The relationship between pollinators and their chosen flowers has evolved over centuries. The traits the flowers express are selected in order to attract the pollinator that benefits their survival and reciprocally the pollinator uses as their food source. Yet, examining the system between 3 desert species - hawkmoths, datura, and agave - a different type of pollination system begins to reveal itself.

Hawkmoths and datura, known commonly as jimsonweed, are a perfect match. Datura has the white, highly reflective surface, strong pleasant scent, and sucrose dominant nectar that hawkmoths are attracted to in flowers. In contrast, the Palmer’s Agave has cream colored flowers with a pungent scent and hexose (fructose and glucose) dominant nectar. This combination is ideal for attracting bats, and agave serves as a keystone species due to its abundance of nectar. The hawkmoth, however, has learned to take advantage of the nectar provided by agaves. The hawkmoth prefers Datura flowers when they are in full bloom, but for most of the summer, they feed on the “bat-adapted” agave. This exhibition of flexibility in obtaining nectar is newly studied in hawkmoths and shows that mixed pollination systems are more common than initially thought by scientists.

Behavioral flexibility allows pollinator populations to exist while their preferred source is scarce, but the innate preference they have allows their coevolutionary relationship with flowers to continue. These relationships, though, continue to evolve. Within the agave species, we see the Palmer’s Agave, when compared to *Agave chrysantha*, have 15 notable differences in their flower traits. These traits vary along with the geographic habitat of each agave, with Palmer’s Agave having a wider range, extending into Mexico, while *Agave chrysantha* is endemic to central and southern Arizona. The range is important to look at since it reveals why one is more “bat-adapted” than the other. The presence of migratory bats in central Mexico encourages the Palmer’s Agave to have strictly bat-adapted traits. With the *Agave chrysantha* being farther north, it carries traits that appeal to both bats and insects, though not strictly encouraging one or the other. The *Agave chrysantha* is thought to be the younger of the two species, with its bat-adapted traits a relic of its earlier form, when it was more closely related to the Palmer’s Agave. With time, it has begun selecting less strictly for bats and carries traits that attract the insects that are prominent in its area.

 The study of these pollinator systems is always illuminating. These systems are being revealed to be more mixed than previously thought, and it highlights that every role within an ecosystem is important.

Citation

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