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A Summary of Blindness in Domestic Animals

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DOGS

**CANINE DISTEMPER**

THIS IS A SPECIFIC, HIGHLY CONTAGIOUS DISEASE OF DOGS caused by a filtrable virus and characterized by fever and catarrhal, respiratory and gastro-intestinal complications. The virus affects several tissues including the eye.

Infection occurs by contact or by droplet transfer. The disease has a 4-day incubation period.

Symptoms referable to the entire respiratory tract show first, with excessive watery discharges from the eyes and nose. The virus reaches the eye by direct spread from the nose via the nasal duct. The eyes first become red due to hyperemia of the sclera and the conjunctiva. With destruction of the selective epithelial linings by the virus, a more severe inflammation sets in; the watery discharge from the eyes and nose becomes more mucopurulent and unless frequently removed, will become encrusted so thick, tenacious material will adhere to the eyelids causing them to stick together and thus producing blindness. In some cases, ulceration of the cornea may result when the infection spreads to the corneal layer. Formation of pustules in the cornea weakens it and cause it to become relatively opaque, resulting in temporary or permanent blindness.

In serious attacks of the disease, staphyloma (protrusion of the cornea or sclera) may occur, with resulting permanent blindness.

**DIABETES MELLITUS**

Diabetes mellitus is a chronic metabolic disease manifested by persistent hyperglycemia and glycosuria, and due to hypo-function of the islets of Langerhans. Diabetes and mellitus affects primarily the dog, but the disease, along with its clinical lesions and symptoms, is very similar in all animals affected.

There are many possible contributory causes, some known and others unknown, but the essential immediate cause of diabetes mellitus is deficiency in insulin. This diabetic disturbance of metabolism is frequently the cause of lesions in various parts of the body, including the eye.

A fairly common phenomenon in diabetes mellitus is a swelling and sponginess of the two layers of the pigmentary epithelium of the iris. The pigment cells become elongated and enlarged and eventually break down to form cyst-like
vesicles and glycogen particles. Free pigment thus may be liberated into the anterior chamber of the eye, providing a mechanical obstruction to sight.

Infiltration of the tissues with glycogen may also be suspected of hampering vision. The corneal epithelium, the retina, the iris and the optic nerve may be involved. While not totally blinding the animal, the cloudiness of vision produced can be considered a contributory factor.

Of the secondary organic changes which may result from diabetes, one of the commonest and earliest is diabetic cataract. It usually occurs in both eyes and is usually in young individuals. It matures rapidly. It consists essentially of subcapsular opacities. The pathogenesis of diabetic cataract is not understood, but a likely theory seems to be this: The body loses a great amount of salt by increased excretion of urine due to a rise in blood sugar. This causes a lowered osmotic pressure in the aqueous humor which results in an inflow of water into the lens, causing first its deformation with the production of myopia and eventually edema and hydration which results in a cataract.

More rarely corneal opacity, probably associated with ulcer formation, sometimes iritis, retinal hemorrhage or detachment of the retina occur. This retinitis may be serious due to hemorrhage of retinal blood vessels in the vitreous causing permanent blindness.

CORNEAL PIGMENTATION

The normal cornea of the dog is perfectly transparent. While some pigment is usually apparent at the limbus, there is no extension of pigment into the normal cornea.

In the pigmented cornea, the first changes are usually observed on the corneal side of the limbus where dark brown or black plaques appear to lie in the superficial stroma or in the epithelium. Early lesions are small and discrete with irregular borders. Later, they may coalesce and the cornea becomes infiltrated with pigment which effectively obscures vision. The cornea is then dry and irregular and symptoms of conjunctival discharge and blepharospasm may appear. Vascularization accompanies pigment deposition and trunk vessels may be seen to arise in the bulbar conjunctiva and branch in the corneal stroma. While one eye may be pigmented and the other normal, bilaterality is the general rule.

Dogs with dark conjunctival pigmentation are prone to develop corneal pigment under certain conditions of stress.
As to the pathogenesis of this condition, a study of stained sections indicates that superficial corneal pigmentation originates from germinal epithelium. This tissue has the same embryological origin as that of the conjunctiva. It has been postulated that the germinal epithelial cells are potential melanoblasts which can take up melanin under conditions of stress. From the point of origin in the germinal epithelium the pigment granules aggregate and drop off to lie in the superficial stroma. Smaller granules are also found superficial to the germinal layer in the epithelium.

