

Figure 126
Asteroid hyalosis of the vitreous body

Synchisis scintillans is likewise characterized by the degeneration-related deposition of particles in the vitreous body, but is accompanied by liquefaction of the vitreous body (syn-eresis). The white crystalline particles therefore settle until swirled up by eye movement.

These vitreous opacities generally do not cause noticeable impairment. Some clients report that the dog is blinded by oncoming light and then sees worse.

No medical treatment exists. The clinical symptoms are insufficient to warrant surgical excision (vitrectomy).

2.11 Fundus

The diagnosis of diseases of the fundus is an extensive subject. In the scope of this book, we can only cover the most common pathological changes of the fundus. Diagnosis of ocular fundus is complicated due to the wide range of variation of the normal appearance of the fundus.

2.11.1 The Normal Fundus

The following structures can be distinguished in the normal fundus:

- Tapetum
- Nontapetum
- Optic disc
- Retinal blood vessels

The retina consists of the following layers (from inside to outside):

- a. Retina: Innermost visible layer (facing the vitreous), which can normally be identified only on the basis of the retinal vessels arising from the optic disc (papilla).
- b. Retinal pigment epithelium (RPE): The RPE generally is pigmented only in the ventral part of the fundus and only obstructs visibility of deeper structures located there.

- c. Choroid: The tapetal layer is located in the choroid of the dorsal fundus. The tapetum reflects incident light and appears green, yellow, blue or orange in color (other colors are also possible).
- d. Choroidal vessels: Appear below the tapetum as a wide system of radial vessels. Here, the choroid may be pigmented or unpigmented.
- e. Sclera: Deepest layer of the retina; the white sclera is not visible unless no other layer is covering it.

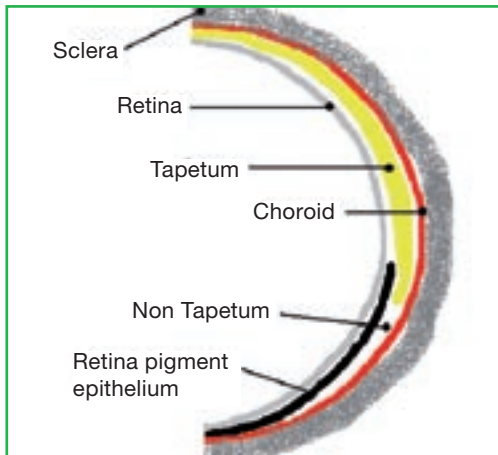


Figure 127
Layers of the fundus

The range of variation of fundus results from the variations in formation and pigmentation of the individual layers.

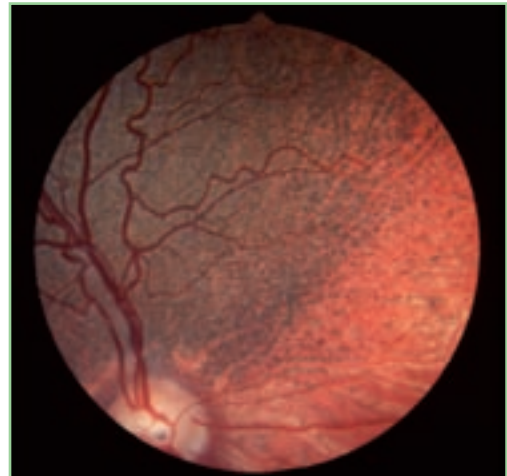
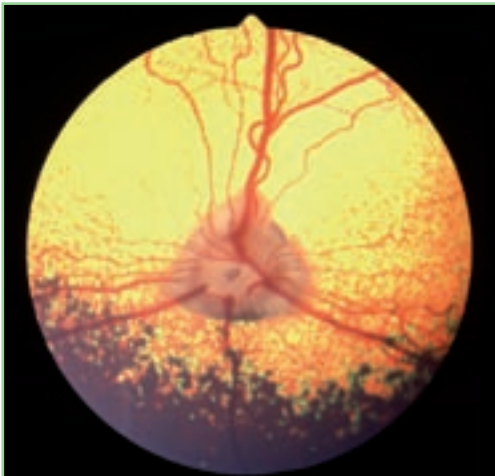


