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Editor's preamble to the 2020 edition of *Platax*

In this 17th issue of *Platax*, we are proud to present seven articles centered around two major research themes: coral reefs (Fig. 1) and ichthyology. Mayfield & Chen (pp. 1-26) and Mayfield (pp. 27-52) have taken a closer look at gene expression datasets from two model reef corals- *Pocillopora acuta* and *Seriatopora hystrix*, respectively- exposed to sustained-elevated and highly variable temperatures, respectively, and documented fundamental shifts in how these widely distributed

Fig. 1. A typical hard+soft coral assemblage along the forereef (~5 m) of Taiwan's Dongsha Atoll (South China Sea). Although the corals appear healthy in this image (taken in April 2016 by myself), the hermatypic corals of these reefs have since undergone significant bleaching (whereby the coral-dinoflagellate mutualism disintegrates) due to abnormally high temperatures associated with global climate change.

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Indo-Pacific corals respond to changes in temperature over long- and short-term timescales, respectively. They have postulated that marine environments may have become so compromised on account of global climate change (GCC) and other anthropogenic stressors (Hoegh-Guldberg et al., 2017) that these coral species, and likely most others, currently exist in what they call "alternative stable states;" although such corals continue to grow and reproduce, their cellular biology has fundamentally shifted (Fig. 2). A less parsimonious, yet more foreboding, explanation for these unexpected findings is that these corals are simply perpetually and sub-lethally stressed.

