

07-00

# Lymphatic Tissue and Lymphatic Organs

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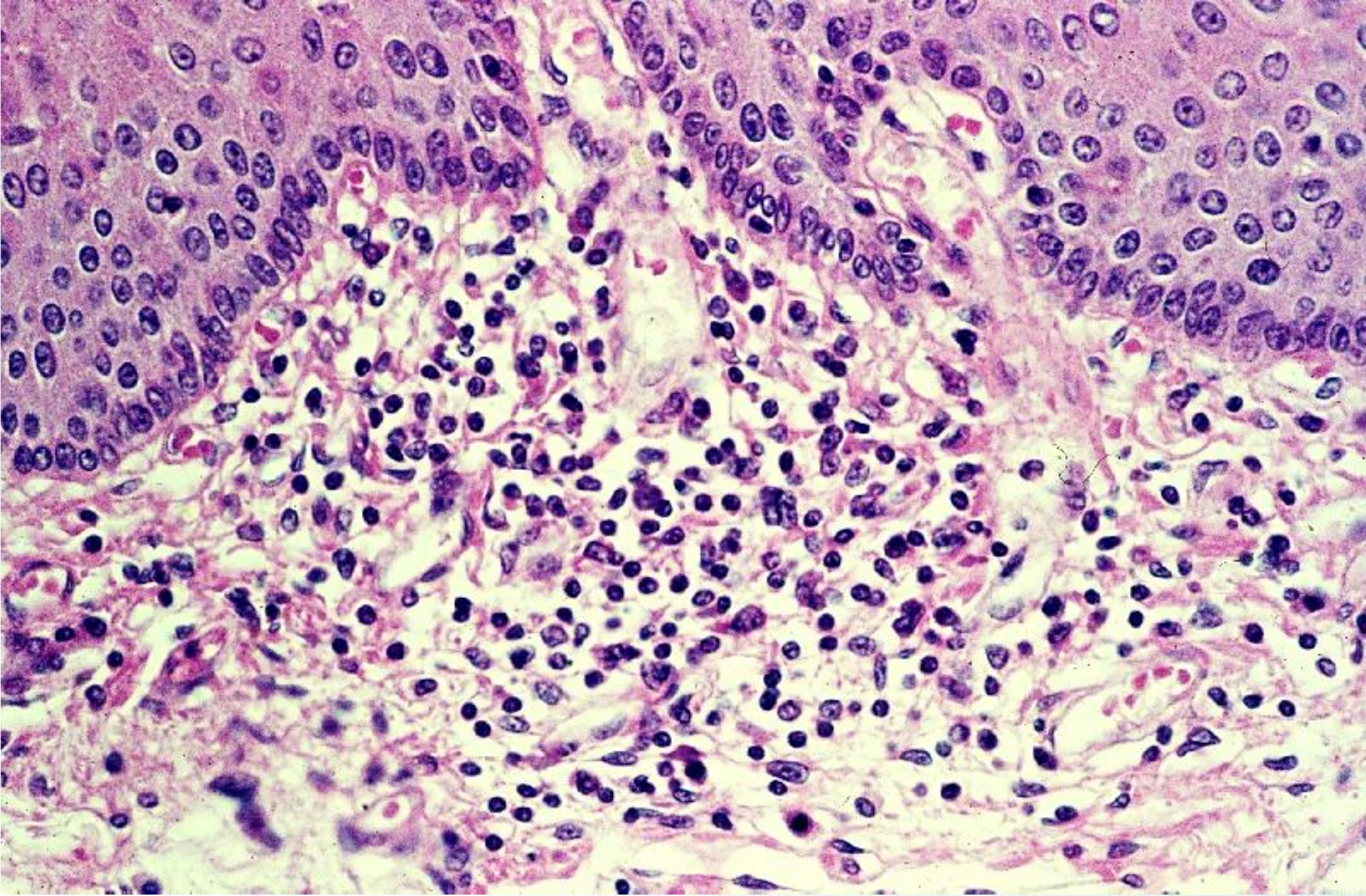
[07-003.](#) Thymus

# 07 Lymphatic Tissue and Lymphatic Organs Menu 2/2

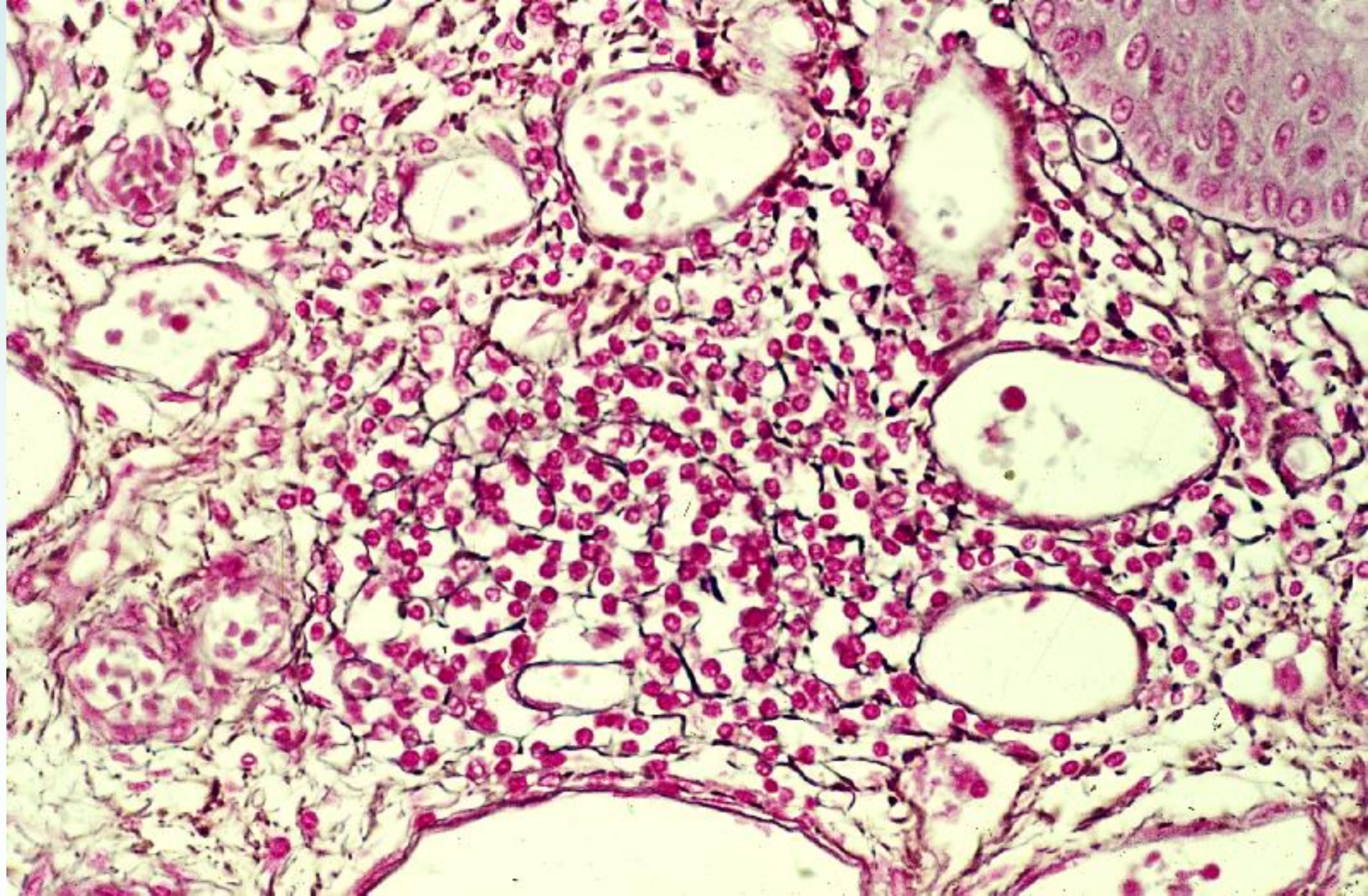
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- [07-77.](#) Splenic sinus. Monkey, H-E stain, x 160.

# 07-001

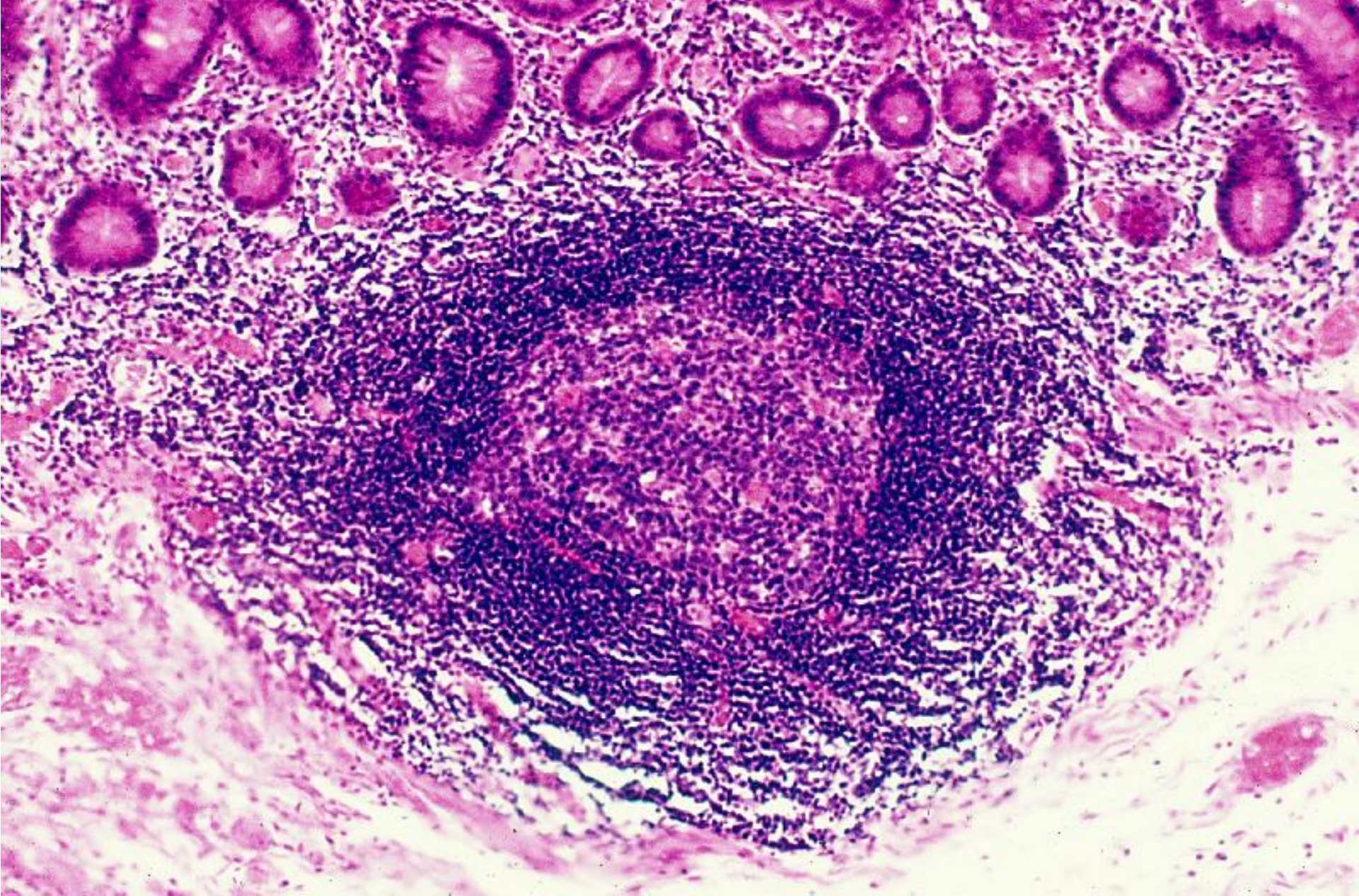
# Lymphatic Tissue



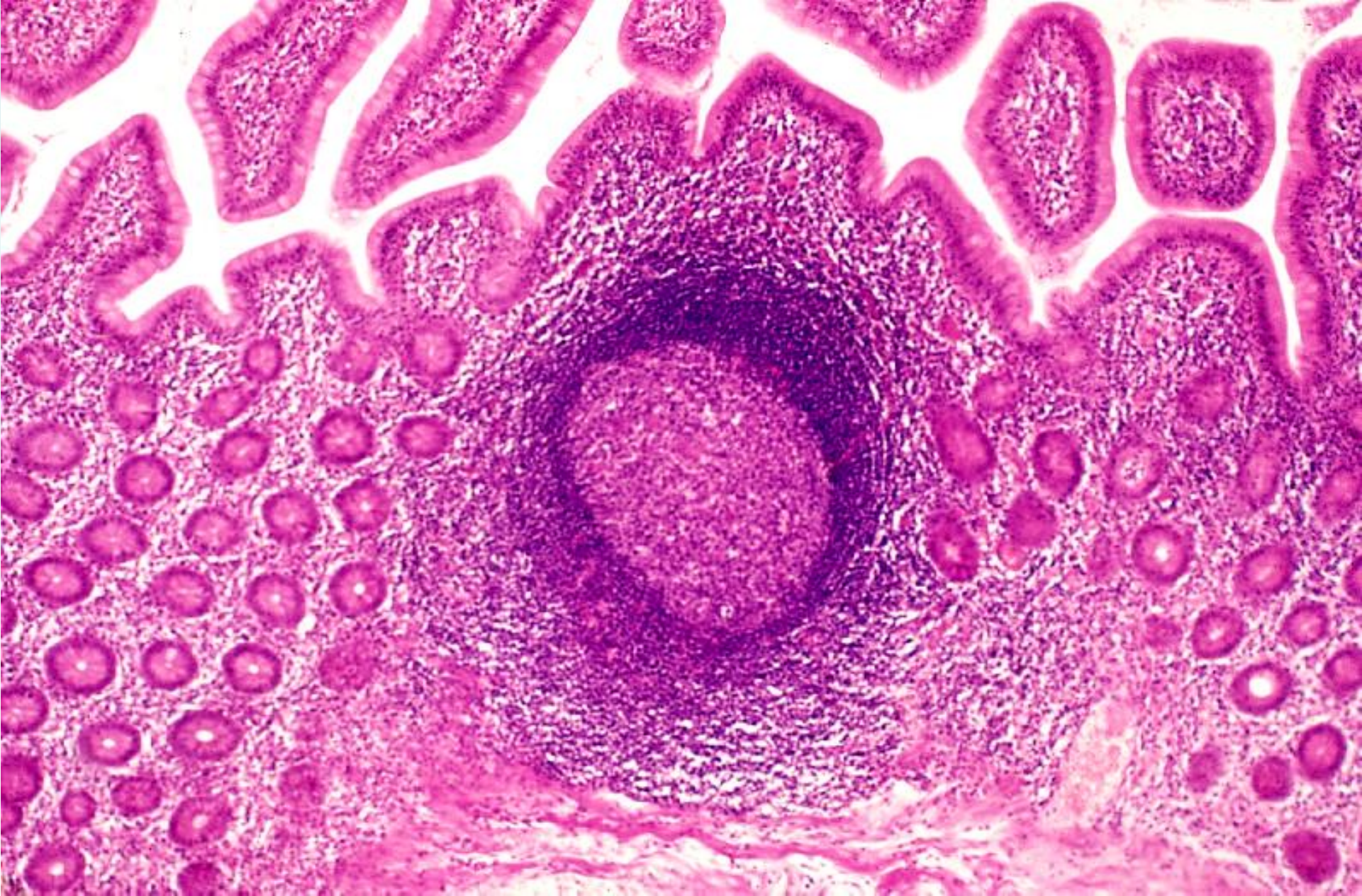
07-01 Infiltration of lymphocytes. Human, H-E stain, x 100.



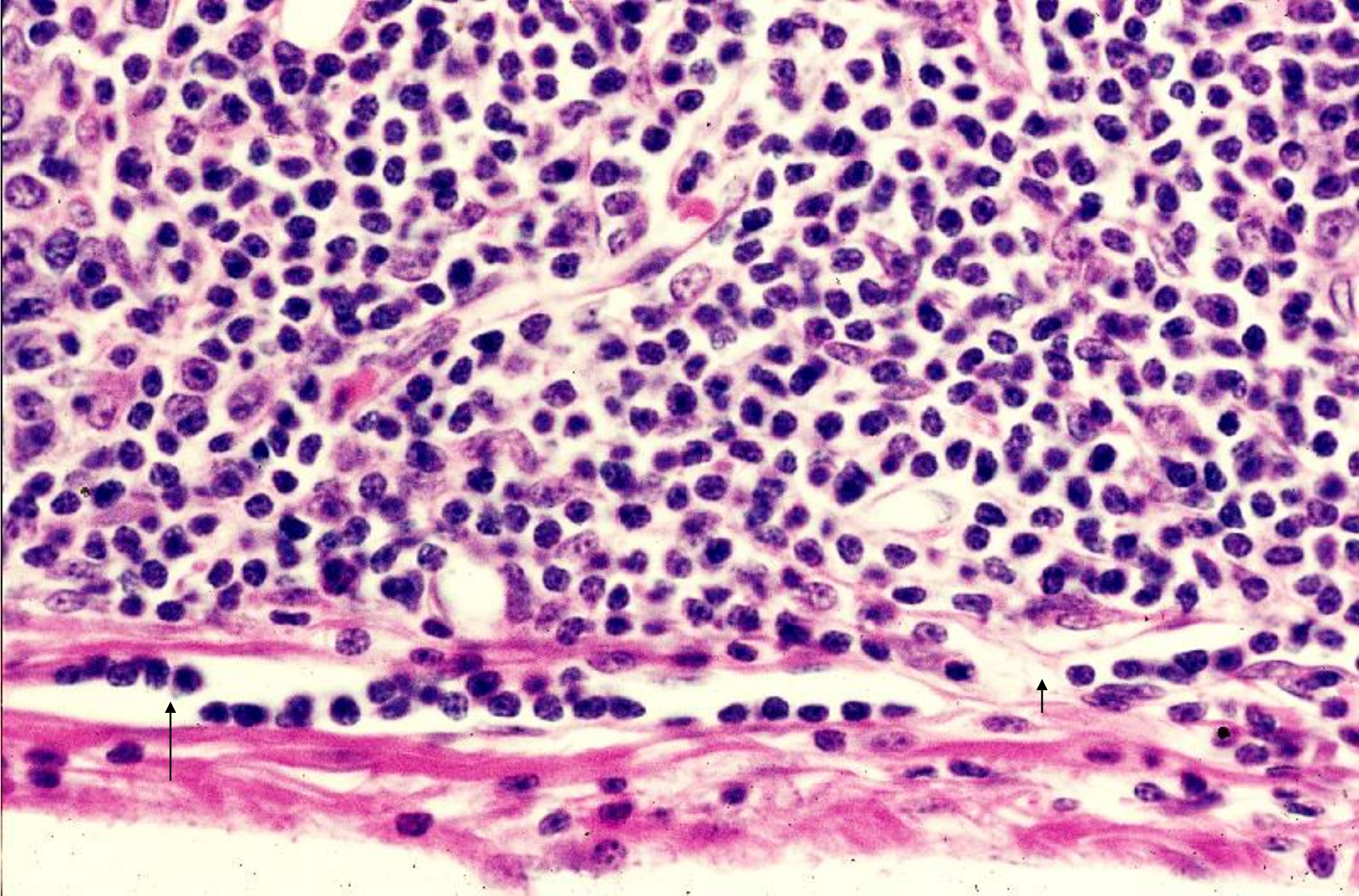
**07-02 Infiltration of lymphocytes. Human, silver impregnation and Kernechtrot stain, x 100.**



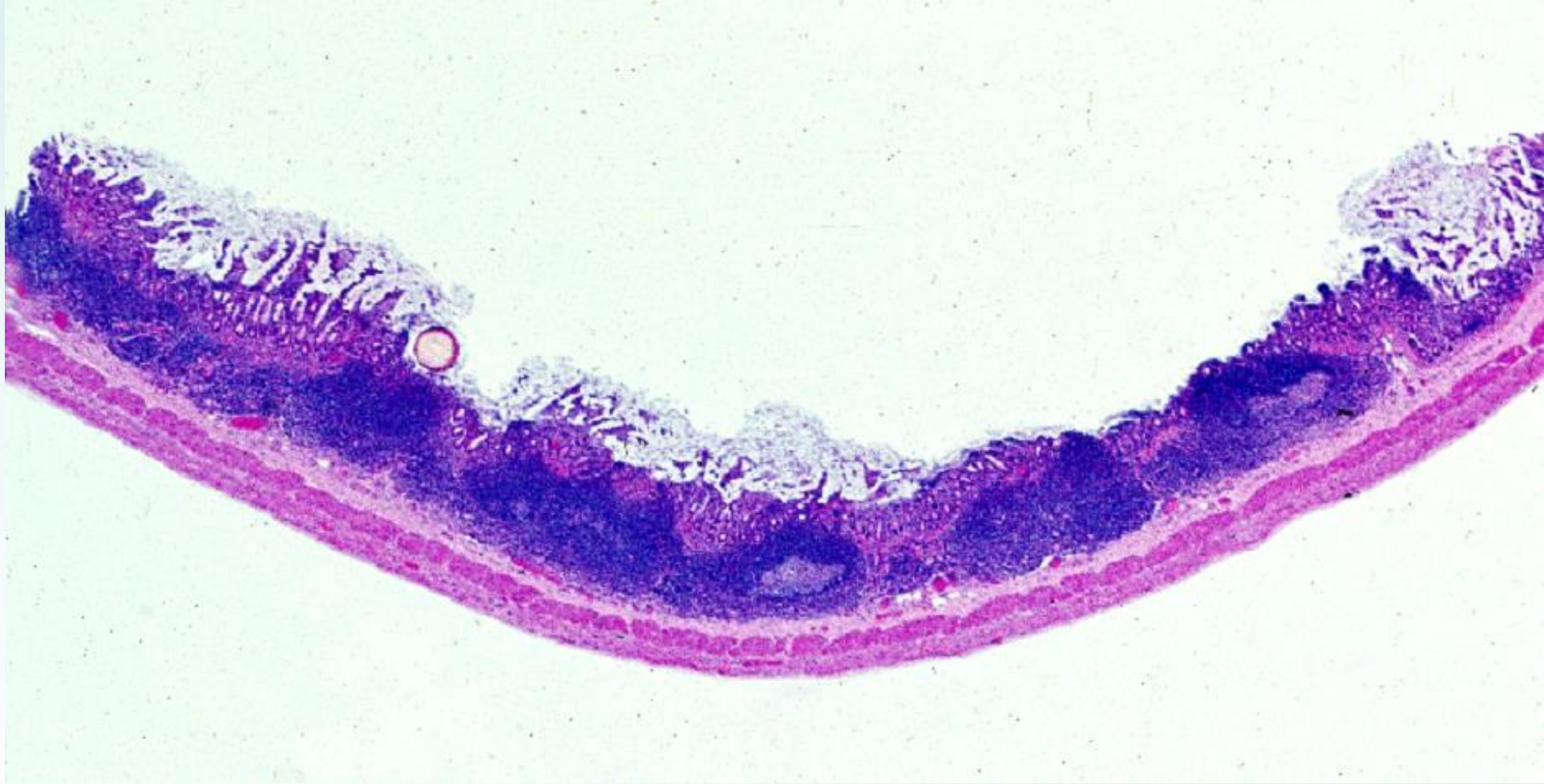
07-03 Solitary lymphatic nodule. Human, H-E stain, x 40.



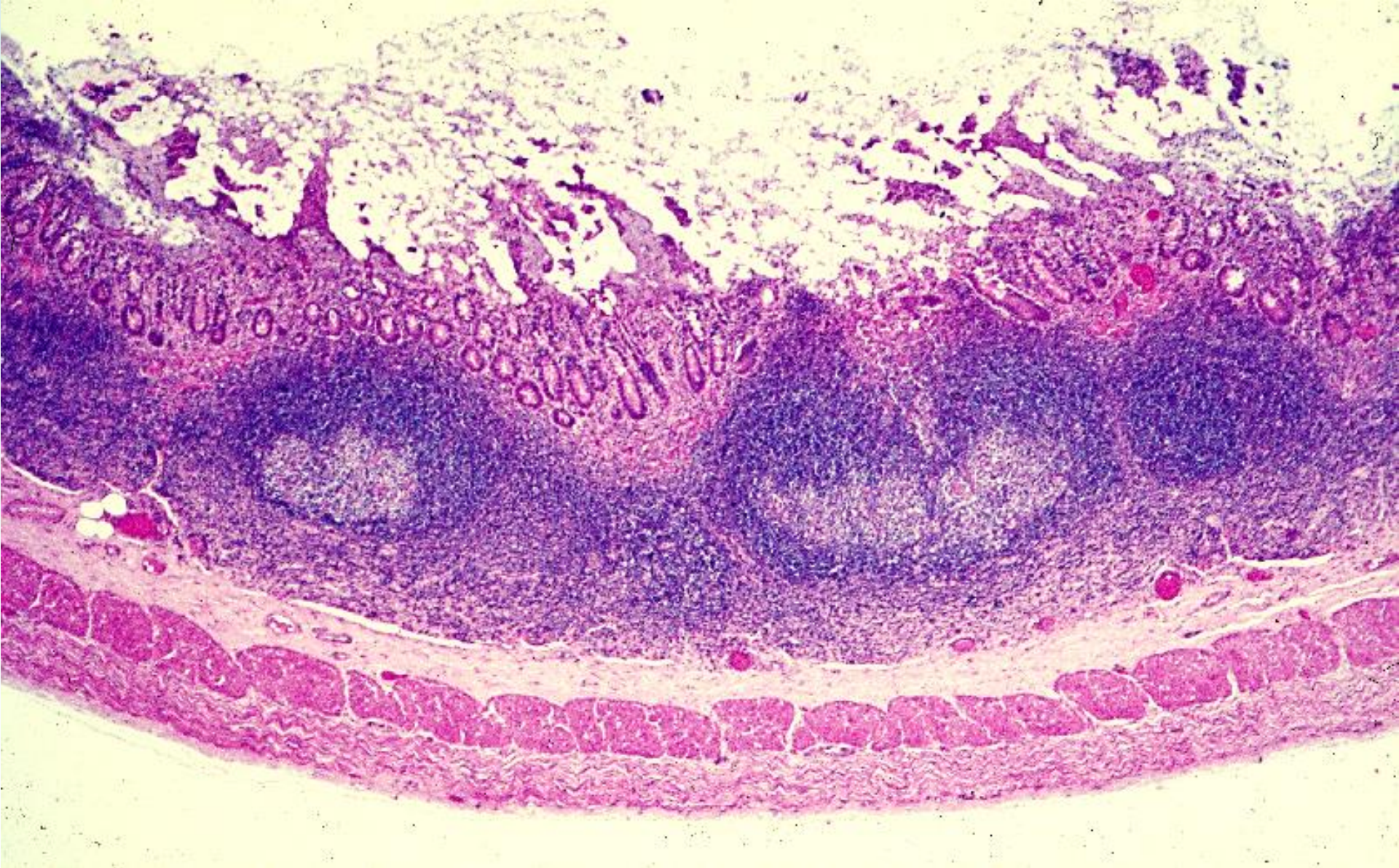
07-04 Solitary lymphatic nodule. Human, H-E stain, x 25.



07-05 Lymphatics surrounding a solitary lymphatic nodule. Human, H-E stain, x 160.



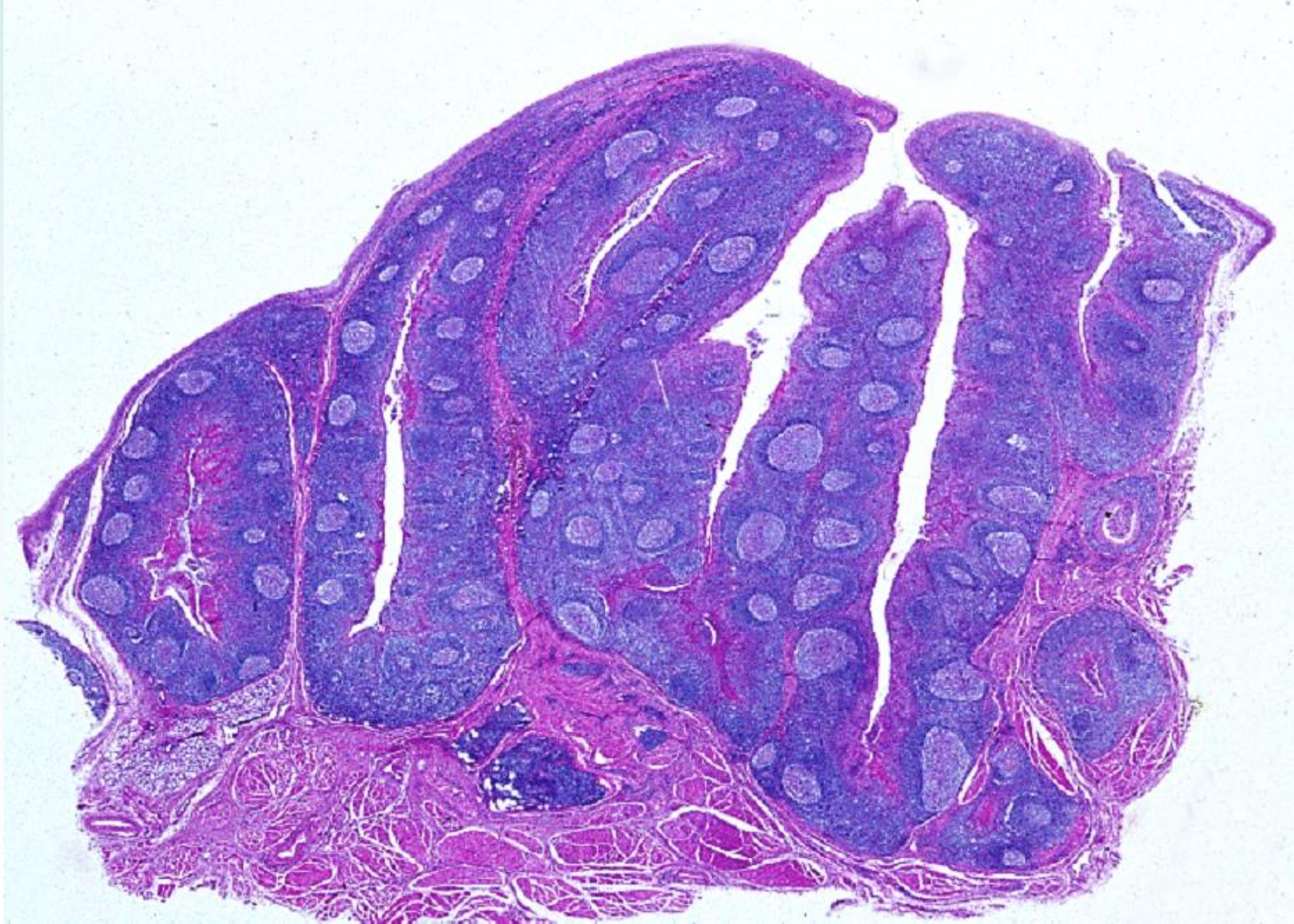
07-06 Aggregated lymphatic nodules, longitudinal section. Human, H-E stain, x 3.4.



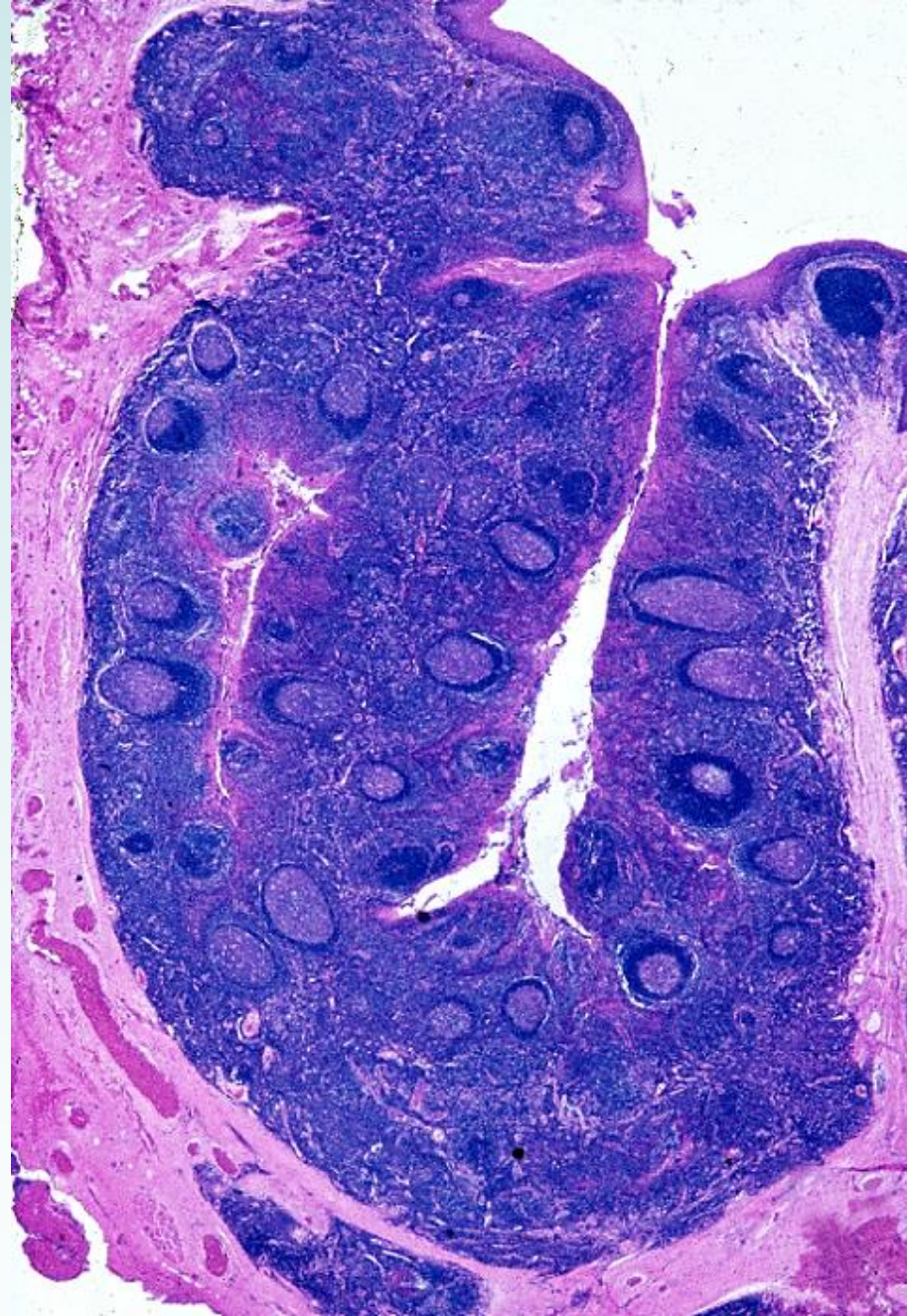
07-07 Aggregated lymphatic nodules, longitudinal section. Human, H-E stain, x 10.



07-08 Lingual tonsil. Human, H-E stain, x 4.0.



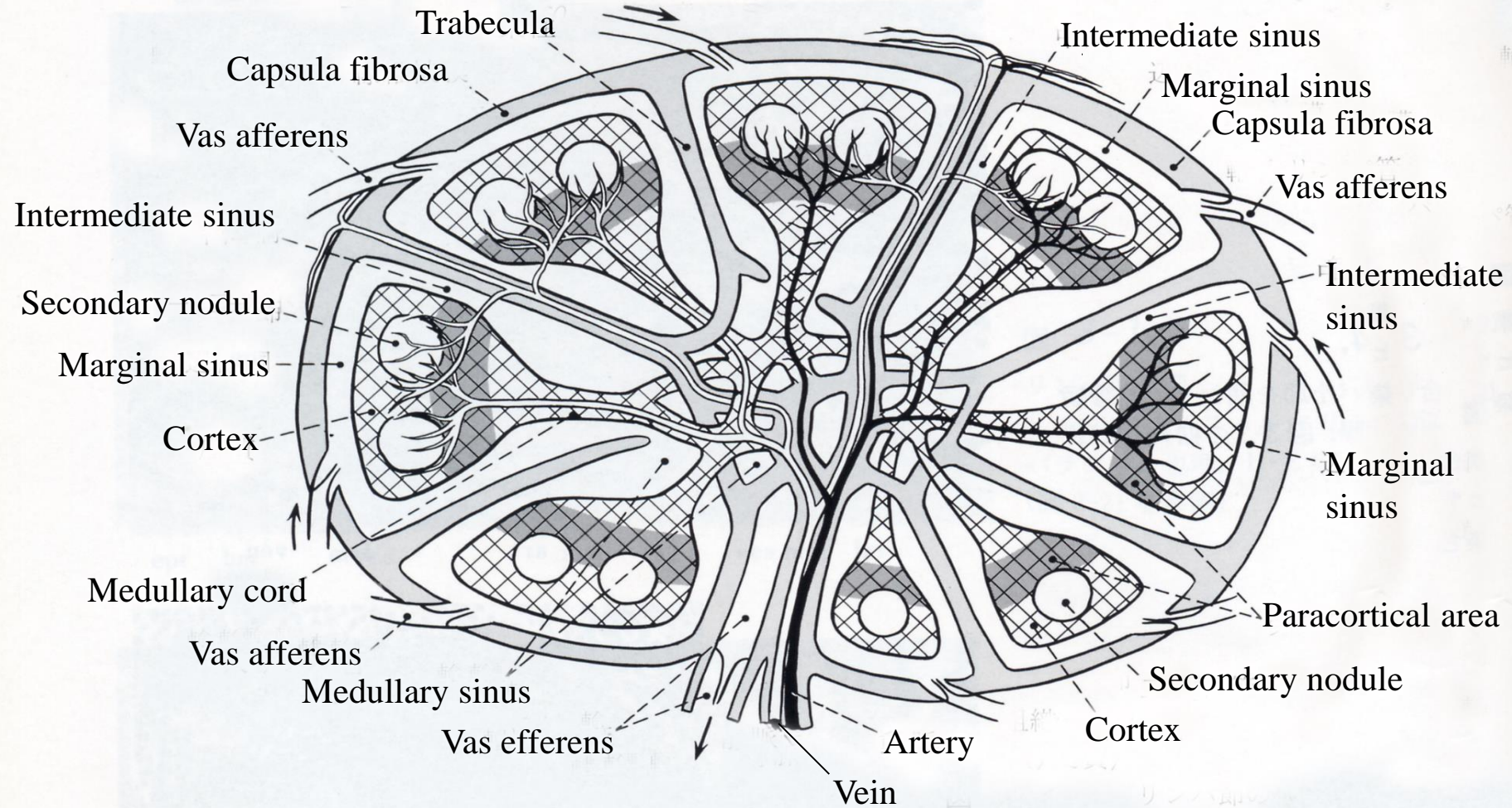
07-09 Tonsilla palatina, 1. Human, H-E stain, x 2.0.



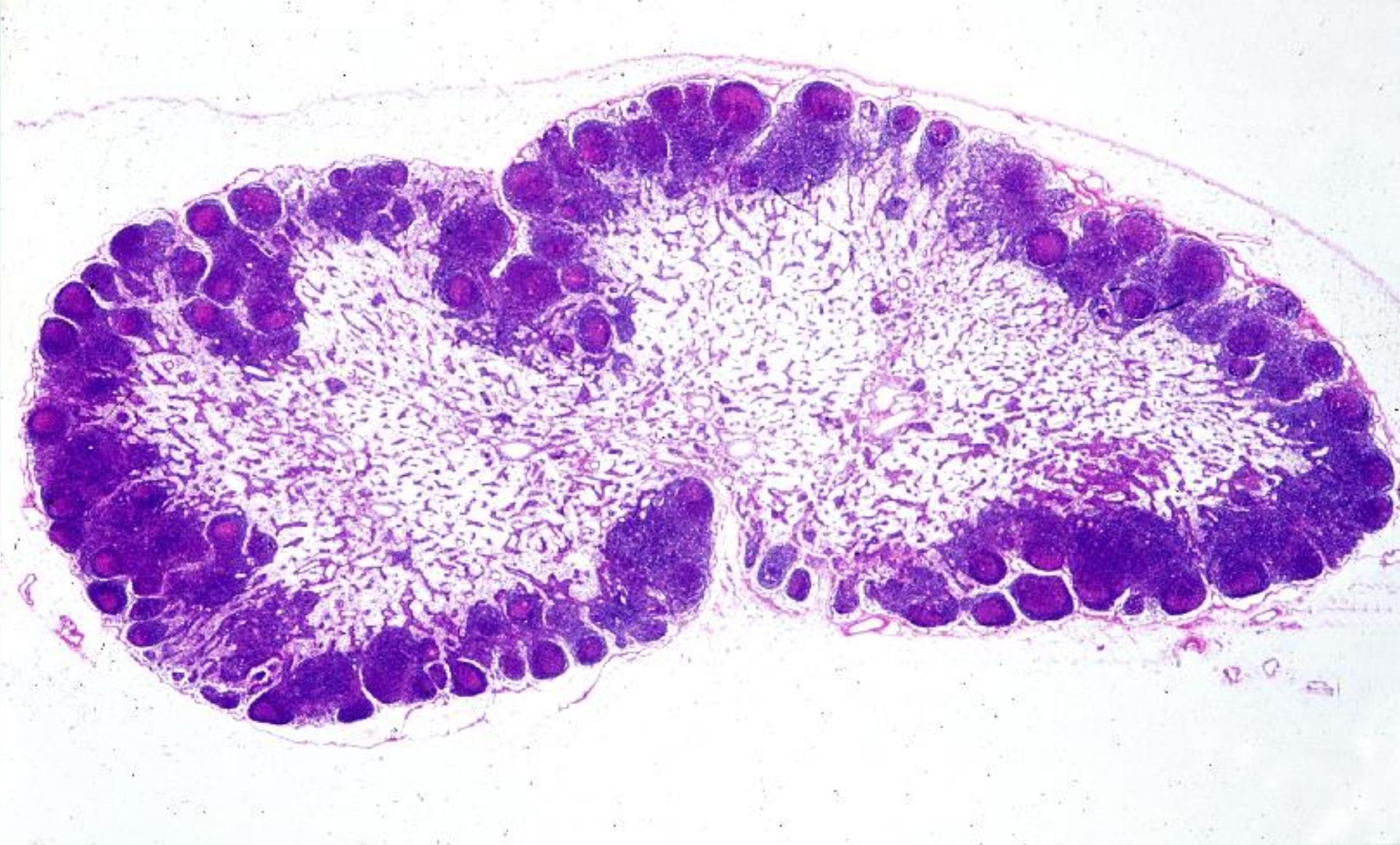
07-10 Tonsilla palatina, 2. Human, H-E stain, x 2.0.