Figure 128 und 129 Variations of the normal fundus in the dog

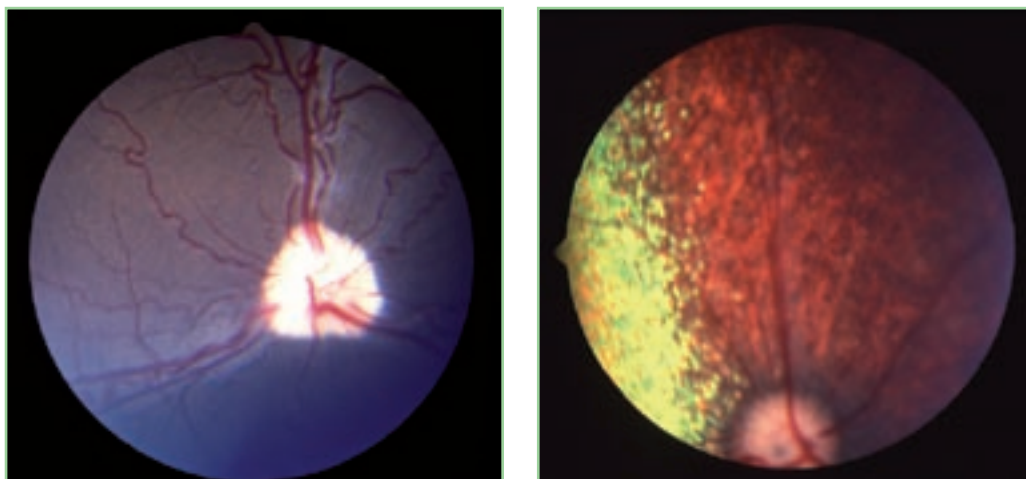


Figure 130 und 131 Variations of the normal fundus in the dog

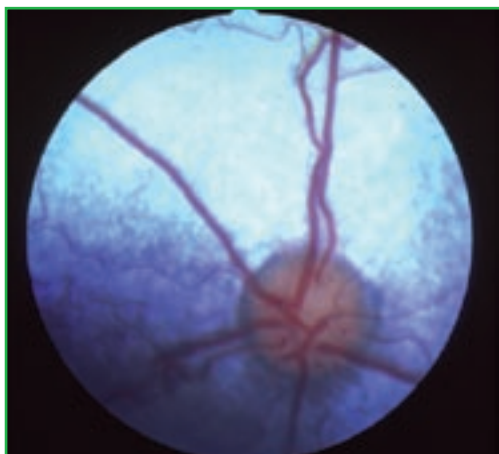


Figure 132
Juvenile fundus of a dog

2.11.2 Fundus Hemorrhage

Ocular hemorrhages can develop at various locations. Those occurring in the anterior segment of the eye can be identified using a simple lamp. An ophthalmoscope is needed to diagnose bleeding in the posterior segment.

- ✓ If ophthalmoscopy reveals the presence of blood in the ocular fundus or vitreous body, this means that the anterior segment is transparent enough to allow an assessment of the fundus.
- ✓ If the blood is located in the anterior segment (hyphema), an ultrasound examination of the globe should be performed for assessment of structures in the posterior segment.
- ✓ Fundus hemorrhages are distinguished as subretinal, intraretinal and preretinal, depending on their form and location.
- ✓ Blood in the ocular fundus may come from ruptured retinal or choroidal vessels.

- ✓ Hemorrhaging from retinal vessels occurs mainly in conjunction with hypertension-related retinal detachment. Hemorrhages follow intraocular pathways to the vitreous body.

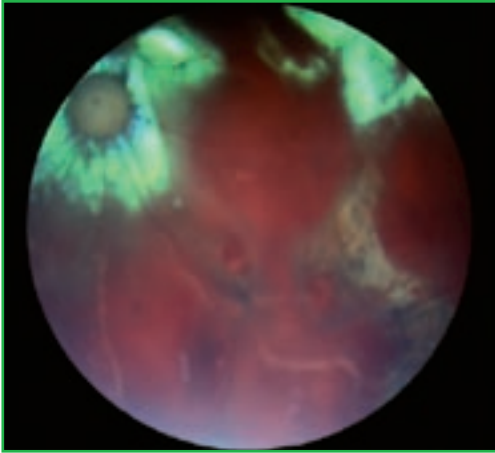


Figure 133

Hypertensive intra- and preretinal hemorrhage

- ✓ Choroidal hemorrhage is observed in connection with posterior uveitis. It generally appears as a mass in the subretinal region. Retinal detachment is also observed in these cases.

