Compiled in 2005, updated in 2015

Compiled by Bill Hoerner, updated by Stacy Fenhaus

BETTAS: A BEGINNER'S GUIDE

INTRODUCTION
by Bill Hoerner

This guide for beginning betta enthusiasts was put together in the hope that it will help newcomers to make a good start and avoid the frustrations and pitfalls that others experienced when they began in this most fascinating area of the tropical fish hobby. The authors are IBC Certified Judges and successful breeders who have held various positions in IBC and their local club, Bettas of the Sunshine State. Lee Branscome's article, BETTAS MY WAY, is based on firsthand experience and a review of various articles on betta spawning. Bill Hoerner's article, ALL YOU EVER WANTED TO KNOW ABOUT BETTA GENETICS, is based on a number of sources and was written because he could not find a simple overview anywhere.

In order to make the best start possible you should obtain the best breeding stock you can. Now, we realize that you may be very impatient, as most of us were when we began, so go ahead and spawn any pair you can get from any source. Even though you won't be likely to get any show quality specimens from such a spawning, the experience is good. There are a few ways to acquire good breeding stock. Perhaps the best way is to attend a show auction and purchase class winners if any are up for auction... in any case you can see what is available before you make any decision. You can review the results of various shows published in *FLARE!*, the bi-monthly IBC bulletin, and contact the winners in the classes in which you are interested. You can order bettas from IBC members advertising them in the Trading Post on the IBC website. A local betta club, if there is one in your area, is a great source of breeding stock and information. If you want to be a successful breeder and competitor, then sooner or later you must acquire the very best breeding stock you can.

Newly hatched brine shrimp are the most important source of food for your fry. Brine shrimp eggs are readily available at local pet shops and can be purchased in bulk, usually one to three pounds, from the IBC Store and distributors. Lee Branscome's article more than adequately covers brine shrimp. Lee also mentions microworms that are little critters smaller than brine shrimp that are raised in a medium of corn meal or baby oatmeal made into a paste and sprinkled with baker's yeast. Microworms are a good supplement to brine shrimp once they have absorbed their yolk sacs; some breeders add infusoria to the fry tank, because infusoria do not naturally occur in the fry tank in sufficient quantity. The most popular infusorian is paramecium, which is easily raised in a jar of water that contains one or two rabbit food pellets. Some breeders use fine powdered dry food until their fry can eat brine shrimp. Infusoria and microworm starter cultures can be ordered from suppliers who advertise in the leading tropical fish hobbyist magazines, though check with your local chapter as well. One can also place an ad in the Trading Post indicating that starter cultures are wanted.

This guide is very basic and intended only to get you and your fry through their first 8 to 12 weeks of existence after which you will get into jarring and selecting potential breeding and show stock. Beyond those 8 to 12 weeks you will benefit from your own increasing experience, contact with other IBC members, and the use of IBC s Technical Assistance Library which contains a wealth of articles written by experienced IBC'ers. All of us in the IBC are ready and willing to help each other, so if you have a betta problem, ask for help.

BETTAS MY WAY

By Lee Branscome (Updated by Stacy Fenhaus)*

When I started to spawn bettas a couple of years ago I looked for reading material on the subject. I thought that out there somewhere was an article or book that would spell it out for me step-by-step so I wouldn't need to go through a trial and error period. Perhaps I could just jump right in and do it like the "pros". Well, I read many such accounts on How-To-Do-It with bettas and still had many unanswered questions. Each article had a little different method. Each person I talked to at our club did it a little differently. Finally I realized that there were as many different methods as there were betta breeders and that I would eventually need to establish my own method rather than adopt someone else's ready-made plan. The goal that I was striving for was a simple method that was the least time consuming, inexpensive and yet productive. After many spawns were set up, both successful and unsuccessful, my simple method finally emerged. These are the steps that I take at the present time. I've been doing it this way for some time now because it works for me almost all the time. I'm still open to suggestions to new ideas so I might find a need to change or modify it in the future. If you are new to spawning bettas I am sure my system will work for you, maybe not every time but often enough that soon you'll have more bettas than you'll know what to do with.

