AN ANATOMIC STUDY OF THE INFERIOR LONGITUDINAL FASCICULUS *

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In the majority of anatomic textbooks the inferior longitudinal fasciculus is described as one of the cerebral association tracts. Its course is spoken of as extending between the poles of the occipital and temporal lobes. The exact anatomic relations of this bundle and the possibility that it represents projection fibers joining the thalamus with the cortex of the occipital and temporal lobes have caused a great difference of opinion among anatomists and neurologists. All observers to date are agreed that it consists of a well defined aggregation of nerve fibers. With two exceptions, all of the recent work on this subject has been done by examinations of serial sections, obtained from cases of cerebral softening or tumors, showing degenerative changes. It should be comparatively easy, however, to show by gross dissections of well hardened specimens, a bundle such as the fasciculus longitudinalis inferior.

In this work we have undertaken to settle by gross dissections of the cerebrum, these moot points with reference to this particular fasciculus: first, the course, extent and relations of the inferior longitudinal bundle, and second, whether or not this tract consists of projection or association fibers. Naturally, we assume in the beginning that such a bundle really exists as a distinct entity.

Reil [1] (1809) was the first to describe the inferior longitudinal bundle. He did not recognize it as such, but included it in his description of the corona radiata of the occipital lobe.

Burdach [2] (1822) identified the fasciculus longitudinalis inferior as a definite bundle and termed it an association tract. He describes it thus:

> In each hemisphere, it extends along the base of the corona radiata; the lower longitudinal fibers coursing in uninterrupted fashion from the pole of the occipital lobe. It forms, in the longitudinal direction, a prominent eminence upon the under surface of the cerebrum. It is somewhat curved longitudinally, arched externally and slightly concave laterally. It forms in its arch, a very level curve which corresponds to the external capsule and is contrasted

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1. Reil: Archiv für die Physiologie von Prof. J. C. Reil und Dr. J. H. F. Autenreith (Halle), quoted from Niessl-Mayendorf (Footnote 7).

2. Burdach: Von Bau und Leiten des Gehirns **1**:152, 1822, quoted from Niessl-Mayendorf (Footnote 7).

to the fasciculus uncinatus which is somewhat concave inferiorly and slightly convex superiorly. It begins in the pole of the occipital lobe and runs anteriorly along the external part of the floor of the inferior horn. In the temporal lobe, it courses somewhat externally and becomes the foundation of the outer wall or the external division of its floor, and bears the hippocampus. It forms a groove in which the corona radiata progresses. Its inner part forms the inner margin of this groove and unites with the tapetum and cingulum. Its outer part unites with the ground bundles which come up in the lateral border of the temporal lobe. A portion of the fibers run more obliquely, anteriorly and medially beneath the fasciculus uncinatus; and course onward beneath the lenticular nucleus to reach the island of Reil. They form the floor of the external capsule and curve somewhat externally and enter the frontal lobe where they course above the uncinate fasciculus and extend to the external side of the frontal pole.

It will be evident from Figure 2, which illustrates the dissection of the lateral aspect of the cerebrum, that Burdach has very accurately described the fasciculus occipitofrontalis inferior.

Gratiolet [3] (1839) says nothing of a long association bundle from the occipital to the temporal lobe. He describes, however, two divisions of the optic radiation, whose fibers intermingle in the occipital lobe and run forward to terminate within the external geniculate body, the pulvinar and the anterior corpora quadrigemina.

Sachs [4] (1892) believes the inferior longitudinal bundle to be a fasciculus of association fibers originating with the occipital lobe and terminating within the temporal lobe, especially in the first and second temporal convolutions. The inner portion of the tract is in close relation to the cingulum, while the fibers of the superior portion intermingle with those of the corona radiata. Sachs introduced the term "external sagittal stratum" in describing the superior fibers.

