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Note on the brain anatomy of the humpback whale, *Megaptera novaengliae* *

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With 2 figures in the text and 3 plates

Eight brains were taken from humpback whales (Table I, Fig. 1) caught in the Indian ocean (Durban Waters) and the Antarctic sea and anatomically examined. The weight of the brain (without the dura mater) is between 4320 grams and 5200 grams. The average weight is 4675 grams. The telencephalon (Table I, Fig. 2) is deeply and richly furrowed. The bulbus and tractus olfactorius are narrow. The tuberculum olfactorium is well developed. The amygdala and the cornu ammonis are relatively small. The fornix (Table II, Fig. 3) is well developed and is, as in sei whale (*Balaenoptera borealis* Lesson; Pilleri 1965) not correlated in any way with the development of the corpus mamillare and the hippocampus. The commissura anterior is narrow and somewhat more developed than that of the sei whale. The basal ganglia (Nucleus caudatus, Putamen, Globus pallidus and Claustrum) are similar anatomically to those of the sei whale, but are more extensive (Table II, Fig. 4). The Neostriatum (Nucleus caudatus and Putamen) is well marked but the palaeostriatum (Globus pallidus) is not easily seen. The capsula externa and interna are very noticeable. The thalamus is very large, its weight is 2,95% of the total brain weight, three

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times more than in the human brain. It is more developed than that of the sei whale, but has, in comparison, a massa intermedia

