

Symmetrical Lupoid Onychodystrophy (SLO)

(full seminar notes 2021)

by Jo Tucker

Definition:

Symmetrical: Affecting corresponding parts simultaneously and similarly.

Lupoid: Comes from the word lupus meaning any of a group of skin diseases in which the lesions are characteristically eroded by the immune system.

Onychodystrophy: Abnormal claw formation.

SLO comes under the heading of an autoimmune skin disease.

Disease process:

SLO is an autoimmune disease whereby the immune system becomes confused and spontaneously produces an aggressive antibody response, which infiltrate and kill the good cells of the nailbed and surrounding area, causing the nails to fall off or grow deformed.

The term 'autoimmune' is used when the immune system destroys good cells for no apparent reason i.e. there are no underlying causes such as infectious or chronic disease.

There are many different autoimmune diseases.

About the Immune System

The immune system is a very powerful and complex tool. It is designed to protect the body, keep it healthy and free of disease. The immune system consists of an army of immune cells that lie in wait for foreign invaders such as, bacteria or a virus, known as antigens. When an antigen is identified, the immune cells multiply and are despatched to destroy the antigen without mercy. When their job is done the immune system returns to normal balance.

To ensure the immune system identifies and kills only the foreign cells, it develops a memory to distinguish between what is:

'Self' – the good cells - its own body

and

'Non-self' -- the bad cells – foreign to its body.

Autoimmune Disease

Autoimmune disease can occur when the immune system of a genetically predisposed dog malfunctions and is no longer able to distinguish between what is 'self' and what is 'non-self'.

These dogs will develop an autoimmune disease if their immune cells mistake a part (or parts) of their own body as a foreign invader. The immune system will aggressively respond and produce antibodies that are programmed to destroy the bad 'foreign' cells, and in doing so unintentionally

destroys the good 'self' cells, resulting in a primary autoimmune disease. It is clearly a case of mistaken identity.

For this breakdown in the system to occur the dog has to have a genetic predisposition. This concealed predisposition is undetectable until an autoimmune disease occurs.

Genetics

A dog that develops an autoimmune disease has inherited these damaging genes from both parents. The mode of inheritance is known to be complicated, with several genes involved. This is often referred to as a polygenic inheritance. Although both parents carry the genes responsible, and it is known to run in families, this does not necessarily mean that if one dog in a litter gets an autoimmune disease the others will follow. Also, it is not known why dogs develop a specific autoimmune disease, or in some cases develop more than one. It may be due to the combination of inherited genes (or lack of them), different environmental influences, or a particular set of untimely circumstances that triggers specific diseases in a predisposed dog.

It is unfortunate that currently, there are no DNA tests available to identify the dogs who are genetically predisposed to autoimmunity, or 'carriers' or genetically 'clear' dogs. This means that dogs with a genetic predisposition can only be retrospectively identified after a diagnosis of an autoimmune disease, because prior to this they will appear relatively normal. A confirmed diagnosis identifies both parents to be at least 'carriers' of autoimmune disease, but they may go on to develop an autoimmune disease if they carry a full quota of deleterious genes.

Age

Autoimmune disease is more likely to occur in young to middle aged dogs, but occasionally dogs as old as 16, have been known to develop an autoimmune disease.

Gender

Both male and females are affected however, it is thought that young females seem to be more prone - and this probably due to hormonal influences. Hormones can be a major trigger factor for autoimmune disease in the dog.

Triggers

It has already been stated that a genetic predisposition is required for a dog to develop an autoimmune disease, but that's not all as it has to encounter a 'trigger' to generate an immune response and, in so doing, the malfunctioning immune system produces auto-antibodies that are programmed to destroy its own cells.

So, what are trigger factors?

Anything within a dog's environment that may challenge their immune system can be a potential trigger. A dog that develops an autoimmune disease may have encountered the same trigger factor before with no detrimental effect, but for some unknown reason, on this occasion it has caused the immune system to malfunction resulting in the dog developing an autoimmune disease.

Possible trigger factors are:

1. Stress eg., fireworks, thunderstorms, separation anxiety, whelping, hormones etc.
2. Viral or bacterial infection.

3. Adverse reaction to chemicals, drugs or vaccines.

SLO

SLO can be **`primary`**, meaning it can occur in isolation, or it can be **`secondary`** to another autoimmune disease such as pemphigus skin disease; or SLE, a multi-systemic autoimmune disease which is far more serious, but thankfully, uncommon.

