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Sonya qualified from Bristol University in 2013. After beginning her professional career in small animal practice, she now works at Highcroft Exotic Vets where she sees a wide variety of exotic species and is in the process of completing her CertAVP(ZooMed). She has a special interest in reptile medicine and surgery, but enjoys all aspects of being an exotic species veterinary surgeon.

Sonya runs North Somerset Reptile Rescue in her spare time.

**Suggested Personal & Professional Development (PPD)*

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FISH CONSULTATIONS

Are you floundering with your fish consults?

Fish are very popular and fascinating pets. They are often considered fantastic first pets for children because they are colourful, hypoallergenic, quiet and clean, yet – mistakenly in some ways – they are thought of as being simple to keep. There are various ways of keeping fish; ranging from large pond collections or goldfish in a tank, to complex living coral reefs (Ford, 1981).

As a veterinary surgeon seeing a variety of fish species, it is important to ensure that you not only have the basic knowledge to take a helpful clinical history, but also the essential equipment with which to be able to perform a thorough clinical examination (Noga, 2013).

Fortunately, most of this is inexpensive and readily available in modern veterinary practices. The only major piece of equipment that is essential is a high-quality microscope with 10X, 40X and 100X objectives (Noga, 2013).

Other essential equipment should include the following (Noga, 2013):

- latex gloves
- simple surgical instruments (scalpel, fine and coarse forceps and scissors)
- histopathology pots
- culture swabs
- microscope slides and cover slips
- water testing kits
- pH meter
- soluble anaesthetic
- aquarium bag
- various-sized nets
- air stones and pumps
- large water storage vessels
- otoscope
- ophthalmoscope and, in some cases,
- advanced imaging modalities are helpful (**Figures 1a** & **1b**).

Home visits

Many clients will be unable – or will refuse – to bring in their fish for a clinical examination; performing home visits, therefore, is commonplace when dealing with sick fish.

***Figures 1a** & **1b.** Sometimes advanced imaging modalities are helpful.*

Undertaking home visits has its advantages because, during such visits, the exact set-up can be assessed. This should include any biological and mechanical filtration methods, water temperature, disinfection protocols, how the system is aerated, how the set-up smells, the condition of the fish – not just the sick ones, the stocking density, and the behaviour of the fish (Noga, 2013; Scott, 1981).

It is wise to take a small selection of lightweight equipment with you that will allow you to take samples on site, and to bring back safely any patients if further investigations – such as anaesthesia, euthanasia or post-mortem – are needed (Noga, 2013).

Regardless of whether you are presented with a fish at your practice or you perform a home visit, a thorough clinical history must always be performed (Noga, 2013). Questions should include:

- for how long did the client condition the tank?
- how long has the system held fish?
- what fish are affected and which ones are not?
- are the fish showing behavioural changes?

Water quality paramount

Because water quality issues are by far the top reason for death in fish (Gratzek, 1981; Scott, 1981), details on the client's filtration methods and water conditioning period are essential. Filtration comes in two forms – biological and mechanical filtration (Noga, 2013; Scott, 1981).

Biological filtration

Biological filtration is most often achieved by utilising gravel in the tank, or having various different types of media inside the filter itself. Gravel should be 2 to 5mm in diameter and 7 to 8cm in depth (Noga, 2013; Scott, 1981). Bacteria responsible for converting toxic ammonia and nitrites into nitrates – still toxic in large amounts, but less toxic than the previous two molecules – are cultivated

on the gravel during the conditioning period (Gratzek, 1981; Scott, 1981).

When gravel becomes clogged up with organic material, however, ammonia can build up which will cause illness and even death (Noga, 2013; Scott, 1981).

Mechanical filtration

Mechanical filtration is the act of drawing the water in the tank though a medium that traps large particles of waste – this is achieved more effectively by utilising an 'under-gravel' filtration system. The detritus in the gravel bed should be cleaned out every 14 days and a 10 per cent water change performed weekly to prevent excessive levels of nitrates building up. When new water is added, it should be either three days old and aerated or have been treated to remove the chlorine (Noga, 2013; Scott, 1981).

Before any fish are added to a system it should first be conditioned. This initial conditioning period is essential prior to the introduction of any species of fish into any system. Adding fish too early can cause 'new tank syndrome' – a rapid increase in ammonia, nitrites and nitrates that can kill off many – if not all – fish (Gratzek, 1981; Scott, 1981).

During this conditioning period, the nitrifying bacteria (*Nitrosomonas* spp) responsible for the oxidation of ammonia to nitrites, and *Nitrobacter* spp, the bacteria responsible for the conversion of nitrites to nitrates, colonise the surfaces of the gravel and filtration media. Without these bacteria, deaths are common (Gratzek, 1981; Scott, 1981).

Core water quality parameters should always be taken into consideration whenever any fish disease is suspected. The parameters that should always be assessed are ammonia, nitrite and pH. Oxygen content and temperature of the water are also part of the core measurements; however, these parameters should be assessed on site by the owner or during a home visit (Noga, 2013).

