KNOWLEDGE NUGGETS

Do You Need a Big Brain to Be Intelligent?

Vastly different kinds of brains can produce highly intelligent creatures. And no, size doesn't always matter

Link: https://lab.sapienship.co/do-you-need-a-brain-to-be-intelligent/

To better understand the intelligence of different species, researchers devised a test to measure their memory. Amazingly, ravens performed better on the test than macaques, coyotes, and even gorillas! It turns out that ravens' brains are extremely dense, packing a massive number of neurons into a small volume. This shows that vastly different kinds of brains can produce highly intelligent creatures.

Take the bee for example. Most bee brains are smaller than a grain of rice; however, studies show that bees have high learning and communication skills. In 2017, researchers showed that bumblebees can even learn to use tools - they were trained to see that a ball could be used to produce a reward. These bees then spontaneously rolled the ball when given the chance, and taught other bees to do the same. Moreover, the bees did not just copy others but actually improved upon learning.

Another very different kind of brain is the cephalopod's. These invertebrates have evolved large nervous systems - the common octopus has about 500 million neurons in its body (that's around the same amount as rabbits). These animals have been found to display high cognitive abilities even in circumstances very different from their natural environment. They can open screw-cap jars for food, turn off the lights by throwing jets of water at the bulbs when no one is watching, and even recognize different human individuals (which is remarkable knowing that in the wild they are very solitary). All of this is done with a nervous system very different from mammals. How different? Well, most of their neurons are in their arms and not in their brain. So, it's not only that size doesn't necessarily matter, but even type doesn't!

Questions

1. Does one have to have a brain to be intelligent? Even organisms without brains or neurons, such as slime molds and plants, appear to exhibit intelligent behavior. How should we define intelligence, then?

   a. Article 1: Are plants smart? Envirobites, June 2020
   https://envirobites.org/2020/06/24/are-plants-smart/

   b. Article 2: There Is Such a Thing as Plant Intelligence. National Geographic, February 2016
   https://www.nationalgeographic.com/science/article/160221-plant-science-botany-evolution-mabey-ngbooktalk

   c. Article 3: Group of biologists tries to bury the idea that plants are conscious. The Guardian, July 2019
   https://www.theguardian.com/science/2019/jul/03/group-of-biologists-tries-to-bury-the-idea-that-plants-are-conscious

2. Is there a difference between intelligence and consciousness? If so, what is it?

3. Should we treat animals differently depending on how smart they are?