Unlike some other autoimmune diseases, primary SLO is not life threatening but it is a very painful and miserable condition until the correct treatment is well under way. Primary SLO involves the nails and surrounding area of the feet only. Multiple nails on different feet are always affected, but this can take several weeks or even months to fully develop.

A dog with secondary SLO will show other signs of being unwell eg., footpads and other areas of skin affected, very high temperature, lameness, anaemia etc.....

Nail problems have been a concern to dog owners and breeders for decades. This condition was always referred to as a **`nail bed infection`**. However, it was not until 1997, following an article written by a veterinary dermatologist and published in the Southern Counties Bearded Collie Club's magazine *`Beardie Times`*, that owners started to worry that this might have a genetic link. The article suggested SLO was not an infection but an autoimmune disease, and this has subsequently been confirmed by various studies.

Alternative Diagnoses

In addition to SLO being linked to other autoimmune diseases, various nail disorders can also be caused by:

- Trauma (very unlikely to involve nails on different feet)
- Infection – bacterial, fungal (again, very unlikely that all nails are involved)
- Endocrine problems: (eg., resulting from an underactive thyroid or Cushing's syndrome)
- Nutritional causes

Clinical signs of SLO can include:

- Lameness, swollen toes.
- Loss or partial loss of nails, licking of feet.
- Bleeding and/or discharge from the nail or surrounding skin.
- Deformity caused by abnormal growth.
- Secondary infection.
- The dog is generally well, but might be miserable and depressed due to the pain.

The disease is progressive and it can take months before all nails are affected. Blood tests will be unremarkable, but a full blood test is advisable to first rule out the possibility of an underlying disease.

Wrong Diagnosis

Initially, only one or two nails might be affected. It is therefore common, and not unreasonable, for a vet to assume a diagnosis of bacterial or fungal infection and treat accordingly. Treatment can go on for several months before both the vet and owner realise that it is not working.

The longer SLO is left without appropriate treatment, the more nails become affected. Secondary infection is very likely because the feet are in contact with the ground and the dog will naturally lick his sore feet which may also cause infection.

Clinical Signs

If your dog has a nail problem, the first thing you may notice is when he cries out in pain and limps, or licks his foot. Also, nails can bleed profusely and this can be quite alarming to start with. It would be natural to think that he has caught his nail on something that has caused it to bleed. It is probably not until a second or third nail breaks that you might start to wonder if this is more than just accidental damage to a couple of broken nails. Of course, one lost nail may be due to trauma or even an infection, but if the problem extends to other nails on different feet - then it is likely to be SLO.

Diagnosis

A diagnosis of SLO can only be confirmed by the amputation of the first digit of a preferably, non-weight bearing toe (the third phalanx) or the complete removal of an affected dew claw. This enables the pathologist to identify infiltrating immune cells (principally from the coronary band at the base of the nail which is buried deep beneath the skin) and confirm the diagnosis.

The complete removal of an affected dew claw is preferable as it has much less impact on the dog and it minimises post-surgical pain, management and trauma. A punch biopsy is not recommended as it is difficult to perform and rarely gives conclusive results. Nails that have previously broken off are of no diagnostic value at all.

Presumptive Diagnosis

A confirmed diagnosis of SLO is valuable information for the vet, owner and the breed. However, if the amputation of the end of a toe, or total removal of a dew claw, is not something you want to put your dog through and you would rather consider and accept the overwhelming clinical signs and treat speculatively for SLO, then the following observations are important to recognise:

- SLO is the most common cause of symmetrical nail disease in dogs.
- Family history, age of dog and known breed predisposition.
- Loss of nails on multiple digits, without evidence of systemic disease, is distinctively characteristic of SLO.
- SLO is progressive. Initially, only one or two nails are affected. Consider SLO if further nails become damaged, despite the dog receiving prolonged antibiotic therapy and other supportive treatment?

- Signs of improvement after correct treatment has started.

How do you control the immune system and get it to behave normally again?

Drugs are used to significantly suppress or regulate the immune system in order to stop the destruction and allow the body to heal and work normally again. When clinical improvement is seen, the drugs are reduced over a period of time, slowly releasing the immune system back to normal function and hopefully, achieving a state of remission.

