

Male toadfish protect the eggs in their care with antibacterial fluid

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By **Ibrahim Sawal**



Male plainfin midshipman fish have an unusual way of protecting eggs in their care

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Male plainfin midshipman toadfish produce an antibacterial fluid that keeps the eggs in their care healthy.

Plainfin midshipman (*Porichthys notatus*) live in the [deep sea](#) of the eastern Pacific and come to shore to mate. Males dig nests in the intertidal zone and “hum” to attract females, which then lay their eggs in the nest of a chosen male. Typically, these eggs are bright yellow, but they often become infected with bacteria due to the microbe-rich nature of the breeding area. Infected eggs turn grey.

Males of the species come in two types. Guarder males dig the nests, attract females and then look after the eggs. Sneaker males, meanwhile, creep into the egg-filled nests of guarder males

and fan their sperm towards the eggs to steal fertilising opportunities.

Both male types have so-called accessory organs, an outgrowth of the testes, which are known to aid with [sperm competition](#) by producing nutrients to make the sperm swim faster. “They look like the head of a mop with these finger-like projections full of fluids,” says Sigal Balshine at McMaster University in Canada.

But there is something unusual about these accessory organs. Guarder male accessory organs grow during mating season while the sneakers’ shrink. This is the opposite of what would be expected if the organs were important only for sperm competition, because sneaker males would benefit most if their sperm were particularly competitive.

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This led Balshine to suspect that these organs have other functions. She and her team investigated whether they might play a role in parental care by preventing bacterial growth in the eggs.

To test this, plainfin midshipman eggs from 18 healthy and 19 infected broods were collected and bacteria from both were cultured. The researchers then extracted fluids from the accessory organs of 24 guarders and 12 sneakers and applied the fluids to the different cultured bacteria.

They found the fluids prevented the growth of bacteria cultured from unhealthy eggs, but not of bacteria cultured from healthy eggs. What’s more, guarder male fluids were three times more potent at this than sneaker male fluids.

The researchers also profiled the molecules within the fluid and found they didn’t match known antibacterial agents, meaning plainfin midshipman fluids contained a novel bacteria-killing chemical. “It’s a mystery how they’re producing this,” says team member Meghan Pepler, also at McMaster University.

Balshine suggests plainfin midshipman accessory organs aid [parental care](#) by producing an antibacterial fluid that helps protect the eggs from harmful bacteria while allowing harmless bacteria to survive. Pepler says with more research, this fluid could have potential uses in [fisheries](#) to minimise bacterial infections in species being farmed.

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