motor and trochlear nerves (Fig. 960). The space cerebralward from these depressions left in the wall corresponds to the region of exit of the main mass of fibres of the root of the oculomotor nerve (Fig. 960). Proximal from this space is a long groove which opens out into the proximal capsule of the nucleus ruber. The groove contains the nucleus of Darkschewitsch and marks the junction of three different masses of fibres: (1) the fasciculus longitudinalis medialis; (2) the commissura posterior, and (3) the capsule of the nucleus ruber. The sides of the trough formed by the fasciculi longitudinales mediales of the sides are related in the model to a large hollow shell which occupies the centre of the dorsal part of the midbrain. It represents the stratum album profundum. The relations of the fasciculus longitudinalis medialis to the nuclei of the motor cerebral nerves is striking. It is in intimate relation with the nuclei of the n. hypoglossus, n. abducens, n. trochlearis, and, n. oculomotorius.

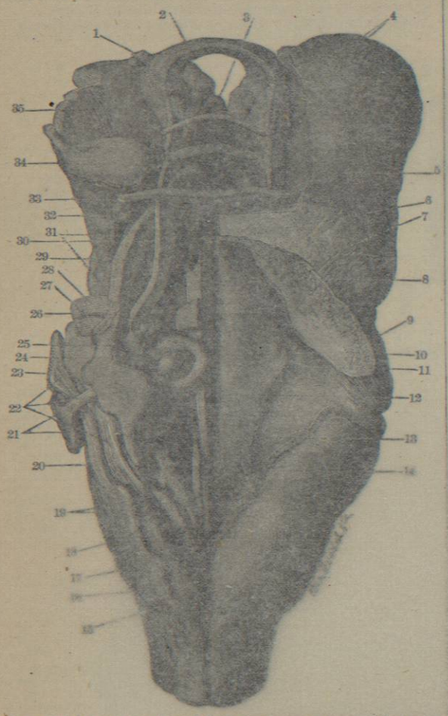

FIG. 955.—View of the Model from the dorsal Surface. The right side of the view shows the surface form, the left the arrangement of the model. The position of these structures can be noticed in the dorsal funiculi of the spinal cord, the fourth ventricle and the inferior and superior colliculi. 1, Fasciculus gracilis; 2, fasciculus cuneatus; 3, substantia gelatinosa (Rolandi); 4, fasciculus cerebellospinalis; 2, stratum album profundum; 3, nucleus n. oculomotorii; 4, commissura posterior; 5, nucleus ruber; 6, brachium conjunctivum; 7, substantia ferruginea; 8, ventriculus quartus; 9, brachium conjunctivum; 9, corpus restiforme; 10, radix n. trigemini (motoria); 11, nucleus n. abducentis; 12, fasciculus longitudinalis medialis; 13, nucleus olivaris inferior; 14, nucleus n. hypoglossi; 15, fasciculus gracilis; 16, nucleus funiculi gracilis; 17, nucleus cuneatus; 18, nuclei funiculi cuneati; 19, radix accessoria (n. nucleus alae cinereae; 20, corpus restiforme; 21, nucleus n. cochlearis dorsalis; 22, nucleus et radix n. vestibuli; 23, corpus restiforme; 24, nucleus n. vestibuli lateralis; 25, nucleus n. trigemini (sens.); 26, nucleus motorius principis n. trigemini; 27, radix n. trigemini (sens.); 28, radix n. trigemini (mot.); 29, locus coeruleus; 30, radix descendens n. trigemini; 31, brachium conjunctivum; 32, a; 33, radix n. trochlearis; 34, nucleus colliculi inferioris; 35, lemniscus medialis.

Nucleus et radix n. vestibuli: The ascending root is marked by the most proximal of the three lines on the figure; the descending by the most distal line, while the nucleus n. vestibuli medialis is indicated by the middle of the three lines. The nucleus n. vestibuli superior is continuous with the medial nucleus and lies opposite the ascending root. The nucleus n. vestibuli lateralis consists of two parts, one between the corpus restiforme and the ascending root, the other in the notch between the medial and superior nuclei.

Nucleus n. cochlear dorsalis: The more proximal of the two lines points to the striæ acusticæ. (After Sabin, F. R.)

The middle portion of the proximal subdivision of the central fibre mass corresponds to a part of the formatio reticularis alba. The relations of the nuclei of the cerebral nerves to the central fibre mass are interesting. In Fig. 957 of the model can be seen the trough which contains the ventral column of gray matter of the spinal cord, opening out on to the medulla sheet. From this point two separate groups of nuclei belonging to the cerebral nerves can be traced: a median motor group, and a lateral group containing both motor and sensory nuclei. The median motor group includes the nucleus n. hypoglossi, the nucleus n. abducentis, the nucleus n. trochlearis, and the nucleus n. oculomotorii. The lateral group, lying near the formatio reticularis, can be subdivided into a ventral motor group and a dorsal sensory group. The motor group includes the nucleus n. accessorius of the motor nuclei of the n. glosso-pharyngeus, n. vagi, n. facialis, and n. trigeminus. The sensory group includes the nuclei of termination of the sensory portions of the n. glosso-pharyngeus, n. vagus, n. intermedius, and n. trigeminus, together with all the nuclei of the cochlear and vestibular nerves.

