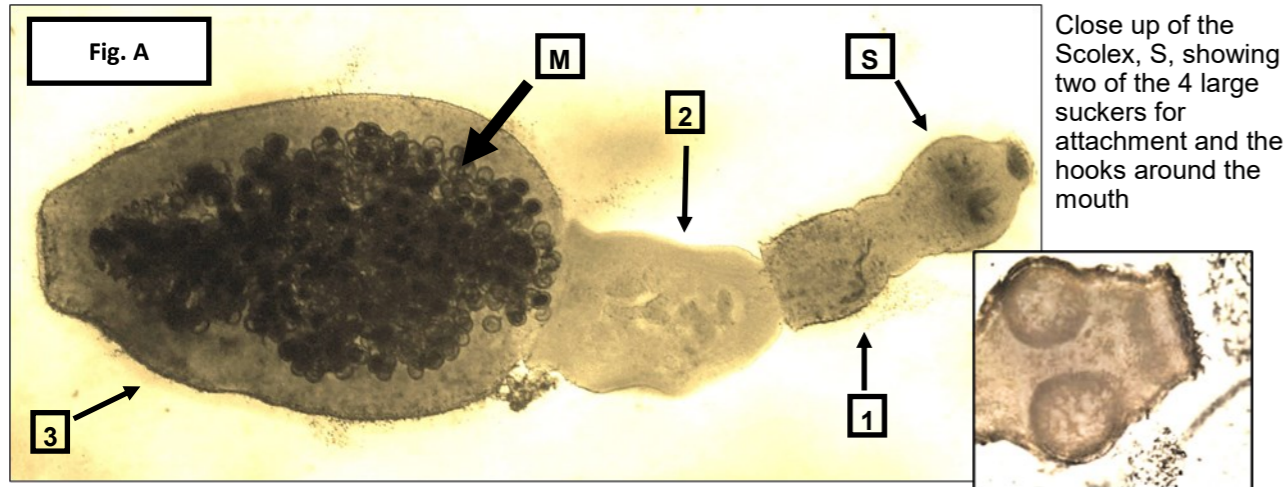


# Life cycle of *Echinococcus granulosus*

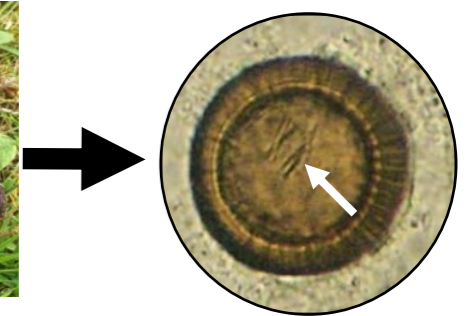
*Echinococcus granulosus* is a minute zoonotic tapeworm of the small intestine of dogs, foxes and other canids around the World which rarely cause clinical problems in the definitive host. However, the larval stages of various species/strains of this parasite infect a wide range of mammal intermediate hosts, including humans in which slow growing cysts form, known as hydatids. The dog-sheep strain of *E. granulosus* is most common in the UK and the latest research has shown its distribution here now extends far beyond well-known hotspots such as those in mid Wales.



1. The adult tapeworm (Fig. A) embeds its mouthparts in the mucosal villi of the small intestine. It is only approx. 6.0 mm long, and comprises the scolex or head (S) and 3, possibly 4, segments, the so-called 'proglottids' labelled 1-3 above. When mature, the large distal segment 3 is packed with several hundred eggs, shown here as dark mass (M); this segment breaks away and releases eggs in the dog's faeces.



2. Farm dogs are most likely to defaecate in fields around farms and pass the tapeworm eggs which are immediately infective for grazing sheep. Cattle, pigs and other livestock can become infected, but infections are more likely to result in non-viable/calcified cysts.



3. Eggs are dark with a thick striated spherical shell, measuring approx. 40 µm in size. They contain the 'hexacanth' embryo, a juvenile form of the tapeworm which has 6 tiny hooks (arrow). Once ingested by a sheep, the embryo migrates via the circulation to the liver or lungs where it grows into a hydatid cyst.

