

First Impressions of a Non-Native

by JOHN HILLMER

Thoreau wrote that there are "mornings . . . when the world seems to begin anew, beyond which memory need not go. A morning which carries back beyond the Mosaic creation, where crystallizations are fresh and unmelting. It is the poet's hour. Mornings when men are new-born, men who have the seeds of life in them."

The morning I woke up to hike in the Maricopa Mountains with the Arizona Native Plant Society was not one of those mornings. My first 6 A.M., Saturday instinct was to roll over and dream of this fresh new world, not to look outside to see if it had magically arrived.

I did make it outside however, equipped with peanut butter and jelly sandwiches and a water bottle - but Thoreau's virgin world had not appeared. (I must have just missed it.) The same concrete corridors of the city and the now familiar stretches of gray lead me to the group's meeting place.

Dressed for warmer temperatures, the nonmembers hunched in the back of Marc's pickup as the cool wind swirled dust from the road and deposited it on our hair, clothes and in our mouths. We managed to find some humor in all this, recalling Roz's promises of a relaxing day in the sun. Was this some sort of strange initiation ritual?

We met at the trailhead where botanists, artists, journalists, entomologists and others would begin their trek into the rich canyon base and up the rocky canyon slopes. One conversation turned to wilderness and water, politics and profits - though the subjects seemed so desperately divided.

We began our climb up the canyon wall, stopping on the immense reddish-brown rocks to identify another plant (the members did the identifying, of course) or to glimpse at the healthy stand of saguaros that seemed now to be waving at us from the canyon floor. Every rock



was a sort of tribute to the earth, every plant another reminder of nature's incredible diversity. We stopped, like proud mountain goats, to feel the cool shade of a large rock and went on to conquer the peak overlooking the pristine Gila River basin in the distance. We were human after all, and our thoughts turned quickly to the cooler of Millers back at the truck.

As I gulped a cold beer, I thought of Thoreau and the feeling he tried to describe, I thought of places like the Maricopas where people might find such inspiration, I thought vaguely of commercial interests that seem to have a penchant for leveling wilderness and dulling the senses of nature. Then, my thoughts were broken.

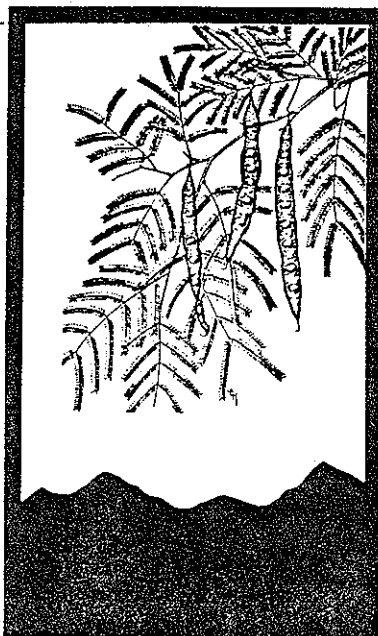
Entomologist Ed had strayed from the pack, lost in search of elusive desert bugs. Luckily the bugs did not seize our professor friend and he returned safely to the group and the all-important cooler of beer. I couldn't help think, however, that this wasn't such a bad place to get lost, for a while.

The morning had started off rather slow. As for the rest of the day - I Thoreau-ly enjoyed it!

Editor's note: Writer, hiker and new member John Hillmer will be back to bring more personal experiences to our newsletter.

The
Arizona
Native
Plant
Society

Flagstaff
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Yuma



The
Plant
Press

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The Endangered Plant Program in Arizona: A Summary

One of the primary purposes of the Society is to advocate the preservation of plant species indigenous to Arizona. Many species in Arizona are at particular risk of extirpation from a variety of threats including collection, habitat destruction and predation. The Endangered Species Act of 1973, as amended (ESA) is the primary force behind rare plant conservation efforts in the state. The U.S. Fish and Wildlife Service (FWS) administers the ESA and is responsible for the listing of species as endangered or threatened and for developing recovery plans for listed species. This summary addresses those species that are listed under the ESA or are currently being considered by FWS for listing as either threatened or endangered.