The corpus restiforme and brachium conjunctivum are well illustrated in the model. The corpus restiforme is made up at this stage chiefly of the direct cerebellar tract from the lateral funiculus from the spinal cord and the dorsal external arcuate fibres from the dorsal funiculi. The large olive-cerebellares are not medullated at this stage. The position of the corpus restiforme to the spinal cord, as well as its position with reference to the restiformis and to the other cerebellar peduncles, is shown.

The brachium conjunctivum or superior cerebellar peduncle is illustrated in Plate A, and Figs. 955, 956, and [illegible]. The part of it which forms the commissure between the [illegible] nucleus of the vestibular nerve is well shown.

The nuclei [illegible] forming the cerebral nerves and [illegible] are represented in the model. The nuclei [illegible] lie near the middle line just [illegible] and are closely related to the [illegible] (Fig. 957). The nuclei [illegible] and n. abducens are very near the [illegible] of the n. trochlearis and [illegible] are farther ventral inasmuch as they [illegible] the medullary [illegible]. The nerve fibres from all the nuclei of the groups except those of the root of the n. trochlearis pass ventralward to the surface near the middle line. The root of the n. trochlearis takes an anomalous course since it passes dorsalward, decussates in the velum, and leaves the brain on the dorsal surface of the isthmus of the rhombencephalon. The motor nuclei of the lateral group lie in the formatio reticularis at a considerable distance from the middle line and at a level ventral from the central canal. The root fibres from these nuclei, with the exception of those of the n. trigeminus, do not follow a direct course toward the surface of the central nervous system. The root fibres of all four nerves take their exit at the lateral sulcus.

The sensory nuclei of the entire region belong to the lateral group, and their root fibres enter without exception on the lateral surface (Plate A and Fig. 956). From

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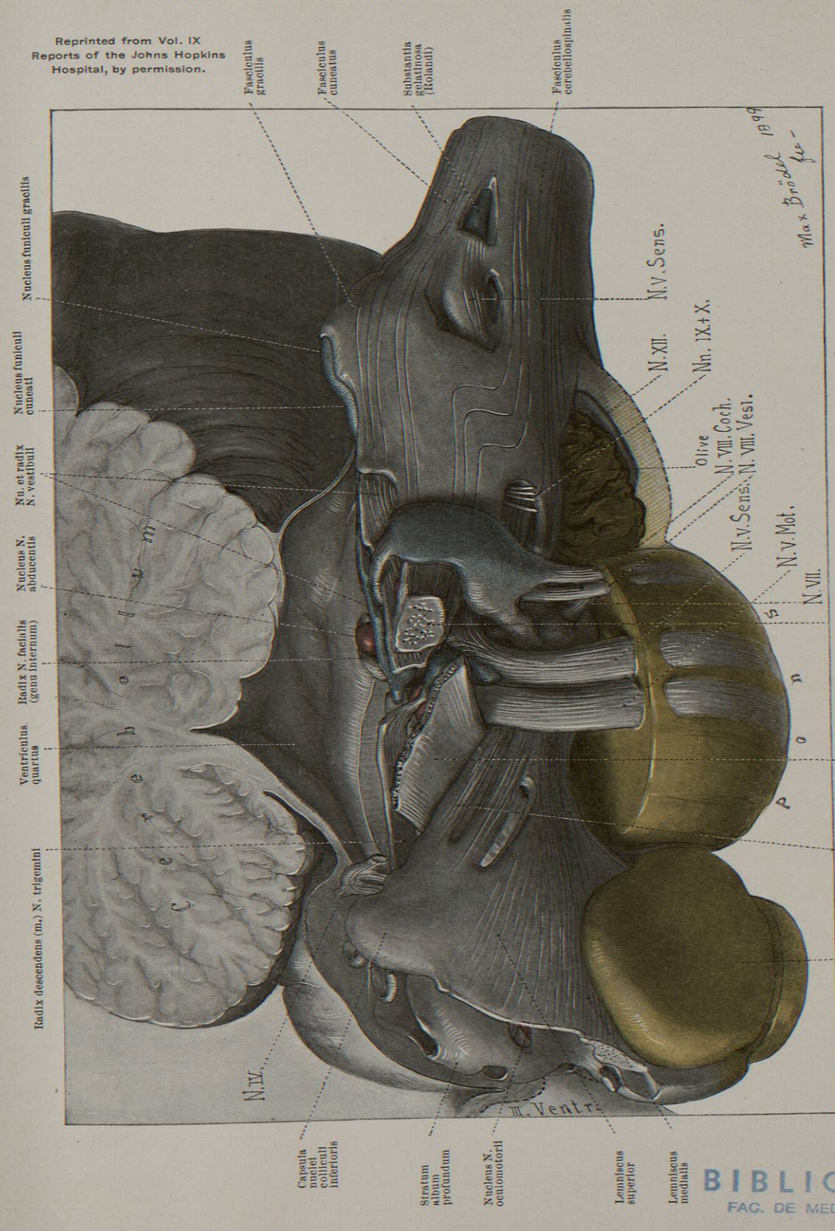

A WAX PLATE RECONSTRUCTION OF THE MEDULLA, PONS AND MIDBRAIN OF THE NEWBORN BABE. MOTOR NUCLEI RED; SENSORY NUCLEI BLUE; OTHER NUCLEI YELLOW.
(After Florence R. Sabin, Welch Volume of Contributions to Medical Science, 1900.)

what we know of the relation of sensory fibres to motor fibres in the spinal cord, it is not surprising that the sensory nuclei tend to occupy a position farther dorsalward than the motor nuclei of the lateral group.

