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Volumes of Basal Ganglia and Cortex in Mammals.

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A resurgence of interest in the basal ganglia has accompanied the recent excellent studies on these nuclei.[1] It is perhaps surprising, therefore, that the comparative morphology of the striatum and the pallidum has received so little attention. The present report presents data on the absolute volumes of these areas in a closely graded series of primates and in one sub-primate brain. Because of the linking of the basal ganglia with the cortex and the general problem of the relationship of brain size to development, the volumes of the cortex and the brain have been included in this study.

The method followed is that suggested by Dornfeld, Slater and Scheffe,[2] wherein the total volume is estimated by constructing a profile from the areas of sample cross sections (measured by planimeter) throughout the extent of the structure studied. In the case of the basal nuclei approximately every 20th or 40th section was measured, and in the case of the cortex and the brain approximately every 100th section was taken. All measurements were made on one side of the brain only (usually the right), hence the figures given in Table I are half-values for the total brain. The measurements in this series were made on preparations stained for fibers and do not take into account variations of cellular density which may be quite marked, particularly in the case of the pallidum.

The brains selected consist of one sub-primate, the sheep (Ovis); 2 primitive primates, Galago and Perodicticus (potto); 2 monkeys, Cebus and Cercocebus, comparable in development to the often studied rhesus monkey, *Macaca mulatta;* and the chimpanzee* (Pan).

Relative size is indicated in Table II where the volume of each gray mass is expressed in percentage of the total brain volume.

A consideration of the data presented reveals that in general the size of all the masses studied is roughly proportionate to the total brain size. This follows from the fact that the percentages for any one nucleus do not vary widely. Despite this, there is a change in the relationship of the caudate-putamen complex as one ascends the phylogenetic scale. Thus, the caudate nucleus is considerably larger than the putamen in sheep (Ovis) and Galago, slighter larger in Perodicticus (potto), and smaller in the remainder of the series.

TABLE I.

Volumes in Cubic Millimeters of Basal Ganglia, Cortex, and Brain of a Series of Mammals. N.B. These are half-values; *i.e.*, computed from one side of the brain.

	Caudate	Putamen	Pallidum		Cortex	Brain
			Lateral Seg.	Medial Seg.		
Ovis	364.3	210.5	61.9		10,165	20,485
Galago	18.9	14.9	2.8	1.1	644	1,346
Perodicticus	73.7	70.6	16.5	9.5	1,430	3,210
Cebus	280.6	490.8	67.3	37.4	10,530	19,100
Cercocebus	501.8	576.9	122.8	71.3	15,738	31,444
Pan	995.6	1,539.0	204.6	115.3	45,999	92,883

[1] *The Diseases of the Basal Ganglia,* Research Pub. Assn. Res. in Nerv. and Ment. Dis., 1942, **21.**

[2] Dornfeld, E. J., Slater, D. W., and Scheffe, H., *Anat. Rec.,* 1942, **82,** 255.

* The writer is indebted to Professor Othmar Solnitzky, Director of the Georgetown University Brain Research Institute for making this material available, and to Professor J. F. Fulton and Dr. Margaret A. Kennard of Yale University School of Medicine, who donated several of the specimens to the Institute.

TABLE II.
Volume of Each Gray Mass Expressed in Percentage of Total Brain Volume.

	Caudate	Putamen	Pallidum		Cortex
			Lateral Seg.	Medial Seg.	
Ovis	1.8	1.0	.30		50.
Galago	1.4	1.1	.21	.082	48.
Perodicticus	2.3	2.2	.51	.30	45.
Cebus	1.5	2.6	.35	.20	55.
Cercocebus	1.6	1.8	.39	.23	50.
Pan	1.1	1.7	.22	.12	50.

The emergence of the putamen in Cebus, Cercocebus, and Pan as the most prominent nucleus of the basal group is a striking result of this study. According to Dusser de Barenne, Garol, and McCulloch,[3] areas 4 and 6 project to the putamen in *Macaca*. This leads to the suggestion that the organization of motor function, which is a prominent feature in primate development may be correlated with a change in the caudate-putamen complex, as well as with the known striking changes in the motor cortex.

[3] Dusser de Barenne, J. G., Garol, H. W., and McCulloch, W. S., *Research Pub. Assn. Res. in Nerv. and Ment. Dis.*, 1942, **21**, 246.

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A Method for Collection of Bacteria from Air and Textiles.*

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With increasing knowledge of the relationship of infected air and textiles to the dissemination of air-borne diseases, numerous devices for the collection of bacteria have been developed. Some of these are difficult to make (Wells air centrifuge,[1] slit sampler[2]) and others do not appear practical for large scale field studies (textile sampler described by Thomas and Van den Ende[3]). The Moulton atomizer sampler[4] is of relatively simple construction and is easily operated but requires expert glass blowing and is fragile. Furthermore, it has been found unsatisfactory for textile sampling since the lint which collects in the atomizer portion is removed with difficulty.

Application of the Folin aeration tube (as used in the Van Slyke urease method) to the determination of glycol vapor in air by Wise, Puck, and Stral[5] suggested a trial of this inexpensive unit for recovery of air-borne bacteria. Rettger made use of a similar bubbling device[6] which Weinzirl and Thomas

* This investigation was aided in part through the Commission on Cross Infections in Hospitals, Board for the Investigation and Control of Influenza and Other Epidemic Diseases in the Army, Preventive Medicine Division, Office of the Surgeon General, U. S. Army.

[1] Wells, W. F., *Am. J. Public Health*, 1933, **23**, 58.

[2] Bourdillon, R. B., Lidwell, O. M., Thomas, J. C., *J. Hygiene*, 1941, **41**, 197.

[3] Thomas, J. C., and Van den Ende, M., *Brit. Med. J.*, 1941, **1**, 953.

[4] Moulton, S., Puck, T. T., and Lemon, H. M., *Science*, 1943, **97**, 51.

[5] Wise, H., Puck, T. T., and Stral, H. M., *J. Biol. Chem.*, 1943, **150**, 61.

[6] Rettger, L. F., *J. Med. Research*, 1910, **22**, 461.