

MORPHOLOGICAL ASPECT OF TAPETUM LUCIDUM AT SOME DOMESTIC ANIMALS

Donisă Alina, A. Muste, F. Beteg, Roxana Briciu

University of Agronomical Sciences and Veterinary Medicine
Calea Mănăştur 3-5 Cluj-Napoca
donisa_alina@yahoo.com

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Abstract: The ocular microanatomy of a nocturnal and a diurnal eye are very different, with compromises needed in the arrhythmic eye. Anatomic differences in light gathering are found in the organization of the retina and the optical system. The presence of a tapetum lucidum influences the light. The tapetum lucidum represents a remarkable example of neural cell and tissue specialization as an adaptation to a dim light environment and, despite these differences, all tapetal variants act to increase retinal sensitivity by reflecting light back through the photoreceptor layer. This study propose an eye fundus examination, in animals of different species: cattles, sheep, pigs, dogs cats and rabbits, to determine the presence or absence of tapetum lucidum, and his characteristics by species to species, age and even breed.

Our observation were made between 2005 - 2007 at the surgery pathology clinic from FMV Cluj, on 31 subjects from different species like horses, dogs and cats (25 animals).

MATERIAL AND METHOD

Our observation were made between 2005 - 2007 at the surgery pathology clinic from FMV Cluj, on 30 subjects from different species like cattles, sheep, pigs, dogs cats and rabbits. The animals were halt and the examination was made with minimal tranquilization.

For the purpose we used indirect ophthalmoscopy method with indirect ophthalmoscope Heine Omega 2C.

The principle of this method is the examination of animal ocular globe, an examination made with indirect ophthalmoscope (with light source and video camera incorporated) and with a lent between examiner (ophthalmoscope) and patient. The lent is not incorporated in ophthalmoscope so, in the time of examination she must be hold with a hand by the examiner. The lent dioptrically power is 20 D and we can obtain 4-5x magnification field of view. This lent must be settle at 4-5 cm from the patient eye and at 0,5 - 0,75 m from the examiner (this in an advantage for the examiner because he keep distances from the animal).

The obtained imagine by indirect ophthalmoscopy is real and upside down.

In the present study, all patients have been exanimate with ough tranquilization, the contention was mad in a good and comfortable position for the animal and examiner too. To every patient we administrated atropine 1% for pupil dilatation with 30 minutes before the examination. To do ophthalmoscopy examination, all the patients have been taken in a especially dark room, used in that purpose.

The next step is the ophthalmoscopy technique, where the examiner take the lent with one hand and put her between light source and animal, at the same distances as we are talking before. Then with easy movements nearly and beyond, he, will show the tapetal reflex of the posterior pole, than very carefully, with ough losing tapetal reflex, he will move the lent

until will obtain a generally view of eye fundus (retina, optic disc, choroids). The imagine obtained can be generally or can fallow in particularly different aspects as vascular aspect, optic disk aspect or retinal endothelium aspect.

RESULTS AND DISCUSSIONS

Bovine tapetum lucidum

The stady were made on 5 cows on different age and breed.

The bovine tapetum fibrosum is situated in the choroid and restricted mainly to the superior fundus. Over the central and mid-region of the tapetum the retinal epithelial layer is completely unpigmented, whereas over the peripheral tapetum, and certainly in the nontapetal periphery of the retina, the retinal epithelium is moderately to heavily pigmented. The bovine tapetum appears blue in color (fig.1). The actual reflective material of the bovine tapetum is a large array of extracellular collagen fibrils arranged in lamellae of varying thickness.

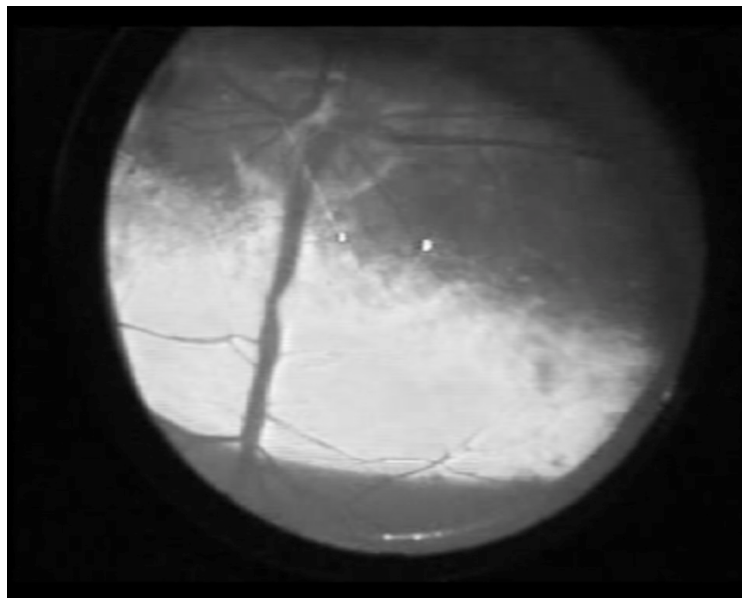


Fig.1. Normal aspect of bovine eye fundus(tapetum lucidum).