The n. hypoglossus arises from the nucleus n. hypoglossi which is seen to be long, and its dorsal border conforms to the cervical curve. The nucleus extends more than one-half the length of the medulla, corresponding in general to the extent of the nucleus olivaris inferior. The root fibres leave the nucleus from its ventral border and have their superficial origin between the olive and the pyramid. The nucleus n. abducentis is well shown in Figs. 957 and 958. It lies in the distal part of the pons just below the floor of the fourth ventricle and just lateral from the fasciculus longitudinalis medialis. Its relations to the knee of the facial nerve are beautifully shown in three dimensions. The root fibres of the nerve leave the nucleus at its ventro-medial border and pass ventralward and slightly spinalward, emerging between the pons and the medulla near the middle line. The root fibres of the n. abducens pass through the trapezoid body.

The nuclei of the trochlear and oculomotor nerves are illustrated in Plate A and Figs. 955 and 956. These nuclei lie in a trough formed by the fasciculus longitudinalis medialis on its midbrain curve. The nucleus of the trochlear nerve is distally and dorsally situated on the curve, lying as it does in the proximal part of the colliculus inferior. There is a lack of symmetry in the nuclei of the two sides, as the mass of cell bodies is single on the left side and double on the right. The volumes of the cell masses of the two sides are, however, about equal. The root fibres leave the lateral and dorsal border of the nucleus and pass at first lateralward in scattered bundles. They then turn dorsalward and slightly spinalward. In this dorsal course the fibres of the root bundles are collected into from two to four compact bundles, lying in the central gray matter just inside the stratum profundum album. The decussation dorsal to the central canal is well illustrated in Fig. 955.

The nucleus of the n. oculomotorius is seen in Fig. 955 to consist of a long mass of cells lying in the trough before mentioned. The nucleus as a whole lies farther ventralward than does the nucleus n. trochlearis. The nucleus is placed obliquely to a horizontal plane so that the distal end is situated farther dorsalward than the proximal end. The nuclei of the two sides lie so close together that they have been modelled as a single mass, which consists of two lateral parts which are fused together in their ventral portions so as to make a gutter in which lies the median nucleus. The whole mass has the shape of a triangular prism with the apex pointing ventralward and the base dorsalward. The course of the root fibres leaving the nucleus is best seen in Fig. 956. The root bundle runs ventralward between the brachium conjunctivum and the red nucleus to the superficial origin in the fossa interpeduncularis.

