

mentioned above, she had had a vaginal discharge, which had been sometimes coffee-coloured and at other times bright red, since she was 55 years of age. On admission a somewhat hard swelling was felt occupying the lower abdomen and rising a hand's breadth above the pubes. On vaginal examination there was seen some prolapse of both vaginal walls. The tumour noticed in the lower abdomen could be felt bimanually in the anterior fornix. It felt hard and like a partially calcified fibroid. The sound passed 2 $\frac{3}{8}$ inches and on moving it slightly it seemed clear that the uterus was separate from the abdominal tumour described. The uterus seemed quite normal.

Operation was performed on Oct. 31st. Abdominal section was done in the usual way and the tumour was found to be a fibroid of the left ovary. On section it showed some yellowish patches of degeneration and there were also one or two small cysts seen. The cysts were adjacent to the surface. There were several small patches of calcareous deposit on the surface of the tumour. The tumour had grown from the outer extremity of the ovary and the inner part of the ovary, about half of it, was apparently unaltered. The right ovary was healthy. There was no free fluid in the peritoneal cavity. The patient made an uninterrupted recovery and left the hospital on Nov. 25th.

CASE 3.—A married woman, aged 74 years, was admitted into the London Hospital under my care on March 7th, 1906. She had been married 52 years and had had ten children, the last 30 years ago, and two miscarriages, the last 34 years ago. The catamenia appeared when she was 15 years of age and had always been normal. The menopause occurred at the age of 48 years. Her complaint was that for the three months prior to her admission to the hospital she had had a constant blood-stained discharge from the vagina. From the age of 48 years till three months ago she had had no red or other vaginal discharge at all. She said that she had been getting thinner lately but that her "stomach" had been growing larger. She had lately had to pass urine much more frequently than usual, both during the day and at night. On examination of the abdomen an elastic swelling was felt occupying chiefly the left side of the abdomen; its highest point was two fingers' breadth from the costal margin. On the right side the outline of the tumour corresponded to a line drawn from the umbilicus to the right anterior superior iliac spine. On vaginal examination the vaginal portion of the cervix was normal; a slight brownish-red discharge was seen in the os. The sound passed through the external os with a slight jerk and could only be passed to the extent of about an inch. Doing this caused no fresh bleeding. A probe a good deal thinner than the uterine sound was then tried and found to pass 2 $\frac{1}{2}$ inches. No fresh bleeding was caused by manipulating the probe in the body of the uterus.

Operation was performed on March 9th. Ovariectomy was done and the tumour was found to be a multilocular cyst of the left ovary. The right ovary was much atrophied. Except for a little bronchitis after the operation the patient made an uninterrupted recovery. It is interesting to notice that in this case it was the presence of a red vaginal discharge which attracted the patient's attention and caused her to seek advice.

Harley-street, W.

ON THE VACUOLATED MONONUCLEAR CELLS IN THE BLOOD OF THE GUINEA-PIG.

[PRELIMINARY COMMUNICATION.]

By J. C. G. LEDINGHAM, M.B., B.Sc., M.A. ABERD.

(From the Bacteriological Department of the London Hospital and the Lister Institute.)

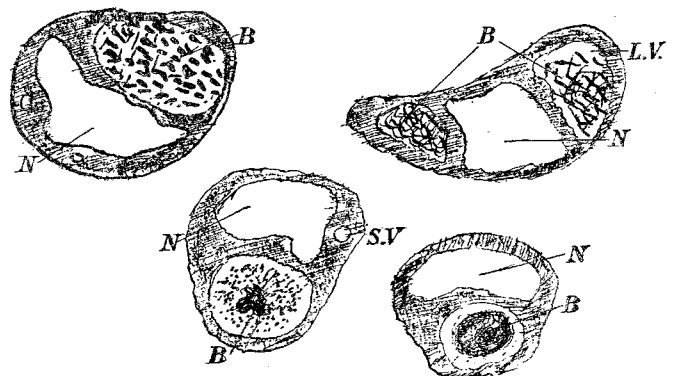
WHILE investigating the question of leucocytosis in the guinea-pig my attention was directed to the presence in stained films of a peculiar form of mononuclear leucocyte. This leucocyte, while possessing generally the characters of the large mononuclear variety of human hæmatology, had a highly vacuolated cytoplasm and lying in the vacuole, which was in the majority of cases single and of large size, was seen a round, oval, and somewhat irregular mass of finely granular material staining a dull-red with

Leishman's stain. In the literature one finds but few references to the leucocytes of the guinea-pig. Hirschfeld, in 1897, discussed, in Virchow's *Archiv* the comparative morphology of the white cells of many of the domestic animals, including the guinea-pig, but made no mention of the vacuolated cells. In 1898 Kurloff's work on the part played by the spleen in blood formation and the blood changes after splenectomy appeared in Ehrlich's "Die Anaemie." The guinea-pig was the animal employed and in the course of his description of that animal's leucocytes he makes the following brief reference to the vacuolated cells:—

We find here a peculiar cell group that is characteristic for guinea-pig's blood. These cells possess no granulation but in its place we find in the protoplasm a rounded nucleus-like structure which is stained by nuclear dyes and is possibly to be placed in the category of a *Nebenkern* or accessory nucleus. Our impression was that we had to do with a vacuole filled with a secretion product of the cell. Examination of a large series of preparations permits us to form some conclusions regarding the development and fate of these structures. At first they appear in the protoplasm as discrete granular dots having no relationship with the cell nucleus. These gradually increase in size and attain considerable dimensions. When they have become as large as the cell nucleus itself they appear to break through the enveloping cell protoplasm and to quit the cell.

