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# The Angelfish Society



# FinTASTic

Newsletter

February 2010

Issue 25

## Guarding against Disease: The Immune System of Fish

By Tamar Stephens

This issue of FinTASTic features an article by Steve Rybicki on "Pathogen Tolerance of Disease-Free Stock." Steve's article responds to questions about whether fish from disease-free stock would fail to develop immunity to pathogens in their tanks and would be more likely to become ill.

At first, I thought about this question from a human perspective. When we have children, do we expose them to chicken pox or polio so they will develop immunity to these diseases? Do we deliberately expose our babies and toddlers to people with colds or with the flu? Do we expose them to people with bacterial skin infections such as staphylococcus, or fungal infections such as ring worm or athlete's foot? Of course not! No! We take a lot of care to protect our children from diseases, we use and teach good hygiene, and we nourish and nurture them to keep them healthy. We vaccinate them to protect against several serious diseases that can be crippling or deadly.



*Don't Let Me Get Sick!*

This line of thought let me to wonder if there is any truth to the assumption that exposure to disease would lead to a stronger immune system. Researching this question led to learning a lot more about how the immune system works in fish. What I found out is that fish, very much like people, have a complex array of external and internal defenses that comprise the immune system. This article is a general overview of the key elements of the fish immune system.

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## Disease Tolerance of Pathogen-Free Stock

By Steve Rybicki

We have had a lot of questions recently where customers expressed concerns that our disease free fish would have no immunity to the diseases in their tanks and would get sick more readily than fish that had been previously exposed to these pathogens. We certainly haven't made the huge effort required to have disease free fish just to have them do poorly in other's tanks. So, let's look at this a little more closely.

There are no scientific studies to look at this. Heck, there may not be another disease-free hatchery in this country, so it's not something that would even be a concern until just recently. However, let's be clear. The reason people wonder about this subject is not because people are experiencing sick fish from our hatchery. It's just a concern based on suppositions.

We've shipped many thousands of fish that have come from our disease-free hatchery over the past couple of years. This gives us a pretty good base to come to some conclusions. We've had plenty of feedback and can easily compare it to when we had a very healthy hatchery, but not one where we were sure there wasn't a pathogen of some type present. We've always quarantined to an extreme and treated for any possible parasites and other pathogens, but it's only been a couple years since we've instituted our new techniques for obtaining pathogen-free fish eggs and then transferring them to a hatchery that has never had anything other than these clean fish eggs entering it.

We need to point out that people who received our fish are given no guarantees to not have a problem. No matter how disease-free they may be when we ship them, they can easily become sick and die when exposed to virulent pathogens or poor care. There are opportunistic bacteria everywhere waiting to pounce on a stressed fish. These are not virulent pathogens, but quite capable of overcoming a fish that has a compromised immune system from too much stress.

The big question is, does exposure to virulent pathogens and opportunistic parasites give some degree of immunity to fish down the road? With some pathogens, like viruses, there is no question. Yes, immunity will develop. But with any virulent viruses, the goal is to never expose them to the virus. Viruses have no cure and exposure at any point is very undesirable. Even if they survive the virus, they are of little value after exposure.

With every other common pathogen that we can think of, either that pathogen is not designed to kill the fish or it is no advantage to having the fish get sick at an early age. In fact, getting sick when young and in the highest growth stage is about the worst thing we can think of. We'd much rather have them grow up in the best pathogen-free conditions and be strong fish with capable immune systems able to better handle any pathogens in the future.

**What we have experienced:** Our shipped fish have a very high survival rate. With no pathogens in the body to attack the stressed fish, they go through shipping like a walk in the park. When they arrive, within hours they are ready to explore, eat and some (mature fish) are even ready to spawn. We've had a lower than normal number of people call with problems and most problems crop up much later down the road. Fewer people have complained about fish getting sick and dying (at any point). Without a doubt they are being exposed to pathogens in customer tanks. It is the rare customer who quarantines in a manner where our fish are never exposed to a pathogen, yet we've experienced greater customer satisfaction than ever before. While this is not a scientific conclusion, it is a sound conclusion based on actual outcomes. We can say with confidence that pathogen-free fish are not more susceptible to getting sick when exposed to them at a later time in life. We believe it is an advantage to stay disease-free as long as possible before exposure to any problems.

This article is reprinted from the February 2010 Angels Plus Newsletter with Steve Rybicki's permission.

### About the Author

Steve Rybicki is one of the founding members of The Angelfish Society, has a degree in marine biology, and is well known for the outstanding quality of his angelfish. Steve has been keeping angelfish since 1965, and built his hatchery in 1982.

