Comments on the Swabbing of Anuran Tadpoles for the Detection of Infectious Diseases

By Steven J. R. Allain

Over the past few months I've presented some research at a couple of conferences on the disease monitoring of a non-native amphibian species here in the UK (see *FrogLog* 119). Whilst presenting my methods and data, one thing has consistently confused the audience – the swabbing of tadpoles for the detection of infectious disease. The routine swabbing of amphibians is an important practise for both the detection and monitoring of diseases. Previous studies such as (*1*), describe a slightly dated method for the swabbing of anuran tadpoles with the use of toothpicks. Modern day amphibian infectious disease studies use surgical cotton swabs (e.g. Medical Wire MW-100) to test for the presence or absence of a particular disease, such as the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*; hereafter *Bd*). The method outlined by (*1*) can still be used as it involves the sampling of the tadpole's mouthparts which is important as this is the area that *Bd* infects in the earlier Gosner stages (*2*).

Some of this confusion may be due to a lack of familiar protocols for the swabbing of larvae as most researchers will be used to sampling post-metamorphic individuals. Therefore I intend to put more emphasis on the methods used to collect a swab from a tadpole to help raise awareness of this widespread yet uncommon practise. Many studies have included tadpoles in their sampling for infectious diseases and thanks to the confined nature of larvae; they are restricted to ponds and can easily be captured in nets. Confusion may stem from the fact that most studies clearly use the correct technique yet only give a passing comment on the methods used, for example (3) states "To swab tadpoles, we made five swipes across the mouthparts."

Although technically correct, it doesn't help in terms of replicability due to a number of factors which will shortly be discussed. Confusion may also come from the fact that anurans are usually swabbed between their limbs and digits, yet tadpoles don't develop these until their later Gosner stages (*4*). When swabbing post-metamorphic amphibians, between ten and fifteen strokes are made with the in areas where infection is suspected. With tadpoles there doesn't appear to be a set number within the literature although between five and ten swipes should suffice.

Unfortunately not all tadpoles encountered can be swabbed; this is particularly true of smaller individuals due to the fact that their mouthparts are too diminutive. The limiting factor here is the size of the swab used, which may unfortunately mean that diseases such as *Bd* are not detected in a population if only the larger individuals are swabbed, due to disproportionate sampling. Care also has to be taken, as noted by (*1*), as vigorous swabbing can lead to damage of labial teeth in tadpoles which may make such infections more likely to develop. It's not currently clear if over-zealous swabbing can lead to future facial deformities in tadpoles. Due to size and metamorphosis, it is important to try to sample tadpoles between Gosner stages 26 and 39.

The facial structure of anuran tadpoles is not equal among species; some species have an elaborate oral disc which is usually specialised for feeding (*5*). For species such as this, the oral disc can be artificially extended by giving the tadpoles a gentle squeeze. Again, care has to be taken not to cause any lasting damage. Swabs should then be placed within the oral disc itself and spun between the thumb and index finger whilst moving through the delicate structure. When handling tadpoles, desiccation is a risk so sampling times should be minimised as much as possible with tadpoles being released at the point of capture after swabs have been taken. It is not clear whether or not this same swabbing technique can be used for urodelean larvae, this is an area where further research is needed. When handling larvae, it's important to keep handling time to a minimum while taking samples.

Photo: Steven J. R. Allain.

References

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