On the Commissura praeinfundibularis et postinfundibularis in Selachian Brains.

By

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With 14 text-figures.

The analysis of the constitutional elements of the commissura praeinfundibularis which separates the postoptic recess from the infundibulum is at present unsatisfied in selachian brains. Moreover, on the commissura postinfundibularis which lies in the anterior part of the tuberculum posterius and connects the gray centers of the caudal part of the inferior lobe, there is yet a divergence in opinion among investigators. On this, the following brief description is intended merely to make the minute structure of these two commissures clear.

The present research is based upon the several series of selachian brains. Most of the series were cut in the three planes of frontal, horizontal and sagittal. They were prepared according to various methods, such as Weigert-Pal, Weigert-Pal-Vitalscharlach VIII, Bielschowsky, Nissl and van Gieson.

At the outset, it is a great pleasure to me to tender my indebtedness to Prof. Dr. C. U. Ariëns Kappers, Director of the Central Institute for Brain Research in Amsterdam, for suggesting this subject.

The commissura praeinfundibularis.

For the purpose to the observation of the commissura praeinfundibularis, the frontal sections, especially in Pristiophorus japonicus, have been most
useful. Immediately caudo-ventral to the commissura transversa Halleri the somewhat thick myelinated fibers of the tr. octavo-hypothalamicus intricate with the contralateral component in the ventral midline of the praeinfundibular area which is comparable with the mammalian tuber cinereum (Fig. 1). This fiber complex may correspond with the fibrae ansulatae in teleostean brains as shown by Ariëns Kappers, Huber and Crosby. A little farther caudal, few of these fibers excentrically enter the massive nervous wall, three to four cells in thickness, surrounding the anterior infundibular cavity (Fig. 2). In the region of the postoptic area, the fibers

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Fig. 2. A transverse section from Pristiorphorus japonicus, through the praeinfundibular area.

Fig. 3. A sagittal section from Acanthodium eglantina, through the ventral midline of the praeinfundibular area.
of the tr. thalamo-saccularis\(^1\) emerge from the postoptic neuropil and can be followed forward insinuated among the fascicles of the optic and postoptic decussations. But it cannot be traced into the nucleus anterior thalami as described by Ariens Kappers, Huber and Crosby.\(^2\) This finding is also confirmed with the sagittal sections in Acantidium eglantina (Fig. 3). Tracing caudally, in the frontal sections, the coarse and diagonally running fibers of the tr. thalamo-saccularis appear fragmentary in the ventral midline, directly basal to the decussation of the tr. octavo-hypothalamicus (Fig. 2). Furthermore, the fibers of the thalamo-saccularis\(^3\) take the longitudinal pathway through the entire length of the infundibular floor (Fig. 4). In the frontal sections, therefore, they indicate the dotted arrangement along the


\(^2\) L. c., 1936, p. 903.

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Fig. 5. Photomicrograph of a transection from Pristiophorus japonicus, through the praefundibular complex.

Fig. 6. A transverse section from Pristiophorus japonicus, through the anterior segment of the infundibular cavity.
Fig. 7. A transverse section from Pristiophorus japonicus, through the recessus lateralis infundibuli.

Fig. 8. Photomicrograph of a transection from Pristiophorus japonicus, through the middle segment of the infundibulum.
base of the decussation of the tr. octavo-hypothalamicus (Fig. 5). This finding is also distinctly assured in Apristurus platyrhynchus, Pristiurus eastmani, Heptanchias deani and Cynias manazo.

The fibers of the tr. cerebello-hypothalamicus incruciatus which is accompanied with the tr. octavo-hypothalamicus throughout the thalamus, run medio-ventrally in the praeinfundibular region along the lateral side of the latter tract and forward take part in the complex. This anterior pathway of fibers may well be observed with the sagittal sections in Acanthidium eglantina (Fig. 3).

Further caudally, where the anterior segment of the medial infundibular cavity just communicates with the third ventricle and the bilateral recesses, fibers of the tr. octavo-hypothalamicus ascend dorsally to the opposite side after crossed in the ventral midline. A few of these fibers diffusely spread out to the dorsomedial gray of the recessus lateralis infundibuli and

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further extend dorsally to the juncture of the ventral thalamus and the lateral inferior lobe (Fig. 6 and 7). Some of these fibers intersect with the descending fibers of the tr. cerebello-hypothalamicus incruciatus which run ventrolaterally into the outside zone of the lateral inferior lobe.

