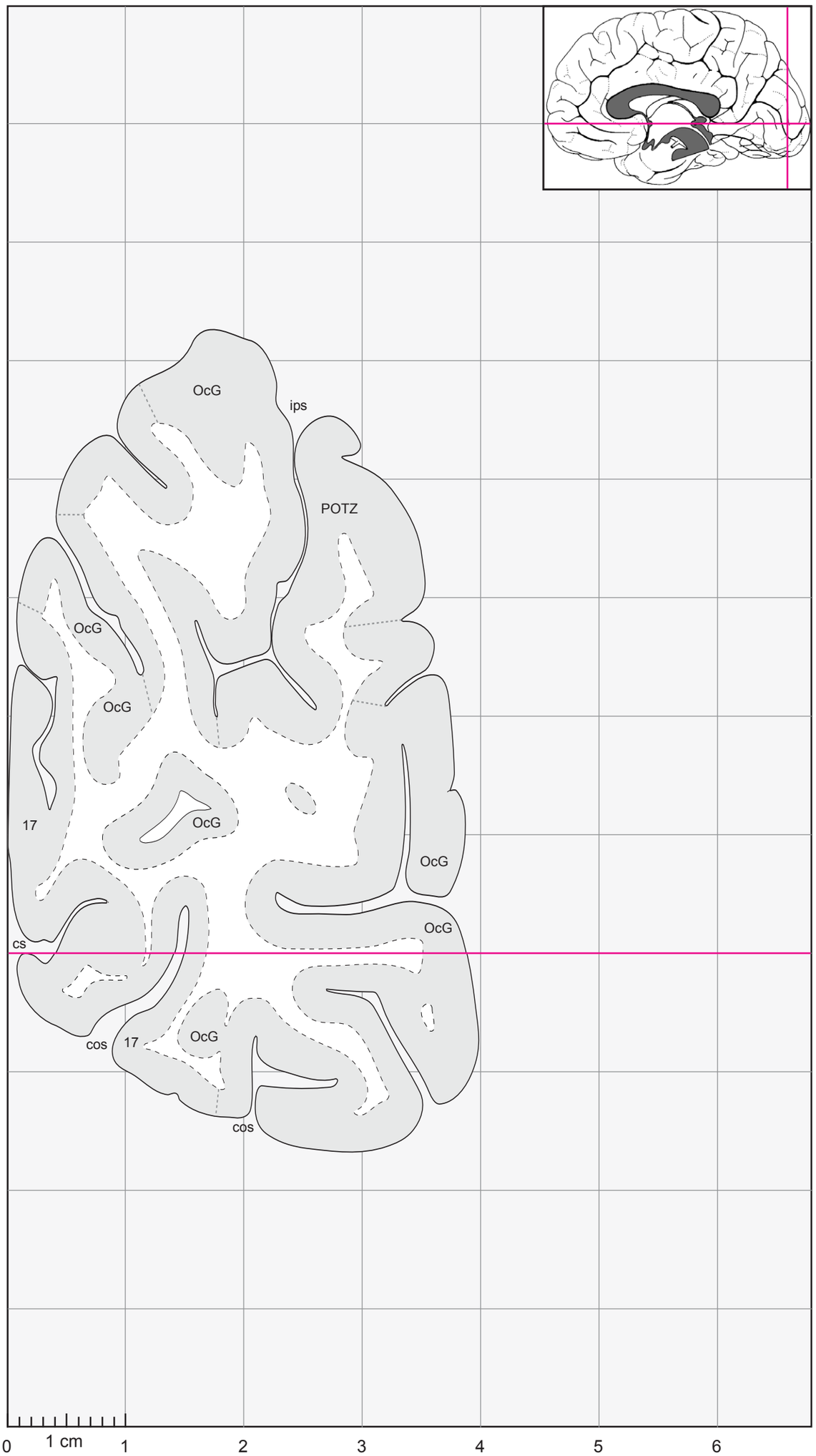
17 striate area
18 area 18
cos collateral sulcus
cs calcarine sulcus
ips intraparietal sulcus
MTG medial temporal gyrus,T2
OcG occipital gyri
pos parietooccipital sulcus
POTZ parietooccipital transition zone
sstr sagittal stratum



67

90,0 mm

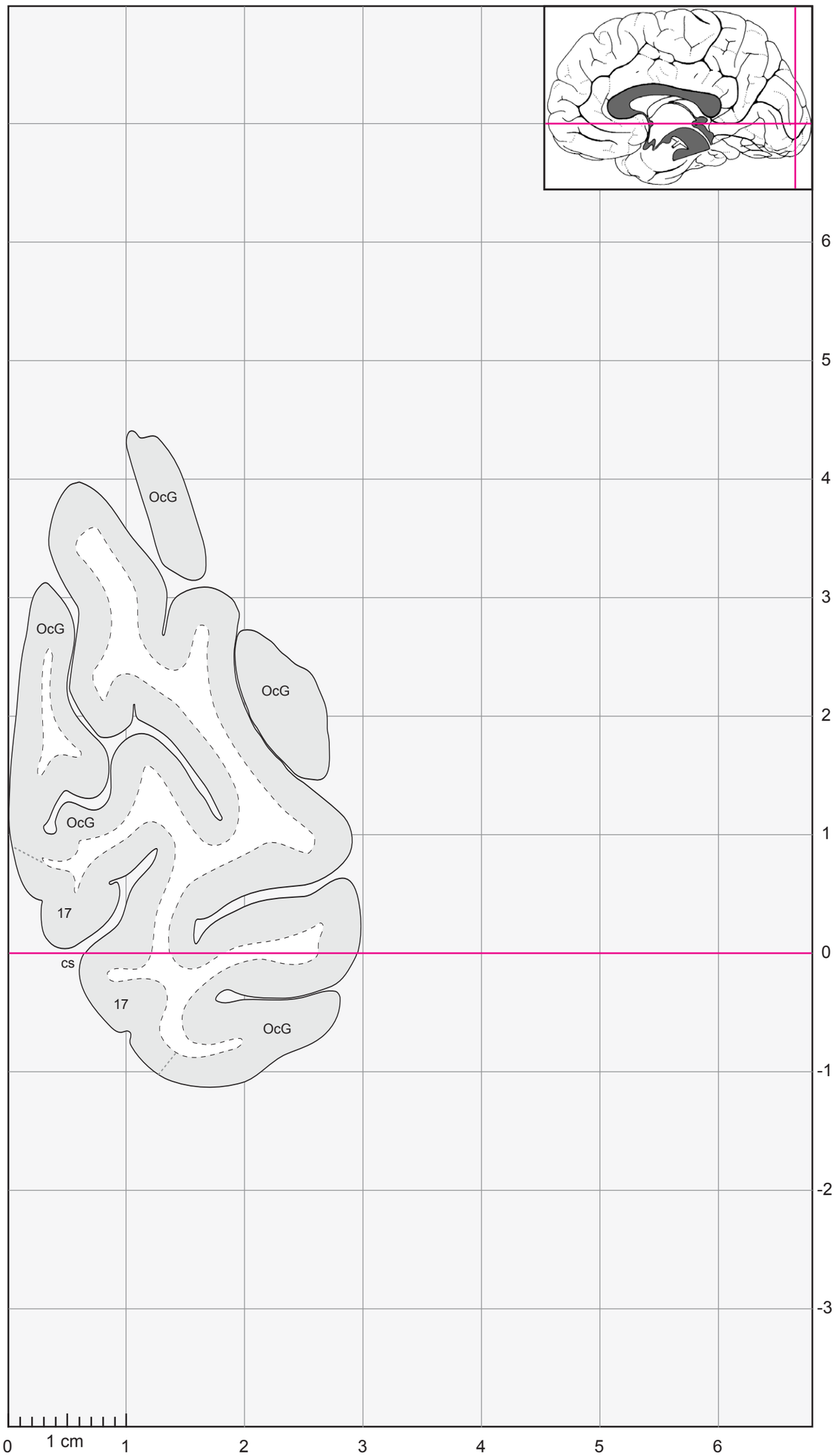
17 striate area
cos collateral sulcus
cs calcarine sulcus
ips intraparietal sulcus
OcG occipital gyri
PCun precuneus
pos parietooccipital sulcus
POTZ parietooccipital transition zone

