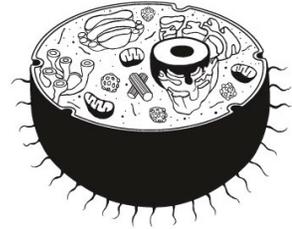
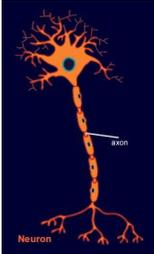


Brain Development/Evolution

- 1) What does the author mention about the environment of a neuron that contributes to its ability to communicate/send signals? What evolutionary changes do you think brought about the neuron's ability to do this?



- 2) Neurons, Cardiomyocytes, and Hepatocytes, all three of these are animal cells found in your body. But what makes them different? Comparing the classical model of an animal cell and a neuron, discuss what significant (and most probably evolutionary) differences/properties allow neurons to send/relay messages across the body?

- 3) Consider the following excerpt from the article you read,

*“...Among mammals, the brain keeps its three major components, but with two new structures. The neocerebellum (“new cerebellum”) is added to the cerebellum, looking much like a fungal growth at the base of the brain, and the neocortex (“new cortex”) grows out of the front of the forebrain. **In most mammals, these new additions are not particularly large relative to the brain stem. In primates they are much larger, and in the human they are so large that the original brain stem is almost completely hidden by this large convoluted mass of grey neural matter. In keeping with this remarkable increase of neocerebellar and neocortical tissue, humans enjoy the largest ratio of brain weight to body weight of any of earth's creatures...**”*

Suggest the impact of the development of a **neocortex** on the behavior of primates/humans.

- 4) Centralized architecture, encephalization, and plasticity, the author mentions that these are the major evolutionary/developmental changes that lead to the human brain. Discuss how these changes in the nervous system affect the development of humans as a species in terms of our abilities, both mental and physical. If possible use examples comparing the development of the human nervous system versus the other organisms mentioned in the article (i.e. jellyfish, worms, insects).

- 5) The author mentions that it is possible that the human brain evolved in such a way that we may not know its original purpose for evolving. Stephen Jay Gould described this phenomenon in his concept of *exaptation*. Briefly discuss what you think *exaptation* is. Provide examples if possible.

- 6) Based on what you read, do you think the human brain changes during development (i.e. from juvenile to adult)? If so, how do you think the human brain changes during development?

- 7) Is the human brain still evolving? Why or why not? Provide examples of specific selective pressures and traits related to the human brain that might be adaptations to those pressures