# 07-002

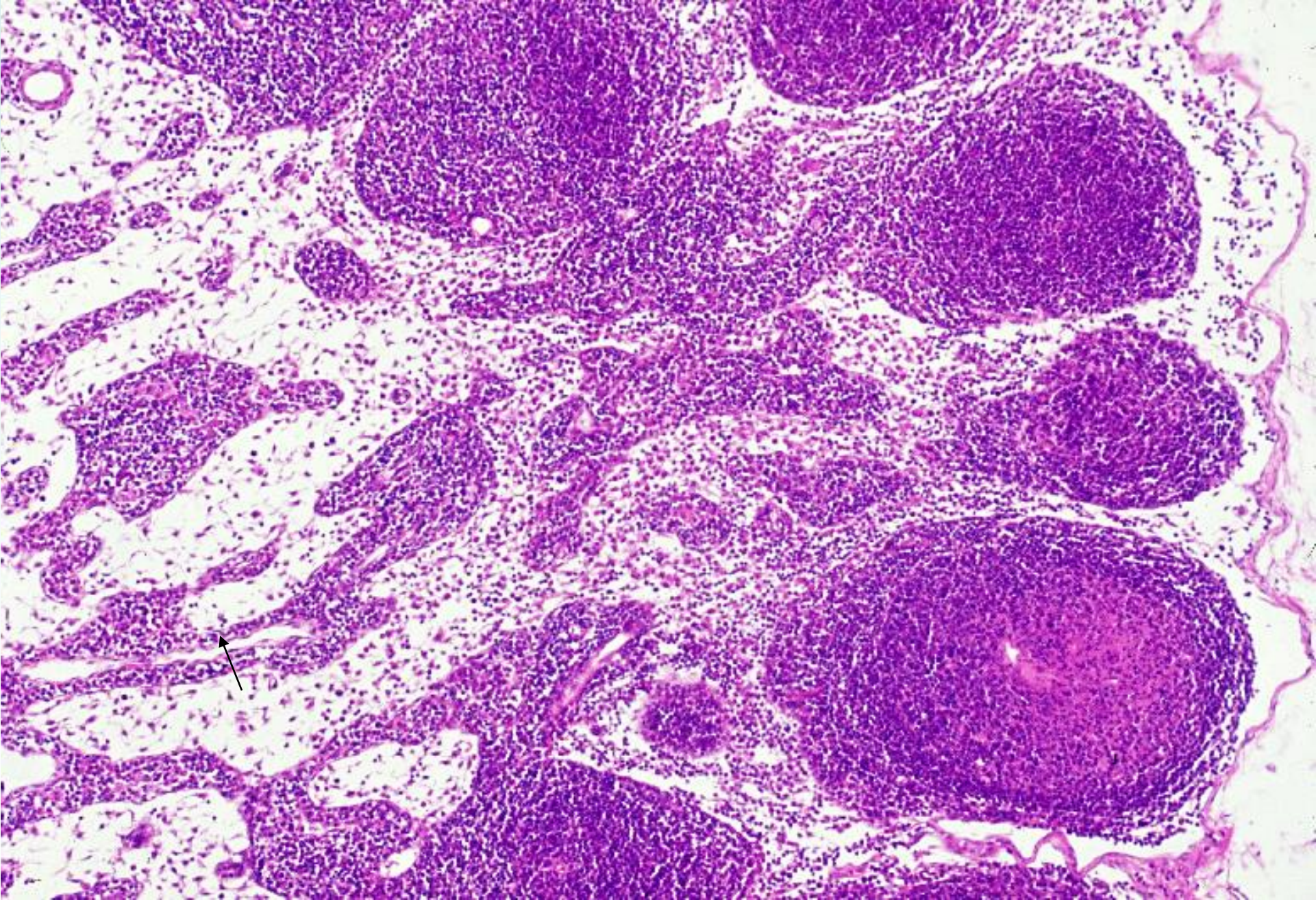
# Lymph Node



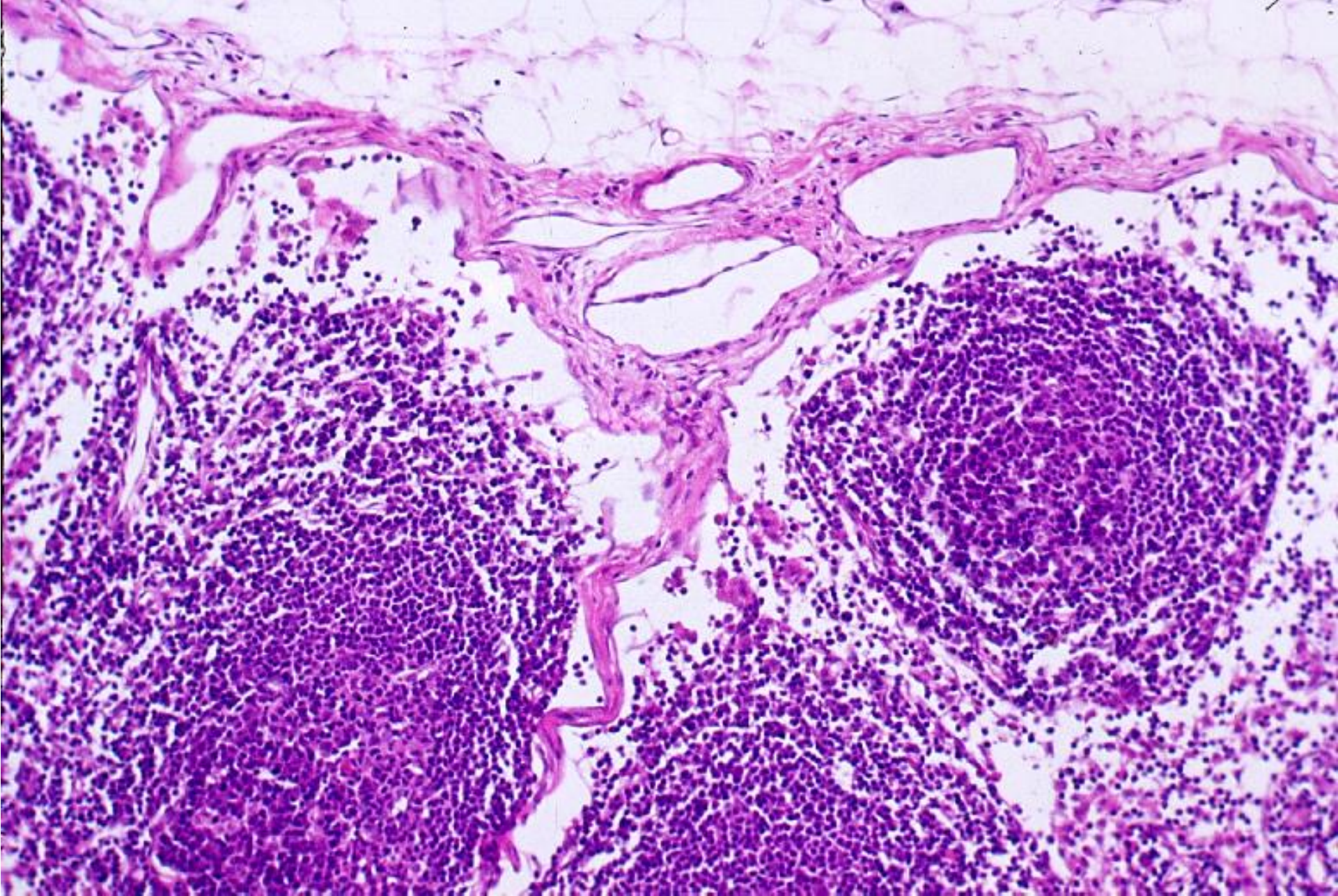
07-11 Scheme showing the structure of lymph node.



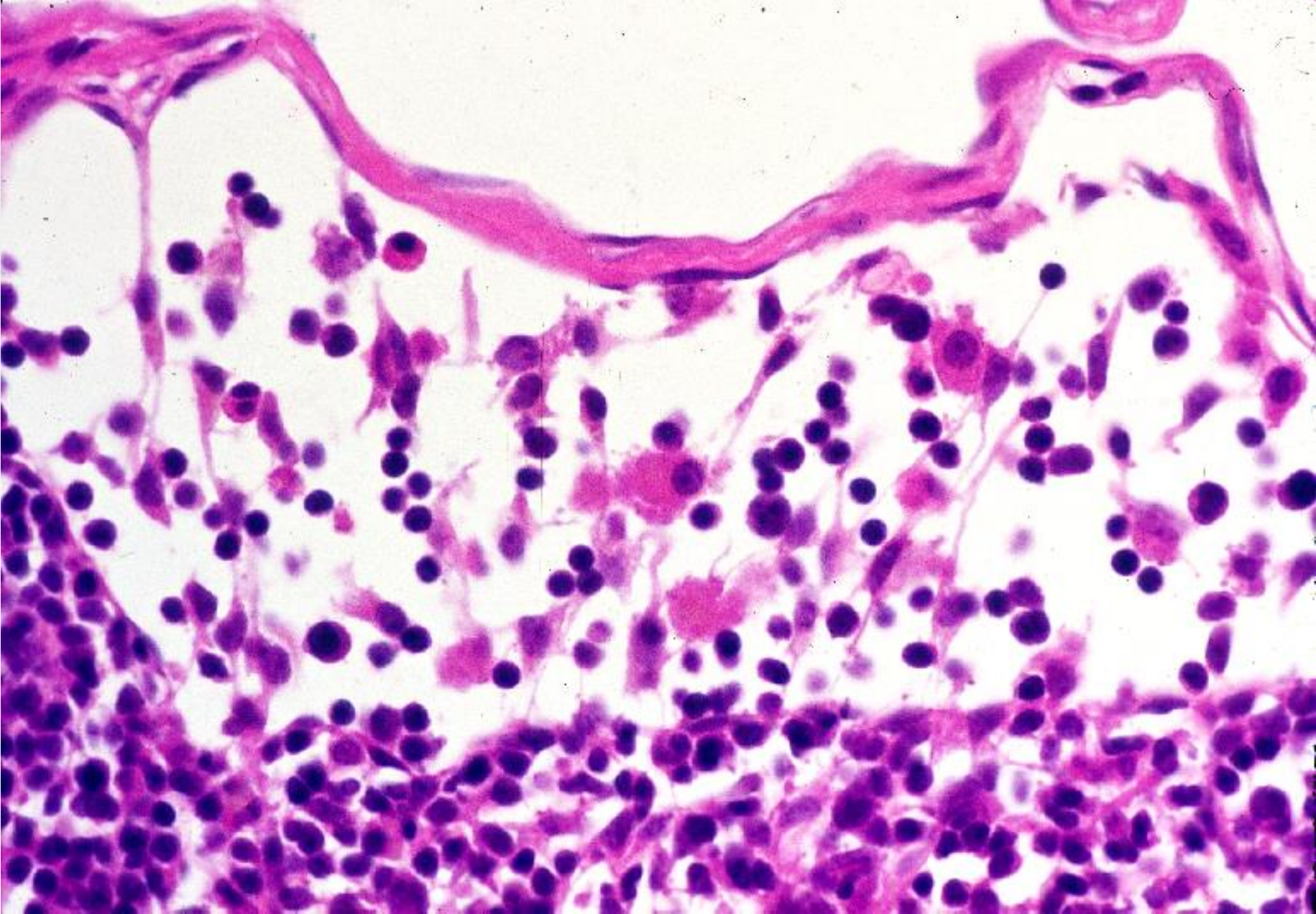
07-12 Lymph node, general view. Human, H-E stain, x 3.



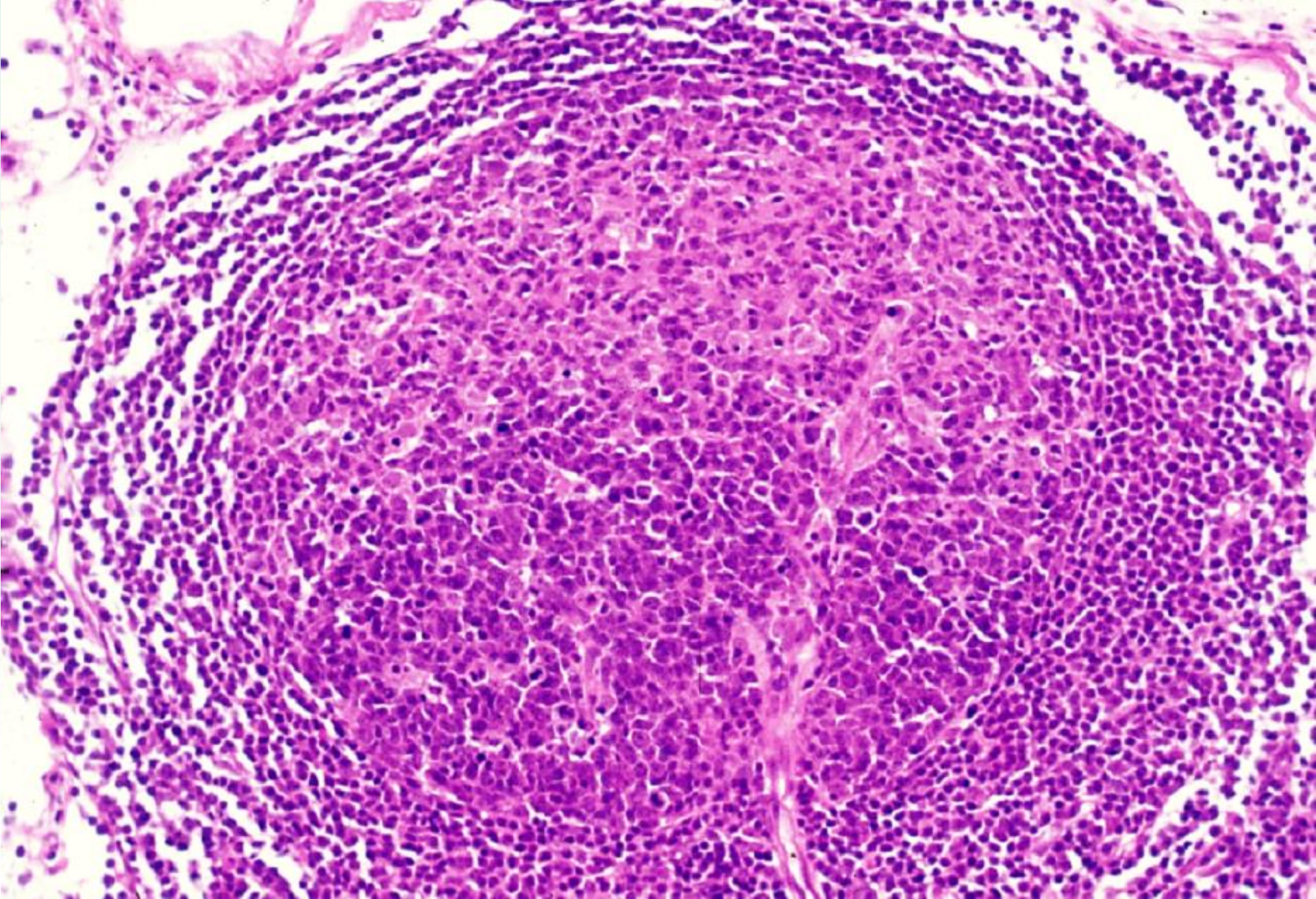
07-13 Cortex and medulla. Human, H-E stain, x 25.



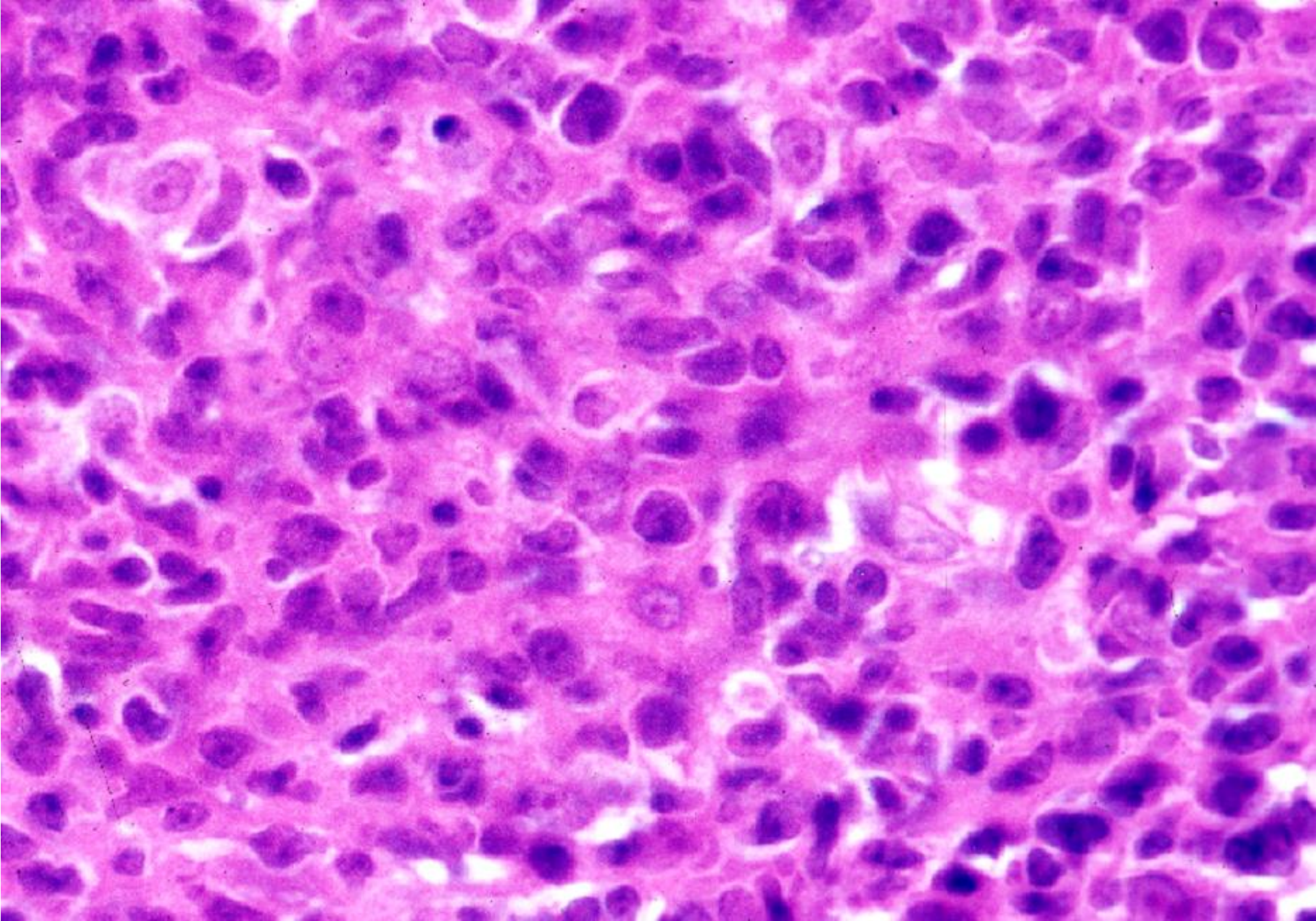
07-14 Cort6ex and subcapsular sinus. Human, H-E stain, x 40.



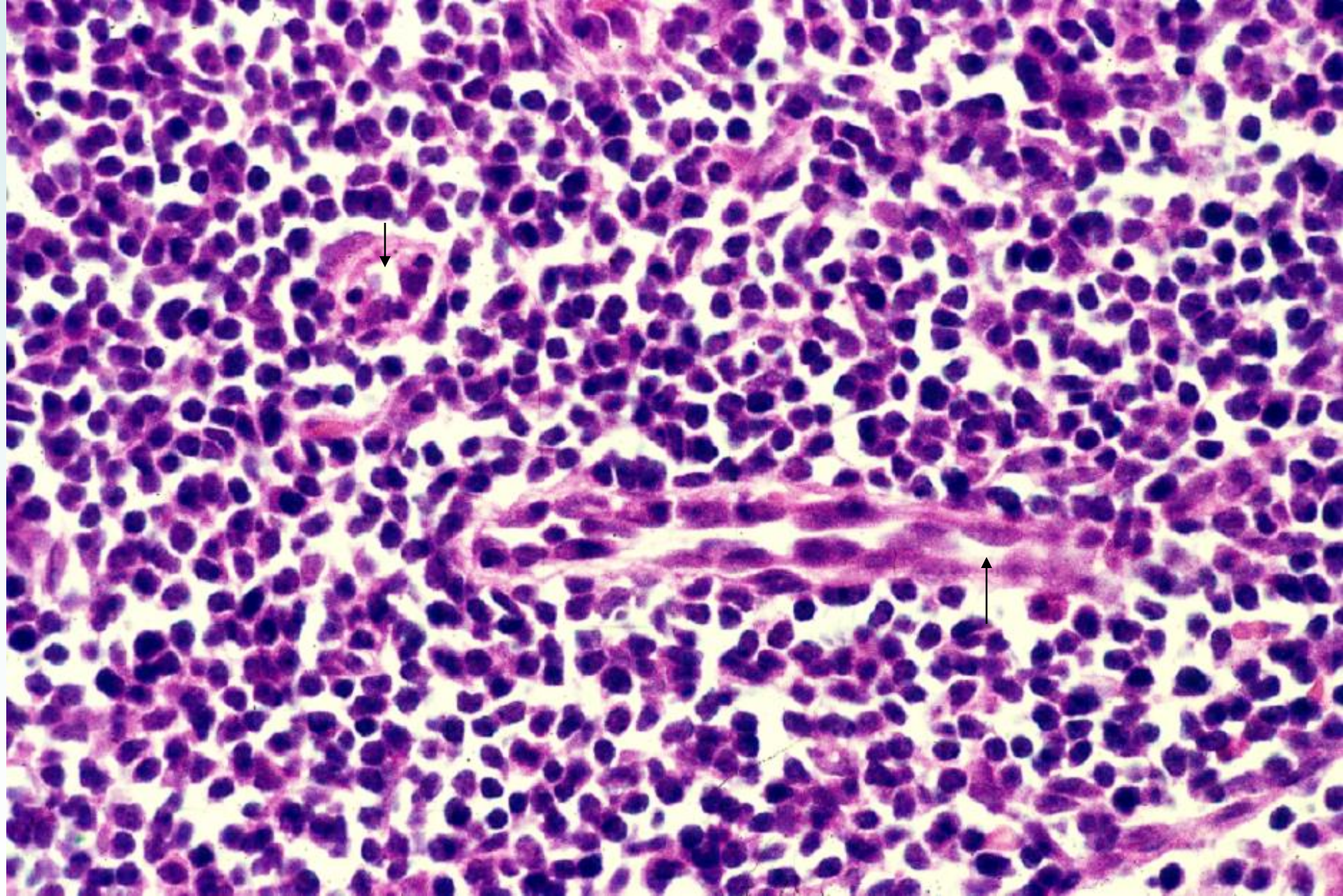
07-15 Marginal sinus. Human, H-E stain, x 160.



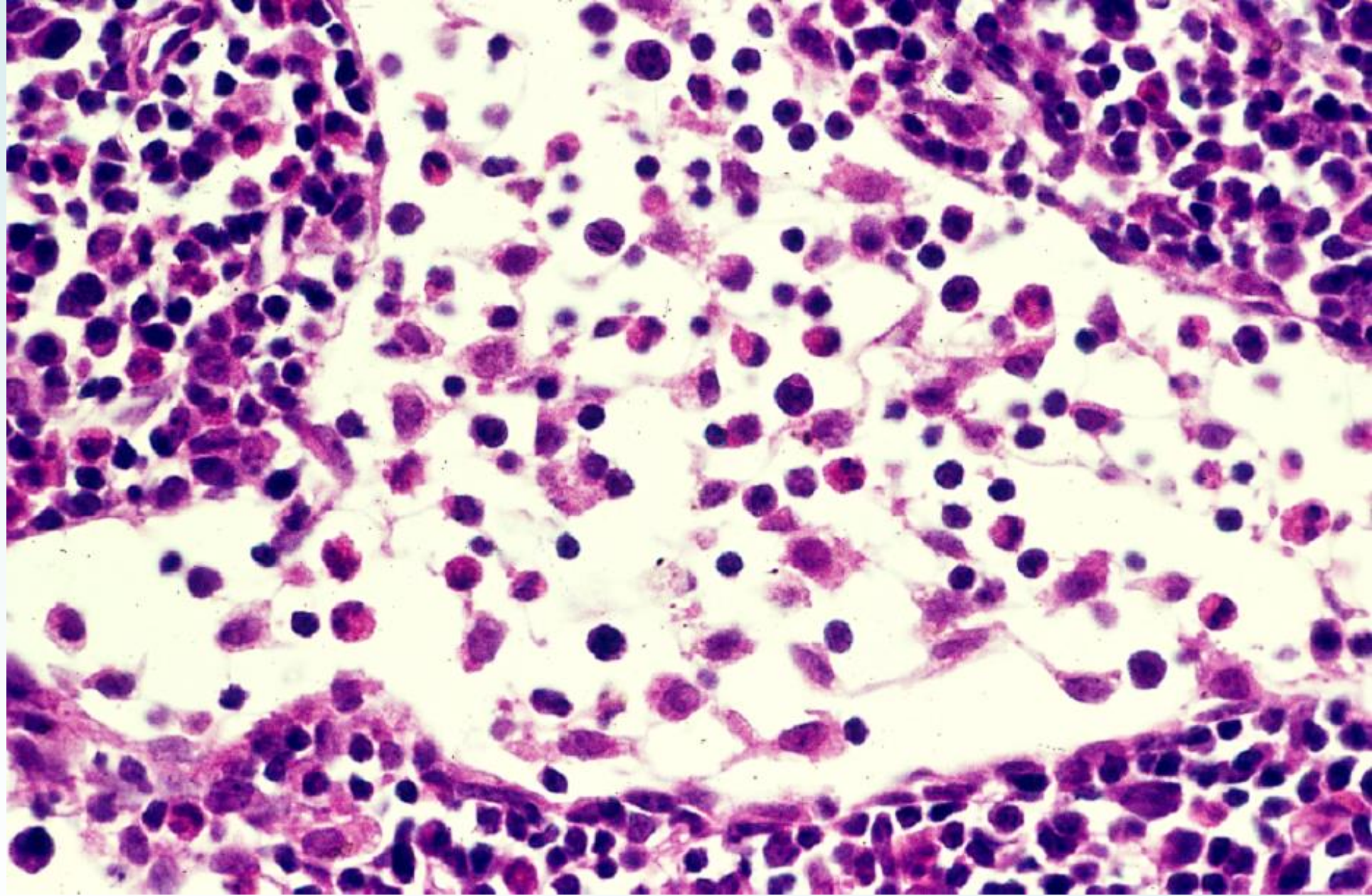
**07-16 Lymphatic nodule with germinal center. Human, H-E stain, x 64.**



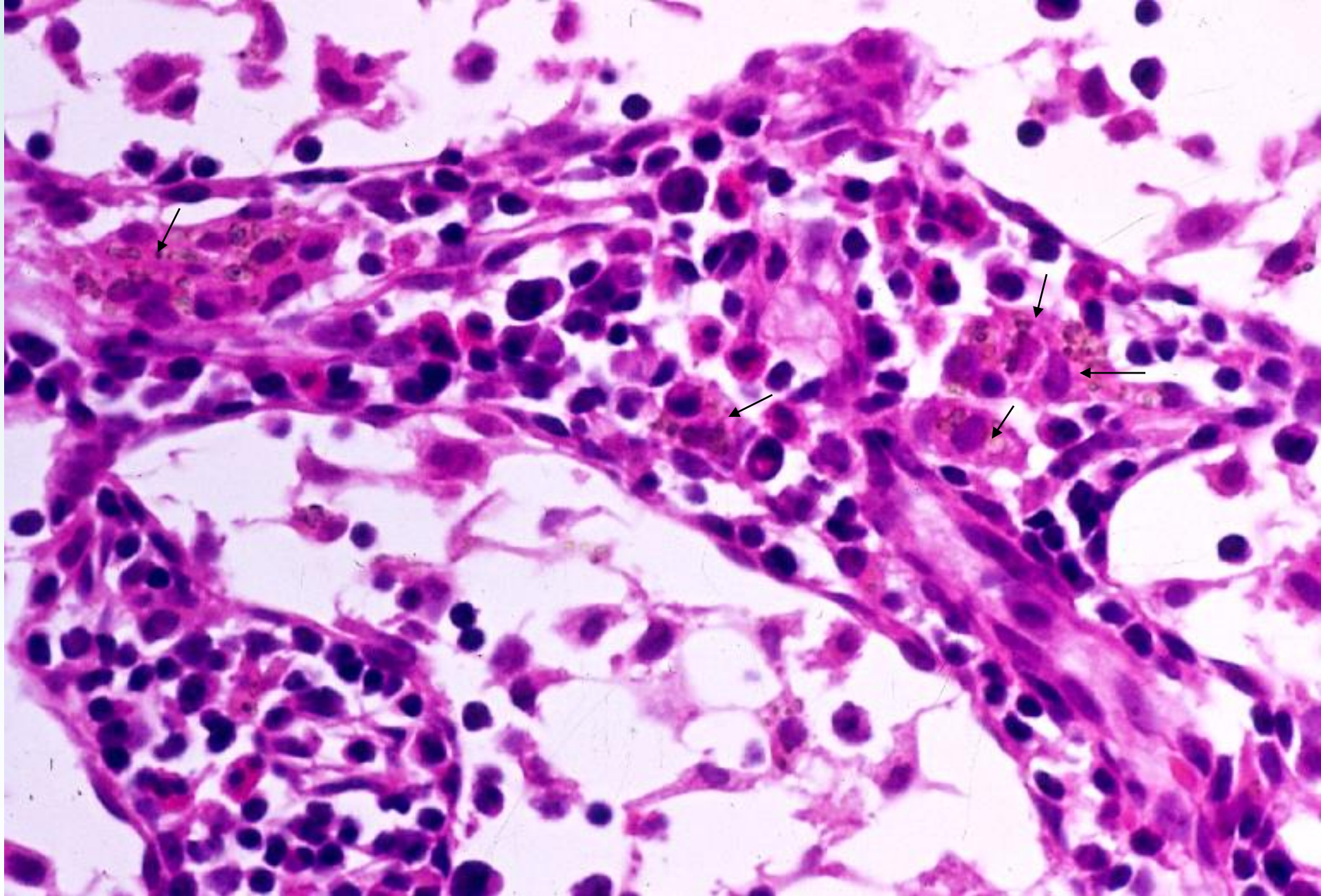
07-17 Germinal center. Human, H-E stain, x250.



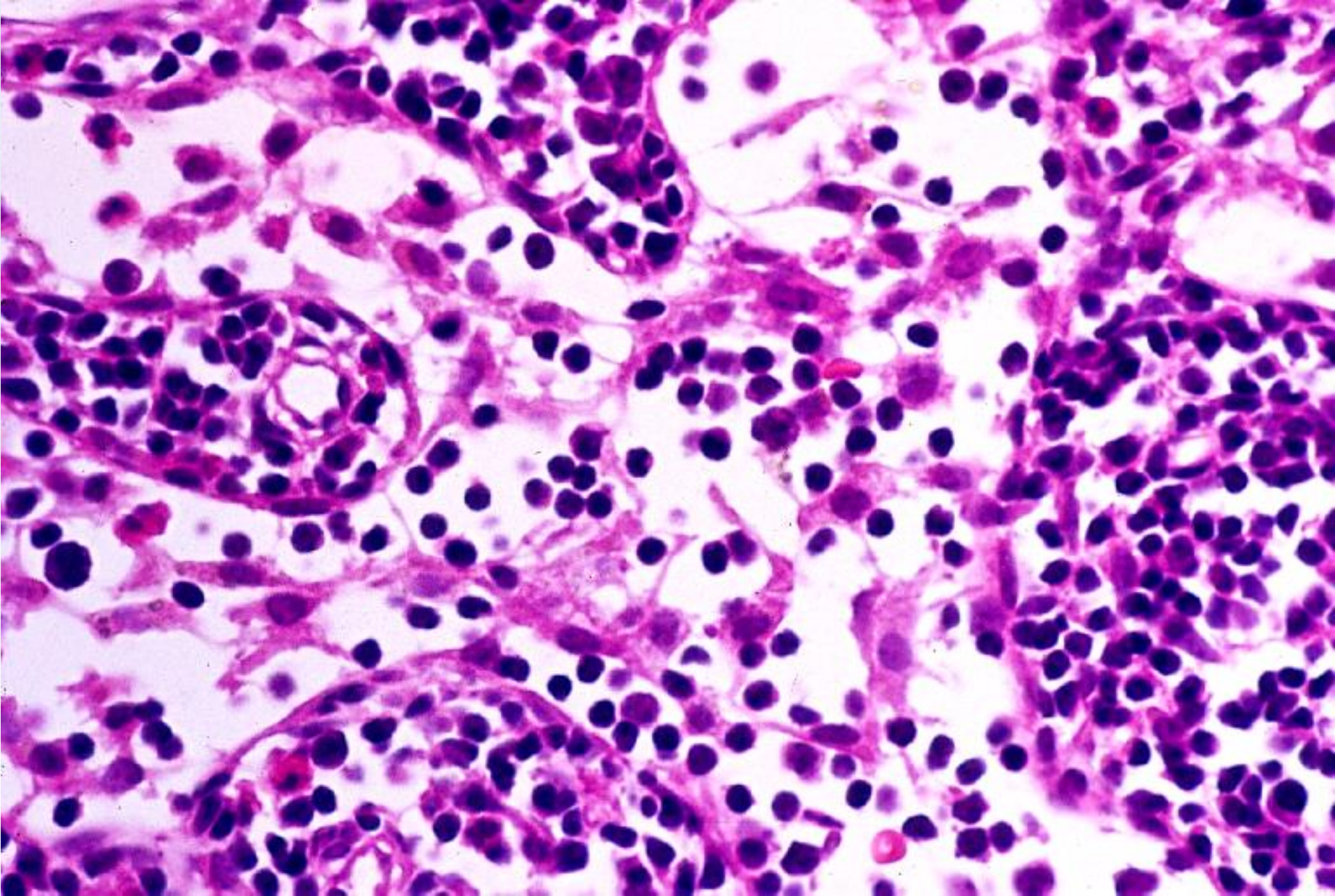
07-18 Postcapillary venules. Human, H-E stain, x 160.



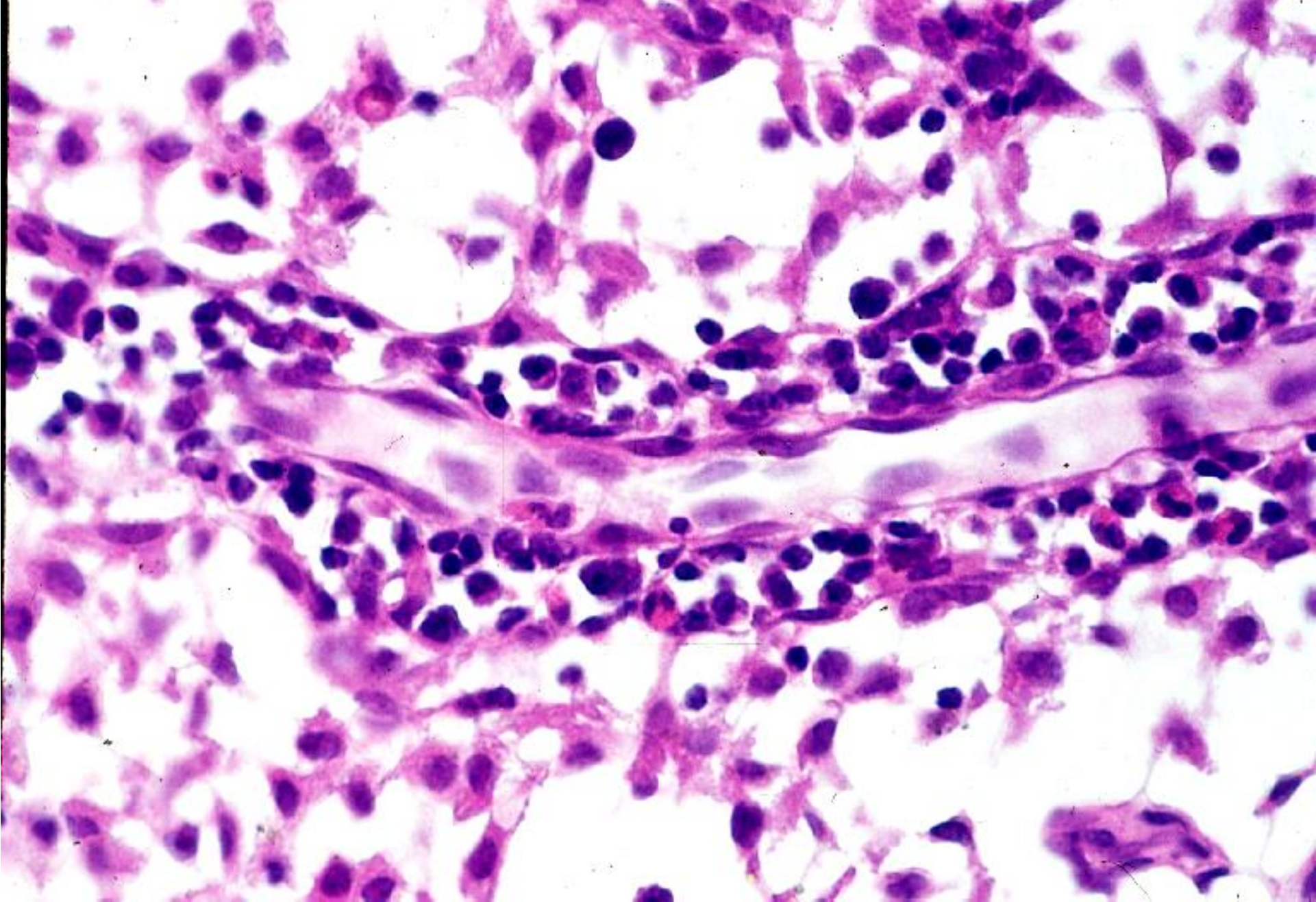
07-19 Cortex and medullary sinus. Human, H-E stain, x 160.



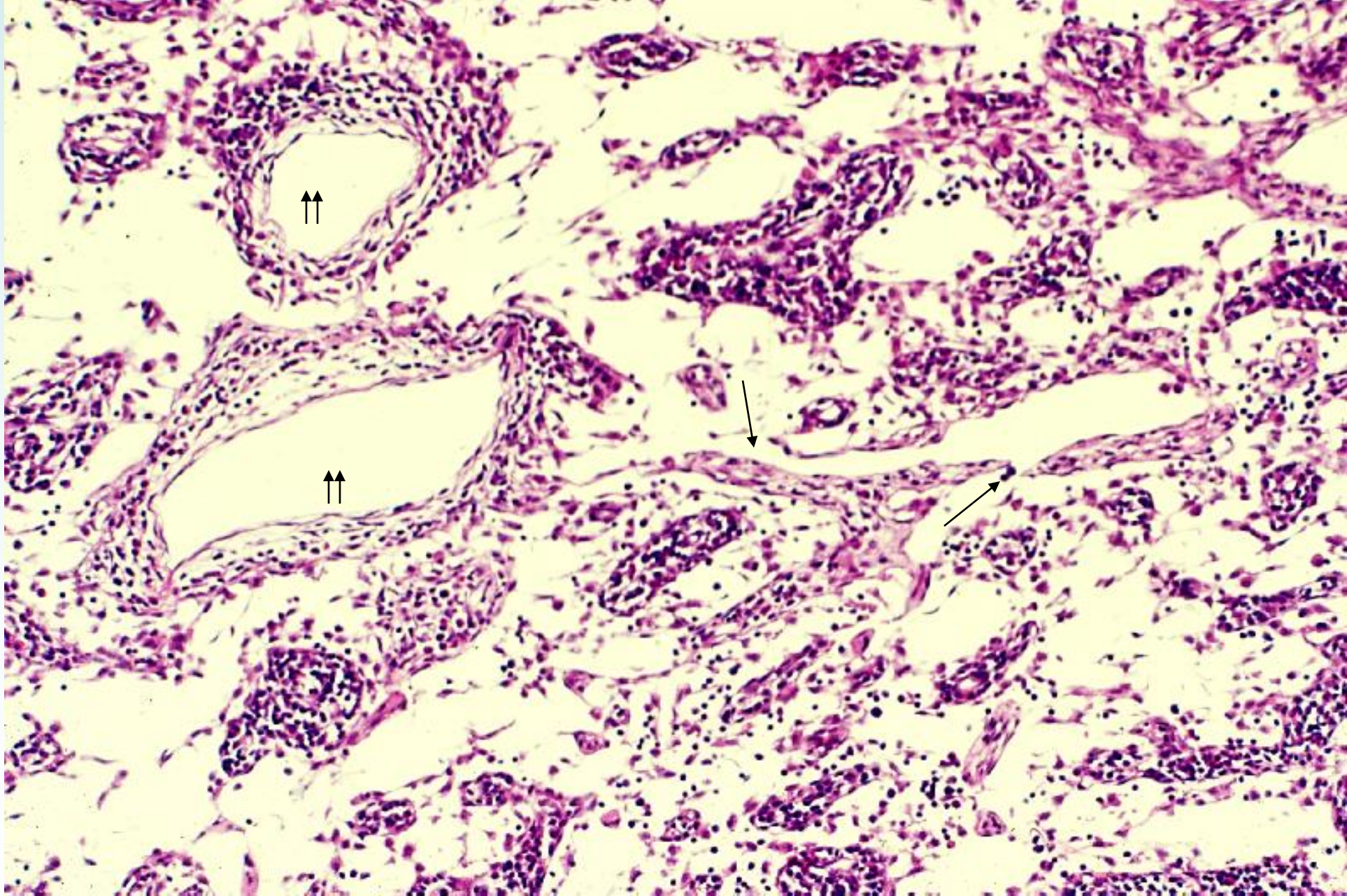
07-20 Medullary cords and medullary sinus 1. Human, H-E stain, x 160.