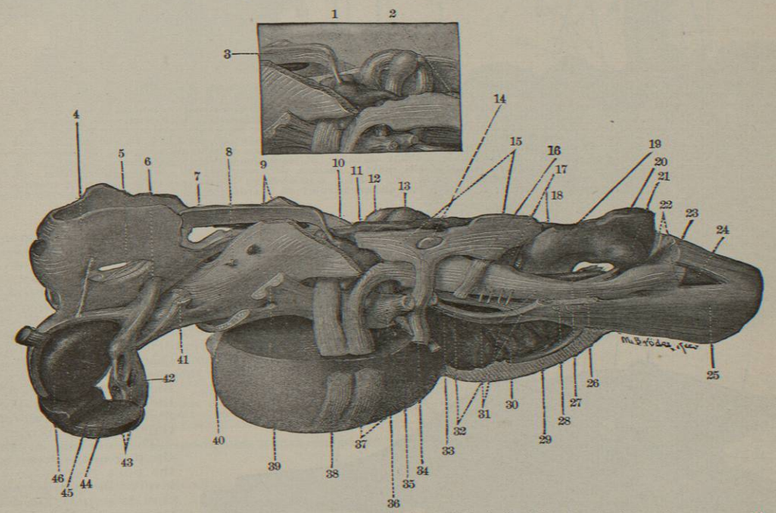

FIG. 956.—View of the Model from the Lateral Aspect. After removing from Plate A the following structures: the corpus restiforme, the substantia nigra, and the medial, lateral, and superior lemnisci. The view is designed to show (1) the sensory nerves and their nuclei, and (2) the midbrain. The nuclei of the dorsal funiculi represent a way station for the sensory fibres from the spinal cord; the sensory cerebral nerves are represented by the nuclei nervi glosso-pharyngei, vagi, vestibuli, et trigemini. These include all of the sensory nerves of the region of the model, except the n. cochleæ, which was removed with the corpus restiforme. 1, Nucleus motorius princeps n. trigemini; 2, nucleus n. trigemini (sensory); 3, radix descendens (m.) n. trigemini; 4, stratum album profundum; 5, nucleus n. oculomotorii; 6, radix n. oculomotorii; 7, radix descendens (m.) n. trigemini; 8, α; 9, brachium conjunctivum; 10, fasciculus longitudinalis medialis; 11, nucleus n. vestibuli superior; 12, radix n. facialis (genu internum); 13, nucleus n. abducentis; 14, nucleus n. vestibuli lateralis; 15, radix descendens et ascendens n. vestibuli; 16, fibres to tractus solitarius; 17, radices n. IX. and X.; 18, tractus solitarius; 19, nucleus funiculi cuneati; 20, nucleus funiculi gracilis; 21, nucleus funiculi cuneati lateralis; 22, fasciculi graciles; 23, fasciculus cuneatus; 24, substantia gelatinosa (Rolandi); 25, fasciculus cerebellospinalis; 26, fibræ arcuatæ internæ (distal bundle); 27, substantia gelatinosa (Rolandi); 28, fasciculus cerebro-spinalis; 29, radix n. hypoglossi; 30, nucleus olivaris inferior; 31, radices n. IX. and X.; 32, tract from Deiters' nucleus to spinal cord; 33, fasciculus lateralis; 34, radix n. vestibuli; 35, radix n. facialis; 36, corpus trapezoideum; 37, radix n. trigemini (sens.); 38, radix n. trigemini (mot.); 39, lemniscus lateralis; 40, lemniscus medialis; 41, fibres to decussatio tegmenti dorsalis; 42, radix n. oculomotorii; 43, nucleus columnaris; 44, nucleus capsulæ lateralis nuclei rubri; 45, lectus substantiæ nigræ; 46, nucleus ruber.
Radix n. trigemini (sens.): The proximal line runs to the root bundle, the distal to the tractus spinalis n. trigemini. (After Sabin, F. R.)

As to the n. accessorius, only the extreme proximal part of the spinal portion is shown in the model. The so-called vagus portion of the nerve is not illustrated. The superficial origin, thus forming what Miss Sabin refers to as a pars prima and a pars secunda of the root.

The nucleus ambiguus or motor nucleus of origin of the

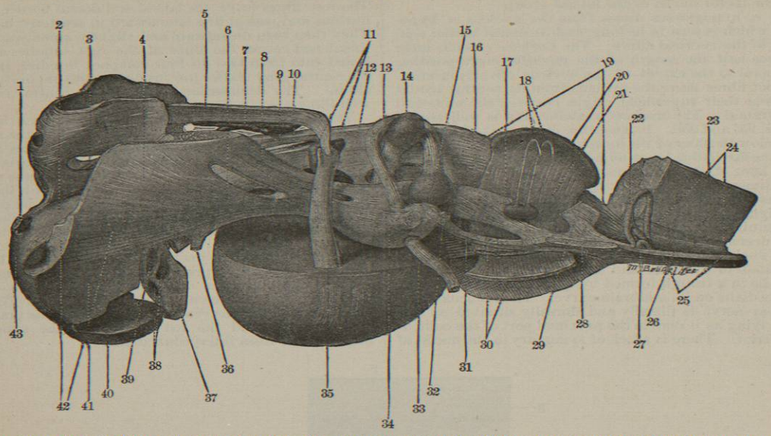

FIG. 957.—View of the Model from the Lateral Aspect. The sensory nerves of Fig. 956 have been removed and all of the motor cerebral nerves except the n. trochlearis are now shown. 1, Fasciculus retroflexus (Meynerti); 2, capsula dorsalis nuclei rubri; 3, nucleus n. oculomotorii; 5, radix descendens (m.) n. trigemini; 6, lemniscus medialis; 7, locus cœruleus; 8, lemniscus lateralis; 9, fasciculus longitudinalis medialis; 10, formatio reticularis alba; 11, nucleus motorius princeps n. trigemini; 12, formatio reticularis alba; 13, radix n. facialis (genu internum); 14, nucleus n. abducentis; 15, nucleus n. facialis; 16, tract from Deiters' nucleus to funiculus lateralis; 17, nucleus ambiguus; 18, radices n. IX. and X. (mot.); 19, fasciculus longitudinalis medialis; 20, nucleus n. hypoglossi; 21, radix n. hypoglossi; 22, radix n. accessorii; 23, fasciculus gracilis; 24, canalis centralis; 25, position of columna ventralis; 26, fasciculus ventralis proprius; 27, fasciculus cerebello-spinalis; 28, fasciculus cerebello-spinalis; 29, fasciculus lateralis; 30, radix n. hypoglossi; 31, nucleus olivaris accessorius medialis; 32, nucleus olivaris superior; 33, radix n. facialis, pars secunda; 34, corpus trapezoideum; 35, radix n. trigemini (mot.); 36, lemniscus medialis to substantia nigra; 37, radix n. oculomotorii; 38, nucleus columnaris; 39, nucleus capsulæ lateralis nuclei rubri; 40, lectus substantiæ nigræ; 41, capsula lateralis nuclei rubri; 42, lemniscus medialis; 43, capsula superior nuclei rubri. (After Sabin, F. R.)

root fibres of the nerve, instead of passing directly from the cell bodies of origin to the lateral groove, pass dorsalward and then turn ventralward and lateralward toward

