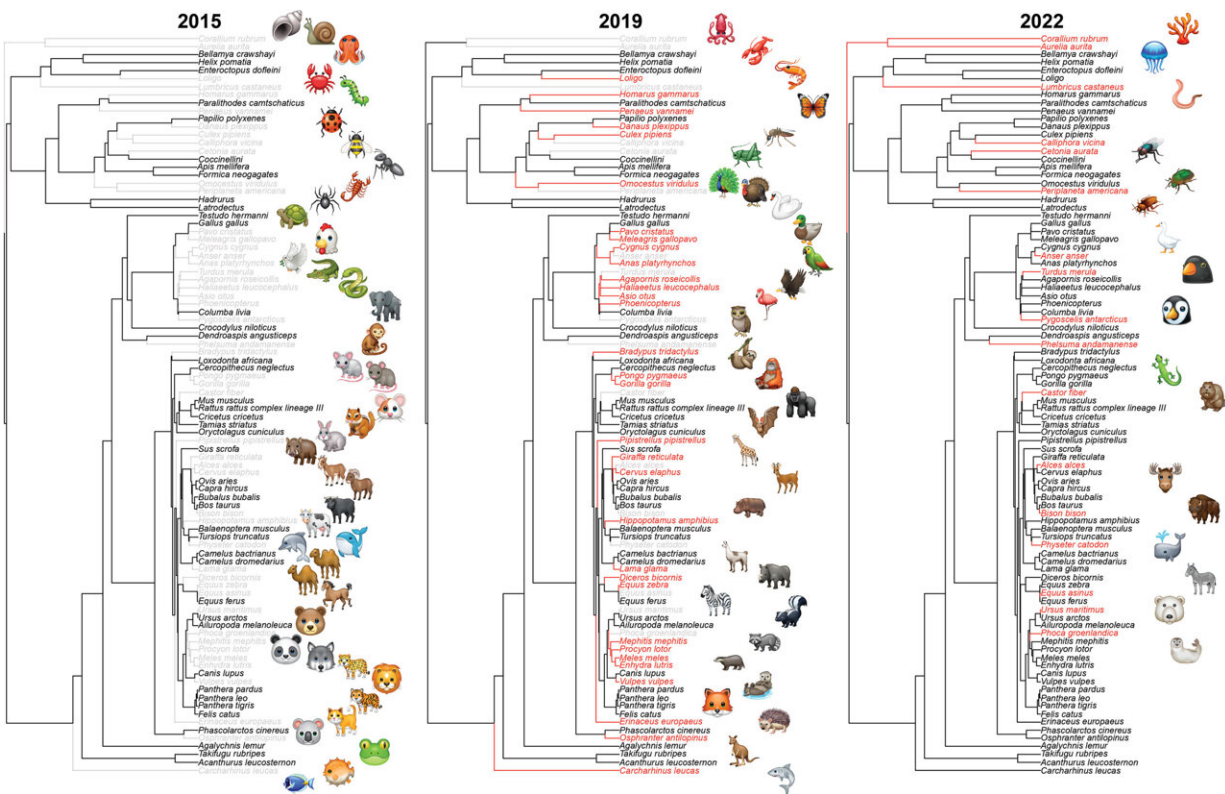# Nature and animal emojis don't accurately represent natural biodiversity: Researchers say they should

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Phylogenetic trees of emojis available in 2015, 2019, and 2022. Credit: iScience/Mammola et al.

The current emoji library doesn't accurately represent the "tree of life" and the breadth of biodiversity seen in nature according to an analysis

presented December 11 in the journal *iScience*.

A team of conservation biologists categorized emojis related to nature and [animals](#) and mapped them onto the phylogenetic tree of life. They found that animals are well represented by the current emoji catalog, whereas plants, fungi, and microorganisms are poorly represented.

Within the [animal kingdom](#), vertebrates were over-represented while arthropods were under-represented with respect to their actual biodiversity. The researchers argue that creating a more diverse and representative emoji catalog could aid conversations around biodiversity and its conservation in the digital era.

"While the [biodiversity crisis](#) may seem distant from the online world, in our increasingly digitized society, we should not underestimate the potential of emojis to raise awareness and foster appreciation for the diversity of life on Earth," write conservation biologists Stefano Mammola, Mattia Falaschi, and Gentile Francesco Ficetola.

"The development and maintenance of diverse and inclusive emoji sets are crucial to ensure the equitable representation of the tree of life in digital communication tools and to effectively convey messages on the importance of all the organisms for the functioning of the biosphere."

To assess the taxonomic comprehensiveness of the emoji [tree of life](#), the team categorized all of the emojis related to nature and animals available in Emojipedia (a curated online catalog of emojis) and then compared emoji biodiversity to real-world biodiversity. They also assessed how emoji biodiversity changed between 2015 and 2022 to determine whether the emoji catalog is evolving to better represent biodiversity as more emojis are added.

Overall, the team identified emojis representing 112 distinct

organisms—92 animals, 16 plants, one fungus (likely Amanita muscaria), and one microorganism (likely Escherichia coli). "Currently available emojis encompass a broad range of animal species, while plants, fungi, and microorganisms are under-represented," the researchers write. "Such strong taxonomic bias is in line with current societal awareness of biodiversity, which tends to prioritize animals over other taxa."

Next, the researchers examined the biodiversity characteristics of the animal emojis in more detail. In some cases, they were able to identify individual animal species (for example, the bald eagle and giant panda emojis), while other emojis were only identifiable to the genus or family level (for example, emojis that represent ants or crocodilians).

Overall, 76% of the animal emojis represented vertebrates, 16% represented arthropods, and 4%, 2%, and 1% represented mollusks, cnidarians, and annelids, respectively. Given that there are 1,302,809 described species of arthropod and only 85,423 described species of vertebrate, this means that the current emoji catalog under-represents arthropod biodiversity and over-represents vertebrates.

The researchers also noted that there were no emojis representing either platyhelminths (i.e., flatworms, including tapeworms) or nematodes, despite there being more than 20,000 platyhelminth species and almost 20,000 nematode species. These biases in the emoji representation of animal biodiversity reflect known biases in biodiversity assessments and conservation analyses, including the IUCN Red List, the researchers write.

The lack of under-represented species could also be due to the criteria for judging potential emoji subjects—for something to become an emoji, it usually needs to be Googled with a certain frequency, and many unrepresented organisms don't meet this criterion.

"This rule can be problematic, as it risks hampering the extension of emojis in order to better cover the actual biodiversity of our planet," the researchers write.

However, emoji biodiversity does appear to be increasing. In 2015, there were only emojis for 45 animal taxa, but this increased to 78 in 2019 and 92 in 2022. As well as increasing in number, animal emojis also became more representative of biodiversity over this time period.

In 2015, there were only emojis representing vertebrates, arthropods, and mollusks, but annelids gained representation in 2020 with the addition of the "worm" emoji, which most likely represents an earthworm, and cnidarians gained representation in 2021 with the addition of a red coral [emoji](#).

"This increase in phylogenetic diversity driven by less-known taxa emphasizes a positive trend of enhanced opportunities for emojifying biodiversity communication, allowing users of digital platforms to discuss a range of biodiversity-related topics and sentiments more effectively, beyond the icons depicting iconic species," the researchers write.

Though the researchers say that having access to biodiverse emojis is crucial for online discussions of biodiversity and conservation, further research is needed to examine how nature-related emojis are used in these contexts.

"Exploring the uses of nature-related emojis in the context of [biodiversity](#) communication and conservation could be a topic for further research," the researchers write.

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