EQUIPMENT NEEDED FOR SPAWNING

1. 5 GALLON (21L) TANK WITH COVER
2. 25 TO 50 WATT HEATER
3. THERMOMETER STRIP
4. STYROFOAM CUP
5. GLASS CHIMNEY
6. BOTTLE OF WATER CONDITIONER
7. YOUR CHOICE ICH/VELVET PREVENTATIVE
8. ANTI-BACTERIAL/FUNGAL MEDICATION
9. SMALL AIR PUMP
10. SPONGE FILTER
11. AIRLINE TUBING
12. PLASTIC AIR VALVE

THE AQUARIUM: I don't think the size is too important. I've had spawns in 10-gallon (38L) tanks and in plastic shoeboxes, as well as 5-gallon (21L) tanks. The 10 gallon (38L) works just great but they are more trouble to wash up and take up more space. The sweater box is cheap and all you need to do is cut a small hole in the top for a heater. The plastic is brittle so it doesn't cut well without cracking. It's best to use a wood burning tool or soldering iron and melt the hole. Some people use ½ gallon (1.8L) tanks successfully. I've stayed away from them because I think it would be easy to pollute the water in such a small space.

I currently have six 5-gallon (21L) spawning tanks and that's what I use. All but one of my tanks came with standard glass covers that work just fine. One is a relic from Goodwill, and I stretch cling film over the top of it. The type of cover doesn't seem to be important but you must have a reasonably tight cover. I've heard a lot of reasons why we need tight covers that I don't completely agree with. My reason for a cover is to keep drafts from causing the bubbles in the nest to dissipate, making the job harder for the male.

LIGHTS: I've heard a lot of stories about tank lights, what types to use, how many watts, leaving them on all night, and so on. Out in the rice paddies bettas spawn without lights just as they do in my fish room. The only lights there are for my convenience, they light up the fish room not individual tanks. I also have a 100 watt bulb mounted on a photo-flood stand that I can move around from tank to tank to occasionally have a closer look, but that has nothing to do with getting the fish to spawn. Regular daylight is all I need, and it's free.

WATER DEPTH: How deep do you make the water in the tank? Most agree that 4 to 6 inches is best as this reduces the amount of swimming the fish have to do to retrieve falling eggs and fry.

WATER TEMPERATURE: Put the water in your tank and adjust to 80°F (26.6°C) exactly. This seems to be the only thing that betta breeders agree upon so why fight it. I have a simple method of getting the water close to 80° quickly. I have a quart jar with a digital thermometer strip on it. I run tap water mixing hot and cold into the jar and pouring it out again until the mix is coming out at 80. Then I fill 2-gallon (9.5L) buckets and pour them into my tank. Only a small adjustment with the heater knob will soon make them exact. Ensure you monitor water temperature for a few hours to verify that the heater is functioning correctly.

THE HEATER: I use a 25-watt heater in the spawning tank. I buy the cheapest brand available. Sometimes they stick and either heat up too much or not at all. That's when I throw them out and buy a new one. The more expensive heaters might be better in the long run but who knows, they might stick too.

THE THERMOMETER: I use the plastic digital thermometer strips. I like them because they are easy to read and reasonably accurate. I've thrown away the glass ones that stick on with suction cups. After a while the suction cups dry up and don't work well.

WATER ADDITIVES: I add a chlorine/chloramine-removing water conditioner to the water (such as NovaAqua or Prime). The amount varies from product to product; please check the instructions for proper dosing. I also add an Ich and velvet preventative (such as Aquari-Sol or salt). I lost many spawns during the first 10 days after hatching before I started using it. Dried Indian Almond Leaves are often used to lower the pH and infuse beneficial tannins into the water but this is optional.

ADDITIONAL ITEMS IN THE TANK: I place three more items in the tank before the fish.

1) A Styrofoam cut cup in half lengthwise so that it resembles a mini airplane hangar. I float this at the front of the tank, positioned so that I can see into it. Usually the male will blow his bubble nest under it. Some other items commonly used are wax paper, bubble-wrap material and small plastic lids (such as you find on Pringles chips).

2) I also add a glass kerosene lamp chimney, placing it at the opposite end of the tank from the Styrofoam cup.

3) (Optional) Live floating plants or aquatic moss. This provides a hiding place for the female and, later on, smaller fry.

