the weekly anthropocene

dispatches from the wild, weird world of humanity and its biosphere

By Sam Matey

The Arctic in the Anthropocene: Rain in Greenland.

Greenland, the largest island in the world, is home to a 660,000 square mile ice sheet. Thanks to climate change, it's losing about 270 billion tons of that ice per year, substantially contributing to ongoing sea level rise. Now, a new study published in *The Cryosphere* has found a disturbing trend indicating even more profound melting ahead. The study examined satellite data and on-the-ground observations (pictured) for the period from 1979 to 2012 and found that melting associated with rain events in the summer doubled over that period, while melting associated with winter rain tripled. In short, more precipitation in Greenland is falling as rain instead of snow. Not only does this increase short-term runoff, it initiates long-term changes that weaken the ice sheet around it (as frozen rain, ice, reflects less sunlight then white, fluffy snow), further increasing melting. This means that climate change may melt more of the Greenland ice sheet than thought. For more on this disturbing new data, check out goo.gl/LoiWy5.

The Arctic in the Anthropocene: Nitrogen Fixation. In another sign of an irrevocably changing Arctic, researchers from Bigelow Labs have discovered that Arctic phytoplankton have begun nitrogen fixation, thanks to a symbiotic cyanobacterium, UCYN-A, that appears to have begun fixing nitrogen from the atmosphere due to climate change-induced warmer waters. This is an indication that the Arctic is undergoing a fundamental ecosystem regime shift, from an ice-dominated sea to a more productive ocean similar to tropical waters. This shift will likely substantially alter world ocean cycles, and could even help fight climate change, as phytoplankton no longer limited by lack of nitrogen will be able to use more atmospheric carbon. For more, see goo.gl/f6cCLQ.

New Research: Rapid Conversion of Algae to Biocrude. In a fascinating new discovery, chemical engineers at the University of Utah have developed a new jet mixing extractor capable of pulling lipids out of algae cells to quickly and cost-effectively create "biocrude," which can then be used as a fuel. "There have been many laudable research efforts to advance algal biofuel, but nothing has yet produced a price point capable of attracting commercial development. Our designs may change that equation and put algal biofuel back in play," said assistant professor Swomitra Mohanty, coauthor of the research paper. This is a spectacular new invention with the potential to finally make algae-derived fuel an economic reality. Great news! For more, see goo.gl/DTWhhE.

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New Species: 103 New Weevils from Sulawesi. In a quirky new revelation of Earth's biological wonders, a dedicated team of German and Indonesian entomologists have discovered no less than one hundred and three new species of weevils in the genus *Trigonopterus*, all from the Indonesian island of Sulawesi. Before this study, only one *Trigonopterus* weevil was known from Sulawesi! (Pictured: specimens from all 103 new species!). The new weevils are named after local features, famed scientists, and fictional characters-three are named after the main characters of the French Asterix comics, while one is even called *Trigonopterus yoda*! Fascinating work. For more, see goo.gl/2dsNg9.

New Species: "Type D" Killer Whales. In a truly epic discovery, researchers suspect that they have found a new species of killer whale (aka orca). For decades, legends have been percolating among fishers about a different sort of killer whale in sub-Antarctic waters, with sightings of these bulbous-headed, small-eye patched whales reported around the world, from New Zealand to Chile to the Crozet Islands of the Indian Ocean. (Pictured: normal killer whales portrayed above Type D killer whales). In January 2019, an international team of researchers set out from Ushuaia, Argentina, on the research vessel *Australis* to see if they could finally confirm the existence of these "Type D" whales. After eight days, they found a pod of about 30 (pictured, below). The researchers spent three hours with the whales, taking pictures, recording their vocalizations with underwater hydrophones, and collected three tissue samples for genetic analysis (using harmless, retrievable crossbow darts). "We are very excited about the genetic analyses to come. Type D killer whales could be the largest undescribed animal left on the planet and a clear indication of how little we know about life in our oceans," said NOAA marine ecologist Dr. Bob Pitman, who initiated the expedition after tracking rumors of the whales for 14 years. This incredible seafaring saga is a reminder of how, even in the sensor-strewn, satellite-girdled Earth of the Anthropocene, the biosphere continues to surprise us with incredible new creatures. For more, check out goo.gl/nweHB1 and goo.gl/aEsmm1!