

A NOTE ON THE RELATIVE POSITIONS OF THE CORPUS CALLOSUM AND THE HIPPOCAMPAL FORMATION

BY Y. APPAJEE, B.A., M.B. (CAL.), M.Sc. (LOND.)

(From the Department of Anatomy, Medical College, Mysore)

Received September 16, 1940

ABBIE (1939) has recently questioned the classical hypothesis of Elliot Smith on the relation of the corpus callosum to the hippocampus and the lamina terminalis in the callosal mammals. The fibres of the corpus callosum, according to Elliot Smith, reach the opposite hemisphere by invading the lamina terminalis in the region of the dorsal (hippocampal) commissure which is itself ventral to the hippocampal area on the medial surface of the cerebral hemisphere. They make use of the commissural bed and when these fibres become the huge corpus callosum, the commissural bed is expanded and stretched. The study of the human embryological material supported this hypothesis. Streeter (1912) found that as the corpus callosum expanded "the mass spreads open a space for itself, in which process, a portion of the pre-commissural body is appropriated, and the eventual lamina terminalis presents a large surface in the median section including the whole corpus callosum and septum pellucidum". [Quoted from Kappers, Huber and Crosby (1936).] Elliot Smith's hypothesis explained certain peculiarities as the formation of fornix dorsalis, stria Lancisii, fibræ perforantes, etc., which are too well known to be repeated here. It really formed the fundamental basis for the forebrain morphology and was widely accepted.

Abbie's theory is a complete repudiation of this classical view. According to him the callosal fibres do not traverse through the hippocampal commissure. On the contrary they pass through the subicular area which is the junctional area between the neopallium and the hippocampus. It means that the corpus callosum lies dorsal to the hippocampal area. Consequently the supracallosal indusium is not hippocampal remnant, but it is a part of the subicular cortex. Another consequential deduction is that the septum pellucidum is not derived from the paraterminal body but it is formed by a drawing up of the anterior part of the lamina terminalis only and there is no such thing as an open cavum pellucidum. The cavum itself is the result of dehension in the lamina terminalis as a result of stress on it by the growing corpus callosum.

The writer was preparing a detailed discussion on this new hypothesis—for he has had the opportunity of studying the forebrains of the mammals which Abbie has used for his paper—when there appeared a paper by Goldby (1940), which has anticipated most of the writer's objections. So the present note is only confined to the observations on the hedge-hog's brain, which Goldby has not touched upon and which Abbie has used in his papers.

