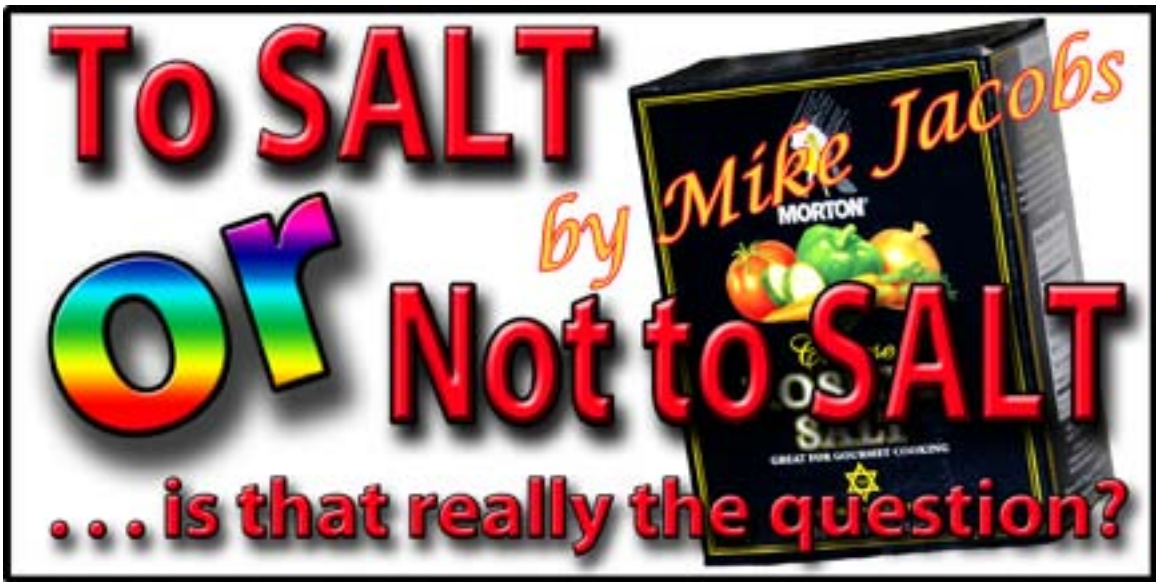

I have been in the tropical fish hobby for a long, long time . . . maybe almost 60 years . . . and I think I have heard most of the old tales and wives' tales and out and out falsehoods that have been told in the hobby. The "pH shock" tale was maybe the best tale of them all . . . the "pH makes a difference in keeping fish" was another . . . being "fed too many worms make for fat fish" . . . now I'm fat, but I've never seen a fat fish: maybe there is one somewhere but the rumor of "fat fish" from feeding them too many worms holds no validity . . . none . . . "black worms are as dangerous as red tubiflex worms" was another . . . NOOOOO . . . not even RE-MOTELY CLOSE! You want another rumor that is out of hand . . . "the rift lakes of Africa are hard water lakes"!!! The Rift lakes of Victoria & Malawi are a soft water environment: the exception is Lake Tanganyika which is very hard and high in pH and alkalinity however, the hardness is mainly from Magnesium not Calcium like our water. Manufactures, however, jumped on the band wagon and have marketed and sold "Cichlid Salts" which were really never needed![(#10)] Most of the rumors I just tried to ignore however some of them, quite frankly, even I got caught up in because I didn't THINK . . . I just took someone's word for it all. Now, with the internet availiable to all of us we can all do a great deal of investigative work concerning rumors and thoughts to illiminate all of the incorrect hobby rumors.

I want to investigate one of those "old time rumors" in this article.

SALT . . . there, I said it . . . the four letter word of aquariums . . . SALT . . . I don't ever want to hear it again. Whatever you say about salt it's not true, certainly terribly exaggerated and I'm gonna try to talk some logical sense to you . . . I hope. I don't have a lot of Scientific Factual malarkey BS published paper stuff . . . just some thinking some digging and some real information . . . BUT NEITHER DO YOU HAVE REAL PROOF . . . NO YOU DON'T . . . NOPE . . . because it doesn't exist . . . not at the level you guys are using salt!!!!! You may have some old tales and innuendos that have been passed down from person to person but no factual "paper stuff" . . . nope . . . it's not out there . . . I've looked! So let's agree to sit and talk and the best man wins in the end . . . or better said the aquarium hobby wins because this is getting really, really silly . . . but do your homework and don't just say "Well, I don't know, old Jeb told me about 30 years ago!" . . . that's not gonna buy it in this argument. When the public goes into some of the larger national tropical fish stores to buy fish and there are little salt containers in EVERY tank to maintain the salt level at about 4000+ uS (conductivity) you now know why the aquarium hobby is no longer the number two hobby in this country (from a study made in the early 1970's till the early 1990's) . . . behind photography (everyone has/had a camera). Here's the present hobby list of 2011 from WikiAnswers.com . . .Top US Hobbies:

1. Golf
2. Playing a musical instrument
3. Skiing
4. Gardening
5. Swimming

6. Snow Boarding
7. Mountain Climbing
We didn't even make the list and I think it's in large part due to salt! MOUNTAIN CLIMBING??? MOUNTAIN CLIMBING . . . the biggest thing I climb into is my bed???????????

