



Barbara and Vern Philips' House
2105 N Jacamar Ln
December 9
520-743-3197
Starts at 3:00

From I-10, west on Grant, which becomes Ironwood Hill, South on Saddlewood Ranch, East on Calle Ceuro de Vaca, North on Jacamar to address on left side.

Please let Brent know if you are interested in hosting a meeting. At present, all months are open in 2013.

SAKA, Inc Club Officers

<i>President</i>	Bob Panter sakabob@cox.net (520) 747-7278
<i>Vice President</i>	David Young koiman@mindspring.com (520) 403-2949
<i>Secretary</i>	Karen Johnson (520) 400-2073

Treasurer	Dan and Martha Cover mardan79@msn.com (520) 297-4071
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Committees/Points of Contact

2013 Pond Tour	
33rd Koi Show Co-Chairperson(s)	Brent VanKoeving bvankoeving@longrealty.com (520) 780-3980
AKCA Representative	Debby Young debbyt@akca.org (520) 682-7697
Newsletter Editor	Brent VanKoeving bvankoeving@longrealty.com (520) 780-3980
Koi Health Advisor	Noel Shaw koidoc@noelshawdc.com (520) 400-0335
Membership Chairperson	Faye Hall (520) 297-1253
Education Committee	TBD

Editor's Note: Articles published herein are intended for the enjoyment of all and come from a variety of sources. The articles are not intended to replace veterinary advice. Pond owners, and not the club, are responsible for the health of their koi, water changes, what to do, and how to treat their pond. Reasonable effort is made to review these articles for accuracy before including them in the newsletter.

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Club Meetings

Hosting Meetings: For those wishing to host an upcoming business/education meeting, the club will reimburse the host up to \$50 (with receipts) toward food/beverage for the meeting. **We would like to see your pond!** Please contact Bob Panter or Brent VanKoeving if you are interested in hosting a meeting.

Club Announcements

Business Meeting Minutes

Koi Meeting Minutes
Call to order: Bob Panter

Oct. 28, 2012

No Minutes from Sept. meeting.
Dan Cover says fish lady called.
Dennis & Kathy will be at the show.
Treasurer Rpt: Ckng \$9688.80 CD \$5200.00
Expenses for the show so far: \$802.23 down pmt
Dep for travel trailer rent \$95.00
Additional fee, room at the Y \$45.00
Awards \$88.00
AKCA Rpt: Deb Young: regarding nominating officers no ballots were sent out. Therefore no voting.
There is a new Koi Society....American Koi Keepers Society starting in 2013 with a \$100.00 yearly fee.
Includes magazine.
Deb Young motions to join, seconded, and approved.
Show Rpt: Brent said there are 4 vendors with this year vendor count down.
Tanks are being brought down from Phoenix.
Dinner at the Y for the Judges on Friday night there at the grounds.
Alan, Bob tow trailers. Noel will transport the judges.
Banquet at El Parador Saturday night- Mexican food.
Fish arrive at 4PM Friday.
Sunday Breakfast at Brent's house.
Auction at Noon Sunday.
Share this with Facebook friends.
Committee Rpts: None
Old business: Poly Tank is coming to the show.
New Business: None
Motion to Adjourn seconded. Moved.

Featured Articles

Koi Photography - Painting with Light

Nigel M.W. Caddock : Nishikigoi International
reprinted from 1994 Seminar Binder

Introduction There are many dimensions to Koi photography of which taking the actual photograph is just one. As with all aspects of Koi keeping it is often when all the key factors combine successfully that the best results are achieved. The objective of this presentation is to identify the key parameters and offer some practical options to help you get the very best results.

The Role of Koi Images Photographic images play a vital role in many areas of the development of our hobby. In addition to offering newcomers a 'shop window' they offer everyone an educational opportunity to compare different Koi and to learn from the different images.

In addition, it is possible to review visually in magazines and books infinitely more koi than would be possible by direct observation at shows or at vendors premises. Koi images offer the ideal training opportunity for variety identification and to learn the basics of Koi appreciation. This information is the very foundation on which more detailed knowledge can be developed and refined.

In addition to images of Koi, images of Koi ponds and systems also offer a wealth of information which enthusiasts can tap into to develop their own pond and system ideas. The availability of quality images is thus vitally important not only from an information and educational perspective but also from an enjoyment aspects also.

The key purpose of this presentation focuses on Koi photography but we will also briefly discuss key aspects of Koi pond photography.

Technical Considerations There are two key aspects to this area these are the equipment (and not just cameras and lenses) and the photographic techniques applied to successfully using the appropriate equipment.

Equipment

CAMERAS: Good quality equipment is of course important but just buying expensive high quality equipment does not guarantee that you will take good Koi photographs.

It is generally the case that the better quality and size of the negative, the better the image will be. Thus small format cameras such as 110 or instant Polaroids although having their niche uses will not provide you with images of consistent high quality. At the other end of the scale although large format cameras without doubt produce the best results their cumbersome nature does represent a limitation to some users. If you can't get used to them and are not comfortable with large format the quality of the results will reflect this mismatch. Better to be comfortable with 35mm than uncomfortable with large format.

