The Marmos
Brain in Ste

The Marmoset Brain in Stereotaxic Coordinates

Xavier Palazzi · Nicole Bordier

The Marmoset Brain in Stereotaxic Coordinates

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Our families

Our colleagues who helped building scientific excellence at Pfizer Amboise during the last 30 years.

Preface

Laboratory-bred common marmosets (Callithrix jacchus) have a natural lifespan in captivity in excess of 12 years, and their maximum longevity is more than 16 years. Due to its small size, its relatively easy adaptation to laboratory conditions and neuroanatomical similarities with human species, this animal is considered to represent a convenient primate model for neurosciences and drug development.

During our research and due to scarce available literature data in this species, a need for some support regarding the morphological interpretation of autoradiographic data and brain anatomy was raised. Based on existing stereotaxic equipment and technological skills, we decided to build a basic atlas of the marmoset brain in stereotaxic coordinates. Several technical difficulties were addressed, and the final document is now ready after 2 years of hard work. We hope this atlas will provide a comprehensive guide for those – researchers and undergraduates – interested in the marmoset brain, tissue target characterization and comparative anatomy. The nomenclature and atlas presentation were inspired from existing reference brain atlases in other species, and the quality of illustrations was achieved thanks to automated whole slide scanning.

We would be pleased to receive comments from the delineations we have made, so that continuous improvement could be made in future editions.

France Xavier Palazzi
France Nicole Bordier

Acknowledgements

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We are indebted to Christian Jobit and Pascal Brizard for their technical assistance.

We also thank all our colleagues from the pathology department for their daily support.

About the Authors

Dr. Xavier Palazzi is a senior veterinary pathologist currently working at Biomatech-NAMSA in France where he is in charge of evaluating the preclinical safety and efficacy of medical devices. He received his DVM from Lyon veterinary school in 1998 and his French certification in veterinary pathology in 2001. He then became a diplomate of the European College of Veterinary Pathology in 2003. Hired in 2004 by Pfizer Global R&D in Amboise (France), he was put in charge of Investigative Pathology until 2007 and developed stereotaxy combined with laser capture microdissection in the marmoset in order to measure mRNA expression of selected brain nuclei for some CNS projects.

Nicole Bordier is an experienced histotechnologist and electron microscopist. She was in charge of the resin laboratory in Drug Safety Research and Development at Pfizer Amboise (France) until 2008, where she developed expert techniques in neurobiology.

Contents

1 Introduction

The marmoset (*Callithrix jacchus*) is a New World primate that is used in toxicology as a non-rodent species and more broadly, in the field of neurosciences. Among non-human primates, the marmoset represents a species of choice given its small size (14–18 cm, 400 g), biosafety, ease of handling and ethical considerations. It also allows for reducing the use of Macaques that fall under the Washington declaration. When pharmaceutical bulk is the limiting factor, the marmoset enables to progress a project rapidly to clinical phase and there is now a broad industry history of use and regulatory acceptance. It also appears to be a valuable animal model to study central nervous system (CNS) neurodegenerative diseases.

Due to little published data in this species, generating robust historical database and references is a challenge for scientists to establish leadership in the use of this model in preclinical or mechanistic studies (Saavedra, 1968; Stephan, 1980; Eidelberg, 1960). There has not been any modern brain atlas in this species commercially available since the 1980 s, so our project consisted in the generation of a new brain atlas in stereotaxic coordinates, to be made available to the scientists who work on CNS-related targets.

Consequently, pre-existing stereotaxic equipment and stereotaxy expertise had to be adapted to the marmoset. Our team benefited from the animal specimens that were used as controls in toxicology studies in order to build an atlas that would satisfy researcher's needs.

2 Surgery and Stereotaxic Approach

The study protocol was first submitted then validated by Pfizer Amboise Ethical Committee.

About 9 control adult animals (5 males and 4 females), 26–30 months old and weighing between 370 and 460 g were selected from toxicity studies. The females were used to establish the methodology, and the males permitted the validation. Furthermore, one of the males was finally used to create the original set of plates supplied in this atlas.

The animals were euthanized by an overdose of 18% sodium pentobarbitone. The animals were then positioned in a Kopf® stereotaxic frame for small animals (Cat. No. 963). The stereotaxic frame was equipped with two eye bars, two atraumatic 45° ear bars and a teeth holder (Cat. No. 948 Kopf®).

The head was positioned in the stereotaxic frame so that anterior and posterior commissures belong to the same horizontal plane, which was confirmed by histology.

Skin and muscles were then removed from the skull.

Electrodes were marked with indeleble ink, the implantation areas were marked and the skull was drilled at the precise locations. Then several electrodes were implanted post-mortem vertically and horizontally as follows:

- two electrodes (0.5 mm in diameter, 28 mm in length) were inserted vertically at +5 and –5 mm mediolaterally to bregma and left in situ in order to define the coronal plane of section and materialize the position of bregma (Fig. a). This coronal plane of section was later used as a reference for the razor blade at cryomicrotomy.
- one electrode (0.5 mm in diameter, 35 mm in length) was submitted to an electrical current and was inserted orthogonally to the coronal plane, caudorostrally at +3 and –3 mm of the midline and at 4, 6, 9 and 12 mm above the interaural line (Fig. b). This procedure allowed the precise alignment of the histological plates on the interaural line.

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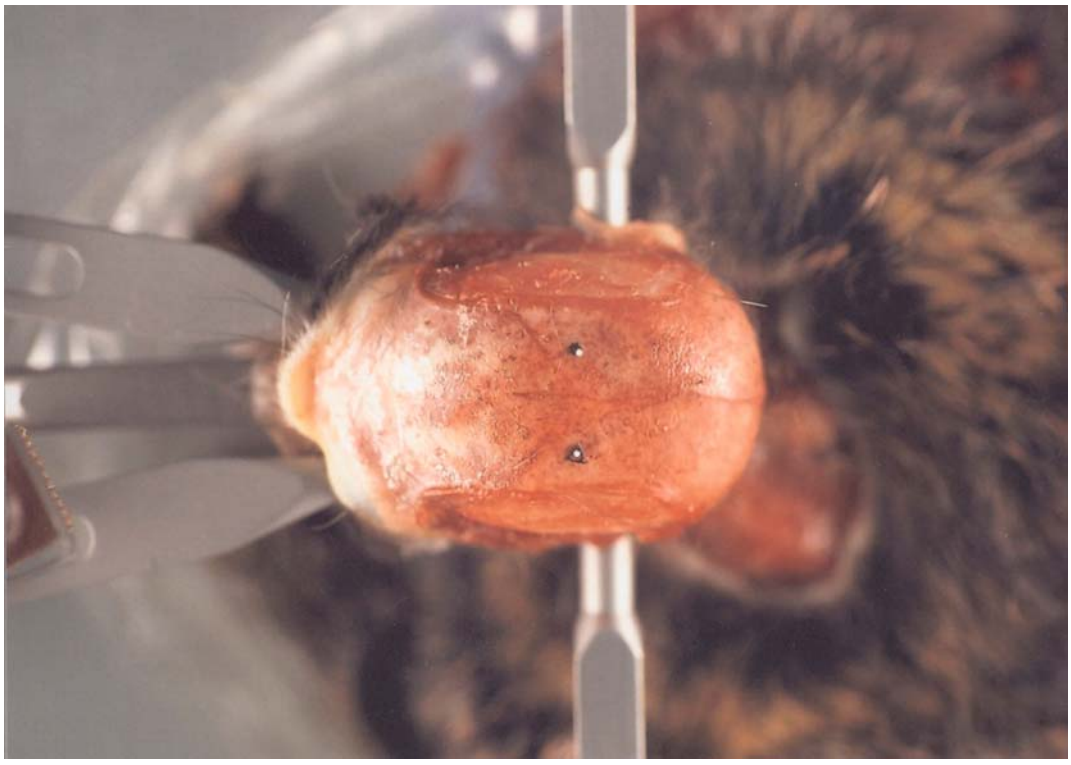

Fig. a Skull of *Callithrix jacchus* positioned in the stereotaxic frame. Holes have been drilled before the insertion of electrodes laterally to bregma

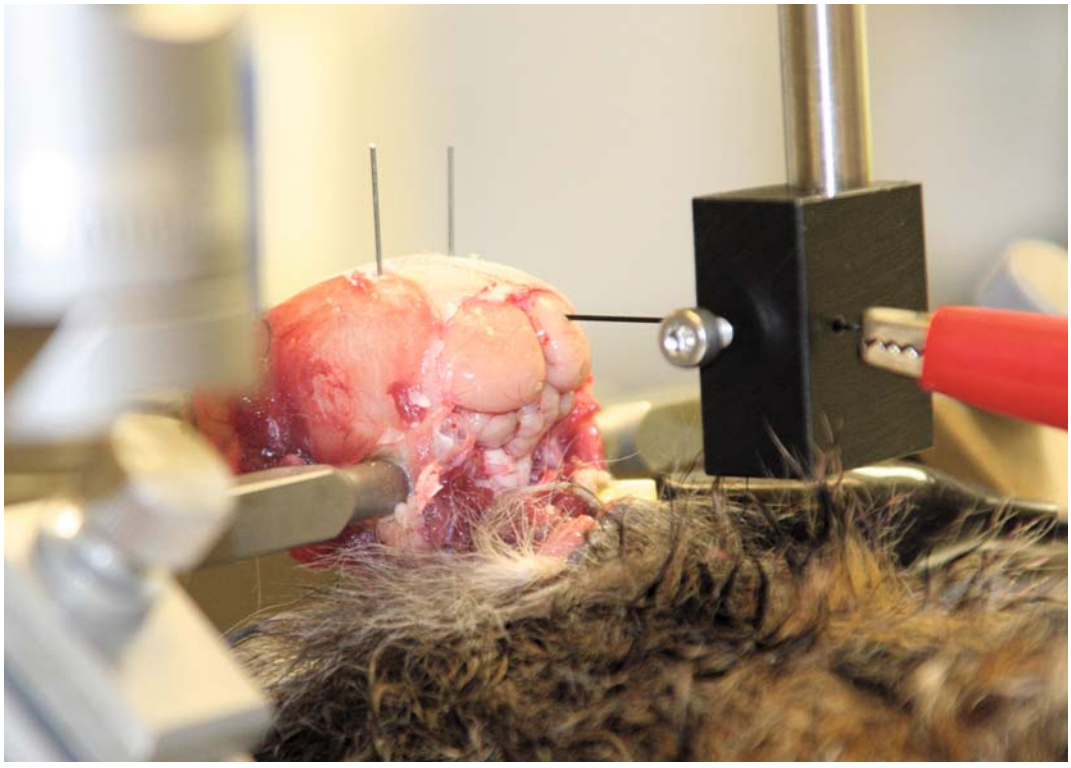

Fig. b Skull of *Callithrix jacchus* positioned in the stereotaxic frame. After implantation of vertical electrodes, the bones are carefully dissected before implanting horizontal electrodes caudorostrally. Bones and meninges were carefully removed and the brain exposed

3 Histology

3.1 Freezing

The brains were removed from the skull and placed in a mold containing OCT Compound™ embedding medium (Fig. c), then snap frozen in an isopentane jar cooled by dry ice. The blocks were then stored at –80°C prior to sectioning.

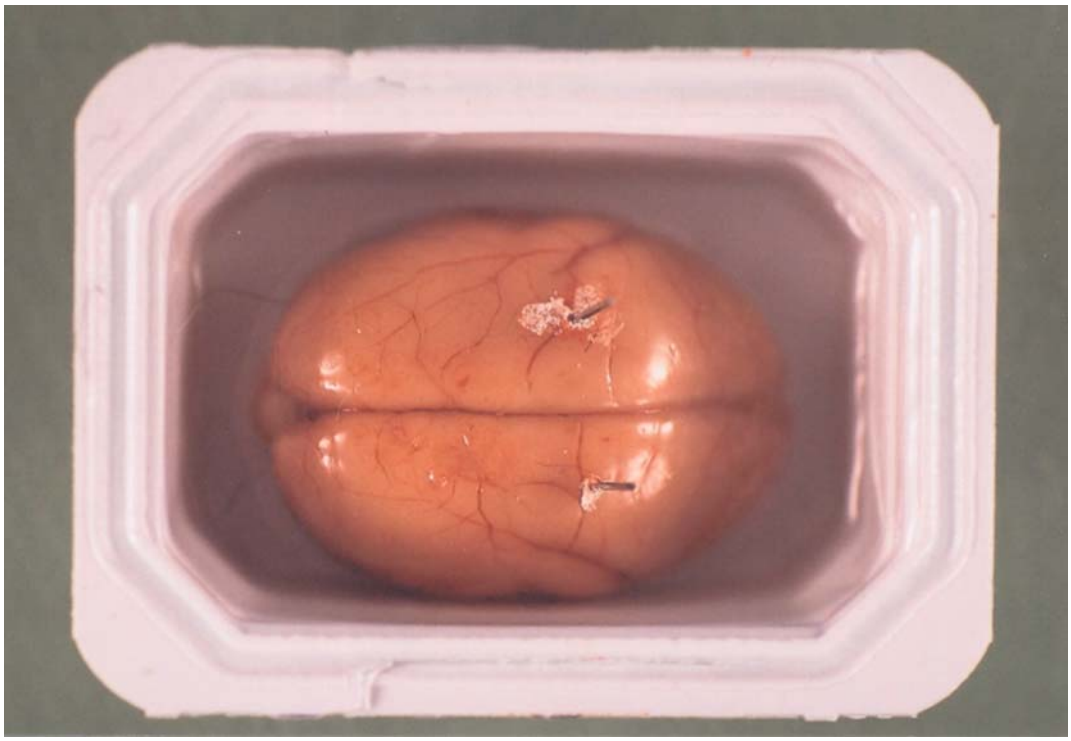

Fig. c After removal from the skull, the brain is embedded in OCT™ prior to freeze drying in isopentane cooled by dry ice

3.2 Sectioning

Frozen brains were cut on a MICROM International GmbH HM 560 MV at 20 µm. Parallel sections to the stereotaxic coronal plane were obtained by adjusting the angle of cutting to the vertically implanted electrodes.

At each of the 48 levels, six sections were taken on uncoated slides. Adjacent levels were at 500 µm distance from each other.

Slides were stored at –20°C until staining.

3.3 Staining

Two sections were stained at each of the 48 levels, one by acetyl choline esterase (AChE) histochemistry (Kawagishi, 1991) and the other one by cresyl violet histochemistry. Only AChE-stained slides are presented in this atlas; cresyl violet-stained slides were used to help delineate the structures. The method for the demonstration of AChE was adapted from Chayen & Bitensky (1991).

3.3.1 AChE Staining Method

Rinse: 50 mM sodium acetate buffer (3 min)
Incubate: Substrate solution (one night at 37°C)
Rinse: Distilled water (2 × 1 min)
Reveal: 1% ammonium sulphide (10 min)
Rinse: Distilled water (2 × 1 min)
Fix: Lillie 10% formaldehyde (10 min)
Rinse: Distilled water (2 × 1 min)
Dehydrate: 70% alcohol and 100% alcohol (1 min, each)
Xylene: 2 × 3 min
Neutral synthetic resin medium was used to mount glass cover slips.

3.3.2 Solutions

3.3.2.1 50 mM Sodium Acetate Buffer

0.68 g of sodium acetate (trihydrated)
0.1 g of anhydric copper sulphate
0.12 g of glycine
100 ml of distilled water
Lower the pH to 5 with HCl

3.3.2.2 Substrate Solution

100 ml of 50 mM Sodium Acetate Buffer
116 mg of *S*-acetylthiocholine iodide

4 Data Capture

Whole histology slides were scanned at a ×40 magnification using the automated Illumea™ system. The resulting virtual slides were then exported to Adobe Photoshop™ CS2 for further contrast optimization. All files were processed in .tif format. There was no mirror-image drawing and the drawings depict the asymmetries and defects present in the sections.

5 Reference Planes and Stereotaxic Accuracy

Bregma, interaural line and midline were used as references to build the three-dimensional stereotaxic system. These landmarks were used to establish the stereotaxic grid and legends on each plate.

The number at the botton right of each plate shows the anteroposterior distance from bregma.

The numbers on the left margin show the dorsoventral distance from the horizontal plane passing through the interaural plane.

The numbers on the bottom margin show the distance of structures from the midline.

One lateral and one ventral schematic brain diagram were added in order to figure the level of section. The stereotaxic reference grid shows 1 mm intervals.

In order to check for technical artefacts, fresh brains were measured rostrocaudally and mediolaterally. These measurements were repeated post-freezing for comparison. The overall variability was found to be less than 3%, so it was decided not to perform any mathematic adjustment of stereotaxic coordinates.

6 Nomenclature

English nomenclature was preferred to Latin terms, except for certain instances where there was no equivalent (Carpenter, 1991). For consistency between species and stable neuroanatomical nomenclature, our nomenclature was compared with the excellent reference atlases from Paxinos in Rhesus monkey and rat and similar terms were used as often as possible (Paxinos, 1995; Paxinos & Watson, 1986; Paxinos & Huang, 2000), (Mai, 2004).

Major cerebral regions have been delineated and labelled on the left side of each plate, while details appear on the right side.

An index and a list of structures were created in order to facilitate the use of this document.

7 List of Structures

A

Abducens nucleus, 6 N
Accumbens nucleus, core AcbC
Accumbens nucleus, shell AcbSh
Alveus of the hippocampus, alv
Ansiform lobule of the cerebellum, ans
Anterior cingulate gyrus, ACg
Anterior amygdaloid area, AA
Anterior commissure, ac
Anterior commissure, anterior part aca
Anterior commissure, posterior part acp
Amygdalohippocampal area, AHi
Anterior olfactory nucleus, AO
Aqueduct, Aq
Arcuate hypothalamic nucleus, Arc
Azygos anterior cerebral artery, azac
Azygos pericallosal artery, azp

B

Basal interstitial, BI
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, ventromedial part BLVM
Basomedial amygdaloid nucleus, BM
Basomedial amygdaloid nucleus, magnocellular part BMMC
Basomedial amygdaloid nucleus, parvicellular part BMPC
Basomedial amygdaloid nucleus, parvicellular part, ventral division BMPCV
Bed nucleus of the stria terminalis, BST
Bed nucleus of the stria terminalis, intraamygdaloid division BSTIA
Brachium of the inferior colliculus, bic
Brachium of the superior colliculus, bsc

C

Calcarine sulcus, cal
Caudate nucleus, Cd
Central amygdaloid nucleus, lateral division, CeL
Central amygdaloid nucleus, medial division CeM,
Central canal, CC,
Central medial thalamic nucleus, CM,
Central nucleus of the inferior colliculus, CIC
Central tegmental tract, ctg
Cerebellar lobule 1, Cb1
Cerebellar lobule 10, Cb10
Cerebellar lobule 2, Cb2
Cerebellar lobule 3, Cb3,
Cerebellar lobule 4, Cb4,
Cerebellar lobule 5, Cb5
Cerebellar lobule 6, Cb6
Cerebellar lobule 7, Cb7
Cerebellar lobule 8, Cb8
Cerebellar lobule 9, Cb9
Cerebral peduncle, basal part cp,
Choroid plexus, chp
Cingulate cortex, Cg
Claustrum, Cl
Commissure of the inferior colliculus, cic
Copula of the pyramis, Cop
Corona radiata, cr,
Corpus callosum, cc,
Crus 1 of the ansiform lobule, Crus1
Crus 2 of the ansiform lobule, Crus2,
Cuneate nucleus, Cu,
Cuneate fasciculus cu
Cuneiform nucleus, CnF,

D

Decussation of the superior cerebellar peduncle, xscp,
Deep mesencephalic nucleus, DpMe
Dorsal 3rd ventricle, D3V,
Dorsal cortex of the inferior colliculus, DCIC
Dorsal endopiriform nucleus, DEn
Dorsal lateral geniculate nucleus, DLG,
Dorsal nucleus of the lateral lemniscus, DLL
Dorsal paraflocculus, DPFl
Dorsal raphe nucleus, DR
Dorsal spinocerebellar tract, dsc
Dorsal tegmental nucleus, DTg

Dorsomedial hypothalamic nucleus, DM
Dorsomedial hypothalamic nucleus, compact part, DMC

E
Edinger–Westphal nucleus, EW
Entorhinal cortex, Er
External capsule, ec
External cortex of the inferior colliculus, ECIC
External cuneate nucleus, ECu
External globus pallidus, EGP
External medullary lamina, eml
Extreme capsule, ex

F
Facial nucleus, 7N
Fasciculus retroflexus, fr
Field CA1 of hippocampus, CA1
Field CA3 of hippocampus, CA3
Field CA4 of hippocampus, CA4
Fimbria of the hippocampus, fi
Flocculus, Fl
Fornix, f
Frontal cortex, Fr

G
Genu of the facial nerve, g7
Gigantocellular reticular nucleus, Gi
Gracile fasciculus, gr
Gracile nucleus, Gr
Granular layer of the dentate gyrus GrDG

H
Hippocampal fissure, hf
Hippocampus, CA
Hippocampus supracommissuralis, HR
Hypoglossal nucleus, 12 N

I
Indusium griseum, IG
Inferior cerebellar peduncle (restiform body), icp
Inferior olive, IO
Inferior pulvinar, IPul
Infundibular stem, InfS
Insularis cortex, CIn
Intermediate nucleus of the lateral lemniscus, ILL
Internal capsule, ic
Internal carotid artery, ictd
Internal globus pallidus, IGP
Interpeduncular fossa, IPF
Interpeduncular nucleus, IP
Interpeduncular nucleus, caudal subnucleus IPC
Interpeduncular nucleus, rostral subnucleus IPR
Interpeduncular nucleus, lateral subnucleus IPL
Interposed cerebellar nucleus, Int
Interposed cerebellar nucleus, anterior part IntA,
Interposed cerebellar nucleus, posterior part IntP,

L
Lacunosum moleculare layer of the hippocampus, LMol
Lateral corticospinal tract, lcsp
Lateral (dentate) cerebellar nucleus, Lat
Lateral amygdaloid nucleus, La
Lateral dorsal thalamic nucleus, superficial part LDSF,
Lateral fissure, lf
Lateral geniculate artery, lga
Lateral hypothalamic area, LH
Lateral habenular nucleus, LHb
Lateral lemniscus, ll
Lateral mammillary nucleus, LM
Lateral medullary lamina, lml
Lateral olfactory tract, lo
Lateral parabrachial nucleus, LPB
Lateral pulvinar, LPul
Lateral reticular nucleus, LRt
Lateral septal nucleus, dorsal part LSD,
Lateral septal nucleus, intermediate part LSI,
Lateral septal nucleus, ventral part LSV,
Lateral ventricle, LV
Lateral vestibulospinal tract, lvsp
Lenticular fasciculus, lenf
Longitudinal fasciculus of the pons, lfp,

M
Magnocellular layer of the caudal spinal trigeminal nucleus, MC5
Medial amygdaloid nucleus, Me
Medial (fastigial) cerebellar nucleus, Med,
Medial eminence, external layer MEE,
Medial eminence, internal layer MEI,
Medial geniculate nucleus, dorsal part MGD,
Medial geniculate nucleus, medial part MGM,
Medial geniculate nucleus, ventral part MGV
Medial habenular nucleus, MHb
Medial lemniscus, ml
Medial longitudinal fasciculus, mlf,
Medial mammillary nucleus, lateral part ML,
Medial mammillary nucleus, medial part MM
Medial medullar lamina, mml
Medial parabrachial nucleus, MPB
Medial pulvinar, MPul
Medial septal nucleus, MS
Median raphe nucleus, MnR
Mediodorsal thalamic nucleus, central part MDC,
Mediodorsal thalamic nucleus, dorsal part MDD,
Mediodorsal thalamic nucleus, lateral part MDL,
Mediodorsal thalamic nucleus, medial part MDM,

Middle cerebellar peduncle, mcp
Middle cerebral artery, mcer
Molecular layer of the dentate gyrus, Mol
Motor and premotor cortex, MPr
Motor trigeminal nucleus, Mo5

N
Nucleus of the brachium of the inferior colliculus, BIC
Nucleus of the horizontal limb of the diagonal band, HDB
Nucleus of the vertical limb of the diagonal band, VDB

O
Occipital cortex, OcC
Occipitotemporal sulcus, ots
Oculomotor nerve or its root, 3 n
Olivary nuclei, On
Olivocerebellar tract, oc
Optic chiasm, ox
Optic nerve, 2 n
Optic tract, opt

P
Parabigeminal nucleus, PBG
Paracollicular tegmentum, PCTg
Paralambdoid septal nucleus, PLd
Paramedian lobule, PM
Paramedian raphe nucleus, PMnR
Paramedian reticular nucleus, PMn
Parasubiculum, PaS
Paraventricular hypothalamic nucleus, parvicellular part PaP
Paraventricular thalamic nucleus, PV
Parietal cortex, PaC
Parvicellular reticular nucleus, PCRT
Pedunculopontine tegmental nucleus, compact part PPTgC
Pedunculopontine tegmental nucleus, diffuse part PPTgD
Periaqueducal gray, PAG
Peripeduncular nucleus, PP
Pineal gland, Pi
Polymorph layer of the dentate gyrus, PoDG
Pontine nuclei, Pn
Pontine reticular nucleus, oral part PnO
Posterior cerebral artery, pcer
Posterior commissure, pc
Posterior hypothalamic area, PH
Posterior paraflocculus, PPFl
Prepositus nucleus, Pr
Presubiculum, PrS
Prosubiculum, ProS
Pulvinar nuclei, Pul
Putamen, Pu
Pyramidal cell layer of the hippocampus, Py
Pyramidal decussation, pyx
Pyramidal tract, py

R
Recess of the inferior colliculus, ReIC
Red nucleus, magnocellular part RMC,
Red nucleus, parvicellular part RPC,
Reticular thalamic nucleus, Rt
Reticulotegmental nucleus of the pons, RtTg
Reuniens thalamic nucleus, Re
Rostrum of the corpus callosum, rcc

S
Sagulum nucleus, Sag
Septofimbrial nucleus, SFi
Septohippocampal nucleus, SHi
Simple lobule, Sim
Solitary nucleus, Sol
Spinal trigeminal nucleus, Sp5
Spinal trigeminal tract, p5
Spinothalamic tract, spth
Stratum lucidum of the hippocampus, Lu
Stria medullaris of the thalamus, sm
Stria terminalis, st
Subcommissural organ, SCO
Subfornical organ, SFO
Subiculum, S
Substantia nigra, SN
Subthalamic nucleus, STh
Superior cerebellar peduncle (brachium conjunctivum), scp
Superior colliculus, SC
Superior medullary velum, SMV,
Supragenual nucleus, SGe
Supramammillary nucleus, SuM
Supraoptic decussation, sox
Supraoptic nucleus, retrochiasmatic part SOR,

T
Tectospinal tract, ts,
Temporal cortex, TE

V
Ventral anterior cortical nucleus of the amygdale, VACo
Ventral anterior thalamic nucleus, lateral part VAL,
Ventral anterior thalamic nucleus, medial part VAM,
Ventral cochlear nucleus, anterior part VCA,
Ventral cochlear nucleus, posterior part VCP,
Ventral cortical amygdaloid nucleus, VCo
Ventral hippocampal commissure, vhc
Ventral horn, VH
Ventral lateral geniculate nucleus, VLG
Ventral lateral thalamic nucleus, lateral part VLL,
Ventral lateral thalamic nucleus, medial part VLM,

Ventral nucleus of the lateral lemniscus, VlL
Ventral pallidum, VP
Ventral paraflocculus, VPFl
Ventral posterolateral thalamic nucleus, VPL
Ventral posteromedial thalamic nucleus, VPM
Ventral spinocerebellar tract, vsc
Ventral tegmental area, VTA
Ventromedial hypothalamic nucleus, VMH
Vestibular nuclei, VeN

Z
Zonal layer of the superior colliculus, Zo
Zona incerta, ZI

8 Index of Abbreviations

Abbreviations are given in alphabetical order followed by their full meaning and the plate numbers where these are mentioned. They were built so as to give an intuitive idea of the structure they represent. They were also aligned on reference neuroanatomical atlases in other laboratory animal species by Paxinos.

