To Melpo, Anwen, Soula, Virginia, and Mitsuki
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The authors would like to encourage users of this atlas to consider the suitability of the nomenclature and abbreviation scheme in this book for their own work.

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Introduction

The common marmoset (Callithrix jacchus) is a small monkey (300-500g), about the size of a rat. However, the marmoset has a primate brain: in fact the marmoset shares some of the most important characteristic features of the human brain such as a highly subdivided frontal lobe, an expanded temporal lobe, and visual pathways that are uniquely dependent on striate cortex. Therefore, this pocket-sized monkey is the simplest available animal model in which one can study these important features in ways that are directly relevant for understanding the human brain in structural terms. In comparison with the macaque, currently the most used primate model, marmosets are cheaper, and easier to keep in laboratory conditions; they have shorter gestation times, reach sexual maturity much more quickly, and reproduce easily, typically giving birth to twins. These advantages are highlighted in the current interest in developing the marmoset as the first “mass produced” transgenic primate model (Sasaki et al. 2009), and the ongoing marmoset genome project.

An increasing number of laboratories are favoring marmosets ahead of larger primates, especially in the field of aging (Figure A). In addition, marmosets are now the main animal model for toxicological studies using primates. The graph below shows the increasing number of articles corresponding to the search term ‘marmoset brain’ in PubMed.

Number of articles

![Graph of PubMed articles corresponding to 'marmoset brain']

While the marmoset is currently less used than the macaque monkey (by a factor of 10), this is changing, and the pace of the change will increase dramatically as they become established as transgenic models. Nowhere will this change be felt more strongly than in neuroscience, a field in which the rodent brain is not always the best model for research (Cyranoski, 2009).

Subjects

We used three adult common marmosets (Callithrix jacchus) of which the images of the brain of marmoset #3 are presented in the coronal atlas.

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>#1</td>
<td>male</td>
<td>2 years 0 month</td>
</tr>
<tr>
<td>#2</td>
<td>female</td>
<td>3 years 1 month</td>
</tr>
<tr>
<td>#3</td>
<td>female</td>
<td>3 years 2 months</td>
</tr>
</tbody>
</table>

Marmosets were obtained from a breeding colony at Tokyo Metropolitan Institute for Neuroscience (now Tokyo Metropolitan Institute of Medical Science). The animals were housed in their home cages in the Animal Center of the Institute. The room temperature was 28°C and the light cycle was 12:12, with light starting at 0700 h. Food and water was available ad libitum. The protocol of the present experiments was approved by the Animal Experiment Committee of the Tokyo Metropolitan Institute for Neuroscience.

Histology

We used ketamine hydrochloride (intramuscular injection of 10 mg/kg body weight) for sedation of the animals and sodium pentobarbital (intraperitoneal injection of 40 mg/kg body weight) for general anesthesia. The deeply anesthetized marmosets were perfused transcardially with 200 ml of heparinized physiological saline followed by 500 ml of 0.1M phosphate buffer (PB, pH 7.3) containing 4.0% paraformaldehyde as fixative.

The animals were immediately placed on a Narishige (http://narishige-group.com) stereotaxic apparatus (SR-6C), specially designed for marmoset brain surgery (Figure B). Eligiloy-alloy metal needles for stereotaxic fiducial marks were inserted into the brain after partial craniotomy. The needles were advanced vertically or horizontally. In the common marmoset, the horizontal zero plane is defined as the plane passing thorough the lower margin of the orbit and the center of the external auditory meatus (Figure B). The antero-posterior zero plane is defined as the plane perpendicular to the horizontal zero plane which passes the centers of the external auditory meati. The left-right zero plane is the midsagittal plane (Saavedra and Mazzuchelli, 1969; Stephan et al., 1980).
However, there are still some distortions in the sections presented in the atlas. It can be seen that there is often space between the fimbria and the thalamus (section 280), a space that is closed in the living animal. This is because the tissue was separated during processing. In the diagrams, we closed off the lateral ventricle as well as the 3rd ventricle and left the remaining space as being outside the brain. The user of the atlas needs to remember that the fimbria and the thalamus touch each other in the live animal rather than being separated as shown in the plates and diagrams of the atlas.

Nissl Staining
Sections were mounted, dehydrated, defatted, and then stained with 0.2% cresyl violet (Wako Chemicals) solution in 0.2M acetate buffer (pH 3.4). All staining procedure was carried out with an automated slide stainer (Tissue-Tek Prisma JOD, Sakura Finetek USA, California, USA, http://www.sakura-americas.com/products/tisstek-prismafilm.html). We highly recommend microwaving sections before staining because it enables crisp Nissl staining in formalin fixed material (see http://www.neura.edu.au/content/ache-and-nissl-staining-protocol).

Histochemistry for AChE
Free-floating sections were incubated for 60 minutes at 37°C in 0.1 M acetate buffer (pH 5.0) containing 0.11% acetylthiocholine iodine, 0.0062% promethazine-HCl, 0.032% CuSO4 and 0.075% glycine. Afterwards, sections were incubated in 1.25% sodium sulfite, 1% silver nitrate and 5% sodium thiosulfate aqueous solutions for visualization of the reaction product (Hardy et al., 1976).

Immunohistochemistry
For immunostaining, free-floating sections were incubated with a primary antibody for 3 days at 4°C, and then incubated with a biotinylated anti-mouse IgG raised in goat as a secondary antibody (Vector laboratories, Burlingame, USA; Cat# BA-2001; 1:250, 2 hours at room temperature). Sections were further processed using an ABC elite kit (Vector laboratories; dilution 1:200, 1.5 hours at room temperature) for detection of the biotinylated antibody. Finally, the reaction product was rendered visible with the DAB-nickel procedure using 0.05M Tris-HCl buffer (pH 7.6) containing 0.04% DAB (3,3’-diaminobenzidine HCl), 0.2% nickel chloride, and 0.00075% hydrogen peroxide (10 - 15 minutes at room temperature).

The primary antibodies used for the sections pictured in the atlas were as follows:

1. SMI32, mouse monoclonal antibody against neurofilament protein, Covance Research Products (Sternerberger Monoclonals in 2005) (California), Cat# SMI-32P, specificity: for most mammals, dilution 1:2,500.

2. Calbindin-D28K, mouse monoclonal antibody, Swant Swiss antibodies (Bellinzona, Switzerland), Cat# 300, specificity: human, monkey, rat, mouse, chicken, dilution 1:20,000.

Figure C. (left)
Dorsal (a), lateral (b) and ventral (c) surface views of the brain that was sectioned. The needles produced the fiducial mark at (1) A=10, L=5, (2) A=-5, L=5, (3) L=3, H=10.
These antibodies were chosen so that the marmoset brain could be directly compared with that of the rat, mouse and rhesus monkey for which chemoarchitectonic atlases exist (Paxinos et al., 2009b; Watson and Paxinos, 2010; Paxinos et al., 2009a). We found that the distribution pattern of immunoreactivity seen in the present study is congruent with previous reports using the marmoset (FitzGibbon et al., 2000; Fahandejaadi et al., 2004; Bourne et al. 2007), the rhesus monkey (Paxinos et al., 2009a), and there are also many points of agreement with data from the rat (Paxinos et al., 2009b).

**Digital Data Preparation**

An Aperio Scanscope CS (http://www.aperio.com) at 10× was used to take high-resolution digital images (0.92μm/pixel) of histological sections. The obtained digital image of the largest section was about 23,000×20,000 (460 megapixels - about 27,000 dpi). After adjustment of brightness and contrast, the digital images were modified in Adobe Photoshop CS3 to conform to photographs of the section surface (block face) taken during sectioning to correct some distortions (Figure D).

The section images from the marmoset #3 were printed with an A2 printer and covered with Polyester Drafting Film with Single Matte Finish. A 2B lead pencil was used to make tracings on drafting film (http://www.partwell.com/). Pencil drawings were scanned and converted to Adobe Illustrator files.

The sequence of stains (anterior to posterior) was as follows:

<table>
<thead>
<tr>
<th>Section</th>
<th>Stain</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Nissl (atlas plate)</td>
</tr>
<tr>
<td>1</td>
<td>Myelin</td>
</tr>
<tr>
<td>2</td>
<td>Calretinin</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
</tr>
<tr>
<td>4</td>
<td>Calbindin D28K (atlas plate)</td>
</tr>
<tr>
<td>5</td>
<td>Parvalbumin</td>
</tr>
<tr>
<td>6</td>
<td>NADPH-diaphorase</td>
</tr>
<tr>
<td>7</td>
<td>AChE (atlas plate)</td>
</tr>
<tr>
<td>8</td>
<td>Tyrosine Hydroxylase</td>
</tr>
<tr>
<td>9</td>
<td>SMI32 (atlas plate)</td>
</tr>
</tbody>
</table>

Since sections are 50 μm thick, the distances between plates in the atlas are:
- Nissl to Calbindin = 200 μm; Calbindin to AChE = 150 μm; Calbindin to SMI32 = 100 μm; SMI32 to Nissl = 50 μm.
- Note that only four of the markers are pictured in the atlas. The remaining sections can be viewed at http://marmoset-brain.org:2008 (see below).

*Fig. D. (right)*

Digital retouch of the section image with Adobe Photoshop. (a) A scanned raw image of a Nissl-stained section. (b) The image of the Nissl-stained section was superimposed on the corresponding photograph of the section surface of the brain block (photographs were taken during sectioning). (c) The image of the Nissl-stained section was divided and warped according to the image of the section surface. (d) The superimposed image on completion of the retouching.
**Nomenclature and Abbreviations**

There is an obvious need for a stable neuroanatomical nomenclature to accurately and efficiently convey information between neuroscientists. Despite this, many terms and abbreviations are still used in the literature to describe a single structure. In some cases, the same term or abbreviation is used for completely different structures. We urge all researchers to consider the merits of our system of nomenclature because it is systematic and derived after extensive consultations with neuroanatomy experts. The utility of our abbreviation system is enhanced by its consistent use in companion atlases of the rat brain (Paxinos and Watson, 2009), the mouse brain (Franklin and Paxinos, 2007, 2008), the human brain (Mai et al., 2008; Paxinos and Huang, 1995), the developing rat brain (Ashwell and Paxinos, 2008), the developing mouse brain (Paxinos et al., 2007), the chick brain (Puelles et al., 2007) and the spinal cord (Watson et al., 2009).

In considering the merit of a particular name over synonyms, we have chosen terms that have been ratified by modern usage, particularly usage by experts in that field. We have used anglicized versions of terms rather than older Latinized versions wherever possible, and we have, in all but a handful of cases, avoided the use of eponyms.

Neuroscience communities concerned with different systems have developed identical abbreviations for completely different structures; for example, SO may stand for both supraoptic nuclei and superior olive, SC for suprachiasmatic nucleus and superior colliculus, and IC for inferior colliculus and internal capsule. An additional complication arises when homologous structures are nonetheless named or abbreviated differently in different species.

The nomenclature and abbreviations used are those that have been employed in The Rat Brain in Stereotaxic Coordinates, 6th ed. (Paxinos and Watson, 2009), Atlas of the Developing Rat Nervous System (Paxinos et al., 2008), Atlas of the Developing Mouse Brain (Paxinos et al., 2007a), Chemoarchitectonic Atlas of the Rat Brain (Paxinos et al. 2009b), Atlas of the Human Brainstem (Paxinos & Huang, 1995), and Atlas of the Human Brain (Mai et al., 2008). We have made a sustained effort to use identical abbreviations for homologous structures in various species so that readers are not burdened with the meaningless task of learning different abbreviations for the same structures. Bowden and Martin (1995) in their atlas of the monkey brain, as well as in NeuroNames, used the same principles for construction of abbreviations as we have used here. Foster (1998), and Morin and Wood (2001) also use the same principles and abbreviations.

To illustrate the need for a common system, we point out that there are more than 20 ways that have been used to abbreviate "accumens nucleus": Acb, ACB, acb, NAS, nas, A, a, Ac, ac, NA, na, AN, an, NAC, nac, ACN, acn, ACU, acu, ACC, and Acc. We encourage the user of this atlas to use our abbreviation Abc, the same abbreviation we used in all our other atlases.

The principles used in the construction of abbreviations are the same as those used to derive the abbreviations for the elements of the Periodic Table and for the word acetylcholinesterase (AChE).

1. The abbreviations represent the order of words as spoken in English (e.g., DLG = dorsal lateral geniculate nucleus).
2. Capital letters represent nuclei, and lower case letters represent fiber tracts. Thus, the letter 'N' has not been used to denote nuclei, and the letter 'Y' has not been used to denote fiber tracts.
3. The general principle used in the abbreviations of the names of elements in the periodic table was followed: the capital letter representing the first letter of a word in a nucleus is followed by the lower case letter most characteristic of that word (not necessarily the second letter; e.g., Mg = magnesium; Rt = reticular thalamic nucleus).
4. Compound names of nuclei have a capital letter for each part (e.g., LPGi = lateral paragigantocellular nucleus).
5. If a word occurs in the names of a number of structures, it is usually given the same abbreviation (e.g., Rt = reticular thalamus nucleus; RTg = reticulotegmental nucleus of the pons). Exceptions to this rule are made for well-established abbreviations, such as VTA.
6. Abbreviations of brain regions are omitted where the identity of the region in question is clear from its position (CM = central meditial thalamic nucleus, not CMTh).
7. Arabic numerals are used instead of Roman numerals in identifying (a) cranial nerves and nuclei (as in the Berman, 1968, atlas), (b) Rexed's laminae of the spinal cord, and cerebellar folia. While the spoken meaning is the same, the detection threshold is lower, ambiguity is reduced, and they are easier to position in small spaces available on diagrams.