ADDING THE FISH: At about the same time, I drop the female inside the glass chimney and the male in the open part of the tank, free to swim all around but unable to get at the female. He can see her and get excited but he can't harm her. Hopefully, he will build a good nest by the next day. If he gets a good nest started that same day I raise the chimney and release the female. If he doesn't build a nest I wait until the next morning and then I release her whether a nest is started or not. I leave the chimney in the tank for her protection. She can swim around it and stay on the opposite side of it, if the male is rough. When she's ready, she will come out in the open.

Most of my spawns take place on the second day from the time I put them into the tank. Sometimes it takes a few days longer. The longest I've waited was 10 days before they spawned. After about 4 or 5 days I usually separate them if he has not built a nest by that time. It seems to be more productive to try another pair and come back to them in a couple of weeks.

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I label the spawning tank identifying the spawn number and the fish. The two fish are listed by the spawn they came from and their individual number or where I got the fish if it wasn't from one of my own spawns.

I also put down the dates: the date they were mated, the date they spawned, and the day the fry hatch. It's very important to me later.

If you are trying one of your first spawns remember to be patient. The first spawn I set up I expected something to happen that evening -- it just doesn't work that way. After all, the female may be thinking what the male will think of her in the morning or perhaps she is thinking of her reputation. It takes a little time to knock down those barriers.

Sometimes during the early stages of spawning the fish nip each other and tear their finds badly, sometimes they are so gentle they could be shown the next day. Don't interrupt the spawning because of a few chewed up fins. Usually if the fish are young, the fins will grow back. I have lost only one fish (a male) in over 70 spawns.

Usually on my successful spawns, the timetable looks like this:

Day 1 Mated (fish are put in tank together).

Day 2 Release female from chimney; sooner if male builds a nest right away.

Day 3 The fish spawn. Afterwards the male will drive the female away and it's time to remove her and her chimney. Put the female in a jar of 80°F (26.6°C) water with light dose of anti-fungal/bacterial medication (such as MarOxy) added to prevent fungus and bacterial infections of her torn fins. The male will attend to the nest by himself, picking up eggs that drop out of the nest and replacing them.

Day 5 The fry hatch. You can see them drop out of the nest and swim back up by themselves. Some will drop to the bottom. The male will pick them up in his mouth and spit them back into the nest. He will continue to do this for the next 2 days.

Day 6 Remove the male in the evening before you retire. He has tended them long enough and they should be ready to go it alone now. If you wait until the next morning your chances of losing all the fry to a hungry male increases.

Day 7 In the morning feed the fry. They do not need to be fed before this time since they have been consuming their egg sac. By now they must feed on their own. The first 3 days I feed them lightly 3 times a day. In the morning, live (24 hours old) baby brine shrimp, at mid-day micro worms, and in the evening live brine shrimp.

After 3 days of this diet I discontinue the microworms but continue to feed live baby brine shrimp twice a day. They stay on this diet until they are old enough to eat other live foods such as tubifex or brown worms and adult brine shrimp (about 2 months old).

If the spawn date is delayed past day 3, move all other dates up accordingly with the same time spacing.

HATCHING BABY BRINE SHRIMP: At a pet store or aquarium shop buy brine shrimp eggs. Instructions for hatching are on the container. Mine are somewhat different so I'll explain my method. You'll need the following:

1. BRINE SHRIMP EGGS
2. NON-IODIZED SALT
3. 2, 2 LITER PLASTIC "COKE" BOTTLES
4. SMALL AIR PUMP
5. AIRLINE TUBING
6. TURKEY BASTER
7. BRINE SHRIMP NET OR PERMANENT COFFEE FILTER

Cut off the bottom 3 inches (≈8cm) of the Coke bottle and keep is as a base. Invert the top and place into the base. Fill the top portion (with lid) with room temperature tap water about 2 1/2 inches (≈6.5cm) from the top. Add 2 tablespoon (30ml) of non-iodized salt and about 1/3 teaspoon (≈2ml) of brine shrimp eggs. You can adjust the amount of shrimp depending on how big a spawn you have or whether you have several spawns.