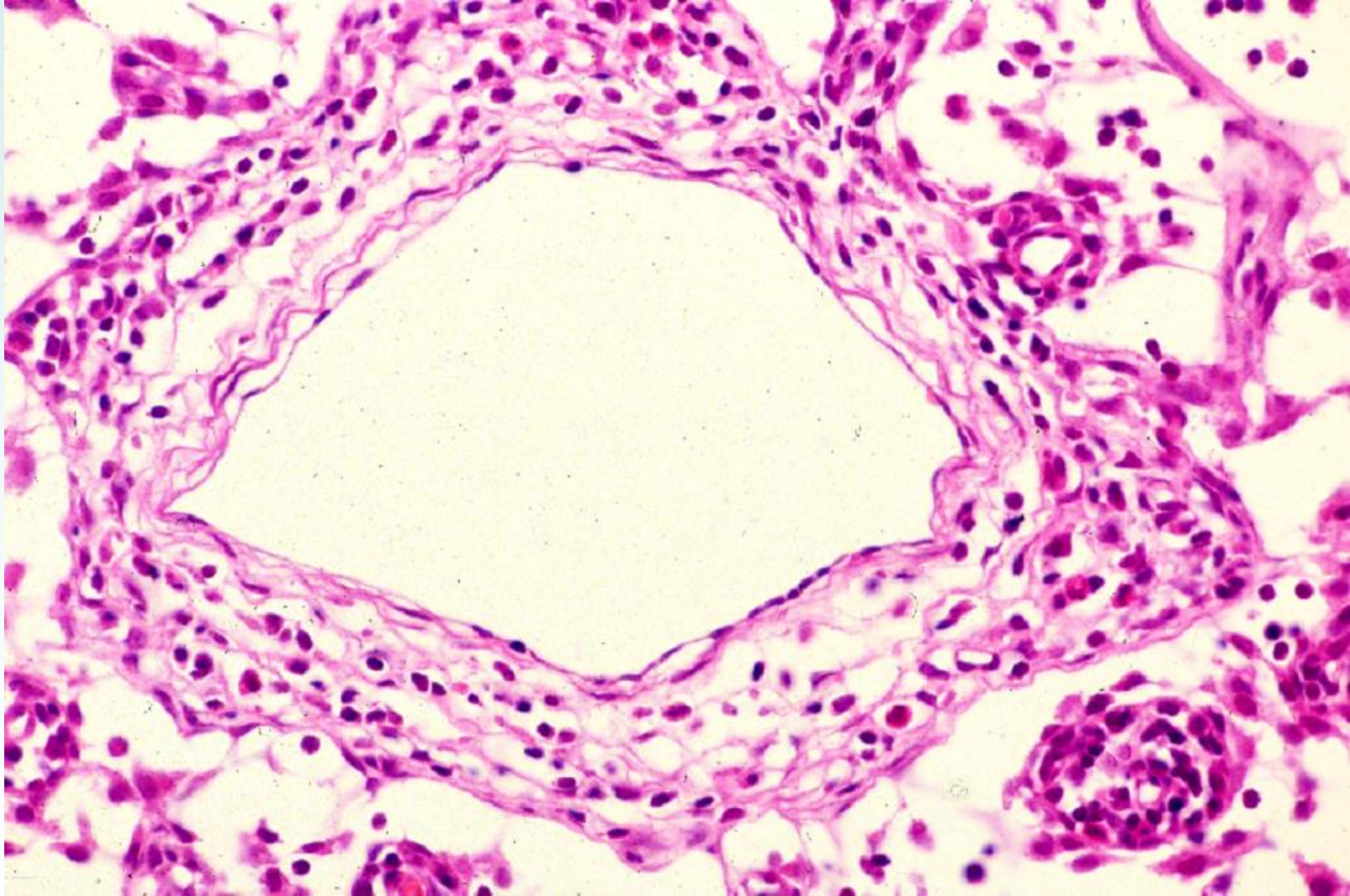
07-21 Medullary cords and medullary sinus 2. Human, H-E stain, x 100.



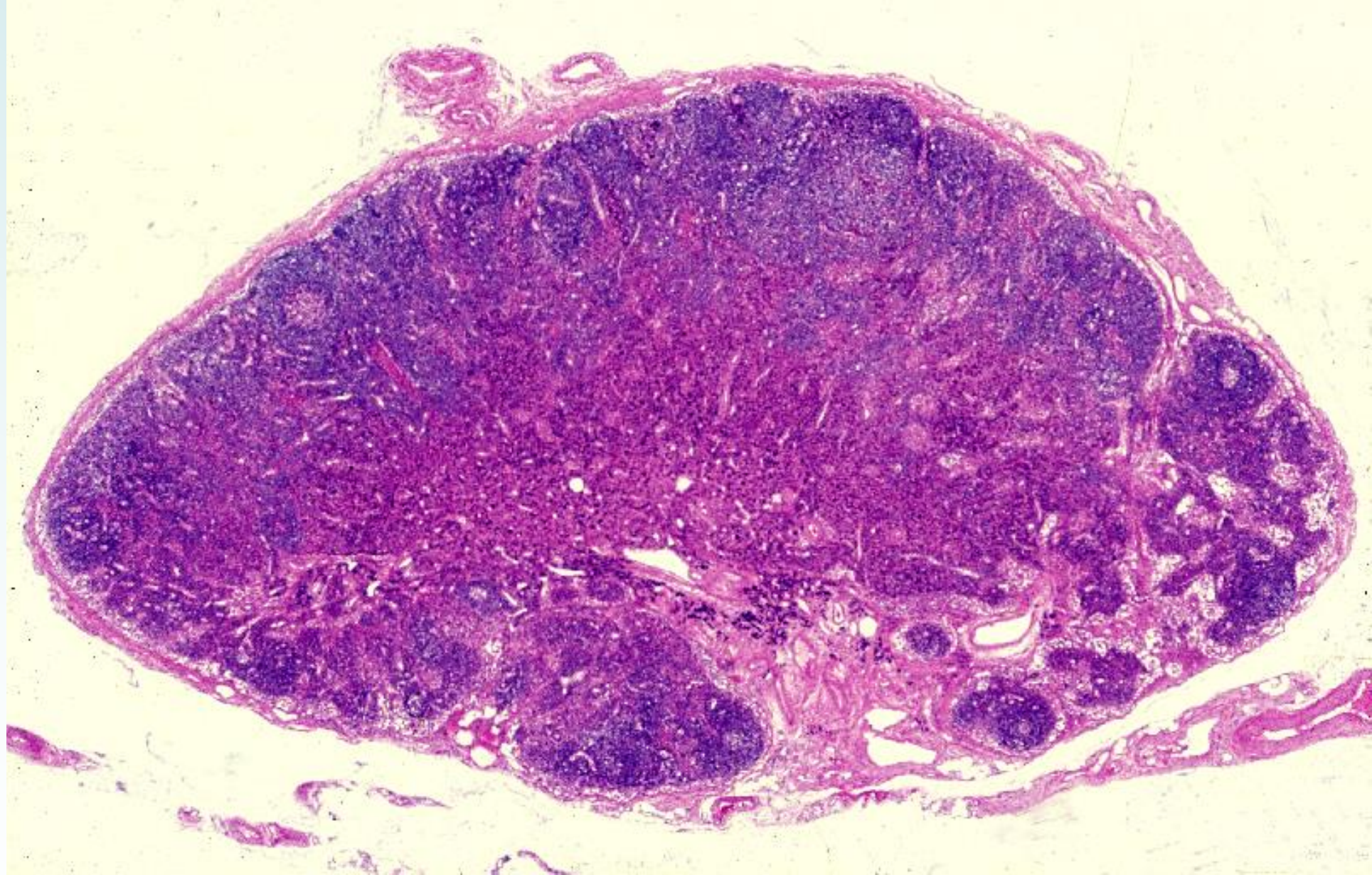
07-22 Medullary cord and medullary sinus 3. Human, H-E stain, x 160.



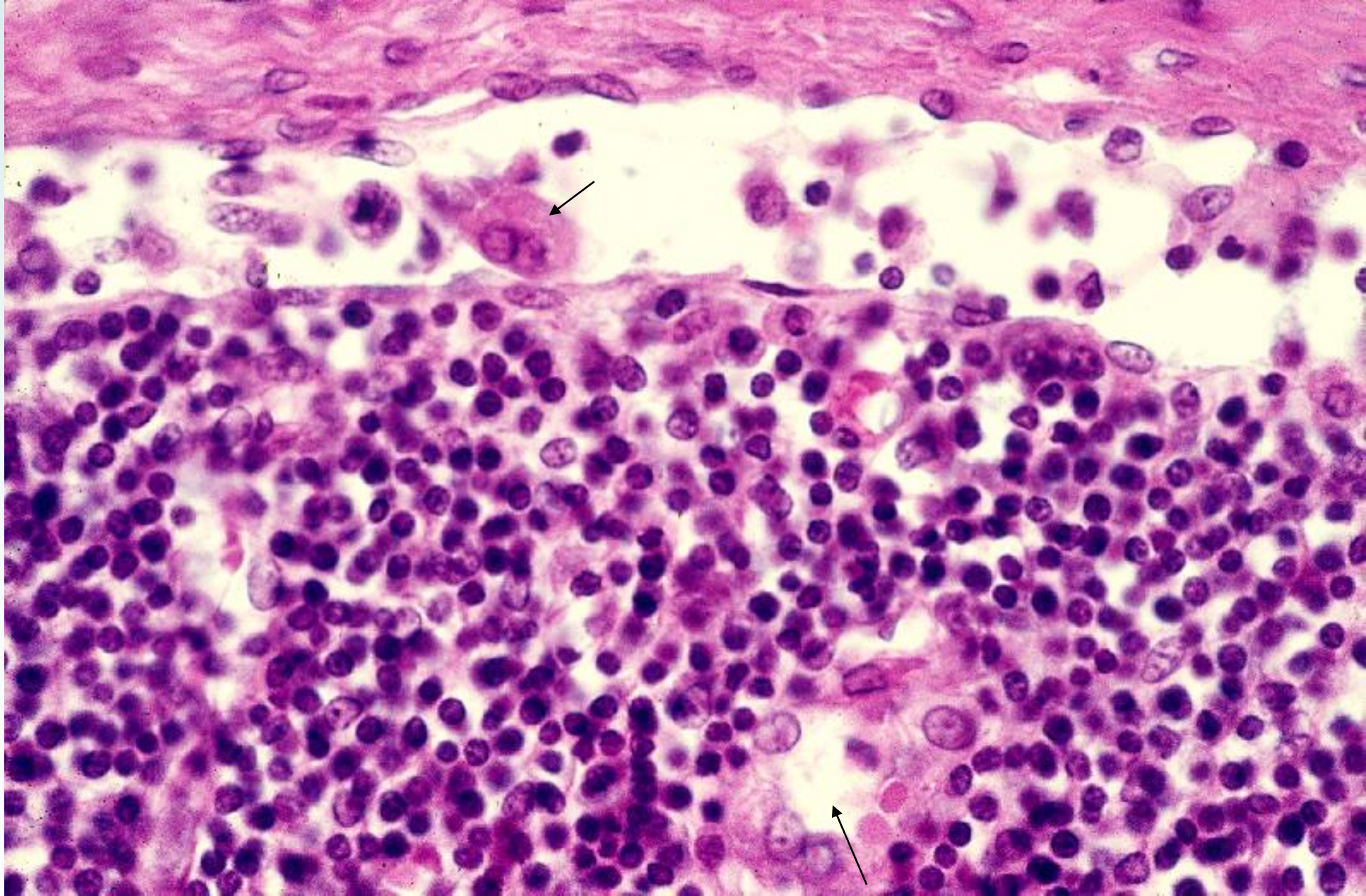
07-23 Medullary cords and medullary sinus 4. Human, H-E stain, x 40.



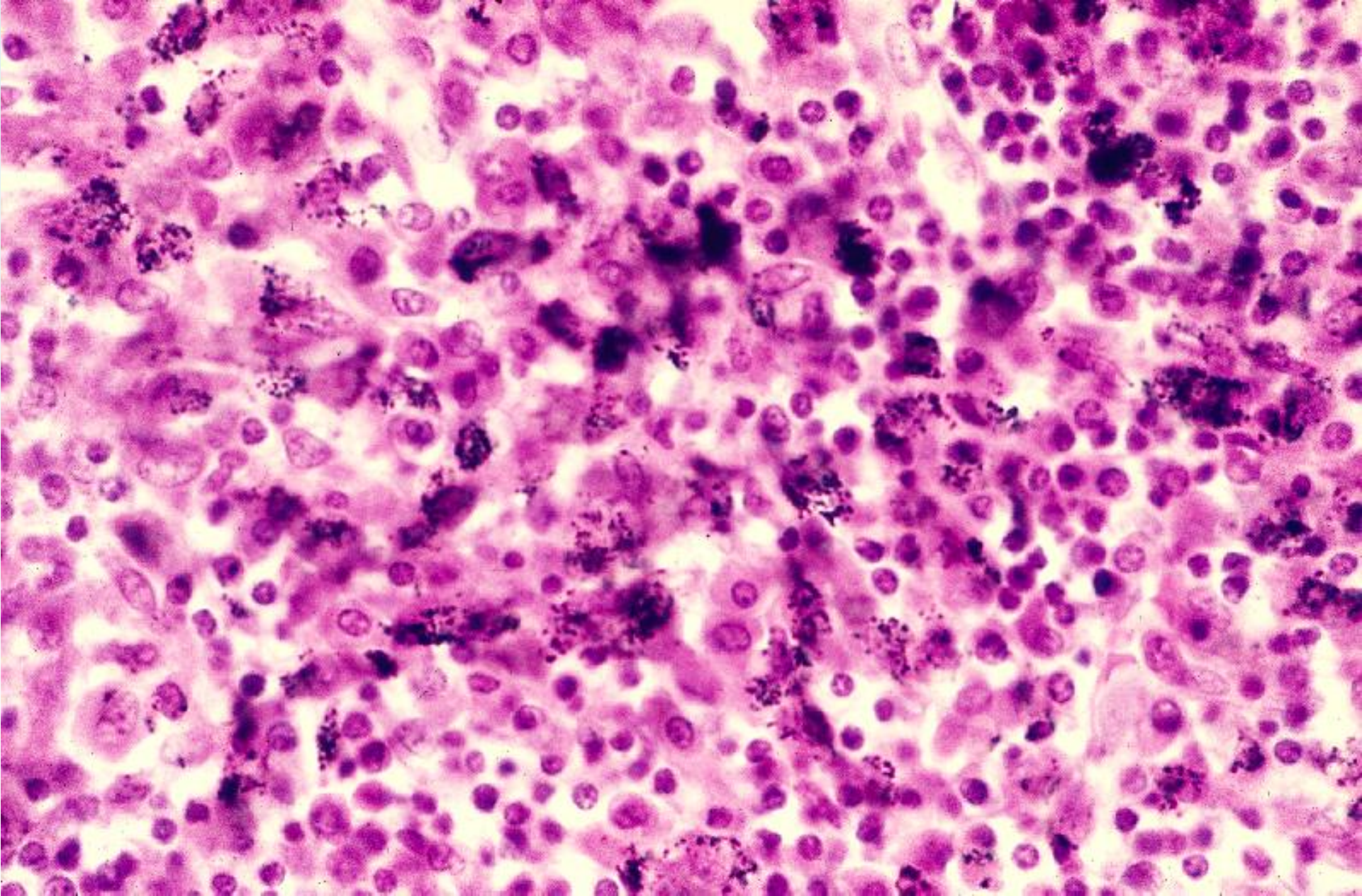
**07-24 Transverse section of an efferent lymphatic vessel. Human, H-E stain, x 100.**



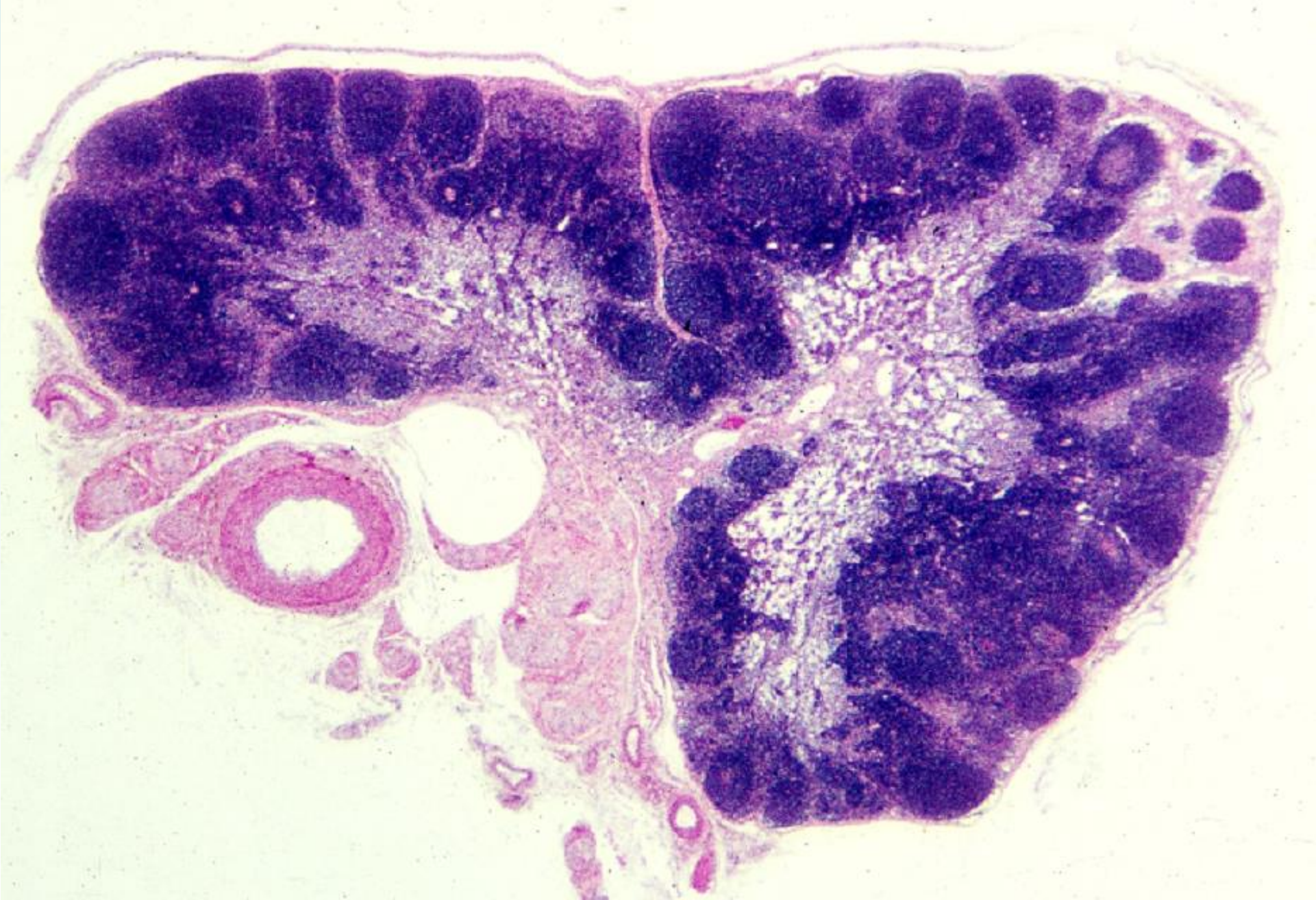
07-25 Lymph node, general view. Human, H-E stain, x 5.0.



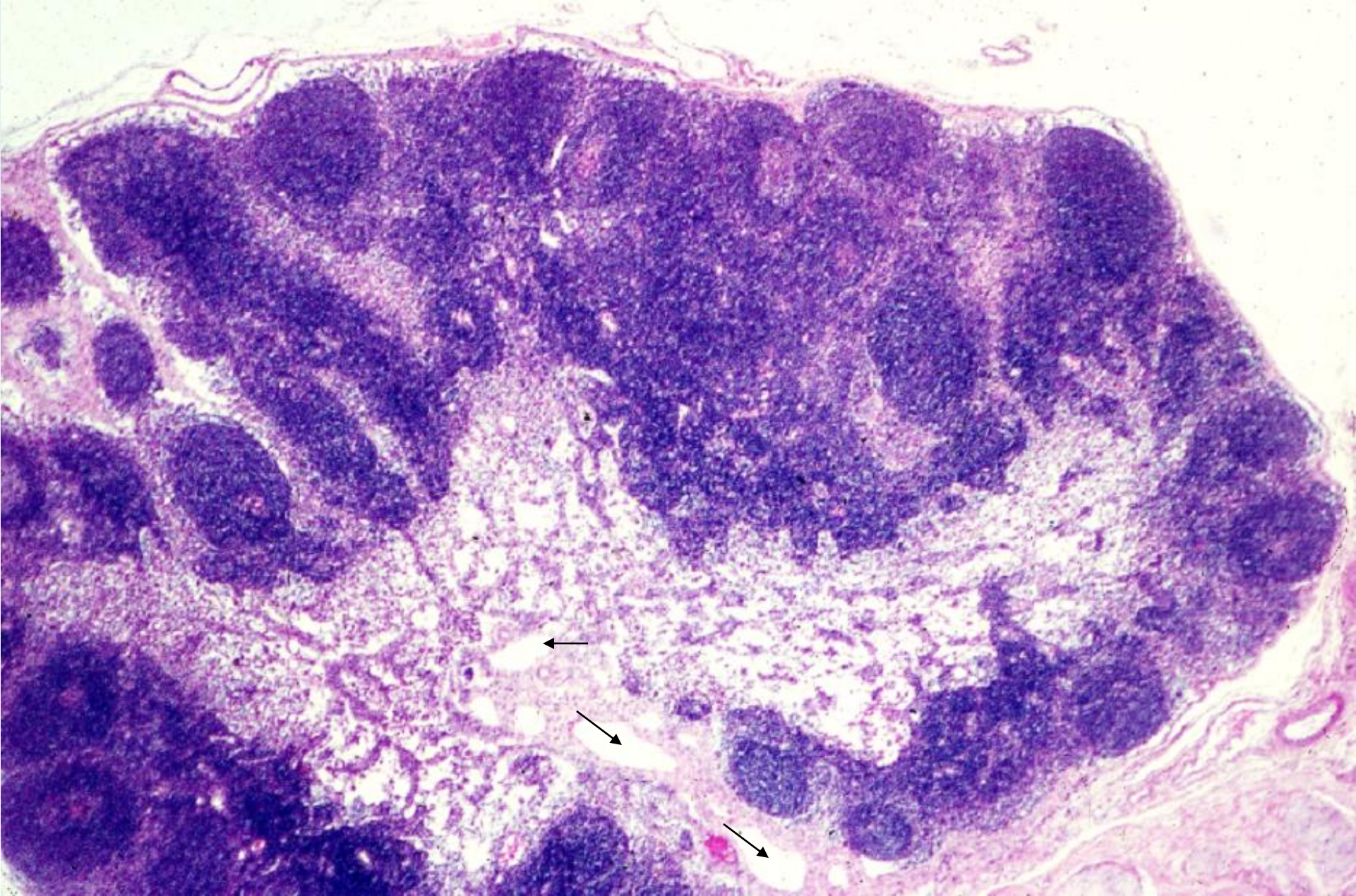
07-26 Subcapsular sinus and cortex. Human, H-E stain, x 160.



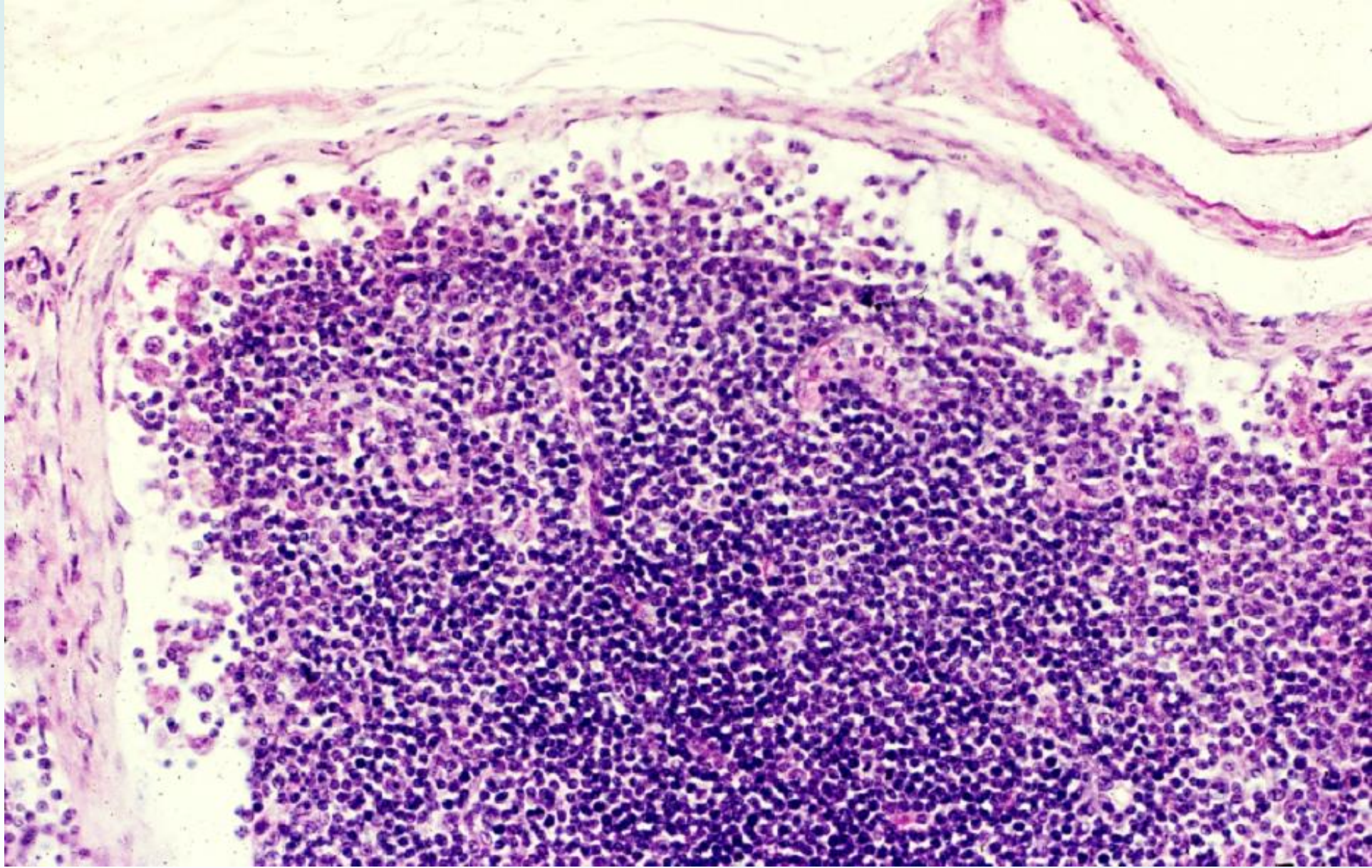
07-27 Medullary sinus. Human, H-E stain, x 160.



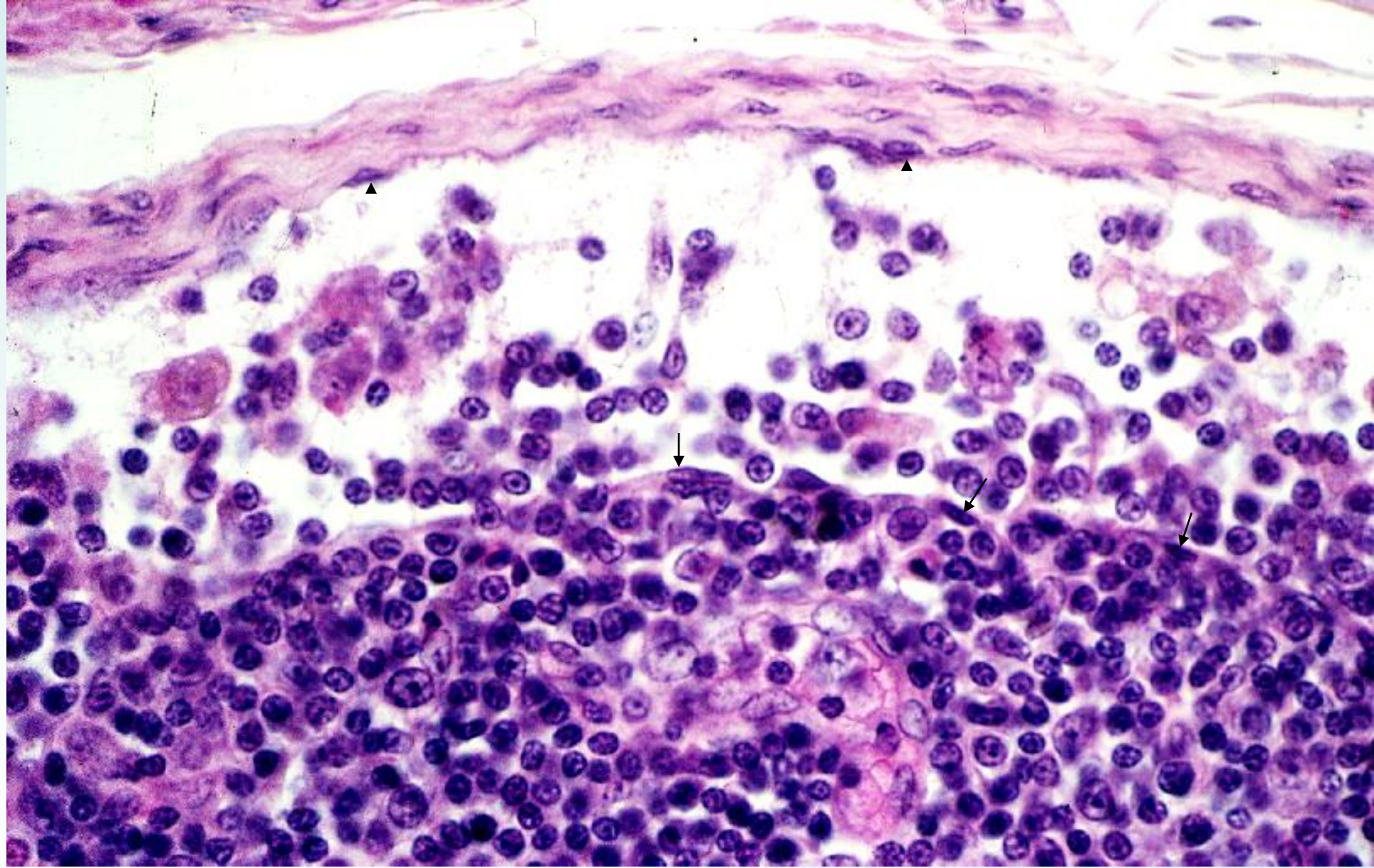
**07-28** General view of a lymph node. Monkey, H-E stain, x 4.0.



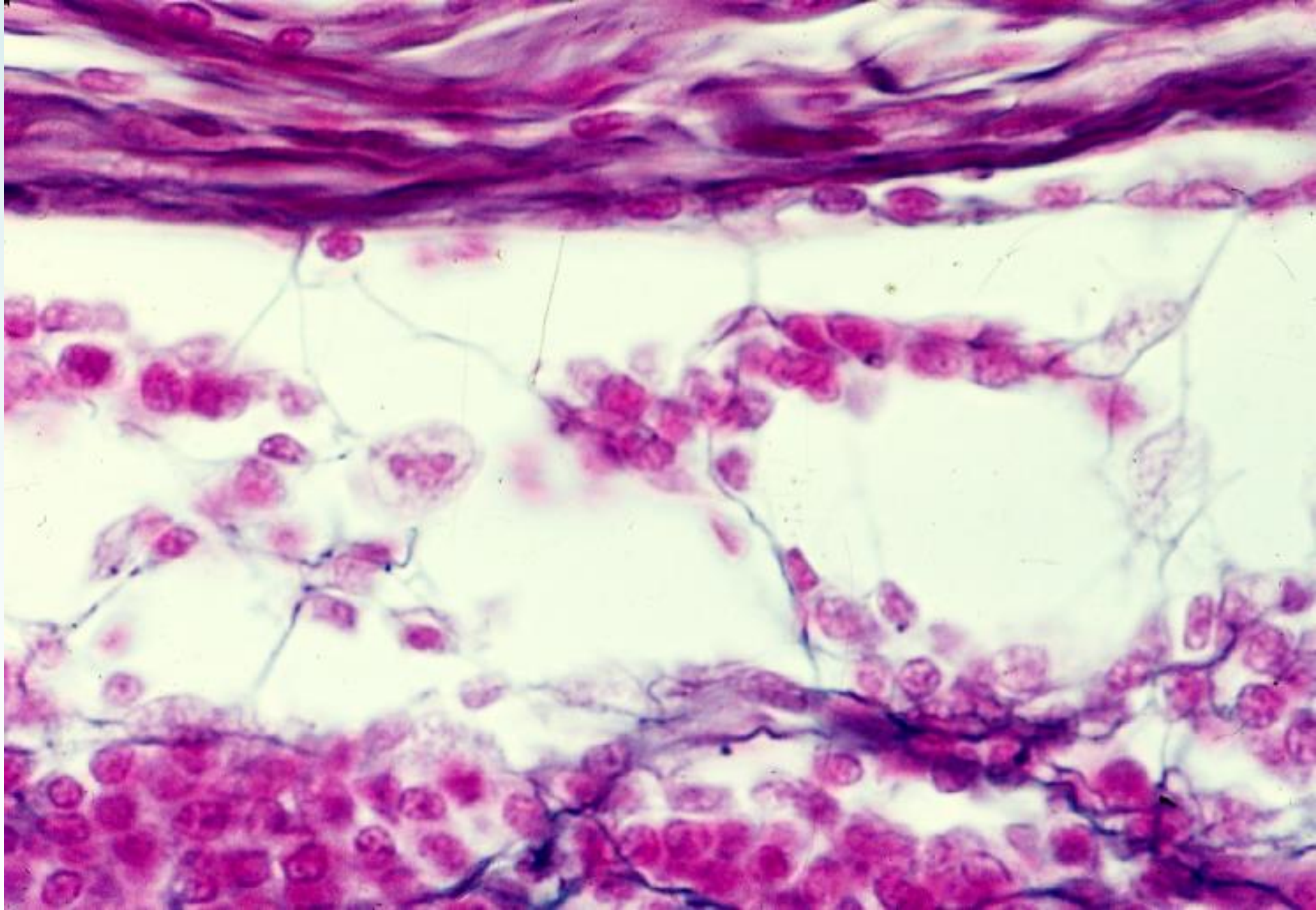
07-29 General view of cortex and medulla. Monkey, H-E stain, x 10.



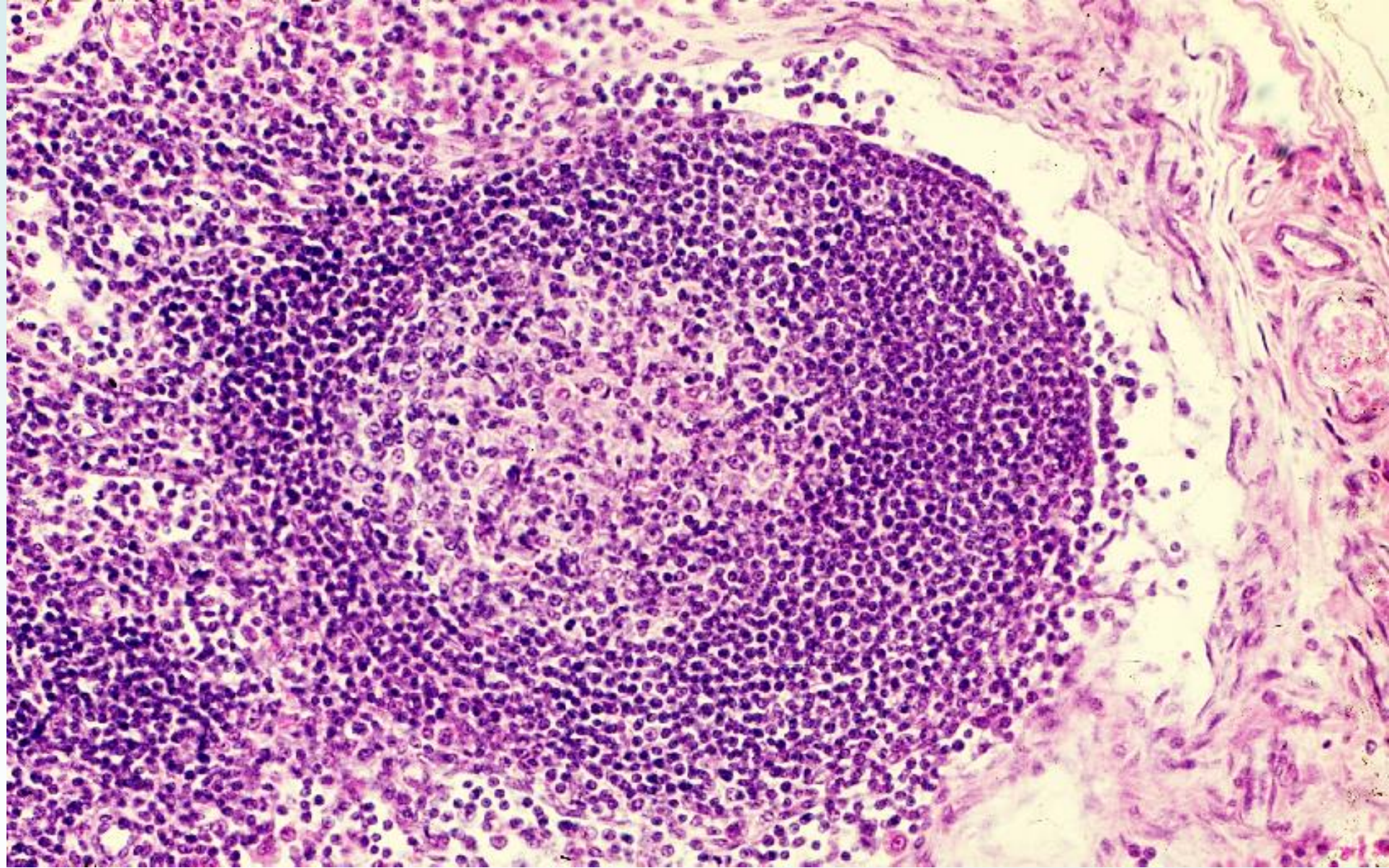
07-30 Cortex and marginal sinus. Monkey, H-E stain, x 64.



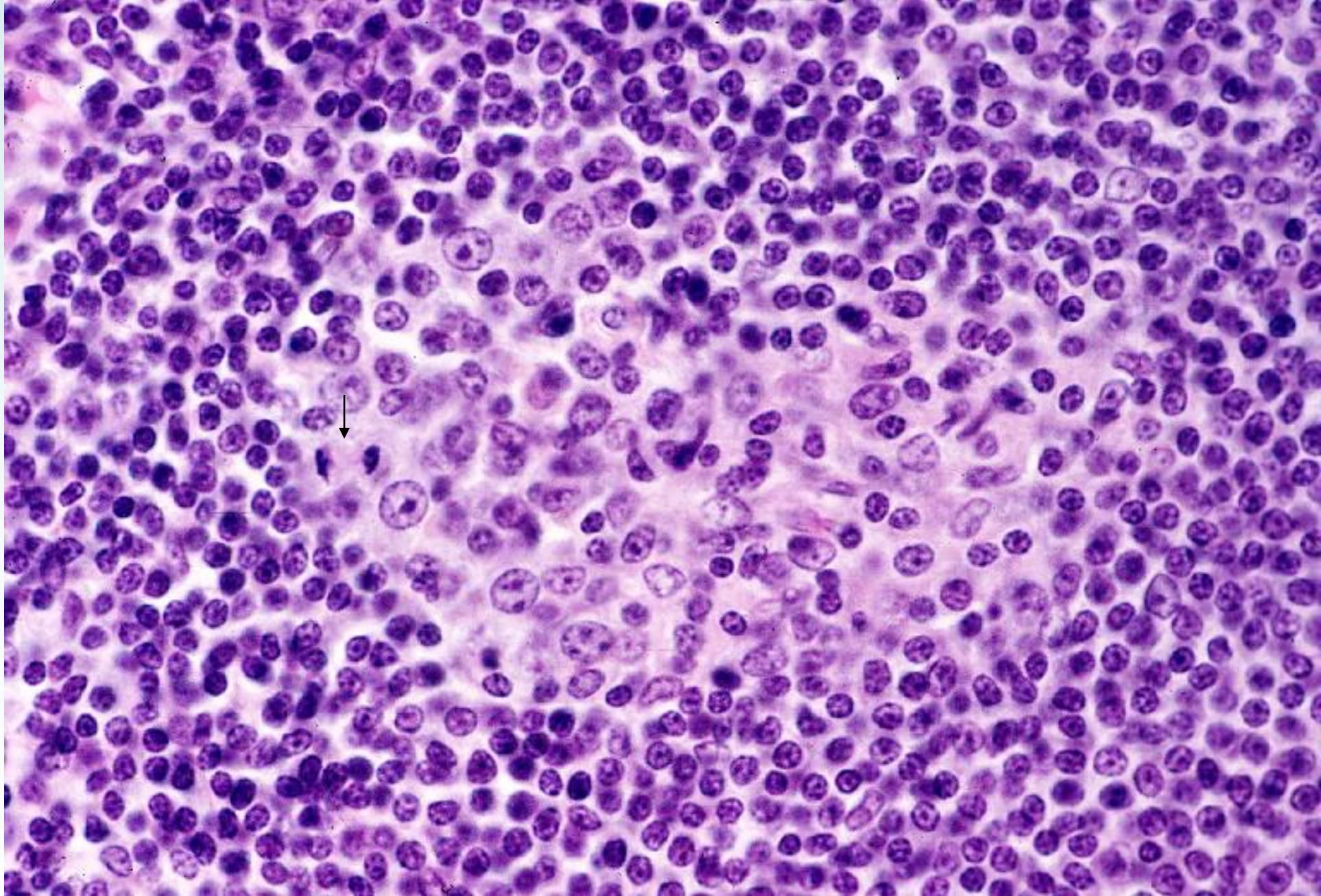
07-31 Marginal sinus 1. Monkey, H-E stain, x 160.



