GREAT LAKES LEARNING

LESSONS & ACTIVITIES BASED ON THE MONTHLY GREAT LAKES NOW PROGRAM

EPISODE 2211 | SEARCHING FOR MADTOMS

VENOMOUS FISH IN THE GREAT LAKES

Image Credit: Great Lakes Now

OVERVIEW

This lesson will explore the phenomenon of venomous fish in the Great Lakes by learning about the Northern Madtoms. Students will learn about the species, learn about how scientists make decisions to classify species like the Northern Madtom, and create an infographic about the species to inform others about it.

LESSON OBJECTIVES

- **Know** about the Northern Madtoms in the Great Lakes
- **Understand** scientists have to make decisions about how to classify species based on their traits
- **Be able to** visually communicate information about a species through an infographic

WHAT YOU'LL NEED

- Computer or mobile device with Internet access to view video and online resources
- Notebooks and pencils
- Chart paper
- Sticky notes
- Markers
- Lab supplies (see individual activities for a full list)
- Copies of the Student Handouts

INTRODUCTION

The Northern Madtom, *noturus stigmosus*, is a species of catfish found in the Great Lakes region of the U.S. and Canada in North America. This animal has some unique features, like poisonous spikes that can inflict a sting, but it is also in a unique situation—it's a vulnerable species. That means it is not quite endangered but also not secure. The Northern Madtom has been spotted in the St. Clair River near Lake Huron during a serendipitous expedition where divers were looking for underwater treasure. This venomous fish has a lot to teach us about animal defense mechanisms and more.

This lesson includes multiple activities, including lab activities, that can span the course of several sessions or be adapted to fit the needs of your group's meeting format.

Some prior knowledge* with which students should be familiar includes:

- taxonomy
- life cycle of organisms
- classification
- structure and function
- Internet researching skills
- defense mechanisms
- stimulus and response

Follow this QR Code or hyperlink to the Episode Landing Page!

Check out our full collection of lessons for more activities related to topics like these.

****The sequence of these activities is flexible, and can be rearranged to fit your teaching needs.***

NGSS CONNECTIONS

Phenomenon: Venomous Fish

- MS-LS1-8
- MS-LS1.B
- MS-LS1.D
- SEP-2
- SEP-7
- SEP-8

During the course of the lesson, students will progress through the following sequence** of activities:

- Class discussion to elicit and activate prior knowledge about **fish**
- Close reading of a **photo** with a partner
- Teacher notes on **taxonomic classification** and **endangered species**
- Watch a segment from *Great Lakes Now*
- Class discussion to debrief the video
- Read about the **venomous Northern Madtoms** and **how fish venom is used to create medicines**
- Play a card sorting game to better understand classification decisions
- Create an infographic about the Northern Madtoms

The lesson progresses through three major sections: **launch, activities, and closure.** After the launch of the lesson, you are ready to begin the lesson activities. Once finished with the activities, students will synthesize their learning in the closure. You can select the activities that are best suited for your learners and teaching goals, and then sequence them in a way that makes sense within your learning progression and the scaffolds of the lesson.

If you use this lesson or any of its activities with your learners, we'd love to hear about it!

Contact us with any feedback or questions at:
GreatLakesNow@DPTV.org

TEACHER BACKGROUND INFORMATION

by Gary G. Abud, Jr., Great Lakes Now Contributor

**This information can be presented by the teacher as notes to students at the teacher's discretion.*

The Great Lakes are home to nearly 200 different kinds of fish of all shapes, sizes, and species.

One of those is a species of bullhead catfish known as the Madtom. And the particular variety that's found in the Great Lakes is the Northern Madtom. It's less than a foot in length but packs some power—even for its size—because it is one of the few venomous fish species you'll find in the Great Lakes.

Although the Northern Madtom are presently a vulnerable species, they aren't going anywhere without a fight. They have painfully sharp spines with connected venom glands that release a toxin that can cause a venomous—but non-lethal—poke to would-be predators.

Where this fish species fits into the taxonomy is, like all other species, based on its features. The Latin terms used to give the Northern Madtom its full scientific name describe key features that distinguish it from other organisms.