There is no cure for autoimmune disease but long term, remission can be achieved. Some dogs will stay in remission without drugs, but others need a low maintenance dose for life.

Dogs may have an autoimmune disease only once and never get it again but there is always a possibility that a predisposed dog could relapse or get another autoimmune disease at a later date.

Treatment Options for Autoimmune Skin Disease

Fortunately, there are different treatment options for autoimmune skin diseases and as primary SLO is not life threatening, the most popular treatment seems to be with either Doxycycline, Tetracycline or Minocycline, with Niacinamide (Vitamin B3).

Doxycycline, Tetracycline and minocycline are from a group of antimicrobial drugs that come under the heading of Tetracyclines. There are over 6 different antimicrobials in this group but only tetracycline, doxycycline and minocycline are indicated in the treatment of SLO and other autoimmune skin disease.

Doxycycline, Tetracycline and minocycline are antibiotics which also have anti-inflammatory properties and suppress antibody production. They are immunomodulating drugs, meaning that they have the ability to adjust the immune response to a desired level. They are known as 'steroid sparing' meaning that the molecular effect is similar to using steroids.

An antibiotic in this class of Tetracyclines, commonly used in veterinary medicine, is Oxytetracycline but it does not have the same properties as those listed above, and is not indicated for the treatment of autoimmune skin disease.

Niacinamide works with Doxycycline, Tetracycline or Minocycline to further suppress antibody production and provide additional anti-inflammatory and immunomodulatory effects.

Important Notes:

1. *Tetracycline should be used with caution in dogs with renal impairment as it is eliminated from the body via the glomerula filtration and a build-up of the drug can occur if used for prolonged periods. If it is necessary to give a dog with renal impairment Tetracycline the dose should be lower than recommended, but a lower dose may not address the problem of SLO, and also the treatment is likely to be for many months at least. However, Doxycycline is excreted in the faeces and does not*

affect renal function and can be used for animals with renal insufficiency. (Plumb's Veterinary Drug Handbook)

2. Niacinamide is also known as nicotinamide but it **must not** be confused with, Nicotinic Acid, (Niacin). Although Niacin acts identically as a vitamin, it increases the blood flow and blood pressure, and should not be used for the treatment of SLO. See this link:

<https://niacinreviews.com/difference-niacin-niacinamide-non-flushing-vs-flushing/>

If you are in doubt as to which product to buy, look for niacinamide or nicotinamide 'Non-flush' label.

Recovery:

Unfortunately, it will take 1-3 months before any positive results are seen (although duration of treatment is much longer, probably 6-12 months on a reducing dose regimen) but, in spite of this, it does seem to be the treatment of choice for SLO as it is effective and usually well tolerated - and it avoids the use of steroids and other stronger drugs. Most dogs do very well on this treatment regimen. When good clinical improvement is seen the drugs can be gradually reduced and the dog weaned off medication over a period of many months, or remain on a low maintenance dose.

Dose: Tetracycline with Niacinamide

****Ref: Plumb's Veterinary Drug Handbook Eighth Edition.***

****Dogs weighing less than 5kg : 100mg niacinamide, 3 times a day.***

****Dogs less than 10kg : 250mg each Tetracycline and niacinamide three times a day.***

****Dogs more than 10kg : 500mg each Tetracycline and niacinamide three times a day.***

Give three times a day until improvement is seen, 3-6 months. Then give twice a day for 2 months, then once a day for maintenance. (Manual of skin Diseases of the Cat and Dog 2nd Edition, By Sue Paterson).

Note: Food or dairy products can significantly reduce (up to 50% or more) the amount of Tetracycline absorbed. Avoid giving oral tetracycline within 1-2 hours of feeding or giving milk or dairy products.

Doxycycline with Niacinamide

Historically the use of doxycycline, instead of Tetracycline, for autoimmune skin disease was much more convenient because unlike tetracycline, dairy products do not affect its absorption and the recommended dose was 5mg/kg/once a day (Plumb's Veterinary Drug Handbook, Fifth Edition).

The new ***Plumb's Veterinary Drug Handbook, Eighth Edition**, recommends the dosage as:

***Doxycycline:** Consider 5-10mg/kg/twice daily

or

***Minocycline** - Consider 7.5mg/kg twice daily

The dose of Niacinamide (see above) is the same regardless of which combination drug is used.

