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Research Article

ORGANIZATION OF RHOMBENCEPHALON OF INDIAN HOUSE WALL LIZARD *HEMIDACTYLUS FLAVIVIRIDIS*

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ABSTRACT
Topological organization of the rhombencephalon of Indian house wall lizard has been studied by Eager's method. The rhombencephalon has both metencephalon (cerebellum) and myelencephalon (medulla oblongata). The rhombencephalon is well developed in Indian house wall lizard *Hemidactylus flaviviridis*. The anterior part of the rhombencephalon, metencephalon (cerebellum) joins with the anterior caudal part of mesencephalon (mid brain). The posterior part of the rhombencephalon, myelencephalon (medulla oblongata) joins with the anterior part of the spinal cord. The metencephalon is ill –developed. This is a narrow, flat, semicircular ridge covering the anterior dorsal surface of medulla. The myelencephalon is triangular. It is broad in front by narrow and tapering behind. Posteriorly, the myelencephalon shows a strong ventral flexure where it passes into the spinal cord.

From the study of different sulci and the relationship of different grooves from nuclear groups of Indian house wall lizard, *Hemidactylus flaviviridis*, the rhombencephalon has been divided into two main longitudinal zones. These are like motor basal plate and sensory alar plate. The motor basal plate is located medially. The sensory alar plate is situated laterally. The motor basal plate is further divided into two zones. These are like area ventralis and area intermedio ventralis. Area ventralis is somatic motor zone. Area intermedio ventralis is visceral motor zone. The area ventralis somatic motor zone includes the different four motor nucleus of cranial nerves. These are as motor nucleus of VI cranial nerve and motor nucleus of XII cranial nerve. The area intermedio ventralis, a visceral motor zone of motor basal plate includes nucleus motorius nervi trigemini (VM), nucleus motorius nervi facialis (VIIM), nucleus motorius nervi glossopharyngei (IXM), nucleus motorius nervi vagi (XM), nucleus motorius nervi spinal accessori (XIM). The sensory alar plate is divided into the four different sensory zones. These are like visceral sensory zone, general somatic sensory zone, special somatic sensory zone and special visceral sensory zone. The visceral sensory zone includes nucleus tractus solitarii. The general somatic sensory zone contains the nucleus descendens and nucleus princeps of V. The special somatic sensory zone is the area where the VIIIth nerve is terminating and forms vestibular nuclear complex. The special visceral sensory zone is the region where the fibers of gustatory nerve are terminating. The rostral part of metencephalon has fasciculus longitudinalis medialis (FLM), nucleus interpeduncularis, pars ventralis (IPV), nucleus raphes superior (RAS) and nucleus reticularis superior (RS). The caudal part metencephalon includes fasciculus longitudinalis medialis (FLM), locus coeruleus (LC), nucleus interpeduncularis, pars ventralis (IPV), nucleus raphes superior (RAS) and parabrachial region (PB). The rostral part of the myelencephalon has nervus abducens (NVI), nervus trigeminus (NV) so on. The caudal part of the myelencephalon includes dorsal fissure (DF), fasciculus longitudinalis medialis (FLM), nucleus funiculi dorsalis (FUN), nucleus tractus solitarii (SOL) and ventral fissure (VF).

Keywords: *Rhombencephalon, Organization, Eager's Method 1970*

INTRODUCTION
The lizards are among the most commonly spotted of all reptiles. There are over 3500 different types of lizards existing in all climates throughout India. The walls and ceilings are their niche where they walk and live their lives. The house wall lizard *Hemidactylus flaviviridis* belongs to the family Gekkonidae of

suborder Sauria or Lacertilia is second largest family of this suborder. It is said that lizards are poisonous except two species *Heloderma suspectum* and *Heloderma hornidum* are poisonous. The lizards are predator of insects hence they are useful for farmers and agriculture. They can be used for pest management.
In our present study the rhombencephlon (metencephalon and myelencephalon) region of the brain of *Hemidactylus flaviviridis* for better understanding of its anatomy and phylogenetic character has been presented.

MATERIALS AND METHODS

Ninety seven adult lizards, Sauria or Lacertilia of both sexes weighing 45 to 70 gms were used in this experiment. Animals were kept in the cage in the light and cool atmosphere at a room temperature (25 to 30°C). The experimental lizards were kept isolated in the separate cage from normal animal. Prior to the experiment, the specimens were acclimatized at room temperature for one day. Surgical procedures were performed with sterilized dissecting instruments. The specimens were anaesthetized by immersing with 10% formalin for 10 to 15 minutes prior to the surgery.

Operation Procedure

For perfusion, animals were anaesthetized with chloroform for 2 to 5 minutes. Completely anaesthetized lizard was kept in the operating tray. After fixing the lizard, a small longitudinal incision was made in the middle of the thorax (1 cm). The rib cage was cut open right from the middle to expose the viscera. The thorax was opened to expose the heart. The pericardium was removed. Fine syringe of the perfusion set was inserted in the aorta through the posterior part of the ventricle. First of all 50 ml of physiological saline (0.75%) was allowed to pass through the aorta to the entire body, lower part of the ventricle was cut and blood was allowed to release. The whole blood of the body was replaced by physiological saline. One hundred ml. of fixative (10% formalin) was allowed to perfuse through the heart in continuation with saline. Precaution was taken to avoid the clotting of the blood which actually leads to incomplete perfusion. After the perfusion of the fixative, the animal becomes totally stretched. Following perfusion for about 15 minutes, the whole brain and spinal cord were dissected out and post fixed in the perfusion fluid at 4°C for twenty four hours. The brain and spinal cord were cut at 40 μm thick on AO HistoSTAT microtome at –20°C. The serial sections were put in section collecting trays containing 2 to 10% formaldehyde solution. For maintaining the serial orders only 5 sections were placed in each bin of the tray. The sections were processed with Eager's method (1970).

Perfusion

This method is conventional technique for preserving the whole animal body by pumping the fixative through the heart in to the whole body, via vascular system. The perfusion is performed by a simple infusion set. This technique works on the gravity flow principle. The perfusion bottle was kept three feet above to the operating table.The infusion set comprises to ordinary infusion set, a bottle with lid having two outlets, in one of them infusion needle was inserted and in other normal injection needle was inserted to avoid air lock. The infusion set comprises of plastic tube, an air column on both side, needle and a stopper.

RESULTS

The rhombencephalon is well developed in Indian house wall lizard *H. flaviviridis.* The rostral part of the hindbrain, metencephalon (cerebellum) unites with the anterior caudal portion of mesencephalon (mid brain). The caudal portion of the hindbrain, myelencephalon (medulla oblongata) associates with the rostral part of the spinal cord. The metencephalon is ill-developed. This is a narrow, flat and semicircular ridge. It covers the anterior dorsal surface of medulla. The myelencephalon is triangular. This is broad in front by narrow and tapering behind. The thin and highly vascular roof of medulla oblongata forms the

Abbreviations used in figures

AUR	auricula cerebelli
CC	central canal
C	cerebellum
DF	dorsal fissure
FLM	fasciculus longitudinalis medialis
V-IV	fourth ventricle
GC	griseum centrale
GL	lamina granularis cerebelli
LC	locus coeruleus
MO	medulla oblongata
NVI	nervus abducens
NXII	nervus hypoglossus
NV	nervus trigeminus
NVIII	nervus vestibulocochlearis
AMB	nucleus ambiguus
CERL	nucleus cerebellaris lateralis
COA	nucleus cochlearis angularis
VDS	nucleus descendens nervi trigemini
FUN	nucleus funiculi dorsalis
FL	nucleus funiculi lateralis
IPV	nucleus interpeduncularis, pars ventralis
LL	nucleus lemnisci lateralis
XMD	nucleus motorius dorsalis nervi vagi
VIIM	nucleus motorius nervi facialis
IXM	nucleus motorius nervi glossopharyngei
XIM	nucleus motorius nervi spinal accessori
VMD	nucleus motorius nervi trigemini, pars dorsali
VMV	nucleus motorius nervi trigemini, pars ventralis
VI	nucleus nervi abducentis
XII	nucleus nervi hypoglossi
VIII-C	nucleus nervi vestibulocochleari, pars caudalis
VIII-D	nucleus nervi vestibulocochleari, pars dorsalis
VIII-V	nucleus nervi vestibulocochleari, pars ventralis
VPR	nucleus princeps nervi trigemini
RAI	nucleus raphes inferior
RAS	nucleus raphes superior
RI	nucleus reticularis inferior
RM	nucleus reticularis medius
RS	nucleus reticularis superior
RSL	nucleus reticularis superior, pars lateralis
RSM	nucleus reticularis superior, pars medialis
NVIII	nucleus vestibulocochlearis
VEDS	nucleus vestibularis descendens
VEDL	nucleus vestibularis dorsolateralis
VETG	nucleus vestibularis tangentialis
VEVL	nucleus vestibularis ventrolateralis
VEVM	nucleus vestibularis ventromedialis
SOL	nucleus tractus solitarii
OLS	oliva superior
Obex	obex
PB	parabrachial region
SLH	sulcus limitans of His
SIV	sulcus intermedius ventralis
SMS	sulcus medianus superior
SMI	sulcus medianus inferior
VF	ventral fissure

choroid plexus. Posteriorly, the myelencephalon shows a strong ventral flexure where it passes into the spinal cord.