This article is published on his website and is reprinted here with his permission.



To read other articles written by Steve, visit his website at <http://www.angelsplus.com>.

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## Guarding against Disease: The Immune System of Fish

By Tamar Stephens

### Type of Fish Pathogens

The immune system of a healthy fish provides protection against the four general types of fish pathogens: parasites, bacteria, viruses, and fungal.

*Parasites* - The majority of fish parasites are various microscopic single-celled organisms known as protozoa. Parasites can infest internal and/or external organs including the skin, eyes, mouth, gills, and/or intestines, where they can cause irritation, weight loss, loss of appetite, and even death.

*Bacteria* - Bacteria are more primitive one-celled organisms that can cause internal infections or external infections such as hemorrhagic ulcers or sores on the body.

*Viruses* - Viruses are very tiny, and can only be seen with an electron microscope. Viruses reside inside body cells and reproduce inside the cells. Viral infections are extremely difficult to treat.

*Fungal* - Fungus spores can be found throughout any body of water. Fungus infections can develop in injured tissue.

### Innate Immune System and Adaptive Immune System

The immune system can be divided into two parts. The *innate immune system* is non-specific; it is designed to provide broad general protection against any type of invading pathogen. The *adaptive immune system* functions by producing antibodies against specific pathogens that a fish has been exposed to. It creates cell "memories" that allow the body to ramp up and produce a fresh batch of antibodies if the fish is exposed to the same disease pathogen again in the future.

### First Line of Defense: Skin and Slime Coat

The first line of defense is the skin and its mucous coating (slime coat).

The skin and slime coat provide a barrier to prevent disease organisms from entering the body. They provide more than just a physical barrier. The skin excretes a variety of chemical defenses against pathogens including anti-microbial proteins and various enzymes that damage and destroy invading organisms. The skin also excretes *macrophages*, which are types of white blood cells that can engulf a pathogen and chemically destroy it through a process called *phagocytosis*. In addition to providing a physical barrier, the slime coat provides a substrate where the various skin excretions and macrophages can reside to attack, poison, and destroy invading pathogens.

### Second Line of Defense: Gills and Gut Mucous

After the skin, the next most likely places for pathogens to enter the body are either through the delicate tissue of the gills or through the lining of the gut. Gills have respiratory cells for taking in oxygen and expelling carbon dioxide and osmoregulatory cells to control the movement of water across membranes. Tucked in among these cells are mucous-producing cells, which provide similar protection against invading pathogens as in the slime coat. The gut tissue is also lined with protective mucous. The mucous provides both a physical barrier and a substrate for the various chemical defenses.

### Defense against Injuries: Inflammation

When the skin is injured, bacteria will enter the torn or cut area almost immediately and begin reproducing and damaging the surrounding tissue. Specialized cells in the skin cause an inflammatory response by releasing histamines. The histamines cause the blood vessels in the injured area to swell, resulting in fluids leaking out into the wound area and causing it to swell. This attracts several types of white blood cells that can engulf and digest the invading bacteria.

### Internal Defenses: Macrophages, Lymphocytes, Cytokines, and Antibodies

The primary internal defenses consist of macrophages, lymphocytes, cytokines and antibodies.

*Macrophages*, as discussed above, are white blood cells that are able to engulf and destroy foreign invaders.

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## Message from the President

by Tamar Stephens



Hello TAS Members,

Welcome to 2010! This is shaping up to be an exciting year for TAS. We will be holding our first TAS-sanctioned, judged, and awarded angelfish show in conjunction with the American Cichlid Association Convention in July.

This will be a major milestone for TAS, and I foresee many benefits from our participation. One of the most important benefits is the national exposure and recognition that can come from our partnering with ACA at this event. And this exposure is important.

I joined TAS in 2001 because I saw that TAS has a lot to offer. But people need to hear about us if we are going to share our knowledge with the hobby at large. That is why I am excited about the opportunity for us to participate at the ACA Convention.

Look for information about the ACA Convention and about the TAS Angelfish Show classes in this edition of FinTASTic. I've already made a commitment to travel from Alaska to Milwaukee for the event. I hope to meet many of my fellow TAS members there!

To all our new and recent members, let me say welcome TAS!

Tamar Stephens, President



### New Members

A warm welcome to our new members! 39 new members joined TAS between November 3, 2009 through March 15, 2010.

