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Case 1. Tissue from a parakeet.

(NOTE: This is not a descriptive slide – there is moderate autolysis which obscures a lot of the salient diagnostic features of the protozoal schizonts. Note the changes and move on.)

MICROSCOPIC DESCRIPTION: Proventriculus: Multifocally within the skeletal muscle of the proventriculus, there are numerous multilocular protozoal megaloschizonts. Protozoal megaloschizonts measure up to 200 um in diameter with a thick eosinophilic hyaline wall which is continuous with hyaline 3-5um septa which subdivide the schizonts. Schizonts contain innumerable 1-2um elliptical zoites with basophilic nuclei. Surrounding these schizonts, small numbers of skeletal muscle fibers are undergoing degeneration and necrosis, with infiltration of low numbers of histiocytes, lymphocytes and plasma cells. In one section, there is a focal ulcer of the gizzard with loss of mucosa and hemorrhage within the overlying koilin layer, and infiltration of low numbers of heterophils at the base of the ulcer.

MORPHOLOGIC DIAGNOSIS: 1. Proventriculus, skeletal muscle: Protozoal megaloschizonts, multiple.
2. Proventriculus: Proventriculitis, ulcerative, focal, moderate, with hemorrhage.

CAUSE: *Hemoproteus* spp.

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Case 2. Tissue from a dog.

(Note: There is significant slide variation – in some sections, the nematode is dragged out of the section and is elsewhere on the slide, often in a fragmented state. In some sections, the aorta is more affected, in others the esophagus is worse.)

MICROSCOPIC DESCRIPTION: Aorta: The wall of the aorta is markedly and irregularly thickened **(1pt.)**, and normal architecture is diffusely lost. The intima is lost with exposure of the tunica media which is infiltrated by large numbers of neutrophils, eosinophils, and macrophages admixed with abundant cellular debris. **(1pt.)** A large fibrin thrombus **(1pt.)** is adherent to the ulcerated surface. The cellular infiltrate extends transmurally through the wall of the aorta and is admixed with numerous fibroblasts, small vessels, granulation tissue and haphazard fibrosis **(1pt.)** which separates and replaces smooth muscle. There are scattered areas of necrosis within the wall, with abundant cellular debris and numerous neutrophils and macrophages. Focally within the adventitia, there is a cluster of larval nematodes **(1pt.)** in cross and tangential section up to 300 um in diameter, with a smooth cuticle; coelomyarian-polymyarian musculature; prominent, stalked lateral chords; brightly eosinophilic material in the pseudocoelom; and a large intestine lined by uninucleate, cuboidal epithelial cells with a prominent, tall brush border, and a developing gonad with large brightly eosinophilic globules. **(2pt.)** The adventitia is also expanded by the large numbers of neutrophils, macrophages, lymphocytes, and plasma cells enmeshed within granulation tissue, which extends into adjacent fibroadipose tissue and multifocally, the adventitia is throughout into papillae. **(1pt.)**

Esophagus: Within the submucosa and extending into the mucosa, there is a focal 1cm nodular area of granulomatous inflammation **(1pt.)** composed of large numbers of macrophages, lymphocytes, and plasma cells enmeshed in variably mature fibrous connective tissue which expands the submucosa and extends into the underlying skeletal muscle. **(1pt.)** Within the fibrous connective tissue, there are aggregates of small numbers of lymphocytes, plasma cells, and fewer macrophages, often in perivascular areas **(1pt.)**, and multifocally, skeletal muscle within fibrotic areas is multifocally lost or shrunken and atrophic. **(1pt.)**

MORPHOLOGIC DIAGNOSIS: 1. Aorta: Aortitis, necrogranulomatous, diffuse, severe, chronic with fibrin thrombi, marked mural fibrosis, and larval nematodes. **(3pt.)**

2. Esophagus: Esophagitis, granulomatous, focal, severe. **(2pt.)**

CAUSE: *Spirocerca lupi* **(2pt.)**

O/C: **(1pt.)**

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Case 3. Tissue from a penguin.

MICROSCOPIC DESCRIPTION: Lung: Diffusely, interbronchiolar fibrous connective tissue **(1pt.)** is expanded up to 3 times normal by an infiltrate of moderate numbers of lymphocytes **(1pt.)** and plasma cells **(1pt.)**, fewer histiocytes **(1pt.)**, and small amounts of edema. Parabronchi contain variable combinations and concentrations of heterophils **(1pt.)** and macrophages **(1pt.)**, admixed with fibrin and edema fluid. Air capillaries are diffusely congested, and multifocally, there is infiltration of low to moderate numbers of macrophages **(1pt.)** (which occasionally form small aggregates) **(1pt.)** and fewer heterophils admixed with cellular debris **(1pt.)** and hemorrhage (necrosis) **(1pt.)**. Rarely, within areas of necrosis, cells are expanded by a 10um protozoal schizont **(2pt.)** with numerous 2x3 fusiform protozoal zoites **(1pt.)**. Aggregates of macrophages often contain anthracosilicotic pigment. **(1pt.)**

MORPHOLOGIC DIAGNOSIS: Lung: Pneumonia, interstitial **(1pt.)**, lymphohistiocytic and necrotizing, **(1pt.)** multifocal, mild to moderate with intracellular protozoal zoites. **(1pt.)**

CAUSE: *Sarcocystis* spp. **(2pt.)**

O/C: **(1pt.)**

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CASE 4. Tissue from a dog.

MICROSCOPIC DESCRIPTION: Globe: Multifocally expanding the sclera **(1pt.)**, there are extensive areas of coalescing, granulomatous **(1pt.)** inflammation composed of large numbers of macrophages **(1pt.)** admixed with fewer lymphocytes **(1pt.)** and plasma cells, admixed with small amounts of cellular debris as well as plump fibroblasts and small amounts of mature collagen**(1pt.)**. Multifocally, areas of granulomatous inflammation contain numerous cross sections of larval nematodes **(1pt.)**, which range up to 150um in diameter with a ridged cuticle **(1pt.)**, a pseudocoelom, low atrophic polymyarian-coelomyarian **(1pt.)** musculature which is multifocally replaced by hypodermis, multiple cross sections of an eccentrically placed small intestine, and occasional uteri. Numerous plasma cells **(1pt.)** populate the vascular fibrous connective tissue surrounding these nematodes. The limbal conjunctiva is multifocally ulcerated and expanded by large numbers of lymphocytes **(1pt.)**, plasma cells, and fewer macrophages and neutrophils, admixed with small amounts of hemorrhage, edema, and cellular debris. **(1pt.)** On one side, the limbal sclera is expanded by abundant vascular granulation tissue containing previously described inflammatory cells with a higher percentage of eosinophils. **(1pt.)** On this side, the drainage angle is occluded by thin layer of collagen and fibroblasts. **(1pt.)**

MORPHOLOGIC DIAGNOSIS: Globe: Scleritis **(1pt.)**, granulomatous and eosinophilic, **(1pt.)** multifocal to coalescing, severe with lymphoplasmacytic conjunctivitis **(1pt.)**, pre-iridal fibrovascular membrane, and numerous adult filarid nematodes. **(1pt.)**

Cause: *Onchocerca lupi*. **(2pt.)**

O/C: **(1pt.)**