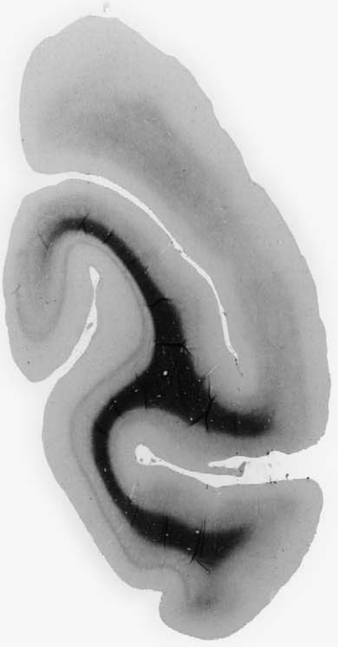


68

90,0 mm

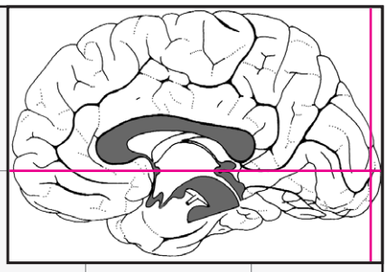
17 striate area
cs calcarine sulcus
OcG occipital gyri



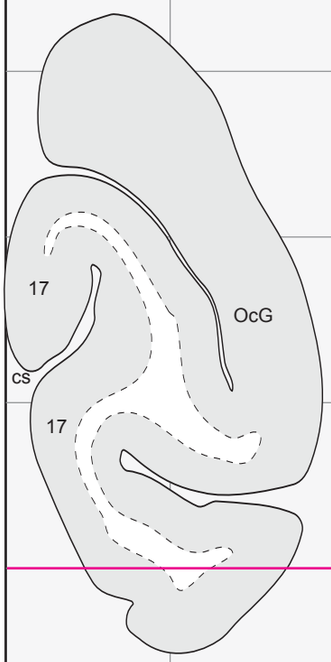


69

100,0 mm



17 striate area
cs calcarine sulcus
OcG occipital gyri



6
5
4
3
2
1
0
-1
-2
-3

0 1 cm 1 2 3 4 5 6

3.3 Past Histological, Morphometric and Histochemical Studies of the Brain Represented in the Microscopic Atlas.

Numerous descriptive and quantitative studies have been performed on the brain represented in the Myeloarchitectonic Atlas. Regions where analyses were perfomed are listed in table 1. In addition, morphometric data (fresh volume, volume of serial sections, numeric cell density, volumetric cell density, absolute cell numbers etc.) which appeared relevant have been compiled. If not stated otherwise, the designations of structures are identical to those of the original work.
References pertinent to these data are to be found at the end of this section.

Table 1
Previous Evaluations of Brain Regions and Their Corresponding Citations

Cortex	Albring, K.M. (1983); Beheim-Schwarzbach, D. (1952); Braitenberg G. V. (1952); Brockhaus, H. (1940); Busch, K.-T. (1960); Lange, H. & Albring, K.M. (1979); Schulze, H.A (1960)
Septal area	Brockhaus, H. (1942)
Basal nuclear complex:	Brockhaus, H. (1942); Buttlar-Brentano, K.v. (1954,1955,1956)
Amygdaloid complex	Brockhaus, H. (1938); Sanides, F. (1957)
Striatum	Brockhaus, H. (1942); Dom, R., De Saedeleer, J., Bogerts, B. & Hopf, A. (1981); Dom. R. (1976); Lange, H. & Thörner, G. (1974); Lange, H., Thörner G. & Hopf, A. (1975); Lange, H., Thörner, G. & Hopf, A. (1975); Lange, H., Thörner, G. & Hopf, A. (1976); Lange, H., Thörner, G., Hopf, A. & Schröder, K.F.(1976); Namba, M. (1957); Sanides, F. (1957)
Hypothalamus	Brockhaus, H. (1942); Buttlar-Brentano, K.v. (1954); Wahren, W. (1952)
Thalamus	
anterior ncl	Fünfgeld, E.W. (1952, 1954)
mediodorsal ncl	Bäumer, H. (1952); Namba, M. (1958)
mediolateral ncl	Bäumer, H. (1952,1954); Dom. R. (1976); Hopf, A., Gihr, M. & Kraus, C. (1967)
Subthalamus	Brockhaus, H. (1942); Füssenich, M.S.U. (1967); Klatzo, I. (1954); . Lange, H. & Thörner, G. (1974); Lange, H., Thörner G., & Hopf, A. (1975); Lange, H., Thörner G. & Hopf, A. (1975); Lange, H., Thörner, G. & Hopf, A. (1976); Lange, H., Thörner, G., Hopf, A. & Schröder, K.F. (1976)
Mesencephalon	
Red nucleus:	Herbel, W. (1979); Sander, H.A. (1981)
Substantia nigra:	Hassler (1937); Solcher, H. (1956)
Area 9 and 10	Bogerts, B., Häntsch, J. & Herzer, M. (1982)
Lower brainstem	Wünscher, W. (1956)
Locus coeruleus	Beheim-Schwarzbach, D. (1955)
Superior olive	Wünscher, W. (1956)
Cell studies	Hempel, K.-J. & Treff, W.M. (1959); Klatzo, I. (1954); Schiffer, D.(1954); Treff, W.M. & Hempel, K.-J. (1959)
Neuroactive substances	Mai, J.K., Kedziora, O., Teckhaus, L. & M.V. Sofroniew (1991); Mai, J.K., Stephens, P., A. Hopf & A.C. Cuello (1986); Mai, J. K. & Reifenberger, G. (1988); Pioro, E.P., Mai, J. K. & Cuello, A. C. (1990); Walter, A., Jimenez-Härtel, W. & J.K. Mai (1990); Walter, A., Mai, J.K., Lanta, L. & T. Görcs (1991)

Morphometric Data

Weight, volume and linear dimensions	R	L
Brain weight (in formalin)	1383	
Fresh volume (cm^3)	1316	
Length (L)*	171	170
Width (W)*	71	71
Height (H)*	97	96
Length +	120	122
Width +	63	64
Height +	82	82

R: right hemisphere, L: left hemisphere

* Formalin fixed brain; + after histological preparation

Shrinkage Factors (SF)	R	L
SFw Lange, Thörner (1974)	2.13	2.22
SFl Lange, Thörner (1974)	1.89	1.81
SFl Sievert (1992)	1.74	1.82

Shrinkage factors (SF) describing the loss of volume from the fixed autopsy brains to the histological material.

SFl : Linear calculated volume shrinkage factor = [L*W*H (autopsy brain in formaline)] / [L*W*H (serial paraffin sections)], where
L = length of hemisphere;
W = width of hemisphere;
H = height of hemisphere).

SFw : Weight related shrinkage factor (SFg) = [(Bw * 0,88 / 1,0365) / serial section volume of hemisphere], where Bw = brain weight, Factor 0,88 = [weight of hemisphere] / [brain weight],
Factor 1.0365 = mean specific brain weight).

PROSENCEPHALON	R	L
Fresh volume (cm3)	549	527
Volume of serial sections (cm3)	267	262

Albring, K.M. (1983); Lange, H. & Albring, K.M. (1979); Lange, H. & Thörner, G. (1974)

CORTEX	R	L
Fresh volume (cm^3)	297	303
Volume of serial sections (cm^3)	144	139

Albring, K.M. (1983); Lange, H. & Albring, K.M. (1979); Lange, H. & Thörner, G. (1974)

CORTEX (fresh volume of cortical regions, (cm3)	R	L
Isocortex (ICx)	261	277
ICx.frontalis (ICx.f.)	101	103
ICx.f. convexitatis	63	64
ICx.f. medialis	22	22
ICx.f. opercularis dorsalis	3.6	3.2
ICx.f. opercularis basalis	0.8	1.2
ICx.f. basalis	11	12
Area (A.) gigantocellularis (gc)	5.1	5.5
A.gc. convexitatis	3.8	4.0
A.gc. medialis	1.3	1.5
ICx. parietalis (ICx.pa)	44	42
ICx.pa. convexitatis	24	22
ICx.pa. medialis	16	15
ICx.pa. opercularis	4.9	5.1
R. postcentralis.	13	15
R.p. convexitatis	11	12
R.p. medialis	2.1	2.5
ICx. temporalis (ICx.t)	41	49
ICx.t.dorsalis	7.7	7.8
R. temporalis transversalis (R.tv)	2.6	2.2
R.tv.1	1.9	1.6
R.tv.2	0.7	0.6
Parieto-temporal convexity	38	38
ICx. occipitalis	37	43
A18 + A19	30	35
A17	7.6	7.9
Allocortex (with Proisocortex):		
Claustro-Cx. temporalis	1.2	0.7
Claustro-Cx. insularis	7.4	7.3
Tbc. Olfactorium, R. praepiriformis frontalis, Peri-Palaeo-Cx. frontalis	0.9	0.5
Paleo-Cx. temporalis	0.5	0.4
Archi-Cx. frontalis	7.3	7.0