In the past, naked numbers have been used to refer to cortical areas, cortical layers, spinal cord layers, cranial nerve nuclei, and cerebellar folia. However, informatic systems cannot deal with the use of the same symbol for totally different things. We have, therefore, allocated the capital letter A (for area) as a prefix to cortical areas, as detailed below, and have added the suffix Cb to numbered cerebellar folia, and the suffix Sp to Rexed's laminae of the spinal cord.

Given we allocated the capital letter A to cortical areas, we were forced to modify the alphanumeric nomenclature for the catecholamine cell groups. For A1 we used NA1 (noradrenalin), for C1 we used Ad1 (adrenaline), for A8 we used DA8 (dopamine group), for A11 we used DA11. Whereas this change in nomenclature was
motivated primarily for practical reasons (avoiding duplication), it is not without its benefit, since the old A1 stood for noradrenalin, something counterintuitive given the A makes one think of adrenalin. Adrenalin on the other hand was designated by C1. The Swedes named these according to which they discovered first (A for first). However, we believe that it will be easier to learn that NA1 is noradrenergic.

The Basis of Delineation of Structures

Cortical Areas

The present parcellation of the marmoset cortex is the result of a new and extensive examination of the cyto- and chemoarchitecture of the complete cerebral cortex. Whereas often we based the nomenclature on contemporary studies of particular sectors of the cortex (e.g. Krubitzer and Kaas, 1990; Liebetanz et al., 2002; De La Mothe et al., 2006, Burman et al., 2006, 2008, 2011; Roberts et al., 2007; Burman and Rosa, 2009; Reser et al., 2009; Rosa et al., 2009), the access to multiple chemoarchitectonic stains led us, in many cases, to refine the subdivisions proposed by these studies. In addition, many parts of the marmoset cortex have not previously been subjected to detailed architectural examination, apart from early attempts by Brodmann (1909) and Peden and Von Bonin (1947). As discussed in detail elsewhere (Burman et al. 2006, 2008, 2011; Roberts et al., 2007; Burman and Rosa, 2009; Reser et al., 2009; Rosa et al., 2009), the boundaries defined by these pioneering studies could not be used as the basis of a modern revision, given a number of significant inconsistencies with current anatomical and physiological evidence.

As a rule, we chose to preserve the names already in general usage. For example, in the case of auditory areas, we adopted the nomenclature of de La Mothe et al. (2006), which designates areas by their topographic position in the temporal lobe. In many cases, however, an attempt was made to harmonize the nomenclature with designations that are more widely used, particularly in the macaque monkey (e.g. Paxinos et al., 2009a). These designations were adopted in an attempt to highlight the fact that the architectonic characteristics of these areas suggest strongly a homologous organization between New and Old World monkeys. When such changes were made, we adopted the solution of indicating the alternative nomenclature in parentheses. To avoid confusion with other numbered structures in the brain, areas for which a numerical designation was retained always appear following the prefix “A” (for example, frontal areas 9 and 10 are designated A9 and A10). Geographical suffixes such as ‘dorsal’, ‘ventral’, ‘rostral’, ‘caudal’, ‘lateral’, ‘medial’ and ‘orbital’ are always designated in uppercase (e.g., medial subdivision of area 6 is A6M). Other suffixes, not related to anatomical position, appear in lowercase (e.g., distinct subdivisions of area 24 are designated A24a, A24b, A24c, and A24d).

In what follows, we detail the subdivisions we defined across the cerebral cortex, indicating, where applicable, the cases in which we deviated from published schemes of parcellation. An appropriate note of caution at this point is to remind the reader that knowledge about the marmoset cortical areas continues to evolve, and that much work is still needed to provide physiological and connectional validation to many of the histological subdivisions we have defined. Nonetheless, we are confident that the areas shown in the present atlas represent the most accurate scheme of subdivision available, and that the nomenclature we employed reflects the likely homologies with other primates, given the sum of currently available evidence.

Dorsolateral Prefrontal Cortex

The frontal pole of the marmoset is occupied by area 10 (A10), which also extends slightly into the orbital and mesial surfaces of the frontal lobe (sections 20-50). A10 was defined in the marmoset by Burman et al. (2006), and the same criteria were adopted here. However, the present reanalysis convinced us that a caudal extension of area 10 (named “10mc” by Burman and Rosa 2009, following Carmichael and Price, 1994, in the macaque) was sufficiently different from the remainder of area 10, and more closely related to medial frontal area 32 (as defined by Petrides and Pandya, 1994; Mackey and Petrides, 2010, in the macaque). Hence, the equivalent area appears in this atlas as the ventral subdivision of area 32 (A32V, sections 60-104).

In the dorsolateral prefrontal cortex, A10 is adjacent, caudally, by area 9 (A9, sections 40-74) and by the dorsal and ventral subdivisions of area 46 (A46D, A46V). Whereas A46V (sections 50-74) is equivalent to area 46 defined by Burman et al. (2006), A46D (sections 50-64) is a newly recognized subdivision of the marmoset cortex, roughly occupying the rostral part of the expansive “area 8Da” defined by Burman et al. (2006, 2011). A46D is a likely homolog of areas 9/46d and 46 of the macaque as defined by Petrides and Pandya (1994, 1999; see also Paxinos et al., 2009a).

Further caudally, we delineated three subdivisions of area 8: area 8b (A8b, sections 74-130), in the dorsal convexity, and dorsal and ventral subdivisions of area 8a (A8aD, sections 67-114, and A8aV, sections 64-124). With the exception of the rostral extent of A8aD (noted above), the extent of these areas is similar to that proposed by Burman et al. (2006), based on criteria defined by Petrides and Pandya (1994, 1999) in the macaque. Area 8aV, possibly combined with area 45 (see below), encompasses the likely homolog of the frontal eye fields in the marmoset (Burman et al., 2006).

Ventrolateral Prefrontal Cortex

The ventral lateral part of the frontal lobe includes areas 47L(12L) (sections 40-124) and 45 (sections 77-124). The elongated strip of cortex that encompasses these areas is equivalent to formerly recognized area 12/45 of Burman et al. (2006). A more detailed examination of the cytoarchitecture allowed us to confirm these authors’ proposal that this region is likely to encompass distinct areas. We adopted the designation A47L (12L) to indicate the fact that area 12 (recognized by Walker, 1940, in the macaque) is in fact homologous to the ventrolateral part of human area 47 in the Brodmann map (see Petrides and Pandya, 2002). The same approach was used in designating the medial and orbital subdivisions of area 12, originally proposed by Carmichael and Price (1994) in the macaque, and subsequently identified in the marmoset (Burman and Rosa, 2009). Thus, these areas are designated as A47M (12M) and A47O (12O) (sections 50-104, and 107-134, respectively).

At the caudal end of the ventrolateral prefrontal cortex, posterior to A47L (12L), we identified the precentral opercular cortex (Roberts and Akert, 1963) according to the criteria specified by Burman and Rosa (2009). This region corresponds to area ProM...
as defined by Barbas and Pandya (1989) in the macaque monkey and also in the Paxinos et al. (2009a) atlas of the rhesus monkey, and for consistency across species it is labeled ProM(PrCO) in the current atlas (sections 114-180).

Medial Prefrontal Cortex
The largest area of the medial prefrontal cortex is area 32 (A32; sections 50-104), defined in the marmoset according to Burman and Rosa (2009). As discussed above, A32 is bordered ventrally by a distinct strip of cortex that was designated A32V (sections 60-104). At the ventral convexity, and partly invading the orbital cortex, there are dysgranular and agranular subdivisions of area 14, which were designated area 14 rostral (A14R; sections 40-104) and 14 caudal (A14C; sections 104-124), following Burman and Rosa (2009).

Area 25 (A25; sections 107-154) occupies most of the subgenual cortex and is an agranular type of cortex with clear increased density of layers V and VI. The agranular cortex around the genu of the corpus callosum, and extending into the rostral cingulate cortex, was attributed to subdivisions of area 24. Originally, only two subdivisions of area 24 were defined in the marmoset (Burman and Rosa, 2009). Here, based on a more extensive examination of these areas across their full rostro-caudal length, we identified four subdivisions of area 24, which were designated by alphabetical suffixes: A24a (sections 107-204), A24b (107-214), A24c (107-214) and A24d (160-230), according to the traditional usage in other species (Vogt et al., 1987). A24d shows transitional characteristics between cingulate and premotor cortical regions, and is likely to include homologs of the cingulate motor areas of other species (Dum and Strick, 2002).

Orbital Frontal Cortex
The nomenclature of orbital frontal areas in the present atlas largely follows Burman and Rosa (2009), who identified subdivisions of areas 11 and 13 based on criteria defined by Carmichael and Price (1994) in the macaque. Granular area 11 (A11, sections 40-94) occupies the major part of the rostral orbital cortex. No distinction was made in the present atlas between the putative lateral and medial subdivisions of this area, which are very subtle (Burman and Rosa, 2009), and could not be confirmed using the multiple chemoarchitectonic stains available to us. Caudal to A11 are lateral and medial subdivisions of dysgranular area 13 (A13L, in sections 87-134, and A13M, in sections 97-144). The medial orbital cortex also included area 13b (A13b, sections 50-104), rostrally, and area 13a (A13a, sections 107-124), caudally.

At the caudal end of the orbitofrontal cortex, and partly extending dorsal to the temporal pole, we identified homologs of the orbital prösocortex (OPro, sections 139-174), orbital periallocortex (OPAL, sections 129-184) and primary gustatory area (Gu, sections 139-174), defined according to criteria established in the macaque (Barbas and Pandya 1989). OPro and OPAL correspond to the “lateral and medial insular orbital areas” (Ins l and Ins m), as previously defined in the marmoset (Burman and Rosa, 2009).

Motor and Premotor Cortical Regions
Area 4 was defined according to Burman et al. (2008), who showed that the physiologically defined primary motor area in the marmoset encompasses distinct cytoarchitectonic subfields. These subfields were designated by alphabetical suffixes, following Watanabe-Sawaguchi et al. (1991). In this atlas, the gigantopyramidal subfields (encompassing representations of the body and limb musculatures) are jointly designated as area 4a/b (A4ab; sections 184-244), whereas the representation of the head musculature, characterized by smaller pyramids in layer 5 and an incipient granular layer, is designated as area 4c (A4c; sections 169-180).

Rostral to area 4, we recognized multiple premotor fields, largely following the architectural criteria proposed by Burman et al. (2006, 2008). From dorsal to ventral, we indicate a medial premotor area (A6M, in sections 130-184; likely to correspond to the supplementary motor area), followed by rostral and caudal subdivisions of the dorsal premotor area (A6DR, in sections 114-154, and A6DC, in sections 149-184), and two subdivisions of the ventral premotor area (A6Va, and A6Vb, in sections 129-164 and 129-154, respectively). Departing from the current maps of the marmoset cortex, we defined a narrow strip of cortex separating A6DR and A6DC from A6Va as a distinct area, which, based on cytoarchitectonic criteria, such as an incipient layer IV, appears to be a transitional area between agranular premotor area 6 and granular area 8. This newly recognized field appears in this atlas as caudal area 8 (A8C, sections 130-164).

Somatosensory Cortex
The primary somatosensory cortex (A3b, sections 169-284) forms an elongated strip, flanked rostrally by area 3a (A3a; sections 159-264), and caudally by another architectural field that is likely to encompass homologs of areas 1 and 2 of other primate species (A1/2, sections 169-290). Whereas this basic subdivision reflects the findings of Krubitzer and Kaas (1990), the present examination of the marmoset brain indicated that A1/2 extends ventral to the face representation in A3b, thus separating this area from a complex of smaller secondary somatosensory (S2) areas located in the lip and medial bank of the lateral sulcus.

Following Krubitzer and Kaas (1990), we have delimited three areas in the S2 complex of the marmoset. In rostral to caudal succession, these are the parietal rostral area (S2PR, sections 170-204), the parietal ventral area (S2PV, sections 204-234) and the secondary somatosensory area proper, which includes external (S2E) and internal (S2I) architectural subfields (sections 239-294 and 239-290, respectively).
Auditory Cortex
The nomenclature follows De La Mothe et al. (2006), who recognized core, belt, and parabelt subdivisions of the marmoset auditory cortex. However, to disambiguate the abbreviations of cortical areas from those used to designate subcortical structures, all auditory areas are indicated in the present atlas by the prefix 'Au.'

The auditory core areas include, from caudal to rostral, the primary auditory field (AuA1; sections 249-294), the rostral field (AuR; sections 224-250), and the rostrotemporal field (AuRT; sections 199-220). The core areas are bordered on the surface of the superior temporal gyrus by a series of four lateral belt areas, which encompass the caudolateral area (AuCL; sections 284-304), the middle lateral area (AuML; sections 259-280), the anterolateral area (AuAL; sections 219-254), and the rostrotemporal lateral area (AuRTL 189-214). There are, in addition, three medial belt areas, which are buried in the lateral bank of the lateral sulcus: the caudomedial area (AuCM; sections 259-304), the rostromedial area (AuRM; sections 224-254), and the rostrotemporal medial area (AuRTM; sections 189-220).

On the lateral surface of the temporal lobe, caudal and rostral subdivisions of the parabelt high-order auditory cortex are indicated (AuCPB, in sections 239-294, and AuRPB, in sections 190-234). Rostrally, the AuRPB is bordered by the superior temporal rostral area (STR, sections 169-224), which is likely to include higher-order auditory area similar areas to those found in the macaque's rostral superior temporal gyrus (Pandya and Sanides, 1973; Burman et al. 2011).

Lateral Sulcus (other areas in the lateral sulcus, including the insula)
Rostrally in the medial bank of the lateral sulcus, we delineated agranular (AI, sections 179-214), dysgranular (DI, sections 179-254), and granular (GI, sections 180-254) sectors of the insular cortex, using the criteria of Mesulam and Mufson (1982). The insular areas are bordered medially by the S2 complex (see above). Laterally, they are separated from the auditory cortex by a complex of areas that show increasing degrees of laminar differentiation as one proceeds away from the insula. At rostral levels (sections 180-224), this transition is formed by successive medial and lateral parainsular areas (PaIM and PaIL). More caudally, the transition is formed by adjacent strips of insular proisocortex (IPro, sections 189-264) and temporal proisocortex (TPro, sections 229-254), which run along the fundus and ventral part of the lateral sulcus, respectively.