Remember all you need is enough for 2 or 3 feedings. Do this with only one bottle. Hook up the airline so that it bubbles rapidly, keeping the eggs moving all the time. Start this at least 24 hours before you need to feed your fry for the first time. *Updated note: The eggs will have a better hatch rate and hatch more rapidly if you keep the bottle under constant light.* The next morning when you feed the fry, start the other bottle filling it in the same manner. As you use the shrimp in the first bottle, the second bottle is hatching for the next morning. Repeat the process each day and you'll have a continuous supply of newly hatched brine shrimp.

To harvest the shrimp, I take out the air line in the jar that is ready and put the jar next to a sink and wait 5 to 15 minutes for the shrimp to settle to the bottom, and the empty egg shells to float to the surface. You can tell when it's ready, the bottom of the jar will be a bright orange color and if you look closely, you can see thousands of shrimp swimming around near the bottom. I take the turkey baster and insert it carefully through the brown shells on the surface of the water and suck up the shrimp from the bottom. Once or twice should be plenty. I squeeze the bulb of the baster flushing the shrimp into a brine shrimp net (or permanent coffee filter) for harvesting, then I rinse them off in cool water. I use a dull kitchen knife to scrape them out of the net and feed them into the fry tank. You can also suck them back up with the clean water and feed your fry that way.

A word of caution... Don't forget to put the bottle back and hook up the air to it again. If it is left too long without the strong water circulation, your shrimp will die and all your fry will go hungry. Remember your next batch won't be ready for 24 hours. A couple of foul-ups here and you could easily lose a whole tank of fry.

One advantage of having the micro worms ready at all times is that you can use them in a pinch after such mistakes. I got my micro worm culture from a fellow fish club member and have kept it going for about two years with very little maintenance. They are advertised in FAMA and also sold by biological supply houses. Get some if you can.

Discard any leftover baby bring shrimp at the end of the day. It's tempting to keep them and spare yourself the trouble; but after hatching, the nauplii quickly use up their egg sac—which is the most nutritious part of them. Feeding your fry from this depleted source of food is not in their best interest.

THE FRY START GROWING UP: A few days after the fry hatch you may notice a scum forming on the top of the water. At this time I hook up another air pump with hose and air valve attached to the hose for controlling the flow of air. I install the hose in a sponge filter and adjust the rate of bubbles until they are gently breaking the surface of the water. One bubble every two seconds is a good rate. I continue with this until the fry have grown enough to require stronger filtration at about 6 weeks, at that point I turn the bubbles up as much as the fry can tolerate.

When the fry are still small (up to 2 months) I give them a weekly water change by siphoning a couple of gallons of water off and replacing it with same temperature 80° water with conditioners and additives added beforehand. I always siphon into gallon glass jars so that if any fry get sucked up I can see them and put them back.

If the water starts looking cloudy you probably have been feeding too much or waited too long for a water change, or both. Watch the bottom of your tank for an orange buildup of uneaten shrimp. If it builds up in a day or so, you are feeding too much and polluting the water. Cut down on the feeding -- all they need is enough for rounded out bellies after each feeding. If you give them more then they can eat, you'll just foul up the water.

A good rule of thumb is to feed your fry and come back in 20 minutes. If they all have nicely rounded out bellies and there is no food remaining—good job—that was the correct amount. If some are full and others aren't, immediately feed a little bit more. If all fry are full and the water is still teeming with food, you fed too much. Get ready to clean up the extras.

At about 2 months I usually move the fry to larger tank and continue with a sponge filter. This stays with them as long as there are still fish in the tank. From 2 months to 5 months is my favorite age of bettas. This is the time when the outstanding individuals start showing up in the tank. It's time for culling out the undesirables and a time for the best to prove to you that they are show quality or breeding quality. After all, this was so much fun that we'll want to pick the best and go for the next generation. Maybe.... just maybe.... they'll be even better than these.

ALL YOU EVER WANTED TO KNOW ABOUT BETTA GENETICS

By Bill Hoerner

Ever wondered why blue bettas crossed with blue bettas produce some green offspring, or why reds and yellows do not produce orange when crossed? There must be hundreds of questions like these. Hopefully some of the answers can be found herein.