CORTEX (fresh volume of cortical regions (cm^3)	R	L
Archi-Cx. parietalis	5.6	4.4
Archi-Cx. temporalis	7.3	6.2

Albring, K.M. (1983)

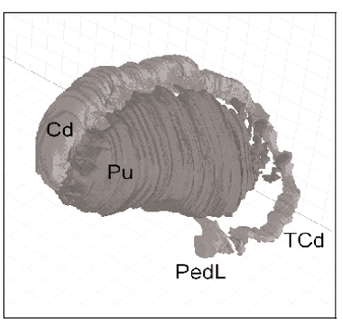
STRIATUM	R	L
Volume of serial sections (10 mm^3)		
Caudate nucleus	298	269
Putamen	360	343
Numeric cell density (number / mm^3)		
Small neurons (x10)	2029	2248
Large neurons	156	156
Glial cells (x10)	7360	7835
Volumetric neuronal density (10-2 %)	454	393
Nuclear diameter (10^{-2} µm)		
Small neurons	859	891

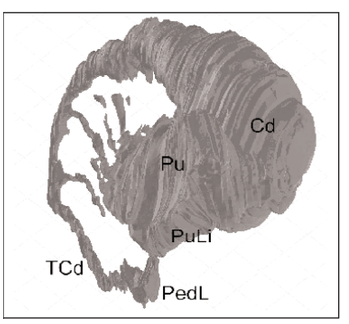
Albring, K.M. (1983); Lange, H. & Albring, K.M. (1979); Lange, H. & Thörner, G. (1974)

CAUDATE NUCLEUS	
Numeric cell density (number / mm^3)	
Macroneurons (L)	270
Microneurons (S)	22,663
L/S	1/83
Average diameter in µm	10.78

Dom, R. et al. (1981)

PUTAMEN	
Numeric cell density (number / mm^3)	
Macroneurons (L)	163
Microneurons (S)	19,953
L/S	1/119
Average diameter in µm	9.47

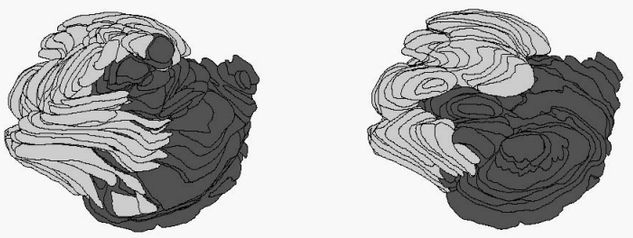




GLOBUS PALLIDUS		R	L
Volume of serial sections (mm^3)			
External globus pallidus	EGP	656	560
Internal globus pallidus	IGP	289	238
Numeric cell density (number / mm^3)			
Neurons	EGP	763	994
	IGP	625	588
Glial cells (*10^3)	EGP	124	132
	IGP	118	120
Volumetric cell density (10^{-3} %)			
Neurons	EGP	290	380
	IGP	210	270
Glial cells	EGP	450	620
	IGP	510	580

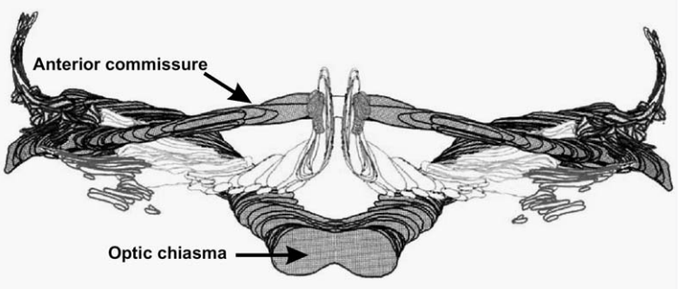
Lange, H. & Albring, K.M. (1979)

Amygdaloid Complex



S. Morres

Basal Nuclera Complex (Magnocellular nuclei of the basal forebrain)



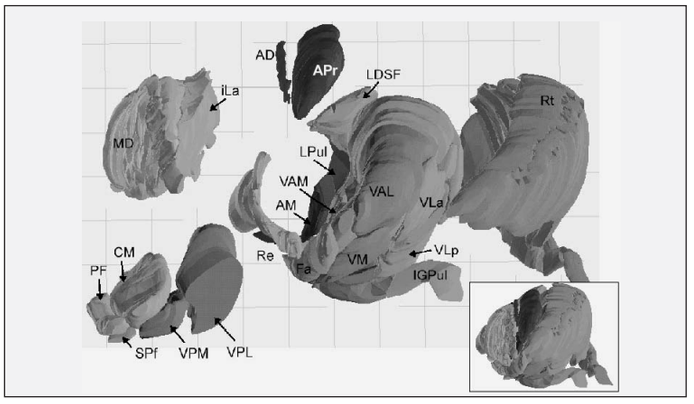
S. Morres

THALAMUS

Numeric cell density (number / mm3)

Small neurons	anterior thalamus	3,522
	medial thalamus	4,544
	lateral thalamus	1,012
	posterior thalamus	4,686
Large neurons	anterior thalamus	6,177
	medial thalamus	5,538
	lateral thalamus	3,248
	posterior thalamus	7,618

Dom, R. et al.(1981); Dom. R. (1976)



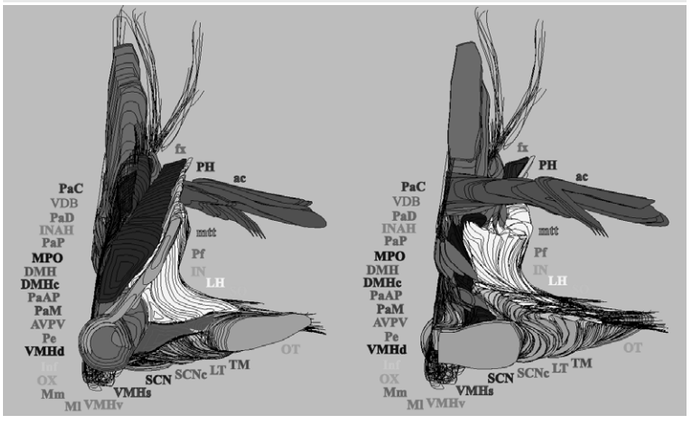
F. Forutan

SUBTHALAMIC NUCLEUS

		R	L
Fresh volume (cm3)		0.139	0.119
Volumes of serial sections (mm3)*			
Subthalamic ncl., med. part	SThM	31.7	31.2
	SThL	35.7	26.6
	total	67.4	57.9
Numeric cell density (number/mm3)			
Neurons (*10)	SThL	375	357
	SThM	591	516
Volumetric cell density			
Neurons (10-2%)	SThL	142	199
	SThM	162	223
Volumetric cell density (%)			
Neurons:	SThL	2.48	
	SThM	1.87	
Glia	SThL	0.99	
	SThM	0.923	
Numeric cell density (number/mm3)			
	SThL	7,417	
	SThM	8,046	
Absolute cell numbers		232	700
		287	600

Füssenich, M.S.U. (1967)

HYPOTHALAMUS



I.Koutcherov

RED NUCLEUS

		R	L
Volume of serial sections (mm3)			
Dorsomedial quadrant	r1		26.6
Dorsolateral quadrant	r2		35.9
ventrolateral quadrant	r3		35.8
ventromedial quadrant	r4		35.2
Numeric cell density (number/mm3)			
Neurons	r1	171	172
	r2	124	95
	r3	104	103
	r4	104	104
Glial cells	r1	446	421
	r2	384	336
	r3	320	402
	r4	309	308
Volumetric density (%)			
Neurons	r1	57	51
	r2	28	24
	r3	25	27
	r4	21	23
Glial cells	r1	78	69
	r2	74	58
	r3	74	60
	r4	72	56

* without shrinkage factor-correction

Herbel, W. (1979);. Sander, H.A. (1981)

References

The full text of the references listed bellow is available on the accompanying CD-Rom.