#### Please welcome:

Randy Adlington	Frank Falcone	John Johnson	Tommy Milner	Jose Lizama Soberanis
Kathy Agel	Susan Findley	Judy Kepler	Michael Nase	Ronald Tichansky
Philip Banks	Rich Frain	Moti Kroshinsky	Michael O'Farrell	Timothy Triolo
Jack Barta	Bob Fulton	Miro Kuprianczyk	Miguel Rodriguez Arana	Susan VanOsdal
Sarah Bennette	Delbert Hagley	David Labell	Susan Schuster	Tanya Wallace
Nichol Cassick	Rick Haubert	Robert Meadows	Jay Shaw	Ann Wlodarczyk
Jake Damico	Maria Hughes	Bruce Menditch	Jeremy Sherman	Barry Wood
Timothy Enschede	Mike Jacobs		Michelle Smith	Brian York

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## Guarding against Disease: The Immune System of Fish

By Tamar Stephens

*Lymphocytes* are specialized white blood cells. There are two general types of lymphocytes: “natural killer” (NK) cells, and T cells and B cells. The NK cells release chemicals that kill invading bacteria and viruses. The T cells and B cells work together to identify specific proteins on invading organisms and create antibodies against them.

*Cytokines* are “messenger” molecules that function to communicate between cells involved in the immune system.

*Antibodies* are specialized proteins that weaken or destroy invading bacteria or viruses. They are also specific to a single disease, so will provide no protection against a different disease. Antibodies do not provide protection against parasites.

Various internal organs are important to the immune system. Fish have an organ known as the head kidney which is the main organ for destroying and eliminated invading bacteria. It also is involved in the production of antibodies and in creating cell memory of how to create specific antibodies in the future. The thymus gland stimulates phagocytosis (the process of engulfing and destroying invading pathogens) and stimulates the production of antibodies by B cells.

### Final Thoughts

Does exposure to pathogens lead to a stronger immune system? I think it is clear that the answer is no. Most of the defenses against disease are part of the innate immune system. The innate immune system depends on good genetics, good health, and lack of stress.

Our angelfish have an adaptive immune system that can develop antibodies to specific diseases after becoming infected, but why would we want them to get sick in the first place? Chances are that a sick fish will produce the pathogen in abundance, infect its tank mates, and may end up dying instead of recovering.

Remember too that the majority of angelfish pathogens are parasites, and the immune system does not create antibodies for parasites. So exposure to parasites can lead to infestation by the parasite, but not to any immunity specific to the parasite.

I think it is clear that our goal should be to prevent illness in the first place. We can promote a robust immune system by providing our angelfish with a clean, high quality, stress-free environment and good nutrition to promote optimal health.

### References:

Diagnosing Fish Diseases (no author given on website)

<http://agsci.oregonstate.edu/aquatic-bt/sites/default/files/PDFs/FSIIB10.pdf>

Klesius, P.H., Evans, J.J., Shoemaker, C.A. Stress Control for Healthy Fish. *Sixth Ecuadoran Aquaculture Conference, October 24-27, 2001 Proceedings*. 2001.

L. Tort, J.C. Balasch, S. Mackenzie. Fish immune system. A crossroads between innate and adaptive responses. *Inmunología* Vol. 22 / Núm 3/ Julio-Septiembre 2003:277-286. Department of Cell Biology, Physiology and Immunology, Universitat Autònoma de Barcelona, Bellaterra, Spain

### Board of Director's List

President: Tamar Stephens  
Vice-President: Lori Carr  
Secretary: Sarah Smith  
Treasurer: Nancy Martens  
Members at large (five):  
Charles Hawks  
Wayne Carlson  
Bob Reaves  
Bernard Tibbetts  
Ted Santos

*Thank you to all Members and the Newsletter Team that make the FinTASic Newsletter possible.*

### The FinTAStic Team

Tony Vaughan – Editor in Chief  
Tamar Stephens – Assistant Editor & Staff Writer  
Jan Kesler – Graphic Layout & Design  
Sarah Smith – Staff Writer  
Amanda Wenger – Staff Writer