ENDANGERED

1. *Agave arizonica* Gentry & Weber; listed 18 May 1984; isolated localities in Maricopa and Yavapai counties; threats are herbivore and insect predation, collection, poor reproductive success, and low numbers of plants.
2. *Cowania subintegra* Kearney; listed 29 May 1984; three sites near Burro Creek in Mohave County, Verde Valley in Coconino County and San Carlos Indian Reservation in Graham County; threats are herbivore predation, mining, low rates of recruitment, and road construction.
3. *Echinocactus horizontalis* Lemaire var. *nicholii* L. Benson; listed 26 October 1979; Pima and Pinal counties; threats are mining, off-road vehicle use, and collecting.
4. *Echinocereus triglochidiatus* Engelm. var. *arizonicus* (Rose ex Orcutt) L. Benson; listed 25 October 1979; Gila and Pinal counties; threats are collecting, mining, and predation.
5. *Pediocactus bradyi* L. Benson; listed 26 October 1979; County; threats are collecting, off-road vehicle use, trampling by livestock, and mining.
6. *Pediocactus peeblesianus* (Croizat) L. Benson var. *peeblesianus*; listed 26 October 1979; Navajo County; threats are collecting, mining, trampling by livestock, off-road vehicle use.
7. *Pediocactus sileri* (Engelm.) L. Benson; listed 26 October 1979; northern Mohave County; threats are mining and collecting.

THREATENED

1. *Senecio franciscanus* Greene; listed 22 November 1983; San Francisco Peaks, Coconino County; primary threat is destruction of habitat by hikers.

PROPOSED FOR LISTING

1. *Hedeoma diffusum* Greene; proposed as threatened 23 June 1983; Coconino County; threats are urban development, road construction, and logging. (Recent inventory has documented additional populations, many of which are located in established wilderness areas. This proposal will be dropped.)
2. *Carex specuicola* J. I. Howell; proposed as threatened 11 April 1984; Coconino County; the species is restricted to a few perennial spring sites that are threatened by livestock trampling and water development projects.

3. *Mammillaria thornberi* Orcutt; proposed as threatened 24 April 1984; Pima and Pinal counties; threats are housing and road construction, Central Arizona Project aqueduct, conversion of habitat for agriculture, collection and grazing.

CATEGORY 1 CANDIDATE SPECIES - includes those species for which the FWS has sufficient information to support their being listed as threatened or endangered. These species are likely to be proposed for listing in the foreseeable future.

1. *Allium gooddingii* M. Owenby; the species is known from isolated localities in Canyon de Chelly, the White Mountains, the Chiricahua Mountains and the Santa Catalina Mountains in Arizona and the Mogollon Mountains in New Mexico. *A. gooddingii* occurs in shaded canyons, a habitat threatened by livestock grazing, logging and possible water development projects.
2. *Amsonia keameyana* Woodson; is known only from one canyon in the Baboquivari Mountains; this area is heavily grazed by livestock and seeds of this species may be subject to insect predation.
3. *Aster lemmonii* Gray; is known in Arizona from the Huachuca Mountains with additional localities in Chihuahua, Mexico. *A. lemmonii* occurs along shaded streams and is threatened by road construction, water development projects, and off-road vehicle use.
4. *Astragalus cremnophylax* Barneby; *A. cremnophylax* var. *cremnophylax* is extremely rare on the South Rim of the Grand Canyon. One of the primary populations is trampled by park visitors.
5. *Astragalus xiphoides* (Barneby) Barneby; the species occurs near Holbrook and on the Petrified Forest National Park; threats to the species outside of the park boundaries are road construction, housing development and possibly grazing.
6. *Camissonia exilis* (Raven) Raven; is known from a few small populations in northern Mohave and Coconino counties; maintenance of right-of-way, gypsum mining, and grazing are threats to the species.
7. *Cimicifuga arizonica* Watson; known from the Bill Williams Mountain, Coconino County and the Sierra Ancha Mountains in Gila County; threats are logging, uranium mining, livestock grazing and recreational use.



8. *Coryphantha robbinsorum* (Earle) A.D. Zimmerman; restricted to a small area in southeastern Arizona; threats are collecting and trampling from livestock.

