

parallel with the border of the ventricle. The perivascular spaces open with a wide funnel on the surface. Their walls are made of fibres of pericerebral connective tissue, one part of which forms the inner wall of the sheath touching the adventitia of the vessel, the rest forming the outer wall towards the brain tissue. Reaching the border of the ventricle, the spaces open into it in a straight line or diagonally, between the ependymal cells. This opening is narrow. A few minutes after the injection into the cranial cavity, the trypan blue can be seen in the whole length of the perivascular spaces, showing that the external and internal fluids communicate through the channels. It is possible that the direction of the circulation is determined by the pressure conditions prevailing on both sides, in which case the perivascular spaces have a compensating role. It is probable that the cerebrospinal fluid flows from the surface towards the ventricle, considering that the channel opens widely on the surface and is narrow in the ventricle.

The structure of the bird's brain is essentially different. Injecting the dye into the ventricle and on the surface of the brains of *Oriolus oriolus*, I found that the stain is absorbed by diffusion some millimetres deep in the cortex and the border of the ventricle (Fig. 2), just as in mammals. The perivascular spaces start from the surface but end in the substance of the brain and do not reach the ventricles. The brain of the bird represents a high degree of development. The development of the striatum increases the brain substance; the hemispheres are thickened, in consequence of which the ventricles, which in members of the lower orders are very large, are narrowed into small fissures. The vessel growing in from the surface and the perivascular spaces entering with them cannot keep pace with the development of the hemispheres, so the continuity of the channel is broken. The communication of external and internal fluids is confined to the foramina of Luschka, the development of which seems to be parallel with the closure of the transcerebral communication.

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¹ Van Rijssel, T. G., *Arch. Neurol. and Psychiatr.*, **56**, 522 (1946).

Persistence of a Substance with Blood Groups A and O Specificity in Commercial Fluid Hog Stomach Extract

IN view of the presence of a substance in hog stomach powder having blood groups A and O activity, as previously reported¹, it was decided to investigate fluid extracts to ascertain if such activity persisted after more extended manufacturing processes.

An active material was obtained from 'Hogastrin' (Giles Schacht and Co.). No details of manufacture could be obtained, but the extract is apparently dissolved in an organic solvent. Attempts to isolate an active fraction using anhydrous sodium sulphate² were unsuccessful. Ethanol precipitation in the presence of sodium acetate, however, gave a white coherent precipitate, the mixture being kept in the refrigerator during sedimentation. This precipitate was collected by centrifuging, dissolved in water, and reprecipitated with ethanol-acetate. This process

was repeated three times on an average, the sediment being dissolved in progressively smaller volumes of water.

The aqueous solution was deproteinized by Sevag's method, six shakings with chloroform-butyl alcohol being necessary. Acetone at 4° C. gave a precipitate which was dissolved in water, the solution being dialysed through 'Cellophane' in the cold, and reprecipitated with cold acetone. The precipitate was dried under reduced pressure and temperature. The yields obtained were very small, averaging 12 mgm. per 100 c.c. of 'Hogastrin'.

The material gave strong Molisch and β -naphthol reactions, and was non-reducing before hydrolysis. No protein fraction was demonstrated with Millon's, xanthoproteic, biuret or precipitation tests. The ninhydrin reaction was negative. Solutions were viscous; but while no measurements were possible, due to the small yields, the degree of viscosity was noticeably less than that of solutions of undenatured hog stomach substance².

Inhibition of blood group A iso-agglutination was effective at dilutions of 1/1,000,000 of the dry substance. Weaker effects were noted at higher dilutions of some fractions. In common with the substances isolated from dry hog mucin and fresh hog stomachs, inhibition of agglutination of human blood group O (by an anti-O bovine serum) was noted³. This double activity of hog mucin has been elucidated by Aminoff *et al.*⁴, who note the individual specificity of hog stomachs. The inhibition of O agglutination occurred at dilutions of 1/30,000.

The weaker activity of the 'Hogastrin' preparation in O inhibition may possibly have been due to chance, in that a small number of stomachs with O specificity were used in preparation of the batch examined. It may also have been due to a selective effect occurring during manufacture; but as details of this cannot be obtained, this hypothesis cannot be substantiated. That selective effect can occur is possible in view of the experience of Aminoff *et al.*⁴, who find some separation of A and O effects using relatively simple chemical procedures. More definite evidence of the individuality of the A and O components of hog mucin has been obtained by Morgan, using the enzymes of *Cl. welchii* filtrates³.

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¹ Folan, M. E., *Nature*, **157**, 231 (1946).

² Morgan, W. T. J., and King, H. K., *Biochem. J.*, **37**, 640 (1943).

³ Morgan, W. T. J., *Nature*, **158**, 759 (1946).

⁴ Aminoff, D., Morgan, W. T. J., and Watkins, W. M., *Nature*, **158**, 879 (1946).

Some Experiments with Fast Electrons and Positrons Produced by a 20-MeV. Betatron

A 20-MeV. betatron, mentioned in an earlier note¹, has been in operation in these Laboratories since January of this year. A paper dealing with the magnetic measurements and adjustments, circuit techniques, etc., is to be published in the near future; but it is thought that a brief description of some of the experiments now in progress may be of interest.

Some work on the nuclear photo-effect and other phenomena, carried out originally with a 20-MeV. betatron and later with a 100-MeV. machine, has been described by Baldwin and his collaborators^{2,3}.