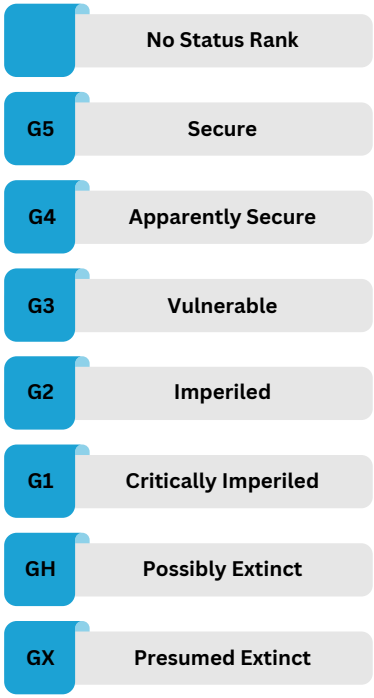
When scientists set out to classify an organism, they have to make decisions about what categories and subcategories to group species together. In many cases, an argument could be made for including a species in more than one category; however, scientists—through claims, evidence, and reasoning—eventually have to choose a final spot where they will classify a particular organism. By doing so the engage in several key scientific skills, just as students will in **the classification card sorting activity** in this lesson, including: exploration and discovery, gathering data, testing ideas, and community analysis and feedback. Be sure in this activity to help students see that they did these things and make connections to how scientists do these when classifying.

Additionally, students will be able to make connections to the actions that scientists take in systematically organizing species according to phylogenetic categories, like:

- Using evidence from observations to make claims and construct arguments about relationships between species
- Using data to make predictions about relationships among species.
- Obtaining, evaluating, and communicating information regarding how evidence can change thinking about phenomena and species.

Northern Madtom are tiny catfish that most anglers will go their entire lives and never encounter, yet they are of interest to research scientists, because they play an important role in the ecosystem as an indicator species, Their presence or absence can tell researchers a great deal about the health of a water system.

But not only do they indicate something about ecosystems by their absence, their absence indicates something about their species. A conservation status is by **NatureServe**:



LESSON LAUNCH

A. Warm Up

The warm up is intended to be structured as teacher-facilitated, whole-group student discussion activities. It helps students to begin thinking about the topic at the center of the lesson.

1. Ask students to list out on a piece of paper five things that come to mind when thinking of **fish**.
2. Have students pair up with a partner to share their five ideas with each other. If any ideas appear on both lists, have students circle those.
3. Then, engage students in a whole-group discussion to ask them to share any ideas that were circled.
4. Generate a list of the circled ideas.
5. Ask for volunteers to share any ideas that were not circled that they think are really important to include in this topic.
6. Generate a separate list of those ideas.
7. At the end of making the two lists, have students copy down one single list of all the circled ideas and important ideas in their notebooks or on their paper.
8. Ask students individually to rank the ideas in the list from most to least relevant.
9. Ask for some students to share which term should be most relevant and why they think that is. Engage the whole group in discussion to arrive at consensus about the most relevant idea related to **fish** that they already know about or that came to mind during this exercise.

Image Credit: Great Lakes Now

B. Close Reading a Photo

Share, distribute, or display **this photo** so that the whole group can see it. Have students discuss with a partner:

- **What's going on in this picture?**

Then have two sets of partners form a small group and make connections between their partner conversations about the videos and the ideas that came up during the warm up activity about things that came to mind about **fish**.

C. Bridge to Learning

After the warm-up activity has concluded, help students prepare for the learning that is about to come by displaying the full Latin classification name of the Northern Madtom for students to view and write in their notebooks: *Animalia Craniata Actinopterygii Siluriformes Ictaluridae Noturus Stigmosus*

1. Have students make predictions about what each of these Latin words means.
2. Go over the definitions of each Latin word separately—see below—listing them out for students to write down.
3. Review the taxonomic categories for this organism:

- Kingdom: Animalia (an animal)
- Phylum: Craniata (has a cranium)
- Class: Actinopteri (ray-finned fishes)
- Order: Siluriformes (catfishes)
- Family: Ictaluridae (North American freshwater catfishes)
- Genus: Noturus (has a tail on its back)
- Species: Stigmosus (having markings)

4. Ask students to explain what kind of organism this Latin name is describing.

D. Background Information Notes

Explain that we are going to build on these ideas and learn more about **the Northern Madtom** in this lesson. Then proceed to give the notes from the **Teacher Background Information**.

ACTIVITY 1: WATCH A GREAT LAKES NOW SEGMENT

This activity is a video discussion of a *Great Lakes Now* episode segment.