## December 2009 Photo Contest Winners! Featuring “Your Best Angel”

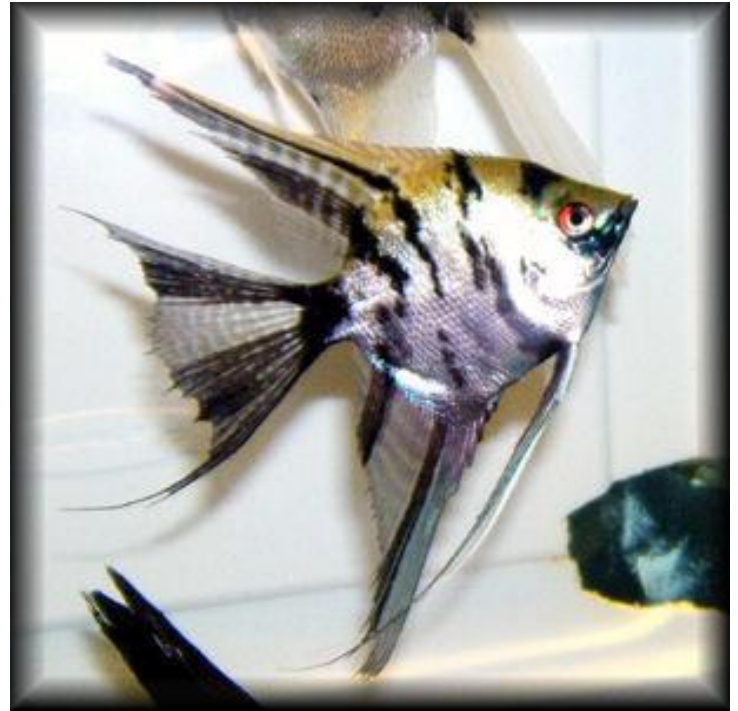


*1<sup>st</sup> Place*  
Jan Kesler

Jan has been breeding angelfish for about 4 years. She tried 20 years ago and failed miserably! She stated “I did so well on getting the angels to pair up and had a wonderful brood of fry, but could not keep the fry alive.”

She claims that her recent success has been because of sites like *The Angelfish Society*, which she has been a member of for 3 years. “Learning from articles of other breeders, on how to rear the delicate fry has made all the difference”, she said.

Since then she has several store accounts that purchase her angels and loves it when she sells to the public and they send her emails back on the beauty of her fish.



*2<sup>nd</sup> Place*  
Jan Kesler

When asked how she chooses her angels? She replied, “I look first for the body shape; I am attracted to an angel that has a body shaped like a fat tear drop”.

“Looking at the fins, I like to see a letter “V” from the center of the body, and then I check for a graceful movement but make sure they have flexibility in their turns. I believe this is imperative for them to set up and defend their territory”, she stated.

She concluded with, “**It was so much fun entering in the photo contest**, I found myself checking the new entries each day to see what the competition was! When the results came out, I was astonished I had won both the 1<sup>st</sup> and 2<sup>nd</sup> place and it was a wonderful affirmation from my peers”.

Have suggestions for Photo Contests Categories?  
Let us know!

[photocommittee@theangelfishsociety.org](mailto:photocommittee@theangelfishsociety.org)

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## 2010 PHOTO CONTESTS

All TAS members are invited to show off your favorite angelfish during our 2010 photo contest. Check out the categories below. If your angelfish doesn't fit one of the specific categories, then September is the month for you, when any variety may be entered in the "Your Best Angelfish" category. It doesn't matter if you have one angelfish, or thousands, or if you are new to keeping angelfish, or an old hand at it. All it takes to win is one beautiful angelfish and the patience to watch for a good pose for snapping the photo.

For the complete rules and judging guidelines, go to the TAS website photo contest page at:

<http://www.theangelfishsociety.org/photocontest/mainphotocontest.html>

Month	Angelfish Category	Submit your Photos	Judging/ Voting
March	Any Marble	March 1-30	April 1-30
May	Any Platinum	May 1-30	June 1-30
July	Any Gold	July 1-30	August 1-30
September	Your Best Angelfish	Sept 1-30	October 1-30
November	Any Dark Gene Angel	Nov 1-30	Dec 1-30

## STANDARDS COMMITTEE ELECTION RESULTS

In December we held an election for the Standards Committee. Did you know that the Standards Committee is the only committee that is elected? Committee members serve two-year terms.

The committee members for the 2010 - 2011 two-year term are:

**Steve Rybicki - Tamar Stephens - Bruce Menditch - Don Mitchell - Tony Vaughan**

### 2010 TAS MEMBERS MEETING CALENDAR

Meetings will continue as in the past to be held on the third Sunday of each month, except as noted below. Meeting time will be at 9:00 PM Eastern time. Meeting location will be the TAS Chat Room at:

[www.theangelfishsociety.org/chat](http://www.theangelfishsociety.org/chat).