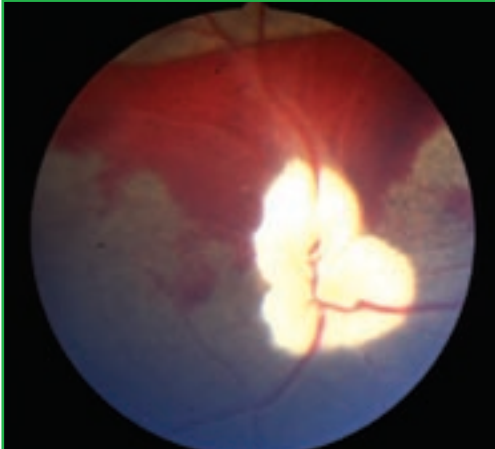


Figure 134

Choroid hemorrhage

- ✓ Vitreous hemorrhages are absorbed poorly or not at all.
- ✓ Rapid degradation of retinal and subretinal hemorrhages occurs.
 - Vitreous hemorrhages may be “old”, whereas bright red retinal hemorrhages are “fresh”.
- ✓ Retinal hemorrhages change color over time and may appear brownish to dark brown or black.

Etiology

- Collie eye anomaly (CEA)
- Posterior uveitis (choroiditis)

- Systemic hypertension
- Toxic
- Neoplastic

2.11.3 Retinal Detachment

Signs of total retinal detachment:

- ✓ Sudden loss of vision
- ✓ Mydriasis
- ✓ Typical ophthalmological features: Appearance of a white “sheet” with fine blood vessels (retinal vessels) behind the pupillary plane.
- ✓ Movement of the detached retinal sheet can sometimes be seen through the pupil.

Retinal detachment occurs between the retinal pigment epithelium and photoreceptor layer, where it is loosely connected. Attachment sites are located posterior to the optic nerve head and anterior to the ora ciliaris, which is situated directly behind the ciliary body. The retina hangs in the vitreous “like a mosquito net over a bed”.

☞ *Depending on the cause of retinal detachment, there is a window of approximately 4 to 6 weeks in which the vision can be restored.*

Signs of partial (bullous) retinal detachment:

- ✓ Indistinct, blister-like raised areas in the ocular fundus
- ✓ Often identifiable only by way of the retinal vessels in the raised areas
- ✓ Do not cause significant visual impairment

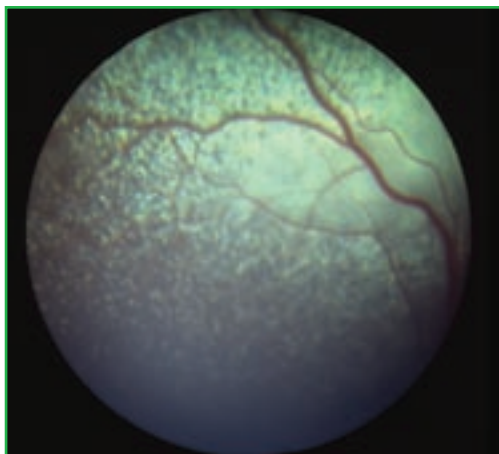


Figure 135

Bullous retinal detachment Note the indistinct appearance.

Retinal detachments may be typed as exudative, rhegmatogenous or tractional.

EXUDATIVE RETINAL DETACHMENT (most common type)

Fluid accumulates between the retinal pigment epithelium and the layer of photoreceptors. This type of detachment is generally reversible after treatment of the underlying disease.

Causes:

- ✓ Inflammatory (exudate, transudate)
- ✓ Hypertensive (transudate)

RHEGMATOGENOUS RETINAL DETACHMENT

- A tear in the retina leads to the influx of liquefied vitreous material below the neuro-retina.
- There are usually no signs of inflammation. Rhegmatogenous retinal detachment is progressive, and prompt action is advised.
- Surgical treatment has the most promising prognosis. After re-attachment of the retina, retinopexy is performed using a diode laser. This type of “posterior segment surgery” is relatively new and is just starting to become established in veterinary medicine.

