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Nature of Science & Math: Analyzing the Presence in Everyday Communication Assignment
Article: Everywhere in the Animal Kingdom, Followers of the Milky Way
Link to Article: https://www.nytimes.com/2019/02/11/science/milk-animals-evolution.html

Science is a Way of Knowing:

The first tenant of the Nature of Science that I believe my article represents well is that of "Science is a Way of Knowing." The NGSS matrix describes one learning outcome for this tenant in the high school grade band as "science is both a body of knowledge that represents current understanding of natural systems and the processes used to refine, elaborate, revise, and extend this knowledge." This practice discusses how we can use science to understand, explain and elaborate on current beliefs of the natural world but also to expand upon these current understandings. In the article I chose this idea is solidified just in the description. The description sentence of the article says, "As scientists learn more about milk's evolution and compositional variations, they are redefining what used to be a signature characteristic of mammals" (Angier, 2019). This descriptive introduction demonstrates that scientists have always found milk as a substance fed to mammals and a characteristic that makes them unique. Those characteristics are discussed throughout the article. However, scientists have begun to find other organisms outside of the mammal family that also seem to use milk to feed their young. There is science in both the uniqueness of mammal lactation but also in the study and attempt to connect mammal lactation to the milk production of other organisms.

Scientific Knowledge is Open to Revision in Light of New Evidence:

This second tenant is very similar to the first in the idea that science can be changed however I believe this second tenant focuses more on how the revisions happen. The standards matric emphasizes that scientific ideas can only be changed with evidence when it says, "Most scientific knowledge is quite durable but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence." This article highlights not just the idea that scientific ideas are changing, but they focus in on the evidence that have led to the changes. The article begins by discussing the study of the tsetse fly. A scientist named Dr. Attardo is quoted in the article saying, '"I was expecting something completely off the wall and different, but there are frightening, fascinating overlaps with mammalian milk in the kinds of proteins we see"' when discussing the analysis of tsetse fly milk (Angier, 2019) Here is one small piece of evidence that mammalian milk may not be only found in mammals. This however, is not enough evidence to change a scientific idea, and the article does not stop here. The article continues by discussing how this find has led scientists to look for others. Throughout the bulk of the article that remains readers will hear about similarities in milks found in armadillos, flamingoes and beetles which helps to demonstrate the importance of collecting multiple sources of evidence to be able to edit a previous scientific idea.

Science as a Human Endeavor:

The last tenant I would like to discuss is the idea that science only happens when people work together. No great scientific idea has come from the work of just one person. The matrix says, "Scientific knowledge is a result of human endeavors, imagination, and creativity." It also states, "Individuals and teams from many nations and cultures have contributed to science and engineering advances." This tenant may be missed in this article if you are not looking closely, however in paying attention to where the research is coming from it is clear that there are many great minds from many different cultures coming together. The article sites research from Geoffrey Attardo from California, Michael Power from Washington, Sandra Steiger from Germany,

Dr. Rose from Britain and Amy Skibiel of Idaho (Angier, 2019). This article does a great job of demonstrating how science discovery can not just happen from one person, but it takes a team of people from all over the world.

Construct viable arguments and critique the reasoning of others:

The first mathematical practice for students to learn is to be able to create arguments that are backed with evidence, and to be able to constructively critique reasoning that others have come up with. Towards the end of the article Dr. Powers is looking into the sweet property of human milk after an observation by another scientists. He says, "The number and variety of sugars in human milk outstrips that seen in any other great ape…" (Angier, 2019). It was previously believed that the sugars were there to build our larger and more complex brains, but he didn't feel the evidence was there to prove this. He proceeds to construct reasonable arguments which he backs with research that the sugars give antibacterial properties we needed once we began moving into towns and cities and being exposed to more pathogens. Therefore, the milk in humans is different than all other animals. He changes a commonly accepted theory through his perseverance and the article ends with his quote that, ""Our brain made our milk, not the other way around."

Make sense of problems and persevere in solving them:

The second mathematical practice from the Common Core Mathematical Practices that I felt this article meets is that of making sense of a problem and persevering in solving it. The math practice states "Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution." In the last practice I discussed the work of Dr. Powers. He recognized a problem through inconsistencies with his own observations and the reasonings of others. In the article he discusses one thing that helped him in solving his problem, even if the findings were totally against what was currently accepted as true. He says, '"Our ability to use animals in lots of different ways is one of the reasons we're successful, but it was a huge shock to the system. Luckily, our milk rose to the challenge"' (Angier, 2019).

Attend to precision:

The third mathematical practice I found to be met by the article I chose is attending to precision, or detail. While there were no mathematical calculations done or discussed in this article, the depth at which the scientists in this article went to fully explain their findings was very clear. Dr. Rose studies flamingos and finds that they work very hard to feed their young for nine months after birth. He shows clear research to prove the passing of milk from parent to child. He does not stop there, however. It was not enough for him to prove that it happens. He asks, and then answers, the questions, "What explains the need for such full-throated lactation? Why can't flamingos simply feed their young on beetles and flies, the way many birds do?" (Angier, 2019). Going deeper that what most see as necessary is part of attending to precision. No rock is left unturned in the research.

Angier, N. (2019, February 11). Everywhere in the Animal Kingdom, Followers of the Milky Way. *The*

New York Times. Retrieved February 12, 2019, from https://www.nytimes.com/2019/02/11/science/milk-animals-evolution.html