



THE UNIVERSITY
WISCONSIN
MADISON

The Comparative Ocular Pathology Laboratory of Wisconsin



AAPSP
Australian Animal Pathology
Standards Program



Davis-Thompson
Foundation



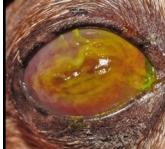
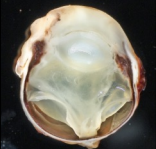
COPLOW

Veterinary Pathology Roadshow
2026

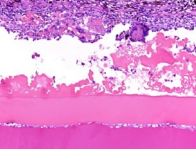
6. Pathology of the Uveal tract

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Director & Head Pathologist – COPLOW
Comparative Ocular Pathology Laboratory of Wisconsin
School of Veterinary Medicine University of Wisconsin-Madison





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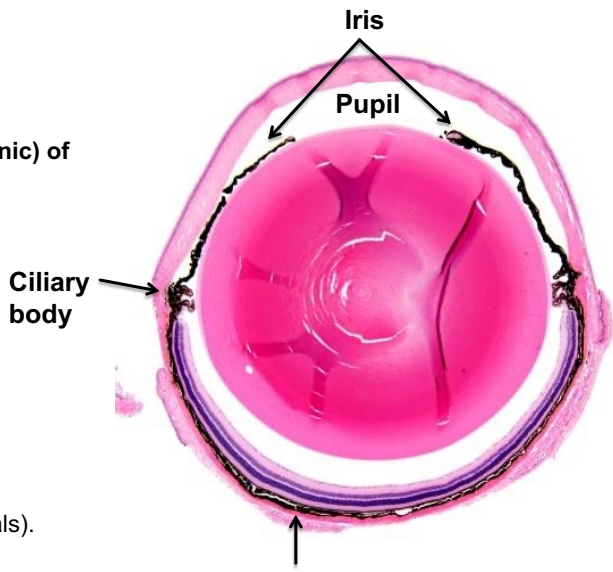


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Uvea

Middle layer (vascular tunic) of eye

- ❖ **Anterior Uvea**
 - ✓ Iris
 - ✓ Ciliary Body
- ❖ **Posterior Uvea**
 - ✓ Choroid
- ❖ **Common Features**
 - ✓ Well vascularized.
 - ✓ Abundant pigment (melanin in mammals).



Mouse

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The Vocabulary of Uveitis

- Inflammation of the uveal tract (vascular tunic)
- Clinical signs: lacrimation, blepharospasm, photophobia, “red eye,” miosis
- Neutrophils and mononuclear cells enter the eye via uveal blood vessels
- Neutrophils and macrophages – migratory, settle in the chambers of the eye
- Lymphocytes and plasma cells remain in the tissue
 - Perivascular cuffs
 - Lymphoid follicles

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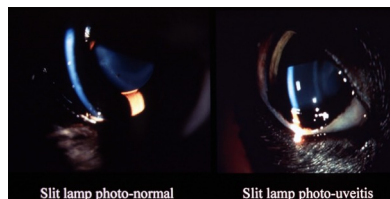
Uveitis

Clinical diagnosis

Aqueous flare

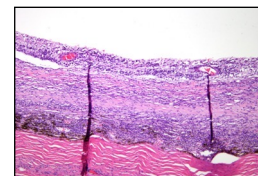
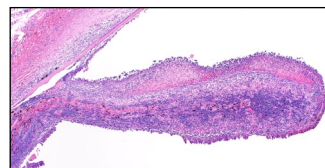
Turbid aqueous humor, caused by the presence of

- Fibrin
- Other proteins
- Inflammatory cells



Pathologic Diagnosis

Cellular hallmarks of inflammation directly within the uveal stroma



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Classification of Uveitis

- **Uveitis:** *inflammation of the uvea*
- **Anterior uveitis/iridocyclitis:** *iris and CB*
- **Posterior uveitis/choroiditis:** *choroid*
- **Endophthalmitis:** *uvea and chambers/vitreous*
- **Panophthalmitis:** *all ocular tunics*

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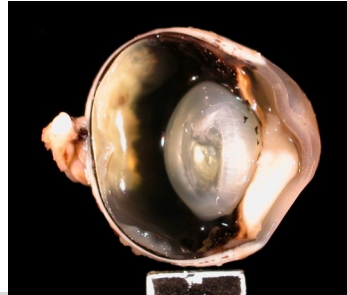
Consequences of Uveitis

- Fibrovascular membranes
- Corneal edema
- Retinal detachment
- Secondary glaucoma

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Consequences of Uveitis

- Blood vessels become leaky, exude serum proteins
- Neutrophils settle into anterior chamber: Hypopyon
- Corneal edema
 - Effects on corneal endothelial cell function



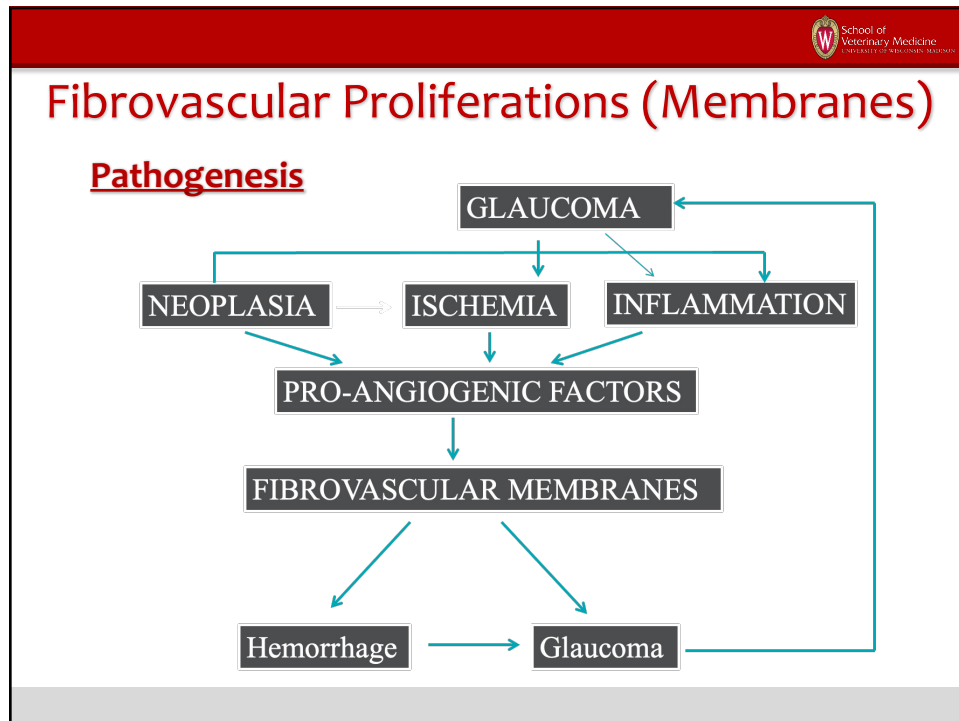
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Consequences of Uveitis

Fibrovascular Proliferations (Membranes)

- Non-specific response to intraocular release of pro-angiogenic factors (ex. VEGF)
- Potential causes:
 - Retinal detachment
 - Tumors
 - Inflammation
 - Trauma
 - Glaucoma

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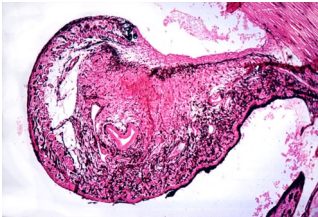


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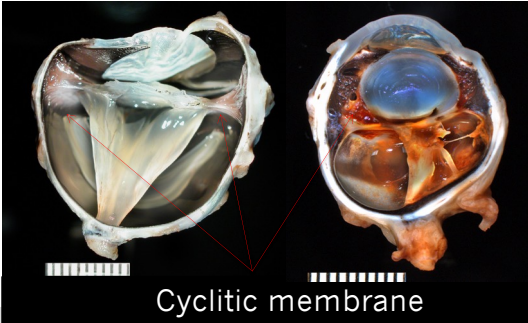
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Fibrovascular Proliferations (Membranes)

- Location
 - Pre-iridial fibrovascular membranes (PIFM)
 - Post-iridial fibrovascular membranes
 - Cyclitic membranes
 - Retrocorneal membrane
 - Pupillary fibrovascular membrane

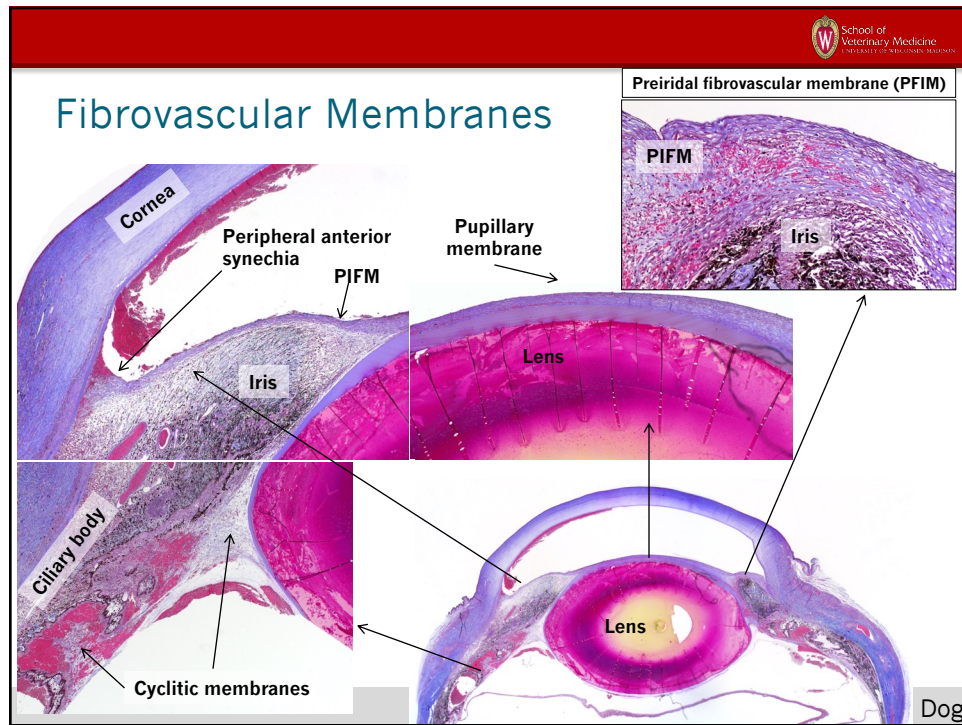


Preiridial fibrovascular membrane

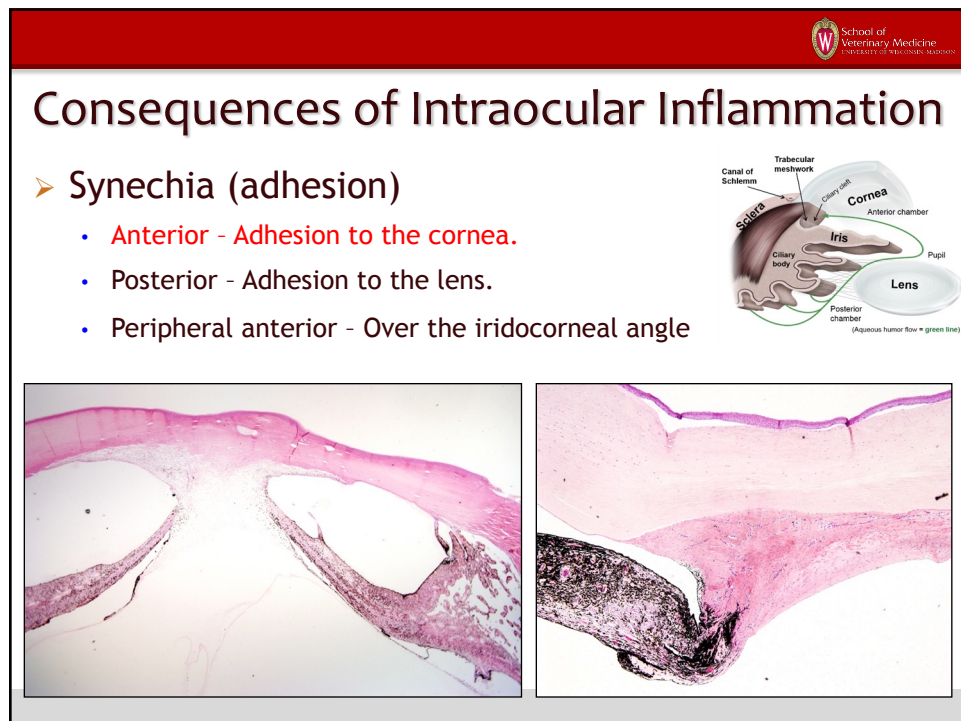


Cyclitic membrane

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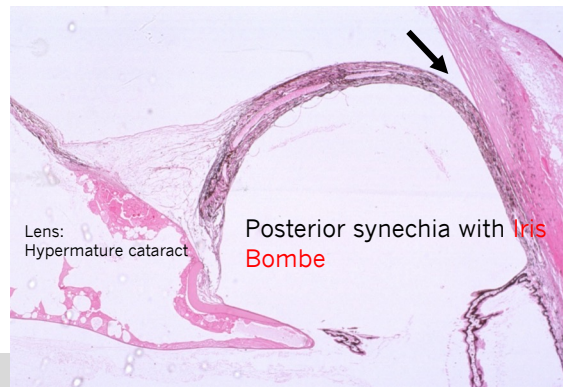
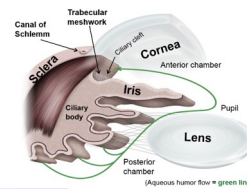


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Consequences of Intraocular Inflammation

➤ Synechia

- Anterior - Adhesion to the cornea.
- **Posterior - Adhesion to the lens.**
- Peripheral anterior - Over the iridocorneal angle

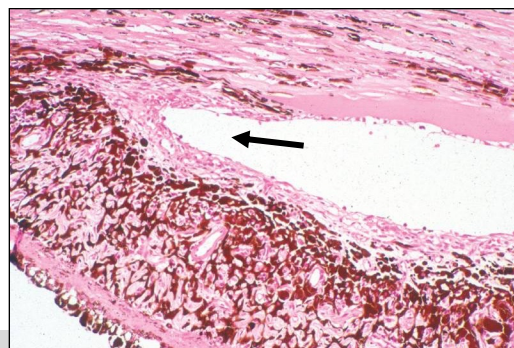
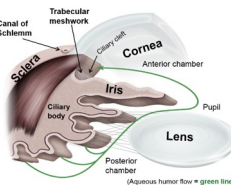


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Consequences of Intraocular Inflammation

➤ Synechia

- Anterior - Adhesion to the cornea.
- Posterior - Adhesion to the lens.
- **Peripheral anterior - Over the iridocorneal angle**

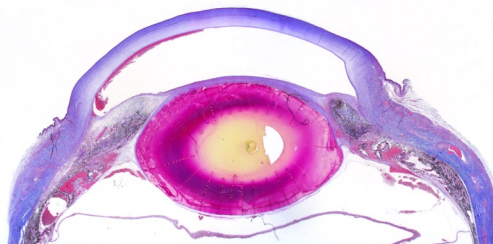
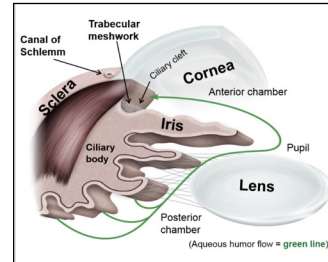


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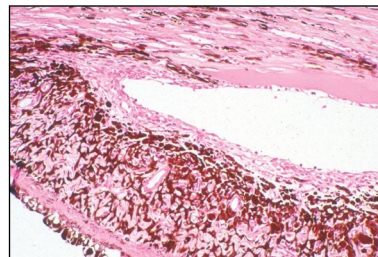
Consequences of Intraocular Inflammation

➤ Secondary Glaucoma

- Accumulation of inflammatory cells and fibrin in the iridocorneal angle may obstruct aqueous outflow
- Peripheral anterior synechia caused by preiridal fibrovascular membrane can close the angle
- Pupillary block: Anterior or posterior synechia



Posterior synechia and pupillary block



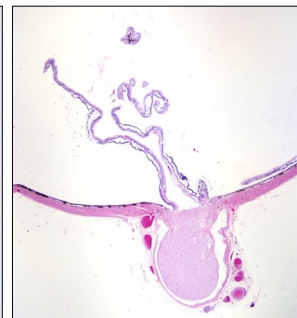
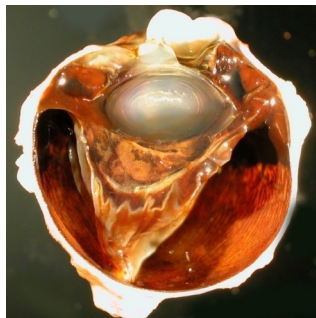
Peripheral anterior synechia

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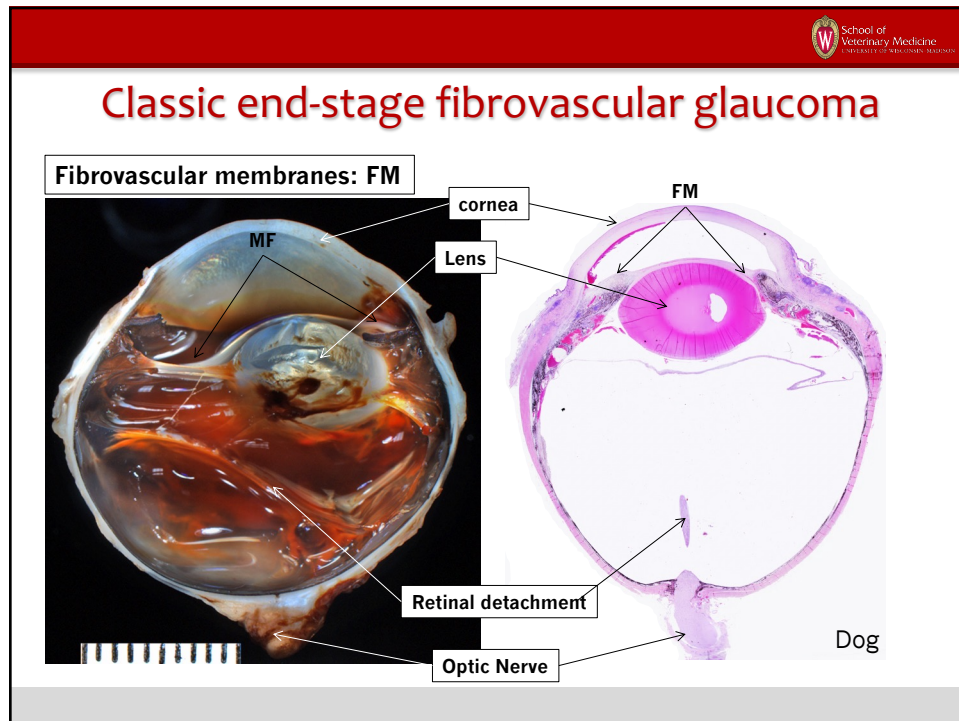
Consequences of Intraocular Inflammation

➤ Retinal detachment

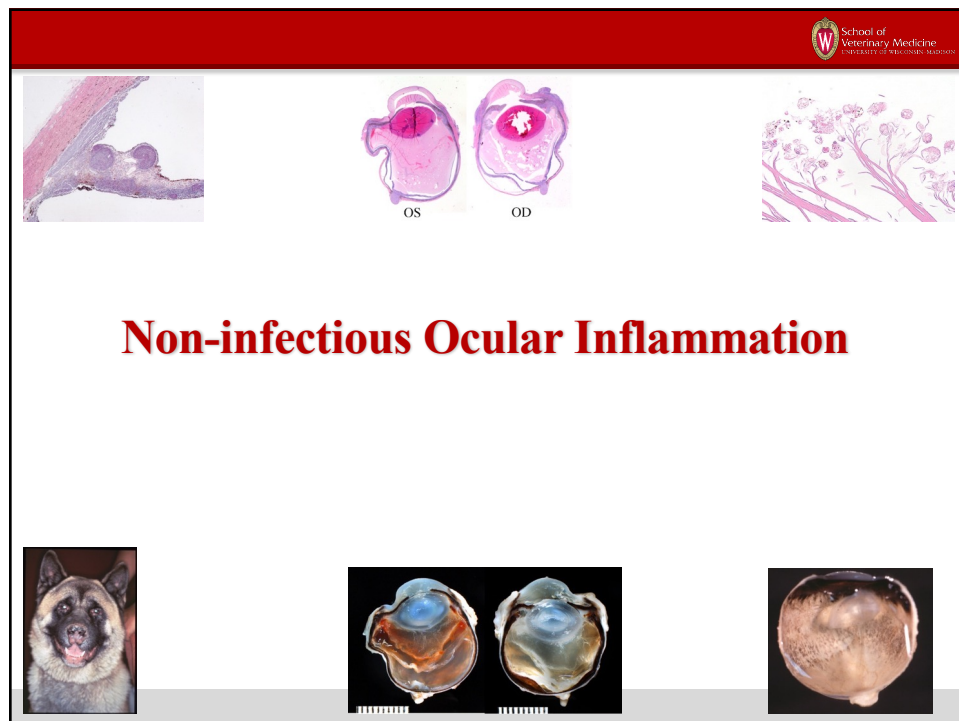
- Protein exudation +/- inflammatory cells from the choroidal vessels into subretinal space