From the study of different sulci like sulcus medianus inferior (SMI), sulcus intermedius ventralis (SIV), sulcus limitans of His (SLH) and sulcus medianus superior (SMS) and the relationship of different grooves from nuclear groups of Indian house wall lizard, *H.flaviviridis*, the rhombencephalon has been divided into two main longitudinal zones (Figs.1,2&3). These are like motor basal plate and sensory alar plate. The motor basal plate is situated medially. The sensory alar plate is located laterally. The motor basal plate is further divided into two areas as ventralis and intermedio ventralis. The area ventralis is somatic motor zone. The area intermedio ventralis is visceral motor zone. The area ventralis somatic motor zone contains two motor nuclei like motor nucleus of VI cranial nerve (Figs.3&6) and motor nucleus of XII cranial nerve (Figs.3&12). The area intermedio ventralis is a visceral motor zone of motor basal plate. It has five motor nuclei like nucleus motorius nervi trigemini (VM) (Fig.3), nucleus motorius nervi facialis (VIIM) (Figs.3 &8), nucleus motorius nervi glossopharyngei (IXM) (Figs.3&8), nucleus motorius nervi vagi (XM) (Fig.3) and nucleus motorius nervi spinal accessori (XIM) (Figs.3&11).

The area intermedio ventralis is the lateral longitudinal visceral motor area of the basal plate. It extends from rostral to caudal level of rhombencephalon. This area has the cranial nerve nuclei of V, VII, IX, X and XI. The lateral part of rhombencephalic basal plate includes the similar group of motor involuntary nuclear groups forming a longitudinal band throughout the rhombencephalon.

Metencephalon and myelencephalon medial reticular formation:
The medial hindbrain reticular zone extends most anteriorly at the metencepalic portion to posterior most part of myelencephalon. At here the motor nucleus of XIIth cranial nerve is present. This constitutes a regular column throughout the rhombencephalon. In the anterior part of the hindbrain, this zone is located immediately adjacent to the hindbrain raphes. It attains the level of abducentis nucleus. In this region, the cells are of small size and diffusely arranged. The medial reticular zone also binds laterally to the visceral motor nuclei. The cells of the reticular formation are not evenly distributed. These can be divided into the following nuclei. There is a nucleus reticularis superior (RS) (Figs.3&4). It is differentiated into as lateral part of reticularis superior (RSL) (Fig.5), medial part of reticularis superior (RSM)(Fig.5), nucleus reticularis medius (RM) (Figs.3,6,7&8) and nucleus reticularis inferior (RI) (Figs.3,11&12). The nucleus raphes (RA) divided into two nuclei as nucleus raphes superior (RAS) (Figs.3&5) and nucleus raphes inferior (RAI) (Figs.3,6,8,9,10&11).

Nuclear groups of alar plate of rhombencephalon (Metencephalon and myelencephalon):
The sulcus limitans extends throughout the rhombencephalon (metencephalon and myelencephalon). It longitudinally divides into a basal plate and an alar plate. This plate is present laterally. It is differentiated into four zones. These have different nuclear organizations. These have been named as different groups of neurons. The observations of Opdam *et al*. (1976) have been taken into consideration to delimit different zones in the present study on *H. flaviviridis*. These zones are as visceral sensory zone, general somatic sensory zone, special somatic sensory zone and special visceral sensory zone. The visceral sensory zone has nucleus tractus solitarii (Figs.3,10 &14). The general somatic sensory zone includes the nucleus descendens and nucleus princeps of V (Figs.3,6,7,9,10&12). The special somatic sensory zone is the area where the VIIIth nerve is terminating and forms vestibular nuclear complex (Fig.3). The special visceral sensory zone is the region where the fibers of gustatory nerve are terminating (Fig.3).

Nucleus tractus solitarius (SOL):
At the posterior level of the facial motor nucleus (VII) a conspicuous portion is located. It is nucleus tractus solitarius (SOL). Both left and right SOL portions fuse in the posterior region to make the commissural nucleus of cajal. The medial and dorsal border of both sides of SOL can be easily depicted but the ventrolateral border of SOL merges with the cells of hindbrain reticular formation. This can be differentiated into a medial SOL and a lateral SOL portions. The medial part of SOL has small densely packed region. The lateral part is less densely packed. The cells of the lateral part is more clearly visible. The multipolar cells are more in the lateral region as compared to medial SOL. At here small fusiform cells are prominent (Figs.3,10&14).

Vestibular nuclear complex:
This constitutes the main area of the hindbrain (metencephalon and myelencephalon) alar plate. It is occupied by the part of the terminals of the VIIIth cranial nerve. This nuclear group can be identified from the anterior of the metencephalon to posterior of the myelencephalon of the hindbrain. Anteriorly this complex is present at the level of enterance of the VIIIth cranial nerve and reach caudally up to the part of hypoglossal nucleus. The vestibular nucleus can be divided into dorsolateral, ventrolateral, ventromedial, tangential and descendens vestibular regions. At certain level the vestibular nucleus seems to mix with reticular formation. This also retains the reticular character but clearly differentiated from medially located hindbrain reticular formation (Figs.3,6,7,9&10).

Nucleus vestibularis dorsolateralis (VEDL):
At the superior dorsal part of alar plate a cluster of medium sized cells form superior vestibular nucleus. The lateral border of superior vestibular nucleus is made by the middle cerebellar

peduncle while the medial border of this is occupied by medial vestibular group of small to medium sized cells. The ventral portion is the caudal part of superior vestibular nucleus. It constitutes rostral portion of lateral vestibular nucleus. At the ventral side it touches the sulcus intermedius dorsalis (Figs.3&6).

Nucleus vestibularis ventrolateralis (VEVL):
The part of vestibular nucleus is occupied by many multipolar cells. These form lateral vestibular nucleus. The cells are of large sized. This is known as lateral vestibular nucleus of Deiters. The anterior part of it is occupied by superior vestibular nucleus. The medial portion is bounded by medial vestibular nucleus. In addition to large multipolar cells, few small sized cells are also present on the border region (Figs.3&7).

Nucleus vestibularis ventromedialis (VEVM):
It is situated at the posterior part of locus coeruleus. The dorsomedial border of medial vestibular nucleus is present below the fourth ventricle (V-IV). The ventral border of it touches the medullar reticular formation. Many different population of neurons are observed in the upper middle and lower part of it. The lower region is predominantly large .This has medium sized cells but few small cells are also present. In the middle portion only medium sized cells are observed (Figs.3,6,7&9).

Nucleus vestibularis tangentialis (VETG):
This is depicted dorsally to the nucleus vestibularis ventro-lateralis, medially to the nervous vestibulocochlearis (NVIII) and dorso-medially to the nucleus vestibularis ventro-medialis. It extends medio-medially. The cells of it are loosely arranged. It has large multipolar cells. Few small sized cells are also observed on the border region (Figs.3,7&9).

Nucleus vestibularis descendens (VEDS):
It is characterised by the presence of longitudinal fibers. These originate from lower part of vestibular nucleus. This extends posteriorly to the spinal cord. The cells are not clear but fibers are present (Figs.3,9&10).
From rostral to caudal the rhombencephalon has auricula cerebelli (AUR), central canal (CC), cerebellum (C), dorsal fissure (DF), fasciculus longitudinalis medialis (FLM), fourth ventricle (V-IV), griseum centrale (GC), lamina granularis cerebelli (GL), locus coeruleus (LC), medulla oblongata (MO), nervus abducens (NVI), nervus hypoglossus (NXII), nervus trigeminus (NV), nervus vestibulocochlearis (NVIII), nucleus ambiguus (AMB), nucleus cerebellaris lateralis (CERL), nucleus cochlearis angularis (COA), nucleus descendens nervi trigemini (VDS), nucleus funiculi dorsalis (FUN), nucleus funiculi lateralis (FL), nucleus interpeduncularis, pars ventralis (IPV), nucleus lemnisci lateralis (LL), nucleus motorius dorsalis nervi vagi (XMD), nucleus motorius nervi facialis (VIIM), nucleus motorius nervi glossopharyngei (IXM), nucleus motorius nervi spinal accessori (XIM), nucleus motorius nervi trigemini, pars dorsalis (VMD), nucleus motorius nervi trigemini, pars ventralis (VMV), nucleus nervi abducentis (VI), nucleus nervi hypoglossi (XII), nucleus nervi vestibulocochleari, pars caudalis (VIII-C), nucleus nervi vestibulocochleari, pars dorsalis (VIII-D), nucleus nervi vestibulocochleari, pars ventralis (VIII-V), nucleus princeps nervi trigemini (VPR), nucleus raphes inferior (RAI), nucleus raphes superior (RAS), nucleus reticularis inferior (RI), nucleus reticularis medius (RM), nucleus reticularis superior (RS), nucleus reticularis superior, pars lateralis (RSL), nucleus reticularis superior, pars medialis (RSM), nucleus vestibulocochlearis (NVIII), nucleus vestibularis descendens (VEDS), nucleus vestibularis dorsolateralis (VEDL), nucleus vestibularis tangentialis (VETG), nucleus vestibularis ventrolateralis (VEVL), nucleus vestibularis ventromedialis (VEVM), nucleus tractus solitarii (SOL), oliva superior (OLS), obex (Obex), parabrachial region (PB), sulcus limitans of His (SLH), sulcus intermedius ventralis (SIV), sulcus medianus superior (SMS), sulcus medianus inferior (SMI), ventral fissure (VF) (Figs.1-14).