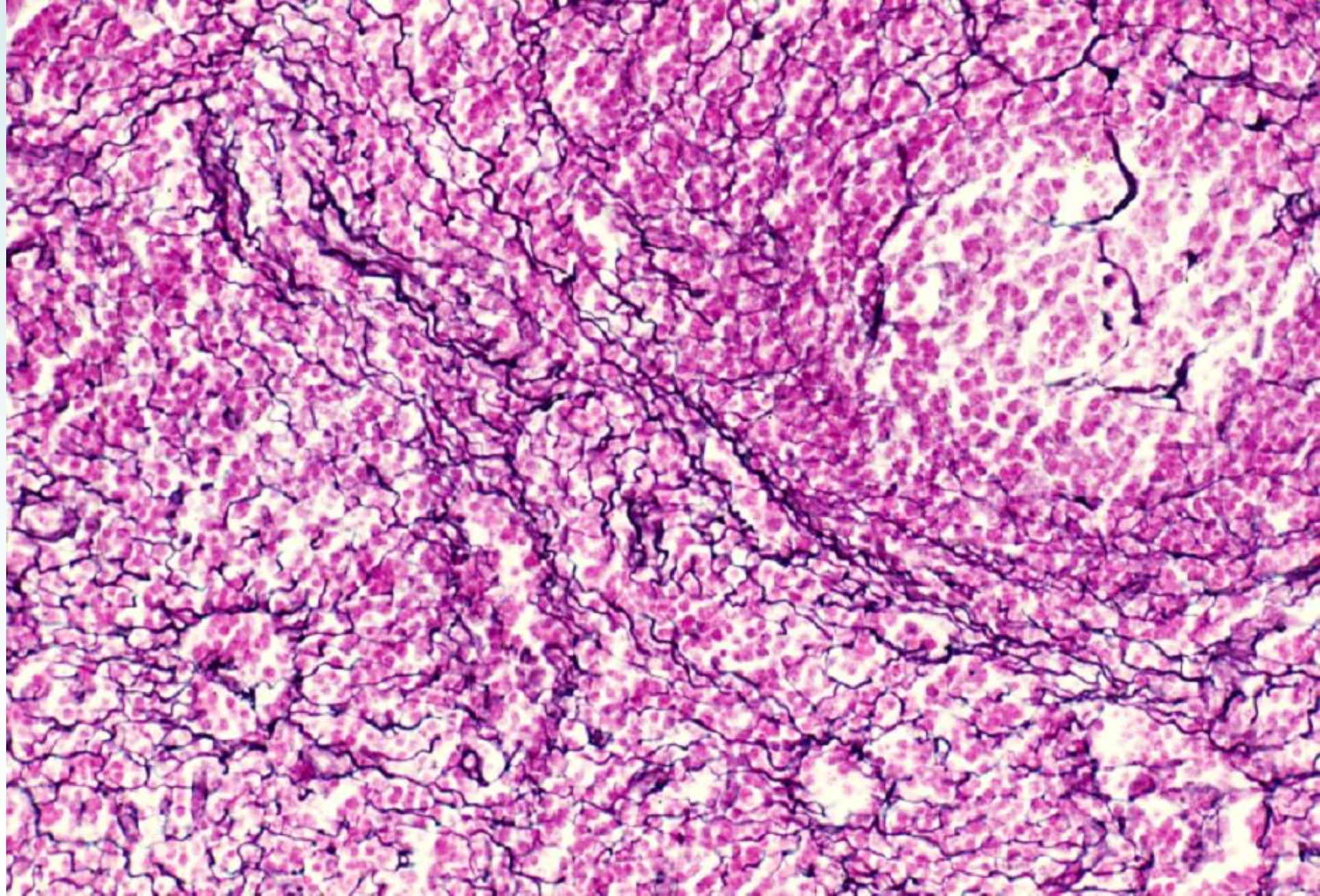
**07-32 Marginal sinus 2. Monkey, silver impregnation and Kernechtrot stain, x 250.**



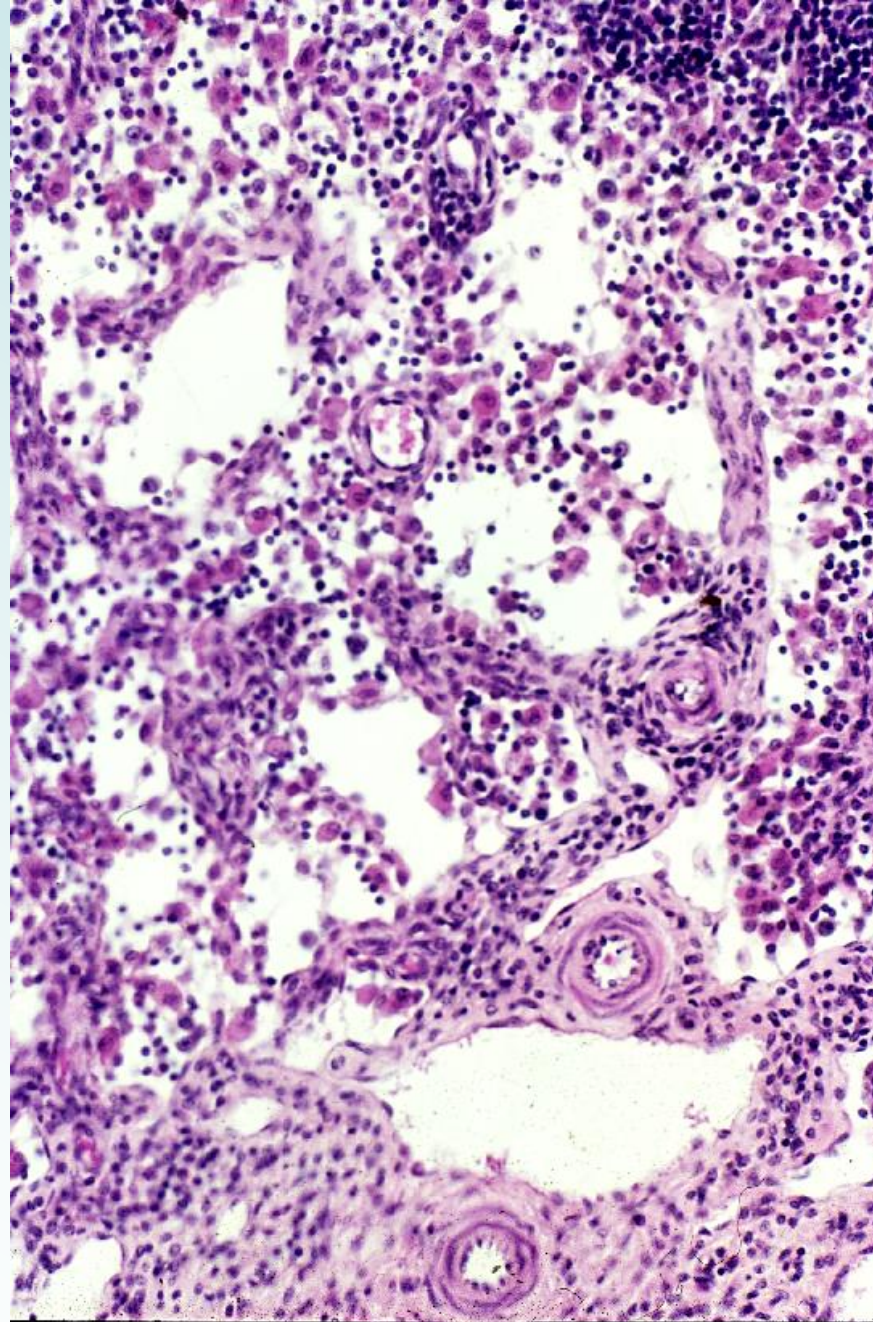
07-33 Cortex, lymphatic nodule with germinal center. Monkey, H-E stain, x 64.



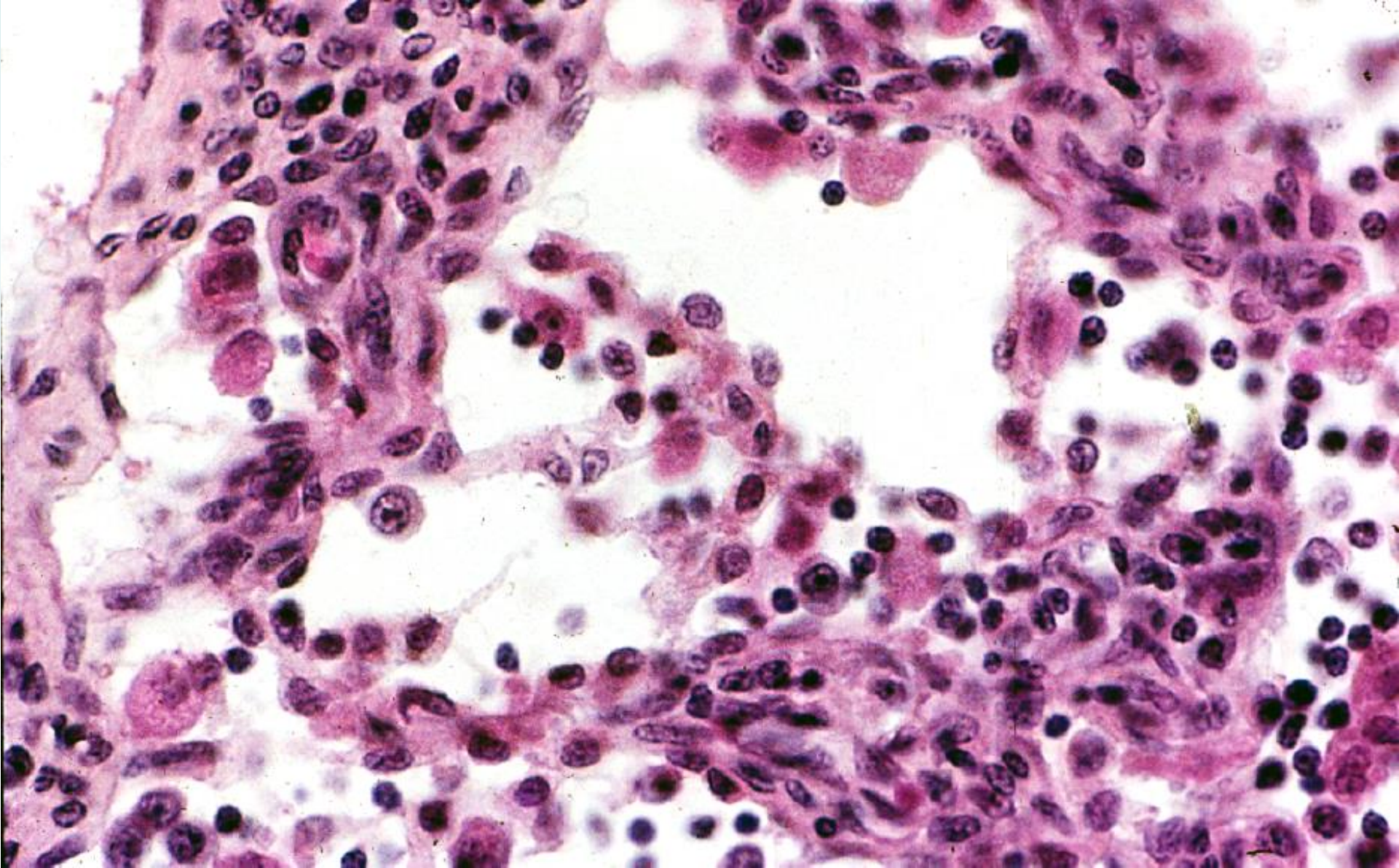
07-34 Germinal center. Monkey, H-E stain, x 250.



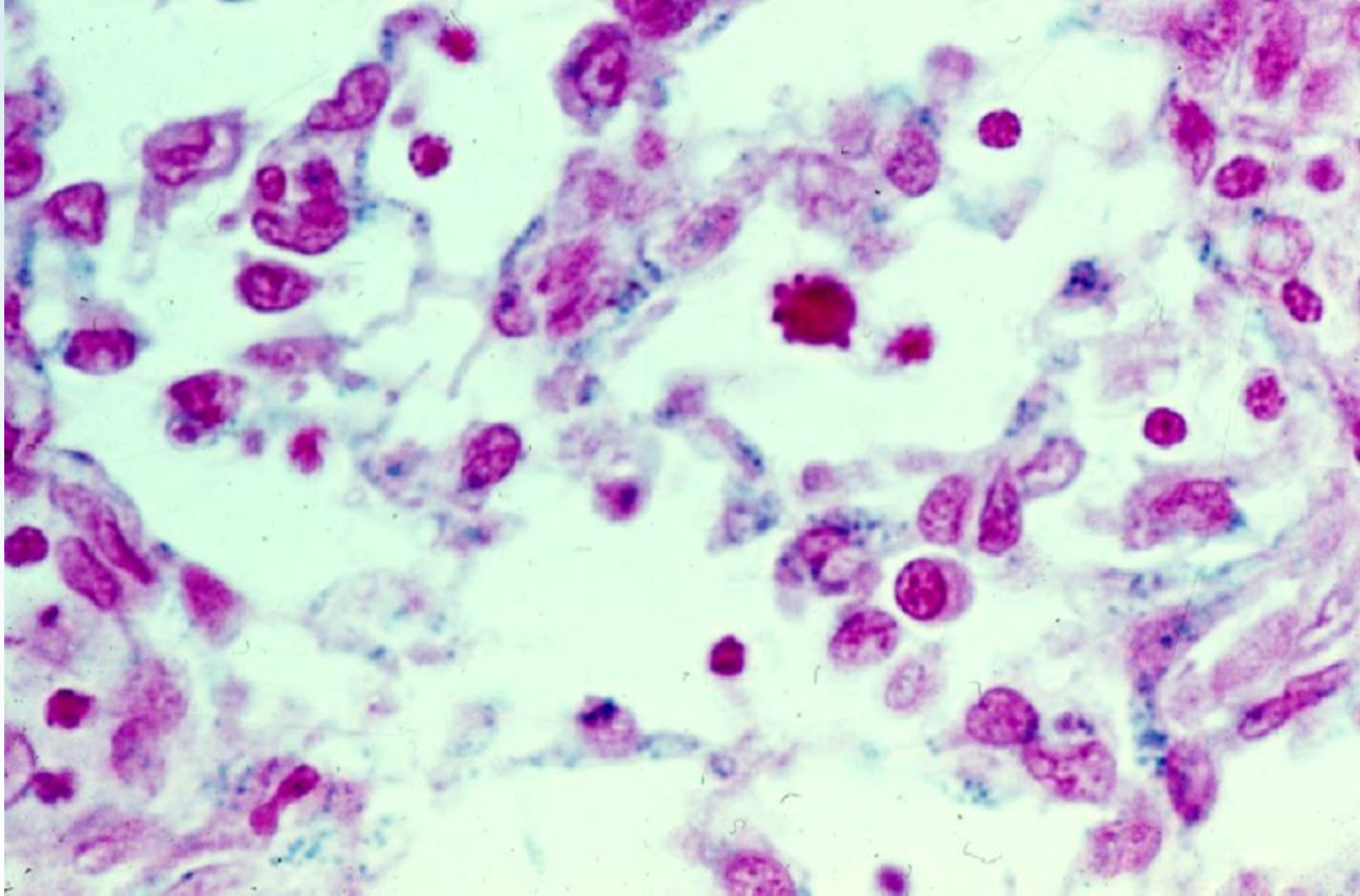
**07-35 Cortex and medulla. Monkey, silver impregnation and Kernechtrot stain, x 64.**



**07-36 Medullary cords and medullary sinus 1. Monkey, H-E stain, x 64.**



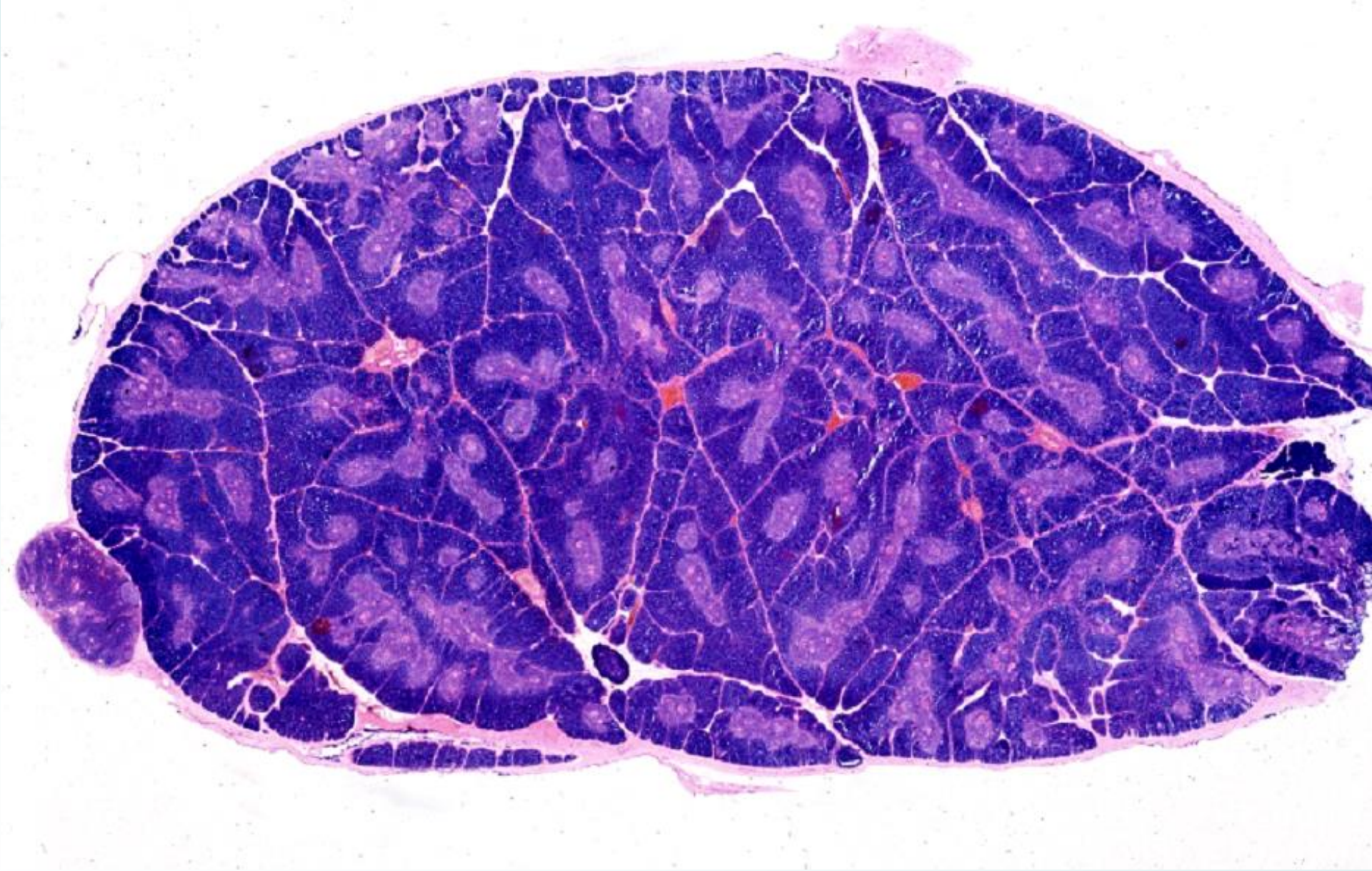
07-37 Medullary cords and medullary sinus 2. Monkey, H-E stain, x 160.



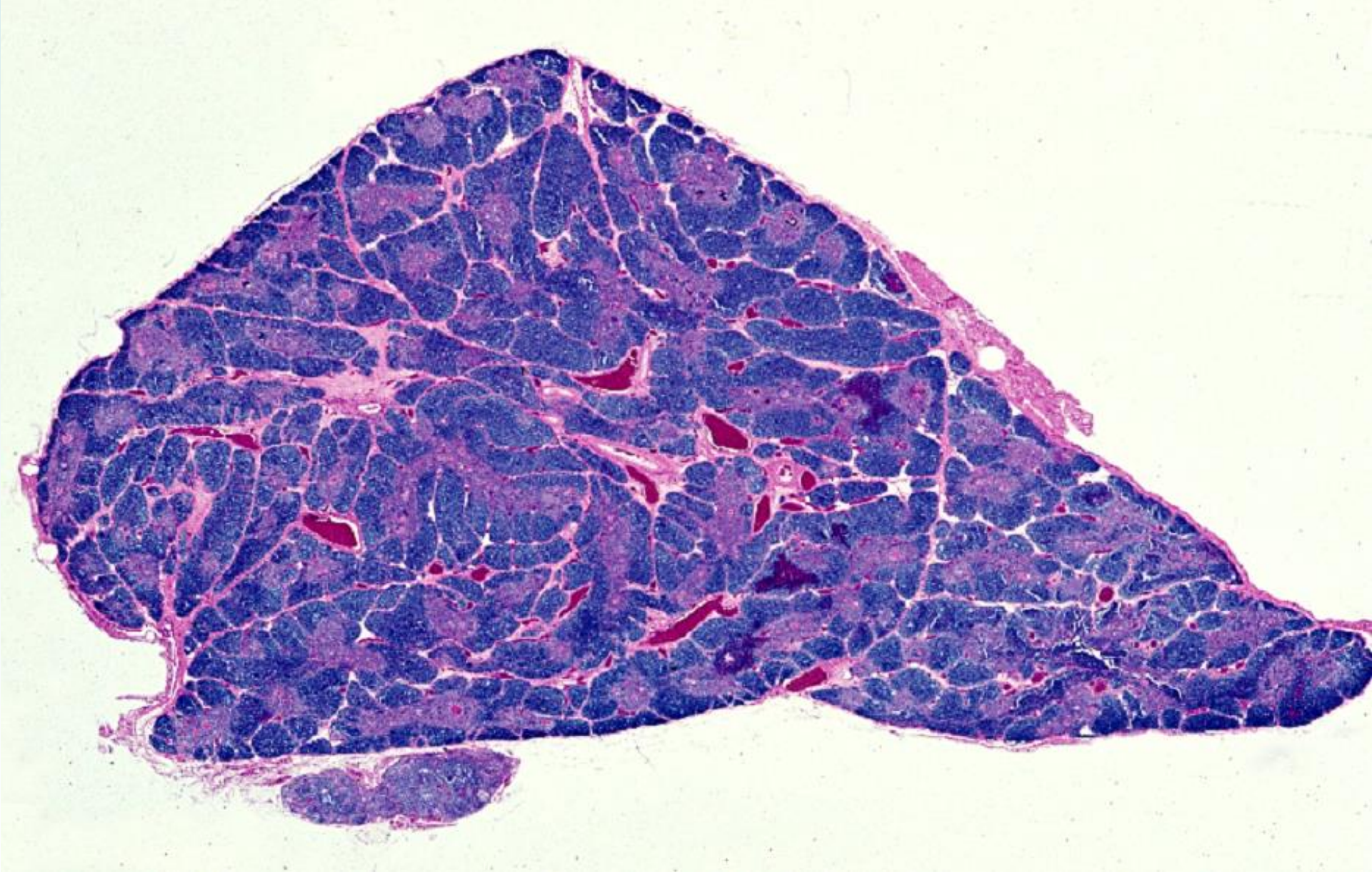
07-38 Medullary sinus. Rabbit, vital stain with tripan blue and Kernechtrot stain, x 250.

# 07-003

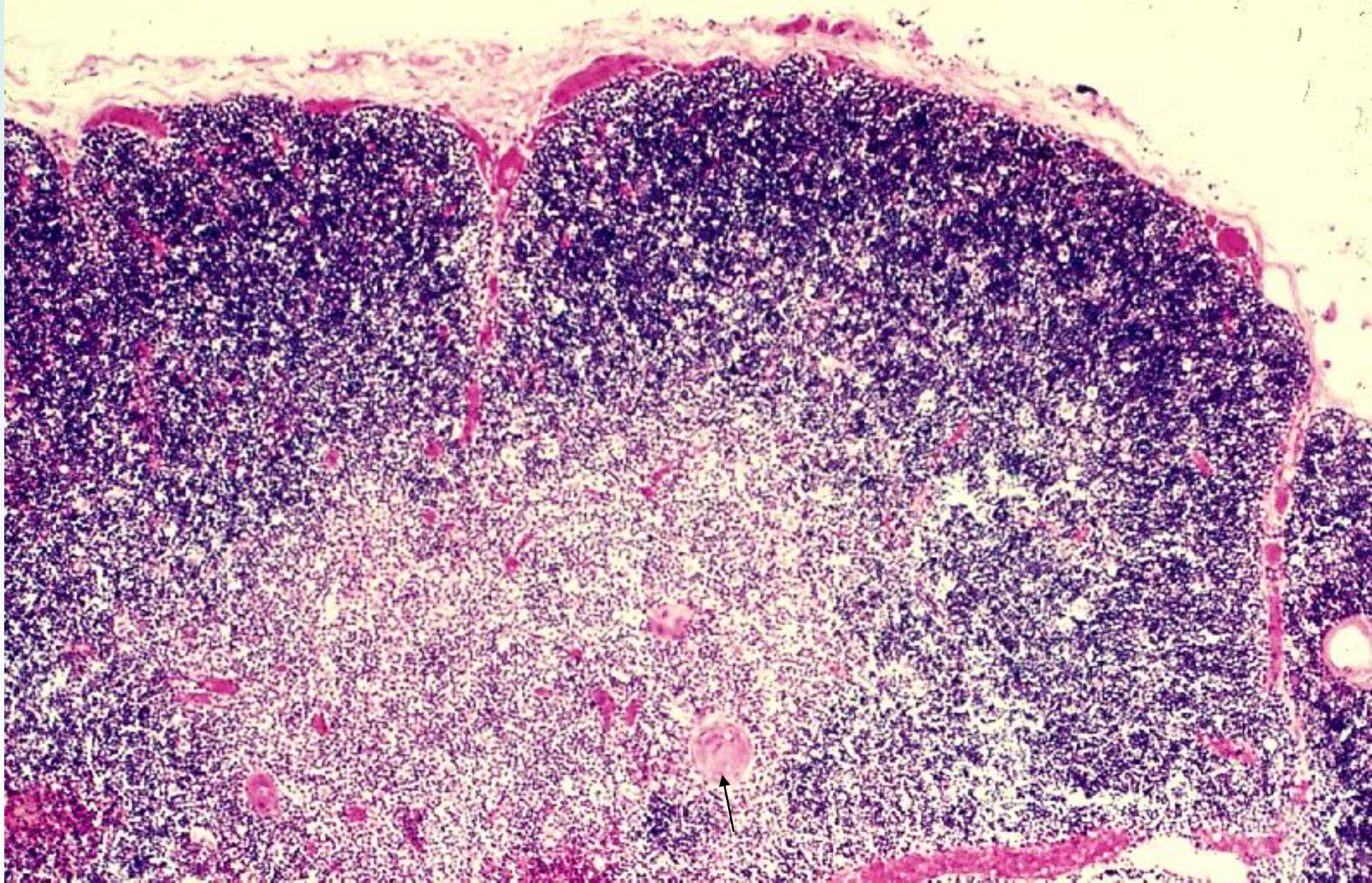
# Thymus



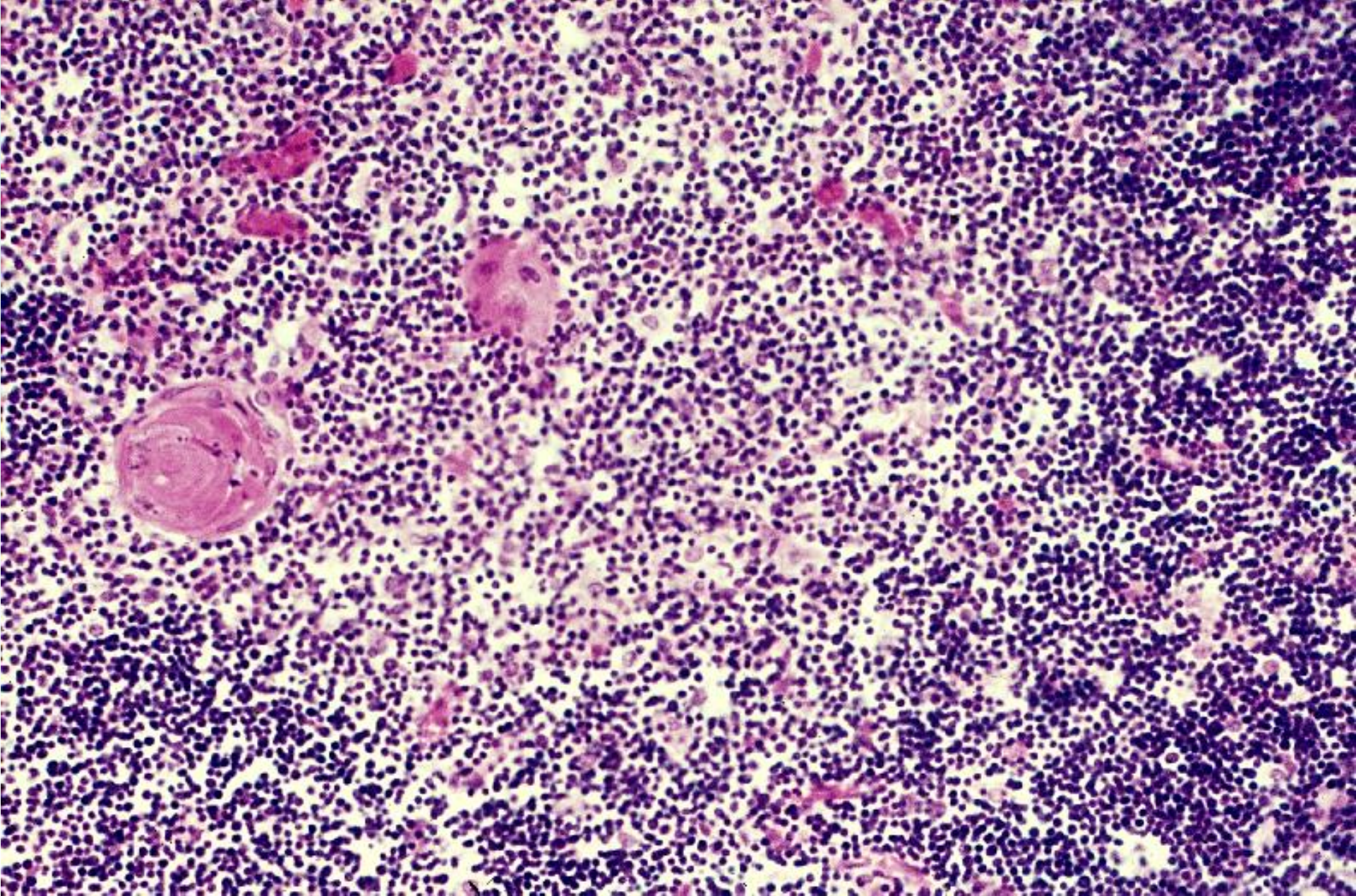
07-39 Thymus of 9-month-old child. Human, H-E stain, x 1.4.



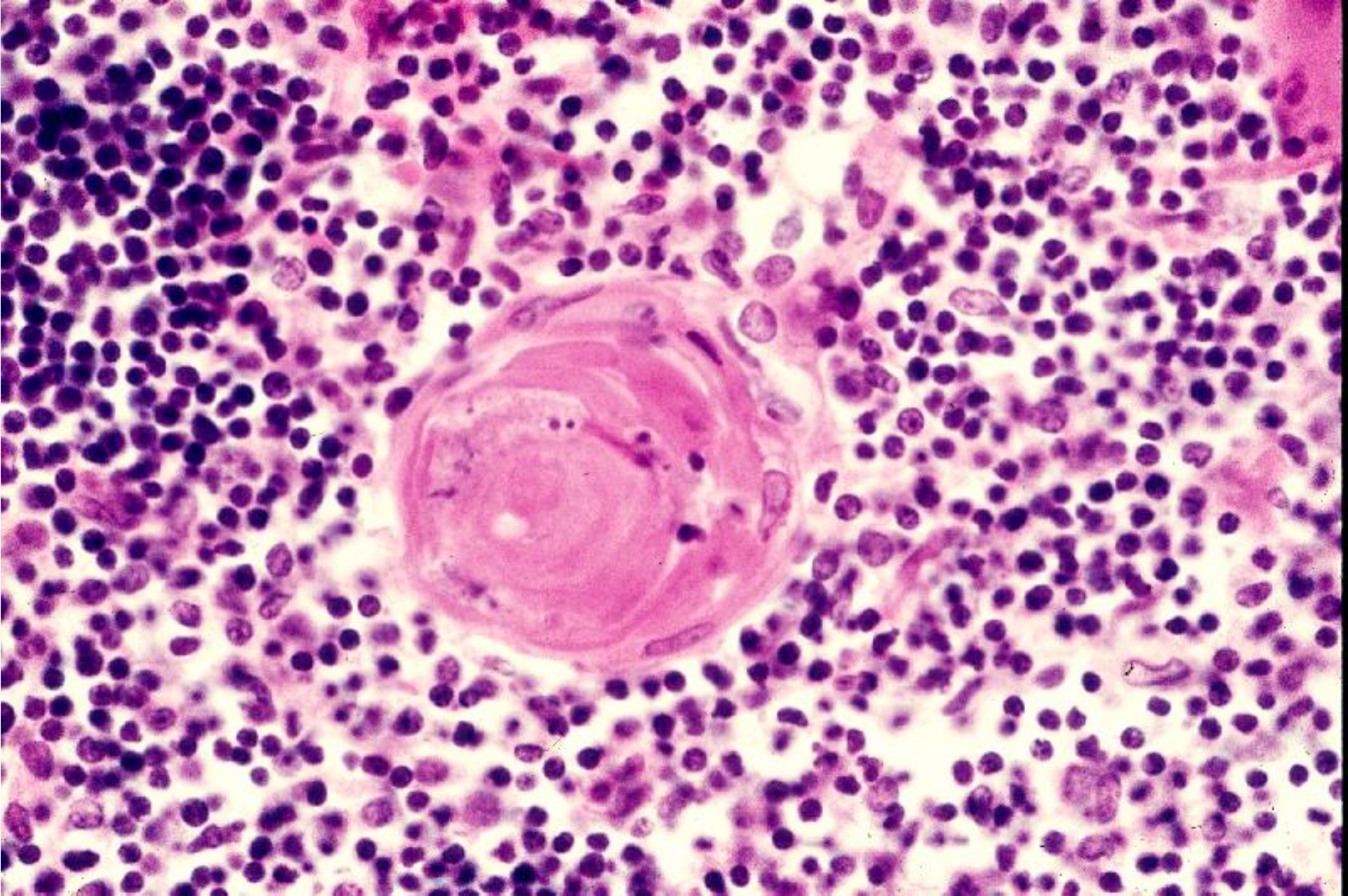
07-40 Thymus of 2.9-year-old boy. Human, H-E stain, x 1.4.



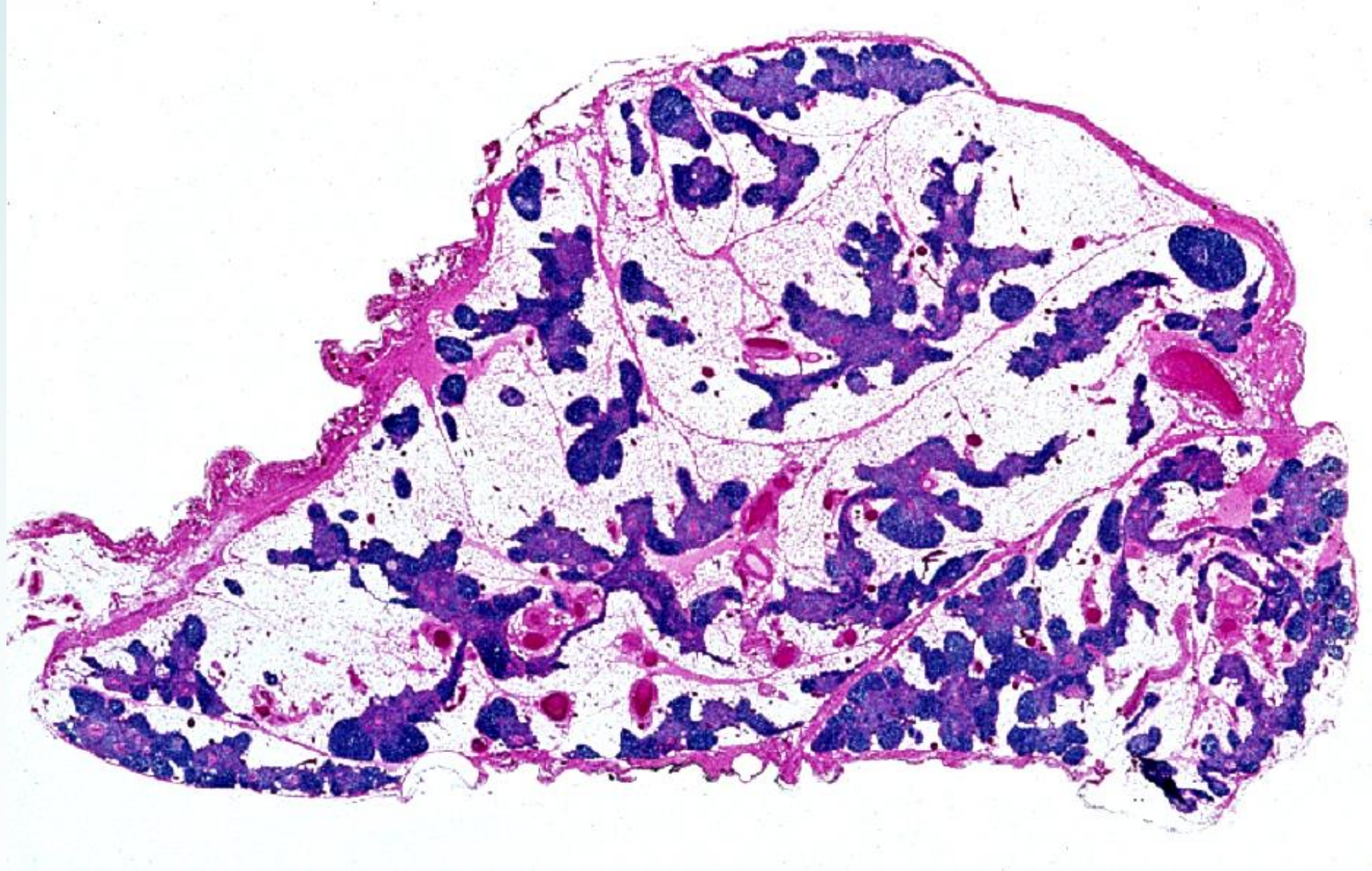
07-41 Thymus of 2.9-year-old boy, cortex and medulla Human, H-E stain, x 25.



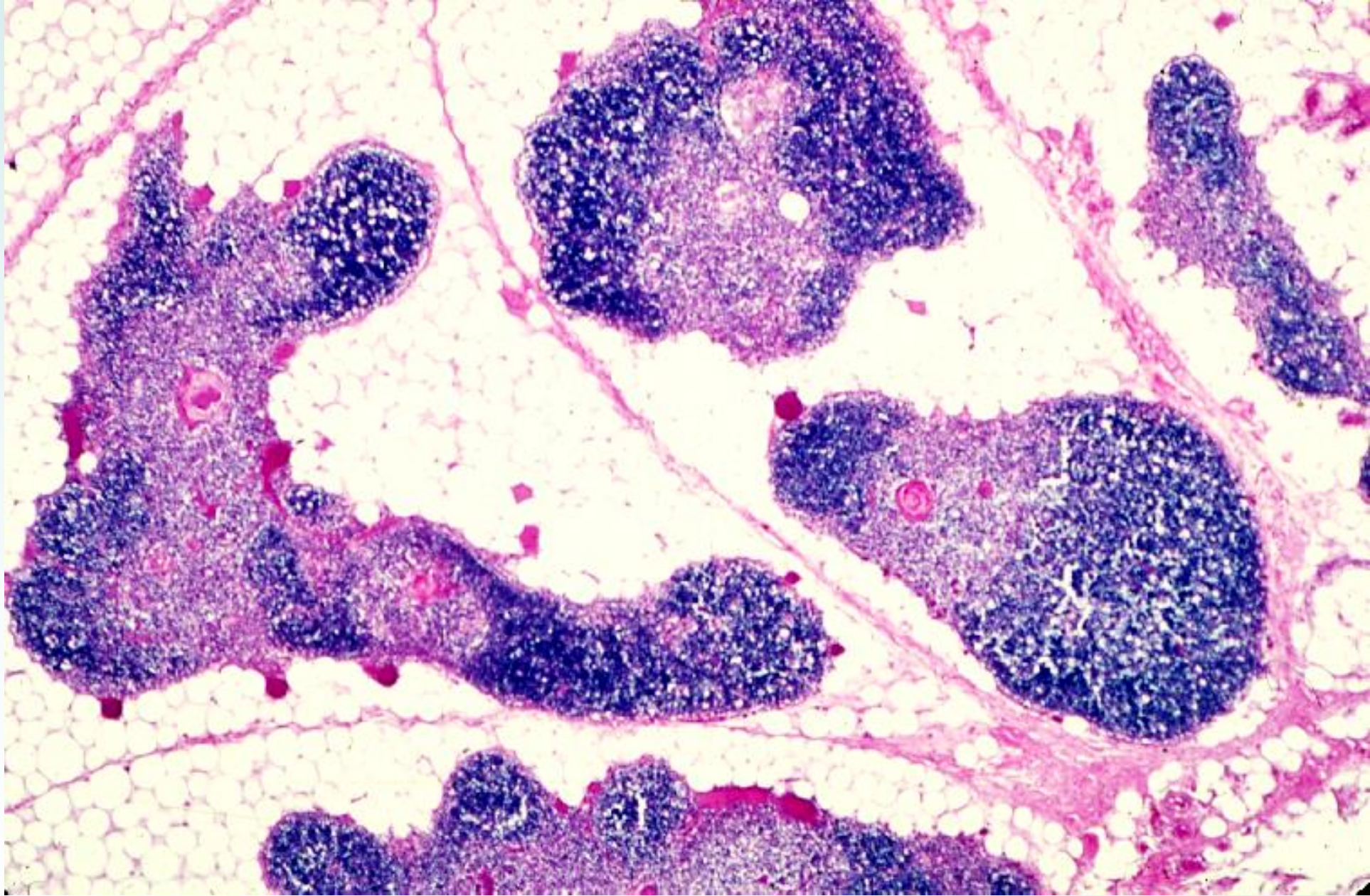
07-42 Thymus of 2.9-year-old boy, medulla Human, H-E stain, x 64.



07-43 Thymus of 2.9-year-old boy, Hassall body. Human, H-E stain, x 25.



