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Respiratory stress is linked to the sexual maturation of fish



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A recent study published in the [Journal of Fish Biology](#) has found that [fish](#) become sexually active and spawn for the first time in response to growth-induced respiratory stress. Thus, the prevailing predictor of maturation in fish appears to be a redirection of energy from growth to reproduction.

Researchers from the [Chinese Academy of Sciences](#) and the [University of British Columbia](#) (UBC) estimated the ratio of oxygen consumption at maximum size and mean size at first maturity in 200 fish populations spanning 133 species of fishes. They found that fish reach adulthood when this ratio is approximately 1.40.

“Maturation and spawning appear to be induced when the supply of oxygen relative to the weight of individual fish declines. Thus, growing fish gradually become oxygen-limited, and there is a threshold, now identified, which tells them that it’s time to respond to external stimuli for maturation and spawning.”

According to Dr. Pauly’s “Gill Oxygen Limitation Theory (GOLT),” the oxygen supply of fish gradually declines as their weight increases because their gills (the organs used to extract oxygen from the water) are two-dimensional surfaces which cannot keep up with the development of their three-dimensional bodies. At a certain point, fish’s growth leads to a decline in gill surface area, which causes a critical level of oxygen supply. “This triggers the hormonal cascade that pushes fish to respond to environmental stimuli to mature and spawn,” said Dr. Pauly.

“Being able to corroborate with empirical evidence that respiratory stress is what prompts fish to reach first maturity when they do is a nice achievement,” added study co-author Dr. Cui Liang, a researcher in Oceanography at the Chinese Academy of Sciences. “This has important implications for aquaculture practitioners, who have long known the importance of dissolved oxygen in fish production.”

Moreover, according to the scientists, the study findings can also be used explain why fish stressed by rise in sea temperature and deoxygenation caused by climate

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