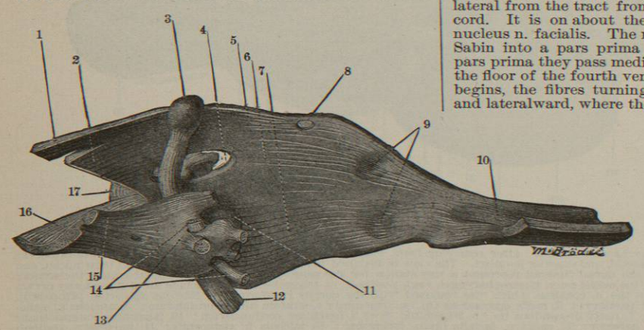

FIG. 958.—View of the Lateral Surface of the Medulla Sheet. The view can be related to Plate A and Figs. 955 and 956 by the position of the nucleus n. abducentis. 1, Fasciculus longitudinalis medialis; 2, formatio reticularis alba; 3, nucleus n. abducentis; 4, position of nucleus centralis inferior; 5, fasciculus longitudinalis medialis; 6, formatio reticularis alba; 7, lemniscus medialis; 8, nucleus of Roller; 9, position of part of nucleus accessorius medialis; 10, position of columna ventralis in fasciculus ventro-lateralis (1); 11, nucleus olivarius superior; 12, radix n. abducentis; 13, corpus trapezoideum; 14, radix n. facialis, pars secunda; 15, lemniscus lateralis; 16, lemniscus medialis; 17, corpus trapezoideum. (After Sabin, F. R.)

n. glosso-pharyngeus and the n. vagus is diagrammatically represented in Fig. 957. It lies in the formatio reticularis, dorso-lateral to the dorsal accessory olive and lateral from the tract from Deiters' nucleus to the spinal cord. It is on about the same horizontal level as the nucleus n. facialis. The root fibres are divided by Miss Sabin into a pars prima and a pars secunda. In the pars prima they pass medianward and dorsalward toward the floor of the fourth ventricle. Then the pars secunda begins, the fibres turning sharply to pass ventralward and lateralward, where they follow the same course as do the entering sensory fibres of the same nerve. The root fibres plunge through the tractus spinalis n. trigemini.

The nucleus n. facialis, situated in the dorsal part of the pons just dorsal to the level of the corpus trapezoideum, is seen in Fig. 957. It is a compact oval mass of cells having its long axis parallel to the long axis of the pons. The illustration in three dimensions of the root fibres, including the pars prima, the genu internum, and the pars secunda, represents one of the most satisfactory features of the model. The motor part of the n. trigeminus is shown in Fig. 962, and the entire nerve is well illustrated

in Fig. 956. The nucleus motorius princeps n. trigemini lies in the middle of the pons, just proximal to the transverse part of the knee of the facial nerve. The dis-

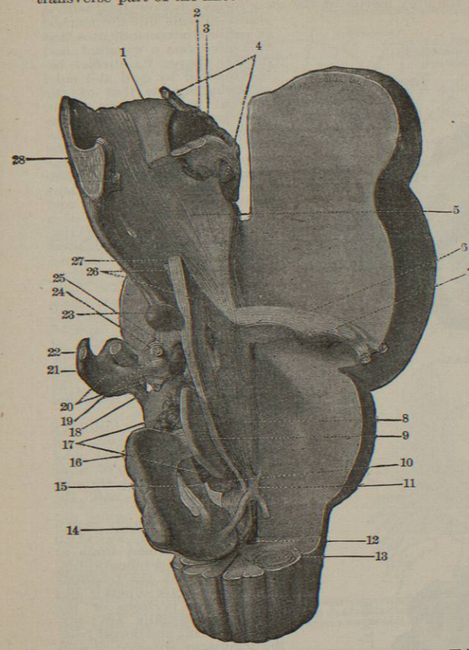

FIG. 959.—View of the Model from a Dorso-Median Aspect. This view is designed to show the central fibre mass, that is, the medulla, pontal and midbrain sheets, together with the corpus trapezoideum. 1, Capsula superior nuclei rubri; 2, radix n. oculomotorii; 3, nucleus ruber; 4, fasciculus retroflexus (Meynerti); 5, lemniscus medialis; 6, corpus trapezoideum; 7, nucleus olivaris superior; 8, stratum interolivare lemnisci; 9, nucleus n. hypoglossi; 10, nucleus olivaris accessorius medialis; 11, decussatio lemniscorum; 12, canalis centralis; 13, substantia gelatinosa (Rolandi); 14, nucleus funiculi gracilis; 15, fasciculus cuneatus to formatio reticularis; 16, nucleus funiculi cuneati; 17, nucleus olivaris inferior; 18, radix n. cochleæ; 19, corpus trapezoideum; 20, radix n. vestibuli; 21, nucleus n. cochleæ dorsalis; 22, striæ acusticæ; 23, nucleus n. abducentis; 24, radix n. facialis; 25, nucleus olivaris superior; 26, formatio reticularis alba; 27, fasciculus longitudinalis medialis; 28, lemniscus lateralis.
α, Fibres running from lemniscus lateralis to the brachium conjunctivum. (After Sabin, F. R.)

tal end lies opposite the proximal end of the nucleus olivaris superior. The radix descendens mesencephalica n. trigemini is seen in the model starting at the distal border of the stratum album profundum and traversing the pons as a narrow bundle parallel to the raphe. Its relation to the locus cœruleus is obvious. The decussating fibres pertaining to the n. trigeminus are shown in Fig. 955.