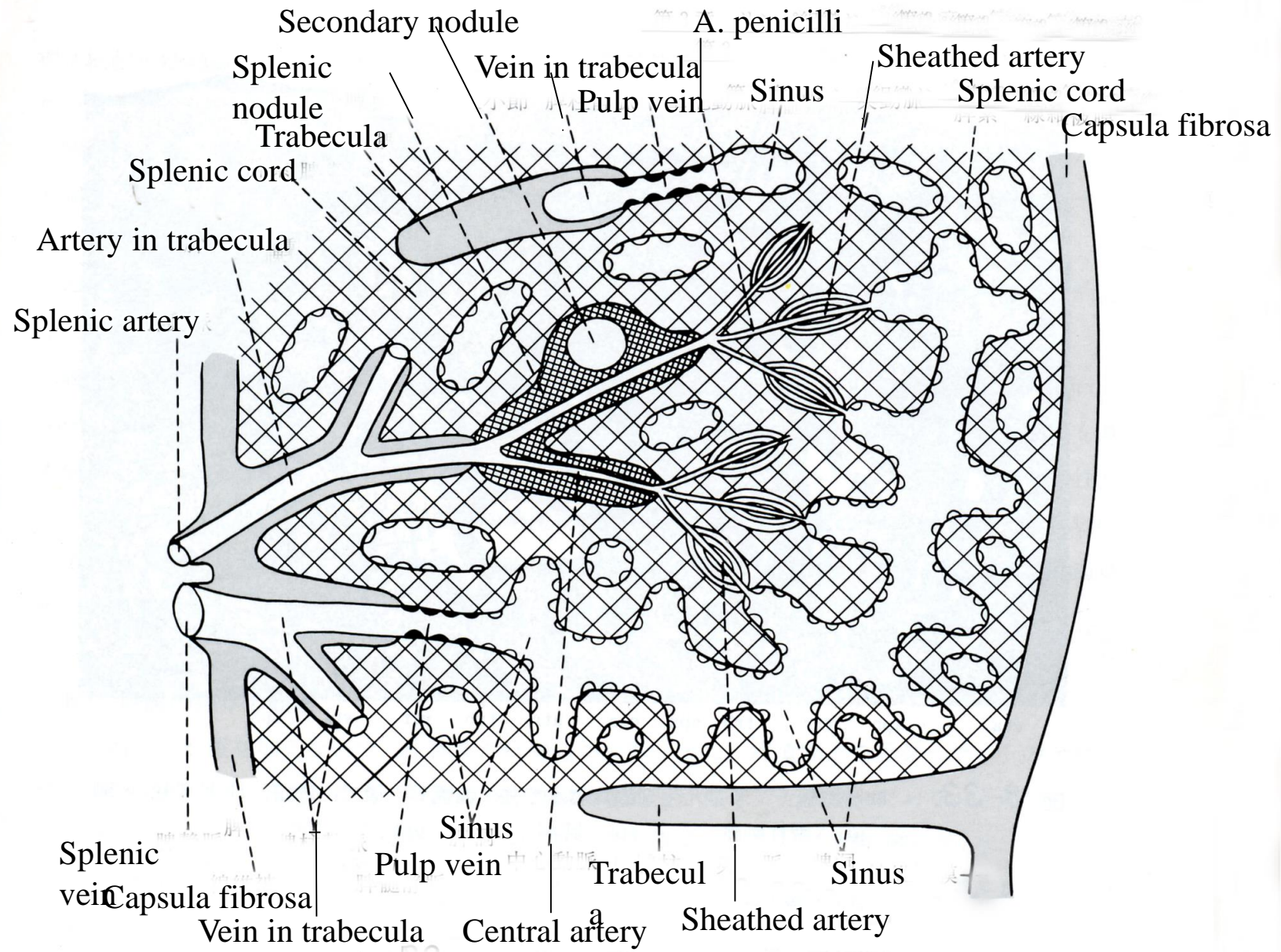
07-44 Thymus of an adult female. Human, H-E stain, x 1.5.

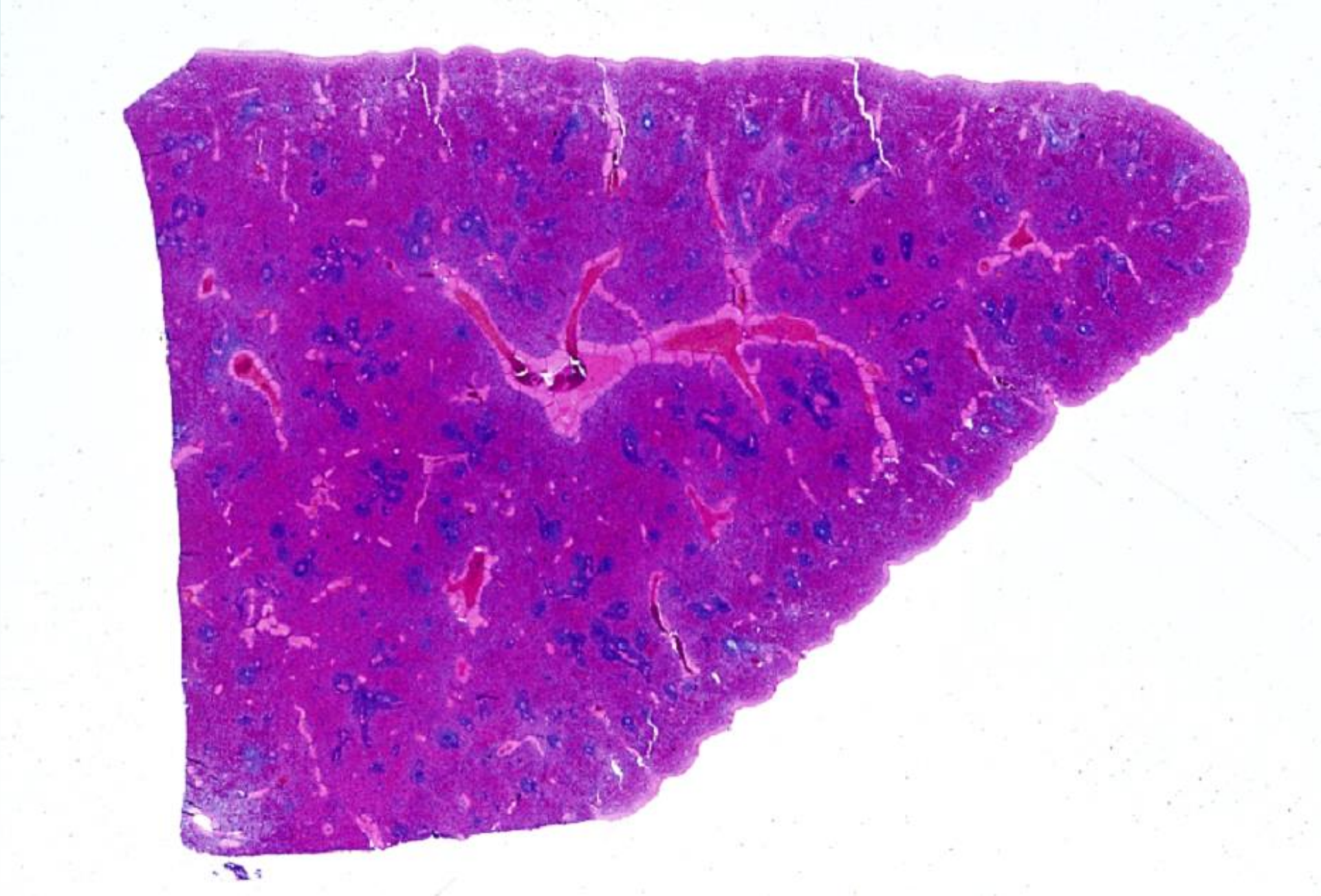


07-45 Thymus of an adult female, cortex and medulla. Human, H-E stain, x 1.5.

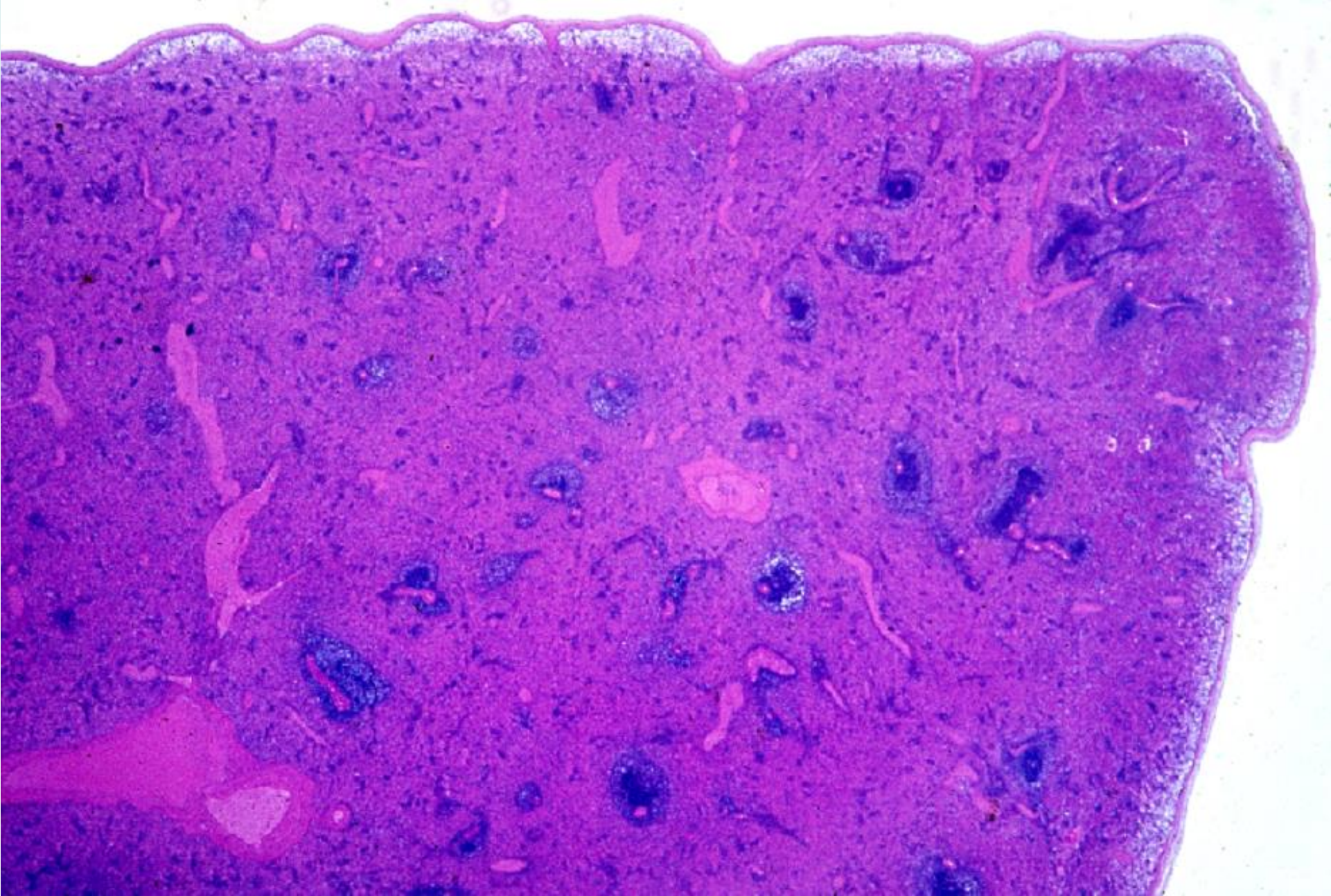
# 07-004

# Spleen

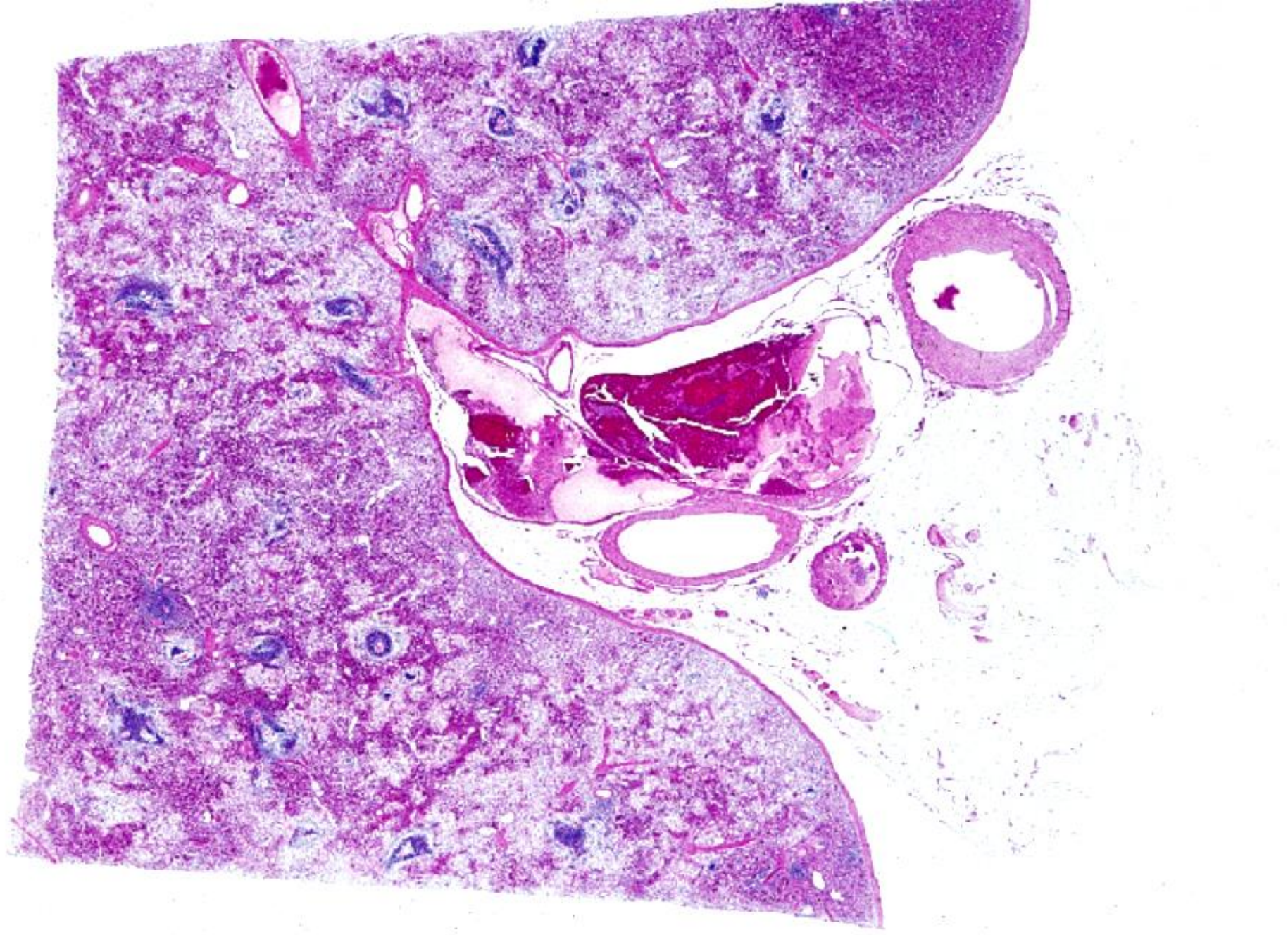




07-47 Spleen, general view, 1. Human, H-E stain, x 1.3.



07-48 Spleen, general view, 2. Human, H-E stain, x 2.0.



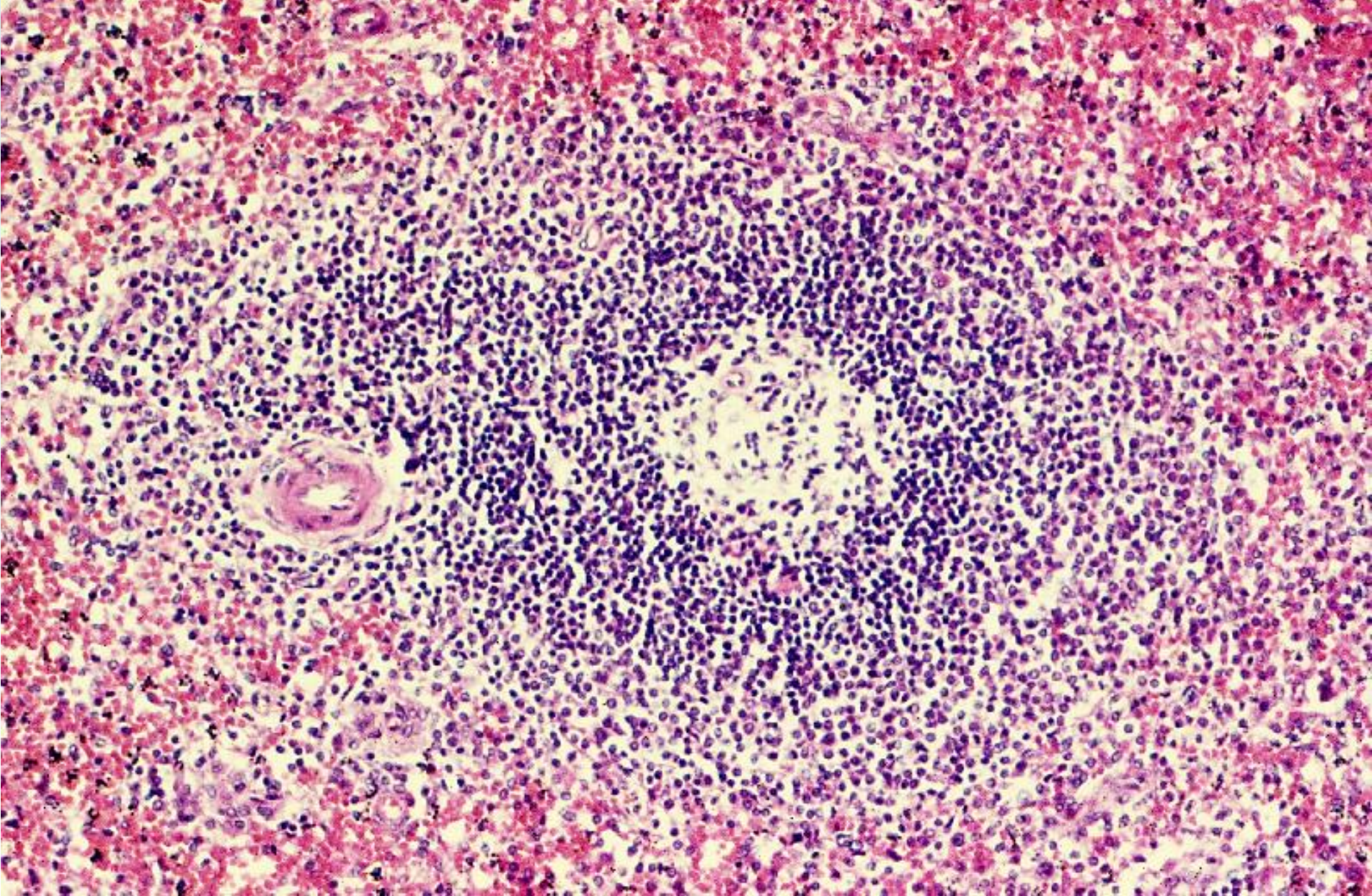
07-49 Spleen, general view, 3. Human, H-E stain, x 1.5.



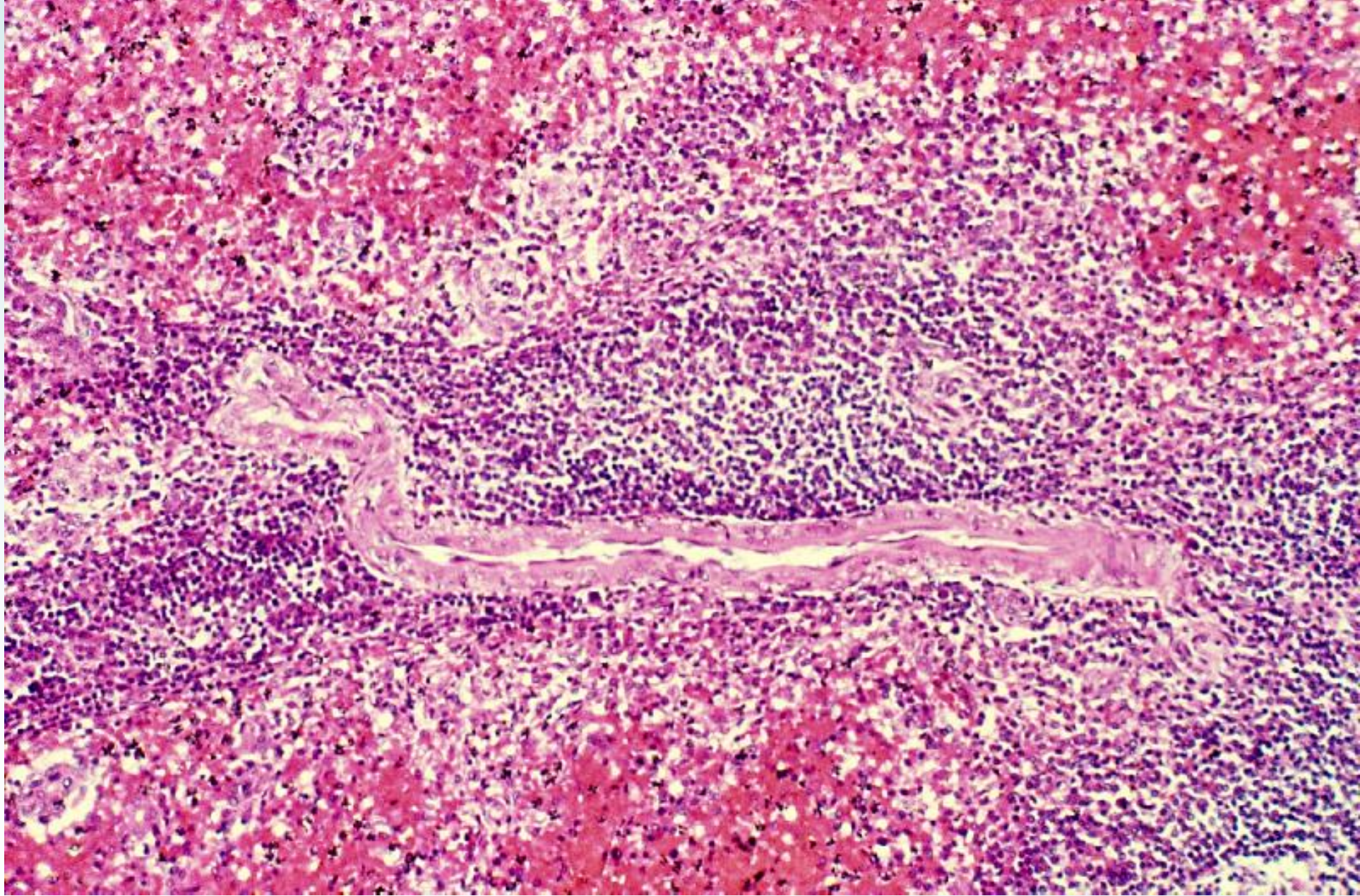
07-50 Spleen, general view, 4. Monkey, H-E stain, x 2.0.



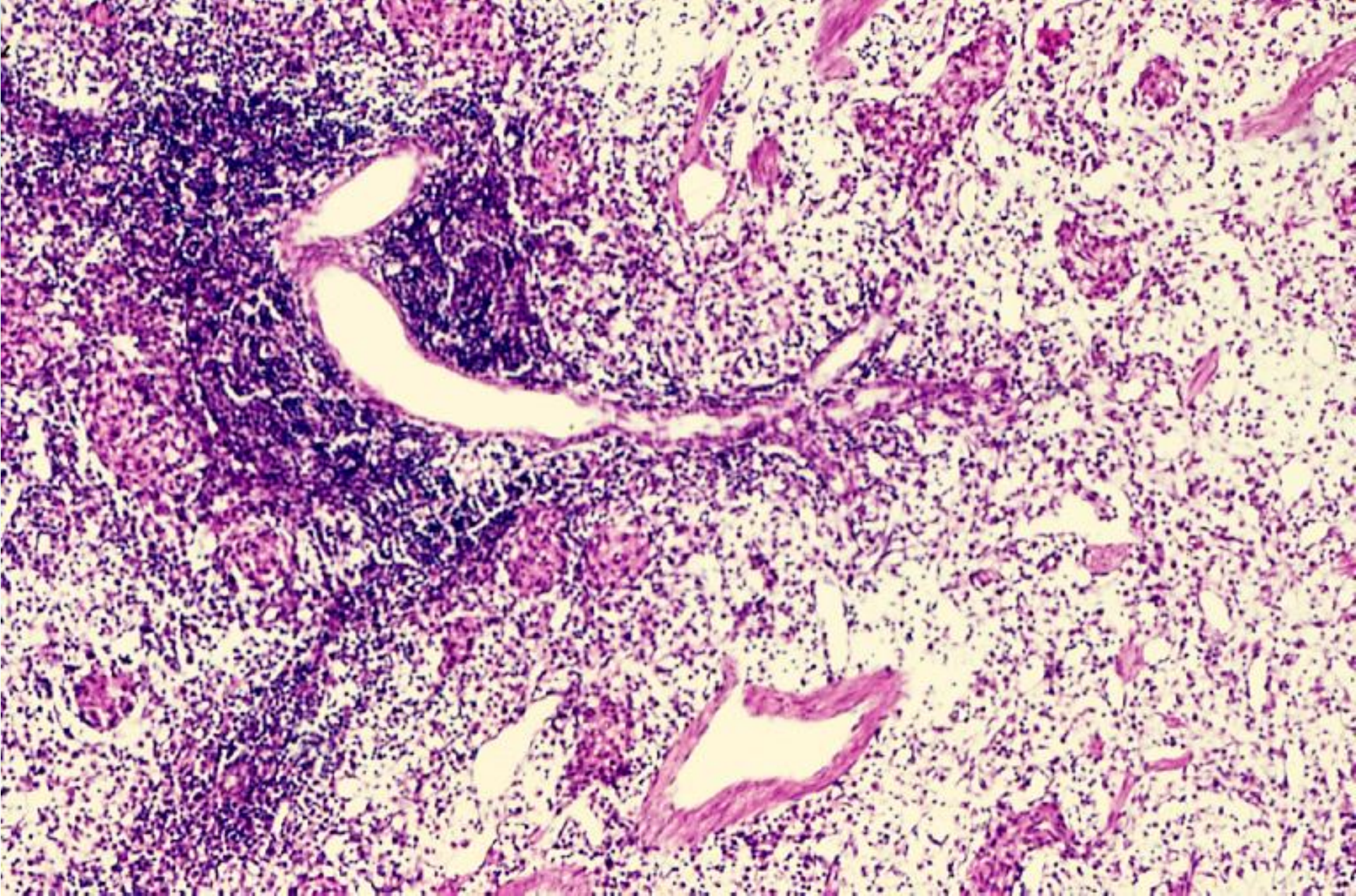
07-51 Spleen, general view, 5. Dog, H-E stain, x 1.5.



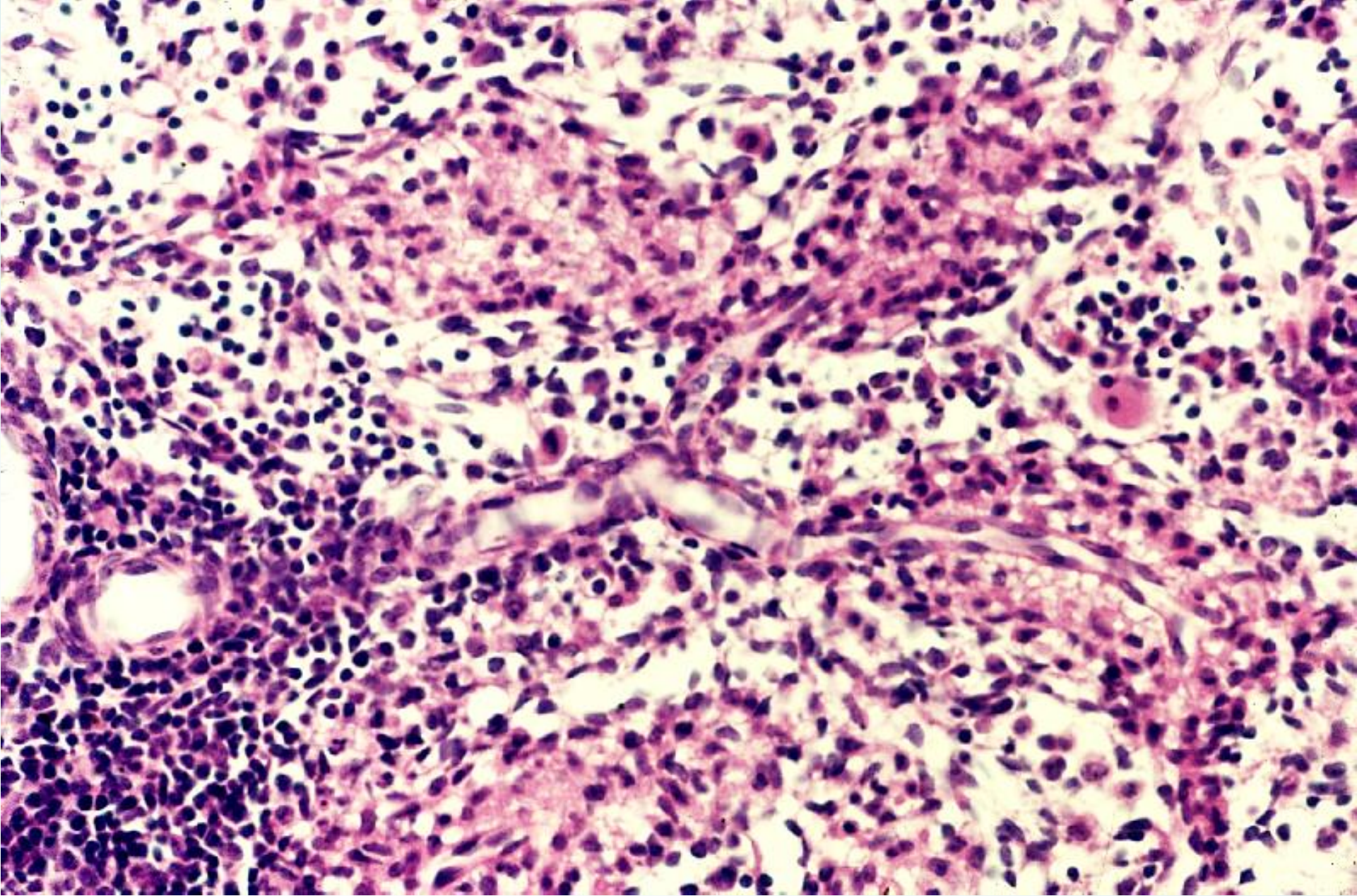
07-52 Splenic nodule, transverse section. Human, H-E stain, x 50.



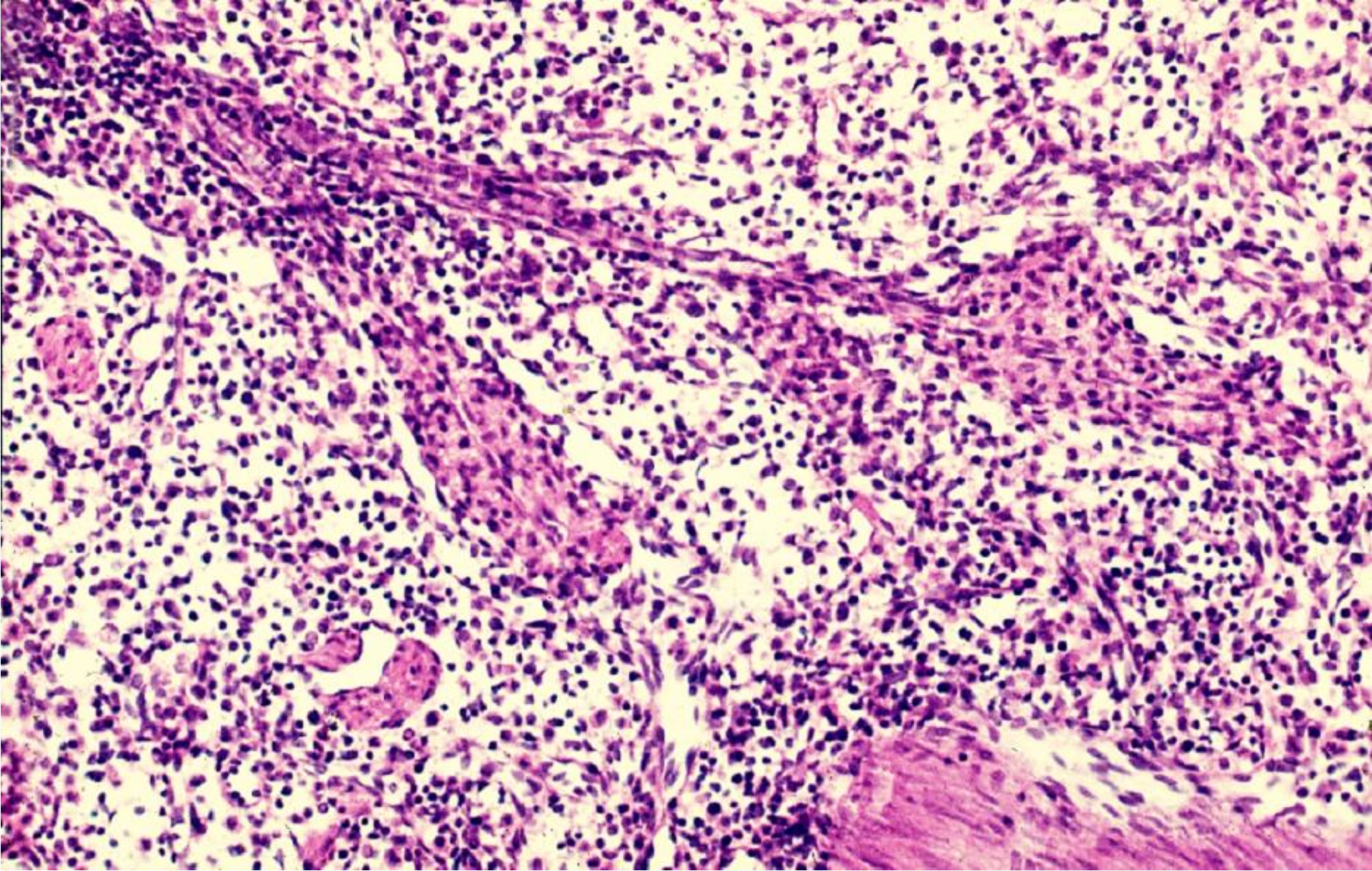
07-53 Splenic nodule, longitudinal section. Human, H-E stain, x 40.



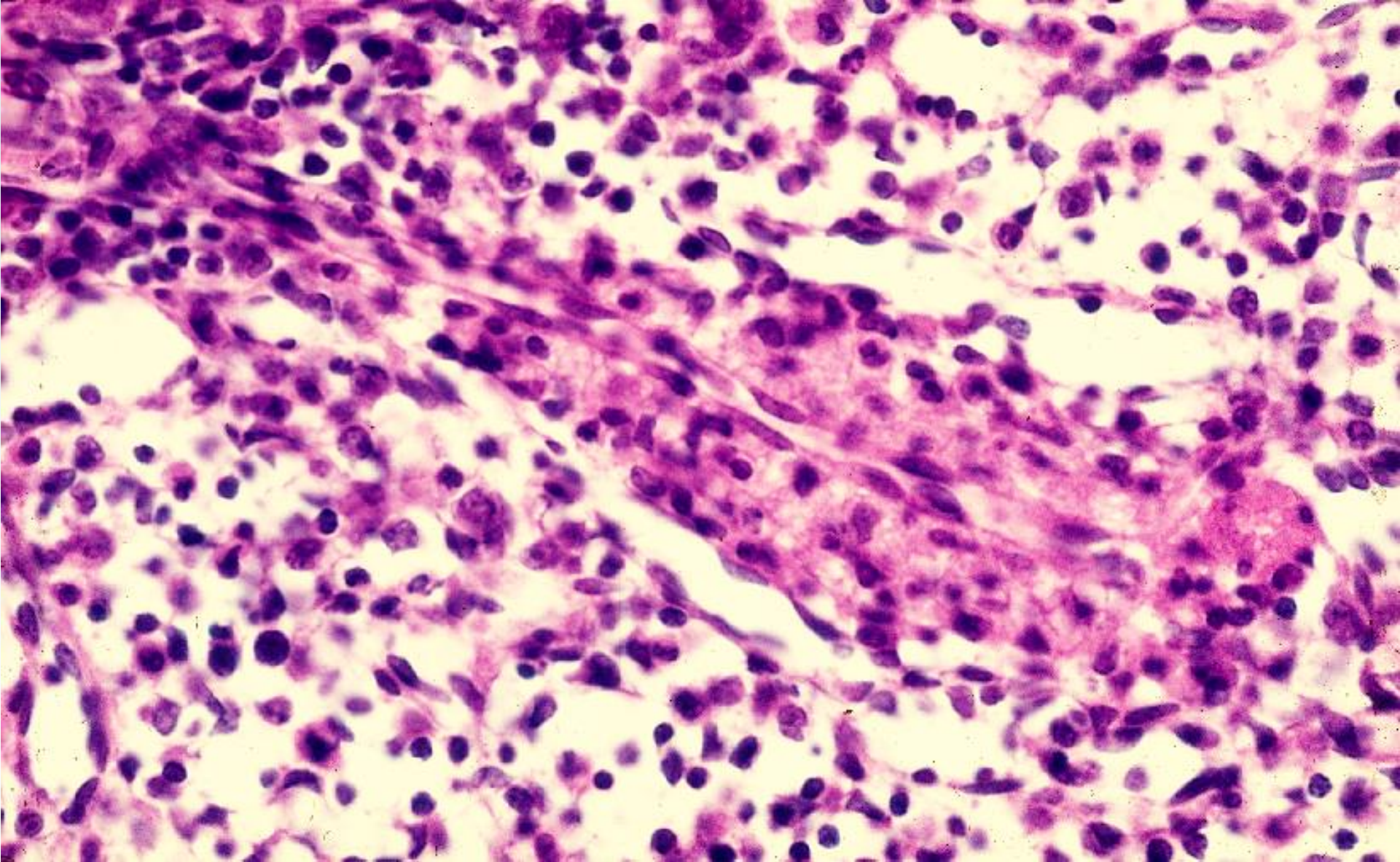
07-54 *A. centralis* and *aa. penicillii*. Dog, H-E stain, x 30.



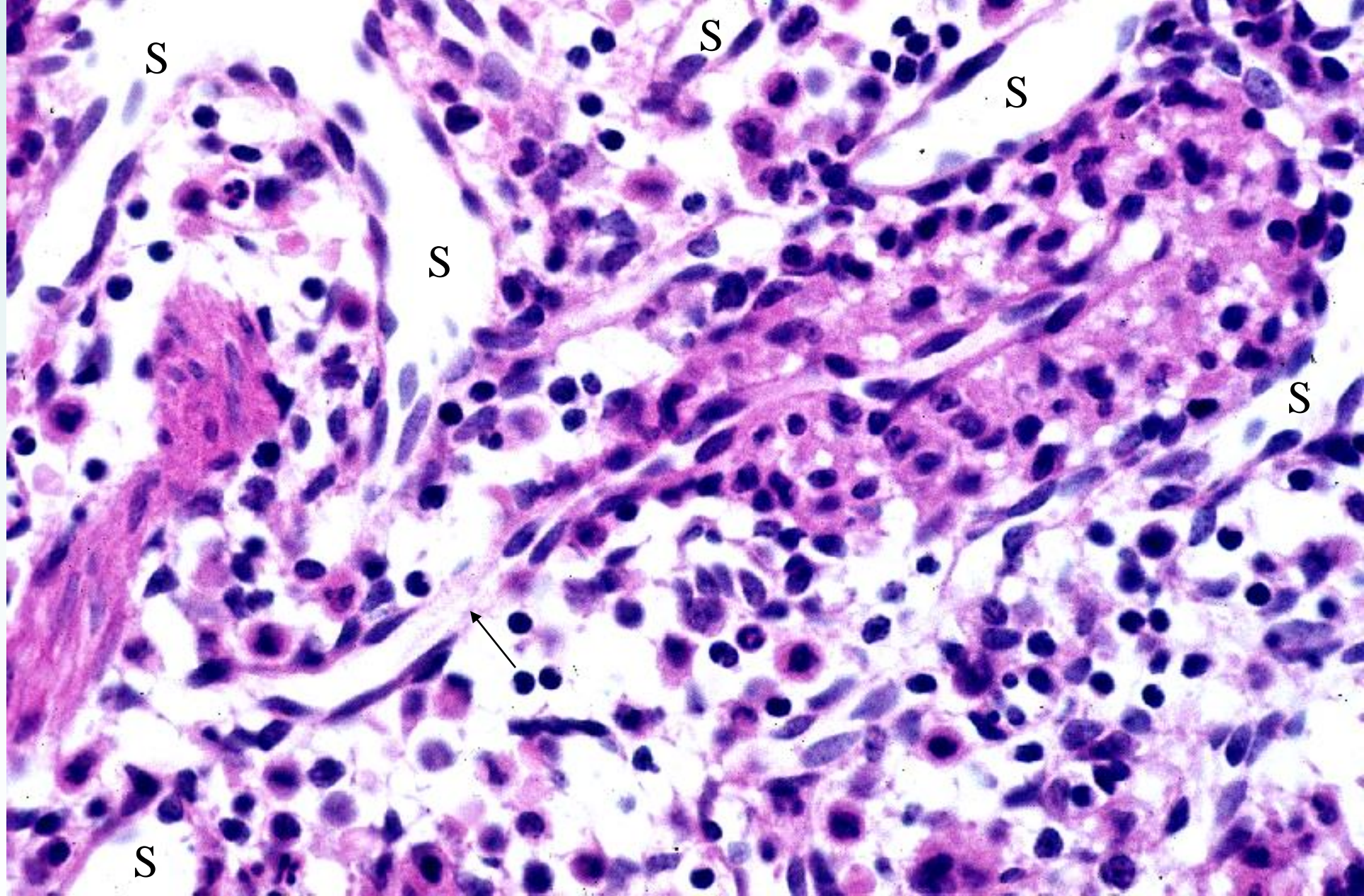
07-55 Aa. penicillii and sheathed arteries, 1. Dog, H-E stain, x 160.



