

# FEEDING FISH BLOODWORMS (CHIRONOMIDAE/CHIRONOMUS): POSSIBLE HEALTH RISKS TO HOBBYISTS

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In a time, long, long ago, in the pre-COVID-19 world when we actually had MASI meetings, a question was raised at one of those meetings by Pat Tosie. “Had anyone had an allergic reaction as a result of feeding their fish bloodworms?” (Figure 1).

I was surprised by the number of hands that immediately shot up in response. So, the question and the overwhelming positive response prompted me to do a quick literature review. I was curious if bloodworms could possibly be a health hazard to aquarium hobbyists.

I first scanned some aquarium hobbyist blogs to see what folks had to say. Here are some posts from *MonsterFishKeepers.com* that will help you gauge the potential severity of an allergic reaction to bloodworms. (Note that in the first description the hobbyist was apparently even allergic to aquarium water in which the fish had been fed bloodworms. This has health implications for you even if you are not feeding your fish bloodworms.)

I fed them for years and developed a very bad allergy. I started having severe allergic reactions; took me three of them to realize it was the bloodworms. My eyes swell completely shut, I break out all over in red splotches and can't breathe. It feels like my chest is caving in. I now carry around an EpiPen and an inhaler. I tried just letting my husband feed them, but that didn't work out, either. I can't clean our aquarium if they've been fed at all, my hand and arm breaks all out in welts. Also, if my husband gets near me without having washed his hands after feeding, I start to react.



Figure 1. Bloodworms.

A previous version of this article appeared in the July/August 2020 issue of *The Darter*, a publication of the Missouri Aquarium Society.

The reactions increased in severity. The first reaction was bad, but the third just plain terrified me. I've always had very bad allergies, but I've never experienced anything as scary as my reactions to these things. On the third reaction it took three days for the swelling to go away in my eyes. They were swollen basically completely shut for 24 hours, even after steroid injections. If you do react and experience swelling in your eyes, whatever you do, DON'T touch your eyes! It will make it a lot worse.

Another hobbyist described a very similar response to bloodworms in their post.

I can't feed them at all, which sucks because fish love them and they offer great nutritional value. Even if I wear gloves and only use utensils to feed, my face swells, airway constricts, and I get a wonderful red itchy rash which lasts for a couple of days. I fed them for years without issues until one day I found myself in a rather unattractive mess requiring an EpiPen and some heavy doses of Benadryl for a few days. I have tried it a few times with gloves: I have a reaction.

To my surprise, a number of the bloggers commented that they had just discovered that they too had an allergy to bloodworms based on the descriptions of allergic reactions provided by their fellow hobbyists. The posts had solved the mysterious symptoms they were having. For example:

Just figured out I am allergic too. What happens is my eyes start to get a burning itch and worsen if I scratch. Back of my hands get itchy. Just pinned it to it only happens right after I feed fish BW's!!! Sure enough, it's all over the net.

After reviewing what the bloggers had to say, I then conducted a search of the scientific/medical literature and found that there was a considerable body of literature, which both supports and parrots the descriptions of allergic reactions provided by the bloggers. There are so many scientific papers and clinical case reports that I could write a lengthy scientific review paper on the topic, and, by the way, allergic reactions are not restricted to hobbyists. They have also been reported in fishermen that use chironomids for bait, in people that work in aquaculture, people that work in public aquariums, people that produce, package, or sell fish food, and people that live in areas with high concentrations of flies. For hobbyists, allergic reactions can be caused by exposure to live, frozen, freeze dried and processed (fish foods that contain bloodworms as well as other components) chironomids.

Table 1. Potential allergic reactions to bloodworms.

Conjunctivitis	Hives	Anaphylaxis!
Angioedema	Localized rash	
Rhinitis	Asthma	

The medical literature suggests that allergic reactions to chironomids (bloodworms) can present themselves as conjunctivitis (inflammation or infection of the transparent membrane (conjunctiva) that lines your eyelid and covers the white part of your eyeball), angioedema (area of swelling of the lower layer of skin and tissue just under the skin or mucous membranes), rhinitis (inflammation of the inner lining of the nose), contact urticaria (hives), contact dermatitis (localized rash or irritation of the skin caused by contact with a foreign substance), asthma (condition in which your airways narrow and swell and may produce extra mucus), and anaphylaxis (anaphylaxis causes your immune system to release a flood of chemicals that can cause you to go into shock—your blood pressure drops suddenly and your airways narrow, blocking breathing). Signs and symptoms include rapid, weak pulse; a skin rash; and nausea and vomiting. Anaphylaxis requires an injection of epinephrine and a follow-up trip to an emergency room (Table 1).

Approximately 20% of people exposed to bloodworms have some level of allergic reactions. The allergen has been identified (Chi t l). As you probably know, hemoglobin is an iron-containing protein that carries oxygen. It is responsible for the red color of human blood cells and of bloodworms.

