

Ornamental Inspiration:

notes for veterinarians starting in pet fish medicine

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My interest in sick fish started because of my fascination in their diseases and the practicalities of treating them. It is still the professional challenge that gets me out of bed in the morning and brightens up my day. This passionate interest in fish health became my unhealthy 'professional hobby', which is my way of saying that there is no money in this business, and it won't help pay off your student loan. However, there is the immense satisfaction from being able to use your professional veterinary skills in a completely alien field, and just like other areas of our work, you can be medic, pathologist, radiographer and surgeon all at the same time.

Now that I'm semi-retired and in my professional twilight years, I hope to inspire you to get involved. I have nothing to sell, just some advice I want to pass on which may spare you some of the mistakes that I made along the way. I can't tell you everything in this short article, so I have limited my advice to the practicalities of starting in pet fish medicine.

Background...

- 1977 — graduated from Glasgow Vet School
- 1985 — interest in fish health
- 1992 — koi papilloma paper in the Vet. Rec.
- 1992 — Married
- 1993 — helped establish Koi Health Quarterly
 - on the board of RCVS cert/diploma
- 1994 — BSAVA fish course tutor, Coventry
- 1996 — Daughter born
- 1997 — passed RCVS Cert FHP exams
- 1999 — Son born
- 2001 — edited BSAVA Manual 2nd edn.
 - 50% partnership in Leyton
- 2007 — presented at NAVC
- 2018 — semi-retired from practice



There are key moments in life like retirement, when you reflect on what you have done for the last 40 years if for no other reason than to help you realise it wasn't all a complete waste of time. Although there were several highlights in my career, in hindsight I feel that it was all a matter of being in the right place at the right time, even though it never felt like that at that time. I started my interest in fish just when koi keeping became a fad in the UK in the 1980s, and before Koi Herpesvirus (KHV) almost killed off the hobby in the late 1990s. It was a challenging but interesting time. Of course, our personal lives run in parallel to our careers and my family were also significant key moments that slotted in along the way, but more on that later. My graduation now seems so long ago but my advice to students is to make sure your haircut is very traditional for your graduation photo because you will be staring at it on your mother's mantelpiece for many years to come!

30+ years of progress?...

Since I started in 1985...

THEN:

- Water quality, skin ulcers in koi...
- Medical sorcery +witchcraft

NOW:

- More scientific literature
- More effective +safer medicines
- More vets involved in pet fish
- Vets in all public aquaria
- More fish pathology services
- Digital radiography
- Ultrasound scanning
- CT and MRI scanning



Reflecting on the last 30+years of pet fish medicine has helped me put things into perspective. To illustrate the point, when I started fish work, most problems were due to poor water quality and skin ulcers. Better filtration systems in recent years have greatly reduced these fundamental problems. Back then, few vets were involved in treating pet fish and much of it looked like medical sorcery and witchcraft practiced by 'wise old men' in the hobby who guarded their 'knowledge' preciously and sold their illegally imported drugs from garden sheds and stands at koi shows.

Thankfully things have changed for the better over the years, although everything in pet fish health seems to move forward at a snail's pace and it just never feels like it is moving fast enough. Today, we now take for granted the availability of accurate scientific information, knowledge of safe and effective medicines, and greater access to better diagnostic techniques and services. Much of this may be a financial barrier to some clients but after years of being in small animal practice, I have learned to never underestimate the emotional value of pet fish or what their owners are willing to pay. They appreciate a professional service, even if the end in some cases is inevitable.

Starting out...

- Keep fish yourself
- Buy some kit
- Subscribe to hobby mags
 - Practical Fishkeeping
- Buy some books — BSAVA, Noga, Roberts
- Adapt your veterinary training
- Go on courses
- Join societies
 - local fish club
 - FVS, WAVMA, AAFV, EAFP, BVZS
- Join list servers (ExoticDVM, VIN)
- Volunteer for FVS committee role



So, you want to work with ornamental fish? Well, where do you start and what comes first? Should you start with gaining practical experience or attend courses and sit exams to obtain more qualifications? I started with practical experience because there were no courses or exams at that time, and in those days much of the information had to be translated from the fish farming industry — it was like the early days of small animal practice.