Dejerine [5] (1895) describes the bundle as a fasciculus of association fibers arising within the pole and entire cortex of the occipital lobe. Within the temporal lobe and at the level of the retrolenticular segment of the internal capsule, the inferior longitudinal bundle curves around the posterior extremity and the inferior border of the putamen, surrounds the sphenoidal horn and reaches the external part of the amygdaloid nucleus where with the fasciculus uncinatus they divide the gray substance of the neighboring cerebral cortex. Within the temporal lobe, the fibers of the inferior couch course within the hippocampal convolution, the fusiform lobe and the third temporal convolutions. A

3. Gratiolet: Anatomie comparée du système nerveux, Paris, 1839, quoted from Niessl-Mayendorf (Footnote 7).

4. Sachs, H.: Ueber Flechsig's Verstandescentren, Monatschr. f. Psychiat. u. Neurol. **1**:199, 1892.

5. Dejerine, J.: Anatomie des centres neuveux, quoted from Archambault (Footnote 11).

large number of fibers radiate within the first and second temporal convolutions. A small number of fibers enter into the constitution of the external capsule and intercross anteriorly with the fibers of the anterior commissure and the fasciculus uncinatus.

Flechsig [6] (1896) working on the myelinization of fibers, wrote about the bundle under the term "primary optic radiation." He described the fibers as originating within the inferior part of the external geniculate body and the principal nucleus of the pulvinar and terminating within the visual sphere of the occipital lobe. In their course, they cross fibers originating from the superior part of the external geniculate body which enter into the stratum zonale. They are joined by fibers coursing from the internal geniculate body to the temporal lobe, hippocampus and the olfactory area. The "secondary optic radiation," or the optic radiation proper of Gratiolet, was described by him as originating within the occipital lobe and coursing to the pulvinar of the thalamus. The fibers of the primary optic radiation receive their myelin sheaths very early and before those of the secondary radiation. Flechsig believes that the primary fibers carry the impulses from the macula lutea to the visual area. Their clinical importance is therefore obvious.

Niessl-Mayendorf [7] (1903) continued Flechsig's work and more accurately described the fasciculus longitudinalis inferior, which he maintained was identical with Flechsig's "primary optic radiation." He also stated that the cells of origin were situated anteriorly. This hypothesis was supported by the appearance of degeneration and atrophy found in the fibers of this tract following lesions of the external geniculate body. Mayendorf believes that the inferior longitudinal bundle consists, therefore, of projection fibers arising within the external geniculate body and the thalamus and terminating in the calcarine fissure of the occipital lobe. He refers to the "secondary optic radiation" of Flechsig, which lies more medially, as the optic radiation proper. These fibers he described as centripetal in direction, arising in the visual sphere and terminating within the thalamus and medial surface of the anterior corpora quadrigemina.

Edinger [8] (1904) believes that the bundle in question is a long association tract uniting the temporal and occipital lobes. His conclusions were drawn from a case of ablation of the temporal cortex and from examination of the course of degenerated fibers.

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6. Flechsig: Weitere Mittheilungen über den Stabkranz des Menschlichsen Grosshirns, Neurol. Centralbl. **15**:2, 1896.

7. Niessl-Mayendorf: Vom Fasciculus longitudinalis inferior, Arch. f. Psychiat. **37**:537, 1903.

8. Edinger: Bau der nervosen centrale Organe, Arch. f. klin. Med. **73**:243, 1904.

Probst [9] (1902) has made a thorough study of the visual fibers and their connections. In his latest publications dealing with this subject, he reports a case which he studied, showing a lesion of the optic thalamus. He observed a partial degeneration of the inferior longitudinal fasciculus which extended into the temporal and occipital lobes. In the midst of these degenerated fibers, he found undegenerated fibers originating from the pulvinar and external geniculate body. The latter areas were not involved in the lesion. He also found undegenerated fibers originating within the cortex of the temporal and occipital convolutions which coursed to the cerebral peduncle. For Probst, therefore, the inferior longitudinal fasciculus consists of thalamocortical fibers directed toward the temporal and occipital lobes, and also of fibers originating within these lobes and passing to the cerebral peduncle. Under the optic radiation of Gratiolet, he includes the corticifugal fibers to the pulvinar and the anterior quadrigeminal body.

