



CLIMATE CHANGE COULD DEVASTATE PAINTED TURTLES, ACCORDING TO NEW STUDY

An Iowa State University biologist is sounding the alarm for the painted turtle, one of many reptiles for which climate change could prove particularly threatening.

Fluctuations in temperature driven by climate change could devastate a range of species for which sex is determined by temperature during critical stages of

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development, according to recently published research led by Nicole Valenzuela, a professor of ecology, evolution and organismal biology. Rising temperatures, along with wider oscillations in temperature, could disrupt the ratio of males to females in painted turtle populations and threaten the survival of the species, Valenzuela said. The study was published in the peer-reviewed journal *Scientific Reports*.

Painted turtles undergo temperature-dependent sex determination while developing inside the egg. Eggs exposed to warmer temperatures tend to produce females, while cooler temperatures tend to produce males, Valenzuela said. Numerous turtle species – as well as crocodilians, some lizards and the tuatara – undergo temperature-dependent sex determination.

And increasing average temperatures combined with stronger thermal fluctuations that result from climate change could lead to drastic shifts in the demographics of those species, she said, eventually leading to population collapse and possibly extinction.

MEET INDIA'S STARRY DWARF FROG, LONE MEMBER OF NEWLY DISCOVERED ANCIENT LINEAGE



The starry dwarf frog is an expert hider. Plunging into leaf litter at the slightest disturbance, it has successfully evaded attention for millions of years—until now.

The thumbnail-sized was discovered in India's Western Ghats, one of the world's "hottest" biodiversity hotspots. Scientists have named the frog *Astrobatrachus kurichiyana* for its constellation-like markings and the indigenous people of

Kurichiyarmala, the hill range where it was found.

But *A. kurichiyana* is not only a new species to science. It's the sole member of an ancient lineage, a long branch on the frog tree of life that researchers have classified as a new subfamily, *Astrobatrachinae*.

"This is an oddball frog—it has no close sister species for maybe tens of millions of years," said David Blackburn, the associate curator of herpetology at the Florida Museum of Natural History. "With frogs, there are still ancient lineages out there awaiting discovery. This gives us one more puzzle piece to think about deep time."

Dark brown with a bright orange underbelly and speckled with pale blue dots, the frog camouflages well in wet leaf litter, and only a few individuals have been found.



"The coloration was the first thing that stood out to me, these starry patterns with a blue tinge," said Seenapuram Palaniswamy Vijayakumar, lead author of the species description and now a postdoctoral fellow at George Washington University. "We hadn't seen anything like this before."



SCIENTISTS FIND MYSTERY KILLER WHALES OFF CAPE HORN, CHILE

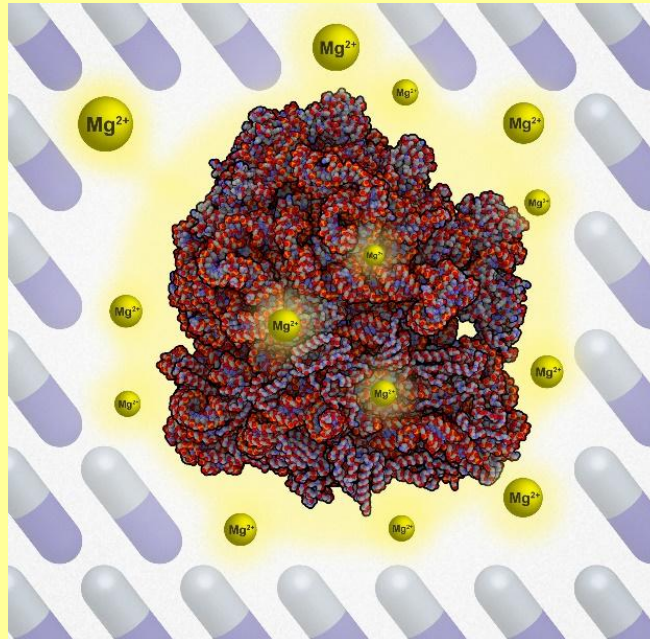
In January 2019, an international team of scientists working off the tip of southern Chile got their first live look at what might be a new species of killer whale. Called Type D, the whales were

previously known only from a beach stranding more than 60 years ago, fishermen's stories, and tourist photographs. Genetic samples the team collected will help determine whether this animal, with its distinctly different color pattern and body shape, is indeed new to science.