1. **Albring**, K.M. (1983) Quantitative Untersuchungen 33 Rindenregionen des menschlichen Gehirns. Thesis, Univ. of Düsseldorf.
2. **Bäumer**, H. (1952) Untersuchungen am Ncl.medialis und lateralis thalami bei Schizophrenie.Proc. I st . Intl. Congr. Neuropathol. Rom.Rosenberg & Sellier, Torino. Vol. 3, pp. 636-647.
3. **Bäumer**, H. (1954) Veränderungen des Thalamus bei Schizophrenie. J. Hirnforsch. 1, 156-172.
4. **Beheim-Schwarzbach**, D. (1952) AnatomischeVeränderungen im Schläfenlappen bei"funktionellen" Psychosen. Proc. I st . Intl. Congr. Neuropathol. Rom. Rosenberg & Sellier, Torino.Vol. 3, pp. 609-620.
5. **Beheim-Schwarzbach**, D. (1955) Lebensgeschichte der melaninhaltigen Nervenzellen des Ncl. coeruleus unter normalen und pathogenen Bedingungen. J. Hirnforsch. 2, 62-95.
6. **Bogerts**, B., **Häntsch**, J. & **Herzer**, M. (1982) A morphometric study of the dopamine-containing cell groups in the mesencephalon of normals,Parkinson patients and schizophrenics. Thesis, Düsseldorf.
7. **Braitenberg,** G. V. (1952) Ricerche istopatologiche sulla corteccia frontale di schizofrenici. Proc. I st .Intl. Cong. Neuropathol. Rom. Rosenberg & Sellier, Torino. Vol. 3, pp. 621-626.
8. **Brockhaus**, H. (1938) Zur normalen und pathologischen Anatomie des Mandelkerngebietes. J. Psychol. Neurol. 49, 1-136.
9. **Brockhaus**, H. (1940) Die Cyto- und Myeloarchitektonik des Cortex claustralis und des Claustrum beim Menschen. J. Psychol. Neurol. 49, 249-348.
10. **Brockhaus**, H. (1942) Beitrag zur normalen Anatomie des Hypothalamus und der Zona incerta beim Menschen. J. Psychol. Neurol. 51, 96-195.
11. **Brockhaus**, H. (1942) Vergleichendanatomische Untersuchungen über den Basalkernkomplex. J. Psychol. Neurol. 51, 57-95.
12. **Brockhaus**, H. (1942) Zur feinen Anatomie des Septum und des Striatum. J. Psychol. Neurol. 51, 1-56. Translated in: Human Brain Dissection. Pope A. ed. (1983) U.S. Government Printing Office Publ. 381-132: 3096.
13. **Busch**, , K.-T. (1960) Individuelle architektonische Differenzen der Area striata. J. Hirnforsch. 4, 535-552.
14. **Buttlar-Brentano**, K.v. (1954) Zur Lebensgeschichte des Ncl. basalis, tuberomammillaris, supraopticus und paraventricularis unter normalen und pathogenen Bedingungen. J. Hirnforsch. 1, 337-419.
15. **Buttlar-Brentano**, K.v. (1955) Das Parkinsonsyndrom im Lichte der lebensgeschichtlichen Veränderungen des Nucleus basalis. J. Hirnforsch. 2, 55-76.
16. **Buttlar-Brentano**, K.v. (1956) Zur weiteren Kenntnis der Veränderung des Basalkerns bei Schizophrenen. J. Hirnforsch. 2, 271-291.
17. **Dom**, R., De Saedeleer, J., Bogerts, B. & Hopf, A (1981) Quantitative cytometric analysis of basal ganglia in catatonic schizophrenics. In: Biological Psychiatry (eds. Perris, C. Struwe, G & Jansson B), Elsevier, North-Holland pp. 723-726.
18. **Dom**. R. (1976) Neostriatal and Thalamic Interneurons. Their role in the pathophysiology of Huntington's chorea, Parkinson's disease and catatonic schizophrenia. Thesis, Univ. of Leuven.
19. **Fünfgeld**, E.W. (1952) Pathologisch-anatomische Untersuchungen im Nucleus anterior thalami bei Schizophrenie, Proc. I st . Intl. Cong. Neuropathol. Rom. Rosenberg & Sellier, Torino. Vol. 3, pp. 648-659.
20. **Fünfgeld**, E.W. (1954) Der Nucleus anterior thalami bei Schizophrenie. J. Hirnforsch. 1, 146-155.
21. **Füssenich**, M.S.U. (1967) Vergleichend anatomische Studien über den Nucleus subthalamicus (Corpus Luysi) bei Primaten.Thesis, Univ. of Freiburg.
22. **Hassler** (1937) Zur Normalanatomie der Substantianigra. Versuch einer architektonischen Gliederung. J. Psychol. Neurol. 48, 1-55.
23. **Hempel**, K.-J. & Treff, W.M. (1959) Die Gliazelldichte bei klinisch Gesunden und Schizophrenen. J. Hirnforsch. 4, 371-411.
24. **Herbel**, W. (1979) Zur Neuroanatomie und Neuropathologie des Nucleus ruber beim Menschen.Thesis, University of Düsseldorf.
25. **Hopf**, A., Gihr, M. & Kraus, C. (1967) Ver-gleichende Architektonik des Primatenthalamus. Progr. Primatol. I. Congress of the International Primatological Society, Frankfurt, pp.120-127.
26. **Klatzo**, I. (1954) Über das Verhalten des Nukleolarapparates in den menschlichen Pallidumzellen. J. Hirnforsch. 1, 47-60.
27. **Lange**, H. & Albring, K.M. (1979) Quantitative Untersuchungen an 33 Rindenregionen des menschlichen Gehirns. Verh. Anat. Ges. 73, 107-109.
28. **Lange**, H. & Thörner, G. (1974) Zur Neuroanatomie und Neuropathologie des Corpus striatum, Globus pallidus und Nucleus subthalamicus beim Menschen, Thesis, Düsseldorf.
29. **Lange**, H., Thörner G., & Hopf, A. (1975) Morphometrisch-statistische Strukturanalysen des Striatum, Pallidum und Nucleus subthalamicus beim Menschen, Teil 1, J. Hirnforsch. 16, 333-350.
30. **Lange**, H., Thörner G., & Hopf, A. (1975) Morphometrisch-statistische Strukturanalysen des Striatum, Pallidum und Nucleus subthalamicus beim Menschen, Teil 2, J. Hirnforsch. 16, 401-413.
31. **Lange**, H., Thörner, G., & Hopf, A. (1976) Morphometrisch-statistische Strukturanalysen des Striatum, Pallidum und Nucleus subthalamicus beim Menschen, Teil 3, J. Hirnforsch. 17,
32. **Lange**, H., Thörner, G., Hopf, A. & Schröder, K.F. (1976) Morphometric studies of the neuropathological changes in choreatic diseases. J. Neurol. Sci. 28, 401-425.
33. **Mai**, J.K., Kedziora, O., Teckhaus, L. & M.V. Sofroniew (1991). Evidence for subdivisions in the human suprachiasmatic nucleus. J. Comp. Neurol. 305: 508-525.
34. **Mai**, J.K., Stephens, P., A. Hopf & A.C. Cuello (1986): Substance P in the human brain. Neuroscience 17, 709-739.
35. **Mai**, J. K. & Reifenberger, G. (1988): Distribution of the carbohydrate epitope 3-fucosyl-N-acetyl-lactosamine (FAL) in the adult human brain. J.Chem. Anat. 1, 255-285.
36. **Namba**, M.(1957) Cytoarchitektonische Untersuchung am Striatum. J. Hirnforsch. 3, 24-48.
37. **Namba**, M. (1958) Über die feineren Strukturen des medio-dorsalen Supranucleus und der Lamella medialis des Thalamus beim Menschen. J.Hirnforsch. 4, 1-41.
38. **Pioro**, E.P., Mai, J. K. & Cuello, A. C. (1990): Distribution of substance P- and enkephalin-immunoreactive neurons and fibers. in: The Human Nervous System. G. Paxinos (ed.), Academic