OK . . . ME, WE, US . . . SALT or NON-SALT!

Let's begin this way. The gentleman who introduced me to real fish keeping was named Stanley Karafin in Gary, Indiana in the early 1960's and boy do I miss old Stanley, what a wonderful old character of a guy. Looking back, this was the beginning of the heyday of the undergravel filter and all of the "lifetime" tanks . . . "never change the water" was the mantra then . . . but not Stanley, he would always tell me . . . "Mike, get the poop out of your tanks and don't put poop in it either (use your sense of humor with poop)!!! . . . Change your water and change your filter medium as OFTEN as you think about it but never let it go for more than a month." Honestly, he said that to me 100000 times until it just became routine and automatic for me. I will forever be grateful to Stan for that lesson and what he taught me about aquarium fish and the aquarium hobby. I had to drive 20-30 miles to get to his store, passing several fish stores, but it was well worth all of the positive things he taught me in an age when rumors and wives' tales were absolutely rampant. "CHANGE YOUR WATER MIKE . . . get the poop out of the house!" Wheeew!! I tell you this story only to let you know that I was never allowed to let the tank go forever without water changes . . . never . . . and I was taught to never put "poop" . . . anything (even medicines) . . . into a tank! "You can only put so much 'poop' in an aquarium until you can no longer hide it. It's still in there and will bite you sooner or later." . . . Stan would holler. Now we know he's not exactly right but he was very, very, very close! Bad aquarium keeping was what was going on and it caused all sorts of problems for people when they went 8-9-10-11 months and only topped off their tanks every 3-4 weeks and CHANGED the tank once or twice every year and when they changed the water some of their fish died . . . oh!!! . . . must have been pH shock . . . Hmmmmm??? Now, when I hear people talk about salt and I ask them "WHY?" they tell me everything from nitrite poisoning to bacteria to Oodinium to " . . . cause Jeb said" but everything we are talking about today has to do with good . . . or maybe bad aquarium husbandry.
From what I can gather from reading and listening there are 3 basic reasons people feel the need to put salt in their aquarium:

1) Treatment of nitrite, NO_2^-, poisoning

My goodness folks . . . First of all, if you are having a nitrite problem why are there fish in the tank in the first place? Put the fish in a different tank and FIX the nitrite problem . . . don't be a typical person and look for a pill or a quick fix . . . rest easy, Stan, am I doing good here already? FIX THE PROBLEM, don't mask it! Do you need the tank that badly? Probably not . . . put on an outside power filter from an established tank and run it for 2-3 days . . . FIX THE PROBLEM! If that is REALLY the only tank you have then put a "bit" (defined later) of salt in it but remember to make 4-5-6 75% water changes in the very near future to get the salt out of the tank but remember this . . . HOW MUCH SALT DO I PUT IN (you actually don't need SALT you need the Chloride ion Cl^-)?!! For the salt (Chloride ion . . . Cl^-) to really help it has been shown and written scientifically, officially, that the chloride ion must be 6 times[(#1)(#7)(#9)] the concentration of the nitrites to be helpful. It is the chloride ion that offsets Nitrite toxicity (not the Sodium) and most natural waters already have chloride in them. Lake Michigan water, for instance, has roughly 18 mg/l Chloride ion that is enough to offset 3 ppm Nitrite toxicity entirely on its own . . . no salt. **Just nice clean fresh water is all that is needed!!!!!**

What is the Nitrite problem all about anyway . . . it's called Brown Blood Disease. "Freshwater fish, particularly **channel catfish**, are susceptible to brown blood disease, which is caused by an accumulation of nitrite (NO_2) in the water. Although most studies conducted on brown blood disease have used **channel catfish** as a model, many other freshwater species are susceptible to the condition.[(#9)] Continuing, "A minimum chloride concentration of 20 ppm is recommended to prevent nitrite toxicity among channel catfish in ponds. **FOLKS: Most ponds are supplied with water containing at least 20 ppm Cl^-**; however salt, should be added to ponds

containing less than 20 ppm Cl^- to increase the chloride concentration to the desired level.[#9] Did you read that . . . "**Most ponds are supplied with water containing at least 20 ppm Cl^-.**" . . . That means just add clean water . . . not salt to the POND (tank) . . . **regular water changes** will do the trick in a tank with a nitrite problem. If you really think salt is necessary then add grains of salt not teaspoons or tablespoons . . . GRAINS! But folks . . . we are talking PONDS not tanks of aquarium fish filled with ordinary tap water that already has 20 ppm chloride.