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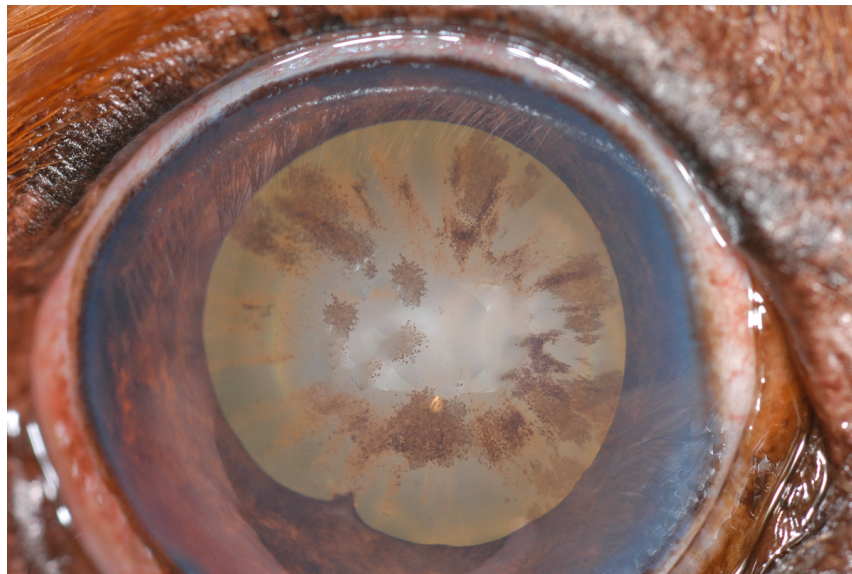
Thin-walled iridociliary cysts

Pigmentary Uveitis Golden Retriever Uveitis

- 292 cases in the COPLOW database (all in Golden Retrievers)
- Age range
 - 0.6% Affected dogs are less than 7 years old
 - 12% of affected dogs are older than 11 years old
 - 82% of affected dogs are between 7 and 11 years old
- 133 Female and 155 Male
- Labradors and Bulldogs can have similar condition

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Thin Walled Iridociliary Cysts



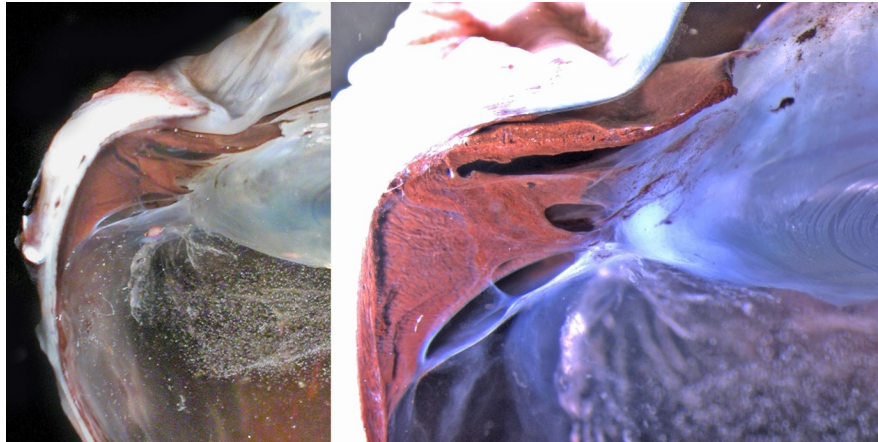
Dr. Ellison Bentley

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Thin Walled Iridociliary Cysts



Thin-walled epithelial membranes (cysts) filling the posterior chamber and stretching over the anterior lens capsule



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Thin Walled Iridociliary Cysts



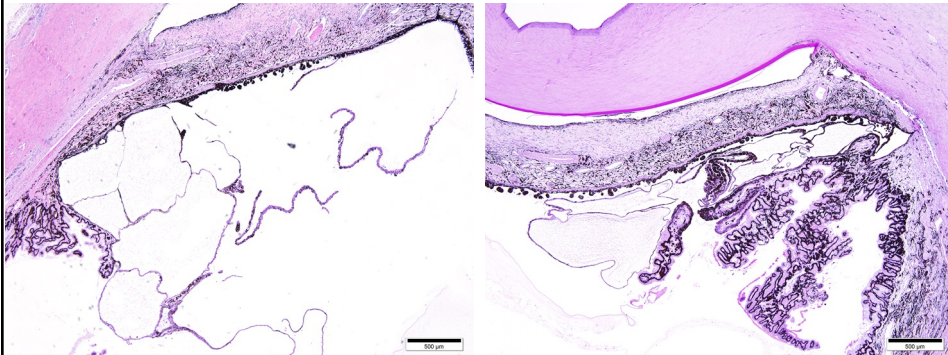
Histo:

- Sparse to no inflammation
- Cysts in the posterior chamber
 - Lens equator or anterior vitreal face
 - Single layer of cuboidal to flattened cells
 - Pigmented or not
- Free pigment in the ICA
- Heavily pigmented eyes



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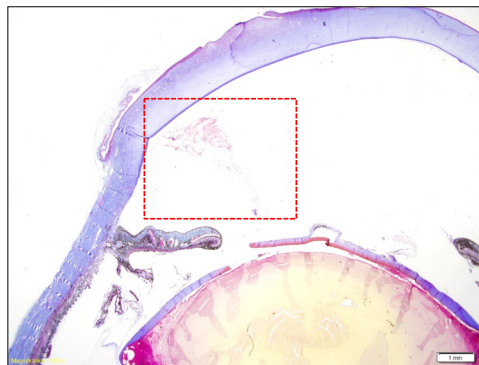
Thin Walled Iridociliary Cysts



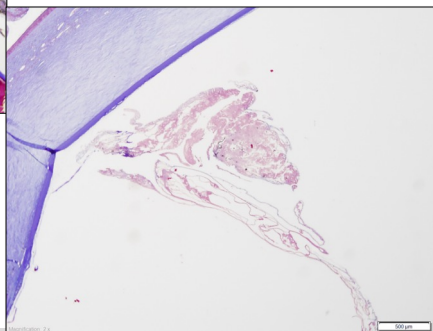
Also note the heavily pigmented uvea which is typical

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Thin Walled Iridociliary Cysts

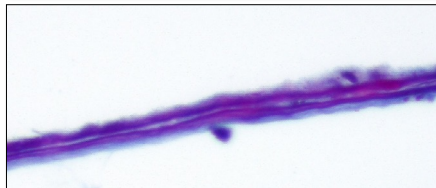
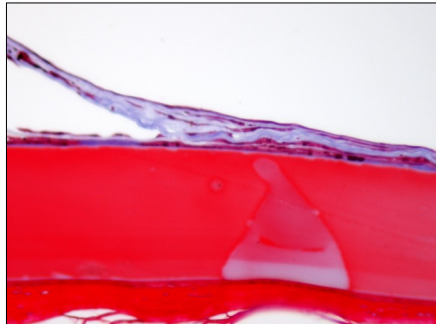


Acellular membrane
or cyst remnants floating
in the aqueous
Not fibrin



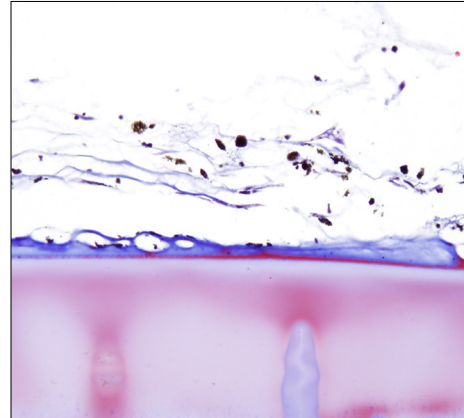
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Thin Walled Iridociliary Cysts



PAS stain demonstrating basal lamina

Pigmented epithelial cells on the anterior lens capsule

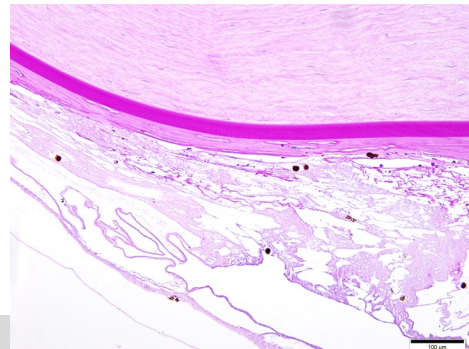
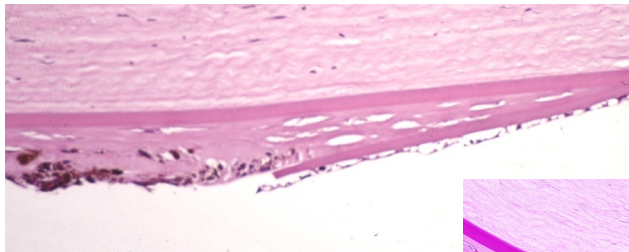


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Thin Walled Iridociliary Cysts



Cyst remnants/membranes touching and distorting Descemet's membrane

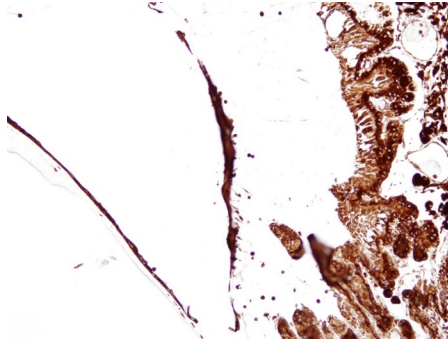


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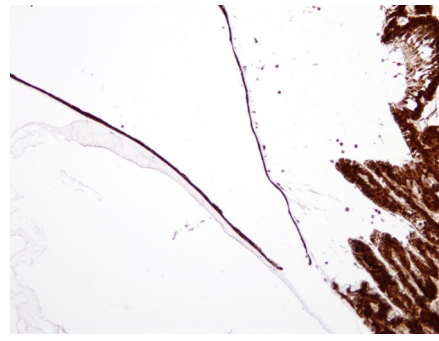
Thin Walled Iridociliary Cysts



IHC pattern of iridociliary epithelium



NSE



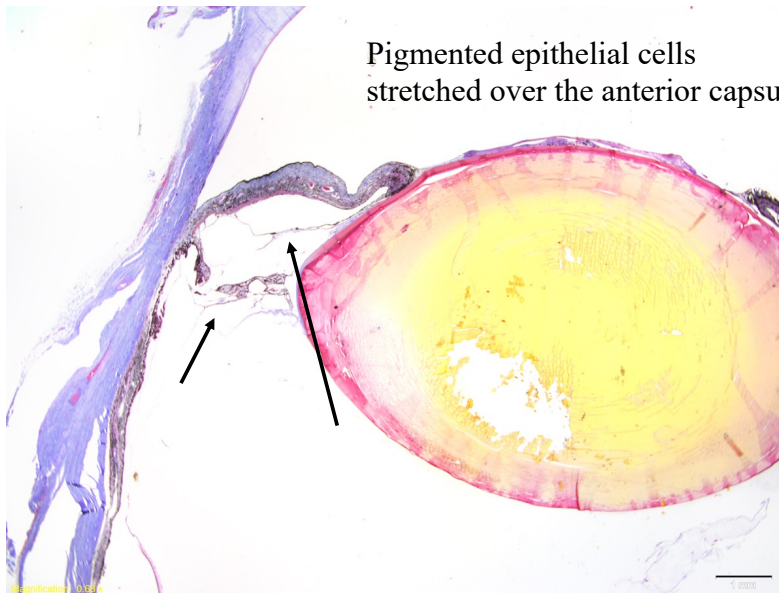
Vimentin

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Thin Walled Iridociliary Cysts



Pigmented epithelial cells stretched over the anterior capsule



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Idiopathic Immune-mediated / Autoimmune Uveitis

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Immune-mediated Uveitis in Veterinary Medicine

- **Dogs**
 - VKH – Uveodermatologic syndrome
 - **Lens-Induced uveitis**
 - Phacolytic uveitis
 - Phacolytic uveitis
 - Asynchronous (asymmetric) uveitis
 - Idiopathic
- **Cats**
 - **Idiopathic lymphoplasmacytic anterior uveitis**
 - **Lens-Induced uveitis**
 - Phacolytic uveitis
 - Phacolytic uveitis
- **Horses**
 - **Equine recurrent uveitis**
 - **Heterochromic iridocyclitis and keratitis (HICK)**
 - **Lens-Induced uveitis**
 - Phacolytic uveitis
 - Phacolytic uveitis

Advancing animal and human health with science and compassion

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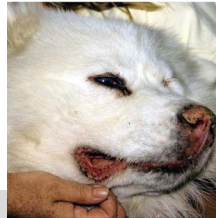
Canine Uveodermatologic Syndrome

Vogt-Koyanagi-Harada-like Syndrome - VKH

Definition

Autoimmune disease that targets melanin or a component protein expressed in melanocytes.

- Leukocyte haplotype (DLA)-DQA1*00201 higher incidence in affected Akitas vs unaffected dogs
- Injection of peptides derived from tyrosinase-related protein into rats and in Japanese Akitas resulted in clinical signs



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Canine Uveodermatologic Syndrome

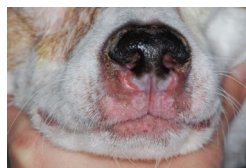
Vogt-Koyanagi-Harada-like Syndrome - VKH

Clinical presentation

- Bilateral and Symmetrical Ocular and/or Cutaneous Lesions

Skin

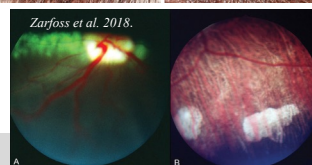
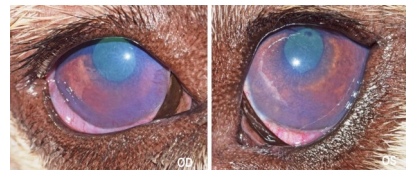
Leukoderma and/or leukotrichia, erosions-ulcerations, alopecia, crust and erythema



Zarfoss et al. 2018.

Eye

Bilateral blindness and granulomatous panuveitis, choroidal depigmentation



Zarfoss et al. 2018.

A B

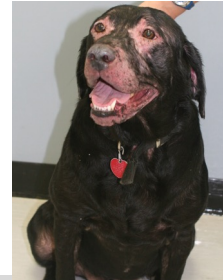
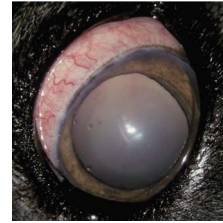
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Canine Uveodermatologic Syndrome

Vogt-Koyanagi-Harada-like Syndrome - VKH

Clinical presentation

- 85% develop ophthalmic clinical signs before the onset of skin lesions.
- 10% develop ophthalmic and dermatological lesions at the same time
- 5% develop cutaneous lesions before ophthalmic signs
- Median time-lapse between ocular signs and skin lesions is approx. 12 weeks (range: 4 days to 3 years);
- Most dogs (86%) eventually develop ocular and skin lesions



Zarfoss et al. 2018.

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Canine Uveodermatologic Syndrome

Vogt-Koyanagi-Harada-like Syndrome - VKH

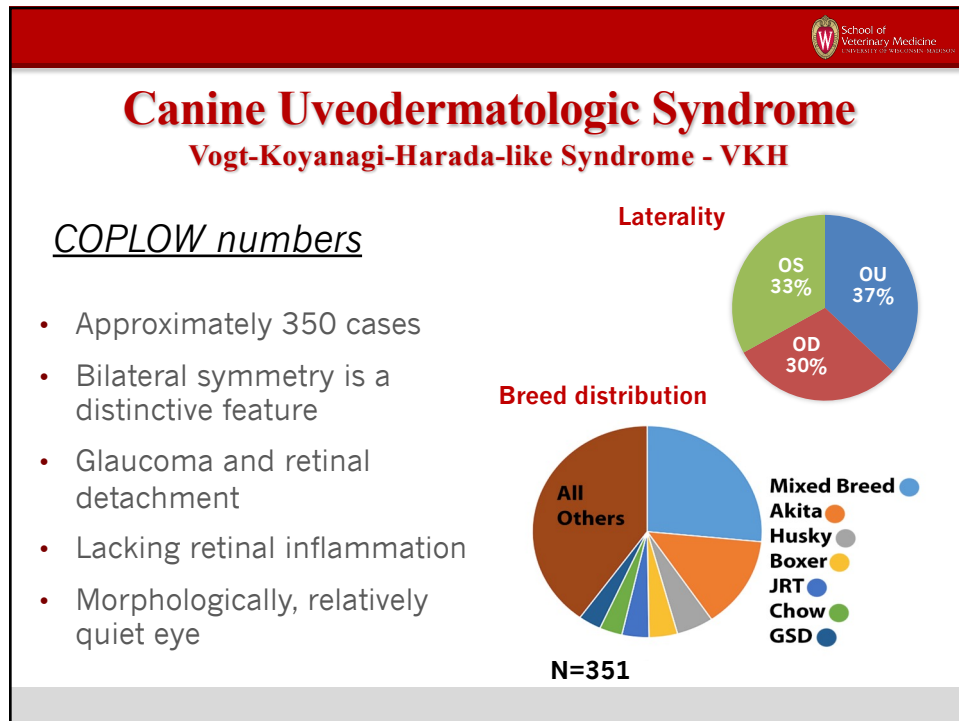
Epidemiology

- Worldwide distribution (Asia, Europe, South America and North America)
- Akitas, Samoyeds and Siberian Huskies are predisposed
 - Literature 166 dogs: 66% Akitas, 8% Siberian Huskies, 3% Samoyeds; 23% other breeds.
- Males more affected
- The age of onset between 7 months and 13 years of age (median: 3 years, mean: 3.6 years)

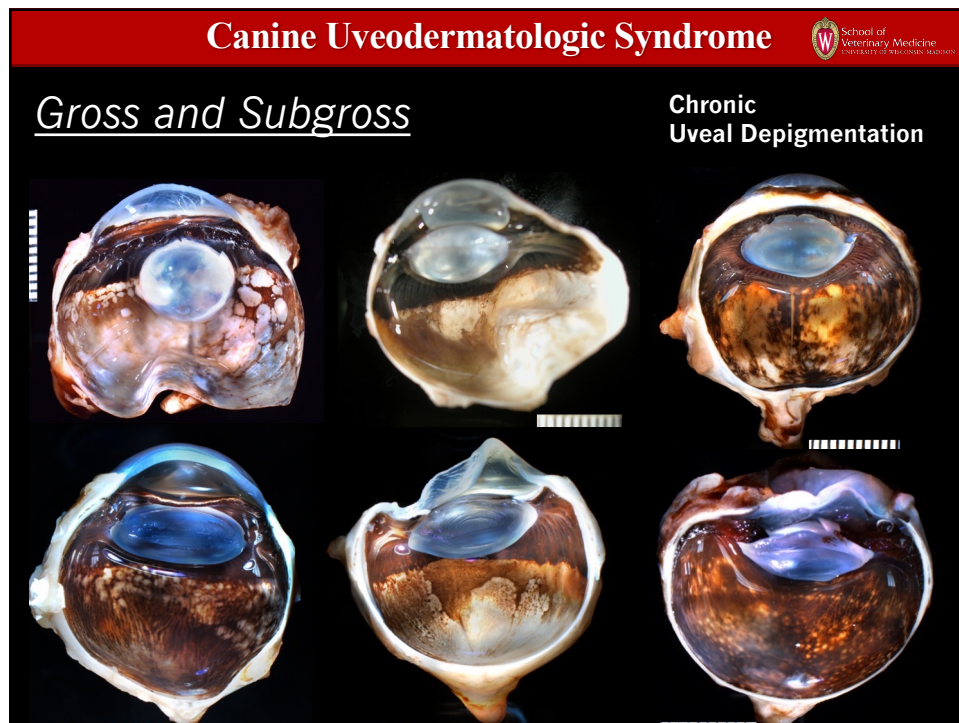


Zarfoss et al. 2018.

