



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

<b>Name(s)</b> <b>Pranav Gupta; Prakrit Jain</b>	<b>Project Number</b> <b>J2305</b>
<b>Project Title</b> <b>Cuticle Sensitivity to UV Light in Uroctonus mordax Scorpions</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Under UV light, scorpions fluoresce a bright bluish-green. A popular conjecture is that this allows them to sense UV light with their cuticle. Sensing UV with their cuticle would allow scorpions to find cover and hide from predators more effectively. The goal of our experiment is to see if they have this ability, which we feel is a strong hypothesis because scorpions are expert at finding cover, and cuticle sensitivity to UV light would be a good explanation for this strength. <b>Methods/Materials</b> We traveled to UC's Hopland Research and Extension Center to collect ten Uroctonus mordax scorpions for our experiment. We kept them in plastic boxes with cover and leaves for a month before starting the experiment, so they become accustomed to their new environment. During our experiment, we needed to determine if scorpions could find cover without eyesight whenever UV light was present. However, if scorpions were still finding cover in the dark, it would suggest that the scorpions are instead finding cover by using sensory organs, such as those known as pectenes. To achieve this, we devised the following experiment: The scorpions would be put in a box with a UV light, then video recorded and timed until they found cover. We conducted three trials with ten scorpions in each, (1) UV light is on, and scorpions are not blindfolded; (2) UV light is on, and scorpions are blindfolded; and (3) UV light is off. <b>Results</b> The scorpions were expected to find cover 100% of the time in Trials 1 and 2, and they did 90% and 80% of the time, respectively. In Trial 3, the scorpions were not expected to find cover, because the UV light was not on, and only one of the ten scorpions found cover, giving the trial a 90% success rate. <b>Conclusions/Discussion</b> We concluded that scorpions are, in fact, able to find cover by sensing UV light with their cuticle, because they could find cover whenever UV light was present, but not without it. This can be used as evidence for future studies in (1) Preventing unwanted human-scorpion interaction; (2) Studying other organisms that fluoresce, such as harvestmen; (3) Determining the reason scorpions fluoresce; and (4) Studying UV response in arthropods, such as pollinators.	
<b>Summary Statement</b> We determined that scorpions can sense UV light using their cuticle, an ability they can use to find cover.	
<b>Help Received</b> Ms. Peng, Lauren Esposito, Eddie Dunbar, Ken-ichi Ueda, and several other entomologists	