The prepatent period is 6-7 weeks

## PUBLIC HEALTH

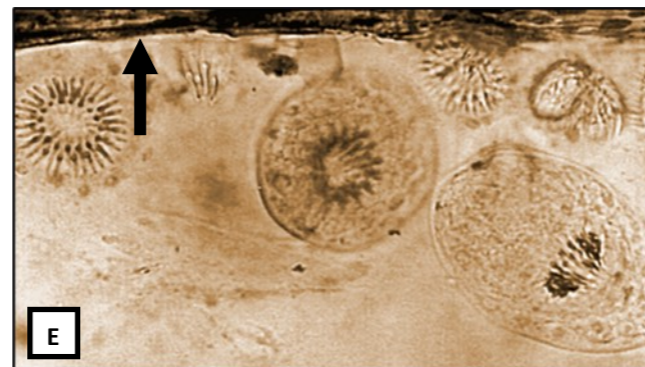
Human cystic echinococcosis or hydatid disease is rare in the UK, with only around 10–20 new cases reported each year, some acquired following international travel. Infection usually occurs when tapeworm egg-contaminated food and vegetables are accidentally ingested or possibly from the coat of an infected dog. Hydatid cysts due to *E. granulosus* are space-occupying lesions mainly occurring in the liver and to a lesser extent in the lungs and other sites. Another UK species, *E. equinus* transmitted by hunting dogs and foxes to horses, is not zoonotic.



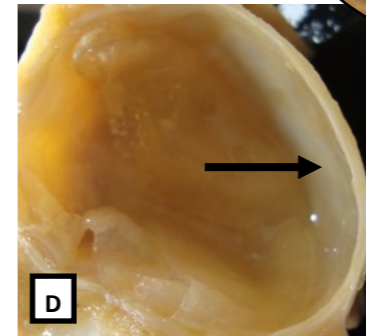
8. Dogs become infected by scavenging dead sheep or by eating uncooked offal containing fertile cysts. When ingested and released by digestion, protoscolices 'evaginate' (image G) so the hooks are then protruding and can be used to tear into the dog's small intestine and develop to adult tapeworms.



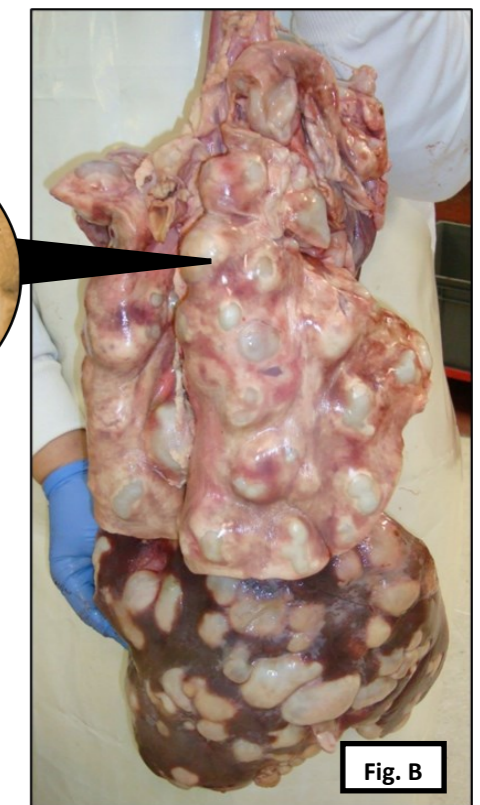
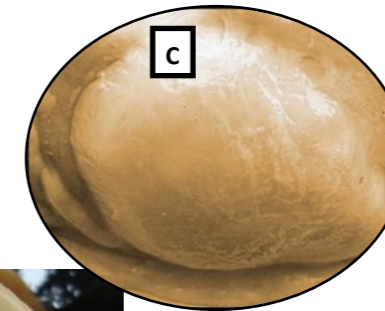
7. Cysts can accumulate many thousands of protoscolices which gather in a sediment. Their heads are 'inverted', i.e. folded in on itself (image F). The prominent hooks are evident inside (arrow)



6. Numerous grouped immature tapeworm heads (protoscolices) contained in brood capsules bud off from the germinal epithelium (arrow, image E). Hooks are present in each protoscolex. Further cysts known as daughter cysts can grow inside the original cyst itself.



5. The hydatid cyst (C) is a fluid-filled bladder which when cut (D) is seen to have a thick wall. The inner surface is lined with a germinal parasitic epithelium (arrow)



4. Fig. B shows the lung and liver of a ewe removed at the abattoir, in which numerous hydatid cysts have developed. This was a coincidental finding at meat inspection. The cysts are slow growing, taking 6-12 months