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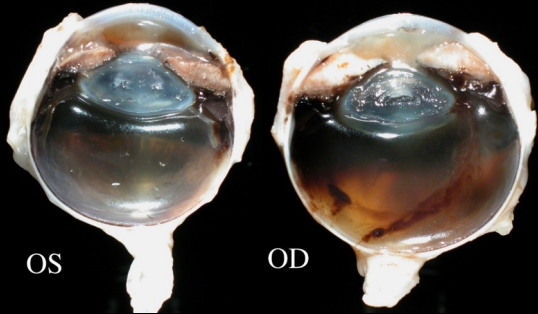
Gross and Subgross

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Subacute



OS OD

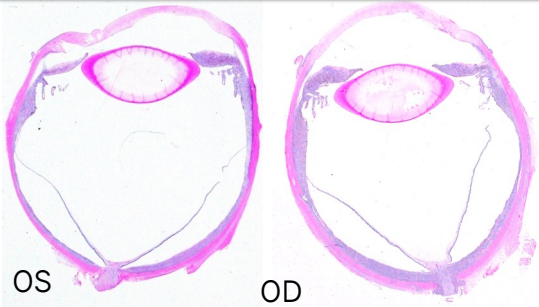


6 y/o MN Siberian husky

- Chronic uveitis OU
- Acute glaucoma OU

Bilateral enucleation

- Bilateral symmetrical Panuveitis



OS OD

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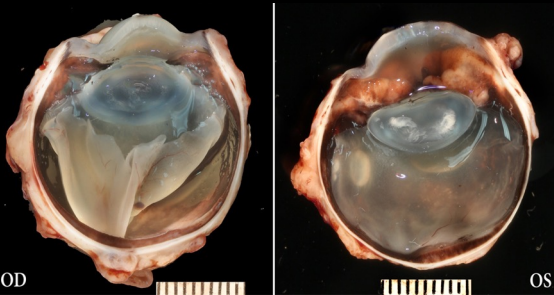
Gross and Subgross

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Amanda Davis



OD OS

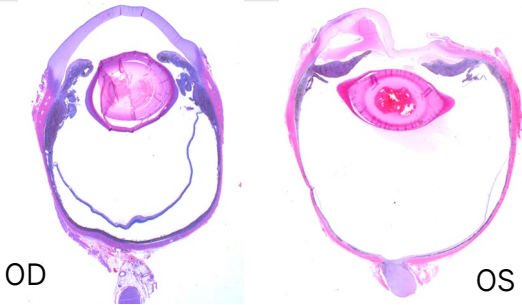


8 y/o MN Pug

- Chronic uveitis
- Chronic glaucoma

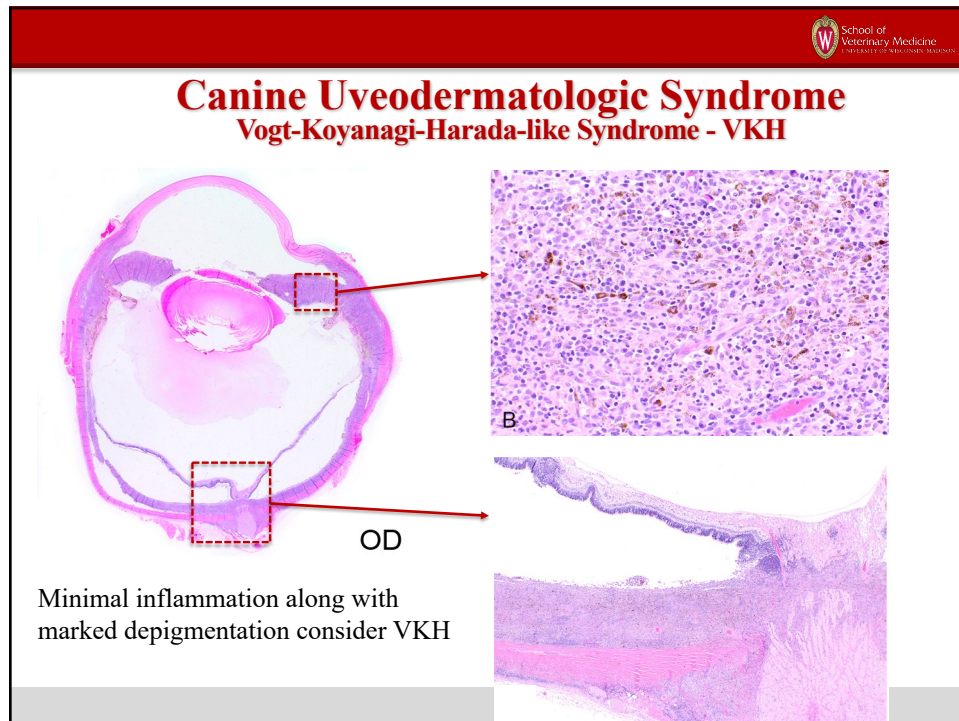
Bilateral enucleation

- Bilateral symmetrical Panuveitis

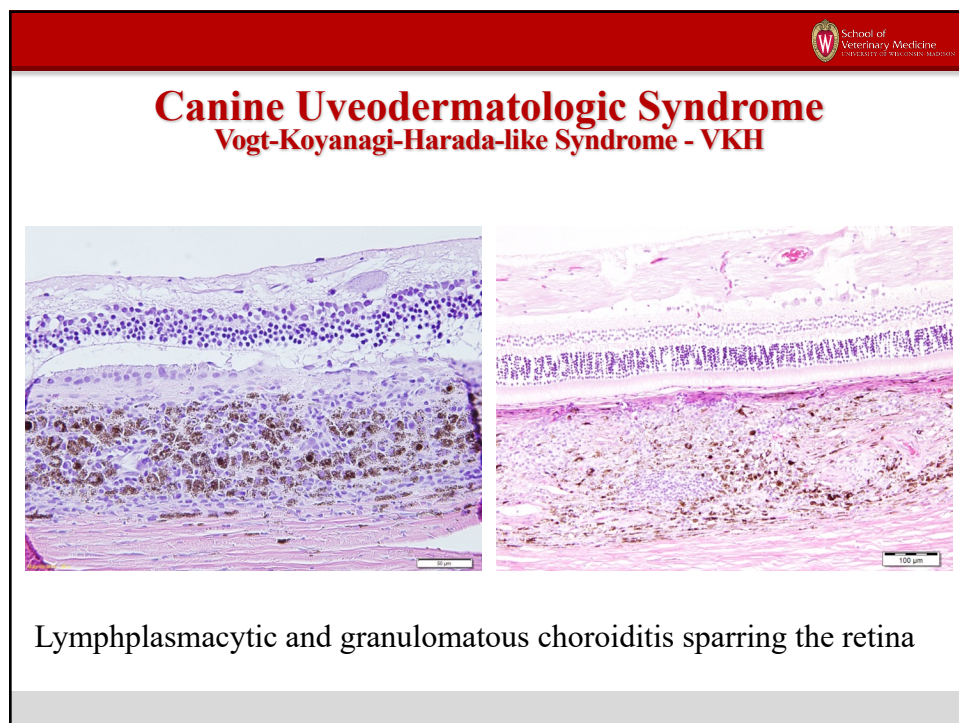


OD OS

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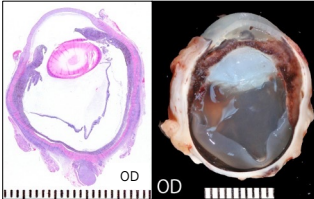
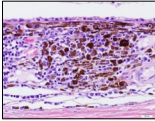
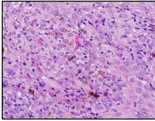
Uveodermatologic Syndrome (UDS) in Blue-eyed Dogs



Barbara Easton
Heterochromic eyes

Brown Eye OD

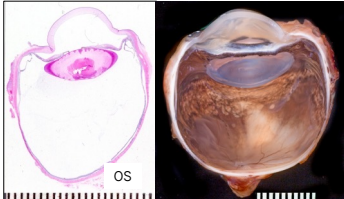
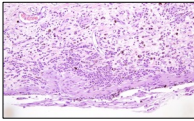
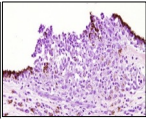
Severe granulomatous/ lpc uveitis and melanin-laden macrophages

More severe lpc /granul uveitis in the uveal stroma

Blue Eye OS

Mild lpc/ granul uveitis + melanin-laden macrophages focused on pigmented epithelia

Destruction of iris epithelium, CB epithelium and RPE

Blue eyes

- Decreased uveal pigment
- Subtle lesions

Supportive clinical information is important for diagnosis

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Lens Induced Inflammation

The Phacitis Syndromes

Lens Induced Uveitis – General term

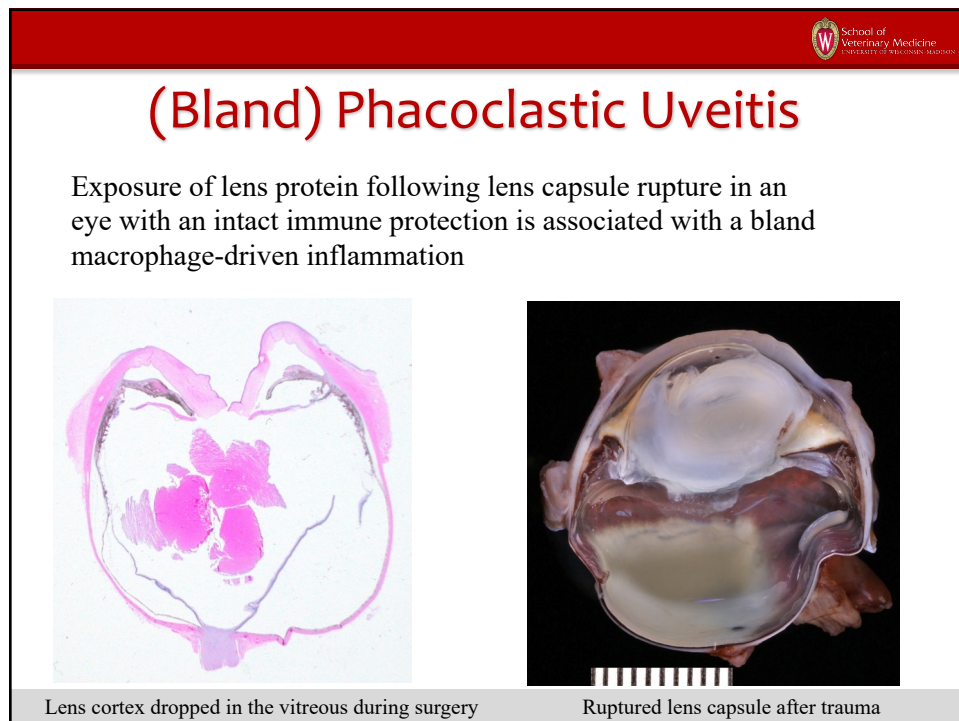
- Phacolytic Uveitis
 - Leakage of liquefied lens fiber through an intact capsule
- Phacoclastic uveitis
 - Release of lens fiber through capsule rupture
- Asynchronous (Asymmetric) Uveitis
 - Exaggerated lens-induced inflammatory reaction
- Septic Implantation Syndrome

Wilcock BP, Peiffer RL Jr. The pathology of lens-induced uveitis in dogs. Vet Pathol. 1987 vol. 24(6):549-53

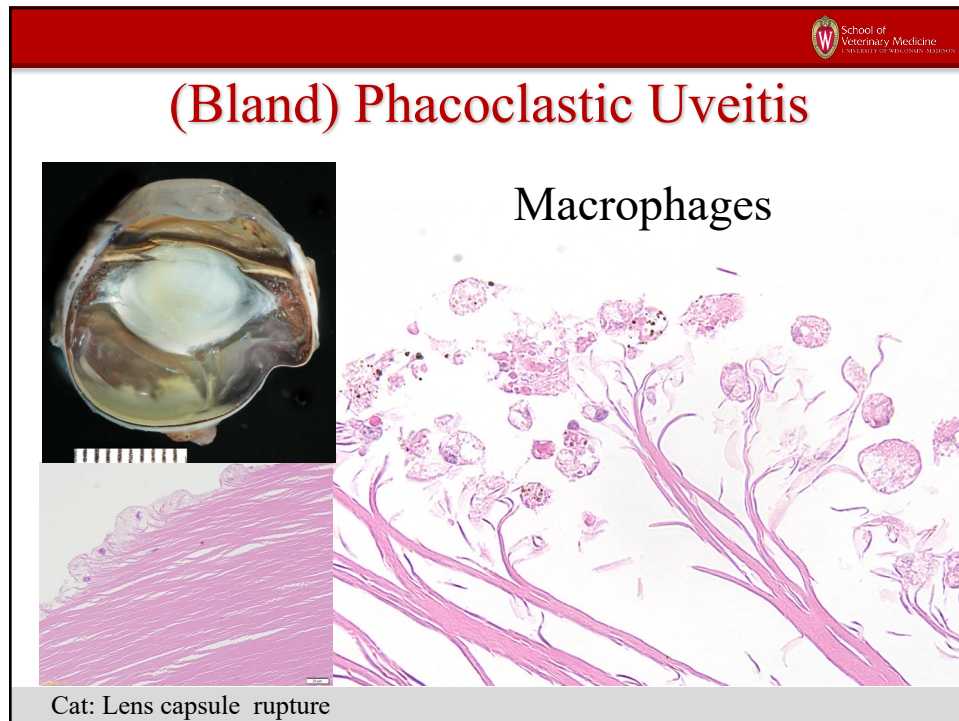
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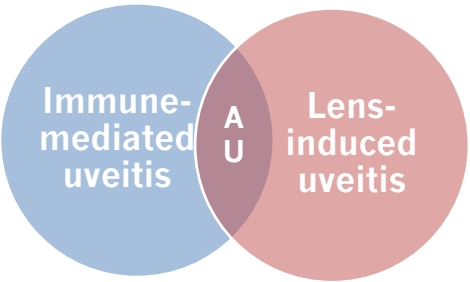


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Canine Asynchronous (Asymmetric) Uveitis

- COPLOW has identified cases of a severe bilateral asymmetric granulomatous panuveitis
- Immune-mediated panuveitis – Lens induced process
 - Hypersensitivity reaction against lens protein
- Strong breed predisposition
- Cataract and Diabetes



Immune-mediated uveitis AU Lens-induced uveitis

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Renaming of the Disease

Asymmetric → Asynchronous

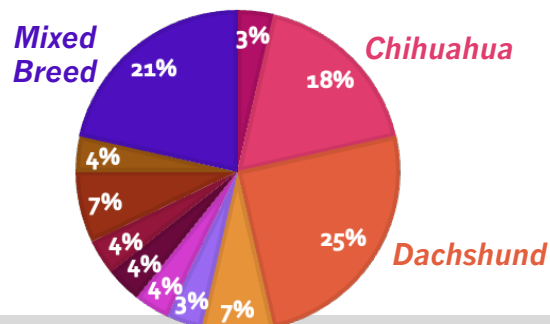
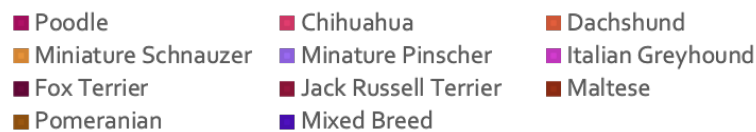
- Initially named to differentiation between VKH and AU
- Better reflect the clinical presentation
- Assist in differentiating this condition from other types of bilateral and lens-induced uveitides
- Improve awareness and recognition among clinicians and pathologists

