roglia cells and their derivatives. These cells, it is now believed, are all epiblastic in origin; the doctrine of a

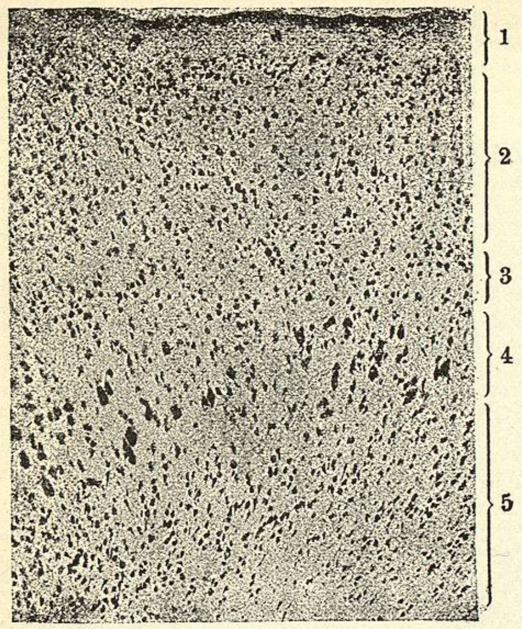

FIG. 929.—Reproduction of a Photogram from a Perpendicular Cortical Section through the Summit of the Gyrus of an Adult Dog, Just in Front of the Sulcus Cruciatus Close to the Falx. Staining by the method of Nissl. 1 = cortical layer free from cells; 2, subdivisible into a narrower external and a broader internal zone, but in no way homological with II. of Fig. 928. On the other hand, 2 in Fig. 928 corresponds to 3 in Fig. 930; 3 in Fig. 928 corresponds to 4 in Fig. 930; (4 + 5) = layer of medullated fibres corresponding to 5 + 6 in Fig. 928, and also to 5 + 6 in Fig. 930. That is, 4 in Fig. 928 corresponds to 5 in Fig. 930, while 5 in Fig. 928 = 6 in Fig. 930. (After F. Nissl, *Münch. med. Wochenschr.*, Bd. xlv., 1898, S. 1027, Fig. 4.)

mesoblastic neuroglia has been given up. In the earlier stages of development the cells lining the cavities of the

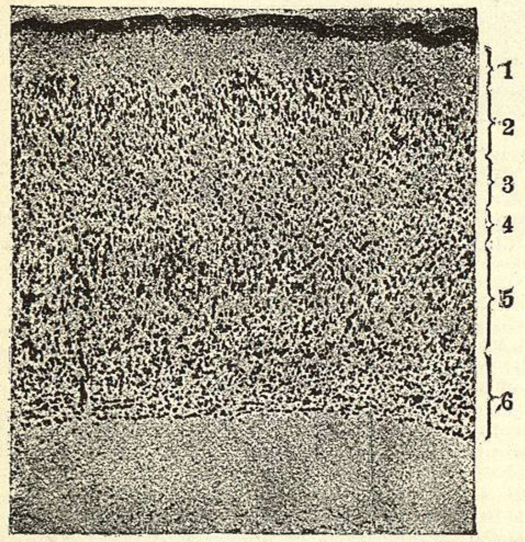

FIG. 930.—Reproduction of a Photogram of a Perpendicular Section through the Cerebral Cortex of a Mole, 1 mm. in Front of the Crucial Suture Close to the Falx. Staining by the method of Nissl. 1 = external layer free from cells; 2, characteristic type of cell arrangement in all cortical areas connected with the olfactorius, especially in the lobus pyriformis; 3 (= 2 of Fig. 929, except the thin cell layer adjoining the cell-free layer, which reminds one still of 2 of Fig. 929); 4 (= 3 of Fig. 929); 5 (= 4 of Fig. 929); 6 (= 5 of Fig. 929). (After F. Nissl, *Münch. med. Wochenschr.*, Bd. xlv., 1898, S. 1027, Fig. 5.)

central nervous system extend through the whole wall of the neural tube, the peripheral processes being drawn out into long pillars or columns. Later, some of the cells become removed from the central canal; the cell bodies assuming positions at various distances from the

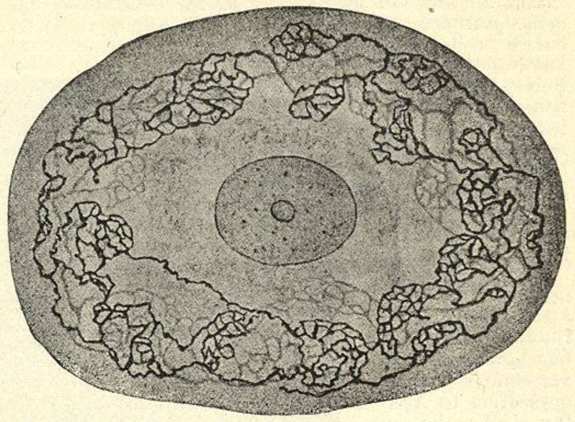

FIG. 931.—Golgi's Endocellular Network. (Taken from A. Van Gehuchten's work.)

central canal somewhere between it and the periphery. Those which remain in connection with the central canal are known in adult life as ependyma cells, while those the cell bodies of which are situated in the nerve substance are known as neuroglia cells. A further origin

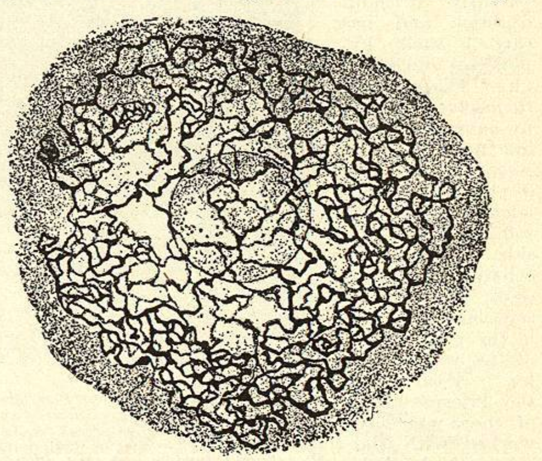

FIG. 932.—Golgi's Endocellular Network. (Taken from A. Van Gehuchten's work.)

of neuroglia cells from germinal cells quite like those which give rise to the neuroblasts and true nerve cells is assumed by a number of authors.