Redlich [10] (1905) describes the fasciculus longitudinalis inferior as a part of the optic radiation terminating within the calcarine fissure, the occipital pole, the inferior convolution of the occipital lobe and partly within the cortex of the parieto-occipital convexity. Within the temporal lobe, the bundle gives off fibers constituting the internal sagittal stratum. The dorsal portion of the fibers are in close relation with the thalamic radiation proper and from a part of the corona radiata. They enter the relation with the optic thalamus and with the external geniculate body, but Redlich believes that they are corticifugal fibers.

Archambault [11] (1905, 1906, 1909) has studied the inferior longitudinal bundle most thoroughly. His material was obtained from cases of cerebral softening, and his conclusions are drawn from serial sections of these brains. This author believes that the inferior longitudinal fasciculus consists of: (1) a bundle of projection fibers, which he has termed the "fasciculus geniculocalcarinus" or the "fasciculus opticus centralis" and (2) of some unnamed fibers of association. He describes the fasciculus geniculocalcarinus as a definite bundle of fibers which

9. Probst: Ueber den Verlauf der centrale Sehfasern (Rinden-Sehhügelfasern) und deren Endigung um Zwischen und Mittelhirne und über die Associations und commissurenfasern der Sehsphäre, Arch. f. Psychiat. **35**:22, 1902.

10 Redlich: Zur vergleichenden Anatomie der Associationsysteme des Gehirns der Saügethiere, Fasciculus longitudinalis inferior, Arb. a.d. Neurol. Inst. (Obersteiner) **12**: 1905.

11. Archambault, L.: Le faisceau longitudinal inférieur et le faisceau optique central, Rev. neurol. **13**:1053, 1905; Le faisceau longitudinal inférieur et le faisceau optique central, Nou. iconog. de la Salpêtrière **2**:215, 1906; The Inferior Longitudinal Bundle and the Geniculocalcarine Fasciculus: Contribution to the Anatomy of the Tract Systems of the Cerebral Hemispheres, Albany M. Ann. **30**:118, 1909.

occupies a portion of the external and internal sagittal beds in the temporal lobe, and which constitutes the entirety of the external sagittal stratum in the occipital lobe. This fasciculus, which represents the corticipetal corona radiata to the occipital lobe, originates within the external geniculate body and terminates within the two lips of the calcarine fissure, but especially within the inferior lip. His description of the fasciculus is as follows:

> The fasciculus geniculocalcarinus takes its origin within the superior and external part of the external geniculate body. The fibers arising from the anterior part of the nucleus pass obliquely backward and inferiorly, along the external wall of the anterior extremity of the sphenoidal horn where they are joined with the fibers of the fasciculus uncinatus, the fibers of the anterior commissure and the short fibers of association of that region. They then bend slightly inward and run backward to the external part of the wall of the inferior horn of the lateral ventricle. The fibers which take their origin in the middle part of the geniculate body, enter into the constitution of the inferior part of the posterior segment of the internal capsule. Traversing the third segment of the lenticular nucleus, they turn at the level of the posterior and inferior part of the external capsule and are directed obliquely inferiorly and medially, where a part of them pass to the external sagittal couch and a part to the internal sagittal couch. Other of the fibers intermingle at this level with the fibers of Türck and with the corticipetal and corticifugal fibers of the first temporal convolution. The fibers which arise in the posterior part of the geniculate body curve around the triangular area of Wernicke and reach the retrolenticular segment of the internal capsule. They project interiorly and reunite in a compact fasciculus which embraces the inferior part and the external border of the sphenoidal caudate nucleus. The fibers are extremely dissociated by the thalamic radiation of the occipital, parietal and temporal regions, which at this level pass into the pulvinar of the optic tract.

Meyer [12] (1907) reports data derived from cases of cerebral softening, adding to Flechsig's original idea that the external sagittal layer consists of projection fibers coursing from the thalamus to the calcarine cortex. Meyer accepts Archambault's term, "fasciculus geniculocalcarinus" as designating the occipital portion of the external sagittal layer.