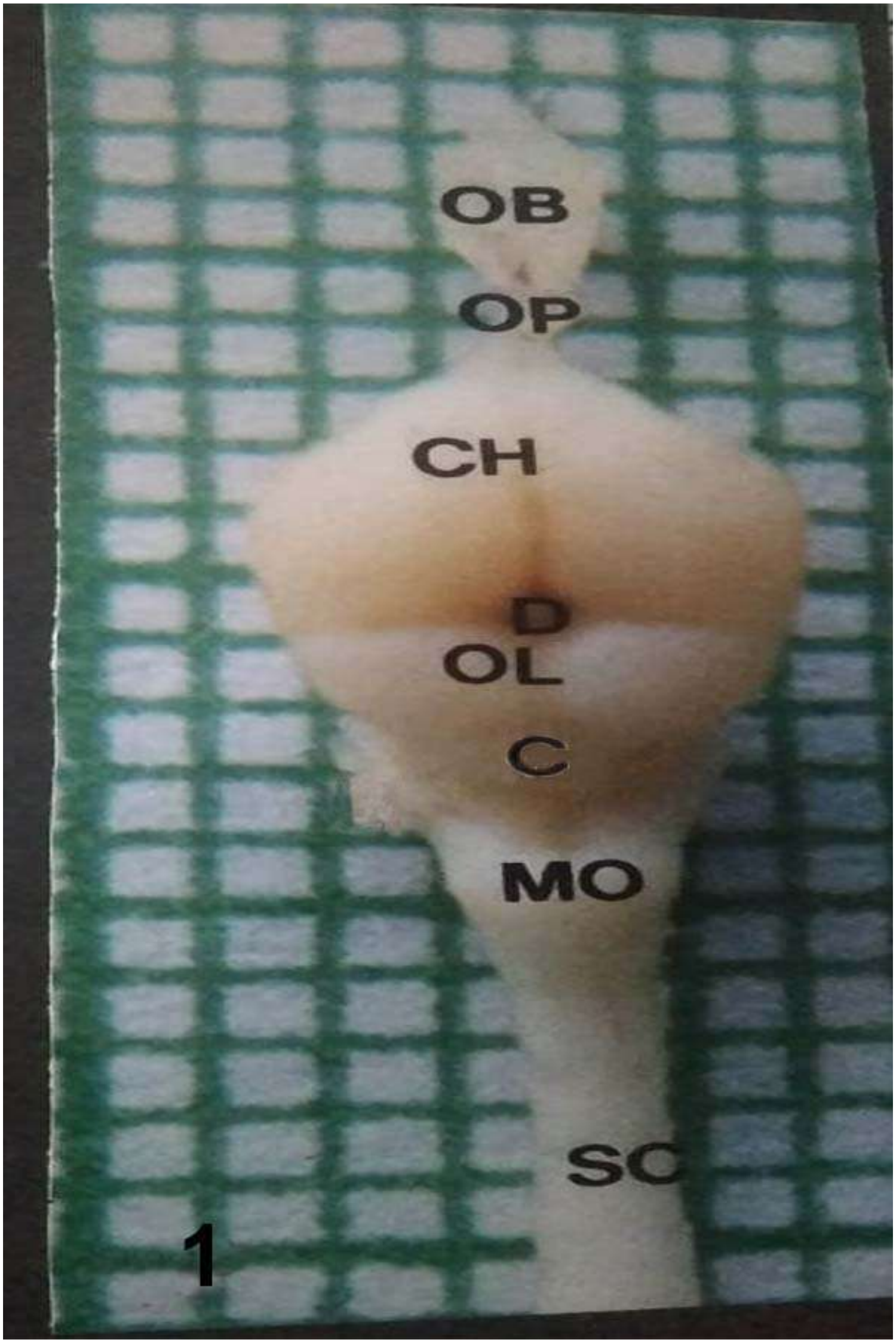

Figure 1


MCX
LCX
P
M
P
L
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STR
ALD
AMD
FM
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ALV
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V-III
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2

Figure 2

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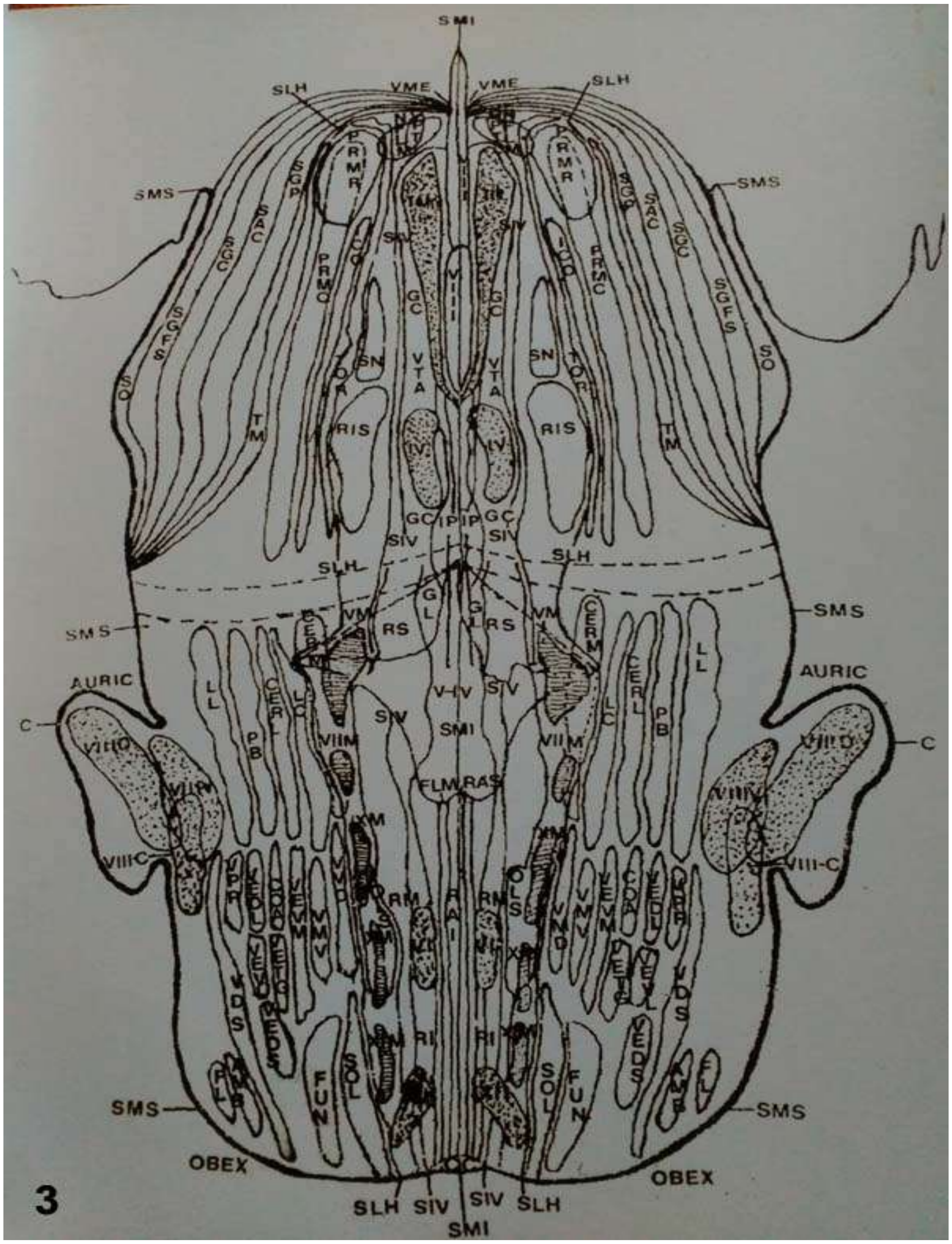