2) Treatment of osmoregulatory stress

This is what a lot of people hang their hat on. But listen to the facts: There does seem to be some validity to a bit of osmoregulatory stress of fish . . . but not very often. Generally it comes from a tremendous change in water of one osmotic pressure to water of a drastically different osmotic pressure when the fish is being moved, but once again and here is the point again: HOW MUCH SALT? Most scientific folks will recommend if the osmotic pressure is only a factor of +/- 300% simply don't worry about it . . . no harm no foul . . . but if you feel you must do something then add 1 - 3 mg/L of Chloride[#4] . . . (using the highest value of 3 mgCl/gal) that starts out to be 3mg Cl/l x 1mg NaCl/.6066 mg Cl = 5 mg NaCl/l . . . now, going through all of the above calculations . . . that comes out to .003 tsp NaCl/gal . . . that's .003 tsp NaCl/gallon (.003 tsp NaCl/gal x 333/333 = 1 tsp NaCl/333 gal) . . . repeat those values to yourself . . . 1 tsp NaCl/300 gal. And again, you want to treat a 10 gallon tank . . . ok, put in 10 x .003 = .03 tsp/10 gallon? How much salt do you want to use? A grain or two of salt?

Along with all of this osmoregulatory stress, and here is the really big one . . . NOT SALT!! The real culprit in fish stress control is CORTISOL[#1][#5][#6][#8]. When stressed, fish produce Cortisol. Among other things, Cortisol INHIBITS the loss of Sodium and Chloride in fish[#6]. In fact it has been shown that when fish are stressed the fishes body will normally go through an uptake of Sodium and Chloride[#6] through special cells on the gill filaments . . . combining this with the Cortisol STOPPING the loss of Sodium and Chloride, everything is fine until the stress is over . . . CORTISOL!!! Remember that name. By the way . . . again . . . in normal everyday water there is plenty of Chloride to be had by normal fish in normal tap water . . . no need to add salt! The amounts of Sodium and Chloride taken up during stress are miniscule . . . not teaspoons and tablespoons per gallon. Besides, it has been shown there is normally in the area of 20 mg/l of the chloride ion present[#9] in most waters . . . so here again, there is no need to help this process along . . . there is plenty of chloride in water for the fishes' needs in 99.999% of the cases.

3) Disease on the body of fishes

The book "Fish Medicine" (W.B. Saunders Company), by Michael Stoskopf[#4] says that salt at a concentration of 22 mg NaCl/L (22mg NaCl/L x 3.74L/gal x 1 tspNaCl/5500mg NaCl = .02 tsp NaCl/gal) (that's .02 tsp NaCl/gallon), used as a dip, for 30 minutes to control fungal infections and protozoal infestations is effective. Again . . . using the calculations as above this treatment comes to .02 teaspoon per 1 gallon . . . that's (.02 tsp NaCl/1gal x 50/50 = 1 tsp NaCl/50gal of water) . . . and he only recommend it for 30 minutes . . . 30 minutes . . . and you must monitor the fish's demeanor during the process . . . and some folks recommend 1 tsp NaCl/gal as a everyday occurrence! Of course you must understand why this dip works: the protozoa will burst under the osmotic pressure change from the freshwater to the saltier water because of osmotic pressure changes . . . imagine what that would do to a normal fish's gill cells when introduced to this amount of salt and then possibly back again if its owners are changed!

Those are the basic arguments I have heard for salt . . . and my rebuttals are there as well. Folks . . . salt is an irritant to freshwater fish. There is no doubt to this . . . no one denies this. Some freshwater fish will tolerate it better than others (brackish are ok . . . "tetras, catfish and fish that navigate by electrical fields are particularly bad"[#9]) but only a scant few were really designed by Mother Nature to deal with salt, why do we subject them to something that they were never, ever meant to be subjected to? Look at it this way! If you had some African Rift Lake Cichlids that were raised, of course, in HARD water, as some should be, and the cure for something was to put them into some soft water for 15-20 minutes. Would you then raise them continually in

soft water from then on just to prevent the problem from coming back? I really don't think any African Cichlid keeper worth his salt would do that. He would bring the fish back to "normal conditions" and do a better job of preventing the problem from reoccurring. As Ruth Francis-Floyd, from the University of Florida said so profoundly "Salt concentration should be based on intended use, duration of exposure, and tolerance of the species to be treated."(#9) . . . not the wholesale use of a bunch of salt on all fish.