At the caudal end of the lateral sulcus, we have identified a homolog of the retrosplenial area (ReI, sections 239-284), which separates auditory area CM from the S2 somatosensory complex (De La Mothe et al., 2006). ReI is bordered caudally by area TPt, which in the marmoset occupies the tip of the lateral sulcus and adjacent surface of the temporoparietal transition (sections 289-334).

Lateral and Inferior Temporal Cortical Region
Ventral to the auditory parabelt region, we followed Burman et al. (2011) in defining an elongated superior temporal polysensory area (TPO/STP, sections 214-314). At caudal levels, TPO/STP is adjoined ventrally by an area that has the characteristics of cytoarchitectonic fields PGa and IPa identified in the macaque (Seltzer and Pandya, 1978). This area, which in most animals runs along the fundus of a shallow superior temporal sulcus (Burman et al., 2011), is also referred to as the ventral subdivision of the fundus of superior temporal area (FSTV; Kaas and Morel, 1993). Hence in the present atlas this area (sections 289-334) appears labeled as PGa/IPa (FSTV).

In the inferior temporal cortex, we identified three subdivisions (TE1, TE2 and TE3), largely based on studies in the macaque by Seltzer and Pandya (1978). Area TE1 (sections 189-274) overlaps extensively with the rostral inferior temporal area (ITr) defined by Burman et al. (2011), while TE2 (sections 219-354) and TE3 (sections 229-390) overlap with the ventral and dorsal inferior temporal cortical areas (ITv and ITd) of these authors. Area TE3 in the marmoset may also include the cortex defined as TEa and TEM by Seltzer and Pandya (1978). Further research will be required to establish comparability between macaque and marmoset subdivisions of TE. The caudal transition between the inferior temporal cortex and topographically organized extrastriate areas is formed by area TEO (sections 359-424), which encompasses within its borders the physiologically defined caudal inferior temporal area (ITc) of Rosa and Tweedale (2000).

The temporal pole proisocortex (TPro, sections 159-184) was defined in the marmoset using the criteria of Burman et al. (2011). In coronal sections, it is difficult to discern the exact transition point between TPro, TE1, and perirhinal areas A35 and A36 (see below).

Ventral Areas of the Temporal Lobe
At rostral levels, the ventral surface of the temporal lobe includes the entorhinal (Ent; sections 189-324) and perirhinal (A35 and A36; sections 189-330) areas, which are separated across most of their border by a shallow rhinal sulcus. These areas are bordered caudally by the parahippocampal complex.

The present analysis of the architectural organization of the parahippocampal cortex has resulted in a major reassignment of borders and nomenclature in comparison with earlier work in the marmoset, which recognized only two fields in this region (TF and TH; Palmer and Rosa, 2006). Specifically, we now use criteria defined by Rose and Pandya (1983) in the macaque to recognize four architectural areas in what was originally considered a single field (TF). Rostrally, these include areas TL (sections 319-354) and TF (sections 279-354). Caudally, these give place to fields TLO (sections 359-394) and TFO (sections 359-404). TLO and TFO together are likely to correspond to 'visual TF' defined physiologically by Boussadou et al. (1991). More medially, area TH (sections 319-380) forms an agranular transition strip between eulaminate areas and the parasubiculum (PaS).
Posterior Parietal Cortex

The present subdivision of the posterior parietal cortex of the marmoset is largely based on Burman et al. (2008) and Rosa et al. (2009), who used architectural criteria defined in Old World monkeys (Pandya and Seltzer, 1982) to identify the putative marmoset homologs. Ventrally, we delineate a complex of four parietal areas in rostral to caudal succession: PF (sections 254-294), PFG (sections 289-334), PG (sections 334-370) and OPI (sections 374-414). The main difference from earlier studies in the marmoset is the recognition of PF and PFG as distinct subdivisions; previous schemes indicated only a single subdivision (PF; Burman et al., 2011) in the corresponding region. Area OPI, as mapped in the present atlas, overlaps with the dorsal occipitotemporal area (DOT) defined through physiological recordings of visually-evoked responses (Rosa and Tweedale, 2000).

Dorsally, an extensive rostral posterior parietal area (architectural area PE, sections 284-364) is delineated, followed by a smaller caudal subdivision (PEC, sections 344-390), which has been identified using criteria analogous to those defined by Bakola et al. (2010) in the macaque.

The ventral and dorsal parietal regions are separated by a complex of areas that we deem to be likely homologs of the intraparietal areas of the macaque (Rosa et al., 2009). This complex includes the medial intraparietal area (MIP, sections 354-420), the ventral intraparietal area (VIP, sections 349-394), the lateral intraparietal area (LIP, sections 349-420), and the anterior intraparietal area (AIP, sections 314-344). In most animals, these areas are located in the immediate vicinity of a shallow intraparietal sulcus (e.g. section 360).

Visual Cortex

The primary visual area (V1), which encompasses the occipital pole and both banks of the calcarine sulcus (sections 409-600), is the largest area of the marmoset brain, occupying nearly one-fifth of the entire cerebral cortex (Rosa and Tweedale, 2005). V1 is bordered rostrally by the second visual area (V2, sections 379-560) which wraps around V1, except for a small sector near the rostral calcarine sulcus where V1 is adjoined by ProSt and, possibly, A23V (section 420).

The rostral border of V2 is formed by a series of retinotopically organized areas, each characterized by a different histological pattern and pattern of representation of the visual field (Rosa et al., 2005, 2009; Palmer and Rosa, 2006). The largest area in this region has been referred to as the ventrolateral posterior area (VLP; Rosa and Tweedale, 2000). In the present atlas, this area is labeled V3(VLP) (sections 374-520), given the evidence that this is the likely homolog of the third visual area in other species (Rosa and Manger, 2005). V3(VLP) is bordered anteriorly by the ventrolateral anterior area, which is designated in this atlas V4(VLA) (sections 369-464) in recognition of the fact that it is equivalent to the fourth visual area defined in Old World monkeys (Gattass et al., 1988; Rosa and Tweedale, 2000).

Most of the anterior border of V2 on the dorsal surface of the hemisphere is formed by the dorsomedial area (DM; Allman and Kaas, 1975; Rosa and Schmid, 1995). Current evidence strongly indicates that this area corresponds to V6 of Old World monkeys (Galletti et al. 1999; Rosa and Tweedale, 2001), and the nomenclature we adopted (V6(DM) (sections 404-480) indicates this fact. Ventrally, V6(DM) is separated from V3(VLP) by the dorsointermediate area (DI; Krubitzer and Kaas, 1990). In order to make its abbreviation distinctive from that of the dysgranular insula, while at the same time indicating that this is a subdivision of Brodmann’s area 19, this area is labeled A19DI (sections 434-500).

Rostral to V6(DM), the occipitoparietal transition is formed by a strip of cortex that has been referred to as the dorsoanterior area (DA) in earlier studies of the marmoset cortex (e.g. Rosa and Schmid, 1995). Whereas this strip has a similar histological appearance throughout, physiological mapping indicates that it is likely to include two areas, which appear in the atlas labeled by reference to their likely homologs in Old World monkeys (Rosa et al., 2009): V3A(DA), laterally (sections 404-434), and V6A(PPM), medially (sections 364-410).

The most rostral components of the retinotopically organized cortex form a complex of motion-selective areas centered on the middle temporal area (V5(MT) (sections 334-410). These areas were defined according to Rosa and Elston (1998). Caudally, V5(MT) is encircled by the middle temporal crescent (MTC; Kaas and Morel, 1993). Given the likelihood that this area is a homolog of the macaque’s transitional V4, it is designated V4T(MTC) in sections 354-430. The rostral border of V5(MT) is formed by the medial superior temporal...

Posterior Cingulate, Medial and Retrosplenial Cortical Regions

The supracallosal sulcus of the marmoset includes three main subdivisions, which form successive parallel, elongated strips (sections 209-404). The most internal of these is labeled as area 29a-c (A29a-c), following the nomenclature of (Vogt, 1976). A29a-c is followed by area 29d, and then area 30 (A30), which typically includes the lip of the supracallosal sulcus (Palmer and Rosa, 2006). Whereas A29a-c and A29d invade the rostral calcarine sulcus, following the splenium of the corpus callosum, A30 gives place caudally to area prostriata (ProSt, sections 389-420), a region with which it shares many structural features, but which is physiologically distinct (Palmer and Rosa, 2006).

On the medial surface of the brain, the posterior cingulate cortex of the marmoset is formed by two main architectural subdivisions, which form ventral and dorsal strips parallel to the lip of the supracallosal sulcus. These large areas are labeled here as area 23a (A23a, sections 209-384) and area 23b (A23b, sections 219-390), respectively. A23a and A23b are joined, at levels rostral to the primary somatosensory area, by a further subdivision (A23c, sections 220-264), which is relatively small, and had not yet been recognized by earlier studies in the marmoset. Caudally, at the level of the splenium of the corpus callosum, we indicate the boundaries of the ventral subdivision of area 23 (A23V, sections 389-424), defined in the marmoset by Palmer and Rosa (2006), following Kobayashi and Amaral (2000).

On the medial surface of the parietal lobe, A23b is bordered dorsally by two architecturally distinctive areas, which we refer to as area 31 (A31, sections 289-370) and PGM (sections 374-404), according to our current assessment of their likely homologs in Old World monkeys (Pandya and Seltzer, 1982). In previous studies of the marmoset cortex, these two subdivisions have been amalgamated under the designation ‘medial dorsal parietal cortex’ (MDP; Rosa et al., 2009; Burman et al., 2011), but the current study revealed a clear architectural distinction.
area (MST, sections 309-370). Finally, the fundus of superior temporal area (FST) borders MST and V4T(MTC) ventrally (sections 309-404).

In visual areas where the retinotopic organization has been established, the symbols ‘+’ and ‘−’ indicate the representations of the upper and lower quadrants of the contralateral hemifield, respectively. In addition, the location of the representation of the center of the fovea is indicated by the word ‘fovea’. The islands of Calleja (ICj) present a problem in section 157 in that they are found detached from the tubercle as well as from the accumbens. These are found either as the magna island (ICMj) at the medial border of the caudal accumbens shell or as ordinary islands of Calleja in the tubercle itself in other species.

We encountered a problem in the transition between area 25 of cortex, on one hand, and the medial septum and vertical nucleus of the diagonal band on the other. In this transitional zone in other species we find the navicular nucleus; we therefore identified the space between area 25 and medial septum and vertical nucleus of the diagonal band in the marmoset as the navicular nucleus (section149-160), even though we could not find a stain that distinguishes the navicular nucleus in the marmoset.

We renamed the magnocellular preoptic nucleus as the lateral nucleus of the diagonal band because this nucleus is cholinergic like the other diagonal band nuclei and has nothing to do with the preoptic area.

There is a large zone lateral to the diagonal band nuclei and medial to the caudal part of the accumbens shell that presented us with a problem in many species (section 189 and 190). This zone is not septal, but neither does it belong to the preoptic area. We decided to call it the paradiagonal zone (PDZ).

The IPAC is a motley collection of areas displaying various densities in various stains. We could not be certain of our identifications.

Basal Forebrain and Basal Ganglia

The shell of the accumbens nucleus displays a dorsal part that is distinguishable by its relatively low density of calbindin in the background (section 154 and 164). The dorsal part of the shell can also be seen to be relatively poor in AChE (section 157 and 167).

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Amygdala

Many of the nuclei of the amygdala were well demarcated with the various stains, especially the NADPH diaphorase and AChE. The lateral nucleus is the sole representative of the amygdaloid nuclei at the caudal levels and it is enormous, larger than we would have predicted from the rhesus monkey (but we have made no quantitative measures). An area of the rostral part of the temporal lobe above the central nucleus of the amygdala is difficult to classify and we have left unmarked (section 190-210).

Caudal to the commencement of the central nucleus of the amygdala, we have allocated the area between the central nucleus and the posterior limb of the anterior commissure to the extension of the amygdala (EA), however the cells of that area differ from the rest of the extended amygdala and we are uncertain as to where it belongs (section 220).

Calretinin (section 222) shows clearly the magnocellular part of the basomedial nucleus (many calretinin-positive cells). This distinguishes it from the parvicellular basomedial nucleus. NADPH diaphorase distinguishes the nuclei of the central nucleus of the amygdala. The lateral as well as the capsular part of the central nucleus is conspicuous by the absence of NADPH diaphorase reactivity in the neuropil given that the area around them is densely positive (section 216, on the web). The medial nucleus has some positivity, but much less than the medially lying anterior amygdaloid area.
The superficial areas of the amygdala, such as the anterior cortical, postero medial cortical, and posterolateral cortical nuclei, presented a problem for us because we have used different schemes for the rhesus monkey, human and rat and we are not sure what is most appropriate for the marmoset. We collapsed the rostral superficial areas into the anterior cortical nucleus and the posterior areas into the posterior cortical nucleus. This scheme agrees more with the human atlas (Mai et al., 2008). We think we have found the nucleus of the lateral olfactory tract on section 200, but we found it difficult to identify this nucleus, and we note that it was not identified in the rhesus monkey (Paxinos et al., 2009a).

The amygdalar striatal area presented a problem; it lies between the central nucleus and the lateral nucleus in the rat, but in the marmoset we have identified it as the area between the vanishing posterior limb of the anterior commissure and the central nucleus replacing the caudate nucleus rostrally (section 229, 230).

