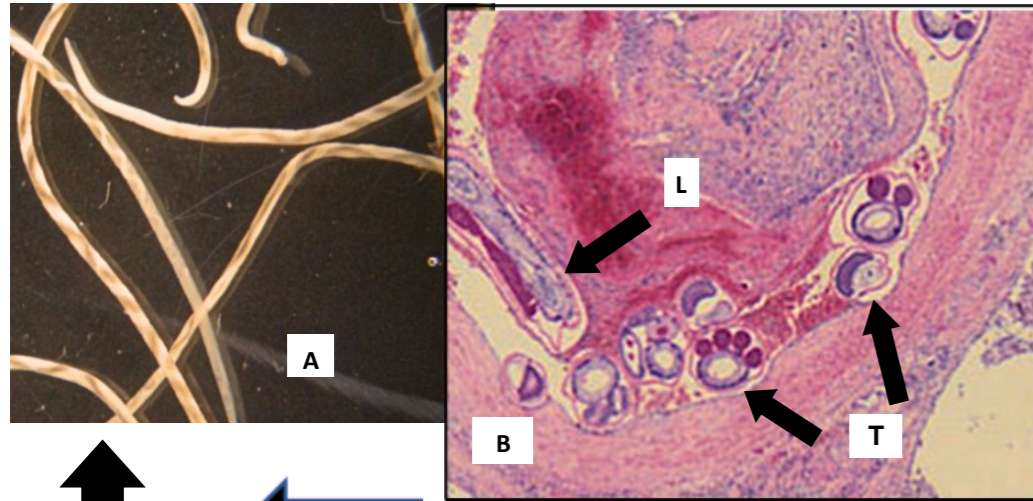
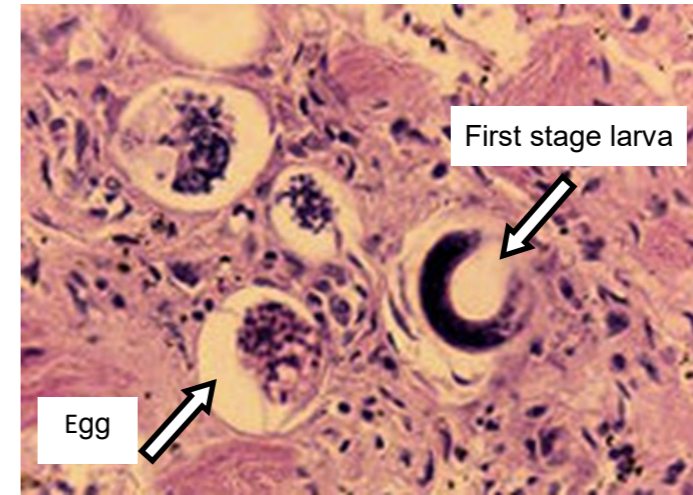


# The Life cycle of the dog lungworm *Angiostrongylus vasorum*

***Angiostrongylus vasorum*** (The 'French Heartworm') is a lungworm of dogs, foxes and other canids. This parasite has spread northwards over the past decades from foci in southern parts of the UK and Wales due to effects of global warming on slug intermediate host populations, an increase in number and movements of dogs around the country and an increase in the red fox populations. The distribution of this parasite is characterised by patchy foci of high or low prevalence.



**1. *Angiostrongylus vasorum*** female worms measure up to 25mm and reside in the pulmonary artery and right ventricle of the heart. The males are somewhat smaller. The pale coloured uterus twists around the red gut giving it the so-called 'Barber's' pole appearance image A. Image B shows longitudinal (L) and transverse (T) sections of an adult worm in the pulmonary vessel.



**2. Eggs** produced by the worms are carried by arterial blood-flow to the lungs where they become trapped in the capillaries. **First stage larvae (the L1)** quickly develop within eggs and on hatching, break into the pulmonary alveoli, climb the respiratory tract and are coughed up and swallowed. In this way L1 appear in faeces, and are approx. 350µm in size.

**7.** Once ingested by a dog, the infective larva travels to the lymph nodes adjacent to the alimentary tract where two moults take place - to the 4<sup>th</sup> (L4) and immature 5<sup>th</sup> (L5) stages. The worm then completes the journey to the heart vessels where it matures fully, lays eggs, and the life cycle is complete. **The prepatent period is approximately seven weeks.**



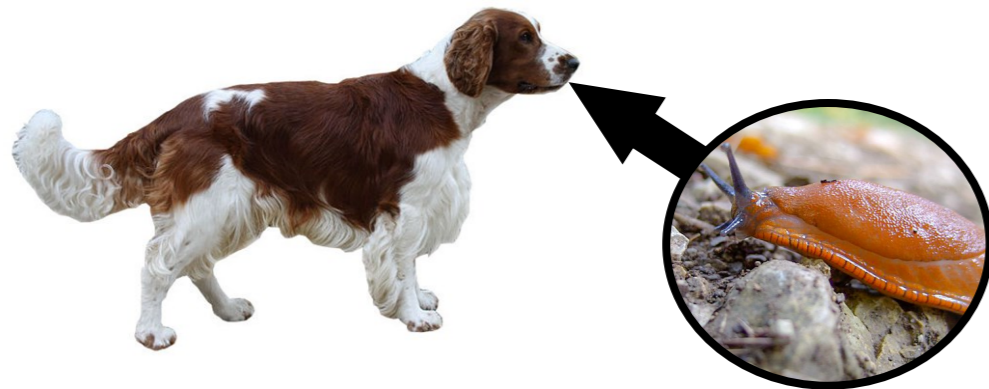
The main wildlife host in Europe is the red fox. Alongside other factors, the range expansion in *A. vasorum* has been attributed to an increased abundance and urbanization of foxes. Credit: Simon Eardley

**A serious pathogen**

Canine angiostrongylosis is usually a chronic condition, extending over months or years. However, if many thousands of eggs are produced by worms in the vessels in a short time, say in a matter of weeks, there can be accumulated damage to the alveoli which gives rise to exercise intolerance and respiratory distress. Furthermore, anticoagulants excreted by adult worms can cause internal bleeding. The worms themselves may cause blockage of vessels, leading to congestive cardiac failure.



**3.** If an L1 is ingested by a gastropod mollusc, most likely as a result of a slug feeding on faecal matter from an infected dog or fox, it develops and moults to the second, then **third stage larva**. It is this L3 stage which is infective to other dogs. In heavy infections large numbers of L1 may appear in faeces and bronchoalveolar lavage.



**6.** Dogs become infected after eating an infected gastropod, its slime exudate or a paratenic host carrying infective larvae. The relative importance of this latter route of transmission is unclear.



**5.** Infective L3 may be taken up **by paratenic (transport) hosts** which include frogs.



**4.** The orange-grey slug *Arion rufus* is an important intermediate host of *A. vasorum* in parts of the UK. It takes approx. 17 days for the L1 to develop to an infective L3. The composition of the slug fauna varies spatially and may explain the patchiness in the prevalence of *A. vasorum*