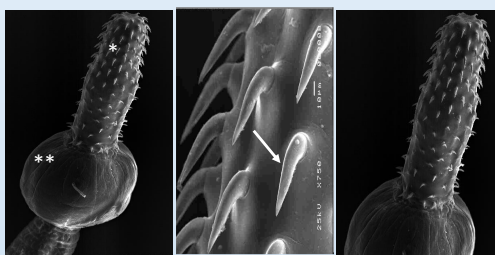


Acanthocephalans are intestinal parasites of fish that use amphipods as their intermediate host. In the UK, greatest attention has been given to *Pomphorhynchus laevis*, which matures in freshwater fish such as chub and barbel, and cycles through *Gammarus pulex*. Recent taxonomic studies have suggested there are two closely related species of *Pomphorhynchus*, *P. laevis* and *P. tereticollis*. This has raised uncertainty over the identity, distribution and impact of these parasites in our rivers. Further studies are needed to clarify the status of this parasite in the UK to improve understanding of parasite diversity and underpin regulatory controls to protect wild fish populations.

Spiny headed worms

Identification of Acanthocephalans is largely based on the number, position and shape of hooks (*) on the proboscis (arrow). These, along with the large bulb (**), are used to aid attachment within the intestine of fish. Subtle morphological and molecular differences, including the shape, size and position of hooks, have separated *Pomphorhynchus* into two distinct species - *P. laevis* and *P. tereticollis*.



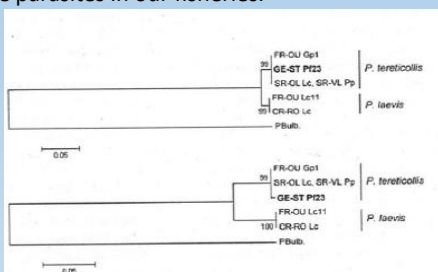
What are we doing?

Gammarid shrimp are being sampled from rivers across England during routine Environment Agency monitoring. We are also asking partner organisations (such as the Riverfly Partnership), volunteers and external groups involved in invertebrate sampling to look out for infected shrimps. Infected Gammarids are then sent to us at the Environment Agency's National Fisheries Laboratory, Bampton where the larval stage of the parasite is dissected from the shrimp.

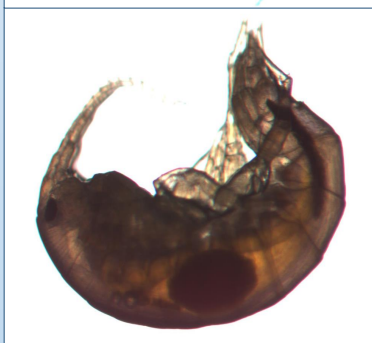


Morphology and molecular investigations

All parasite samples will be stored in ethanol for molecular analysis being conducted through partners at Bournemouth University. This will help us to determine which species of *Pomphorhynchus* the sample contains and the genetic variation between hosts, rivers and catchments. Based on these results we will conduct targeted sampling of wild fish populations to confirm parasite identification through morphological examinations. These combined approaches will provide a robust, current picture of the distribution and characteristics of these parasites in our fisheries.



Spakulova, M., et al (2011) Resurrection of *Pomphorhynchus tereticollis* (Rudolphi, 1809) (Acanthocephala: Pomphorhynchidae) based on new morphological and molecular data, *Helminthologia*, 48, 3: 268-277



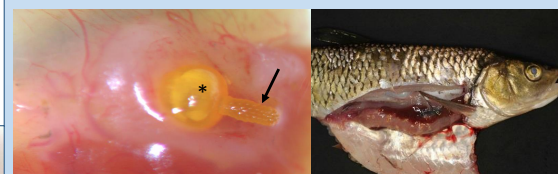
Effects on the shrimp host

The larval stage, known as the cystacanth, causes a characteristic orange spot to develop within the body of the intermediate shrimp host, increasing visibility to fish. This conspicuous orange spots allows infected shrimps to be easily recognised and provides a simple means for collecting parasites, rather than sampling fish.



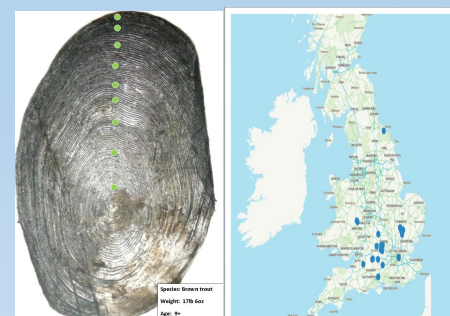
Effects on fish populations

Pomphorhynchus spp. fully penetrates the intestine wall causing considerable damage, inflammation and loss of normal gut structure. Heavy infections have the potential to reduce the growth, condition and survival of fish. Understanding their distribution will allow us to better understand the impact of these parasites and the risk posed to our fisheries. The below images show penetration of the proboscis (arrow) and bulb (*) through the intestinal wall of a fish.



Mapping and monitoring

A distribution map will be generated to show what species of *Pomphorhynchus* we have and where these populations are. This will also allow us to clarify the status of rivers previously known to harbour *P. laevis* and assess how the parasite has spread over time. The fish ageing team (NFS, Bampton) will analyse historic fish growth and recruitment data, gained through fish scale analysis, to determine if there are any differences between infected and uninfected rivers. This will be supported by targeted monitoring and a review of histopathology, to evaluate parasite pathogenicity.



What can you do to help?

We are providing kits containing vials and pre-paid transport boxes to partnership groups and volunteers involved in invertebrate sampling.

If you are involved in invertebrate sampling and think you can provide any infected *Gammarus* samples please contact hannah.bradley@environment-agency.gov.uk for sample kits and further information.

Thank-you to all our partners and volunteers involved with the project!