Bed Nucleus of the Stria Terminalis
The only subnucleus of the bed nucleus of the stria terminalis that we could clearly see was the dorsal part of the lateral division (section 209-217). Our set of stains was not very helpful in identifying the subnuclei of the bed nucleus of the stria terminalis.

Septum
We have identified the triangular septal nucleus as being the one that is positive in AChE and has positive cells in SMI32. We are uncertain of the nature of a group of cells in a circular arrangement above the triangular septal nucleus in calbindin (section 214). We are also uncertain about the caudal extent of the lateral septal nucleus dorsal part and the associated septohippocampal nucleus because the lateral septal nucleus does not stain in AChE at rostral levels but its continuation caudally is very densely stained in AChE and, therefore, we do not know whether it is the same nucleus. The identification of the septohippocampal nucleus presented a problem but we identified it by position in most areas.

The triangular septal nucleus is positive in cells in SMI32 (section 219). It also has calretinin-positive cells. The triangular septal nucleus is located posterior to the descending columns of the fornix.

Preoptic Area and Hypothalamus
The vascular organ of the lamina terminalis (VOLT) is very large as can be seen in section 167-180. Because of the damage to sections in this part of the brain we were not able to make accurate delineations and have indicated the borders of the medial preoptic area on the basis of the available evidence.

The medial preoptic nucleus is in a similar position to that in the rhesus monkey, dorsal and lateral to the paraventricular nucleus, approaching the bed nucleus of the stria terminalis (by which it is separated in most of its extent by the medial preoptic area). We could not be certain of the presence of the septohypothalamic nucleus but we have indicated it in section 220 on the basis of the expected location, sandwiched in the continuum of cells between the bed nucleus of the stria terminalis and the medial preoptic nucleus.

The paraventricular hypothalamic nucleus is extensive in the marmoset, commencing at section 209 and finishing at section 247. We think we have identified the posterior part of the paraventricular nucleus in section 247. The lateral magnocellular subnucleus can be seen in section 232-235 also in section 236 (NADPH diaphorase). Otherwise the subnuclei of the paraventricular nucleus remained obscure to us, except for what we guess on the basis of position and size is the dorsal cap which we identified on section 234 (calbindin), also visible on the web section 235 (parvalbumin) and section 236 (NADPH diaphorase).

The anterior hypothalamic nucleus was small in comparison with the same nucleus in rodents. The ventromedial hypothalamic nucleus is enormous and is easiest to delineate in NADPH diaphorase (section 236 and 246).

The medial tuberal nucleus is very positive in AChE and the positivity seems to be in the neuropil (section 247), it is also positive in calretinin (section 242 and 252 on the web). We could not identify the parvicellular lateral tuberal nucleus.

The ventral tuberal mamillary nucleus is conspicuous in sections SMI32 (section 259) as well as Nissl (section 260) and calretinin (section 262).

The marmoset mamillary complex is a bit of a mystery for us. We identified a medial mammillary nucleus medial part and a medial mammillary nucleus lateral part (section 260 and 264), but we could not be certain of the lateral mammillary nucleus, though we have identified it by position. What Stephan et al. (1980) identify as the lateral mammillary nucleus we call the ventral tuberomamillary nucleus — a big discrepancy. We could not identify the median mammillary nucleus.

We could see the premamillary nucleus dorsal part by its dense Nissl appearance (section 260) and smoothly textured calretinin and calbindin immunoreactivity (section 262 and 264). We guessed this was the ventral premamillary nucleus. The retromamillary area (previous supramamillary nucleus) is very dense in NADPH diaphorase (section 266).

We could not identify a DA13 TH-positive group; this is perhaps because the group fell between our two TH sections (that is, in a space of 0.5 mm between the TH sections).

We identified the dorsal component of the supraoptic commissure which contains, inter alia, pallidohypothalamic fibers (section 220 and 230).

Prethalamus
The zona incerta has a dense cellular arrangement at its rostral end (section 250) and part of it has a very dense plexus in SMI32 fibers (section 249). At caudal levels, the zona incerta is surrounded by the h1 (dorsally) and h2 (ventrally) fields, with the H region limiting it medially (section 264). The H field eventually becomes the prerubral fields at caudal levels (section 284) when it confronts the red nucleus. We cannot distinguish the H field from the prerubral fields other than by position. In the same region in the rat, we have identified the fields of Forel and nucleus of the fields of Forel. The zona incerta is at times divisible on the basis of various stains (for example SMI32 section 279), where the dorsal part is more densely stained featuring cells and neuropil. Sometimes the dorsal part is larger and more densocellular.
than the ventral part but this depends on the anterior-posterior location of the nucleus. In calbindin sections, the zona incerta (except its rostral part) is characterized by the presence of cells of similar appearance to those described by Bourne et al. (2007) in the layer 4 of MT of the marmoset where a halo of stained processes surrounds a positive cell body. These cells with the halo are also found in the subthalamus (section 274), anterior olfactory nucleus, hippocampus, and many parts of the neocortex.

The subgenuliculate nucleus, first identified in the rat by its AChE positivity (Paxinos and Watson, 1986) is very prominent in the marmoset, featuring large cells densely arranged (section 290) and positive in AChE (section 287) as well as in NADPH diaphorase (section 286), but totally negative in calbindin (section 284). It is next to the prereticulate (erstwhile ventral lateral genicululate) nucleus which has many calbindin-positive cells (section 284) and is also positive in NADPH diaphorase (section 286).

Thalamus

We could not be certain about the presence of a rhomboid nucleus but we identified it by position, interposed between the central medial and the reuniens nuclei (section 260 and 264). In the atlas of Stephan et al. (1980), the rhomboid nucleus is above the CM. We have decided to place it interposed between the CM and the reuniens nucleus (section 254-260).

The central medial nucleus (CM) becomes enormous at the level at which the interanteromedial nuclei recede and prior to the expansion of the mediodorsal nucleus caudally (section 264, 267 and 270). CM is positive in AChE reactivity (section 267 and 277); it has many calbindin-positive cell bodies and significant staining in the neuropil (section 264 and 274).

The reuniens nucleus is obvious by its positively stained cells and neuropil in calbindin (section 254). It is succeeded caudally by the retroreuniens nucleus (section 274), which is less dense in cells and neuropil.

The angular thalamic nucleus gave us a pleasant surprise. This nucleus was identified on our rat material by William R Mehler but we were never too confident of its existence. However, in the marmoset the nucleus is evident in stains for SMI32 (section 279) as well as in Nissl (section 280), AChE (section 277) and parvalbumin (section 275).

The subparafascicular nucleus is evident by the presence of well-stained calretinin neurons (section 282 and 292), also by its negativity in parvalbumin (section 285) and the presence of some background positivity and some positive neurons in calbindin (section 284). In AChE it shows up as a relatively negative region surrounded by positive structures (section 287). The subparafascicular nucleus parvicellular part (SPFPC) is conspicuous by the presence of dense NADPH diaphorase reactivity (section 286, 296 and 306).

The centromedian nucleus (CMn) is located immediately lateral to the parafascicular nucleus at caudal levels and it can be distinguished from it by the presence of smaller cells in the centromedian nucleus. In calbindin it shows positive cells and neuropil except for a surround which is negative (section 314 and 324). The centromedian nucleus can best be distinguished in SMI32 by the fact that positive elements in the neuropil are not as strong as in the medially lying parafascicular nucleus. The parafascicular nucleus displays both fibers and the occasional cells positive in SMI32 (section 309). The retroparafascicular nucleus is conspicuous by its dense NADPH diaphorase reactivity (section 316).

The cell density in the rostral interstitial nucleus (section 280) is surprisingly high in the marmoset.

The mediodorsal nucleus shows positivity in AChE in its lateral and central divisions but it is devoid of reactivity in its medial division (section 297, 307 and 317). Its central and the lateral subnuclei can be distinguished on the basis of SMI32 immunoreactivity (section 309) with the SMI32 staining being more intense in neuropil and cells in the lateral subnucleus.

The ventroposterior complex (VPM, VPL, VPPC) is best seen at levels 290 (Nissl) and 304 (calbindin). In calbindin, as well as in SMI32 preparations, it is possible to see the septa that divide the ventroposteromedial (VPM) from the ventroposterolateral (VPL). The separation of the palm and digit area from the sole and toes area can also be seen (section 294). This is also the case with parvalbumin sections (section 295). The ventroposterior, parvicellular part (VPPC) is conspicuous by its lack of positive cells in SMI32 (section 299), contrasting with the adjacent VPM which features many positive cells. VPPC has more calbindin-positive cells and neuropil than VPM (section 294).

The dorsal lateral geniculate nucleus (DLG) is conspicuous in SMI32 (section 309) where its external and internal magnocellular layers feature many strongly positive cells. The K1, K2, K3 and K4 cell poor regions can be distinguished in Nissl preparations (section 310). The dorsal part of the medial geniculate nucleus features calbindin-positive glial cells similar to those found in the deeper layers of the cortex. The ventral subnucleus does not have these cells and it is more positive in neuropil and neurons (section 324, calbindin). In the suprageniculate nucleus there are sometimes patches of dense cells and neuropil in calbindin (section 324). Calbindin indicates the extent of the posterior triangular and posterior intralaminar (PoT and PIL) that lie medial to the medial geniculate nucleus (section 324).

The ventral anterior thalamic nucleus, lateral part (VAL) is conspicuous by its multiple squiggly elements in AChE (section 257, 267 and 277). It maintains these squiggles even when VAL recedes dorsally, displaced by the VLLa).

The lateral posterior nucleus (LP) displays patchy SMI32 immunoreactivity that distinguishes it from adjacent regions (section 309).

We pondered on what the ovoid area ventral to VLM is. One candidate was the ventromedial nucleus (VM) of the rat. However, some authors think that primates do not possess a VM. This area seems similar to an area in the macaque monkey labeled as VLm by a number of groups. To avoid confusion, we opted for the term VLV in symmetry with VLD.

Pretectum

In the pretectum we recognized a retrocommissural nucleus which showed positivity in neuropil in calbindin (section 334). It is also somewhat positive in calretinin and features some cells in this stain (section 342). The anterior pretectal nucleus displayed calbindin-positive glia, such as were seen in the zona incerta (section 334), but
the location of these glia are not always within the anterior pretectal area but sometimes medial to it (section 324). The posterior limitans nucleus features many positive cells in calbindin (section 334). The precommissural nucleus is strongly positive in calretinin cells and neuropil (section 322 and 332).

Midbrain

The separation of oculomotor from the trochlear nerve nuclei is seen clearly with the calretinin stain. The two nuclei overlap in section 352, but the trochlear nucleus has less neuropil staining than the oculomotor, and, therefore, it is distinguishable.

As in other species, the dorsolateral PAG is the area most intensely stained sector of the PAG in NADPH diaphorase, having many reactive cells and neuropil (366 not shown). The pliogial PAG is visible on Nissl 360.

In the superior colliculus the very large SMI32-positive cells are found in the intermediate grey, consistent with the presence of very large cells in Nissl in this layer (379 and 380).

The central nucleus of the inferior colliculus is negative in calbindin (394).

The precuneiform nucleus occupies some of the area we had allocated to intercollicular nucleus in our earlier atlases (Paxinos and Watson, 1986).

One of our most pleasant surprises was finding distinctive calbindin staining for cells and neuropil in the retrolemnisical nucleus (section 404). The nucleus sagulum lies between the retrolemnisical nucleus and the inferior colliculus. However, more rostrally, the dorsal nucleus of the lateral lemniscus intercedes between the retrolemnisical and sagulum nuclei (sections 390, 394). The nucleus sagulum has been previously place in a wide variety of different positions in the isthmus and midbrain in various atlases (Paxinos and Watson, 1986; Dong, 2008).

The compact part of the substantia nigra is negative in calbindin (section 314). The ventral tier of the compact part is positive in neuropil and cells in SMI32 (section 319). SNrCM is a small round group of cells that appears at the point of the exiting 3rd nerve. The paranigral is SMI32-negative. Caudally, the parapigral nuclei are bigger than the parainterfascicular. We agonized over what is paranigral and what is the lateral part of the interpeduncular nucleus. In the end we called the tyrosine hydroxylase-positive strip paranigral, assuming that the interpeduncular nucleus has no TH-positive fibers or cells. The not-otherwise-differentiated VTA at the caudal areas we called VTA caudal part, in symmetry with VTAR.

The Isthmus

The isthmus is a complete segment of the brain, separating the midbrain from the first rhombomere. It is completely ignored in almost all mammalian texbooks. Given the distinctive expression of fgf8 in the isthmus in the mouse (Watson, 2010), its existence can no longer be ignored. The isthmus contains the trochlear nucleus, the parabigeminal nucleus, the microcellular tegmental nucleus, caudal linear nucleus, the major part of the dorsal raphe, caudal parts of the substantia nigra and VTA, the dorsal nucleus of the lateral lemniscus, and specific parts of the reticular formation.

The Pontine Nuclei

The pontine nuclei are nuclei that migrated rostrally from rhombomere 6 or later and are now attached under rhombomeres 3 and 4. They do not constitute a segmental part of the brain like the isthmus, the mesencephalon, and the prosomeres. The term pons should therefore be reserved for the nuclei and crossing fibers of the basilar pontine formation. It should never be used to describe a rostro-caudal segment of the brainstem.

Rhombencephalon

The reticular tegmental nucleus displays two parts in calbindin. The main part is totally negative but dorsomedial to it is a sector which displays strongly positive calbindin cells (section 334).