Figure 2. *Most fish will tolerate a gross examination and basic testing when they are conscious and held gently.*

Figure 3. *A skin scraping being taken using a scalpel while the fish is adequately restrained.*

When requesting water samples for analysis, half a litre of fresh water should be provided, and the sample analysed immediately for accurate results. Most commercially available tests are based on the addition of a known volume of water added to different chemicals, which then react to produce a colour change. The amount of substance present is proportional to the intensity of the colour change (Noga, 2013).

Clinical examination

Whenever possible, a clinical examination should be performed with the fish in their normal environment; and, in particular, accurate observation of any abnormal behaviour that the fish may be exhibiting. Fish that have an ectoparasite infestation often flick their bodies or rub themselves. Unwell fish will often group together away from healthy fish in areas of flowing water. Very sick fish, or those with swim bladder issues, will often be in dorsal

Figure 4. *Carrying out a 'fin snip'.*

Figure 5. *Visualising the gill arches.*

recumbency or spend excessive periods of time on the surface of the water (Noga, 2013).

Videos of behaviours should be taken by the client if a home visit is not possible.

When fish are sick or blind, they will often undergo a colour change. This is owing to their inability to maintain normal pigmentation – which is under neuroendocrine control – and other vital bodily functions will take priority when they are sick (Noga, 2013).

Reddening of the body is often a sign of septicaemia or skin wounds. Abdominal swelling (dropsy) can be caused by a wide range of issues, such as metabolic imbalances, neoplasia, obesity or even egg retention. Gills can also exhibit gross lesions and should be assessed during the clinical examination.

Diagnostic sampling

Samples to aid in diagnosis should be taken from all sick fish and examined as soon as possible (Noga, 2013; Scott, 1981). Care should be taken when taking samples because the skin of fish is delicate and susceptible to iatrogenic injury, so latex gloves should be used. This also minimises the risk of zoonotic disease spread (Noga, 2013).

Most fish will tolerate a gross examination and basic testing when they are conscious and held gently (**Figure 2**); but for other procedures, sedation or anaesthesia should be considered. It must be remembered, however, that the use of sedatives and anaesthetic agents can compromise the diagnosis of skin and gill pathogens (Noga, 2013).

The eyes and skin should be checked and scrapings taken – a spatula or scalpel are gently scraped along the surface, in a cranial to caudal direction, while the fish is being adequately restrained (**Figure 3**). Care should be taken not to scrape too large an area because this will result in an open wound that can become infected or cause fluid imbalances (Noga, 2013).

The sample must be placed onto a microscope slide immediately, followed by a drop of water, then a cover slip, before examination under a microscope (Scott, 1981). The best place to take a skin scraping is behind the pectoral or pelvic fins. A 'fin snip' (**Figure 4**) can also be performed using a fine pair of scissors and placing the sample on a slide for microscopic examination (Noga, 2013).

Skin biopsies should be taken of any gross lesion, using fine scissors to remove part of the leading edge of a lesion (Noga, 2013).

The gills should be examined grossly and gill snips and squashes analysed. Healthy gills are bright red. A pair of fine scissors are inserted into the gill chamber, opened to lift the operculum until the gill arches are seen (**Figure 5**). The tips of several primary lamellae can then be cut and transferred to a slide and a cover slip applied (Noga, 2013; Scott, 1981). It is not uncommon for debris to be stuck in the gills, especially if the fish has been lying in sediment. This can be washed away gently by rinsing (Noga, 2013).

Faecal samples can be assessed by removing faecal material from the tank. They are not very sensitive for diagnostic purposes, but helminth ova and protozoa

Figure 6. *Obtaining a blood sample from a sedated fish.*

can be identified. The most accurate way of obtaining a faecal sample is when the fish is anaesthetised. A fresh smear and faecal flotation should be performed – and both these methods should be employed because the flotation liquids can damage fragile piscine coccidia that will only be demonstrated on fresh smears (Noga, 2013).

Biochemical and haematological analysis is not commonly performed to investigate fish disease; although it is helpful in some situations.

Blood samples should be performed on sedated fish, when they are held in dorsal recumbency. A needle is pushed through the skin near the base of the caudal peduncle. The needle should make contact with the vertebral column, negative pressure applied to the plunger of the syringe and then the needle withdrawn slowly until blood is obtained (**Figure 6**). Blood can be taken from the heart in larger fish (Noga, 2013).

Conclusion

It is vitally important that any veterinary surgeon treating fish should not only have a selection of readily accessible equipment at hand but also that they are familiar with the ideal questions to ask in order to take an in-depth clinical history and to perform a thorough clinical examination. There are many simple diagnostic tests that can be performed on both conscious and anaesthetised fish to help form a diagnosis; although, in the majority of cases, the illness is the consequence of stress and water quality issues. ■

PPD Questions

1. The equipment needed to examine and treat fish is complex and expensive. True or false?

2. Home visits are the ideal situation in which fish should be seen to assess their environment at first hand. True or false?

3. Water quality issues are the main reason fish get sick. True or false?

4. During 'new tank syndrome' what is elevated?
   A. nitrates
   B. nitrites
   C. ammonia
   D. oxygen

5. Which of the following diagnostic tests should be performed on sick fish?
   A. blood tests
   B. faecal test
   C. skin scrapes
   D. gill and fin snips
   E. all of the above

Answers
1.false 2.true 3.true 4.A&C 5.E.

References

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