



Researchers using pipettes to collect sperm in the water during the spawning exercise. Giant clams have both male and female reproductive parts. ST PHOTOS: MARK CHEONG

‘Grow-A-Clam’ for a healthier reef

NUS scientists are trying to grow an endangered giant clam in the lab



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They sit regally on the seabed, their shells opening in a riot of colour – the footstools of Triton’s royal family.

But these giant clams are also increasingly coveted. Some people want the shells for their homes, while hobbyists who own marine aquariums often desire these relics of the sea for their aquascapes.

This demand is fuelling the poaching of this marine creature from the wild.

Scientists at the National University of Singapore (NUS) are studying whether a giant clam species – the boring giant clam (*Tridacna crocea*), so called for the way it burrows into the seabed – can be grown in laboratories or nurseries.

If successful, findings can support the repopulation of areas where wild clam numbers have fallen. Such methods could also be shared with aquarium businesses to grow the clams instead of harvesting them from the wild.

In Singapore, *Tridacna crocea* is an endangered species. It is one of two giant clam species that can still be found here regularly, the other being *Tridacna squamosa*. Three others – *Hippopus hippopus*, *Tridacna gigas* and *Tridacna maxima* – are presumed extinct nationally.

Principal investigator of the

project, Dr Neo Mei Lin of the NUS Tropical Marine Science Institute, said the boring giant clam is the smallest in its family, growing up to about 15cm long.

Their small size and brightly coloured flesh make them popular among hobbyists, she said.

In comparison, the largest giant clam species, *Tridacna gigas*, can reach lengths of over a metre. As for *T. squamosa*, the largest clam found on Singapore’s reefs, it measures about 40cm.

The “Grow-A-Clam” project is part of a larger initiative that is looking into the mariculture of marine species which started last October on St John’s Island, where the national marine laboratory is located. Dr Neo and her colleagues first bought from local aquariums 10 boring giant clams as the initial brood stock for the experiment.

Other than determining the ideal conditions for rearing them outside their natural habitat, the researchers also coaxed them to spawn – or release their sperm and eggs into the water. Ideally, the clams would spawn naturally. But little is known about the reproductive cycles of these creatures.

“Even after so many years of research, I can count with my fingers the number of studies that re-

ported natural spawning in the wild,” said Dr Neo, who has been studying these organisms for more than a decade.

So the scientists induced them to spawn, by injecting the hormone serotonin into the clams’ sexual organs. This causes them to contract their muscles, and release their sperm and eggs into the water.

Giant clams have both male and female reproductive parts. To prevent in-breeding, where the eggs of a clam fertilises its own eggs, the researchers quickly siphoned out the murky liquid and put them into another tank where the eggs of another clam were waiting.

Within a few days, the scientists observed that larvae had formed, and that they had developed tiny shells.

Said Dr Neo: “The next milestone would be to see if we can produce them at regular intervals in sizeable batches – this could be tough since not all larvae would reach maturity. If we can replicate this for the other species, we could help bring them back to the seas of South-east Asia.”

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Dr Neo Mei Lin (right) and Mr Samuel Lee, an intern studying life sciences at the National University of Singapore, preparing boring giant clams for the spawning exercise at NUS’ Tropical Marine Science Institute (TMSI) on St John’s Island.



Before the spawning exercise, researchers clean the clams with apparatus such as toothbrushes to remove any external materials and to make sure there are as few variants as possible.

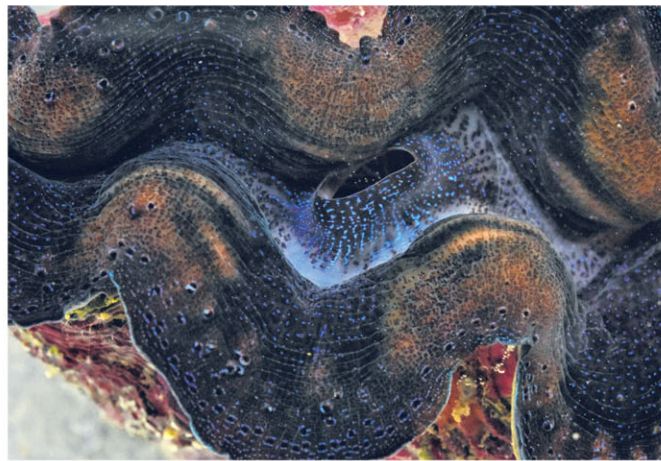
After the spawning exercise, the clams used are placed in a recovery tank and monitored for a week before being moved to their normal holding area (which is called the outdoor aquarium).



