



# Susceptibility of common fish and chelonians to ranavirus

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## Introduction

Ranaviruses have been associated with mortality of lower vertebrates around the world. FV3-like ranaviruses have been isolated from different ectothermic vertebrate classes; however, few studies have demonstrated whether this pathogen can be transmitted among classes.

## Objective

Our objective was to determine occurrence of ranavirus transmission (infection prevalence) and relative susceptibility (percent mortality) for five fish and four turtle species exposed to FV3-like ranaviruses isolated from three different ectothermic vertebrate classes.

## Virus

The challenges were conducted using FV3-like ranavirus isolates obtained from three different ectothermic hosts; fish (pallid sturgeon), turtle (Box Turtle), and amphibian (American Bullfrog).

## Fish

We tested five species of fish from five families: Tilapia (*Oreochromis niloticus niloticus*); Channel catfish (*Ictalurus punctatus*), Mosquito fish (*Gambusia affinis*); Bluegill (*Lepomis macrochirus*); and Fathead minnow (*Pimephales promelas*).



These species can be found in association with turtles and amphibians, and some are important in aquaculture and sport fisheries.

## Turtles

We tested four species of turtles from two families: Red-eared slider (*Trachemys scripta*) Eastern Spiny Soft-shell Turtle (*Apalone spinifera*), Eastern river cooter (*Pseudemys concinna*) and Mississippi Map Turtle (*Graptemys kohni*)



## Methods

Fish and turtle hosts were exposed to a ranavirus isolated from an amphibian (*Lithobates catesbeianus*), a turtle (*Terrapene carolina carolina*), and fish (*Scaphirhynchus albus*) species.

Exposure was administered via water bath (10<sup>3</sup> PFU/mL) for three days and survival was monitored for 28 days. Individuals were monitored daily for survival and morbidity. Experiments lasted 28 days.

## Ranavirus Testing

Necropsy: individuals were dissected and gross signs were recorded.



Sections of liver and kidney were extracted and frozen at -80C for real-time PCR analysis, and rest of the body was stored in 10% buffered formalin for histopathology.

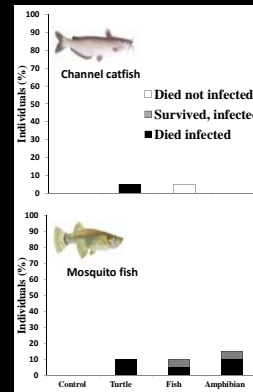
## Results

### Channel catfish:

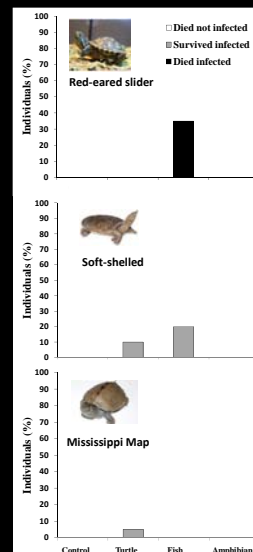
- **5% mortality** when exposed to the turtle isolate

### Mosquito fish:

- **10% mortality** when exposed to the turtle and amphibian isolates
- **5% mortality and 5% subclinical infection** from the fish and amphibian isolates.



Percent mortality fish species exposed to three ranavirus isolates from three different ectothermic hosts; turtle, fish, and amphibian



Percent mortality turtle species exposed to three ranavirus isolates from three different ectothermic hosts; turtle, fish, and amphibian

### Red-eared slider:

- **35% mortality** when exposed to the fish isolate

### Soft-shelled turtles:

- **10% and 20% subclinical infections** when exposed to the reptile and fish isolates

### Mississippi map turtles:

- **5% subclinical infections** when exposed to the turtle isolate

## Discussion

Our results demonstrate that FV3-like ranaviruses are capable of infecting hosts from different ectothermic classes.

Although substantial mortality did not occur in our experiments, the occurrence of subclinical infections in mosquito fish, soft-shelled and map turtles, suggests that fish and chelonians may function as reservoirs for FV3-like ranaviruses.

Moreover, these species may contribute to pathogen pollution via the pet trade or mosquito fish releases for insect control.

Our study is the first to report that a chelonian species can be infected by a ranavirus originating from a fish.

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