Press, 1051-1094.
39. **Sander**, H.A. (1981) Morphometrische Analyse der neuropathologischen Veränderungen im Nucleus ruber bei Parkinson'scher Krankheit. Thesis, Univ. of Düsseldorf.
40. **Sanides**, F. (1957) Die Insulae terminales des Erwachsenengehirns des Menschen. J. Hirnforsch. 3, 243-273.
41. **Sanides**, F. (1957) Untersuchungen über die histologische Struktur des Mandelkerngebietes. J. Hirnforsch. 2, 354-390.
42. **Schiffer**, D.(1954) Sur l'action reparatrice du noyau des cellules nerveuses. J. Hirnforsch. 1, 326-336.
43. **Schulze**, H.A.: Zur individuellen cytoarchi-tektonischen Gestaltung der linken und rechten Hemisphäre des Lobulus parietalis inferior. J.Hirnforsch. 4, 486-534 (1960)
44. **Schröder**, K.F. (1970) Quantitativ-morphologische Untersuchungen zur Genese verschiedener Choreaformen. Thesis, University of Marburg.
45. **Solcher**, H. (1956) Zur Pathologie des Nigerreticulatus und zu seiner Stellung im extrapyramidalen System. J. Hirnforsch. 2, 391-401.
46. **Treff**, W.M. & Hempel, K.-J. (1959) Quantitative Untersuchungen über relative Zell- und Zellkernvolumina bei klinisch Gesunden und Schizophrenen. J. Hirnforsch. 4, 412-454.
47. **Vogt**, C. & Vogt, O. (1942) Morphologische Gestaltungen. J. Psychol. Neurol. 50, 1-504.
48. **Wahren**, W. (1952) The changes of hypothalamic nuclei in schizophrenia. Proc. I st . Intl. Congr. Neuropathol. Rom. Rosenberg & Sellier, Torino. Vol. 3, pp. 660-673.
49. **Walter**, A., Jimenez-Härtel, W. & J.K. Mai (1990) Mapping of neuropeptide Y-like immunoreactivity in the human forebrain. Brain Res. Bull. 24, 297-311.
50. **Walter**, A., Mai, J.K., Lanta, L. & T. Görcs (1991) Differential distribution of histochemical markers in the bed nucleus of the stria terminalis in the human
51. brain. J. Chem. Neuroanat. 4: 281-298.
Wünscher, W. (1956) Cytoarchitektonik und Involution einiger Hirnstammkerne mit vegetativen Funktionen und der oberen Olive. J. Hirnforsch. 2, 354-390.

Abbreviations

2n	optic nerve
3n	oculomotor nerve or its root
3ni	oculomotor nerve (inferior branch)
3V	third ventricle
4n	trochlear nerve or its root
4V	fourth ventricle
5fr	frontal nerve of trigeminus
5Gn	trigeminal ganglion (Gasseri)
5ialv	inferior alveolar nerve
5inf	infraorbital nerve
5lac	lacrimal nerve
5lg	lingual nerve
5mo	motor root of trigeminal nerve
5mx	maxillary nerve of the trigeminal
5n	trigeminal nerve
5nc	nasociliary nerve
5ophth	ophthalmic nerve
6n	abducens nerve or its root
7C	facial nerve and canal
7gp	greater petrosal nerve
7n	facial nerve or its root
8n	vestibulocochlear nerve
9n	glossopharyngeal nerve
10n	vagus nerve
11n	accessory nerve
12C	hypoglossal canal
12n	hypoglossal nerve or its root
17	striate area (Brodmann area 18)
18	(Brodmann) area 18
AAA	anterior amygdaloid area
AAT	anterior arch of atlas
aau	anterior auricular artery
AB	access. basal amygdaloid ncl.
ac	anterior commissure
Acb	accumbens nucleus
AcC	accumbens n., central part (core)
AcL	accumbens nucleus, lateral part (shell)
AcM	accumbens nucleus, medial part (core)
ACeIT	anterior cervical intertransv. muscle
acer	anterior cerebral artery
AcL	lateral accumbens nucleus
AcM	accumbens n., medial part
aco	anterior commissure, olfactory limb
ACo	anterior cortical amygdaloid nucleus
ACoD	anterior cortical amygdaloid nucleus, dorsal part
acs	anterior calcarine sulcus
AcSV	accumbens nucleus, subventricular region
AD	anterodorsal thalamic nucleus
ADB	nucleus of the diagonal band, angular part
afx	anterior column of fornix
AG	ambiens gyrus
AHi	amygdalohippocampal area
AI	amygdaloid island (extended amygdala)
aic	anterior limb of internal capsule
aica	anterior inferior cerebellar artery
AIn	agranular insular cortex (claustro-cortex insularis)
ajugv	anterior jugular vein
al	ansa lenticularis
alal	alar ligament of dens
ald	apical ligament of dens
all	anterior longitudinal ligament
ALPO	anterior lateral preoptic nucleus
Alv	alveolar process of maxilla
alv	alveus of hippocampus
AM	anteromedial thalamic nucleus
Amg	amygdala
AMjC	ala major cartilage
AMPO	anterior medial preoptic nucleus
ancer	ansa cervicalis
ang	angular artery
AnG	angular gyrus
angv	angular vein
AO	anterior olfactory nucleus (retrobulbar region)
AOP	anterior olfactory nucleus, posterior part
ap	ansa peduncularis
apal	ascending palatine artery
aph	ascending pharyngeal artery
APr	anteroprincipal thalamic nucleus
aps	anterior parolfactory sulcus
APS	anterior perforated substance
apsi	anterior parolfactory sulcus, inferior branch
apss	anterior parolfactory sulcus, superior branch
APul	anterior pulvinar nucleus
Aq	cerebral aqueduct (Sylvius)
AReCaM	anterior rectus capitis muscle
ARG	Andreas Retzius gyrus
argr	arachnoid granulations
AryE	aryepiglotticus muscle
AStr	amygdalostriatal transition area
AtAx	altanto-axial membrane
ATh	anterior thalamic nucleus
Atlas	atlas
AtOc	atlanto occipital joint
ATub	articular tubercle
aud	auditory radiation
Aud	auditory tube
AudC	auditory tube cartilage
aute	auriculotemporal nerve
AV	anteroventral thalamic nucleus
Axis	axis (C2 vertebra)
bas	basilar artery
BasCi	basilar cistern
BC	basal nucleus, compact part
bcc	body of corpus callosum
BFat	buccal fat pad
bfx	body of fornix

