President Corner

It looks like spring has evaded us again. Summer is just around the corner. Where did all the time go? Time is running short so be sure to clean your pond, plants, etc. Water temps are rising. Check your pond chemistry often to make sure everything is in balance. This time of year it is important to do this since our fish are coming out of hibernation.

A big thanks goes to the Essics for hosting our last meeting. Then another big thanks to C. Richardson for hosting this months meeting. If anyone would like to host a meeting just contact our newsletter editor. We will see that your name goes to a meeting date. A big thanks to all our host.

Pond Tour 2005 is right around the corner. Lets get those tickets out there. The first weekend in May is almost here. Let us make this the best tour ever.

This is also the time of year when our koi want to breed, if they haven't already. If they have you will know because your pond will be a mess. Do not fear your water will get back to normal.

We do hope all of you are having fun with your hobby. Raising Koi is fun, and watching them grow is the best of all.

For the love of Koi,

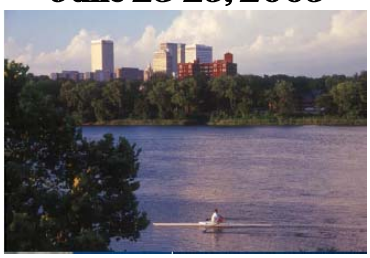
Bob Panter

Bob Panter
President SAKA

Koi People of the year
Dave & Debby Young

SAKA's AKCA
Fish of the Year
Ginrin Showa
Tom Ayers

Destination:
Koi Powwow in Tulsa, OK
24th Annual AKCA
Convention
June 23-25, 2005



Located in the center of the country on historic Route 66, Tulsa was created by Oil Barons (large collection of art deco buildings) with renowned Southern Hospitality and a touch of Western. The 2005 AKCA Seminar will be held in Tulsa, Oklahoma at the Crowne Plaza Hotel-Tulsa. Seminar special room rate is $80/night. Registration for the hotel at 1-800-227-6963

The Koi Powwow will be just as unique as it's host city.

Thinking of flying? Upon arrival, you will be greeted with a special Powwow welcome. Check in to a first class, newly renovated hotel with high-speed Internet connections in every room.

The city tour is comprised of shopping, gardens, unique museums with private docents, casinos, an aquarium and, of course, lunch. You select where you would like to go; stay as long as you would like. The Powwow express will shuttle you.

The Friday morning opening *don't miss!* Will be followed by seminars and break out sessions on topics including the current status of the Koi industry in Japan, the affect of shade on Koi color, picking and raising show Koi, Bonsai and many more for both the seasoned pro and the new hobbyist.

No seminar would be complete without a raffle. The Powwow raffle will donate half the proceeds to KHV research. Items are coming in weekly. To date, items include: Champion Nishikigoi, Tetra Pond Dynamag 500 pump, Aqua Ultraviolet, Hikari, Chengro Koi Foods, Mighty Pump, a 67" umbrella, Emperor Aquatics 40 watt Smart UV, a Samurai sword, original artwork and much, much more.

Remember; bring your key from Hawaii! Didn't go to Hawaii? Not to worry, each club will be receiving keys or get one in Tulsa. You don't want to miss the unlocking of the lock.

Register on line today!

A pronunciation guide for the hopelessly baffled

By Chuck Jones from Koi world 1999

Newcomers to the Koi hobby can have a rough time guessing how to go about pronouncing various Koi names and terms. Hopefully the following list of some basic abbreviated Koi type names, terms and their phonetic pronunciations will help. The definitions that go along with the terms and pronunciations are presented in a very concise form-only the bare basics of the meanings and translations are presented-so as to be less confusing. In trying to pronounce these Japanese terms, please remember that: The letter "R" is sometimes pronounced like the letter "L" in English. The Japanese pronunciation for the letter "I" is similar to the English pronunciation
for the long "E", as in the words “see." In this guide the Japanese letter "G" is a hard sound similar to its sound in the English words "get" or "give." Sometime Japanese vowels are not pronounced at all in the guide below, the accented syllable is in ALL CAPITAL LETTERS.

1. Al GOROMO (eye goh-ROH-moh). A Kohaku / Asagi cross with blue, gray, black or purple reticulation to the scales in the red patterns.

2. AKA (ah-KAH). Red.

3. AKA BEKKO (ah-KAH beh-KOH). An Orange/red Koi with black markings.

4. AKA MATSUBA (ah-KAH maht-SOO-bah). An orange/red Koi with a reticulated (matsuba) pattern on the scales.

5. AKAME (ah-KAH-may). An eye with a red iris or "albino eye."

6. ASAGI (ah-SAH-gee). A gray-to-blue Koi where the edges of the scales are a lighter blue-to-white color. This gives a reticuhted ("net") look to the scales. Asagi may also have an orange/red color on its stomach, sides, cheeks or fins.