The pedunculotegmental nucleus (367) and the lateral dorsal tegmental nucleus (387 and 397) show AChE-positive cells in neuropil, in addition they both show NADPH diaphorase-positive cells and neuropil (366 and 386, not shown). The pedunculopontine tegmental nucleus was recently renamed the pedunculotegmental nucleus because of the evidence that the ‘pons’ does not exist as a subdivision of the brain in the same subordination as the rhombencephalon, mesencephalon, diencephalon. There has been an inconsistency in the literature of the rodents and primates. In rodents there is a pedunculotegmental nucleus and retorubral nucleus. In primates there is a pedunculotegmental nucleus compact part and diffuse part (Paxinos and Huang, 1995). On the basis of neuromeric analysis of this area, we have suggested (Paxinos et al, 2009a) that there are homologies between these areas and simply the rodent was not studied in the same way as the primate. The term retorubral nucleus in the rodent was therefore changed to retroisthmic nucleus for two reasons: first, it was often confused with the retorubral fields (DA8 — which is a dopaminergic cell group); second, it actually is not retorubral, because it lies in rhombomere 1, and is therefore separated from the red nucleus by the isthmus. Comparing the location of the pedunculotegmental nucleus pars compacta and pars dissipata in the primate with the location of the pedunculotegmental nucleus and the retroisthmic nucleus in the rodent shows that these structures are homologous and therefore we have renamed the primate dissipata as the retroisthmic nucleus.

The reticular tegmental nucleus shows a dorsomedial sector with cells intensely stained for calbindin, while the remainder of the nucleus is negative (254).

The parvicellular part of the motor trigeminal nucleus is not as prominent in this species, but it can be seen among the rootlets of the motor trigeminal nerve (389 and 390), above the superior olive.

There is a cellular area that connects the principal trigeminal nucleus with the parabrachial nuclei (Nissl 410). This we have identified in the rat (Paxinos and Watson, 2006) as the trigeminal transitional zone and this area is also found in the marmoset (410).

Above the trapezoid nucleus, embedded in the nucleus of the central acoustic tract, there is an area that is positive in calretinin neuropil and cells and is seen as cell sparse in Nissl 370. We could not allocate this to any nucleus but have indicated its presence by defining its borders. The medial superior olive is seen to advantage in Nissl 380. In the area above the genu of the facial nerve we have identified the nucleus of the efferent vestibular cells, but we cannot be definite about
this nucleus and we are not certain that we are not confusing it with the supragenual nucleus or the posterior dorsal tegmental nucleus (AChE 407, Nissl 410).

As in other mammals, the cochlear nuclei can be divided into dorsal and in ventral subnuclei. The ventral nucleus is in turn divided into anterior and posterior, and the division point is the entrance of the eighth nerve. Covering the dorsal cochlear nucleus on the dorsal and lateral sides and extending to cover the posterior part of the ventral cochlear nucleus is a band of granule cells that appropriately is called the granule cell layer of the cochlear nucleus (440). In the rat and mouse we have previously divided this into granule cell layer and glial cell layer (e.g., Paxinos and Watson, 2006). We are now incorporating both of these regions into the granule cell layer in the marmoset.

At the point of entrance of the eighth nerve (430), there is a nucleus embedded in the eighth nerve, which is appropriately called the interstitial nucleus of the eighth nerve. Its prominent cells can also be seen in SMI32 (429). The interstitial nucleus of the eighth nerve is seen as positive in calretinin (422). There are some similar calretinin-positive cells inside the fibers of the eighth vestibular nerve in the same calretinin section which can also be seen in Nissl 420. These we presume do not belong to the interstitial nucleus of the eighth nerve and we have not classified them with any other nucleus.

What we presumed to be superior salivatory nucleus cells are SMI32-positive and can be found among the fascicles of the exiting facial nerve (SMI32, section 409). The ambiguous nucleus compact part is quite clearly seen AChE 427. The labeling of Botzinger nucleus, the pre-Botzinger nucleus, and the rostroventral respiratory group was determined simply by their position in relation to the compact ambiguous, semicompart ambiguous, and loose ambiguous nuclei.

The nervus intermedius is seen to enter the rostral pole of the interstitial nucleus of the solitary (417 AChE). In the solitary nucleus we have tried to find the subnuclei identified in the rat and mouse as well as in Atlas of the Human Brain Stem (Paxinos and Huang, 1995; Paxinos et al., 2012). In some stains, certain subnuclei of the solitary show up very clearly, for example in NADPH 476 the dorsolateral nucleus is extremely positive.

The central cervical nucleus is evident by its absence of AChE reactivity except for some squiggly elements (517). It is also negative in calretinin (512).

Nucleus Y displays positive cells in calretinin (552) and it has positive cells and neuropil in calbindin (554).

**Olfactory Bulb**

The olfactory bulb was not retained for this section series. The marmoset has a small but typically mammalian olfactory bulb and a small accessory olfactory bulb.

**References**


List of Structures

Names of the structures are listed in alphabetical order. Each name is followed by the abbreviation of the structure.

3rd ventricle 3V
4th ventricle 4V

A
abducens nerve 6n
abducens nucleus 6N
accumbens nucleus Acb
accumbens nucleus, core AcbC
accumbens nucleus, shell AcbSh
Ad1 adrenalin cells Ad1
agranular insular cortex AI
alveus of the hippocampus alv
ambiguus nucleus, compact part AmbC
ambiguus nucleus, loose part AmbL
amygdalohippocampal area AHi
amygdaloid intramedullary gray IMG
amygdalopiriform transition area APir
amygdalostratial transition area ASt
angular thalamic nucleus Ang
ansa lenticularis al
anteroventral periventricular nucleus AVPe
anteroventral thalamic nucleus AV
aqueduct Aq
arcuate hypothalamic nucleus Arc
area 10 of cortex A10
area 11 of cortex A11
area 12 of cortex A12
area 13 of cortex, lateral part A13L
area 13 of cortex, medial part A13M
area 14 of cortex, caudal part A14C
area 14 of cortex, rostral part A14R
area 15 of cortex A15
area 16 of cortex A16
area 17 of cortex A17
area 18 of cortex A18
area 19 of cortex, medial part A19M
area 20 of cortex A20
area 21 of cortex A21
area 22 of cortex A22
area 23 of cortex, ventral part A23V
area 24 of cortex A24
area 25 of cortex A25
area 29a-c of cortex A29a-c
area 29d of cortex A29d
area 30 of cortex A30
area 31 of cortex A31
area 32 of cortex A32
area 32 of cortex, ventral part A32V
area 35 of cortex A35
area 36 of cortex A36
area 3a of cortex (somatosensory) A3a
area 3b of cortex (somatosensory) A3b
area 4 of cortex, part c (primary motor) A4c
area 4 of cortex, parts a and b (primary motor) A4ab
area 45 of cortex A45
area 46 of cortex, dorsal part A46D
area 46 of cortex, ventral part A46V
area 47 (old 12) of cortex, lateral part A47L
area 47 (old 12) of cortex, medial part A47M
area 47 (old 12) of cortex, orbital part A47O
area 6 of cortex, dorsocaudal part A6DC
area 6 of cortex, dorsorostral part A6DR
area 6 of cortex, medial (supplementary motor) part A6M
area 7 of cortex, ventral, part a A7Va
area 7 of cortex, ventral, part b A7Vb
area 8 of cortex, caudal part A8C
area 8a of cortex, dorsal part A8aD
area 8a of cortex, ventral part A8aN
area 8b of cortex A8b
area 9 of cortex A9
area postrema AP
area subpostrema SubP
areas 1 and 2 of cortex A1/2
ascending fibers of the facial nerve asc7
auditory cortex, anterolateral area AuAL
auditory cortex, caudal parabelt area AuCPB
auditory cortex, caudolateral area AuCL
auditory cortex, caudomedial area AuCM
auditory cortex, middle lateral area AuML
auditory cortex, primary area AuA1
auditory cortex, rostral area AuR
auditory cortex, rostral parabelt AuRPB
auditory cortex, rostromedial area AuRM
auditory cortex, rostrotemporal lateral area AuRTL
auditory cortex, rostrotemporal medial area AuRTM
auditory cortex, rostrotemporal part AuRT

B
B9 serotonin cells B9
Barrington's nucleus Bar
basal nucleus (Meynert) B
basolateral amygdaloid nucleus BL
basolateral amygdaloid nucleus, dorsal part BLD
basolateral amygdaloid nucleus, dorsolateral part BLDL
basolateral amygdaloid nucleus, intermediate part BLI
basolateral amygdaloid nucleus, ventrolateral part BLVL
basolateral amygdaloid nucleus, ventromedial part BLVM
basomedial amygdaloid nucleus BM
basomedial amygdaloid nucleus, dorsal part BMD
basomedial amygdaloid nucleus, magnocellular part BMNC
basomedial amygdaloid nucleus, parvicellular part BMPC
basomedial amygdaloid nucleus, ventral part BMV
basomedial amygdaloid nucleus, ventromedial part BMVM
<table>
<thead>
<tr>
<th>Labeled Term</th>
<th>Abbreviation</th>
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<tr>
<td>bed nucleus of the stria terminalis, fusiform part</td>
<td>Fu</td>
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<tr>
<td>bed nucleus of the stria terminalis</td>
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<td>granular insular cortex</td>
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</table>
granule cell layer of the cochlear nuclei \textit{GrC}
granule cell layer of the dentate gyrus \textit{GrDG}
gustatory cortex \textit{Gu}

H
h1 fasciculus (thalamic fasciculus) \textit{h1}
h2 fasciculus (lenticular fasciculus) \textit{h2}
habenula nucleus \textit{Hb}
habenular commissure \textit{hbc}
hippocampal fissure \textit{hif}
hypoglossal nerve \textit{12n}
hypoglossal nucleus \textit{12N}
hypoglossal nucleus, geniohyoid part \textit{12GH}

I
indusium griseum \textit{IG}
inferior cerebellar peduncle \textit{icp}
inferior colliculus \textit{IC}
inferior olive, beta subnucleus of the medial nucleus \textit{IOBe}
inferior olive, cap of Kooy of the medial nucleus \textit{IOK}
inferior olive, dorsal nucleus \textit{IOD}
inferior olive, medial nucleus \textit{IOM}
inferior olive, principal nucleus \textit{IOPr}
inferior olive, subnucleus A of medial nucleus \textit{IOA}
inferior olive, subnucleus B of medial nucleus \textit{IOB}
inferior olive, subnucleus C of medial nucleus \textit{IOC}
inferior pulvinar \textit{IPul}
inferior pulvinar, caudalateral part \textit{IPulCL}
inferior pulvinar, caudomedial part \textit{IPulCM}
inferior pulvinar, medial part \textit{IPulM}
inferior pulvinar, posterior part \textit{IPulP}
inferior salivatory nucleus \textit{IS}
inferior thalamic peduncle \textit{ithp}
infrapyramidal motor neurons of lamina 9 \textit{IH9}
insular proisocortex \textit{IPro}
interanterodorsal thalamic nucleus \textit{IAD}
interanteromedial thalamic nucleus \textit{IAM}
intercalated amygdaloid nucleus, main part \textit{IM}
intercalated nuclei of the amygdala \textit{I}
intercalated nucleus \textit{In}
interfacicular nucleus \textit{IF}
intermediate endopiriform nucleus \textit{IEn}
intermediate gray layer of the superior colliculus \textit{InG}
intermediate nucleus of the lateral lemniscus \textit{ILL}
intermediate reticular nucleus \textit{IRt}
intermediate white layer of the superior colliculus \textit{InWh}
intermediodorsal thalamic nucleus \textit{IMD}
internal capsule \textit{ic}
internal globus pallidus \textit{IGP}
internal magnocellular layer of the dorsal lateral geniculate \textit{InMC}
internal parvicellular layer of the dorsal lateral geniculate \textit{InPC}
intercollicular motor nucleus \textit{IC}
interpeduncular nucleus, apical subnucleus \textit{IPA}
interpeduncular nucleus, caudal subnucleus \textit{IPC}
interpeduncular nucleus, intermediate subnucleus \textit{IPI}
interpeduncular nucleus, lateral subnucleus \textit{IPL}
interpeduncular nucleus, rostral subnucleus \textit{IPR}
interposed cerebellar nucleus, anterior part \textit{IntA}
interposed cerebellar nucleus, posterior part \textit{IntP}
interstitial nucleus of Cajal \textit{InC}
interstitial nucleus of the posterior limb of the anterior commissure \textit{IPAC}
interstitial nucleus of the vestibular part of the 8th nerve \textit{18}

interventricular foramen \textit{IVF}
intraparietal sulcus \textit{ips}
island of Calleja \textit{ICj}
island of Calleja, major island \textit{ICJM}
istic reticular formation \textit{isRt}

J
juxtaparaventricular part of the lateral hypothalamus \textit{JPLH}

K
Kolliker-Fuse nucleus \textit{KF}
koniocellular layer of dorsal lateral geniculate \textit{K1}
koniocellular layer of dorsal lateral geniculate \textit{K2}
koniocellular layer of dorsal lateral geniculate \textit{K3}
koniocellular layer of dorsal lateral geniculate \textit{K4}

