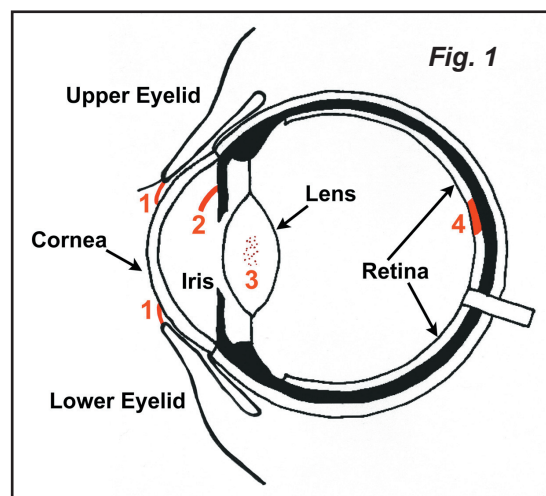


# ABNORMAL FINDINGS IN THE EYES OF SWEDISH VALLHUNDS

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*The following article discusses abnormal findings that have been made in the eyes of Swedish Vallhunds over the past few years. The discussion is based on my own examinations as well as examinations performed by other veterinary ophthalmologists in the United States and in Scandinavia. These data include the most recent statistics of the Canine Eye Registry Foundation (CERF). In 2005, I examined 34 Swedish Vallhunds in the United States for potentially inherited eye diseases. The dogs were between 7 months and 9 years of age. Table 1 summarizes my findings. Even though a genetic basis is suspected for most of the abnormal findings, the underlying causes are unknown.*



## 1. Distichiae

**Definition:** Distichiae are abnormal eyelashes that grow from the margin of the eyelid and touch the surface of the eye (Figure 1). In most dogs distichiae will not cause any problems. Rarely, distichiae have to be surgically removed if they cause irritation. Distichiae will not lead to the exclusion of a dog from breeding (breeder option).

**Swedish Vallhund:** Distichiae are not a common problem in the breed (Table 1). There are no indications that we have to be concerned about complications caused by distichiae.



## 2. Persistent pupillary membranes (PPMs)

**Definition:** The pupillary membrane is a thin membrane that normally covers the lens during the early development of the eye. This membrane usually disappears during the first two weeks after birth, before eyelid opening. If parts of the membrane persist, we call them persistent pupillary membranes or PPMs. They are little tissue strands that originate from the iris (Figure 1). The PPMs are more common in certain breeds than others, which indicates that they may be inherited.

Most commonly, PPM tissue strands go from one part of the iris to another (iris-to-iris), which is usually of no consequence. Any dog with iris-to-iris PPMs can be bred (breeder option). Vision problems could arise if the strands attach to the lens (iris-to-lens) or to the inner aspects of the cornea (iris-to-cornea). Iris-to-lens PPMs cause cloudiness of the lens or cataracts. Iris-to-cornea PPMs are responsible for a cloudy cornea. Sometimes PPMs are wide bands rather than thin strands, which can also cause vision problems. These more severe forms of PPM (wide bands, iris-to-lens and iris-to-cornea strands) will lead to the exclusion of a dog from breeding.

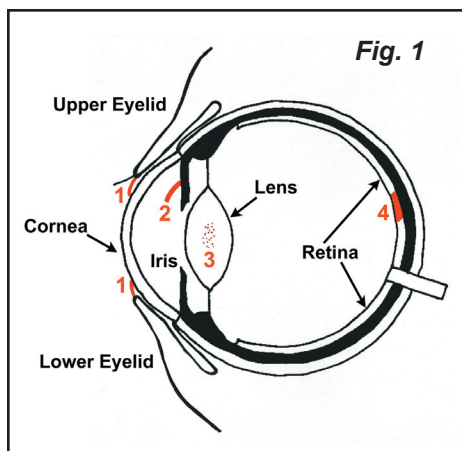
**Swedish Vallhund:** Based on the CERF data, PPMs have been listed as a suspected inherited abnormality in the breed. About one quarter of the dogs that I examined had iris-to-iris PPMs (Table 1).

