intestine, rather than the duodenum. It was noticeable that dye loss occurred first in the duodenum and not until about 10 h later did it occur in the small intestine. The appearance of the infected intestine compared with that of a normal control can be seen in the Figure. This shows the state of the intestine 90 h after infection. The dark areas on the infected tissue correspond to sites of dye loss. Microscopically, a marked difference in the colouration of the mucosa was found between the controls and the infected birds, during the period of dye loss. Both the mucosa and the submucosa of the infected birds always took on a blue colouration, whereas with the controls, the colour was restricted to the submucosa, leaving the mucosa quite clear.

The leakage of Pontamine sky blue, presumably attached to serum proteins, into the lumen of the gut of infected birds and the alteration in its distribution within the gut wall, indicates that there has been some change in the permeability of both the mucosal capillaries and the epithelium. The reasons for this change in permeability are not clear but the phenomenon is associated with the rapid growth of the parasite within the epithelial cells and the sloughing of the epithelium. Concurrent with the period of maximum dye loss, a depression in the absorption of L-histidine, D-glucose and fluid has been found by PRESTON-MAFHAM[4], indicating that there are considerable physiological changes in the gut during infection.

Résumé. La perméabilité de l'intestin grêle infecté d'*Eimeria acervulina* est modifiée. Des poules normales et des poules infectées ont reçu des injections i.v. de pontamine colorant bleu-ciel en solution saline. La présence de teinte bleu seulement chez les poules infectées a indiqué un changement de perméabilité. Ce changement est produit par les coccidioses entre 48 et 144 h à partir de l'infection dans la plupart des cas.

R. A. PRESTON-MAFHAM and A. H. SYKES

Department of Poultry Research, Wye College (University of London), Ashford (Kent), 29 May 1967.

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Architectonical and Volumetrical Investigations on the Thalamus of the Cetacea in Comparison with the Human Brain[1]

The thalamus has a key position in the cerebrum. Many afferent pathways from the cerebellum, the mesencephalon, the hypothalamus and particularly the afferent somatic sensory fibre system end here and undergo reorganization. On the other hand, the cortex has a two-way contact with the thalamus and is constantly controlled and influenced by it.

More research should be carried out on one of the main nuclei of the thalamus, the Nucleus anterior thalami. The fact that it plays a leading role as link in the limbic system concerning the study of behaviour problems is important. PILLERI[2-5] has published several papers on the morphology of the cetacean brain. KRUGER[6] made an important contribution to the information on the thalamus of *Tursiops truncatus* with his paper on comparative anatomical and volumetrical investigations. The following observations were made on the brains of 2 *Odontoceti* (*Delphinapterus leucas*, *Delphinus delphis*) and on the brain of 1 *Mysticeti* (*Balaenoptera physalus*).

The relative portion of the thalamus averages 2.8% in the Cetacea, which is twice that of the human brain.

The Nucleus anterior thalami can, as is the case in the human brain, be divided into a main nucleus, which consists of the Nucleus anterior principalis (Apr) and medialis (Am), and into a Nucleus anterodorsalis (Ad).

The Nucleus anterior thalami is very small in the cetacean brains we examined. The relative volume of *Balaenoptera* is 0.66%, of Delphinapterus 0.49% and of Delphinus 0.20%, which gives an average of approxi-

[1] With the assistance of the Schweizerische Nationalfonds zur Förderung der wissenschaftlichen Forschung (Grant No. 3883).
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Table I. Absolute and relative voluminal values of the thalamus and the nucleus anterior thalami

Species		Thalamus total	Nucleus anterior thalami total
Homo	Fresh volume mm^3	18,810.00	404.50
	%	100	2.15
Delphinus delphis	Fresh volume mm^3	18,531.94	37.43
	%	100	0.20
Delphinapterus leucas	Fresh volume mm^3	78,100.00	383.17
	%	100	0.49
Balaenoptera physalus	Fresh volume mm^3	79,910.00	530.44
	%	100	0.66

Table II. Volume of the neurons of the anterior nuclei as a percentage

Nucleus	Species	Neuron volume %
Apr	Homo	4.2
	Delphinapterus leucas	2.4
	Balaenoptera physalus	3.7
Ad	Homo	3.3
	Delphinapterus leucas	4.4
	Balaenoptera physalus	4.8