I went to my fish room a bit ago to find out the conductivity change with salt in a tank. I emptied a 5 gallon tank completely and put 5 teaspoons of salt in the bottom of the tank (recommended doses of salt from some killifish breeders and other tropical fish folks is ½ to 1 teaspoon/per gallon) and filled it up with my tap water! The conductivity of my tap water is normally 415 +/- uS straight out of the tap and in the 5 gallon tank with 1 teaspoon/gallon (5 teaspoons total) of salt the conductivity shot up to 4120 uS. You guys make the call. Salt or not? You want an osmotic shock change . . . well, you got it! It is totally beyond my comprehension why anyone would want that amount of salt in their tanks. Remember, Michael Stoskopf in his book, "Fish Medicine" recommended the dose of 1 teaspoon/50 gallons of water and ONLY for about 30 minutes and then it was proper to monitor the fish and promptly take the fish out after 30 minutes because salt is such an IRRITANT.

Americans are wonderful people . . . we are among, if not the most, productive people in the world but we have been raised in a world where if 1 pill will do the job in aquariums use 8 and don't worry about it for the next 3 days . . . don't bother me. The quick fix is in and the levels of salt in aquarium tanks far exceed, totally, the limits that real aquarium scientists suggest. We all know where it comes from . . . old tales that get stretched . . . numbers get expanded upon . . . times get exaggerated . . . people exaggerate without looking things up or asking . . . and our precious hobby is suffering. We are putting fish from the Amazon (a conductivity of near 0 uS) in salt (a conductivity of 4500 uS) . . . we are putting fish that clearly never saw a grain of salt in the last 1000000000 years in salt big time and begin wondering why they don't live much less spawn. We wonder why they act funny . . . salt is a known big time IRRITANT!

Let's go back to really taking care of our aquarium charges without short-cuts. We read books and look things up and ask questions of people in the know . . . we challenge people who we differ with us . . . not to cause an argument but to discuss things and get them correct. Drop your ego! This is not an "ego thing" . . . it's a "let's get it right thing"!!! As is with most arguments the resolve of my discourse here may lie somewhere between your story and my story . . . Ok, for the sake of an argument, I'll give you that much and buy that for the moment of this conversation but I would issue you this challenge then. Let's say you have 10 tanks at home, all of them with salt in them to the tune of approximately 1 teaspoon/gallon. I challenge you to take one of those tanks and completely eliminate the salt from that tank for 9-10-11 months or a year . . . slowly back the fish down (or you will lose them) from the salt of course but totally cleanse the tank of all salt . . . a complete breakdown. I bet you will be completely surprised. OOOPPPSSSSSS, nothing has happened and the fish didn't die and they are fine without the "salt cure-all". There is no . . . I SAY NO . . . NADA . . . salt in my tanks! There hasn't been salt in my tanks for 55-60 years . . . my tanks are OK and my fish are Ok: I wonder why that is . . . why do I get away with no salt, my friends? Mike has some magic potion . . . No . . . no magic potion . . . just a friend . . . Stan Karafin, my MAGIC MAN. Whenever there is some sort of a problem I just ask myself "What would Stan do?"
Thanks, Stan . . . thanks a million for the start you gave me to this hobby!

Postscript 1: It was suggested in our club conversation of salt that hobbyists' conductivity meters were "totally inaccurate at upper levels of its range". The following is an excerpt from the website of the make of my conductivity meter.

Model AP-2
EC Range: 0-9999 µS (editor: EC = Electrical Conductivity)
Temperature Range: 0-80 °C; 32-176 °F
Resolution: 1 µS; Temp. resolution is 0.1 °C/F
Accuracy: +/- 2%

If, as it was suggested in our club discussion, that the meter was inaccurate in its upper range we are

talking about a range of 0-9999uS . . . the reading I was speaking of was ~ 4000uS. I would think is well within accurate limits of the meter I use.

I spoke with the meter's manufacturer's representative regarding accuracy of their conductivity meters. His reply was: "I can understand aquarists concerns because many of the meters that were on the market in the past were not accurate in the high ranges. However, todays meters use a much more advanced microprocessor and program that allows it to be accurate through its entire range. It's similar to any computer - as technology progresses, we can make better and better products."

POSTSCRIPT 2: There is an argument that a teaspoon of NaCl is from 3-5.5 gms (weight to volume) depending on the texture of the salt. The larger of the values is used in this article. I use the smaller grain salt to hatch baby brine so the larger unit is what I used.

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