At the retinal edge of the tapetum, a rich vascularized lamella containing the choriocapillaris separates the tapetum from Bruch's membrane. Blood vessels from the pigmented outer region of the choroid penetrate the tapetum fibrosum to supply the choriocapillaris adjacent to Bruch's membrane. These penetrating blood vessels pass through the tapetal region parallel to the incoming light very close to a right angle. The bovine choriocapillaris, while abutting directly against Bruch's membrane, does not indent this membrane nor the retinal epithelial layer.

Sheep tapetum lucidum

The study was made on 5 sheep of different age and breed.

The sheep's tapetum reflects a greenish blue color in contrast to the adjoining regions of dense black pigmented choroid. (fig.2.).

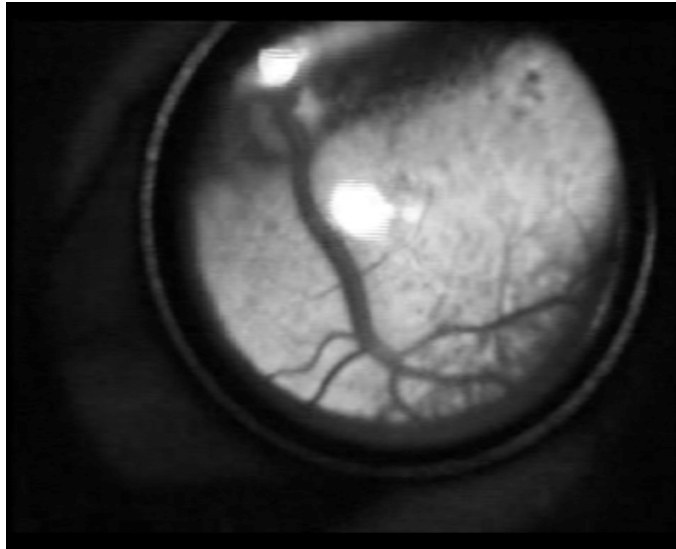


Fig.2. Sheep eye fundus

The tapetum is essentially a horizontal strip in shape, and its lower edge just touches the point of entry of the optic nerve. The upper edge is a more complex shape, and is less clearly defined. The tapetum consists of a layer of collagen fibrils (100–200 μm in depth), in which a few fibroblasts are present.

Dog tapetum lucidum

The study was made on 5 dogs of different age and breed.

The tapetum lucidum in the dog is a rounded equilateral triangle in shape, with the base oriented horizontally (excluding the optic disc in most of the breeds) and the apex directed upwards (fig.3).

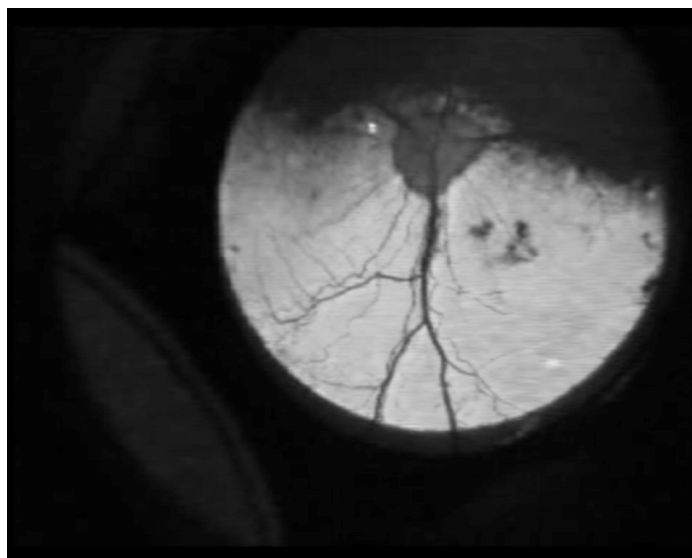


Fig.3. Dog eye fundus.

It covers an area of approximately 30% of the superior fundus. In fresh preparations the reflected color of the canine tapetum varies from yellow-green to green-blue with an irregular marginal area (fig.4.). The tapetum in the center of the tapetal fundus of the dog consists of 18–20 layers of cells.