47

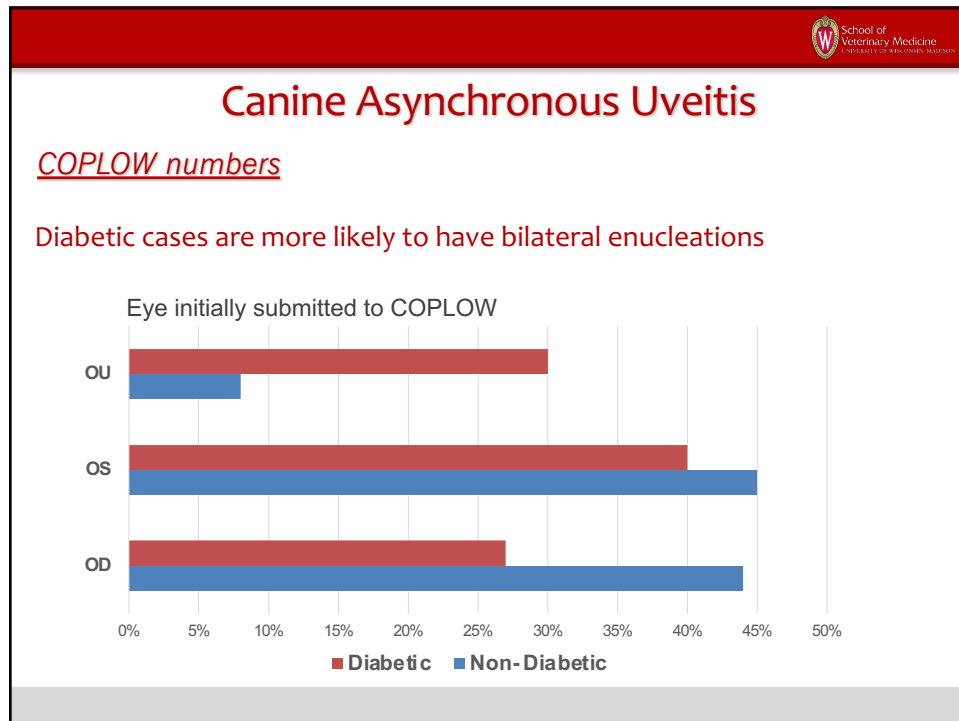
Canine Asynchronous Uveitis

COPLOW numbers

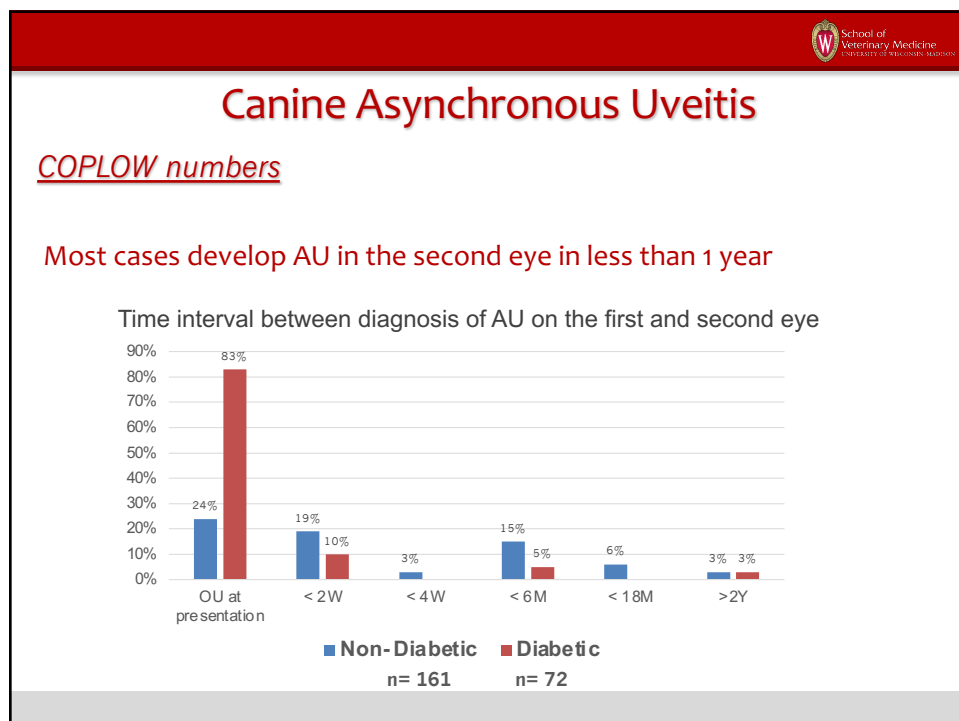
BREED DISTRIBUTION



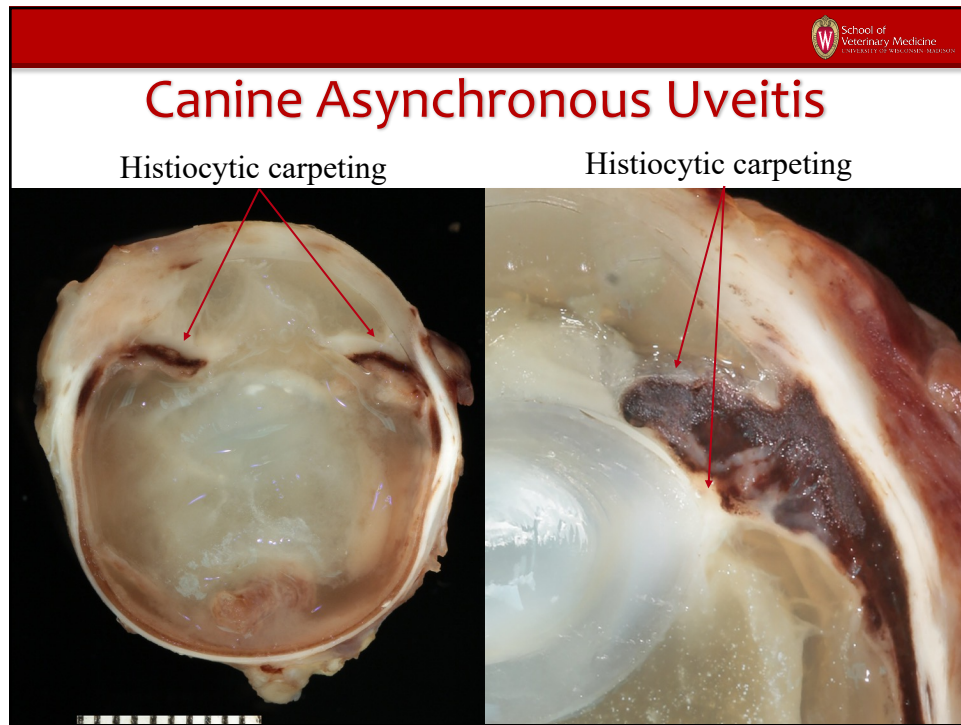
48



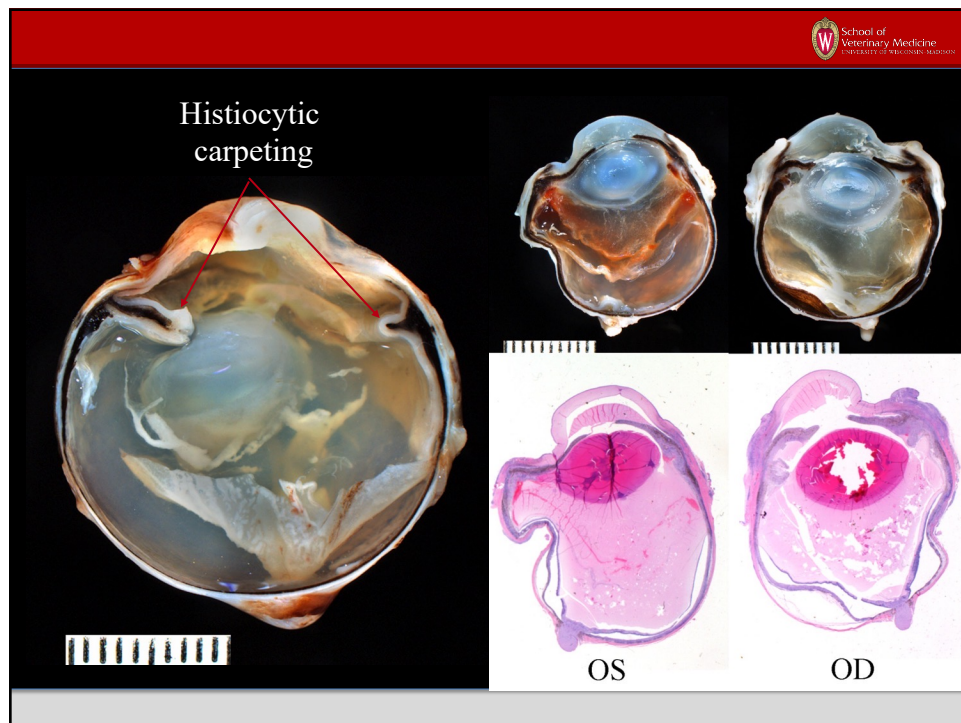
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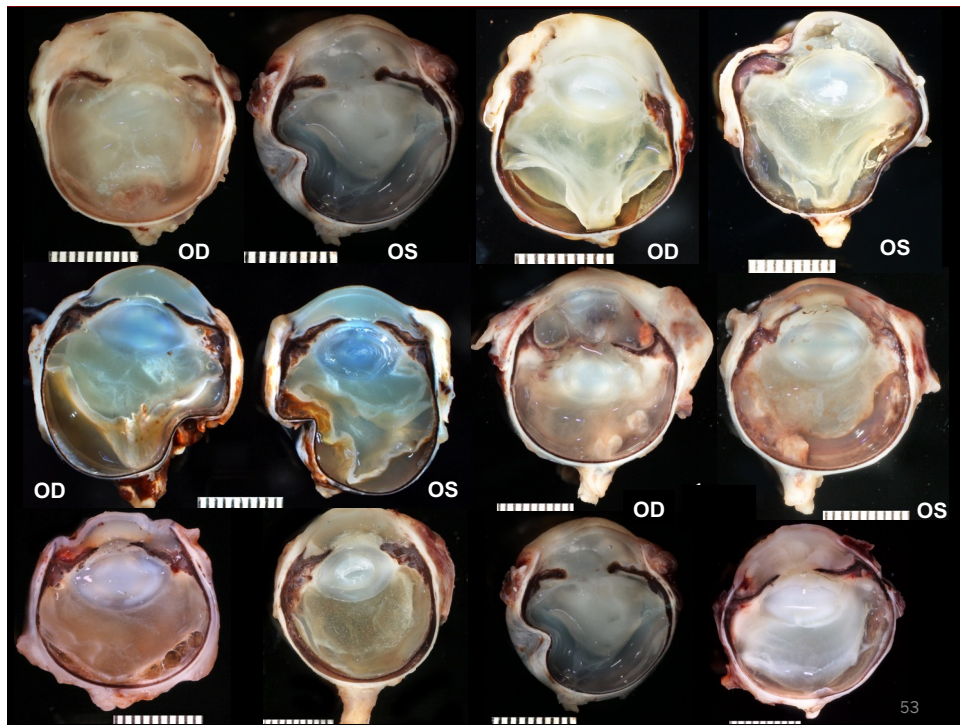
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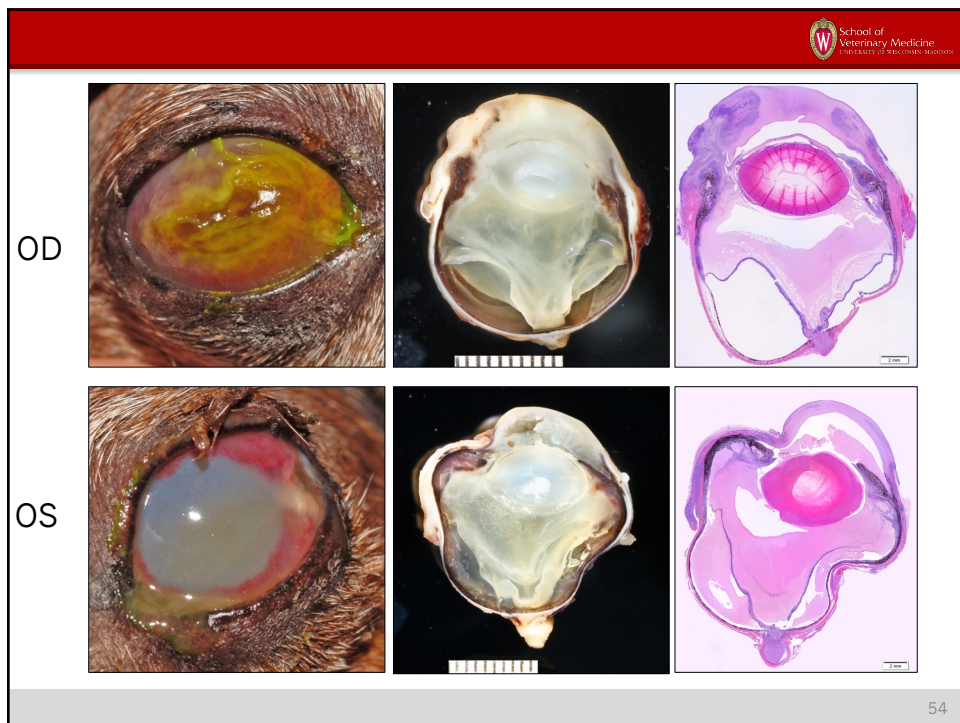
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52



53

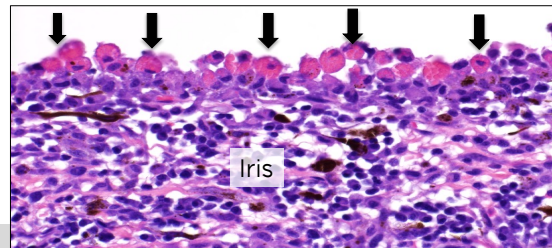
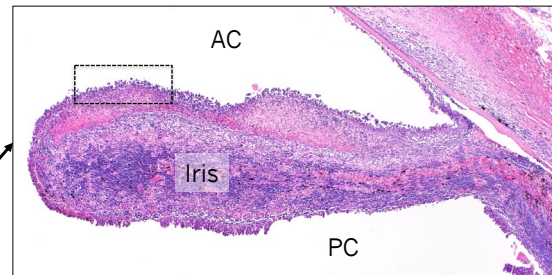
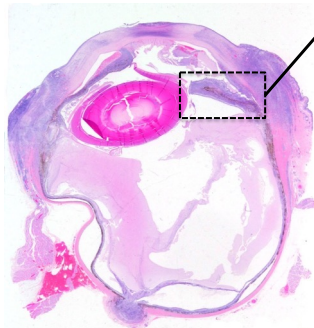


54

Canine Asynchronous Uveitis

Histopathology

Uveitis and
Macrophage carpet

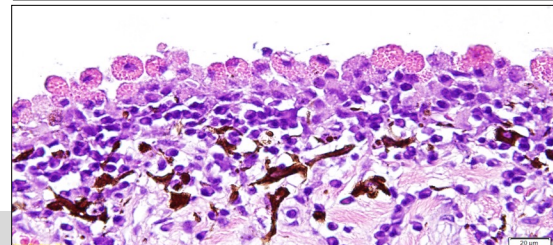
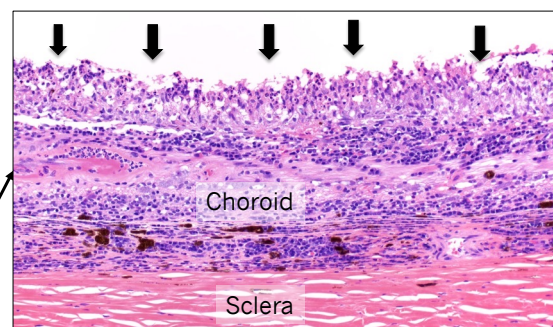
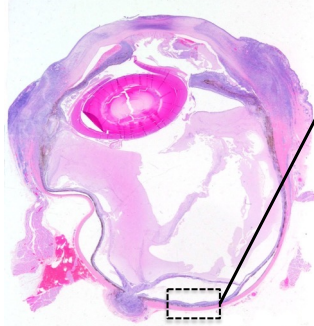


55

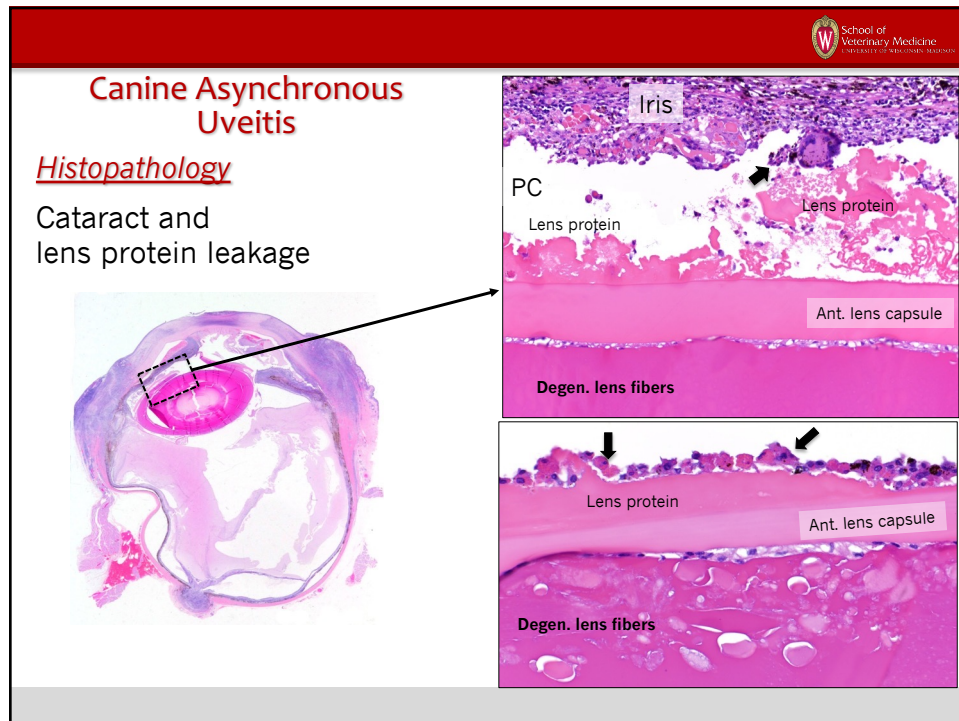
Canine Asynchronous Uveitis

Histopathology

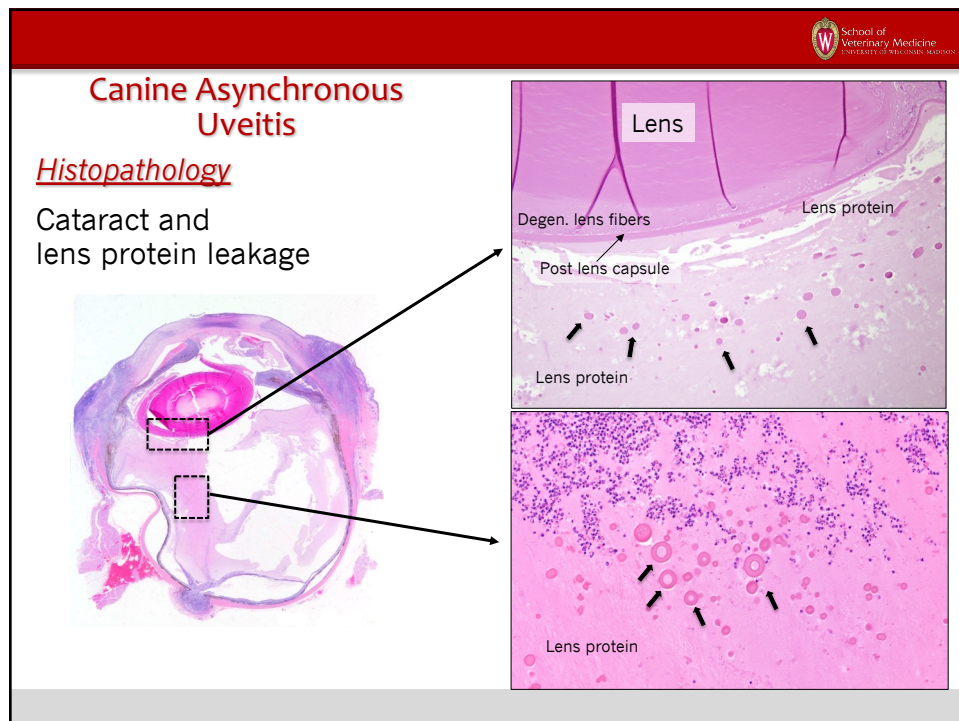
Uveitis and
Macrophage carpet



56



57

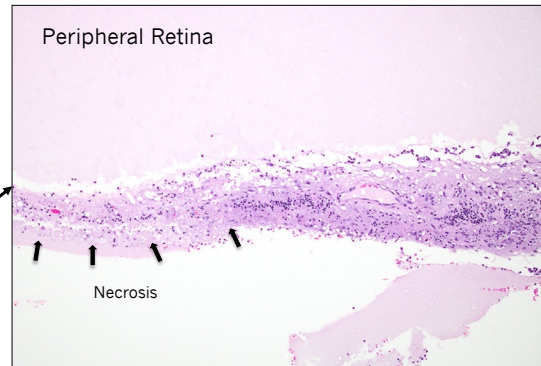
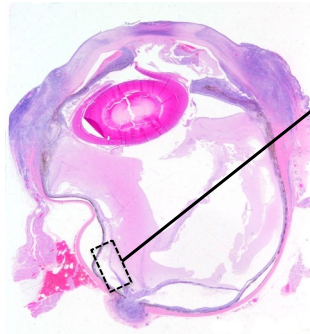


58

Canine Asynchronous Uveitis

Histopathology

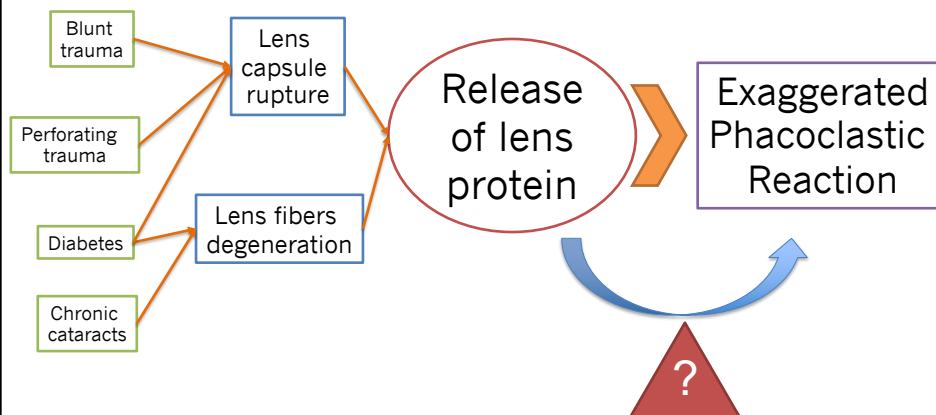
Retinal necrosis



59

Canine Asynchronous Uveitis

Pathogenesis



60

60

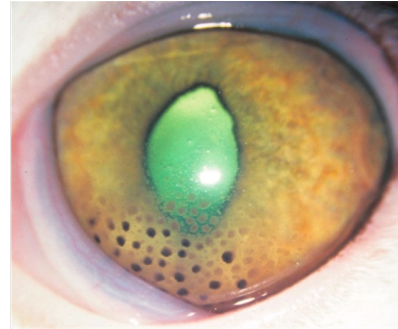
Feline Lymphoplasmacytic Uveitis

Very common histo diagnosis

- Histologic pattern

Cause unknown:

- End-stage?
 - *Toxoplasma* spp., *Bartonella* spp.,
FIV, FeLV
- Immune-mediated

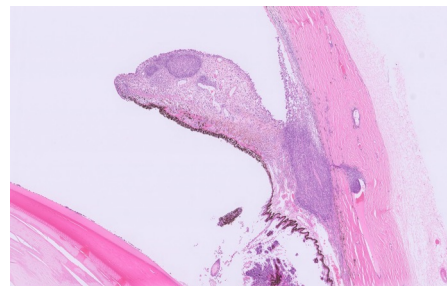


Courtesy Dr. Davidson

61

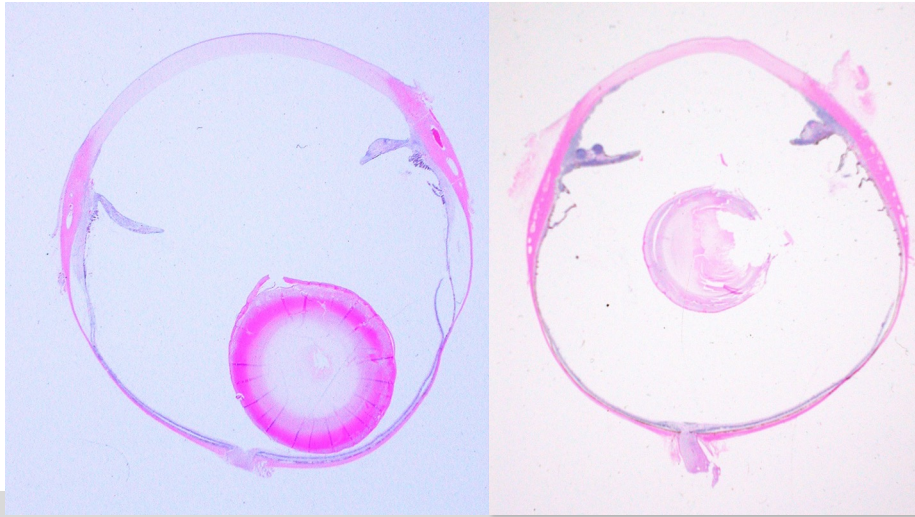
Feline Lymphoplasmacytic Uveitis

- Lymphocytes / Plasma cells
 - Anterior uvea
 - CB non-pigmented epithelium
 - Retina
- Follicle-like structures
- Condensed anterior vitreous
- Hypereosinophilic granular protein