2 n optic nerve, 13
3 n oculomotor nerve or its root, 17–21
3 V 3rd ventricle, 14–22
4 n trochlear nerve or its root, 26–30
4 V 4th ventricle, 30–37
4x trochlear decussation, 30
6 N abducens nucleus, 31–32
6 n root of abducens nerve, 27
7 N facial nucleus, 31–33
12 N hypoglossal nucleus, 37

A
AA anterior amygdaloid area, 13–15
ac anterior commissure, 14–16
aca anterior commissure, anterior part, 11–13
AcbC accumbens nucleus, core, 10–13
AcbSh accumbens nucleus, shell, 10–13
ACg anterior cingulate gyrus, 4–5
acp anterior commissure, posterior part, 14–18
AHi amygdalohippocampal area, 19
alv alveus of the hippocampus, 19–29
ans ansiform lobule of the cerebellum, 38–40
AO anterior olfactory nucleus, 5–8
Aq aqueduct, 23–29
Arc arcuate hypothalamic nucleus, 17–20
azac azygos anterior cerebral artery, 9–10
azp azygos pericallosal artery, 9–20, 24–25

B
B basal nucleus (Meynert), 14–20
BI basal interstitial, 37
BIC nucleus of the brachium of the inferior colliculus, 29
bic brachium of the inferior colliculus, 27–30
BL basolateral amygdaloid nucleus, 13–14
BLD basolateral amygdaloid nucleus, dorsal part, 15–16
BLDL basolateral amygdaloid nucleus, dorsolateral part, 15
BLI basolateral amygdaloid nucleus, intermediate part, 15–18
BLVM basolateral amygdaloid nucleus, ventromedial part, 15–16
BM basomedial amygdaloid nucleus, 13–15
BMMC basomedial amygdaloid nucleus, magnocellular part, 15–16
BMPC basomedial amygdaloid nucleus, parvicellular part, 16
BMPCV basomedial amygdaloid nucleus, parvicellular part, ventral division, 15
bsc brachium of the superior colliculus, 26–28
BST bed nucleus of the stria terminalis, 14–17
BSTIA bed nucleus of the stria terminalis, intraamygdaloid division, 19–20

C
CA hippocampus, 17–18
CA1 field CA1 of hippocampus, 19–29
CA3 field CA3 of hippocampus, 19–28
CA4 field CA4 of hippocampus, 21–29
cal calcarine sulcus, 30–45
Cb1 cerebellar lobule 1, 32–34
Cb10 cerebellar lobule 10, 35–37
Cb2 cerebellar lobule 2, 30–34
Cb3 cerebellar lobule 3, 31–34
Cb4 cerebellar lobule 4, 33–35
Cb5 cerebellar lobule 5, 33–42
Cb6 cerebellar lobule 6, 33–43
Cb7 cerebellar lobule 7, 39–47
Cb8 cerebellar lobule 8, 38–47
Cb9 cerebellar lobule 9, 38–42
CC central canal, 38–41
cc corpus callosum, 9–29
Cd caudate nucleus, 8–28
CeL central amygdaloid nucleus, lateral division, 15–17
CeM central amydaloid nucleus, medial division, 15–18
Cg cingulate cortex, 6–26
chp choroid plexus, 26
CIC central nucleus of the inferior colliculus, 29–32
cic commissure of the inferior colliculus, 31
CIn insularis cortex, 9–25
Cl claustrum, 13–24
CM central medial thalamic nucleus, 18
CnF cuneiform nucleus, 30

Cop copula of the pyramis, 38–43
cp cerebral peduncle, basal part, 20–24
cr corona radiata, 7–23
Crus1 crus 1 of the ansiform lobule, 38–43
Crus2 crus 2 of the ansiform lobule, 38–43
ctg central tegmental tract, 25
Cu cuneate nucleus, 36–40
cu cuneate fasciculus, 39–41

D
D3 V dorsal 3rd ventricle, 23–26
DCIC dorsal cortex of the inferior colliculus, 29–32
DEn dorsal endopiriform nucleus, 14
DLG dorsal lateral geniculate nucleus, 21–25
DLL dorsal nucleus of the lateral lemniscus, 27
DM dorsomedial hypothalamic nucleus, 18–19
DMC dorsomedial hypothalamic nucleus compact part, 18
DPFl dorsal paraflocculus, 36–37
DpMe deep mesencephalic nucleus, 21–28
DR dorsal raphe nucleus, 26–28
dsc dorsal spinocerebellar tract, 38–41
DTg dorsal tegmental nucleus, 29–30

E
ec external capsule, 13–24
ECIC external cortex of the inferior colliculus, 29–32
ECu external cuneate nucleus, 36–38
EGP external globus pallidus, 14–20
eml external medullary lamina, 21–28
Er entorhinal cortex, 13–23
EW Edinger–Westphal nucleus, 23
ex extreme capsule, 13–24

F
f fornix, 17–21
fi fimbria of the hippocampus, 23–28
Fl flocculus, 36
Fr frontal cortex, 1–12
fr fasciculus retroflexus, 23–24

G
g7 genu of the facial nerve, 31–32
Gi gigantocellular reticular nucleus, 31–36
Gr gracile nucleus, 38–41
gr gracile fasciculus, 41
GrDG granular layer of the dentate gyrus, 20–29

H
HDB nucleus of the horizontal limb of the diagonal band, 11–14
hf hippocampal fissure, 20–29
HR hippocampus supracommissuralis, 30

I
ic internal capsule, 9–26
icp inferior cerebellar peduncle (restiform body), 31–37
ictd internal carotid artery, 17
IG indusium griseum, 14–19
IGP internal globus pallidus, 17–20
ILL intermediate nucleus of the lateral lemniscus, 27
InfS infundibular stem, 16
Int interposed cerebellar nucleus, 34–35
IntA interposed cerebellar nucleus, anterior part, 36–37
IntP interposed cerebellar nucleus, posterior part, 36–38
IO inferior olive, 31–37
IP interpeduncular nucleus, 26
IPC interpeduncular nucleus, caudal subnucleus, 22–24
IPF interpeduncular fossa, 21
IPL interpeduncular nucleus, lateral subnucleus, 22–23
IPR interpeduncular nucleus, rostral subnucleus, 21–24
IPul inferior pulvinar, 24–26

L
La lateral amygdaloid nucleus, 13–18
Lat lateral (dentate) cerebellar nucleus, 34–37
lcsp lateral corticospinal tract, 39
LDSF lateral dorsal thalamic nucleus, superficial part, 20–22
lenf lenticular fasciculus, 18–21
lf lateral fissure, 12–25
lfp longitudinal fasciculus of the pons, 24–29
lga lateral geniculate artery, 22
LH lateral hypothalamic area, 17–20
LHb lateral habenular nucleus, 25–26
ll lateral lemniscus, 27–28
LM lateral mammillary nucleus, 18–19
lml lateral medullary lamina, 15–21
LMol lacunosum moleculare layer of the hippocampus, 20–29
lo lateral olfactory tract, 5–10
LPB lateral parabrachial nucleus, 31
LPul lateral pulvinar, 24–27
LRt lateral reticular nucleus, 35–36
LSD lateral septal nucleus, dorsal part, 11–16
LSI lateral septal nucleus, intermediate part, 11–16
LSV lateral septal nucleus, ventral part, 11–14
Lu stratum lucidum of the hippocampus, 19
LV lateral ventricle, 7–32
lvsp lateral vestibulospinal tract, 38–40

M
m5 motor root of the trigeminal nerve, 26–30
MC5 magnocellular layer of the caudal spinal trigeminal nucleus, 38–41
mcer middle cerebral artery, 12–15
mcp middle cerebellar peduncle, 24–33
MDC mediodorsal thalamic nucleus, central part, 20–23
MDD mediodorsal thalamic nucleus, dorsal part, 20
MDL mediodorsal thalamic nucleus, lateral part, 20–23
MDM mediodorsal thalamic nucleus, medial part, 20–22
Me medial amygdaloid nucleus, 15–17
Med medial (fastigial) cerebellar nucleus, 34–37
MEE medial eminence, external layer, 17
MEI medial eminence, internal layer, 17
MGD medial geniculate nucleus, dorsal part, 24–25

VLL ventral lateral thalamic nucleus, lateral part, 19–21
VlL ventral nucleus of the lateral lemniscus, 27
VLM ventral lateral thalamic nucleus, medial part, 20–21
VMH ventromedial hypothalamic nucleus, 18
VP ventral pallidum, 14–16
VPFl ventral paraflocculus, 28–32
VPL ventral posterolateral thalamic nucleus, 22–23
VPM ventral posteromedial thalamic nucleus, 22–23
vsc ventral spinocerebellar tract, 28–29, 40–41
VTA ventral tegmental area, 21–25

X
xscp decussation of the superior cerebellar peduncle, 24–27

Z
ZI zona incerta, 21
Zo zonal layer of the superior colliculus, 32

9 List of Major Brain Areas

The major cerebral regions are given by order of apparition and followed by the plate numbers where these are mentioned.

I. Cerebral cortex (telencephalon), 1–48
II. Olfactory pathways (telencephalon), 5–10
III. Corpus striatum and related nuclei (telencephalon) 8–28
IV. Septum (telencephalon), 11–19
V. Optic tract (diencephalon), 13–23
VI. Amygdala (telencephalon), 13–18
VII. Hypothalamus (diencephalon), 15–22
VIII. Hippocampus (telencephalon), 17–30
IX. Thalamus (diencephalon), 17–29
X. Mesencephalon, 21–32
XI. Pons (metencephalon), 22–37
XII. Cerebellum (metencephalon), 24–47
XIII. Medulla (myelencephalon), 30–41

10 Conclusion

Due to the necessity to better characterize CNS targets, this work sets the basis for further comparison with Cynomolgus monkeys and humans, promoting the marmoset as a highly valuable model for CNS toxicity. It also enables to get an access to brain nuclei and circuitries involved in physiology and pathology. It represents a reference for normal morphology, and it facilitates further messenger RNA characterization at extremely precise locations by laser capture microdissection.

Overall, this atlas will enable scientists to increase their confidence in rationale and safety in this emerging non-rodent model.

11 References

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12 Plates

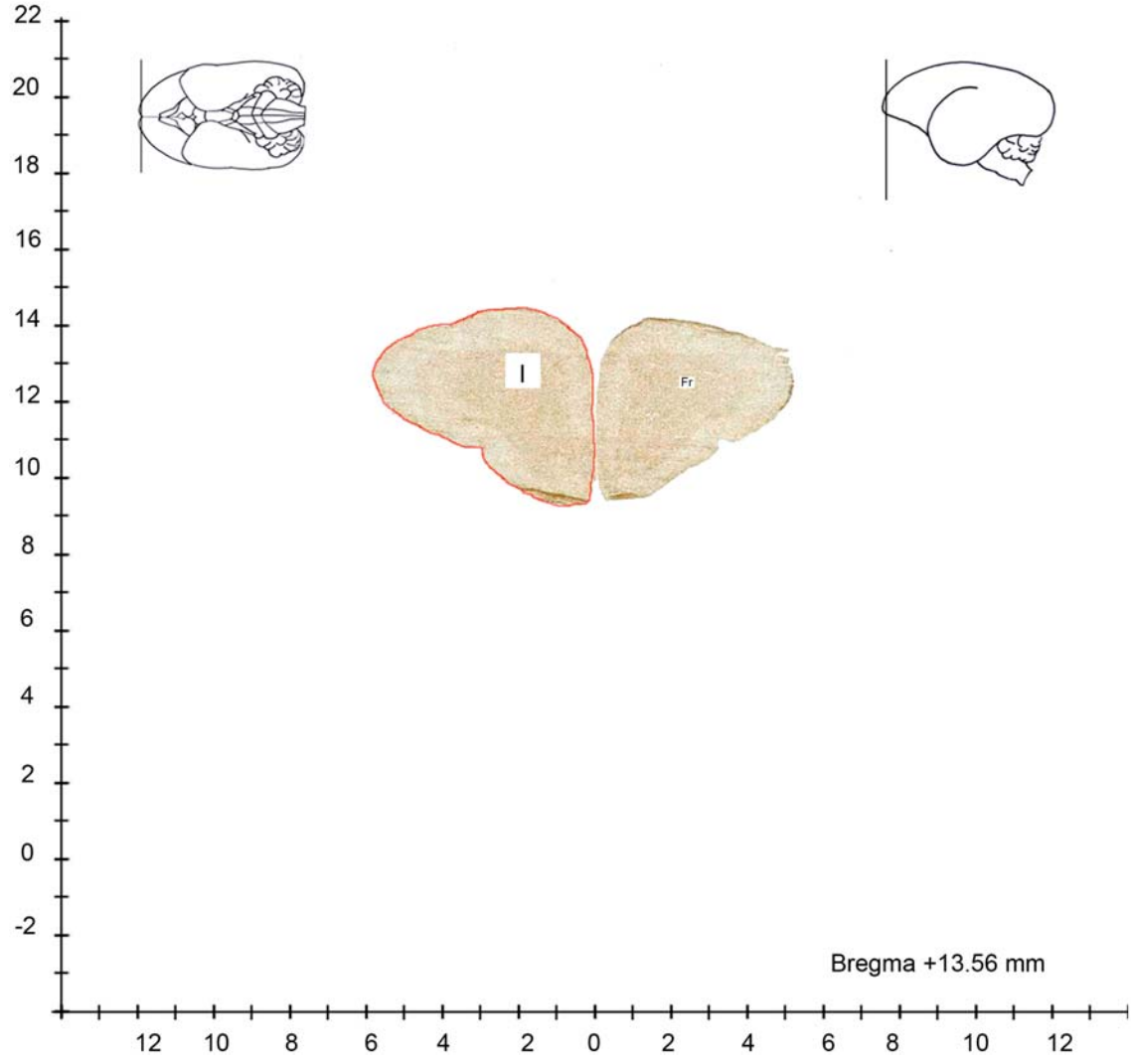

Figure 1

Fr frontal cortex

I Cerebral cortex (telencephalon)

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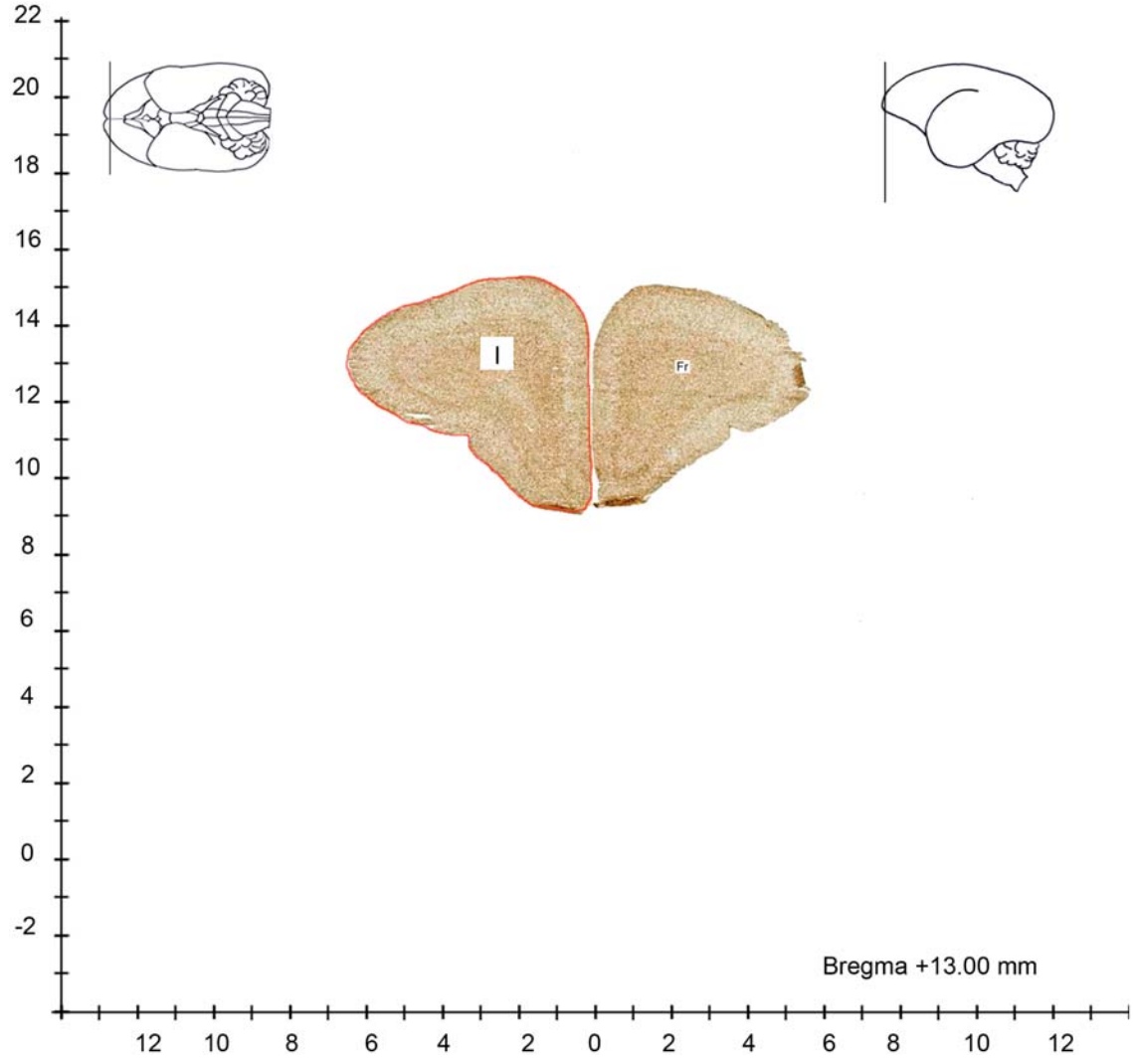

Figure 2

Fr frontal cortex

I Cerebral cortex (telencephalon)

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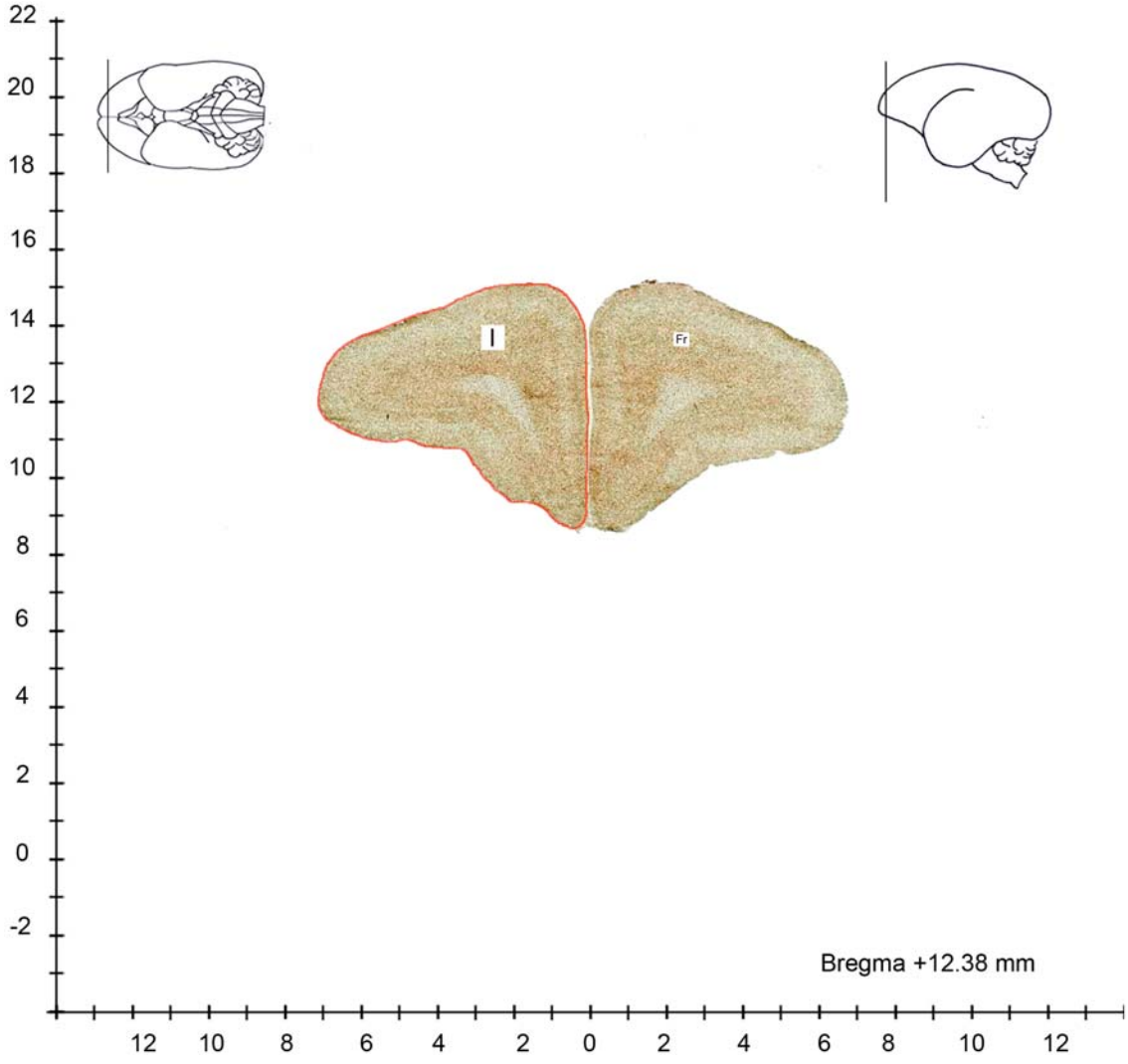

Figure 3

Fr frontal cortex

I Cerebral cortex (telencephalon)

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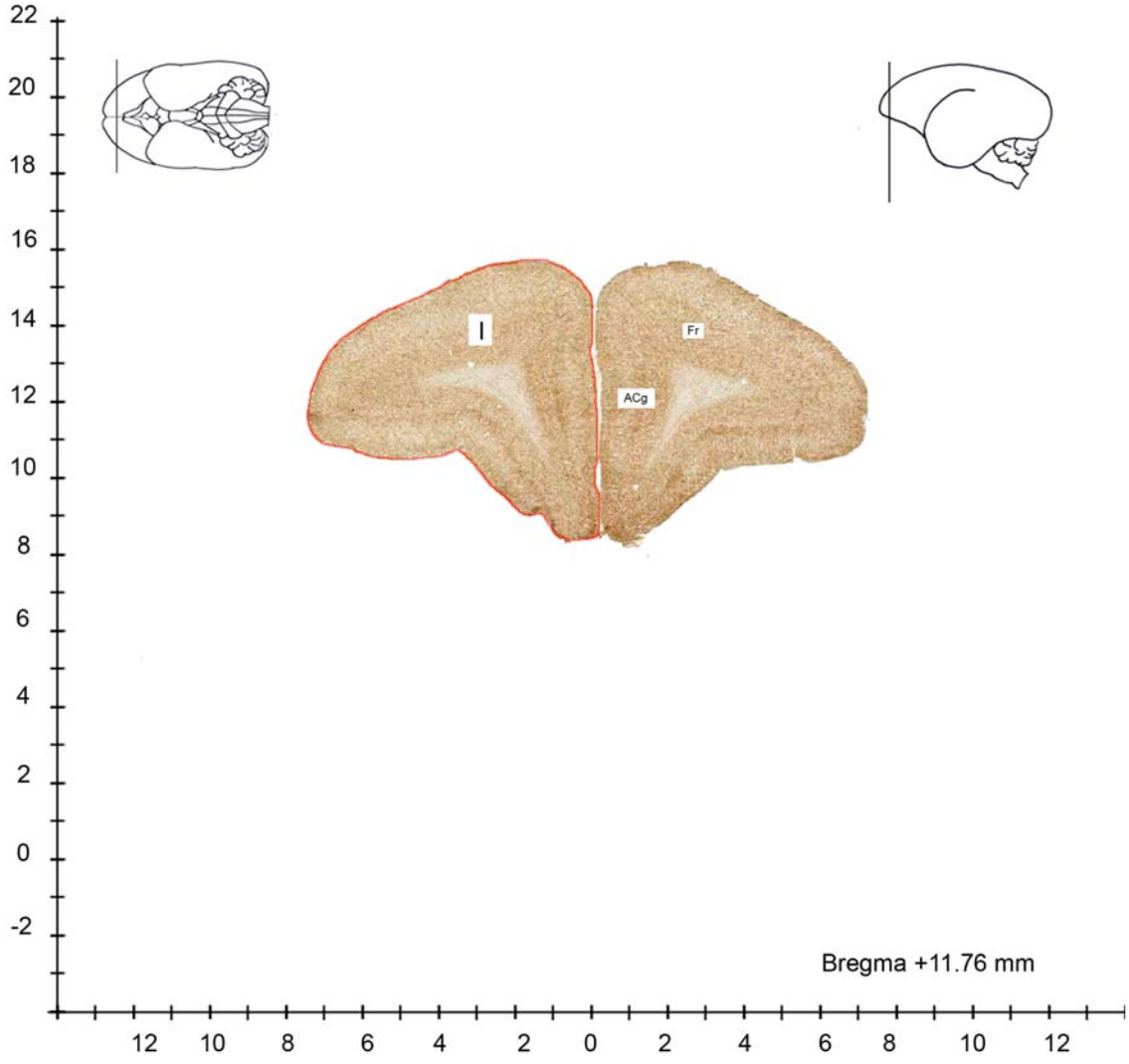

Figure 4

ACg anterior cingulate cortex
Fr frontal cortex

I Cerebral cortex (telencephalon)

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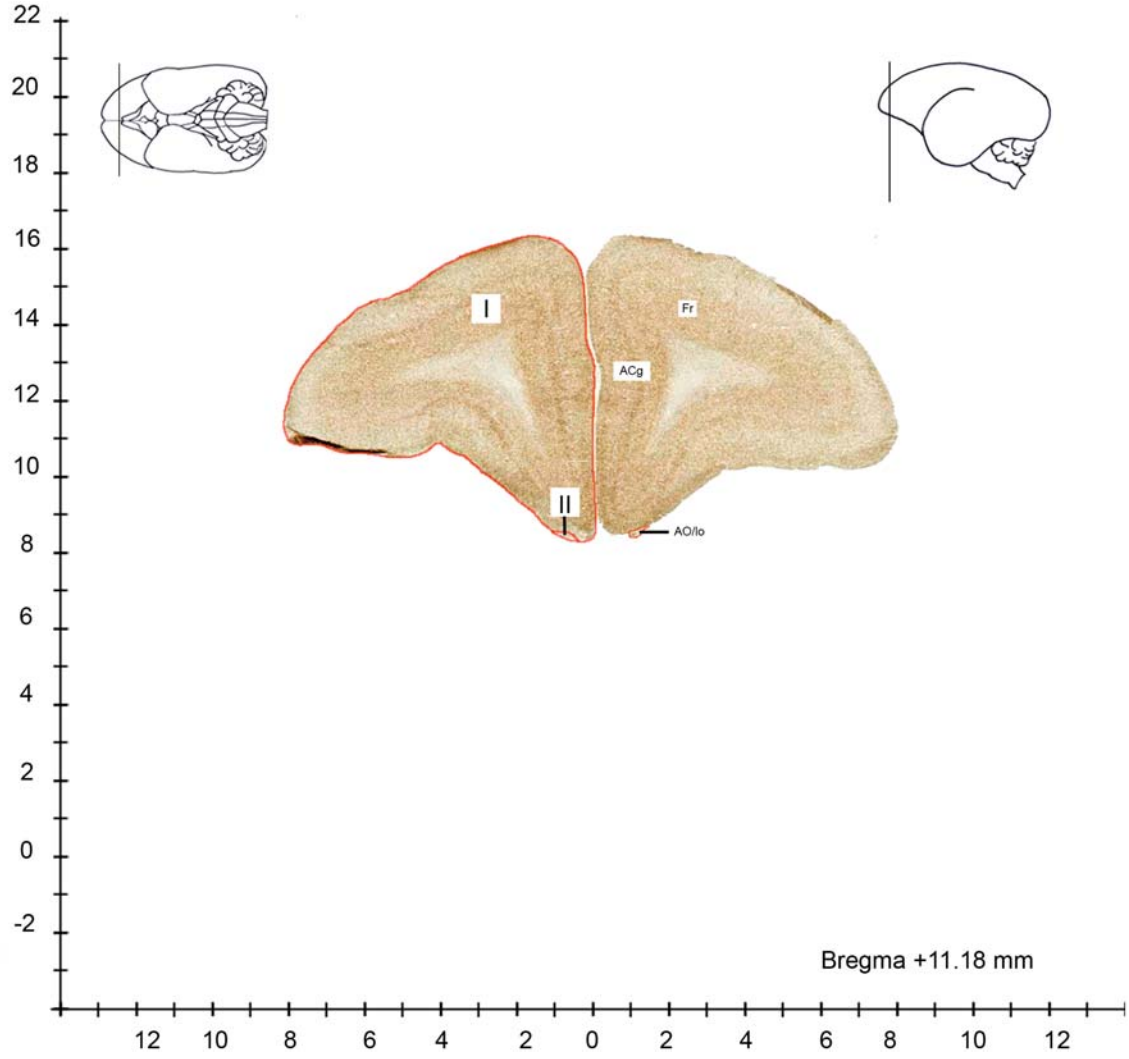

Figure 5

ACg anterior cingulate cortex
AO anterior olfactory nucleus
Fr frontal cortex
lo lateral olfactory tract
I Cerebral cortex (telencephalon)
II Olfactory pathways (telencephalon).

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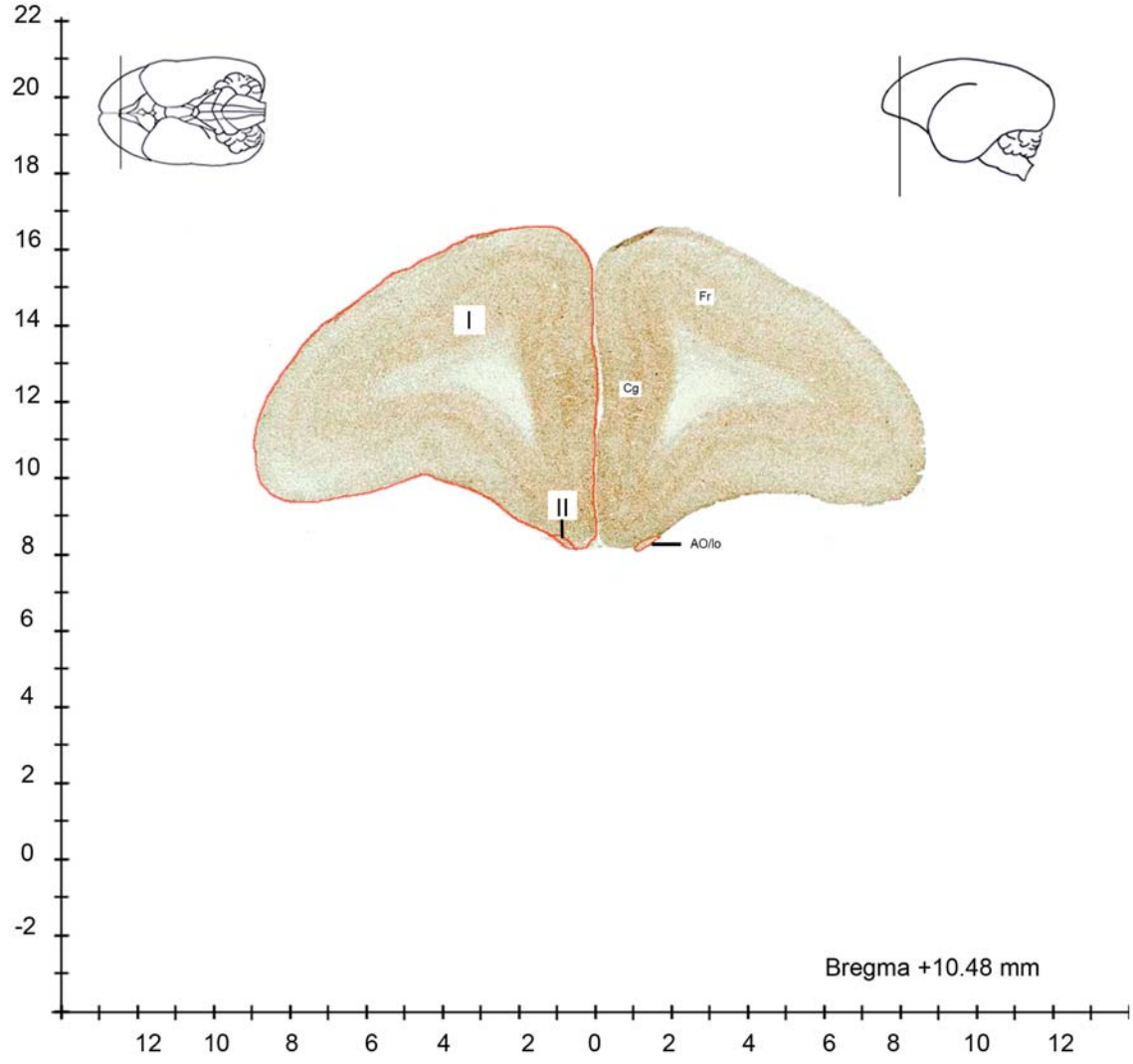

Figure 6

AO anterior olfactory nucleus
Cg cingulate cortex
Fr frontal cortex
lo lateral olfactory tract
I Cerebral cortex (telencephalon)
II Olfactory pathways (telencephalon)

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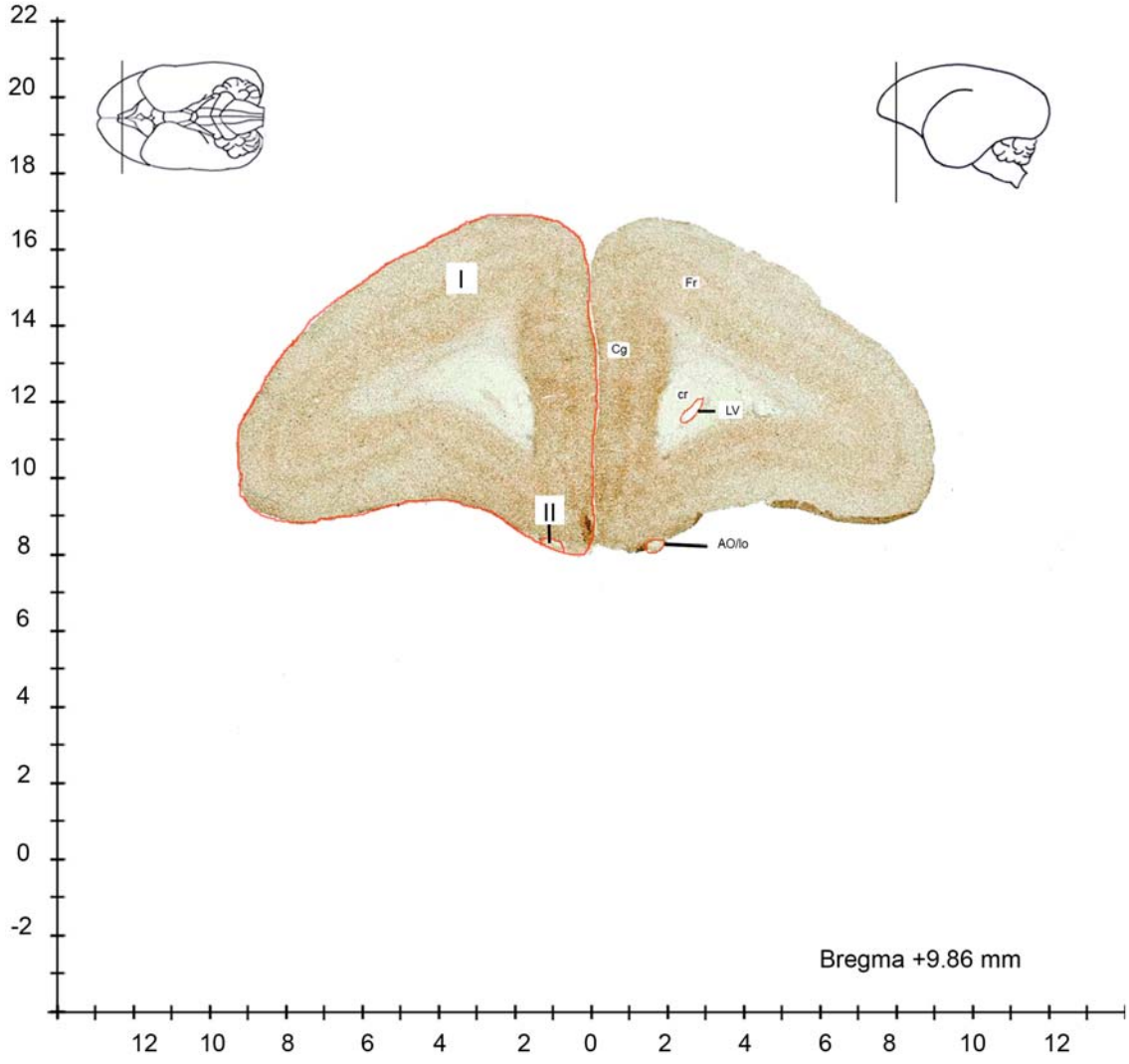