This article is written as an expression of what one person, deeply interested in bettas, has learned from limited experience, from listening to what others have said, and from reading what Liebetrau, Lucas, Maurus, Sonnier, and others have written. There is a wealth of information available. I firmly believe that a reasonable understanding of betta genetics can greatly heighten the enjoyment and satisfaction that can be derived from our hobby. I think anyone who ignores this subject is doing himself or herself a real disservice.

Bettas possess two genes, one from each parent, for each characteristic. Each betta consists of many, pairs of genes, many of which are for characteristics that are not observable under normal conditions. The gene pairs that are of primary concern to us are those associated with coloration and finnage. Let's consider what these various gene pairs translate to in a normal betta.

The normal betta is not the exquisitely colored, magnificently finned beauty found in a bowl flaring at its neighbor, but rather the inconspicuous wild-type splendens which is short-finned and generally brownish with green highlights and varying degrees of red in the fins. This normal betta possesses layers of normal colors: yellow closest to the body, followed outwardly by red, black, and green in that order. The lovelies we see today possess, for the most part, mutations of the normal colors and short fins found in the wild-type.

A conceptual difficulty arises for some individuals when considering the normal colors. A betta possessing normal red is not a red betta. A betta that possesses normal black is not a black betta. A betta possessing a pair of the normal green or yellow genes is not a green or yellow betta. In fact, a betta possessing all four normal colors is a multicolor. Green, red, and a brownish variation or black can be observed, although yellow cannot because of its paleness.

There are basically two types of genes. Type I genes are those that express a dominant or recessive relationship when paired. The effect of the dominant gene is observable with regards to color and finnage. The effect of the recessive gene is not normally observable unless it is paired with a similar recessive gene. When a dominant long-finned gene is paired with a recessive short-finned gene, long fins will be observed. Sometimes a recessive gene can produce effects that are observable when paired with a dominant gene. Singletail bettas carrying a doubletail gene usually display wider based and more expansive fins than their all singletail counterparts. Type II genes are those that interfere with each other when paired. A classic example is the pairing of green and steel blue genes to produce blue.

The fact that any betta possesses all the normal colors or their mutations can cause a bit of a conceptual problem. However, at the risk of oversimplifying, the observable color or colors will depend upon the relative intensity and distribution of the various layers. A betta will, for example, be observably red when the red layer is very intense and evenly distributed and the other layers are lacking sufficient intensity and distribution to overcome the red. Solid colored bettas usually result only when one or more of the normal colors has mutated. The chart included herein lists the normal colors and their mutations and briefly describes each. It is interesting to note that a couple of the mutations are not so much involved with color as they are with patterns of color. The butterfly pattern is a mutation of red, and--even though it is dominant over normal red-- good butterfly patterns are often difficult to produce even when crossing butterfly to butterfly. The marble pattern is a mutation of black that produces many strange and varied effects. Marble bettas may not begin to display marble patterning until they are a few months old and then the patterning can change dramatically over a relatively short period of time. There are color varieties that are not the result of any single gene pair, but are produced by more than one gene pair. Pastels, for example, result when green, steel blue, or blue, overlay Cambodian. Whites are produced by a combination of mutations of red, black, and green.

The color chart indicates relative dominance within layers, but not between layers. It has generally been observed that the green layer and its mutations, the top layer, will dominate the other layers when intense enough and evenly distributed. However, as a result of varying intensity and distribution within layers, more than one color may be observed, as in multicolors. Intensity and distribution of any layer can be enhanced or subdued through selective breeding, depending on what one's goals are. One can select for darker or lighter, or brighter reds, greens, blues, or for creamier Cambodian body color, and so forth as desired.

Suppose you are not sure whether genes are functioning as Type I or Type II. You can find out which Type it is as few as two generations, provided you get large enough spawns, say 100 or more. Theoretically, Type I genes can result in 75% of a spawn appearing the same color, but Type II genes cannot. Let's check this out.

First, let's consider a Type I example. Assume that only the red color layer is present and that only the extended red (R) and non-red (Y) genes are involved. The male carries two R's and the female one R and one Y. The first Generation (F1) will be 50% RR and 50% RY, but they will all appear to be extended red. Why? Each square in the accompanying blocks represents 25%. Suppose, two of the F1 RY's are crossed to produce the second generation (F2)? F2 will consist of 25% RR, 50% RY, and 25% YY. However, 75% of the offspring will appear to be extended red and 25% non-red. Why? Review the color chart. Keep the 75% in mind.