L
lacunosem molecular layer of the hippocampus \textit{LMol}
lambdoid septal zone \textit{Ld}
lamina 9 of the spinal gray \textit{9Sp}
lamina terminalis \textit{LTer}
lateral (dentine) cerebellar nucleus \textit{Lat}
lateraI acumbens shell \textit{LabSh}
lateral amygdaloid nucleus \textit{La}
lateral cerebellar nucleus, parvicellular part \textit{LatPC}
lateral cervical nucleus \textit{LatC}
lateral corticospinal tract \textit{lcs}
lateral fissure \textit{lf}
lateral habenular nucleus \textit{LHb}
lateral hypothalamic area \textit{LH}
lateral intraparietal area of cortex \textit{LIP}
lateral lemniscus \textit{ll}
lateral mamillary nucleus \textit{LM}
lateral medullary lamina \textit{lml}
lateral nucleus of the diagonal band \textit{LDB}
lateral olfactory tract \textit{lo}
lateral parabrachial nucleus \textit{LPB}
lateral parabrachial nucleus, central part \textit{LPBC}
lateral parabrachial nucleus, crescent part \textit{LPBCr}
lateral parabrachial nucleus, dorsal part \textit{LPBD}
lateral parabrachial nucleus, external part \textit{LPBE}
lateral parabrachial nucleus, internal part \textit{LPBI}
lateral parabrachial nucleus, superior part \textit{LPBS}
lateral parabrachial nucleus, ventral part \textit{LPBV}
lateral paragigantocellular nucleus \textit{LPGi}
lateral periaqueductal gray \textit{LPAG}
lateral pericuneate nucleus \textit{LPCu}
lateral posterior thalamic nucleus \textit{LP}
lateral preoptic area \textit{LPO}
lateral pulvinar \textit{LPul}
lateral recess of the 4th ventricle \textit{LR4V}
lateral reticular nucleus \textit{LRt}
lateral reticular nucleus, parvicellular part \textit{LRtPC}
lateral reticular nucleus, subintrigeminal part \textit{LRtS5}
lateral septal nucleus, dorsal part \textit{LSD}
lateral septal nucleus, intermediate part \textit{LSI}
lateral septal nucleus, ventral part \textit{LSV}
lateral spinal nucleus \textit{LSp}
lateral superior olive \textit{LSO}
lateral terminal nucleus of the accessory optic tract \textit{LT}
lateral ventricle \textit{LV}
lateral vestibular nucleus \textit{LVe}
laterodorsal tegmental nucleus  LDTg
laterodorsal tegmental nucleus, ventral part  LDTgV
laterodorsal thalamic nucleus  LD
lateroventral periolivary nucleus  LVPO
linear nucleus of the hindbrain  Li
lithoid nucleus  Lth
lobule 1 of cerebellar vermis  1Cb
lobule 10 of cerebellar vermis  10Cb
lobule 2 of the cerebellar vermis  2Cb
lobule 3 of the cerebellar vermis  3Cb
lobule 4 of the cerebellar vermis  4Cb
lobule 5 of the cerebellar vermis  5Cb
lobule 6 of the cerebellar vermis  6Cb
lobule 7 of cerebellum  7Cb
lobule 8 of cerebellar vermis  8Cb
lobule 9 of cerebellar vermis  9Cb
locus coeruleus  LC
longitudinal fasciculus of the pons  lfp

M
magnocellular nucleus of the lateral hypothalamus  MCLH
magnocellular nucleus of the posterior commissure  MCPC
mammillary body  MB
mammillary peduncle  mp
mammillary recess of the 3rd ventricle  MRe
mamillothalamic tract  mtg
mamillothalamotectal tract  mt
matrix region of the medulla  Mx
medial accessory oculomotor nucleus  MA3
medial accumbens shell  MACHSh
medial amygdaloid nucleus  Me
medial cerebellar nucleus  Med
medial eminence, external layer  MEE
medial eminence, internal layer  MEI
medial geniculate nucleus  MG
medial geniculate nucleus, dorsal part  MGD
medial geniculate nucleus, medial part  MGM
medial geniculate nucleus, ventral part  MGV
medial habenular nucleus  MHb
medial intraparietal area of cortex  MIP
medial lemniscus  ml
medial longitudinal fasciculus  mlf
medial mammillary nucleus, lateral part  ML
medial mammillary nucleus, medial part  MM
medial medullary lamina  mmml
medial parabrachial nucleus  MPB
medial parabrachial nucleus, external part  MPBE
medial paralemniscal nucleus  MPL
medial preoptic area  MPA
medial preoptic nucleus  MPO
medial pretectal area  MPT
medial pulvinar  MPul
medial septal nucleus  MS
medial superior olive  MSO
medial superior temporal area of cortex  MST
medial tuberal nucleus  MTu
medial vestibular nucleus  MVe
medial vestibular nucleus, magnocellular part  MVemC
medial vestibular nucleus, parvocellular part  MVepC
median accessory nucleus of the medulla  MnA
median eminence  ME
median preoptic nucleus  MnPO
median raphe nucleus  MnR
mediodorsal thalamic nucleus  MD
mediodorsal thalamic nucleus, central part  MDC
mediodorsal thalamic nucleus, lateral part  MDL
mediodorsal thalamic nucleus, medial part  MDM
medioventral periolivary nucleus  MVPO
medullary reticular nucleus, dorsal part  MdD
medullary reticular nucleus, ventral part  MdV
mesencephalic reticular formation  mRt
mesencephalic trigeminal nucleus  Me5
microcellular tegmental nucleus  MiTg
middle cerebellar peduncle  mcp
middle cerebral artery  mcer
molecular layer of the dentate gyrus  MoDG
motor root of the trigeminal nerve  m5
motor trigeminal nucleus  5N
motor trigeminal nucleus, parvocellular part  5PC

N
NA1 noradrenalin cells  NA1
NA2 noradrenalin cells  NA2
NA5 noradrenalin cells  NA5
NA7 noradrenalin cells  NA7
navicular nucleus of the basal forebrain  Nv
nervus intermedius component of facial nerve  7ni
nigrostriatal bundle  ns
noto cuneate nucleus  Nt
nucleus of Darkschewitsch  Dk
nucleus of origin of efferents of the vestibular nerve  EVE
nucleus of Roller  Ro
nucleus of stria medullaris  SM
nucleus of the ansa lenticularis  AL
nucleus of the brachium of the inferior colliculus  BIC
nucleus of the central acoustic tract  CAT
nucleus of the H field of Forel  H
nucleus of the horizontal limb of the diagonal band  HDB
nucleus of the lateral olfactory tract  LOT
nucleus of the optic tract  OT
nucleus of the posterior commissure  PCom
nucleus of the trapezoid body  Tz
nucleus of the vertical limb of the diagonal band  VDB
nucleus X  X
nucleus Y of the vestibular complex  Y

O
occipito-parietal transitional area of cortex  OPt
occipitotemporal sulcus  ots
oculomotor nerve  3n
oculomotor nucleus  3N
oculomotor nucleus, parvocellular part  3PC
olfactory tubercle  Tu
olivary pretectal nucleus  OPT
olivocerebellar tract  oc
olivocochlear bundle  ocb
optic chiasm  och
optic nerve layer of the superior colliculus  Op
optic tract  opt
orbital periallocortex  OPAI
orbital proisocortex  OPro
orbital sulcus  orbs
oriens layer of the hippocampus  Or
oval paracentral thalamic nucleus  OPC
paralidohypothalamic tract  palhy
parabigeminal nucleus  PBG
parabrachial pigmented nucleus of the VTA  PBP
paracentral thalamic nucleus  PC
paradiagonal zone  PDZ
parafascicular thalamic nucleus  PaF
paraflocculus  Pfl
parainsular cortex, lateral part  PaIL
parainsular cortex, medial part  PalM
parainterfascicular nucleus of the ventral tegmental area  PIF
paralaminal amygdaloid nucleus  PaL
paralemniscal nucleus  PL
paramedian lobule  PM
paramedian raphe nucleus  PMnR
paranigral nucleus of the VTA  PN
parasolitary nucleus  PSol
parasubicular  PaS
parasubthalamic nucleus  PSTh
paratenial thalamic nucleus  PT
paratrigeminal nucleus  Pa5
paraventricular hypothalamic nucleus  Pa
paraventricular hypothalamic nucleus, dorsal cap  PaDC
paraventricular hypothalamic nucleus, lateral magnocellular part  PaLM
paraventricular hypothalamic nucleus, posterior part  PaPo
paraventricular thalamic nucleus  PV
paraventricular thalamic nucleus, anterior part  PVA
paraventricular thalamic nucleus, posterior part  PVP
parietal area PE  PE
parietal area PE, caudal part  PEC
parietal area PF (cortex)  PF
parietal area PFG (cortex)  PFG
parietal area PG  PG
parietal area PG, medial part (cortex)  PGM
parietal areas PGa and IPa (fundus of superior temporal ventral area)  PGa/IPa
paraventricular reticular nucleus  PCRt
paraventricular reticular nucleus, alpha part  PCRtA
pedunculotegmental nucleus  PTg
perifugal nucleus  PeF
peripeduncular nucleus  PP
perirhinal cortex  P5
periventricular hypothalamic nucleus  Pe
piriform cortex  Pir
piriform cortex, layer 1  Pir1
piriform cortex, layer 2  Pir2
piriform cortex, layer 3  Pir3
pleiochiasma  PIPAG
polymorph layer of the dentate gyrus  PoDG
pontine nuclei  Pn
pontine reticular nucleus, caudal part  PnC
pontine reticular nucleus, oral part  PnO
pontine reticular nucleus, ventral part  PnV
posterior commissure  pc
posterior cortical amygdaloid nucleus  PCo
posterior hypothalamic nucleus  PH
posterior intralaminar thalamic nucleus  PIL
posterior limitans thalamic nucleus  PLi
posterior thalamic nuclear group  Po
posterior thalamic nuclear group, triangular part  PoT
posterodorsal tegmental nucleus  PDTg
posterolateral fissure  plf
pre-Botzinger complex  PrBo
precommissural nucleus  PrC
precuneiform area  PrCnF
pregeniculate nucleus of the prethalamus  PrG
premamillary nucleus, dorsal part  PMD
premamillary nucleus, ventral part  PMV
prepositus nucleus  Pr
prepositus nucleus, magnocellular part  PrMC
prepyramidal fissure  ppf
pretectal field  PR
presubiculum  PrS
primary fissure  prf
primary visual cortex  V1
principal sensory trigeminal nucleus  Pr5
principal sensory trigeminal nucleus, dorsomedial part  Pr5DM
principal sensory trigeminal nucleus, ventrolateral part  Pr5VL
proisocortical motor region (precentral opercular cortex)  ProM
prostriate area  ProSt
prosubiculum  ProS
putamen  Pu
pyramidal cell layer of the hippocampus  Py
pyramidal decussation  pyx
pyramidal tract  py
radiatum layer of the hippocampus  Rad
raphe interpositus nucleus  RIP
raphe magnus nucleus  RMg
raphe obscurus nucleus  ROb
raphe pallidus nucleus  RPa
recess of the inferior colliculus  ReIC
red nucleus, magnocellular part  RMC
red nucleus, parvicellular part  RPC
reticular nucleus (prethalamus)  Rt
reticulotegmental nucleus of the pons  Rtg
reticulotegmental nucleus of the pons, lateral part  RtgL
retroambigus nucleus  Ramb
retrocommissural nucleus  Rec
retroisocortical motor region (precentral opercular cortex)  ProM
retrosplenial  Ret
retrosplenial cortex  Ret
rostral interstitial nucleus of the medial longitudinal fasciculus  RI
rostral linear nucleus (midbrain)  RLi
rostral ventral respiratory group  RVRG
rostroventrolateral reticular nucleus  RVL
rostroventral thalamic nucleus  RVt
rubrospinal tract  rs
ventrolateral periaqueductal gray  VLPAG
ventrolateral preoptic nucleus  VLPO
ventrolateral thalamic nucleus, dorsal part  VLD
ventrolateral thalamic nucleus, ventral part  VLV
ventromedial hypothalamic nucleus  VMH
ventromedial preoptic nucleus  VMPO
ventromedian fissure  vmf
vestibular root of the vestibulocochlear nerve  8vn
vestibulocerebellar nucleus  VeCb
vestibulocochlear nerve  8n
vestibulomesencephalic tract  veme
visual area 2  V2
visual area 3 (ventrolateral posterior area)  V3
visual area 3A (dorsoanterior area)  V3A
visual area 4 (ventrolateral anterior area)  V4
visual area 4, transitional part  V4T
visual area 5 (middle temporal area)  V5
visual area 6 (dorsomedial area)  V6
visual area 6A (posterior parietal medial area)  V6A

X
xiphoid thalamic nucleus  Xi

Z
zona incerta, caudal part  ZIC
zona incerta, dorsal part  ZID
zona incerta, rostral part  ZIR
zona incerta, ventral part  ZIV
zonal layer of superior colliculus  Zo
Index of Abbreviations
The abbreviations are listed in alphabetical order. Each abbreviation
is followed by the structure name and the number of figures on which
the abbreviation appears.
1Cb lobule 1 of cerebellar vermis 1-108, 110-197
2Cb lobule 2 of the cerebellar vermis 141, 145-161
3Cb lobule 3 of the cerebellar vermis 146-166
3N oculomotor nucleus 103-121
3n oculomotor nerve 95-114
3PC oculomotor nucleus, parvicellular part 103-105, 107-121
3V 3rd ventricle 48-110, 113
4Cb lobule 4 of the cerebellar vermis 150-169, 173-177
4N trochlear nucleus 120-129
4n trochlear nerve 126-144
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5Cb lobule 5 of the cerebellar vermis 167-189
5N motor trigeminal nucleus 136-141
5PC motor trigeminal nucleus, parvicellular part 136-137
5Sol trigeminal-solitary transition zone 159-177
5Tr trigeminal transition zone 140-145
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6n abducens nerve 125-143
7Cb lobule 7 of cerebellar vermis 182-184, 188
7N facial nucleus 141-149
7n facial nerve 136-145
7ni nervus intermedius component of facial nerve 147
7SH facial motor nucleus, stylohyoid part 143-145
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8cn cochlear root of the vestibulocochlear nerve 148-150
8n vestibulocochlear nerve 144-146
8vn vestibular root of the vestibulocochlear nerve 140-153, 155
9Cb lobule 9 of cerebellar vermis 172, 174-185, 189
9Sp lamina 9 of the spinal gray 177-179, 181-182, 185-186, 189
10Ca dorsal motor nucleus of vagus, caudal part 174-177
10Cb lobule 10 of cerebellar vermis 163, 165-166, 168-178
10N vagus nerve nucleus 162-173
12GH hypoglossal nucleus, geniohyoid part 167-170
12N hypoglossal nucleus 163-173
12n hypoglossal nerve 165, 169, 175
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A11 area 11 of cortex 3-18
A13a area 13a of cortex 23-30
A13b area 13b of cortex 4-22
A13L area 13 of cortex, lateral part 15-30, 32-34
A13M area 13 of cortex, medial part 19-30, 32-34, 36-38
A14C area 14 of cortex, caudal part 23-30
A14R area 14 of cortex, rostral part 3-22
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68-70, 72-74, 76-78, 80-82, 84-86, 88-90, 92-94
A45 area 45 of cortex 11-30
A46D area 46 of cortex, dorsal part 4-6
A46V area 46 of cortex, ventral part 4-10
A47L area 47 (old 12) of cortex, lateral part 3-30
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A6DR area 6 of cortex, dorsorostral part 26-30, 32-34, 36-38, 40-42
A6M area 6 of cortex, medial (supplementary motor) part 34, 36-38, 4042, 44-46, 48-50, 52-54
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A6Vb area 6 of cortex, ventral, part b 32-34, 36-38, 40-42
A8aD area 8a of cortex, dorsal part 7-26
A8aV area 8a of cortex, ventral part 6-30
A8b area 8b of cortex 10-30, 32-33
A8C area 8 of cortex, caudal part 32-34, 36-38, 40-42, 44-46
A9 area 9 of cortex 3-10
AA anterior amygdaloid area 55-70, 72-75
ac anterior commissure 61-68
aca anterior commissure, anterior part 40-46, 48-59
Acb accumbens nucleus 32-34, 37
AcbC accumbens nucleus, core 35-36, 38-58
AcbSh accumbens nucleus, shell 35-36, 38
ACo anterior cortical amygdaloid nucleus 56-66
acp anterior commissure, posterior limb 59-70, 72-74, 77-78, 80-82
AD anterodorsal thalamic nucleus 76-94
Ad1 Ad1 adrenalin cells 146-147, 150-156, 158, 161-162, 165-167, 173
AH anterior hypothalamic nucleus 67-70
AHA anterior hypothalamic area, anterior part 63-66
AHi amygdalohippocampal area 67-74, 76
AI agranular insular cortex 52-54, 56-58, 60-62, 64-66
XXXI