Figure 3

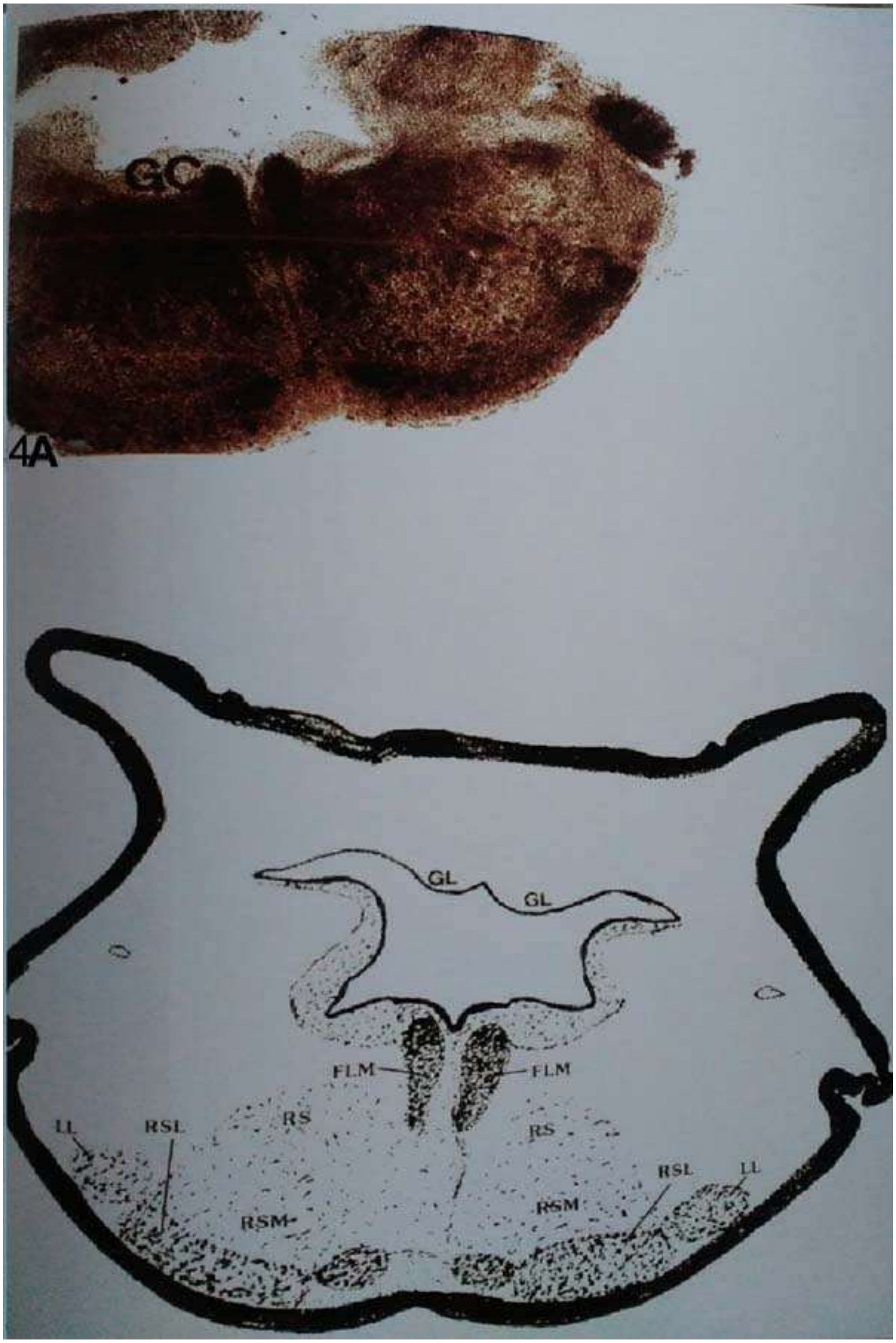

Figure 4A-B

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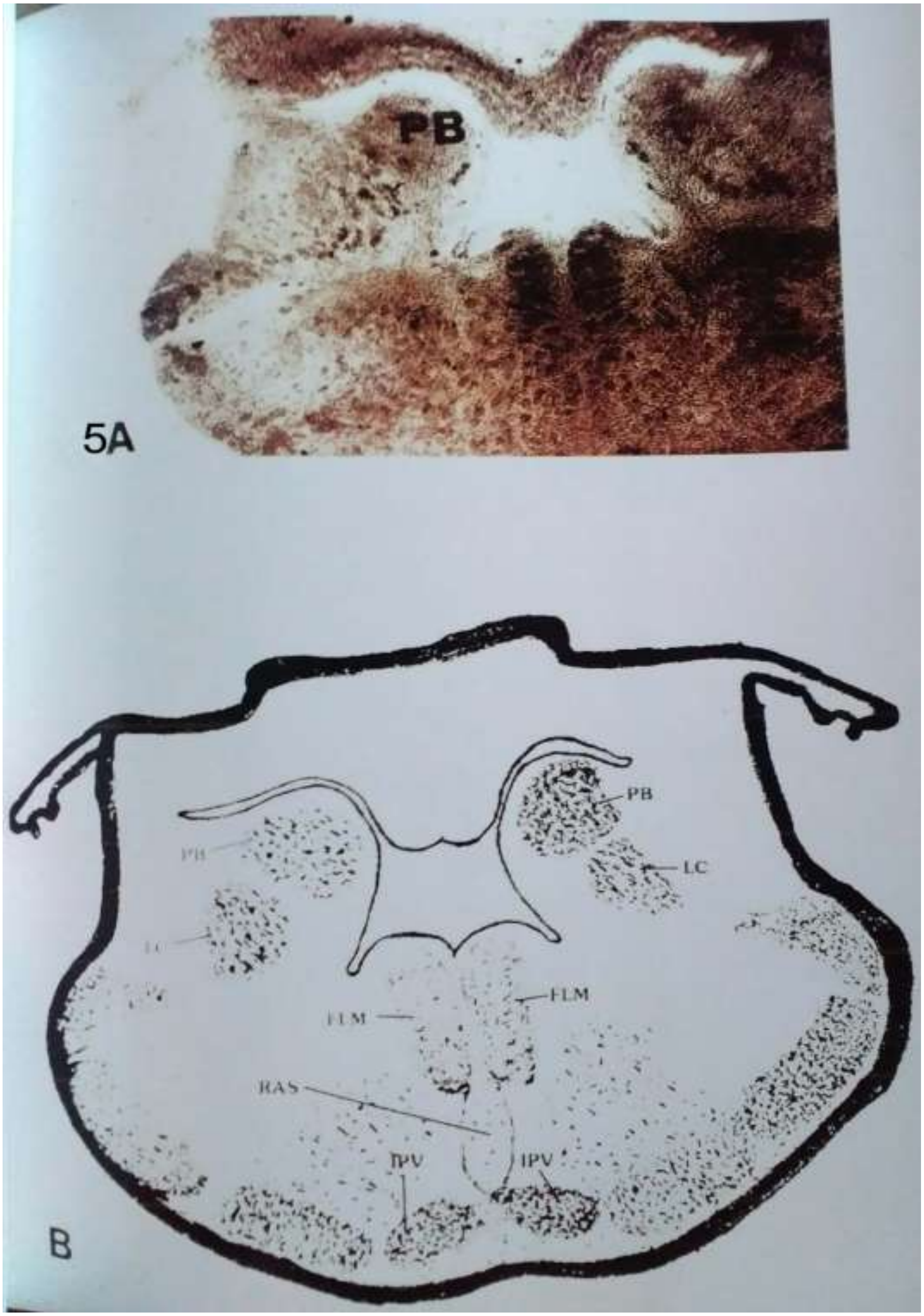

