imental rats in which the corpora were not greatly increased in size the vaginae were cornified and in 5 rats which presented extremely large corpora lutea the vaginae were definitely mucified. In the rest of the experimental rats the vaginae were stratified, in some of these, there was some evidence of early mucification.

Detailed morphologic studies on the anterior pituitaries of these rats are incomplete. However, in the glands that we have studied the basophiles were reduced in relative percentage and those present were enlarged and devoid of granules. The eosinophiles were moderately reduced in percentage and many cells exhibited evidence of granular loss. The reduction in percentage and morphologic changes in the eosinophiles were most marked in those anterior lobes in which the weight increase was greatest. In previous reports we have invariably associated granular loss from the eosinophiles with the presence of active corpora lutea in the ovaries. The results presented in this paper confirm these previous findings.

7850 P

Production of a Collateral Circulation to the Heart.

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The experiments recorded in this paper are to a large extent an outgrowth of work done previously.[1, 2] It was our purpose to destroy the normal coronary circulation and in its place provide an adequate collateral circulatory bed. This study, begun in February, 1932, is based upon 103 dogs in which attempts were made to produce a collateral circulation to the heart. The problem of producing a new blood supply to the heart resolved itself into 2 components, (1) to provide a vascular bed from which blood vessels could grow directly into the myocardium, (2) to reduce the circulation in the myocardium, so that collateral circulation in the adhesions might develop. The operative procedure was one of almost constant evolution. Omitting the details of development the procedure used was as follows:

[1] Hudson, C. L., Moritz, A. R., and Wearn, J. T., *J. Exp. Med.*, 1932, **56**, 919.

[2] Moritz, A. R., Hudson, C. L., and Orgain, E. S., *J. Exp. Med.*, 1932, **56**, 927.

Epicardiectomy* was done under ether anesthesia by abrasion and stripping with a special burr. The lining of the parietal pericardium was removed. Silver clips were placed around the major coronary arteries. The lumina of these vessels were reduced in stages at repeated operations over a period of 2 years in some of the animals.

The collateral bed established through the pericardial adhesions was injected with a watery suspension of iron ferrocyanide (0.4%). The injection was carried out as follows: The venae cavae and azygos vein were ligated. The right auricle was incised. The aorta was clamped close to the heart and the aorta was incised between heart and clamp. This dissection prevented injection of the heart by way of the aortic coronary ostia and by way of the thebesian vessels. Dye was run into the right carotid artery under gravity pressure. The pressure in the arterial system, as determined from the left carotid artery, was between 100 and 120 mm. mercury. The injection was continued for one-half hour. It was concluded that the dye that entered the heart in such injection experiments arrived by way of the extracardiac anastomoses with the coronary system.

Normal control dogs have extracardiac anastomoses with the coronary system as does the human being. In normal dogs, injected as described, a little dye can be found in the coronary arteries, in the auricular wall, in the myocardium and in the fat at the base of the heart. The amount of dye in the myocardium is minimal and except for the major coronary arteries is sometimes altogether absent.

When a collateral vascular bed is supplied to the dog's heart, as was done in these experiments, the coronary arteries can be completely occluded without producing infarction or fibrosis of the myocardium. The dog recovers after total coronary occlusion is produced, is normally active and seems to be in good health. We obtained recovery in dogs with total occlusion of the right coronary artery, with total occlusion of the descending branch of the left coronary artery or with total occlusion of the circumflex branch of the left coronary artery. In one dog recovery occurred after complete occlusion of the right coronary artery, complete occlusion of the ramus descendens at the bifurcation of the left coronary artery and almost complete occlusion of the circumflex branch of the left coronary artery. The reduction in this experiment was estimated to be at least 85% of the total cross sectional area of the 2

* In so far as we know this is the first time this word has been used in medical literature and the first time this operative procedure has been done.

coronary arteries. The dog appeared to be in good health. The heart after injection through the extracardiac anastomoses contained as much dye as did the somatic muscles. In this animal a collateral blood supply had been built up sufficient to maintain cardiac function.

The experiments show that a collateral blood supply to the heart of dogs can be made available by operation. The circulatory bed thus supplied does not interfere with the filling and emptying of the heart. This vascular bed distributes blood supply to the myocardium and experimentally becomes a mechanism which permits compensation that protects a faltering heart from stopping. It makes possible the maintenance of function despite the occlusion of large coronary trunks.

7851 P

Influence of Diet on Lipid Content of the Rat's Brain.

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Previous studies on the blood lipids in epilepsy[1] and in acute infectious diseases[2] indicated to us the need for further information regarding the factors which control the lipid content of the tissues. The present report deals with the influence of various diets on the total fatty acid, cholesterol and phospholipid content of the rat's brain. The interest of earlier workers appears to have centered chiefly in cholesterol. Page and Menschick,[3] Chanutin and Ludewig[4] and others have shown that the cholesterol content of the rabbit's liver is greatly increased by prolonged ingestion of this substance, whereas that of the brain is not changed. Best and Ridout[5] found that the livers of cholesterol-fed rats could be prevented from becoming excessively fatty by addition of choline to the diet. A high fat diet is said to inhibit and a high carbohydrate diet to accelerate deposition of cholesterol in the liver.[4] The effect of diet on

[1] McQuarrie, Irvine, Husted, Clara, and Bloor, W. R., *J. Clin. Invest.*, 1933, **12**, 255.

[2] McQuarrie, Irvine, and Stoesser, A. V., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 1281.

[3] Page, I. H., and Menschick, W., *J. Biol. Chem.*, 1932, **97**, 359.

[4] Chanutin, A., and Ludewig, S., *J. Biol. Chem.*, 1933, **102**, 57.

[5] Best, C. H., and Ridout, J. H., *Am. J. Physiol.*, 1933, **105**, 6.