As I was anxious to ascertain whether anything further was known regarding these cells Dr. W. Bulloch kindly wrote on my behalf to Professor Ehrlich who replied that he had not directed his attention for many years to these peculiar structures but that he still thought they represented some "Secretstoff." He also kindly forwarded a dissertation by Hans Bab on Colostrum Formation which appeared in 1904 and contained some references to the vacuolated cells of the guinea-pig. This author found in film preparations of the marrow and spleen vacuolated cells containing masses of ill-defined granules staining metachromatically with thionin. These cells he preferred to consider as new discoveries on his part but they are undoubtedly identical with those described by Kurloff in the circulating blood. He agreed with Ehrlich that the body represented a mass of granular Secretstoff.

In the *Journal of Medical Research* for 1904 Burnett gives a description of the leucocytes of normal guinea-pigs and makes some references to the vacuolated cells. He states that in fresh blood these bodies are round, homogeneous, and straw-coloured, varying in size from one micron or less to a body occupying nearly half of the cell.



Some types of vacuolated cells as seen in films.
N, Nucleus. B, Body. L.V., Large vacuole. S.V., Small vacuole.

Occasionally true lymphocytes and polynuclear cells were seen with these bodies inside them. In some cases the body presented a clear oval central part, while the peripheral area contained many fine purplish granules (Wright's stain) which seemed to be nodal points of a fine purplish reticulum.

These are all the facts relating to these peculiar structures which I have been able to find in the literature. During the last nine months I have examined numerous films mostly from adult guinea-pigs or, at any rate, from guinea-pigs three months old and upwards. Leishman's and Giemsa's stains were invariably employed. In the majority of the animals the description of the minute structure of the body given by Kurloff and Burnett holds good. The vacuole was either completely filled with fine granular material or presented an irregular homogeneous central mass with granular radiations extending to the periphery. In some animals, however, a totally different appearance was presented by the body inside the vacuole. With Giemsa's stain after fixation by methyl alcohol the body was found to consist of distinct purplish-staining rods. These latter

when very numerous had the appearance of a reticular skein with denser portions here and there; in fact, it had exactly the felted honeycomb appearance of a streptothrix preparation. The skein-like character was exceedingly remarkable and gave the impression of being due to the windings of one continuous thread. It is more probable, however, that the meshwork is due to the close apposition of rods lying inclined at all angles to each other, for in some cells the vacuole was filled with perfectly discrete small thick rods. I have never seen these bodies inclosed in other than large mononuclear cells. Regarding Burnett's statement that he had noted the bodies very rarely in polynuclear cells, I should certainly think that he had mistaken a detached portion of the nucleus for one of these bodies. Such detached nuclear portions are exceedingly frequent in the polynuclear cells which exhibit marked winding of the nuclear chromatin. Kurloff's statement that the body may ultimately break through the enveloping protoplasm and leave the cell I have been unable to verify. It is quite true that in the preparation of the films a body may become dislocated from the cell protoplasm but I have never found an apparently free body far away from a large mononuclear cell. I should therefore think that the body, whatever be its nature, develops and disintegrates *in loco*. Evidence of such disintegration is frequently seen in the faint staining power or even complete disappearance of the contained granular matter. The number of these vacuolated cells varies in different animals. On an average they form about 8 per cent. of the total leucocytes with a variation of from 4 per cent. to 11 per cent.

As regards the age at which these vacuolated cells appear in the blood of guinea-pigs I have been impressed with the fact that in animals under three weeks old none of these peculiar cells are to be seen in stained films. In one case a female guinea-pig was killed during pregnancy. Blood from the placenta showed numerous vacuolated cells but in the heart blood of the foetus I was unable to find any. Neither did I find any in films prepared from the foetal spleen and marrow, though they were very numerous in films from the maternal organs. In other cases the blood of young guinea-pigs has been examined from birth onwards, but, as a rule, definite vacuolated cells like those of the adult do not appear till about the third week.