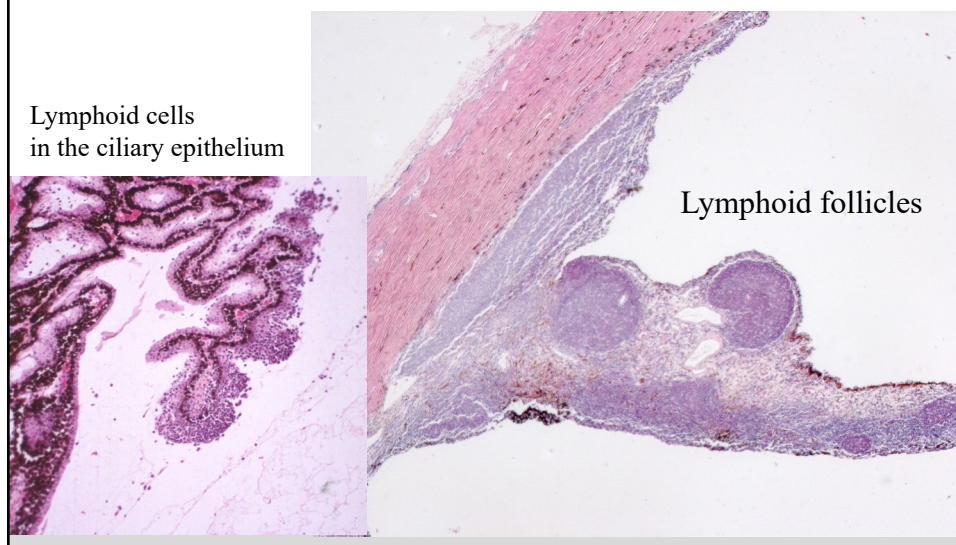
63

Feline Lymphoplasmacytic Uveitis



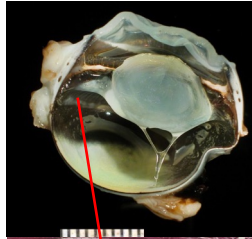
64

Feline Lymphoplasmacytic Uveitis

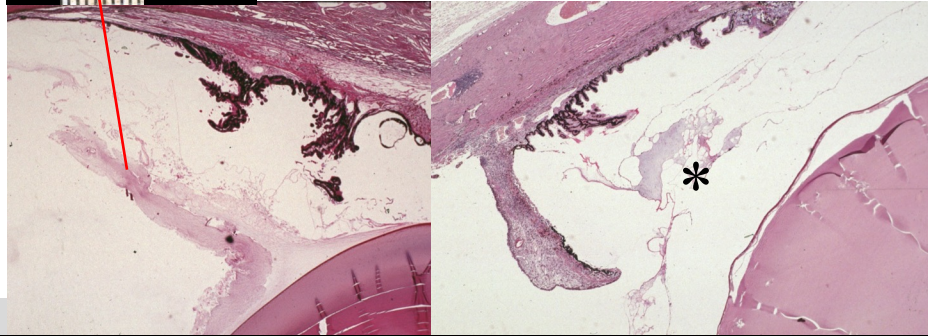


65

Feline Lymphoplasmacytic Uveitis

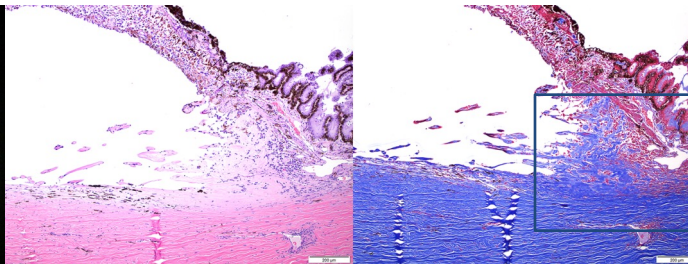


Cyclitic membranes

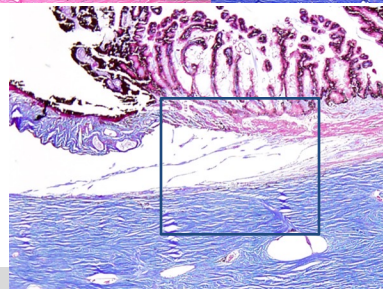


66

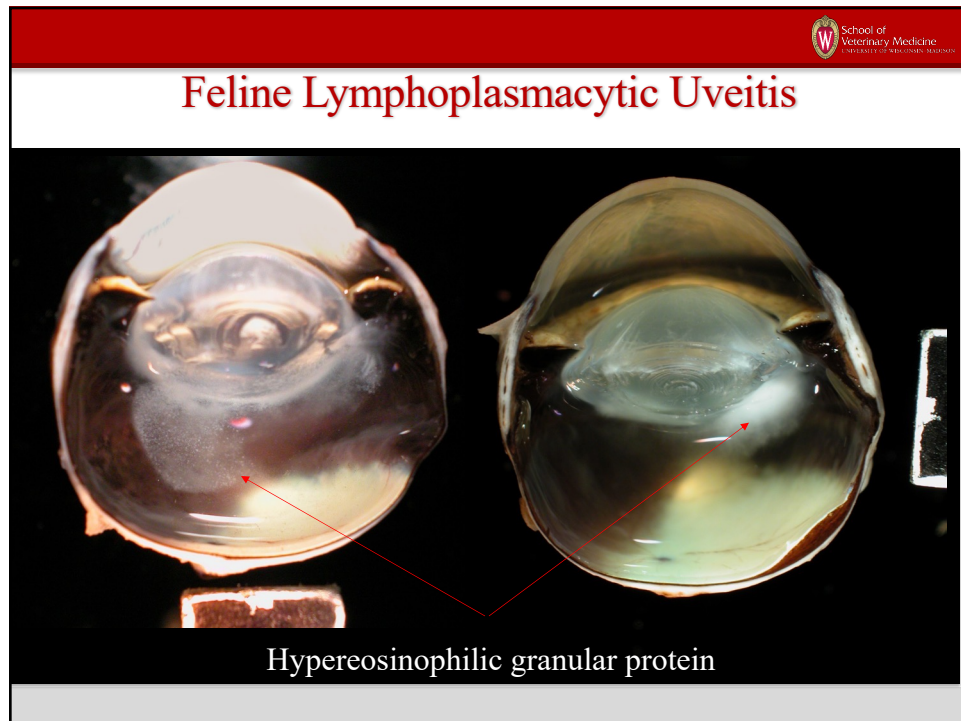
Feline Lymphoplasmacytic Uveitis



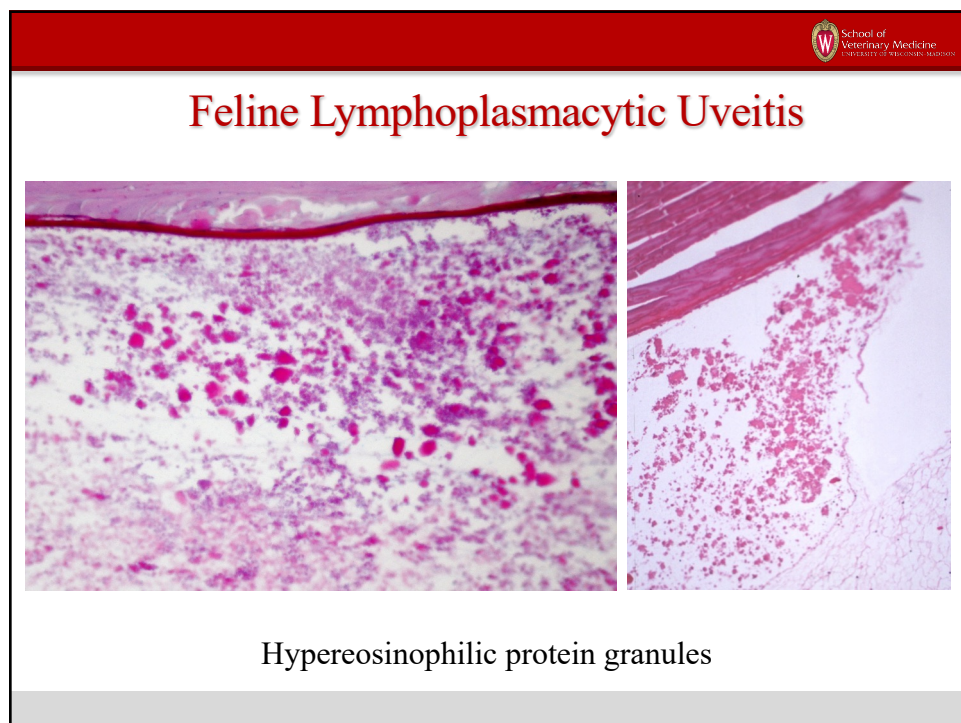
Fibrosis of the corneoscleral
trabecular meshwork:
*possible cause of glaucoma
in some cats with l/p uveitis*



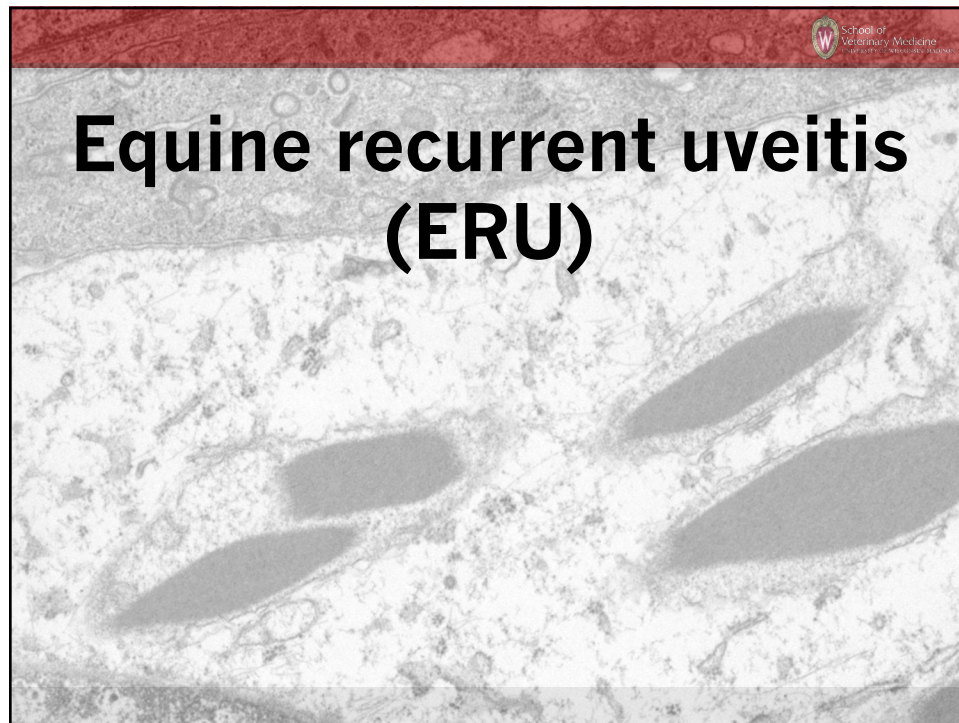
67



68



69



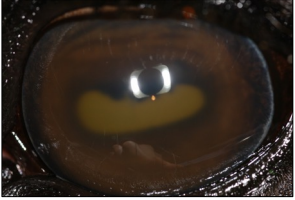
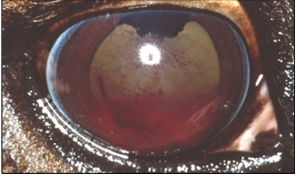
70



Equine recurrent uveitis (ERU)

Moon blindness; Periodic ophthalmia;

- Complex Immune-mediated panuveitis
- First described by Vegetius 4 AD
 - Moon blindness
- Most common cause of blindness in horses
- Breed predisposition (**Appaloosa**)
- Uveitis horse ≠ ERU
- 8-25% prevalence in USA
(1-2% severe enough to threaten vision)

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Equine Recurrent Uveitis (ERU)

Pathogenesis

- Complex immune-mediated inflammation
 - CD4+ lymphocytes triggering Th17 and Th1 proinflammatory response
- Genetic predisposition
 - Appaloosas, European Warm-bloods, draught breeds, Standardbred trotters and color diluted horses (Appaloosa)
 - Cases with a positive the MHC class I ELA-9 haplotype)
- Infectious agents
 - Bacterial (e.g. *Borrelia* spp., *Leptospira* spp., and *Streptococcus* spp.),
 - Viral (equine influenza, equine viral arteritis, equine herpesvirus)
 - Parasitic (*Onchocerca* spp., *Strongylus* spp., *Toxoplasma* spp.)

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Equine Recurrent Uveitis (ERU)

Pathogenesis

- Intraocular exposure of infectious agent or antigen
- Antigen/Antibody complexes deposition into uveal tract
- Autoimmune activity against retinal proteins and antigens
 - Molecular mimicry - leptospira and equine cornea
 - Unmasked antigens
 - Interphotoreceptor-binding protein (IBPR)
 - S-antigen derived peptide
- Continued presence of antigen (i.e. *Leptospira*)
 - Live organisms not needed for disease
- Persistence of sensitized T lymphocytes in the uveal tract
 - Reactivation the uveitis

73

ERU as a cause of Blindness

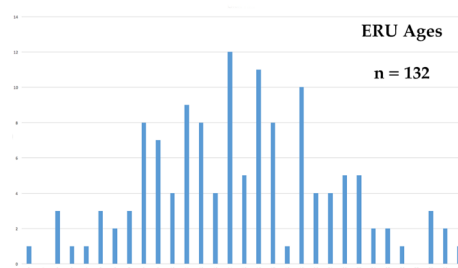
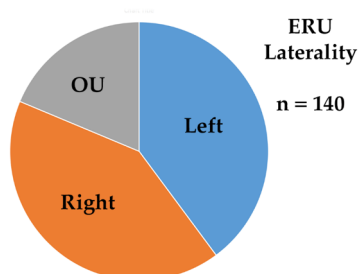
- Retinal detachment
- Synechiation
- Glaucoma
- Permanent corneal edema
- Cataracts



74

Equine Recurrent Uveitis (ERU)

- 210 cases in the COPLOW database
- 64 Appaloosa, 40 Quarter horse, 26 Thoroughbred
- Bilateral, but not always symmetrical
- History - Cyclic episodes of Uveitis



75

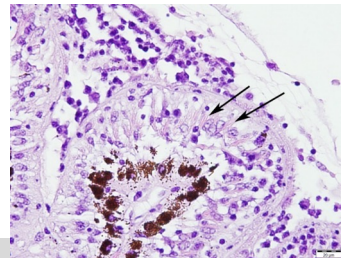
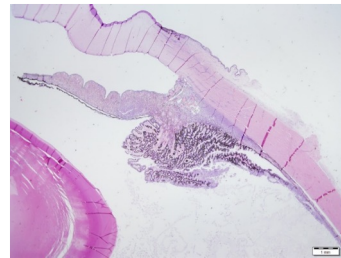
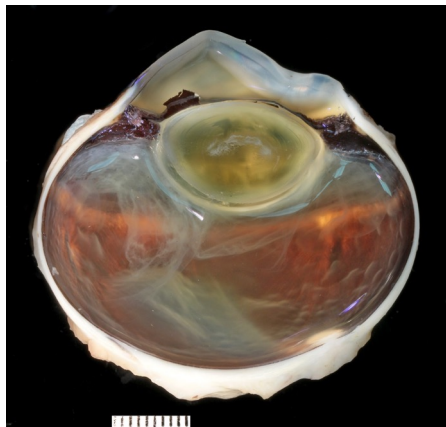
Equine Recurrent Uveitis (ERU)

- Microscopic features

- Variable lymphoplasmacytic infiltration in the anterior uvea
 - Active vs inactive stage
- Ciliary body amyloidosis
- “Coolie” Bodies

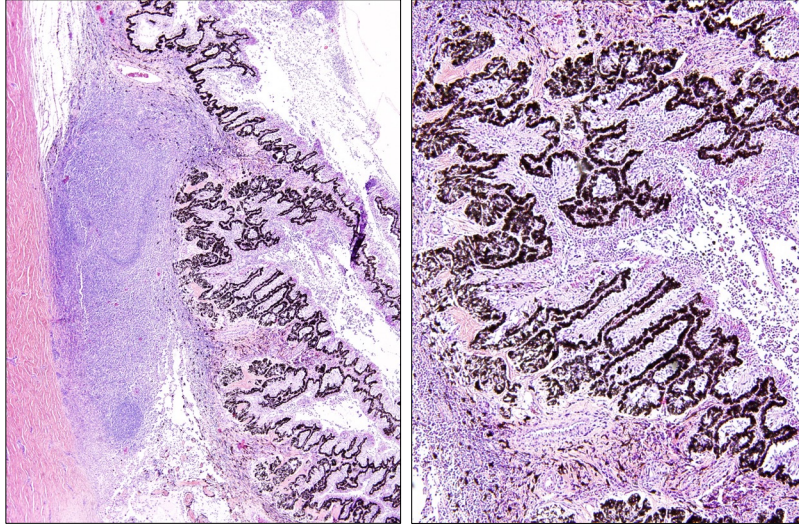
76

Equine Recurrent Uveitis (ERU) Active Stage of Disease



77

ERU

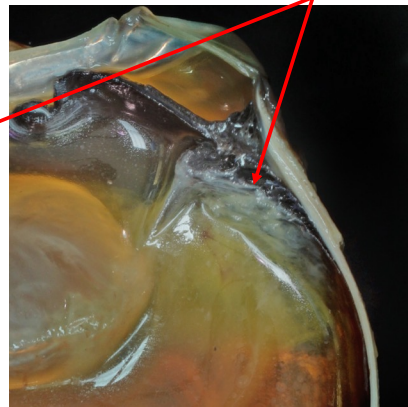
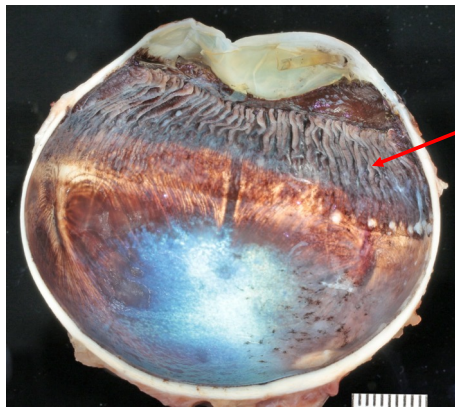


Lymphoplasmacytic uveitis

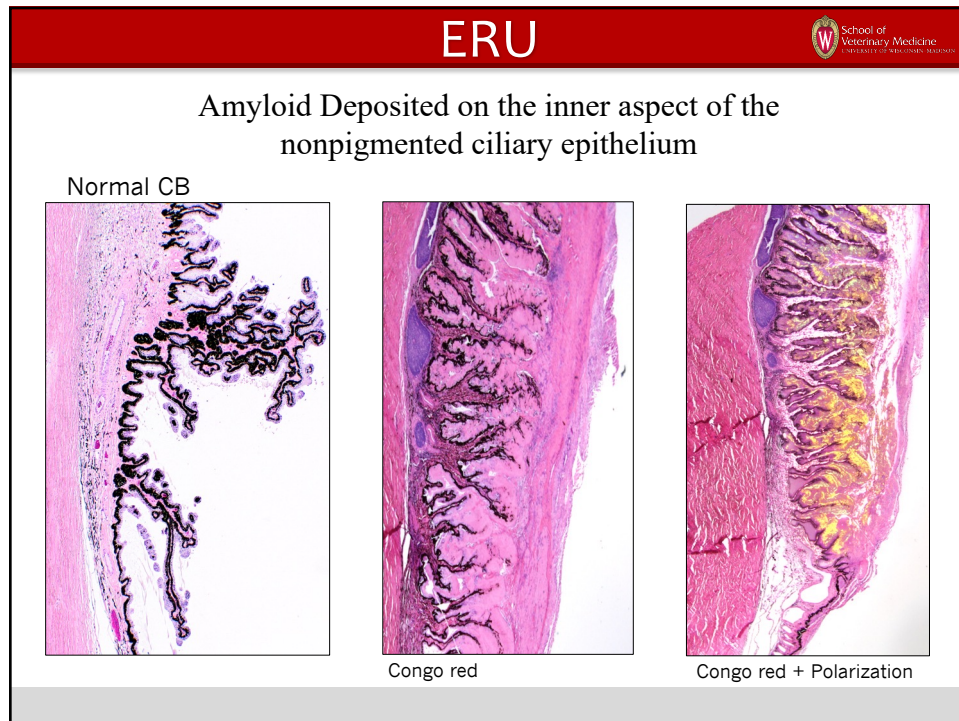
78

Equine Recurrent Uveitis (ERU)

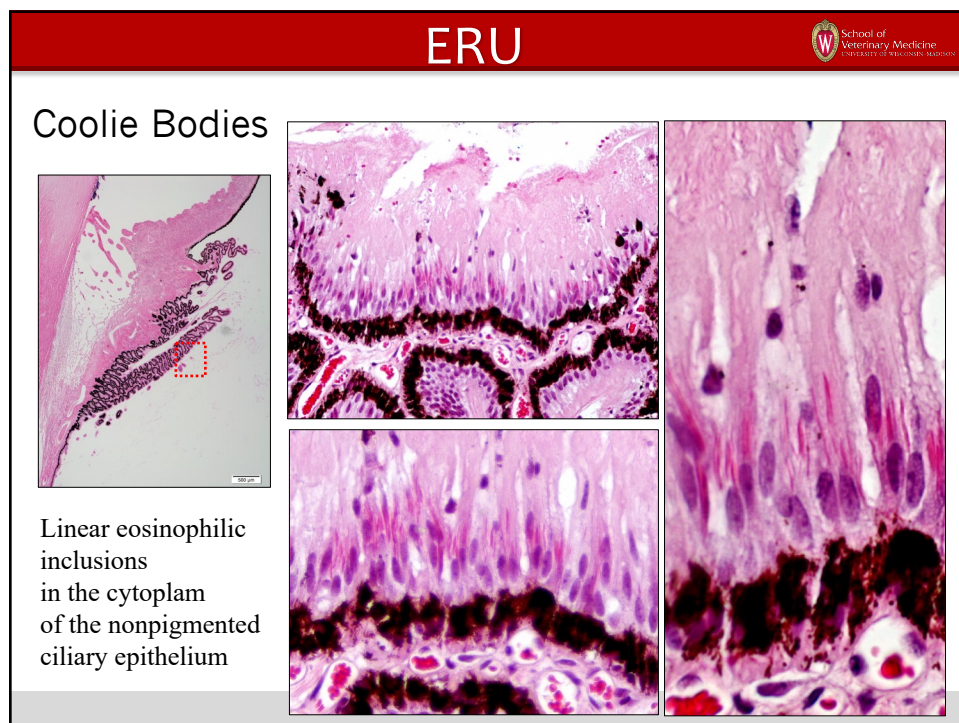
Ciliary Body amyloidosis



79



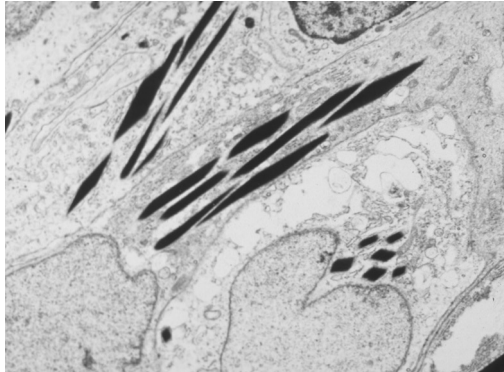
80



81

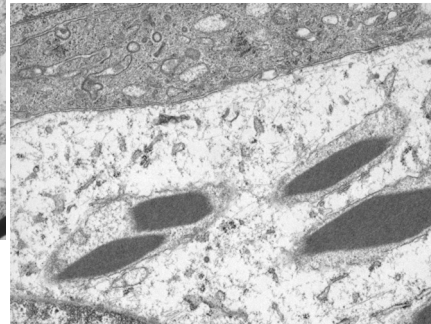
Equine Recurrent Uveitis (ERU)

Coolie Bodies



TEM

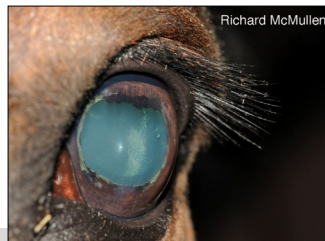
Crystalline protein inclusions
in mitochondria



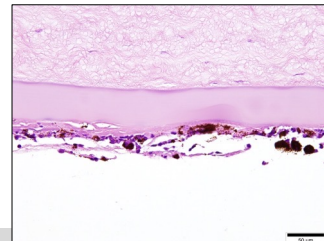
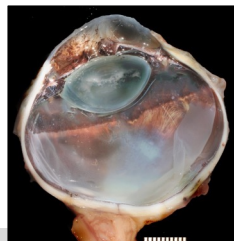
82

Equine Heterochromic Iridocyclitis Keratitis (HIK)

Immune-mediated (?) uveitis and endotheliitis
affecting the iris and corneal endothelium ,
involving melanin/melanocytes (depigmentation)
with secondary corneal edema, ulceration and
keratitis



Richard McMullen



83

Equine Heterochromic Iridocyclitis Keratitis (HIK)

Vet Ophthalmol. 2015 Nov;18(6):443-56. doi: 10.1111/vop.12234. Epub 2014 Nov 17.

