

MICRO-ANATOMY OF THE LYMPH NODES OF THE PIG

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It has been shown that in the lymphoid tissue of cats (Rohlich, 1930; 1933), rats (Kindred, 1938), mice (Congdon, 1962) and humans (Millikin, 1966) the germinal centres of lymphoid tissue are spheroids and have 2 zones, a light zone and a dark zone. The light zone is so called because it contains more reticulum cells than the dark zone which is composed mainly of darker staining, medium-sized lymphocytes. Over the light zone is a cap of small lymphocytes and in the species mentioned above and probably in most other mammals it is always nearest to the marginal sinus of lymph nodes and towards the epithelial surface in the tonsil and Peyer's patches. It is sometimes referred to as the superficial zone in contrast to the deep or dark zone. The dark zone is more sharply demarcated from the surrounding lymphoid cells than is the light zone.

MATERIALS AND METHODS

In the course of a study of liver transplantation and allied problems in the pig (Terblanche, Peacock, Bowes, Davies, Tierris, Palmer and Hunt, 1967; Hunt, 1967) lymph nodes from 45 pigs have been examined. Random samples were taken from several groups of lymph nodes in each animal; the tissue was fixed in 10 per cent neutral formalin. Longitudinal slices were embedded in paraffin wax and sections stained with haematoxylin and eosin, Van Gieson's stain and by Gordon and Sweet's method for reticulin.

RESULTS

The light zone in the germinal centres of the porcine lymph node is not so clearly distinguishable from the dark zone as it is in man but when it can be made out, the light zone is always at the pole of the germinal centre furthest from the lymph node capsule—a reversal of the position in other species. The cap of lymphocytes over the light zone is also on the deep aspect of the germ centre rather than towards the lymph node capsule (Fig. 1 and 2).

Silver impregnation of the reticulin of the lymph nodes shows the outlines of the germ centres very clearly in the lymph nodes of pigs and slightly less clearly in those of humans. The sharp demarcation of the dark zone seen in haematoxylin

EXPLANATION OF PLATES

FIG. 1.—Human lymph node germinal centre. H. and E. $\times 90$.

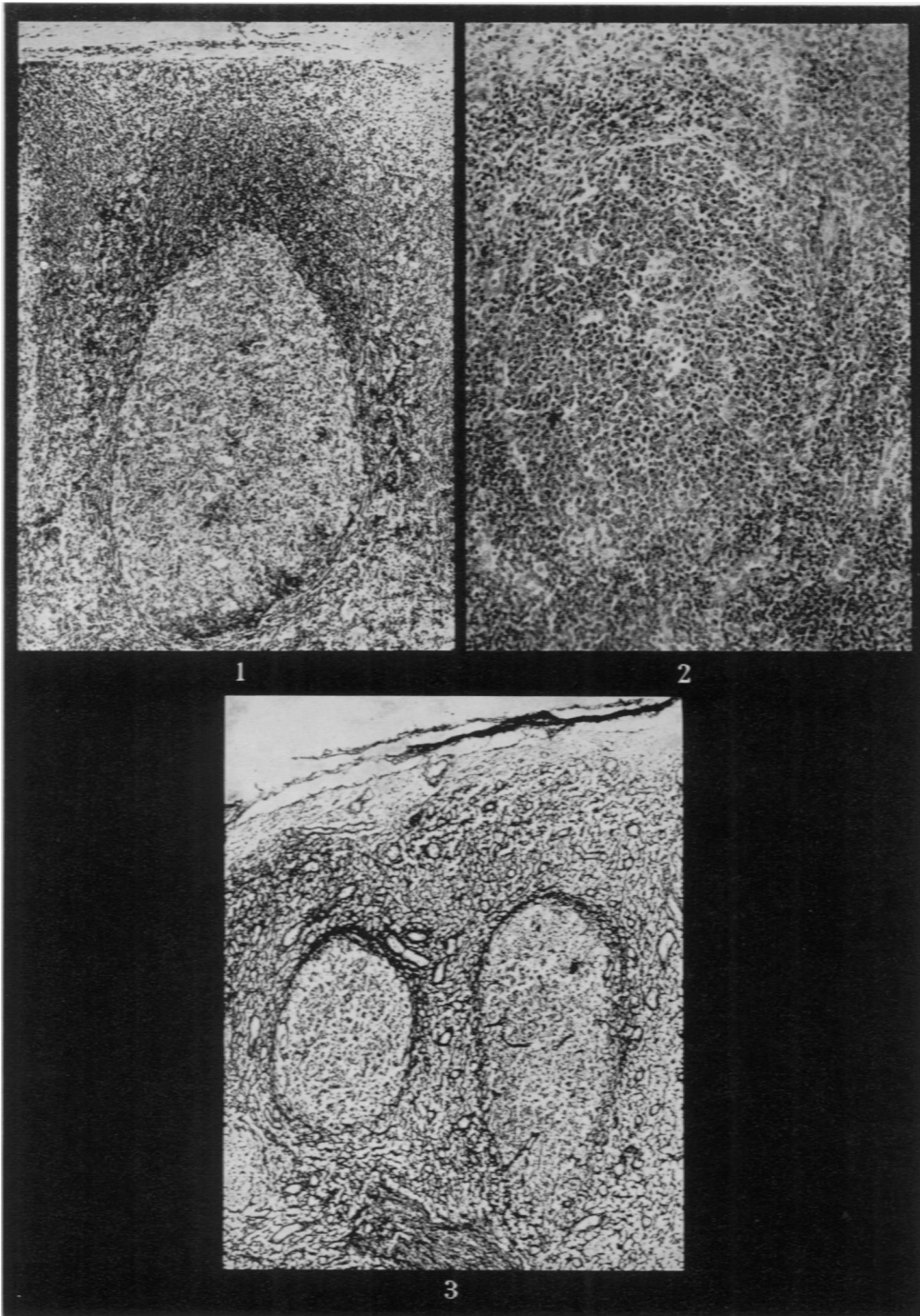
FIG. 2.—Pig's lymph node germinal centre. H. and E. $\times 120$.