7. BEKKO (beh-KOH). Koi with a base color of white (Shiro), orangered (Aka) or yellow (Ki) with "windows" of black markings on the base color.

8. BEN I (BEN-ee). Red. Usually a base color on Koi.

9. BENI-GOI (BEN-ee goy). A solid orange/red Koi with a darker red color than the Aka red.

10. BOKE (BOH-kee). A blurred or gray-black (sum)) area of a black (sum)) pattern.

11. BUDO (BOO-doh). Grape.

12. BUDO-GOROMO (BOO-doh go-RO-mo). A Kohaku-pattern Koi with purplish scale reticulation usually in red areas only.

13. CHA (chah). Brown

14. CHA GOI (CHAH-goy). A solid brown colored Koi.

15. DOITSU (DWAH-tsoo). A type of Koi derived from German mirror carp. They have scales along the dorsal area and / or lateral line (side of body) only. The other areas of the body are scale-less and have smooth skin. Many-types of Koi are produced in German-scaled (Doitsu) forms.
16. FUKARIN (FOO-kah-ren). An area of skin or scale where two colors transition to each other on a Koi. The defining line between two color tone areas.

17. GIN (gen). Metallic silver.

18. GIN MATSUBA (yen-maht-SOO-bah). A metallic silver Platinum Ogon Koi with a gray/black Matsuba pattern.

19. GIN SHIRO UTSURI (gen SHEER-oh OOT sir-Be). A silvery metallic Shiro Utsuri.

20. GIN SHOWA (yen SHO-wah). A silvery metallic Showa.

21 GINRIN (GEN ren). Common term used for Kinginrin or "sparkling scales." Hikari Metallic and Ginrin are not the same thing.

22. GOI (goy). Fish.

23. GOSHIKI (GOH-shkee). A five-color Koi. These often have a gray or even black net (reticulated Asagi) base pattern with a red "Kohaku" pattern on top of the gray base.

24. HAGESHIRO (HAH-gee-SHEER-oh). Black Koi with white tips on its pectoral fins and a white head and nose.

25. HAJIRO (hah-JEER-oh). Black Koi with white tips on its pectoral fins.

26. HESEI NISHIKI (HAY say NEESH-kee).German -scaled metallic Sanke or Doitsu Yamato Nishiki.

27. Hl (hee). Red.

28. Hl UTSURI (tree OOT sir-Be). Black Koi with an orange/red pattern. The orange/red pattern is considered "windows" on top of a black base.

29. HIKARI (HEE-kah-ree). Metallic.

30. HIKARI UTSURIMONO (HEE-kah-ree OOT-sir-ee MOEnoh). The show classification under which the metallic Utsuri and Showa are shown.

31. HIKARIMONO (HEE-kah-ree-MOE-noh). The show classification for metallic Koi of a single color and metallic Koi with a matsuba scale pattern.

32. HIKARIMOYO MONO (HEE-kah-ree moy-yo-MOE-noh). Show classification for all metallic Koi with more than two colors except Showa and Utsuri varieties.
33. KAGE (KAH-gay). "Shadow" or "phantom." Describes a hazy, reticulated or blurry black pattern.

34. KANOKO A dappled red (Hi) pattern.

35. KARASUGOI (kahRAH-soo goy). A black koi or a "Black Crow."

36. KASANE SUMI (KAH-sahn-ay SOO-mee.) Black (Sum)) hat is located on top of a red (Hi) color area.

37. KAWARIMONO (KAH-wahr-ee-moh-noh). A show classification of all non-metallic Koi that don.t fit into another classification.

38. KI (kee). Yellow.

39. KI BEKKO (kee beh-KOH). A rare non-metallic yellow Koi with black markings.

40. KI UTSURI (kee OOT sir-Be.) A rare black Koi with a yellow pattern.

41. KIGOI (KEE-goy). A rare non-metallic yellow Koi.

42. KIKUSUI (KEE-koo-soo-ee). A metallic platinum Koi with yellow, orange or orangish / red pattern. Usually German or leather-scaled.

