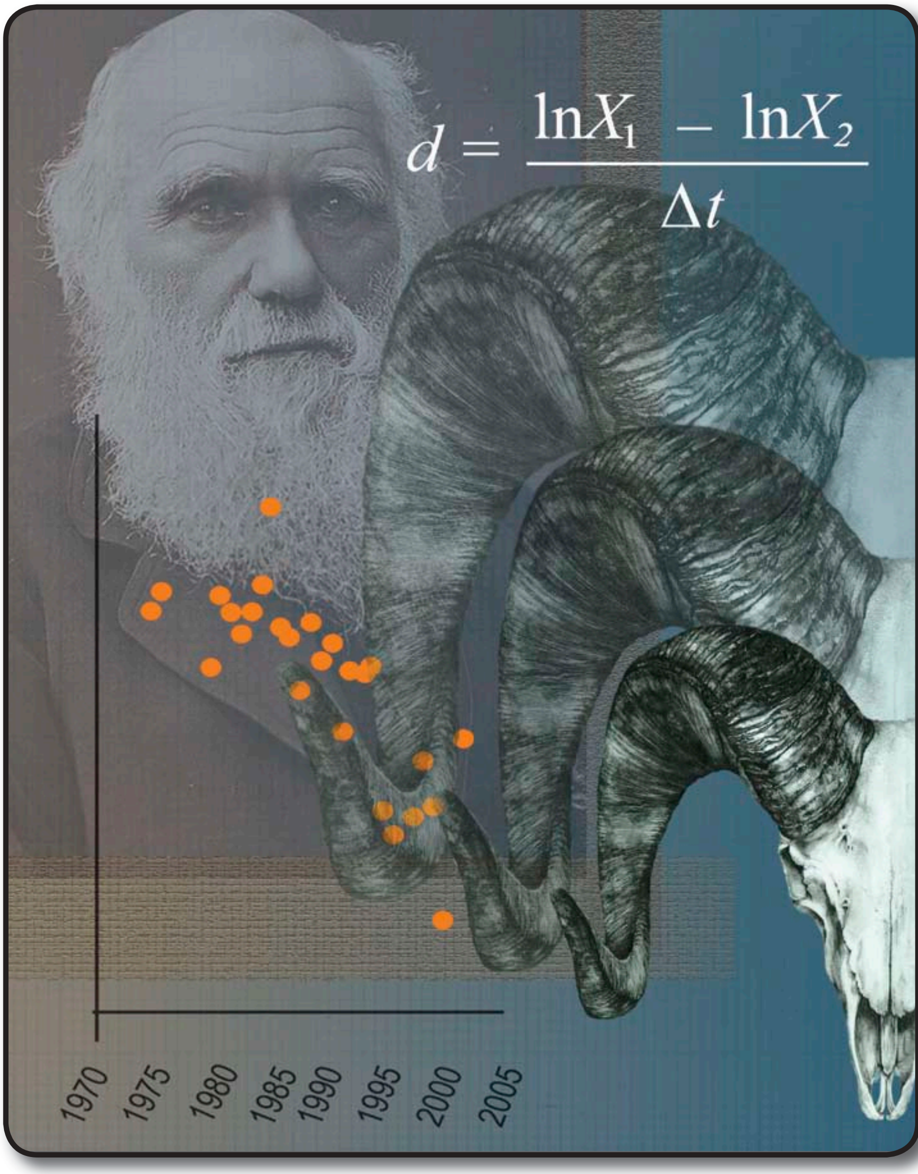
HUNTING SPEEDS UP EVOLUTION

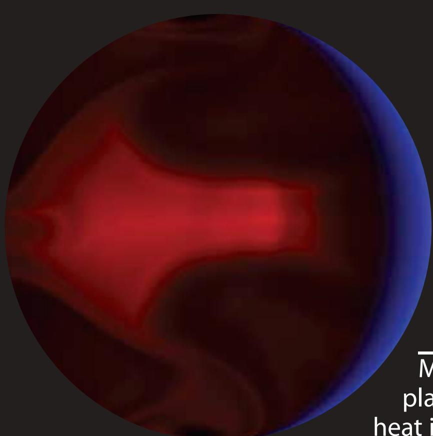
It's not news that overfishing and overhunting can stress ecosystems by decimating entire populations. But a new study shows that these practices also exert pressure on ecosystems in a different way: They accelerate evolution, leading plants and animals to change much faster than they would if left to their own devices. That, in turn, could throw off the delicate balance of entire ecosystems, scientists say.

New research indicates that overhunting and overfishing speed up evolution, leading "prey" species to become smaller and faster.