The *ependyma cells* have bodies which are cubical or low columnar in shape and long peripheral processes

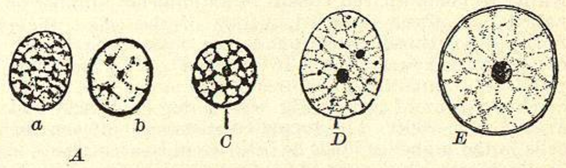

FIG. 933.—Examples of a Variety of Nerve-Cell Nuclei. (After Ramón y Cajal, S., "Textura del sistema nervioso," Madrid, 1899, p. 134, Fig. 43.)

which extend for a shorter or longer distance into the gray and white substance. With ordinary nuclear stains the cell body and its nucleus near the cavity of the ven-

tricles are well seen, but the processes are difficult to make out. In order to demonstrate the latter, the method of Golgi should be employed. With the silver impregnation long strands with short, prickly processes on the surface can be distinguished.

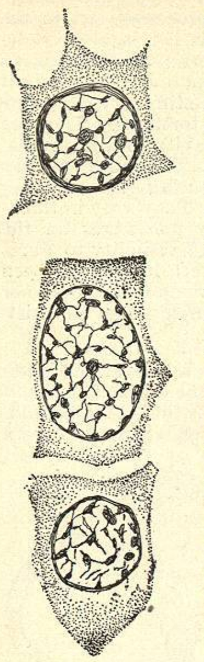

FIG. 934.—Neuroglia Cells. (After Ramón y Cajal, S., "Textura del sistema nervioso," p. 188, Fig. 58.)

Neuroglia cells as seen in preparations stained by ordinary nuclear dyes are small cells with deeply staining nucleus and surrounded by very little protoplasm (Fig. 934). The cell often appears to be the centre of a radiating system of processes or fibrils. These appearances in freshly teased and stained preparations were carefully investigated by Deiters, and they have since been spoken of as the "spider cells of Deiters." The most careful of the earlier investigations was made by Golgi in 1871. He studied neuroglia chiefly by means of teased preparations and sections, and pictured the glia cells as small elements from which numerous rigid glistening fibres radiated out into the nerve substance. He believed that these fibres did not branch and that they formed no anastomoses. The processes of the glia cells in the gray substance are, according to Golgi, more delicate and less rigid than those in the white substance. The histogenetic position of the glia cells was not understood, however, by Golgi at the time of his earlier work. Although he recognized that the glia fibres differ materially from ordinary connective-tissue fibres, still he believed them to be connective-tissue elements.

A very important advance in our knowledge of glia followed upon the application of the silver chromate method. In preparations thus made the glia cells appear as small black masses from which radiate out into the nervous tissue great numbers of delicate black processes (Fig. 935). These for the most part are unbranched,

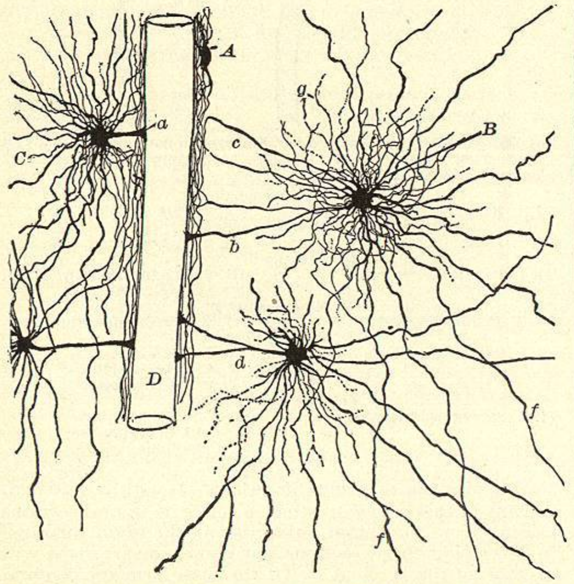

FIG. 935.—Glia Cells as Impregnated in Silver-Chromate Preparations. (After Ramón y Cajal, S., "Textura del sistema nervioso," Madrid, 1899, p. 175, Fig. 48.)

and do not form anastomoses. While, as a rule, they appear to radiate out in all directions from the periphery of the cell, in other instances the processes project from the two extremities of the cell or even from one extremity only. From the peculiar appearances presented by the radiating processes the name astrocyte has been used as a designation for the cell of Deiters or Golgi to distinguish it from the ependyma cell. Kölliker, who has given very exact descriptions of neuroglia, divides the astrocytes into two principal groups: first, those with long