Figure 7

AO anterior olfactory nucleus
Cg cingulate cortex
cr corona radiata
Fr frontal cortex
lo lateral olfactory tract
LV lateral ventricle

I Cerebral cortex (telencephalon)
II Olfactory pathways (telencephalon)

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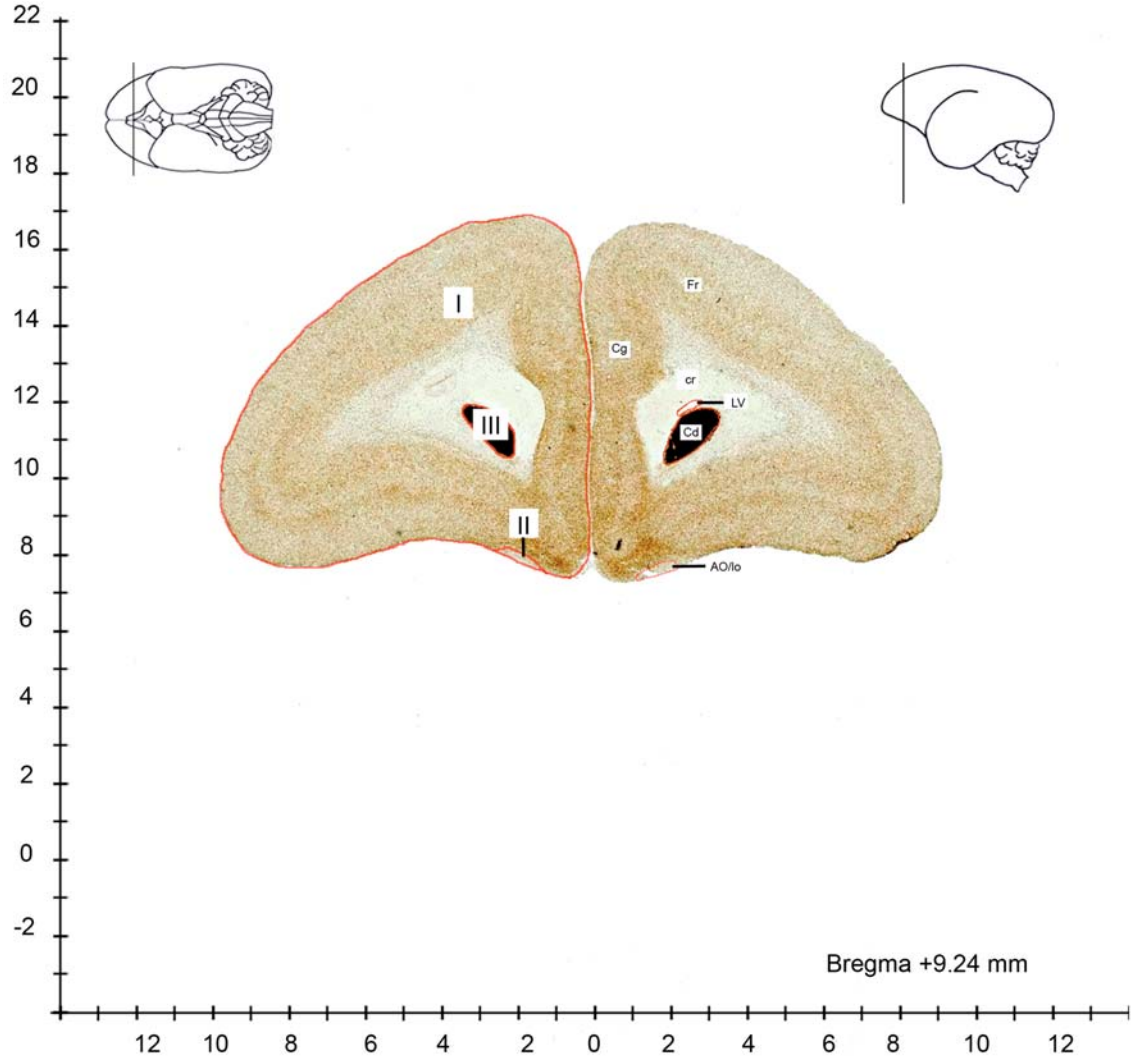

Figure 8

AO anterior olfactory nucleus
Cd caudate nucleus
Cg cingulate cortex
cr corona radiata
Fr frontal cortex
lo lateral olfactory tract
LV lateral ventricle

I Cerebral cortex (telencephalon)
II Olfactory pathways (telencephalon)
III Corpus striatum and related nuclei (telencephalon)

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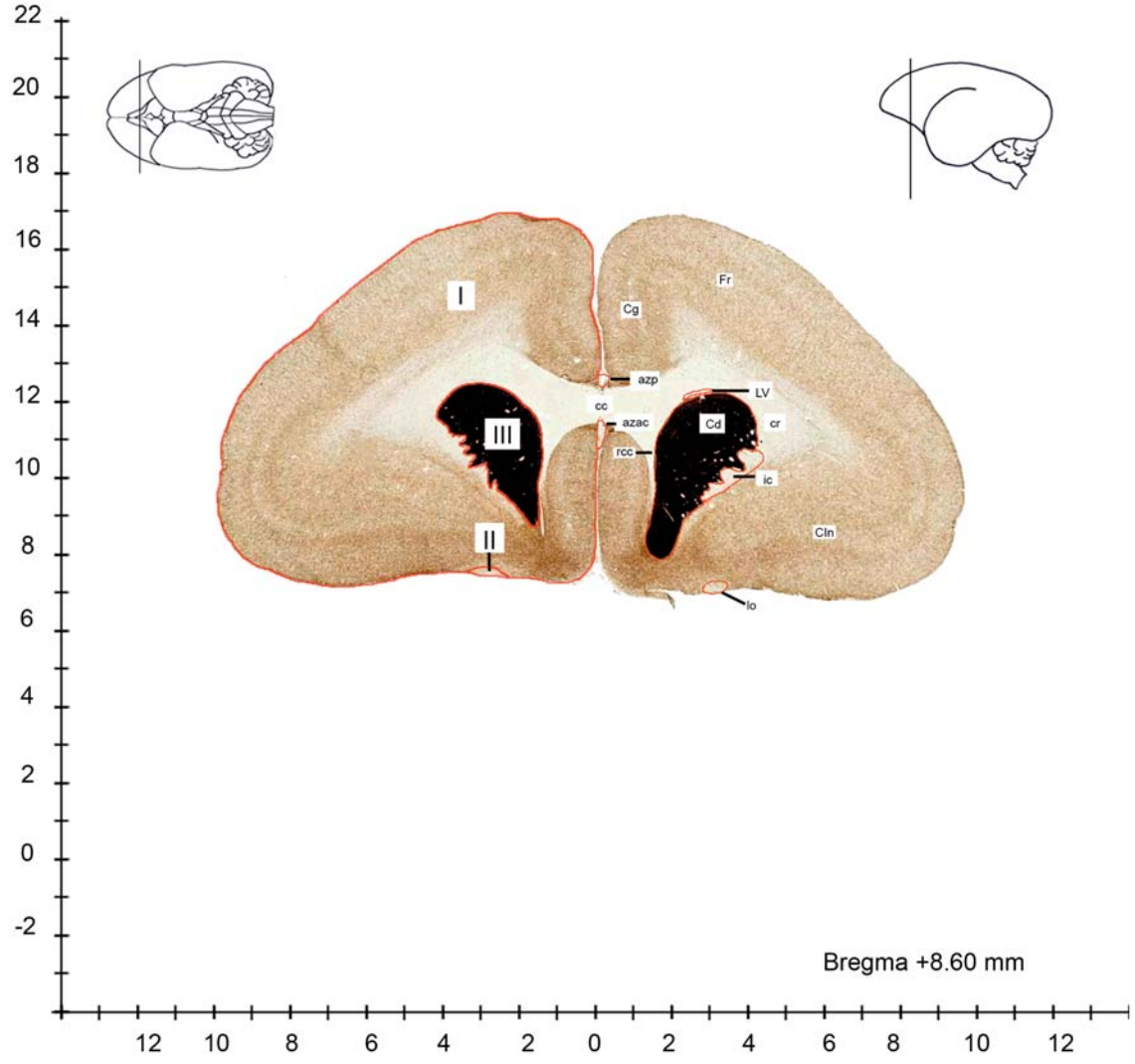

Figure 9

azac azygos anterior cerebral artery
azp azygos pericallosal artery
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
cr corona radiata
ic internal capsule
Fr frontal cortex
lo lateral olfactory tract
LV lateral ventricle
rcc rostrum of the corpus callosum

I Cerebral cortex (telencephalon)
II Olfactory pathways (telencephalon)
III Corpus striatum and related nuclei (telencephalon)

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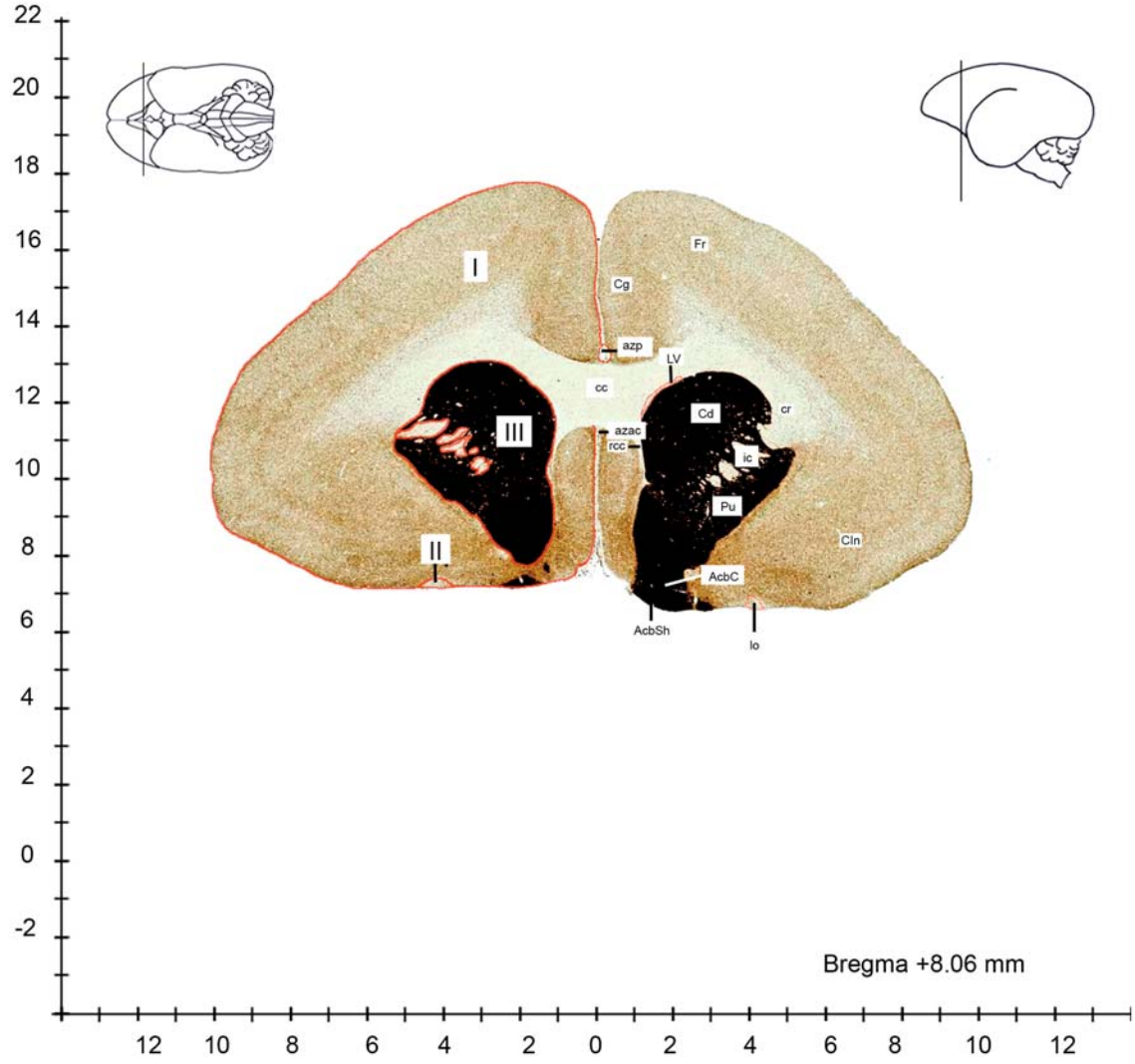

Figure 10

AcbC accumbens nucleus, core
AcbSh accumbens nucleus, shell
azac azygos anterior cerebral artery
azp azygos pericallosal artery
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
cr corona radiata
Fr frontal cortex
ic internal capsule
lo lateral olfactory tract
LV lateral ventricle
Pu putamen
rcc rostrum of the corpus callosum

I Cerebral cortex (telencephalon)
II Olfactory pathways (telencephalon)
III Corpus striatum and related nuclei (telencephalon)

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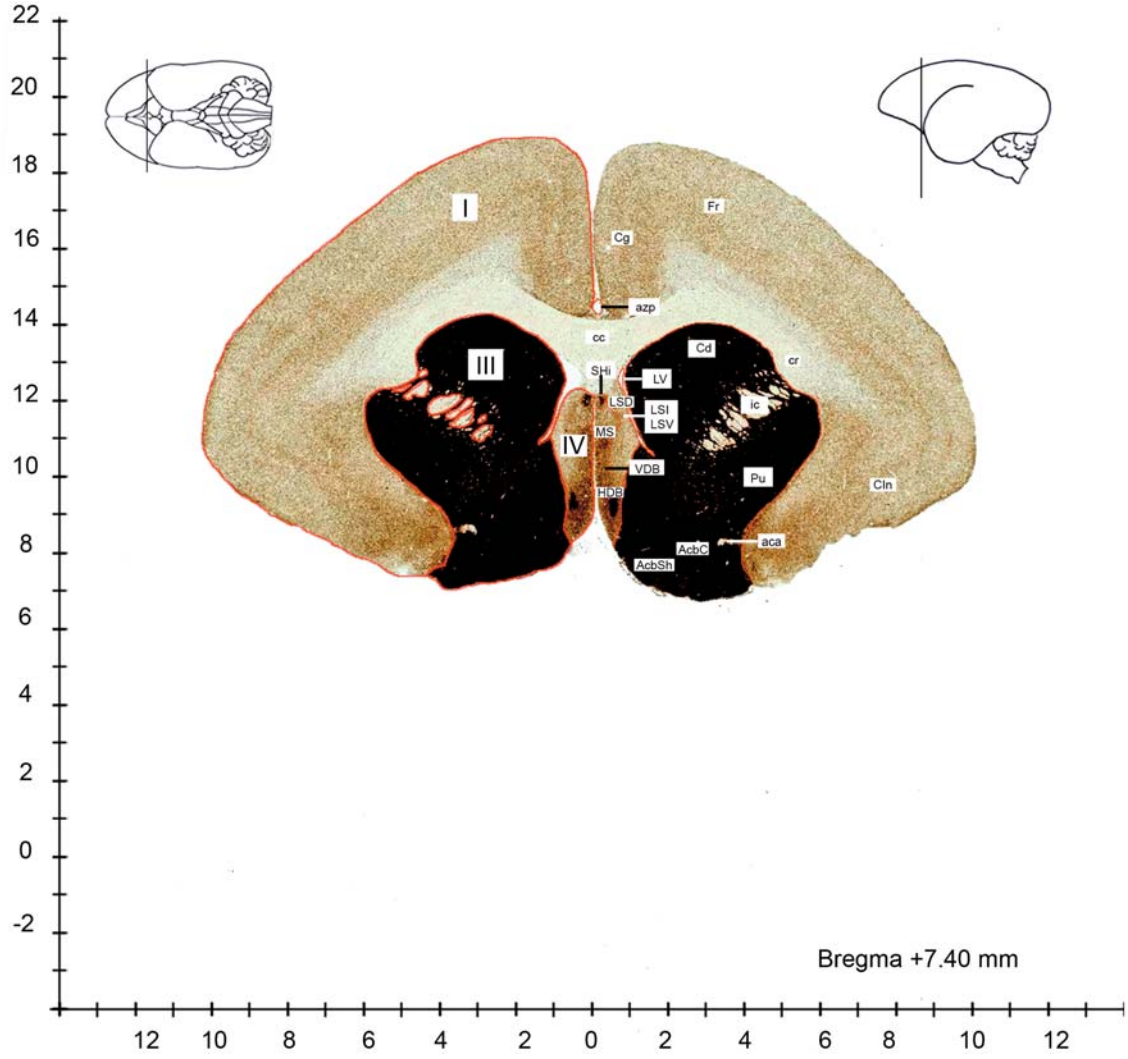

Figure 11

aca anterior commissure, anterior part
AcbC accumbens nucleus, core
AcbSh accumbens nucleus, shell
azp azygos pericallosal artery
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
cr corona radiata
Fr frontal cortex
HDB nucleus of the horizontal limb of the diagonal band
ic internal capsule
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LSV lateral septal nucleus, ventral part
LV lateral ventricle
MS medial septal nucleus
Pu putamen
SHi septohippocampal nucleus
VDB nucleus of the vertical limb of the diagonal band

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)

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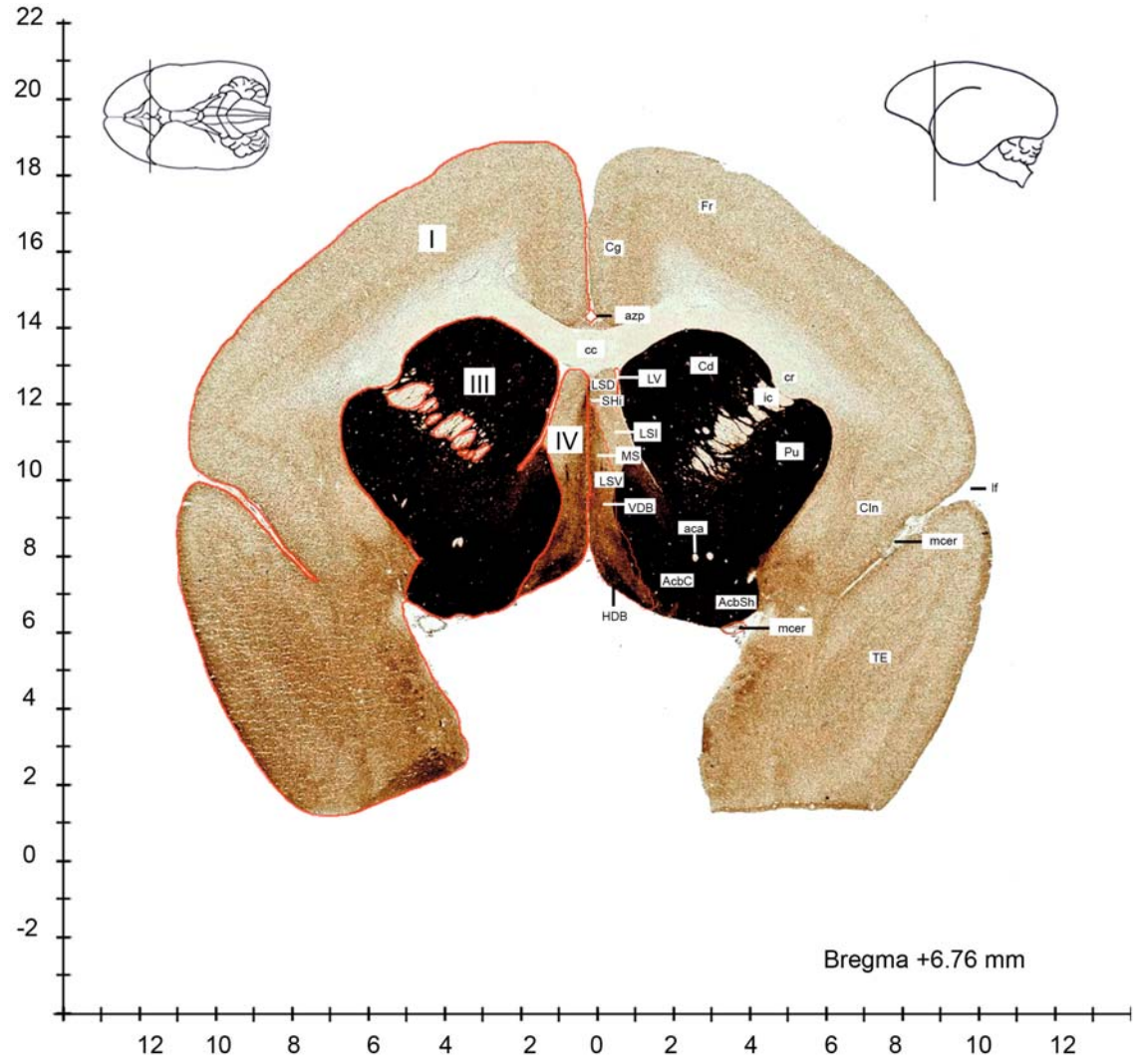

Figure 12

aca anterior commissure, anterior part
AcbC accumbens nucleus, core
AcbSh accumbens nucleus, shell
azp azygos pericallosal artery
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
cr corona radiata
Fr frontal cortex
HDB nucleus of the horizontal limb of the diagonal band
ic internal capsule
lf lateral fissure
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LSV lateral septal nucleus, ventral part
LV lateral ventricle
mcer middle cerebral artery
MS medial septal nucleus
Pu putamen
SHi septohippocampal nucleus
TE temporal cortex
VDB nucleus of the vertical limb of the diagonal band

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)

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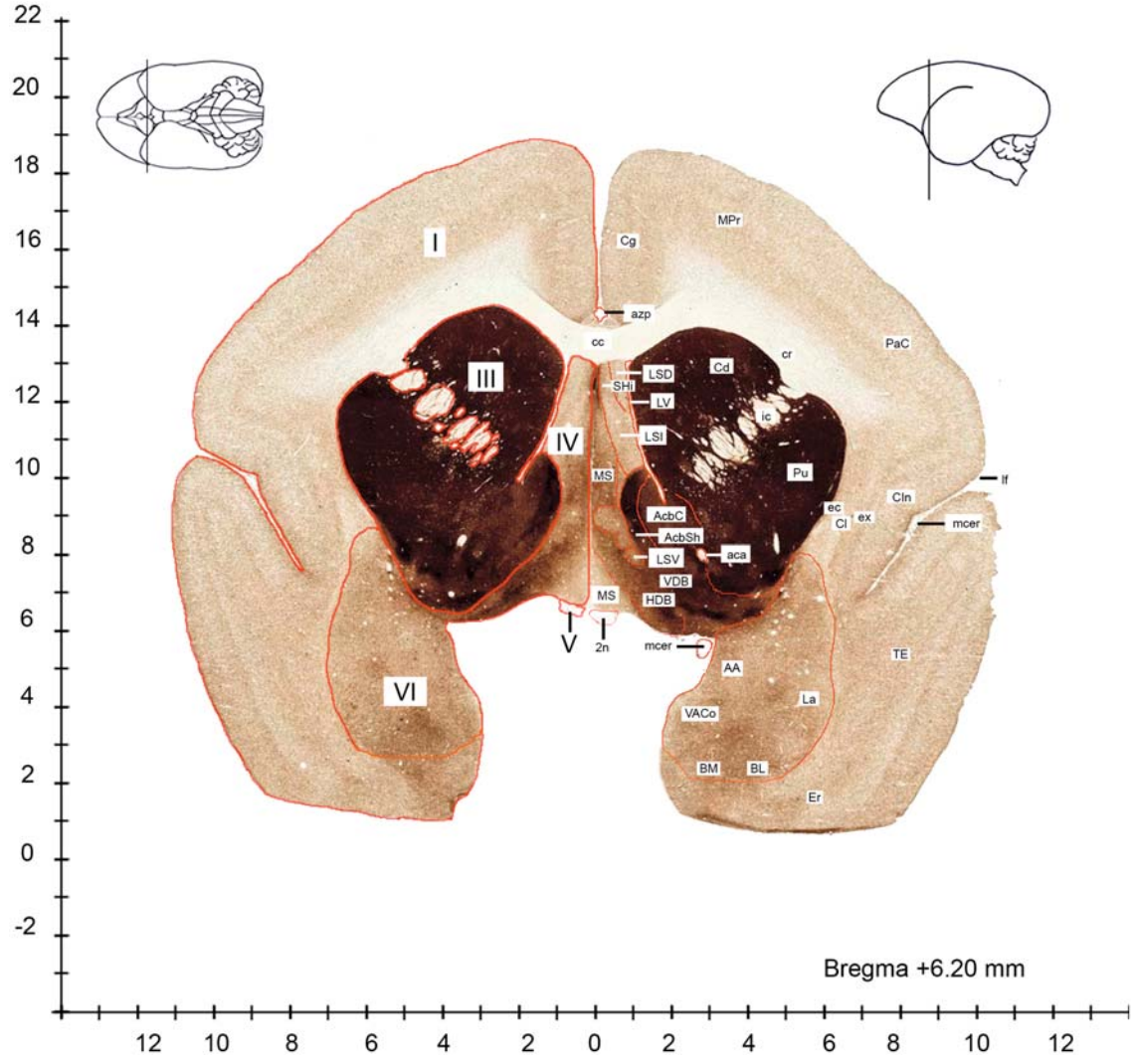

Figure 13

2 n optic nerve
AA anterior amygdaloid area
aca anterior commissure, anterior part
AcbC accumbens nucleus, core
AcbSh accumbens nucleus, shell
azp azygos pericallosal artery
BL basolateral amygdaloid nucleus
BM basomedial amygdaloid nucleus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cr corona radiata
ec external capsule
Er entorhinal cortex
ex extreme capsule
HDB nucleus of the horizontal limb of the diagonal band
ic internal capsule
lf lateral fissure
La lateral amygdaloid nucleus
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LSV lateral septal nucleus, ventral part
LV lateral ventricle
mcer middle cerebral artery
MPr motor and premotor cortex
MS medial septal nucleus
PaC parietal cortex
Pu putamen
SHi septohippocampal nucleus
TE temporal cortex
VACo ventral anterior cortical nucleus of the amygdala
VDB nucleus of the vertical limb of the diagonal band

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VI Amygdala (telencephalon)

This image is available as ESM at http://www.springer.com/dx.doi.org/10.1007/978-0-387-78385-7_1

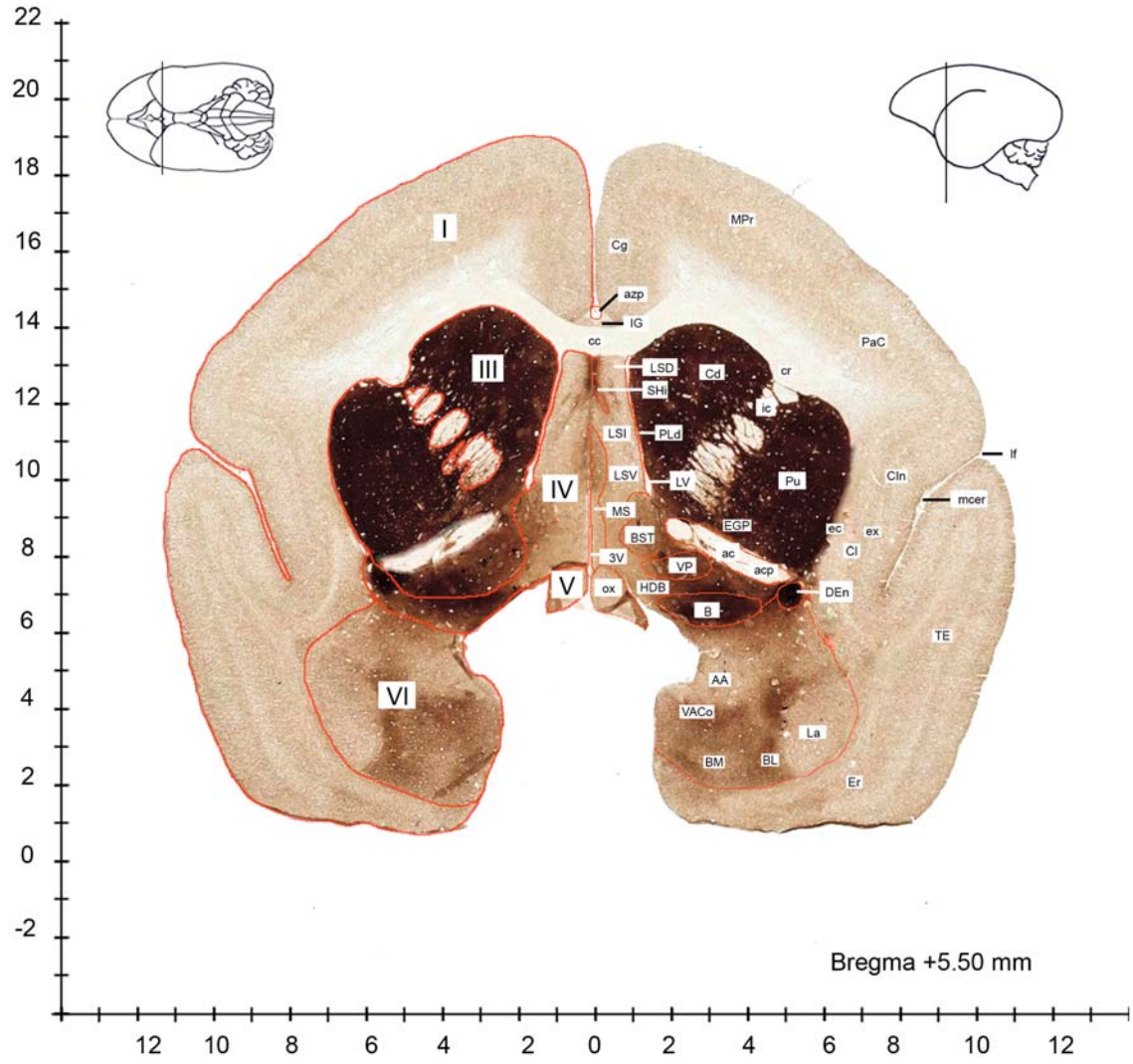

Figure 14

3 V 3rd ventricle
AA anterior amygdaloid area
ac anterior commissure
acp anterior commissure, posterior part
azp azygos pericallosal artery
B basal nucleus (Meynert)
BL basolateral amygdaloid nucleus
BM basomedial amygdaloid nucleus
BST bed nucleus of the stria terminalis
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cr corona radiata
DEn dorsal endopiriform nucleus
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
HDB nucleus of the horizontal limb of the diagonal band
ic internal capsule
IG indusium griseum
La lateral amygdaloid nucleus
lf lateral fissure
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LSV lateral septal nucleus, ventral part
LV lateral ventricle
mcer middle cerebral artery
MPr motor and premotor cortex
MS medial septal nucleus
ox optic chiasm
PaC parietal cortex
PLd paralambdoid septal nucleus
Pu putamen
SHi septohippocampal nucleus
TE temporal cortex
VACo ventral anterior cortical nucleus of the amygdala
VP ventral pallidum

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VI Amygdala (telencephalon)

