

## Environment News Futures

### Land-based Bird Populations are at Risk of Local Extinction

September 21, 2018—University College, London

**A new report finds that land-based bird populations are becoming confined to nature reserves in some parts of the world—raising the risk of global extinction—due to the loss of suitable habitat.**

Researchers analysed biodiversity in the area known as Sundaland, which covers the peninsula of Thailand, Borneo, Malaysia, Sumatra, Java and Bali, one of the world's most biologically degraded regions.

The study, published today in *Conservation Letters*, focuses on galliformes—heavy-bodied ground-feeding birds such as pheasants, grouse and quail—as their numbers are well-recorded and they are amongst the most threatened species in some parts of the world.

Scientists found that up to 13 populations (25 per cent of galliform populations in the area) have been extirpated (made locally extinct) in the region and no longer exist outside nature reserves (protected areas). The island of Sumatra has suffered the highest proportion of extirpations among the areas studied, having lost 50 percent of its galliform species in unprotected land.

As a result, certain species are only found in protected areas—raising questions about the ultimate goal of conservation. The researchers argue that these areas were never intended to be a last resort for the existence of species and are also coming under increasing threat from human activity.

### How Math Helps Explain the Delicate Patterns of Dragonfly Wings

The dainty veins gracing the wings of dragonflies and other insects are like fingerprints: Each wing displays a distinct pattern. A randomized mathematical process may help explain how certain thin filaments, called secondary veins, form these complex patterns, a new study finds.

Insect wings consist of two types of veins, both of which provide structural support (SN: 6/24/17, p. 5)....

### A Gentoo Penguin's Dinner Knows How to Fight Back

September 4, 2018—Sarah Zielinski

In a fight between a pipsqueak and a giant, the giant should always win, right?

Well, a battle between an underwater David and Goliath has revealed that sometimes the little

guy can come out on top. He just needs the right armaments. The David in this case is the lobster krill. And instead of a slingshot, it's armed with sharp pincers that can sometimes fight off a Goliath: the gentoo penguin.

These gentoo penguins (*Pygoscelis papua*) live on the Falkland Islands in the remote South Atlantic, where the birds nest among tall white grass. To eat, they trek from their colony some 800 metres to the sea along what conservation ecologist Jonathan Handley calls "penguin highways." He worked with these penguins while at the Marine Apex Predator Research Unit at Nelson Mandela University in Port Elizabeth, South Africa.

After staying at sea for a day or two hunting down their meals, the penguins return home along the same highways. Those predictable paths make it easy to find a single penguin after a swim. So, in December 2013, Handley and the MAPRU, along with Falklands Conservation, an organization that protects Falklands wildlife, began a project to see what the penguins did in the water.

The researchers started by setting up along one of the paths. "Then you wait really quiet, really low to the ground as the birds are coming past," Handley says. With a net attached to a long pole, the scientists would catch a penguin as it was headed out to sea. Next, they'd mark the bird with an animal marker (the kind that farmers use on sheep), strap on the equivalent of a penguin GoPro camera and set the animal loose. Then, the team would wait for the bird to return.

## **The Way Hunter-gatherers Share Food Shows How Cooperation Evolved**

East African Hadza hunter-gatherers are neither generous nor stingy. But the groups they live in are. That pattern highlights a flexible and underappreciated form of cooperation that may have helped humans go from mobile bands to industrialized states, researchers say.

Some camps share food more than others, but Hadza circulate among all camps rather than clustering in the most...

## **Kidney Stones Grow and Dissolve Much like Geological Crystals**

It took a close look at crystal formation in Yellowstone's hot springs to understand stones much closer to home. Growth and dissolution patterns found in rocks there mirror what's going on with stones in our kidneys, says Bruce Fouke, a geobiologist at the University of Illinois at Urbana-Champaign, contradicting the medical dogma that kidney stones don't dissolve.

## **Humans Have Skeletal Stem Cells that Help Bones and Cartilage Grow**

Repairing bones and cartilage may get easier thanks to newly discovered human skeletal stem cells.