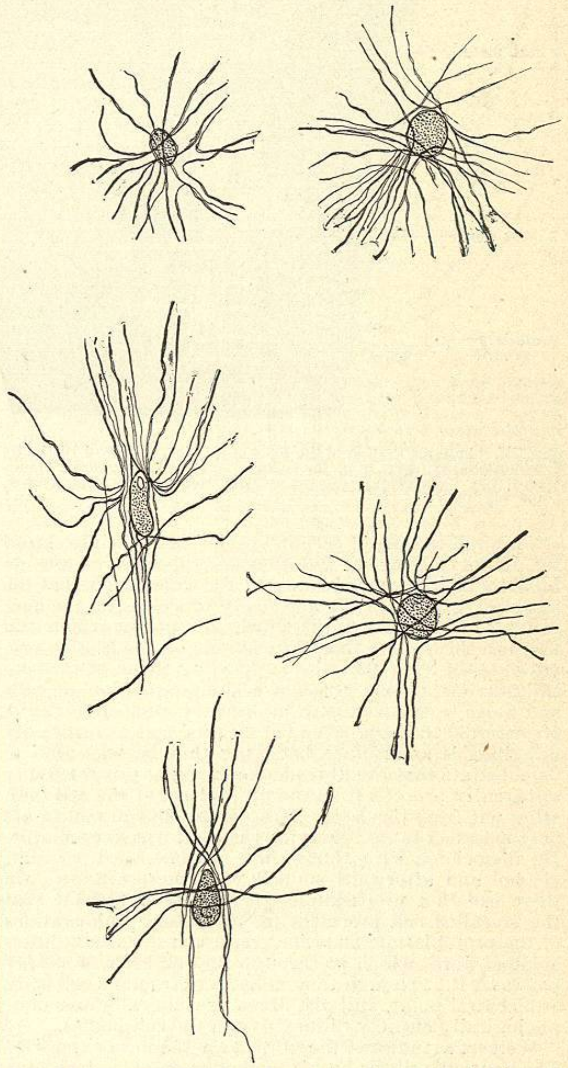

FIG. 936.—Neuroglia Fibrils as Demonstrated by Weigert's Neuroglia Stain. (After Weigert, C., "Der menschliche Neuroglia," Frankfort, 189–.)

branches (*Langstrahler*); and second, those with short branches (*Kurzstrahler*). The cells with short branches are more abundant in the gray substance and are characterized chiefly by the brevity and delicacy of their radiating processes. Their processes show a marked tendency to varicose swelling in Golgi preparations. They are much more difficult to impregnate with the silver chromate method and often assume a brownish rather than a black color.

The glia cells with long processes occur in different parts of the gray and white substance. They are the typical glia cells which were studied by Deiters and Golgi.

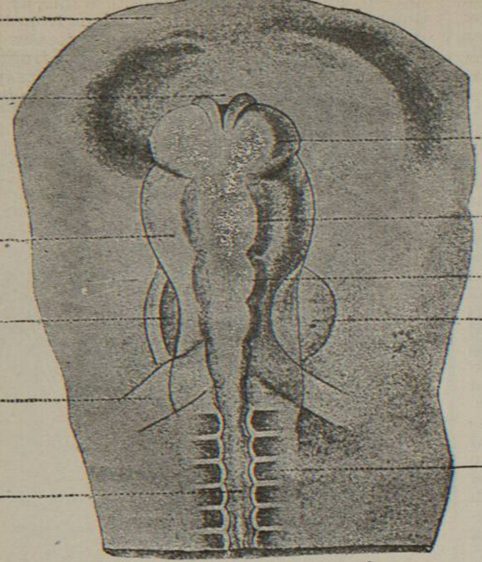

FIG. 937.—Anterior Portion of the Body of a Chick, the Head Distinctly Differentiated; seen from the surface. (After J. Kollmann, "Lehrbuch der Entwickelungsgeschichte des Menschen," Jena, 1898, S. 199, Fig. 120.)

Through the use of certain special methods introduced by Mallory, Weigert, and Beneke, appearances are obtained which have led many to the conclusion that the so-called glia fibres are not really processes of the neuroglia cells, but are fibrils which lie upon or which run through the cells. Ranvier was one of the first to promulgate the view that the supporting tissue of the central nervous system presents a similar relation of cells and fibres to that met with in ordinary connective tissue. He asserted that the so-called Deiters' cell as ordinarily described is an artefact, believing that he was able to demonstrate that the fibres looked upon as processes only apparently proceed from the protoplasm of the cell radiating out from the latter as a centre; but in reality are only attached to it. Ranvier's method was very simple. He dissociated with thirty-three-and-one-third-per-cent. alcohol and afterward stained with picrocarmine. In these isolation preparations he convinced himself that the so-called cell processes are not actual prolongations of the protoplasmic body, but represent definitely differentiated fibres which go through the cell body or simply pass over it. Though they radiate out from the cell body as a central point, still the fibres are clinically and morphologically entirely different from the cell bodies.

Weigert's studies of the subject are the most extensive. The neuroglia fibrils by his method stain of a deep blue color and are exquisitely differentiated (Fig. 936). In the so-called astrocytes or Deiters' cells Weigert finds that blue-stained neuroglia fibrils run directly through the protoplasm of the cells, the nuclei of the cells being entirely independent of the fibrils. Weigert feels sure that the fibrils stained by his method do not represent a new, hitherto unknown, structural element, but are identical with what have been described as the processes of Deiters' cells. The fibrils are not chemically identical with the protoplasm, but are composed of an entirely different substance. Nor does this chemical difference between fibres and cell protoplasm appear at any distance from the cell body in the so-called processes of the glia cells, but the differentiation can be made out in the cell body. It is even quite close to the nucleus of the cell. Accordingly, Weigert believes that most of the so-called processes of the cells are in reality not processes, but fibres running through the cells and more or less independent of them. In the embryo they may be regarded as actual processes, but in the adult the differentiation is always demonstrable. Weigert's method shows that the fibres are more or less straight or they may run in stiff curves. They are never markedly tortuous. They are solid, no central cavity being demonstrable in them. They are always smooth, rarely presenting varicosities or moss-like processes. They vary in thickness from extremely fine fibres on the limits of microscopic visibility to fibres 1.5 μ thick. Weigert has never been able to observe division of his fibres nor could he make out in any case the existence of anastomoses.