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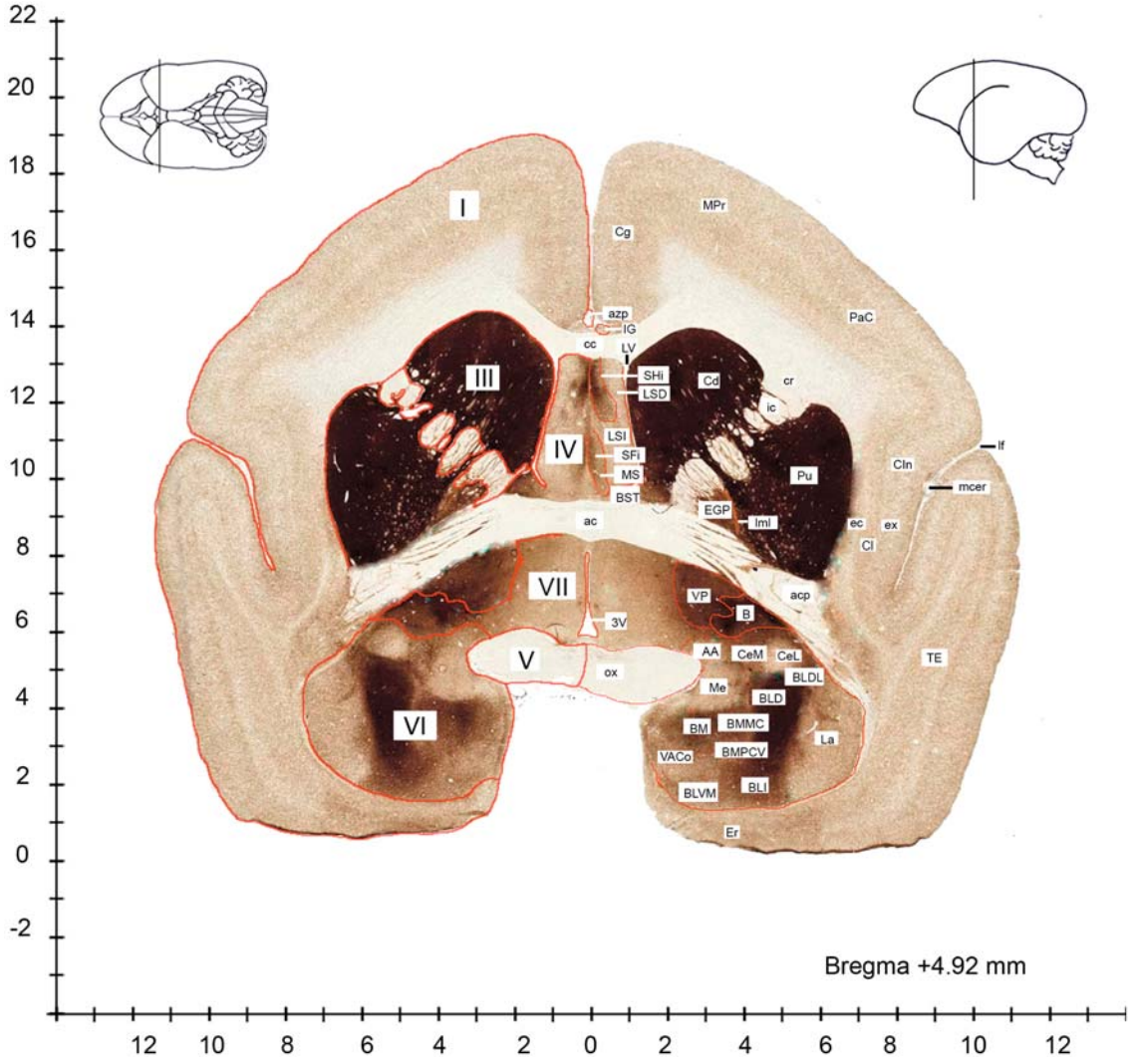

Figure 15

3 V 3rd ventricle
AA anterior amygdaloid area
ac anterior commissure
acp anterior commissure, posterior part
azp azygos pericallosal artery
B basal nucleus (Meynert)
BLD basolateral amygdaloid nucleus, dorsal part
BLDL basolateral amygdaloid nucleus, dorsolateral part
BLI basolateral amygdaloid nucleus, intermediate part
BLVM basolateral amygdaloid nucleus, ventromedial part
BM basomedial amygdaloid nucleus
BMMC basomedial amygdaloid nucleus, magnocellular part
BMPCV basomedial amygdaloid nucleus, parvicellular part, ventral division
BST bed nucleus of the stria terminalis
cc corpus callosum
Cd caudate nucleus
CeL central amygdaloid nucleus, lateral division
CeM central amygdaloid nucleus, medial division
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cr corona radiata
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
ic internal capsule
IG indusium griseum
La lateral amygdaloid nucleus
lf lateral fissure
lml lateral medullary lamina
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LV lateral ventricle
mcer middle cerebral artery
Me medial amygdaloid nucleus
MPr motor and premotor cortex
MS medial septal nucleus
PaC parietal cortex
Pu putamen
ox optic chiasm
SFi septofimbrial nucleus
SHi septohippocampal nucleus
TE temporal cortex
VACo ventral anterior cortical nucleus of the amygdala
VP ventral pallidum

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VI Amygdala (telencephalon)
VII Hypothalamus (diencephalon)

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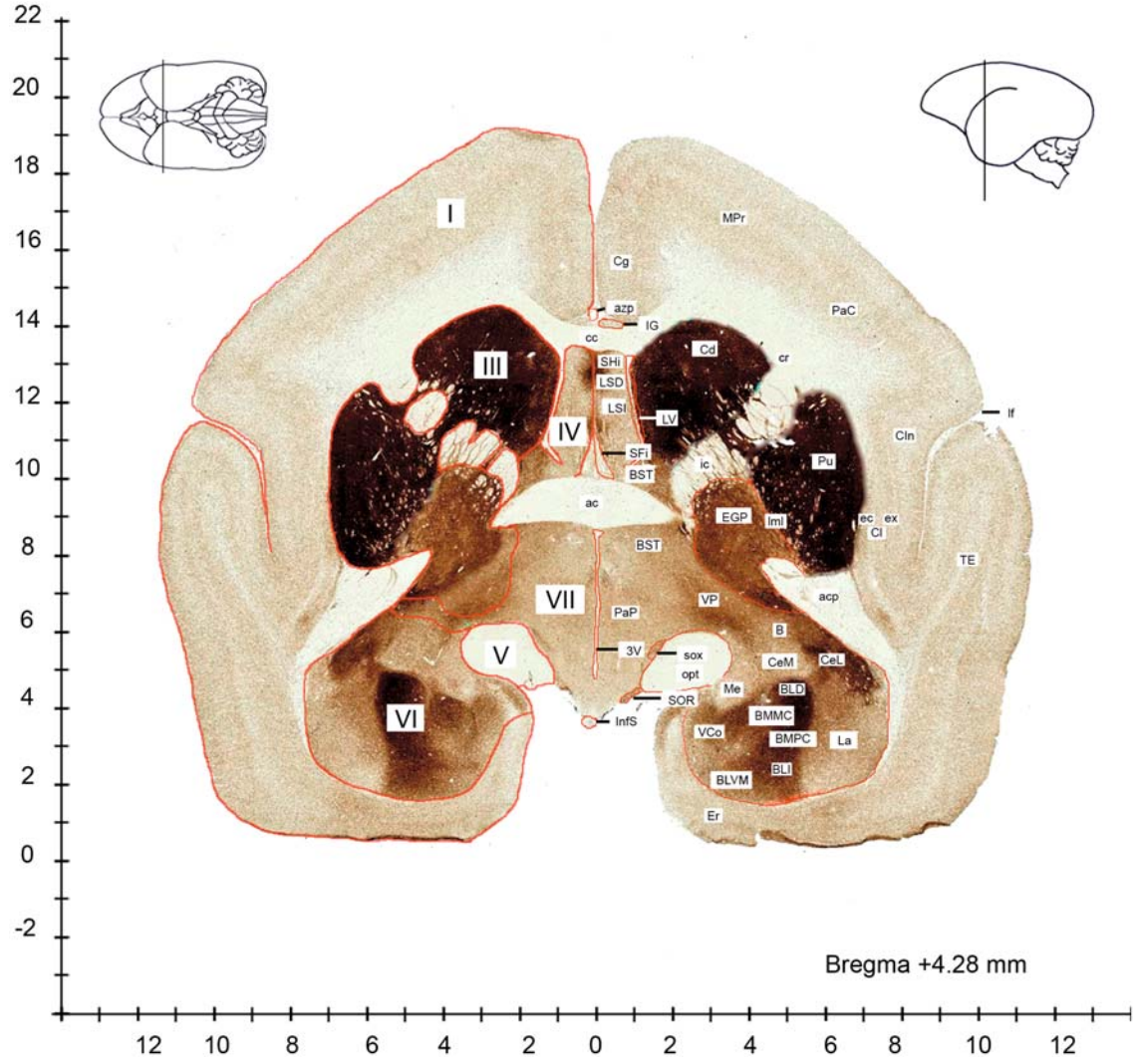

Figure 16

3 V 3rd ventricle
ac anterior commissure
acp anterior commissure, posterior part
azp azygos pericallosal artery
B basal nucleus (Meynert)
BLD basolateral amygdaloid nucleus, dorsal part
BLI basolateral amygdaloid nucleus, intermediate part
BLVM basolateral amygdaloid nucleus, ventromedial part
BMMC basomedial amygdaloid nucleus, magnocellular part
BMPC basomedial amygdaloid nucleus, parvicellular part
BST bed nucleus of the stria terminalis
cc corpus callosum
Cd caudate nucleus
CeL central amygdaloid nucleus, lateral division
CeM central amygdaloid nucleus, medial division
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cr corona radiata
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
ic internal capsule
IG indusium griseum
InfS infundibular stem
La lateral amygdaloid nucleus
lf lateral fissure
lml lateral medullary lamina
LSD lateral septal nucleus, dorsal part
LSI lateral septal nucleus, intermediate part
LV lateral ventricle
Me medial amygdaloid nucleus
MPr motor and premotor cortex
opt optic tract
PaC parietal cortex
PaP paraventricular hypothalamic nucleus, parvicellular part
Pu putamen
SFi septofimbrial nucleus
SHi septohippocampal nucleus
SOR supraoptic nucleus, retrochiasmatic part
sox supraoptic decussation
TE temporal cortex
VCo ventral cortical amygdaloid nucleus
VP ventral pallidum

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VI Amygdala (telencephalon)
VII Hypothalamus (diencephalon)

This image is available as ESM at http://www.springer.com/dx.doi.org/10.1007/978-0-387-78385-7_1

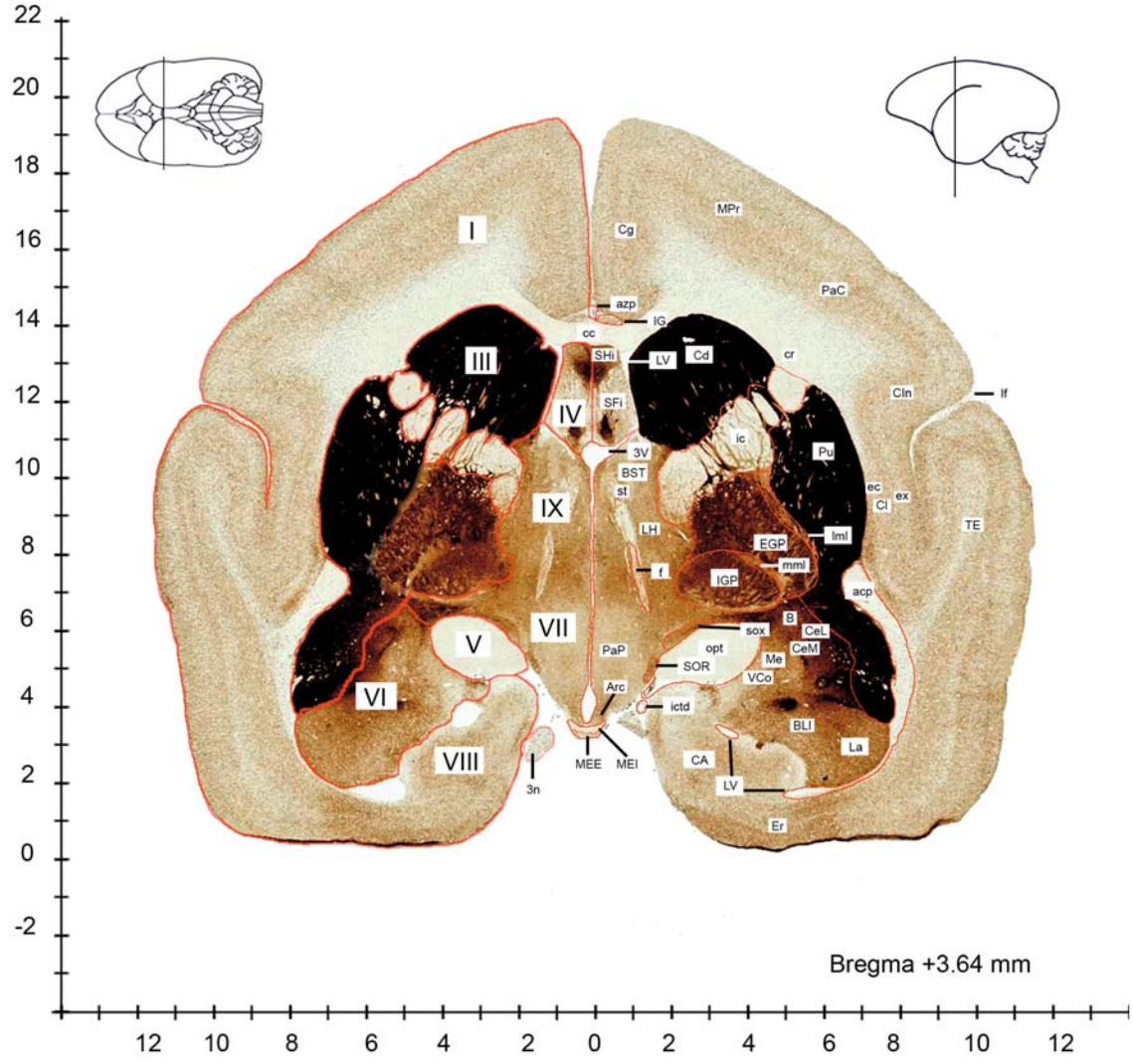

Figure 17

3 n oculomotor nerve or its root
3 V 3rd ventricle
acp anterior commissure, posterior part
Arc arcuate hypothalamic nucleus
azp azygos pericallosal artery
B basal nucleus (Meynert)
BLI basolateral amygdaloid nucleus, intermediate part
BST bed nucleus of the stria terminalis
CA hippocampus
cc corpus callosum
Cd caudate nucleus
CeL central amygdaloid nucleus, lateral division
CeM central amygdaloid nucleus, medial division
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cr corona radiata
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
f fornix
ic internal capsule
ictd internal carotid artery
IG indusium griseum
IGP internal globus pallidus
La lateral amygdaloid nucleus
lf lateral fissure
LH lateral hypothalamic area
lml lateral medullary lamina
LV lateral ventricle
Me medial amygdaloid nucleus
MEE medial eminence, external layer
MEI medial eminence, internal layer
mml medial medullar lamina
MPr motor and premotor cortex
opt optic tract
PaC parietal cortex
PaP paraventricular hypothalamic nucleus, parvicellular part
Pu putamen
SFi septofimbrial nucleus
SHi septohippocampal nucleus
SOR supraoptic nucleus, retrochiasmatic part
sox supraoptic decussation
st stria terminalis
TE temporal cortex
VCo ventral cortical amygdaloid nucleus

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VI Amygdala (telencephalon)
VII Hypothalamus (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)

This image is available as ESM at http://www.springer.com/dx.doi.org/10.1007/978-0-387-78385-7_1

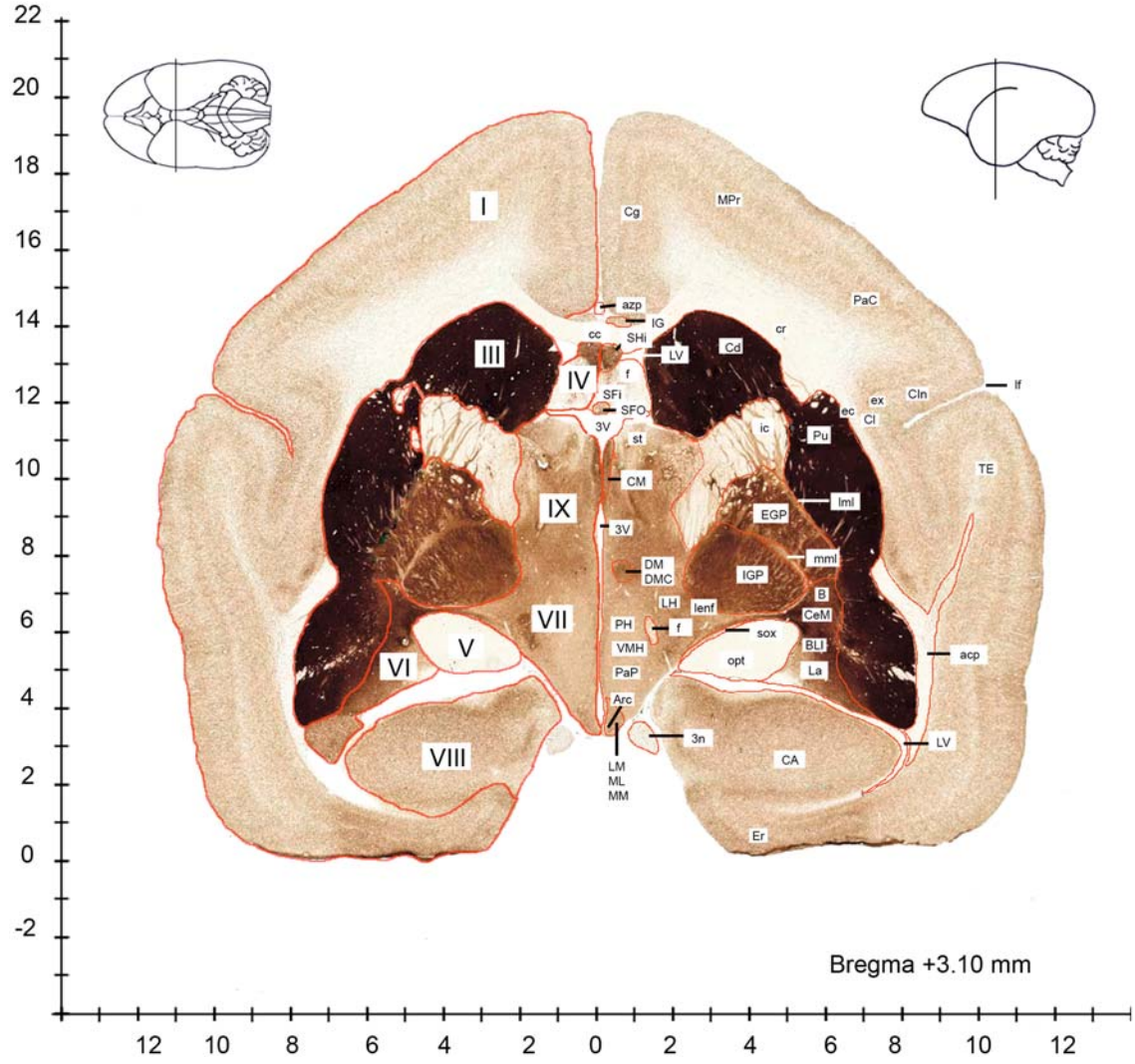

Figure 18

3 n oculomotor nerve or its root
3 V 3rd ventricle
acp anterior commissure, posterior part
Arc arcuate hypothalamic nucleus
azp azygos pericallosal artery
B basal nucleus (Meynert)
BLI basolateral amygdaloid nucleus, intermediate part
CA hippocampus
cc corpus callosum
Cd caudate nucleus
CeM central amygdaloid nucleus, medial division
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
CM central medial thalamic nucleus
cr corona radiata
DM dorsomedial hypothalamic nucleus
DMC dorsomedial hypothalamic nucleus, compact part
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
f fornix
ic internal capsule
IG indusium griseum
IGP internal globus pallidus
La lateral amygdaloid nucleus
lenf lenticular fasciculus
lf lateral fissure
LH lateral hypothalamic area
LM lateral mammillary nucleus
lml lateral medullary lamina
LV lateral ventricle
ML medial mammillary nucleus, lateral part
MM medial mammillary nucleus, medial part
mml medial medullar lamina
MPr motor and premotor cortex
opt optic tract
PaC parietal cortex
PaP paraventricular hypothalamic nucleus, parvicellular part
PH posterior hypothalamic area
Pu putamen
SFi septofimbrial nucleus
SFO subfornical organ
SHi septohippocampal nucleus
sox supraoptic decussation
st stria terminalis
TE temporal cortex
VMH ventromedial hypothalamic nucleus

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VI Amygdala (telencephalon)
VII Hypothalamus (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)

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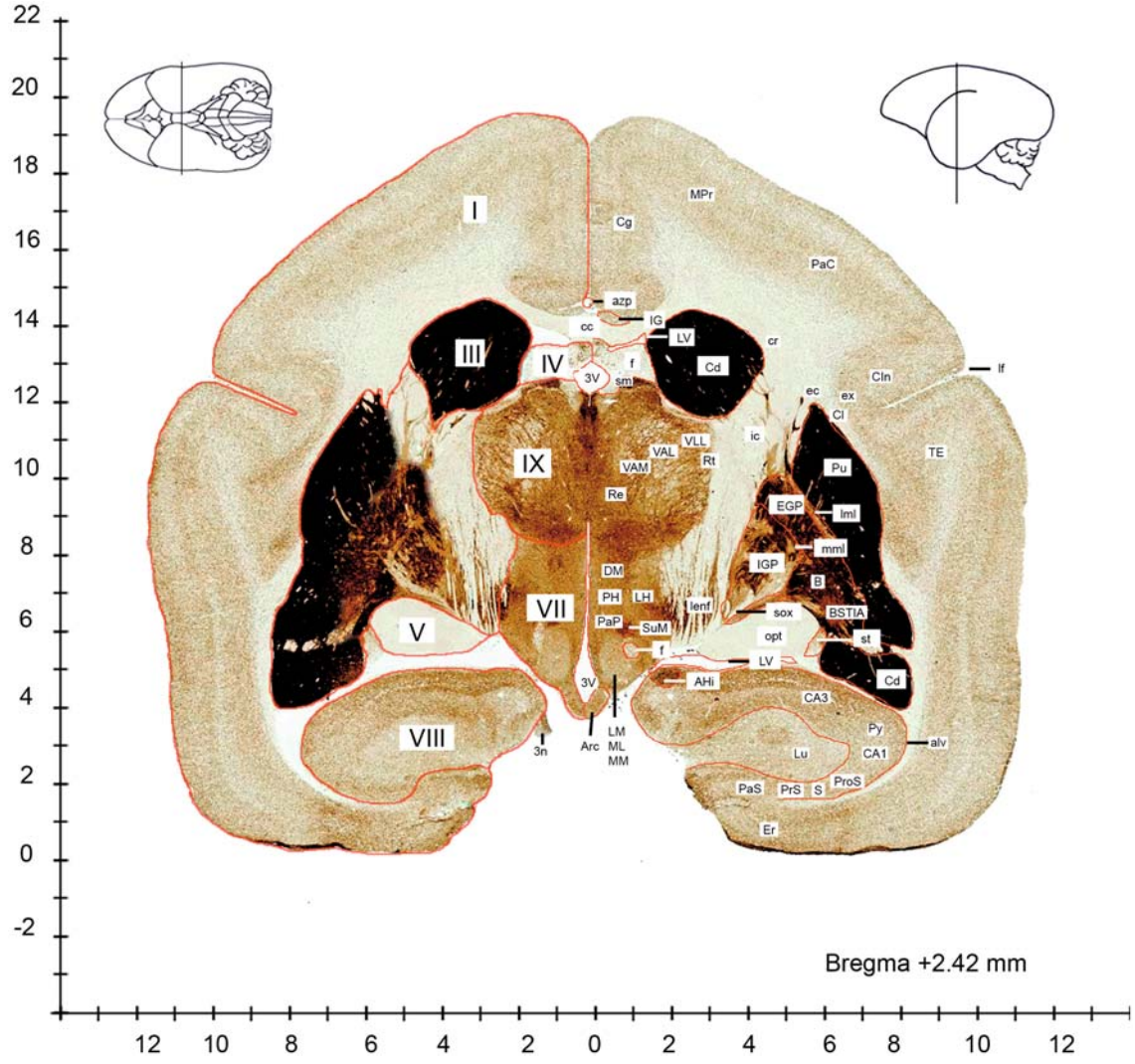

Figure 19

3 n oculomotor nerve or its root
3 V 3rd ventricle
AHi amygdalohippocampal area
alv alveus of the hippocampus
Arc arcuate hypothalamic nucleus
azp azygos pericallosal artery
B basal nucleus (Meynert)
BSTIA bed nucleus of the stria terminalis, intraamygdaloid division
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cr corona radiata
DM dorsomedial hypothalamic nucleus
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
f fornix
ic internal capsule
IG indusium griseum
IGP internal globus pallidus
lenf lenticular fasciculus
lf lateral fissure
LH lateral hypothalamic area
LM lateral mammillary nucleus
lml lateral medullary lamina
Lu stratum lucidum of the hippocampus
LV lateral ventricle
ML medial mammillary nucleus, lateral part
MM medial mammillary nucleus, medial part
mml medial medullar lamina
MPr motor and premotor cortex
opt optic tract
PaC parietal cortex
PaP paraventricular hypothalamic nucleus, parvicellular part
PaS parasubiculum
PH posterior hypothalamic area
ProS prosubiculum
PrS presubiculum
Pu putamen
Py pyramidal cell layer of the hippocampus
Re reuniens thalamic nucleus
Rt reticular thalamic nucleus
S subiculum
sm stria medullaris of the thalamus
sox supraoptic decussation
st stria terminalis
SuM supramammillary nucleus
TE temporal cortex
VAL ventral anterior thalamic nucleus, lateral part
VAM ventral anterior thalamic nucleus, medial part
VLL ventral lateral thalamic nucleus, lateral part

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
IV Septum (telencephalon)
V Optic tract (diencephalon)
VII Hypothalamus (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)

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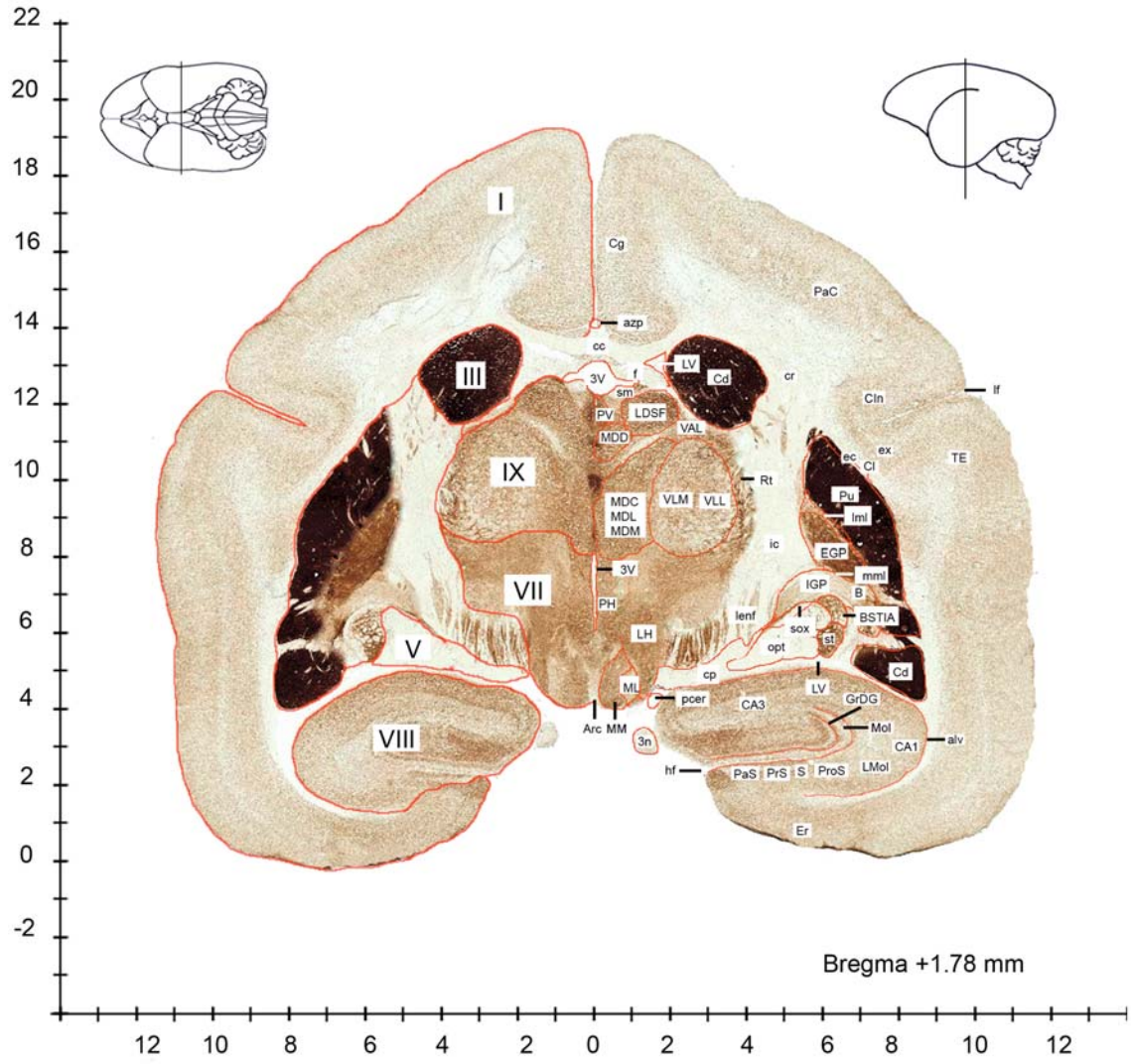

Figure 20

3 n oculomotor nerve or its root
3 V 3rd ventricle
alv alveus of the hippocampus
Arc arcuate hypothalamic nucleus
azp azygos pericallosal artery
B basal nucleus (Meynert)
BSTIA bed nucleus of the stria terminalis intraamygdaloid division
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cp cerebral peduncle, basal part
cr corona radiata
ec external capsule
EGP external globus pallidus
Er entorhinal cortex
ex extreme capsule
f fornix
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IGP internal globus pallidus
LDSF lateral dorsal thalamic nucleus, superficial part
lenf lenticular fasciculus
lf lateral fissure
LH lateral hypothalamic area
lml lateral medullary lamina
LMol lacunosum moleculare layer of the hippocampus
LV lateral ventricle
MDC mediodorsal thalamic nucleus, central part
MDD mediodorsal thalamic nucleus, dorsal part
MDL mediodorsal thalamic nucleus, lateral part
MDM mediodorsal thalamic nucleus, medial part
ML medial mammillary nucleus, lateral part
MM medial mammillary nucleus, medial part
mml medial medullar lamina
Mol molecular layer of the dentate gyrus
opt optic tract
PaC parietal cortex
PaS parasubiculum
pcer posterior cerebral artery
PH posterior hypothalamic area
ProS prosubiculum
PrS presubiculum
Pu putamen
PV paraventricular thalamic nucleus
Rt reticular thalamic nucleus
S subiculum
sm stria medullaris of the thalamus
sox supraoptic decussation
st stria terminalis
TE temporal cortex
VAL ventral anterior thalamic nucleus, lateral part
VLL ventral lateral thalamic nucleus, lateral part
VLM ventral lateral thalamic nucleus, medial part

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
V Optic tract (diencephalon)
VII Hypothalamus (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)