When starting, things to consider include:

- keep fish yourself or set up a tank in the practice. This will help you understand the problems your clients' experience. I didn't, because I was more interested in sick fish than looking after healthy ones.
- buy some kit. I'm assuming that you have a good microscope and other basic veterinary equipment. For fish work, you will also need:
 - water quality test kits
 - salinity meter or hydrometer to measure dissolved salts
 - pH meter (that adjusts automatically for temperature)
 - thermometer (digital are faster and more accurate)
 - range of plastic fish tanks and containers for all sizes of fish
 - air pump+ air stones
 - nets (small aquarium hand nets and large pond nets)
 - fish anaesthetic agent (eg. tricaine, alfaxalone, propofol)
 - measuring jug for measuring anaesthetic solutions
 - measuring spoons or microscales (for tricaine powder etc)
 - angler's weighing scales (for accurate injection doses)
- there is a steep learning curve, but scientific information is more accessible these days, so be prepared to read a lot, and subscribe to some hobby magazines to keep abreast of trends in the hobby
- there was a time when buying books was essential, but now with the internet and social media as sources of information, it is less important. However, there are still some textbooks that cannot be replaced with the click of a mouse, such as:
 - Wildgoose WH (2001) *BSAVA Manual of Ornamental Fish, 2nd edn.* British Small Animal Association, Quedgeley
 - Hadfield C & Clayton L (2021) *Clinical guide to fish medicine.* Wiley-Blackwell, Iowa
 - Noga EJ (2010) *Fish Disease: Disease & Treatment (2nd edn).* Wiley-Blackwell, Iowa
 - Roberts RJ (2012) *Fish Pathology (4th edn).* Wiley-Blackwell, Iowa
- join your local fish keepers' club — yes, some still exist!
- join some fish veterinary societies and list servers
 - [Fish Veterinary Society](#) (UK)
 - [World Aquatic Veterinary Medical Association](#) (USA)
 - [American Association of Fish Veterinarians](#) (USA)
 - [European Association of Fish Pathologists](#)
 - [British Veterinary Zoological Society](#) (UK)
- volunteer for a role in your fish vet society, either on the committee or help out at conferences. This will help keep you 'in the loop' in the world of fish medicine and it won't be half as challenging as sitting your final vet school exams.

First consultations...

BEFORE

- *Speak to owner personally*
- *arrange convenient time*
- *prepare for the type of case*

DURING

- *put air-stones into water*
- *brief exam then lot of questions*
- *follow +record on history sheets*
- *client to leave room during GA etc*

AFTER

- *make lots of notes*
- *follow-up all cases by phone call*



There is no easy way to start. Like most other areas of veterinary medicine, you just need to get on with it and prove to yourself that you can do it. It will often involve going outside your comfort zone, adapting as you go, and learning a lot by trial and error. But you will learn most from your mistakes and you should look critically at what you do so that you know how to improve. It will be a long, slow learning experience.

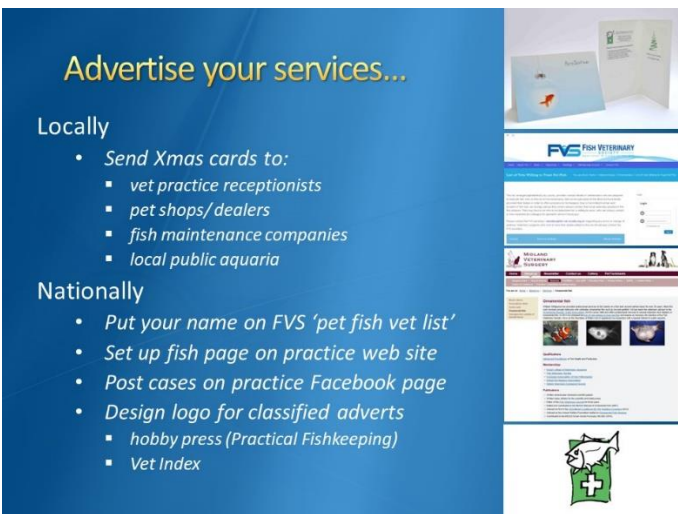
Book fish appointments yourself (not by the receptionist) and always discuss the case with the client before they arrive so that there are no nasty surprises when they walk through the door. This gives you the opportunity to have equipment and drugs ready and more importantly, be mentally prepared. I use a timer to help keep phone calls short and avoid the conversation drifting, as they often do. Arrange a convenient time for both you and the client, and allow yourself plenty of time. From past experience, I book a minimum of a one-hour appointment so that I can review the husbandry and to anaesthetise any fish for a detailed examination. Ideally, visit the client to see their facility and assess their standard of husbandry, or advise them on how to transport their fish to the practice and ask them to bring photos or videos of the facility. Ask the client to bring a suitable volume of water from the tank or pond in a separate container, which can then be used for making up anaesthetic solutions.