"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 Bob Pitman, a researcher from NOAA Fisheries' Southwest Fisheries Science Center in La Jolla, California.

The team's encounter with the distinctive whales came after they spent more than a week at anchor, waiting out the perpetual storms of Cape Horn off southern Chile. It was here that the scientists collected three biopsy samples—tiny bits of skin harmlessly taken from the whales with a crossbow dart—from a group of Type D killer whales.

RESEARCHERS DISCOVER A NEW MECHANISM USED BY BACTERIA TO EVADE ANTIBIOTICS



As bacteria continue to demonstrate powerful resilience to antibiotic treatments—posing a rising public health crisis involving a variety of infections—scientists continue to seek a better understanding of bacterial defenses against antibiotics in an effort to develop new treatments.

Now, researchers at the University of California San Diego who combine experiments and mathematical modeling have discovered an unexpected mechanism that allows bacteria to survive antibiotics.

The researchers investigated the relationship between ribosome activity and the electrochemical flux of ions across cell membranes. This membrane potential and ribosomes are among the most ancient and fundamental processes that operate in all living cells, from bacteria to humans. The scientists identified a distinct connection that "reveals how these ancient and fundamental cellular processes that are essential for life are interacting with each other," said Suel.

SCIENTISTS IDENTIFY GENE PARTNERSHIPS THAT PROMOTE SPINAL CORD REGENERATION

Researchers are one step closer to solving the mystery of why some vertebrates can regenerate their spinal cords while others, including humans, create scar

tissue after spinal cord injury, leading to lifelong damage.

Scientists at the Marine Biological Laboratory (MBL) have identified gene "partners" in the axolotl salamander that, when activated, allow the neural tube and associated nerve fibers to functionally regenerate after severe spinal cord damage. Interestingly, these genes are also present in humans, though they are activated in a different manner. Their results are published this week in *Nature Communications Biology*.

"Axolotls are the champions of regeneration in that they can regenerate multiple body parts. For example, if you make a lesion in the spinal cord, they can fully regenerate it and gain back both motor and sensory control," says Karen Echeverri, associate scientist in the Eugene Bell Center



for Regenerative Biology and Tissue Engineering. "We wanted to understand what is different at a molecular level that drives them towards this pro-regenerative response instead of forming scar tissue."

Echeverri's prior research had shown that, in both axolotls and humans, the c-Fos gene is up-regulated in the glial cells of the nervous system after spinal cord injury. She also knew that c-Fos cannot act alone.

GIRAFFER MORE SPECIOSETHAN EXPECTED

Scientists from the Senckenberg and the Giraffe Conservation Foundation have analysed the genetic relationships of all major populations of giraffe in the wild. The large study on the genetic makeup of giraffe, published today in *Current Biology*, shows that there are four distinct giraffe species. Until now, only one giraffe species had been recognized. The unexpected results are based on analyses using several nuclear marker genes of more than 100 animals. The new insights are set to improve protection efforts of these endangered animals in Africa.

Despite their large size and iconic presence, giraffe have been incompletely



explored until now, with many aspects of their biology poorly understood. Latest estimates have revealed that giraffe numbers have plummeted by >35% over the past 30 years down to approximately 100,000 individuals across their range in Africa. Traditionally giraffe are classified as one species with nine subspecies based on coat patterns, ossicone (horn) structure and geographical distribution - now, this view has to be thoroughly revised.

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