***Tetracycline** – avoid giving drug orally within 1-2 hours of feeding, giving milk or other dairy products.

***Doxycycline and Minocycline** – Oral doxycycline and minocycline can be given without regard to feeding. Milk or other dairy products do not significantly alter the amount of doxycycline or minocycline absorbed. Do not give as a dry pill. Give with a moist treat or small amount of liquid to be sure that it reaches the stomach.

***Do not give multivitamins, calcium supplements, antacids, or laxatives within 2 hours before or after giving doxycycline. These products can reduce the drug's effectiveness.**

***Ref: Plumb's Veterinary Drug Handbook Eighth Edition**

Note: I have known numerous SLO dogs to achieve remission on Doxycycline: 5mg/kg/once a day but referencing both of these recommendations gives the vet licence to adjust the dosage if necessary.

Tetracycline or Doxycycline is usually well tolerated however, some dogs exhibit signs of nausea, vomiting or diarrhoea at the start of treatment, if this happens reduce the dose for a week or so and gradually increase to full dose.

Steroids

Steroids are life-saving and work like a miracle drug at times. However, if the autoimmune disease is not life threatening, and there is an effective, alternative treatment with less side effects, then it is always worth trying other treatment options before using high doses of steroids and other more potent and expensive drugs. If you and your vet choose steroids to treat your dog's SLO you may see quicker results because the effect of steroids on the immune system is rapid. However, there are numerous side effects and these must be expected.

Steroids suppress the immune system in order to stop the destruction. The dose of steroids has to be high and 'immunosuppressive', anything less and the treatment may not work and remission will not be achieved. Over a period of months, the dose is gradually reduced.

Example: Immunosuppressive Protocol for Oral Prednisolone in the Dog.

Note: The following protocol is excellent and can be used as a guide.

Prednisolone 1-2mg/kg/12hrs – starting at the lowest dose and gradually reducing dose over a period of months.

Reducing Protocol: With kind permission of Prof. M J Day

This example is based on a dog receiving an induction dose of 1.0mg/kg/q12hrs

Dose	Duration (based on clinical effect)
1.0mg/kg/q12h	10-28 days
0.75mg/kg/q12h	10-28 days
0.5mg/kg/q12h	10-28 days
0.25mg/kg/q12h	10-28 days
0.25mg/kg/q24h	10-28 days
0.25-0.5mg/kg/ Every other day	at least 21 days
0.25-0.5 mg/kg/ Every third day	at least 21 days

Ref: *Clinical Immunology of the Dog & Cat* by Michael J Day BSc, BVMS (Hons), PhD, DSc, DipIECVP, FASM, FRCPath, FRCVS – Professor of Veterinary Pathology, University of Bristol, UK and WSAVA - Chairman of Scientific Advisory Committee

Note: Steroids can cause an excess of stomach acid so, as a precaution, giving something to protect the stomach, such as Antepsin, Omeprazole or Ranitidine in addition to steroid treatment, is prudent. Dogs treated with steroids without a gastroprotectant may develop stomach ulcers and all the problems associated with this avoidable complication.

The extensive side effects of steroids should be carefully considered when deciding on a treatment for SLO. I am not going to expand on what to expect when your dog is on immunosuppressive doses of steroids, or the side effects of using steroids, but if you do decide to go down the steroid route and would like to have more information or clarification, please contact me directly.

Other drug options, if your initial choice doesn't work, can include:

(Chlorambocyl, Gold salts, Pentoxifylline, Retinoids, Azathioprine, Atopica)

- **Pain Relief** especially in the early stages or after surgery may be necessary, eg. Tramadol.
- **Essential Fatty Acids (EFA's)** are given in therapeutic doses, regardless of which primary treatment regime is used. High doses of EFA's play an 'active' role in the treatment of skin diseases and should be included in the treatment regimen and in low maintenance doses after remission. EFA's are known to be 'steroid sparing' in high doses. This means that they have anti-inflammatory properties which may ultimately, lead to a lower dose of steroids being used and this is especially useful in dogs that remain dependant on steroids. However it is not easy to find a specified dose that is consistently used. Examples below:

EFA Ratio/Supplements

The 'therapeutic' dose of recommended supplements, in the treatment of autoimmune skin disease, often varies from one clinician to another. Below are some examples with their references.