FIG. 3.—Pig's lymph node germinal centre. Gordon and Sweet's method for reticulin $\times 90$.

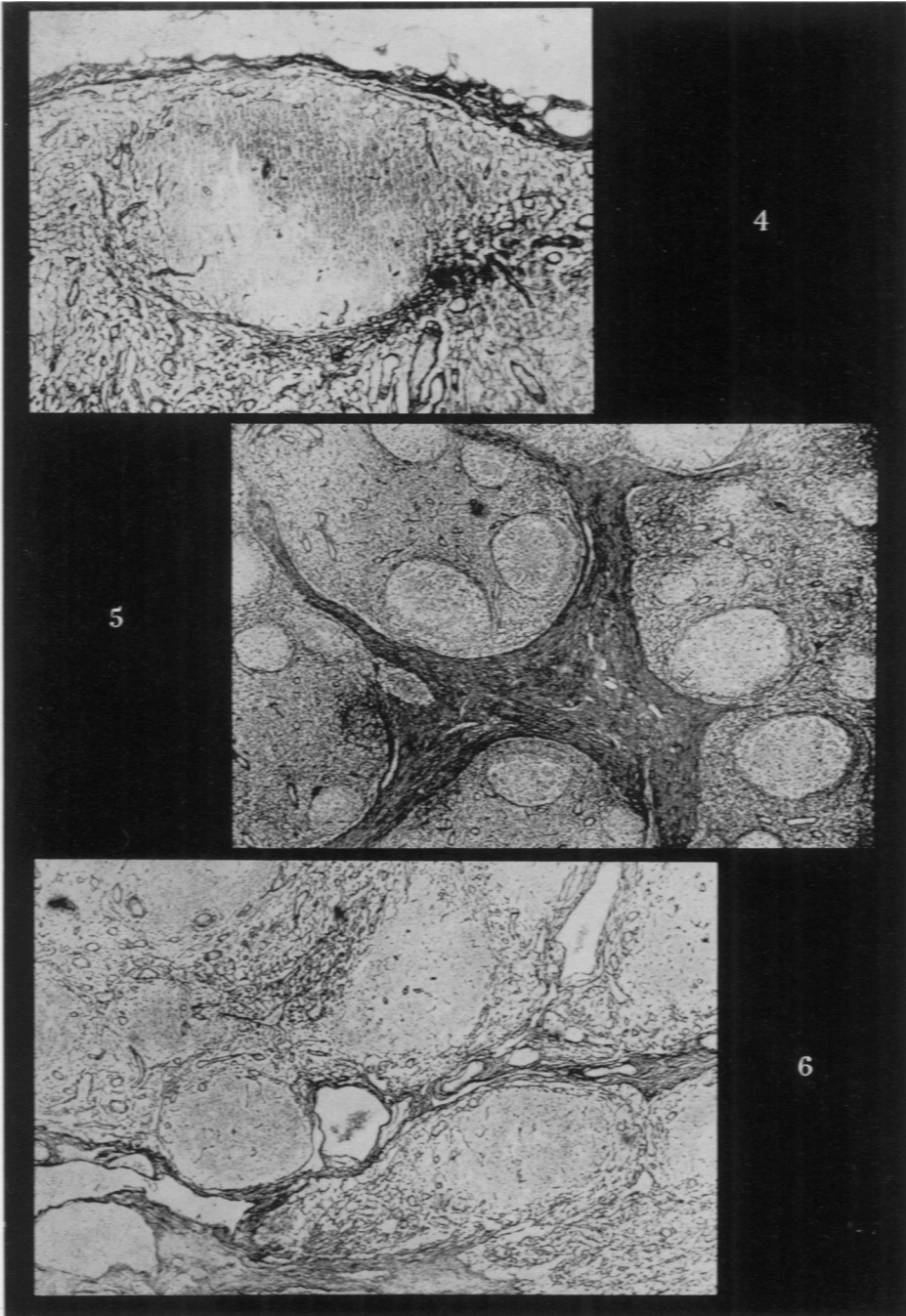
FIG. 4.—Human lymph node germinal centre. Gordon and Sweet's method for reticulin $\times 120$.