Causes:

- ✓ Liquefaction/degeneration of the vitreous body
- ✓ Excessive vitreous mobility (e.g., after lens extraction without artificial lens implantation)

TRACTIONAL RETINAL DETACHMENT

- This form develops as a result of shortening and contraction of fibrin strands or membranes in the vitreous. The strands pull on the retina, resulting in retinal detachment. Effective treatment requires the separation of the strands (posterior segment surgery). The retina is then re-attached using a laser.

Causes:

- ✓ Fibrin strand formation due to recurrent vitreous hemorrhage
- ✓ Iatrogenic damage from prior intraocular surgery
- ✓ Proliferative retinopathy (e.g., diabetogenic)



Figure 136

Total retinal detachment. The retina is torn off at the ora ciliaris. Only fixation is around the optic nerve head.

Total retinal detachment results in blindness. In the initial stages, pupillary reflexes may still be present.

2.11.4 Chorioretinitis Scars

Localized inflammations of the retina and/or choroid can result in permanent scarring.

- ✓ In the tapetal fundus, the scars primarily appear as zones that are lighter and more strongly reflective than their surroundings. They are well demarcated. They exhibit central areas of black pigmentation. These chorioretinitis scars tend to be incidental findings. They may be a sign of prior distemper virus infection.
- ✓ In the nontapetal fundus, they appear as well-defined areas of depigmentation.
- ✓ No treatment is required.

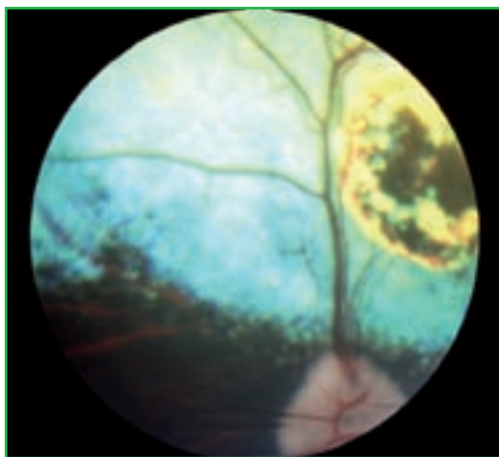


Figure 137
Chorioretinal scar with central pigmentation

2.11.5 Optic Disc

OPTIC NEURITIS (INFLAMMATION OF THE OPTIC NERVE HEAD, PAPPILLITIS)

Clinical features

- ✓ Hyperemia of the optic disc
- ✓ The optic disc is swollen and protrudes into the vitreous
- ✓ Its margins are blurry
- ✓ The center of the optic disc often appears drawn in, making it look like a “Bundt cake”.

Etiology

Toxic; neoplastic; immune-mediated

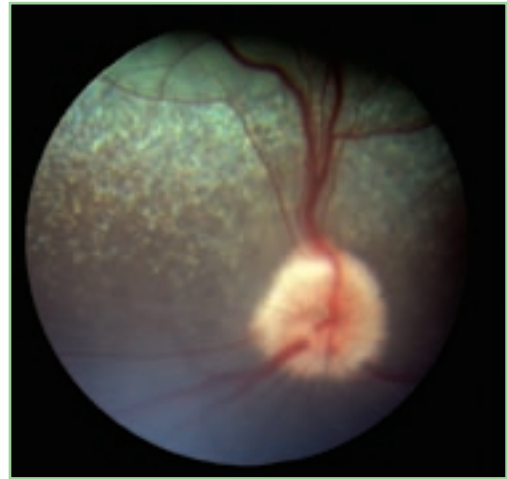
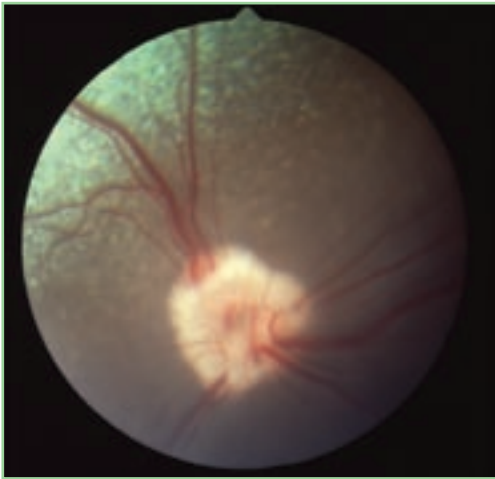