F1

	R	R
R	RR	RR
Y	RY	RY

F2

	R	Y
R	RR	RY
Y	RY	YY

How about a Type II gene in action? Assume that only the green color layer is present and that only the extended green (G) and steel blue (S) genes are active. The male carries two G's and the female one G and one S. The first generation (F1) will be 50% GG and 50% GS; 50% will appear green and 50% blue. If two F1 GS's are crossed to produce the second generation (F2), the spawn will consist of 25% GG, 50% GS and 25% SS.

25% of the offspring will appear green and 50% blue and

25% steel blue. There is no way that 75% of the offspring can appear to be the same color. Look at the blocks and gene pairings very carefully and you should be able to tell why 75% look-a-likes can't occur.

F1

	G	G
G	GG	GG
S	GS	GS

F2

	G	S
G	GG	GS
S	GS	SS

The terms phenotype and genotype are frequently bandied about in betta discussions. They, especially genotype, can be very important when acquiring breeders. Phenotype refers to any observable characteristics. If a betta appears to be red, it is a red phenotype. A singletail betta is a singletail phenotype. A doubletail betta is a doubletail phenotype. What you see is what you get, or is it? Genotype normally refers to characteristics that are recessive to those observed. If there is no recessive characteristic, genotype is the same as phenotype. A red betta carrying two genes for extended red is a red phenotype and a red genotype. Breeders who work with melano strains can't use melano females because they cannot produce viable offspring. *Updated note: Some melano lines are now producing fertile females, be sure to ask the breeder.* The breeders usually use steel blue females who carry a gene for melano. These females are steel blue phenotypes, but black (melano) genotypes. Frequently, singletail bettas carry a gene for doubletail, making them singletail phenotypes, but doubletail genotypes. When breeder fish are acquired, it is helpful to know their genotypes. If, for example, the breeders are both doubletail genotypes while appearing to be singletails, they will produce doubletail offspring as well as singletail. So you can get more than you see.

Now that you know "everything" there is to know about betta genetics, go have some fun with it!

NORMAL COLOR PRODUCING GENES AND KNOWN MUTATIONS

NORMAL LAYER	MUTATION	DESCRIPTION
Yellow	------------------------	Very pale, innermost layer. Virtually always covered by other layers. Not observable. Not to be confused with non-red yellow. No known mutations.
Red	------------------------	Prevalent in the ventral, anal, and caudal fins.
	Extended Red	Denser than normal red and extends over the entire body and fins. Type I – dominant over normal red.
	Non-Red	Red is replaced by yellow. Type I – recessive to both normal and extended red.
	Red Loss	Initial red disappears partially or completely as the fish matures. Type I – dominant over normal red.
	Butterfly Pattern	Clear to white areas occur in fins where red is usually predominant. Type I – dominant over non-butterfly, but variably expressible.
Black	-----------------------	Prevalent throughout, but weakest in the abdominal area and caudal fin. Black
	Melano	is very dense and extensive. Melano females are incapable of producing viable offspring. Type I – recessive to normal black.
	Blond	Density of black is greatly reduced, but not absent as in Cambodian. Type I – recessive to normal black.
	Cambodian	Black is eliminated from the body, but may continue to exist to some degree in the fins. Type I – recessive to normal black.
	Marble	Black is of varying density which can change over time. Type I – dominance/ recessiveness hasn't been established due to the variability of the marble effect. Produces "fertile black" females capable of reproducing. The "fertile black" black is less dense than the melano.
Green	------------------------	Prevalent in the body area posterior to the head and in the bases of fins. Denser
	Extended Green	than normal green and extends over the entire body, but not usually over the head area. Type II – interferes with steel blue to produce blue, but functions as Type I in being dominant over normal green. Also referred to as Spread Iridescence.
	Steel Blue	Green is replaced by steel blue. Iridescence is of the same intensity as in the replaced green.
	Opaque	An iridescent, milky color replaces or combines with steel blue. Type II – effects are variable.

*Much of the information and text of the original article "Bettas My Way" remains unchanged and is thus still credited to Mr. Branscome.