

# Fish cancer gene linked to pigment pattern that attracts mates

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Though skin cancer is deadly to male fish, it also has one perk: The black melanoma splotches arise from attractive natural markings that lure female mates. A new study published in the *Proceedings of the National Academy of Sciences* this week shows that the melanoma gene can be conserved in swordtail fish because of its beneficial role in sexual selection.

Ohio University scientists André Fernandez and Molly Morris studied three populations of female swordtails, tiny freshwater fish native to North and Central America, and found that two of them preferred males whose tails were painted to resemble the skin cancer spots. The researchers also examined specimens of swordtail fish with real melanomas, which confirmed that the cancer gene is switched on only in the tissue with the dark pigment. The study marks the first time scientists have found a cancer gene linked to a pigment pattern that functions to increase mating success in animals.

In the current study, the researchers placed a female swordtail in the middle of a tank with two partitions. They positioned a male with the faux pattern from which melanomas form on one side, and a male without the pattern on the other. After releasing the female from an opaque tube into the tank's center chamber, the scientists observed how much time she spent looking at each male during an eight-minute period. The project builds on previous studies in the Morris lab, which used the same tests to show that female swordtails are strongly attracted to males with dark vertical bars.

To avoid any bias the female might have for a particular side of the tank, Fernandez then switched the males. Two days later, he conducted the trials again, this time changing which male received the painted skin cancer spot. The female consistently chose the male with the dark pigmented marking in two of the three populations, he said.

But the research suggests that the swordtail fish population also keeps the prevalence of the cancer gene in check. A third population of females in the study rejected the males painted with the pattern that can form melanomas. The scientists suspect that's because the third group had a higher ratio of both males and females with the gene for skin cancer, which increases the likelihood of too many offspring inheriting the gene and dying off.

Swordtail fish usually live for 1.5 to 2 years in the wild and sexually mature at 4.5 months. The ones with the skin cancer gene can develop melanomas at about 7 months and die a few months later.

"Melanoma formation cuts the reproductive life cycle in half," Fernandez said. "It has a huge cost for males."

But during the few months when the male is sexually mature and healthy, he also can produce a lot of offspring, he noted.

The swordtail melanoma has been studied since the 1920s, and scientists previously believed that fish developed the cancer only in captivity. But in the recent study, 10 percent of the swordtails collected from the third population in Mexico also exhibited the disease, said Fernandez, who joins the University of Texas M.D. Anderson Cancer Center this fall as a postdoctoral fellow. He hopes to conduct further studies on the habitat, such as whether stronger exposure to the sun's UV rays might be driving more instances of skin cancer in the wild.

Source: Ohio University

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