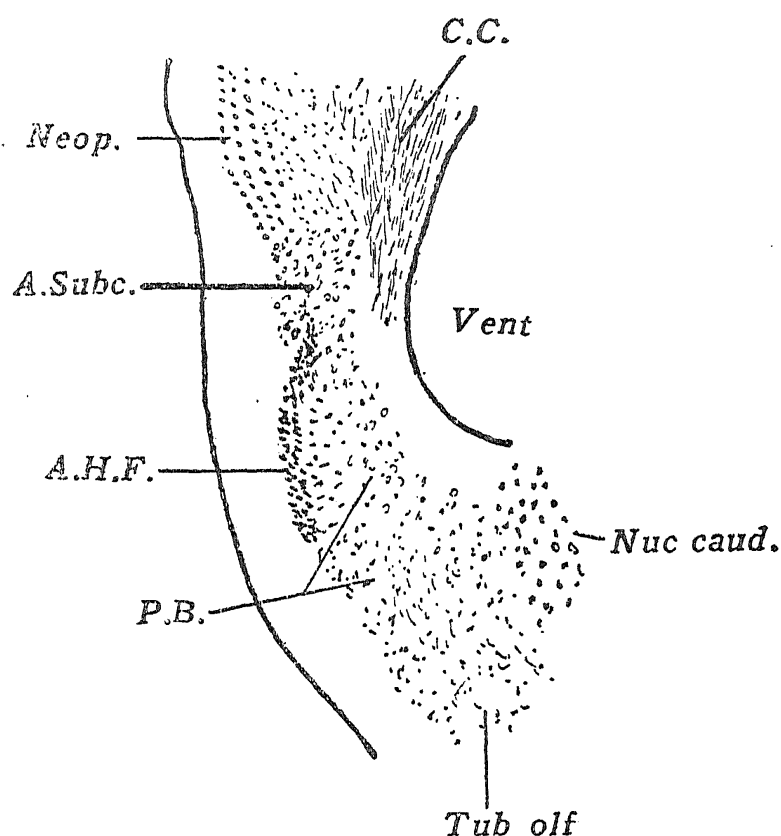


FIG. 1

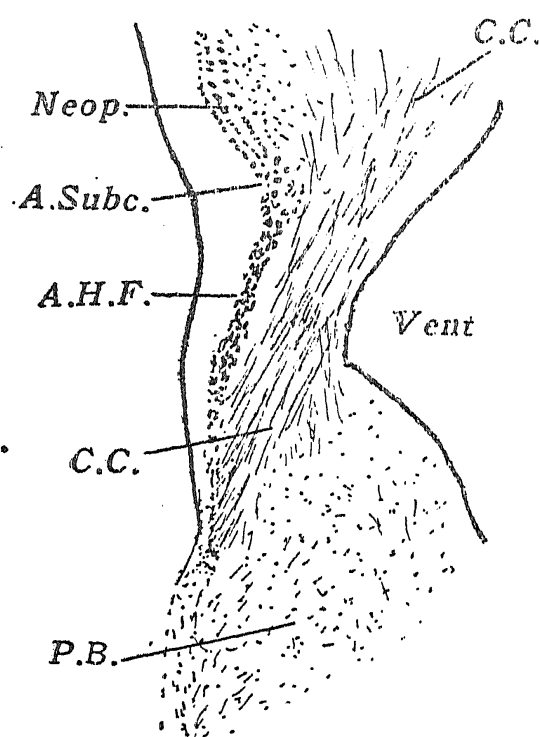


FIG. 2

ABBREVIATIONS USED IN DIAGRAMS

A.H.F.	Anterior Hippocampal formation or area
C.C.	Corpus Callosum
P.B.	Paraterminal Body
A.Subc.	Area subiculum
Neop.	Neopallium
F.H.	Fissura Hippocampi
Nuc caud	Caudate nucleus
Tub. olf	Tuberculum olfactorium
Vent	Ventricle

Abbie seems to have made a fundamental error in wrongly identifying the hippocampal area as the subiculum. There seems to be some confusion in his labelling of the hippocampal and subicular areas in his two papers, published in the volumes 70 and 68 of the *Journal of Comparative Neurology*. (Compare the figures illustrating the sections of the hedgehog's brain in the

two papers.) In his 1939 paper on the corpus callosum, he has labelled the deeply staining compact layer of the hippocampal cortex as the subiculum, which is really a small junctional region of scattered cells lying between the dorsal edge of the hippocampal area and neocortex. From the study of the hedgehog's material at the writer's disposal, it is clear that a great part of the dorsal portion of the hippocampal cortex is lifted up by the anterior part of the corpus callosum and it is really the hippocampal area that is broken through by the developing fibres of the corpus callosum. The accompanying camera lucida drawings of this area in transverse section are self-explanatory and show that Abbie's theory is based on wrong interpretation of the medial cortical areas. So the present writer is in entire agreement with Goldby that Abbie has to produce more convincing evidence to substantiate his new hypothesis as to the relation of the corpus callosum to the hippocampus.

REFERENCES

- Abbie, A. A. .. "The relations of the Fascia Dentata, Hippocampus and Neocortex, and the nature of a subiculum," *J. Comp. Neur.*, 1938, 68, 307.
- .. "The origin of the Corpus Callosum and the fate of the structures related to it," *Ibid.*, 1939, 70, 9.
- Appajee, Y. .. *On the forebrain of the Erinaceus Europeus*," Unpublished Thesis. University of London, 1934.
- Elliot Smith .. "The origin of the Corpus Callosum," *Transactions of the Linn. Soc. Lond., Second Series, Zool.*, 1897, C. 7, 47-69.
- .. "Aris and Gale Lectures," *Lancet*, 1910.
- Goldby, F. .. "On the relative position of the hippocampus and the Corpus Callosum in placental mammals," *J. Anat.*, 1940, 74, 227.
- Kappers, Huber and Crosby .. *The Comparative Anatomy of the Nervous System of Vertebrates*, 1936, II.