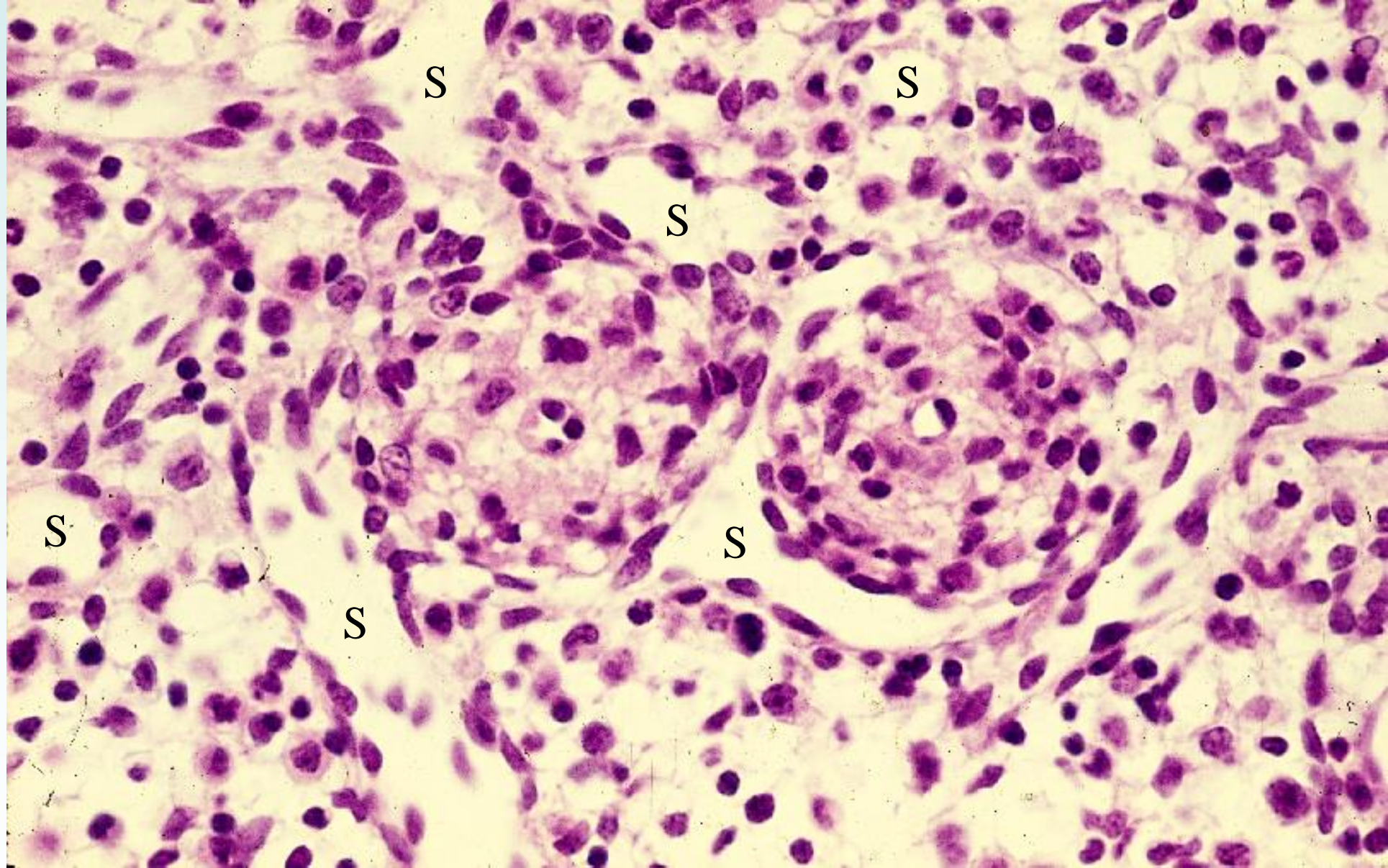
07-56 Aa. penicillii and sheathed arteries, 2. Dog, H-E stain, x 64.



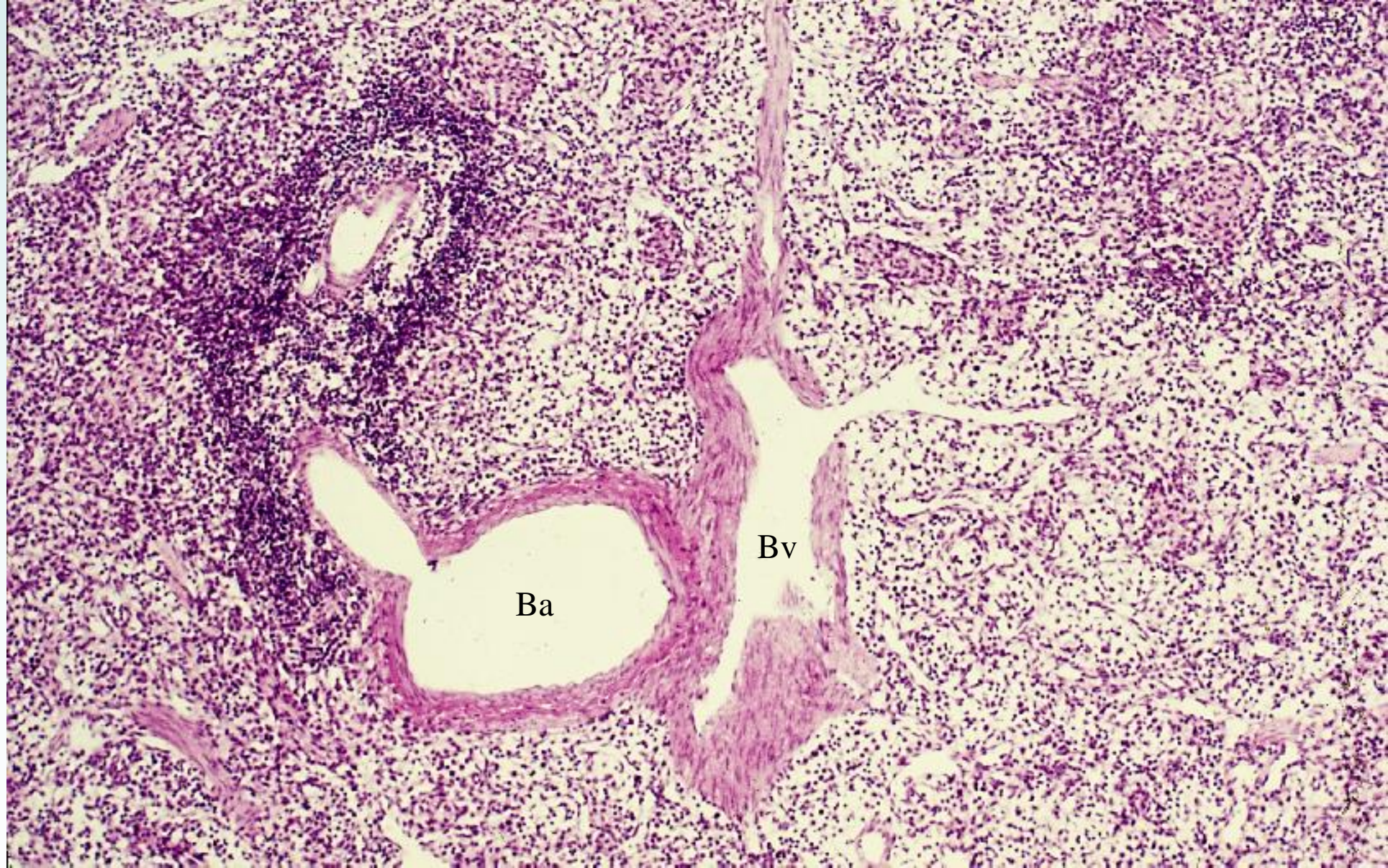
07-57 Sheathed artery, longitudinal section. . Dog, H-E stain, x 160.



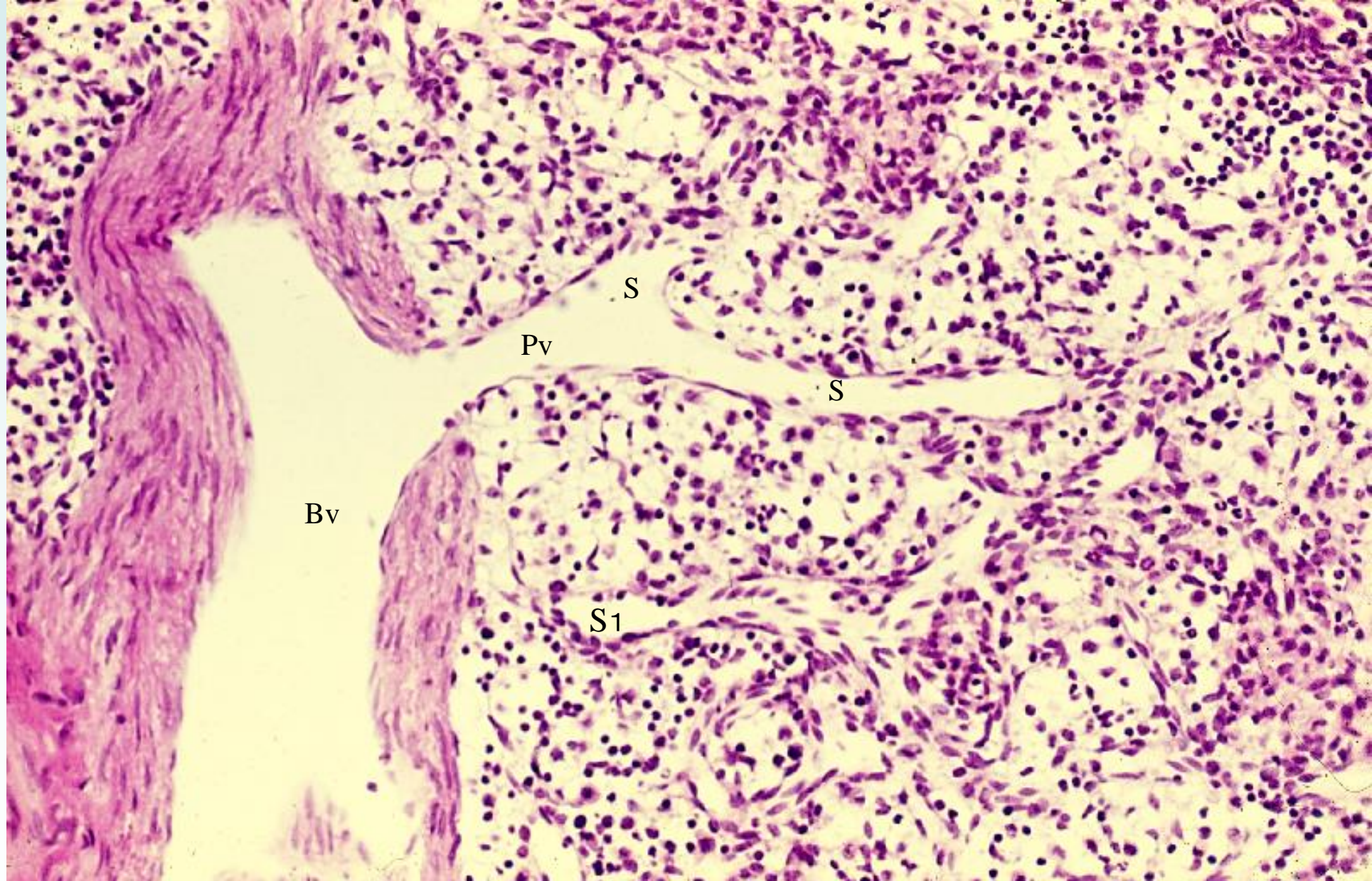
07-58 Sheathed artery and splenic sinus, longitudinal section. Dog, H-E stain, x 160.



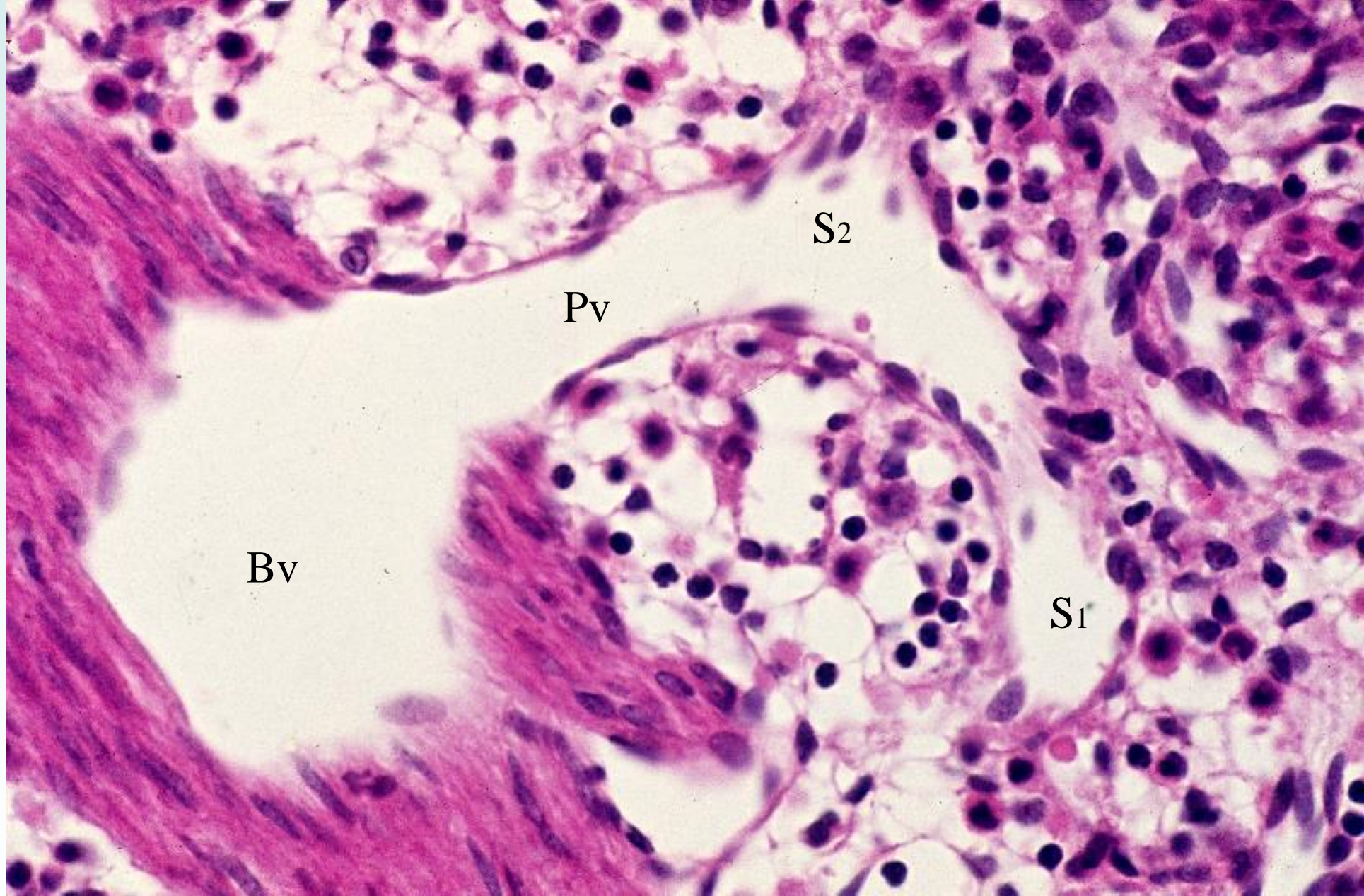
07-59 Sheathed arteries, transverse section. Dog. H-E stain, x 160.



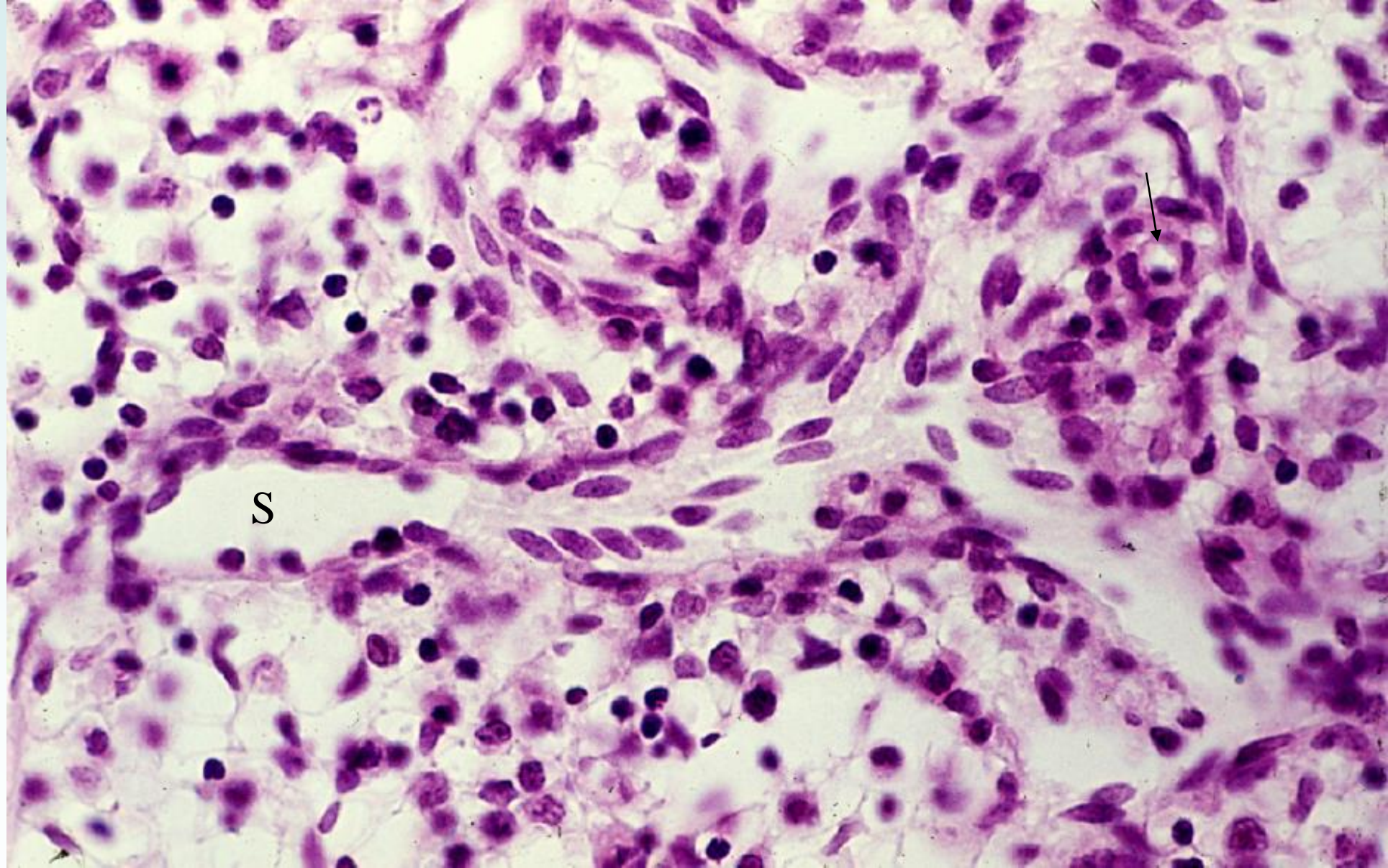
07-60 Artery and vein in trabecula. Dog, H-E stain, x 25.



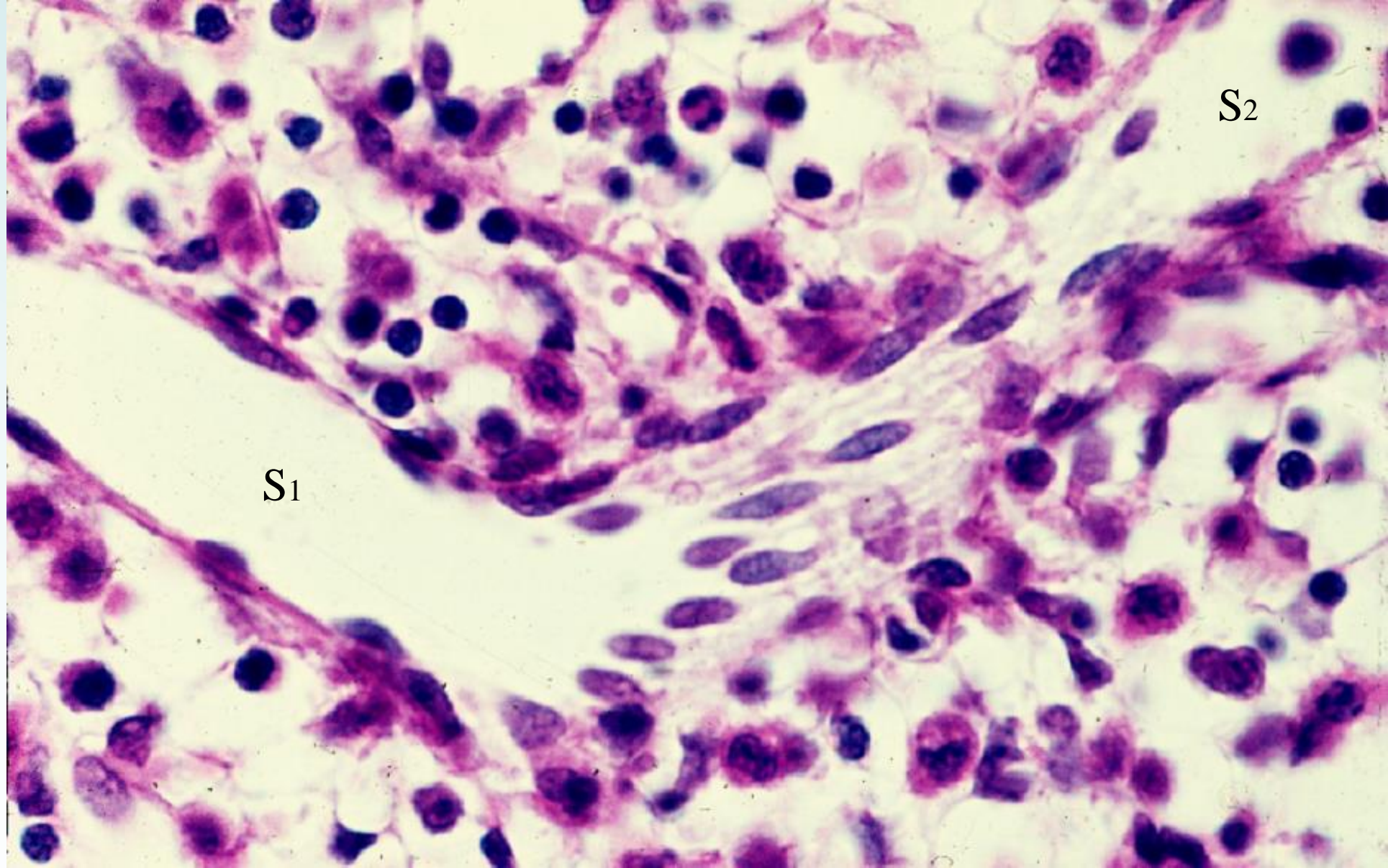
07-61 Vein in trabecula and pulp vein. Dog, H-E stain, x 64.



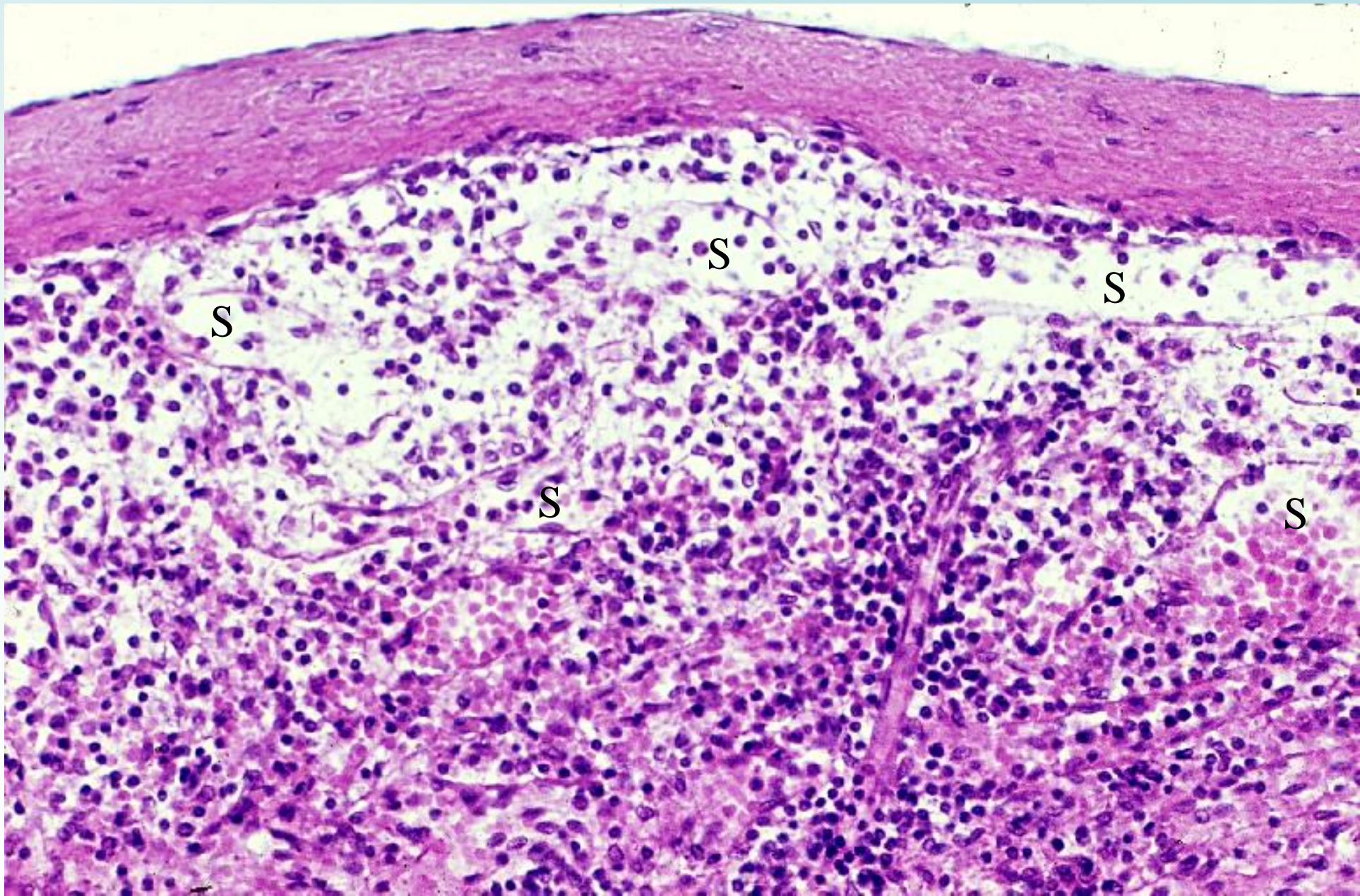
07-62 Splenic sinus, pulp vein and vein in trabeculae. Dog, H-E stain, x 160.



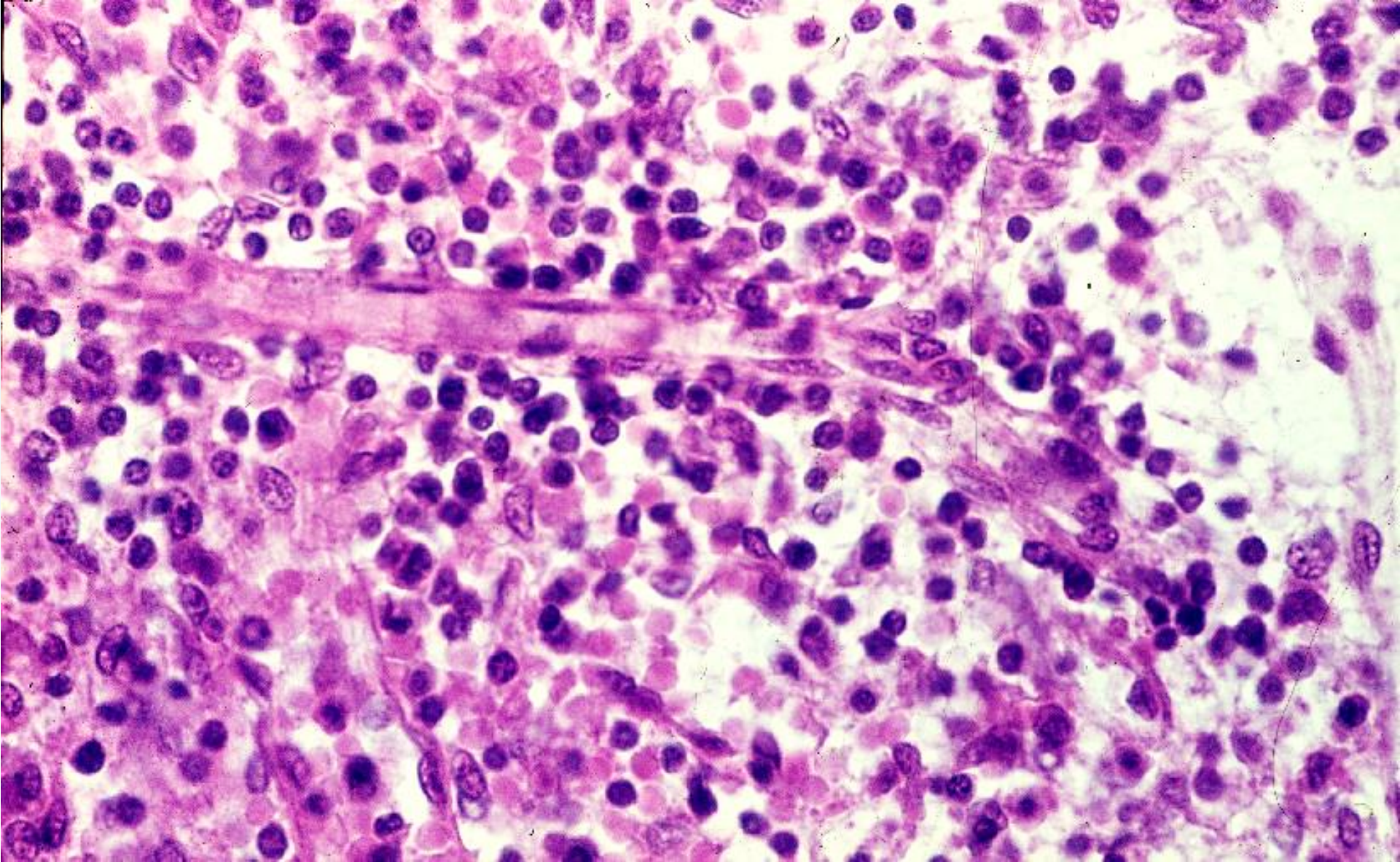
07-63 Splenic sinus, 1. Dog, H-E stain, x 160.



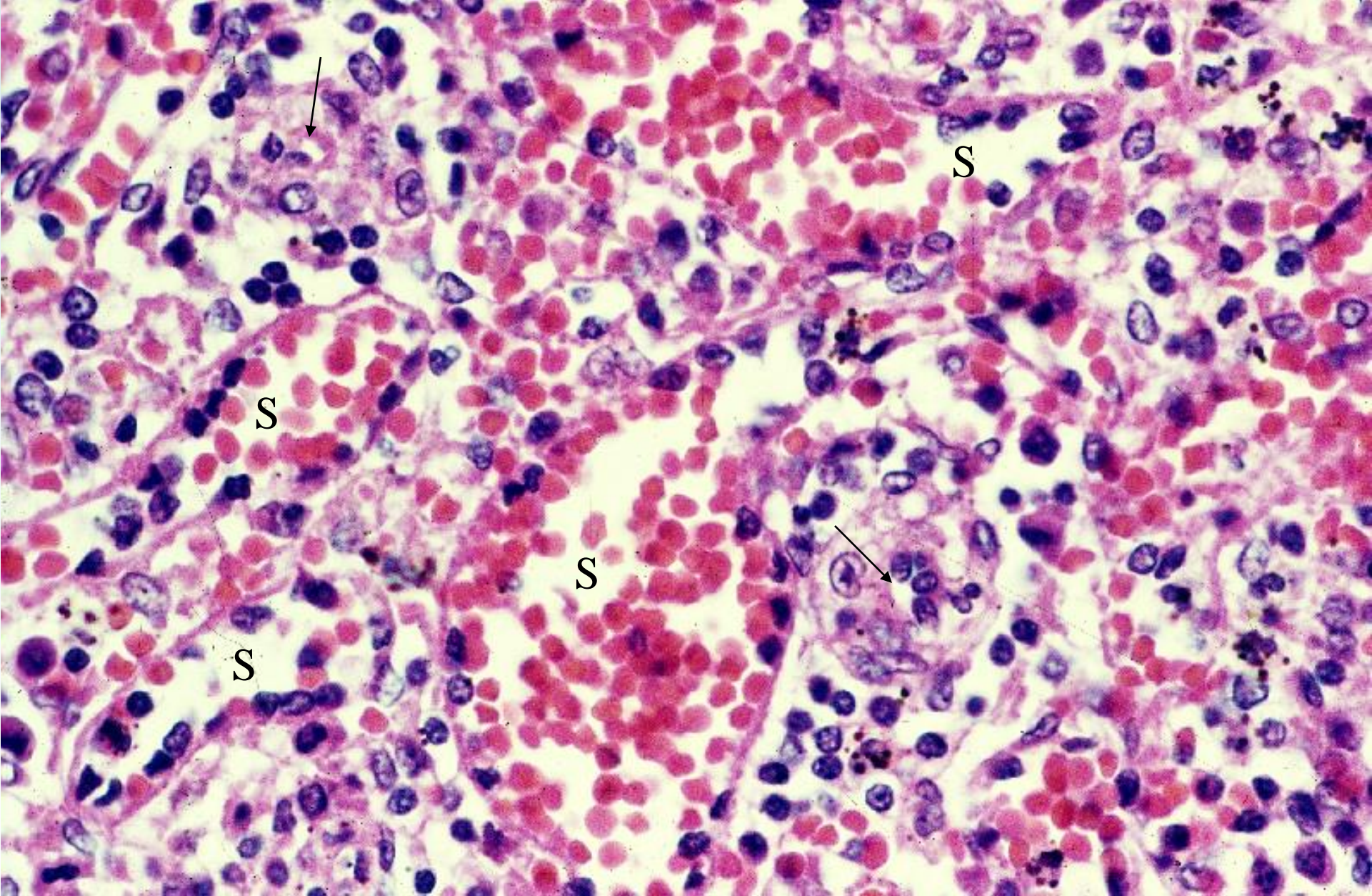
07-64 Splenic sinus, 2. Dog, H-E stain, x 160.



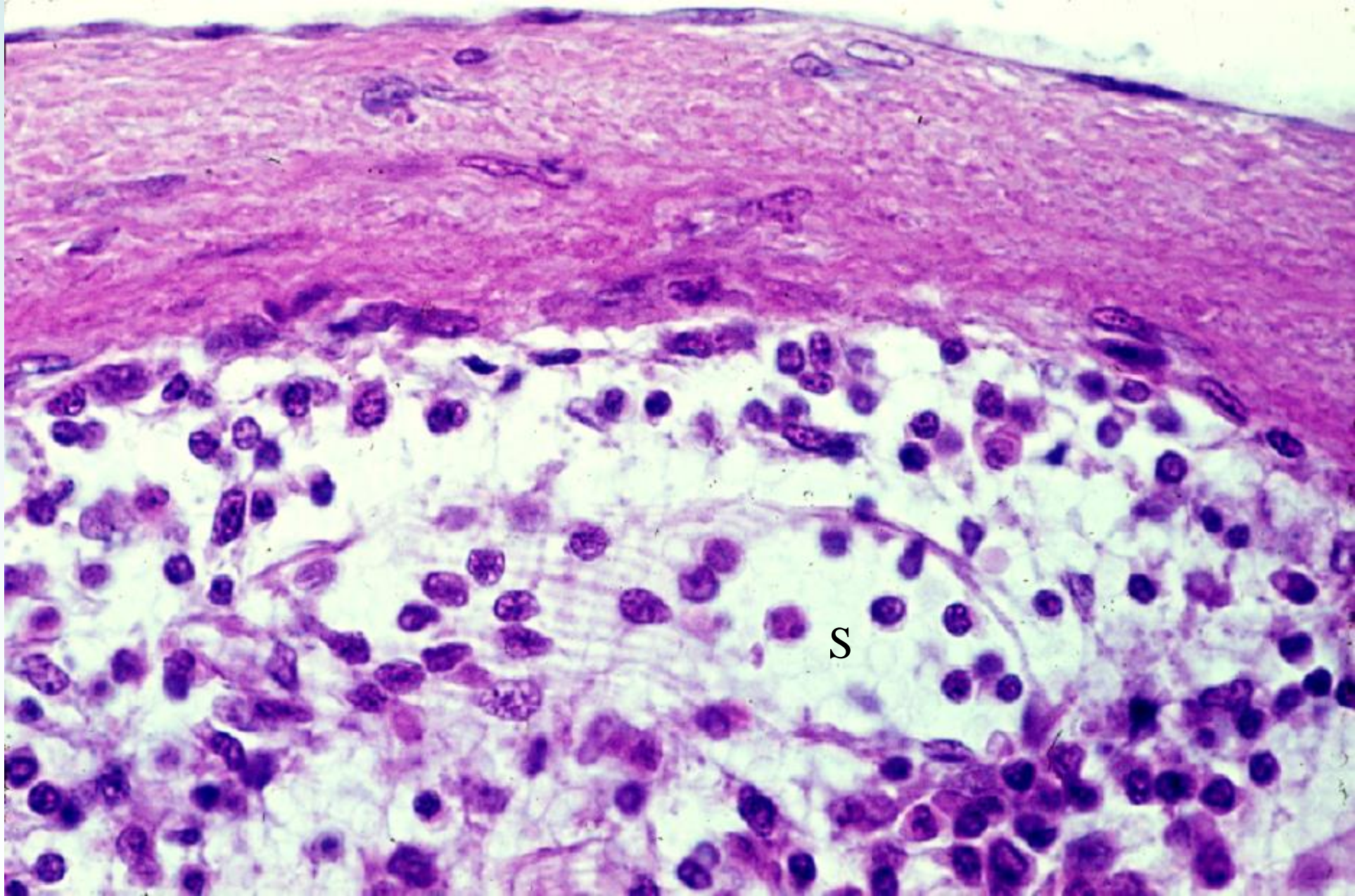
07-65 Spleen, subcapaular region. Human, H-E stain, x 64.



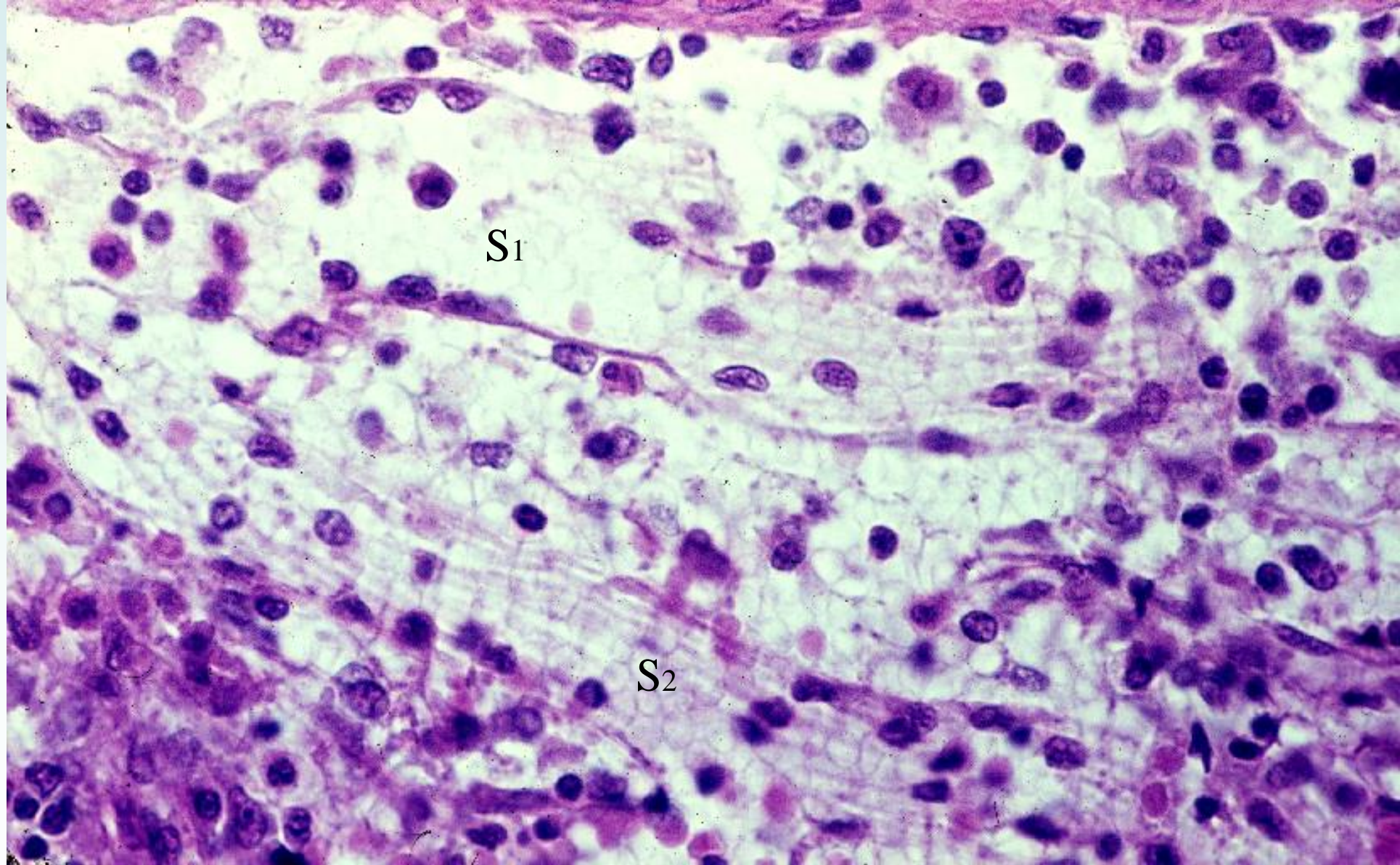
07-66 Sheathed artery, longitudinal section. Human, H-E stain, x 160.



