Desert Mammals and Their Role in the Active Dispersal of Cholla Cacti

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Background and Importance

Cholla cacti spread via vegetative propagation. In order to do this, chollas grow tubercles, or short arms at terminal joints that tend to catch in the skin or pelts of passing animals. Generally, those animals that carry the cholla are vertebrates[1], and some vertebrates may eat the cholla and deposit seeds in droppings[2]. However, increased urbanization may alter animal-cholla relationships by disrupting distributions of important transport vertebrates like coyotes and bobcats and increasing cholla contact with domesticated dogs[3]. Therefore, more research is necessary to identify which species may carry cholla tubercles, how important those species are to active dispersal of offspring, and how often such animal-plant interactions actually occur.

Methods

- Identified areas of high-density cholla in "untouched" areas - selected Brown's Ranch Trailhead in NE Scottsdale
- Set up trail cameras near cholla patches and left for 24-36 hours
- Checked for signs of animal activity in each cholla patch, including burrows, footprints, and droppings

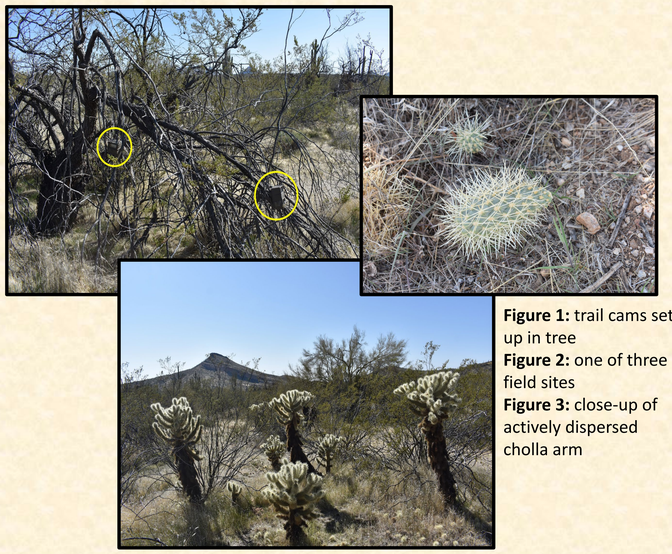

Figure 1: trail cams set up in tree
Figure 2: one of three field sites
Figure 3: close-up of actively dispersed cholla arm

Results

- **We collected ample evidence of mammal presence near patches of cholla, including pictures of mammals caught on our trail cameras, scat, paths/footprints, and nests.**
  - **Mammals caught directly were a coyote (Figure 4) and a bat (Figure 5)**
  - **Scat included coyote (Figure 12), deer (Figure 10), and rabbit (Figure 11)**
  - **Nests included packrat (Figures 6-7) and ground squirrel (Figure 8)**
- **We also saw evidence of active dispersal in all cholla patches we studied in the form of arms more than 2 feet and up to 4 feet away from the base of cholla cacti present (Figures 13-16)**

Figure 4: coyote caught on trail cam
Figure 5: bat caught on trail cam (frozen from video)
Figure 6-7: packrat nest
Figure 8: ground squirrel nests
Figure 9: animal trail
Figure 10: deer scat
Figure 11: rabbit scat
Figure 12: coyote scat

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Figure 13: passively and actively dispersed cholla arms
Figure 14: cholla arm in ground squirrel hole
Figure 15-16: actively dispersed cholla arms

Conclusion

This research suggests a correlation between animal activity and active cholla dispersal. Correlation is based on the presence of mammalian scat, paths/footprints, and nests in the vicinity of cholla cacti with actively dispersed arms. These results contribute to the limited literature on animal dispersal of cholla cacti, indicating that mammals are present near cholla patches and are likely to participate in active dispersal unwillingly as tubercles become lodged in their skin. Additionally, these results support limited literature on packrats as dispersers of cholla via seed droppings, as packrat nests were identified near cholla patches.

Future Research

Future research on this topic would include setting out more trail cameras in more locations to try to capture the active dispersal of cholla by desert mammals, thereby proving causation. Trail cameras could be set out in different regions of Arizona and at different times of year to identify where and in what seasons animal dispersal of cholla occurs most frequently. Additionally, trail cameras could be set up for longer periods of time, assuming memory is not an issue, to create more opportunity for animal sightings. Finally, locations for camera set-up could be identified based on evidence of animal presence AND cholla cacti presence rather than on cholla cacti presence alone.

Sources

1. Bobich, E. G., & Nobel, P. S. (2001). Vegetative reproduction as related to biomechanics, morphology and anatomy of four cholla cactus species in the Sonoran Desert.
2. Brown, J. H et al. (1972). Woodrats and cholla: dependence of a small mammal population on the density of cacti.
3. Ordeñana, M. A. et al. (2010). Effects of urbanization on carnivore species distribution and richness.