Mai Chao Thao
BIOL 862
Plant Sterol Effects on Primates

References

1. Baraza, Elena., Villalba, Juan J., and Provenza, Frederick D. 2005. Nutritional context influences preferences of lambs for food with plant secondary metabolites. Applied Animal Behavior Science 92: 293-305.

    - This paper was useful in my research because it show how plants defended themselves against animals and how animals by pass the plant's chemical defenses. The paper makes a great argument that plants chemical defenses prevents the plant from being eaten because they are toxic to the animal. However, these animals find a way to overcome these defenses. For instance, tannins which are a known chemical defense of plants can be overcome by having the animal consuming more protein products, which helps the digestion of the tannins.
    - The paper also establish this correlation cycle:
        i. Animals eat plants with less plant secondary metabolites allowing plants with high secondary metabolites to increase in number which in turns decrease plant diversity as a whole. This correlation then forces the animal to consume plants with high secondary metabolites in the long run due to the loss of plants with low secondary metabolites.

2. Becerra, Judith X., Venable, D.L. , Evans, P.H., and Bowers, W. S. 2001. Interactions between chemical and mechanical defenses in the plant genus *Bursera* and their implications for herbivores. Amer. Zool 41: 865-876.

    - This paper addresses the interaction that plant chemical defenses have with mechanical defenses in the plant genus *Bursera*. The paper starts out by identifying the two types of plant defenses: chemical and mechanical and then discuss how these two defenses have been thought to act independently of each others. Through the research, the scientists were able to say that there is an interaction among the two types of defenses. The paper is filled with many examples.

3. Coley, P.D., and Barone, J.A. 1996. Herbivory and plant defenses in tropical forests. Annu . Rev. Ecol. 27: 305-335.

    - Coley and Barone state that herbivore pressure influences the evolution of plant chemical, mechanical and phonological defenses in plants. But this pressure doesn't stop there because the plant's evolution affects the herbivore's behavior and evolution too. This statement is similar to the statement in one of the pervious paper I read.
    - Through the research of this paper, the researchers were able to find that leaves in tropical forest have lower nutrimental value, exhibits a great diversity of secondary metabolites and are a lot tougher.
    - The information within this paper wasn't that helpful but gave me an understanding of the plant's behaviors.

4. Foley, William J. and Moore, Ben D. 2005. Plant secondary metabolites and vertebrate herbivores- from physiological regulation to ecosystem function. Current Opinion in Plant Biology 8: 430-435.

    - This paper is great paper it provided me with a lot of information. For instance there is a discussion within the paper about the effects that tannins have on vertebrates as the pervious paper mention: alternation in animal eating behavior.
        i. The alternation of animal behavior occurs through a learning mechanism, meaning that when an animal consume a plant containing a special level of secondary metabolite, the animal realize that it is toxic and stays away from it.
    - The paper also point out the relationship that the plant secondary metabolites have on the vertebrate and vice versus.
    - Another aspect that the paper discusses how particular secondary metabolites only affect certain animals due to the presence of receptors on the animal cell. In another words, if the animal does not have the receptor that can response to the metabolite it will not elicit any kind of harm on the animal. Additionally, the animal must also have a detoxification mechanism for the plant toxin to prevent damage to the animal's digestion system or body as a whole.

5. Gray, L.E., Ostby, J., Furpr, J., Wolf, C.J., Lambright, C., Parks, L., Veeramachanemi, D.N., Wilson, V., Price, M., Hotchkiss, A., Orlando, E., and Guillette, L. 2001. Effects of environmental antiandrogens on reproductive development in experimental animals. Human Reproduction Update 7: 248-264.

    - This paper only discusses about endocrine disruptor chemicals but these chemical were synthetic not naturally produce by animals or plants. Thus, the paper proves no significant input to my research.

6. Higham James P. Ross, Caroline., Warren, Ymke., Heistermann, Micheal., and MacLarnon, Ann M. 2007. Reduced reproductive function in wild baboons (*Papio hamadryas Anubis*) related to natural consumption of the African black plum (*Vitex doniana*). Hormones and Behavior 52: 384-390.

    - This paper discusses how plant sterols affect the reproductive system of primates. In this research, the researchers were able to so that the plant *Vitex doniana* has a negative effect on the primate's reproduction. In another words, the when the primate consume the plant the reproduce at a lower rate than normal. The research was done by measuring the levels of sex hormones within the urine of the primate and was conducted on both sexes. The paper also points out the reproduction of the primate might not solely depend the consumption of the plant or not considering that primates of social animals. Thus, if the female cannot attract the male, reproduction doesn't occur too. In conclusion, the plant relationship with reproduction rate is not strict.

7. Thompson, Melissa Emery., Wilson, Micheal L., Gobbo, Grace., and Muller, Martin N. 2008. Hyperprogesteronemia in response to *Vitex fisheri* consumption in wild chimpanzees *(Pan troglodytes schweinfurthii*). American Journal of Primatologist 70: 1064-1071.

    - This paper is another paper to address how plant sterols effect the reproduction of primates. The experiment within this paper was performed through observation and examination the primate's feces rather than urine samples. The research in this paper show that there is correlation between the plant and the reproductive rate of the primate but it does not indicate that this relationship is a positive one or negative one; this might be because of the experimental set up.

8. Wynne-Edwards, Katherine E. 2001. Evolutionary Biology of Plant Defenses against Herbivory and their Predictive Implications for Endocrine Disruptor Susceptibility in Vertebrates. Environmental Health Perspectives 109: 443-447.

    - This paper is a review paper that addresses many of the plant defenses against herbivores. One great example given within this paper was the opium example. To human opium is a drug from poppies. To animals it is a food source; however, if the animal consumes the plant, it will eventually die, reducing the plant chance of getting attack again. The killing of the animal also reduces the animal's population; thus, the plant wins the battle because it is able to kill two birds with one stone.
    - The paper also address the concept of hormone disruption by plants sterols because plant sterols are similar molecular and uses the same the biochemical pathway as those in animal, it can mimic sex hormones or other hormones of the animals. This mimicking ability of the plant can kill the animal or weaken it. Additionally, the production of plant sterols is very low energy cost because the plants are making them constantly for its own survival; therefore, a little extra won't hurt.
    - Another concept within the paper was the idea of co-evolution between the plant and herbivores. This co-evolution relationship allows the plant to live and become strong, same goes the herbivores. In conclusion, it is a race to see who will survive in the end.
    - The last thing that the paper focus on that was useful to me was the idea that it is the level of the plant chemical defense that elicits the harm. For instance if an animal only consume a low amount of the plant, there will only be low levels of the toxin. Thus, the effect on the animal can be mild or nothing at all. In another, words if the animal is a careful eater, it can survive longer if it wasn't.