Curran [13] (1909) describes a well marked bundle of fibers extending from the frontal to the occipital lobe. He has termed these fibers the "fasciculus occipitofrontalis inferior." It begins as a fan-shaped structure in the occipital lobe and becomes a well defined bundle, swinging to the lower, external side of the lenticular nucleus and the external capsule. It again spreads out fanlike in the frontal lobe. Inferiorly to this bundle lies the middle and posterior portions of the fasciculus

12. Meyer: Two Cases of Cerebral Softening, Tr. A. Am. Phys. **2**:2, 1907.
13. Curran: A New Association Fiber Tract in the Cerebrum, J. Comp. Neur. and Psych. **19**:645, 1909.

uncinatus. Anteriorly, the floor of the fasciculus occipitofrontalis inferior is formed by the corona radiata and the anterior commissural fibers. In the medial portion of its extent, the floor is formed by the descending horn of the lateral ventricle, the corona radiata, the tapetum and the tail of the caudate nucleus. Posteriorly, the fasciculus lies on the ependyma of the posterior horn of the lateral ventricle. Curran believes the inferior longitudinal bundle lies more externally and inferiorly, and that some of the fibers intercross far back in the occipital lobe with the fasciculus occipitofrontalis inferior. No illustrations of the inferior longitudinal bundle are given. This author's work was done on gross dissections of the cerebral hemisphere from the lateral aspect.

Trolard [14] (1906), however, had previously made a similar gross dissection from the lateral aspect of the brain. His illustration shows in detail the fasciculus described by Curran. Trolard believes that the inferior longitudinal fasciculus, as described by Déjerine, formed a part of this bundle. The article, it seems, was only preparatory to further work; but a very careful search of the literature has not revealed the later studies.

A review of the literature, therefore, reveals opinion to be divided about equally as to whether or not the inferior longitudinal fasciculus is an association or a projection tract. Burdach, Sachs, Déjerine, Edinger, Curran and Trolard believe the bundle to be purely an association tract. On the other hand, Flechsig, Probst, Niessl-Mayerdorf, Dedlich and Archambault insist strongly that it is a bundle of projection fibers. With the exception of Curran and Trolard, whose articles include illustrations of gross dissection, the more recent authors have used degenerated material and have based their conclusions on serial sections. Curran emphasizes the fact that well defined fiber tracts in the cerebrum can be clearly defined in gross dissections of well hardened specimens.

TECHNIC

In this work, we have made several gross dissections of human brains in an effort to attain our objectives. The results of our dissections in each case have been identical. The final dissections, from which the accompanying illustrations were made, are, therefore, entirely representative. These dissections were made on adult brains, which were removed from one to four hours following death. The fresh specimens were immediately suspended in a large jar containing 10 per cent. formaldehyd solution, by attaching a cord to the vessels comprising the circle of Willis. The fluid completely surrounded the brain, and no part of it was allowed to touch any part of the container. This point of

14. Trolard: Le faisceau longitudinal inférieur du cerveau, Rev. neurol. **14**:440, 1906.

technic was insisted on to prevent distortion of the brain and to preserve the exact relations of all fibers within the cerebrum. The specimens were allowed to remain suspended in this manner for five weeks. The fluid was changed twice during this period.

Dissections of the fiber tracts were made in accordance with the detailed technic described by Curran. After the dissections were made, photographs were taken of the brain and the drawings were made from the picture and the specimen. The object of this procedure was to get the exact structural proportions and relations which are difficult to obtain from a drawing made directly from the specimen.

In our dissections, it clearly became our first duty to identify those fibers which have been included in previous descriptions of the inferior longitudinal fasciculus. By a careful evaluation of the literature heretofore reviewed, one will see that three descriptions of this fasciculus have been given.

First, Archambault's description, in which he gives in detail the relations of the fasciculus geniculocalcarinus. This, he believes to be the principal portion of what has been considered the inferior longitudinal bundle by many authors. This tract agrees with Flechsig's primary optic radiation and with Niessl-Mayendorf's description of the inferior longitudinal fasciculus.

Second, a long association tract of fibers coursing between the occipital and temporal lobes described by Déjerine, Sachs and their followers. I shall show later that at least the majority of these fibers extend anteriorly into the frontal lobe and do not end within the temporal lobe.

Third, Curran's description of the fasciculus occipitofrontalis interior, earlier seen by Trolard and apparently also by Burdach, in which he states that the inferior longitudinal fibers are placed more inferiorly than the main bundle and consist of shorter occipitotemporal association fibers.