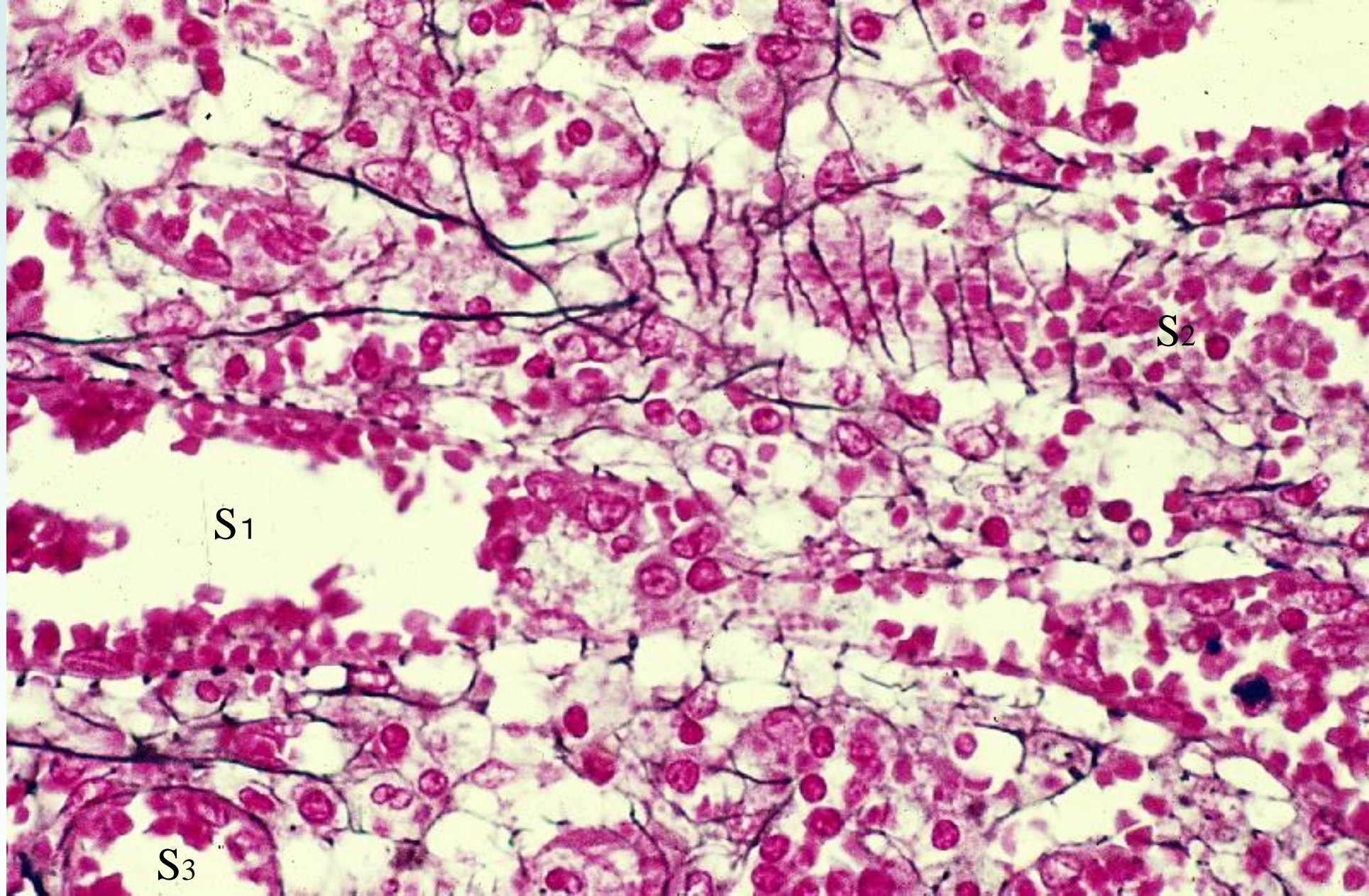
07-67 Sheathed artery, transverse section. Human, H-E stain, x 160.



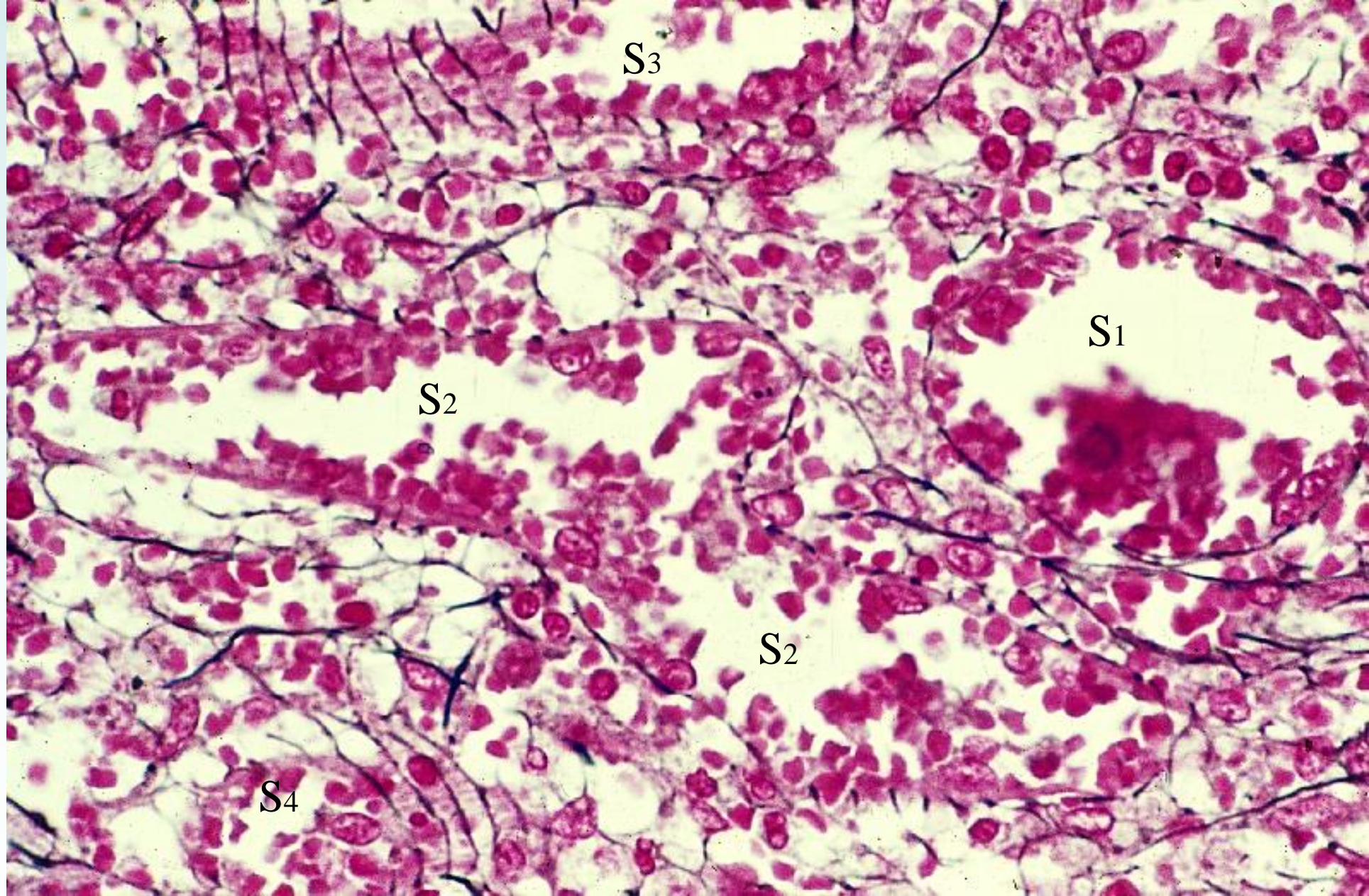
07-68 Splenic sinus, 1. Human, H-E stain, x 160.



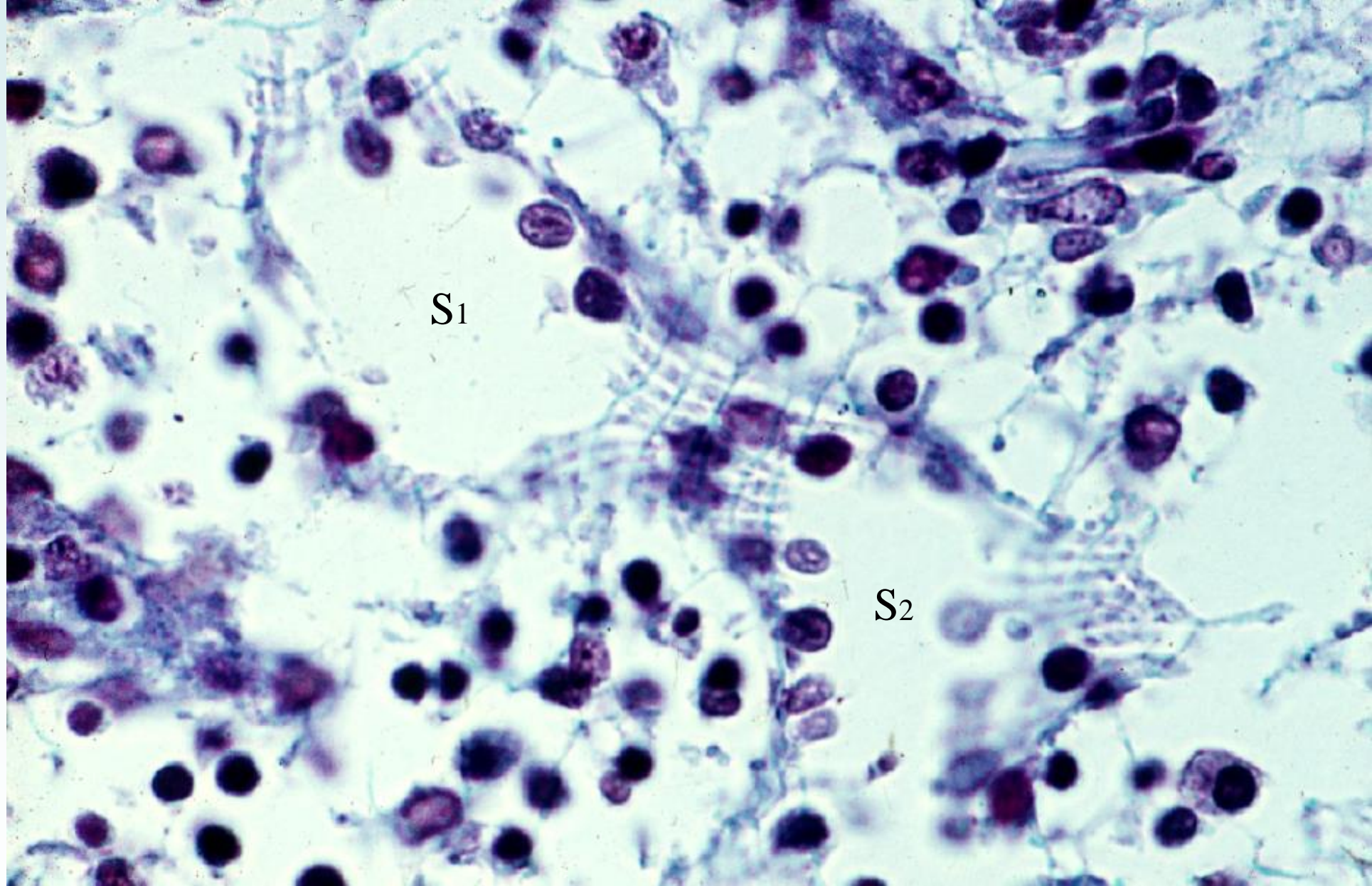
07-69 Splenic sinuses, 2. Human, H-E stain, x 160.



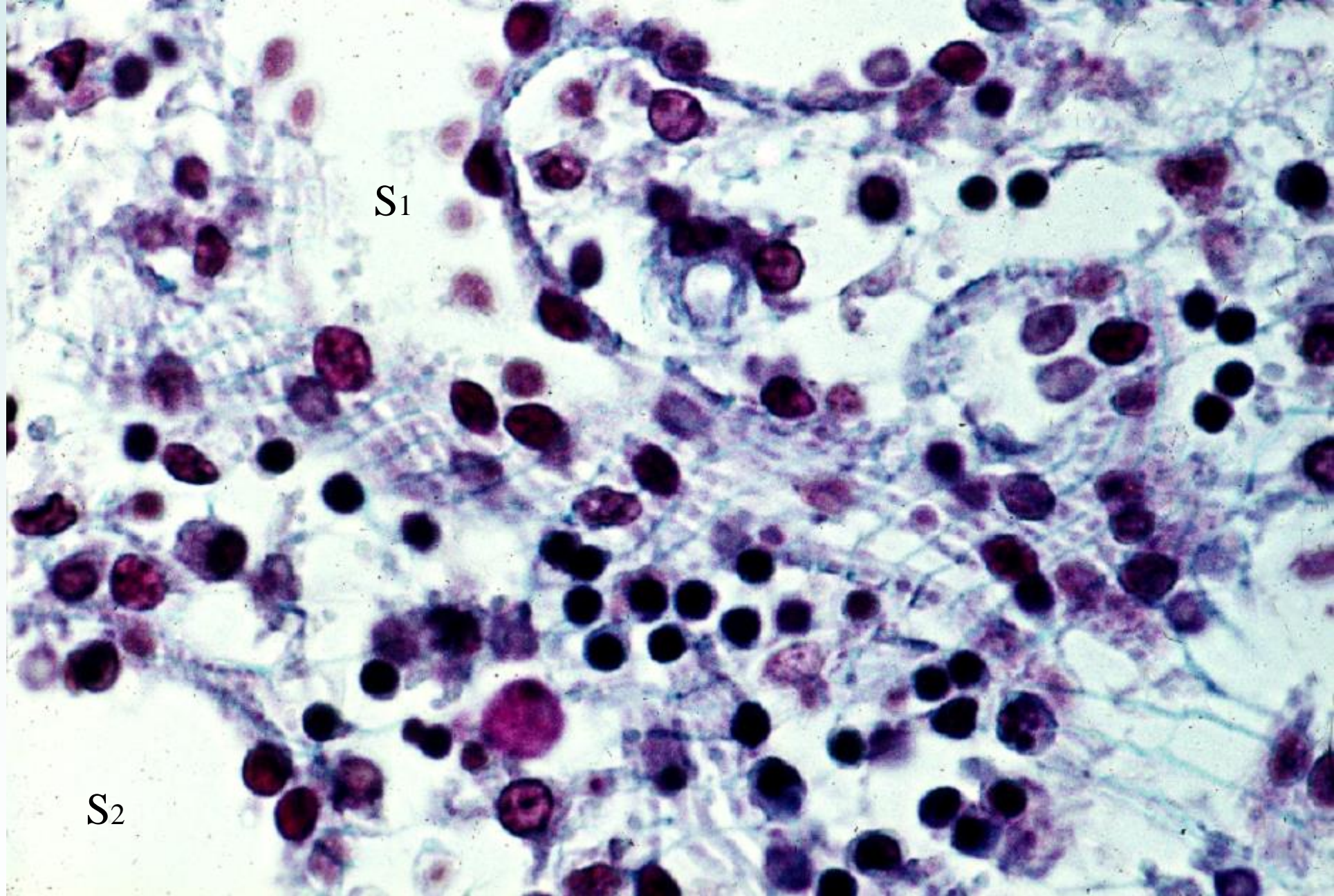
07-70 Splenic sinuses, 3. Human, silver impregnation and Kernechtrot stain, x 160.



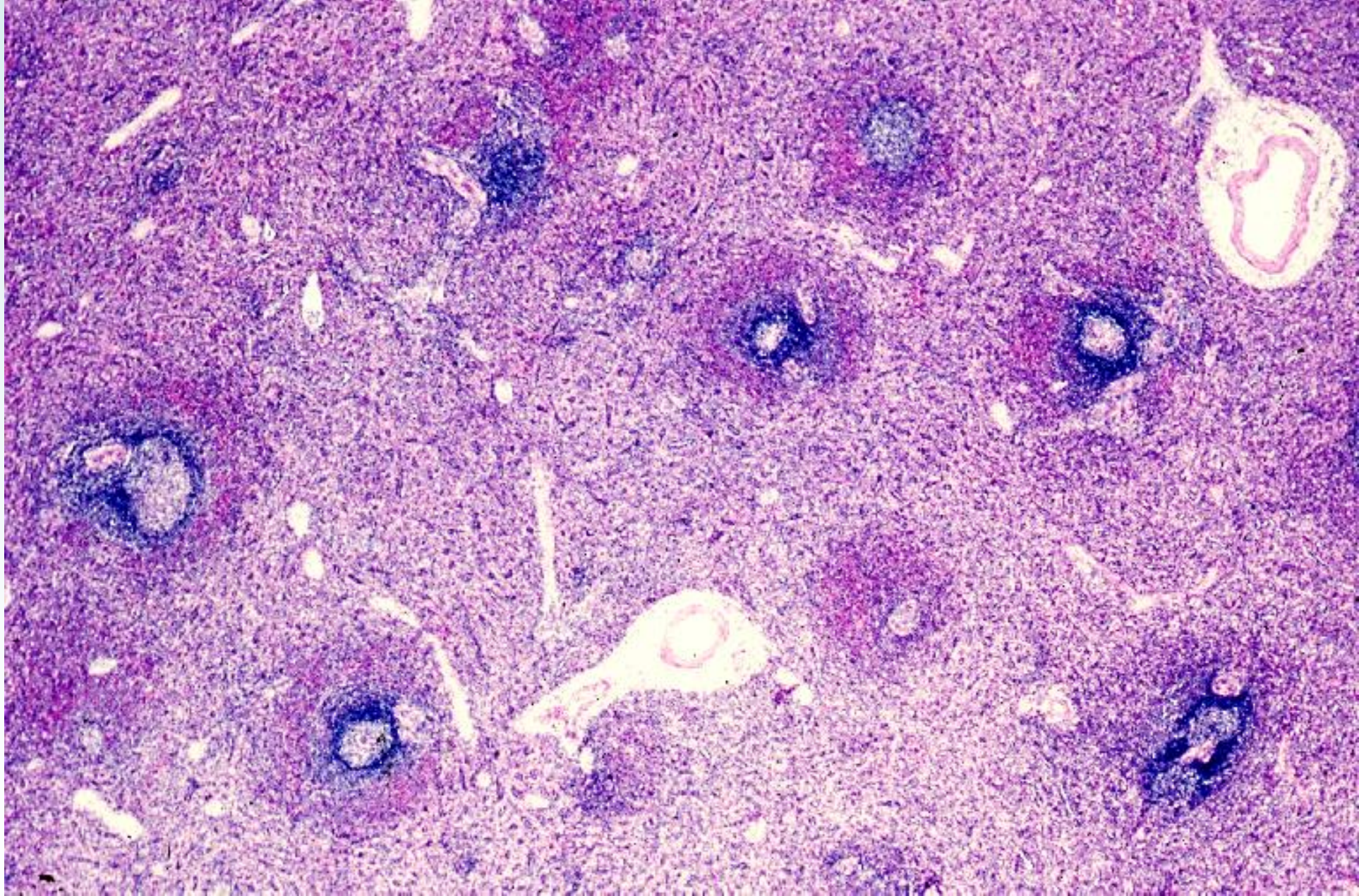
07-71 Splenic sinuses, 4. Human, silver impregnation and Kernechtrot stain, x 160.



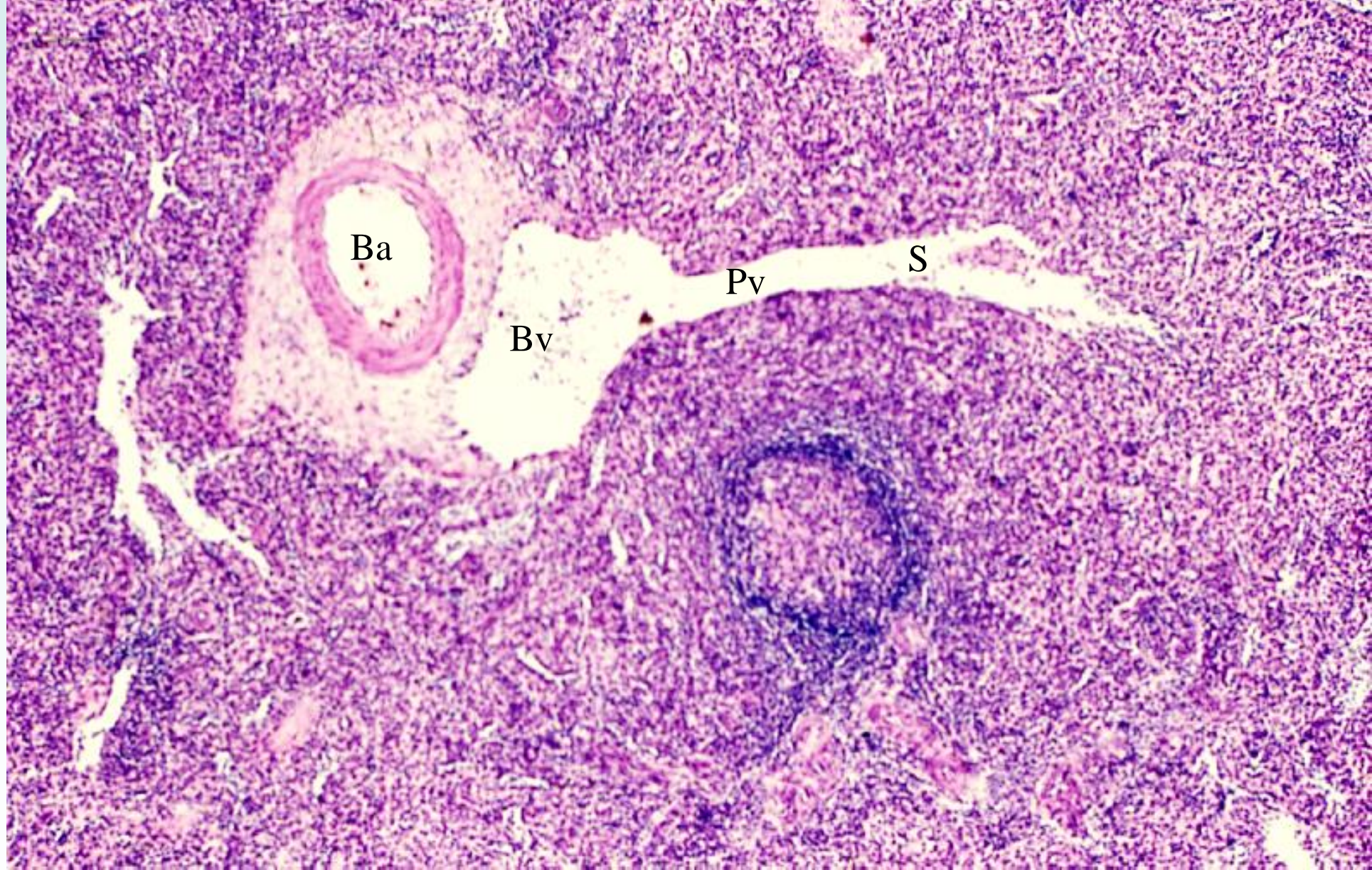
07-72 Splenic sinus, 5. Human, Azan stain, x 250.



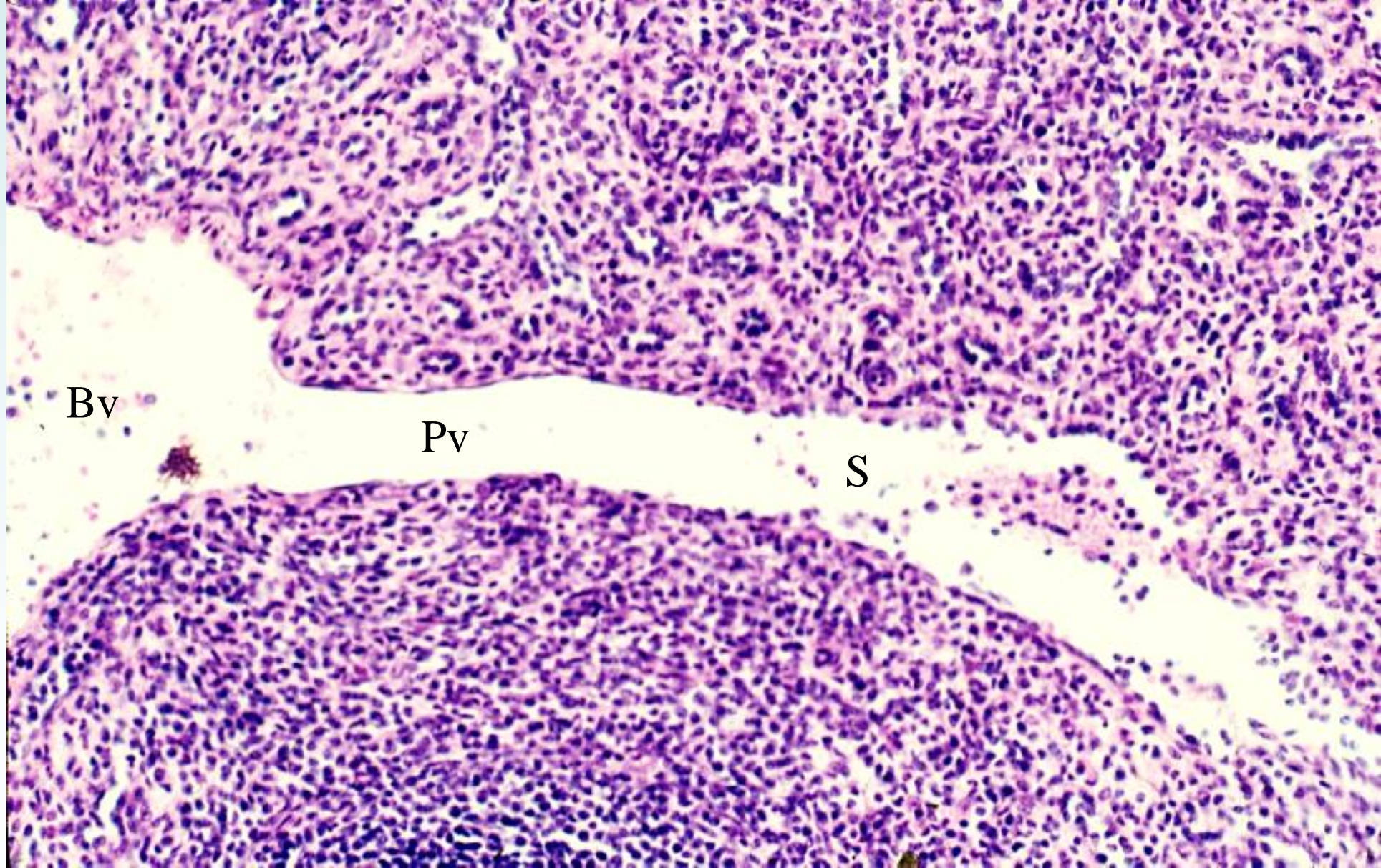
07-73 Splenic sinus, 6. Human, Azan stain, x 250.



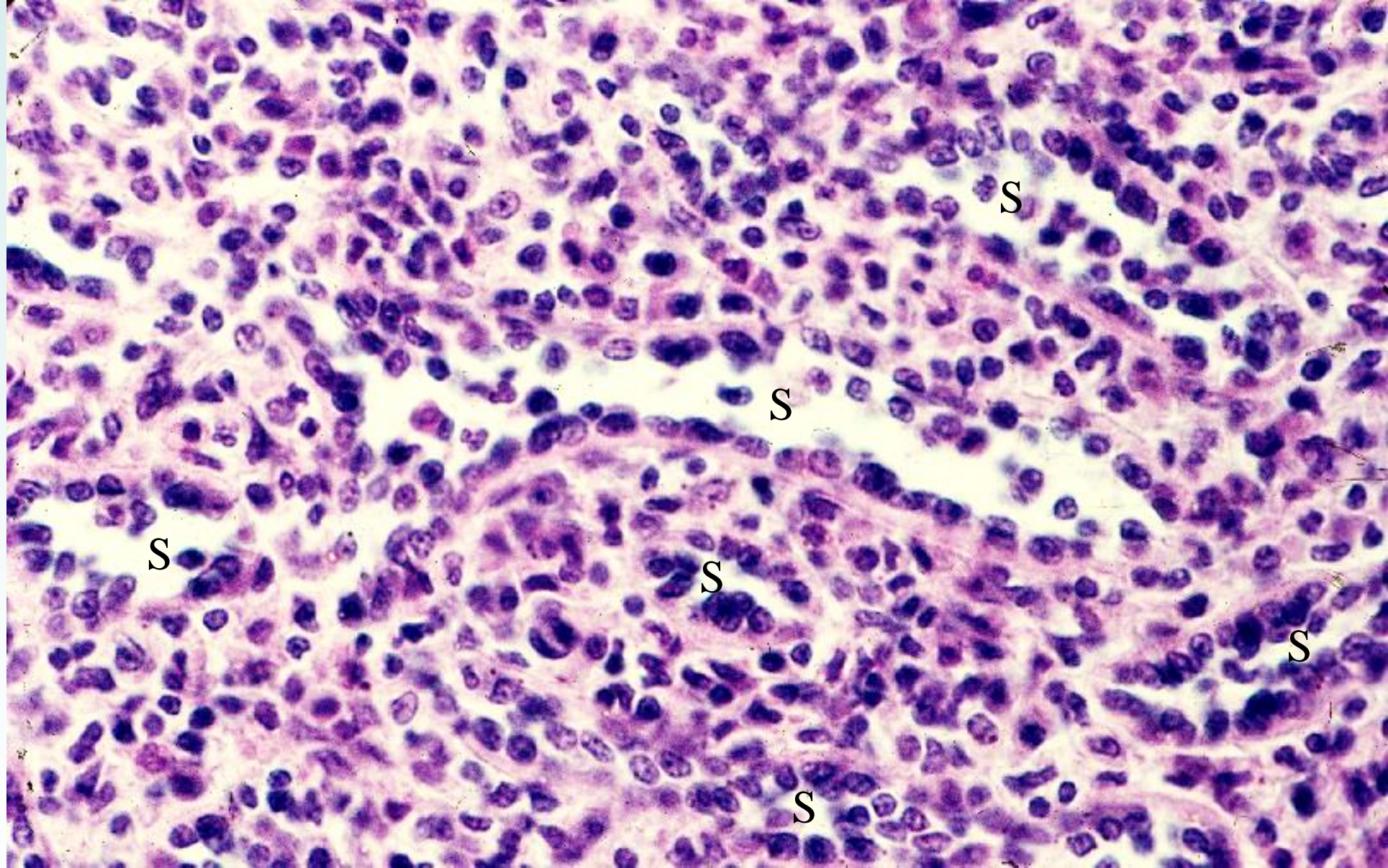
07-74 Spleen, general view. Monkey, H-E stain, x 10.



07-75 Artery and vein in trabecula. Monkey, H-E stain. x 25.



07-76 Spleen, sinus, pulp vein and vein in trabecula. Monkey, H-E stain, x 64.



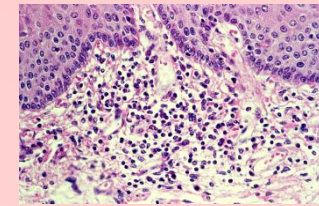
07-77 Splenic sinus. Monkey, H-E stain, x 160.

## 07- Lymphatic Tissue & Lymphatic Organs

- Lymphatic tissue is the principal sites where the immune response of the body against bacteria takes place. Lymphatic tissue consists of a three dimensional network of reticular cells and reticular fibers, and lymphocytes contained within these meshes. When the density of the lymphocytes is low, such lymphatic tissue is called the “infiltration of lymphocytes”, when lymphocytes aggregate densely, “lymphatic nodules”. The organs consisting of lymphatic tissue are called the “lymphatic organs”, such as tonsillae, lymph nodes, spleen and thymus.

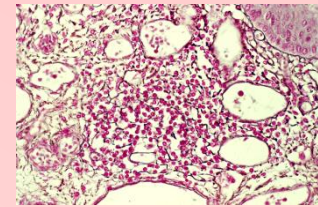
## 07- ymphatic Tissue

## 07-01 Infiltration of lymphocytes. Human, H-E stain, x 100.



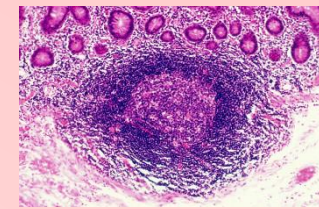
- This figure shows an infiltration of lymphocytes found in the subepithelial connective tissue ( lamina propria ) of human esophagus. Such diffuse infiltration of lymphocytes is the simplest lymphatic tissue, consisting of networks of reticular cells and reticular fibers, and lymphocytes that are contained within the meshes scatteredly. The infiltration of lymphocytes occurs in the subepithelial connective tissue of the digestive, respiratory and urinary systems.

## 07-02 Infiltration of lymphocytes. Human, silver impregnation and Kernechtrot stain, x 100.



- The same specimen as 07-01 but stained by silver impregnation and Kernechtrot.
- At the center, in the network of the reticular fibers ( black stained ), loose aggregation of lymphocytes ( red nuclei ) is seen. In the surrounding region collagenous fibers appear brown.

### 07-03 Solitary lymphatic nodule. Human, H-E stain, x 40.



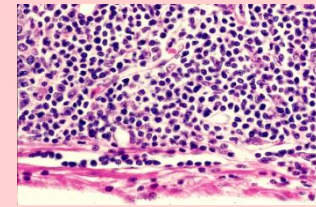
- In the subepithelial connective tissue of the digestive, respiratory and urinary systems small round aggregations of lymphocytes occur; they are called “solitary lymphatic nodules”. When bacterial stimuli are active, numerous nodules appear at the site and when stimuli are over, they diminish the number and disappear. Each nodule consists of a germinal center and surrounding dense aggregation of lymphocytes. The germinal center is composed of mainly reticular cells and large and middle sized lymphocytes with faintly staining cytoplasm so that the center itself looks lightly. In the center mitotic figures are often recognized. Directly surrounding region of the center aggregation of small lymphocytes is especially dense but becomes looser in the periphery.
- This is a solitary lymphatic nodule found in the lamina propria of human jejunum, which forces out the lamina muscularis mucosae into the tela submucosa.

**07-04 Solitary lymphatic nodule. Human, H-E stain,  
x 25.**



- This is also a solitary lymphatic nodule occupying the whole lamina propria of human jejunum. In this nodule the germinal center is large and conspicuous..

**07-05 Lymphatics surrounding a solitary lymphatic nodule. Human, H-E stain, x 160.**



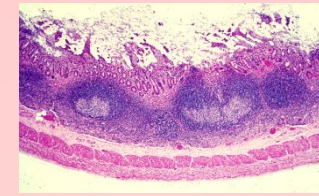
- This is a lymphatic directly surrounding the nodule ( large arrow ). The small arrow indicates the confluence of the lymphatic outflowing the nodule with the surrounding lymphatic. The lowermost layer of this figure is the lamina muscularis mucosae.

## 07-06 Aggregated lymphatic nodules, longitudinal section. Human, H-E stain, x 3.4.



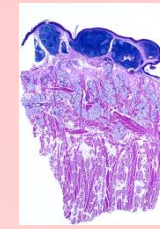
- This is a whole view of an aggregated lymphatic nodule ( Peyer' s patch ), sectioned longitudinally. The Peyer' s patches occur in the ileum at the side against the root of the mesenterium and consist of numerous densely packed lymphatic nodules side by side occupying the whole lamina propria of the ileum. The surface epithelium including villi is entirely destroyed by the post mortem autolysis.

**07-07 Aggregated lymphatic nodules, longitudinal section. Human, H-E stain, x 10.**



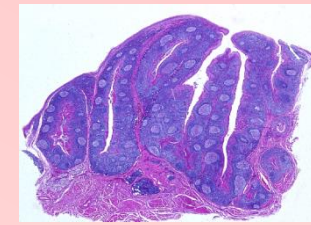
- Higher magnification of 07-06. Lymphatic nodules containing the germinal center continue side by side and occupy the whole lamina propria of the ileum. The surface epithelium including villi is entirely destroyed by post mortem autolysis and only the bottom of the intestinal gland remain. Beneath the aggregated lymphatic nodule, tela submucosa, tunica muscularis, consisting of circular and longitudinal muscle layers, and tunica serosa are conspicuously discerned.

## 07-08 Lingual tonsil. Human, H-E stain, x 4.0.



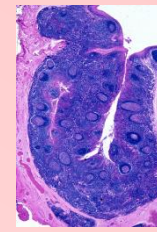
- On the surface of the tongue root, there are numerous flat round areas of 3~5 mm in diameter and beneath the epithelium occupy the very dense aggregations of lymphocytes containing the germinal centers. These lymphatic aggregations are called collectively “lingual tonsil”.
- This figure shows a human lingual tonsil. Very dense aggregations of lymphocytes containing several germinal centers push up the epithelium. Beneath the tonsil mucous glands occupy the spaces among the lingual muscles.

## 07-09 Tonsilla palatina, 1. Human, H-E stain, x 2.0.



- The palatine tonsil is a large lymphatic organ locating in the fovea between arcus palatohyoideus and arcus palatopharyngeus. In this area the surface epithelium makes 10 to 20 cylindrical depressions ( crypts ). Beneath the surface epithelium and surrounding the crypts fills the highly developed lymphatic tissue, i.e. very densely aggregated lymphocytes and numerous germinal centers. The palatine tonsil is as a whole surrounded by a connective tissue capsule which sends partitions between the crypts.

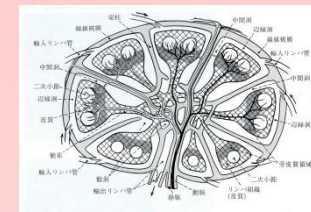
## 07-10 Tonsilla palatina, 2. Human, H-E stain, x 2.0.



- This is also human tonsilla palatina, obtained by tonsillectomy. The crypt and surrounding dense lymphatic tissue containing germinal centers are distinct.

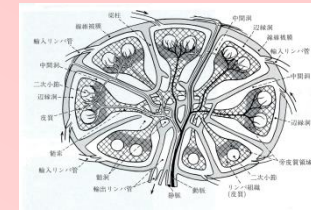
## 07-002 Lymph Node

## 07-11 Scheme showing the structure of lymph node. (1/2)



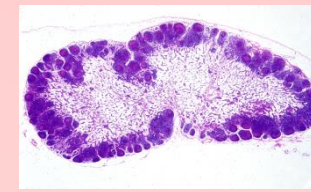
- The lymph nodes are flat elliptic or kidney-like organs of variable size from microscopic small ones to macroscopic large ones of 2~3 cm in length and about 1 cm in width, occurring in series along the course of lymphatic vessels. The lymph node is enclosed by a capsule of dense collagenous fibers ( capsula fibrosa ) and has two sides, the one is convex where several lymphatics ( afferent lymphatic vessels ) enter the node and the other side is concave and at the center slightly indented, where one or two lymphatics ( efferent lymphatic vessels ) leave and blood vessels enter and leave the node. This place is called “hilus”. The afferent vessels are provided with valves with the free edge of the cusps toward the node, whereas valve cusps of the efferent vessels point away from the hilus.
- Capsula fibrosa sends inward numerous dense connective tissue cords ( trabeculae ) which branch highly and connect with one another constituting the loose network and finally with connective tissue of the hilus. The stroma of the lymph node ( dense aggregation of lymphocytes ) is divided by these trabeculae into numerous rounded areas that are collectively called the cortex. Each area of the cortex sends inward cords of lymphatic tissue ( medullary cords ) that ramify and connect with each other making the network of medullary cords and also with trabeculae near the hilus here and there. Except for such direct connection of medullary cords and trabeculae, the lymphatic tissue network is suspended within the connective tissue framework. Between these two there are sinuses through which the lymph flows and percolates. Sinuses between capsule and cortex are called the subcapsular or marginal sinuses; sinuses between trabeculae and cortex and sinuses between trabeculae and medullary cords, the medullary sinuses. In the sinuses there are numerous traversing reticular fibers and associated reticular cells, macrophages and lymphocytes in variable density. Because of these facts the sinuses are regarded as the very loose lymphatic tissue.
- The cortex occupies the superficial portion of the node and consists primarily of dense lymphatic tissue, which continues into the medulla as medullary cords. The cortex contains lymphatic nodules with and without the germinal centers. They are temporary structures, expressing the cytogenetic and defense functions of the lymphatic tissue. The number and size of the nodules fluctuate markedly.

## 07-11 Scheme showing the structure of lymph node. (2/2)



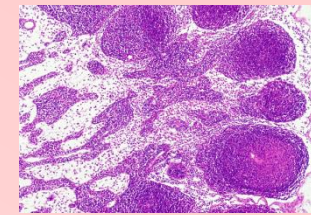
- The medulla consists of the same cytological constituents as the cortex. The medulla is not sharply separated from the cortex and occupies the inner portion of the node radiating from the hilus. The medullary cords branch and anastomose freely with one another and near the hilus they connect with trabeculae here and there. The substance of the medullary sinuses is also composed of lymphatic tissue, but its meshes are so wide that they constitute broad channels for the passage of lymph.
- The afferent vessels ( vasa afferentia ) that supply lymph to the node are provided with valves that open the node. These afferent vessels approach the convex surface of the node, pierce its capsule, and open into the subcapsular sinus. From here lymph passes through the intermediate and medullary sinuses and then into the efferent lymphatic vessels ( vasa efferentia ) at the hilus, and then leaves the node through these vessels, that are provided valves opening outward. The arrangement of the valves in the afferent and efferent vessels permits thus a flow of lymph in only one direction through the node.
- The inner surface of the capsula fibrosa, surface of the trabeculae and surface of the cortex and medullary cord, are covered by reticular cells and fixed macrophages supported by the reticular fibers. These endothelium-like cells are often called the littoral cells. As a continuous stream of lymph flows through the sinuses lymphocytes are swept into the efferent vessels, and new lymphocytes enter the sinuses by their own ameboid movement.
- Blood vessels enter and leave mostly through the hilus. The larger arterial and venous branches pass along the trabeculae, while the smaller ones pass along the axis of the medullary cords toward the cortex. The capillaries form particularly dense network in the peripheral layers of the medullary cords and of the nodules. Around the nodules capillaries form radially arranged meshes. In the cortex venules have a thickened endothelium, so that in cross section endothelial cells appear as cuboidal epithelium. These venules are called “postcapillary venules”. Through this portion large number of small lymphocytes migrate from venules into the lymphatic tissue.

## 07-12 Lymph node, general view. Human, H-E stain, x 3.



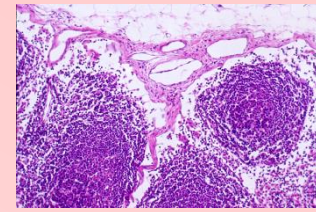
- This is a general view of a human mesenteric lymph node, sectioned flat longitudinally. Dense lymphatic tissue containing numerous nodules constitutes the peripheral contour, the cortex, and encloses the very loose lymphatic tissue, the medulla. At the central portion both the upper and lower contours are indented; here is the flat sectioned hilus. A faint line limiting the upper portion of this figure is the mesentery. Figures 07-13 to 07-24 are all of this specimen.

## 07-13 Cortex and medulla. Human, H-E stain, x 25.



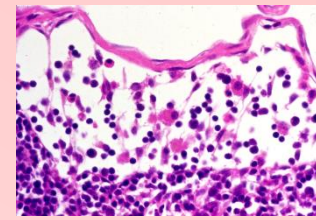
- A thin pink line limiting the right end of this figure is the capsula fibrosa which sends a trabecula at lower right corner leftward. Left to the capsule large round lymphatic nodules stand side by side, each of that sends thin lymphatic tissue cords ( medullary cords ) leftward, branching and anastomosing with neighboring ones. Spaces between the capsule and the cortex are subcapsular ( marginal ) sinuses and that between trabeculae and cortex, and between medullary cords are medullary sinuses. In this specimen sinuses are not densely packed with reticular cells and lymphocytes. Some medullary cords are penetrated by blood vessels ( arrows ).

**07-14 Cortex and subcapsular sinus. Human, H-E stain, x 40.**



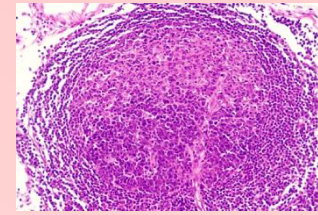
- The capsula fibrosa limiting the upper border of this figure consists of collagenous fibers and sends a trabecula downward at the center. At the starting portion of this trabecula there is an afferent lymphatic vessel with valve. Beneath the capsule, separated by the subcapsular ( marginal ) sinus, round lymphatic nodules constitute the cortex.