## 3. Cataracts

**Definition:** A cataract is defined as a cloudy area in the lens (Figure 1). The most common causes for cataracts in dogs are either genetic defects or diabetes. Other causes

**TABLE 1.**

FINDING	NUMBER OF DOGS (Males/Females)	Percent of all examined dogs
Distichiae	4 (2/2)	12%
Persistent pupillary membranes (PPM)	8 (5/3)	24%
Punctate cataracts	5 (3/2)	15%
Chorioretinal scars	8 (4/4)	24%
Red/brown pigmentation of the retina	10 (5/5)	29%
Dogs without any abnormal findings	14 (7/7)	41%



**Figure 1: Schematic cross-section through the dog eye showing the locations of the distichiae (1), persistent pupillary membranes or PPMs (2), punctate cataracts (3), and retinal abnormalities such as progressive retinal atrophy (PRA), chorioretinal scars, or red/brown pigmentation (4).**

for cataracts are possible, but if in doubt we always have to assume that a cataract could be inherited. While small cataracts usually do not cause any vision problems, they have the potential to cause blindness should they become larger. This potentially severe consequence of cataracts is the reason why any dog diagnosed with a cataract should be excluded from breeding, unless it can be proven that the cataract is not inherited.

If a cataract is very small (smaller than the tip of a pen) it is called a punctate cataract.

Punctate cataracts are usually so small that they can only be seen with magnification. Most of the punctate cataracts will never progress and will not cause any vision problems. Therefore, the veterinary ophthalmologist can mark "significance of punctate cataract unknown"

on the CERF form, and the dog can still be bred (breeder option). Nevertheless, it is important to mark these small cataracts in order to get a better idea about progression over time and over many dogs.

Swedish Vallhund: Punctate cataracts were found in a few dogs (Table 1). The affected dogs were between 2 and 4 years of age. To the best of my knowledge, no Swedish Vallhund has become blind from cataracts in the United States. This is encouraging and indicates that the punctate cataracts found in this breed may be of no consequence. However, we will see if this holds true over the next few years. Breeders should continue to be very careful about breeding dogs with punctate cataracts until we get a better idea about the potential for progression and vision problems. It is always a good idea to have the eyes checked before breeding a particular animal.

#### **4. Progressive retinal atrophy (PRA)**

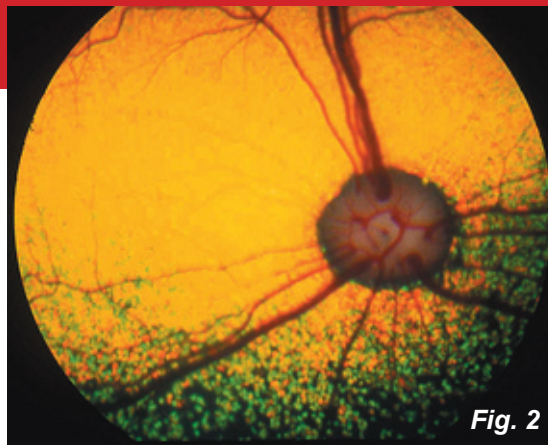
**Definition:** The retina is a very thin and tender tissue in the back of the eye (Figures 1 and 2). The retina is responsible for processing the images that the animal sees. It sends the information to the brain. If we compared the eye to a camera, the retina would correspond to the film. Progressive retinal atrophy or PRA is an inherited degeneration of the retina in dogs. There are many different types of PRA, some occurring very early in life, before the dog reaches adulthood. However, most forms of PRA start later in life, long after the dogs have reached breeding age. The first signs are usually vision problems in the dim light. As the disease progresses over months or years, the vision problems become worse and may eventually lead to complete blindness. Any dog diagnosed with PRA should not be bred.

For several dog breeds, blood tests are available so that animals can be tested for the disease at an early age. For many types of PRA, a blood test does not yet exist. Dogs that may be affected by PRA can be tested by recording an electroretinogram or ERG under general anesthesia. The ERG may indicate the presence of PRA a few months before the dog is having severe vision problems.

**Swedish Vallhund:** So far, PRA has not been diagnosed in the United States. However, Swedish Vallhunds suspected to have PRA have been seen in Scandinavia. No blood test is currently available for the breed.