The arrangement of the various histological elements in the different parts of the brain can best be studied by examining a series of sections taken at different

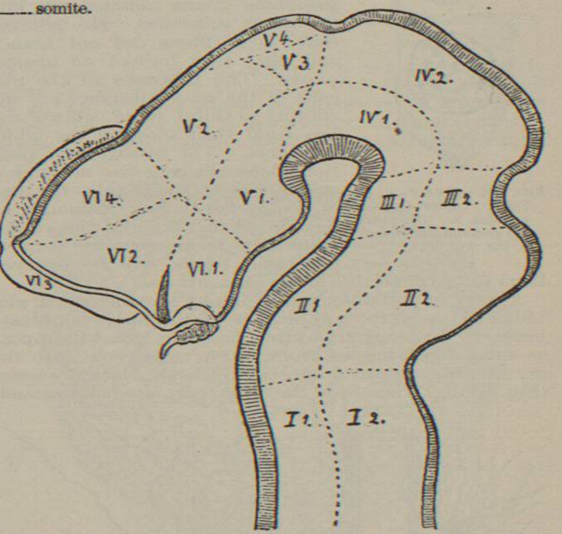

FIG. 938.—Median Section through Embryo Human Brain at the End of the First Month. (After W. His, "Anatomische Nomenclatur," Leipsic, 1895, S. 158, Fig. 17.)

I. Myelencephalon.
I. 1. Pars ventralis. — I. 2. Pars dorsalis.
II. Metencephalon.
II. 1. Pons. — II. 2. Cerebellum.
III. Isthmus.
III. 1. Pedunculi cerebri. — III. 2. Brachia conjunctiva, vel. med. ant.
IV. Mesencephalon.
IV. 1. Pedunculi cerebri. — IV. 2. Corpora quadrigemina.
V. Diencephalon.
V. 1. Pars mammillaris hypothalami. — V. 2. Thalamus. V. 3. Metathalamus. V. 4. Epithalamus.
VI. Telencephalon.
VI. 1. Pars optica hypothalami. — VI. 2. Corpus striatum. VI. 3. Rhinencephalon. VI. 4. Pallium.

levels and made in various directions. It will be most convenient in this article to study a series of frontal sections passing from the spinal extremity of the brain forward. In describing these sections the nomenclature used will be that of the B. N. A.* Of the three primary cerebral vesicles the first gives rise to the forebrain or telencephalon and the interbrain or diencephalon, the second to the midbrain or mesencephalon, and the third to the rhombencephalon. The relations of these parts are shown in the accompanying figures (Figs. 937, 938, and 939). Perhaps the classification which follows will be found most satisfactory. It is that introduced by His of Leipsic. The encephalon or brain is divisible into the cerebrum and the rhombencephalon. The rhombencephalon in turn includes the myelencephalon, the metencephalon, and the isthmus rhombencephali. The myelencephalon corresponds to the medulla oblongata, the metencephalon to the pons and cerebellum. The cerebrum

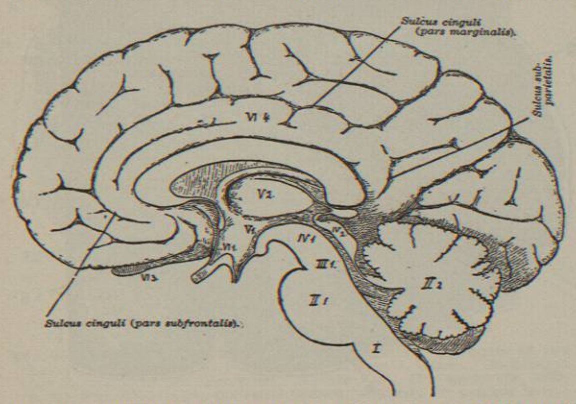

FIG. 939.—Median Section through Fœtal Human Brain of the Third Month. (After His, *Arch. f. Anat. u. Physiol.*, Anat. Abth., 1892.) Lettering same as in Fig. 938 (*vide supra*).

is divisible into the mesencephalon and prosencephalon. The mesencephalon includes the pedunculi cerebri and the corpora quadrigemina. The prosencephalon is divisible into the diencephalon or interbrain and the telencephalon or endbrain. The diencephalon includes the pars mamillaris hypothalami and the thalamencephalon, the thalamencephalon in turn including the thalamus, the metathalamus, and the epithalamus. The telencephalon includes the hemisphærium and the pars optica hypothalami. The hemisphærium is made up of the pallium, the corpus striatum, and the rhinencephalon. These relations are presented below in tabular form:

Posterior cerebral vesicle.	I. Medulla oblongata	**Myelencephalon I.** (Afterbrain).	**Rhombencephalon I.-III.** (*Rautenhirn*).		**Encephalon I.—VI.** (Brain).
Posterior cerebral vesicle.	II_1. Pons; II_2. Cerebellum	**Metencephalon II.** (Hindbrain).	**Rhombencephalon I.-III.** (*Rautenhirn*).		**Encephalon I.—VI.** (Brain).
Posterior cerebral vesicle.	III.	**Isthmus rhombencephali III.**	**Rhombencephalon I.-III.** (*Rautenhirn*).		**Encephalon I.—VI.** (Brain).
Middle cerebral vesicle.	IV_1. Pedunculi cerebri; IV_2. Corpora quadrigemina	**Mesencephalon IV.** (Midbrain).		**Cerebrum IV.—VI.** (*Grosshirn*).	**Encephalon I.—VI.** (Brain).
Anterior cerebral vesicle.	V_1. Pars mammillaris hypothalami (Hypothalamus vice pars mam. and pars optica).	**Diencephalon V.** (Interbrain).	**Prosencephalon V. and VI.** (Forebrain).	**Cerebrum IV.—VI.** (*Grosshirn*).	**Encephalon I.—VI.** (Brain).
Anterior cerebral vesicle.	V_2. Thalamus; V_3. Metathalamus; V_4. Epithalamus — Thalamencephalon V_2—V_4.	**Diencephalon V.** (Interbrain).	**Prosencephalon V. and VI.** (Forebrain).	**Cerebrum IV.—VI.** (*Grosshirn*).	**Encephalon I.—VI.** (Brain).
Anterior cerebral vesicle.	VI_1. Pars optica hypothalami	**Telencephalon VI.** (Endbrain).	**Prosencephalon V. and VI.** (Forebrain).	**Cerebrum IV.—VI.** (*Grosshirn*).	**Encephalon I.—VI.** (Brain).
Anterior cerebral vesicle.	VI_2. Corpus striatum; VI_3. Rhinencephalon; VI_4. Pallium — Hemisphærium VI_2–VI_4.	**Telencephalon VI.** (Endbrain).	**Prosencephalon V. and VI.** (Forebrain).	**Cerebrum IV.—VI.** (*Grosshirn*).	**Encephalon I.—VI.** (Brain).

In describing sections through these various parts it will be necessary, in order to make clear the connections of all, to begin with a section of the spinal cord in the cervical region.

If we begin with a schematic transverse section through the cervical portion of the spinal cord it will be easy to localize the main features of the cross section and to connect these with the parts met with in sections higher up. In this section (Fig. 940) only one-half of the cord is shown. In the middle line in front is seen the *fissura mediana ventralis*, the *commissura ventralis alba* (*Ca*), the *commissura grisea*, containing the *canalis centralis* surrounded by the *substantia gelatinosa centralis* (*Sac*); behind is the *septum medianum dorsalis* separating Goll's fasciculi of the two sides. In the half of the cord shown, the gray substance is seen to be completely surrounded by the white substance. The white substance consists of the three funiculi, the *funiculus ventralis* in front, the *funiculus lateralis* at the side, and the *funiculus dorsalis* behind. The funiculus ventralis includes the *fasciculus cerebro-spinalis ventralis* or ventral pyramidal tract (*PyV*), the *fasciculus ventralis proprius* or ventral ground bundle (*Vg*), and the *fasciculus sulco-marginalis* (*vm*). The funiculus lateralis includes the *fasciculus spino-cerebellaris dorso-lateralis* or direct cerebellar tract (*KS*), the *fasciculus ventro-lateralis Gowersi* or Gowers' tract (*G*), the *fasciculus cerebro-spinalis lateralis* or lateral pyramidal tract (*PyS*), the *fasciculus Lissaueri* (*L*), the *fasciculus lateralis limitans* or lateral limiting layer (*SG*), the *fasciculus lateralis proprius* or lateral ground bundle (*GSZ iS*). The funiculus dorsalis includes the *fasciculus gracilis* or Goll's fasciculus (*GS*) and the *fasciculus cuneatus* or Burdach's fasciculus (*B*). Goll's fasciculus is separated from Burdach's fasciculus by the *septum paramedianum*. The region of Schultze's comma in the dorsal funiculus is designated as *SC*.

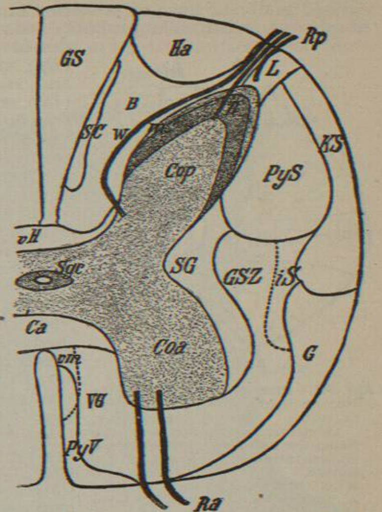

FIG. 940.—Schematic Transverse Section through the Pars Cervicalis of the Medulla Spinalis. (After H. Obersteiner, "Anleitung beim Studium des Baues der nervösen Centralorgane," iii. Aufl., Leipz. u. Wien, 1896, S. 257, Fig. 113.) *B*, Fasciculus cuneatus Burdachi; *Ca*, commissura ventralis; *Coa*, cornu ventralis; *Cop*, cornu dorsalis; *G*, fasciculus ventro-lateralis Gowersi; *GS*, fasciculus gracilis Golli; *GSZ*, mixed bundle of funiculus lateralis; *Ha*, dorso-lateral field of funiculus dorsalis; *iS*, intermediary bundle of funiculus lateralis; *KS*, fasciculus cerebello-spinalis or direct cerebellar tract of Flechsig; *L*, Lissauer's fasciculus; *m*, marginal zone; *PyS*, fasciculus cerebro-spinalis lateralis or lateral pyramidal tract; *PyV*, fasciculus cerebro-spinalis ventralis or ventral pyramidal tract; *R*, substantia gelatinosa Rolandi; *Ra*, radix ventralis; *Rp*, radix dorsalis; *SC*, comma of Schultze; *SG*, lateral limiting layer; *Sgc*, substantia gelatinosa centralis; *VG*, fasciculus ventralis proprius; *vH*, ventral field of dorsal funiculi; *vm*, fasciculus sulco-marginalis; *w*, dorsal root fibre.