As regards the sensory nuclei in the model, those connected with the n. glosso-pharyngeus and n. vagus may first be referred to. They include the nucleus alæ cinereæ and the nucleus tractus solitarii. These are well illustrated in Figs. 955 and 956. The mass of cell bodies situated at the distal end of the tractus solitarius, shown in Fig. 955, possibly corresponds to the commissural nucleus of Ramón y Cajal.

The sensory nucleus of the n. trigeminus corresponds to the substantia gelatinosa. In Fig. 956 the sensory fibres of the n. trigeminus are seen to enter the lateral surface of the pons just distal to the motor bundle. The fibres form a compact mass, which extends dorsalward past the lemniscus lateralis into the region of the pars dorsalis pontis. The bundle bifurcates into a Y, corresponding to the Y-shaped bifurcation of its constituent fibres. Into the notch of the Y fits the upper end of the sensory nucleus. The lateral and longer arm of the Y forms the tractus spinalis n. trigemini. The medial and shorter arm of the Y passes dorsalward just medial to the sensory nucleus. The tractus spinalis n. trigemini extends from the middle of the pons to the upper part of the cervical spinal cord. It lies medial to the cochlear nuclei but lateral from the nuclei of the dorsal funiculi. For details with regard to the sensory nucleus of the trigeminal nerve and the tractus spinalis n. trigemini, Miss Sabin's article may be consulted.

The various nuclei connected with the n. vestibuli are depicted in three dimensions in the model. The root fibres of the vestibular nerve, on entering the central nervous system, bifurcate into short ascending limbs and long descending limbs. The bundle of descending limbs

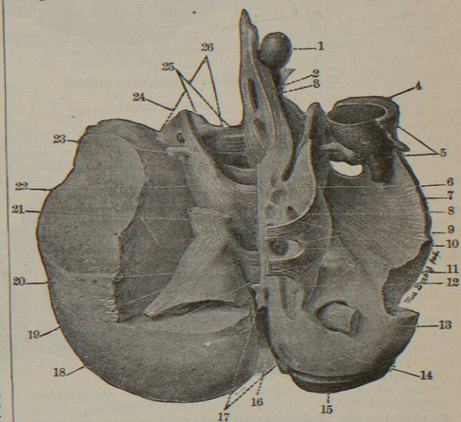

FIG. 960.—View of the Midbrain from the Superior or Cerebral Aspect. This view can be understood by comparing it with Plate A and Figs. 956 and 957, which show the stratum profundum album, the lemniscus superior, and the capsula nuclei rubri from the lateral aspect. 1, Nucleus n. abducentis; 2, fasciculus longitudinalis medialis; 3, nucleus reticularis tegmenti; 4, nucleus colliculi inferioris; 5, capsula nuclei colliculi inferioris; 6, position of nucleus n. trochlearis; 7, lemniscus superior; 8, γ; 9, position of nucleus n. oculomotorii; 10, stratum album profundum; 11, lemniscus medialis; 12, commissura posterior; 13, fasciculus retroflexus (Meynerti); 14, capsula superior nuclei rubri; 15, lectus nuclei rubri; 16, nucleus fasciculi longitudinalis medialis; 17, fasciculus longitudinalis medialis; 18, decussatio tegmenti ventralis; 19, decussatio tegmenti dorsalis; 20, capsula dorsalis nuclei rubri; 21, decussatio tegmenti dorsalis; 22, brachium conjunctivum; 23, α; 24, brachium conjunctivum (dorsalis bundle); 25, corpus trapezoideum and nucleus olivaris superior; 26, commissure between Bechterew's nuclei.
γ is a space in the model, in the stratum profundum album, where fibres of the formatio reticularis alba are related to the substantia centralis grisea. (After Sabin, F. R.)

is known as the radix descendens n. vestibuli. There are four nuclei, namely: (1) the nucleus n. vestibuli medialis; (2) the nucleus n. vestibuli radicis descendentis, which is directly continuous with (1); (3) the nucleus n.

vestibuli superior or nucleus of von Bechterew, and (4) the nucleus n. vestibuli lateralis or nucleus of Deiters. The last-mentioned nucleus is divisible into two parts, one part lying lateral to the root bundle of the vestibular

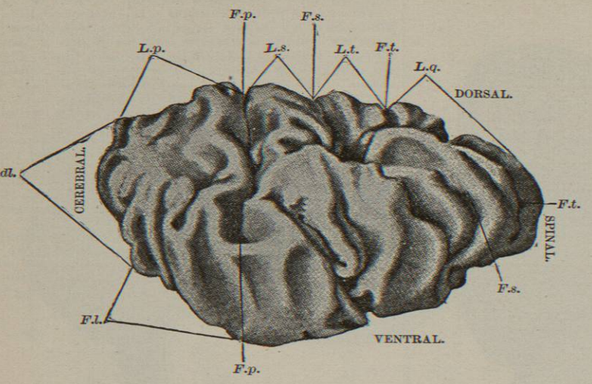

FIG. 961.