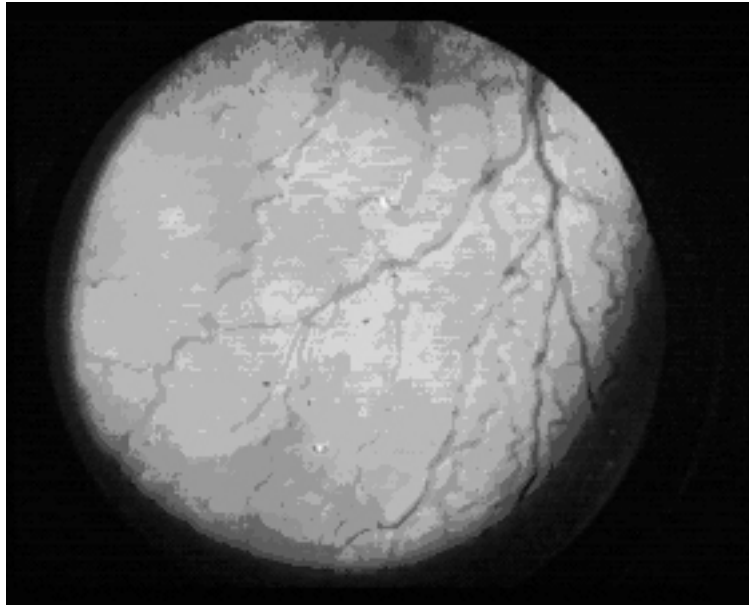


Fig.4.Dog eye fundus(tapetum lucidum)

Cat eye fundus

The study were made on 5 cats on different age and breed.

The tapetum lucidum in the cat covers nearly 50% of the fundus area, and is shaped roughly like a rounded equilateral triangle, with its apex upwards and its base passing horizontally just below the optic disc(fig.5.)

Tapetal development initially produces the immature feline tapetum that is pale blue in color. Its predominant dult color varies from yellow to green between individuals.

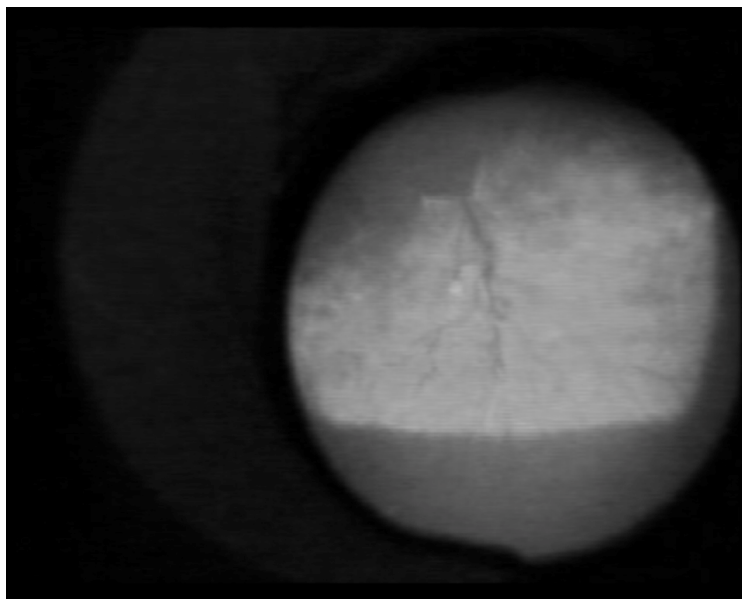


Fig.5. Cat eye fundus.

Histologically, the feline tapetum consists of 15–20 layers of cells in its center, progressively thins and eventually disappears towards the periphery.

Pigs and rabbits don't have tapetum lucidum.

CONCLUSIONS

In conclusions, we can say that the tapetum lucidum have different aspect from species to species, and in case of the same species is different by age, because the color is variable at young animal and at adult one.

Normal aspect of eye fundus, have a great importance in halt status of the eye, and the image is cached in a short time if exist a special technique and ophthalmoscope.

1. Witought tapetum lucidum have an extremely important role, he is not present at all species, so cows, sheep's, dogs and cats have tapetum, and at the pig and the rabbit is missing
2. Tapetal color varies with species, breed, age, coat color and amount of pigmentation in the eye and skin .Structure, organization and composition of the tapetum also vary from species to species.
3. The dog tapetum is surrounding the optic disc in some cases, and in others when he arrives at optic disc is finish already.
4. The cat tapetum surround every time optic disc, he have a geometric form as equilateral triangle.

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