First, inform students that they will be watching a *Great Lakes Now* segment discussing the Northern Madtoms in the St. Clair River near Lake Huron. During the video they need to jot down four things they took away from the video using the **4 Notes Summary Protocol**.

Then, if students are not already familiar, introduce them to the 4 Notes Summary Protocol, which they will use after they finish watching the video, where they write down one of each of the following notes:

- **Oooh!** (something that was interesting)
- **Aaah!** (something that was an ah-ha moment)
- **Hmmm…** (something that left them wanting to know more)
- **Huh?** (a question they have afterward)

Next, have students watch the segment from episode 2211 of *Great Lakes Now* called **Searching for Madtoms**.

Last, have students complete their individual 4 Notes Summary and then discuss those in groups of 3-4 students.

Teaching Tip: Use the Student Handouts to help students organize their thinking in writing around each of the lesson protocols.

Post-Video Discussion

After the groups have had time to go over their 4 Notes Summaries, invite a handful of students to share out some of their notes, eliciting at least 1-2 of each of the 4 Notes and listing those somewhere for the whole group to see.

Ask students to turn back and talk with their groups to make connections between the *Great Lakes Now* video and what they remember from the warm-up activities.

How is what we saw in the video related to what we discussed earlier in this lesson during the warm up?

After giving the groups some time to talk, bring the whole group back together for a shareout and discussion of ideas.

In this culminating discussion, the goal is to help students make connections between the video segment and what they discussed during the warm up activities earlier in the lesson about what they knew about **fish.**

Once the discussion finishes, have each student write a "**Sum It Up**" statement in their notebooks. This is a single sentence that captures the big idea of what was just learned.

Have 2-3 students share out their **Sum It Up** statements before concluding this activity.

ACTIVITY 2: READ ABOUT MADTOMS IN THE GREAT LAKES

While technology can help us image the underwater depths, divers are still largely responsible for documenting many of the species we know about, including Northern Madtoms. One group of divers set out on an underwater treasure hunt and instead found some Northern Madtoms. Their dive was documented for *Great Lakes Now*.

Image Credit: Great Lakes Now

In this activity, students will use a **Think Pair Square Protocol** for discussing what they will read about this very topic.

First, have students partner up and distribute the article **No Petting For These Cats** by Kathy Johnson from *Great Lakes Now*. Allow time for students to individually read the article, and have them jot down three things they took away from the article using the **Rose Thorn Bud Protocol**—in their notebook or using the handout.

Then, give students time after reading to discuss the article that they read with their partner. Have students share their rose, thorn, and bud with each other, including how those points connect to each other. The pair should come up with a statement to summarize all of their article takeaways.

Next, have two student pairs join up, standing near each other to form the four corners of a square, to discuss the article and what they talked about in their pairs. Encourage them to come to a consensus about which point they found most important or interesting in the article.

Teaching Tip:
If the reading level of the article is going to be tough for some students to read individually, have partners or small groups read the article together aloud while each follows along.

Last, have each group craft a summary statement of the most important point from their discussion and ask for a volunteer in each group to share that key point with the whole group.

As student groups share their most important point, record their ideas on the board and have students copy the list of student ideas down into their notebooks.

Once the shareout is complete, ask students to return to their groups and discuss one last question based on the article:

Based on the article, what are some reasons it might be difficult to spot Northern Madtoms in the Great Lakes?

After giving the groups some time to discuss this question, invite conversation from the whole group to see what consensus can be reached.

Be sure to encourage students to support their claims with evidence and reasoning as they discuss in the whole group.

ACTIVITY 3: CLASSIFICATION AND GROUPING GAME

In this activity, students will play a game to learn about how scientists classify and group organisms based on their traits and have to make systematic decisions.

Image Credit: Gary Abud, Jr.

The whole group will be provided a set of game cards—one card per student—and they will have the task of working together to put all of the cards into groups of 4 based on which items on the cards they think go together. *The challenge is some items can be classified in multiple groups.*

This activity practices a variety of scientific skills including—among others—communication, evaluation, developing and using models, and collaboration. Just like scientists use the features of organisms to classify them and group them together, students will have to consider the properties of each item on their cards—including doing some outside research in some cases to learn more about each card—until they can determine how to group all of the cards.