43. KIN (ken). Metallic gold.

44. IN HI UTSURI (ken hee OOT-sir-ee). Metallic Hi Utsuri.

45 KlNSHOWA (kenSHOw sir-Be) Metallic Showa with a golden Luster.

46. KINDAI SHOWA (ken-dye SHO-wah). "Modern" Showa where the white is predominant over the black coloration.

47. KINGINRIN (ken-GIN-ren). Formal form of Ginrin

48. KIWA. (KEE-wah). The definition or "sharpness" between a red (Hi) and a white pattern area.

49. KOHAKU (koh-HAH-koo). White Koi with red pattern

50. KOROMO (KOH-roh-moh). The show classification under which Goromo are shown.

51. KUCHIBENI (KOO-chch-BEN-ee). "Red lips."

52. KUJAKU (koo-JAH-koo). A platinum Koi with orange or orange/red markings and a gray or black matsuba pattern. Also known as Kujaku Ogon.

53. KUMONRYU (koo-mohn-DOO). "Dragon Fish." Black (leather) German scaled Koi with a white pattern that can change its black-andwhite pattern periodically.

54. LEATHER CARP. A Doitsu Koi where the only scales are a row of small ones along each side of the dorsal fin.

55. MAGOI (mah-goy). A wild type of black carp, an ancestor of the modern Koi.

56. MARUTEN (MAHR-eh-TEN). A red spot on the head of a Koi and other red markings elsewhere on the body.

57. MATSUBA (maht-SOO-bah). A gray or black marking on the middle part of the scales that give the impression of a "pine cone" pattern. men-wah-ray-literally: split mask. In Kendo, a Japanese martial art, this term describes a sword stroke that lands between the opponent's eyes, splitting the mask, and ending the match-a killing stroke. In Koi, it refers to a black line of sumi that runs diagonally from the Koi's forehead to its nose or mouth, in effect "splitting the mask."

58. MATSUKAWA-BAKE (maht-soo KAH-wah bah KEE) A non-metallic black-and-white normal scaled Koi that changes *its* pattern layout.

59. MIDORI (meh-DOHR-ee). Green.

60. MIDORI-GOI (meh-DOHR-ee goy) A rare green Koi.

61. MIZUHO OGON (MEE-zoo-HOH oh-GOHN) A metallic orange-tobronze/ orange German-scaled Koi where the German scales are a darker bronze-to-black color.

62. MOTOGURO (moh-toh-GUR-oh). Black color that comes from the base or joint of the pectoral fin.

63. NARUMI (nay-ROO-mee). A medium blue color named after a town in Japan where cloth of this color is made.

64. NARUMI ASAGI (nay-ROO-mee ah-SAH-gee). A medium blue Asagi that is the desired color of those fish today

65. NEZU (nay-ZOO). Gray.

66. NEZU OGON (nay-ZOO oh-GOHN). A rare gray metallic Ogon an original type of the metallic.

67. NISHIKIGOI (neesh-KEE-goy) Colored carp or Koi. This is the formal term for Koi. "Nishiki" refers to a colored cloth or silk and "goi" means fish or carp.

68. OCHIBA SHIGURA (oh-CHEE-buh shuh-GUR-ay). A gray net knitbased color Koi with a brown pattern. Literally translated-"autumn leaves on the water."

69. OGON (oh-GOHN). A single-colored metallic Koi.

70. ORANJI (ohr-in-JEE). Orange.

71. ORANJI HARIWAKI (ohr-in-JEE hih-ruh-WAH-kee). A platinum Ogon with a metallic orange pattern.

72. ORANJI OGON (ohr-in-JEE oh-GOHN). Metallic orange Koi.

73. PLATINUM. Metallic White

74. PLATINUM OGON. Metallic white Koi.

75. RIN (ren). A scale.

76. SANKE (SAHN-kee.). A white Koi with red and black markings on the white base.

77. SANSHOKU (san-SHO-koo). A three-colored Koi. Usually used to describe Sanke and Showa.

78. SASHI (SAHSH-ee). Front edge of a red or black color patterned area.

79. SHIRO (SHEER-oh). White.

80. SHIRO BEKKO (SHEER-oh beh-KOH). White Koi with black markings.

81. SHIRO UTSURI (SHEER-oh OOT-sir-ee). Black Koi with a white pattern.

82. SHOWA (SHO-wah). A black Koi with red and white markings. Showa are born black and develop red and white markings on the black base.

83. SHUSUI (SHOO-swee). A blue Koi with dark blue German scales which sometimes has an orange belly.

84. SORA-GOI (SOHR-ah-goy). Essentially an Ochiba Shigura without a brown pattern.

85. SUMI. (SOO-mee). Black or a black pattern.

86. TAISHO SANSHOKU (TlE-sho san-SHO-koo). Formal name for Sanke
.

87. TANCHO (tahn-CHOH). A term for a red spot on the head of a Koi where there is no other red on the body.

88. TSUBA SUMI (SOO-bah SOO-mee). Black markings that appear on white skin instead of a red pattern. Preferred arrangement on Sanke, for example.