Figure 5A-B

Research Article

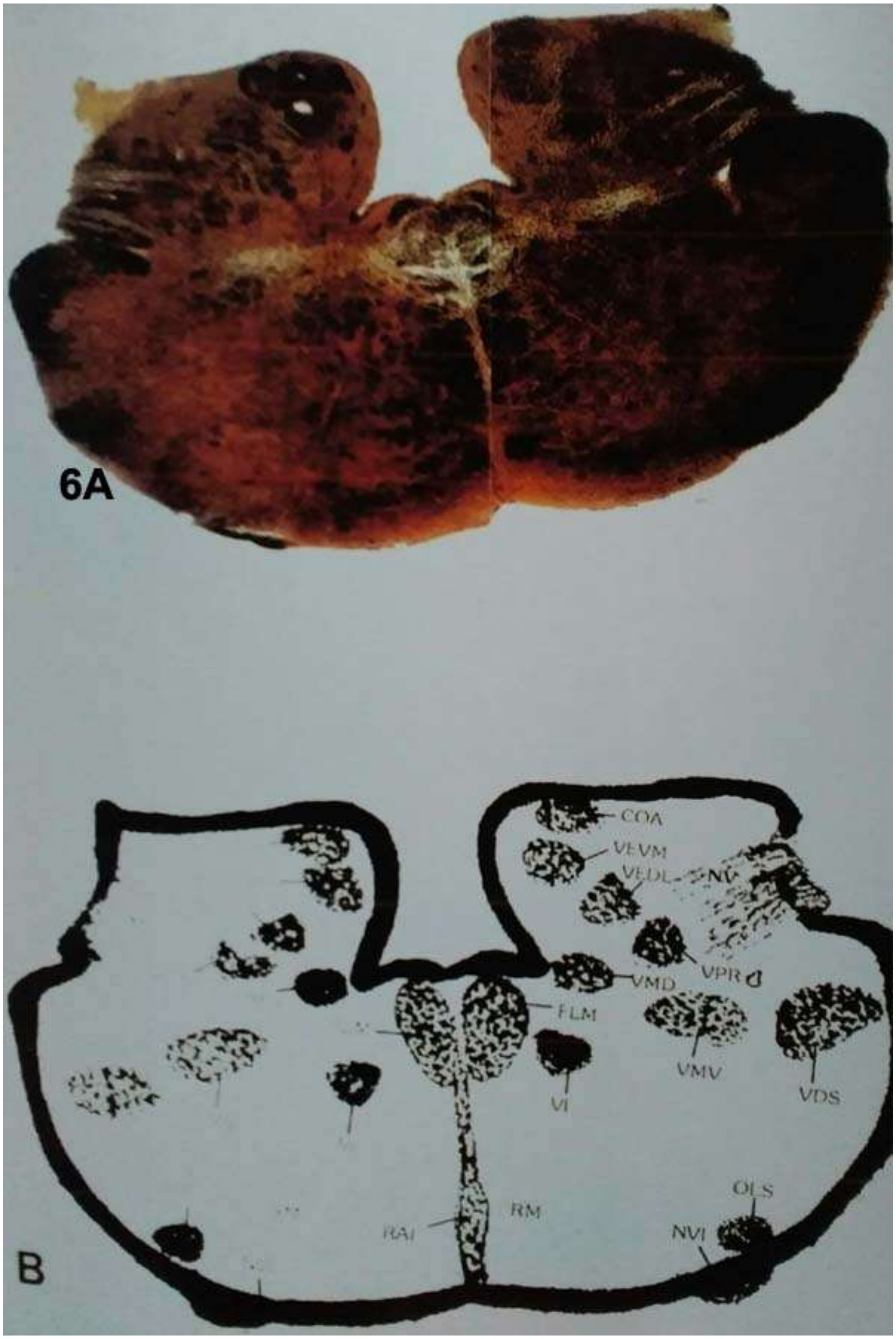

Figure 6A-B

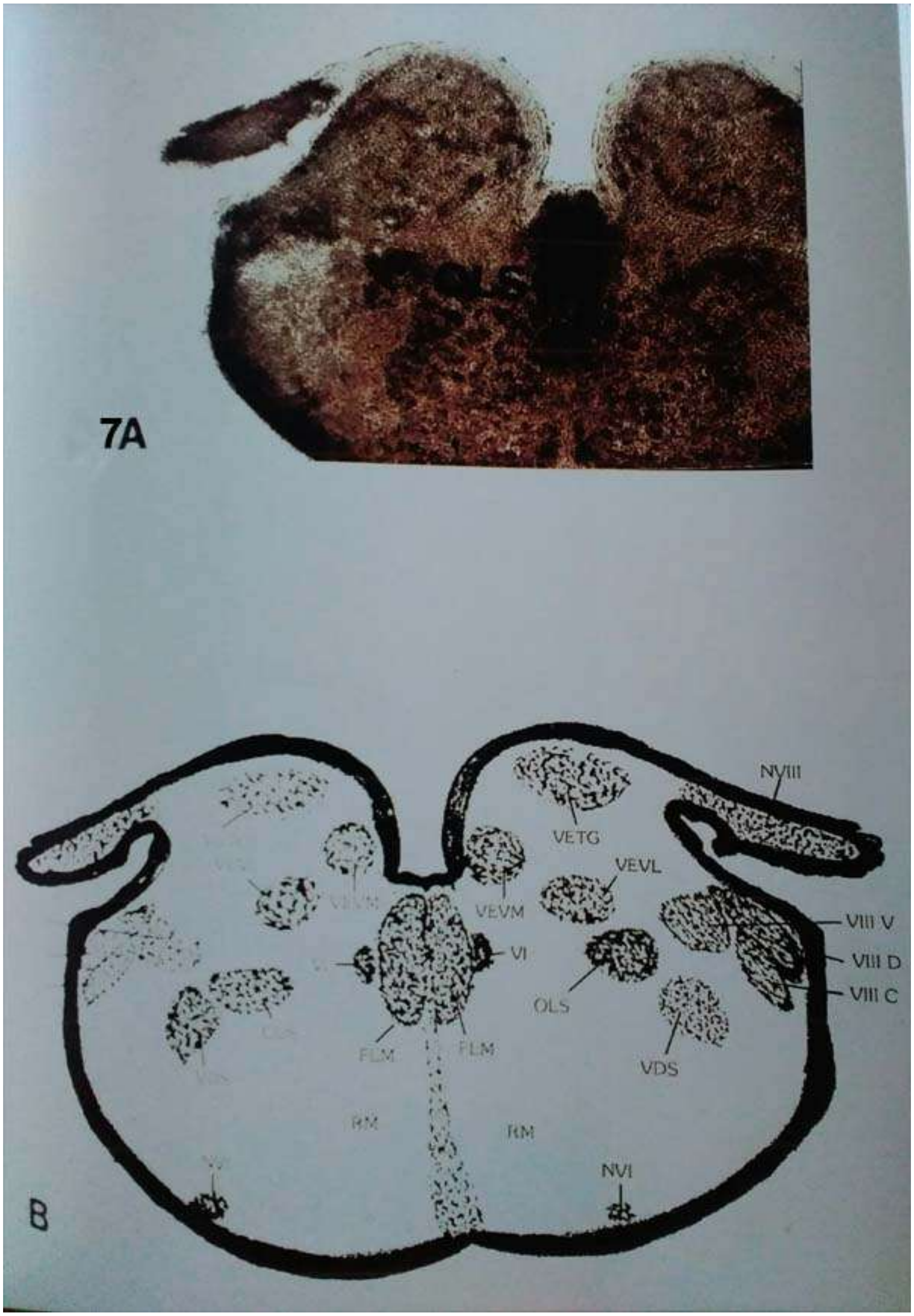
7A
B
NVIII
VETG
VEVL
VEVM
VI
VIII V
VIII D
VIII C
OLS
VDS
FLM
FLM
RM
RM
NVI

Figure 7A-B

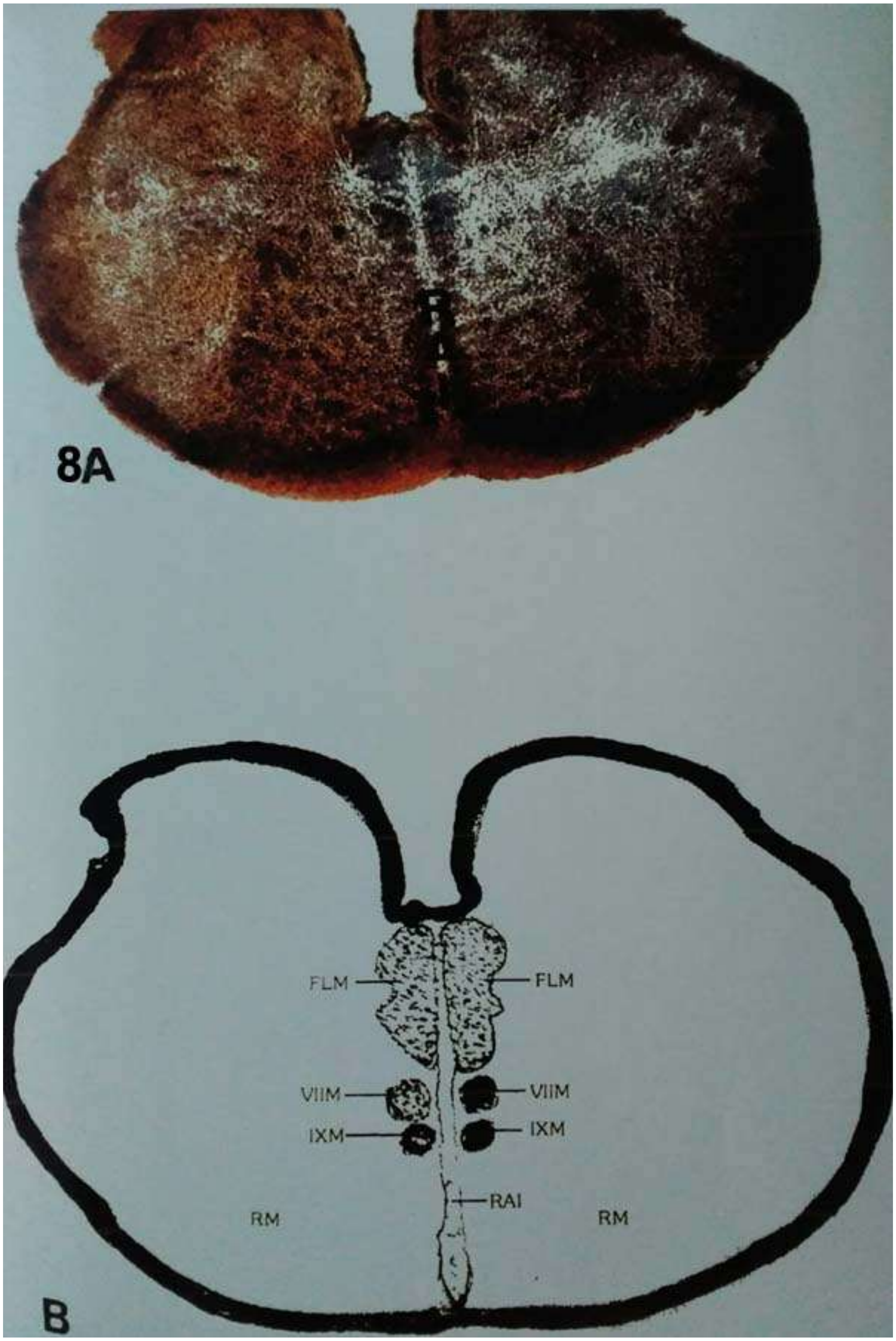

Figure 8A-B

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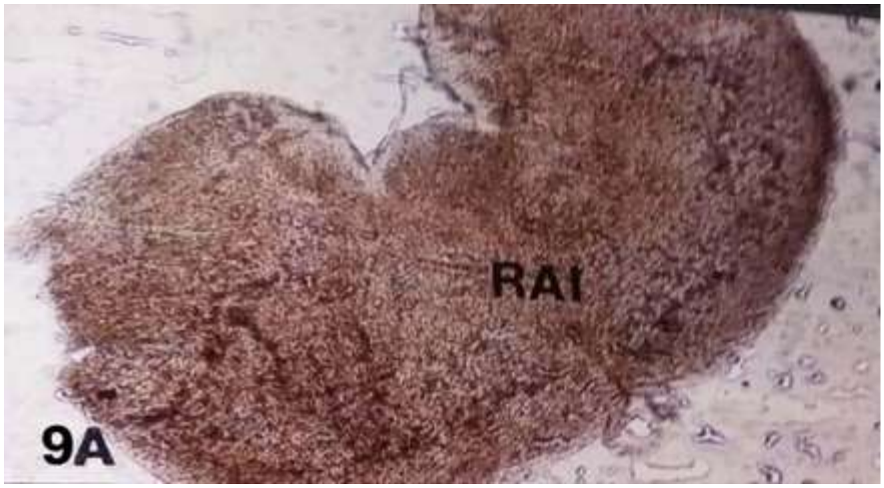

