

# Scientists find that in the evolutionary mating game, brawn and stealth rule

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When prowling for a hook up, it's not always the good-looker who gets the girl. In fact, in a certain species of South American fish, brawn and stealth beat out colorful and refined almost every time.

In a series of published studies of a South American species of fish (*Poecilia parae*), which are closely related to guppies, Syracuse University scientists have discovered how the interplay between male mating strategies and predator behavior has helped preserve the population's distinctive color diversity over the course of time. The third study in the series was published Dec. 23 in *BMC Evolutionary Biology*, a publication of BioMed Central, London. The studies were supported in part by grants from the National Science Foundation (NSF).

"*Poecilia parae* are an ideal model for investigating how genetic diversity originates and is maintained within a species," says study author Jorge Luis Hurtado-Gonzales, a Ph.D. candidate in the Department of Biology in SU's College of Arts and Sciences. "The findings may help us better understand how to protect biodiversity in larger ecosystems." Hurtado-Gonzales' co-author is J. Albert C. Uy of the University of Miami.

Like guppies, *Poecilia parae* sexually reproduce and their offspring are born live. Unlike guppies, in which no two males have exactly the same [color patterns](#), *Poecilia parae* males come in five, genetically determined colors—red, yellow, blue, *parae* (clear with a black stripe), and *immaculata* (drab gray that mimics the color of immature females). When found in the wild, the abundance of each color group represented

in the total population is relatively constant despite the fact that females prefer to mate with the more striking reds and yellows.

"If females prefer red and yellow males, then one would think that red and yellow would dominate and the other colors would phase out over time," Hurtado-Gonzales says. "However, red and yellow are the rarest colors found in the wild."

The most recent study in [BMC Evolutionary Biology](#) found that while females prefer reds and yellows they go for the winner of fin-to-fin combat in a significant number of cases. In the study, the larger parae almost always prevailed, thus gaining a mating advantage despite its less-than-desirable coloration. Immaculatas, which are the smallest males, generally shunned the showy displays of violence and were mostly ignored by all but yellow males. The larger yellows almost always defeated immaculatas, stopping them from approaching females.

"In the absence of male-to-male competition, we found that females will almost always choose a red male," Hurtado-Gonzales says. "However, if the red loses a fight, the female will generally seek out the winner. In most cases, that is the larger parae, which is the most dominant male."

Immaculatas compensate for their lack of physical prowess and attractiveness through a mating strategy that relies on stealth. In a 2009 study published in the journal *Animal Behavior*, Hurtado-Gonzales found that the immaculatas' drab color provides camouflage that enables them to stealthy mate with females while the more colorful red males were wooing them. Females are promiscuous and will mate with multiple males. Additionally, immaculatas have developed larger testes, which produce more sperm, providing a post-mating advantage in the race to fertilize female eggs.

Finally, in a study published earlier this year in the *Journal of*

Evolutionary Biology, produced by the European Society for Evolutionary Biology, Hurtado-Gonzales found that a common predator of *Poecilia parae* prefers to dine on reds and yellows, most likely because their striking colors make them easier to see. This predatory disadvantage contributes to the lower numbers of reds and yellows in the overall population.

"It seems that within an evolutionary scale, the less attractive males persist in the population over their more attractive counterparts by evolving unique, but likely equally effective mating strategies," Hurtado-Gonzales says. "Therefore, the maintenance of multiple colors may result from the interaction between predator control of attractive males (reds and yellows) and the ability of less attractive males to exploit other areas of sexual selection, including male dominance, sneak behavior, and sperm competition."

A forthcoming study will focus on how blue males gain a mating advantage. Early results indicate that blues exploit habitats in which blue light waves maximize their attractiveness to females and possibly limit their vulnerability to predators.

Provided by Syracuse University

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