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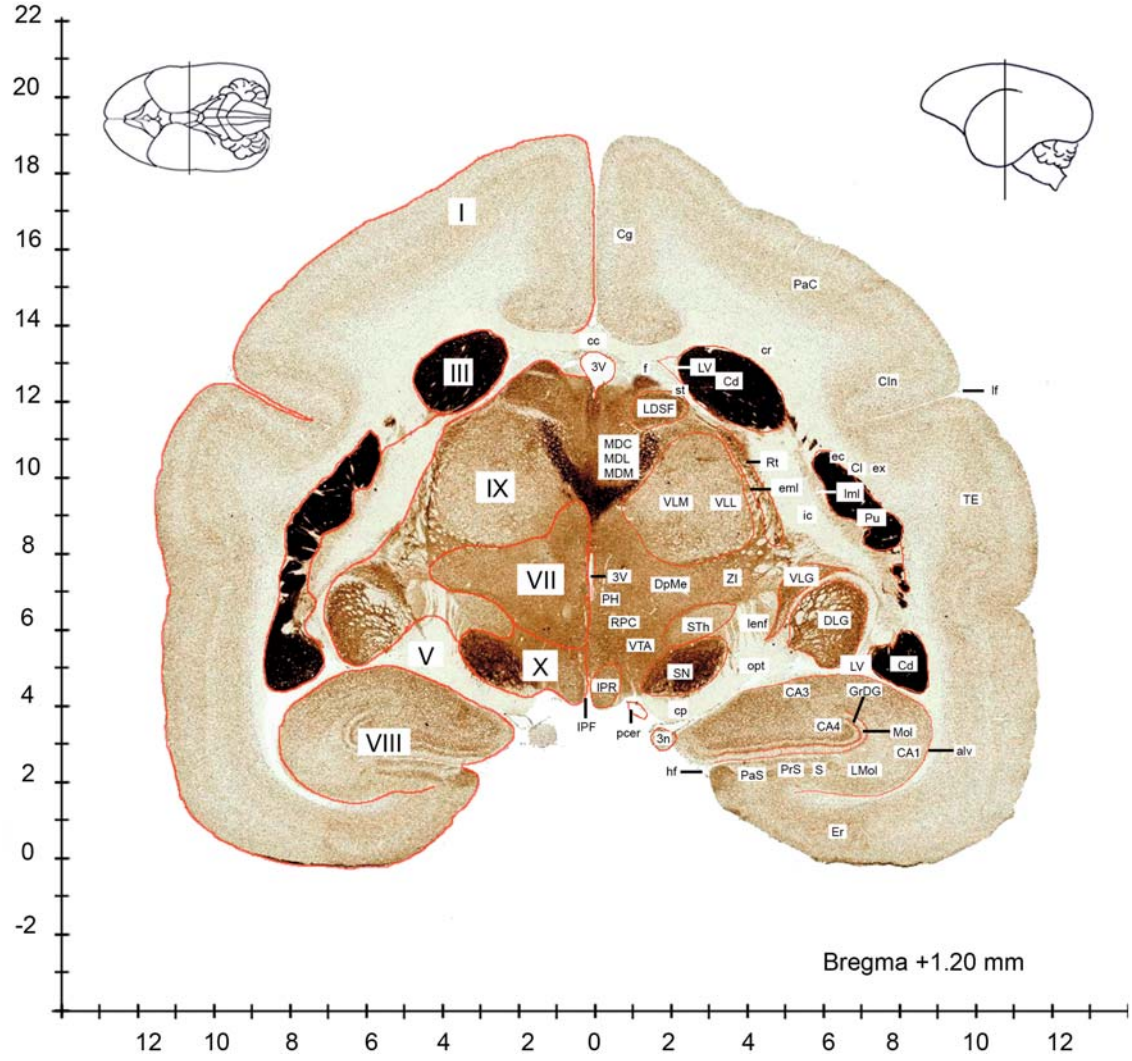

Figure 21

3 n oculomotor nerve or its root
3 V 3rd ventricle
alv alveus of the hippocampus
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cp cerebral peduncle, basal part
cr corona radiata
DLG dorsal lateral geniculate nucleus
DpMe deep mesencephalic nucleus
ec external capsule
eml external medullary lamina
Er entorhinal cortex
ex extreme capsule
f fornix
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IPF interpeduncular fossa
IPR interpeduncular nucleus, rostral subnucleus
LDSF lateral dorsal thalamic nucleus, superficial part
lenf lenticular fasciculus
lf lateral fissure
lml lateral medullary lamina
LMol lacunosum moleculare layer of the hippocampus
LV lateral ventricle
MDC mediodorsal thalamic nucleus, central part
MDL mediodorsal thalamic nucleus, lateral part
MDM mediodorsal thalamic nucleus, medial part
Mol molecular layer of the dentate gyrus
opt optic tract
PaC parietal cortex
PaS parasubiculum
pcer posterior cerebral artery
PH posterior hypothalamic area
PrS presubiculum
Pu putamen
RPC red nucleus, parvicellular part
Rt reticular thalamic nucleus
S subiculum
SN substantia nigra
st stria terminalis
STh subthalamic nucleus
TE temporal cortex
VLG ventral lateral geniculate nucleus
VLL ventral lateral thalamic nucleus, lateral part
VLM ventral lateral thalamic nucleus, medial part
VTA ventral tegmental area
ZI zona incerta

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
V Optic tract (diencephalon)
VII Hypothalamus (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon

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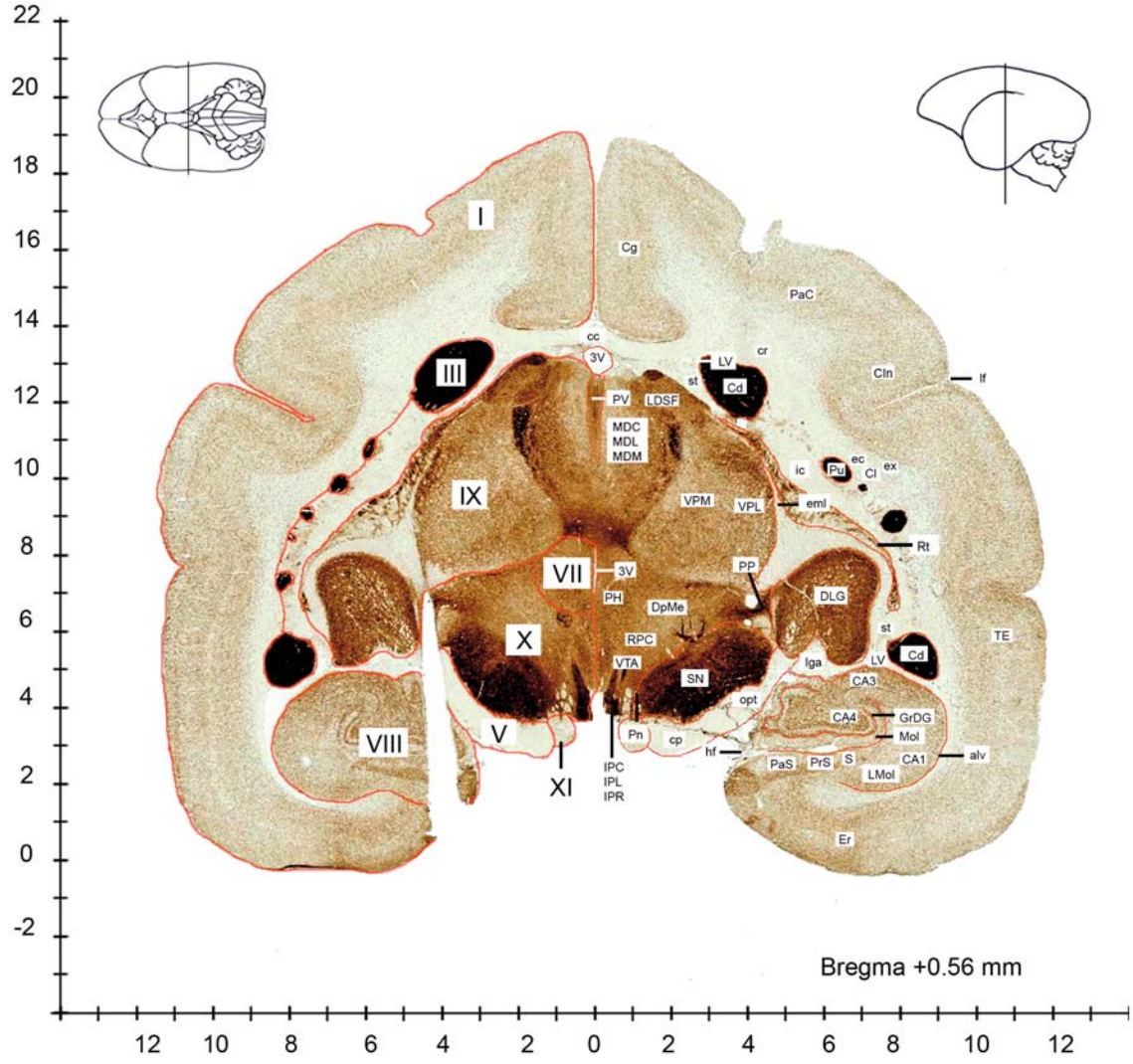

Figure 22

3 V 3rd ventricle
alv alveus of the hippocampus
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cp cerebral peduncle, basal part
cr corona radiata
DLG dorsal lateral geniculate nucleus
DpMe deep mesencephalic nucleus
ec external capsule
eml external medullary lamina
Er entorhinal cortex
ex extreme capsule
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IPC interpeduncular nucleus, caudal subnucleus
IPL interpeduncular nucleus, lateral subnucleus
IPR interpeduncular nucleus, rostral subnucleus
LDSF lateral dorsal thalamic nucleus, superficial part
lf lateral fissure
lga lateral geniculate artery
LMol lacunosum moleculare layer of the hippocampus
LV lateral ventricle
MDC mediodorsal thalamic nucleus, central part
MDL mediodorsal thalamic nucleus, lateral part
MDM mediodorsal thalamic nucleus, medial part
Mol molecular layer of the dentate gyrus
opt optic tract
PaC parietal cortex
PaS parasubiculum
PH posterior hypothalamic area
Pn pontine nuclei
PP peripeduncular nucleus
PrS presubiculum
Pu putamen
PV paraventricular thalamic nucleus
RPC red nucleus, parvicellular part
Rt reticular thalamic nucleus
S subiculum
SN substantia nigra
st stria terminalis
TE temporal cortex
VPL ventral posterolateral thalamic nucleus
VPM ventral posteromedial thalamic nucleus
VTA ventral tegmental area

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
V Optic tract (diencephalon)
VII Hypothalamus (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)

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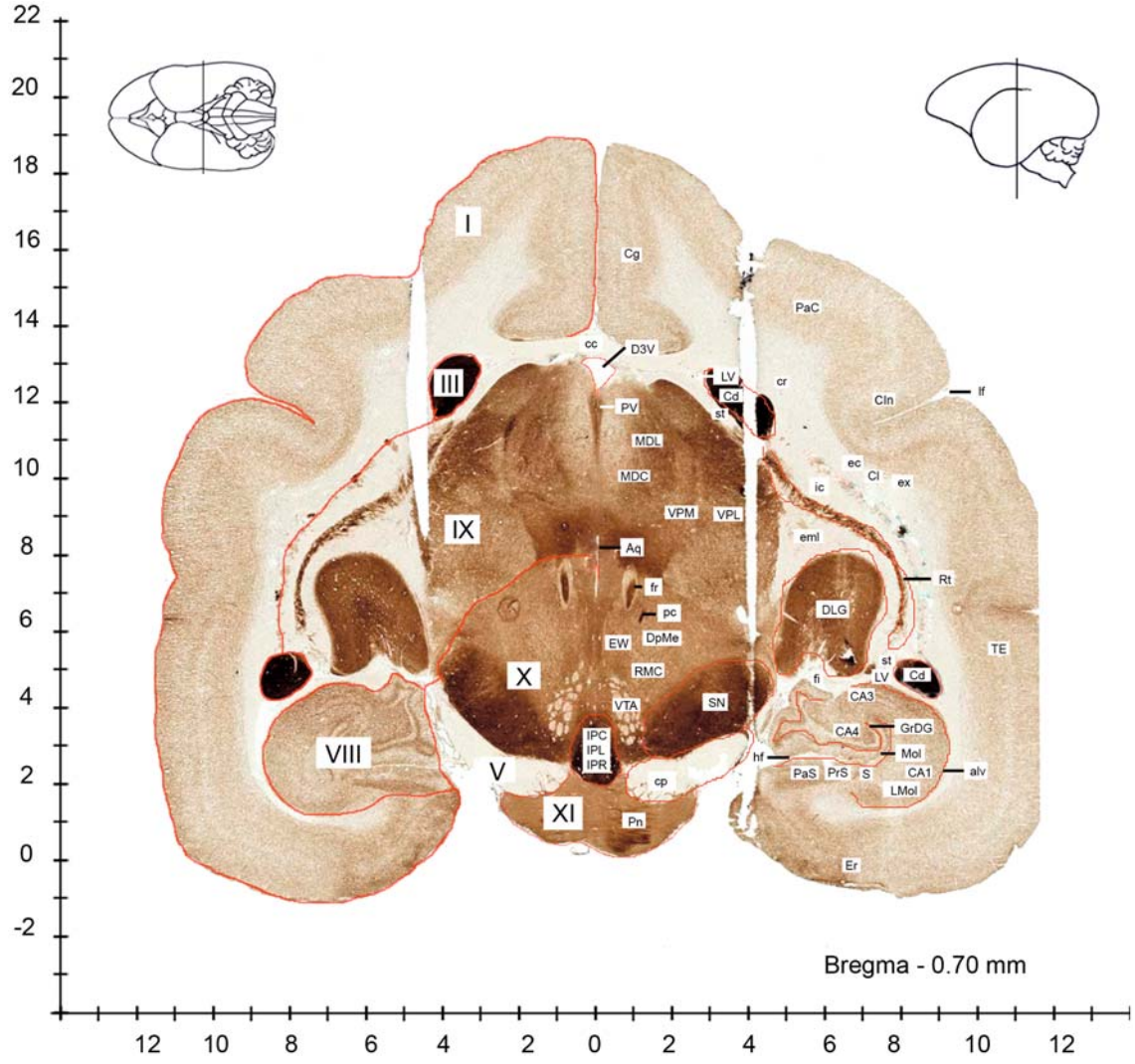

Figure 23

alv slveus of the hippocampus
Aq squeduct
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cp cerebral peduncle, basal part
cr corona radiata
D3 V dorsal 3rd ventricle
DLG dorsal lateral geniculate nucleus
DpMe deep mesencephalic nucleus
ec external capsule
eml external medullary lamina
Er entorhinal cortex
EW edinger–Westphal nucleus
ex extreme capsule
fi fimbria of the hippocampus
fr fasciculus retroflexus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IPC interpeduncular nucleus, caudal subnucleus
IPL interpeduncular nucleus, lateral subnucleus
IPR interpeduncular nucleus, rostral subnucleus
lf lateral fissure
LMol lacunosum moleculare layer of the hippocampus
LV lateral ventricle
MDC mediodorsal thalamic nucleus, central part
MDL mediodorsal thalamic nucleus, lateral part
Mol molecular layer of the dentate gyrus
PaC parietal cortex
PaS parasubiculum
pc posterior commissure
Pn pontine nuclei
PrS presubiculum
PV paraventricular thalamic nucleus
RMC red nucleus, magnocellular part
Rt reticular thalamic nucleus
S subiculum
SN substantia nigra
st stria terminalis
TE temporal cortex
VPL ventral posterolateral thalamic nucleus
VPM ventral posteromedial thalamic nucleus
VTA ventral tegmental area

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
V Optic tract (diencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)

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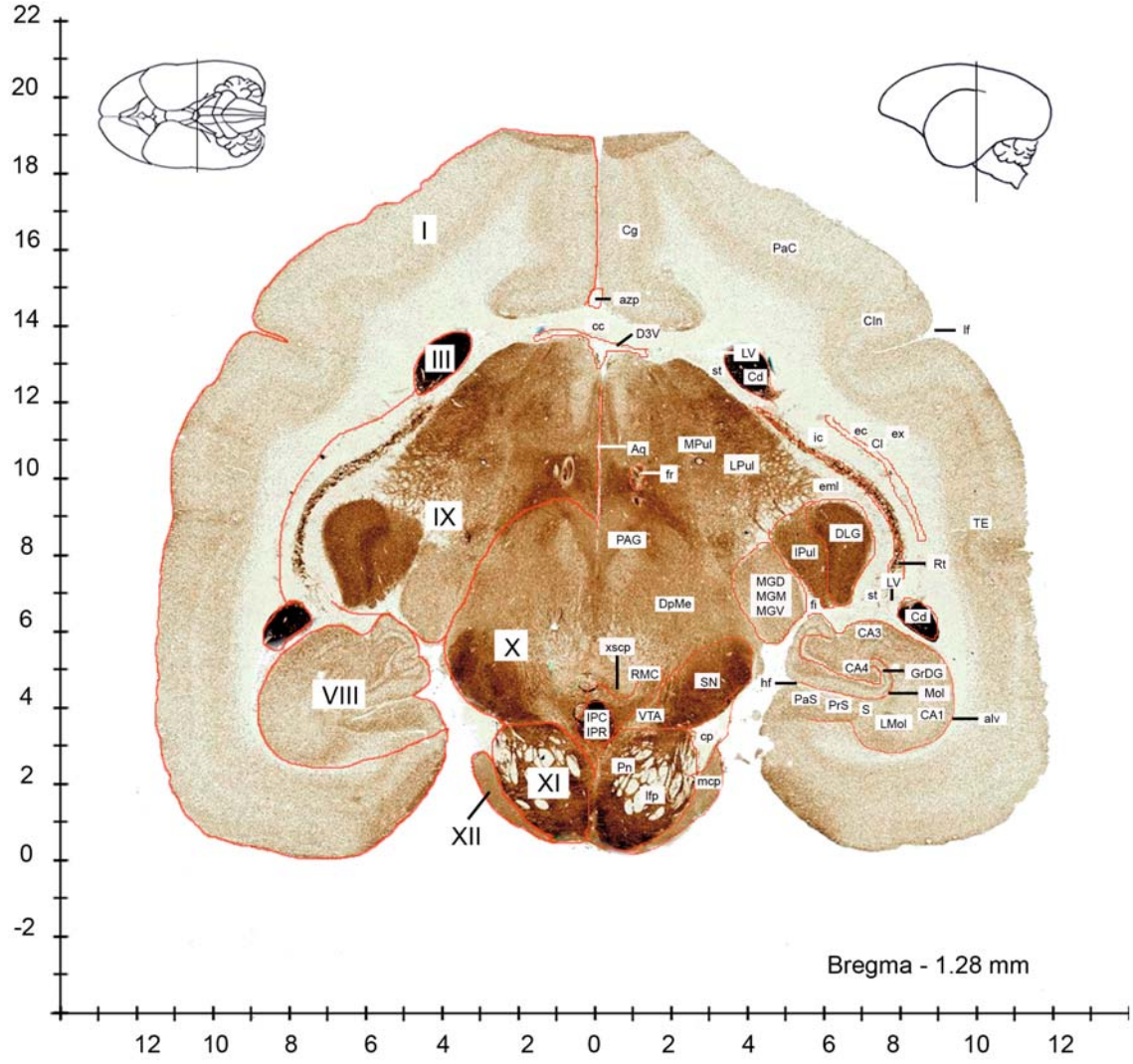

Figure 24

alv alveus of the hippocampus
Aq aqueduct
azp azygos pericallosal artery
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
Cl claustrum
cp cerebral peduncle, basal part
D3 V dorsal 3rd ventricle
DLG dorsal lateral geniculate nucleus
DpMe deep mesencephalic nucleus
ec external capsule
eml external medullary lamina
ex extreme capsule
fi fimbria of the hippocampus
fr fasciculus retroflexus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IPC interpeduncular nucleus, caudal subnucleus
IPR interpedoncular nucleus, rostral subnucleus
IPul inferior pulvinar
lf lateral fissure
lfp longitudinal fasciculus of the pons
LMol lacunosum moleculare layer of the hippocampus
LPul lateral pulvinar
LV lateral ventricle
mcp middle cerebellar peduncle
MGD medial geniculate nucleus, dorsal part
MGM medial geniculate nucleus, medial part
MGV medial geniculate nucleus, ventral part
Mol molecular layer of the dentate gyrus
MPul medial pulvinar
PaC parietal cortex
PAG periaqueductal gray
PaS parasubiculum
Pn pontine nuclei
PrS presubiculum
RMC red nucleus, magnocellular part
Rt reticular thalamic nucleus
S subiculum
SN substantia nigra
st stria terminalis
TE temporal cortex
VTA ventral tegmental area
xscp decussation of the superior cerebellar peduncle

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)

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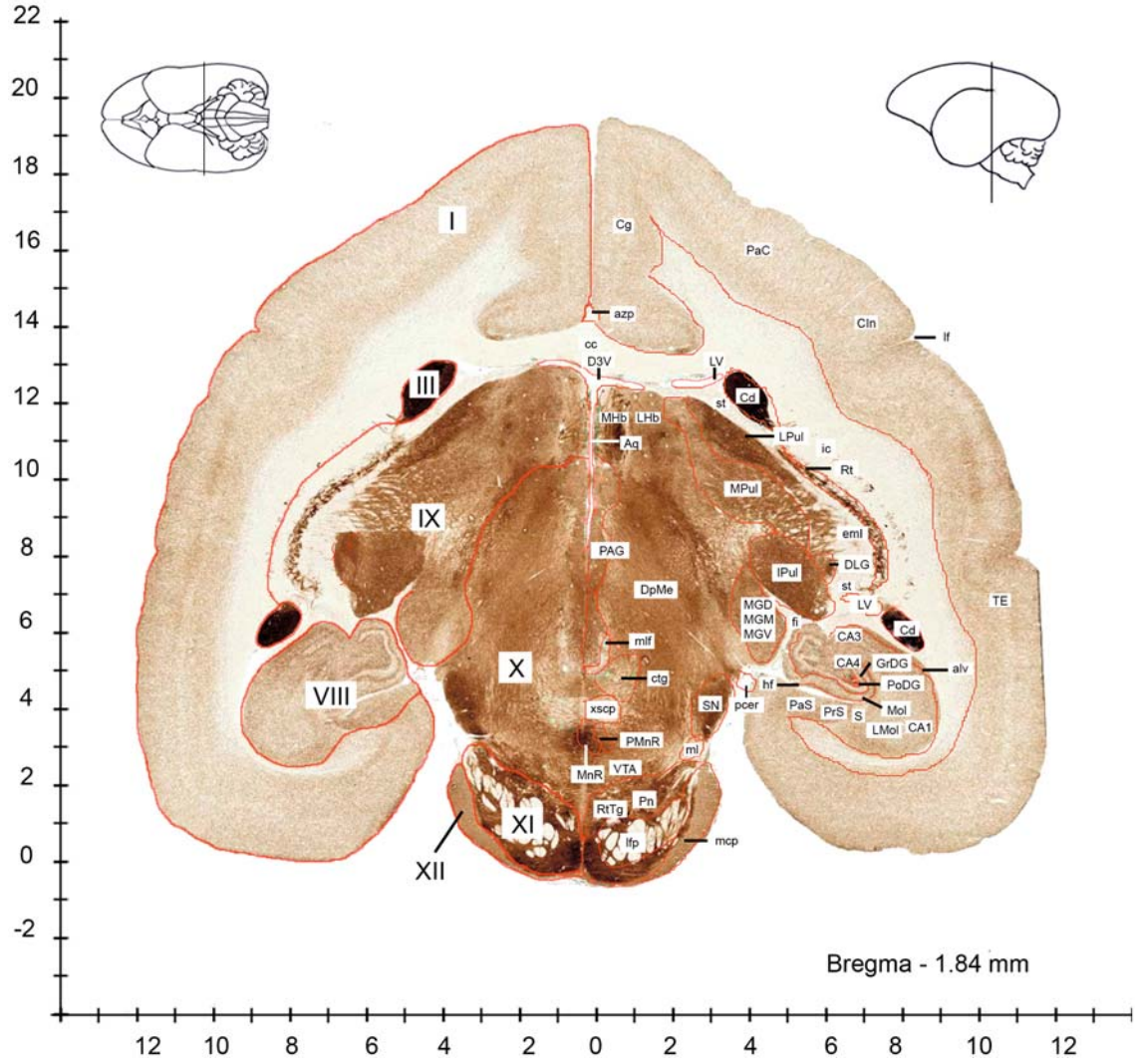

Figure 25

alv alveus of the hippocampus
Aq aqueduct
azp azygos pericallosal artery
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
CIn insularis cortex
ctg central tegmental tract
D3 V dorsal 3rd ventricle
DLG drsal lateral geniculate nucleus
DpMe deep mesencephalic nucleus
eml external medullary lamina
fi fimbria of the hippocampus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IPul inferior pulvinar
lf lateral fissure
lfp longitudinal fasciculus of the pons
LHb lateral habenular nucleus
LMol lacunosum moleculare layer of the hippocampus
LPul lateral pulvinar
LV lateral ventricle
mcp middle cerebellar peduncle
MGD medial geniculate nucleus, dorsal part
MGM medial geniculate nucleus, medial part
MGV medial geniculate nucleus, ventral part
MHb medial habenular nucleus
ml medial lemniscus
mlf medial longitudinal fasciculus
MnR median raphe nucleus
Mol molecular layer of the dentate gyrus
MPul medial pulvinar
PaC parietal cortex
PAG periaqueductal gray
PaS parasubiculum
pcer posterior cerebral artery
PMnR paramedian raphe nucleus
Pn pontine nuclei
PoDG polymorph layer of the dentate gyrus
PrS presubiculum
Rt reticular thalamic nucleus
RtTg reticulotegmental nucleus of the pons
S subiculum
SN substantia nigra
st stria terminalis
TE temporal cortex
VTA ventral tegmental area
xscp decussation of the superior cerebellar peduncle

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)

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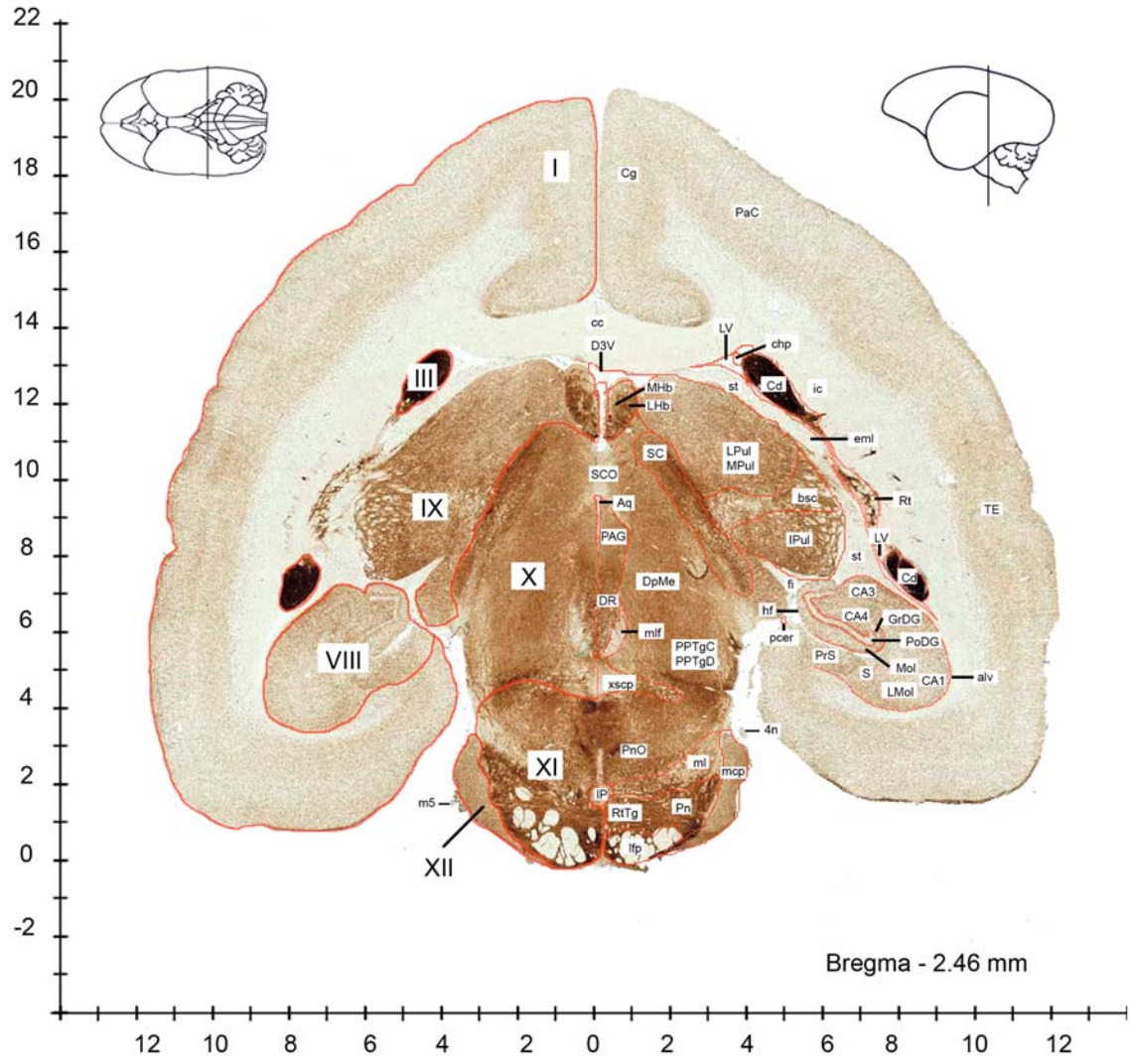

Figure 26

4 n trochlear nerve or its root
alv alveus of the hippocampus
Aq aqueduct
bsc brachium of the superior colliculus
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
Cg cingulate cortex
chp choroid plexus
D3 V dorsal 3rd ventricle
DpMe deep mesencephalic nucleus
DR dorsal raphe nucleus
eml external medullary lamina
fi fimbria of the hippocampus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ic internal capsule
IP interpeduncular nucleus
IPul inferior pulvinar
lfp longitudinal fasciculus of the pons
LHb lateral habenular nucleus
LMol lacunosum moleculare layer of the hippocampus
LPul lateral pulvinar
LV lateral ventricle
m5 motor root of the trigeminal nerve
mcp middle cerebellar peduncle
MHb medial habenular nucleus
ml medial lemnicus
mlf medial longitudinal fasciculus
Mol molecular layer of the dentate gyrus
MPul medial pulvinar
PaC parietal cortex
PAG periaqueductal gray
pcer posterior cerebral artery
Pn pontine nuclei
PnO pontine reticular nucleus, oral part
PoDG polymorph layer of the dentate gyrus
PPTgC pedunculopontine tegmental nucleus, compact part
PPTgD pedunculopontine tegmental nucleus, diffuse part
PrS presubiculum
Rt reticular thalamic nucleus
RtTg reticulotegmental nucleus of the pons
S subiculum
SC superior colliculus
SCO subcommissural organ
st stria terminalis
TE temporal cortex
xscp decussation of the superior cerebellar peduncle

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)

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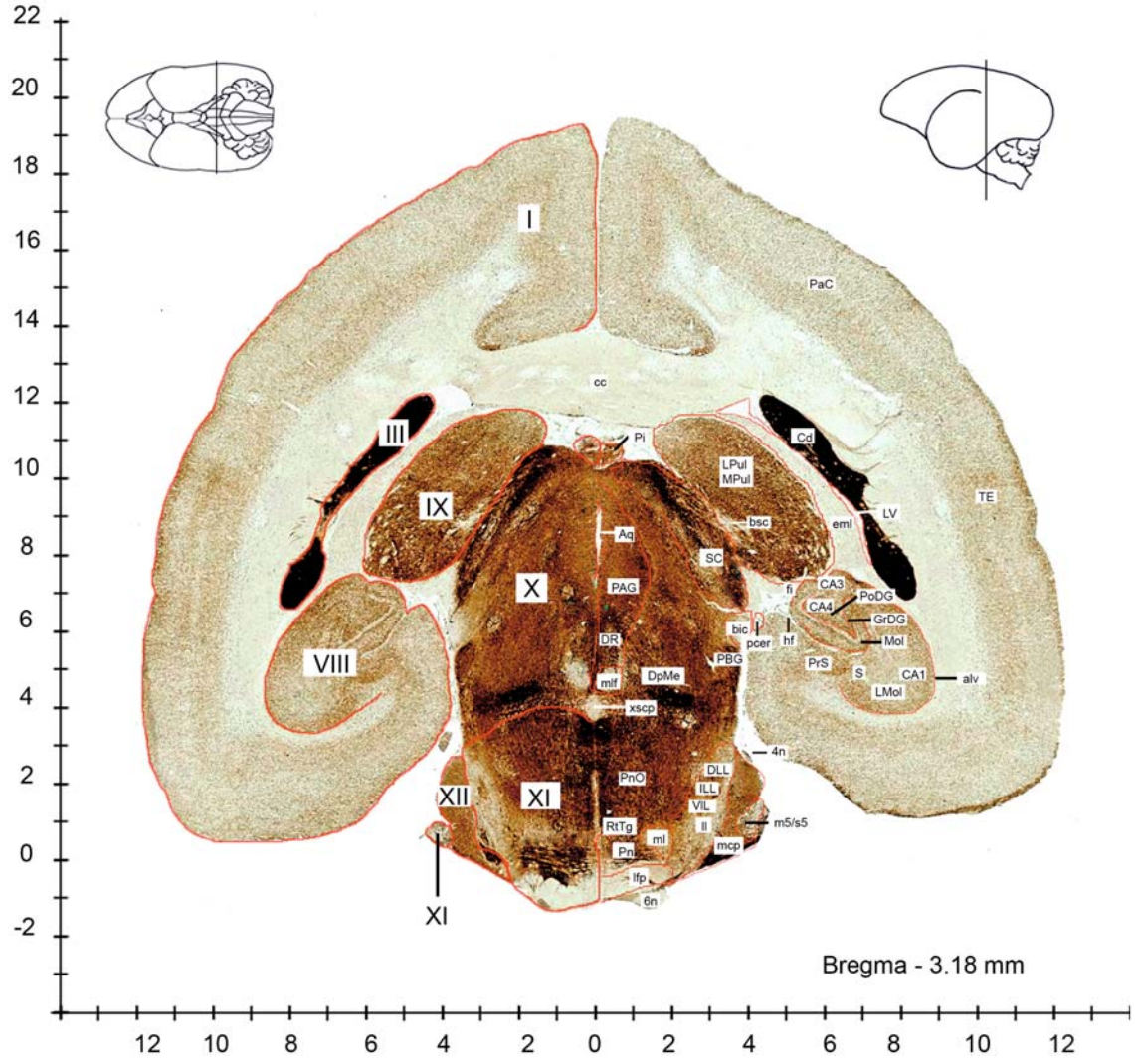