89. UTSURI (OOT-sir-ee). Black Koi with either white, yellow or orange pattern.

90. UTSURIMONO (OOT-sir-ee-moh-noh). The show classification under which Utsuri are shown.

91. YAMABUKI (yah-mah-BOO-kee). Japonica bush that has yellow flowers.

92.YAMABUK HARIWAKI (yah-mah-BOO-kee hah-ruh-WAH-kee). Platinum Ogon with a metallic yellow pattern.

93. YAMABUKI OGON (yah-mah-BOO-kee oh-GOHN). The formal name for the Lemon Ogon, a metallic yellow Koi.

94. YAMATO-NISHIKI (yah-MAHT-oh neesh-KEE). Metallic Sanke.

95. YOTSUSHIRO (yote-soo-SHEER-oh)."Five Whites." A black Koi with white on the head and four fins.

What is the Nitrogen Cycle

- As explained by Tom Lansing

With the new season approaching and in light of the cold winter we have had and may continue to have, I thought this article might really help some of the members, who ARE going to see some filter stumbling and major start overs this year. Understanding what is happening can help. Rod Lawton

What is the nitrogen cycle? Good question and I'm about to give you more than you ever wanted to know on the subject. It's really kind of interesting. In it's simplest definition, the Nitrogen Cycle occurs as follow:

1. Fish excrete ammonia from their gills and kidneys. Ammonia also is formed from decaying whatever (leaves, uneaten food, etc.)

2. This ammonia is converted to Nitrite by Nitrosomonas bacteria

3. Nitrite is converted to Nitrate by Nitrobacter bacteria

4. Nitrates, in most cases, are harmless unless at high levels and are consumed by algae, plants or through regular water changes.

One of the most important aspects of successful koi keeping or any fish keeping for that matter, is biological filtration and its function in the nitrogen cycle. I read recently, that the number one reason novice fish keepers become disillusioned with the hobby is the frequency in which they experience high death rates of their aquatic pets after setting up a new system. Statistically, as much as 75% of the fish sold to hobbyists will die within the first 30 days and 2 out of every 3 new hobbyist abandon the hobby within the first year. This data applies to all types of fish but nonetheless, they're pretty staggering statistics. My very first four koi died in less than 24 hours. For some unknown reason to me at the time, they didn't like all that chlorine I had in the water to keep it clear.

One of the most common reason for these kill rates is known as 'new tank syndrome' or as your questioned asked, the 'nitrogen cycle.' The fish are simply poisoned by high levels of ammonia (NH3) that is produced by the bacterial mineralization of fish wastes, excess food, the decomposition of animal and plant tissues and let's not forget, the additional ammonia that is excreted directly into the water by the fish themselves. The effects of ammonia poisoning in fish include: extensive damage to tissues, especially the gills and kidney; physiological imbalances; impaired growth; decreased resistance to disease, and; death. Nitrite poisoning inhibits the uptake of oxygen by red blood cells. Known as brown blood disease, the hemoglobin in red blood cells is converted to methemoglobin. This problem is much more severe in fresh water fish than in other marine organisms and can easily cause death.

So, to quickly answer the question these are the 'nitrifying bacteria.'

Nitrosomonas bacteria convert ammonia (NH3) to nitrite (NO2)

Nitrobacter bacteria convert nitrite (NO2) to nitrate (NO3)

You don't have to go any further but for those interested, here's some additional information/data that I and few others might find interesting.

Nitrifying bacteria are classified as obligate chemolithotrophs. This simply means that they must use inorganic salts as an energy source and generally cannot utilize organic materials. They must oxidize ammonia and nitrites for their energy needs and fix inorganic carbon dioxide (CO2) to fulfill their carbon requirements. They are largely non-motile (can't move around easily) and must colonize a surface (gravel, sand, synthetic biomedia, and the 1001 other filter materials out there) for optimum growth. They secrete a sticky slime matrix, which they use to attach themselves. Species of Nitrosomonas and Nitrobacter are gram negative, mostly rod-shaped, microbes ranging between 0.6-4.0 microns in length. They have evolved to become extremely efficient at converting ammonia and nitrite. One disadvantage is, they have a very slow reproductive rate. Nitrifying bacteria reproduce by binary division. Under optimal conditions, Nitrosomonas may double every 7 hours and Nitrobacter every 13 hours. More realistically, they will double every 15-20 hours.

Nitrobacter and Nitrosomonas bacteria have limited tolerance ranges and are individually sensitive to pH, dissolved oxygen levels, salt, temperature, and most chemicals. They cannot survive any drying process without killing the organism. Doc Conrad will disagree with the drying process part of that statement but until he supplies me with scientific data, non-anecdotal, science on this subject isn't on his side. In water, they can survive short periods of adverse conditions by utilizing stored materials within the cell. When these materials are depleted, the bacteria die.

