

Fish prone to melanoma get DNA decoded

April 15 2013



Scientists have decoded the genome of platyfish, which are prone to developing melanomas (shown above) along the tail and fins. Credit: Texas State University

Scientists at Washington University School of Medicine in St. Louis and elsewhere have decoded the genome of the platyfish, a cousin of the guppy and a popular choice for home aquariums. Among scientists, the fish are meticulously studied for their tendency to develop melanoma and for other attributes more common to mammals, like courting prospective mates and giving birth to live young.

Known scientifically as *Xiphophorus maculatus*, platyfish sport a variety

of spectacular colors – brilliant oranges, yellows and a lovely iridescent silver – and myriad striped and speckled patterns. And when melanomas develop, they are easy to spot, even to an untrained eye.

"In platyfish, melanomas typically develop as black splotches along the tail and fins," says senior author Wesley Warren, PhD, a [geneticist](#) at Washington University's Genome Institute. "These fish are an ideal model for exploring the many unknowns of cancer, including how, when and where it develops in the body as well as its severity."

Scientists at Washington University, the University of Würzburg in Germany and Texas State University led an international team involved in sequencing and analyzing the platyfish genome. Their findings are available online in *Nature Genetics*.

"Now that we have the genome in hand, we can tease apart the way genes interact with one another to cause melanoma," says co-lead author Manfred Schartl, PhD, of the University of Würzburg in Germany. "Just as in human melanoma, genes that play a role in [pigment cells](#) also influence the development of [melanoma](#) in platyfish."

The platyfish genome includes some 20,000 genes, roughly the same number found in the [human genome](#). But unlike humans and other mammals, the chromosomes of the platyfish, like those in other fish, have remained remarkably intact over some 200 million years of evolution.

"It's very much a mystery as to why these chromosomes are so structurally similar among [fish species](#) over long time periods of evolution because they live in vastly different aquatic environments," says Warren.

The platyfish is a prolific breeder. But while most fish lay eggs, platyfish

females give birth to live young, often in broods of more than 100.

Comparing the genes of platyfish to those in mice and other mammals that give birth to their young, the scientists found a number of altered genes in the fish involved in live-bearing birth.

"Surprisingly, we found that the platyfish retain some yolk-related genes typically found in fish that lay eggs to produce their offspring, and genes involved in placenta function and egg fertilization displayed unique molecular changes," says co-lead author Ron Walter, PhD, of Texas State University.

While humans are known for their higher-level thinking and behaviors, platyfish and other fish have evolved their own set of complex behaviors, like courting, schooling and avoiding predators that far exceed the abilities of amphibians, reptiles and other lower vertebrates. Looking through the platyfish genome, the researchers found a number of gene copies linked to cognition in humans and other mammals that could underlie these behaviors.

"These gene copies were retained at a high rate in the platyfish, which give them a chance to evolve different functions," Warren explains. "In this case, we believe the extra gene copies gave platyfish and other related fish the ability to develop more complex behaviors, which is unexpected for many lower-level vertebrates."

More information: Schartl M, Walter, RB, Shen Y, Garcia T, Catchen J, Amores A, Braasch I, Chalopin D, Volf J-N, Lesch K-P, Bisazza A, Minx P, Hillier L, Wilson RK, Fuerstenberg S, Boore J, Searle S, Postlethwait JH and Warren WC. The genome of the platyfish, *Xiphophorus maculatus*, provides insights into evolutionary adaptation and several complex traits. *Nature Genetics*. March 31, 2013.

Provided by Washington University School of Medicine

Citation: Fish prone to melanoma get DNA decoded (2013, April 15) retrieved 23 June 2024 from <https://phys.org/news/2013-04-fish-prone-melanoma-dna-decoded.html>

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