Figure 27

4 n trochlear nerve or its root
6 n root of abducens nerve
alv alveus of the hippocampus
Aq aqueduct
bic brachium of the inferior colliculus
bsc brachium of the superior colliculus
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
DLL dorsal nucleus of the lateral lemniscus
DpMe deep mesencephalic nucleus
DR dorsal raphe nucleus
eml external medullary lamina
fi fimbria of the hippocampus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
ILL intermediate nucleus of the lateral lemniscus
lfp longitudinal fasciculus of the pons
ll lateral lemniscus
LMol lacunosum moleculare layer of the hippocampus
LPul lateral pulvinar
LV lateral ventricle
m5 motor root of the trigeminal nerve
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
Mol molecular layer of the dentate gyrus
MPul medial pulvinar
PaC parietal cortex
PAG periaqueductal gray
PBG parabigeminal nucleus
pcer posterior cerebral artery
Pi pineal gland
Pn pontine nuclei
PnO pontine reticular nucleus, oral part
PoDG polymorph layer of the dentate gyrus
PrS presubiculum
RtTg reticulotegmental nucleus of the pons
S subiculum
SC superior colliculus
s5 sensory root of the trigeminal nerve
TE temporal cortex
VlL ventral nucleus of the lateral lemniscus
xscp decussation of the superior cerebellar peduncle

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)

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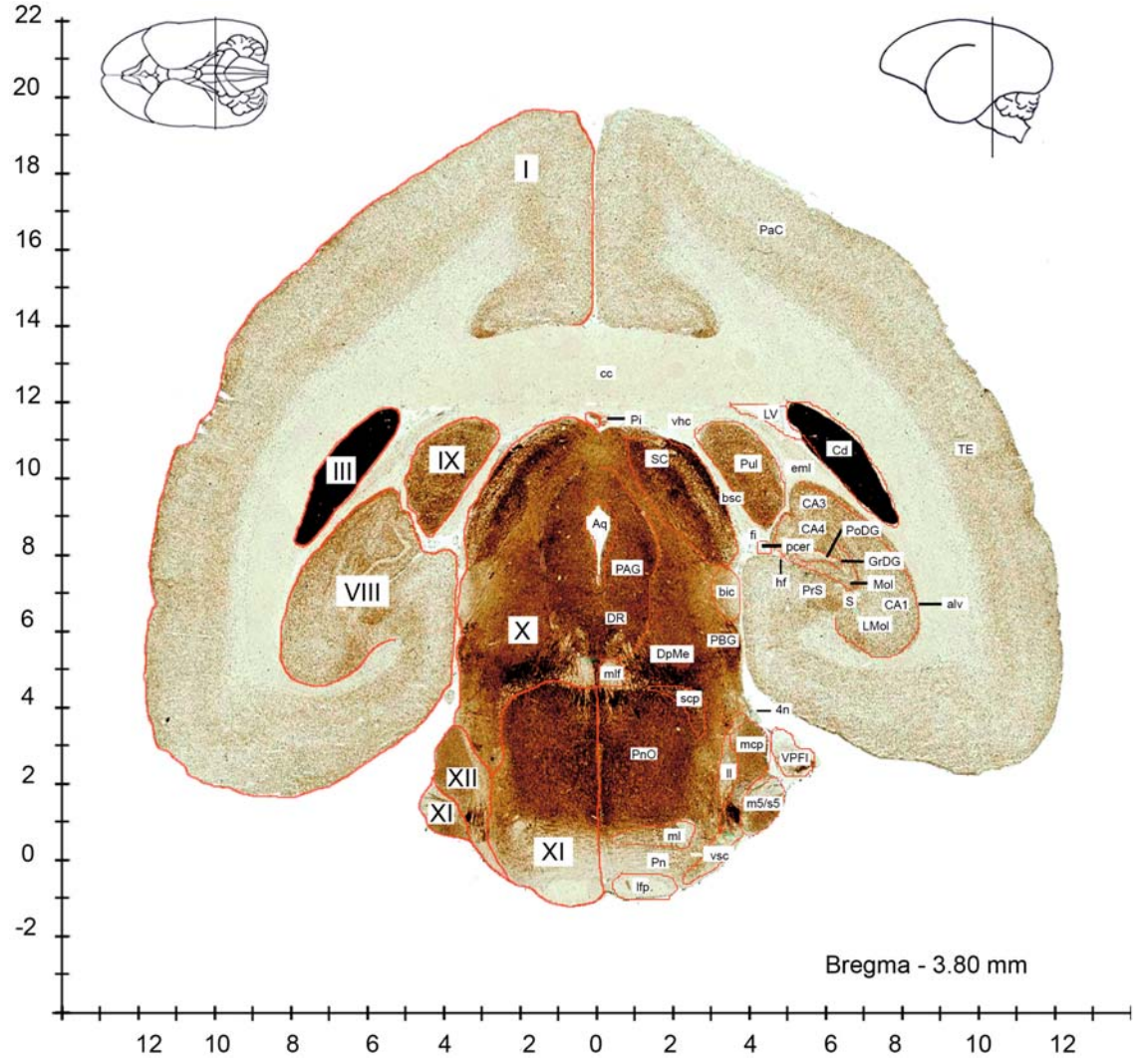

Figure 28

4 n trochlear nerve or its root
alv alveus of the hippocampus
Aq aqueduct
bic brachium of the inferior colliculus
bsc brachium of the superior colliculus
CA1 field CA1 of hippocampus
CA3 field CA3 of hippocampus
CA4 field CA4 of hippocampus
cc corpus callosum
Cd caudate nucleus
DpMe deep mesencephalic nucleus
DR dorsal raphe nucleus
eml external medullary lamina
fi fimbria of the hippocampus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
lfp longidinal fasciculus of the pons
ll lateral lemniscus
LMol lacunosum moleculare layer of the hippocampus
LV lateral ventricle
m5 motor root of the trigeminal nerve
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
Mol molecular layer of the dentate gyrus
PaC parietal cortex
PAG periaqueductal gray
PBG parabigeminal nucleus
pcer posterior cerebral artery
Pi pineal gland
Pn pontine nuclei
PnO pontine reticular nucleus, oral part
PoDG polymorph layer of the dentate gyrus
PrS presubiculum
Pul pulvinar nuclei
S subiculum
s5 sensory root of the trigeminal nerve
SC superior colliculus
scp superior cerebellar peduncle (brachium conjunctivum)
TE temporal cortex
vhc ventral hippocampal commissure
VPFl ventral paraflocculus
vsc ventral spinocerebellar tract

I Cerebral cortex (telencephalon)
III Corpus striatum and related nuclei (telencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)

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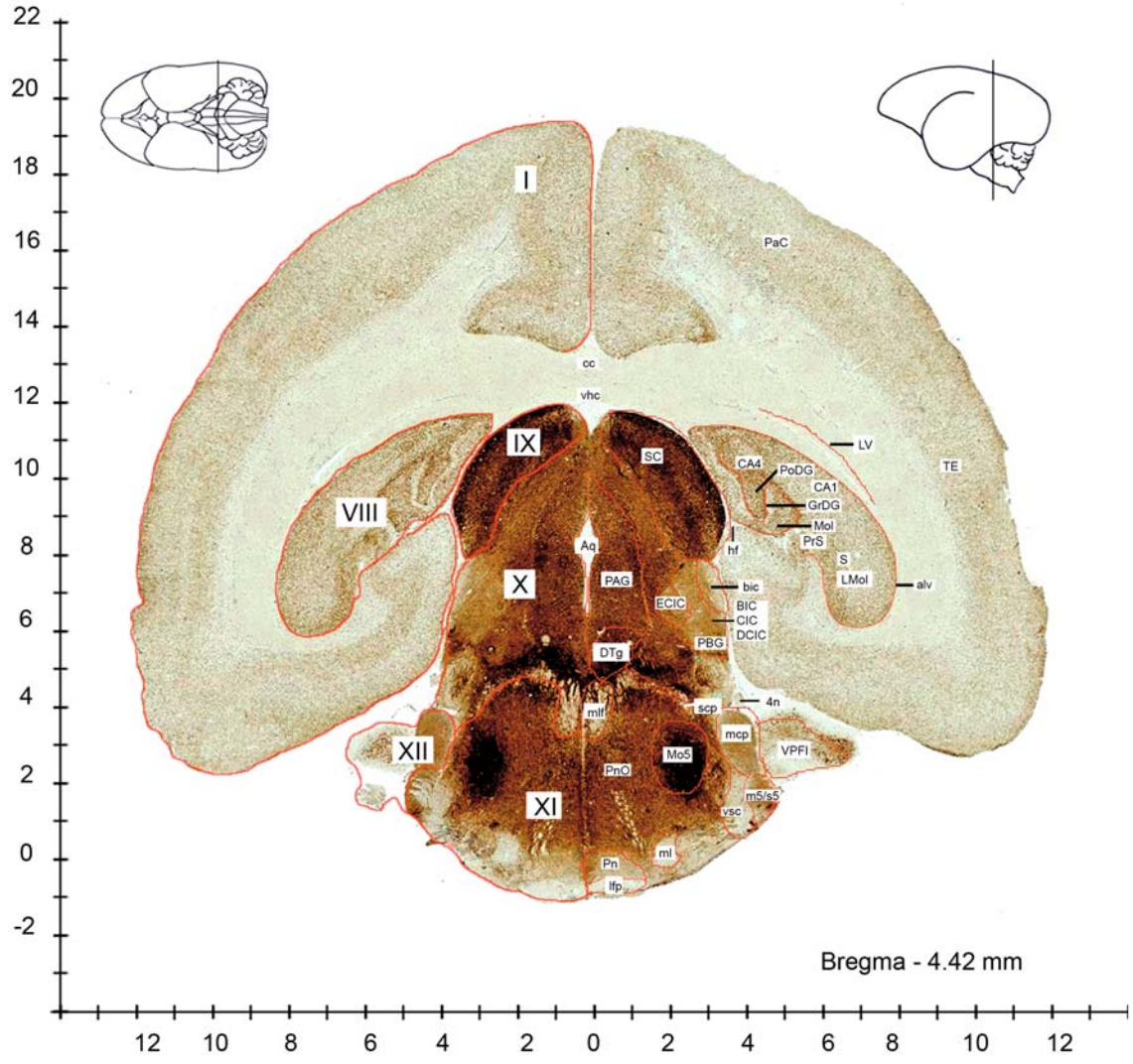

Figure 29

4 n trochlear nerve or its root
alv alveus of the hippocampus
Aq aqueduct
BIC nucleus of the brachium of the inferior colliculus
bic brachium of the inferior colliculus
CA1 field CA1 of hippocampus
CA4 field CA4 of hippocampus
CIC central nucleus of the inferior colliculus
cc corpus callosum
DCIC dorsal cortex of the inferior colliculus
DTg dorsal tegmental nucleus
ECIC external cortex of the inferior colliculus
GrDG granular layer of the dentate gyrus
hf hippocampal fissure
lfp longitudinal fasciculus of the pons
LMol lacunosum moleculare layer of the hippocampus
LV lateral ventricle
m5 motor root of the trigeminal nerve
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
Mo5 motor trigeminal nucleus
Mol molecular layer of the dentate gyrus
PaC parietal cortex
PAG periaqueductal gray
PBG parabigeminal nucleus
Pn pontine nuclei
PnO pontine reticular nucleus, oral part
PoDG polymorph layer of the dentate gyrus
PrS presubiculum
S subiculum
s5 sensory root of the trigeminal nerve
SC superior colliculus
scp superior cerebellar peduncle (brachium conjunctivum)
TE temporal cortex
vhc ventral hippocampal commissure
VPFI ventral paraflocculus
vsc ventral spinocerebellar tract

I Cerebral cortex (telencephalon)
VIII Hippocampus (telencephalon)
IX Thalamus (diencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)

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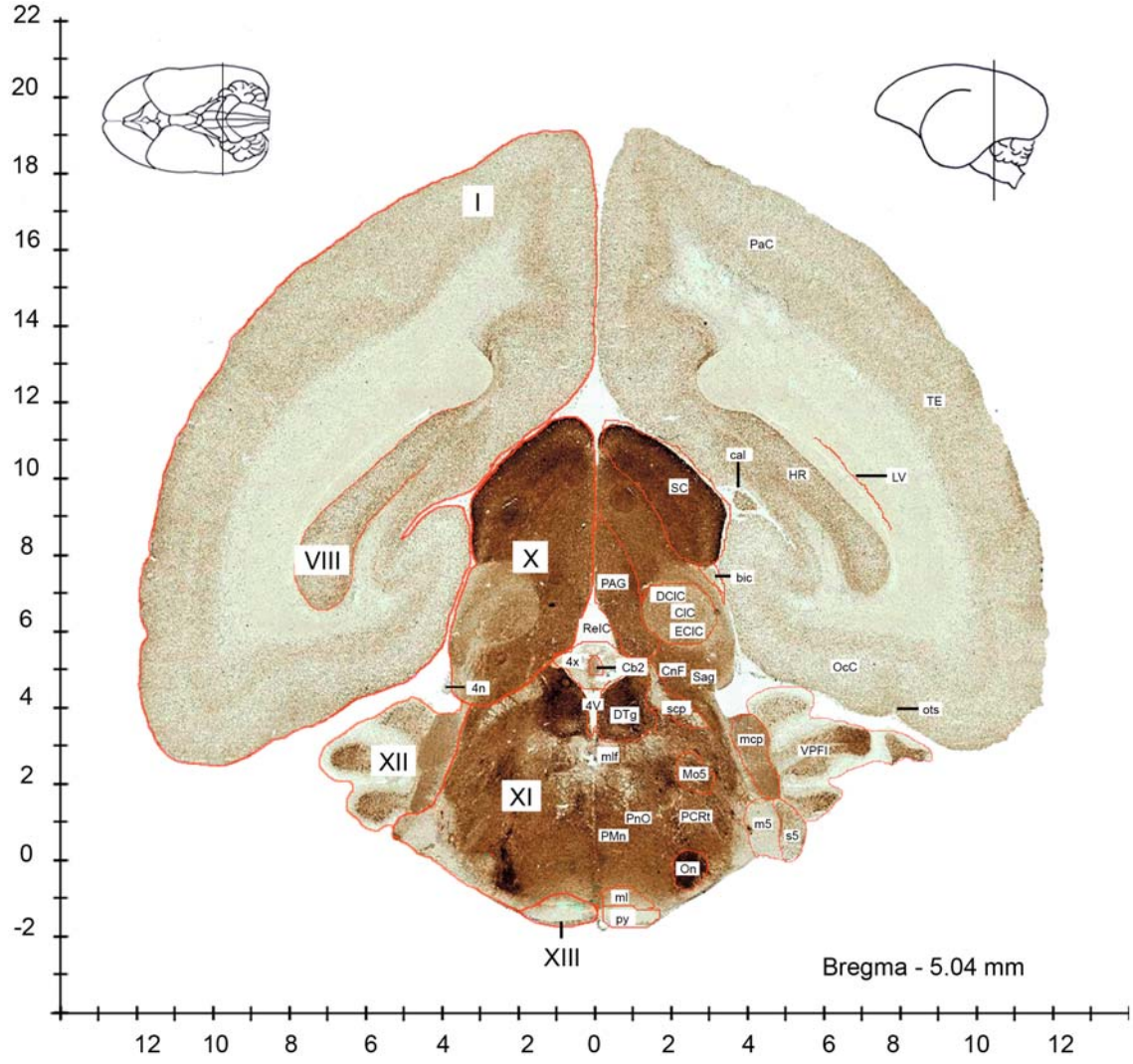

Figure 30

4 n trochlear nerve or its root
4 V 4th ventricle
4x trochlear decussation
bic brachium of the inferior colliculus
cal calcarine sulcus
Cb2 cerebellar lobule 2
CIC central nucleus of the inferior colliculus
CnF cuneiform nucleus
DCIC dorsal cortex of the inferior colliculus
DTg dorsal tegmental nucleus
ECIC external cortex of the inferior colliculus
HR hippocampus supracommissuralis
LV lateral ventricle
m5 motor root of the trigeminal nerve
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
Mo5 motor trigeminal nucleus
OcC occipital cortex
On olivary nuclei
ots occipitotemporal sulcus
PaC parietal cortex
PAG periaqueductal gray
PCRt parvicellular reticular nucleus
PMn paramedian reticular nucleus
PnO pontine reticular nucleus, oral part
py pyramidal tract
ReIC recess of the inferior colliculus
s5 sensory root of the trigeminal nerve
Sag sagulum nucleus
SC superior colliculus
scp superior cerebellar peduncle (brachium conjunctivum)
TE temporal cortex
VPFI ventral paraflocculus

I Cerebral cortex (Telencephalon)
VIII Hippocampus (Telencephalon)
X Mesencephalon
XI Pons (Metencephalon)
XII Cerebellum (Metencephalon)
XIII Medulla (Myelencephalon)

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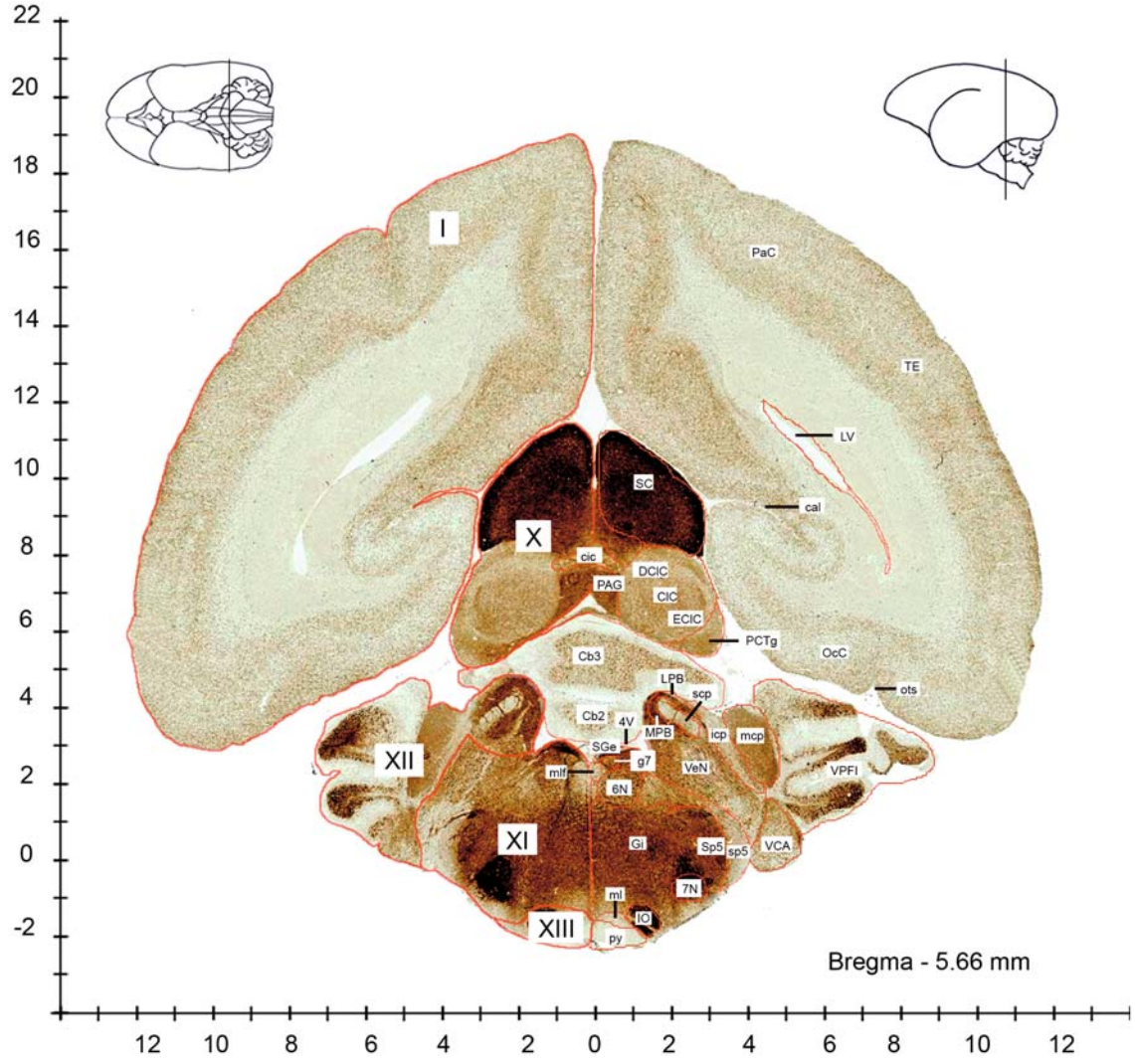

Figure 31

4 V 4th ventricle
6 N abducens nucleus
7 N facial nucleus
cal calcarine sulcus
Cb2 cerebellar lobule 2
Cb3 cerebellar lobule 3
CIC central nucleus of the inferior colliculus
cic commissure of the inferior colliculus
DCIC dorsal cortex of the inferior colliculus
ECIC external cortex of the inferior colliculus
g7 genu of the facial nerve
Gi gigantocellular reticular nucleus
icp inferior cerebral peduncle (restiform body)
IO inferior olive
LPB lateral parabrachial nucleus
LV lateral ventricle
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
MPB medial parabrachial nucleus
OcC occipital cortex
ots occipitotemporal sulcus
PaC parietal cortex
PAG periaqueductal gray
PCTg paracollicular tegmentum
py pyramidal tract
SC superior colliculus
scp superior cerebellar peduncle (brachium conjunctivum)
SGe supragenual nucleus
Sp5 spinal trigeminal nucleus
sp5 spinal trigeminal tract
TE temporal cortex
VCA ventral cochlear nucleus, anterior part
VeN vestibular nuclei
VPFI ventral paraflocculus

I Cerebral Cortex (telencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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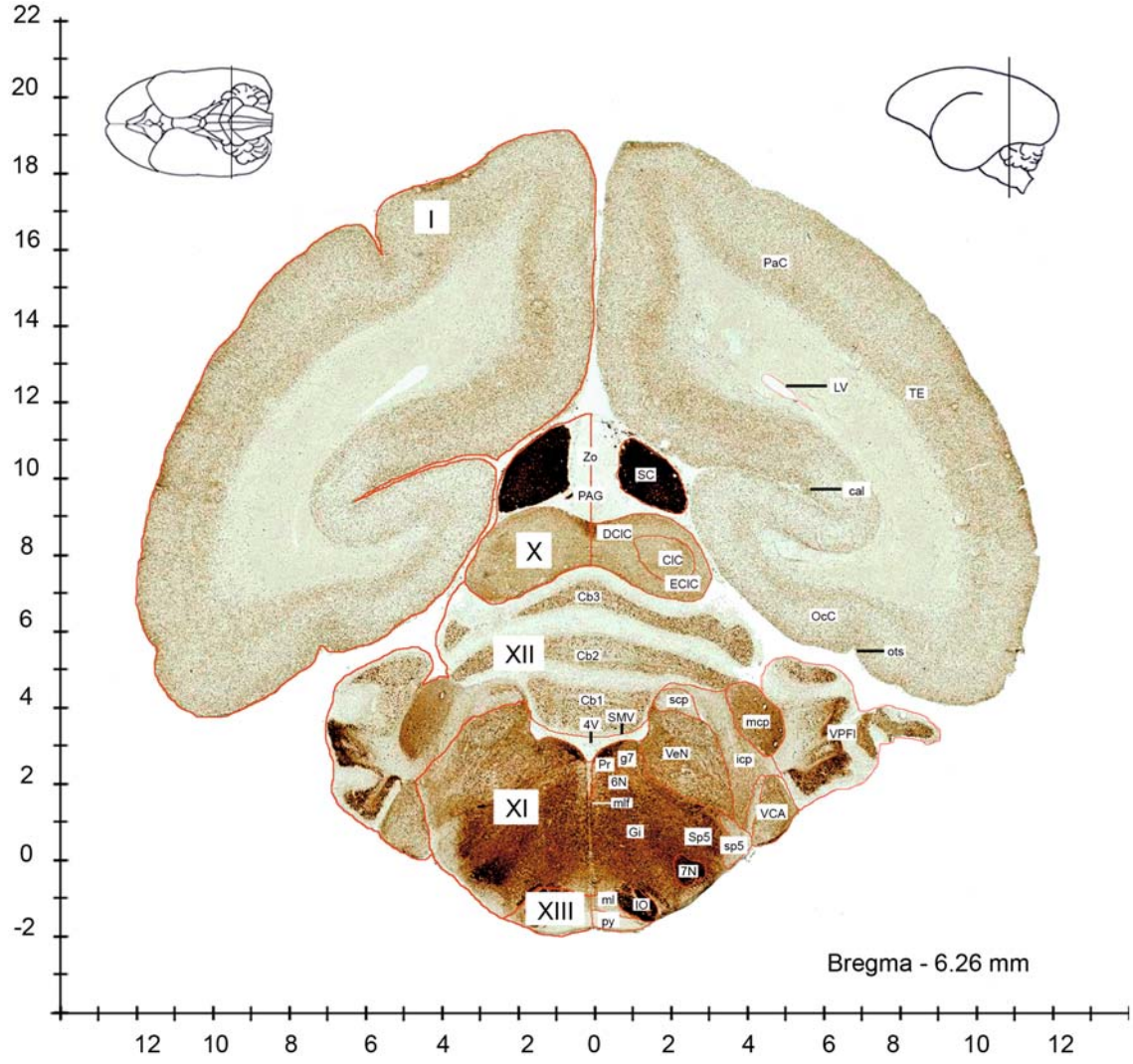

Figure 32

4 V 4th ventricle
6 N abducens nucleus
7 N facial nucleus
cal calcarine sulcus
Cb1 cerebellar lobule 1
Cb2 cerebellar lobule 2
Cb3 cerebellar lobule 3
CIC central nucleus of the inferior colliculus
DCIC dorsal cortex of the inferior colliculus
ECIC external cortex of the inferior colliculus
g7 genu of the facial nerve
Gi gigantocellular reticular nucleus
icp inferior cerebral peduncle (restiform body)
IO inferior olive
LV lateral ventricle
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
OcC occipital cortex
ots occipitotemporal sulcus
PaC parietal cortex
PAG periaqueductal gray
Pr prepositus nucleus
py pyramidal tract
SC superior colliculus
scp superior cerebellar peduncle (brachium conjunctivum)
SMV superior medullary velum
Sp5 spinal trigeminal nucleus
sp5 spinal trigeminal tract
TE temporal cortex
VCA ventral cochlear nucleus, anterior part
VeN vestibular nuclei
VPFl ventral paraflocculus
Zo zonal layer of the superior colliculus

I Cerebral cortex (telencephalon)
X Mesencephalon
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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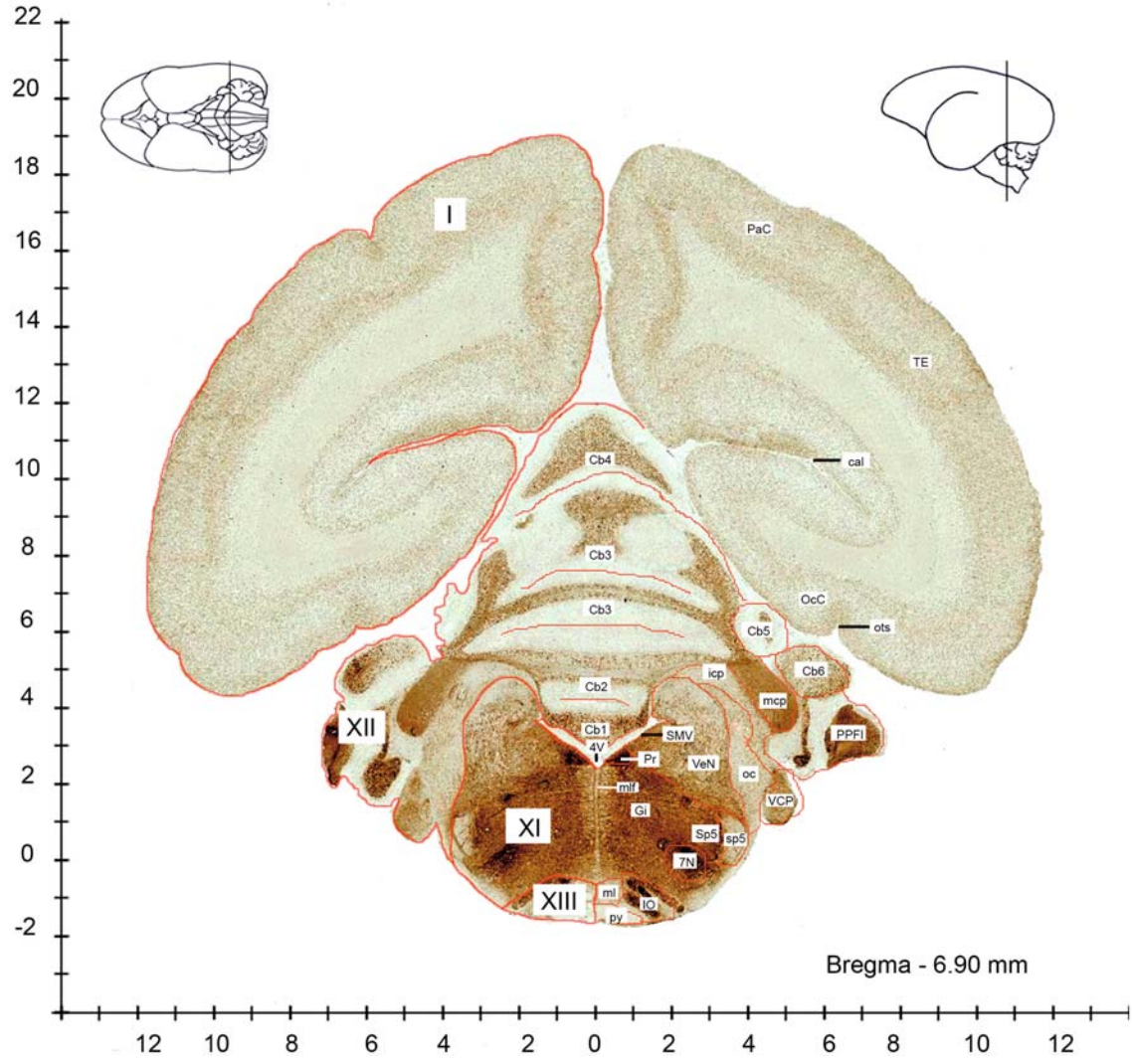

Figure 33

4 V 4th ventricle
7 N facial nucleus
cal calcarine sulcus
Cb1 cerebellar lobule 1
Cb2 cerebellar lobule 2
Cb3 cerebellar lobule 3
Cb4 cerebellar lobule 4
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Gi gigantocellular reticular nucleus
icp inferior cerebellar peduncle (restiform body)
IO inferior olive
mcp middle cerebellar peduncle
ml medial lemniscus
mlf medial longitudinal fasciculus
oc olivocerebellar tract
OcC occipital cortex
ots occipitotemporal sulcus
PaC parietal cortex
PPFI posterior paraflocculus
Pr prepositus nucleus
py pyramidal tract
SMV superior medullary velum
Sp5 spinal trigeminal nucleus
sp5 spinal trigeminal tract
TE temporal cortex
VCP ventral cochlear nucleus, posterior part
VeN vestibular nuclei