There are several species of Nitrosomonas and Nitrobacter bacteria and many strains among those species. Most of the following information can be applied to species of Nitrosomonas and Nitrobacter in general., however, each strain may have specific tolerances to environmental factors and nutriment preferences not shared by other, very closely related, strains. This is why Genesyz (Lymnozyme) coexists with Nitrosomonas and Nitrobacter bacteria, they don't compete for the same food source.

Temperature

The temperature for optimum growth of nitrifying bacteria is between 77-86° F (25-30° C).

Growth rate is decreased by 50% at 64° F (18° C).

Growth rate is decreased by 75% at 46-50° F.

No activity will occur at 39° F (4° C)

Nitrifying bacteria will die at 32° F (0° C).

Nitrifying bacteria will die at 120° F (49° C)

Nitrobacter is less tolerant of low temperatures than Nitrosomonas. In cold water systems, care must be taken to monitor the accumulation of nitrites. Here again, except for a few people I know that feel nitrifying bacteria can survive in freezing water, science isn't on their side. If either of them has found some data to the contrary, I'd be most interested to see it.

PH

The optimum pH range for Nitrosomonas is between 7.8-8.0.

The optimum pH range for Nitrobacter is between 7.7-8.2

Nitrosomonas growth is inhibited at a pH of 6.5. All nitrification is inhibited if the pH drops to 6.0 or less. Care must be taken to monitor ammonia if the pH begins to drop close to 6.5. At this pH almost all of the ammonia present in the water will be in the mildly toxic, ionized NH3+ state.

Dissolved Oxygen

Maximum nitrification rates will exist if dissolved oxygen (DO) levels exceed 80% saturation. Nitrification will not occur if DO concentrations drop to 2.0 mg/l (ppm) or less. Nitrobacter is more strongly affected by low DO than NITROSOMONAS.

All species of Nitrosomonas use ammonia (NH3) as an energy source during its conversion to nitrite (NO2). All species of Nitrobacter use nitrites for their energy source in oxidizing them to nitrate (NO3).

Chlorine and Chloramines

Before adding bacteria or fish to any aquarium or system, all chlorine must be completely neutralized. Residual chlorine or chloramines will kill Nitrifying bacteria. Most US cities now treat their drinking water with chloramines.

Chloramines are more stable than chlorine. It is advisable to test for chlorine with an inexpensive test kit. If you are unsure whether your water has been treated with chloramine, test for ammonia after neutralizing the chlorine. You can also call your local water treatment facility.

The type of chloramines formed is dependent on pH. Most of it exists as either monochloramine (NH2Cl) or dichloramine (NHCl2). They are made by adding ammonia to chlorinated water. Commercial chlorine reducing chemicals, such as sodium thiosulfate (Na2S2O2) break the chlorine/ammonia bond. Chlorine (Cl) is reduced to the harmless chloride ion.

Since dichloramine has two chlorine molecules, a double dose of a chlorine remover, such as sodium thiosulfate, is recommended. Each molecule of chloramine that is reduced will produce one molecule of ammonia. If the chloramine concentration is 2 ppm then your pond will start out with 2 ppm of ammonia. Chlorine Remover will reduce up to 2 ppm of chlorine at recommended dosages. During the warmer months chlorine levels may exceed 2 ppm. A double dose would be required to effectively eliminate the excess chlorine.

There's a character (I mean that in a kind way) in the UK, who believes that adding DO (dissolved oxygen) to one's filtration media is not only wrong, but has disadvantages. He's the only person on the face of the earth that thinks that, as far as I've ever found. Actually, as I stated above, the nitrifying bacteria consume more oxygen then our fish require. I believe that this person feels that given your pond water is oxygenated well, there is enough left over for the nitrifying bacteria in your filters to use. I personally don't want to have to depend on 'left over' oxygen for my nitrifying bacteria. Each one of my filter chambers has (4) air stones each, a total of 45 air stones.

As to good books on aspects of koi keeping, in my biased opinion and tens of thousands of others, there is only one, 'Koi Kichi' by some relatively unknown British guy named Peter something.

Good luck with your pond and filter system. Tom Lansing

HOW FEEDING CAN AFFECT WATER QUALITY

BY Ben Helm, Nishiki Koi , U.K. via MAKC 5/03

Reprinted from Koi, Ponds and Gardens Magazine, UK.