On arrival, see the client immediately. Avoid having them in the waiting room for too long because they inevitably attract attention and there's nothing worse than the fish dying in front of your other clients before it is even examined. Once they are in the consult room, briefly check that it is still alive and not in distress, then put an air-stone into the water. Ask LOTS of questions about the problem and the clinical history. This will allow time for the fish to 'calm down'. Prepare a history sheet for notes about the facility and a clinical sheet for notes about the fish in front of you. Explain your plan of action to your client and get them to sign an informed consent form for any procedure, such as for sedation and treatment.

I prefer to have clients leave the consult room for most examinations under anaesthetic, mainly to avoid causing any unnecessary anxiety. Always give the client a realistic prognosis — that usually means prepare them for the worst since the fish are often more ill than they appear and there is often a high mortality since treatment options may be limited. Clients will often want to be present during euthanasia, to ensure their pet does not suffer or appear in distress. You should manage this situation professionally as you would with any other animal, and it helps to explain the process of overdosing with anaesthetic (using 5–10 times the normal anaesthetic dose) and that it can be a lengthy procedure. This can be accelerated by administering pentobarbitone intravenously into the caudal vein or intracardiac route when the fish is unconscious. Check that the fish has

died and that the heart has stopped beating using an ultrasound scanner or Doppler pulse probe. If this is not available and the owners wish to take the fish home for burial, then it should be kept in the anaesthetic solution for at least 90minutes.

You may worry that fish will go home and die immediately, especially after any anaesthetic or minor surgery where capillary bleeding is a problem. If necessary, hospitalise the fish but be aware that they are often better off in their own environment with water chemistry to which they have adapted. Depending on the case, I strongly recommend that you follow-up ALL consultations by phone 7–14 days later. However, you should be prepared for failure, in which case, be professional and listen sympathetically. Equally, you will often be surprised to hear how the most unlikely cases have survived and recovered fully.



Advertise your services...

Locally

- *Send Xmas cards to:*
 - *vet practice receptionists*
 - *pet shops/dealers*
 - *fish maintenance companies*
 - *local public aquaria*

Nationally

- *Put your name on FVS 'pet fish vet list'*
- *Set up fish page on practice web site*
- *Post cases on practice Facebook page*
- *Design logo for classified adverts*
 - *hobby press (Practical Fishkeeping)*
 - *Vet Index*

The slide includes three images on the right: a Christmas card with a fish illustration, a screenshot of the FVS Fish Veterinary website, and a logo featuring a fish and a green cross.

Advertise and let people know that you are interested in seeing fish patients — don't worry, there will not be a stampede to your door. However, you will need to be proactive to make your presence known.

In the days before social media, I sent promotional 'fish' Xmas cards advertising my fish services, not to local vets but to their receptionists, because they are on the front line and take all the client phone calls. It also helps to build a relationship with pet shops and pond maintenance companies so that you can refer clients to them when recommending their services or over-the-counter-products. Nowadays, social media and the internet is the easiest way to 'advertise' but this can result in you spending time talking to owners at the other end of the country who you will never see and will rarely pay for your time or advice. Other areas to consider are:

- put your name on the Fish Veterinary Society's 'pet fish vet list'. It is a free service and only requires you to send your contact details to the secretary. This list helps fish owners to find a local vet that can help them and is also linked to by other organisations such as the Ornamental Aquatic Trade Association (OATA).
- create a 'fish page' on your practice web site with lots of images
- write up interesting case reports for your practice Facebook page
- design a logo specifically for your fish services and use it on your stationary, business cards, web site, work clothes and advertising
- approach local newspapers and tell them about interesting cases. You may need to supply text and images. Occasionally, national newspapers or television may follow-up very interesting cases, but don't worry too much since the lifespan of an interesting story these days is only one or two days. However, once it is up there on the web, it is there for ever, so make an effort to keep it professional.

Photograph everything...

Buy a good camera+ macro lens

Learn to take good images

- use clean plain matt background
- use accurate focus+ exposure
- use high f-stop for good depth of field
- practice, practice, practice

Why bother?