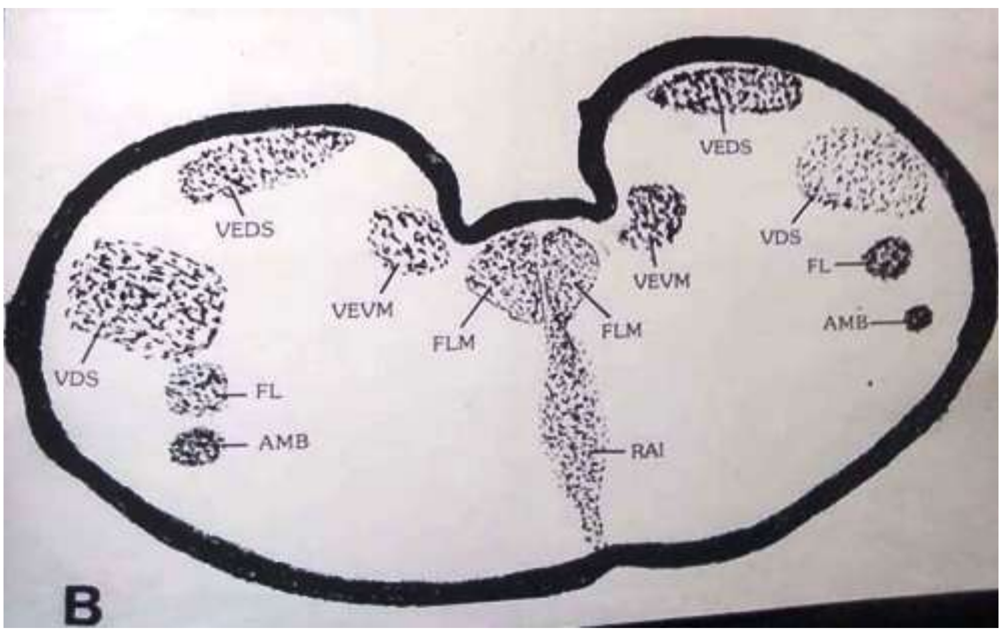

Figure 9A-B

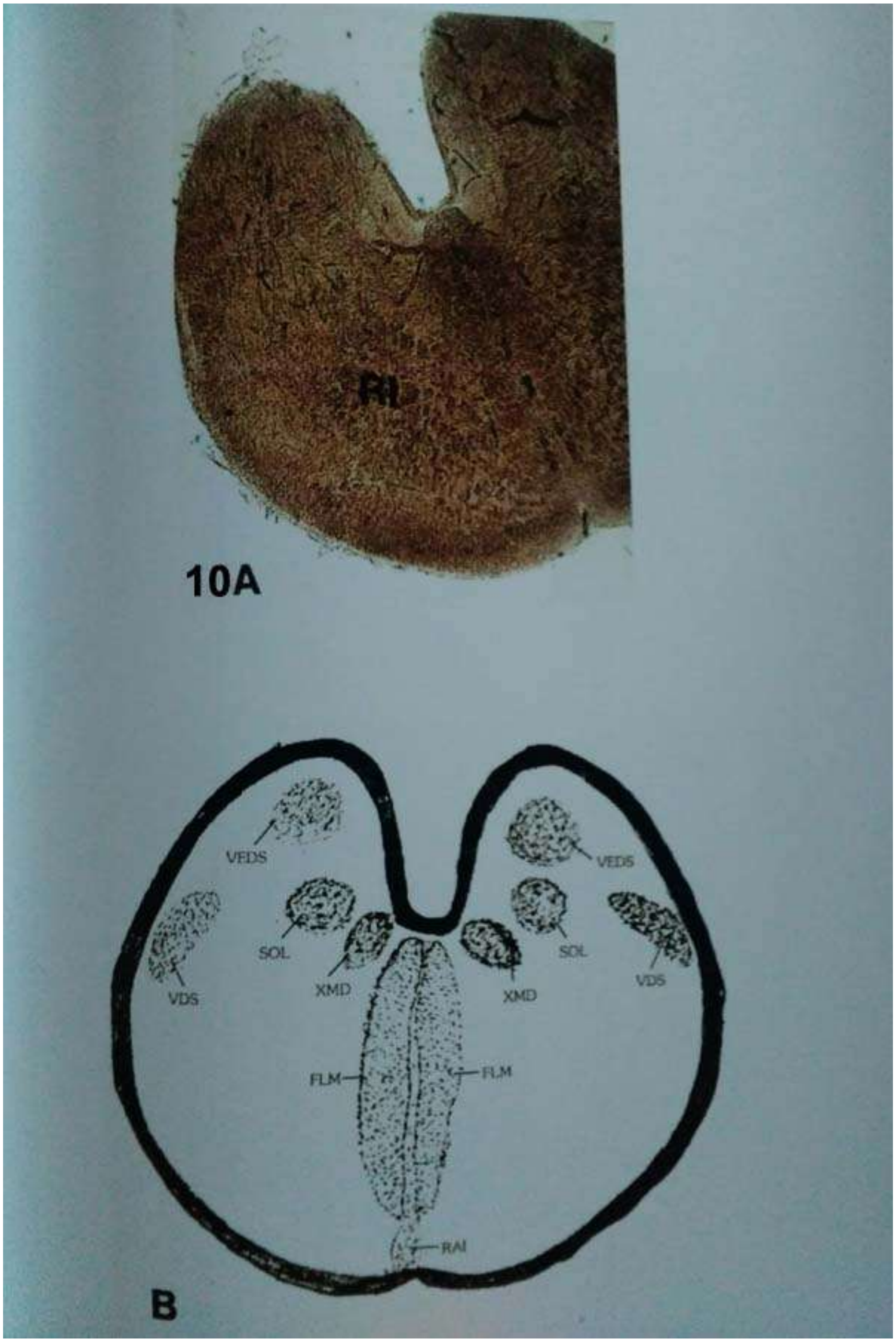

Figure 10A-B

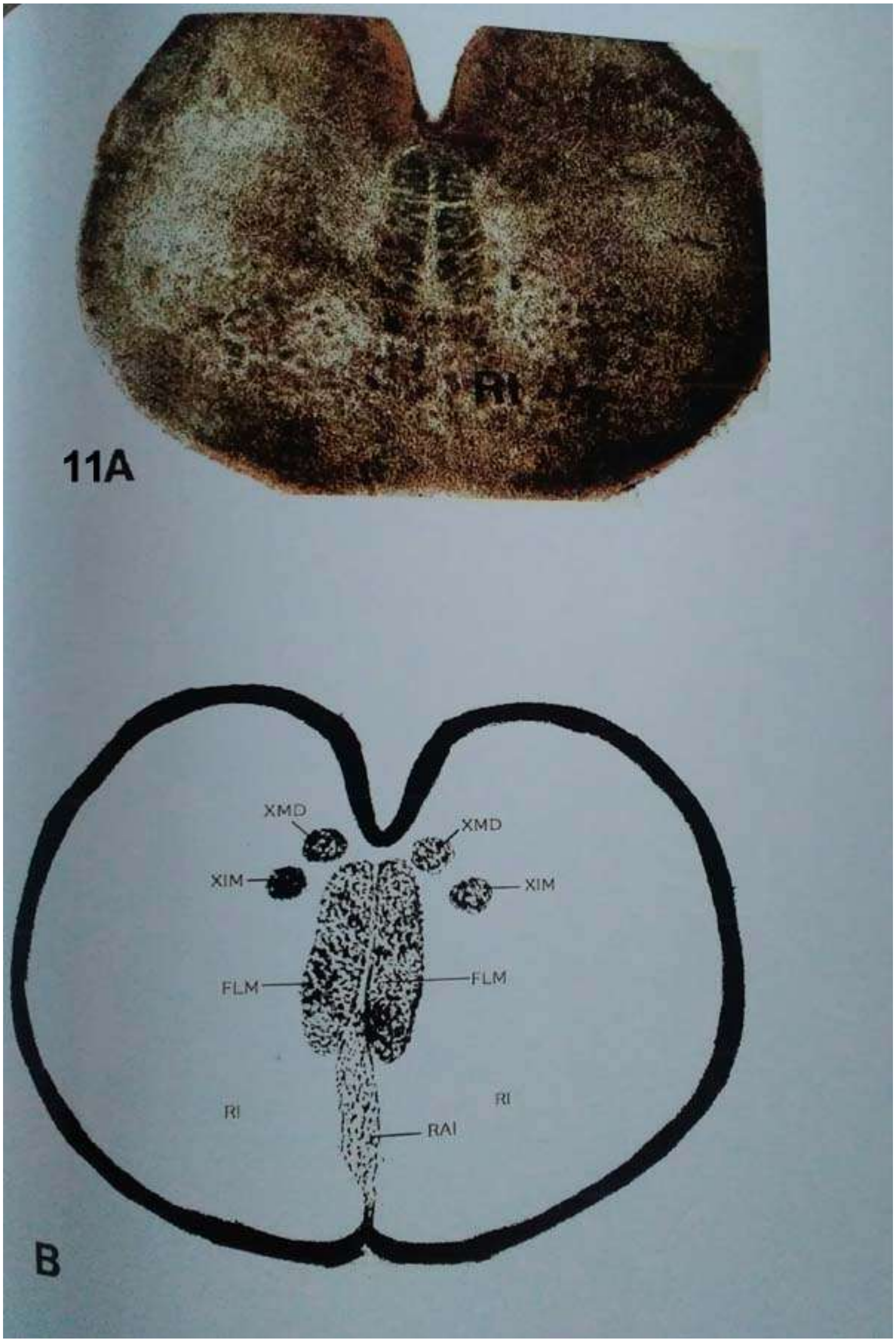

Figure 11A-B

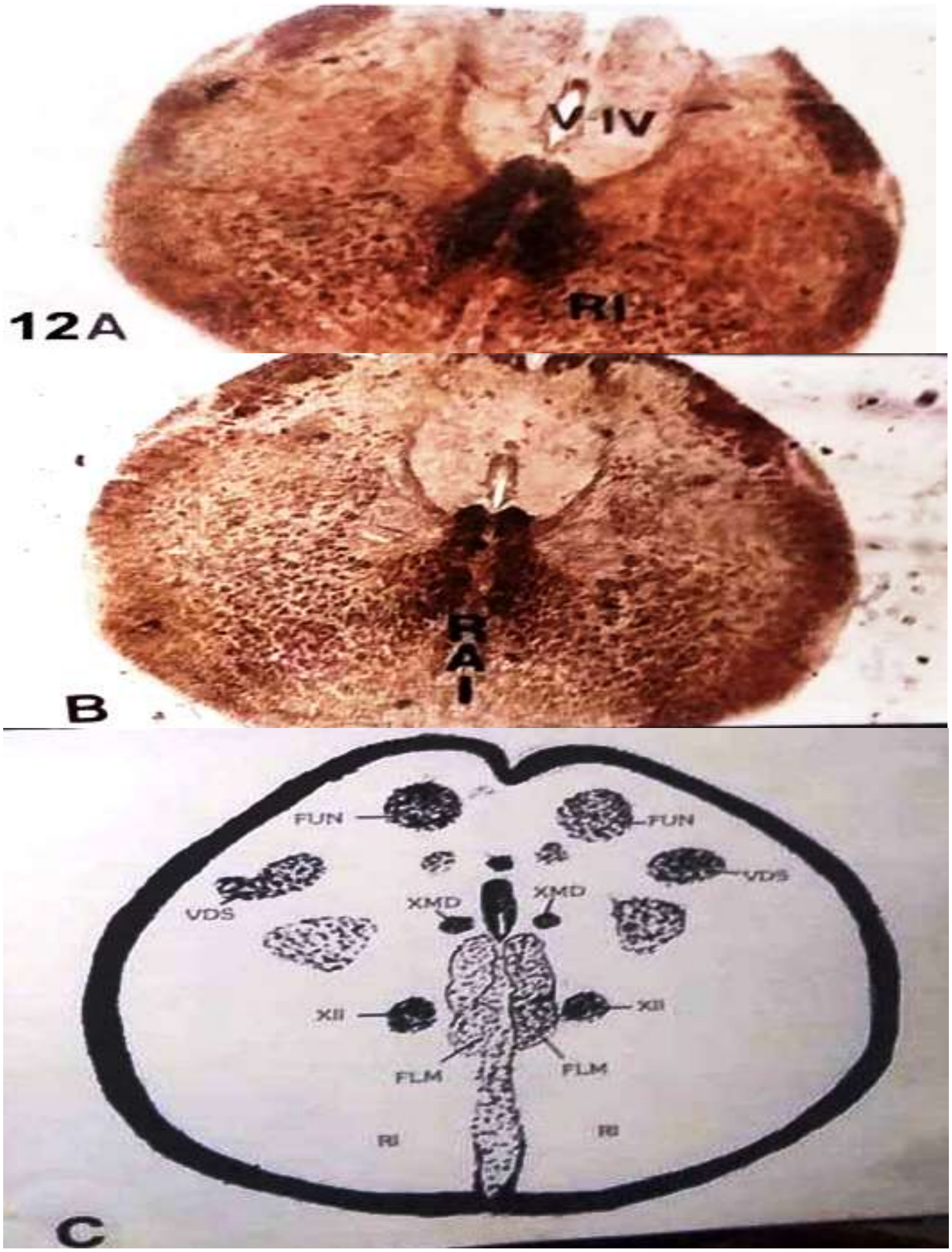

Figure 12A-C

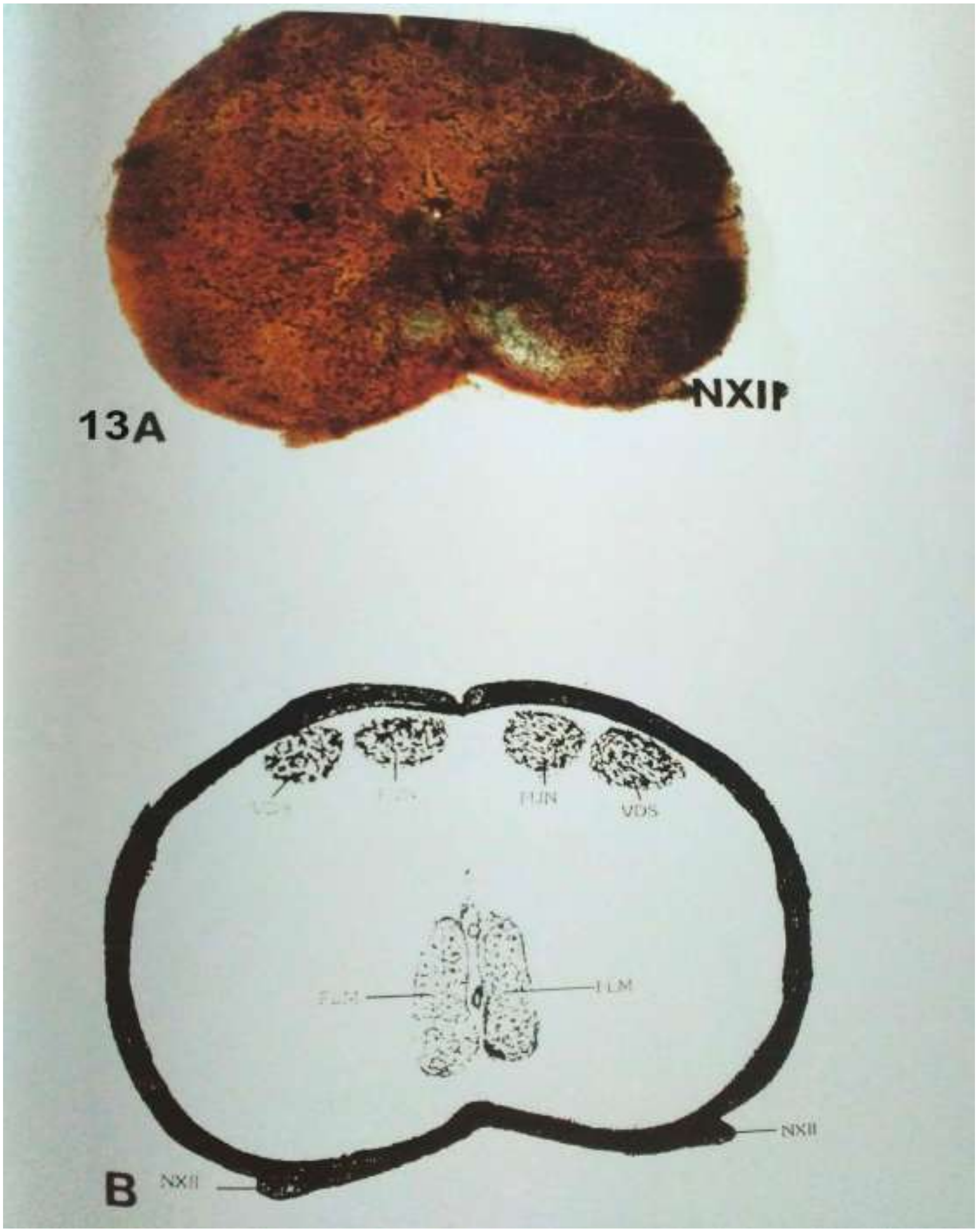

Figure 13A-B

Research Article

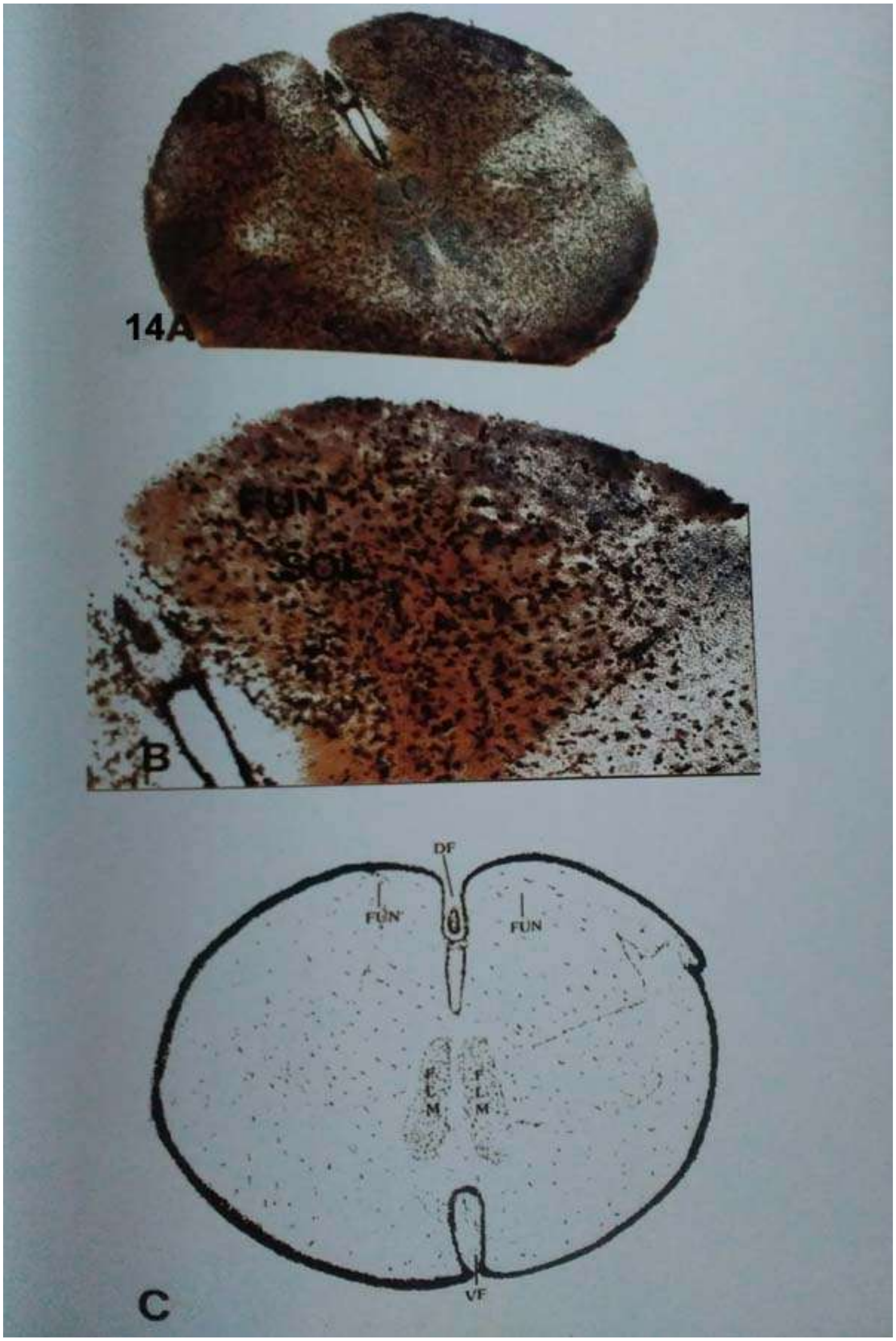

Figure 14A-C

DISCUSSION

The rhombencephalon is well developed in Indian house wall lizard *H. flaviviridis.* The anterior part of the rhombencephalon, metencephalon (cerebellum) connectes anteriorly with the caudal mesencephalon (midbrain). The posterior part of the rhombencephalon, myelencephalon (medulla oblongata) unites posteriorly with the anterior part of the spinal cord. The metencephalon is ill –developed. This is a narrow, flat, semicircular ridge covering the anterior dorsal surface of medulla. The myelencephalon is triangular. It is broad in front with narrow and tapering behind. The thin and highly vascular roof of medulla oblongata forms the posterior choroid plexus. Posteriorly, the myelencephalon presents a strong ventral flexure where it passes into the spinal cord.

The rhombencephalon of *H. flaviviridis* can be divided into two separate longitudinal columns due to longitudinal zones into basal plate and alar plate. The basal plate is located medially. It has all the nuclei of motor cranial nerves. This is designated as motor plate. The laterally located plate is designated as sensory alar plate. It includes the nuclear groups of sensory nerves.

In addition to ventricular furrow the sulcus medianus inferior is the axis of brain. It depicts bilateral symmetrical condition. The sulcus intermedio ventralis divides the basal plate into two longitudinal zones. The medial is known as the area ventralis. The lateral one is called as area intermedio ventralis. The area ventralis has the cranial nerve nuclei of VIth and XIIth. This is called as somatic motor zone of basal plate. The lateral area intermedio ventralis includes the nuclei of VIIth, IXth, Xth and XIth cranial nerves.

Rostrocaudally the most part of rhombencephalon the different somatic nerve nuclei are located in a definite plane. It is close to median line. In the rhombencephalic part the two conspicuous groups of cells, the nuclei of XIIth and VIth cranial nerves are present. At the rostral level of these two groups the rhombencephalic reticular formation is present. These nuclei are also present in the same plane i.e. close to the median line. This longitudinal zone including four cranial nerve nuclei and rhombencephalic reticular formation is designated as somatic motor zone or area ventralis of basal plate. The area intermedio ventralis of basal plate can be observed only in rhombencephalic region. It has nuclei of VIIth, IXth, Xth and XIth cranial nerves. This zone has been observed from cerebellar region to the beginning of 2nd spinal root.