Clinical, histopathological and immunohistochemical characterization of a novel equine ocular disorder: heterochromic iridocyclitis with secondary keratitis in adult horses.

Pinto NJ¹, McMullen RJ Jr^{1,2}, Linder KE³, Cullen JM³, Gilger BC¹.

16 cases reported from NCSU

- Inflammatory disease (anterior uveitis and endotheliitis)
- Pigmentary changes in the anterior uvea
- Corneal opacity
- Retrocorneal membranes



Courtesy of Dr. Dennis Brooks

19 cases in the COPLOW database since manuscript publication (2015)

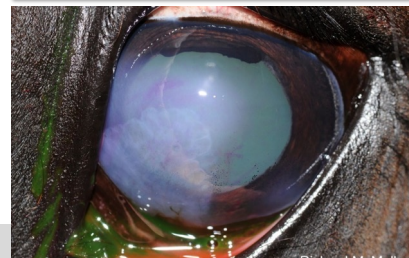
- *At least one case from 2012*
- *Searching archives for cases of non-ERU-related uveitis*

84

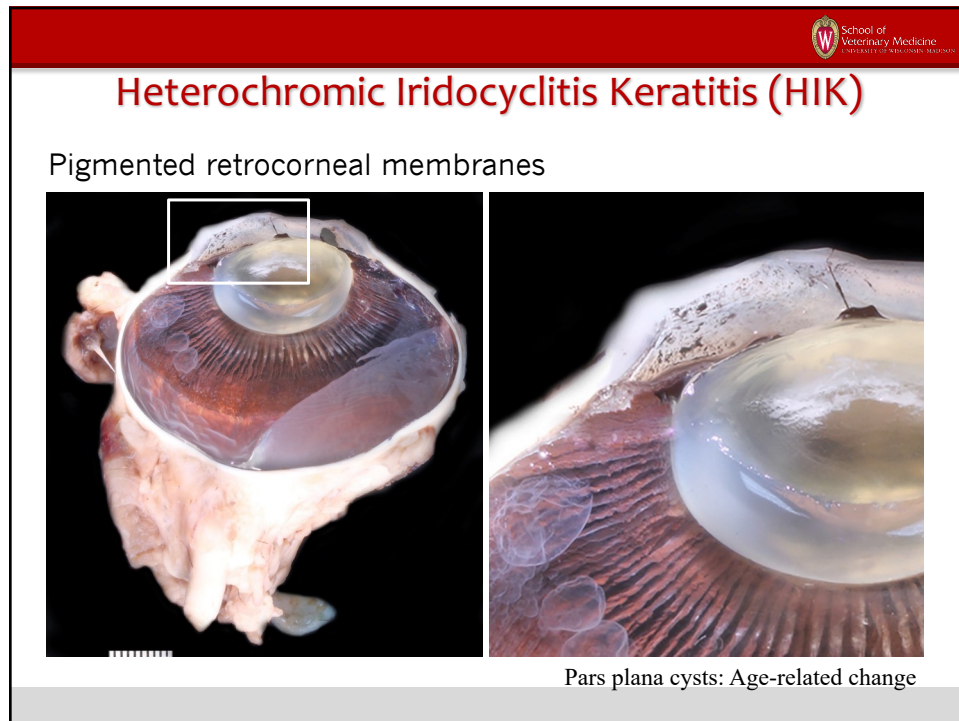
Heterochromic Iridocyclitis Keratitis (HIK)



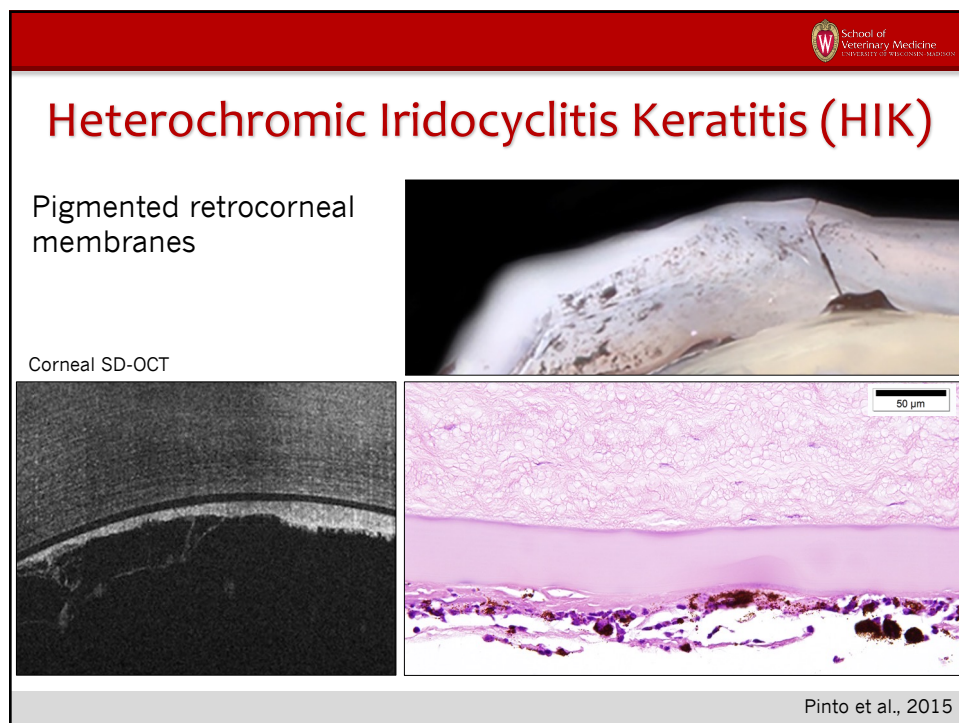
- Depigmentation of the pupillary margin of the iris
- Corneal edema and pigmentation on the corneal endothelium



85



86

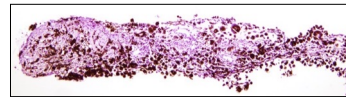
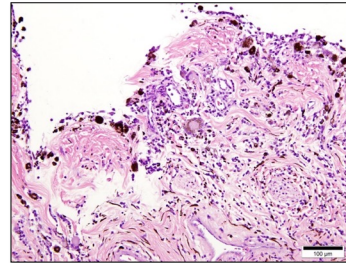
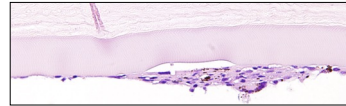


87

Heterochromic Iridocyclitis Keratitis (HIK)

Microscopic features

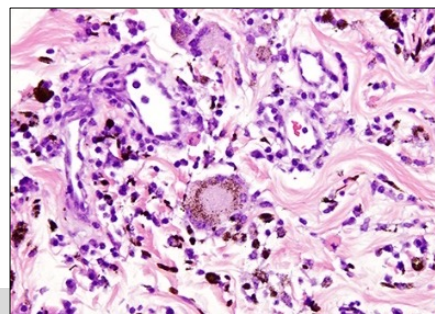
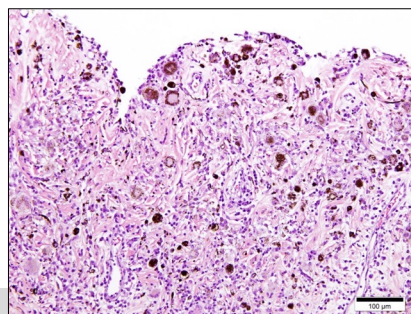
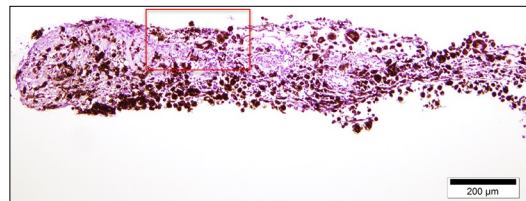
- Robust retro corneal membranes
 - Often melanin-laden macrophages and free melanin
- Variable lymphoplasmacytic infiltration in the anterior uvea
- Melanin pigment peppering in the iris stroma with melanin-laden multinucleated macrophages



88

Heterochromic Iridocyclitis Keratitis (HIK)

- Lymphoplasmacytic anterior uveitis
- Pigment peppering
- Melanin-laden multinucleated macrophages

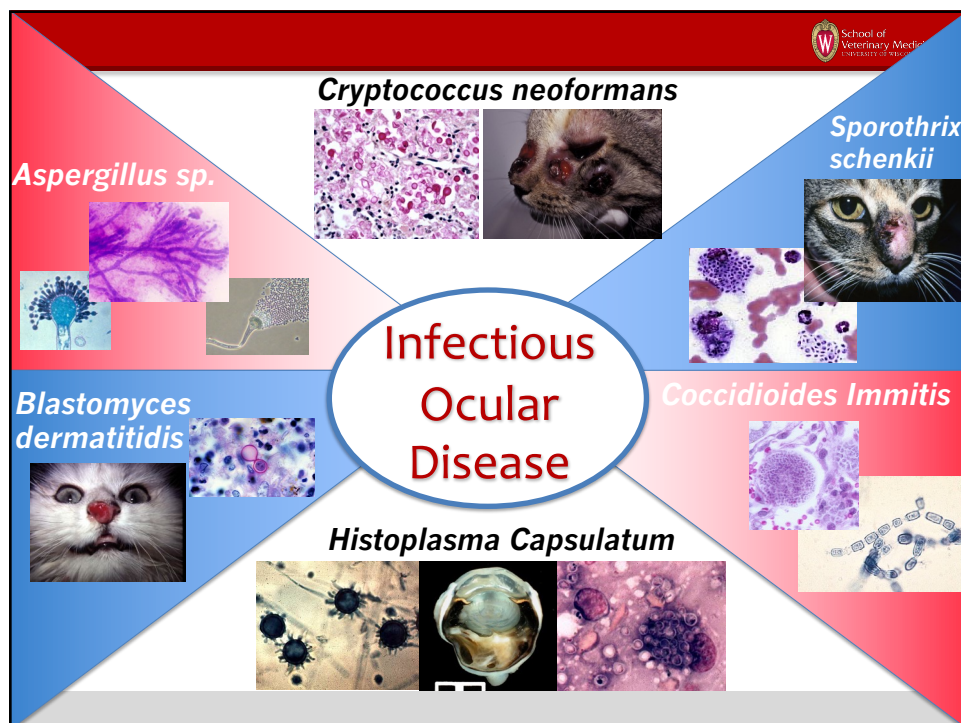


89

HIK take home messages

- Not all uveitis in horses is ERU!
- Autoimmune /immune-mediated?
- Reaction against melanin like VKH?

90



91

Infectious intraocular inflammation

- Not all dz have specific pathological features
 - Rickettsiae and Ehrlichiae
 - *Borrelia* spp.
 - *Bartonella* spp.
 - *Brucella* spp.
 - *Leptospira* spp.
- Underdiagnosed

92

Suppurative endo/panophthalmitis

- Most common consequence of penetrating trauma
- Brachycephalic and large breed dogs
- Gross:
 - Tan to yellow exudates throughout globe
 - Displaced or ruptured lens

93



Ocular mycobacteria

- Increasingly recognized, especially UK
- Choroid & retina most frequently affected
 - CB, sclera, cornea, conjunctiva and iris
 - Hematogenous route suspected
 - Exclusive anterior segment or superficial involvement in some cases (direct inoculation)

Ocular mycobacterial lesions in cats

Jordan L. Mitchell¹, **Laura MacDougall²**, **Melanie J. Dobromylskyj³**,
Ken Smith⁴, **Renata Stavinohova⁵**, **Danielle A. Gunn-Moore¹**,
Jayne C. Hope¹, and **Emma Scurrall⁶**

Veterinary Pathology
1-14
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DOI: 10.1177/03009858221098431
journals.sagepub.com/home/vet

Table 4. Summary of the main histological findings in 24 cases of feline ocular mycobacteriosis.

Histological finding	No. cases	%	Case
Posterior uveitis or panuveitis with retinitis	20	83	1, 2, 4–14, 16–20, 23, 24
Optic neuritis	11	55*	1, 6–9, 12–14, 20, 23, 24
Corneal, conjunctival, and/or scleral mass	5	21	2, 3, 16, 21, 22
Orbital to periorbital cellulitis or abscess	3	13	4, 9, 12
Anterior uveitis	1	4	15

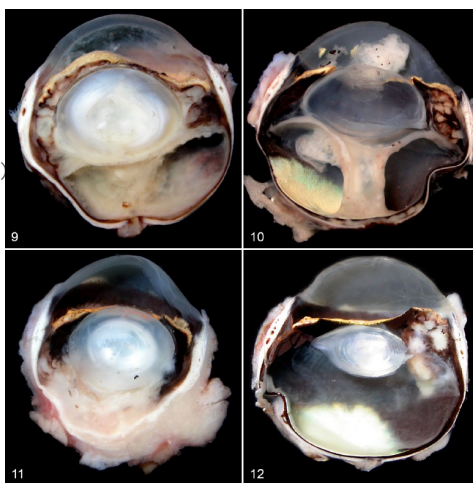
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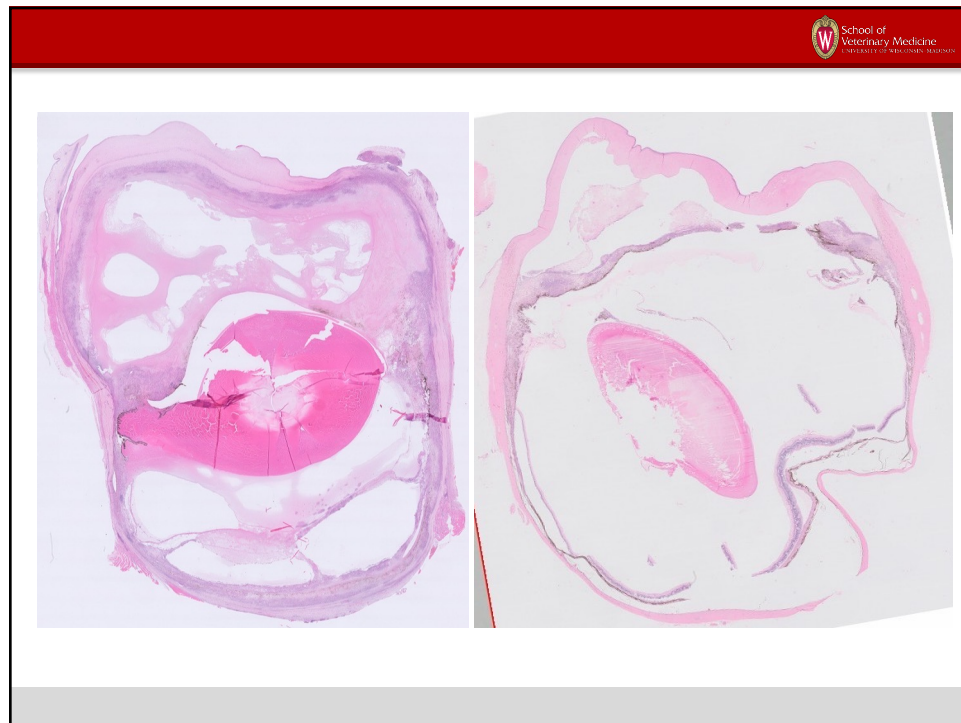
Ocular mycobacteria

- Diagnosed as TB
 - M. bovis*, *M. microti* or nonspecified MTBC
 - Rarely *M. lepraemurium* (cornea, sclera and conj)
- Ziehl-Neelsen +ive, and other Dx methods

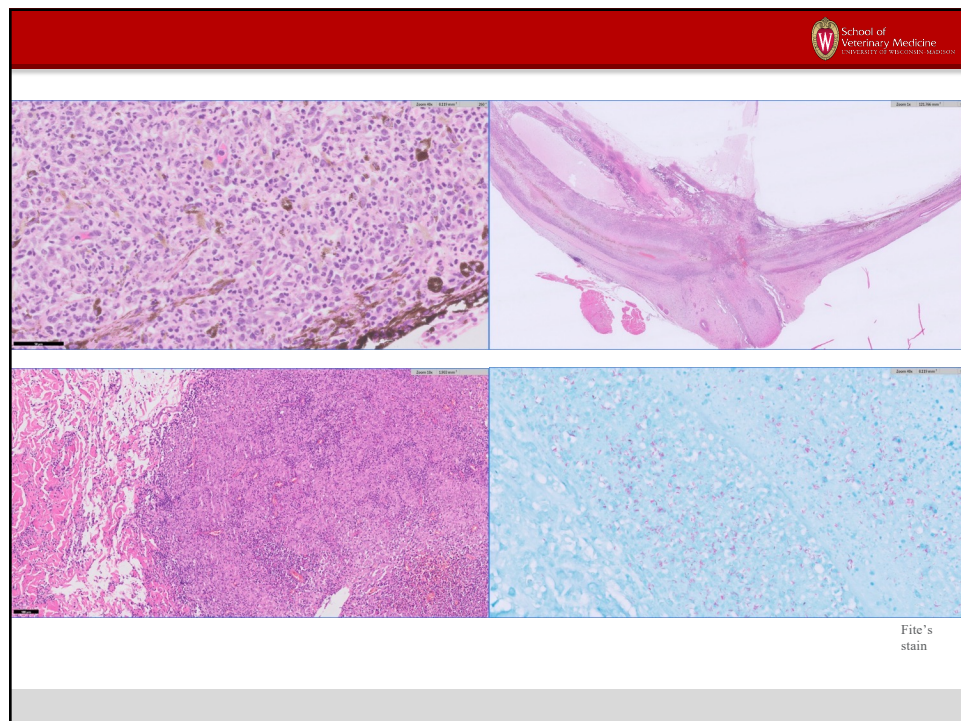
Stavinohova et al.,
 2019



95



96



97

Systemic / Ocular Fungal Infections

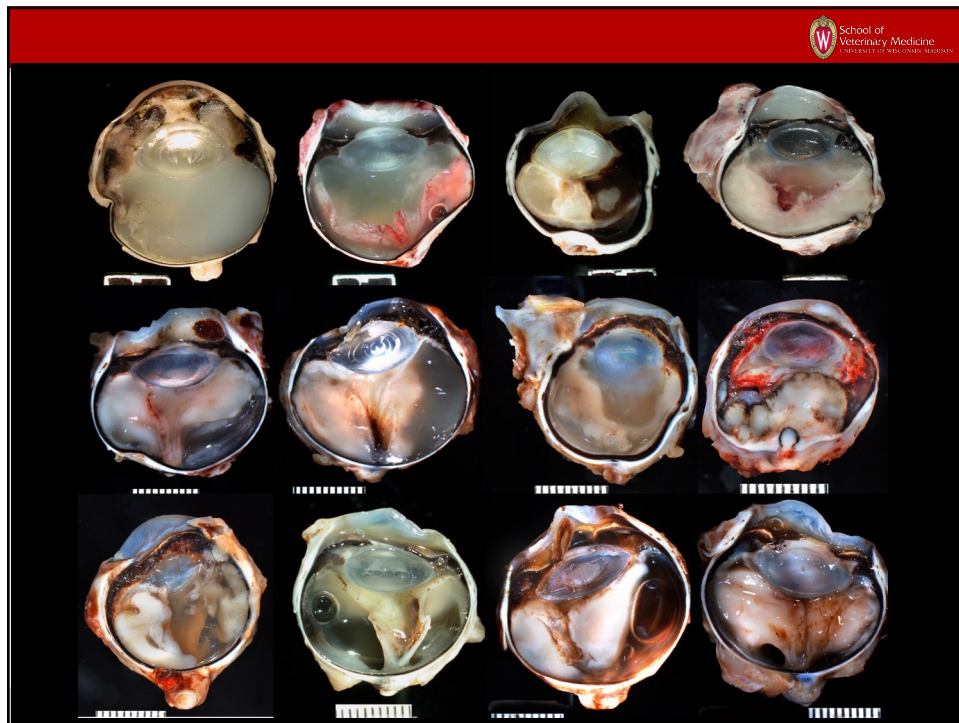
- Geographical restrictions
- Pyogranulomatous chorioretinitis to endophthalmitis
- PAS or silver stains (GMS, Grocott)
 - Blastomycosis
 - CRYPTOCOCCOSIS
 - Coccidioidomycosis
 - Histoplasmosis
 - Aspergillosis
 - Protothecosis (algae)

98

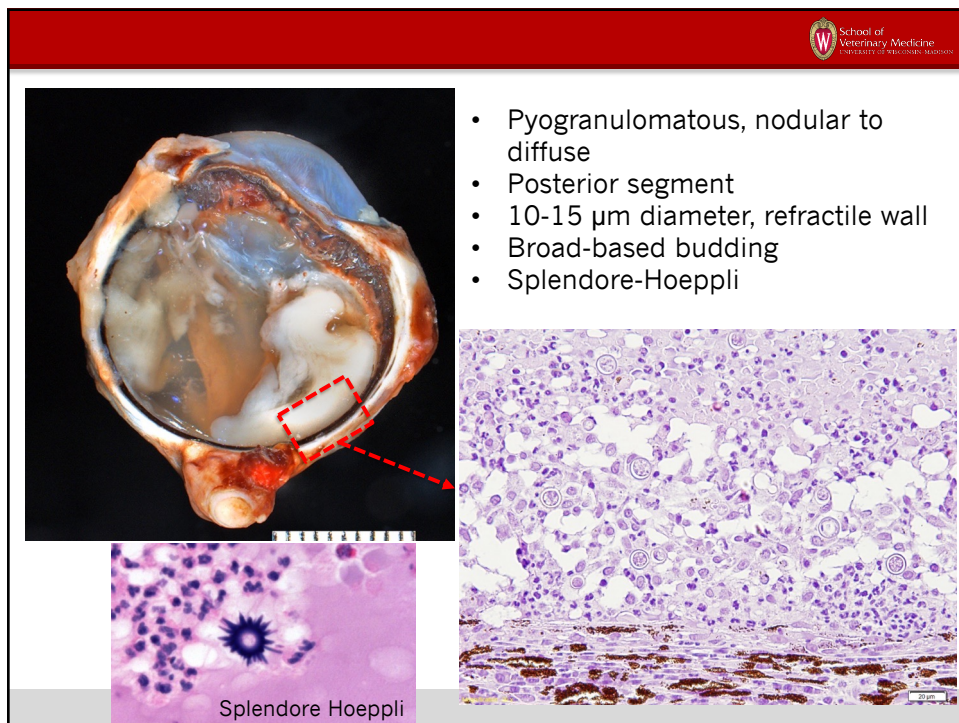
Blastomycosis

- *Blastomyces dermatitidis*
- Dogs more than cats
- Mississippi River valley
- Very local hotbeds
- Soil fungus spread through inhalation from the soil or rarely direct inoculation
 - Lung > eyes, skin, LN, bone
- Encapsulated with broad-based budding