I Cerebral cortex (telencephalon)
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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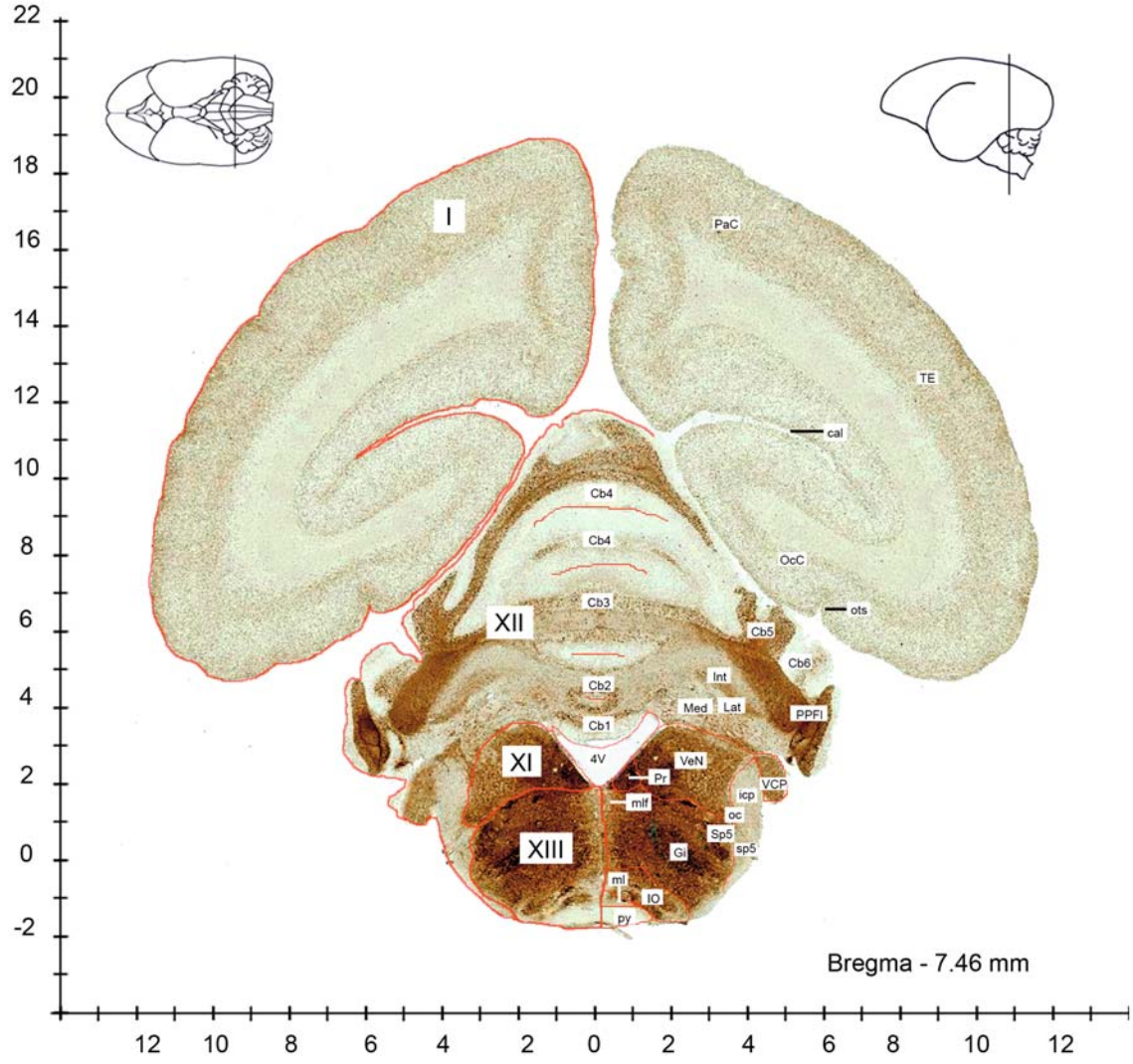

Figure 34

4 V 4th ventricle
cal calcarine sulcus
Cb1 cerebellar lobule 1
Cb2 cerebellar lobule 2
Cb3 cerebellar lobule 3
Cb4 cerebellar lobule 4
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Gi gigantocellular reticular nucleus
icp inferior cerebellar peduncle (restiform body)
Int interposed cerebellar nucleus
IO inferior olive
Lat lateral (dentate) cerebellar nucleus
Med medial (fastigial) cerebellar nucleus
ml medial lemniscus
mlf medial longitudinal fasciculus
oc olivocerebellar tract
OcC occipital cortex
ots occipitotemporal sulcus
PPFl posterior paraflocculus
Pr prepositus nucleus
py pyramidal tract
Sp5 spinal trigeminal nucleus
sp5 spinal trigeminal tract
TE temporal cortex
VCP ventral cochlear nucleus, posterior part
VeN vestibular nuclei

I Cerebral cortex (telencephalon)
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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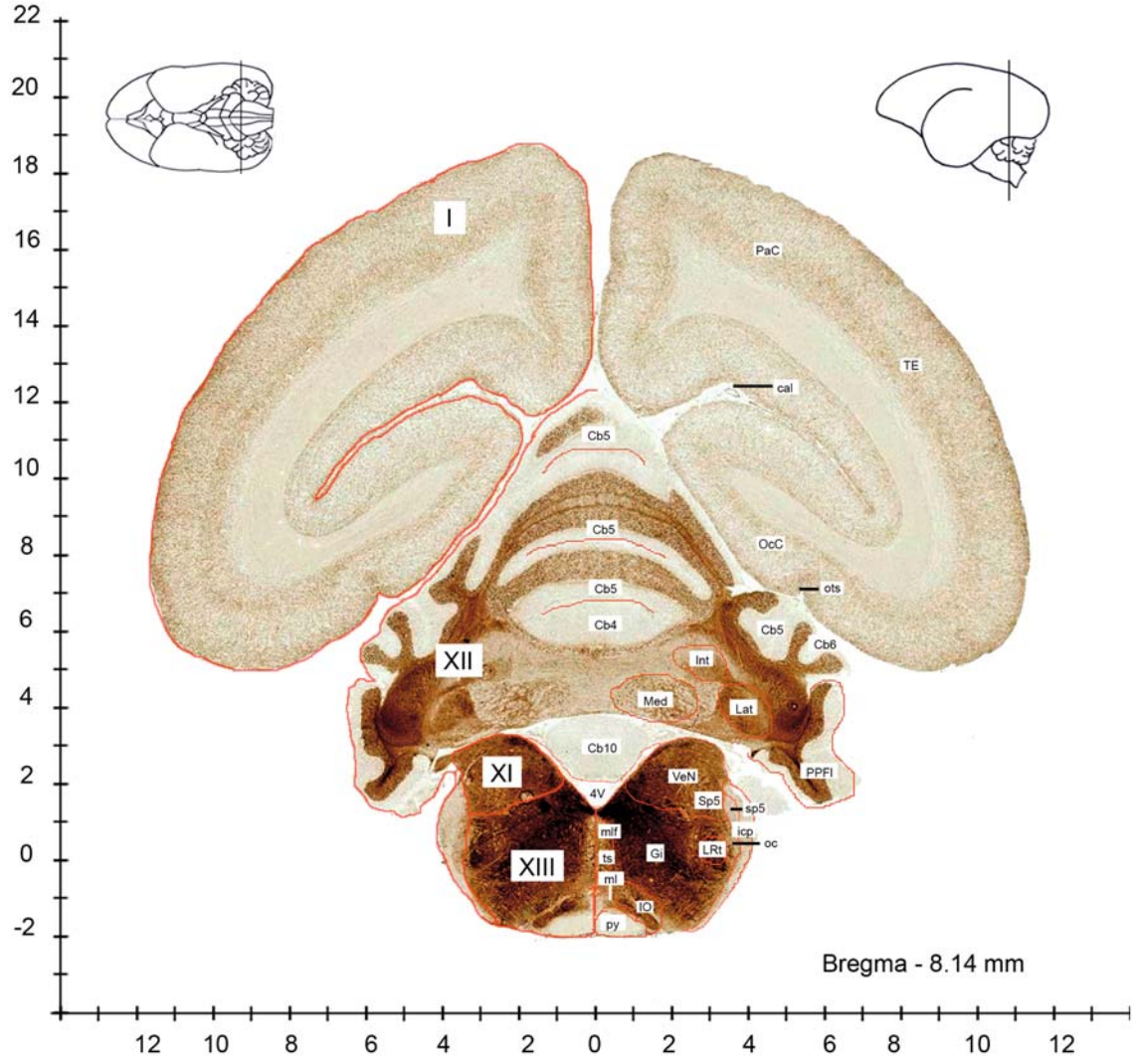

Figure 35

4 V 4th ventricle
cal calcarine sulcus
Cb4 cerebellar lobule 4
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb10 cerebellar lobule 10
Gi gigantocellular reticular nucleus
icp inferior cerebellar peduncle (restiform body)
Int interposed cerebellar nucleus
IO inferior olive
Lat lateral (dentate) cerebellar nucleus
LRt lateral reticular nucleus
Med medial (fastigial) cerebellar nucleus
ml medial lemniscus
mlf medial longitudinal fasciculus
oc olivocerebellar tract
OcC occipital cortex
ots occipitotemporal sulcus
PaC parietal cortex
PPFI posterior paraflocculus
py pyramidal tract
Sp5 spinal trigeminal nucleus
sp5 spinal trigeminal tract
TE temporal cortex
ts tectospinal tract
VeN vestibular nuclei

I Cerebral cortex (telencephalon)
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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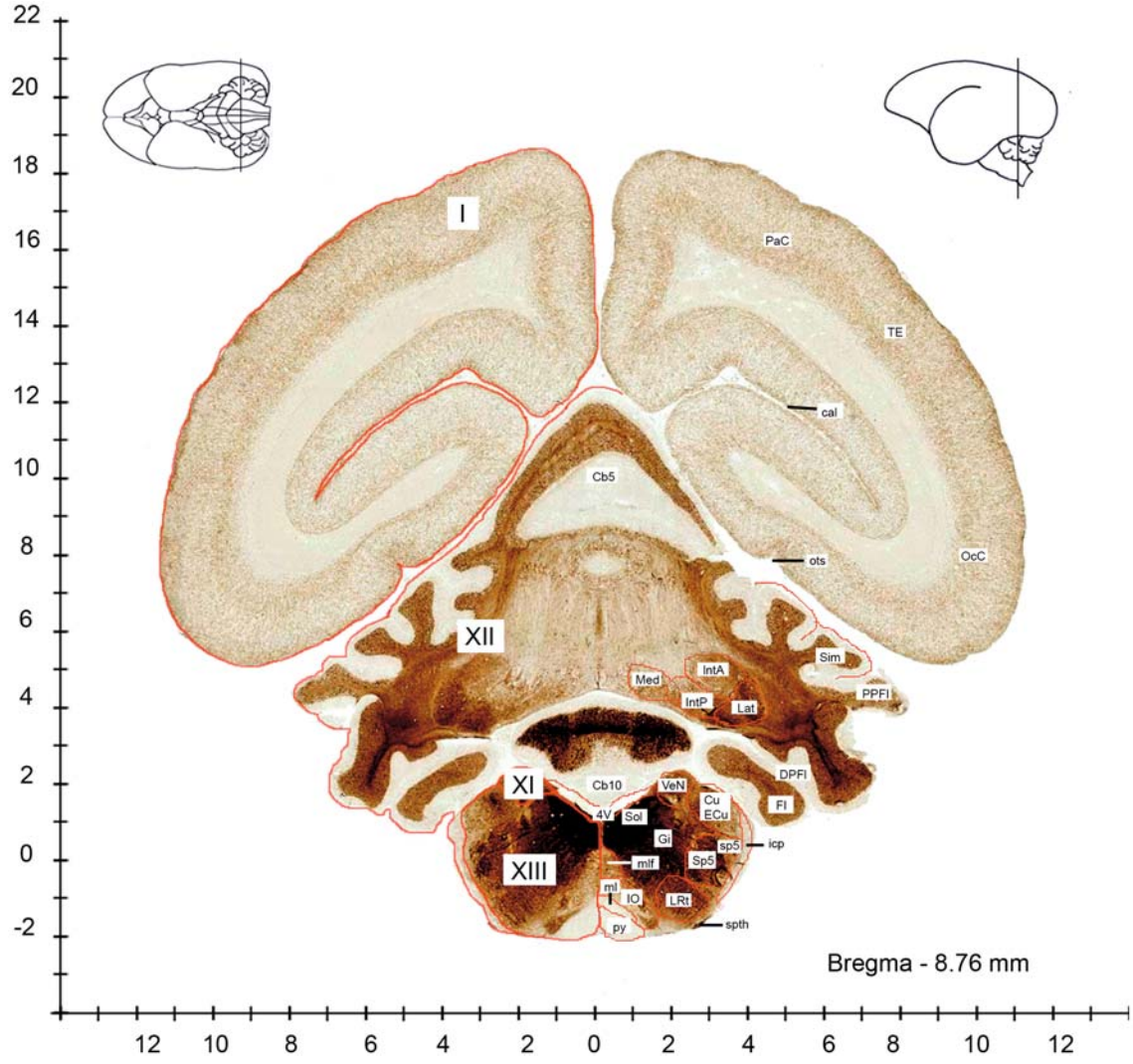

Figure 36

4 V 4th ventricle
cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb10 cerebellar lobule 10
Cu cuneate nucleus
DPFI dorsal parafloculus
ECu external cuneate nucleus
FI flocculus
Gi gigantocellular reticular nucleus
icp inferior cerebellar peduncle (restiform body)
IntA interposed cerebellar nucleus, anterior part
IntP interposed cerebellar nucleus, posterior part
IO inferior olive
Lat lateral (dentate) cerebellar nucleus
LRt lateral reticular nucleus
Med medial (fastigial) cerebellar nucleus
ml medial lemniscus
mlf medial longitudinal fasciculus
OcC occipital cortex
ots occipitotemporal sulcus
PaC parietal cortex
PPFI posterior paraflocculus
py pyramidal tract
Sim simple lobule
Sol solitary nucleus
Sp5 spinal trigeminal nucleus
sp5 spinal trigeminal tract
spth spinothalamic tract
TE temporal cortex
VeN vestibular nuclei

I Cerebral cortex (telencephalon)
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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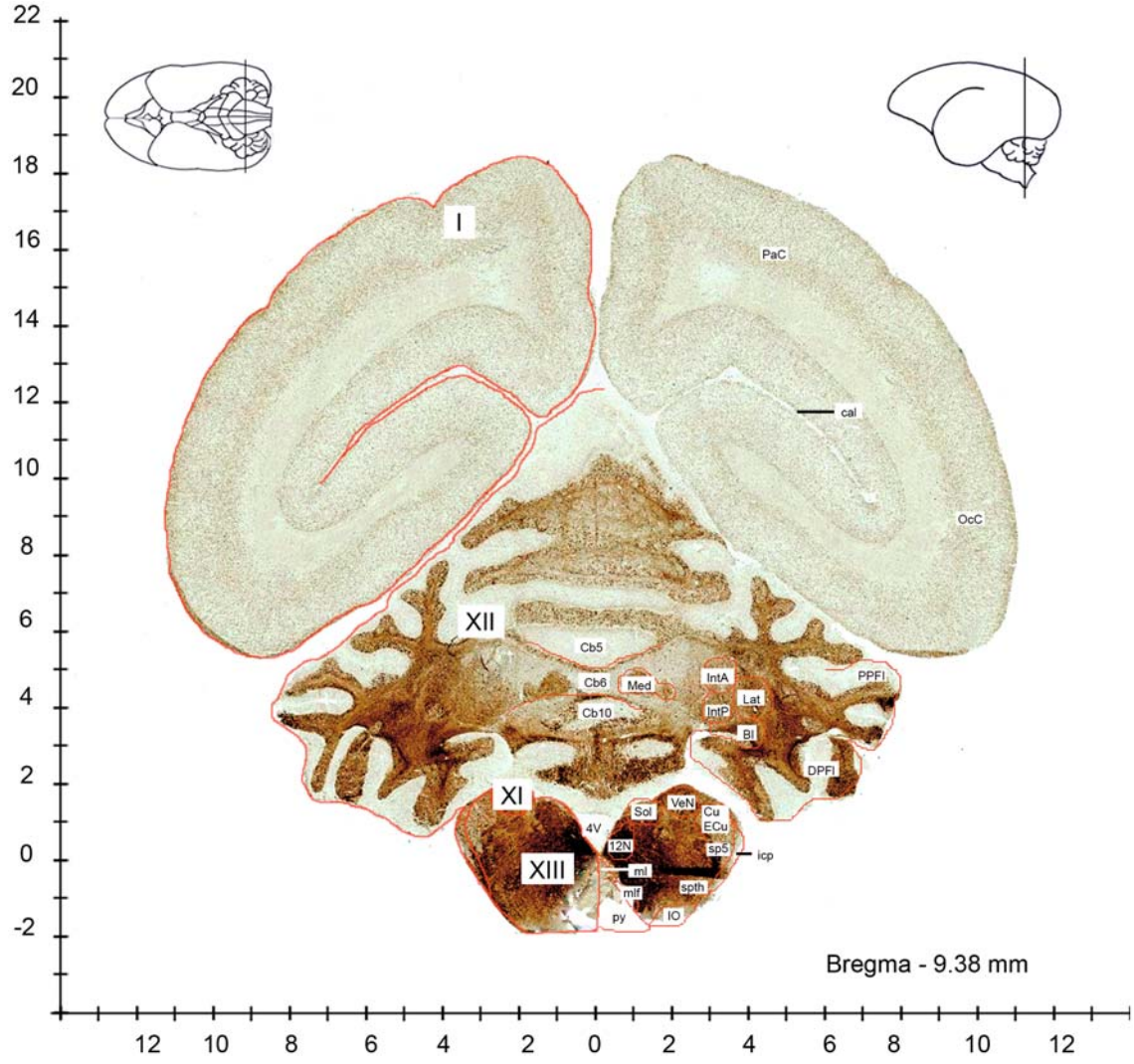

Figure 37

4 V 4th ventricle
12 N hypoglossal nucleus
BI basal interstitial
cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb10 cerebellar lobule 10
Cu cuneate nucleus
DPFI dorsal paraflocculus
ECu external cuneate nucleus
icp inferior cerebellar peduncle (restiform body)
IntA interposed cerebellar nucleus, anterior part
IntP interposed cerebellar nucleus, posterior part
IO inferior olive
Lat lateral (dentate) cerebellar nucleus
Med medial (fastigial) cerebellar nucleus
ml medial lemniscus
mlf medial longitudinal fasciculus
OcC occipital cortex
PaC parietal cortex
PPFI posterior paraflocculus
py pyramidal tract
Sol solitary nucleus
sp5 spinal trigeminal tract
spth spinothalamic tract
VeN vestibular nuclei

I Cerebral cortex (telencephalon)
XI Pons (metencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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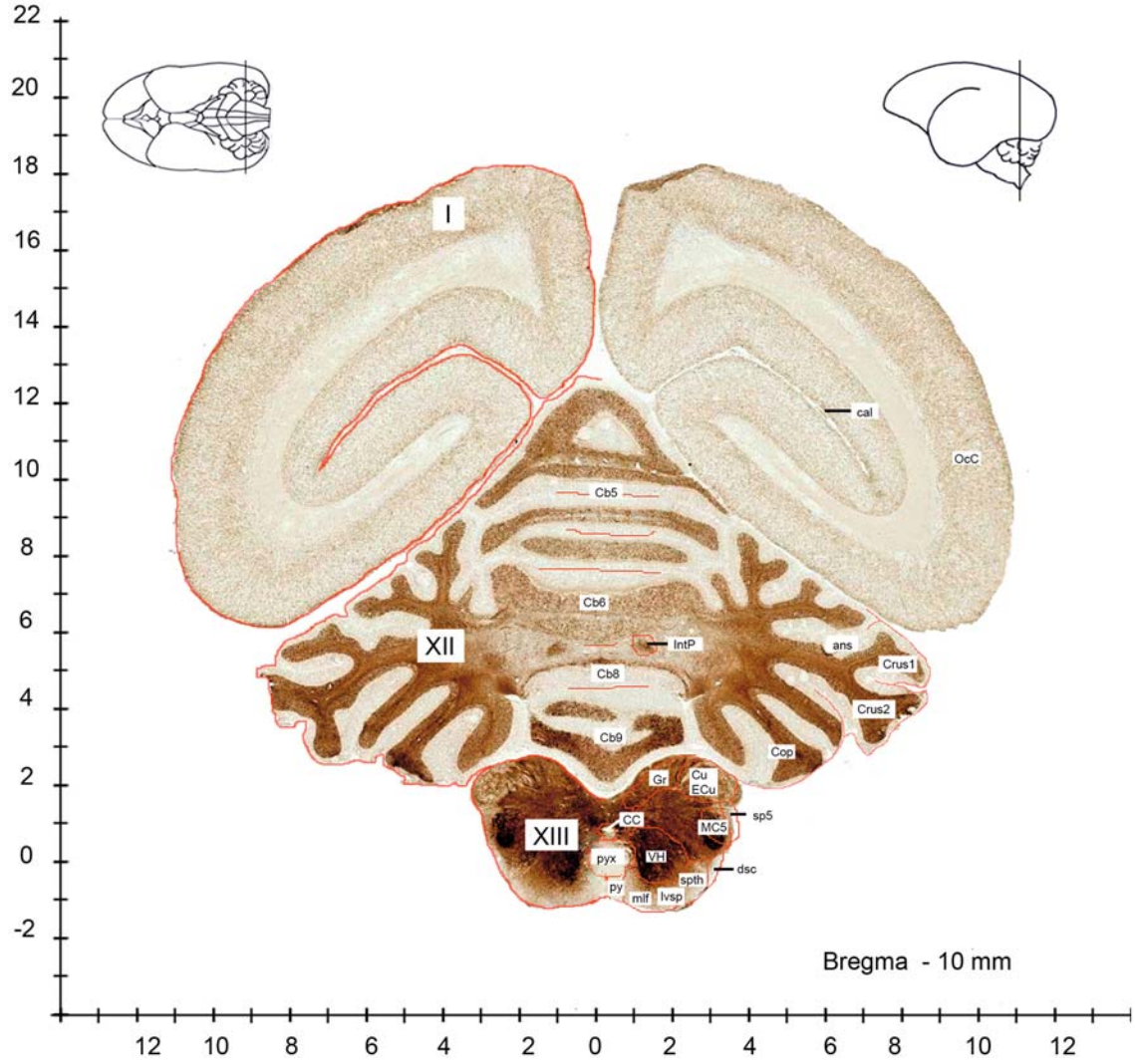

Figure 38

ans ansiform lobule of the cerebellum
cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb8 cerebellar lobule 8
Cb9 cerebellar lobule 9
CC central canal
Cop copula of the pyramis
Crus1 crus1 of the ansiform lobule
Crus2 crus2 of the ansiform lobule
Cu cuneate nucleus
dsc dorsal spinocerebellar tract
ECu external cuneate nucleus
Gr gracile nucleus
IntP interposed cerebellar nucleus, posterior part
lvsp lateral vestibulospinal tract
MC5 magnocellular layer of the caudal spinal trigeminal nucleus
mlf medial longitudinal fasciculus
OcC occipital cortex
py pyramidal tract
pyx pyramidal decussation
sp5 spinal trigeminal tract
spth spinothalamic tract
VH ventral horn

I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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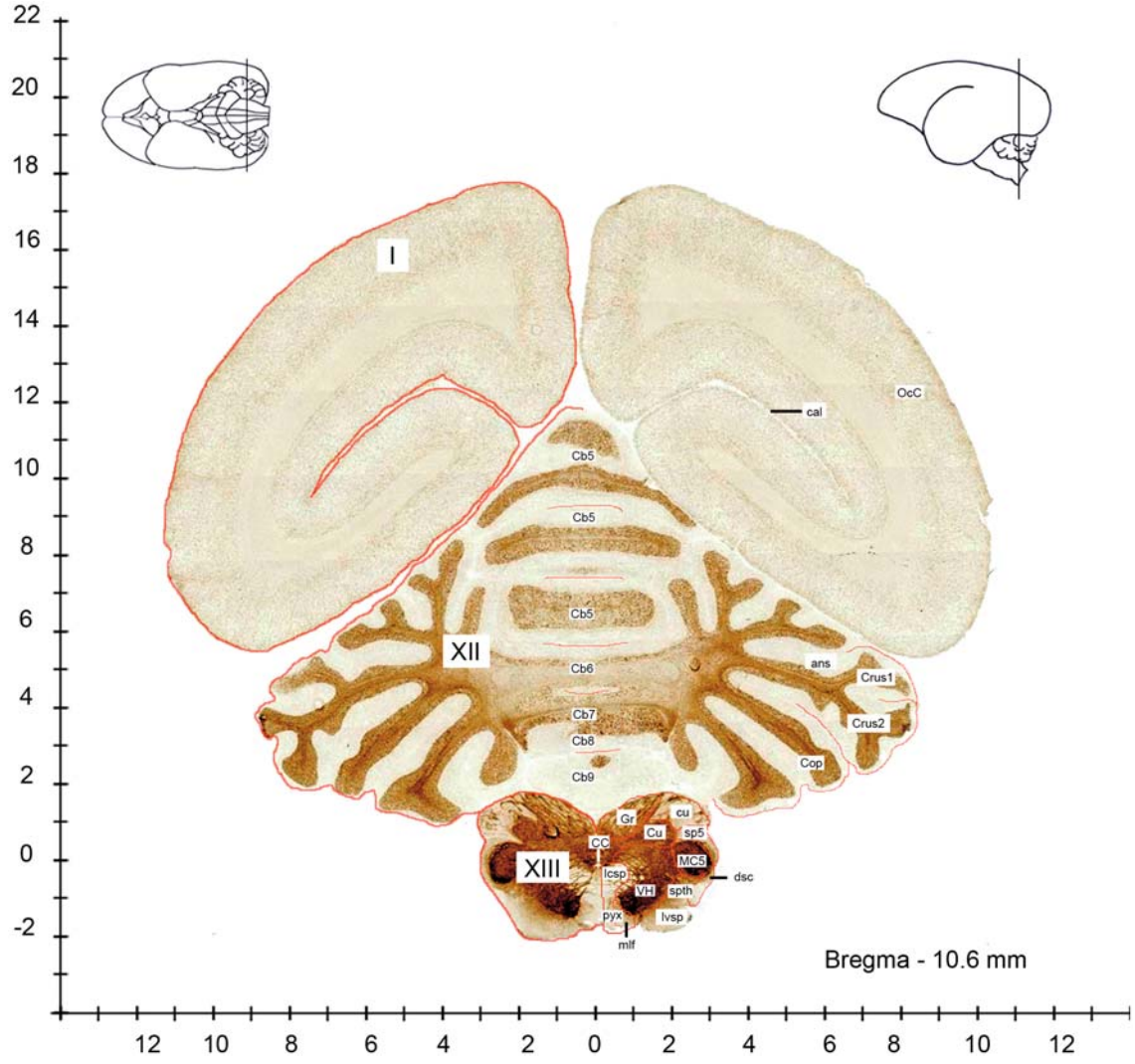

Figure 39

ans ansiform lobule of the cerebellum
cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb7 crebellar lobule 7
Cb8 cerebellar lobule 8
Cb9 cerebellar lobule 9
CC central canal
Cop copula of the pyramis
Crus1 crus1 of the ansiform lobule
Crus2 crus2 of the ansiform lobule
Cu cuneate nucleus
cu cuneate fasciculus
dsc dorsal spinocerebellar tract
Gr gracile nucleus
lcsp lateral corticospinal tract
lvsp lateral vestibulospinal tract
MC5 magnocellular layer of the caudal Spinal trigeminal nucleus
mlf medial longitudinal fasciculus
pyx pyramidal decussation
sp5 spinal trigeminal tract
spth spinothalamic tract
VH ventral horn

I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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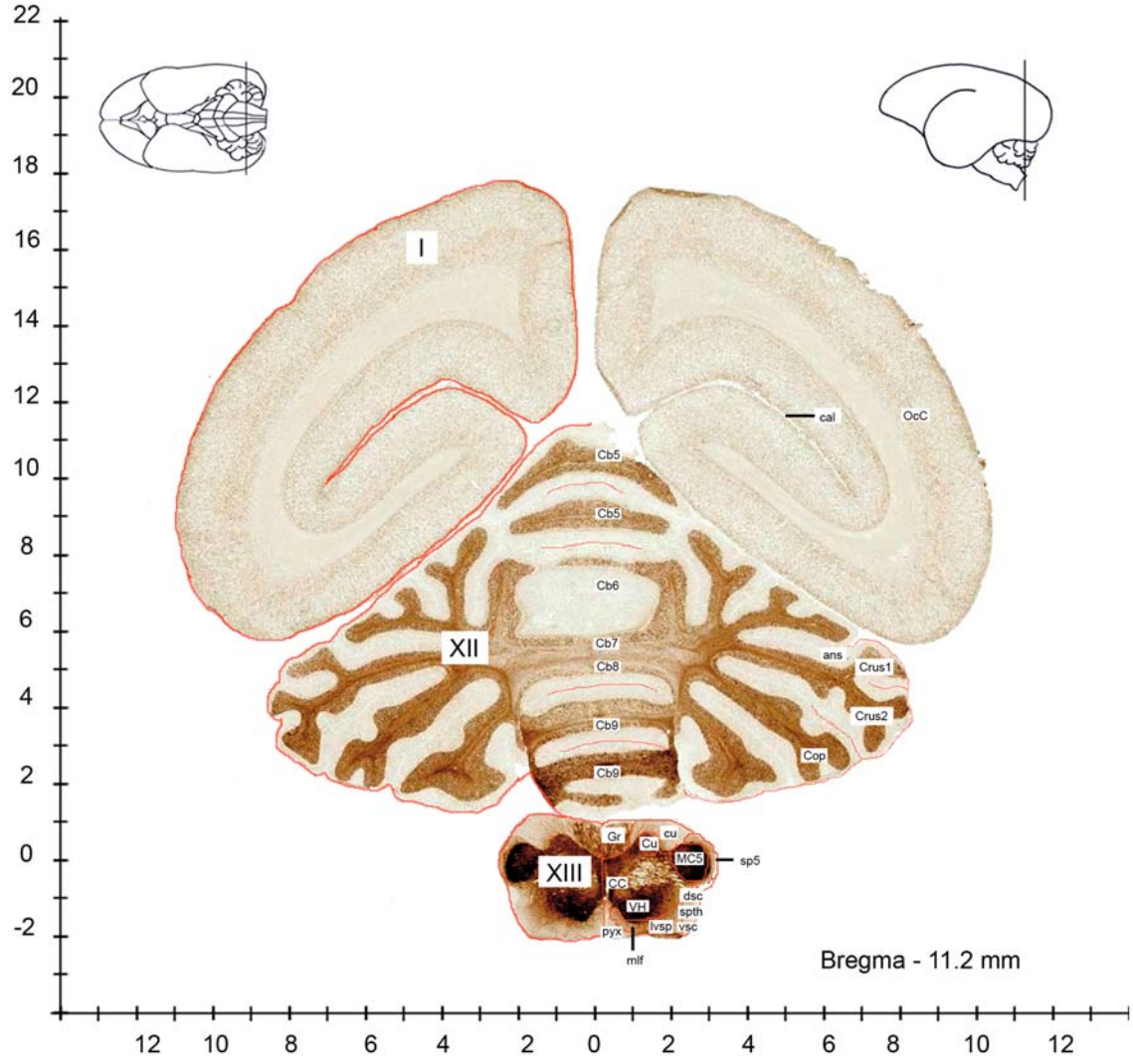