It is the case however that virtually all top Japanese Koi photographers use large format camera like Mamiya, Bronica etc. and if you can cope with their bulk they do offer the best results. They are of course the most expensive cameras to buy and the film and processing is also the most expensive of the available options. As an anecdote to this perhaps the key reason for the Japanese preference for large format cameras is that when they are photographing Koi not only are special photographic facilities provided but they also often have a team of helpers to prod the Koi into cooperation so all they have to concern themselves with is getting the shot! Most western photographers do not have these luxuries and cannot do everything as well as wrestle with a large format camera too.

The pragmatic solution is 35mm and there is no doubt that good quality 35mm is the ideal compromise. 35mm should however be regarded by serious exponents as the minimum standard for consistent high quality. With very few exceptions ALL NI PHOTOGRAPHS ARE 35MM. Camera brand is almost irrelevant as long as the quality is good.

LENSES: The specific make of lens is again almost irrelevant as long as it's compatible with your camera.. The quality of the lens however, fundamentally impacts on the quality of your image even more so than the camera so do make sure your lens is good quality.

The selection of lens formats currently available is mind boggling; it is best to keep it as simple as possible. 28mm - 75mm zoom provides the ideal range of options that will allow you to cover most Koi photographic situations. Zooms are also very useful as they allow you to get close without having to physically get so close that you risk 'spooking your target' thus making your already tough job even tougher!

AUTOFOCUS: Autofocus is a very useful tool but you do need to fully understand their limitations. Even the most advanced system available will not cope with focussing on the convex back of a Kohaku! Red pigment on curved surfaces totally confuse autofocus systems. To avoid this, focus on the pupil of the eye, a reflective scale, a shimmi or the leading edge of the dorsal bone as your autofocus needs an optical contrast to get a fix on. This is a limitation not a problem and if you are aware of it you can effectively deal with it.

POWER WINDERS: Given the limited time frame of opportunity when the Koi is ideally located, you ideally need to get as many shots as possible off. Power winders really come into their own for this duty and, if you can justify the cost, power winders are well worth the investment. If you do plan 'rapid shooting' power winders are a prerequisite but it is also important that the rest of your equipment is compatible with your power winders capabilities.

FLASH GUNS: Compatibility is again vital and if you are planning to run off three frames a second then you need to make sure that your flash gun is up to the job. Always check manufacturer's recommendations and make sure that your flash is not only compatible with the rest of your equipment but also suitable for the duty you require it to perform. High performance rapid shoot capability flash guns are not cheap. If that's what you want, you need to be prepared to pay the price.

POWER: All the above photographic hardware consume prodigious quantities of power in the form of batteries. Despite the claims some ancillary equipment manufacturers, rechargeable batteries are fine and offer by far the cheapest source of power. Specialist power packs are also a good option especially if you are planning a long shoot as there is nothing more irritating than flat batteries. Whatever your selection always have overcapacity with lots of spares.

FILM: For best consistent results use top quality brand films - Kodak/Fuji/Agfa etc. Do not use often cheaper 'kown brand' films. They are not as good and the last thing you need when you have died in a ditch to get a great shot is the result to be poor simply because the film is not up to standard. Equipment selection, generally, and film selection and processing, in particular, are aspects you do have control over so it seems sensible to take advantage of this potential.

FILM SPEED: Generally, the slower the film speed the better the result; thus, for 35mm, MASA slide film is best with 100ASA print film second and 200ASA at a push but no faster. If possible avoid fast films (above 200ASA) as they are not designed for fine requirements and the results often appear grainy, soft or even out of focus.

SLIDES v PRINTS: It is the case that slides/transparencies give the best quality. Just how much better is a matter of judgment. Selection also depends on what you plan to use your photos for. It is the case that for printing purposes slides give better reproduction but they can be a real pain in the neck for viewing as they are very inconvenient and you have to set up equipment like projectors and screens to fully enjoy them. This is of course not the case with prints. Prints are generally more convenient and in my view more fun, more friendly and much less pretentious! 95% of photos included in NI are off 35mm PRINTS

FILM PROCESSING: Having worked hard to get good photos, it is criminal to compromise all that effort by using cheap and nasty processors. Use quality labs NOT the booths!

Photographic Techniques

There are an infinitely varying number of photographic techniques and styles which can produce excellent results. In order to offer a usable guide, the following represents the technique applied by the author