Chris Darimont, a postdoctoral researcher at the University of California at Santa Cruz, and his colleagues searched the literature for studies of evolutionary changes in 40 species of fish, land animals and plants that are harvested by humans. The team found that, on average, these organisms were changing about three times faster than species not regularly hunted by humans.

GET OUT YOUR SUNSCREEN, THIS PLANET'S GETTING HOT!



More than 200 light years away from Earth, planet HD 80606b glows orange from its own heat in this computer-generated image.

Actually, don't bother. Scientists observed planet HD 80606b, which is more than 200 light years away, when its orbit brought the planet 300 times closer to its star than Mercury is to the sun. The team then measured the amount of heat the planet emitted and determined the planet's surface temperature. Within the six hours leading up to the planet's close encounter with its star, the temperature rose from 800 Kelvin to 1,500 Kelvin (527 to 1,227 degrees Celsius), the researchers reported in Nature. The imaging technique that the researchers used produced the most realistic pictures to date of planets outside our solar system, said lead author Gregory Laughlin, professor of astronomy and astrophysics at the University of California at Santa Cruz.

Alexandra Ossola

Even compared to species affected by other human influences, such as pollution, harvested organisms still evolved 50 percent faster, the team reported in Proceedings of the National Academy of Sciences.

One trait that changed markedly was size; the bodies of hunted, fished or harvested organisms have shrunk on average by about 20 percent over just a few decades. For example, one study found that after only 30 years of bighorn sheep trophy hunting at Ram Mountain in Alberta, Canada, the weight and the horn length of males had declined by about one-fifth. Organisms also began to breed at a younger age than previous generations. Another study showed that, starting in the 1990s, Atlantic cod on Canada's East Coast began to reproduce one year earlier than they did two decades prior.

Organisms that are aggressively hunted and fished by humans are developing smaller body sizes and younger breeding ages because that gives them a selective advantage, Darimont says. For example, smaller individuals have an easier time escaping. Consider fish in a net, he says. "Those fish within the targeted population that are about the same size or larger than the mesh size will get killed, but those that are smaller are able to swim right through." And those that breed before they are large enough to be caught in nets also have an advantage, which, after several generations, can lead to earlier breeding times, he adds.

These evolutionary mechanisms are likely operating so quickly because anthropogenic patterns of predation are unique in the natural world, Darimont says. "Natural predators target primarily newborns, or small individuals, because they are much less dangerous to kill. In addition, fish and birds often just can't open their mouths wide enough to eat something big." Humans, on the other hand, prize the largest prey, Darimont says. We want the biggest fish or a good chunk of meat in the grocery store. Even our cultural norms adhere to this pattern: "Fishing derbies or trophy hunting are all about getting the biggest," he says.

Furthermore, we tend to overexploit the resources. Natural predators take about 10 percent of a population, whereas commercial fisheries harvest up to 80 percent. Such high exploitation rates combined with the narrow targeting of large individuals "overwhelm any other selective pressures" and are "the key ingredients to rapid trait change," Darimont says.

What this speedy evolution means for the function of the ecosystems in which these organisms live is unclear, Darimont says, but "it's probably not a good thing." For example, it is unknown whether the natural predators of these animals can keep up with the size changes. A predatory fish must keep up with and catch smaller versions of its prey. If it doesn't and the prey get too small or too difficult to catch, it may not be worth the effort to pursue. "That means that ecological relationships among natural predators might become altered or severed."

In the long term, continuing on the current path might actually hurt commercial harvesters in the future because traits such as the age and size at which organisms first reproduce are important for population viability, says Jeffrey Hutchings at Dalhousie University in Halifax, Canada. "Changes in some of these traits will almost certainly have a negative impact on population growth, which will then negatively impact sustainable rates of harvesting and the ability to recover following depletion," he says. That's why fisheries are becoming interested in this subject now, Darimont says. "They may not necessarily care that things are shrinking, but they are going to care if evolutionary changes lead to fewer offspring in the future."

Nicole Branan

FIRST BIRD HEARD LIKE A BIRD

Archaeopteryx is a "missing link" between dinosaurs and birds, and a new analysis of its inner ear may shed new light on whether its biology and behavior was more dinosaur-like or more bird-like. Researchers used the length of the bony canal in the inner ear to estimate the *Archaeopteryx*'s hearing range. A comparison to 59 species of birds and reptiles found that *Archaeopteryx* heard most like the modern emu, whose hearing range is one of the most limited of all modern birds, lead author Stig Walsh, a paleontologist at the Natural History Museum in London, reported in Proceedings of the Royal Society B. In addition to *Archaeopteryx*'s hearing, Walsh and his colleagues say this research may reveal clues on the animal's eye movements, head posture, agility, sociality, vocal complexity and even habitat preference.

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