Figure 40

ans ansiform lobule of the cerebellum
cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
Cb9 cerebellar lobule 9
CC central canal
Cop copula of the pyramis
Crus1 crus1 of the ansiform lobule
Crus2 crus2 of the ansiform lobule
Cu cuneate nucleus
cu cuneate fasciculus
dsc dorsal spinocerebellar tract
Gr gracile nucleus
lvsp lateral vestibulospinal tract
MC5 magnocellular layer of the caudal Spinal trigeminal nucleus
mlf medial longitudinal fasciculus
OcC occipital cortex
pyx pyramidal decussation
sp5 spinal trigeminal tract
spth spinothalamic tract
VH ventral horn
vsc ventral spinocerebellar tract

I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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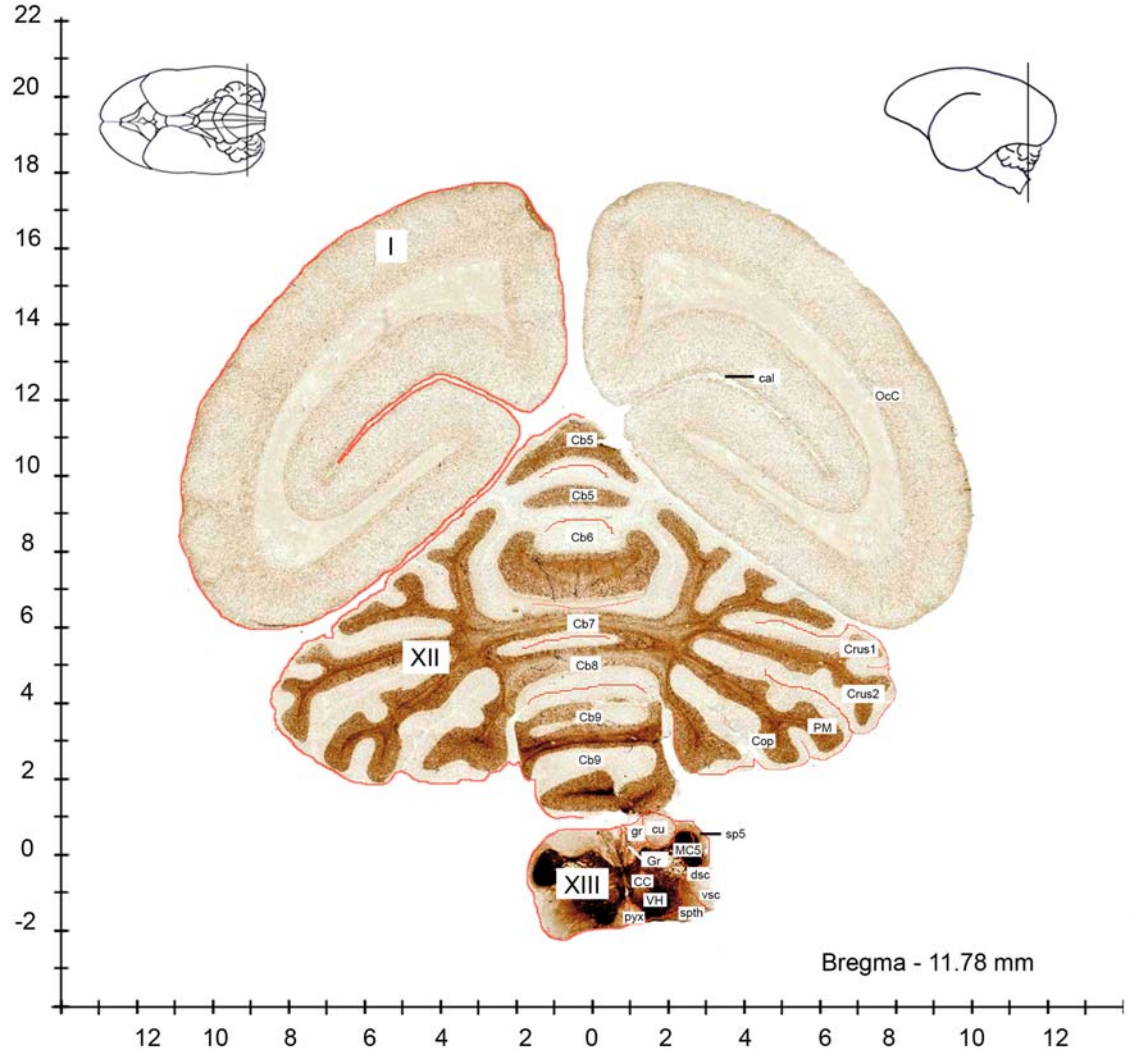

Figure 41

cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
Cb9 cerebellar lobule 9
CC central canal
Cop copula of the pyramis
Crus1 crus1 of the ansiform lobule
Crus2 crus 2 of the ansiform lobule
cu cuneate fasciculus
dsc dorsal spinocerebellar tract
Gr gracile nucleus
gr gracile fasciculus
MC5 magnocellular layer of the caudal spinal trigeminal nucleus
OcC occipital cortex
PM paramedian lobule
pyx pyramidal decussation
sp5 spinal trigeminal tract
spth spinothalamic tract
VH ventral horn
vsc ventral spinocerebellar tract

I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)
XIII Medulla (myelencephalon)

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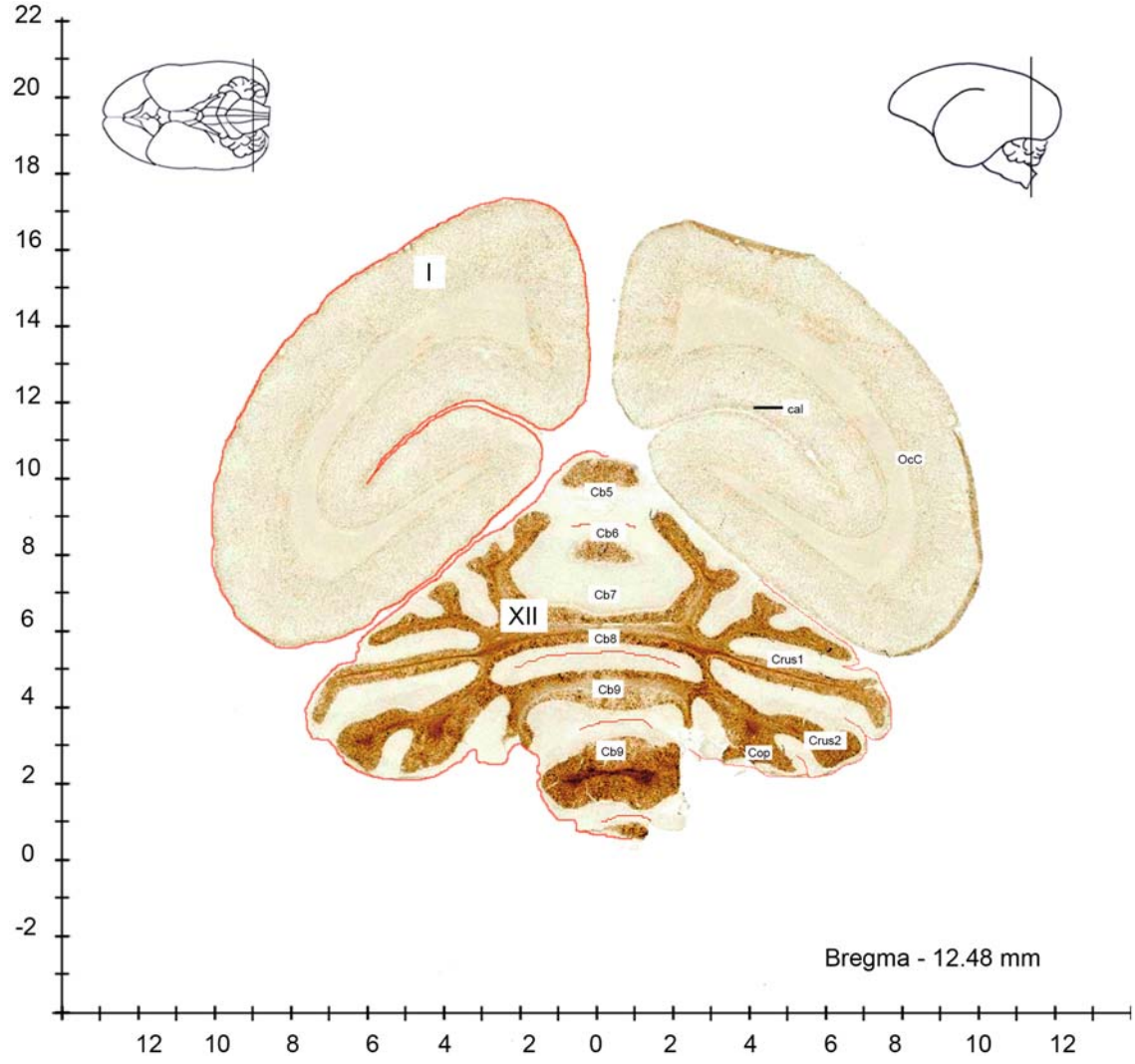

Figure 42

cal calcarine sulcus
Cb5 cerebellar lobule 5
Cb6 cerebellar lobule 6
Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
Cb9 cerebellar lobule 9
Cop copula of the pyramis
Crus1 crus1 of the ansiform lobule
Crus2 crus 2 of the ansiform lobule
OcC occipital cortex

I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)

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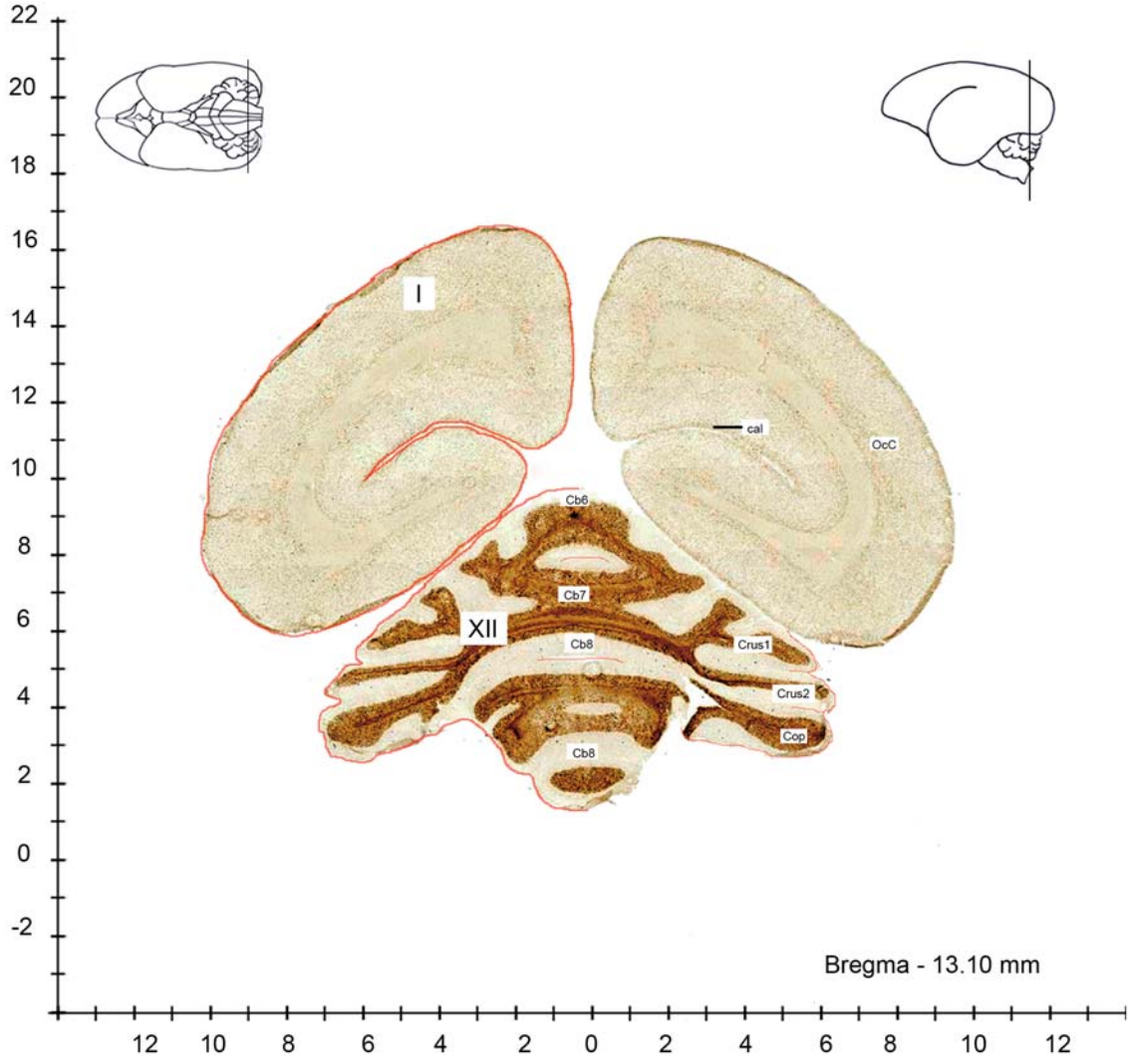

Figure 43

cal calcarine sulcus
Cb6 cerebellar lobule 6
Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
Cop copula of the pyramis
Crus1 crus1 of the ansiform lobule
Crus2 crus 2 of the ansiform lobule
OcC occipital cortex

I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)

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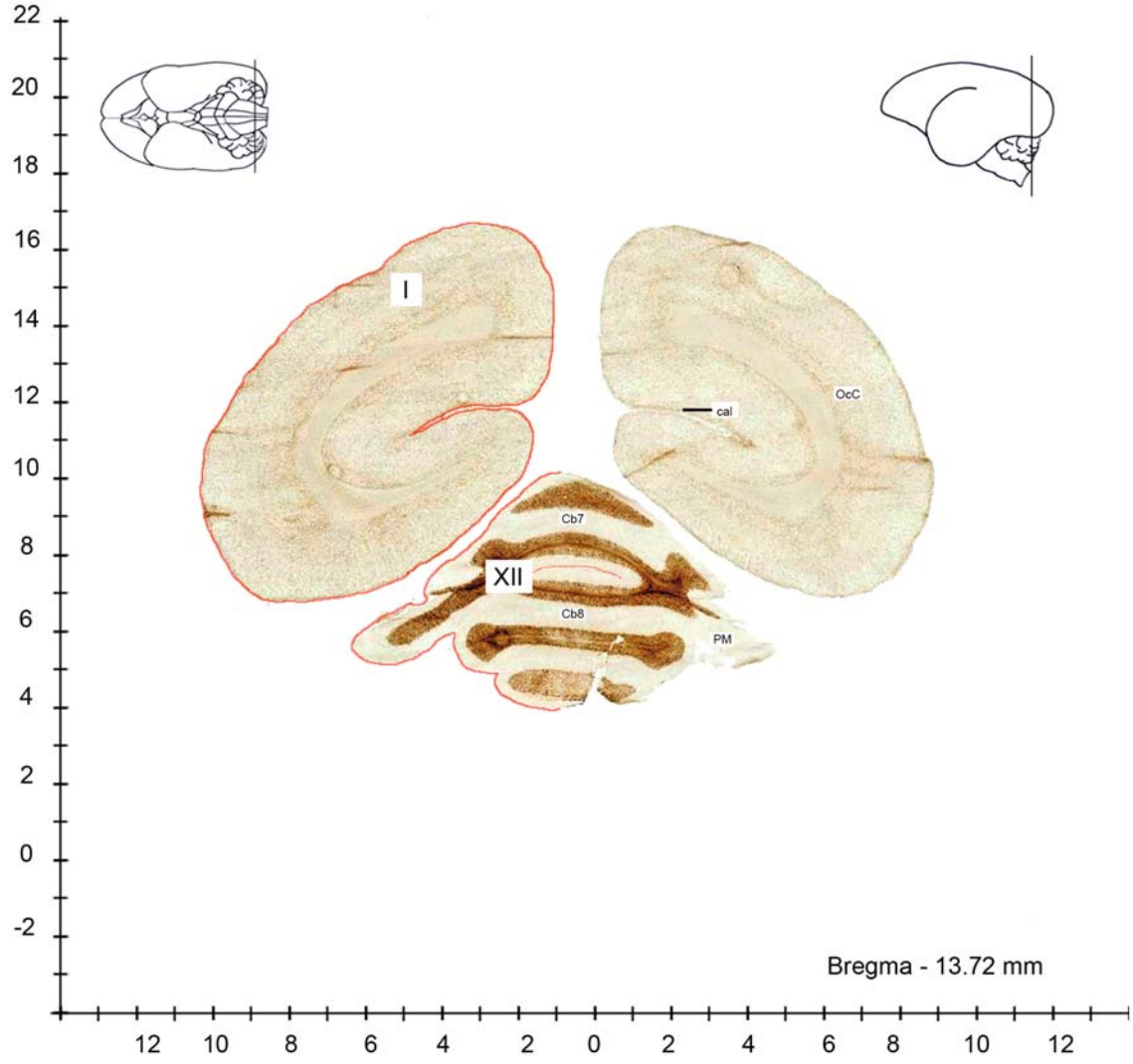

Figure 44

cal calcarine sulcus
Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
OcC occipital cortex
PM paramedian lobule
I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)

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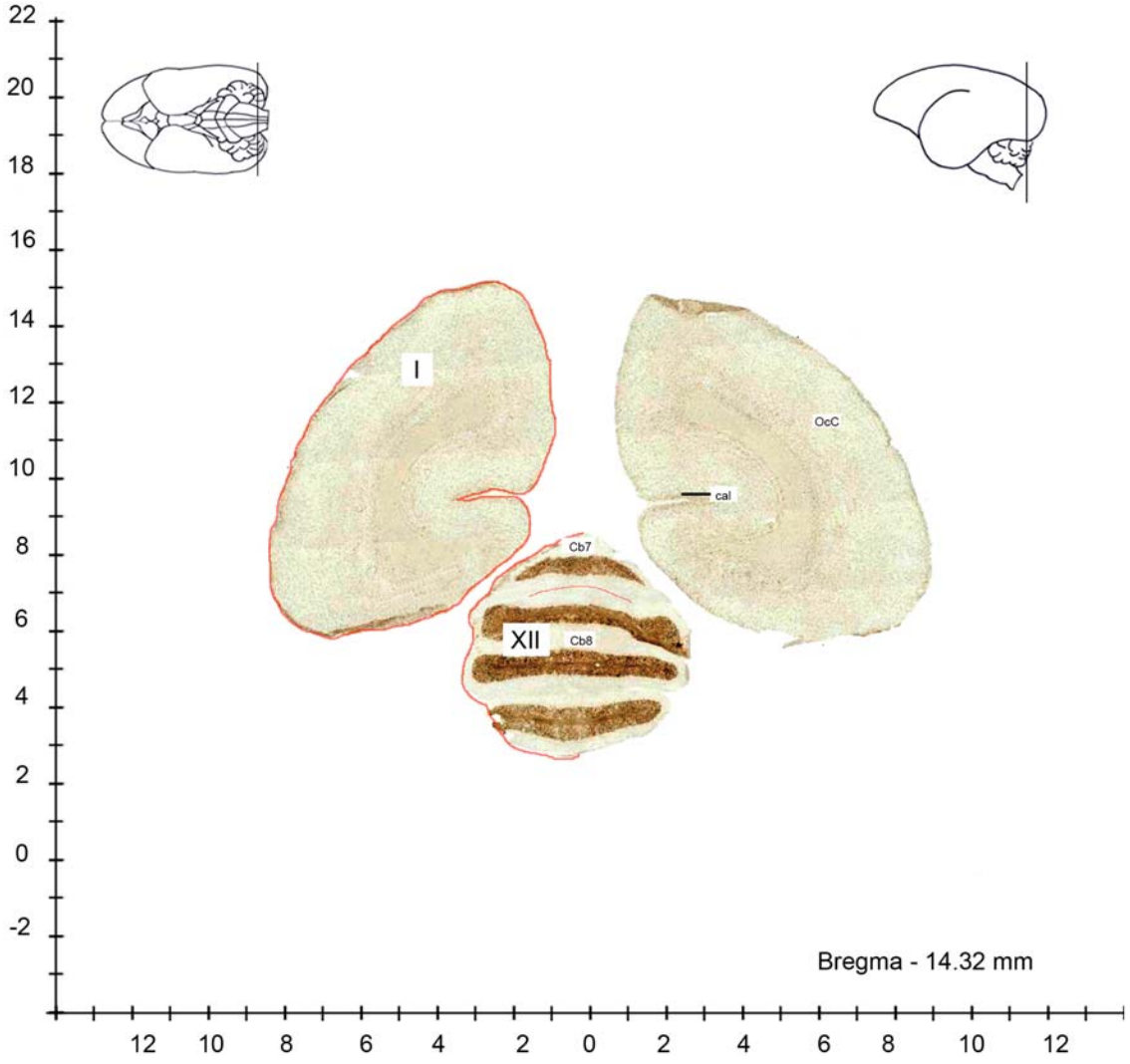

Figure 45

cal calcarine sulcus
Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
OcC occipital cortex
I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)

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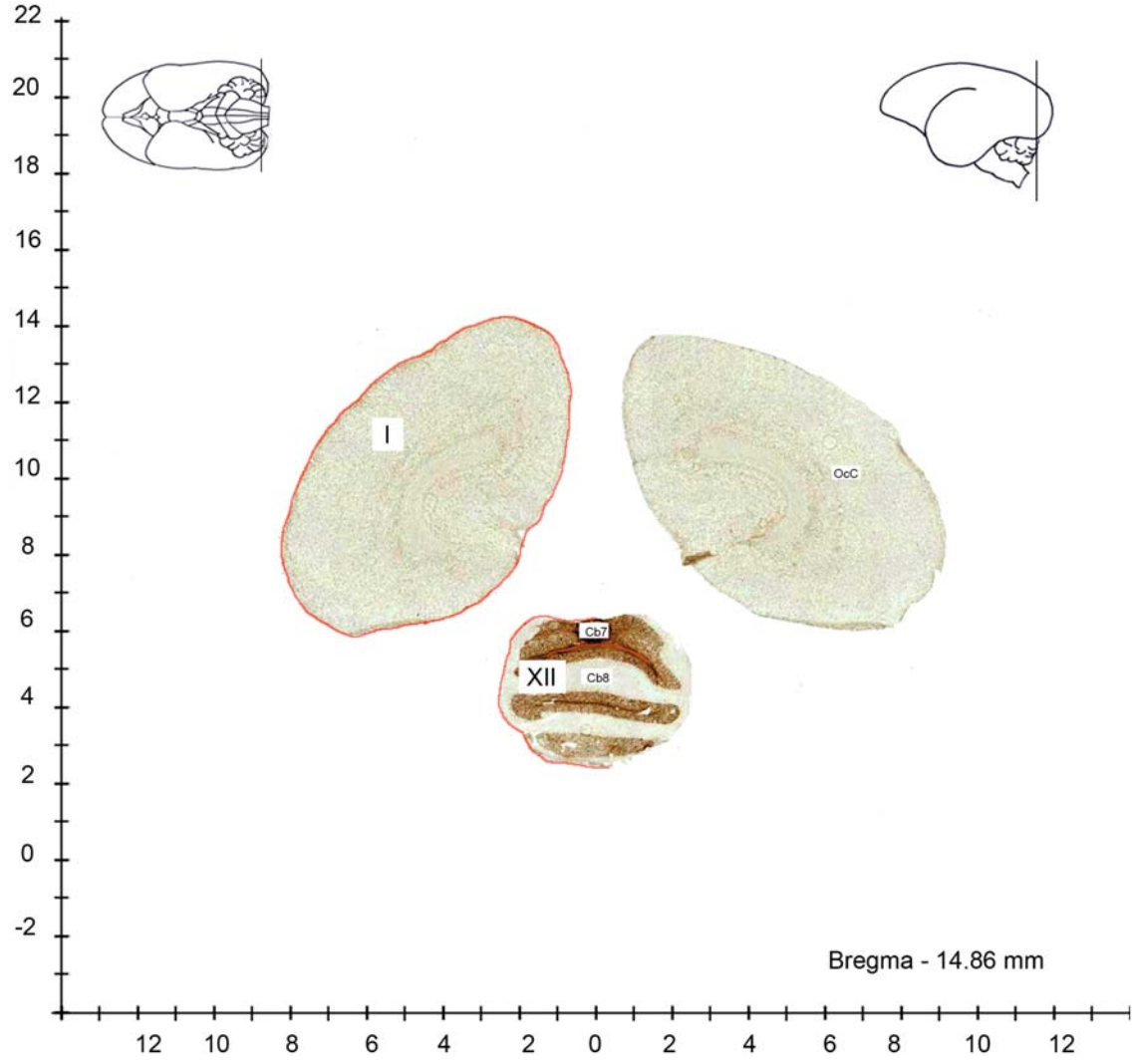

Figure 46

Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
OcC occipital cortex
I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)

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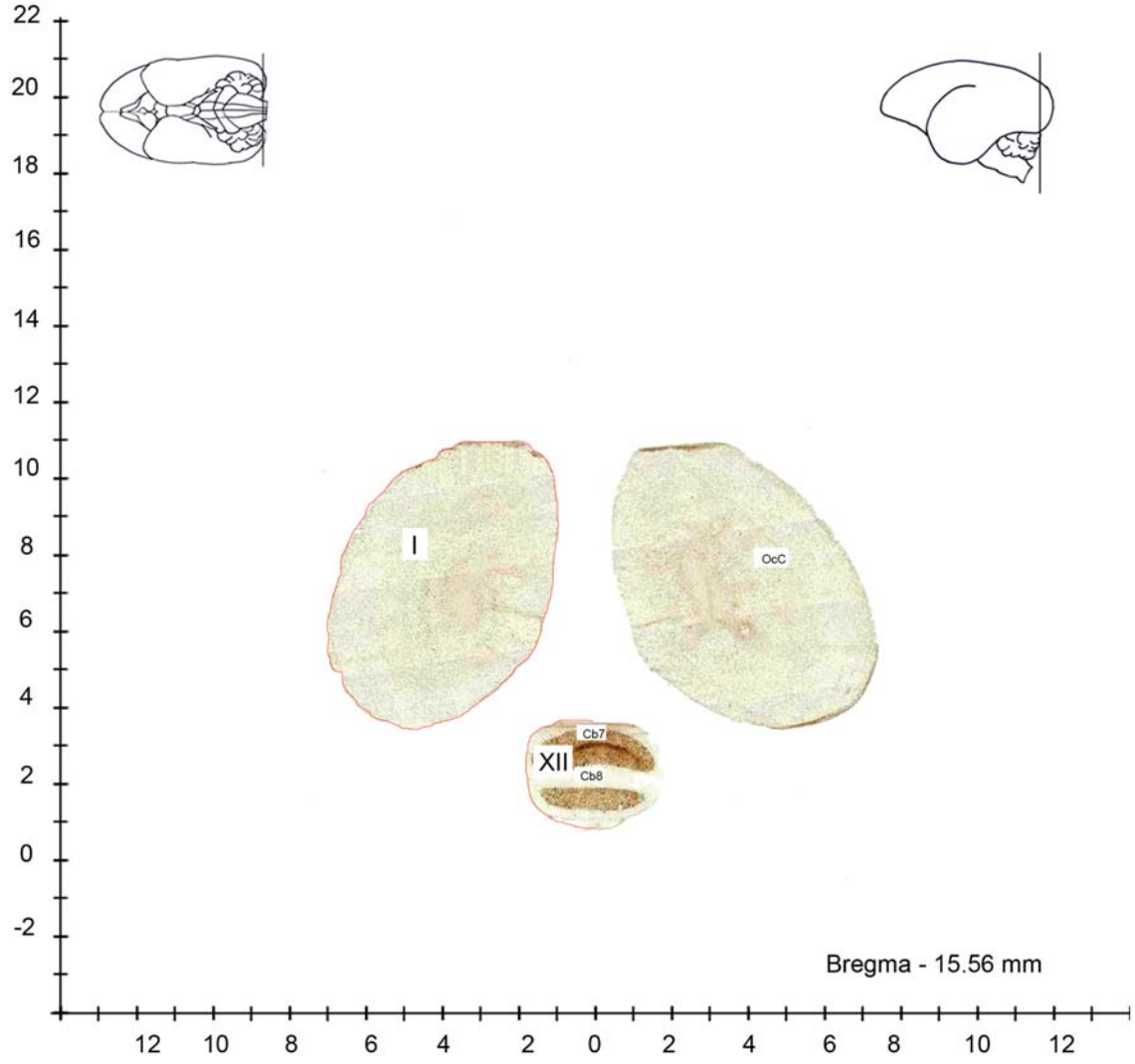

Figure 47

Cb7 cerebellar lobule 7
Cb8 cerebellar lobule 8
OcC occipital cortex
I Cerebral cortex (telencephalon)
XII Cerebellum (metencephalon)

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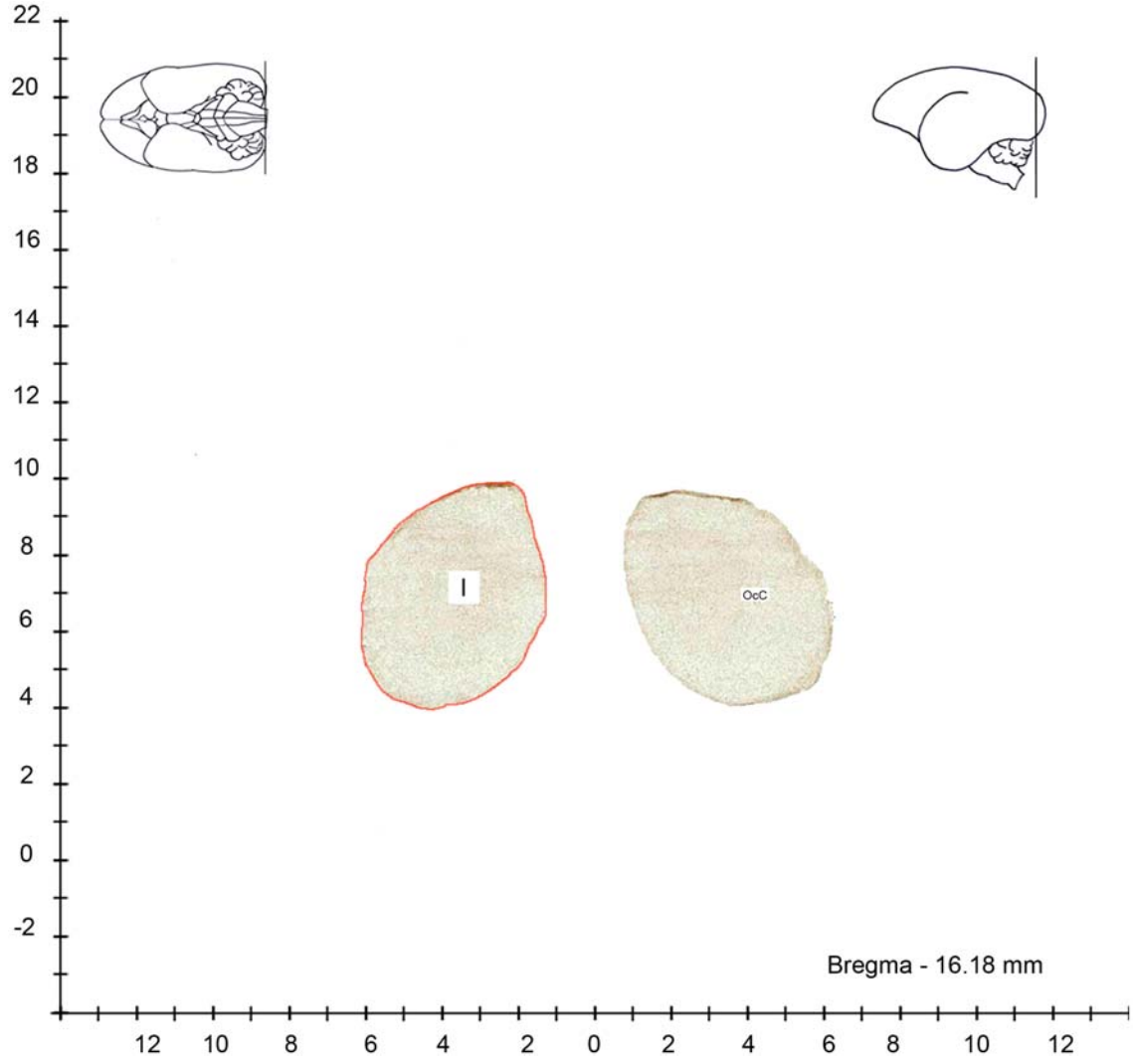

Figure 48

OcC occipital cortex

I Cerebral cortex (telencephalon)
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