9. *Coryphantha scheeri* (Kuntze) L. Benson var. *robustispina* (Schott) L. Benson; scattered localities in Santa Cruz and Pima counties with additional populations in Sonora, Mexico; threats are collecting, mining, housing and road development, livestock grazing, and rabbit and insect predation.

10. *Coryphantha vivipara* B.& R. var. *buoflamma* Fischer; known only from one area in Yavapai County; threats are mining, road construction, livestock grazing, collection and urbanization.

11. *Dalea tentaculoides* Gentry; a few localities in the Pajarito Mountains in Santa Cruz County and in the Baboquivari Mountains in Pima County; potential threats are livestock grazing, mining and recreational impacts. The species apparently has low reproductive success.

12. *Erigeron eriophyllus* Gray; scattered localities in Santa Cruz and Cochise counties; potential threats are habitat degradation from livestock grazing.

13. *Erigeron kuschei* Eastw.; known only from the Chiricahua Mountains in Cochise County; the species has a very restricted distribution and is known only from small populations.

14. *Neolloydia erectocentra* (Coulter) L. Benson var. *acunensis* L. Benson; a few isolated localities in Maricopa, Pinal and Pima counties; threats are collecting, mining, off-road vehicle use and road construction.

15. *Pediocactus paradinei* L. Benson; restricted to a portion of northeastern Mohave County and northern Coconino County; threats are habitat conversion from sagebrush to seeded grassland, collecting and livestock grazing.

16. *Pediocactus peeblesianus* (Croizat) L. Benson var. *fickeiseniae* L. Benson; scattered populations near the Little Colorado River in Mohave and Coconino counties; threats are collecting, mining and livestock grazing.

17. *Penstemon discolor* Keck; known only from a few populations in the Santa Catalina Mountains in Pima County; the species is threatened by recreational use and possibly by road construction.

18. *Rumex orthoneurus* Rech.; restricted to springs and moist meadows in the Chiricahua Mountains in Cochise County and Sierra Ancha Mountains in Gila County; threats are uranium mining, recreational use, livestock grazing, water developments, and pollution.

19. *Senecio huachucanus* Gray; known from the Huachuca Mountains in Cochise County and the Santa Rita Mountains in Santa Cruz County; no threats are known.

20. *Tumamoca macdougallii* J.N. Rose; a few isolated localities in Pima County with additional populations in northern Sonora, Mexico; threats are agricultural and housing development, construction of the Central Arizona Project and predation.



1. *Agave parviflora* Torr.; Santa Cruz County with additional populations in Sonora, Mexico.

2. *Agave schottii* Engelm. var. *treleasei* (Tourmey) K. & P.; Santa Catalina and Ajo Mountains, Pima County.

3. *Amsonia grandiflora* Alexander; Santa Cruz County.

4. *Amsonia peeblesii* Woodson; Little Colorado River area between Cameron and St. John's, Coconino, Navajo and Apache counties.

5. *Apocynum jonesii* Woodson; near Flagstaff, Coconino County.

6. *Aquilegia longissima* Gray; Huachuca Mountains, Cochise County and Baboquivari Mountains, Pima County.

7. *Arctomecon californica* Torr. & Frem.; Mohave County near Pierce Ferry, Lake Mead area, lower Grand Canyon, with additional localities in southern Nevada.

8. *Argemone arizonica* G.B. Owenby; Coconino County in the Grand Canyon, at base of the Vermillion Cliffs and Houserock Valley.

9. *Asclepias cutleri* Woodson; southeastern Utah and northeastern Arizona near Rock Point, Apache County and Carrizo, Navajo County.

10. *Asplenium andrewsii* A. Nels. (*Asplenium adiantum-nigrum* L.); in Arizona known only from Mount Eldon, Coconino County.

11. *Astragalus ampullarius* Wats.; Mohave County between Meccasin and Coral Pink Sand Dunes and Coconino County in the Cockscomb area with additional localities in southern Utah.

12. *Astragalus barnebyi* Welsh & Atwood; Little Colorado River area in Navajo County and Coconino County near Fredonia with additional localities in southern Utah.