There are different molecular hemoglobin structures; hence, bloodworm hemoglobin, which is different from human hemoglobin, can be an allergen to humans. Adults (flies) can also cause allergic reactions in humans (although aquarists are not exposed to adult flies), but the allergen is apparently tropomyosin.

The description of allergic reactions in the medical case study literature is very similar to what we saw in the fish hobbyist’s blogs.

A person who worked in an office setting in our hospital was referred to me after three admissions to our emergency department for marked angioedema and inflammation of the right side of the face, chemosis of the right eye, and blurred vision with onset in the morning at work. She had no atopic history and had eaten no food on the day of one of the reactions. Only after persistent questioning regarding what she may have transferred from her hand to her face (she was right-handed) did she divulge that she fed the fish in her aquarium in the office. She did not know the source of the fish food, and I requested that she place a tiny amount on her forearm the following day. This produced a swelling of the entire forearm. The fish food was freeze-dried bloodworms. (From Schellenberg 2005)

Schellenberg (2005) also describe an incident of accidental ingestion of bloodworms:

Dr. J. Roberts presented the case of a girl who had ingested residual fish food that was on her hands when she was eating dinner. This individual had a striking reaction to a dilute preparation of the bloodworm fish food on skin testing and did not react to other fish food preparations.



Figure 2. Tetra bloodworm warning label.

A simple skin-prick test with a dilute solution of bloodworms can be used to determine if you have an allergy to chironomids. However, be careful! A medical publication (Nguyen et al. 2007), by a group of allergists, was prepared to inform the medical community that the skin prick tests for bloodworm allergies could actually cause severe allergic reactions, including anaphylaxis. The paper described three severe allergic reactions and made the following recommendations.

Performance of skin prick test with Chironomus should be done with extreme caution. Undiluted red grubs should be avoided. Skin tests have to be started with a highly diluted solution and progressively increased to obtain the lowest effective concentration. ...

In conclusion we report three cases of patients who developed adverse systemic reactions to Scandrick test-



ing with red grubs. Chironomus larvae have proven to be a potent allergen. As demonstrated, skin testing with red grubs can result in severe reactions and should therefore be performed only in controlled hospitalized settings.

I think this has answered Pat's question. The 20% of people exposed to bloodworms (mostly fish hobbyists) who develop allergies to them—which can be severe in some people—corresponds well with the number of hands raised when he asked it.

A runny nose, sneezing, coughing, hives, itching skin, and swollen eyes can all be considerable inconveniences, but asthma or anaphylaxis can be fatal if not quickly treated. So, it was worth my time sitting down and doing a short literature review if you now know why your hands itch after feeding your fish or if I have potentially saved somebody's life. The one thing I couldn't understand while reading the hobbyists' blogs was why they continued to feed their fish bloodworms when they actually had associated the fish food with their symptoms

A doctor's recommendation in one of the case studies was simple: stop feeding your fish bloodworms and feed them something else! Remember, the more you expose yourself to bloodworms the greater the chance that you will eventually have a severe allergic reaction.

#### References

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**Editor's Note:** The author published a follow-up article about bloodworms and potential allergic reactions in dogs and cats in the November/December 2020 issue of *The Darter*. He found only one post reporting a dog having a severe allergic reaction. The poor puppy spent the night in a veterinary hospital ICU, leading to an expensive medical bill. This was actually a fortunate incident, because the pet owner witnessed the puppy raiding the trash for the empty wrapper. Otherwise, the puppy might have gone to his grave without the secret being revealed. Tetra is one supplier that includes a warning label on their bloodworm product (Figure 2).

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#### NANFA 2021 FINANCIAL SUMMARY Submitted by Tom Watson, Treasurer

**BEGINNING BALANCE: \$50,811.01 (AS REPORTED IN APR. 2021 AC)**

<u>INCOME</u>		<u>EXPENSES</u>	
Membership Dues	17,376.33	Convention <sup>2</sup>	-100.00
T-shirt sales	1,333.32	Snorkle Guide <sup>3</sup>	-1,143.40
Snorkel Guide	1,505.60	Merchandise <sup>4</sup>	-832.69
Convention	0.00	AC	-14,276.05
Donations	2,697.82	Grants	-1,000.00
Misc. Income <sup>1</sup>	379.60	T-shirts	-34.40
		USPS	-1,105.50
		Web Site	-959.40
<b>TOTAL INCOME</b>	<b>23,292.67</b>	<b>TOTAL EXPENSES</b>	<b>-19,451.44</b>

**YEAR END BALANCE (12/31/2021) \$54,652.24**

<sup>1</sup>Includes hats, cards, decals, calendars, etc.

<sup>2</sup>Deposit on facilities for 2022 convention.

<sup>3</sup>Payments to Freshwaters Illustrated.

<sup>4</sup>Includes shipping cost for mixed merchandise not differentiated.