- **LIGHT:** The control of lighting is fundamentally important. Although Koi always look best in daylight, it is the case that they DO NOT photograph best in daylight. It is the case that the best results are obtained by controlled flash photography, and the better the control the better the resulting photo.
- **GLARE:** Glare is probably the Koi photographers' single biggest enemy, and Koi photographers go to great lengths to remove it. While polarising filters are fine for surface glare and invaluable for shooting ponds with Koi on bright days, they will not remove enough glare for quality Koi photography attempted in daylight. The solution is to remove the glare by shading the subject and tank containing it as comprehensively as possible by using shades/blackouts or even better by photographing indoors where no light is shining on the tank water. In other words, take your photos in the dark!
- **TANK COLOUR:** The colour of photographic tank or container is also vital. Too light and the Koi colours are flattened; too dark and the contrast offers displeasing appearance or distorts the resulting colour balances. Having tried them all medium blue is best.
- **TANK SHAPE:** Koi are pretty stupid... nearly as stupid as their keepers and if you show them a round tank they will merrily swim round the edges for hours. Oblong tanks tend to deter this process and often relax the Koi quicker thus making our photographic tasks slightly less difficult.
- **WATER LEVEL:** The water level in the tank may seem trivial but it is in fact important. Too little and the surface will be continually disturbed too much and the body of water will distend like a gently rolling balloon without a membrane. The correct level is obviously determined by the size of Koi you are photographing; generally the ideal is enough to cover the extended dorsal by around three inches.
- **WATER QUALITY:** It is important to remember that although your primary task is taking the photo you always need to remember that your real primary task is to protect the welfare of the Koi you are photographing. To this end, make sure the tank is clean and has had no contact with potentially harmful chemicals or materials. Also make sure that no residual debris is present. Also ensure that the water you plan to put into the tank is the same as the water your target Koi has just come out. This is important especially in terms of temperature and pH as both thermal and pH shock can be lethal and also

remember the smaller the volume of water in your photographic tank the bigger the potential risk, so check, check and double check! It is also important to consider that while your Koi is in the small tank it will be contaminating the tank water, not just with organic physical material that may spoil your photo but also chemical contamination which may build up and put your Koi at risk. To reduce the risk, make sure you regularly check the tank water quality and unless you have a big tank (100 gallons plus) make sure you change water completely at regular intervals. These risks are very real but likely to cause problems only if you are not aware of them; don't be caught out. It is no good being sorry after the event! An additional indicator of deteriorating tank water quality especially in small volumes, is a proliferation of gungy surface bubbles that won't go away. They are often synonymous with organic build ups, so use that as a guide and be aware of this risk

- **TANK LOCATION & KOI MOVEMENTS:** Make sure your selected location is as safe as possible and as near as possible so as to minimise the distance the Koi has to be moved. NEVER, NEVER, NEVER leave a tank containing a Koi unattended. If you do have to leave it for a short time, make sure the tank is securely covered.
- **PHOTO BUDDY:** In addition to learning from each other, a photo buddy will also help you double check all the aforementioned and two pairs of eyes, ears and Koi instincts are always better than one!
- **PHOTO ANGLE:** It is a much quoted misnomer that the best angle to shoot Koi is 90. This is not the case; the correct angle to take Koi shots is in fact 45. **FINALLY:** Please always remember that although it is nice to have good Koi photographs the welfare of the Koi comes first - so do check the tank water and keep checking it. Make sure the Koi can't jump out! (as they often try to do) and remember you can always take another photo another time and if the Koi is obviously not happy at being subjected to your photographic advances abandon them and try again another time.

Photographic Aesthetics

- **FORMAT:** Always shoot in portrait format NOT landscape. Landscape shots rarely work as do unusual upside down or sideswipe shots which sound clever but are in fact a waste of film.
- **FRAMING:** Make sure you have the head and tail in the shot and try to keep the Koi generally in the centre of your frame. There is nothing worse than having a great Koi photo with the tail missing!
- **FRAMING:** It is vital that the Koi is framed only by the tank background. This may sound contradictory but the Koi is the focus of the photo and any third party incursion into the frame will detract from the quality and impact of your Koi image. Make sure your target Koi is not clamped to the side of the tank or has its nose buried in the corner, instead wait until it is away from the sides and corners and located as near to the centre of the tank as possible.
- **POSE:** It is important that the pose emphasises the imposingness of the Koi so do try and make sure the Koi's overall pose is attractive and not forced.
- **PATIENCE:** It is vital that you have patience and wait until the Koi is still, don't try and chase it round the tub not only will this exacerbate the chase, it will spook the Koi and irritate you!
- **PECTORAL FINS:** Pectoral fins are vital components to photos of Koi. Their suitable deployment or not often make the difference between a good shot, a great shot and a poor shot. Shoot when the Koi has flared pectoral fins NOT when they are clamped to its side-
- **FOCUSING:** It is of course vital that your shots are in focus. However, the nature of Koi photography is such that it is virtually impossible to have all parts of the Koi in the same sharp focus. Unless the Koi is small don't even try, instead focus on the eyes; this will ensure that the front three quarters of the Koi are sharp and the tail is slightly softer. The result will be a much more natural and pleasing image which appears attractive not forced and graceful rather than staid.
- **KEEP IT SIMPLE:** Close head shots and clever angles can be very dramatic but good shots are very difficult to get and you will waste lots of time and film trying to perfect the unperfectable. Concentrate on refining your basic techniques as you will find this much more rewarding.
- **TAKE LOTS OF SHOTS:** Good Koi photography is one of the most difficult of all photographic challenges. There is no easy way and no quick solutions. If you follow the above advice and take a lot of shots you will develop a successful style and technique that provides good consistent results. A good success rate given all the above is 10% to 20%. So take lots of photos to get a few good shots. For every photo included in NI forty are rejected.
- **POND SHOTS:** Pond photos can be very boring unless you make a big effort to make them creative and pleasing. Seek out the unusual angle; look for the position which enables you to naturally frame the shot.

