Scientists find faster way to count animal sperm using DNA

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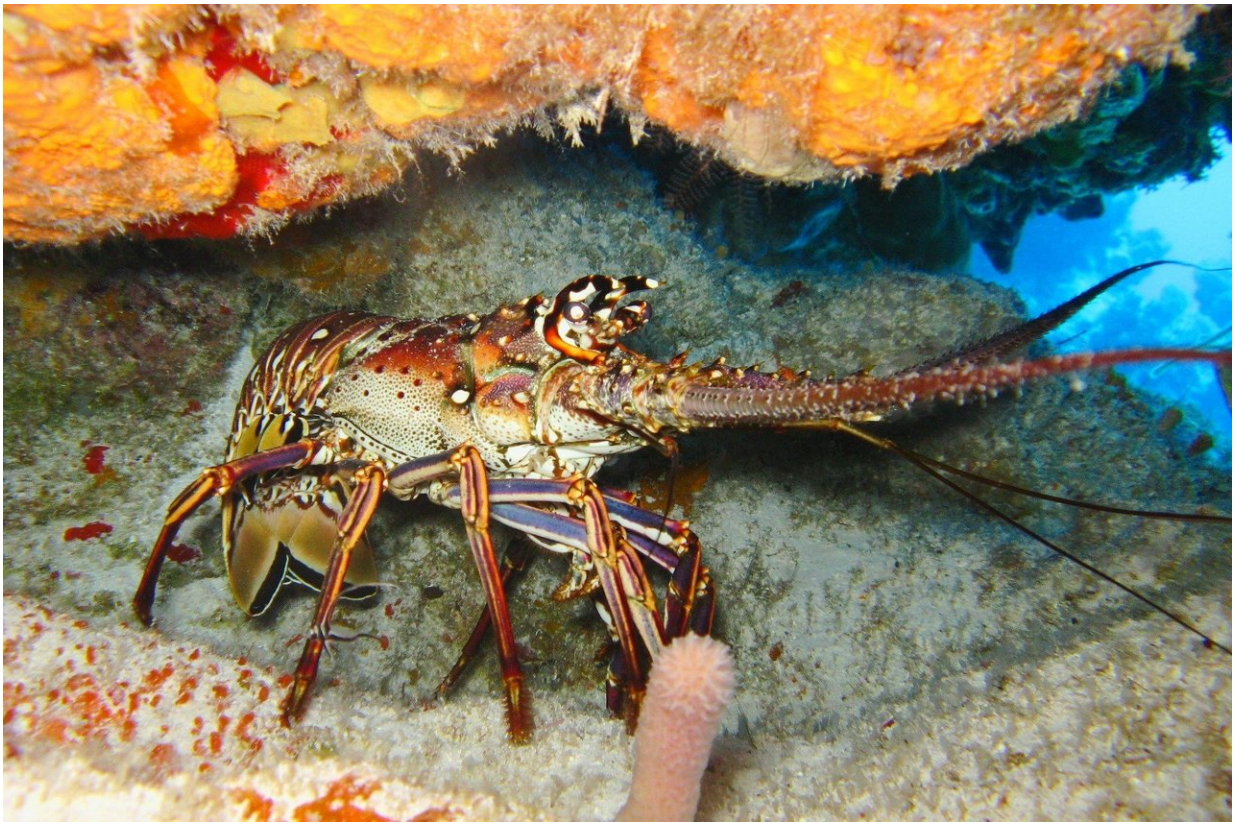

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Researchers at the University of New Hampshire have identified a quicker and less expensive way to count sperm in lobsters that could help scientists looking at any animal better understand mating, a key aspect of

species survival.

"Scientists used to have to do this using a very tedious or expensive method so it was rarely attempted," said Win Watson, professor emeritus of marine biology. "Now that DNA technology has become so accessible and affordable, we decided to try it and it worked great."

The technique is described in their study which was recently featured in the *Journal of Crustacean Biology*. Researchers outlined how they were looking to better understand how climate change may alter lobster reproduction by influencing the amount of sperm a male lobster could produce. The challenge they encountered was counting the number of sperm contained in the lobster's spermatophore—the package of sperm a male lobster transfers to females during mating. Each spermatophore contains about two million sperm cells, so counting them under a microscope is too time-consuming, especially when processing numerous samples. The new DNA method they developed allowed them to determine whether male lobsters experienced declining numbers of sperm when they mated successively, leading to sperm limitation within the population.

"Imagine if it took a week to produce a complete lobster spermatophore. That would mean that male lobsters might only be able to mate once a week," said Watson. "That, in turn, might mean that some female lobsters that might be ready to mate, would not get the chance. Females only mate after they molt, which they do only once per year, and they all tend to do it around the same time. So, limited availability of male sperm could significantly impact the population."

The absence of cost-effective ways to measure lobster sperm meant that testing the sperm limitation hypothesis were rarely attempted, despite concerns about the sustainability of the American lobster population.

"Beforehand, if we wanted to look at questions of reproductive output in lobsters, it took labor-intensive methods and an incredible amount of time," says Ben Gutzler, a recent Ph.D. graduate from UNH in Marine Biology and lead author. "This new DNA method will hopefully make it possible for a broader group of scientists to ask more relevant questions about more animals."

Although the researchers did not find evidence of sperm limitation among male lobsters, they did uncover inconsistent sperm production among the individual lobsters studied. For example, they found that lobsters with severe shell disease, which is very common in southern New England, packaged fewer sperm cells in each spermatophore. This could have implications for population sustainability and prompt further study.

More information: Benjamin C Gutzler et al, A novel method of quantifying sperm to determine the potential for sperm depletion in male American lobsters Homarus americanus (H. Milne Edwards, 1837) (Decapoda: Astacidea: Nephropidae), *Journal of Crustacean Biology* (2020). DOI: 10.1093/jcbiol/ruaa030

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