Scientists found the stem cells, which give rise to bones, cartilage and the spongy bone that harbours bone marrow, in fetal bones, adult bones and fat, researchers report online September 20 in Cell. The researchers also reprogrammed adult cells into skeletal stem cells.

## Over-the-Hill Cells May Cause Trouble in the Aging Brain

Cells past their prime may have a role in dementia. Culling these cells protected the brains of mice that were otherwise destined for brain decline, a new study finds.

Senescent cells, which accumulate with age, are still alive but in a state of suspended animation—they stop doing their jobs and they stop dividing. Getting rid of these cells in the body extends the life spans of mice...

## Fossil Teeth Show How a Mass Extinction Scrambled Shark Evolution

The extinction event that wiped out all non-bird dinosaurs about 66 million years ago also shook up shark evolution.

Fossilized shark teeth show that the extinction marked a shift in the relative fates of two groups of sharks. Apex predators called lamniformes, which include modern great white sharks, dominated the oceans before the event, which took place at the end of the Cretaceous...

## Smart Plants Can Teach Us a Thing or Two

The Revolutionary Genius of Plants Stefano Mancuso Atria Books, \$30

More than 200 years ago, French botanist René Desfontaines instructed a student to monitor the behaviour of *Mimosa pudica* plants as he drove them around Paris in a carriage. *Mimosa pudica* quickly closes its leaves when touched—presumably as a defense mechanism. Desfontaines was interested in the plants' response to...

## Scientists Discover 20 New Gnat Species in Brazil

September 21, 2018—Estonian Research Council

Scientists from Estonia, Finland and Brazil have found 20 new species of gnat in the Brazilian Atlantic Forest.

Due to the heterogeneity of natural habitats and its dimension, Brazil is thought to hold 15 to 20 percent of the biodiversity on planet Earth. A study conducted in the Brazilian Atlantic Forest under the leadership of senior researcher Olavi Kurina from the Chair of Biodiversity and Nature Tourism at Estonian University of Life Sciences could only confirm this theory.

## We are Bombarded by Thousands of Diverse Species and Chemicals

September 20, 2018—Stanford Medicine

**Scientists have measured the human ‘exposome’, or the particulates, chemicals and microbes that individually swaddle us all, in unprecedented detail.**

We are all exposed to a vast and dynamic cloud of microbes, chemicals and particulates that, if visible, might make us look something like Pig-Pen from Peanuts. Using a re-engineered air-monitoring device, scientists from the Stanford University School of Medicine have peered into that plume and discovered a smorgasbord of biological and chemical minutia that swirl in, on and around us. Their findings show, in unprecedented detail, the variety of bacteria, viruses, chemicals, plant particulates, fungi, and even tiny microscopic animals that enter our personal space—a bombardment known as the human “exposome”.

“Human health is influenced by two things: your DNA and the environment,” said Michael Snyder, PhD, professor and chair of genetics at Stanford. “People have measured things like air pollution on a broad scale, but no one has really measured biological and chemical exposures at a personal level. No one really knows how vast the human exposome is or what kinds of things are in there.”

That curiosity—to see, for the first time, what a person’s exposure looks like at an individual level and how much it varies among people—was what motivated the study, Snyder said. But studying the exposome also provides an opportunity to clarify environmental influencers of human health that are otherwise obscure, he said. For example, rather than simply blaming pollen, those with seasonal allergies would be able to identify exactly what they’re allergic to by monitoring their exposome data and symptoms throughout the year.

The study’s findings also reveal information about geographic- and household-chemical spikes and weather-related patterns, and likewise show the wide range of chemical and biological particulates that can be found between individuals—even within a relatively small geographic region, such as the San Francisco Bay Area.

The study will be published online Sept. 20 in *Cell*. Snyder is the senior author. Postdoctoral scholar Chao Jiang, PhD; research scientist Xin Wang, PhD; research associate Xiyan Li, PhD; and postdoctoral scholars JinggaInlora, PhD, and Ting Wang, PhD, are co-lead authors.