Name: _____Date_____

EEB/ANTH 4329: Primate Ecology and Social Behavior
Lab 2: Benefits of Social Life: Grooming

Group-living primates spend a lot of time grooming one another. Grooming is potentially an important benefit of living in such groups. But why do primates groom? Among other things, grooming involves the removal of *ectoparasites* – parasites attached to the outside of an animal's body. Some ectoparasites that may be familiar to you (especially if you have spent time in the Minnesota woods) include ticks, leeches, and lice. Ectoparasites such as ticks feed on the blood of their host, which they then convert into energy for their own reproduction. The actual energetic cost of hosting ectoparasites may be small, but the diseases transmitted by these parasites can be lethal (such as Lyme disease, a potentially deadly bacterial disease carried by deer ticks in Minnesota).

In this lab we test whether a predisposition towards social behavior can provide help primates defend themselves more effectively from parasites.

The simulated world is generally similar to the one from last week, with one major new addition: Parasites. Since parasites are simply very small predators, they are called predators in the model. These parasites are rather like ticks. They attach to the bodies of primates, where they can be seen as tiny dark dots. They steal energy from their primate host and use it to reproduce. (This energy loss could also be interpreted as costs of fighting infections transmitted by parasites, though the model does not explicitly simulate such infections.) Young parasites attach themselves to new hosts when other primates come close enough, spreading the infestation through the population. The only way primates can get rid of their primates is by being groomed by other primates. When two primates come sufficiently close, they automatically groom one another, if and only if they have sufficiently high tolerance scores for one another. For this simulation, we have prepared two different sets of *Predispositions* for our virtual primates: Solitary and Social.

Instructions

1. Download the latest NetLogo model from your TA.
2. Set the **Patch** and **Primate Settings** as listed below.
3. Click on *setup* to initiate the model. NetLogo will prompt you to load a text file, which is the primate's digital chromosome. This chromosome determines whether the primate's **predisposition** is either **solitary** or **social**. Once you have loaded the appropriate text file, click on *go* to run the model.
4. You will run a total of four models: ***solitary, no parasites; social, no parasites; solitary, parasites present; and social, parasites present.*** Before running any of these models, record your expectations here:

Prediction: In models without parasites, will the *solitary* or *social* primates fare better?

_____

_____

Name: _____ Date_____

Hypothesis: Why do you think that?
_____

Prediction: In the models with parasites, will the *solitary* or *social* primates fare better?
_____

Hypothesis: Why do you think that?
_____
_____

5. Let each model run for about 10 minutes, recording the results for each model on your datasheet once the 10 minutes are up. While running your model, take *ad libitum* notes about the behavior and life history patterns of your virtual primates.

initial-number-of-groups	5
Initial-group-size	8
Patch Settings	
patch-count	30
patch-radius	2
patch-growth-rate	5
patch-max-energy	100
Primate Settings	
food-eaten-per-step	30
cost-per-bmr	10
cost-per-unit-step	2
cost-per-growth-unit	15
cost-per-attack	20
Predator Settings	
Predator-size	0.1
Initial-predator-count	0 or 100*
Alarm-calls?	OFF

*This value changes depending on whether parasites are present or not

Results Table:

Trial / Parameter	1	2	3	4
Parasites	**Present**	**Absent**	**Absent**	**Present**
Predisposition	**Solitary**	**Social**	**Solitary**	**Social**
Time (in ticks) at end of simulation				
Average group size				
Average group radius				
Average number of adult females				
Average number of adult males				
Total number of primates				
# Ticks at which primates became extinct (if they did; otherwise write "NA").				
Total parasite population				
# Ticks at which parasites became extinct (if they did; otherwise write "NA").				

Lab Report (due before the start of your next section meeting): Write a short (4-5 page) lab report detailing your findings. Lab reports need to be formatted as follows: typed, 12-point font, Times New Roman, double-spaced, 1" margin. Include your name, date, and section number at the top of each page.

This lab report should include the following sections:

Introduction: Briefly stated, what were the goals of your study? What is/are your hypothesis(es)? What is/are your prediction(s)?

Methods: What methods did you use in your study? This section doesn't need to be long, but should concisely describe what you did. A good methods section enables a reader to replicate your study. Make sure to include all relevant information regarding what model you used, what the parameters values were set to, and how the simulations were run.

Results: Summarize your data! What did you find? What patterns of behavior did you see in each model? What differences did you observe in the different models?

Conclusions: This is where you discuss the results of your study, relating your findings to the goals stated in your introduction, and discussing the implications of your findings for broader questions in the field. In this section, you should address the following questions (in addition to any other questions you think are relevant to include):

1. Were these results consistent with your prediction(s)? Why or why not?

2. Briefly discuss the advantages and limitations of this sort of modeling for understanding the behavior of real primates.

3. Briefly describe a study that could be done to test the hypothesized relationship between social behavior, grooming, and ectoparasite load for real primates.

Works Cited: Please provide the complete bibliographic data for any works cited in the body of the report, using a standard format, such as the following:
Altmann, J. (1974). "Observational study of behavior: Sampling methods." *Behaviour* 49: 227-267). Remember to cite the model!

Appendix: Include a copy of your filled-in results table. Like before, this can be included as a scan, digital photo, or retyped document, for example.