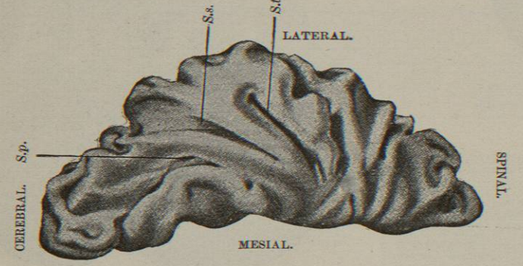

FIG. 962.

FIGS. 961 AND 962.—FIG. 961.—View of the Dorso-Lateral and Lateral Surfaces of the Nucleus Olivaris Inferior. *f.dl.*, Facies dorso-lateralis; *f.l.*, facies lateralis; *f.p.*, fissura prima; *f.s.*, fissura secunda; *f.t.*, fissura tertia; *f.q.*, fissura quarta; *l.p.*, lobus primus; *l.s.*, lobus secundus; *l.t.*, lobus tertius; *l.q.*, lobus quartus.
FIG. 962.—View of the Ventral Surface of the Nucleus Olivaris Superior. *s.p.*, Sulcus primus; *s.s.*, sulcus secundus; *s.t.*, sulcus tertius. (After Sabin, F. R.)

nerve and the other part lying in an angle between the superior and medial nuclei of the vestibular nerve. The model illustrates further a set of internal arcuate fibres passing from the medial nucleus to the raphe, a commissure between the superior vestibular nuclei off the two sides, a tract from Deiters' nucleus to the spinal cord, and two sets of fibres relating the vestibular area with the cerebellum.

Connected with the n. cochleæ near its entrance are two definite nuclei of termination, namely, the nucleus n. cochleæ ventralis and the nucleus n. cochleæ dorsalis (Plate A). The relation of the ventral cochlear nucleus to the corpus trapezoideum is shown in Figs. 959 and 960.

A surprising feature of the model is the appearance presented by the nucleus olivaris inferior (Figs. 961, 962). Sections through the medulla have long taught us that the gray matter of the olive forms a hollow shell with a wrinkled wall, but the method of reconstruction indicates that the olive has a constant and definite shape, its surface being marked by gyri and sulci as definitely as that of the cerebral cortex. Miss Sabin describes the lateral surface as presenting four lobes. The first or proximal lobe is the largest; it is subdivided in the dorsal portion by two or three groups or sulci. It contains three gyri. The second and third lobes each consist of a single convolution or gyrus; the fourth lobe is the smallest of all, and consists like the second and third of a single gyrus.

In the midbrain the main bundles of fibres have been modelled as well as the nucleus ruber and its capsule, the fasciculus retroflexus of Meynert, the various decussations of the tegmentum, the stratum album profundum, the substantia centralis grisea, and the substantia nigra.

Passing now to the histology and microscopic anatomy of the prosencephalon, we may begin by a description of some sections which pass through the hypothalamus and the thalamencephalon.

In Fig. 963, which represents a transverse section through the human brain at the level of the decussatio brachii conjunctivi, the positions of the lemniscus superior and of the main portions of the lemniscus medialis are outlined. Lateral and dorsal from the lemniscus superior is seen the brachium quadrigeminum inferius.

In a section higher up (Fig. 964), in addition to structures met with in sections lower down, some of the nuclei of the thalami are seen, the nucleus ventralis lateralis thalami and

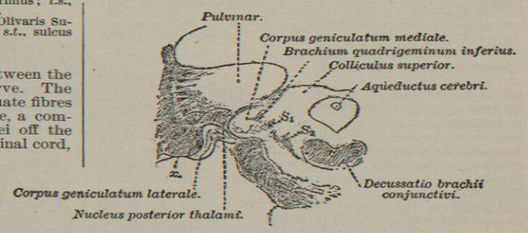

FIG. 963.—Frontal Section through a Normal Human Brain at the Level of the Decussatio Brachii Conjunctivi. (After C. von Monakow, *Arch. f. Psychiat.*, Berlin, Bd. xxvii., 1895. (Taken from "The Nervous System and Its Constituent Neurones," New York, 1900.)

the nucleus posterior thalami. The relation of the lemniscus to the nucleus ventralis lateralis thalami is obvious.

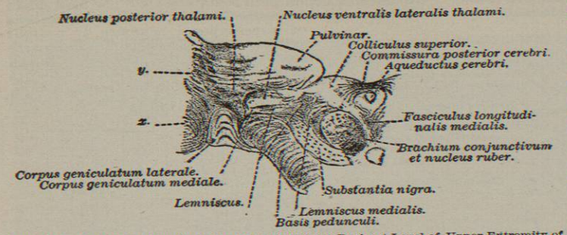

FIG. 964.—Frontal Section through a Normal Human Brain at Level of Upper Extremity of Corpus Geniculatum Mediale. (After C. von Monakow, *Arch. f. Psychiat.*, Berlin, Bd. xxvii., 1895, Taf. ii., Fig. 13.) *z*, Lateral white matter of lateral geniculate body; *γ*, lateral white matter of pulvinar. (Taken from "The Nervous System and Its Constituent Neurones," New York, 1900.)