<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vmf</td>
<td>ventromedial fissure</td>
</tr>
<tr>
<td>VMH</td>
<td>ventromedial hypothalamic nucleus</td>
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<tr>
<td>VMPO</td>
<td>ventromedial preoptic nucleus</td>
</tr>
<tr>
<td>VOLT</td>
<td>vascular organ of the lamina terminalis</td>
</tr>
<tr>
<td>VP</td>
<td>ventral pallidum</td>
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<tr>
<td>VPI</td>
<td>ventral posterior thalamic nucleus, inferior part</td>
</tr>
<tr>
<td>VPL</td>
<td>ventral posterolateral thalamic nucleus</td>
</tr>
<tr>
<td>VPM</td>
<td>ventral posteromedial thalamic nucleus</td>
</tr>
<tr>
<td>VPPC</td>
<td>ventral posterior nucleus of the thalamus, parvicellular</td>
</tr>
<tr>
<td>VPS</td>
<td>ventral posterior thalamic nucleus, superior part</td>
</tr>
<tr>
<td>vsc</td>
<td>ventral spinocerebellar tract</td>
</tr>
<tr>
<td>VTAC</td>
<td>ventral tegmental area, caudal part</td>
</tr>
<tr>
<td>VTAR</td>
<td>ventral tegmental area, rostral part</td>
</tr>
<tr>
<td>vtgx</td>
<td>ventral tegmental decussation</td>
</tr>
<tr>
<td>VTM</td>
<td>ventral tuberomamillary nucleus</td>
</tr>
<tr>
<td>X</td>
<td>nucleus X</td>
</tr>
<tr>
<td>Xi</td>
<td>xiphoid thalamic nucleus</td>
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<tr>
<td>xml</td>
<td>decussation of the medial lemniscus</td>
</tr>
<tr>
<td>xscp</td>
<td>decussation of the superior cerebellar peduncle</td>
</tr>
<tr>
<td>Y</td>
<td>nucleus Y of the vestibular complex</td>
</tr>
<tr>
<td>ZIC</td>
<td>zona incerta, caudal part</td>
</tr>
<tr>
<td>ZID</td>
<td>zona incerta, dorsal part</td>
</tr>
<tr>
<td>ZIR</td>
<td>zona incerta, rostral part</td>
</tr>
<tr>
<td>ZIV</td>
<td>zona incerta, ventral part</td>
</tr>
<tr>
<td>Zo</td>
<td>zonal layer of superior colliculus</td>
</tr>
<tr>
<td>TEO</td>
<td>temporal area TE, occipital part</td>
</tr>
<tr>
<td>TF</td>
<td>temporal area TF</td>
</tr>
<tr>
<td>TFO</td>
<td>temporal area TF, occipital part</td>
</tr>
<tr>
<td>TEO</td>
<td>temporal area TE, occipital part</td>
</tr>
<tr>
<td>TLO</td>
<td>temporal area TL, occipital part</td>
</tr>
<tr>
<td>TPO</td>
<td>temporal area TF, occipital part</td>
</tr>
<tr>
<td>TPO</td>
<td>temporoparieto-occipital association area (superior temporal polysensory cortex)</td>
</tr>
<tr>
<td>TPro</td>
<td>temporopolar proisocortex</td>
</tr>
<tr>
<td>TPt</td>
<td>temporoparietal transitional area</td>
</tr>
<tr>
<td>TLL</td>
<td>triangular nucleus of the lateral lemniscus</td>
</tr>
<tr>
<td>TS</td>
<td>triangular septal nucleus</td>
</tr>
<tr>
<td>Tu</td>
<td>olfactory tubercle</td>
</tr>
<tr>
<td>Tz</td>
<td>nucleus of the trapezoid body</td>
</tr>
<tr>
<td>vz</td>
<td>trapezoid body</td>
</tr>
<tr>
<td>VAL</td>
<td>ventral anterior thalamic nucleus, lateral part</td>
</tr>
<tr>
<td>VAM</td>
<td>ventral anterior thalamic nucleus, medial part</td>
</tr>
<tr>
<td>VAMC</td>
<td>ventral anterior thalamic nucleus, magnocellular part</td>
</tr>
<tr>
<td>VCA</td>
<td>ventral cochlear nucleus, anterior part</td>
</tr>
<tr>
<td>VCP</td>
<td>ventral cochlear nucleus, posterior part</td>
</tr>
<tr>
<td>VDB</td>
<td>nucleus of the vertical limb of the diagonal band</td>
</tr>
<tr>
<td>VeCb</td>
<td>vestibulocerebellar nucleus</td>
</tr>
<tr>
<td>veme</td>
<td>vestibulomesencephalic tract</td>
</tr>
<tr>
<td>VEn</td>
<td>ventral nucleus of the endopiriform claustrum</td>
</tr>
<tr>
<td>VIP</td>
<td>ventral intraparietal area of cortex</td>
</tr>
<tr>
<td>VLD</td>
<td>ventrolateral thalamic nucleus, dorsal part</td>
</tr>
<tr>
<td>VLL</td>
<td>ventral nucleus of the lateral lemniscus</td>
</tr>
<tr>
<td>VLLa</td>
<td>ventral lateral thalamic nucleus, lateral part</td>
</tr>
<tr>
<td>VLM</td>
<td>ventral lateral thalamic nucleus, medial part</td>
</tr>
<tr>
<td>VLPAG</td>
<td>ventrolateral periaqueductal gray</td>
</tr>
<tr>
<td>VLPc</td>
<td>ventral posterior thalamic nucleus</td>
</tr>
<tr>
<td>VLV</td>
<td>ventrolateral thalamic nucleus, ventral part</td>
</tr>
</tbody>
</table>
3D Reconstructions of the Cortical Surface

3D reconstruction of the lateral surface of the cortex of the marmoset brain presented in this atlas. The authors thank Tristan Chaplin and Hsin-Hao Yu for the reconstructions.

3D reconstruction of the medial surface of the cortex of the marmoset brain presented in this atlas. The authors thank Tristan Chaplin and Hsin-Hao Yu for the reconstructions.
To facilitate visualization of the spatial relationships between areas, the cortical sheet was reconstructed as a 3D surface from histological sections. The digital images of Nissl-stained sections were registered with using the TurboReg plug-in for Image J software (http://rsbweb.nih.gov/ij/). Contours of layer IV of the cortex were manually traced, and assembled into a three-dimensional triangular mesh with Nuage software, and smoothed with MeshLab. In the case of agranular areas, a mid-thickness contour was used.
Flat Maps of the Cortex

The 3D surface was computationally flattened using Caret (http://brainvis.wustl.edu/wiki/index.php/Caret:About). The coordinates of the boundaries were projected to the surface, and connected to form closed paths using the Dijkstra algorithm.

Flat map reconstruction of the lateral surface of the cortex of the marmoset brain presented in this atlas. The coronal section numbers are indicated. The authors thank Tristan Chaplin and Hsin-Hao Yu for the reconstructions.
Flat map reconstruction of the lateral surface of the cortex of the marmoset brain presented in this atlas. The authors thank Tristan Chaplin and Hsin-Hao Yu for the reconstructions.
Figure 1b
Interaural +19.00mm

Figure 2b
Interaural +18.50mm
Nissl
Figure 9a
Section #70
Interaural +16.50mm

Cb
Figure 10a
Section #74
Interaural +16.30mm
Figure 9b
Interaural +16.50mm

Figure 10b
Interaural +16.30mm
A11: area 11 of cortex
A13b: area 13b of cortex
A14R: area 14 of cortex, rostral part
A32: area 32 of cortex
A32V: area 32 of cortex, ventral part
A45: area 45 of cortex
A47L: area 47 (old 12) of cortex, lateral part
A47M: area 47 (old 12) of cortex, medial part
A8b: area 8b of cortex
A8aD: area 8a of cortex, dorsal part
A8aV: area 8a of cortex, ventral part
orbs: orbital sulcus

Figure 13b
Interaural +16.00mm

Figure 14b
Interaural +15.80mm
Figure 15a
Section #87
Interaural +15.65mm
Figure 17b
Interaural +15.50mm

Figure 18b
Interaural +15.30mm
Figure 19a
Interaural Section
#97
AChE

19a+15.15mm
Nissl

Figure 21a
Section #100
Interaural +15.00mm
Figure 21b

Interaural +15.00mm

A13b  area 13b of cortex
A13L  area 13 of cortex, lateral part
A13M  area 13 of cortex, medial part
A14R  area 14 of cortex, rostral part
A32   area 32 of cortex
A32V  area 32 of cortex, ventral part
A45   area 45 of cortex
A47L  area 47 (old 12) of cortex, lateral part
A47M  area 47 (old 12) of cortex, medial part
A4bD  area 4b of cortex, dorsal part
A4bV  area 4b of cortex, ventral part
A8b   area 8b of cortex
orbs  orbital sulcus
Figure 22b

Interaural +14.80mm

A13b  area 13b of cortex
A13L  area 13 of cortex, lateral part
A13M  area 13 of cortex, medial part
A14R  area 14 of cortex, rostral part
A32  area 32 of cortex
A32V  area 32 of cortex, ventral part
A47  area 47 (old 12) of cortex, lateral part
A47M  area 47 (old 12) of cortex, medial part
A4bD  area 4b of cortex, dorsal part
A4bV  area 4b of cortex, ventral part
A6b  area 6b of cortex
A6O  anterior olfactory nucleus
lo  lateral olfactory tract
orbs  orbital sulcus
Figure 27a
Section #117
Interaural +14.15mm
Figure 29b

Interaural +14.00mm
A13a    area 13a of cortex
A13L   area 13 of cortex, lateral part
A13M   area 13 of cortex, medial part
A14C   area 14 of cortex, caudal part
A24a   area 24a of cortex
A24b   area 24b of cortex
A24c   area 24c of cortex
A25    area 25 of cortex
A45    area 45 of cortex
A47L   area 47 (old 12) of cortex, lateral part
A47O   area 47 (old 12) of cortex, orbital part
A6DR   area 6 of cortex, dorsoventral part
A8aV   area 8a of cortex, ventral part
A8b    area 8b of cortex
AO     anterior olfactory nucleus
Cd     caudate nucleus
cg     cingulum
gcc    genu of the corpus callosum
IG     indusium griseum
lo     lateral olfactory tract
LV     lateral ventricle
ProM   proisocortical motor region (precentral opercular cortex)
A13L: area 13 of cortex, lateral part
A13M: area 13 of cortex, medial part
A24a: area 24a of cortex
A24b: area 24b of cortex
A24c: area 24c of cortex
A25: area 25 of cortex
A47O: area 47 (old 12) of cortex, orbital part
A6DR: area 6 of cortex, dorsorostral part
A6Va: area 6 of cortex, ventral, part a
A6Vb: area 6 of cortex, ventral, part b
A8b: area 8b of cortex
A13L: area 13 of cortex, lateral part
A13M: area 13 of cortex, medial part
A24a: area 24a of cortex
A24b: area 24b of cortex
A24c: area 24c of cortex
A25: area 25 of cortex
A47O: area 47 (old 12) of cortex, orbital part
A6DR: area 6 of cortex, dorsorostral part
A6Va: area 6 of cortex, ventral, part a
A6Vb: area 6 of cortex, ventral, part b
A8b: area 8b of cortex
Acb: accumbens nucleus
AO: anterior olfactory nucleus
cad: caudate nucleus
cg: cingulum
gcc: genu of the corpus callosum
IG: indusium griseum
lo: lateral olfactory tract
LV: lateral ventricle
OPAl: orbital periallocortex
ProM: proisocortical motor region (precentral opercular cortex)