The gray matter is divisible in this region into a ventral and a dorsal column. The *columna ventralis* (*Coa*), often spoken of as the ventral horn or anterior horn, contains the motor cells; the *columna dorsalis* (*Cop*), often

* Those who are accustomed to the terms employed by Professor Wilder will find the equivalents of the terms of the Basle Commission in Professor Wilder's article entitled "Neural Terms—International and National." Journ. Comp. Neurol., Granville, vol. vi. (1896), pp. 216–352.

called the dorsal horn or posterior horn, contains a large number of small cells, probably sensory. The entering dorsal root, *radix dorsalis* (*Rp*), and the issuing ventral root, *radix ventralis* (*Ra*), are shown. The lateral horn is not well illustrated in the schematic figure.

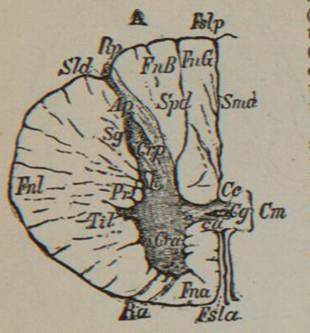

FIG. 941.—Cross Section through the Human Spinal Cord, Stained with Carmine. (After H. Obersteiner, "Anleitung beim Studium des Baues der nervösen Centralorgane im gesunden und kranken Zustande," iii. Aufl., Leipzig und Wien, 1896, S. 227, Figs. 96–102.) A, Transverse section at the level of C iii; *Cg*, commissura grisea; *Ap*, apex columnæ dorsalis; *Ca*, commissura ventralis alba; *Cc*, canalis centralis; *Cm*, commissura medullæ spinalis; *Cra*, cornu ventralis; *Crp*, cornu dorsalis; *Fna*, funiculus ventralis; *FnB*, fasciculus cuneatus Burdachi; *FnG*, fasciculus gracilis Golli; *Fnl*, funiculus lateralis; *Fsla*, fissura mediana ventralis; *Fslp*, sulcus medianus dorsalis; *k*, tractus solitarius; *Pr*, formatio reticularis; *Ra*, radix ventralis; *Rp*, radix dorsalis; *Sg*, substantia gelatinosa Rolandi; *Sld*, sulcus lateralis dorsalis; *Smd*, septum medianum dorsale; *Spd*, septum intermedium dorsale; *Til*, tractus intermedio lateralis.

The more exact relations at the level of the third cervical nerve are shown in Fig. 941. The legend will explain the various parts sufficiently.

A little higher up, just at the junction of the cervical spinal cord with the medulla oblongata, the relations of the gray matter to the white matter change considerably. In Fig. 942 one can easily make out that the gray matter is more abundant than at the lower level, that the dorsal horns of gray matter are inclined much more lateralward instead of dorsalward, while the neck of gray matter connecting the dorsal horn with the rest of the gray matter is very long and narrow. In the region of the lateral horn of gray matter the white and gray matter are much mixed up, corresponding to the beginning of the formatio reticularis of the medulla oblongata.

A section taken through one side of the central nervous system of the new-born babe at the junction of the cervical portion of the spinal cord with the medulla oblongata will show certain particulars not brought out in previous sections (see Fig. 943). Here not all the white matter is medullated. Thus, for example, the fibres of the pyramidal tract are not yet surrounded by myeline sheaths. In the centre is seen the *canalis centralis*; ventral from it is a white area corresponding to the non-medullated decussation of the pyramids (*decussatio pyramidum*); dorsal from the central canal is a mass of gray matter and a median dorsal septum and sulcus. The ventral part of the section has been cut off so that the gray matter of the ventral horn is not well shown. That of the dorsal horn (*columna dorsalis*) is, however, well illustrated. It is directed, however, far lateralward instead of backward, and is capped by a large mass of gelatinous substance (*substantia gelatinosa Rolandi*). Between the dorsal horn and the median line are two new masses of gray matter not met with in the spinal cord lower down; one very well developed, occupying a large part of the region of the funiculus gracilis, is called the *nucleus funiculi gracilis* or Goll's nucleus. Lateral from it, in the ventral part of the fasciculus cuneatus, a mass of gray matter is beginning to appear which higher up becomes very voluminous and is known as the *nucleus funiculi cuneati* or Burdach's nucleus. The white matter surrounds the gray matter as before, and is again divisible into the funiculus ventralis, the funiculus lateralis, and the funiculus dorsalis. The funiculus ventralis includes the non-medullated pyramid and the partly medullated fasciculus ventralis proprius. The funiculus lateralis includes the partially medullated fasciculus ventralis proprius, the well-medullated fasciculus spino-cerebellaris dorso-lateralis. In the funiculus dorsalis are seen the well-medullated fasciculus gracilis and the well-medullated fasciculus cuneatus. Passing transversely lateralward through the gray matter and through the funiculus lateralis are seen the root fibres of the accessory nerve (*radix nervi accessorii*). A good deal of white matter mixed up with gray matter is visible in the lateral region. This corresponds to the beginning of the *formatio reticularis.* A section from a similar region in the adult is shown in Fig. 944. In this figure the decussation of the pyramids is well marked.

