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New Records of *Heliopora hiberniana* from SE Asia and the Central Indian Ocean

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Coral reefs are among the most diverse ecosystems on the planet. They provide spawning sites for fishes and habitat for a myriad of fauna and flora. They protect coastlines from waves and storms and have important socio-economic value. However, coral reefs, as we know them, are seriously threatened by globalization and climate change [1]. The widespread bleaching of scleractinian corals threatens to destabilize critical ecosystem functions such as reef-building [2], and a growing body of data indicates that coral reefs are being transformed [3,4]. Future reefs are predicted to be dominated by non-constructional taxa [5,6], and the retreat of scleractinians threatens to cripple coral reef ecosystem functioning and endanger the lives of the millions of people that rely on coral reefs for protection, income and nutrition [7]. To detect coral community responses to climate change, and to identify which species may perform critical functional roles on future reefs, accurate taxonomic and systematic information is needed.

Heliopora is a genus of hermatypic octocoral that is a major contributor to reef accretion in tropical Indo-Pacific locations [8]. Up until recently, *Heliopora coerulea* was the only extant species in the genera, however in 2018, a new reef-building octocoral species, *Heliopora hiberniana* was described from four locations in north Western Australia [7]. The newly described species is morphologically distinguished from *H. coerulea* by its thin branches and white skeleton. Colonies of *H. hiberniana* survived the 2016 coral bleaching event at Scott Reef, sparking suggestions that non-scleractinian reef builders may have a higher probability of persisting through future climate regimes [7]. Hence it has been hypothesized that *Heliopora* may become increasingly important in the reconfiguration of tropical Indo-Pacific coral reefs [7]. The ability to accurately detect such compositional changes on future reefs is contingent upon a good understanding of current species distribution patterns.

Here we report new photographic evidence (Figure 1A–E) that extends the known range of *Heliopora hiberniana* from the north-west shelf of Western Australia to the Maldives and the Wakatobi and Gili Islands in Indonesia (Figure 2). The visual records are augmented by the re-discovery of a specimen in the Smithsonian Museum, collected from Kur Island in Indonesia in 1979, which matches the description of *H. hiberniana* (Figure 1E). These new records extend the distribution of *H. hiberniana* from NW Australia to the Central Indian Ocean and the Bali and Banda Seas in SE Asia. It is possible *H. hiberniana* also occurs from the Philippines through to Taiwan and Japan as two morphologically and reproductively differentiated lineages have been described along the Kuroshio Current [9,10]; however, the relationship between these lineages and *H. hiberniana* remains to be clarified.

Figure 1. New photographic evidence increases the known distribution of *Heliopora hiberniana*. (**A**). Kunfunadhoo Island, Baa Atoll, Maldives, 12 m; (**B**,**C**). Wangiwangi Island, Wakatobi Islands, Indonesia, 10–12 m. The red arrow points to a broken branch showing the white skeleton; (**D**). Gili Islands, Indonesia, 8 m; (**E**). Specimen #79530 Smithsonian Institute. Collected by Gordon Hendler on the Helix-79 expedition in 1979, station M-99, Kur Island, Moluccas, 8–16 m; (**F**). Gili Islands, 10 m with annular lesions.

Colonies at the Gili Islands in Indonesia were commonly observed to have white rings with healthy, intact tissue in the centre (Figure 1G). The rings are presumed to be a feeding scar because similar annular lesions observed on *Acropora palmata* in the Atlantic Ocean, and *Psammocora albopicta* in South Korea, were formed by the foraging activity of cowfish (Ostraciidae) [11,12]. Further observational studies are needed to determine if a member of the Ostraciidae family is responsible for the *Heliopora* lesions. These new records advance our understanding of the distribution of this species, but little information is available about its reproductive behaviour or symbiont composition. Further demographic data, along with experimental and post-bleaching survivorship studies are needed to test the hypothesis

that this species may play an increased functional role on future reefs as a result of higher tolerance to heat stress.

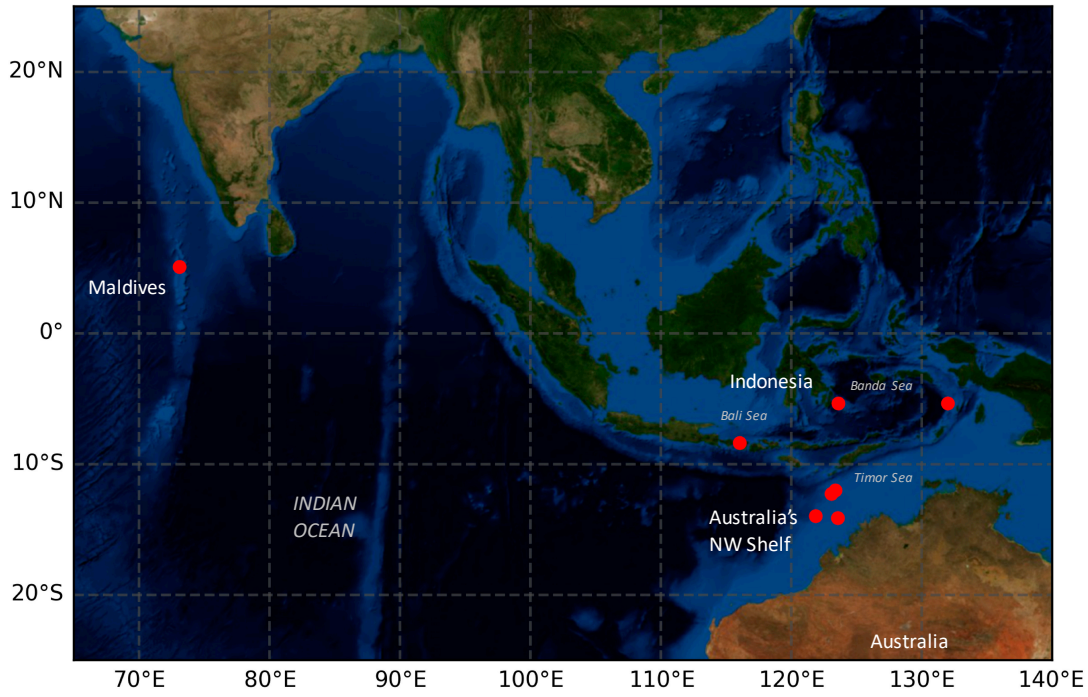

Figure 2. The current known distribution of *Heliopora hiberniana* extends from the Central Indian Ocean to SE Asia and NW Australia (red dots).

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