Figure 138 und 139 Bilateral optic neuritis

COLOBOMA

- ✓ Congenital defects (holes) in the optic disc
- ✓ Coloboma appear as gray, avascular hole-like excavations
- ✓ They usually lie at 6 o'clock
- ✓ Sporadic occurrences are seen in all breeds
- ✓ Typically associated with collie eye anomaly

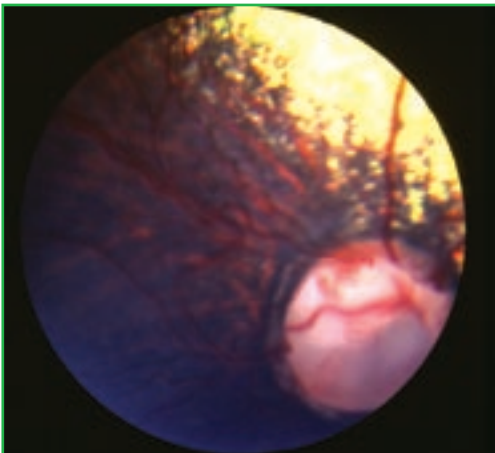


Figure 140

Coloboma of the optic disc. Note the avascular “hole” in the disc.

OPTIC DISC HYPOPLASIA (MICROPAPILLA)

- ✓ Underdevelopment of the optic disc
- ✓ Bilateral comparison is essential!
- ✓ The affected optic disc appears small and pale
- ✓ The retinal vessels appear swollen and less branched
- ✓ This congenital anomaly leads to exclusion of certain breeds (e.g., Poodle) from breeding.

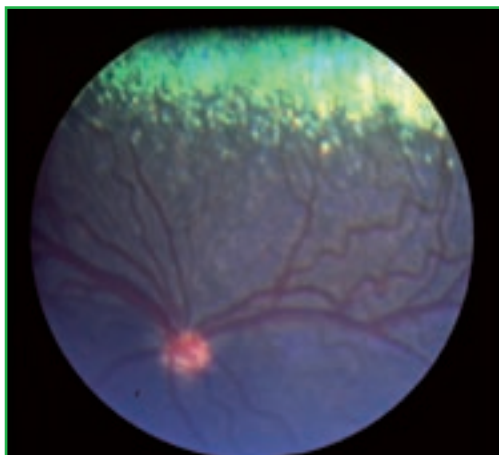


Figure 141
Optic disc hypoplasia (micropapilla)

Isolated hypoplasia of the optic disc does not lead to blindness. Blindness does not occur unless optic nerve hypoplasia is also present. Only hypoplasia of the optic disc can be identified by ophthalmoscopy. The diagnosis of optic nerve hypoplasia is therefore established based on negative vision tests.

2.11.6 Degenerative Disorders / Atrophy of the Fundus

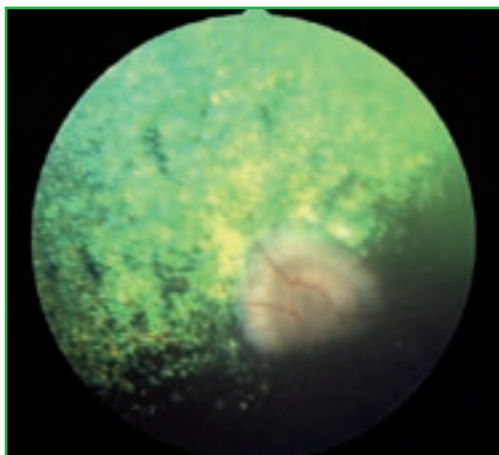


Figure 142
Fundus atrophy

Clinical features

- **Hyperreflexia:**
The atrophied retina becomes thinner. Consequently, the choroid situated below becomes clearly visible. This in turn results in stronger reflection of light in the tapetal fundus.
This produces a glare effect when fundoscopy is performed.
- **Irregular pigmentation of retinal pigment epithelium in the nontapetal fundus:**
A mixed pattern of pigmented areas and bright unpigmented areas can be seen.

- **Vascular attenuation:**
Generalized retinal atrophy is associated with a simultaneous decline in retinal vessels. The vessels become thinner and shorter and no longer reach the periphery of the fundus.
- **Optic disc atrophy:**
The optic disc appears undervascularized and “pale”. In dogs, the optic nerve also appears to be “smaller” due to demyelination of the optic nerve.