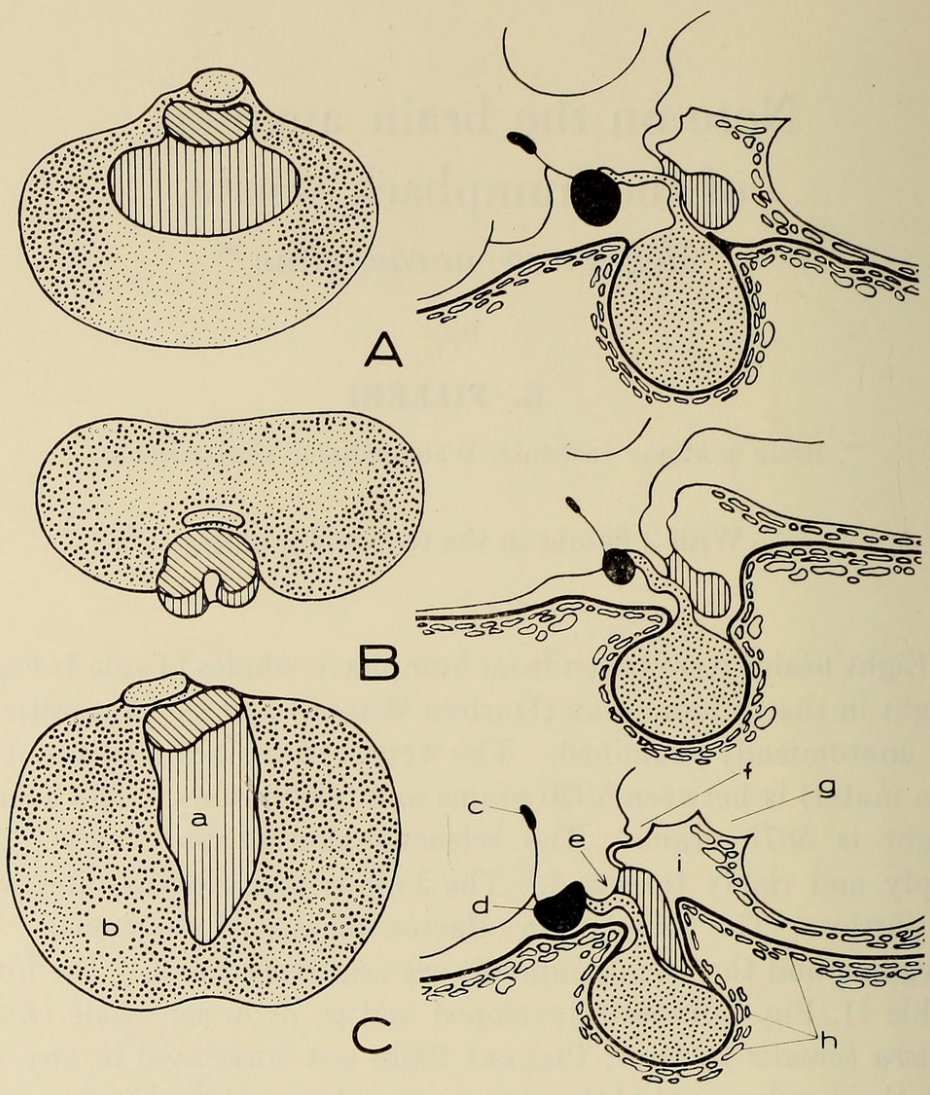

Fig. 1

Dorsal view and medial sections of the hypophysis cerebri of: A = *Megaptera novaeangliae*, B = *Eubalaena australis*, C = *Balaenoptera borealis*; a = neurohypophysis, b = adenohypophysis, c = commissura anterior, d = chiasma opticum, e = recessus infundibuli, f = corpus mamillare, g = mesencephalon, i = fossa interpeduncularis, h = rete mirabile of the dura mater (schematically).

(Table II, Fig. 3). The corpus mamillare is very small and is, macroscopically, undivided. The adeno- and neurohypophysis (Fig. 1) are separate from each another as in other investigated *Mysticeti*. The adenohypophysis is intradural and the neuro-