#### **5. Chorioretinal scars**

**Definition:** Chorioretinal scars are scars located in the retina (Figure 1). A scar indicates a location previously affected by inflammation. However, the cause for the inflammation can



**Figure 2: Appearance of the normal dog retina as seen by the ophthalmologist. The tapetum or eye-shine is yellow or slightly green in most dogs.**

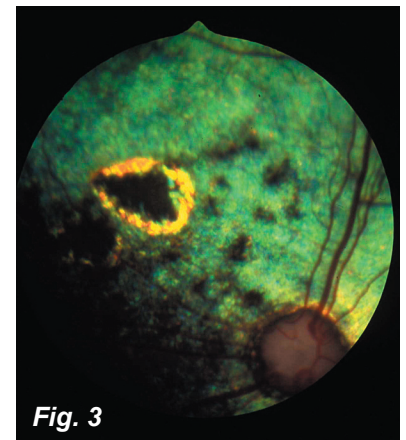
usually not be determined by an eye exam. A few chorioretinal scars will not cause any noticeable vision deficits, but if they are more numerous, they can potentially affect the animal's sight.

In some dogs, the chorioretinal scars may appear like retinal dysplasia. Contrary to chorioretinal scars, retinal dysplasia is caused by an abnormal development of the retina and can usually be diagnosed in puppies.

**Swedish Vallhund:** I found chorioretinal scars in almost one quarter of all the dogs examined (Table 1, Figure 3). The affected dogs were at least 2 years old. These scars have also been diagnosed by other veterinary ophthalmologists in America and in Europe. In Finland these lesions are given the code "J175".

As long as we do not know if the chorioretinal scars are part of an inherited disease, and as long as the sight of the affected dogs is not negatively affected, dogs diagnosed with this problem can still be bred (breeder option). However, it is important that such dogs are re-examined yearly in order to monitor progression and vision loss.

At this point we can only speculate about the potential cause for the



**Figure 3: The black spots in the green area indicate chorioretinal scars as seen in Swedish Vallhunds. The biggest scar is surrounded by a yellow rim.**

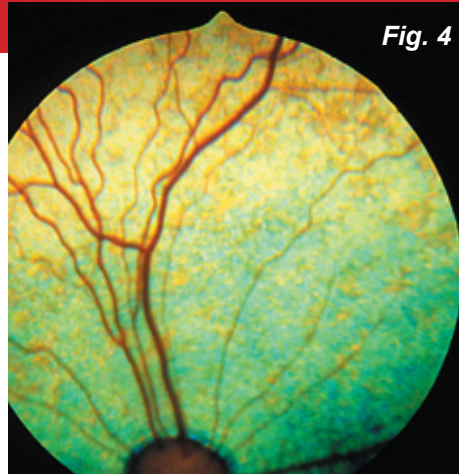
chorioretinal scars. Similar lesions have been described in other breeds, such as Border Collies, New Zealand Herding Dogs, and Borzois. Parasites and abnormal blood vessels in the retina have been suggested as underlying causes, but any attempts to prove inheritance failed. The underlying causes may be different in the various breeds. In a few Borzois and Border Collies the chorioretinal scars have been shown to progress and cause complete degeneration of the retina, which can look like PRA. However, we know that the disease is not PRA! It is possible that some of the Swedish Vallhunds diagnosed with PRA in Scandinavia may initially have had chorioretinal scars. Any confusion could be cleared by consistently having the eyes checked on a yearly basis.



## 6. Red/brown pigmentation of the retina

Definition: No definition of red/brown pigmentation of the retina can be given at this time since it is unclear what the pigmentation represents.

Swedish Vallhund: In about one third of the dogs examined, I detected red/brown pigment in the retina as early as 7 months of age (Table 1 and Figure 4). I am not aware that other veterinary ophthalmologists have noticed this. Sharing my pictures with some experts in the field, we have not been able to come up with an explanation for this pigmentation. It is possible that the pigmentation is completely normal for the breed. However, I suspect that the pigmentation may indicate an abnormality. It is possible that the red/brown pigmentation may be a variation of the chorioretinal scars. In order to determine the importance of these changes, the affected dogs should continue to be examined on a yearly basis.



**Figure 4:** Many small areas of red/brown pigmentation can be seen within the green-yellow eye-shine of a Swedish Vallhund.