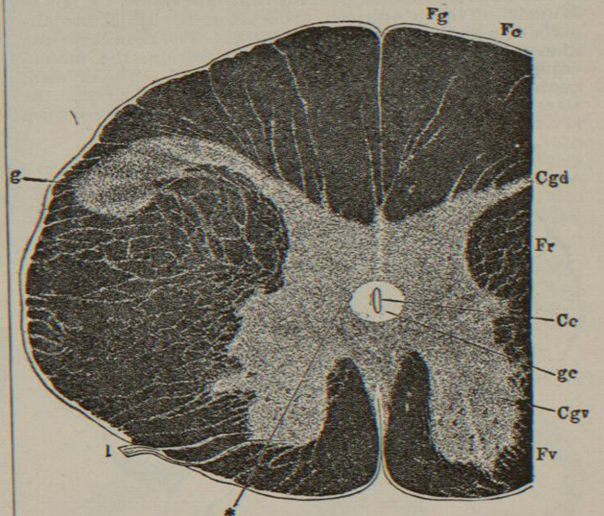

FIG. 942.—Transverse Section at the Junction of the Medulla Spinalis with the Medulla Oblongata. (After J. Henle, "Handbuch der Nervenlehre des Menschen," zweite Aufl., Braunschweig, 1879, S. 208, Fig. 124.) *Cc*, Canalis centralis; *Cgd*, columna (grisea) dorsalis; *Cgv*, columna (grisea) ventralis; *Fv*, funiculus ventralis; *Fc*, fasciculus cuneatus; *Fg*, fasciculus gracilis; *g*, substantia gelatinosa Rolandi; *gc*, substantia gelatinosa centralis; *I*, ventral root of the first cervical nerve; the asterisk * indicates a cross section of a blood-vessel; *Fr*, formatio reticularis. This section is below the level of the decussatio pyramidum.

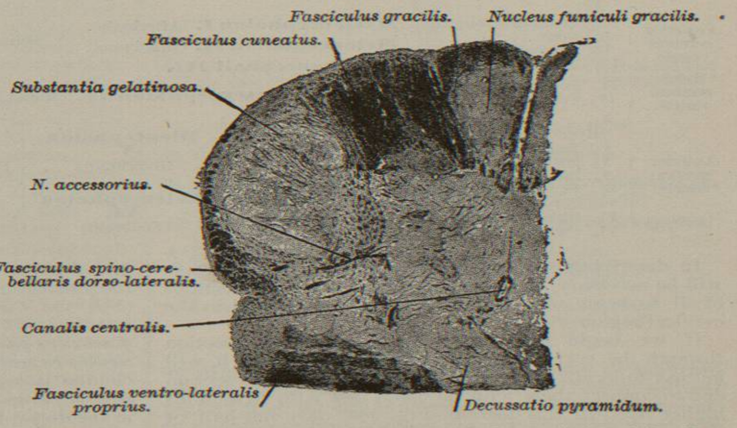

FIG. 943.—Transverse Section through One Side of Central Nervous System of New-Born Babe at Junction of Pars Cervicalis Medullæ Spinalis with the Medulla Oblongata, Showing the N. Accessorius. (Weigert-Pal preparation by Dr. John Hewetson, drawing by A. Karsted.) (Taken from "The Nervous System and Its Constituent Neurones," New York, D. Appleton & Co., 1899.)

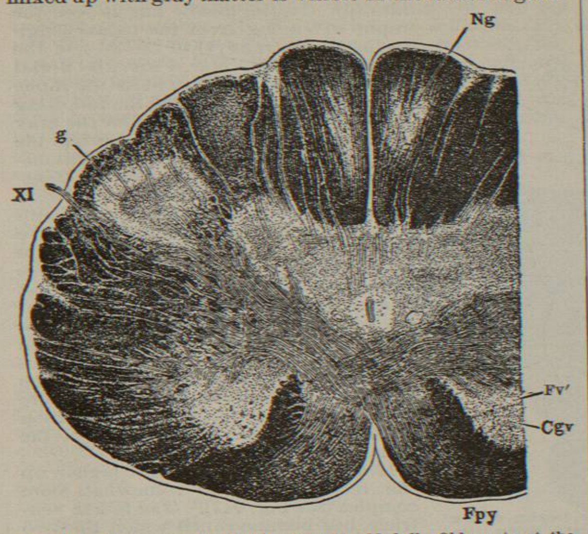

FIG. 944.—Transverse Section through the Medulla Oblongata at the Level of the Decussatio Pyramidum. (After J. Henle, "Handbuch der Nervenlehre des Menschen," Zweite Aufl., Braunschweig, 1879, S. 211, Fig. 126.) *Cgv*, Columna (grisea) ventralis or ventral horn; *Fv'*, continuation in the medulla of the fasciculus ventralis proprius (*Vorderstrangrest* of the Germans); *Fpy*, fasciculi cerebro-spinales pyramidales undergoing decussation; *g*, substantia gelatinosa Rolandi; *Ng*, spinal extremity of nucleus funiculi gracilis; *XI*, nervus accessorius.