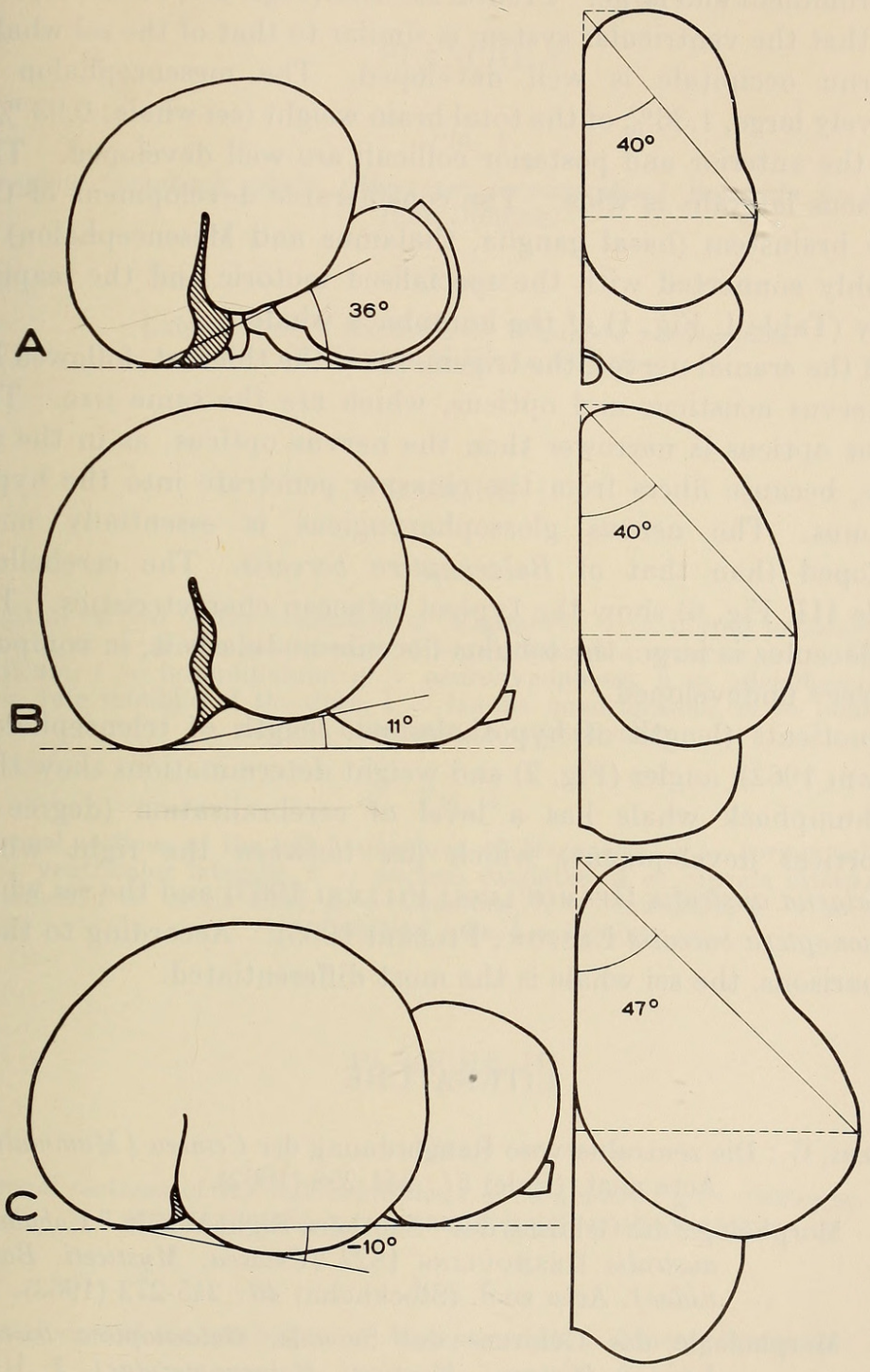

Fig. 2

Progressive cerebralisation and develop of the temporal lobe of A = *Eubalaena australis*, B = *Megaptera novaeangliae* and C = *Balaenoptera borealis*.

hypophysis is subdural (Fig. 1). The corpus geniculatum mediale is well prominent and large. Frontal sections (Figs. 4-5, Tables II, III) show that the ventricular system is similar to that of the sei whale. A cornu occipitale is well developed. The mesencephalon is relatively large, 1,36% of the total brain weight (sei whale: 0,93 %). Both the anterior and posterior colliculi are well developed. The lemniscus lateralis is wide. The considerable development of the whole brainstem (basal ganglia, thalamus and Mesencephalon) is probably connected with the specialised motoric and the leaping ability (Table I, Fig. 1) of the humpback whale.

Of the cranial nerves, the trigeminus is the thickest, followed by the nervus acusticus and opticus, which are the same size. The tractus opticus is narrower than the nervus opticus, as in the sei whale, because fibers from the chiasma penetrate into the hypothalamus. The nervus glossopharyngicus is essentially more developed than that of *Balaenoptera borealis*. The cerebellum (Table III, Fig. 6) show the typical cetacean characteristics. The paraflocculus is large, the lobulus flocculo-nodularis is, in comparison, very undeveloped.

Quotients (length of hypothalamus: length of telencephalon, Pilleri 1962), angles (Fig. 2) and weight determinations show that the humpback whale has a level of cerebralisation (degree of neocortical development) which lies between the right whale (*Eubalaena australis* Desmoulins; Pilleri 1963) and the sei whale (*Balaenoptera borealis* Lesson; Pilleri 1965). According to these comparisons, the sei whale is the most differentiated.

LITERATURE

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PLANCHE I

FIG. 1

Leaping humpback whale *(Megaptera novaeangliae)* Bermuda area, Foto John Dominis.

FIG. 2

Lateral view of the brain of *Megaptera novaeangliae* (Collection of Dr. G. Pilleri).

PLANCHE II

FIG. 3

Sagittal section of the brainstem of *Magaptera:* a = Corpus callosum, b = Fornix, c = Massa intermedia, d = Commissura anterior, e = Chiasma opticum, f = infundibulum, g = neurohypophysis, h = adenohypophysis, k = rete mirabile of the dura, l = lamina quadrigemina, m = pons, n = medulla oblongata, o = cerebellum.

FIG. 4

Coronal sections of the left hemisphere of *Megaptera:* a = corpus callosum, b = ventriculus lateralis, c = nucleus caudatus, d = capsula interna, e = putamen, f = insula Reili, g = thalamus, h = claustrum, k = amygdala, i = temporal lobe, l = fornix.

PLANCHE III

FIG. 5

Coronal sections of the left hemisphere of *Megaptera:* g = thalamus, m = cornu ammonis, n = cornu occipitale of the ventricle.

FIG. 6

Dorsal view of the cerebellum of *Megaptera:* IV = Nervus trochlearis.

Pilleri, G. 1966. "Note on the brain anatomy of the humpback whale, Megaptera novaengliae." *Revue suisse de zoologie* 73, 161–165. https://doi.org/10.5962/bhl.part.75811.

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