This may involve climbing onto garages or aawling on yoirr. stomach but the results are worth the effort. Night shots are also often very dramatic and once you have mastered the basic technical challenge, you can have lots of fun experimenting with long tripod exposures, etc. Unlike shooting Koi be adventurous and take the unusual challenge; you will be amazed at what you can achieve.

Golden Rules

The very best Koi photographers are those who keep Koi and take photos. Although being technically competent is OK to a degree, to get the best shots you have to love Koi and understand them. The essence of success is in understanding and appreciating their four dimensional form and being able to express it in a two dimensional photographic image.

- There are none!... But...
- Prepare properly - make sure you have correct equipment
- Beware glare
- Be patient - Don't rush!
- Take lots of shots
- Develop your own technique that works for you
- Always remember your subject is someone's beloved pet - so take care of it at all times
- Practise may not make perfect but it is great fun and will eventually give you some good Koi photographs, so keep trying and ENJOY!

Fish Health Management (Part 1)

by Dr. Arthur Lembke

Before I start this article, I would like to thank the MAKC for choosing me to attend the course on Fish Health Management this year. The course was offered by Dr. John Gratzek at the University of Georgia. The course lasted for 3 and 1/2 days and included classroom and laboratory studies. There was much to learn from this highly noted expert on fish health and I was glad to have the experience of studying with such a learned individual. If at all possible, I would highly recommend this course to all MAKC members. As a way to say thank you to the MAKC, I would like to write several articles, reviewing the information given to me by Dr. Gratzek. I make no claims as to the accuracy of the information. In fact, some information presented I still question, but that is what made the course so interesting. There was ample time during and after class to discuss these differences. The class was also a great place to meet others and share information. There were several dealers and distributors, veterinarians, hobbyists, someone from Disney, someone from Sea World, and even an airplane pilot. The first day of the Fish Health Management course, fish basics were presented so we could better understand the disease process. Gill function was a good start. Gills function to take in oxygen and put out carbon dioxide. Gills excrete 70% of the ammonia of the fish and the kidney excretes the other 30%. The gills are responsible for osmoregulation which controls the uptake of chloride, the excretion of sodium, the balance of water in the fish, and the balance of electrolytes. Stress on a fish can affect osmoregulation in the following ways:

- 1. increase salt excretion
- 2. increase water uptake into the fish
- 3. increase gill permeability, which can cause electrolytes to leak and increase the uptake of toxins; an electrolyte imbalance can lead to death.

Stress can be reduced by maintaining a salt concentration of 0.3% in the pond water, and possibly by using corticosteroid injections in severe cases.

Next, a short review of filtration was presented. Mechanical filters were discussed. Three types were mentioned, including sediment chambers, entrapment (i.e. sand or gravel filters), and foam fractionators. It was agreed that foam fractionating does not work as well for fresh water application. The process by which filtration breaks down ammonia into nitrite and then nitrate was quickly reviewed and it was stated that this process gives off hydrogen ions which brings the pH down unless buffering capacity was increased in the pond. It was also stated that salt in the pond does not seem to alter or slow down the development of the ammonia cycle.

To help a new system start up better, with less stress on the fish, the following suggestions were made:

- 1. add fewer fish
- 2. start with hardy fish
- 3. seed filter with media from established system (I could not find anyone who thought liquid or dry bacteria cultures helped start a filter)
- 4. change water often
- 5. use ammonia absorbers (although Dr. Gratzek did not like this method)

When adding new water to the pond, Dr. Gratzek stated that chlorine could be taken out of the water by aeration, sunlight, activated carbon, or sodium thiosulfate. He seemed to prefer sodium thiosulfate because it was cheap and seemed to be very safe with fish. Chloramine was said to be removed by activated carbon or sodium thiosulfate. However, sodium thiosulfate removes the chlorine of the chloramine molecule but leaves the ammonia behind. The remaining ammonia would have to be taken up by the filters or removed by ammonia neutralizers (i.e. Zeolite, Amquel).

The next topic Dr. Gratzek presented was water chemistry and quality. This will be the subject of an upcoming article.

Fish Health Management (Part 2)

by Dr. Arthur Lembke

The next part of the lectures on Fish Health Management presented by Dr. John Gratzek at the University of Georgia covered water chemistry and quality. The information was more detailed because this subject has a lot to do with the management of fish health.

The first water parameter that was discussed was oxygen. Fish need oxygen for proper body function and filter bacteria need oxygen to carry out the nitrification process. The following situations affect the oxygen levels in water:

- 1. increased temperature decreases oxygen levels
- 2. salt decreases oxygen levels
- 3. surface turbulence increases oxygen levels
- 4. increased fish load decrease oxygen levels
- 5. too many chemicals in the water will decrease oxygen levels

pH

was defined as the concentration of hydrogen ions (H⁺) in the water in relation to the OH⁻ ions. High pH (above 7.5) will make ammonia more toxic to fish. This is because the normal balance of ammonia (toxic) to

ammonium (less toxic) molecules in the pond is pushed toward the ammonia end at a higher pH. Therefore, optimal pH of a pond would be 7.2 to 7.4 to reduce ammonia toxicity. To lower the pH, it was suggested the alkalinity be lowered first by water softeners or reverse osmosis. Then monobasic sodium phosphate can be slowly added to lower the pH. Peat moss in the filter may also help to lower pH. To raise the pH, one can use commercial buffers, water changes, oyster shell, or sodium bicarbonate. The class tested the use of sodium bicarbonate and the highest pH reached was 8.4, at which point further additions of sodium bicarbonate did not change the pH.