2.11.7 Selected Inherited Diseases of the Ocular Fundus

2.11.7.1 Progressive Retinal Atrophy (PRA)

- ✓ PRA has been described as a genetically inherited disease in almost all breeds.
- ✓ The mode of inheritance is autosomal recessive.
- ✓ Progressive retinal atrophy is an umbrella term used to describe a number of different retinal diseases. They are grouped together because of their clinical similarities.
- ✓ Different forms appear at different ages depending on the breed of the animal.
- ✓ In some cases, different forms appear within a given breed (e.g., early and late forms). The onset of PRA is typically observed in animals between the ages of 4 and 6 years.
- ✓ All forms have in common that this is a progressive disease that can lead to blindness.

Clinical features

- Degenerative changes in the fundus, as described in Section 11.5.
- Night blindness is the main symptom, particularly in the early stages of the disease.
- The loss of day vision occurs in the later stages.
- Typical history: The owner reports that the dog refuses to go down stairs at night and trips over curbs or stumbles into objects in the dark. The problem usually is not noticeable in the familiar home environment.
- Secondary cataract is common.

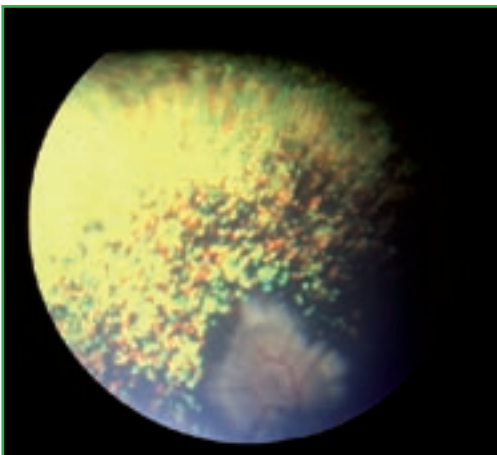


Figure 143
Progressive retinal atrophy

- 👁️ *It makes little sense to treat PRA-related cataracts surgically because maintenance or restoration of the vision cannot be expected in the presence of progressive retinal atrophy. A retinal function test (electroretinography) is therefore performed prior to any cataract operation.*

Treatment

There is no treatment for progressive retinal atrophy. Breed selection is the only way to limit the inheritance of the gene. A list of registered examiners exists in every country (for those listed in Germany, see www.dok-vet.de).

Of course the problem of recessive inheritance remains. Only those animals with two defective genes develop clinical symptoms and can be identified. The carriers (animals with a single defective gene) do not become symptomatic and remain unidentified.

Gene tests have been developed for certain breeds. With these test kits, the carriers can also be identified in a simple blood test (www.optigen.com).

2.11.7.2 Retinal Dysplasia (RD)

Retinal dysplasia is a rare retinal disease of variable severity.

Commonly affected breeds:

Labrador Retriever, English Springer Spaniel, Rottweiler, etc.

Clinical features

- ✓ Retinal folds that appear gray in the tapetal fundus and whitish in the nontapetal fundus.
- ✓ They present as single or multiple wormlike or rosette-shaped structures distributed throughout the fundus (focal or multifocal)
- ✓ Dysplasia of large areas of the retina is referred to as “geographic retinal dysplasia” They generally appear as circumscribed horseshoe-shaped areas located above the optic disc in the central tapetal region. They may be hyper- or hyporeflective and are often partially pigmented.
- ✓ Retinal detachment may also occur in some animals (e.g., Bedlington Terriers) that present with sudden blindness.

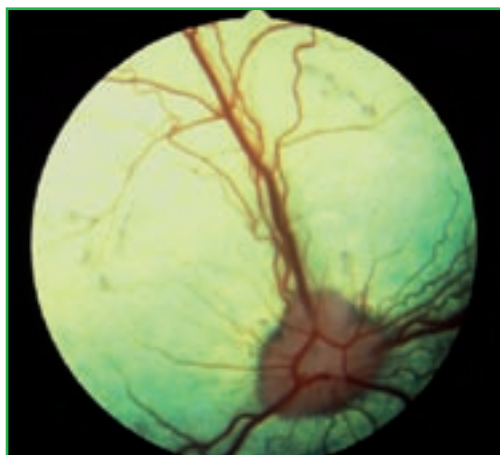


Figure 144

Multifocal retinal dysplasia