99



100

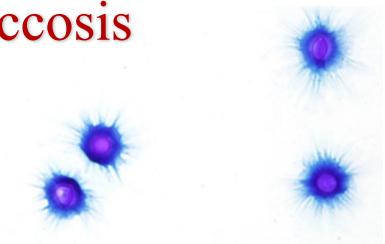


101



Cryptococcosis

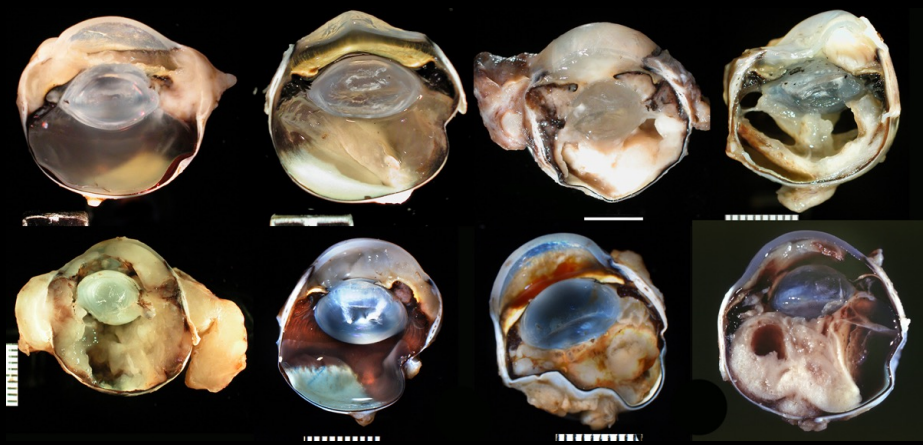
- *Cryptococcus neoformans*
- Worldwide distribution
- Cats more than dogs
- Inhalation of spores
 - Spread from soil rich with pigeon droppings
 - Lungs, CNS, LN, skin, eyes
- 7 to 10 micron poorly staining cell body surrounded by mucinous capsule



102



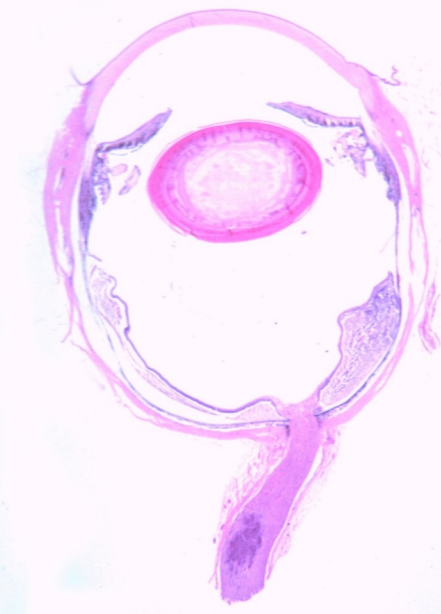
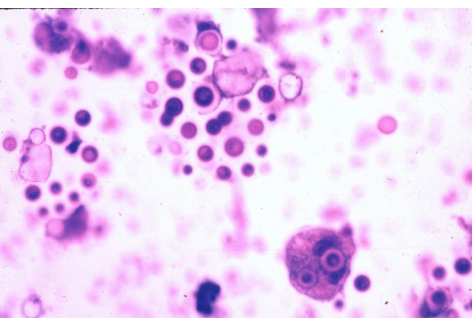
- Pyogranulomatous chorioretinitis/endophthalmitis
- Gelatinous appearance



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 School of
Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

Pyogranulomatous chorioretinitis

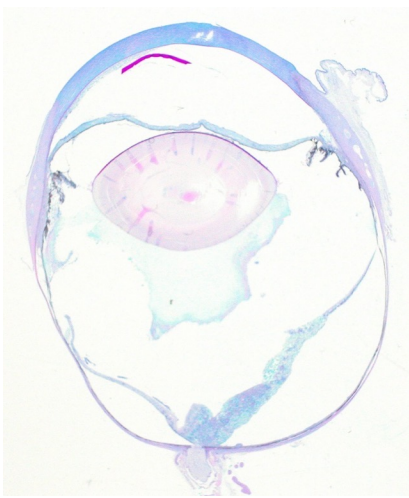
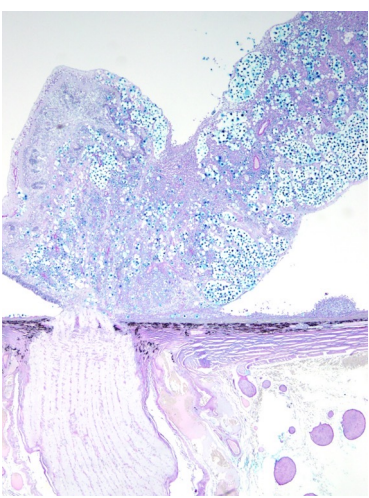
- 5-8 μm w/ 1-30 μm -thick capsule
- Narrow-based budding

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Cryptococcosis

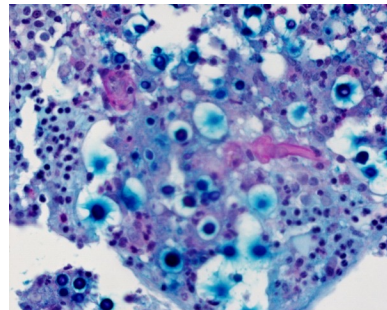
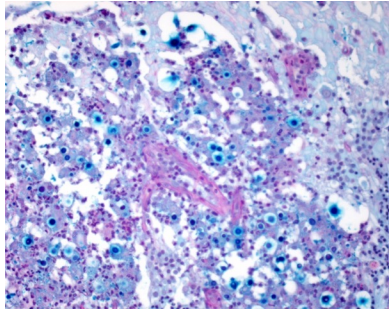
 School of
Veterinary Medicine
UNIVERSITY OF WISCONSIN-MADISON

- “Soap-bubble”
- Inverse relationship b/w inflammation and organisms
- Capsule deficient variety $\rightarrow$ more inflammation

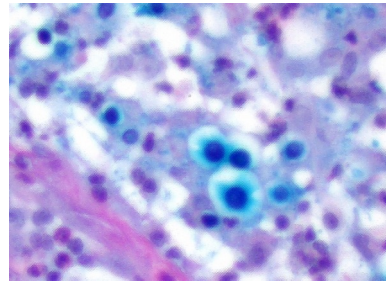



Alcian Blue PAS

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- “Soap-bubble”
- 5-8 μm w/ 1-30 μm -thick capsule
- Narrow-based budding
- Pseudohyphae

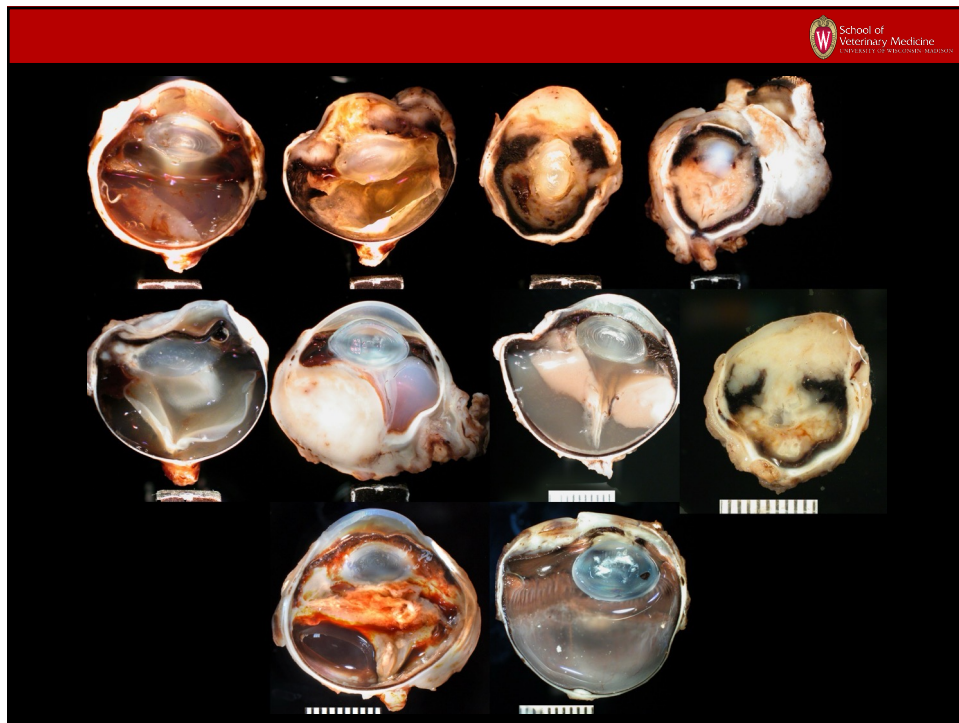


106

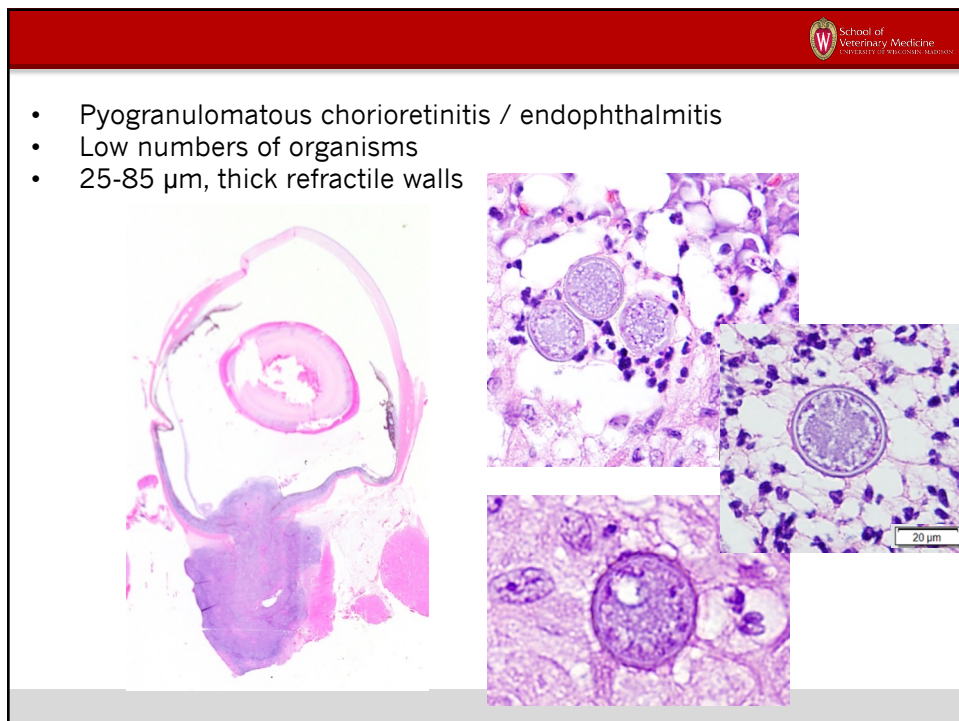
Coccidioidomycosis

- *Coccidioides immitis*
- Soil organism from Southwestern desert (USA), Central and South America
- Infects many species
 - Dogs > cats
- Immunosuppressed and outdoor animals
- Inhalation of spores
 - Lung, bones, eyes
- Organism easier to find in cats than dogs
- 20-40 microns spherule with enclosed endospores (endosporulation)
 - Does not have a budding form

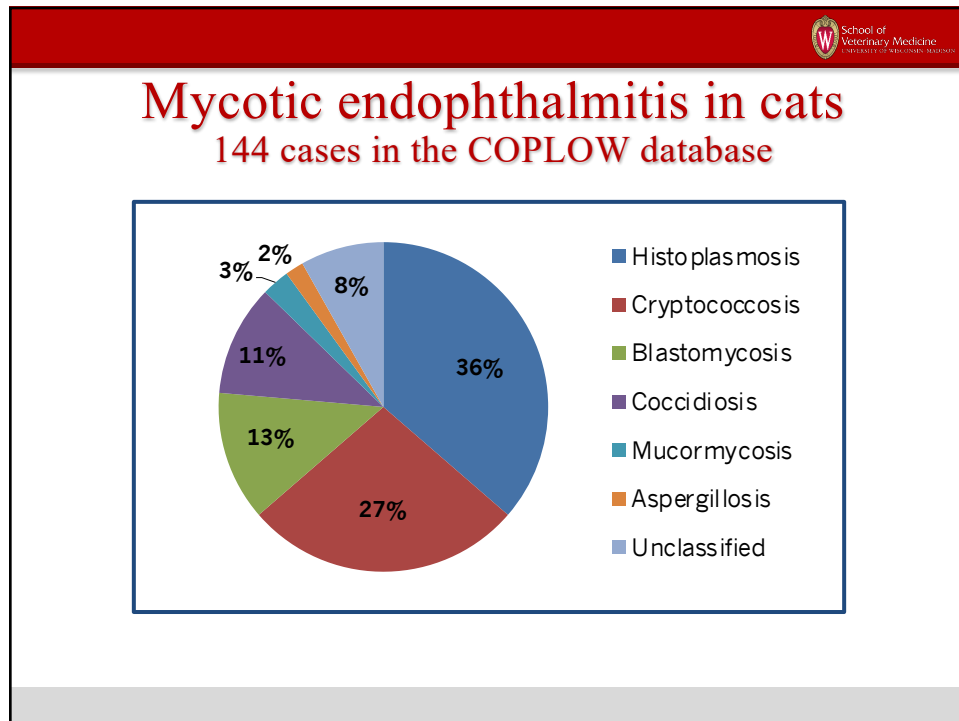
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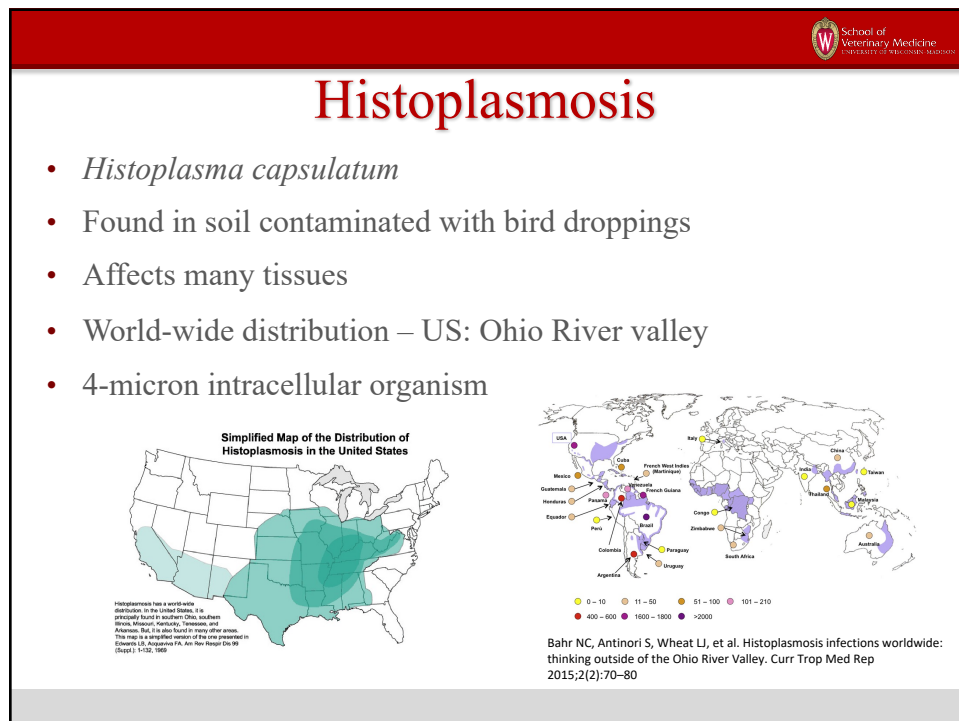
108



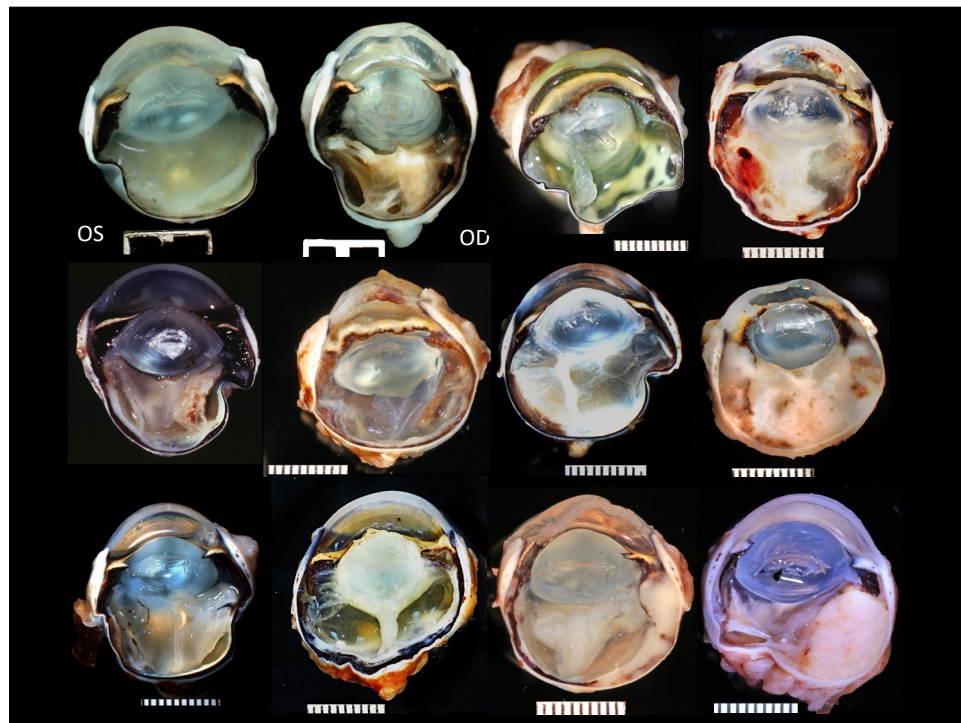
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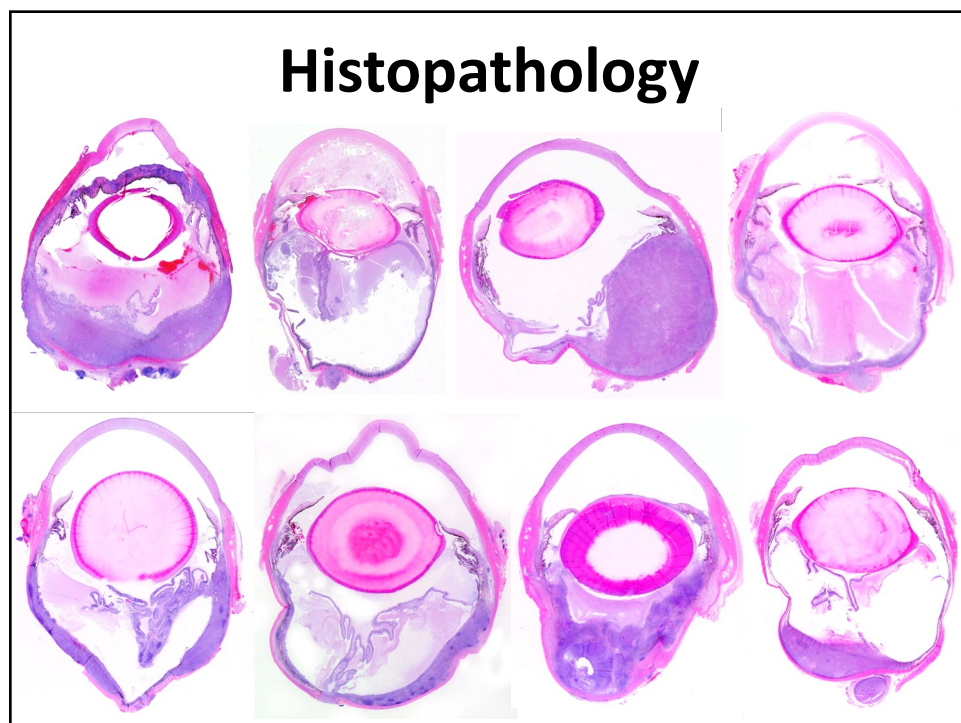
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111