Hardness

measures the amount of calcium carbonate in the water. Soft water is 0 to 75ppm, moderately hard water is 75 to 150ppm, hard water is 150 to 300ppm, and very hard water is 330+ ppm. Ideal for koi ponds seems to be in the moderately hard range. Harder water generally means high alkalinity, higher buffer, and increased resistance to pH changes.

Alkalinity

is the concentration of carbonate in the water. The higher the alkalinity, the less pH fluctuations. In water with low alkalinity, the filtering process will drive the pH down. Keep alkalinity above 80ppm.

Ammonia

was discussed next. Ammonia is toxic to fish because it causes less oxygen to be taken up by the gills and it interferes with osmoregulation. Gills become irritated and the fish surface in the pond. As mentioned earlier, the ammonia is more toxic at higher pH, therefore if ammonia is present, as in start_up, it is important to maintain pH below 7.5. Ammonia is controlled by:

- 1. less feeding
- 2. decreasing fish load
- 3. water changes
- 4. adding more filtration
- 5. decreasing pH
- 6. ammonia absorbing chemicals

Nitrite

is the next component in the filter nitrification process. Nitrite is toxic as well, and can cause the fish to be lethargic, have flared gill plates, and dark blood. If fish die of nitrite toxicity, they die with their mouth open. Methods of lowering nitrite include:

- 1. water changes
- 2. decreasing fish load
- 3. adding conditioned filter media to increase nitrobacter bacteria
- 4. raise salt to 0.3% to decrease uptake of nitrite by fish gills

Nitrate

is the end product of nitrification and is not as toxic to fish unless present in very high concentrations. Nitrate is reduced by plants and algae. It can also be reduced by doing water changes and reducing fish load.

Hydrogen sulfide was mentioned as a toxic concern in water. It comes from anaerobic decomposition in the pond. This can be avoided by cleaning filters and removing mulm from the pond.

Organics include proteins, amino acids, and carbohydrates given off by the fish as waste. Organics will increase bacteria growth, increase protozoan growth, and inhibit fish appetite, growth, and immunity. Organics can be reduced by decreasing food, increasing filtration, decreasing fish load, and water changes.

Other water pollutants include chlorine, cyanide, detergents, fertilizers, pesticides, and thermal pollution. The rest of the course covered in depth disease information and laboratory diagnosis of disease. This will be covered in upcoming articles.

Fish Health Management (Part 3)

by Dr. Arthur Lembke

The rest of the Fish Health Management course presented by Dr. Gratzek covered diseases in general as well as specific disease information. Laboratory dissections were also done each day to learn methods of preparing slides for microscopic diagnosis and to see various diseases.

It requires the right combination of three elements for a fish to get a disease. These elements are the host, the pathogen, and the environment. The most important thing to learn from this information is that you can have a fish in the presence of the pathogen, but if the environment is good, the fish will not become diseased. We tested this in the lab by putting water samples on agar plates that grew only *Aeromonas*. We found that *Aeromonas* is always found in the water, even with healthy fish.

General disease information was given to include the following:

- BEHAVIOR OF FISH WITH DISEASES-1. lethargic 2. no appetite 3. flashing 4. increased respiration 5. fish not surfacing 6. erratic swimming 7. shimmies
- PHYSICAL SIGNS OF DISEASE- 1. frayed fins 2. ulcers 3. hemorrhage 4. excess slime 5. spots and lumps 6. exophthalmia (pop eye) 7. ascites (stomach distention)
- NATURAL PREVENTION TO DISEASE- "Above all do not harm" - 1. change water - dilutes bacteria and parasites, buffers water, corrects water chemistry to maintain high quality 2. good nutrition 3. maintain stable temperature 4. avoid stress
- SUMMARY OF DISEASE DIAGNOSIS - 1. check history of pond a) water chemistry b) nutrition c) new fish added d) check fish husbandry e) get a description of problem 2. tests a) observe fish b) test water c) biopsy_ do gill snip, fin snip, check feces, mucous scrapes d) necropsy - after death check gills, kidney, liver, stomach e) define problem f) action 1. advise on husbandry 2. treatment- do no harm 3. select drug, dose, and treatment times g) prognosis

The first group of diseases discussed were the non_infectious diseases. These are basically nutritional problems. Nutritional problems arise from: 1. spoiled stored food 2. pellet size too large for fish to eat 3. not enough food 4. not enough Vitamin C 5. not enough Vitamin E Therefore, feed as many times a day as possible with small amounts of food and put variety in the diet. Signs of nutritional deficiency include: 1. decreased appetite 2. ascites 3. lethargy 4. poor growth 5. decreased color 6. dark skin 7. deformities 8. anemic 9. fatty liver 10. blindness/cataract Signs of poor nutrition include: 1. decreased disease resistance 2. excitable 3. increased slime 4. poor appetite

Specific diseases will be discussed in an upcoming article.