The Rules of the Game

1. All cards must end up in one group
2. All groups must contain exactly four members
3. Students may not trade cards with others
4. Any student in the room may talk with any other student in the room about their cards
5. Students go to the group where their card belongs, but they may switch groups as they get more information
6. Students may do Internet research, as needed, to learn more about the item on their card
7. A rationale must be provided for each group's final selection of members

Materials

- Dry erase boards/chart paper and markers
- Devices to access the Internet for research
- Set of grouping cards (see **Teacher Handouts**)

Setup / Procedure Notes

1. Review the **Teacher Handouts** and prepare the game cards ahead of time.
2. There are multiple connections to make between items to form partial groups, but only one classification will group all the cards.

First, explain to students that they will be conducting a classification activity by playing a game where they will group things according to their properties. Let them know that groups of four items can be made by making connections between the properties of different items.

Next, distribute one item card to each student face down. Tell them not to peek until after everyone gets their card. Inform them that the items written on their cards have three other items that can go with them to form a similar group based on their properties. It's their job to work together and figure out which sets of cards should go together to form a group.

Then, distribute the visual medium that they will use to show their rationale and keep track of any information as they form their group. Whether you're using dry erase boards, chart paper, or some other medium for students to share their rationale for their grouping, inform them that the goal is to make their thinking visible about how they arrived at their grouping. Explain the rules to the game and check for understanding with a few students.

Last, allow students time to work together to figure out how they will group their cards. Inform them that there is only one configuration that will allow all the cards to be in a group such that there are four groups.

Making Thinking Visible

Remind them that for making their thinking visible to show how they grouped their cards, they will want to have a **claim** (which cards go in the group) based on **evidence** (what features they considered) and **reasoning** (how those features connect within this group better than any other group.

Once all the groups have formed and have their set of members finalized, give students time to show their thought process visually before giving each group time to present to the whole group and explain their thinking. Give students the option to respond or ask questions as they hear from each group and more information arises about the sets of items.

ACTIVITY 4: MADTOMS INFOGRAPHIC

In this activity, students will further learn about Madtoms by researching them to create an infographic that synthesizes their learning and visually communicates what they've learned to others about Madtoms.

Students will need access to computers and the Internet for this activity. Using an infographic creating tool, such as Canva, Google Slides, etc., students will work with a partner to summarize what they've learned about Northern Madtoms thus far, conduct any additional research that they feel is necessary, and create an infographic to communicate what they've learned to others. They can work with a template or create an infographic from scratch.

This project-based activity is open ended and has only a driving question, resources, and framework for setting up the project. Adapt this framework to fit your students.

Driving Question
How might we visually communicate information about Northern Madtoms in order to educate and inform others?

What Makes an Infographic Stand Out?
The hallmark features of an infographic are:

- Great Graphics
- Clearly Organized Information
- Information is Concise
- Descriptive Titles and Subheadings
- Informative Data
- Specially Formatted Facts
- Great Use of Space and Layout

Evaluating Performance on This Task
Teachers can consider a performance rubric for evaluating the infographics students create that utilizes the categories above—or includes others—and rates the categories on a scale of 1–3, where 1=not evident; 2=somewhat evident; and 3=evident.

Note: When you introduce and set up this project, be clear that students need to keep track of, and cite, their information sources in a separate document with their infographics when they turn them in.

Image Credit: Great Lakes Now

Research Resources
Students can use the resources available from Great Lakes Now in this episode and lesson, review this **Madtoms Fact Sheet** from Michigan State University's Natural Features Inventory of Michigan, this **Assessment and Update Status Report on the Northern Madtom** from the Committee on the Status of Endangered Wildlife in Canada, or conduct their own additional research. The Madtoms Fact Sheet from MSU is like an infographic in the way that it chunks information, but it is unlike an infographic in that the information is displayed in text only and there is a lot of information.

Note: An additional article is included in the resources section of this lesson entitled ***Turning the Tables by Kathy Johnson****. It goes into depth about the spines, venom, and stings of the Northern Madtom—an important aspect of the fish that should be included in the infographic—so be sure to make this article available in print or online for students to read during their project research.*

Presentation & Feedback Session
Have partners pair up with other partners to present their infographics to one another. Instruct students—prior to presenting—that they will need to provide one piece of feedback and ask one question to their presenters. They should use the **Notice and Wonder Protocol** for this to keep the feedback structured and constructive. You may wish to model this format for students ahead to help them familiarize themselves with how to give good feedback and ask questions posed as a wonder.