Every environment shares problems if the inputs into the system are out of balance with the rate at which they are removed or broken down. Currently, on the global basis, this is the case with CO2 and the earth's atmosphere and it is also true for every koi pond, where the regular addition of food into the pond environment will unavoidable lead to a change in the water quality.

It is helpful to understand the various implications for both koi and koi pond that are being fed regularly, the reasons why particular changes in water quality occur and the measures we can take to reduce them.

The stability of our pond environment is going to be threatened through the activities of feeding at many different states from the moment the food hits the pond's surface through to its digestions, assimilation and excretion and ultimate collection in the pond filter.

The impact of feeding on water quality. Leaching. Water is the world's best solvent and will readily draw solutes out of food, the moment the two come in to contact. Many water-soluble compounds in foods (most vitamins and minerals) will have a tendency to leach out of the food into the water and the longer the food is in the water before being consumed, the more extreme the leaching is likely to be. There is a danger of leaching making food nutritionally deficient, but most food manufacturers recognize this potential problem and ensure that food contains excess levels of water soluble vitamins. However, even a tiny degree of leaching is inevitable at each feed, causing nutrients to accumulate in the pond water, thus altering the water chemistry. Therefore, even through the natural course of feeding, the balance of the pond's chemistry is under threat.

Pre-soaking Food ? With the extent and speed at which leaching occurs, it should really bring in to question the practice adopted by a number of KOI Keepers, of pre-soaking food in the belief that it aids feeding and digestion. Pre-soaking food will cause most of the water soluble nutrients to dissolve, increasing the speed at which they leach into the pond. Is this good for water quality and koi nutrition?

Ingestion, digestion and assimilation. Even if koi consumed their food the second it was offered, feeding would still be implications for water quality, through their breakdown and utilization of food.

As koi are cold-blooded and the metabolism (biological tick over rake) is governed by water temperature, it is logical that they are offered different types of diet at different temperatures.

There is no reason why koi cannot be offered a summer diet all year round, as koi will simply digest and assimilate (take up and utilize) what they require, excreting any surplus. However, feeding a summer growth food all year round will have a detrimental effect on water quality (which in turn will affect koi health) by the levels of food excreted by koi.

What makes a summer food different from an autumn food? As summer is the warmest period of the year (allegedly) it is the period when koi will utilize their food for both growth and storage of energy for the follow winter period that is anticipated by their physiology. Consequently, such diets are high protein and high energy diets, ready to satisfy their increased nutrition demands. Yet if these diets are offered when koi cannot utilize them efficiently, then levels of excretion will be increased having a knock-on effect on water quality. Excess protein in particular is likely to affect water quality.

If protein in the diet is in excess of what koi require, koi will not utilize all of the protein in the diet for growth, but either break it down and burn it for energy or excreted high levels undigested.

Protein is made up of 4 elements, carbon, hydrogen, oxygen and nitrogen. When protein is used as a source of energy, koi utilize the carbon, hydrogen and oxygen element, but excrete the nitrogen in the form of ammonia. Consequently, too much protein in the diet is likely to lead to an increase in the levels of ammonia excreted by koi.

In addition, the undigested proteins excreted by koi) along with other organic material, will attract significant bacterial action by oxygen demanding heterotrophic bacteria. Interested in the organic element of the waste, such bacteria will also lead to an additional release of ammonia into the water. When koi are ever subjected to excess food (both quality and quantity) it will have serious implications for water quality, but if your filtration is adequate. Will, avert any short term toxicity problems (ammonia) but still ultimately lead to build up of nitrates. The accumulation of excreted products (both solid and soluble) will also lead to further noticeable changes in water quality.

Build up of soluble organics. The accumulation of soluble organic pollutants either directly from food or indirectly from excretion will cause water to become discolored, often taking on a yellowish tinge. This may also be accompanied by excessive frothing that is caused by the build up of soluble organic matter, created around waterfalls and venturis where pond water mixes vigorously with air. The presence of a high organic content in the water causes the formation of stable bubbles, that do not readily burst.

Build of of Inorganics. Besides the accumulation of nitrates after the filter's handling of ammonia, feeding can also cause quite a build up of other inorganic compounds-particularly phosphates and sulfates.

Although not as directly observable as organic compounds that cause discoloration and foaming, phosphates can lead to the proliferation of algae. As most koi ponds are plant free and fitted with a UV lamp to kill green water, blanketweed is likely to proliferate in such a nutrient-rich and competition-free environment.

Reducing the Impact. In the current fight against global warming, we recognize that a proportion of CO2 emissions can be added through careful management and the use of alternative energy sources. The same is true for reducing the impact of feeding on a koi pond where the main objective is maintaining healthy koi and to provide them with a stable and healthy pond environment. Having identified that feeding can cause both short-term and long term instability to water quality, our koi's health will benefit if we can reduce such instability.