- record progress of lesions (before+ after)
- enlarge images to aid diagnosis
- post on practice Facebook/ web site
- give presentations
- loan images to colleagues
- sell images to publishers



Photograph everything! This is my first rule of fish medicine. This subject is a presentation in itself, but here are a few basic tips:

- buy a good camera with a macro lens and learn how to take good photos by photographing every case (you can use a screw-on close-up filter or extension tubes as cheaper alternatives to an expensive macro lens)
- use a clean plain non-reflective background — my latest preference is for matt white, using a piece of Formica™
- always have a ruler for scale on at least one image
- focus accurately — it easier to manually fix the focus and move the camera closer to or further from the subject than using autofocus
- avoid automatic settings since this often results in a fast shutter speed with a low f-stop, which produces a shallow depth of field with much of the background out of focus
- use flash and manual exposure settings to allow 1/125 second speed and high f-stop (f14–20) to give a good depth of field
- use the 'fine' image quality setting to allow for a good level of detail, even after cropping the image
- take several shots moving around slightly to find the best position with least reflections from wet surfaces.

Taking the perfect image requires practice, critical rejection, and is harder than it looks. So, why bother? My main reasons are:

- to record cases, which helps with memory and allows easy access to image files for follow-up calls
- monitoring of lesions such as tumour growth and ulcer healing, recording before and after surgical procedures
- enlarging sharp images 40–50 times on a monitor to look for very small lesions in very small fish
- comparing eyes side by side to help identify very subtle unilateral lesions
- use for our practice Facebook page or web site
- use in my own presentations at conferences or for teaching
- publication of case reports with images of clinical lesions before histological fixation (resulting in colour changes)
- loan to colleagues for their publications or presentations
- sell to potential publishers or commercial users.

Work for free...

- Visit local pet shops and dealers
- Offer free post mortem exams
 - *practice taking X-rays or doing u/s scans*
- Write case reports
 - *publish on Facebook/ hobby press/ journals*
- Research project for public aquarium
 - *offer assistance on your 'days off'*
- Write book reviews
- Give presentations at:
 - *hobbyist club meetings, shows*
 - *conferences (FVS, BVZS, NAC, EAFP, NAVC)*
- Volunteer for FVS committee role



Work for free. Yes, you did read that correctly — working for the greater good. This is my version of doing charity work. In practice, actual fish cases may be few and far between, so make the best of each case when they do arrive, but also participate in peripheral fish activities to maintain your interest and presence in the field. Some examples include:

- visit local pet shops and fish dealers. Get to know them personally but keep a professional distance to avoid any compromising situations where you may feel pressurised to supply prescription-only medicines or unofficial health certificates. They will always have customers with fish health problems and not always ones with water quality problems (which they can manage themselves). These are usually more interesting such as surgical cases or those requiring more detailed investigations
- offer to carry out free post mortem examinations to some clients. Practice taking radiographs and performing ultrasound scans before opening up the cadaver, then compare findings to diagnostic images
- when taking digital radiographs, it is essential to find the best processing algorithms that produces the best image since the equipment settings are rarely optimised for fish patients. This initially requires a lot of practice and trial & error
- write up cases for non-technical publication on the practice web site, Facebook page, hobby magazines. These can be simple common cases to demonstrate what can be achieved by fish vets
- write case reports of unusual cases for scientific publication, with clinical images taken before tissue fixation
- offer to help with a research project for a local public aquarium on your 'days off'. In the UK, they are legally required to undertake conservation and education, but additional research also has a positive impact during the official zoo inspections. Liaise with the curator and specialist vet who may only visit a few times each year. Discuss what is achievable, realistic and is ethically acceptable, such as retrospective record reviews of diseases, mortality, treatment efficacy in addition to investigating current health problems
- write book reviews for professional journals and magazines. Approach publishers directly and offer to write a review in a suitable publication in return for a free copy of the book
- give talks to local fish-keeper clubs or at their shows
- give presentations at veterinary society conferences.

Ornamental opportunities...