LESSON CLOSURE

After the conclusion of all the activities, help students to make connections* between everything they did in the lesson and what they learned overall.

A. Free Recall

Group students in pairs or triads (e.g., in groups of 2-3 partners) and distribute the **Free Recall Protocol handout**, Alternatively, you can have students do this in their notebooks. Set a 3-min timer and have students generate a list of everything they can remember learning about in this lesson related to the central topic of the lesson. This doesn't have to be in depth, just whatever each group can call to mind. Have them draw lines between any terms that relate to one another. After the timer finishes, give groups a chance to volunteer to share aloud 2-3 things from their free recall lists and any of the connections that they made with those. Jot down any ideas that come up multiple times during the shareout for the whole group to see.

B. Lesson Synthesis

Give students individual thinking and writing time in their notebooks to synthesize their learning, by jotting down their own reflections using the **Word, Phrase, Sentence Protocol.**

In the Word-Phrase-Sentence Protocol, students write:

- A **word** that they thought was most important from the lesson
- A **phrase** that they would like to remember
- A **sentence** that sums up what they learned in the lesson

Image Credit: Great Lakes Now

C. Cool Down

After the individual synthesis is complete, students should share their synthesis with a partner.

After sharing their syntheses, have students complete a **3, 2, 1 Review** for the lesson with their partner, recording in their notebooks or, optionally, on exit ticket slips to submit, each of the following:

- **3 things** that they liked or learned
- **2 ideas** that make more sense now
- **1 question** that they were left with

Invite several students to share aloud what they wrote in either the synthesis or 3, 2, 1 Review.

Lastly, ask one student volunteer to summarize what has been heard from the students as a final summary of student learning.

**Optionally here, the teacher can revisit the learning objectives and make connections more explicit for students.*

Teaching Tip: Use the Student Handouts to help students organize their thinking in writing around each of the lesson protocols.

NAME: _____

A Word, Phrase, Sentence Protocol

What is a **word** that you thought was most important from this lesson?

What is a **phrase** that you would like to remember from this lesson?

What is a **sentence** that sums up what you learned in this lesson?

3, 2, 1 Review Protocol

What are **3 things that you liked or learned** from this lesson's activities?

-
-
-

What are **2 ideas that make more sense** now to you?

-
-

What is **1 question that you were left with** after this lesson?

-

NAME: _____

Free Recall Protocol

With 1-2 partners, generate a list of everything you can remember learning about in this lesson related to the central topic of the lesson. Draw lines between any terms that relate to one another.

NAME: _____

4 Notes Summary Protocol

OOOH!

Something that was interesting to you

AAAH!

Something that became clearer; an "ah-ha" moment

HMMM...

Something that left you wanting to learn more

HUH?

Something you questioned or wondered

Sum It Up Statement:

Summarize your group discussion about your 4 Notes Summaries below:

NAME: _____

Think Pair Square Protocol

THINK

Write down your own individual ideas

PAIR

Summarize what you and your partner discussed

SQUARE

Summarize what your group discussed

NAME: _____

Rose, Thorn, Bud Protocol

ROSE

Something that "blossomed" for you in your learning

THORN

Something that challenged your thinking or was difficult to understand

BUD

Something that's new and growing in your mind — a "budding" idea

NAME: _____

Notice & Wonder Feedback Protocol

I NOTICED...

Something that you observed that stood out to you as positive or noteworthy.

I WONDER...

Ask a question about something that you'd like to know or hear more about, or something you'd like the other person to consider of your opinion.

Classification Grouping Game Cards

Print the cards below with item names on them, cut them out, and then mix them up before giving one card to each student. If you have more students than cards, either omit one or more full groups OR give some students an extra card to classify. Each group is organized into cards on its own sheet. Below are the correct item groupings based on key properties.