In addition to these fiber tracts, I mention fibers which transverse along the superficial zone of the two tubercular spheres of the infundibular floor and forward continuously fuse with the praefundibular fiber complex (Fig. 8). Besides, a very few fibers of the medial forebrain bundle partly add to this commissure. In the caudal segment of the infundibular floor, the commissural fibers are gradually reduced in number accompanying with the path of the tr. thalamo-saccularis. The former has no direct relation with the saccus vasculosus, while the latter finally enter into the epithelium of the saccus vasculosus as shown by Dammerman. ¹) It is well confirmed with the horizontal sections in Apristurus platyrhynchus (Fig. 9). These fiber systems above-mentioned briefly consist the fiber complex of the commissura praefundibularis.

¹) L. e., 1910, p. 704.
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The commissura postinfundibularis.

On the occurrence of the fiber complex of the commissura postinfundibularis, have been well traced in the frontal and the horizontal sections in Pristiophorus japonicus, Scylnorhynchus licha, Cynias manazo and Triakis scyllium. The decussated fiber groups of the tr. cerebello-mesencephalicus (Bindearm), tr. cerebello-hypothalamicus and the tr. tecto-bulbaris cruciatus all together make an intermediate fascicle in the dorsal midline of the anterior segment of the tuberculum posterius (Fig. 10).

Immediately caudal to this fiber complex or above the posterior infundibular cavity, there is a small bundle of fine crossing fibers, which apparently connect the two centers of gray in the lobi inferiores (Fig. 11).

1) It may be homologous to the fiber complex of the tecto-thalamicus et hypothalamicus cruciatus and the tr. thalamo-hypothalamicus et peduncularis cruciatus in Necturus (Herrick). Comp. Herrick, C. J., L. c., 1934, p. 377.
Fig. 12. Photomicrograph of a transection from Apisturus platyrhynchus, through the commissura postinfundibularis.

Fig. 13. Photomicrograph of a transection from Pristophorus japonicus, through the posterior infundibular floor.
This finding can well be confirmed with the horizontal sections in Apristurus platyrhynchus (Fig. 12). This is possibly the same as the commissura postinfundibularis superior of Dammerman.¹)

The fibers of the commissura postinfundibularis is mixed up or pierced at both ends by the fine terminal fibers of the forebrain bundle and also by the ascending fibers coming from the posterior lobe of the ventral hypothalamus. The latter may be corresponded with the tr. infundibularis ascendens of Herrick in Necturus.²) The slender fascicle of myelinated fibers of the lateral forebrain bundle take a roundabout way along the latero-ventral wall of the recessus posterior of the infundibulum and frontalwards run into the infundibular floor to unite with the posterior part of the commissura praeinfundibularis. (Fig. 13).

The fine medullated fibers of the tr. tubero-posterius³) which leave the ganglion sacci vasculosi run excentrically being confused with the fibers of the commissura postinfundibularis and then extend spinalwards through the tuberculum beneath the pathway of the lateral longitudinal fascicle.

¹) L. c., 1910, p. 702.
²) L. c., 1934, p. 383.
The commissura postinfundibularis inferior of Dammerman\(^1\) apparently indicates the decussation of the unmyelinated fibers of the tr. sacci vasculosi as shown by Johnston in Acipencer.\(^2\) These fibers make the fascicle after crossed and go forewards to the central gray of the dorsal thalamus as shown by Dammerman, Ariëns Kappers, and others, as the tr. sacco-thalamicus (Fig. 14). Since its fibers join the corresponding tract of the opposite side, it is not a true commissure but a decussation. This tract, therefore, may not be applicable to be named as the commissura postinfundibularis inferior.

In brief, two commissures—commissura praeinfundibularis and commissura postinfundibularis—belong to the hypothalamus proper. The commissura praeinfundibularis chiefly contains the majority of the secondary somatosensible fibers coming from the octavus and the cerebellum, such as the tr. octavo-hypothalamicus and the tr. cerebello-hypothalamicus. Besides, it relates with the tr. thalamo-saccularis which contains the nervous impulse between the thalamus and the saccus vasculosus. A very few fibers of the olfactory projection tract relates with this commissure.

The commissura postinfundibularis is consisted of the fibers which connect the gray substance in the posterior part of the lobi inferiores and few of the fine crossing fibers of the tuberculum posterius impar, such as the tr. tecto-bulbaris cruciatus, tr. cerebello-hypothalamicus cruciatus participate in this commissure. This commissure, moreover, is also intricately interwoven with the ascending fibers which may be comparable with the tr. infundibularis ascendens of Herrick coming from the posterior lobe and also with the homolateral descending fibers of the forebrain bundle. The unmyelinated fibers of the commissura postinfundibularis inferior of Dammerman or the decussatio retro-infundibularis may probably be in anatomical connection with the commissura postinfundibularis.

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1) L. c., 1910, pp. 702–704.