bG band of Giacomini
BHy body of hyoid bone
bic brachium of the inferior colliculus
BL basolateral amygdaloid nucleus
BLD basolateral amygdaloid nucl., dorsal (magnocell.) part
BLI basolateral amygdaloid nucleus, intermediate part
BLPL basolateral amygdaloid nucleus, paralaminar part
BLVL basolateral amygdaloid nucleus, ventrolateral part
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucleus
BMan body of mandible
BMCM basomedial amygdaloid nucleus, centromedial part
BMDL basomed. amygdaloid n., dorsolat. part
BMDM basomedial amygdaloid nucleus, dorsomedial part
BMVM basomedial amygdaloid nucleus, ventromedial part
BOp basal operculum
bsc brachium of the superior colliculus
BST bed nucleus of the stria terminalis
BSTC bed nucleus of the stria terminalis, central division
BSTL bed nucleus of the stria terminalis, lateral division
BSTLJ bed nucleus of the stria terminalis, lateral division, juxtacapsular part
BSTM bed nucleus of the stria terminalis, medial division
BSTP bed nucleus of the stria terminalis, posterior part
BSTV bed nucleus of the stria terminalis, ventral division
BucM buccinator muscle
bucn buccal nerve
CA1 CA1 field of hippocampus
CA2 CA2 field of hippocampus
CA3 CA3 field of hippocampus
cal calcar avis
calv callosal vein
CAnT common anular tendon
cas callosal sulcus
cav cavernous sinus
Cb cerebellum
cc corpus callosum
cctd common carotid artery
Cd caudate nucleus
CdL lateral caudate nucleus
CdM medial caudate nucleus
CdV ventral caudate nucleus
Ce central amygdaloid nucleus
ce central sulcus
CeL central amygdaloid nucleus, lateral part
CeM central amygdaloid nucleus, medial part
cern cervical nerve
cerpx cervical plexus
cfx crus of the fornix
CG cingulate gyrus
cg cingulum
CGal crista galli
cgs cingulate sulcus
CH cerebellar hemisphere
cha choroid artery
chf choroidal fissure
chp choroid plexus
Ci cistern
cic commissure of the inferior colliculi
CilM ciliaris muscle
cir circular insular sulcus
CISM cervical interspinal muscle
Cl claustrum
CLV central part of lateral ventricle
CM central medial thalamic nucleus
cmg capsule of medial geniculate n.
CMMC centromedian thalamic nucleus, magnocellular part
CMn centrum medianum, parafascicular nucleus
Co commissural nucleus
CoCl compact insular claustrum
comb comb system
Cond condylar process of mandible
Cor coronoid process of the mandible
cos collateral sulcus
cosi confluence of sinuses
cp cerebral peduncle
cplx carotid plexus
cr capsule of red nucleus
cret central artery of retina
crt cerebello-rubro-thalamic fibers
cs calcarine sulcus
csc commissure of the superior colliculi
CSCil corrugator supercilii muscle
CSP cavity of septum pellucidum
ctg central tegmental tract
cty chorda tympani
CuA cuneiform area
Cuc cucullaris nucleus
Cun cuneus
CxA cortico-amygdaloid transition area
DAx dens axis
db diagonal band
DB diagonal band nucleus
DCl dorsal claustrum
DG dentate gyrus
DH dorsal hypothalamic area
dhc dorsal hippocampal commissure
DiCl diffuse insular claustrum
DiM digastric muscle, ant. belly
dip diploic vein
DiPul diffuse pulvinar nucleus
Disc articular disc of temporo-mandibular joint
DiT digastric muscle, tendon
dlg deep lingual artery and vein
DMH dorsomedial hypothalamic nucleus
Do dorsal hypothalamic nucleus
dpal descending palatine artery
DpAO depressor anguli oris muscle
dpc deep cervical artery and vein
DPe dorsal periventricular hypothalamic nucleus
DpLb depressor labii inferioris muscle
DpSCil depressor supercilii muscle
dr2 dorsal root (C2)
DS diaphragma sellae
dta deep temporalis artery
DTP dorsal temporopolar region
EAM external auditory meatus
ec external capsule
ectd external carotid artery
EGl epiglottis
EGP external globus pallidus
ejug external jugular vein

ejugv external jugular vein
emi emissary vein
eml external medullary lamina (thalamus)
Ent entorhinal cortex
EP entopeduncular nucleus
ers endorhinal sulcus
EthBu ethmoidal bulla
eths ethmoidal sinus (cells)
EthS ethmoidal sinus (cells)
ex extreme capsule
eye eyeball
Fa fasciculosus nucleus
fac facial artery
facv facial vein
Fas fasciculosus nucleus
FCd caudate fundus region
FD fascia dentata
FG fasciolar gyrus
fi fimbria of the hippocampus
FL frontal lobe
FLA frontal limbic area
FLV frontal horn of lateral ventricle
FMG frontomarginal gyrus
fmi forceps minor of the corpus callosum
fmj forceps major of the corpus callosum
fms frontomarginal sulcus
FOp frontal operculum
FPu putaminal fundus region
fr fasciculus retroflexus
frn frontal nerve
Fro frontal bone
FroC frontal bone, crest
FroN frontal bone, nasal part
FroO frontal bone, orbital part
FroSq frontal bone, squamosal part
FrP frontopolar cortex
FrS frontal sinus
FStr fundus striati
FuG fusiform gyrus
fx fornix
FxC falx cerebri
gapo epicranial aponeurosis
gcc genu of the corpus callosum
GeHy geniohyoid muscle
GGM genioglossus muscle
GHHy greater horn of hyoid bone
gic internal capsule, genu
gld glandular branches of facial artery
GNaC greater nasal cartilage
gocn greater occipital nerve
GP globus pallidus
gpa greater palatine artery
GPalF greater palatine foramen
gpn greater palatine nerve
gpv greater palatine vein
GR gyrus rectus
GrCi great (cerebellomedullary) cistern
GTI great terminal island
GZgM greater zygomatic muscle
H1 thalamic fasciculus (field H1)
H2 lenticular fasciculus (field H2)
Hb habenular nuclei
hbc habenular commissure
HCd head of caudate nucleus
HDB horizontal limb of the diagonal band
Hi hippocampus
HiH hippocampal head
his hippocampal sulcus
HPtg hamulus of the pterygoid bone
Hy hypothalamus
HyGl hyoglossus muscle
Hyoid hyoid bone
ialn inferior alveolar nerve
ialva inferior alveolar artery
IAud internal auditory meatus
IC inferior colliculus
ic internal capsule
ICCe iliocostalis cervicis muscle
ICG isthmus of cingulate gyrus (gyrus fornicatus)
ICM inferior constrictor m. of pharynx
icml incomplete medullary lamina of the globus pallidus
ictd internal carotid artery
icv internal cerebral vein
IFG inferior frontal gyrus
IFGOp inferior frontal gyrus, opercular part
IFGOr inferior frontal gyrus, orbital part
IFGTr inferior frontal gyrus, triangular part
ifs inferior frontal sulcus
IG insular gyrus
IGP internal globus pallidus
IGPul intergeniculate pulvinar
IGr indusium griseum
ijugv internal jugular vein, bulbus
ilab inferior labial artery and vein
ilf inferior longitudinal fasciculus
imfs intermediate frontal sulcus
iml internal medullary lamina of thalamus
imos intermediate obirtal sulcus
INaCo inferior nasal concha
IncC incisive canal
Inf infundibular nucleus
infa infraorbital artery
InfS infundibular stalk
Ins insula
InTrM intertransversarii muscles
IO inferior olive
IObCpM inferior oblique capitis muscle
IObM inferior oblique muscle
IObMT inferior oblique muscle, tendon
IOC infraorbital canal
IOrbF infraorbital foramen
IOrG intermediate orbital gyrus
IP interpeduncular nucleus
IPCi interpeduncular cistern
ipets inferior petrosal sinus
ipf interpeduncular fossa
IPL inferior parietal lobule
ips intraparietal sulcus
IPul inferior pulvinar nucleus
IReM inferior rectus muscle
IRoG inferior rostral gyrus
ISM interspinalis muscle