Correct Groups / Properties

- Georgia, Texas, Arizona, Montana (STATES)
- Austin, Phoenix, Sydney, Brooklyn (CITIES)
- Washington, Kennedy, Lincoln, Obama (PRESIDENTS)
- Kia, Bentley, Ford, Toyota (AUTOMAKERS)
- Moana, Minnie, Elsa, Pluto (DISNEY CHARACTERS)
- Cobalt, Platinum, Gold, Silver (METALS/ELEMENTS)
- Mercury, Jupiter, Earth, Neptune (PLANETS)
- Mustang, Bronco, Philly, Mare (HORSES)
- Michigan, Huron, Ontario, Superior (GREAT LAKES)

Notes: you'll notice that there are a number of connections between items that could go in multiple groups, such as:

- Kennedy could be a a president or a child's name, like Sydney, which could also be a major world city
- Washington could fit into the presidents, states, or cities group
- Michigan could be the state or the Great Lake
- Arizona and Georgia could be girls' names or states
- Mercury could be a planet or, like Cobalt, could be a car
- Pluto could be the Disney character or a planet ("or is it a planet anymore?" students will ask)
- Bentley is an automotive brand but is also a boy's name, like Ford, which is also an automotive brand and a President. When it's discovered that Obama is on a card, students will be cued that there must be a presidential group.

Group 1 Cards:
U.S. STATES

GEORGIA

TEXAS

ARIZONA

MONTANA

Group 2 Cards:
MAJOR CITIES

AUSTIN

PHOENIX

BROOKLYN

SYDNEY

Group 3 Cards:
PRESIDENTS

WASHINGTON

KENNEDY

LINCOLN

OBAMA

Group 4 Cards:
AUTOMOTIVE BRANDS

KIA	BENTLEY
FORD	TOYOTA

Group 5 Cards:
DISNEY CHARACTERS

MOANA

PLUTO

ELSA

MINNIE

Group 6 Cards:
METALS/ELEMENTS

PLATINUM

GOLD

SILVER

COBALT

Group 7 Cards:
PLANETS

JUPITER

EARTH

NEPTUNE

MERCURY

Group 8 Cards:
HORSES

MUSTANG	BRONCO
PHILLY	MARE

Group 9 Cards:
GREAT LAKES

ONTARIO

SUPERIOR

MICHIGAN

HURON

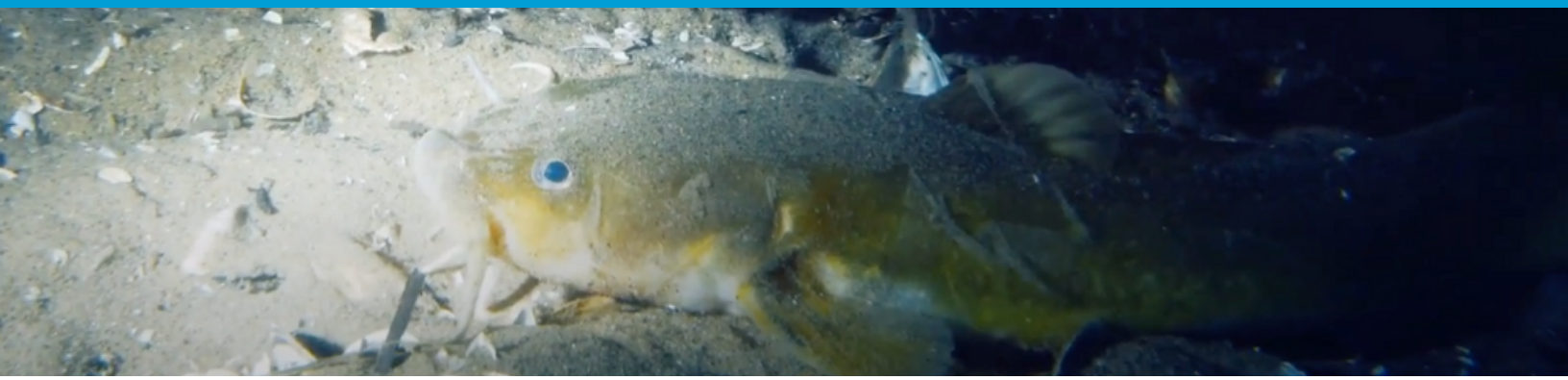


Image Credit: Great Lakes Now

Turning the Tables

How deadly fish venoms are being used to save lives

By Kathy Johnson
Great Lakes Now Contributor *(I Speak for the Fish)*

There are more venomous fish than there are venomous reptiles according to Bianca op den Brouw an evolutionary biologist and toxicologist at the University of Melbourne.

In a recent article, Brouw reports that venomous fish were once thought to number around 200, but "the abundance of venomous fish species is rapidly being re-evaluated as research into the field expands, putting current estimates at between 2000-3000 species."