DESCRIPTION OF SPECIMENS

Figure 1 is a drawing made from the medial aspect of the left cerebral hemisphere. The splenium of the corpus callosum, the fimbria, the inferior and posterior horns of the lateral ventricle, the cingulum and the hippocampus have been removed, as well as the overlying cortex in this region. The stria terminalis, the temporothalamic fasciculus of Arnold, and the arcuate thalamotemporal fasciculus described by Ranson have also been removed. We can very easily identify the thalamus, pulvinar, lateral geniculate body, cerebral peduncle, the optic nerve and the anterior commissure.

In the occipital lobe, the thalamic radiation to the visual area is clearly seen, extending from the cortex to the thalamus in its posterior

and superior surface. These fibers constitute the optic radiation proper, as described by Gratiolet, and have been determined to be corticifugal in direction. As we pass inferiorly and externally, we encounter a definite layer of fibers in the same plane as these fibers. This bundle runs from the lateral lip of the inferior and posterior surfaces of the thalamus and from the lateral geniculate body to the visual area. These fibers, very characteristically, curve forward and inferiorly before they sweep back to their termination. We may definitely identify them as the fasciculus geniculocalcarinus, whose cells of origin according to Archambault, rest within the external geniculate body.

Farther inferiorly and somewhat externally, we see long uninterrupted fibers lying on the same plane as the two previously described

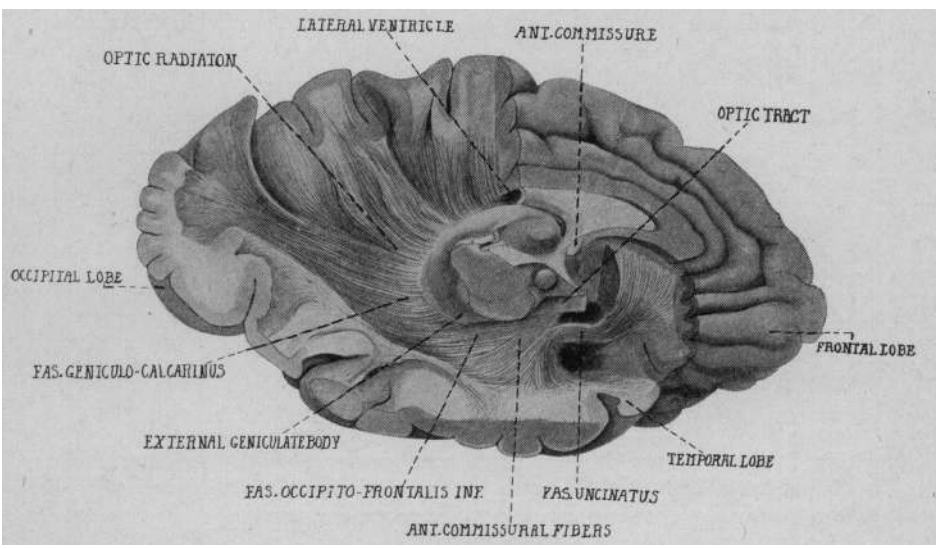

Fig. 1.—Medial view of a dissection of a human cerebral hemisphere. The splenium of the corpus callosum, the fimbria, the inferior and posterior horns of the lateral ventricle, the cingulum, the hippocampus and the overlying cortex have been removed. Reduced one-fourth.

fiber tracts. This group of fibers is in close relation above with the fasciculus geniculocalcarinus as far forward as the anterior surfacec of the lateral geniculate body. At this point, they continue still farther anteriorly to pass beneath the anterior commissural fibers. No fibers can be discerned to pass into the thalamus at this point. They spread out in a fan-shaped manner deep within the cortex of the frontal lobe. As these fibers course into the frontal lobe, they lie somewhat superior and anterior to the fasciculus uncinatus.

Still more inferiorly, we encounter shorter fibers wholly within the temporal lobe. These are shown very distinctly in the illustration and

must be considered only as longer arcuate fibers of association within the temporal lobe. The latter fibers are evidently the ones which Curran has referred to as being external and superficial to the longer fibers of his fasciculus occipitofrontalis inferior and which he groups under the inferior longitudinal bundle. Their evident intratemporal course, however, shows that they cannot properly be so designated.

