

## Short Communication

# Histomorphology of the Spleen in the Fox (*Vulpes bengalensis*)

**Firdous, A.D.<sup>1</sup> Maya, S.<sup>2</sup> and Ashok.N**

Department of Veterinary Anatomy and Histology, College of Veterinary and Animal Sciences Mannuthy Thrissur -680651, Kerala, India

Email: drromey@gmail.com

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With 9 figures

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## Abstract

The spleen is the largest secondary lymphatic organ involved in filtering the blood and initiating immune responses against blood borne antigens. The present study was carried out on the spleen of fox collected from the Department of Veterinary Pathology. Grossly, spleen was tongue shaped and dark brown in colour. It was located in the left cranial quadrant of the abdomen. Histologically, the spleen was surrounded by a thick capsule composed mainly of dense collagen fibers with a few smooth muscle fibers. Thick trabeculae consisting of collagen, few elastic and smooth muscle fibers extended from the capsule into the parenchyma. The splenic parenchyma was composed of red pulp with extensive venous

sinuses, venules and splenic cords. White pulp was distributed throughout the spleen and was composed of lymphatic nodules with a central artery, and diffuse lymphatic tissue arranged as periarteriolar lymphatic sheaths (PALS).

**Keywords:** lymphatic nodules, periarteriolar lymphatic sheaths, spleen.

## Introduction

The Bengal fox (*Vulpes bengalensis*), also known as the Indian fox, is endemic to the Indian sub-continent and is found in the Himalayan foothills and Terrain of Nepal through southern India and from southern and eastern Pakistan to eastern India. The gross anatomy and histology of the various organs

including the spleen are not explored in this species. The spleen is the largest lymphatic organ located adjacent to the greater curvature of the stomach and is involved in filtering the blood and initiating immune responses against blood borne antigens. These functions are carried out by the two main compartments of the spleen, the white pulp and the red pulp.

## Material and Methods

The aim of the present work was to study the histomorphology of the spleen in fox and also to find the difference if any exists with the spleen of dog and rats. After recording the gross anatomical characteristics, samples of the spleen were fixed in neutral buffered formalin. The samples were processed using routine procedures and paraffin sections of  $5\mu\text{m}$  thickness were made for histological studies. Staining techniques employed were Haematoxylin and Eosin (H&E) and the Gomori's rapid one step trichrome method specific for connective tissue fibers (Luna, 1968).

## Results and Discussion

The Present study is the first reporting the histomorphology of spleen in fox (*Vulpesbengalensis*), although studies on the spleen of dog was

carried out by Dyce *et al.* (1996). Grossly, the spleen in fox was tongue shaped, dark brown in colour (Fig. 1), located in the left cranial quadrant of the abdominal cavity. The average weight, length and thickness of the spleens were  $125\text{g}\pm0.56$ ,  $16\text{cm}\pm0.1$  and  $0.62\pm0.25\text{cm}$ , respectively. Elongated spleens presented two extremities, the narrow ( $2.5\text{ cm}\pm0.2$ ) dorsal extremity and the broader ( $5.5\text{ cm}\pm0.1$ ) ventral extremity.

Histologically, the spleen of fox was surrounded by a thick capsule composed mainly of dense collagen fibers with a few smooth muscle fibers (Fig 2). Thick trabeculae made of collagen, some elastic and smooth muscle fibers extended from the capsule into the parenchyma (Fig 3). Similar observation reported by Nicanderet *et al.* (1993) in case dogs. Branches of the splenic artery entered the capsule and extended into the large trabeculae as trabecular arteries. The branching pattern of splenic artery also differs from that of dogs. In dogs, it branches into as many as 25 smaller branches prior to entry into the spleen (Hoganesch and Hahn, 2001). The splenic parenchyma consisted of red pulp with extensive venous sinuses, venules and splenic cords (Fig.4). White pulp was distributed throughout the spleen and was

composed of lymphatic nodules with a central artery and diffused lymphatic tissue as periarterial lymphatic sheaths, PALS (Fig 5). PALS were organized along the artery of the white pulp(Fig 6). Cesta (2006) reported that the white pulp in Wister rat was composed of three sub-compartments: the periarteriolar lymphoid sheath (PALS), the follicles and the marginal zone.

