

86 Percent of Earth's Species Still Unknown?

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for [National Geographic News](#)

Millions of organisms unnamed as extinction accelerates, study says.

Picture: Various species of sea life found along the California coast (pictured).

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Even after centuries of effort, some 86 percent of [Earth's](#) species have yet to be fully described, according to new study that predicts our planet is home to 8.7 million species.

That means scientists have cataloged less than 15 percent of species now alive—and current extinction rates mean many unknown organisms will wink out of existence before they can be recorded.

The study was driven by a simple question: "Are we within reach of finding all species, or are we way off?" said study co-author [Boris Worm](#) of Canada's Dalhousie University.

"The answer is, we are way off."

Two hundred and fifty years after Swedish botanist [Carl Linnaeus](#) devised a formal system for classifying the diversity of nature, the catalog for some classes of living things—such as mammals and birds—is nearly complete, the study says. But the inventories for other classes are woefully sparse.

For instance, only 7 percent of the predicted number of fungi—which includes mushrooms and yeasts—has been described, and less than 10 percent of the life-forms in the world's oceans has been identified.

What's been discovered so far are "those things that are easy to find, that are conspicuous, that are relatively large," Worm said.

"There is an age of discovery ahead of us when we could find out so much more of what lives with us on this planet."

Counting Earth's Millions

So far, some 1.2 million species are known to science. To calculate the percentage of unknown species, Worm and colleagues first had to answer one of the great questions of ecology: How many species live on the Earth?

Previous guesses ranged from three million all the way to a hundred million. (See "['Encyclopedia of Life' to Catalog All Species on Earth.](#)")

To gain a more precise answer, the authors examined the categories into which all species are grouped.

Scientists lump similar species together into a broader grouping called a genus, similar genera into a still broader category called a family, and so on, all the way up to a supercategory called a kingdom. (See [photos of species classification](#) in National Geographic magazine.)

There are five kingdoms: animals, plants, fungi, chromists—including one-celled plants such as diatoms—and protozoa, or one-celled organisms.

Worm's team estimated the total number of genera, families, orders, classes, and phyla—a designation above class—in each kingdom. That's a relatively easy task, since the number of new examples in these categories has leveled off in recent decades.

By contrast, the number of newly discovered species continues to rise sharply.

Using complex statistics, Worm and colleagues used the number of genera, families, and so on to predict Earth's number of unknown species, and their calculations gave them a number: 8.7 million.

An Issue of Statistics

Some experts called the research, published August 23 in the journal [PLoS Biology](#), reasonable. The new study "takes a hugely clever approach, and I think it's going to turn out to be a pretty important study," said [Lucas Joppa](#), a conservation ecologist at Microsoft Research, the research branch of the software giant.

"If I asked you to count out 8.7 million pennies, that would take you a while, even if you had a whole lot of people doing it."

But [Dan Bebber](#), an ecologist at the environmental group Earthwatch Institute, said the study relies on improper statistical methods.

The study team used a method called linear regression to calculate the number of Earth's species. But Bebber thinks this method is the wrong one for the data, and that the team should have used a technique known as ordinal regression.

As a result, the true number of species could be much higher or lower than 8.7 million, he said.

Nature's Library Disappearing

Overall, formally categorizing a new organism is a lot more complicated than discovering one, study co-author Worm said. Scientists must compare their specimen to museum samples, analyze its DNA, and complete reams of paperwork.

"It's a long process," he said. Most scientists "will describe dozens of species in their lifetime, if they're really lucky."

Unfortunately, extinction rates have accelerated to ten to a hundred times their natural level, Worm added.

The information to be gained when new species are discovered "is nature's library, and we've only begun to decipher the first ten books," Worm said.

"We're throwing out entire books without having a look at them."