Training:

- *Aquarium internship (Plymouth UK, various in US)*
- *WAVMA CertAqV (distance learning)*
- *MSc in aquatic veterinary studies (Stirling UK) +others*

RCVS qualifications:

- *Certificate in Advanced Veterinary Practice*
- *Advanced Practitioner in Fish Health & Production*
- *Specialist in Fish Health & Production*

Roles:

- *Provide 1st and 2nd opinion service in general practice*
- *Named Veterinary Surgeon for a laboratory*
- *Veterinary advisor for a public aquarium*
- *Secretary of State's zoo inspector*

Currently, there are no formal veterinary courses on ornamental fish health in the UK although in the past there have been a few 1–2day courses organised by the British Small Animal Veterinary Association. Current training opportunities include:

- internships — there are few in the UK, but some organisations offer positions abroad for volunteers, although you may need to pay
- the World Aquatic Veterinary Medical Association (WAVMA) have an online distance learning course that leads to a specific qualification, the [Certified Aquatic Veterinarian Program](#) (CertAqV)
- short courses are run by some fish vets:
 - Rob Jones, the Aquarium Vet [e-aquarist course](#)
 - Richmond Loh, [The Fish Vet in Australia](#)
 - Jesse Sanders, [Aquatic Veterinary Services in California](#)
 - there are a few modules on fish at the Royal Veterinary College [MSc course in zoo and wildlife medicine](#) in London
- the Institute of Aquaculture in Stirling offers a [MSc in Aquatic Veterinary Studies](#) although much of the course is aimed at commercial fish farming
- Royal College of Veterinary Surgeons post-graduate qualifications. There are various options to aim for, including a fish module for the [Certificate in Advanced Veterinary Practice](#) (Cert AVP) and advanced practitioner or specialist status in fish health and production.

Despite all this additional training and examinations, currently there are limited opportunities for ornamental fish work in the UK. In reality, most pet fish are seen in first opinion practice. I rarely see second opinion cases from other veterinary surgeons, although owners will often be referred to me by pet shops. There are some positions for Named Veterinary Surgeons (NVS) who have completed the general 3-day NVS course, working in fish research laboratories. A few veterinary surgeons work for public aquaria in the UK in a specialist advisory role, and some general practitioners may fill in on an occasional basis in between the specialist's visits. These visiting specialists, after further training and passing a City & Guilds examination, may also take on a role as a zoo inspector for the Secretary of State, although this is mainly compliance and regulatory work.

Advanced stuff...

Imaging:

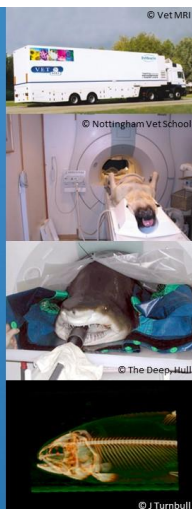
- *digital radiography*
- *contrast media studies*
- *ultrasound scanning*
- *CT and MRI scanning*

Laboratory:

- *histopath*
- *virology*

Surgery:

- *skin+ fin repairs*
- *tumour debulking*
- *enucleation*
- *laparotomy*



On the face of it, this is not all that advanced in terms of small animal medicine but equally it is not simple stuff for beginners to tackle. It takes time to get a feel for common problems and internal anatomy so that you can interpret diagnostic images and decide on a realistic course of action.

Don't be surprised if euthanasia is a common outcome because many cases will be too advanced by the time an owner seeks professional help for a sick fish. Equally, there may be a financial limit on how much an owner may be willing to pay for professional services. Advanced skills and procedures will involve:

- radiography — essential to investigate buoyancy disorders and other internal diseases, but it takes practice to get good results
- contrast radiography — barium and other contrast media can be used to enhance some internal lesions by outlining the bowel
- ultrasonography — can help diagnose polycystic kidney disease, cystic gonadal tumours and intra-ocular lesions
- computed tomography (CT) and magnetic resonance imaging (MRI) — these have been used on fish in some research or training centres
- histopathology — an essential diagnostic tool, but it is also expensive since it usually requires several tissues to be processed and examined
- surgery — often limited to treating skin ulcers, debulking skin tumours and removing eyes. All these require some skill and expertise. I have rarely performed celiotomy or removed internal tumours since I am not personally convinced that it is in the fish's best interests in most cases.

Challenges are not always obvious...