Presence of smooth muscle fibers in the capsule and trabeculae indicated the capacity of spleen to expand and store large number of erythrocytes and also the ability for rapid contraction. Spleen of fox can be classified under sinusal spleen due to the presence of extensive venous sinuses and abundance of red pulp. Sinusal spleens were also found in rats and dogs and nonsinusal spleens were reported in mice by Schmidt et al., 1985.

In summary present study justifies that although there were not much of the differences seen between spleen of dog and fox but the differences existed as presented in this article may serve as a guide for species identification.

#### **Conflict of interest statement**

None of the authors of this paper has a financial or personal relation-

ship with other people or organizations that could inappropriately influence or bias the content of the paper.

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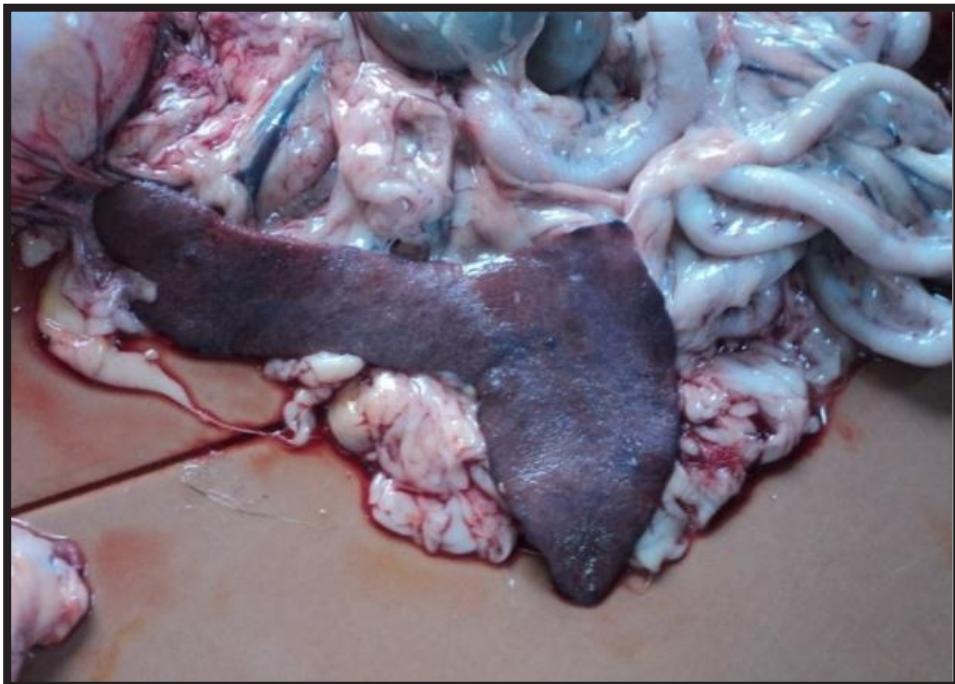
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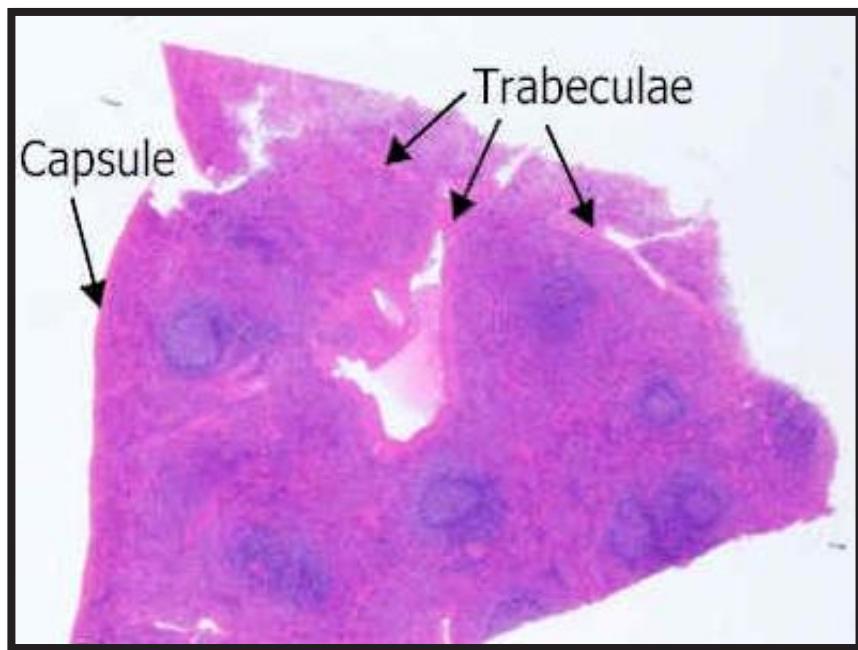
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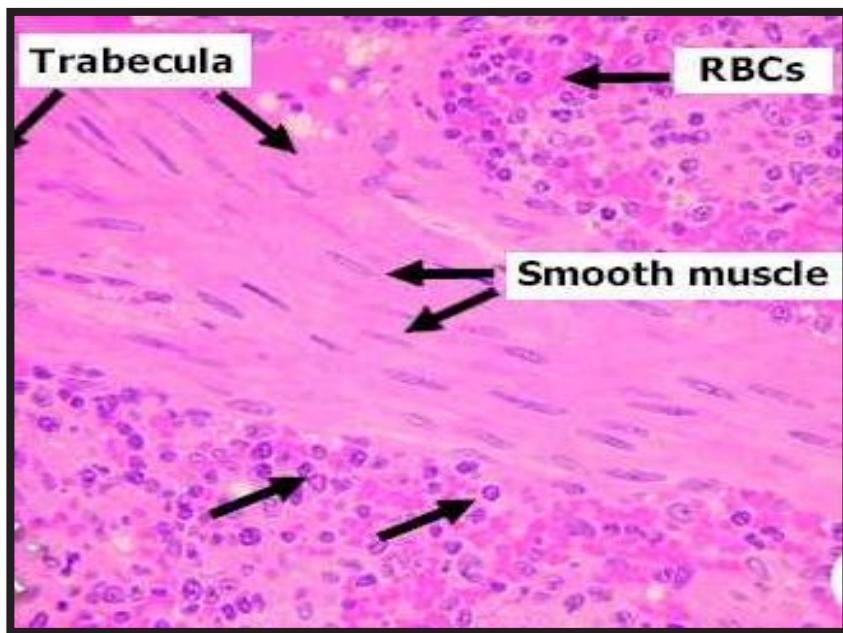
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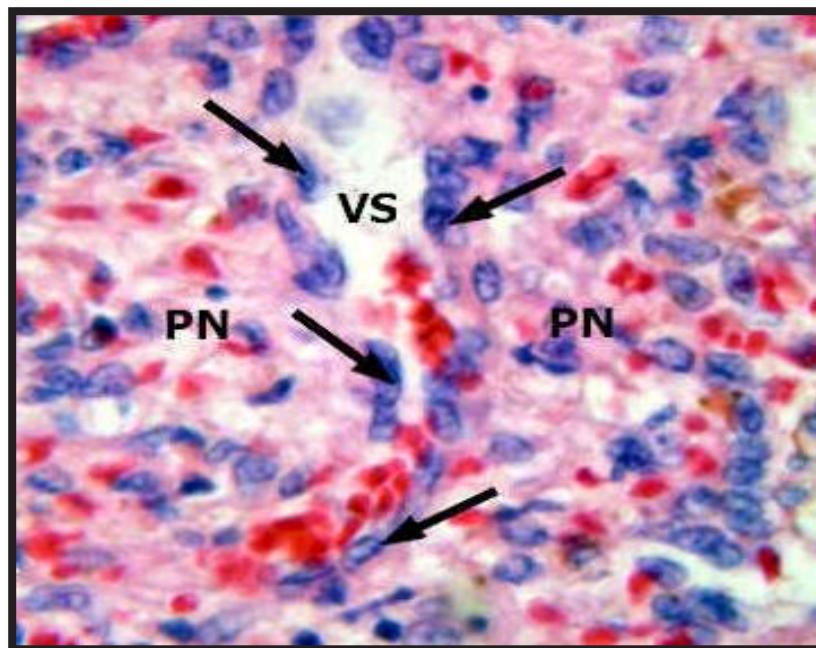
**Fig (1):** Gross anatomy of the spleen of the fox



