



# Does Prey Species (*Gerbillus andersoni allenbyi*) Respond Appropriately to an Evolutionarily Novel Predator?

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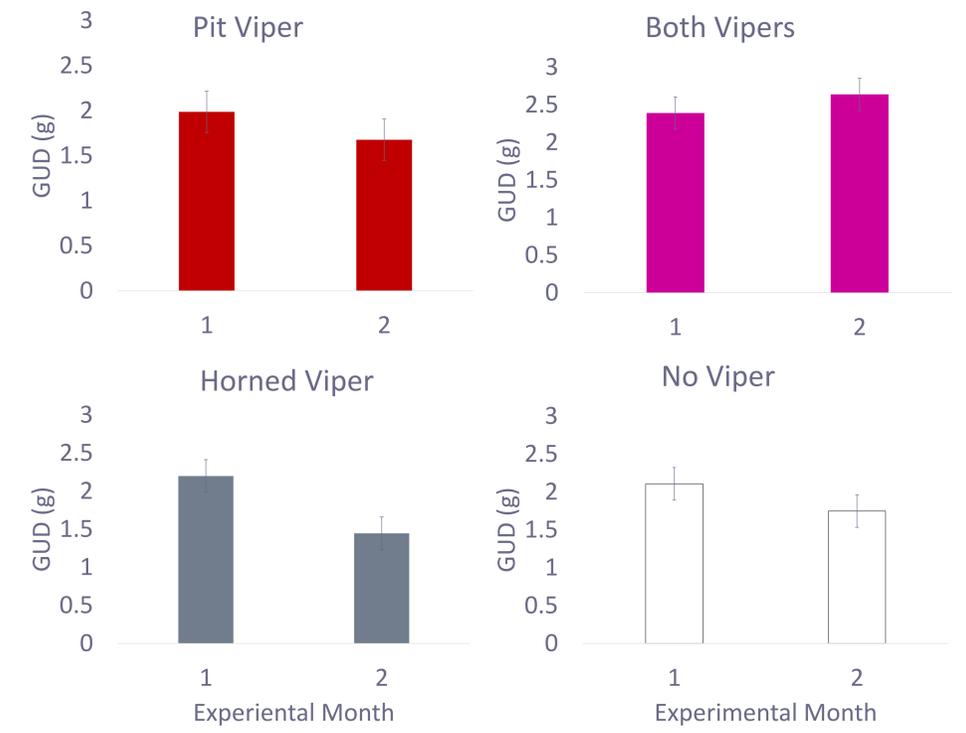
## OVERVIEW

- Granivorous rodents are preyed on by vipers in desert dunes worldwide. However not all vipers possess the same evolutionary tools for catching prey.
- For this experiment we transplanted sidewinder rattlesnakes from the Mojave Desert to the Negev in order to simulate an invasion of a predator with a constraint breaking adaptation over the local snakes.
- Our research was aimed at understand how a prey population responds to a novel predator and can it distinguish which of the vipers poses a higher risk to it.

## DESIGN

- 24 Gerbils were released into a semi-natural arena (vivarium) measuring 17 X 34 meters (fig. 2). The rodents were able to move between the quadrants of the vivarium while the snakes were limited to quadrants using special gates.
- Within the vivarium 48 diminishing return food patches were set daily and the fear level of the gerbils was recorded using a giving up density ((GUD) the density of food remaining in a patch after an animal no longer forages in it based on energy economics and physical risk the patch poses (Brown 1988)
- The data were collected for four nights every moon phase ( a total of 16 nights per months), for two months.
- The data were analyzed using both a spatial analysis (landscape of fear) and using a variance based general linear model.

## RESULTS (ANOVA)



↑ **Figure 3.** ANOVA for snake treatment by experimental month arranged spatially to match the treatments in the vivarium as in figure 1. Higher values suggest higher risk.