Fish Health Management (Part 4)

by Dr. Arthur Lembke

The rest and majority of the Fish Health Management lectures presented by Dr. Gratzek at the University of Georgia were spent on studying specific diseases, including diagnosis and microscopic study. Many diseases were discussed, including some which do not pertain to koi or goldfish. To simplify a complex subject, I will review only those diseases that we would encounter as koi hobbyists. The first, and probably, the most important of the diseases for koi keepers are parasites. It is rare to find

a fish that is parasite free, as we know from doing mucous scrapes of healthy fish. Parasites may be passed through water, therefore, it is important to remove dead fish from ponds immediately.

Diagnosis of parasites includes:

- 1. history of fish
- 2. water quality and nutrition is checked because fish under stress will develop parasitic infections more easily
- 3. lack of quarantine is most common method of spreading parasites
- 4. some parasites are large enough to see
- 5. some parasites are seen on microscopic study at low magnification

Clinical signs of parasites include:

- 1. skin and fin lesions
- 2. lethargy
- 3. respiratory distress
- 4. flashing
- 5. spots or lumps
- 6. excess mucous
- 7. white tufts
- 8. "velvet"
- 9. hemorrhage
- 10. ulcers

Biopsy is normally done on snips of gill, skin scrapings, or small pieces of fin. These can be done on live fish as we did in the lab. In the lab, we also did samples on freshly sacrificed fish, looking at liver, kidney, gills, and intestines. For those interested in biopsy and necropsy, which I think is necessary for proper diagnosis, I would suggest reading the text of Dr. Gratzek's book, "The Science of Fish Health Management", and then practicing on your own or with someone that has done it before. It was also noted in lecture, that many times bacterial infections occur secondary to parasitic infections, and for this reason when treating for parasites one must many times treat for bacterial infection as well.

The major external protozoan parasites that we see in our hobby are Ich, Chilodonella, Oodinium, Trichodina, Tetrahymena, and Epistylis.

Ich or Costia

is a round, ciliated organism which is covered by a cyst. It appears as white spots over the body of the fish, and it can destroy gills and cause respiratory distress. Medications can only kill the free-swimming forms, therefore, treatments have to be done every 5 days for 3 treatments. Ich treatment: 1. increase water temperature to 80 degrees 2. change water every day to dilute ich 3. use UV filtration 4. use Formaldehyde at 25ppm (100cc/1000gal) 5. use salt at a concentration of 0.3%

Chilodonella

is a quick killer of fish that appears as mucous over the eyes and skin, respiratory distress, and clamped fins. Diagnosis is by microscopic scrapings of gills and skin. Treatment is 0.3% salt (2.5lbs/100gal).

Oodinium

also called "velvet", appears as a fine dust on fish on the gills and skin. Diagnosis is done by microscopic scrapings. It is treated by formaldehyde at 25ppm or with acriflavine at 5 to 10 ppm, however acriflavine turns the pond water yellow.

Trichodina

attacks the gills and can affect pond fish. Diagnosis is done by microscope and treatment is the same as for Ich.

Tetrahymena

is sometimes found in pond fish. It causes necrosis and hemorrhage, eye bulge, and fin rot. There is no treatment and it is fatal to fish.

Epistylis

appears as white tufts on the ends of fins and occurs in ponds with high organic content. Diagnosis is by microscope, and treatment includes swabbing the area with iodine and using formaldehyde at 25 ppm. As one can see, most of these parasites are treated with salt at 0.3% and formaldehyde as 25 ppm. For the hobbyist, there would be no reason to differentiate the parasites. More on parasites will appear in my next article.

Fish Health Management (Part 5)

by Dr. Arthur Lembke

The lectures on Fish Health Management presented by Dr. Gratzek continued to discuss other pond parasites.

Monogenetic Trematodes

or flukes are very common in the koi hobby. The two types are Dactylogyridae (gill flukes) and Gyrodactylidae (skin flukes). Gill flukes appear with rapid respiratory movements, clamped fins, flashing, lethargy, and death. They can cause hyperplasia, destruction of gills, and asphyxiation. Gill flukes are easily diagnosed on mucous scrapings under a microscope. Gill flukes are egg_layers and to get rid of the disease three treatments must be given 5 to 7 days apart.

Skin flukes can appear as hemorrhage, excessive mucous, ulcerations, and tail rot. Many times they lead to secondary bacterial infections. Skin flukes are live_bearers and only require one treatment.

Treatment for both gill and skin flukes includes:

- 1. formaldehyde 25ppm (100cc/1000gal)
- 2. trichlorofon at 0.25ppm, however some strains are resistant to this (organophosphates do not work well at high pH, therefore at 8.4 pH may need to increase dose)
- 3. Praziquantel (Droncit, Biltricide) at 2ppm good for quarantine but too expensive for whole pond
- 4. salt dip in 2.5% concentration for 2 minutes or until fish is in stress

Leeches

are small worms of about 0.2 to 0.4 inches. They frequently are introduced by plants and snails and can carry mycobacteria infection. Plants should be treated with alum (1tbsp/gal of water) before being placed in the pond. Trichlorofon or formaldehyde can be used in the pond once infected.