FIG. 5.—Pig's lymph node germinal centres. Gordon and Sweet's method for reticulin $\times 48$.

FIG. 6.—Human lymph node germinal centres. Gordon and Sweet's method for reticulin $\times 48$.



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and eosin stained preparations appears as a condensation of reticulin and the technique is valuable for demonstrating the difference between the orientation of germinal centres in pigs and in humans (Fig. 3 and 4).

In most of the pigs' lymph nodes examined there were prominent fibrous trabeculae running throughout the node, and a constant finding was that the germinal centres related to them had their light zones towards the trabeculae, often with a cap of lymphocytes also on that side. Trabeculae are not so prominent in human lymph nodes, the orientation of germinal centres towards them is not so constant and the dark zones are often towards them (Fig. 5 and 6).

Lymphoid tissue in the pharynx and intestine of pigs has also been studied. The germ centres are orientated towards the epithelial surface in the same fashion as in other species.

DISCUSSION

Attention has recently been drawn (Binns and Hall, 1966) to other unique features in the architecture of the lymph nodes of pigs. Binns and Hall (1966) point out that it is known that the conventional arrangement of cortex and medulla is inverted and that germ centres are found in the centre of the lymph node and that no true medullary cords are present. They suggest that this may be in some way connected with their finding of the paucity of lymphocytes in the thoracic duct lymph. They propose that lymphocytes are transported through pigs' lymph nodes from capillary system back to a capillary system and not from a capillary to a lymphatic system as in other animals (Marchesi and Gowans, 1964).

There is evidence that the light zone of a germinal centre points towards the nearest source of antigen, and in species other than the pig it faces the marginal sinus of the lymph node and therefore the antigen-bearing incoming lymph. Lymph enters the lymph nodes of pigs *via* the hilum and trabeculae (Baum and Grau, 1938) and leaves at the periphery, and the orientation of the germ centre is presumably a reflection of this unusual direction of lymph flow.

SUMMARY

The germinal centres of the lymph nodes of pigs show a reversal of the micro-anatomy seen in germinal centres of other animals. It is suggested that this reflects the unusual direction of lymph flow in the porcine lymph node.

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