The longer fibers just described as coursing between the occipital and frontal lobes and as bearing such close relation to the fasciculus geniculocalcarinus are no doubt the association tract which Déjerine, Edinger, Sachs and others have described as the inferior longitudinal bundle. We believe, however, that these fibers are merely the internal layer of the fasciculus occipitofrontalis inferior as described by Curran. By carefully dissecting away individual fibers of this layer, one invariably reaches the external fibers of Curran's bundle. The individual

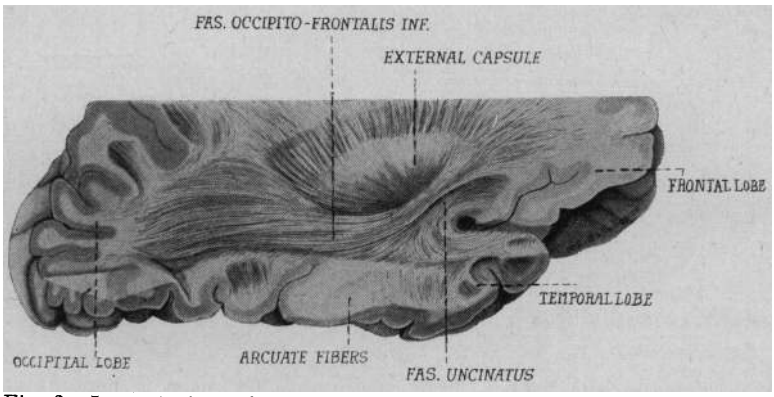

Fig. 2.—Lateral view of a dissection of a human cerebral hemisphere. The insula, opercula and adjacent parts have been removed. The dorsal portion of the hemisphere has been cut away. Reduced one-fourth.

fibers can be carried in an uninterrupted manner between the frontal and occipital lobes.

Figure 2 is the reproduction of a drawing made from a dissection of the lateral aspect of the cerebral hemisphere. The opercula, insula, superior longitudinal bundle and the fasciculus transversus occipitalis have been removed.

We see the fasciculus occipitofrontalis inferior extending between the frontal and occipital lobes. Fibers converge from a large part of the frontal lobe and swing inferiorly to the lenticular nucleus as a compact bundle. They then spread out in a fan-shaped manner into the occipital lobe. At the posterior inferior edge of the lenticular nucleus, which we see covered by the external capsular fibers, a marked depression is evident. This depression is formed by two prominences; one, situated above the depression and curving from above downward and

backward, and the other, situated below the depression and proceeding anteriorly into the temporal lobe. Still a third prominence is related to the above two and extends into the occipital lobe. These eminences are formed by the lateral ventricle with its posterior and inferior horns. Internally, the optic radiation proper and the fasciculus geniculocalcarinus occupy the concave surfaces of the superior and posterior prominences; while the inferior portion of the fasciculus geniculocalcarinus and the internal layer of the fasciculus occipitofrontalis inferior are closely applied to the inferior prominence and to the inferior portion of the posterior prominence. Externally, the fasciculus occipitofrontalis inferior sweeps over the posterior and inferior and over the inferior portion of the superior prominences.

The individual fibers of the fasciculus occipitofrontalis inferior can easily be carried forward from the occipital lobe to the frontal lobe in unbroken fashion, thus demonstrating their continuity. In its medial portion, the fasciculus uncinatus lies inferiorly and in close apposition. By carefully dissecting the fasciculus occipitofrontalis inferior away, we find, as we go deeper, that we are removing fibers which are closely related to the fasciculus geniculocalcarinus and which are shown in Figure 1 as long occcipitofrontal fibers. It seems reasonable to believe that these fibers and the fibers of the fasciculus occipitofrontalis inferior are constituents of the same bundle.

Inferior to the fibers of the fasciculus occipitofrontalis inferior, within the temporal lobe, only short arcuate intratemporal fibers are found. No occipitotemporal fibers can be found lying inferiorly, such as Curran designates under the name fasciculus longitudinalis inferior.