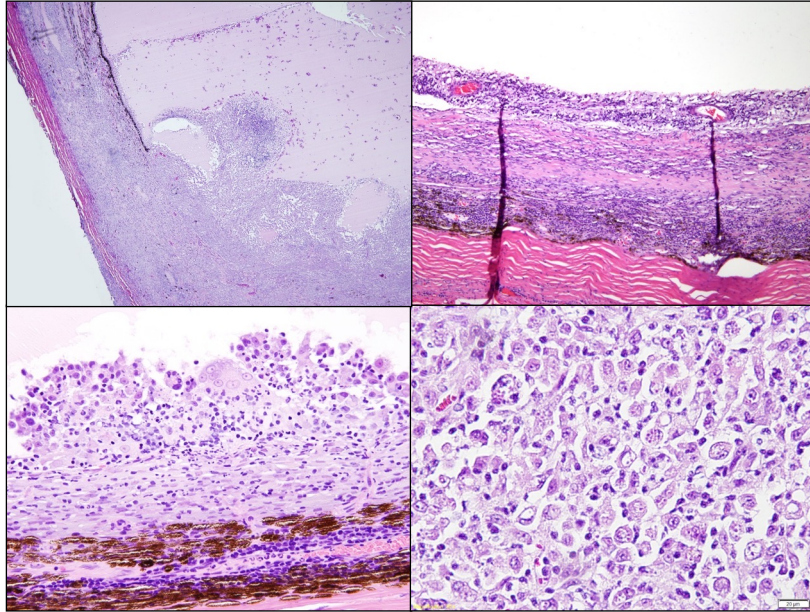


112



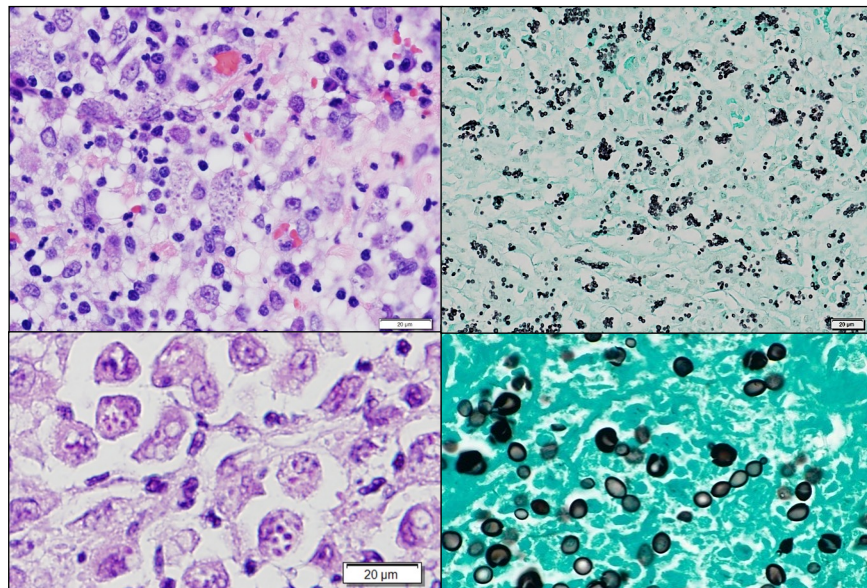
113

Histopathology



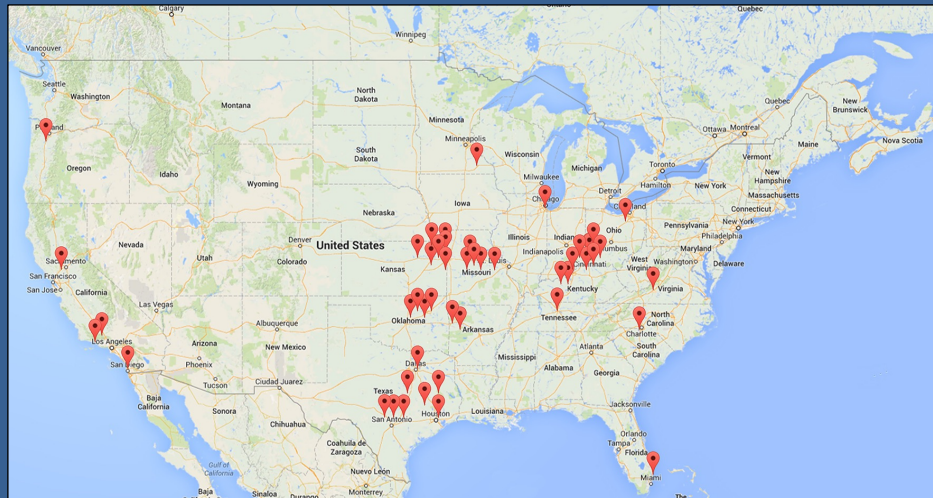
114

Histopathology



115

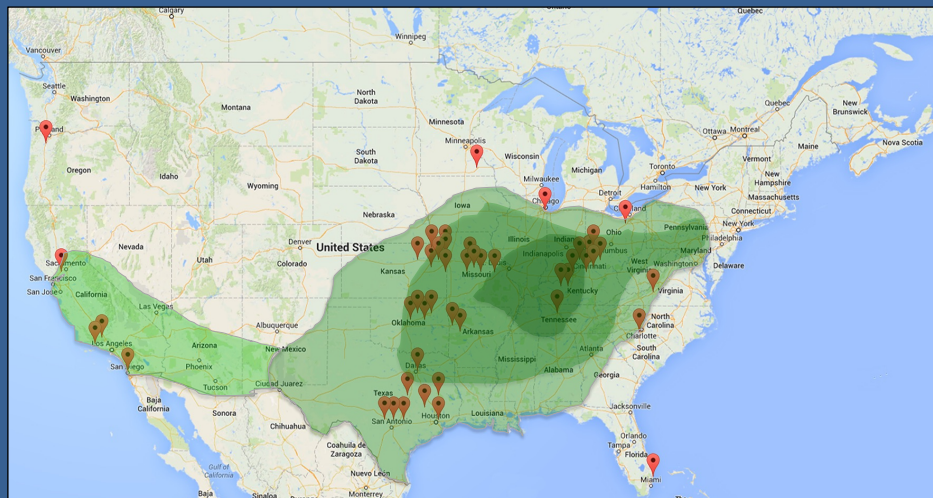
Geographic distribution of the cases



Individual case (n52)
Locations based on the owner's zip code

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Geographic distribution of the cases



Superimposed geographic distribution of histoplasmosis cases in humans
(Edwards and Aquaviva , 1989).

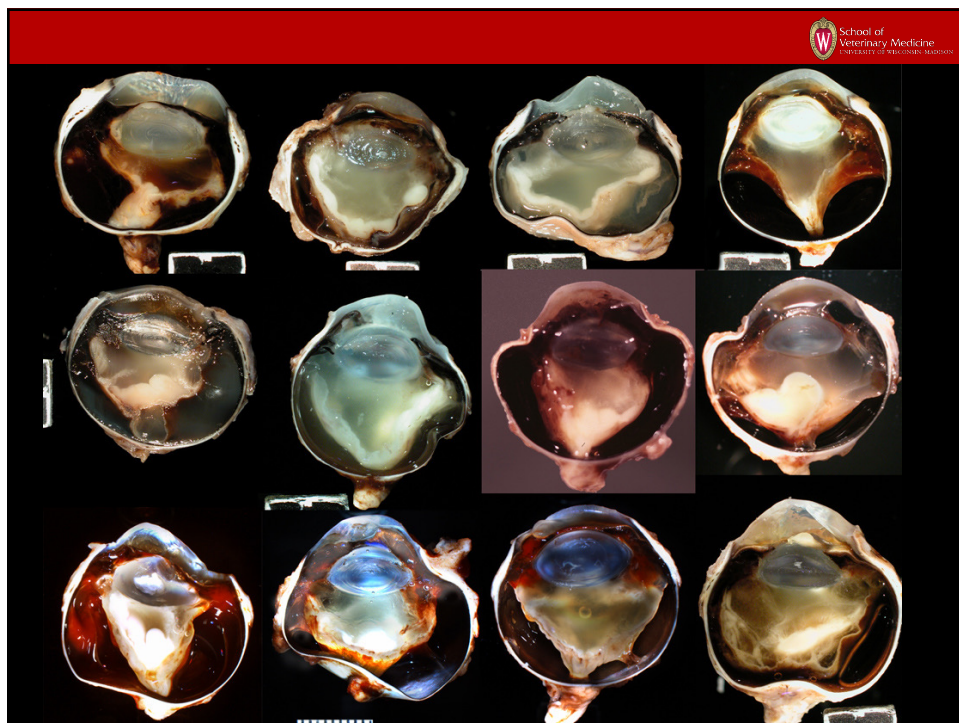
117



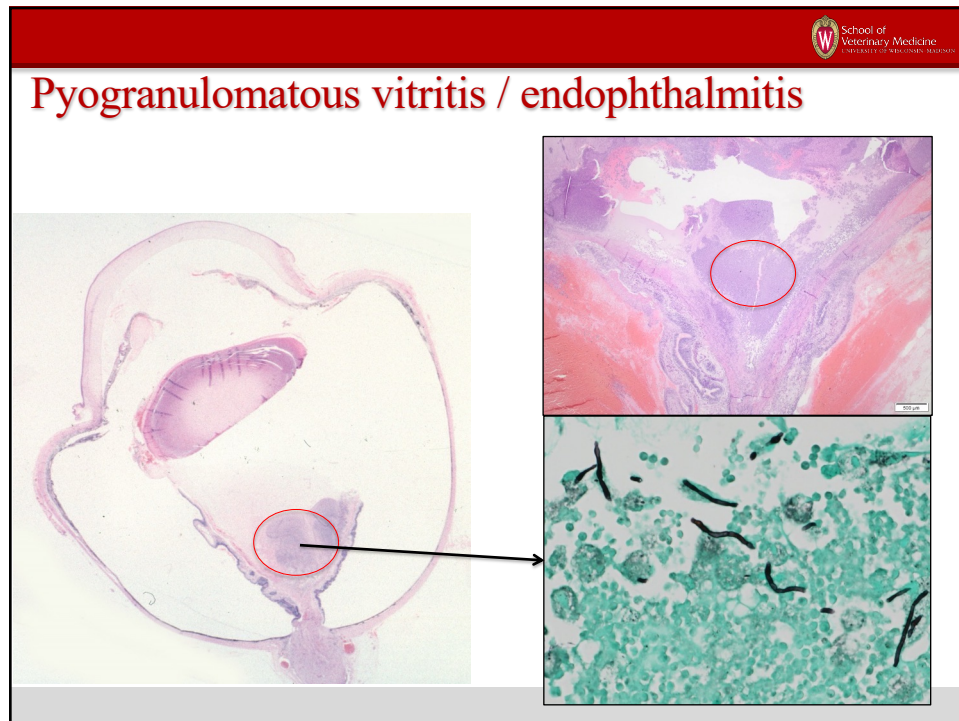

Canine Systemic Aspergillosis 109 Cases

- Worldwide distribution
- Young female dogs are predisposed
- German Shepherd breed at risk (>50% of cases)
 - Aberrant immune response
- Systemic disease with vasculitis
- Poor prognosis

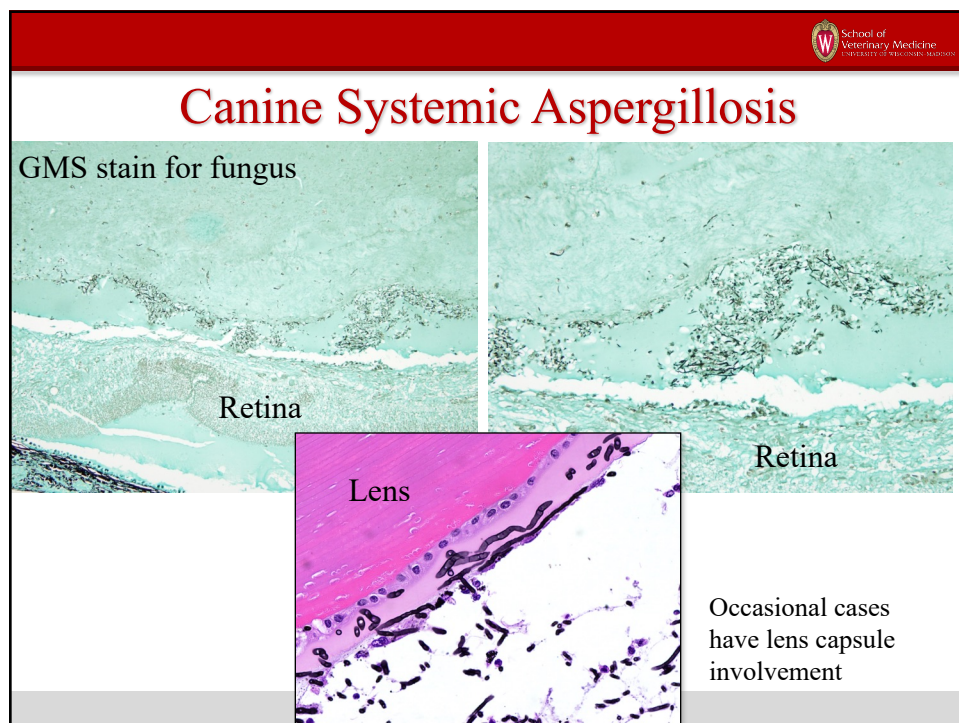
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Protothecosis

88 cases in dogs, 0 in cats

Veterinary Ophthalmology (2015) 18, 5, 437–442

DOI:10.1111/vop.12239

CASE REPORT

Canine ocular protothecosis: A review of 14 cases

Alba Maria M. Shank,* Richard D. Dubielzig† and Leandro B. C. Teixeira‡

- *Prototheca zopfii*, *Prototheca wickerhamii*
- Saprophytic achlorophyllous algae
- Worldwide distribution affecting several species
- Associated with contaminated water and susceptible host
- GI dz, systemic spread (6/14 systemic signs)
- Ocular involvement: 2/3 of cases

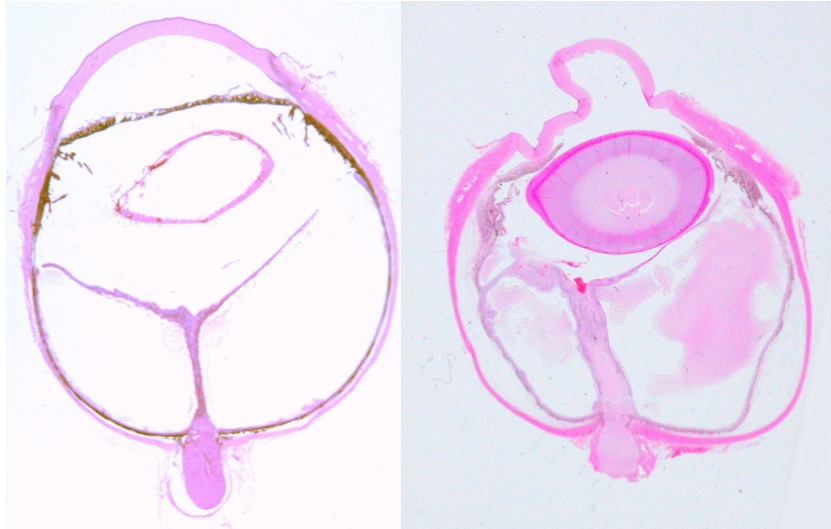
122

- Complete retinal detachment
- Thick tan exudate around retina

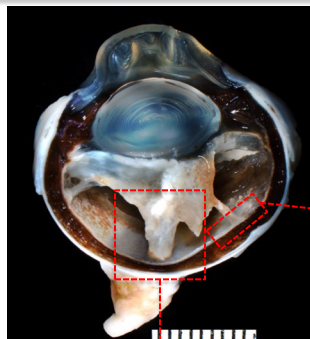


123

Protothecosis

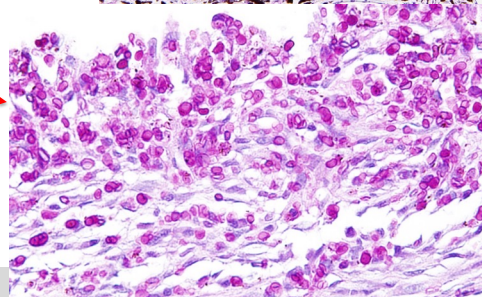
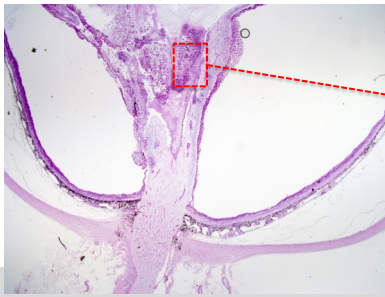
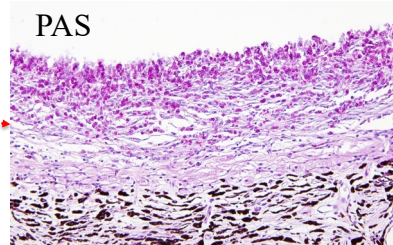


124

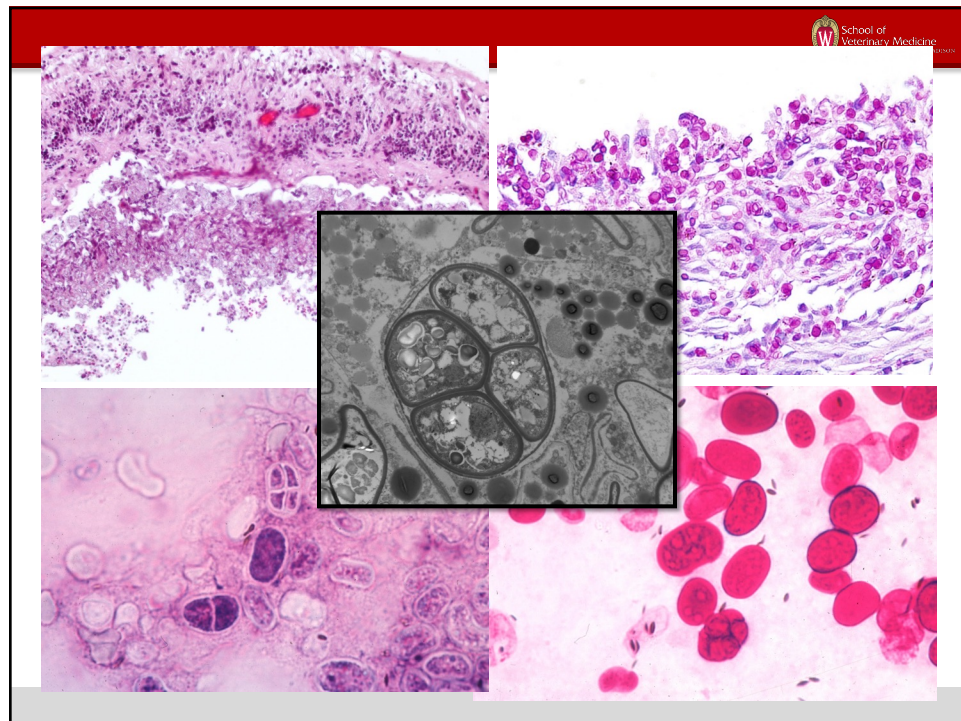


- (Pyo)granulomatous retinitis – endophthalmitis
- Round, 5-10 μ m, refractile wall

PAS



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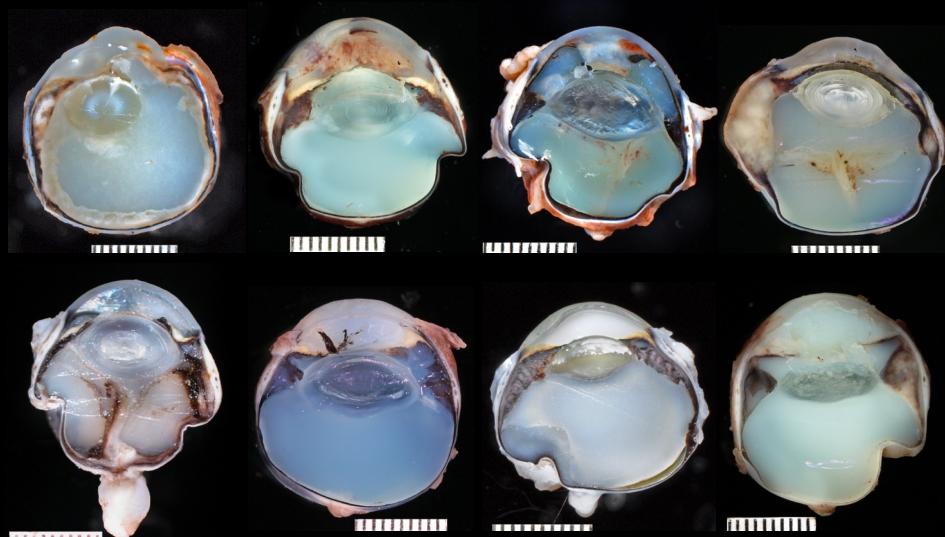
Feline Infectious Peritonitis

- Mutated feline infectious peritonitis virus (FeCV/FIPV)
- Typically, younger than 3 years (not only)
- Commonly seen with the “dry” form
 - Cats FIP without effusions → 60% ocular signs
 - Cats FIP with effusions → <9% ocular signs
- Pyogranulomatous inflammation
- Occ. seen as a neuro-ocular form
- The most common ocular signs
 - Uveitis and chorioretinitis



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- Translucent to opaque ocular media
- Solidified aqueous and/or vitreous - High-protein exudate



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Feline Infectious Peritonitis

- **Histologic features**

- Dense proteinaceous vitreal exudate
- Plasma cell-rich inflammation
- Lymphoplasmacytic and histiocytic panuveitis and endophthalmitis
 - Large reactive macrophages
 - Neutrophils in the chambers
- +/- vasculitis
- IHC for FIP virus



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Other viral uveitis

- Bovine malignant catarrhal fever-associated uveitis
- Canine adenovirus 1
- Canine distemper virus
- Herpes (multiple species)
- Non-specific / Non-diagnostic inflammatory pattern
 - Lpc uveitis/ retinitis / endothelitis

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