Jeremy Wright, an ichthyologist at the New York State Museum, has studied catfish extensively. Of all the venomous fish species, Wright estimates that 1250-1625 are catfish. In an article published in the BMC Ecology and Evolution Journal, Wright states "venomous catfishes may outnumber the combined diversity of all other venomous vertebrates."

Fish use venom as both a way to capture prey and as a defense mechanism. Brouw notes that "venoms contain toxins that effectively disrupt the physiology of prey species in a manner that weakens or immobilizes the prey animal." However, not all fish venom is deadly.

For species like the northern madtom, venom is used strictly for defense. Rather than being deadly, northern madtom venom causes immediate, severe pain which results in predatory species avoiding them.

"The primary objective is the immediate survival of the venomous animal, and extreme pain is a very effective means of stopping a predator in its tracks. Amongst venomous vertebrates, the award for most painful venoms likely goes to the fish," Brouw states.

Rx: Fish Venom

A recent study in the International Journal of Pharmacy and Pharmaceutical Sciences reviewed medical applications for fish venoms. Authors Shweta Pandey and Ravi Kant Upadhyay report that fish venoms are comprised of a large number of components such as enzymes, small peptides, proteins, and non-proteinaceous molecules with diverse biological activities. The journal review found fish venoms can act as antipathogens, antibacterials, analgesics, antimicrobials and antibiotics. Many contain pharmacologically active components that are proving useful in the research and development of new medical treatments for humans.

"It's common in medicine to use things that would be considered toxic, in small doses and in appropriately controlled settings, to take advantage of the toxicity for a health benefit," said Dr. Julie Gronek, Deputy Chief of Staff at the VA Health Care System in Battle Creek, MI.

Fish venoms work by attacking the molecules associated with the nervous or circulatory system of their victims. Researchers are finding that the chemical formula of some fish venoms can have beneficial uses in medical applications ranging from wound care and tissue regeneration to multiple sclerosis and cancer treatments.

Image Credit: Great Lakes Now

"People are relatively familiar with chemotherapeutic agents which are just out and out poison but they kill faster growing cells rather than slower growing cells so they can be used to kill tumors. That's a classic example, but we do it with all types of drugs," Gronek said.

Pardaxin is a polypeptide toxin from the Red Sea Flatfish which can trigger the death of cancer cells when used on in vitro cell cultures and may also prohibit cancer cells from spreading. According to Pandey and Upadhyay, pardaxin "shows strong anticancer potential against cancer cells and does not show any deleterious effects on human lymphocytes." A host of new applications for fish venoms are being studied although the research is challenging as fish venoms are difficult to collect and unstable at normal ambient temperatures.

A host of new applications for fish venoms are being studied although the research is challenging as fish venoms are difficult to collect and unstable at normal ambient temperatures. Click here to watch a video of researchers extracting fish venom.

Treating Stings

Fish venom injuries represents a great cost in terms of public health, leisure, and tourism according to Pandey and Upadhyay. Their review found that venomous fish species contribute to thousands of fatalities each year particularly among divers, tourists, and fishermen. Fish venoms range from mildly painful to potentially life-threatening. Scorpion or lionfish and stonefish are species that produce the most lethal venoms.

Pandey and Upadhyay note that victims of highly toxic fish venom can rapidly develop symptoms ranging from pain and localized swelling to headache, abdominal pain, vomiting, hypertension, hypotension, shock, convulsions and cardiac arrest. By comparison, catfish venoms are generally non-lethal causing only localized pain, swelling and inflammation. Brad Utrup, a research biologist with the Michigan Department of Natural Resources said the venom from a northern madtom is comparable to a wasp sting. It is unpleasant enough that he said they are extremely cautious when handling the tiny catfish.

Size is not necessarily a determining factor for fish venom potency. Nathan Luhan an ichthyologist at the Royal Ontario Museum has been stung by large, armored catfish in South American and small northern madtom in North America. He said the pain can last for several hours and the madtoms have a well-deserved reputation for inflicting nasty stings.

The general treatment for non-lethal fish stings focuses on pain relief and typically involves soaking the affected area in warm water. Pandey and Upadhyay found that fish stings can impose the risk of secondary bacterial infections and other complications which may require further medical intervention.

Anti-venom therapy successfully neutralizes fish venom toxins and can provide lifesaving protection to victims of lethal fish stings such as from the stonefish. However, Pandey and Upadhyay's review found lifesaving anti-venoms are scarce, and this scarcity most particularly affects rural populations.