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Baby sea urchins boost coral survival rate – new research will benefit global coral restoration

New research into co-culturing – raising juvenile sea urchins alongside lab-spawned corals – has found the technique produces an eight-times-higher survival rate in young corals, and could have major implications for the restoration of damaged reefs around the world.

The research – published this week in open access journal Scientific Reports – took as its starting point the known benefits of algae-grazing sea urchins for coral reefs, which can become overwhelmed if the algae is not kept in check. For young corals, though, adult sea urchins cause damage and even eat the corals, so juvenile urchins are needed to control the algae without threatening the coral 'babies'.

Researchers at the Horniman Museum and Gardens in London and the University of Derby spawned Tuxedo urchins (*Mespilia globulus*) and reared them to a suitable size in time for the planned spawning of broadcast corals at the Horniman Aquarium's research laboratory. Compared to a coral survival rate of just 5% in a tank without any urchins, researchers found that 40% of the corals survived for six months in the tank with the most urchins (18 urchins reared alongside 1,250 corals).

Dr Jamie Craggs, lead researcher and curator at the Horniman Aquarium, says: 'This research is an important next step for Project Coral, our international research partnership which has already broken the code to allow predictable spawning of corals in laboratory settings. Low survival rates of juvenile corals are currently a barrier to effective reef restoration. This new co-culturing technique using sea urchins makes possible a major up-scaling in the number of corals that could be reared and transplanted onto damaged reefs, and we're already getting interest from leading reef restoration organisations around the world.'

Dr Michael Sweet, Associate Professor in Aquatic Biology at the University of Derby, says: 'Co-culturing itself is a known concept, used before with snails but never before with corals and sea urchins. This research has overcome significant challenges in terms of logistics and husbandry, to rear sea urchins to exactly the right size to graze without damaging the juvenile corals, allowing

More

them to thrive. In addition we highlight one possible way in which reef restoration can be self-funded, by co-culturing a commercially important species and using the profits to funnel back into methods to try and save our reefs.'

The research paper 'Ex-situ co culturing of the sea urchin, *Mespilia globulus* and the coral *Acropora millepora* enhances early post-settlement survivorship' was published online in Scientific Reports on 10 September 2019 and is freely available at nature.com/articles/s41598-019-49447-9.

Dr Jamie Craggs was seen earlier this year on the BBC's *Blue Planet UK*, spawning sea urchins on camera and talking about the work of Project Coral. International Project Coral partner the Florida Aquarium recently announced the first predictable spawning of Atlantic corals, using the techniques developed at the Horniman working with Pacific corals. Find out more about Project Coral and support its work at horniman.ac.uk/coral.

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Notes to Editors:

- **Project Coral** is an innovative coral reproductive research project led by the Horniman Aquarium with international partners. The Horniman Aquarium has been pioneering research into developing techniques to stimulate coral sexual reproduction, and became the first institution globally to successfully induce predictable broadcast coral spawning as well as the first successful in-vitro fertilisation of captive corals in the UK. Project Coral's breakthrough of controlled captive coral spawning will support coral research facilities all over the world, by opening up opportunities to examine the effects of climate change, aid restoration of the reefs and support sustainable livelihoods.
- **The University of Derby –** Located in the heart of England, we build on our region's heritage of innovation to provide industry-relevant, expert teaching, from foundation and undergraduate degrees through to postgraduate study and research. Rated Gold in the Teaching Excellence and Student Outcomes Framework (TEF) and a Top 30 UK University in the Guardian University Guide 2020, our academic strength is backed up by practical experience to ensure our students are ready for a successful career.
- **The Horniman Museum and Gardens** opened in 1901 as a gift to the people in perpetuity from tea trader and philanthropist Frederick John Horniman, to 'bring the world to Forest Hill'. Today the Horniman has a collection of 350,000 objects, specimens and artefacts from around the world. Its galleries include natural history, music and an acclaimed aquarium. A new World Gallery of anthropology opened in June 2018 and a new arts space, The Studio, opened in October 2018. Indoor exhibits link to the award-winning display gardens – from medicinal and dye gardens to an interactive sound garden, Butterfly House and an animal walk – set among 16 acres of beautiful, green space offering spectacular views across London. horniman.ac.uk
- The Horniman Museum and Gardens is core-funded by the Department for Digital, Culture, Media and Sport (DCMS) and since 1990 has been governed by an independent charitable trust, registered charity no. 802725. The Horniman Museum and Gardens also receives funding from Arts Council England as one of its National Portfolio Organisations.
- On 29 July 2019 the **Horniman Museum and Gardens declared an ecological and climate emergency**, pledging to place carbon reduction and environmental issues at the heart of its work. The declaration is both a consolidation of existing work and a commitment to renewed ambitions to reduce the Horniman's environmental and pollution footprint, increase biodiversity, and inspire others to do so. Find out more about the Horniman's specific commitments as part of the declaration at horniman.ac.uk.