SHEEP & GOATS

INFECTIOUS KERATITIS

The most common disease of the eye in sheep is infectious keratitis, commonly referred to as pinkeye, not to be confused with the disease of the same name found in the bovine. The sheep become infected only by direct contact with the tears of the infected host. Insects have been suspected as carriers of the disease but since a 4 foot high board fence will prevent spread of the disease this theory was weakened considerably. It is not transmitted when infected fluid is given orally, intradermally, subcutaneously, or intravenously.

Pathogenesis includes a 48-hour incubation period followed by acute conjunctivitis, profuse lacrimation and photophobia. The disease spreads from one eye to the other in 48 hours. The discharge changes to a purulent nature accompanied by granulation of the eyelids. Within 24 hours, opacity of the cornea begins at the upper margin and then from the lower border. This may become complete followed by vascularization. At first the cornea is gray, then red and finally yellow. This discoloration and partial opacity are the direct cause of blockage of light entrance and resulting blindness. Ulceration may follow this stage and even rupture in extreme cases. Recovery begins in 4 days to 2 weeks and in most instances is complete, the cornea clears and sight returns. Immunity is good up to one hundred days but reinfection may occur afterwards. Older animals are immune.

SHEEP POX

Sheep pox is an acute, infectious disease which usually runs a typical course and is characterized by a skin eruption consisting first of papules, next pustules and finally scabs. The virus responsible for causing sheep pox is Borrelia vario-lae. Infection results from contact with infected animals, from inhalation of the virus, from contact with infected objects such as hides, wool, food, manure, litter and from infected fields.

The virus has an affinity for the epithelial layers of the skin and mucous membranes, especially areas of the skin devoid of wool. At the points of localization of the virus, the epithelial cells proliferate at first to form a papule but soon undergo liquefaction degeneration and a vesicle results. Migration of leucocytes into the contents of the vesicles changes the contents from a serous to a purulent exudate with a pustule resulting. Next, the pustules dries, forming a scab and healing occurs. The mechanism by which blindness results may be in the following ways: proliferation of the epithelium around the eyes which mechanically blocks vision, the thick mucous lacrimal exudate may cause the lids to stick together, edema of the conjunctiva as a result of irritation of the mucous membrane of the eye may lead to ulceration or necrosis of the cornea with extension of the inflammation to the interior of the eye and vesicles on the cornea may cause permanent corneal opacity.

The average duration of the disease is 3 to 4 weeks. Immunity is conferred by infection.

PREGNANCY DISEASE

Pregnancy disease is a disease of mature, poorly nourished, pregnant ewes, characterized by marked hypoglycemia, acetonemia and acetonuria due to lack of carbohydrate. While a carbohydrate deficiency is the principal causative factor there are also two others, namely ad-
vanced multiple pregnancy and lack of exercise.

Ewes have an extremely low normal glucose blood level. They, like other animals, convert the glucose into glycogen in the liver, where much of it is stored. The relative amount stored is likewise very small. When the ration of a ewe in advanced pregnancy is deficient in carbohydrate, or when she fails to eat, the liver glycogen content becomes diminished more rapidly than it can be replenished. Depot fat is then transported to the liver to replace the glycogen lost by the hepatic cells. In the oxidation of this hepatic fat, ketone bodies are formed in excess. In inactive ewes these substances accumulate in the blood and large amounts are excreted in the urine. In the body's effort to excrete these two organic ketone acids, the alkali reserve is depleted and the ewes dies in a state of acidosis. Blindness may result from the mobilization of the fat from the central nervous system and thus the optic nerve, or it may be as a result of these ketone bodies in the blood affecting the central nervous system or the eye directly.

The course of the disease is from 1 to 6 days and once the disease is advanced, the case is hopeless.

CATTLE

BOVINE INFECTIOUS KERATITIS
(PINKEYE)

This is an infectious and contagious acute conjunctivitis and keratitis believed to be caused by Hemophilus bovis. The disease is transmitted into the eye by contact with infected eye or nasal exudates. Flies have been suspected as carriers of the infection.

The disease is widespread in North America. It is most prevalent as a pasture disease in the late summer or fall.

The pathogenesis includes an incubation period of 2 to 4 days. The onset is sudden with photophobia, lachrymation, swelling and redness of the lids which remain closed and are painful on palpation. There is prominent matting of the hair of the eyelids and the face. After 2 or 3 days, if the lids are forced open, one finds a yellow deposit over the entire surface of the cornea and viewed from the side there may be a cone-shaped bulging of the cornea caused by intraocular pressure. At the point of this bulge an ulcer may form and in severe attacks it is the seat of perforation of the cornea with subsequent infection, involvement of the eyeball and permanent loss of sight. As a rule the corneal opacity finally disappears and the sight returns. The most severe forms are found in range cattle, where the afflicted are exposed to sun, dust, flies and wind. It is said to be most severe in white-faced cattle. The course is from 2 to 4 weeks with a high percentage of recovery.