More ventrally situated are seen the lateral and medial geniculate bodies.

In a section higher up (Fig. 965) the nucleus hypothalamicus, or Luys' body, is illustrated. In the thalamus are seen the tænia thalami, the nucleus medialis thalami, the lamina medullaris thalami, the nucleus medialis thalami (or *centre median* of Luys), the lamina medullaris medialis, the nucleus ventralis thalami (*b*), the lamina medullaris media, the nucleus ventralis thalami (*a*). Lateral from the latter is seen the capsula interna, and more lateral still the nucleus lentiformis. In the hypothalamus the nucleus hypothalamicus or corpus Luysi is seen just dorsal to the base of the peduncle where it goes over into the capsule.

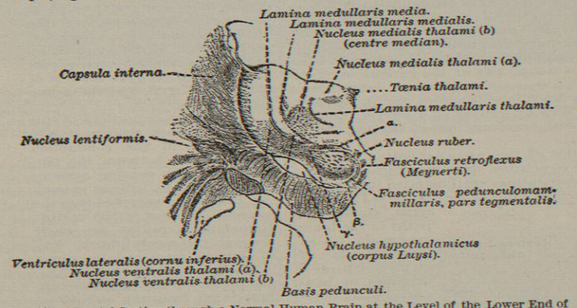

FIG. 965.—Frontal Section through a Normal Human Brain at the Level of the Lower End of the Nucleus Hypothalamicus. (After C. von Monakow, *Arch. f. Psychiat.*, Berlin, Bd. xxvii., 1895, Taf. iii., Fig. 20.) *a*, Dorsal white matter of nucleus ruber; *β*, ventral white matter of nucleus ruber; *γ*, lateral white matter of nucleus ruber. (Taken from "The Nervous System and Its Constituent Neurones," New York, 1900.)

A little higher up (Fig. 966), passing from the third ventricle lateralward, are seen the tænia thalami, the lamina medullaris medialis, the nucleus anterior thalami, the nucleus lateralis thalami, and the zona reticularis. Lateral from the latter is seen the capsula interna. The anterior part of the nucleus ventralis thalami is met with in the ventral part of the thalamencephalon. At the ventral extremity of the lamina medullaris medialis, in transverse section, is the fasciculus thalamo-mammillaris (Vicq d'Azyri). In the hypothalamus are seen a part of Forel's field H and the two parts of the ansa lenticularis, namely, the pars dorsalis and the pars ventralis. Ventro-medially situated is the columna fornicis, and most ventral of all in section is the tractus opticus.

In the next section (Fig. 967) the part cut through corresponds to the most anterior portion of the thalamencephalon. Passing from the middle line lateralward are seen the stratum griseum centrale, the tænia thalami, the nucleus anterior thalami with its ventral capsule, the fasciculus thalamo-mammillaris (Vicq d'Azyri), the nucleus lateralis thalami, and the nucleus ventralis thalami (anterior part). Bounding the thalamus lateralward is the capsula interna of the nucleus lentiformis. The three parts of the nucleus lentiformis are represented, namely, the pars medialis and pars lateralis of the globus pallidus and the putamen. Ventral to the globus pallidus is the commissura anterior cerebri. A portion of the ventral part of the ansa lenticularis is seen in the ventro-medial part of the section.

The histology of the cerebral cortex varies in different parts. At least four layers are usually described (Fig. 968): (1) an external molecular layer; (2) a layer of small pyramidal cells; (3) a layer of large pyramidal cells, and (4) a layer of polymorphous cells. The molecular layer contains a very large number of nerve fibres which run in various directions. They represent for the most part terminals of other cortical cells or of projection or association fibres. The subdivisions of the apical dendrites of the pyramidal cells constitute a large part of this layer. Three types of cells exist here: (1) polygonal cells, (2) spindle-shaped cells, and (3) triangular or stellate cells.

The layer of small pyramidal cells and that of the large pyramidal cells are very characteristic. They contain the pyramidal-shaped perikaryons which are so characteristic of the microscopic picture of the cerebral cortex. Each perikaryon gives off an ascending dendrite known as the chief proc-

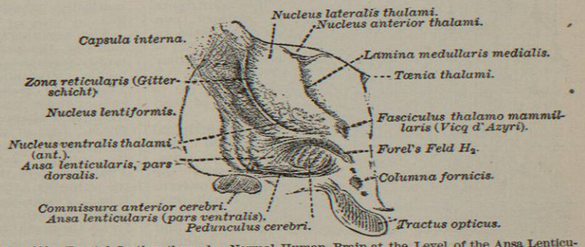

FIG. 966.—Frontal Section through a Normal Human Brain at the Level of the Ansa Lenticularis (Anterior to the Nucleus Hypothalamicus). (After C. von Monakow, *Arch. f. Psychiat.*, Berlin, Bd. xxvii., 1895, Taf. iii., Fig. 28.) (Taken from "The Nervous System and Its Constituent Neurones," New York, 1900.)