The presence of sulcus medianus inferior, sulcus intermedio ventralis, sulcus limitans of His, sulcus medianus superior and also the formation of motor basal plate and sensory alar plate having different nuclei of cranial nerves in the present study mentioned above are in harmony with those of previous investigators (Potter,1965; Senn,1972; Opdam *et al*.,1976; Srivastava and Srivastava,1991,1992).

The nuclear complex of the abducens nerve of monitor lizard *Varanus exanthematicus* comprises of the principal and accessory abducens nuclei. The principal abducens nucleus is situated just below the fourth ventricle laterally adjacent to the medial longitudinal fasciculus. The accessory abducens nucleus has a ventrolateral position in the brain stem (Barbas-Henry and Lohman, 1988). However, in the present study on Indian house wall lizard the accessory abducens nucleus has not been found. This nucleus is identical in shape and size with respect to nucleus nervi oculomotorii like frog. According to Addens (1933) in *Rana catesbeiana* an accessory nucleus is present lateral to the main abducens nucleus. Opdam *et al*. (1976) observed similar structure in frog but described it as a part of lateral reticular zone. The accessory abducens nucleus is also reported in *Bufo marinus* which was described as a part of reticularis medius by Opdam *et al.* (1976). It seems that in the present study the accessory abducens nucleus is absent because there is no clear demarcation between abducens and reticular formation. The possibility can not be ruled out that accessory abducens nucleus observed by Addens (1933) and Abbie and Adey 1950) is a part of lateral reticular formation described by Opdam *et al*. (1976).

The motor nucleus of XII cranial nerve – nucleus nervi hypoglossi is found in the caudal most region of rhombencephalon below the XIth motor cranial nerve nuclei in wall lizard. The topological position of this nucleus is comparable with that of mammals. This nucleus is developed in *Varanus* with respect to cells as compared to the present observation in *Hemidactylus*.

Senn (1972) has reported that there are two parts of nucleus nervi hypoglossi – a dorsal and a ventral but this division has not been observed either in frog – *Rana tigrina* (Srivastava and Srivastava, 1992) or in *H. flaviviridis* presently studied. Further studies are required in different groups of animal to find out evolutionary significance of this nucleus.

