Name _____ Per _____

Fantastic Fins: Diving into Diversity in Guppies

Guppies Galore, morphological variability

Study the pictures on your table. The fish belong to the species *Poecilia reticulata,* more commonly known as Guppies. You'll see, there is a lot of variability within the species.

1. In detail, describe your favorite guppy. Explain what you like about it.
   Answers will vary

2. Is your favorite guppy male or female? What evidence supports your selection?
   Answers will vary

Guppy Camouflage

Design your own guppy! You will color your guppy to hide in our river (classroom). The teacher will act as the predator and look for your guppy, so be sure to camouflage it well.

3. Summarize why you designed your guppy with the characteristics you chose.
   Answers will vary

4. How many guppies were found by the predator?
   Answers will vary
5. How many guppies remained unfound?
   Answers will vary
6. What changes would you make to your guppy to increase likelihood of survival?
   Answers will vary

Guppy Simulation

Go to the Guppy Simulation link and explore the simulation. Notice the "Guppy Settings" on the left. These parameters need to be adjusted according to the KEY card.
Init Guppy = 200 and Guppy K = 200. These are your "control" settings.
Run the simulation and record your data.
*Any time you change a variable, you must click "setup" (to restart the generations), and run the simulation through at least 100 generations. Record your results below.

		Dependent Variables (results)	
Independent Variable	Variable value(s)	Av. # of Spots	Percent Female
Initial Settings (control)		**4.95**	**44.78%**

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Female Preference	.05		5.19	56.99%
	.50		5.98	50.17%
	1.0		9.75	47.55%
Pike predators	2		3.93	53.59%
	10		3.76	52.10%
	20		3.50	54.08%
Female Preference And Pike Predators (answer 7, 8, & 9 FIRST)	.05	2	2.69	48.08%
	.50	10	3.69	50.10%
	1.0	20	7.92	50.95%

7. Analyze the data you collected and explain what patterns you see.
   When compared to the control, students should notice that increasing female preference will increase the average number of spots. Increasing predators will decrease the number of spots.

8. As the proportion of predators to guppies increases, what trends in the average number of spots do you observe?
   As predator numbers increase, male guppies, on average, have fewer spots.

9. In a simulation with female preference AND Pike predators, what do you predict will happen to the average number of spots after 100 generations?
   Possible answers based on data in the table could include that the average number of male spots will range between 4 and 6 because, while the brightly colored males will attract female mates, they will also attract predators. Thus, a careful balance between a high and low number of spots should become evident in the environment.

Article: Variation and Natural Selection in Guppies

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Underline the information in the article that describes the guppy habitat. Highlight the information relating to male guppy morphology (how the male guppies look) in different habitats. Summarize what you learned about guppy habitat and male morphology.

Guppy habitat	Male morphology
Stream with low/no predators	**More conspicuous, brightly colored, more spots**
Stream with many predators	**Less conspicuous, more drab, fewer spots**

10. What are the advantages to being brightly colored?
    Males being brightly colored will be more attracted to female mates.

11. What are the disadvantages to being brightly colored?
    Brightly colored males will also stand out to predators in the area.

12. Why would the proportion of females to males ever be significantly different than 50%?
    Several answers are possible but one example would be if the males were too brightly colored and attracted predators then the male population would be reduced and the female population would increase.

13. Predict what male guppies would look like in an environment with no predators. Explain your reasoning.
    Male guppies would continue to increase in their attractiveness due to there being no pressures from predators.

14. If you were to color a guppy to attract a mate, rather than remain hidden from predators, how would you change your design?
    Instead of trying to camouflage the guppy I would color the guppy brightly so that it was the first one seen by the female so I could improve the chance of mating.

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