iss inferior sagittal sinus
ita inferior temporal artery
ITG inferior temporal gyrus
IthA interthalamic adhesion
ithp inferior thalamic peduncle
its inferior temporal sulcus
IVF interventricular foramen
ivvpx internal vertebral venous plexus
JugF jugular foramen
JugP jugular process
La lateral amygdaloid nucleus
lab labial artery
lac lacrimal artery
LacG lacrimal gland
lacv lacrimal vein
LaDA lateral amygdaloid nucleus, dorsal anterior part
LADL lateral amygdaloid nucleus, dorsal lateral part
LaDM lat. amygdaloid nucl., dorsomed. part
LaI lateral amygdaloid nucl., intermediate part
LAngO levator anguli oris muscle
LaV lateral amygdaloid nucl., ventral part
LC locus coeruleus
ld lambdoid suture
LD lateral dorsal thalamic nucleus
LDO laterodorsal nucl., oral part
lds lamboid suture
LDSF laterodorsal nucleus, superficial part
lenf lenticular fasciculus
lf lateral fissure
LG lateral geniculate nucleus
lg lingual artery
LgC longus capitis and colli muscles
LgCaM longus capitis muscle
LgCoM longus colli muscle
LgFo lingual follicle
LgG lingual gyrus
LgGl lingual gland
LgsCaM longissimus capitis muscle
LgsCeM longissimus cervicis muscle
LgsCeT longissimus cervicis muscle tendon
LgSpt lingual septum
lgv lingual vein
LHA lateral hypothalamic area
LHb lateral habenular nucleus
Li limen insulae
LiCl limitans claustrum
Lim limitans nucleus
liml limiting medullary lamina of the globus pallidus
ling lingual nerve
ll lateral lemniscus
LLb levator labii superioris muscle
LLPt lateral lamina of pterygoid process
lls lateral longitudinal stria
LM lateral mamillary nucleus
lml lateral medullary lamina of the globus pallidus
lo lateral olfactory tract
LOrG lateral orbital gyrus
los lateral orbital sulcus
lots lateral occipitotemporal sulcus
LPal levator palpebrae muscle
LPtg lateral pterygoid muscle
LPtgL lateral pterygoid muscle, lateral belly
LPtgM lateral pterygoid muscle, medial belly
LPul lateral pulvinar nucleus
LRec lateral rectus muscle
LReCa lateral rectus capitis muscle
LReM lateral rectus muscle
ls longitudinal stria
LScM levator scapulae muscle
LSD dorsolateral septal nucleus
LSI lateral septal nucleus, intermediate part
LSV ventral septal nucleus
LT lamina terminalis
LTh lateral thalamic nuclear region
LTP lateral temporopolar region
LTu lateral tuberal nucleus
LV lateral ventricle
LVePa levator veli palatini muscle
Ly lymph node
MaA mastoid antrum
Man mandible
ManC mandibular canal
mand5 mandibular nerve
ManF mandibular fossa
MasM masseter muscle
MB mamillary body
mcer middle cerebral artery
MCM medial constrictor muscle
mcp middle cerebellar peduncle
MD medial dorsal thalamic nucleus
MDMc medial dorsal thalamic nucleus, magnocellular part
Md medulla oblongata
MDe margo denticulatus
MDFa medial dorsal thalamic nucl., fasciculosus part
MDFi medial dorsal thalamic nucl., fibrosus part
MDMC medial dorsal thalamic n., magnocellular part
MDV medial dorsal thalamic nucl., ventral part
Me medial amygdaloid nucleus
MeA medial amygdaloid nucleus, anterior part
MentM mentalis muscle
mfb medial forebrain bundle
MFG medial frontal gyrus
MG medial geniculate nucleus
MGDA medial geniculate nucl., dorsoant. (magnocellular) part
MGDP medial geniculate nucleus, dorsoposterior part
MGFi medial geniculate nucleus, fibrosus part
MGLi medial geniculate nucleus, limitans part
MGPC medial geniculate nucleus, parvocellular part
MHb medial habenular nucleus
MidE middle ear
MiPRe minor posterior rectus capitis muscle
MiZgM minor zygomatic muscle
ml medial lemniscus
ML medial mamillary nucleus, lateral part
mlf medial longitudinal fasciculus
MLPt medial lamina of pterygoid process
mls medial longitudinal stria
MM medial mamillary nucleus, medial part
mm middle meningeal artery
mml medial medullary lamina of the globus pallidus
mmp middle meningeal artery, parietal branch
MNaC middle nasal concha

MnPO median preoptic nucleus
molf medial olfactory radiation
MOrG medial orbital gyrus
mos medial orbital sulcus
MPC medial mammillary n., parvocellular part
MPO medial preoptic nucleus
MPtg medial pterygoid muscle
MPtgM medial pterygoideus muscle
MPul medial pulvinar nucleus
MRec medial rectus muscle
MReM medial rectus muscle
MS medial septal nucleus
ms medullary substance of frontal lobe
MScalM medial scalenus muscle
Mst mastoid process of temporal bone
MstC mastoid cells
mt mammillo-thalamic tract
MTec mesencephalic tectum
mtg mammillo-tegmental tract
MTG medial temporal gyrus
MTP medial temporopolar region
MTu medial tuberal nucleus
MulM multifidus muscle
Mx maxilla
mx maxillary artery
mxs maxillary sinus
mxv maxillary vein
MyHy mylohyoid muscle
myhy mylohyoid nerve
Na nasal bone
nl nuchal ligament
nlac nasolacrimal duct
npal nasopalatine artery, incisive canal
NPhT nasopharyngeal tonsil
NSpt nasal septum
nuf nuchal fascia
oaud opening of auditory tube
OB olfactory bulb
Occ occipital bone
occa occipital artery
occs occipital sinus
occv occipital vein
OcFrF occipito-frontal muscle, frontal belly
OcFrO occipito-frontal muscle, occipital belly
OcG occipital gyri
ocm occipito-mastoid suture
OFat orbital fat
OFG orbitofrontal gyri
olf olfactory tract
OlfA olfactory area
olfr olfactory radiation
olfs olfactory sulcus
OLV occipital horn of lateral ventricle
OmHy omohyoid muscle
OOM orbicularis oculi muscle
OOrM orbicularis oris muscle
oph ophthalmic artery
ophv ophthalmic vein
opt optic tract
or optic radiation
Oral oral cavity
OrG orbital gyri
ors orbital sulcus
OTG occipito-temporal gyrus
Otic otic ganglion
OTr olfactory trigone
ox optic chiasm
P3V preoptic recess of the third ventricle
Pa paraventricular hypothalamic nucleus
Pa2 paraoptic nucleus
PAA periamygdalar area
PaAP paraventricular hypothalamic nucl., ant. parvocell. part
PAC periamygdaloid cortex
PACl preamygdalar claustrum
PaD paraventricular hypothalamic nucleus, dorsal part
PaF parafornical nucleus
PaFo paraventricular hypothalamic nucleus, fornical part
PAG periaqueductal gray
PalG palatine glands
PalHy pallidohypothalamic nucleus
paln palatine nerve (s)
PaMc paraventricular hypothalamic nucl., magnocellular part
PaOp parietal operculum
pap optic papilla
PaP paraventricular hypothalamic nucl., parvocellular part
PaPo paraventricular hypothalamic nucleus, posterior part
papx parotid plexus
Par patotid gland
ParB parietal bone
PaS parasubiculum
PAT posterior arch of atlas
pau posterior auricular artery
pauv posterior auricular vein
PBP parabrachial pigmented nucl.
pc posterior commissure
PCA precommissural archicortex
pcer posterior cerebral artery
pcfx precommissural fornix
PCL paracentral lobule
PCo post. cortical amygdaloid n.
pcoma posterior communicating artery
pcs precentral sulcus
PCun precuneus
PedL peduncle of lentiform nucleus
PeP perpendicular plate
PF parafascicular thalamic nucl.
pfx post. column (crus) of fornix
PH posterior hypothalamus
PHA parahippocampal-amygdaloid transition area
phar pharyngeal branches
PHG parahippocampal gyrus
PhRe pharyngeal recess
phy pallidohypothalamic fibers
Pi pineal gland
pic posterior limb of the internal capsule
pica posterior inferior cerebellar artery
PIR parainsular region
Pir piriform cortex
PirF (pre-)piriform cortex, frontal area
PirR piriform recess
PirT (pre-)piriform cortex, temporal area
Pit pituitary gland