Measures to reduce the impact of feeding on koi pond instability.

1. Feed the most appropriate diet: Ensure that koi are offered the protein and energy content they require and can most adequately utilize. This means feeding lower protein diets at cooler temperatures, moving to a higher protein diet when the water warms up..

2. Feed on basis of a little and often: If too much food is offered at any one time, nutrients have longer to leach out into the water. Not only does this risk causing fish deficiencies, but will also taint the water color and lead to the proliferation of algae.

3. Reconsider pre-soaking food before feeding.: Pre soaking food pre-leaches nutrients prior to adding the food to the pond.

4. Water changes: The best strategy for creating a stable water quality is not to leave lengthy periods between water changes. This keeps you on top of any build up of food-related compounds and ensures that the addition of freshwater is not too dissimilar (and therefore stressful) to the pond and to koi.

5. Protein skimmer: The installation of a protein skimmer can be a useful tool in removing dissolved organic compounds from the pond water. It should not be used in place of regular partial water changes, but may allow you to reduce the frequency of water changes.

In Summary: We feed our koi to enhance their health, growth and coloration, but in doing so, unintentionally present our pond with potential water quality problems which must be managed to maintain a stable and healthy pond environment.

Managing Your Disease "Odds"

By Hugh Mitchell, D.V.M. Licensed Veterinary Medicine for Your Koi Reprinted from Washington Koi and Water Garden Society Newsletter, via Mid-Columbia Koi & Pond Club.

At a recent talk, I tried to put forth the concept of disease as being more than the result of an encounter of the fish with a pathogen (bacteria, virus, or parasite). A more accurate way of viewing disease is to see it as a complex combination of factors about the fish, the pathogen, and the pond environment which come together like "the ingredients in a recipe." These factors work in concert to produce the specific "flavor" of a malady - each disease with its own complete set of fish, pathogen, and pond environmental factors, without which disease cannot happen!

This means that disease IS NOT A RANDOM EVENT! It happens for a reason, and the secret to keeping your fish disease-free is to recognize the set of circumstances that produces a particular disease and do what you can in your pond, and with your fish, to minimize them.

This is easier said than done. In fact, another fish veterinarian from the U.K. puts it quite nicely when defining what fish medicine is all about: "Diagnosis and treatment are often quite straightforward but the underlying (pond) management problems need to be corrected as well." We call these "pond management problems" risk factors. They come from the same three things.

1. The Fish, 2. The Pathogen, 3. The Pond Itself.: Therefore, the key to avoiding disease is to identify and, when possible, remove or reduce the effects of these risk factors for each particular disease and many are common among many diseases!.

In human and economically justifiable veterinary medicine, these risk factors have been scientifically studied for many diseases by sophisticated statistical methods. For a particular disease, numbers representing degrees of risk or "odds" for those familiar with gambling, have been generated, and thses are ranked so that people and animal caretakers have prioritized lists of those things which decrease the chance of getting a particular disease. Now, the "odds" concept is extremely important, because it illustrates that prevention or production of disease is not absolute! Theoretically, it should be, but there are just too many subtle and ill-defined interacting variables to be absolute. In other words, getting a disease with all the risk factors present is not a certainty, just as avoiding the disease is not, but there are certainly some avoidable practices which will greatly reduce the chances of getting a particular disease.: Okay, if you made it this far congratulations, because it is a complex concept and I have only scratched the surface! So, what does this mean for your koi and your pond~Well, to my knowledge, there has never been a good study performed to try and define the risk

factors that increase the chances of even our common koi diseases. We can, however, use some make a best guess at what these are for some of the more prevalent diseases. Let's take Bacterial Ulcer Disease BUD for example. Here is my semi-prioritized list of what are the most important risk factors that contribute to this disease in your pond. Now, in presenting this list, please remember, it is not scientific! I would love to have the resources and time to more accurately work out the relative contributions of each factor. Maybe someday, but until then, these are open for debate, amongst hobbyists and veterinarians, alike! Each risk factor listed has a few brief comments attached and is worthy of a whole article itself-especially the first one. However, I am confident that if you work towards reducing these, you will go a long way to reducing not only the frequency of BUD in your pond, and also increasing the effectiveness of treatment. Many are related to each other, so in working to correct one, you will correct others.