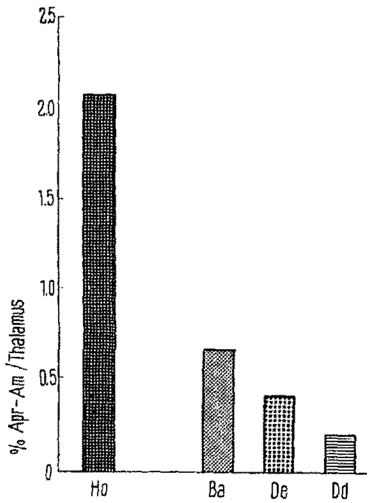

Fig. 1. Relative portion of volume of the Nucleus anterior principalis and medialis in the total thalamus. Ba, *Balaenoptera physalus*, Dd, *Delphinus delphis*, De, *Delphinapterus leucas*, Ho, Homo.

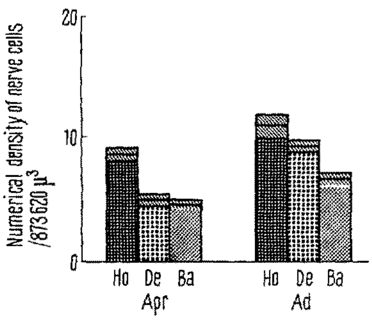

Fig. 2. Numerical density of nerve cells of the Nucleus anterior principalis (Apr) and anterodorsalis (Ad).

mately $^1/_5$ of the percentage value of the human brain (2.15%) (Table I). The same is true of the main nucleus (Apr-Am) although it forms the bulk of the Nucleus anterior thalami (Figure 1). The Nucleus anterodorsalis (Ad) is not very well developed. *Delphinapterus* has the greatest volume, 0.086%, which compares approximately with the percentage of the Ad of the human brain. The other 2 Cetacea have only 0.014 and 0.0004%.

The numerical density of both the anterior nuclei (Apr and Ad) are less dense than in the human brain (Figure 2). The reduction in the number of cells is, however, somewhat compensated by the size of the individual cells. This fact can also be seen in the voluminal percentages, which are approximately the same as those of the human brain (Table II).

The glial cells of both anterior nuclei are more dense than in the human brain. HAWKINS and OLSZEWSKI[7] also found that the glia/neuron index is higher in the cortex of *Balaenoptera physalus* than in man. They believe that this is caused by the size of the brain.

Zusammenfassung. Der Thalamus – insbesondere der Nucleus anterior thalami – einiger Cetacea wird architektonisch und volumetrisch untersucht. Die Ergebnisse werden mit den Befunden beim Menschen verglichen. Der Nucleus anterior thalami ist bei den untersuchten Cetacea stark reduziert. Die geringere numerische Nervenzelldichte der Cetacea wird durch das grössereVolumen ihrer Nervenzellen kompensiert. Die Gliazelldichte ist bei den Cetacea höher als beim Menschen.

CAROLA KRAUS and MARGARETE GIHR

Brain Anatomy Institute of the Psychiatric Clinic, University of Berne, 3072 Waldau-Berne (Switzerland), 29th June 1967.

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STUDIORUM PROGRESSUS

The Substrate Supply of the Human Skeletal Muscle at Rest, during and after Work[1]

The capacity of the human body for work is dependent on energy-producing metabolic processes in the muscle cell. A continuing production of energy in the mucle cell is tied to the supply of oxygen and energy-carrying substrates, of which the most important are glucose, lactate, pyruvate, free fatty acids and amino acids. The following is a report of the substrate uptake and discharge of the human skeletal muscle, established by the determination of arterio femoral venous differences during varied work load and at rest.

Material and methods. Subject matter: fourteen normal male persons aged 20–26 years ($\bar{x} = 24$) were examined. Course of the examination: the ergometric work test was carried out with the bicycle ergometer of the Elema Schönander company, Stockholm. It was preceded by a detailed clinical examination. Pulse frequency was determined auscultatorily. Work was done according to the principle of the relative steady state[2]. Starting with 50 W, the work load was increased by 50 W for each specific work level until the limit of capacity was reached. Arterial blood samples were taken from the arteria brachialis with a Cournand canula, femoral venous samples from the deep vena femoralis with a catheter. The samples

[1] This investigation was supported by the Deutsche Forschungsgemeinschaft and Kuratorium für sportmedizinische Forschung.

[2] H. MELLEROWICZ, *Ergometrie, Grundriss der medizinischen Leistungsmessung für Innere Medizin, Arbeitsmedizin, Sportmedizin, Versorgungsmedizin und Versicherungsmedizin* (Verlag Urban und Schwarzenberg, München und Berlin 1962).