Crustaceans

that affect our koi are anchor worm and fish lice. Anchor worms are seen as wormlike organisms sticking out of a hole in the fish where the female burrows its head. They can cause hemorrhage and secondary bacterial infections. Fish lice are disc shaped, transparent, and move freely around the fish. Secondary bacterial and fungal infections many times follow infestations.

Anchor worm and fish lice are both killed by Dimilin at 2ppm in one treatment. Trichlorofon at .25ppm can be

used for 3 treatments 5 days apart. Fish lice will fall off in salt dip or potassium permanganate dip (50_70ppm) for 15 seconds.

Sporozoans

are another type of parasite. The two seen most often in our hobby are Coccidia and Mitraspora. They both affect goldfish and can form nodules on the fish. Coccidia is observed in goldfish in cold water. It can cause lethargy and emaciation as it attacks the intestines. Diagnosis is done through intestinal scrapings. Mitraspora causes bloating of the fish due to kidney damage. It mostly appears in September and October. The disease is transmitted in the spring through the urine.

There is no treatment for these sporozoan infections. One can only control the spread of the disease by removal of dying fish, avoiding feeding of live foods, and disinfecting ponds by liming and drying.

Internal worms

Digenetic trematodes appear in the intestines of the fish. They have a complex cycle involving birds and swine, and are rarely found in retail fish, however fish out of mud ponds can be infected. Once fish are infected they can not be treated. Tapeworm is found attached to the intestinal walls. It is treated by using praziquantel at 2ppm. Roundworms can be found in the intestine and also can be seen in necropsy as cysts in the muscles. Initially, it can be seen protruding from the anus of the fish. Roundworms are treated by using Panacur at .25% of food. Roundworms have an intermediate host of daphnia or tubifex. Therefore, to stop the spread of the disease, avoid feeding live food.

Bacterial infections will be the subject of my next article.

Fish Health Management (Part 6)

by Dr. Arthur Lembke

In this article I will review the information on bacterial disease given at the Fish Health Management course by Dr. Gratzek. First, it is important to know that not all bacteria cause disease. In the lab at the course, we grew many bacteria out of the water of healthy aquariums. Among these were benign bacteria that never cause disease (i.e. nitrifying bacteria), opportunistic bacteria that only cause disease under the right conditions (i.e. stress), and primary pathogens that always cause disease. Bacterial infections can be external or internal. Fish can become lethargic, lose spatial orientation, hemorrhage, develop ulcers, have frayed fins, become discolored, develop stomach distention or popeye.

Factors that predispose fish to bacterial infection:

- 1. condition of fish a. immune system down b. poor nutrition c. parasites d. viruses e. handling of fish
- 2. environment a. carrier fish b. high organics c. crowding d. temperature change

One can avoid bacterial infections by reducing stress on the fish. This is done by better nutrition, improved water quality, stabilizing water temperature in pond, and quarantine of new fish. Diagnosis of bacterial infections is done in diagnostic laboratories. Fish must still be alive when they arrive at the lab. Samples of internal organs can be taken shortly after killing the fish. Samples can be taken of lesions if the external part of the lesion is sterilized and a sample is taken from just under the surface of the lesion.

Mycobacterium

is a chronic progressive disease. It is seen as emaciation, popeye, frayed fins, chronic ulcers, and decreased appetite. It generally affects older fish. It is controlled by maintaining water quality and removing sick fish from

the pond. Most antibiotic treatments are ineffective. Hobbyists should be aware that this bacteria can be transferred to humans. Therefore, persons with cuts on their hands should wear gloves when cleaning around ponds. *Aeromonas* is the most common bacteria seen in lesions of koi.

Aeromonas

is always found in the pond and infections normally follow stress due to recent shipment, handling, parasites, and viruses. When external signs are present, they may include hemorrhage in and around the gills and anal area. Ulcers can occur any place on the fish. When systemic infection occurs, you will normally see abdominal distention and popeye. *Aeromonas* can be isolated from kidneys of infected fish. Treatment includes changing water, cleaning wounds, 0.3% salt in pond water to ease osmoregulation, and injecting fish with antibiotics. Dr. Gratzek's favorite is Chloramphenicol at 0.5ml to 1.0ml intraperitoneally every other day for 3 days. Baytril can also be used for injection. Dr. Gratzek preferred intraperitoneal injections to intramuscular injections.

Pseudomonas

appears as fin and body ulcers, many times accompanied by *Aeromonas* infection. Therefore, treatment remains the same as for *Aeromonas*, and there is no need to differentiate between the two bacteria.

Yersinia

can attack carp, although it is mostly seen at the wholesale level. It appears as hemorrhage of the mouth and throat, hemorrhage at the base of the fins, lethargy, popeye, and darkening of the skin. Antibiotics in the food will generally control the infection. If hemorrhage appears, injection is a better treatment.