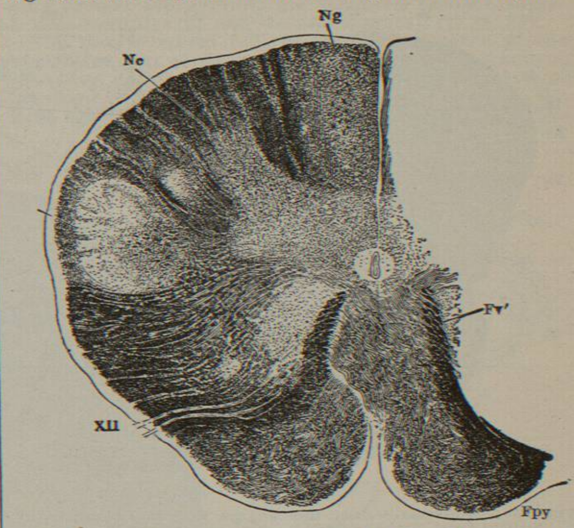

FIG. 945.—Transverse Section through the Medulla Oblongata at the Level of the Most Caudal Fila Radicularia of the Nervus Hypoglossus. (After J. Henle, "Handbuch der Nervenlehre des Menschen," Zweite Aufl., Braunschweig, 1879, S. 213, Fig. 127.) *Fv'*, Continuation in the Medulla of the fasciculus ventralis proprius of the spinal cord; *Fpy*, pyramis (at uppermost level of decussatio pyramidum); *g*, substantia gelatinosa; *Nc*, nucleus funiculi cuneati (Burdachi); *Ng*, nucleus funiculi gracilis (Golli). The decussatio lemniscorum is not indicated in the figure, though it is to be seen at this level.

At a little higher level (Fig. 945), the relations of the gray matter to the white matter have become still more complex. The fasciculus gracilis is almost entirely replaced by the nucleus funiculi gracilis, and the funiculus cuneatus is much encroached upon by the nucleus funiculi cuneati. The region of the lateral funiculus is being converted largely into a mass of formatio reticularis. The substantia gelatinosa Rolandi has increased in bulk, and between it and the surface lie, instead of the fasciculus of Lissauer met with in the spinal cord, the descending fibres of the spinal tract of the trigeminal nerve (*tractus spinalis nervi trigemini*).

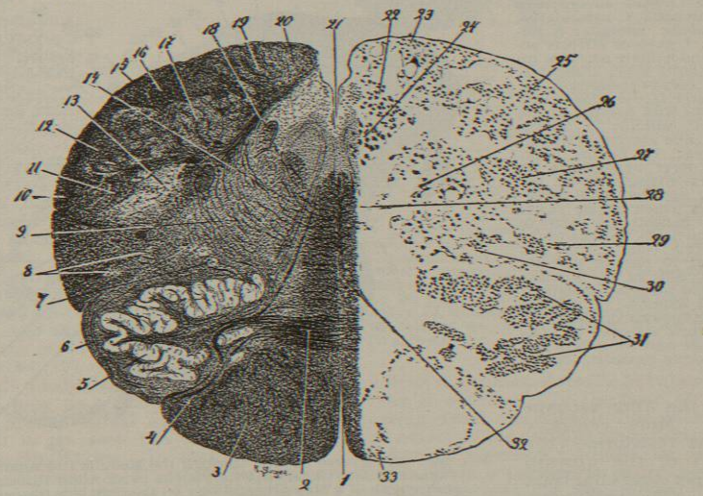

FIG. 946.—Transverse Section through the Medulla Oblongata in the Region of the Distal Portion of the Fossa Rhomboidea of an Adult Human Being. The nerve fibres have been drawn in on the left side (Weigert-Wolters' staining); on the right side, the cells (Nissl's stain). (After E. Flatau, "Atlas Cerebri Humani," Tab. x., Fig. B.) 1, Fissura longitudinalis mediana; 2, stratum interolivare lemnisci; 3, pyramis; 4, radix nervi hypoglossi; 5, nucleus olivaris inferior; 6, fibræ arcuatæ superficiales laterales; 7, nucleus olivaris accessorius dorsalis; 8, nucleus lateralis; 9, substantia reticularis grisea with fibræ arcuatæ internæ; 10, fibræ arcuatæ superficiales laterales; 11, tractus spinalis nervi trigemini; 12, corpus restiforme; 13, substantia gelatinosa; 14, nervus hypoglossus; 15, fibræ arcuatæ superficiales dorsales; 16, funiculus cuneatus Burdachi; 17, nucleus funiculi cuneati; 18, tractus solitarius; 19, nucleus funiculi gracilis; 20, funiculus gracilis Golli; 21, distal part of fossa rhomboidea; 22, nucleus alæ cinereæ; 23, nucleus funiculi gracilis; 24, nucleus nervi hypoglossi; 25, nucleus funiculi cuneati; 26, scattered cells of the formatio reticularis grisea; 27, substantia gelatinosa; 28, dorsal part of substantia reticularis alba (fasciculus longitudinalis medialis); 29, nucleus lateralis; 30, cells of the nucleus olivaris accessorius dorsalis; 31, cells of the nucleus olivaris inferior; 32, raphe with the stratum interolivare lemnisci on each side of it. On both sides of the raphe lie some scattered small cells; 33, cells of the nuclei arcuati. Some large cells which lie in the region between the dorsal accessory olive (30) and the substantia gelatinosa (27) belong to the nucleus ambiguus.

In a section at a higher level (Fig. 946) the central canal has opened out into the lower part of the fourth ventricle. Below the stratum griseum centrale is the nucleus nervi hypoglossi (24). Just dorsad from this nucleus is situated part of the nucleus alæ cinereæ (22), while more laterally and dorsally placed is seen the upward continuation of the nucleus funiculi gracilis (19, 23); some fibres of the funiculus gracilis are still present (20). Still more lateralward is seen the upward continuation of the fu-