How long these constitutively

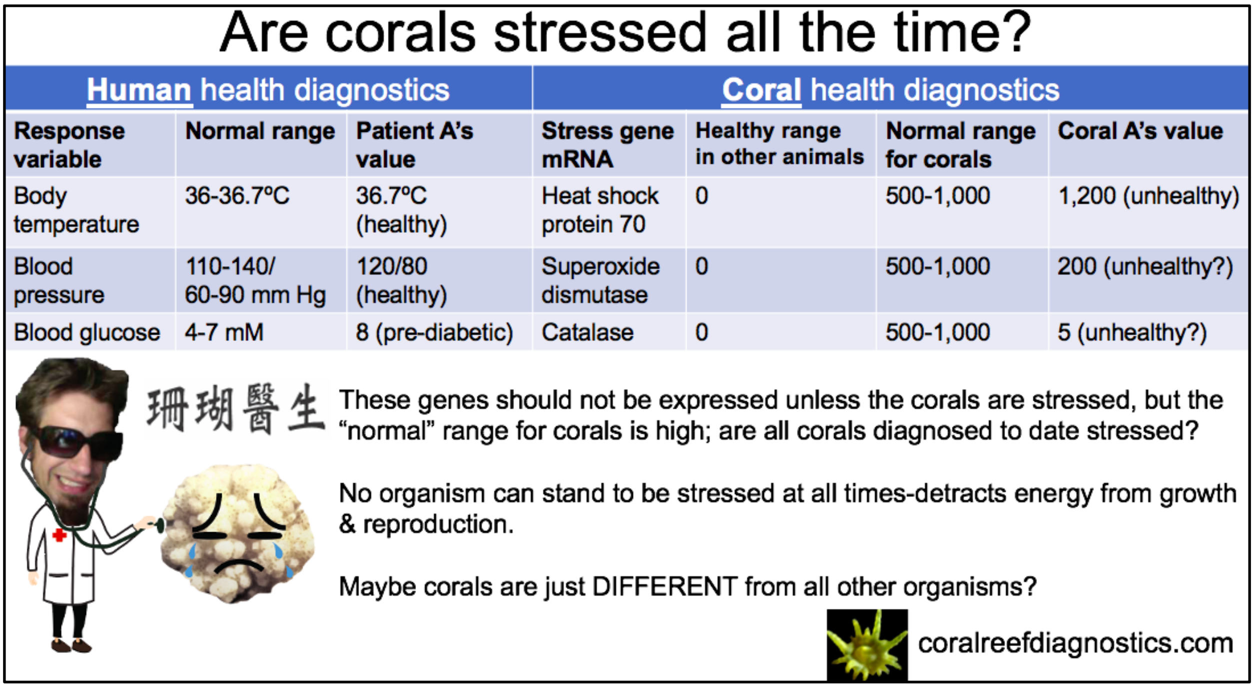

Fig. 2. A diagnostic chart depicting the difficulties in assessing coral health relative to human health. In this example, coral patient A ("Coral A") has presented abnormally high heat shock protein 70 mRNA expression levels relative to values obtained in conspecifics sampled across the Indo-Pacific as part of the Khaled bin Sultan Living Oceans Foundation's "Global Reef Expedition" (the largest coral reef survey+sampling endeavor ever undertaken). Based on this marker alone, we would surmise that Coral A is potentially stressed. However, its expression levels of the second and third markers, superoxide dismutase and catalase, respectively, are well below those of "normal" corals, but substantially above values measured in healthy (non-coral) animals. Based on these data, then, would Coral A represent a healthy coral or one that has instead entered into an "alternative stable state" (sensu Mayfield & Chen pp. 1-26)?

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compromised coral phenotypes can be maintained is currently unknown, though many marine biologists are planning for the worst with respect to GCC and other human impacts on marine organisms. For this reason, Lin (pp. 53-76) has reviewed progress in the coral cryopreservation field. In a better world, this approach would be used strictly for research purposes (e.g., sharing samples among colleagues); unfortunately, it is clear that, in many parts of the world, coral reefs have become so marginalized that the framework-building scleractinians can no longer survive without human intervention. Since aquarium husbandry of extinction-prone species is challenging (though significant advances have been made; see Chang et al., 2020 & Huang et al., 2020.), our best bet may, sadly, be to cryopreserve the genetic material of these thermo-sensitive invertebrates (as well as the gastrodermal dinoflagellate symbionts critical to their survival). This would allow future scientists to thaw the cryopreserved specimens and reseed reefs (or husbandry facilities) when/if seawater quality conditions have once again become favorable for coral survival.

Although not directly linked to environmental change, the remaining four articles in this year's issue nevertheless address one common goal of the marine biology field: documenting "current baseline" levels of biodiversity against which future change can be tracked. Specifically, Tang (pp. 77-84), Lai (pp. 85-102), Tang & Chan (pp. 103-112), and Kawai & Ho (pp. 113-117) describe new records of fish species in Taiwan (Fig. 3), a country situated at the northern terminus of the ultra-high-biodiversity "Coral Triangle." Through their collective efforts, we now have a better understanding of the teleost fish biodiversity around the country, where well over 3,000 species have now been conclusively identified (with specimens archived at Academia Sinica & the National Museum of Marine Biology & Aquarium). It is my hope that such findings not only reflect how much work is left to be done in cataloging Taiwan's rich marine life, but constitute a better justification for limiting our reliance on fossil fuels and wild-caught fish by demonstrating just how much we have to lose with respect to Earth's marine heritage.

References

Chang, T.C., A.B. Mayfield & T.Y. Fan. 2020. Culture systems influence the physiological performance of the soft coral *Sarcophyton glaucum*. Scientific Reports 10, 20200.

Hoegh-Guldberg, O., E.S. Poloczanska, W. Skirving & S. Dove. 2017. Coral reef ecosystems under climate change and ocean acidification. Frontiers in Marine Science, 4:158.

Huang, Y.L., A.B. Mayfield & T.Y. Fan. 2020.

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Effects of feeding on the physiological performance of the stony coral *Pocillopora acuta*. Scientific Reports, 10, 19988.

Fig. 3. Although the reef fish biodiversity of Dongsha Atoll is high, the virtual absence of large predators from shallow reef areas (2-30 m) evident from this representative image (taken by myself) may point to overfishing in this often-thought "remote," relatively "pristine" area (which is unfortunately well within reach of Vietnamese & Cantonese fishing vessels).