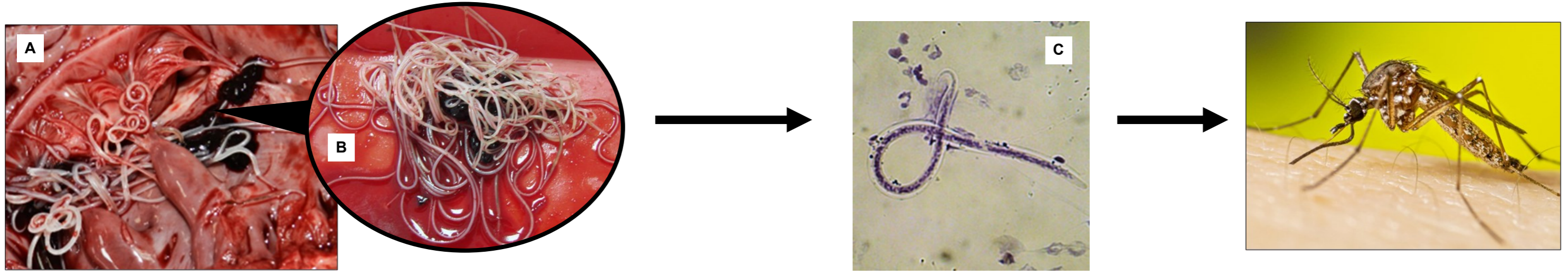


# The life cycle of the canine heartworm *Dirofilaria immitis*

The nematode *Dirofilaria immitis* infects dogs causing chronic congestive heart failure and in cases of heavy infection, sudden collapse. This mosquito-transmitted parasite is present in southern Europe and parts of the USA and throughout the tropics and sub tropics but as yet, there is no evidence of transmission in the UK. Infected dogs are regularly seen here as a result of pet travel and importations from European countries where the parasite is presently increasing its range.



**1.** Female worms are slender and white up to 30 cm in length but the males are approx. half this size. The tail of the male, as in all filarial worms, ends in a spiral. The parasites inhabit the right side of the heart and the pulmonary vessels, living free in the blood. Image A shows worms *in situ*; image B is a mass of worms removed from the same area. Adult worms can survive in dogs for 5-7 years

**2.** Filarial worms are 'larviparous', meaning they release first stage larvae directly into the host tissues. These larvae have a special name – 'microfilariae' (mfs). Image C is a mf of *D. immitis* in a blood smear which has been stained with Geimsa. Mfs are 300-320µm in length

**3.** Microfilariae density in blood is highest at night. This is not a coincidence but rather a specialised life cycle adaptation: Mosquitoes serve as the intermediate host for this parasite and mfs have a higher chance of being picked up during night time when most mosquitoes are actively seeking a blood meal.



**A note on final hosts:** Dogs, foxes and wild canids are the primary final hosts but cats can also become infected. Few worms progress to the adult stage in cats and ectopic infections are more commonly reported, for example in the eye and CNS. The parasite is also zoonotic but infections are rare and worms do not migrate to the heart



**6.** Having entered the bite wound the L3 travel through the connective tissue of the new host, making their way to the pulmonary vessels and right ventricle of the heart. The parasite reaches the heart vessels after several months, having grown to 1-5cm in length following two moults .

**Microfilariae from newly established worms appear in blood 6-7 months post-infection. The prepatent period is therefore long.** This timeframe can make case management in nonendemic areas challenging.



**5.** Once microfilariae have been taken up by a feeding mosquito, they moult twice and become the infective form which is the third stage larva or L3. Development from mf to L3 takes on average 2 weeks but this is temperature dependent; the period may be over a month at 18°C, for example. The L3 migrate to the mosquito mouthparts and when a mosquito feeds on a new dog transmission of the parasite occurs.

**4.** There are many different species of culicid mosquitoes (*Culex* spp., *Aedes* spp., *Anopheles* spp.) which can act as an intermediate stage in order to complete their life cycle. The image shows a female *Aedes aegypti* which has taken a full blood meal.