Throughout the literature, one encounters the terms, "internal sagittal stratum" and "external sagittal stratum." The word "stratum" is used synonomously with "bundle" or "fasciculus" by many authors. Sachs, who introduced the terms, refers to the inferior longitudinal bundle as the "external sagittal stratum." The use of these loose terms has caused misinterpretations and false conclusions which are obvious. I believe the term "stratum" should define a bed or groundwork of fibers wholly distinct from a compact aggregation of nerve fibers which form a fasciculus or bundle. I believe the external sagittal stratum consists of several components which are from the occipital lobe forward; the fasciculus geniculocalcarinus, the fasciculus occipitofrontalis inferior; the corona radiata to the parietal lobe, some fibers of the geniculocalcarine fasciculus in the temporal lobe plus the corticifugal fibers of projection of the first and second temporal convolutions, and most anteriorly, the fasciculus occipitofrontalis inferior. The internal sagittal stratum, from the occipital lobe anteriorly, consists of the optic radiation proper, some fibers of the fasciculus geniculocalcarinus and

the fasciculus of Türck. The various constituents of these arbitrary terms can easily be identified in the accompanying illustrations. It also becomes evident that the internal sagittal stratum of the occipital lobe is represented wholly by the optic radiation proper, while the external sagittal stratum in the same lobe is formed entirely by the fasciculus geniculocalcarinus.

It is clearly seen how much confusion exists as to the exact anatomy of the inferior longitudinal fasciculus. At least three distinct anatomic entities have been described under the name of this tract. The fasciculus geniculocalcarinus or the primary optic radiation of Flechsig has been definitely isolated both in degeneration sections and by our gross dissections. It is a thalamocortical projection tract, which anatomically is very hard to differentiate from the optic radiation proper. By serial sections, showing degeneration of the fibers, this becomes relatively easy. We can see no real reason for designating this tract the inferior longitudinal bundle. On the other hand, it seems logical to retain such a definite and accurately descriptive term as Archambault has applied to it.

Our dissections further show that the long fibers lying external and inferior to the fasciculus geniculocalcarinus extend between the occipital and frontal lobes. These fibers belong to the tract described from the lateral aspect by Curran, as the fasciculus occipitofrontalis inferior. The classical description of the inferior longitudinal bundle, accepted and pictured by numerous anatomic textbooks, is that of a tract extending from the occipital to the temporal poles. But the fibers in question can be definitely shown to continue in unbroken fashion from the occipital to the frontal lobes, whether examined from the medial or the lateral aspect. It has also been shown, from both aspects of the cerebrum, that no long association fibers lie inferior to this bundle either in the occipital or the temporal lobes. It seems, consequently, that those fibers are not to be named as the inferior longitudinal bundle, provided the classical description of the latter is retained. In fact, no bundle of fibers can be found by dissection, which fits the description accepted by textbook authors. This, of course, does not exclude the possibility that some fibers which join the temporal and occipital cortex may be mingled with the two long tracts just described, but these, if present, are not sufficiently numerous to make possible their recognition by the dissection method.

If we are to use accurate, descriptive, anatomic terms, we must either speak of Curran's fasciculus occipitofrontalis inferior as the inferior longitudinal bundle or we must drop the latter term, as it refers to no anatomic entity. I believe that the more definite name, fasciculus occipitofrontalis inferior, should be used to designate this

bundle, which evidently must, therefore, be purely an association tract. This is substantiated by the definiteness with which these fibers are separated from those of the fasciculus geniculocalcarinus which arise from the external geniculate body.

CONCLUSIONS

I believe, therefore, that:

1. Such purely occipitotemporal fibers of association as may exist do not form any compact bundle which can properly be termed the inferior longitudinal fasciculus.

2. There exists a long fronto-occipital tract of association, which medially, represents the fibers spoken of by Déjerine and others, as the inferior longitudinal bundle and which, externally, represents the fasciculus occipitofrontalis inferior of Curran.

3. That the term "inferior longitudinal fasciculus" should be dropped and the term "fasciculus occipitofrontalis inferior" should be used to describe this long association tract.

4. The fasciculus geniculocalcarinus of Archambault is a definite thalamocortical projection tract not to be confused with the fasciculus occipitofrontalis inferior.

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