2. Rapid change-any change!: The fish physiology is extremely intertwined with its aquatic environment (it lives in its own toilet!). It is not good at coping with rapid change in pond water parameters. This is especially true for day-to-day fluctuations in temperature (especially in and out of that 55 to 65 degree F range). Also pH, oxygen, and other water chemistry changes can be very good water quality! Another important point about change and BUD, is that koi in a pond get used to the kinds and numbers of bacteria, viruses, and parasites that are present (disease causing ones and others)! The pond microbiology is a literal soup! A kind of balance gets set up. Changing this, whether by introducing new fish, or treating the pond with those "organic burners" (e.g.: potassium permanganate), can result in a whole new situation which the fish has to get used to, all over again! Be careful and minimize change to minimize BUD! Bigger deeper ponds are far more resistant to change than smaller and/or shallower ones.

3. Medium-Cold-Water: It seems that some of the bacteria implicated in BUD (e.g.: Aeromonas sp, Pseudomonas sp, etc.) Have the upper hand over the fish at around 55 to 65 degrees F (also see above). This is probably because the bacterial machinery is more efficient at these temperatures than that of the koi's immune system. If you can afford it, get a pond heater to minimize this risk factor, and keep temperatures consistent at 65-75 degrees F during those fluctuating spring and fall seasons.

4. Poor water quality: No need to harp on the importance of ammonia and nitrite control, is there? Be careful in the fall when fish have grown through the summer; you are used to summer feeding amounts, and the efficiency of your biofilter is decreasing because of falling temperatures, Low total hardness and alkalinity may be extremely important risk factors for a number of reasons (a future article). Soft water tends to be prone to changing other water quality parameters (see 1!), and harder water is thought to aid in more efficient gill function.

5. Subsaturation Aeration: Aerate well with supplemental airstones-especially as temperature rises in the spring, at maximum pond temperatures, and during the night. BUD bacteria seem to enjoy a pond where the fish are not experiencing well-aerated water!

6. Inadequate Water Movement: Put some good current in your pond with a well-angled inflow or venturi! It seems to be good for the koi's "well being," as well as conditioning. The benefits on koi physiology can only be guessed at, but some have said that good current may cause koi to work more and thereby reduce stress (works for people - who am I to argue?). Also, there may actually be a phenomenon whereby a current reduces the effective "contact ratio" (a medical concept) effect of bacterial transmission between fish.

7. No Salinity: Much has been said and written about the benefits of salt. Fish blood is at 0.9% and although they need a little bit of an osmotic gradient, reducing the work they have to do by keeping pond water at 0.1 or even 0.2 is a good idea. It helps the gills work better and bacteria and parasites don't seem to like it as much!

8. High Fish Densities: More and/or bigger fish results in: more waste, more bacteria (even from recovered shedding carriers!), and a chance for more change.

9. High Infectious Pressure: Simply put, this means that high numbers of bacteria will make other listed risk factors even more important to control. REMOVE SICK FISH FROM YOUR POND TO YOUR HOSPITAL TANK as they will build up the infectious pressure and make other fish more susceptible. Identify the bacteria and treat early with a targeted pharmaceutical.

10. Type Of Bacteria: Certain bacteria do not need the risk factors to be as out of balance as other bacteria do. The term is that they are "more pathogenic." By identifying which bacteria your pond has been infected with can help determine how "off" the other fish and pond environment factors are.

11. Poor Immune Status: A fish with a better immune status can stave off higher numbers of more pathogenic bacteria. The immune status of a fish will be affected by other listed risk factors. In addition, different individual fish/varieties (like people) at different times, will have more"robust" immune systems than others. Centuries of inbreeding appears to have made our current show koi less robust than the common carp. Is it now time to start breeding for form AND function? Also, the immune status is what a good vaccine is supposed to improve.

12. Mucusmembrane Disturbance: The slime layer is the primary physical barrier in a fish to bacteria. It is colonized by good and bad bacteria (which can live nicely in a balance). It can be disturbed by crowding, improper handling, poor nutrition, and other risk factors. "Organic burners" can also remove a lot of it, meaning that the fish has to re-secrete and bacteria have to re-colonize (see 1).

13. Excessive Parasites: By tying up the immune system, causing wounds, and disturbing the slime coat, parasites can make a fish more prone to BUD (as can parasite control medications!). Therefore, treat, but treat with caution.

14. Poor Nutrition: Poor nutrition does not give a koi the proper building blocks to thrive and maintain a responsive immune system. Pay special attention to your food's freshness ("born on" date), fish meal quality, and vitamin level (especially A, B-complex, E and C). Refrigerate your food in a sealed container. Nothing can predispose a fish to BUD more than bad, oxidized, or toxic feed (which can happen in a bag in "hot spots"). Hugh Mitchell, DVM Copyright 2000 Feedback mitch@wetvet.com

Kawarigo Korner

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June 17, 2005
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June 23 -26, 2005
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September 25, 2005
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