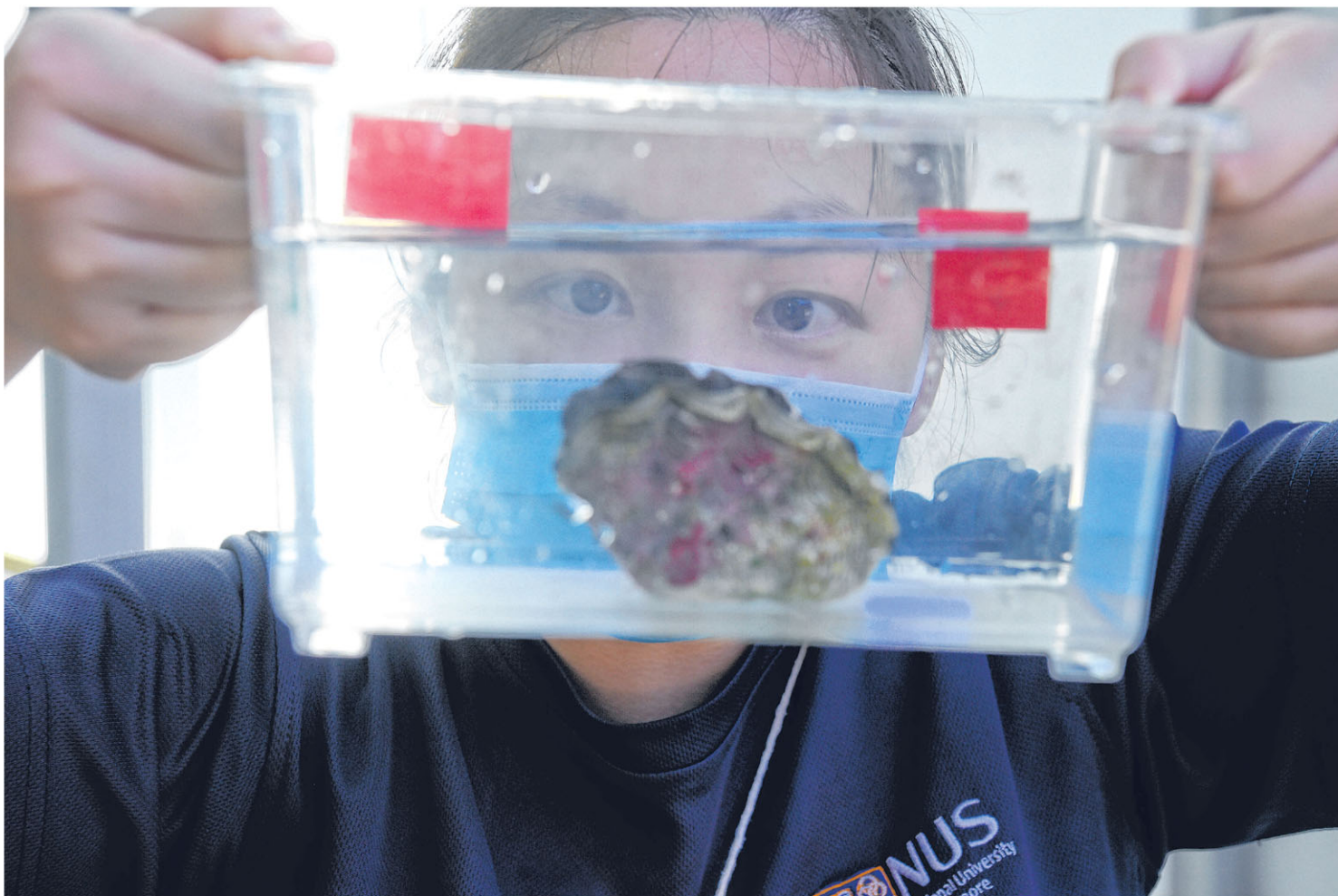
Researchers finally setting up various tanks with a mixture of sperm and eggs until successfully fertilised eggs are mature enough to be moved to another area of the research facility. It will take about one month for the clam to reach at least 1mm in size.



Researchers injecting serotonin into a boring giant clam (*Tridacna crocea*). This triggers a reaction which contracts their muscle in their sexual organs. (Left) Almost immediately after the serotonin is injected, the clam starts to eject sperm through its siphon, as seen from the cloudiness in the water. If and when the clams start producing eggs after ejecting sperm, they are moved from tank to tank so that there is less chance of contamination and in-breeding.

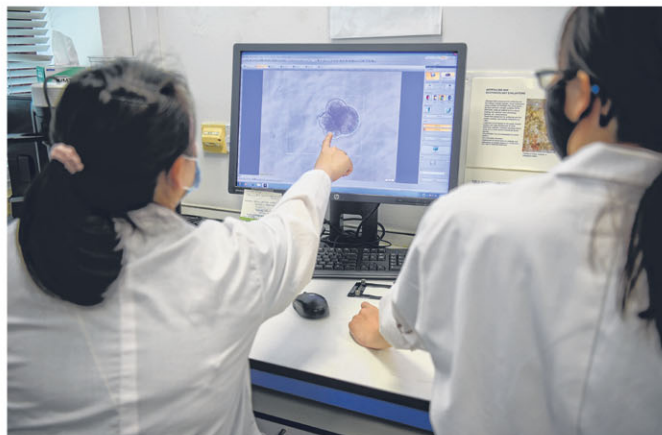


The siphon (centre) of the boring giant clam is where sperm and eggs are ejected from. Ideally, the clams would spawn naturally. But little is known about the reproductive cycles of these creatures.



Dr Neo checking to see if one of the clams is still ejecting sperm. When the clams are younger, they produce more sperm, and after seven to 10 years they express both sexual differentiations.

Researchers checking on whether the eggs had been successfully fertilised after three hours. On screen, a partially dividing embryo can be seen. The next milestone, says Dr Neo, would be to see if "we can produce them at regular intervals in sizeable batches".



Wild giant clams in Malaysian waters. These clams are increasingly coveted by people, such as hobbyists who own marine aquariums, for their aquascapes. This demand, in turn, is fuelling the poaching of this marine creature from the wild. PHOTO: COURTESY OF NEO MEI LIN