## CONCLUSIONS/COMMENTS

*Even though over half the Swedish Vallhunds that I examined in 2005 had some abnormalities in their eyes, to the best of my knowledge, no dog of this breed has lost vision in the United States because of these abnormalities. Still, it is very important that as many dogs as possible are evaluated on a yearly basis by CERF examinations performed by board certified veterinary ophthalmologists. Based on the information from Scandinavia, the retinal problems have the greatest potential to cause vision problems in the Swedish Vallhund.*

*Over the past 2 years, I have become quite involved in figuring out the eye abnormalities in the Swedish Vallhund. I have recently become the liaison for the breed in the Genetics Committee of the American College of Veterinary Ophthalmologists (ACVO).*

*With the help of several Swedish Vallhund breeders, I was able to collect many eye examination forms and pedigrees which will be very helpful to determine the cause for some of the eye abnormalities in the breed. I would be happy to continue collecting data about the breed in our laboratory at the University of Pennsylvania as long as the breed clubs continue to support my efforts.*

*The following paragraphs list strategies to determine the underlying causes for some of the observed eye abnormalities:*

- 1.** The Genetics Committee of the ACVO decided in October 2005 that there will be a new category for "retinopathy" on the CERF form. This category should be marked by veterinary ophthalmologists if they see chorioretinal scars or red/brown pigmentation. We hope that the introduction of this category will help to better trace these abnormalities in the CERF database.
- 2.** As many dogs as possible should continue to undergo yearly eye examinations (CERF exams) by veterinary ophthalmologists, ideally starting before 1 year of age. The data will automatically be entered in the CERF database. The data will show if the frequency of some of the eye abnormalities are either increasing or decreasing in the breed.

*NOTE: Any personal information about the dog or the owner is handled confidential and is automatically destroyed by CERF.*

## CONCLUSIONS/COMMENTS

**3.** It would be extremely helpful, if I could receive copies of eye exam forms (normal and abnormal) together with copies of pedigrees from as many dogs as possible over the next few years. The combined analysis of the eye exam forms and the pedigrees will allow us to draw conclusions about potentially inherited eye diseases.

*NOTE: I would like to thank all the Swedish Vallhund breeders and owners who have already provided me with information and are continuing to do so in the future!*

**4.** Within the next year, we will send out a questionnaire to the members of the breed clubs in order to collect some information about the environment in which the Swedish Vallhunds live. The collection of these data will help us to find non-inherited factors that could be responsible for some of the eye abnormalities found in the breed.

**5.** Within the next year we will start to solicit breeders and owners of Swedish Vallhunds for blood samples from their dogs. These blood samples can be collected by any veterinarian. We will send exact instructions about the collection and shipping methods.

*NOTE: Unrelated to our blood collection, it is important that blood from any dog suspected to suffer from PRA will be sent to OptiGen ([www.optigen.com](http://www.optigen.com)) for free screening of genetic mutations that have already been found in other breeds. I would be happy to provide more information if needed as our laboratory works very closely with OptiGen.*

**6.** Examination of eye tissues will be very useful. If ever an eye has to be removed for medical reasons, or a Swedish Vallhund with retinal changes should die, it would be very important to have the eyes submitted to a pathology laboratory for histologic examination. Certain laboratories are better than others, and I would be happy to provide more information. I am aware that this is a sensitive issue, as nobody likes the thought of his/her dog dying, but the analysis of eye tissue may be most revealing. Eye tissue should ideally be accompanied by previous eye exam forms and pedigrees.

**7.** Trying to determine the cause of an eye abnormality always costs money. So far our work has been supported by funds from within our laboratory as well as some contributions from Swedish Vallhund owners.

More funding will probably be required in the future. With some of our preliminary data we will try to apply for additional funding, but some of the bigger funding institutions do require that the breed clubs make financial contributions. Therefore, fund raising should also be considered as a strategy to investigate the eye abnormalities in the Swedish Vallhund.

Readers should feel free to contact me with any questions, suggestions, or concerns about the eye abnormalities in the Swedish Vallhund.

Any of the personal information/data gathered (names, addresses, etc.) will be handled strictly confidential!

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