Columnaris flexibacter

also occurs in koi. It appears in warm water and can be seen as fin and body rot, saddleback lesion, mouth fungus, cloudy eye, gill disease, or even death with no lesions. Antibiotics used to treat this infection include sulfa drugs, tetracycline, and nitrofurans. However, since *Aeromonas* often is seen in conjunction with this infection, antibiotic injection may still be the best treatment.

As a personal note, I would add that most bacterial infections appear as ulcers, and once ulcers appear injection of fish should be considered. If you are not comfortable with giving injections, then antibiotics can be added to food and water. If too many antibiotics are used for too short a time or at too low a dose, bacteria can become resistant to the antibiotics. This must be avoided as there are a limited number of antibiotics available to the hobbyist for treating bacterial infections.

Organics in the pond water can alter the amount of antibiotic available for the fish to absorb. Therefore, Dr. Gratzek recommends doing a water change before adding antibiotics to the water and a major water change 4 hours later to avoid exposing the fish to low doses of antibiotic over long periods of time. Water hardness may also affect the dosing level of antibiotics. Antibiotics can be added to food, and Dr. Gratzek suggests mixing it in cod liver oil to make it stick to the food. His instructions for mixing food include using 100 to 250mg of antibiotic mixed with a shot glass of cod liver oil added to 1 and 1/2 cups of food. Then lay out the food to dry and blot. For bacteria in general, Dr. Gratzek suggests using formaldehyde first and then antibiotics. Guidelines include using correct dose, minimal time, ending treatment by water change after 4 hours, aeration, and stop filter. Experiments were done and the results suggest that of all the medications and antibiotics we use in our ponds, the only one that seems to harm the filter is methylene blue. Fungus and viruses will be the topic of the next article.

Fish Health Management (Part 7)

by Dr. Arthur Lembke

This article will focus on the discussion of fungus and viruses as presented by Dr. Gratzek at the course on Fish Health Management.

Saprolegnia

is the most common fungus found in koi. It shows as a white, fuzzy mass on the fish. Lesions often occur just forward of the dorsal fin and can be associated with a preexisting wound. Predisposing factors include presence of another disease, stress, and temperature changes. Lower water temperatures favor the growth of the fungus. Malachite green is the primary mode of treatment. It can be painted on the lesion, used as a bath of 2ppm for 30 minutes, or used at 0.1ppm for long term. Stop filtration and do water changes every 2_3 days.

Viruses

can infect koi as well. Viruses are the least studied of all the diseases because of cost restraints. They can only be cultured on living cells and can only be seen on electronic microscopes. They can be tested for by using a PLR Test or fluorescent microscopy. A viral disease is suspected after all other possible causes have been eliminated. There are no antiviral drugs available for fish. To stop spread of the disease, one should quarantine fish for at least 21 days.

Lymphocytosis

can affect goldfish and koi, resulting in an increase in the size of cells up to 50,000 times their normal volume. Cells can enlarge on the fins, eyes, and mouth. It can spread from fish to fish by contact of the virus with openings in the skin due to handling, sores, or parasites. Masses can be surgically removed and then cauterized.

Goldfish Iridovirus

can affect fish and attach to the swimbladder.

Spring viremia of carp

can cause hemorrhages and dropsy during the spring months.

In all the previous articles on fish health management, I have reported the facts as presented at the course and have not made any of my own suggestions. At the risk of over simplifying the diagnosis and treatment process, I would like to summarize and give my own diagnostic process for koi.

If a fish flashes in the pond, first check ammonia, nitrite, and pH of the pond. If these are not in the safe range, then correct them. If these are corrected or they were normal, then do a mucous scraping and check for parasites or protozoa. If anchor worms or fish lice are present, treat with Dimilin if you have it, or use Trichlorofon for 3 times. If flukes or protozoans are present, treat with formaldehyde 3 times. As with any disease, always add salt to the water at 0.3% concentration.

If white, fuzzy patches appear, consider fungus as the problem and use 0.3% salt and malachite green. If hemorrhage, ulcers, or fin or tail rot are noted, then always consider bacterial infections as the problem. First choice here is injection of Chloramphenicol, Baytril, or Azactam. I prefer intramuscular injection, although Dr. Gratzek preferred intraperitoneal injection. Second choice would be antibiotic food, and last choice would be antibiotics added to the water. When treating for bacteria, always start with formaldehyde in the pond because many infections follow parasite infestations.

Art's Medicine Chest

- 1. Salt - any disease
- 2. Dimilin - for anchor worm or fish lice
- 3. formaldehyde - for protozoans or flukes
- 4. trichlorofon - alternate treatment for flukes, anchor worms or fish lice as second choice
- 5. Azactam - for bacteria, injections
- 6. mercurochrome - for ulcer cleaning
- 7. Orabase with benzocaine - healing salve
- 8. MS222 - anesthesia
- 9. Nitrofuracin green - good for bacteria dip and contains malachite green for fungus

I hope these articles have helped give information that is useful to you. If you have the chance, I would highly recommend that you take the Fish Health Management course offered at the University of Georgia

Yours in koi,
Dr. Arthur Lembke

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September 22	
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Shows, Pond Tours and Seminars

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