## RESEARCH SPECIES

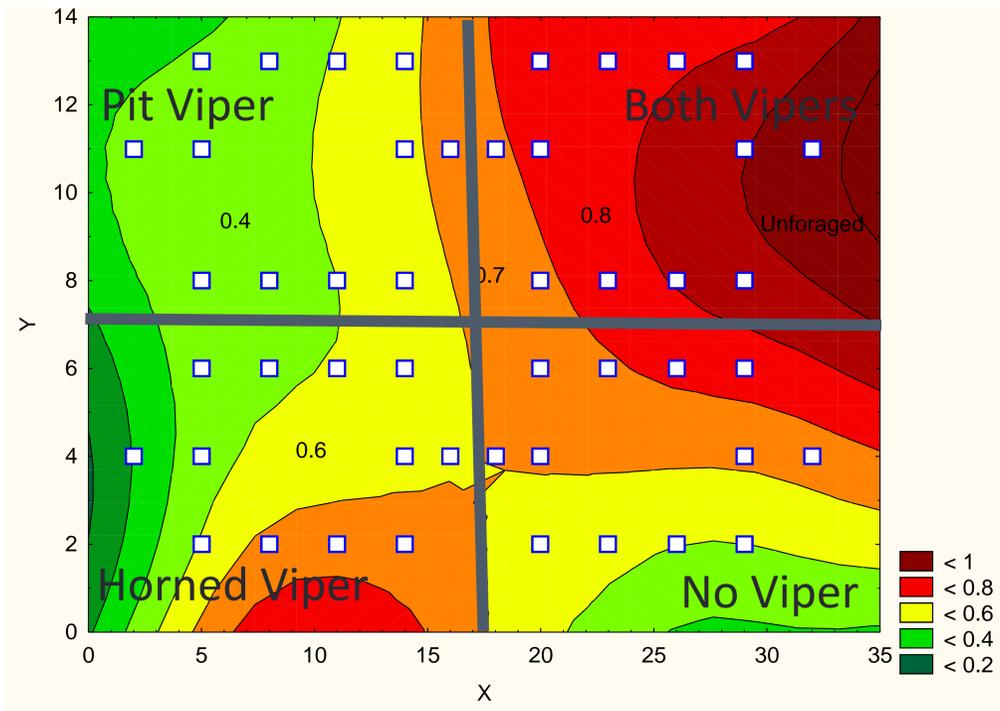
### The Research Species:

- Allenby's gerbil (*Gerbillus andersoni allenbyi*)**
  - A granivorous rodent endemic to the Northern Sahara Desert and the Middle East.
  - A sandy soil generalist species
  - It's main predators are: sand vipers, red foxes and barn owl

### The Treatment Species :

- Saharan Horned Viper (*Cerastes cerastes*)**
  - A sand viper species living in the Northern Sahara.
  - Lives in sandy habitats where it buries itself in the sand to ambush rodents who step near it's horn shaped sensitive adapted scales on it's head or hunts using moonlight.
- Sidewinder rattlesnake (*Crotalus cerastes*)**
  - A pit viper endemic to the Mojave and Sonoran Deserts of North America.
  - Uses infrared sensing organs (pits) to locate and attack warm prey, allowing it an activity range throughout the month and a high accuracy.

## RESULTS (SPATIAL)



↑ **Figure 1.** Landscape of fear analysis using distance weighted least squares contour analysis to map the giving up percentile (GUD/3) of the patches. Red contours suggest risk zones while green contours suggest safe zones

← **Figure 2.** The research vivarium showing bush trellises, a foraging patch (in black) and an RFID data logger.

## CONCLUSIONS

- The Gerbils recognized the novel pit viper as a predator (Fig. 3) however it feared it less than the known honed viper.
- The combination of two viper species is of higher risk to a gerbil than the area with one species only (2 snakes per quadrant (fig. 1)).
- Gerbils take more risk after a month of habituation to the vipers, and after the selection against individuals that do not manage predation risk well.

## ACKNOWLEDGMENTS