Pinkeye is a disease of considerable importance both in beef and dairy cattle. In beef cattle the disease is accompanied by an appreciable loss of weight. In dairy cows a considerable drop in milk production occurs. Thus, with increase in prevalence of the malady it is becoming of more economic importance.

BOVINE OCULAR NEOPLASMS

Two types of bovine eye cancers are usually found. One is a leaflike growth present on the lower or upper eyelid which is very frail, breaking off easily on handling. This type has a small pedunculated base, can usually be successfully removed by surgery, and usually proves to be a squamous cell carcinoma.

The other type, the epidermoid carcinoma, is by far the most frequently encountered. It resembles an exuberant granulation process with a necrotic, suppurative surface. It is found on the membrana nictitans and/or in the lower lid and is characterized by a broad base, extending deeply into the surrounding tissue. This makes surgical removal difficult and results in recurrence in almost every instance. If these cancers go untreated and become extensive, metastasis may occur. Early treatment is imperative in this as well as other types of cancer; if the neoplasm is allowed to grow, it may eventually involve the eye proper as well as the surrounding bony structures.
Most Herefords have red pigmented eyelids; in some the pigment surrounds one eye only, the other being free of pigment; in other, both eyes are entirely free of pigment. It has been theorized, that a relationship exists between occurrence of cancer eye in Herefords and the nonpigmented eyelids. It seems reasonable that the sunburning of continuously moist, nonpigmented areas of the lower eyelids is a predisposing cause of cellular rearrangement, and this, combined with a possible hereditary predisposition, may result in malignancy. This carcinoma can cause blindness by becoming so large that it covers the eye, or, in extensive cases, the eye itself may become involved.

**MALIGNANT HEAD CATARRH**

This is an acute, highly fatal infectious disease of cattle characterized by inflammatory edema of the tissues lining the facial sinuses, the nose and the throat; often the eyes are involved. Malignant head catarrh is usually a limited enzootic disease in stabled cows in the spring months. Under natural conditions, the period of incubation appears to be about 1 month and the course of the disease from 4 to 10 days, ending in death.

The etiological agent is an ultra-visible but non-filterable virus closely associated with erythrocytes. The disease is not transmissible from sick to healthy cattle by contact, nor does infection follow the ingestion of virulent material. Under natural conditions the disease is believed to be conveyed to cattle by some blood sucking insect. Once in the blood stream, the virus is carried to the eye where it first causes lachrymation and swelling of the lids. Later on various changes may take place; in one case the eyes may remain normal; in another the lids swell badly; while in a third there may be closing of the pupils, bulging forward of the iris, nystagmus and total loss of sight.

**MUCOSAL DISEASE OF CATTLE**

This is an acute disease of unknown etiology characterized by erosive, ulcerative, and cystic lesions confined primarily to the lamina epithelia and mucosa of the alimentary canal. Erosions and rarely shallow ulcers were present on the muzzle and in the external nares of about eighty per cent of the cattle. The lymph nodes in general were only slightly edematous and rarely showed significant enlargement or other lesions. Occasionally the disease involves the eye and slight opacity of one or both corneas may occur. If the eye is involved, the infection is probably carried there by the blood stream and then it localizes in the cornea where it produces this cloudy condition.

Treatment to date has been a complete failure, however there has been no recurrence in herds to date.

**CORNSTALK POISONING IN CATTLE**

This condition is caused by an unknown toxic substance obtained from uncut cornstalks, following a drought which prevents normal development of the corn. This toxic substance gets into the blood stream and is carried to the eye. Some of the symptoms have been lesions of the conjunctiva, completely contracted irises and pupils visible only as a mere slit; blindness was evident.

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This is the first half of a paper by Mr. Fertig. This paper was prepared, as a special assignment in pathology, under the direction of Dr. F. K. Ramsey.

For an average one way fare of $50.00, most passenger liners will now carry dogs and cats to Europe.

*Coccidiosis*  
(continued from page 11)  

chickens can be vaccinated for Newcastle disease and/or infectious bronchitis at one to seven days of age and vaccinated for coccidiosis at three days. The inclusion of antibiotics and growth stimulants in the ration in no way interferes with the immunization process. It is not recommended that chickens vaccinated for coccidiosis be fed one of the coccidiostats continuously for the latter will retard the immunization process.