**Figure 33b**

Interaural +13.50mm
A13M  area 13 of cortex, medial part
A24a  area 24a of cortex
A24b  area 24b of cortex
A24c  area 24c of cortex
A25  area 25 of cortex
A6DR  area 6 of cortex, dorsostral part
A6M  area 6 of cortex, medial (supplementary motor) part
A6Vb  area 6 of cortex, ventral, part b
A8C  area 8 of cortex, caudal part
Acb  accumbens nucleus
AO  anterior olfactory nucleus
Cd  caudate nucleus
Cl  claustrum
cg  cingulum
cl  claustrum
cex  extreme capsule
goc  genu of the corpus callosum
Gu  gustatory cortex
ic  internal capsule
IG  indusium griseum
ig  lateral amygdala
LV  lateral ventricle
Nv  nucleus of the basal forebrain
OPAl  orbital periallocortex
OPro  orbital proisocortex
ProM  proisocortical motor region (precentral opercular cortex)
rcc  rostrum of the corpus callosum

Figure 37b
Interaural +13.00mm
Figure 39a
Section #147
Interaural +12.65mm

AChE
Figure 42b
Interaural +12.30mm
Figure 43a
Section #157
Interaural +12.15mm
Figure 49b
Interaural +11.50mm

3V 3rd ventricle
A1/2 areas 1 and 2 of cortex
A24a area 24a of cortex
A24b area 24b of cortex
A24c area 24c of cortex
A24d area 24d of cortex
A3a area 3a of cortex (somatosensory)
A3b area 3b of cortex (somatosensory)
A4c area 4 of cortex, part c (primary motor)
A6DC area 6 of cortex, dorsocaudal part
A6M area 6 of cortex, medial (supplementary motor) part
Aca anterior commissure, anterior part
Acb accumbens nucleus, core
Cc corpus callosum
Cd caudate nucleus
cg cingulum
Cl claustrum
CxA cortex-amygdala transition zone
DAcbSh dorsal accumbens shell
DeN dorsal nucleus of the endopiriform claustrum
ec external capsule
ecx extreme capsule
Gu gustatory cortex
HDB nucleus of the horizontal limb of the diagonal band
ic internal capsule
Ia island of Calleja
ICjM island of Calleja, major island
IEn intermediate endopiriform nucleus
IG isthmus griseum
LActSh lateral accumbens shell
Ld lambdoid septal zone
Lo lateral olfactory tract
LSD lateral septal nucleus, dorsal part
LSIs lateral septal nucleus, intermediate part
LSV lateral septal nucleus, ventral part
LV lateral ventricle
MAdcSh medial accumbens shell
moc middle cerebral artery
MS medial septal nucleus
MSd medial septal nucleus, dorsal part
MSi medial septal nucleus, intermediate part
Msv medial septal nucleus, ventral part
Och optic chiasm
OPAl orbital periallocortex
OPs orbital prosopocortex
PDZ paradiagonal zone
Pm primary motor
Prom proisocortical motor region (precentral opercular cortex)
Pu putamen
SH septohippocampal nucleus
SS supracallosal subiculum
STR superior temporal rostral area (cortex)
TPPro temporopolar proisocortex
Tu olfactory tubercle
VDB nucleus of the vertical limb of the diagonal band
VOLT vascular organ of the lamina terminalis
VP ventral pallidum
Figure 50b

Interaural +11.30mm

3V 3rd ventricle
A1/2 areas 1 and 2 of cortex
A24a area 24a of cortex
A24b area 24b of cortex
A24c area 24c of cortex
A24d area 24d of cortex
A3a area 3a of cortex (somatosensory)
A3b area 3b of cortex (somatosensory)
A4c area 4 of cortex, part c (primary motor)
A6DC area 6 of cortex, dorsocaudal part
A6M area 6 of cortex, medial (supplementary motor) part
aca anterior commissure, anterior part
AcbC accumbens nucleus, core
cad cadaver nucleus
cg cingulum
Cl claustrum
CxA cortex-amygdala transition zone
DAcbSh dorsal accumbens shell
dEn dorsal nucleus of the endopiriform claustrum
ec external capsule
ec external capsule
Gu gustatory cortex
HDB nucleus of the horizontal limb of the diagonal band
ic internal capsule
ICjM island of Calleja, major island
IEn intermediate endopiriform nucleus
IG iclucnual gyrus
LAcSh lateral accumbens shell
Ld lamina terminalis
lf lateral fissure
Lo lateral olfactory tract
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LSV lateral septal nucleus, ventral part
LV lateral ventricle
MAdhSm medial accumbens shell
MS medial septal nucleus
och optic chiasm
OPAl orbital periallocortex
OPro orbital proisocortex
PDZ paradiagonal zone
Pir piriform cortex
ProM proisocortical motor region (precentral opercular cortex)
Pu putamen
rf rhinal fissure
SHi septohippocampal nucleus
SS supracallosal subiculum
STR superior temporal rostral area (cortex)
TPPro tempoparietal proisocortices
Tu olfactory tubercle
VDB nucleus of the vertical limb of the diagonal band
VOLT vascular organ of the lamina terminalis
VP ventral pallidum
SMI32
Figure 56a
Section #189
Interaural +10.55mm
Figure 57a
Section #190
Interaural +10.50mm
Figure 57b
Interaural +10.50mm
**Figure 58b**

**Interaural** +10.30mm

**3V** 3rd ventricle
A1/2 areas 1 and 2 of cortex
A2a area 2a of cortex
A2ab area 2ab of cortex
A2ac area 2ac of cortex
A2Ad area 2Ad of cortex
A3a area 3a of cortex
A3b area 3b of cortex
A3c area 3c of cortex
A3d area 3d of cortex
A4ab area 4 of cortex, parts a and b (primary motor)
AA anterior amygdaloid area
aca anterior commissure, anterior part
AcbC accumbens nucleus, core
ACo agranular insular cortex
APe amygdalohippocampal transition area
AuRPB auditory cortex, rostral parabelt
AuRTL auditory cortex, rostromedial lateral area
AuRTM auditory cortex, rostrotemporal medial area
AVPe anteroventral periventricular nucleus
B basal nucleus (Meynert)
BL basolateral amygdaloid nucleus
BM basomedial amygdaloid nucleus
cd corpus callosum
cg cingulum
Cl claustrum
CTA corticocortical association areas
CU cortex
DEn dorsal nucleus of the endopiriform nucleus
DFe dorsal endopiriform nucleus
DIF dorsal insular fissure
DIP dorsal insular nucleus
EI endolateral insular nucleus
EIPI endopiriform-transition insular nucleus
EIPII endopiriform-transition insular nucleus
Fin amygdalofugal area
GL amygdaleal complex
GLC lateral nucleus of the lateral geniculate body
HDB nucleus of the horizontal limb of the diagonal band
iC internal capsule
IG insular granular cortex
IPro insular proisocortex
La lateral amygdaloid nucleus
LAcSh lateral accumbens shell
Ld lateral dorsal zone
LDB lateral nucleus of the diagonal band
LHC lateral hypothalamic area
de lateral fissure
LPO lateral preoptic area
MS medial septal nucleus
MnPO median preoptic nucleus
MPO medial preoptic area
MO nucleus of the optic tract
MPO medial preoptic area
Mt amygdaloid nucleus
Ms medial septal nucleus
MnP medial preoptic area
Mv medial septal nucleus
Og optic chiasm
S1 primary sensory cortex
S2 secondary somatosensory cortex
S2PR secondary somatosensory cortex, parietal rostral area
SH secondary somatosensory cortex, parietal area
SHB secondary somatosensory cortex, parietal area
SIB substantia innominata, basal part
SII secondary somatosensory cortex
SS substantia nigra
SVC suprachiasmatic nucleus
STR superior temporal rostral area
TE1 superior temporal area TE1 (inferior temporal cortex)
VEn ventral nucleus of the endopiriform nucleus
VLPO ventrolateral preoptic nucleus
VMAPO ventromedial preoptic nucleus
VP ventral pallidum
Interaural +10.00mm

Figure 61b
Figure 77b
Interaural +8.00mm
Figure 86b
Interaural +6.80mm
Nissl

Figure 89a
Section
Interaural
#270
+6.50mm
Figure 109a
Section #320
Interaural + 4.00mm
Figure 117b

Interaural +3.00mm
Figure 129b

Interaural +1.50mm
Figure 156a
Section #439
Interaural -1.95mm
Nissl

Figure 157a
Section #440
Interaural -2.00mm
Figure 165b

Interaural
-3.00mm
Figure 170b

Interaural -3.70mm
4Cb: lobule 4 of the cerebellar vermis
5Cb: lobule 5 of the cerebellar vermis
6Cb: lobule 6 of the cerebellar vermis
9Cb: lobule 9 of the cerebellar vermis
5Sp: lamina 5 of the spinal gray
10Ca: dorsal motor nucleus of vagus, caudal part
10Cb: lobule 10 of cerebellar vermis
A19DI: area 19 of cortex, dorsointermediate part
CC: central canal
CeCv: central cervical nucleus
Cop: copula of the pyramids
Crus1: crus 1 of the ansiform lobule
Crus2: crus 2 of the ansiform lobule
Cu: cuneate nucleus
cu: cuneate fasciculus
ECu: external cuneate nucleus
Ge5: gelatinous layer of the caudal spinal trigeminal nucleus
Gr: gracile nucleus
IntA: interposed cerebellar nucleus, anterior part
IntP: interposed cerebellar nucleus, posterior part
Ir: intermediate reticular nucleus
Lat: lateral (dentate) cerebellar nucleus
MdD: medullary reticular nucleus, dorsal part
MdV: medullary reticular nucleus, ventral part
Med: medial cerebellar nucleus
mfl: medial longitudinal fasciculus
Ms: matrix region of the medulla
NA1: NA1 noradrenalin cells
NA2: NA2 noradrenalin cells
Pa5: paratrigeminal nucleus
plf: posterolateral fissure
PM: paramedian lobule
prf: primary fissure
px: pyramidal decussation
RAmb: retroambigus nucleus
rs: rubrospinal tract
Sim: simple lobule
sol: solitary tract
SolC: solitary nucleus, commissural part
SolDM: solitary nucleus, intermediate part
SolM: solitary nucleus, medial part
SolPS: solitary nucleus, paracomissural part
SolV: solitary nucleus, ventral part
SolVL: solitary nucleus, ventrolateral part
sp5: spinal trigeminal tract
Sp5C: spinal trigeminal nucleus, caudal part
V1: primary visual cortex
V2: visual area 2
V3: visual area 3 (lateral posterior area)
V3(VLP): visual area 3 (ventrolateral posterior area)
Vc: ventral spinocerebellar tract
5Cb  lobule 5 of the cerebellar vermis
5Ch  lobule 6 of the cerebellar vermis
6Cb  lobule 7 of the cerebellar vermis
7Sp  lamina 9 of the spinal gray
CC  central canal
CeCv  central cervical nucleus
Cop  copula of the pyramis
Crus1 crus 1 of the ansiform lobule
Crus2 crus 2 of the ansiform lobule
Cu  cuneate nucleus
cu  cuneate fasciculus
EcG  external cuneate nucleus
EcGc  gelatinous layer of the caudal spinal trigeminal nucleus
Gr  gracile nucleus
gr  gracile fasciculus
GrC  gracile nucleus, caudal part
GrCv  gracile fasciculus, caudal part
Ias  lateral corticospinal tract
LSp  lateral spinal nucleus
Lv  lateral reticular nucleus
PM  paramedian lobule
prf  primary fissure
rs  rubrospinal tract
Sim  simple lobule
Sp  spinal trigeminal tract
Sp5c  spinal trigeminal nucleus, caudal part
V1  primary visual cortex
V2  visual area 2
V3  visual area 3 (ventromedial posterior area)
vmf  ventromedial fissure

Figure 185b
Interaural
-5.50mm
**Figure 186b**
Interaural -5.70mm

5Cb: lobule 5 of the cerebellar vermis
6Cb: lobule 6 of the cerebellar vermis
9Sp: lamina 9 of the spinal gray
CC: central canal
CgCr: central cervical nucleus
Cop: copula of the pyramids
Crus1: crus 1 of the ansiform lobule
Crus2: crus 2 of the ansiform lobule
Cu: cuneate nucleus
cu: cuneate fasciculus
Gel5: gelatinous layer of the caudal spinal trigeminal nucleus
Gr: gracile nucleus
gr: gracile fasciculus
Ias: lateral corticospinal tract
LSp: lateral spinal nucleus
MnA: median accessory nucleus of the medulla
PM: paramedian lobule
rs: rubrospinal tract
sf: secondary fissure
Sim: simple lobule
Sp5: spinal trigeminal tract
Sp5C: spinal trigeminal nucleus, caudal part
V1: primary visual cortex
V2: visual area 2
V3: visual area 3 (ventrolateral posterior area)
Nissl
Figure 189a
Section Interaural
#520 -6.00mm
5Cb  lobe 5 of the cerebellar vermis
6Cb  lobe 6 of the cerebellar vermis
8Cb  lobe 8 of the cerebellar vermis
9Cb  lobe 9 of the cerebellar vermis
5Sp  spinal cord layer 9
GCv  central canal
Cnp  central nervous system
Crus1 crus 1 of the ansiform lobule
Crus2 crus 2 of the ansiform lobule
Cu  cuneate nucleus
cu  cuneate fasciculus
Ge5 gelatinous layer of the caudal spinal trigeminal nucleus
gs  gracile fasciculus
LaC  lateral cervical nucleus
ls  lateral corticospinal tract
LSp  lateral spinal nucleus
MnA  median accessory nucleus of the medulla
PM  paramedian lobule
ppf  prepyramidal fissure
prf  primary fissure
sf  secondary fissure
Sim  simple lobule
Sp5  spinal trigeminal tract
Sp5c spinal trigeminal nucleus, caudal part
V1  primary visual cortex
V2  visual area 2
V3  visual area 3 (ventrolateral posterior area)
vmf  ventromedial fissure

Figure 189b
Interaural -6.00mm