Be sure to mark your calendars for these dates:

January 17	May 16	September 19
February 21	June 13	October 17
March 21	July 18	November 21
April 18	August 15	December 12

June 13 (one week early to avoid conflict with Father's Day)  
December 12 (one week early due to holidays)

### 2010 TAS BOARD OF DIRECTORS MEETING CALENDAR

Board of Director meetings will be held preceding the regular members meetings on the dates listed below. Meetings will be held in the TAS Chat Room. In keeping with our open door policy, all TAS members are welcome to sit in as observers at BOD meetings. Additional and/or special meetings may be called as needed. Meeting times will usually be one hour preceding the Membership meeting (8:00 PM Eastern time), but may be scheduled to start earlier if a lot of business is on the agenda.

January 17	May 16	September 19
February 21	June 13	November 21
March 21	July 18	December 12
April 18		

## Our First TAS Sanctioned Angelfish Show!



We are thrilled to announce that The Angelfish Society will hold our first sanctioned angelfish show in conjunction with the ACA 2010 Convention!

**When: July 22-25, 2010**

**Where: Milwaukee, Wisconsin**

The TAS Angelfish Show is being sponsored by Mark Barnett of AquaBid. Thank you Mark!

The show will be for angelfish (genus *Pterophyllum*) entered into the ACA shows (hobbyist or commercial). All fish that are shown at ACA 2010 are required to be entered in the ACA show. To enter your fish in the TAS-sanctioned show, you will register them with TAS at our information table at the convention.

The show will have four classes and judging standards defined by TAS. The awards are separate from the ACA awards, so a fish entered in both contests may win in both shows.

Entry into the TAS-sanctioned show is free for members of TAS.

For complete information on the convention go to: <http://www.aca2010.com/>

### TAS SHOW CLASSES:

#### Class 1- Wild and Wild Type

- a. Altum
- b. Scalare
- c. Leopoldi
- d. Silver - (tank-bred that no longer retain all the features of wild-caught scalare)

Class 2 – Tank Raised/Domestic – Dark Locus Phenotypes (A single gene locus is responsible for their phenotype) to include, but not limited to:

- a. Black (Dark) (genotypes D/D, D/Gm, D/g)
- b. Marble (genotypes M/+, M/M, M/Gm, M/g)
- c. Gold Marble (genotypes Gm/+, Gm/Gm, Gm/g)
- d. Gold (g/g)

- a. Class 3 – Tank Raised/Domestic – Single-Locus Phenotypes other than Dark Locus
- b. Zebra (Z/Z, Z/+)
- c. Albino (all)
- d. Pearlscale (all)
- e. Smokey and Chocolate
- f. Half-Black



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## Our First Sanctioned Angelfish Show!

Class 4 – Tank Raised/Domestic – Multiple Locus and Co-Dominant Phenotypes (where interaction/co-dominance determine the phenotype) to include, but not limited to:

- a. Black (All lace, ghost, and black blushing varieties)
- b. Zebra (clowns and leopards)
- c. Smokey and chocolate (including ghosts, blushing, smokey gold-marble, etc.)
- d. Blushing not in above (including Blue Koi, Koi, Sunset, etc.)
- e. All others (including platinum, platinum (blue) silver, etc.)

\*TAS has not officially adopted a name for the gene that is called by various names, including “platinum” and “platinum blue.” It is listed here to provide an opportunity for people who are breeding for expression of the gene to show off their results.

TAS reserves the right to reclassify an angelfish prior to commencing the judging.

If you aren't sure what class your angelfish fits in, don't worry – we will have someone to help you place it in the correct class.

## SAVE THE DATE!



### OPEN CHAT

Every Friday –  
Open chat in the TAS Chat  
Room starting at 7:00pm  
[www.theangelfishsociety.org/chat](http://www.theangelfishsociety.org/chat)

### TAS MEMBERS MEETINGS

All meetings to be held in the  
TAS Chat Room:

- **Sunday March 21**  
TAS Members Meeting  
9 PM EDT
- **Sunday April 18**  
TAS Members Meeting 9:00  
PM EDT



Details on Page 6

### NEWSLETTER SUBMISSIONS



- **May 1<sup>st</sup>** Dealine for submitting articles and announcements for publication in the May edition of *FinTASTic*

### BOARD OF DIRECTORS MEETINGS

All meetings to be held in the  
TAS Chat Room:

- **Sunday March 21**  
TAS Members Meeting  
8 PM EDT
- **Sunday April 18**  
TAS Members Meeting  
8:00 PM EDT



### PHOTO CONTEST

- **March 1-30** Submit Photos
- **April 1 - 30** Voting for Photo Contest.
- **May 1 – 30** Submit Photos

See details on page 6



### Buy / Sell / Trade / Freebies

Submit your ad to:  
[newslettercommittee@theangelfishsociety.org](mailto:newslettercommittee@theangelfishsociety.org)

Hurry! Get Your Ad's In!