Quote: "Research is being performed to determine the optimal ratio of omega-6 to omega-3 fatty acids that should be consumed. Previously, it was thought that the ratio should be approximately 15:1. Current recommendations are for ratios of 10:1 to 5:1." (**Omega fatty Acids: sources, Effects, and Therapeutic uses in Dogs, Veterinary Services Department, Drs Foster & Smith, Inc. Holly Nash, DVM, MS**)

Example Therapeutic Dose: Essential Fatty Acids

Quote: "Effect appears to be dose related and optimum doses and the most effective combinations of these oils have not yet been determined. Daily doses of *Evening Primrose oil* 172mg/kg/day, and

Fish oil @ 44mg/kg/day, have been used in dogs over a one year period without ill effects". (**Ref: The Veterinary Formulary by Yolande M Bishop**)

- EFA dose should start at a high level until a response is seen. This can take up to 12 weeks. EFA's can cause loose stools. If this occurs, start on a lower dose and build up to the highest dose over a couple of weeks. Avoid using Evening Primrose Oil in dogs with epilepsy. Always follow manufacturer's dosing recommendations.

Manual of Skin Diseases of the Dog and Cat by Sue Paterson – Drug therapies for onychodystrophy

Essential Fatty Acid Dosage differs with individuals

EPA 400mg/10kg

GLA 100mg/10kg

Biotin 2.5mg/dog once a day

- **Natural Vitamin E (400-800iu/12hrs)** encourages new cell growth. (**Ref: Clinical Immunology of the Dog and Cat by Michael J Day**).
- **Chinese herbs** are also noted as being effective but the owner should consult a vet who practices in natural treatments.

Biotin (5mg/kg/day: Ref: Muller, Kirks Small Animal Dermatology)

- Improves the quality of the nails but it can be difficult to obtain. Some dogs with SLO have shown to be deficient in biotin. This may be due to their diet. Foods with a relatively high biotin content include cooked eggs, liver, chicken livers, kidneys, some vegetables eg., boiled broad beans, raw or canned tomatoes, raw cauliflower, dried skimmed or whole milk, fresh milk, bran, yeast and raw egg yolk.

Note: Do not give raw egg white as it contains a substance called avidin which binds to biotin and prevents its absorption. This does not apply to cooked egg whites as the cooking process deactivates avidin.

- **Gelatine – 10 grains (one capsule) every 12 hours.** Ref: Muller, Kirks Small Animal Dermatology. Some owners give 1-2 cubes of jelly every day.
- **Good quality high protein diet** in case of nutritional deficiencies.
- **Antibiotics** if secondary infection is present
- **Topical acrylic nail cement** applied externally to permanent nail deformities, which suffer from re infection. Nails could be strengthened and protected by this application.

I have not known a dog to have external acrylic nail cement treatment but reference to this can be found in *Muller, Kirks Small Animal Dermatology*.

- **Removal of loose nails** Loose nails may have to be removed, usually under anaesthesia. As you can imagine, recovery from this procedure is likely to be very painful and prolonged, especially if nails on several different feet are affected. Clipping, cleansing, removal of the fractured portion of claws may be necessary even after treatment is well under way. Understandably, most dogs with SLO become very sensitive to their feet being touched.

- **Topical shampoos, Antiseptic soaks** (Salt or Epsom Salt foot baths, Hibiscrub etc.) Initially it may be necessary to bathe your dog's feet to keep them clean and to wash off the blood etc., but once they are dry and healing it seems better practice to try to keep their feet dry. Antiseptic soaks or salt soaks will help to soothe and clean. Epsom salt soaks are reported to be very soothing when the dog has pain. When the feet are sore and weeping, you can use socks and boots (or strong plastic bags tied with string) to offer protection when out walking. This will keep the feet clean, but do remove the boots when indoors otherwise the feet may become warm and sweaty which could set up more secondary infection and prolong the healing time. New nails should be kept short.
- **Nail Growth**

Normal nail growth is: 1.9mm per week. This is approximately 2.5cm (1 inch) in 13 weeks.