- *Treating koi pond >£25,000*
- *Treating small fish...*
 - *5cm marine fish >£200*
 - *3cm neon tetra <£6*
- *Treating complex internal diseases*
 - *Buoyancy disorders*
 - *Mycobacterial disease*
 - *Polycystic kidney disease*
- *Treating coral diseases*
- *Disease often too advanced*
- *Owners using OTC meds for tumours*
- *Owners with unrealistic expectations*



Like all areas of veterinary medicine, it doesn't matter how advanced your approach to a health problem is, there will always be challenging cases. Sometimes this is heavily influenced by money, such as the overwhelming value of a state-of-the-art koi pond with expensive koi that the owner personally selected from a breeder in Japan. Or treating very small fish where visual identification of disease and physical sampling can be technically difficult. Even when a diagnosis is achieved, there are common health problems in addition to neoplasia that are untreatable, such as buoyancy disorders, granulomatous diseases and polycystic kidney disease in goldfish. And if you find some fish health problems a challenge, then treating diseases of aquatic invertebrates such as corals and molluscs is at a completely different level. Not only is there so little scientific information about their diseases and treatments available, but they also require more complex life support systems and critical water quality than fish in order to maintain a healthy environment.

However, the greatest challenge is that owners often leave a problem for too long before seeking help, and they often use several over-the-counter (OTC) medications to treat incurable diseases. Even when they do get professional assistance, it is important to manage their expectations of the outcome because it is not possible to fully assess the health status of many fish or judge the efficacy of some treatments.

What next?...

- *Join fish (vet) societies*
- *Attend conferences*
- *Network with colleagues*
- *Join list-server discussions*
- *Share your experiences*

BUT BEWARE:

- *Know your own limitations+ seek advice*
- *Complaints about fees+ expectations*
- *Requests for POM drugs*
- *Requests for blank export health certs*



As veterinary surgeons, I feel that we should all represent our profession as best we can in a field where we are not the first source of advice or information. Historically, that was the situation when I started out and

sadly it is still the case 30years later. In all areas of fish medicine, there is much to be gained by collaboration with colleagues trained in other disciplines. Joining a professional society allows you to network and engage with colleagues at conferences and on list servers where we are often happy to share our knowledge and offer help and advice.

Pet fish medicine can be very rewarding, but it is important to know your own limitations and seek advice from colleagues when necessary. You should be prepared to have difficult conversations with owners over realistic prices and realistic expectations. Some owners and fish dealers may be adamant that they know the problem and demand prescription-only medicines such as antibiotics, in which case they may need to have the medicines legislation explained to them. Exportation of live fish may require very specific health certification and occasionally dealers may request signed 'blank' export health certificates which should be discussed with the legal department of your governing body and professional indemnity insurer.

Take home message...

Just do it:

- *Be passionate*
- *Be inquisitive*
- *Aim high*
- *Start now*



My take home message is that you should aim to achieve as much as you can professionally before you have children. Study hard, learn from your mistakes and go to conferences. Believe me, it is easier to do this as a single person because after marriage, everything becomes a compromise and requires bargaining with a partner. And after you have children, it requires a lot of personal sacrifice and understanding. For your clients, try to:

- be passionate — reassure owners that you are doing your best. They always appreciate professional help, despite the outcome
- be inquisitive — take time with each case and follow up all of them. You will be pleasantly surprised by your successes
- aim high — be bold and challenge yourself professionally by taking radiographs, performing ultrasound scans and minor surgery
- but most important, **START NOW** — don't expect there to be a better or perfect time to start.

This article contains some of my suggestions on how to get started in pet fish work. It is not the only way, and some may not be practical for everyone, but they worked for me. So, if you want to get involved, then just GET ON AND DO IT.

This paper is based on a presentation given at the Fish Veterinary Society Conference in Livingstone on 27 March 2019.

ONLINE RESOURCES

EXTERN-/ INTERNSHIPS:

<https://www.wavma.org/Externships>

[Aquatic Veterinary Resources - Fish Vet \(cafishvet.com\)](http://www.cafishvet.com)

FISH ANAESTHESIA:

[Aquarium Science - Fish Sedation prt 1 - YouTube](#)

[Fish anaesthesia, 5 stages of fish anaesthesia with Fish Vet Dr Loh. - YouTube](#)

FISH PARASITE VIDEOS:

White spot

- <https://www.youtube.com/watch?v=6YirArXoTZA>
- <https://www.youtube.com/watch?v=cOfPk3i0clw>
- <http://www.pond-life.me.uk/fishhealth/ichthyophthirius>

Trichodina

- <https://www.youtube.com/watch?v=eVpvXCdOv5E>

Chilodonella

- <http://www.pond-life.me.uk/fishhealth/chilodonella>

Ichthyobodo (Costia)

- <https://youtu.be/ESp45gLE1Aw>

Flukes

- <https://youtu.be/OiOeznXQZul>