AIRO JOURNALS

Free / Unpaid
Peer Reviewed
Multidisciplinary
National

ISSN: 2321-3914
Volume 2 Issue 3
June 2021
Impact Factor: 11.9
Subject: Zoology

An Analysis on Cephalopods resemble marine primates

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Session: 2014-15

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ISSN: 2321-3914
Volume 2 Issue 3
June 2021
Impact Factor: 11.9
Subject: Zoology

Abstract

What is the distribution of mental capacity among animals? It would be equitable to believe that intelligence varies clonally everywhere, but by comparing trends throughout the major evolutionary groupings, it is simple to discern between high-performing "generalists" and "specialists," whose range of activity is constrained and environmentally particular. Mammals, birds, and, intriguingly, cephalopods are some of these generalists. Due to our distinct evolutionary histories, the apparent intelligence of colloid cephalopods (squids, octopuses, and cuttlefish) is surprising - and philosophically significant. The most recent common ancestor of cephalopods and vertebrates would have been a small wormlike organism with no significant organizational structure to its nervous system. We can start to deduce some broad principles of intelligence as a biological phenomenon by finding the cognitive parallels between these invertebrates and vertebrates. Here, I review cephalopod behavioral trends and related theories and make some suggestions about how they can affect our comprehension of domain-general cognition and its evolution.

Keywords Cephalopods. Cognitive evolution, Ethology, Comparative psychology

Introduction

In mythology dating back to ancient Greek culture; to sea monster legends in Nordic culture and among sailors throughout the middle ages; to science fiction of the modern era; and beyond, cephalopods have long. And while this particular molluscan taxon was previously derided as "dumb" by Aristotle (1910) and harmful, as depicted in Toilers of the Sea, it has since grown to be revered by scientists, artists, and members of the general public. Despite the occasionally difficult obstacles involved in keeping them, several aquariums have chosen to host them as the main attractions, a reflection of their rising popularity. In addition, they are portrayed affectionately in modern culture, which ranges from computer-generated animations in blockbuster movies (such as Pirates of the Caribbean, At World's End, Finding Dory, etc.), to apparel, jewelry, and other decorative items, to the abundance of online videos 5 that feature cephalopods. Few other invertebrates achieve this level of status or respect.

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In addition, cephalopods are now valued for their numerous contributions to science. Because of the large axon in squid's relative accessibility throughout the first half of the 20th century, they were crucial in advancing our understanding of the neuron. After that, John Z. Young and his colleagues, including B. B. Boycott and M. J. Wells among others, conducted extensive research on the neural system and learning skills of cephalopods from the 1950s to the 1970s. Progress slowed between the 1970s and 1990 , primarily because there weren't enough effective research instruments to answer unanswered problems. Thankfully, there has been a steady increase in research on a variety of other parts of cephalopod biology from the turn of the 20th century to the present, such as genetics, welfare, and the consequences of climate change.

Cephalopods and Genetics

The use of genetic tools in cephalopod research has advanced at a very modest rate in comparison to other taxonomic groupings and has encountered various difficulties, such as huge and highly repetitive genomes. But things are shifting, and even in the brief period of time since this earlier review by Xavier et al. (2015), there have been a number of significant advances. In general, the cost of sequencing a bp of DNA has continued to decline, while the output capacity of commercial platforms has increased to the point that we risk becoming overloaded with data. In fact, it is anticipated that we will soon be working in an area where having enough data storage and bioinformatic processing capacity will be considerably more important than simply producing sequence data.

Many cephalopod genome projects are currently under development and have been for some time, but the sheer complexity of cephalopod genomes has prevented their completion and publication. Several of the cephalopod species chosen by the CephSeq are currently the subject of ongoing investigations, including the pygmy squid (Idiosepius paradoxus), the bobtail squid (Euprymna scolopes), the blue-ringed octopus (Hapalochlaena maculosa), and the deep-s (Architeuthis dux). This first selection of species6 was based on both extremely intriguing and distinctive biological features as well as on the potential practical usage of the animals in a laboratory setting.

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The first cephalopod genome, that of the California two-spot octopus (Octopus bimaculoides), was finally finished and published as a result of these efforts, marking a significant milestone that made front page news in the magazine Nature. The primary conclusions were exciting and unexpected. The full genome duplication, which was previously considered to account for the huge genome size and widespread repeats, did not appear to have occurred. Instead, it was discovered that the octopus genome shared most similarities with other invertebrate genomes, with the exception of a massive increase of two particular gene families that were previously thought to only be enlarged in vertebrate genomes. The first of them are protocadherins, a class of cell-adhesion proteins that are crucial for the growth of neurons. The second is the octopus-specific C2H2 class of zinc finger transcription factors, which are small protein structures that frequently serve as interaction modules between DNA, RNA, proteins, or other small, functional molecules within a cell. Furthermore, it was discovered that these transcription factors are specifically expressed in cephalopod-specific tissues like their suckers, neurological systems, and skin that may change color. The expansion and diversity of these two gene families may have been crucial in the evolution of the neurological and morphological features that make cephalopods unique, according to the findings of this first cephalopod genome.

Conclusion

Because it shows how phylogenetically different species can come up with the same cognitive response to ecological instability, cephalopod behavior is a philosophically relevant phenomena because it helps us understand the evolution of intelligence. It implies that environmental diversity and hostility are the most important selection pressures for domain-general intelligence, with other selective pressures (such the evolution of cognitive architecture to enable sophisticated perceptual systems) playing a supporting role. Mammals, birds, and cephalopods all appear to have developed sophisticated flexible, rather than modular, ways of cognitive processing in response to the broad ecological demands posed by their extremely varied and competitive surroundings. Furthermore, the parallels in domain-general intelligence between vertebrates and invertebrates help us identify the cognitive abilities that are most supportive of the growth of complex, flexible cognition. These include processes for focusing attention, memory, and powerful associative learning capacities.

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Most intriguingly, despite not appearing to be necessary for the evolution of domain-general intelligence, mental events requiring a "theory of mind" (such as self-awareness and awareness of others) appear to be frequent outcomes of such cognition. Understanding how cephalopods and other species use theories of mind will help us better understand how these forms of cognition connect to intelligence and how these organisms differ or are similar to humans.

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ISSN: 2321-3914
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