The above mentioned nuclei of VIth and XIIth cranial nerves constitute a column which is located close to mid line of brain of Indian house wall lizard *H. flaviviridis*.

The rhombencephalon reticular formation has been studied in many species of reptiles (Newman and Cruce, 1982). They have found that reticular neurons in crocodilians and snakes are larger than those found in lizards and turtles. The reticular formation is divided into seven nuclei. A reticularis inferior (RI) is found in myelencephalon, a reticularis medius (RM) in the caudal two third of the metencephalon and a reticularis superior in the rostral metencephalon and caudal mesencephalon. Reticularis inferior can be subdivided into a dorsal and a ventral region. All reptilian species possess reticularis inferior (dorsal) and reticular medius but ventral portion of reticularis inferior is absent in turtles. These divisions are clearly observed in the present investigation on Indian house wall lizard but quite variable in appearance. The myelencephalic raphes nucleus is also quite variable in its morphology among the different reptilian families. A reticularis ventrolateralis observed in the present study is also found in snakes and teiid lizards. All the divisions and subdivisions of reticular formation have been topologically demarcated in the house wall lizard – *H. flaviviridis* which have been mentioned in observation, are comparable with mammalian species also.

The mid line group of nerves extending from the level of lower mid brain to the level of lower rhombencephalon, called nucleus raphes observed in the present study is identical in other reptiles.

It is concluded that fewer number of nuclei in reticular formation of old reptilian lineages and more number of nuclei in modern reptiles are found. Certain reticular nuclei are present in those reptiles in which prominent rhombencephalic alar plate. This group has been identified from rostral to caudal rhombencephalon. The vestibular nucleus has been divided into dorsolateral, ventrolateral, ventromedial, tangential and descendens vestibular regions. At certain level the vestibular nucleus seems to mix with reticular formation. The topological divisions of VIIIth cranial nerve nuclei correspond well with the amphibia (cf. Srivastava and Srivastava, 1991) and mammals (cf. Montgomery, 1988). Since the connections of the complex have not been studied in *H. flaviviridis*, it would be too early to comment and compare the functional significance of VIIIth cranial nerve nuclei with other vertebrate species.

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