Plat platysma
PlGl palatoglossus muscle
PLi posterior limitans thalamic nucleus
PlPh palatopharyngeus muscle
pm principal mammillary fasciculus
PMiRe post. minor rectus capitis muscle
pna posterior nasal artery
PoCi pontine cistern
pocs postcentral sulcus
PoG postcentral gyrus
Pons pons
POrbM posterior orbicularis muscle
POrG posterior orbital gyrus
pos parietooccipital sulcus
POTZ parietooccipital transition area
PP peripeduncular nucleus
PPA peripeduncular area
PPCl prepiriform claustrum
PPo planum polare
pps posterior parolfactory sulcus
PRC perirhinal cortex
PrG precentral gyrus
PrS presubiculum
psa posterior superior alveolar artery
PT paratenial thalamic nucleus
PTc pretectal area
ptdd parotid duct
PTe planum temporale
PTG paraterminal gyrus
PTG paraterminal gyrus
Ptg pterygoid process
PtgC pterygoid canal
ptgpal pterygopalatine ganglion
ptgpx pterygoid plexus
ptpf pterygopalatine fossa
PtPF pterygopalatine fossa
PTR post temporopolar region
PtT palatine tonsil
Pu putamen
PuLi limitans putamen
PuM medial putamen
PuV ventral putamen
PV paraventricular thalamic nucleus
pvf prevertebral fascia
py pyramidal tract
QP quadrigeminal plate
R red nucleus
racc radiation of corpus callosum
rapx retroarticular (venous) plexus
RBR retrobulbar region
rcc rostrum of corpus callosum
Re reuniens thalamic nucleus
RG rectus gyrus
RisM risorius muscle
rmv retromandibular vein
ros rostral sulcus
RPC red nucleus, parvocellular part
Rt reticular thalamic nucleus
S subiculum
SalPhM salpingopharyngeus muscle
SArS subarachnoid space
sas semiannular sulcus
SB striatal cell bridges
sbps subparietal sulcus
SC superior colliculus
SCA subcallosal area
sca superior cerebellar artery
scal subcallosal bundle
ScalM scalenus muscle
SCC semicircular canals
scc splenium of corpus callosum
SCD semicircular ducts
SCG subcallosal gyrus
SCGn superior cervical ganglion
SCGP supracapsular part of the globus pallidus
SCh suprachiasmatic nucleus
SCM superior constrictor muscle of the pharynx
SCMPP superior constrictor muscle, pterygopharyngeal part
scp superior cerebellar peduncle
SCS subcallosal stratum
SCTI subcaudate terminal island
SeC septal cartilage
SEL subependymal layer
SepG separans gyrus
SEpS subependymal stratum
SFG superior frontal gyrus
SFi septofimbrial nucleus
SFO subfornical organ
SFPul superficial pulvinar
sfs superior frontal sulcus
SGe suprageniculate nucleus
SGl substantia gliosa
SGL substantia gliosa (subependymal gray)
shl stylohyoid ligament
SHThC superior horn of thyroid cartilage
sigs sigmoid sinus
slf superior fronto-occipital fasciculus
SLG semilunar gyrus
slg sublingual artery and vein
SLGl sublingual gland and duct
slic sublenticular part of internal capsule
sln superior laryngeal nerve
sls sublenticular stria
sm stria medullaris of thalamus
sma submental artery
smd submandibular duct
SMG supramarginal gyrus
SMGl submandibular gland
sms superficial medullary stratum
smv submental vein
SN substantia nigra
SNaC septum nasi cartilage
SNC substantia nigra, pars compacta
SNR subst. nigra, reticular part
SO supraoptic nucleus
SOb superior oblique muscle
SObCa superior oblique capitis muscle
SObM superior oblique muscle
socv suboccipital venous plexus
SODL supraoptic nucleus, dorsolateral part
sof superior occipitofrontal fascicle
SOP supraoptic nucl., posterior p.

sophv superior ophthalmic vein
SOT supraoptic nucleus, tuberal part
SOVM supraoptic nucleus, ventromedial part
sox supraoptic commissure
spa sphenopalatine artery
SPaF salpingopalatinal fold
SPal soft palate
spalv superior posterior alveolar artery
SpAx spinous process of axis
SpC splenius capitis and cervicis muscle
SpCaM splenius capitis muscle
SpCeM splenius cervicis muscle
spets superior petrosal sinus
SPF subparafascicular thalamic nucleus
SphB sphenoid bone
SPhF salpingopharyngeal fold
SphGW sphenoid, greater wing
sphml sphenomandibular ligament
sphn superior pharyngeal nerve
SphP pterygopalatine ganglion
SphP sphenopalatine ganglion
sphp sphenoparietal sinus
sphpl sphenopalatine artery
sphs sphenoid sinus
sphzg spheno-zygomatic suture
Spinal spinal cord
SPL superior parietal lobule
SplM splenius capitis and cervicis muscle
SpM spinalis muscle
spth spino-thalamic tract
SptP septum pellucidum
SReM superior rectus muscle
SRoG superior rostral gyrus
ss straight sinus
SSpCaM semispinalis capitis muscle
SSpCeM semispinal cervicis muscle
SSpG subsplenial gyrus
sss superior sagittal sinus
SSTI substriatal terminal island
sstr sagittal stratum
st stria terminalis
sta superficial temporal artery and vein
staf superior temporal artery,frontal branch
stam superficial temporal a., median root
stap superficial temporal a., parietal root
stempv superficial temporal vein
STG superior temporal gyrus
sth subthalamic fascicle
STh subthalamic nucleus
StHy sternohyoid muscle
sthy superior thyroid artery
sthyv superior thyroid vein
StM sternomastoid muscle
StMT sternomastoid muscle, tendon
sts superior temporal sulcus
StT sternomastoid muscle, tendon
Sty styloid process
StyGlM styloglossus muscle
StyHyM stylohyoid muscle
StyPhM stylopharyngeus muscle
SubH subhabenular nucleus
sublgv sublingual vein
sumx supramammillary commissure
suorba supraorbital artery
sutr supratrochlear artery
sutrn supratrochlear nerve
sutrv supratrochlear vein
sv septal vein
SVTI subventricular terminal island
SxD sexual dimorphic ncl.
Symp sympathetic trunk
TCb tentorium cerebelli
TCd tail of caudate nucleus
tch tenia of choroid plexus
TCl temporal claustrum
tclv tela choroides of lat. ventricle
Tec tectum
TelePa tensor veli palatini muscle
Temp temporal bone
TempM temporalis muscle
TempP temporal bone, petrosal part
TempS temporal bone, squamous part
TempT temporalis muscle (tendon)
tempv temporal veins
TenT tensor tympani muscle
TeVePa tensor palatini muscle
tf temporal fascia
tfa transverse facial artery
tfi tenia of fimbria
TFPGI inferior transverse frontopolar gyrus
TFPGM medial transverse frontopolar gyrus
TFPGS superior transverse frontopolar gyrus
tfv transverse facial vein
tfx tenia of fornix
Th thalamus
ThC thyroid cartilage, upper horn
ThHy thyrohyoid muscle
ThHyMe thyrohyoid membrane
thr thalamic radiation (corona radiata)
TL temporal lobe
tla transverse ligament of atlas
TLev torus levatorius
TLV temporal horn of lateral ventricle
TM tuberomammillary nucleus
TMD temporomandibular disc
TmP temporal pole
TOp temporal operculum
TOTZ temporooccipital transition zone
tp tapetum
TrA triangular area (Wernicke)
TrG transverse temporal gyrus
TrLV trigone of lateral ventricle
TrP4 transverse process of fourth vertebra
TrPAt transverse process of atlas
TrPAt transverse process of the atlas
trs transverse sinus
TS triangular septal nucleus
tst tenia of stria terminalis
tsv thalamostriate vein
tt tenia of thalamus
TTG transverse temporal gyri
tth dorsal trigemino-thalamic tract

TTub	torus tubarius
Tu	olfactory tubercle
TuCn	tuber cinereum
TuTI	tubercular terminal island(s)
tv	temporal vein
TyC	tympanic cavity
TzM	trapezius muscle
Un	uncus
unc	uncinate fasciculus
unn	uncal notch
us	uncal sulcus (diverticulum unci)
Uv	uvula
v	vein
VA	ventral anterior thalamic nucleus
vaf	ventral anygdalofugal pathway
VAMC	ventroanterior thalamic nucleus, magnocellular part
VCl	ventral claustrum
VCo	ventral cortical nucleus
VDB	vertical limb of the diagonal band
Ver	vermis of cerebellum
Vert	vertebra
vert	vertebral artery
VIM	ventrointermedius nucleus
VIME	ventrointermedius nucleus, external part
VIMI	ventrointermedius nucleus, internal part
VL	ventral lateral thalamic nucleus
vl	vocal ligament
VLAE	ventrolateral anterior thalamic nucleus, external part
VLAI	ventrolateral anterior thalamic nucleus, internal part
VLP	ventrolateral posterior thalamic nucleus
VLPE	ventrolateral posterior thalamic nucleus, external part
VLPI	ventrolateral posterior thalamic nucleus, internal part
VM	ventromedial thalamic nucl.
VMH	ventromedial hypothalamic nucleus
Voc	vocalis muscle
voc	vocalis muscle
VOLT	vascular organ of the lamina terminalis
Vom	vomer
VP	ventral pallidum
VPe	ventral periventricular hypothalamic nucleus
VPI	ventral posterolateral thalamic nucleus, inferior part
VPIPC	ventroposterior internus nucleus, parvocellular part
VPL	ventral posterolateral thalamic nucleus
VPLA	ventral posterolateral thalamic nucleus, anterior part
VPM	ventroposterior medial thalamic nucleus
vr	ventral root
vt	velum terminale
VTA	ventral tegmental area
xscp	decussation of the superior cerebellar peduncle
ZgM	zygomatic muscles
ZI	zona incerta
ZID	zona incerta, dorsal part
ZIV	zona incerta, ventral part
Zyg	zygomatic bone
ZygA	zygomatic arch