## 07-15 Marginal sinus. Human, H-E stain, x 160.



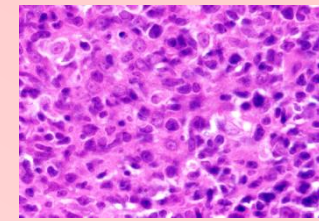
- Between the capsule, consisting of collagenous fibers, and cortex, dense lymphatic tissue, the marginal sinus is distinct, in which long spindle-shaped and stellate reticular cells with long processes compose a very loose lymphatic network. In these meshes float small lymphocytes and several macrophages with abundant cytoplasm.

**07-16 Lymphatic nodule with germinal center. Human,  
H-E stain, x 64.**



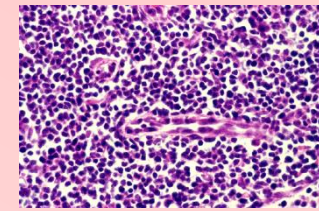
- This is a lymphatic nodule surrounded by marginal and medullary sinuses. The upper half of this nodule occupies the germinal center, appearing less dense in the small lymphocytes. An arteriole running from bottom upward is distinct.

## 07-17 Germinal center. Human, H-E stain, x250.



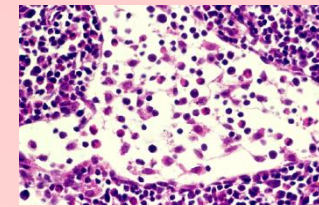
- The germinal center consists of reticular cells of large nuclei and abundant cytoplasm and large and medium sized lymphocytes. Because their cytoplasm stains pale pink and the density of the small lymphocytes is low, the germinal center appears light surrounded by a dark shell of dense aggregation of small lymphocytes. The large and medium-sized lymphocytes perform the mitosis and produce the small lymphocytes which move to the periphery of the germinal center, join to the dark shell and mature; in this figure, however no mitotic figure is recognized.

## 07-18 Postcapillary venules. Human, H-E stain, x 160.



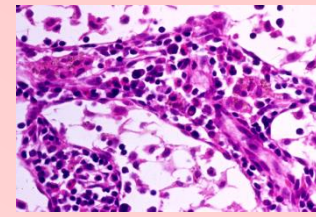
- In the cortex, especially around the germinal center, venules may be lined by the tall endothelium. Such venules are called “postcapillary venules”. Through this portions large number of small lymphocytes migrate from venules into the lymphatic tissue. In this figure a longitudinally sectioned ( long arrow ) and a transverse sectioned (short arrow ) postcapillary venules are seen.

**07-19 Cortex and medullary sinus. Human, H-E stain,  
x 160.**



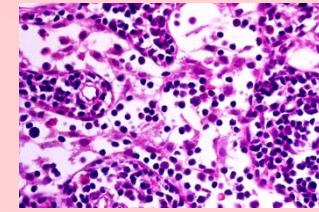
- This is the medullary sinus surrounded by cortex ( dense lymphatic tissue ). The surface of the dense lymphatic tissue is lined by the littoral cells. In the sinus spindle shaped and stellate reticular cells with long processes compose a very loose network, in which small lymphocytes, eosinophilic leucocytes and macrophages are scattered.

**07-20 Medullary cords and medullary sinus 1. Human,  
H-E stain, x 160.**



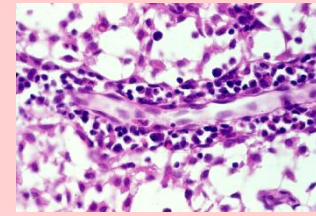
- In the medullary cords the lymphatic tissue is less densely composed than in the cortex. The medullary cords in this figure, beside the small lymphocytes and eosinophilic leucocytes, there are several large macrophages ( arrows ) with abundant cytoplasm containing brownish phagosomes. In the sinus star-shaped reticular cells constitute a very loose network.

**07-21 Medullary cords and medullary sinus 2. Human,  
H-E stain, x 100.**



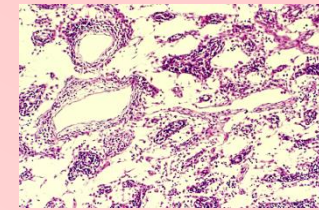
- In this figure the intermingled relationship between the medullary cords and medullary sinus is distinctly recognized. In the sinus among the loose meshwork composed of star-shaped reticular cells small lymphocytes and macrophages are scattered.

**07-22 Medullary cord and medullary sinus 3. Human,  
H-E stain, x 160.**



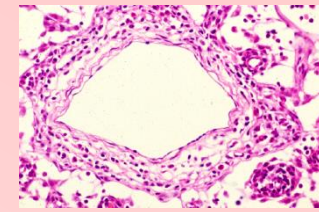
- This is a longitudinally sectioned medullary cord penetrated by a vein in the axial portion. At the center a leucocyte is going through the lower wall of this vein. In the sinus the loose meshwork of reticular cells is distinct.

## 07-23 Medullary cords and medullary sinus 4. Human, H-E stain, x 40.



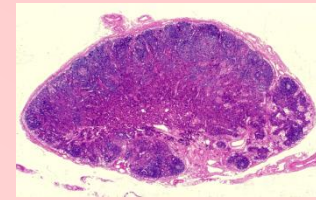
- This figure shows the flat section near the hilus. At upper left two transverse sections of efferent lymphatic vessel ( EV) and at right center a longitudinal section of efferent vessel ( EV2 ) are seen. The EV2 is the beginning portion of the efferent vessel continuing directly with medullary sinus ( arrows ). The trabeculae and medullary cords are intermingled and connect with each other here and there.

**07-24 Transverse section of an efferent lymphatic vessel. Human, H-E stain, x 100.**



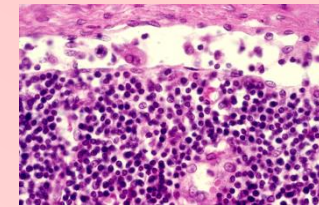
- This is a transverse section of an efferent lymphatic vessel, the wall of which consists of loosely arranged connective tissue fibers. An arrow indicates the trabecula and double arrows, medullary cord.

**07-25 Lymph node, general view. Human, H-E stain,  
x 5.0.**



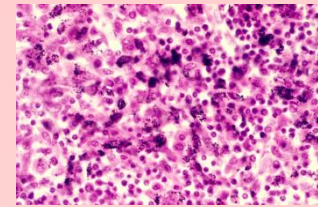
- This is a human lymph node of bronchopulmonary area. This node is encapsulated by thick capsula fibrosa and at lower center collagenous fibers of capsel become thick and constitute the conspicuous hilus. Directly beneath the capsule dense lymphatic tissue constitutes the cortex. In this node, medullary sinuses are not clearly recognized because they are filled with macrophages containing carbon particles.

**07-26 Subcapsular sinus and cortex. Human, H-E stain, x 160.**



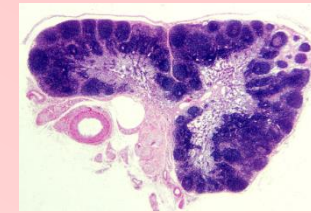
- Higher magnification of 07-25. The upper border of this figure is capsula fibrosa consisting of dense collagenous fibers. and lower two thirds of this figure occupies the cortex, consisting of denselymphatic tissue. Between these two is the subcapsular ( marginal ) sinus where star-shaped reticular cells with long processes, small lymphocytes and a large macrophage ( arrow ) are seen. On the surface of the cortex lining of the littoral cells is clearly recognized. In the cortex among the dense aggregation of the small lymphocytes a postcapillary venule ( double arrow ) is seen.

## 07-27 Medullary sinus. Human, H-E stain, x 160.



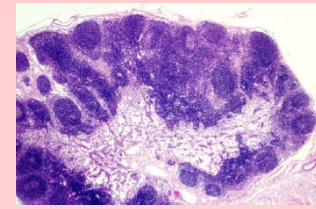
- Higher magnification of 07-26. In this specimen, medullary sinus is filled with macrophages containing abundant carbon particles so that it is difficult to discern the medullary cords and trabeculae.

**07-28 General view of a lymph node. Monkey, H-E stain,  
x 4.0.**



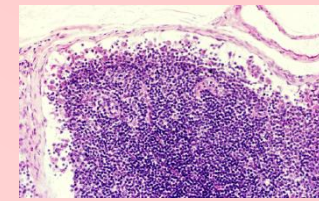
- In this case the cortex is composed with very dense lymphatic tissue so that distinction between the cortex and medulla is easy and the general structure of the lymph node is clearly recognized. A cross sectioned artery at the hilus is shown in 06-25 as an artery of muscular type.

**07-29 General view of cortex and medulla. Monkey,  
H-E stain, x 10.**



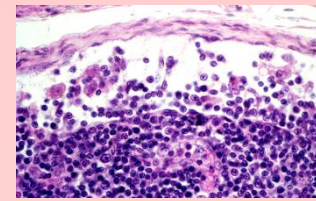
- Higher magnification of 07-28. The capsula fibrosa, trabecula, cortex and medullary cords are easily discerned. At the hilus an efferent lymphatic vessel distinctly seen ( arrows ).

**07-30 Cortex and marginal sinus. Monkey, H-E stain,  
x 64.**



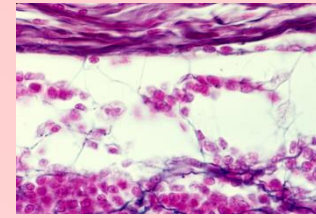
- Higher magnification of 07-29. The capsula fibrosa, limiting the upper edge of this figure sende a thick trabecula at the left edge downward. The sinus between the capsula and cortex is the marginal ( subcapsular ) sinus and that between the trabecula and cortex, the medullary sinus. In both the sinuses there are numerous reticular cells and small lymphocytes.

## 07-31 Marginal sinus 1. Monkey, H-E stain, x 160.



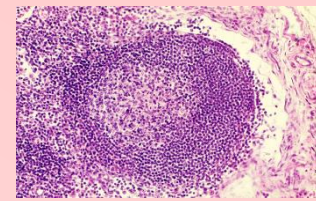
- The nuclei of the littoral cells lining the surface of the cortex ( arrows ) and the inner surface of the capsula fibrosa ( arrow heads ) are conspicuous. In the sinus reticular cells with long processes constitute very loose network and small lymphocytes are suspended within it. Several macrophages reddish stained abundant cytoplasm are seen. In the middle of cortex a postcapillary venule is recognized.

**07-32 Marginal sinus 2. Monkey, silver impregnation and Kernechtrot stain, x 250.**



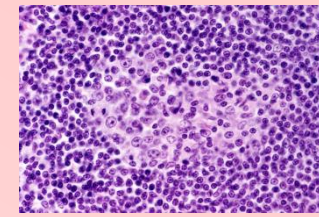
- The reticular fibers traversing the sinus appear black and collagenous fibers constituting the capsule, dark brown. The cells in the sinus are intimately related with these reticular fibers.

**07-33 Cortex, lymphatic nodule with germinal center.  
Monkey, H-E stain, x 64.**



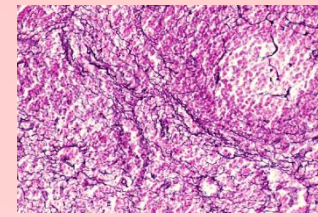
- The right edge of this figure is the capsula fibrosa. Separated by the marginal sinus, a round lymphatic nodule with germinal center occupies the figure which is enclosed by the sinuses all around: right side is the distinct marginal sinus; left side, upper and lower sides are the medullary sinus, that are filled with free cells and difficult to recognize.

## 07-34 Germinal center. Monkey, H-E stain, x 250.



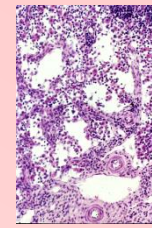
- The germinal center, in the middle, is surrounded by the dense aggregation of the small lymphocytes constituting the dark shell. The germinal center consists of reticular cells, with large light nuclei and faintly stained abundant cytoplasm, and large and medium-sized lymphocytes, with light nuclei and lightly stained cytoplasm, appear as a light circle surrounded by the dark shell. In the center mitotic figures are often observed ( arrow ). In the dark shell, because of the dense aggregation of the small lymphocytes, it is difficult to find the reticular cells.

**07-35 Cortex and medulla. Monkey, silver impregnation and Kernechtrot stain, x 64.**



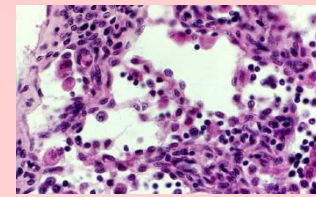
- Both in the cortex and medulla reticular fibers constitute loose network; but within the germinal center, in the upper right one fourth of the figure, reticular fibers are very few.

**07-36 Medullary cords and medullary sinus 1. Monkey,  
H-E stain, x 64.**



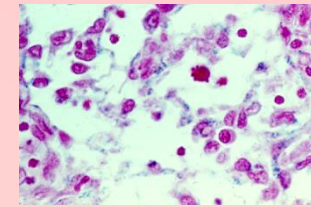
- In the upper three fourths medullary cords and branches of trabeculae compose the intricate meshwork within the sinus. In the lower one fourth there is a large connective tissue mass containing a wide lumen, that is the beginning portion of the efferent lymphatic vessel, Above and beneath this lumen two transverse sections of small arteries are seen.

**07-37 Medullary cords and medullary sinus 2. Monkey,  
H-E stain, x 160.**



- Near the hilus, medullary cords and branches of the trabeculae intermingle with each other and compose the complicate meshworks. At the left edge a trabecula ( arrow ) is clearly seen but most of the other structures numerous small lymphocytes invade among the collagenous fibers, so it is difficult to distinguish the medullary cords from the branches of trabeculae. In the sinuses among the loose network numerous small lymphocytes and large macrophages are scattered.

**07-38 Medullary sinus. Rabbit, vital stain with tripan blue and Kernechtrot stain, x 250.**

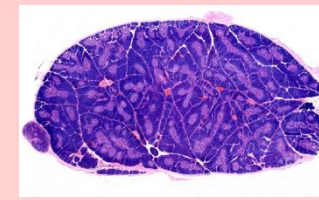


- This is the medullary sinus of a rabbit, vitally stained with tripan blue. The cells with phagocytotic function take in the vital dye, tripan blue, and appear as if they are stained with this dye. In this figure macrophages, reticular cells and littoral cells contain the blue particles in the cytoplasm.

## 07-003 Thymus

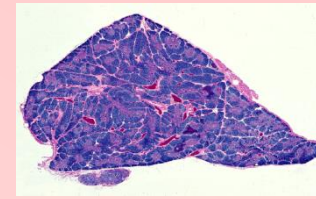
- The thymus arises from the entodermal epithelium of the third and fourth branchial pouches on either side and is the first lymphatic organ during the embryonic life. The thymus consists of two lobes and situates in the superior mediastinum anterior to the upper part of the heart. Each lobe is invested by a thin capsule of loose connective tissue and is subdivided into a number of parenchymal lobules, that are polyhedral in shape and 0.5~2.0 mm in diameter.
- The parenchyma of the thymus consists of a three-dimensional network of stellate, reticular cells of entodermal origin and being connected with one another with desmosomes. Meshes of this network are filled with small lymphocytes, being not distinguishable from the lymphocytes of the blood, lymph and other lymphatic organs.
- Each lobule consists of cortex constituted by dense lymphatic tissue and therefore appearing dark blue and medulla of less dense lymphatic tissue, appearing light pink blue.
- The thymus attains its greatest relative weight at the end of fetal life but its absolute weight continues to increase, reaching 30~40 g at the time of puberty. It then begins to undergo involution that progresses until, in the adult, the organ is largely replaced by adipose tissue. But the remaining lymphatic tissue retains some function.

**07-39 Thymus of 9-month-old child. Human, H-E stain, x 1.4.**



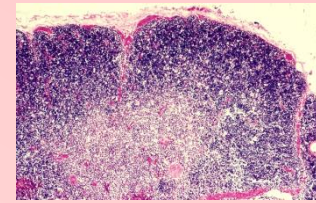
- This is a general view of a thymus of 9-month-old child. General structure of the thymus, lobules, cortex and medulla, is conspicuously wseen.

**07-40 Thymus of 2.9-year-old boy. Human, H-E stain, x 1.4.**



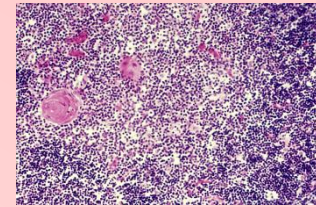
- General feature of the thymus is quite the same as 07-40. The thin connective tissue capsule invade into the parenchyma and divided it a number of lobules consisting of cortex and medulla.

**07-41 Thymus of 2.9-year-old boy, cortex and medulla**  
**Human, H-E stain, x 25.**



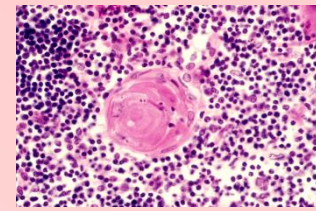
- Higher magnification of 07-40. From the capsule comes into the parenchyma and divides the cortex but not the medulla. The cortex consists of dense lymphatic tissue containing some small blood vessels. The lymphatic tissue of the medulla is loose, containing a number of small blood vessels. An arrow indicates a Hassall body.

**07-42 Thymus of 2.9-year-old boy, medulla Human,  
H-E stain, x 64.**



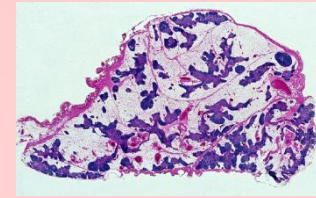
- Higher magnification of 07-41. In the round medulla surrounded by the cortex two Hassall bodies are seen.

**07-43 Thymus of 2.9-year-old boy, Hassall body.  
Human, H-E stain, x 25.**



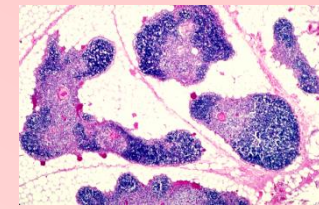
- The Hassall body consists of a concentric array of modified reticular cells. Around the Hassall body numerous reticular cells with large and light nuclei and faintly stained abundant cytoplasm. The dense aggregation of small lymphocytes at upper left corner is a part of cortex.

**07-44 Thymus of an adult female. Human, H-E stain,  
x 1.5.**



- The parenchyma of the thymus is randomly, without distinction between the cortex and medulla, replaced by adipose tissue.

**07-45 Thymus of an adult female, cortex and medulla.  
Human, H-E stain, x 1.5.**

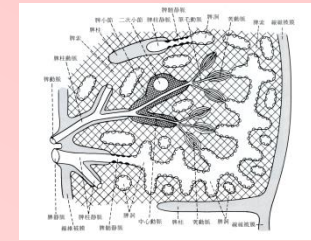


- Higher magnification of 07-44. The parenchyma of the thymus is replaced by adipose tissue, without distinction between the cortex and medulla. In the medulla Hassall bodies are recognized.

## 07-004 Spleen

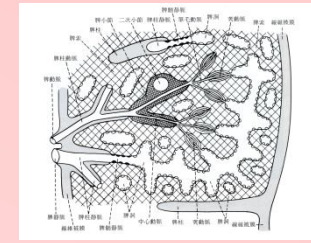
- The Spleen is a filter of blood inserted in the blood stream. The spleen contains a large amount of lymphatic tissue and plays important roles in the defense mechanisms of the body. In the spleen there are peculiar type of blood vessels, splenic sinuses, that allow the circulating blood to come into contact with the macrophages of this organ, so that the spleen acts in many respects as a filter for the bloods.
- The spleen is as a whole encapsulated by a collagenous capsule which thickens at the hilus. The capsule sends numerous trabeculae into the parenchyma, that branch and anastomose with one another to form a loose framework. Within this framework is suspended a reticular framework. At the hilus trabeculae are thick and through these arteries enter and veins leave the organ.
- The reticular framework fills the spaces between the capsule, hilus and trabeculae, and constitute, together with the cells present, the splenic tissue. The splenic parenchyma consists of typical lymphatic tissue, white pulp, and atypical lymphatic tissue, red pulp. On a freshly sectioned surface, the white pulp is seen as irregular long or rounded gray areas, 0.2~0.7mm in diameter, scattered throughout the red pulp. These white areas consist of diffuse and nodular lymphatic tissue, which varies considerably in its finer structure from time to time. The red pulp consists, on the contrary, of the peculiar blood vessels, splenic sinuses, and surrounding reticular network, splenic cords, both of which are filled with blood cells, especially erythrocytes, so that it appears dark red.

## 07-46 Scheme showing the structure of spleen. (1/2)



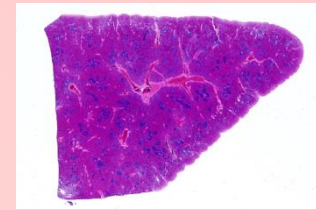
- To understand the splenic structure, it is convenient to follow the blood stream.
- The branches of the splenic artery enter the hilus and pass along the trabeculae, with which they branch repeatedly, becoming smaller in caliber. They are muscular type arteries of medium size and have a loose tunica adventitia surrounded by the dense connective tissue of the trabeculae. When the arterial branches have reached a diameter of about 0.2 mm, they leave trabeculae. At this place the tunica adventitia is replaced by a cylindrical sheath of dense lymphatic tissue, splenic nodule, which surrounds arteries almost to the point where they break up into arterioles. These arteries are named central arteries ( aa. centrales ). In the course of the central arteries the lymphatic sheath contains often the germinal center aside from the artery, so that the central artery never passes through the germinal center. Throughout its course within the nodule, the artery gives off numerous capillaries, which supply the lymphatic tissue of the nodule.
- At the distal end of the lymphatic nodule each central artery branches into several small straight arterioles, arteriae penicillii, distal one third of that is provided with a characteristic spindle-shaped thickening of its wall, the Schweigger-Seidel sheath. This portion has a narrow lumen of  $6\sim 8\mu\text{m}$  in diameter and is called sheathed artery. The endothelial cells of this portion rise into the lumen and surrounded by concentrically arranged reticular cells and reticular fibers composing the sheath. In human development of this sheath is very poor and it is not easy to identify the sheath; in dog, on the centrally, the sheath is very well developed.
- Distal end of the sheathed artery shifts, via short capillary, to the venous vessel. splenic sinus. Whether the distal end of the sheathed artery continues with splenic sinus, beginning of the venous vessel, or opens directly into the reticular tissue, splenic cords, is still in dispute.

## 07-46 Scheme showing the structure of spleen. (2/2)



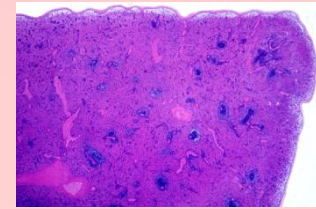
- The veins of the spleen begin as networks of splenic sinuses, which have a wide irregular lumen (  $12 \sim 40 \mu\text{m}$  in diameter ) and penetrate all the red pulp. They occupy more space than the reticular networks, splenic cords, between them.
- The wall of the splenic sinuses is constituted not by the common endothelial cells but is lined by long rod-shaped cells arranged parallel to the long axis of the sinus. The middle of each cell is distended by a nucleus. These lining cells are fixed macrophages, identical in origin and properties with those of the adjacent splenic cords. Their arrangement is relatively loose one another with a gap, which allows erythrocytes to pass through from the lumen into the splenic cords and visa versa.
- Outside these cells, the wall of the sinus is supported by a system of mainly circularly disposed, occasionally branching reticular fibers which continue into the reticular fibers of the splenic cords. The wall of the splenic sinuses is thus a network of longitudinal, rod-shaped fixed macrophages and circular reticular fibers.
- The splenic sinuses empty into the veins of the red pulp, whose wall consists of endothelium supported externally by a condensed stroma of the red pulp. These pulp veins coalesce to form a vein of the trabeculae. These veins consist only of endothelium supported by the connective tissue of the trabeculae. The trabecular veins form the splenic veins, which leave the organ at the hilum and empty into the portal vein.
- The splenic cords consist of a loose network of reticular cells and associated reticular fibers, and a large number of free macrophages.
- The lumen of the sinuses and meshes of the splenic cords are densely filled by the blood cells, especially erythrocytes, so that the sectioned surface of the spleen appears dark red.

## 07-47 Spleen, general view, 1. Human, H-E stain, x 1.3.



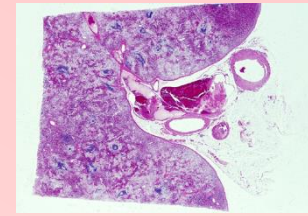
- This is a human spleen specimen made by the routine method; i.e. after taking out from abdomen, the spleen was soaked in 10% formalin and then, without any special manipulation, processed according to the routine method to prepare the microscopic specimens. In the dark red stained parenchyma lightly red stained branches of the trabeculae and dark blue stained splenic nodules ( white pulp ) are scattered. At the center a large branch of trabecula containing the artery and vein is conspicuous.

## 07-48 Spleen, general view, 2. Human, H-E stain, x 2.0.



- This specimen was made from a cadaver, that was fixed by perfusion of 10 % formalin. By this manipulation, in the narrow area directly beneath the capsula fibrosa the tissue became loosened but except for this area the appearance of the spleen is almost the same as 07-47. At lower left corner a large branch of trabecula containing the artery and vein is seen.

## 07-49 Spleen, general view, 3. Human, H-E stain, x 1.5.



- This specimen was made from a spleen, which was treated by perfusion fixation first with a quantity of saline then with 10% formalin. Through this manipulation the blood in the parenchyma was largely washed out, so that the lumen of the sinuses and meshes of the splenic cords are empty and somewhat widened. The parenchyma appears less dark red and distinctly loose. At the center large arteries and veins enter and leave the organ at the hilus.

**07-50 Spleen, general view, 4. Monkey, H-E stain,  
x 2.0.**



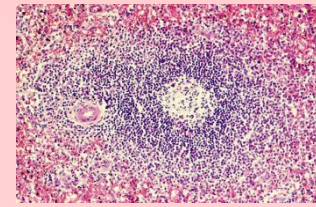
- This specimen was made simply by soaking in 10% formalin. In this section branching of trabeculae entering from the hilus is very conspicuous. In this specimen the splenic nodules are highly developed.

## 07-51 Spleen, general view, 5. Dog, H-E stain, x 1.5.



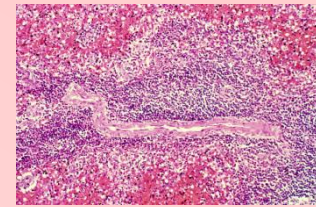
- This specimen was thus prepared: first perfusion with a quantity of saline then 10% formalin and finally gently pressured until the spleen became swelled about two times in volume. Through this manipulation the blood was almost perfectly washed out from the parenchyma of the spleen and lumen of the sinuses and meshes of the splenic cords were distinctly widened. Because of the highly development of the sheathed arteries in dog, fundamental structures of the spleen is easily understood through this specimen.

**07-52 Splenic nodule, transverse section. Human, H-E stain, x 50.**



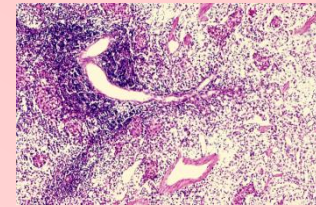
- This is a transversely sectioned splenic nodule with germinal center. At the center of this figure there is the round germinal center, left to that is the central artery. As the germinal center develops avoiding the central artery, on the transverse section the central artery seems to locate at the periphery of the nodule aside to the germinal center.
- Around the nodule the parenchyma is filled with erythrocytes but not in the splenic nodule.

**07-53 Splenic nodule, longitudinal section. Human,  
H-E stain, x 40.**



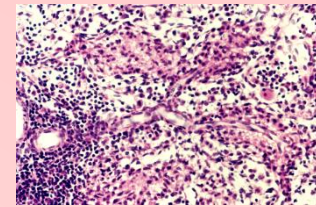
- This is a longitudinally sectioned splenic nodule. The central artery runs at the lower periphery of the nodule. Somewhat loose area upper to the artery is the germinal center. Among densely packed lymphocytes of the nodule invading erythrocytes is very few.

**07-54 A. centralis and aa. penicillii. Dog, H-E stain, x 30.**



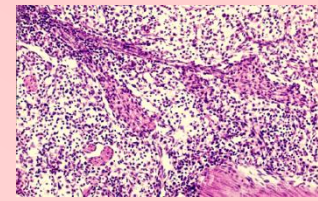
- Figures from 07-54 to 07-64 are all higher magnification of 07-51, of dog which was treated by perfusion fixation.
- At upper left corner is a splenic nodule in which two branches of the central arteries are seen. At lower right periphery of the nodule leaves one branch and divides into three aa. penicillii. The parenchyma is very loose; Trv is the vein in trabecula.

**07-55 Aa. penicillii and sheathed arteries, 1. Dog, H-E stain, x 160.**



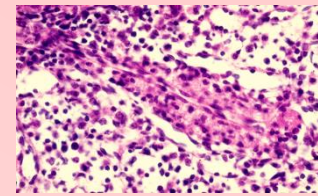
- At lower left corner two branches of the central artery are seen, one of which leaves the nodule rightward becoming the arteria penicillii dividing into three and each has the typical sheath, consisting of the reticular cells and reticular fibers. The axial portion of the lower right sheath is penetrated by the vessel lumen. Except for these structures the sinuses and splenic cords are very loose containing a small number of free cells.

**07-56 Aa. penicillii and sheathed arteries, 2. Dog, H-E stain, x 64.**



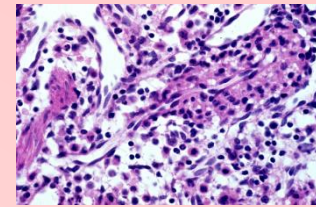
- At upper left corner come two aa. penicillii right downward and each is provided at their distal end the sheath. The higher magnification of the left one is shown in 07-57.

**07-57 Sheathed artery, longitudinal section. . Dog, H-E stain, x 160.**



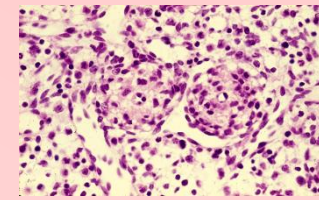
- This is a typical sheathed artery. The narrow lumen penetrates the axial portion of the sheath, consisting of the reticular cells and reticular fibers. Sinuses are indicated with S.

**07-58 Sheathed artery and splenic sinus, longitudinal section. Dog, H-E stain, x 160.**



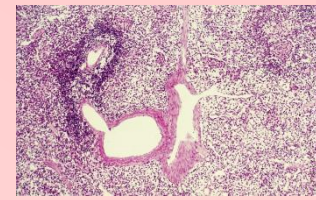
- From upper right corner comes a sheathed artery left downward and shifts at its distal end to the splenic sinus ( arrow ). The lumen of the sheathed artery penetrates the axial portion of the sheath and via short capillary shifts to the sinus continuously. Tr indicates trabecula and S, splenic sinuses.

**07-59 Sheathed arteries, transverse section. Dog. H-E stain, x 160.**



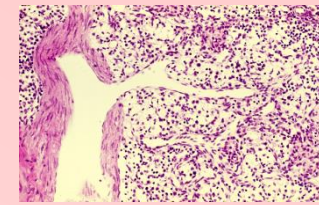
- In the center two transversely sectioned sheathed arteries are seen, whose lumen is very narrow and locates at the axial portion of the sheath. The construction of the sheath is here distinctly shown. S indicates the sinuses and others are splenic cords.

**07-60 Artery and vein in trabecula. Dog, H-E stain,  
x 25.**



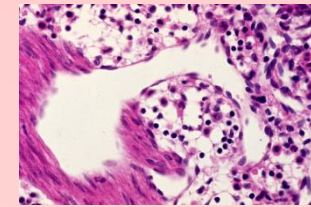
- At lower center there are an artery ( Tra ) and a vein ( Trv ) in the trabecula. The artery sends a branch into the splenic nodule, as central artery and vein accepts the pulp vein at upper right portion.

**07-61 Vein in trabecula and pulp vein. Dog, H-E stain, x 64.**



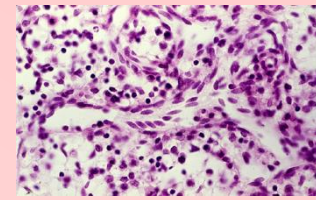
- Higher magnification of 07-60. The vein in trabecula
- At the left verge there is the trabecula ( Tr ) containing the trabecular vein ( Trv ), whose wall consists only of the endothelium supported externally by the connective tissue of the trabecula. Into this vein empties the pulp vein ( Pv ), consisting of the endothelium surrounded by the splenic cords. To this pulp vein coalesce two sinuses ( S ), nuclei of whose endothelium protrude into the sinus lumen. Higher magnification of S1 is shown in 07-63.

**07-62 Splenic sinus, pulp vein and vein in trabeculae.  
Dog, H-E stain, x 160.**



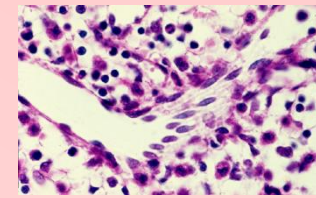
- In this field splenic sinuses ( S1, S2 ), pulp vein ( Pv ) and vein in trabecula ( Trv ) are continuously observed. The wall of sinuses consists of long rod-shaped cells arranged parallel to the long axis of the sinus, whose nuclei protrude into the lumen of the sinuses. The wall of the pulp vein consists, on the centrally to the sinuses, of usual endo- thelium tightly connected with one another, and supported externally by the splenic cords. The nuclei of the endothelium are flat and not protruded into the lumen. The pulp veins are usually very short and empty into the veins in trabecula, whose wall consists only of endothelium and externally supported directly by the connective tissue of the trabecula.

## 07-63 Splenic sinus, 1. Dog, H-E stain, x 160.



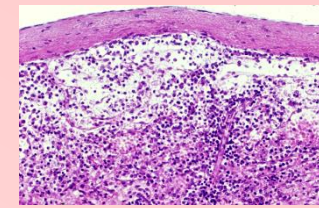
- Higher magnification of S1 in 07-61. At the center sinus ( S1 ) runs rightward and divides into two ( S2 and S3 ). Between S1 and S2, the surface view of the sinus wall is seen. The arrangement of the long rod-shaped cells parallel to the long axis of the sinus is clearly observed.

**07-64 Splenic sinus, 2. Dog, H-E stain, x 160.**



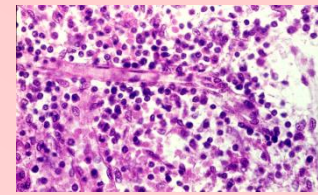
- S1 and S2 are longitudinally sectioned splenic sinuses and between them the surface view of the sinus wall is seen; the long rod-shaped cells constituting the wall of the sinus are clearly observed.

**07-65 Spleen, subcapsular region. Human, H-E stain,  
x 64.**



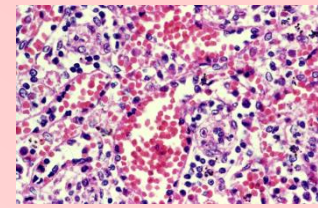
- This is higher magnification of 07-48. This spleen was taken from a cadaver which was fixed by infusion of 10% formalin. In this spleen blood was driven out from the narrow area directly beneath the capsula fibrosa ( cap. fibr. ) and tissue was loosened. In this area several empty sinuses ( S ) are seen. At right one third a sheathed artery is observed. In human development of the sheath is very poor compared with dog.

**07-66 Sheathed artery, longitudinal section. Human,  
H-E stain, x 160.**



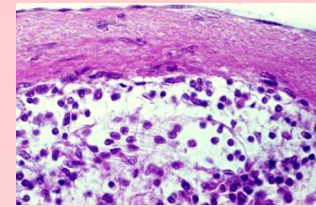
- Higher magnification of 07-65. A sheathed artery runs horizontally from left right-ward and at its extremity shifts to the sinus. In human the sheath develops very poorly so that it is barely recognized in this case. Compare with 07-67.

**07-67 Sheathed artery, transverse section. Human,  
H-E stain, x 160.**



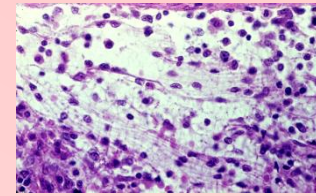
- This field is found in a spleen shown in 07-49. In this case the blood is largely driven out from the splenic cords but not from the sinus. In this field two transversely sectioned sheathed artery ( arrow ) are recognized. Comparing with dog ( 07-59 ) , poor development of the sheath in human is well understood. S indicates the sinuses containing erythrocytes.

## 07-68 Splenic sinus, 1. Human, H-E stain, x 160.



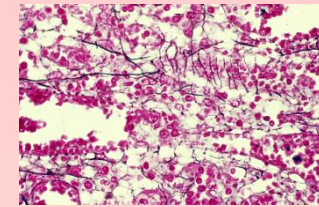
- This is higher magnification of 07-65. Beneath the capsula fibrosa ( cap. fibr. ) the tissue is loosened. At center a sinus obliquely sectioned so that its lumen ( S ) and surface view of the wall are both observed. In the surface view the parallel arrangement of the long rod-shaped cells and the externally encircling reticular fibers are clearly seen.

## 07-69 Splenic sinuses, 2. Human, H-E stain, x 160.



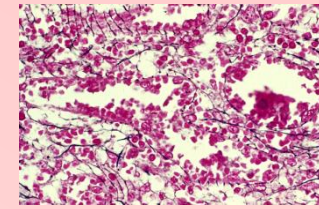
- This is also higher magnification of 07-65. Two longitudinally sectioned sinuses are seen ( S1, S2 ). The S1 shows the lumen and surface view of the sinus wall and S2 the surface view of the sinus wall. Especially in S2 the parallel arrangement of the long rod-shaped cells and externally encircling reticular fibers are clearly observed.

### 07-70 Splenic sinuses, 3. Human, silver impregnation and Kernechtrot stain, x 160.



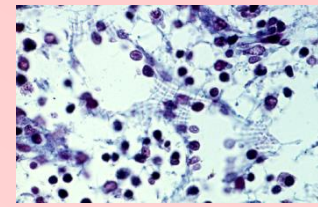
- This is the same specimen as 07-49, but silver impregnated and Kernechtrot stained .
- By silver impregnation the reticular fibers appear black. In this field a longitudinally sectioned sinus ( S1 ), and a transversely sectioned sinus ( S3 ) are seen. S2 is the surface view of a sinus wall. In S1 transversely sectioned reticular fibers form a line along the edge of the sinus. In S3 the reticular fiber encircles the sinus lumen. In S2 the reticular fibers appear as parallel lines perpendicular to the long axis of the sinus. These reticular fibers send branches to form a loose network in the splenic cords. The nuclei of all kinds of cells are stained deep red.

## 07-71 Splenic sinuses, 4. Human, silver impregnation and Kernechtrot stain, x 160.



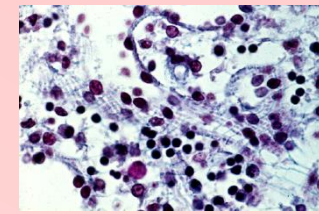
- The same specimen as 07-70. In this field a transversely sectioned sinus ( S1 ), a longitudinally sectioned sinus ( S2 ) and obliquely sectioned sinuses( S3, S4 ) are seen. In S1 reticular fiber encircles the sinus continuously; in S2 sections of the reticular fibers line along the edge of the sinus. In S3 and S4 the reticular fibers appear as the parallel lines perpendicular to the long axis of the sinus. These fibers send the branches into the splenic cords and connect with fibers in the cords to form a loose network.

## 07-72 Splenic sinus, 5. Human, Azan stain, x 250.



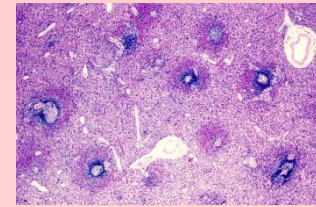
- At center between S1 and S2 the surface view of the sinus wall is distinctly seen. The arrangement of the long rod-shaped cells parallel to the long axis of the sinus and the blue stained encircling reticular fibers perpendicular to the rod-shaped cells are very clear. The very loose tissue outside the sinus is the splenic cord.

### 07-73 Splenic sinus, 6. Human, Azan stain, x 250.



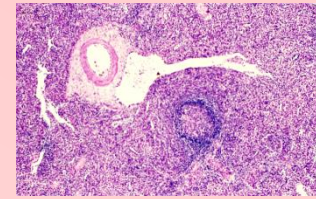
- The same specimen as 07-72. Here the surface view of the splenic wall is long demonstrated. S1 is a longitudinally sectioned lumen; on the right wall two nuclei of the long rod-shaped cells protrude into the lumen. From here right downward continues the surface view of the wall consisting of the long rod-shaped cells and externally encircling reticular fibers (blue stained). S2 is the lumen of a transversely sectioned sinus.

**07-74 Spleen, general view. Monkey, H-E stain, x 10.**



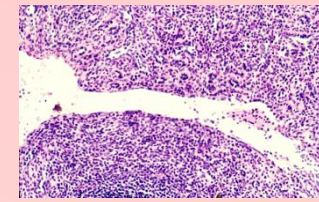
- Higher magnification of 07-50. In this spleen splenic nodules are well developed. In this field several nodules are scattered randomly. At upper right corner a trabecula with an artery is seen.

**07-75 Artery and vein in trabecula. Monkey, H-E stain.  
x 25.**



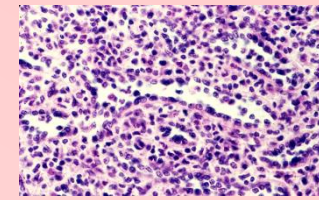
- Higher magnification of 07-74. At upper left there is a trabecula containing an artery ( Tra ) and a vein ( Trv ). Into this vein a sinus ( S ) and a pulp vein ( Pv ) empty continuously. Down to the pulp vein there is a splenic nodule with germinal center. Thick and thin cracks in the field are the splenic sinuses.

**07-76 Spleen, sinus, pulp vein and vein in trabecula.  
Monkey, H-E stain, x 64.**



- Higher magnification of 07-75. At center of this field run splenic sinus ( S ) and pulp vein ( Pv ) continuously and empty into the vein in trabecula ( Trv ). In S nuclei of the rod-shaped cells protrude into the lumen of sinus but in Pv nuclei of the endothelial cells are flat and externally supported directly by the splenic cord. In Trv endothelium is directly supported by the connective tissue of the trabecula.

## 07-77 Splenic sinus. Monkey, H-E stain, x 160.



- In this field splenic sinuses ( S ) edged by the protruded nuclei are observed. The splenic cords surrounding the sinuses contain very few erythrocytes and are not loosened so that the identification of the splenic cords is not easy.