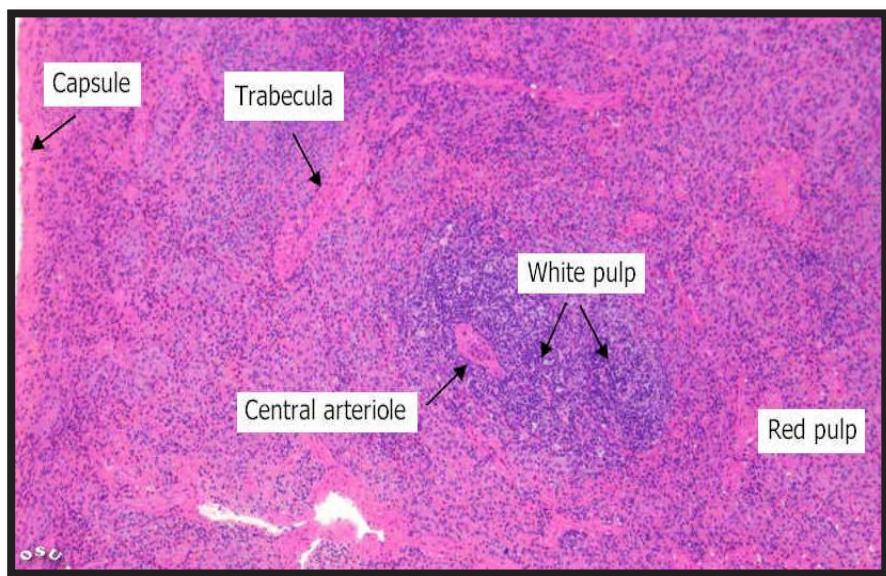
**Fig (2):** Cross Section of spleen of fox showing the fibrous capsule and its detached trabeculae



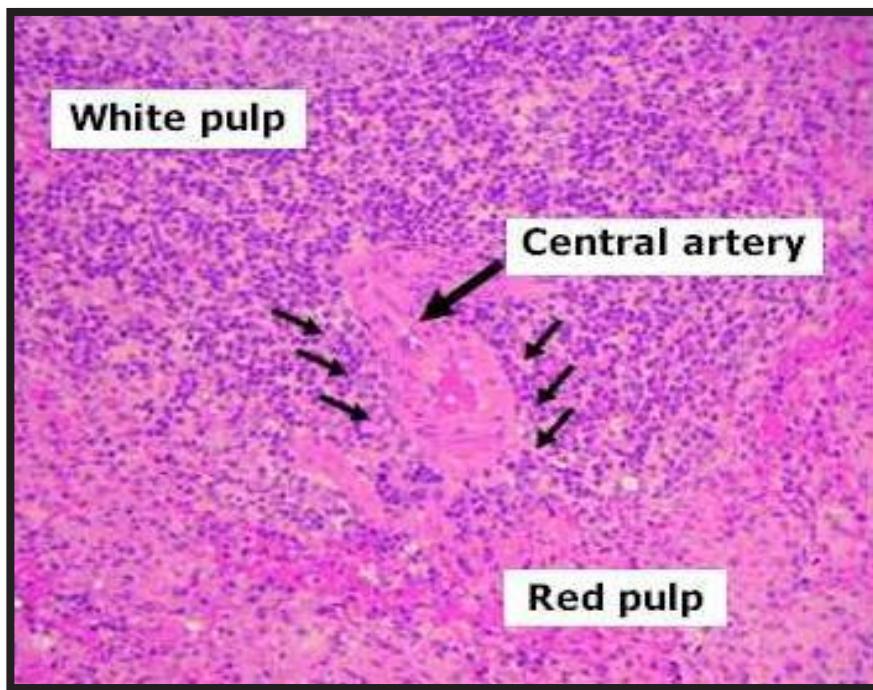
**Fig (3):** Cross section of spleen of fox showing trabeculae, smooth muscles and RBC's



**Fig (4):** Cross section of spleen of fox showing red pulp with extensive venous sinuses (VN- venous sinuses, PN-parenchyma)



**Fig (5):** Cross section of spleen of fox showing lymphatic nodule with a central artery



**Fig (6):** Cross Section of spleen of fox. Small arrows indicate peri-arterial lymphatic sheaths(PALS).