An interesting question is the distribution of these cells in the organs. In splenic films they are frequently very numerous, far more so than in the marrow. There is no difficulty in distinguishing them from the blood-corpuscle-containing cells (*Blutkörperchenhaltige Zellen*) which may occur in large numbers in the spleen pulp. On examining the fresh, unstained spleen pulp on the warm stage one can readily recognise these cells by the large straw-coloured homogeneous vacuole filling sometimes three-fourths of the cell body, the nucleus being pushed to the side. Also, in fresh blood the same appearance is observed. No trace of the body inside the vacuole is seen in the fresh unstained condition but by adding neutral red to the blood on the warm stage it is found that the only substance which takes up the stain immediately is the body inside the vacuole. It may appear as reddish granules in active Brownian movement or as distinct rods or even round and irregular clumps. In sections of the spleen stained by Giemsa these cells form a very striking picture. The vacuole is stained a pale pink and appears quite homogeneous. Probably the procedure employed in the fixation of the tissue has caused a dissolution of the granular matter. In one spleen which I examined these cells were present in enormous numbers in the pulp but were quite absent in the Malpighian follicles. Curiously enough, in other spleens it is difficult to demonstrate any in sections.

The question now arises, What is the significance of these bodies? If they represent some *Secretstoff*, as Ehrlich thought, one might expect to find them in the blood of other members of the Caviidæ. To settle this question I have had an opportunity of examining the blood of four allied animals, agoutis and cavies. These were *Dasyproctida cristata*, *Dasyproctida prymnolopha*, *Dasyproctida punctata*, and *Cœlogenys paca*. In none of these animals did I find anything approaching the structures found in guinea-pig's blood, although the leucocytic formulæ of these animals resembled closely that of the guinea-pig. The peculiar structure of the body suggested the idea of its being a parasite or leucocytozoon of some sort. In favour of this view is the fact that these bodies are not found in

young animals or in allied species and that they occur in such varying numbers in different animals.

When fresh blood in normal salt solution is carefully watched on the warm stage the vacuole is so highly refractile that the included body is invisible. It immediately comes into view, however, on adding a trace of neutral-red solution, while the nuclei of the leucocytes and the granules of the polymorphonuclear cells take up the stain much more slowly. There is no evidence that the body makes its exit from the vacuole or that definite free motile forms appear, although the amoeboid character and the peculiar spermatozoid-like form of the blood-platelets are undoubtedly apt to lead to some confusion owing to their close resemblance to flagellated parasites. On the other hand, in the absence of any definite proof of parasitic origin, the morphological structure of these bodies in stained films and their inclusion in vacuoles of the cytoplasm suggest a marked analogy to the so-called parasitic vaccine bodies or cell inclusions first described by Guarnieri (*cytorcytes variolæ* or *vacciniæ*) and since confirmed by numerous observers in lesions of the cornea, epidermis, &c., in experimental variola and vaccinia. Further investigations of these bodies are in progress.

The Lister Institute, Elstree.

A CASE OF COMPLETE REMOVAL OF A MULTILOCULAR CYSTIC TUMOUR OF THE PANCREAS;

COLO-COLIC ANASTOMOSIS 16 DAYS LATER; RECOVERY.¹

BY JOHN D. MALCOLM, M.B. EDIN., F.R.C.S. EDIN.,
SURGEON TO THE SAMARITAN FREE HOSPITAL FOR WOMEN, MARYLEBONE-ROAD, LONDON, N.W.

THE case here recorded is the second in which I have been so fortunate as to be able to remove completely a multi-locular cystic tumour of the pancreas. The patient, a female, aged 50 years, felt something move in her abdomen and was very sick about six months before she sought medical advice. This disturbance soon passed off and she "forgot" about the "lump" but she began to lose flesh and strength about that time. A month before I saw her she fainted and was very pale for the following week. The fæces were "like ink" for three days and then resumed their natural colour. Apparently there had been a hæmorrhage into the upper part of the alimentary tract. The patient again became conscious of something abnormal in her abdomen and consulted Dr. Basil G. Morison who sent her to me. Her general condition was good, the urine was normal, and the bowels acted well without medicine. There was an oval, hard tumour in the left side of the upper abdomen measuring about four inches in its lateral diameter and rather more from above downwards. It had considerable mobility exactly resembling that of a large loose kidney, the greatest fixity being towards the spine. The percussion note over the most prominent parts was dull before and behind, the area of dulness varying with the position of the tumour. The right kidney was somewhat mobile. I diagnosed a malignant growth in a loose left kidney, the capsule of which had not yet ruptured.

At the Samaritan Free Hospital, on April 26th, 1905, I opened the abdominal cavity by an incision outside the left rectus muscle. The transverse colon was displaced downwards and pressed forwards by a growth which was seen between it and the stomach. There was only one layer of serous membrane over the tumour which apparently had developed to the left of the lesser sac of the peritoneum. The kidney was in normal position behind the neoplasm and the tail of the pancreas lay across the upper inch or rather more of its anterior surface intimately attached to it. Many vessels over the tumour were ligatured as they were divided and the mass was gradually freed without much loss of blood until its only attachment was to the pancreas. I cut into this gland so as to get the whole growth away. The pancreatic tissue bled freely but it showed no friability and ligatures applied to it held well. A large vein, quite a third of an inch in diameter, was cut across and there was a

¹ A paper read before the Clinical Society of London on May 11th, 1906.