Management

Regardless of which treatment you opt for, the damage already done to the nails within the nail bed will not repair or improve. Gradually, as the damaged nails emerge through the skin they may have to be surgically removed. Sometimes, if the nails are only deformed, and not split or fractured, they can be managed by keeping them short. Hopefully within a few months the new nails will emerge looking much healthier or at least, not broken or fractured, and the dog will be free of pain.

As a result of SLO, permanent nail bed damage sometimes occurs and your dog's nails may look a bit malformed but as long as your dog is in remission, they should not cause any pain or functional problems.

Recovery

Doxycycline, Tetracycline or Minocycline with Niacinamide

Recovery is slow especially if the treatment is with Doxycycline, Tetracycline or minocycline with Niacinamide. It is expected to take at least 6 weeks before improvement is seen. Although some owners have said that they have seen positive results within 4 weeks. If there are no signs of active disease the dose can be gradually reduced after 3-6 months. Dogs appear to tolerate this treatment very well without any obvious side effects.

If you notice any adverse effects, reduce the Niacinamide first, as this is more likely to cause a reaction than the Doxycycline, Tetracycline or minocycline (*Plumb's Veterinary Drug Handbook*).

Steroids

Steroids are very powerful drugs. The immune destruction is halted within hours of starting treatment, but steroids cannot reduce the damage already done. Nails will slowly grow out from the nail bed and fracture or break off in the usual manner.

Note: It is extremely important that steroids are not stopped abruptly and a good reducing protocol is followed.

Generally, a dog with any autoimmune disease benefits from being treated promptly and correctly as clinical signs will get worse the longer treatment is delayed.

A more favourable outcome can be achieved if:

- Diagnosed quickly

- Treated correctly
- The best choice of drugs used
- Appropriate dose for the disease
- Given for the correct duration of time
- Correct protocol for weaning down drugs - minimises side effects and optimises success of the drug regimen. This is very important when using prolonged, high doses of steroids.

Relapses

Most dogs with SLO achieve long term remission, but relapses can occur. If the dog is in remission when a relapse occurs, then it is most likely that he has encountered another trigger factor. Treatment must begin again at the original dose.

If a relapse occurs whilst the dog is still on treatment, then it is possible that the dose of the drug had been lowered too quickly or the initial dose was not high enough to achieve remission. The treatment regimen must be reviewed, and if necessary, changed. Consider the possibility of an unidentified, underlying cause.

Note: *Anecdotal evidence suggests that subsequent relapses are not as bloody or as painful as at the initial onset of the disease.*

Autoimmune Disease - Working with your vet

It must always be a consideration that some vets in general practice may not have the experience to recognise autoimmune diseases, or even know the correct treatment. Autoimmune diseases can mimic other more common conditions such as: infection, organ failure and even cancer. It is unreasonable to expect all vets in general practice to know all of the diseases different breeds are predisposed to. It is the owner's responsibility to be aware of the potential health problems within their dog's breed. Working together with your vet is essential and your 'breed specific' knowledge may assist the vet in reaching a correct diagnosis with the minimum of delay, *and that may just make the difference!* If your dog is not improving and you have concerns about the treatment or management of your dog's condition – consult another vet or ask your vet for a referral to a specialist. This may sound obvious but it is very common for an owner to persevere with ineffective treatment for many months for fear of questioning their vet's diagnosis and treatment regimen.

Life after a diagnosis of SLO

Yes, a good life can be expected, although it is hard to believe this at the beginning of treatment. You just have to be vigilant and aware of clinical signs so if a relapse occurs, prompt treatment will give the best results. Your aim is to achieve and maintain long term remission.

Jo Tucker

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Please Note: All information is provided for your assistance and reference purposes only and is not meant in any way to substitute advice or treatment from your veterinary surgeon.

References

Plumb's Veterinary Drug Handbook.

Clinical Immunology of the Dog and Cat by Michael J Day

The Veterinary Formulary by Yolande M Bishop.

Muller, Kirks Small Animal Dermatology, UK Vet Publications.

Manual of Skin Diseases of the Dog and Cat 2nd Edition by Sue Paterson.

CIMDA : <http://www.cimda.co.uk/>

Link to Finnish SLO Study Document: http://www.beaconforhealth.org/DLA_raporttiEnglish.pdf

For SLO survey and research: **BeacCon for health:** <http://www.beaconforhealth.org>

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