13. *Astragalus geyeri* Gray var. *triquetrus* (Gray) Jones; Mohave County near Beaver Creek, Beaver Dam and lower Muddy, Virgin, and Colorado rivers.

14. *Astragalus holmgreniorum* Barneby; Mohave County in Virgin River valley.

15. *Astragalus lentiginosus* Dougl. var. *ambiguus* Ripley & Barneby; Mohave County on west side of Cerbat Mountains and Coconino County in Houserock Valley.

16. *Astragalus musimonum* Barneby; northwestern Mohave County with additional populations in southern Nevada.

17. *Astragalus striatiflorus* Jones; Coconino County in Paria Canyon area with additional populations in southern Utah.

CATEGORY 2 CANDIDATE SPECIES - includes those species for which the FWS does not have sufficient information on hand to support their being listed as threatened or endangered at this time. The FWS is actively seeking information on these species to determine if they warrant inclusion in a different category.

18. *Astragalus titanophilus* Barneby; near junction of Coconino, Mohave and Yavapai counties, Music Mountains with an additional locality north of the Colorado River in Warm Springs Canyon.
19. *Camissonia confertiflora* (Raven) Raven; Mohave County in Toroweap Valley at base of Vulcan's Throne.
20. *Camissonia specuicola* (Raven) Raven var. *heperia* (Raven) Raven; Grand Canyon with scattered populations in Havasu and Hualapai Canyons in Coconino County and from Separation Canyon to Spencer Canyon in Mohave County.
21. *Castilleja kaibabensis* N. Holmgren; endemic to Kaibab Plateau in Coconino County
22. *Cereus greggii* Engelm. (*Periocereus greggii* (Engelm.) B. & R.); scattered localities throughout much of southern Arizona.
23. *Cheilanthes arizonica* (Maxon) Mickel; Cochise County in Chiricahua, Huachuca and Mule mountains.
24. *Cheilanthes pringlei* Davenp.; Gila County in the Mazatzal Mountains, Cochise County in the Chiricahua Mountains, Pima County in various ranges including the Tucson and Santa Catalina mountains.
25. *Choisya mollis* Standl.; Santa Cruz County in the Pajarito Mountains area.
26. *Chrysothamnus molestus* (Blake) L.C. Anderson; Coconino County in the vicinity of the San Francisco Peaks.
27. *Cirsium virginensis* Welsh; northwestern Mohave County near Littlefield and a few additional localities in Washington County, Utah.
28. *Clematis hirsutissima* Pursh var. *arizonica* (Heller) Erickson; Coconino County in Walnut Canyon, south of rim of the Grand Canyon, Lake Mary and the vicinity of Flagstaff.
29. *Coryphantha missouriensis* (Sweet) B. & R. var. *marstonii* (Clover) L. Benson; Coconino County in the Buckskin Mountains and on the Kaibab Plateau, Yavapai County in the Prescott area.
30. *Coryphantha recurvata* (Engelm.) B. & R.; Santa Cruz County in the Pena Blanca-Ruby area.
31. *Coryphantha vivipara* (Nutt.) B.&R. var. *alversonii* (Coult.) L. Benson; lower Colorado River in the Arizona-California border area.
32. *Desmanthus bicornutus* Wats.; Santa Cruz County near Ruby with additional localities in Mexico.
33. *Erigeron lemmoni* Gray; Pima County in the Santa Catalina Mountains, Santa Cruz County in the Santa Rita Mountains, Cochise County in the Huachuca Mountains and Maricopa County in Fish Creek Canyon.
34. *Erigeron pringlei* Greene; Gila County in the Mazatzal and Sierra Ancha mountains, Graham County in the Penaleno Mountains, Santa Cruz County in the Santa Rita Mountains and Coconino County in Oak Creek Canyon.
35. *Eriogonum capillare* Small; Gila County in the vicinity of Peridot on the San Carlos Indian Reservation.
36. *Eriogonum mortonianum* Reveal; Mohave County near Fredonia.
37. *Eriogonum ripleyi* J. T. Howell; Coconino County in the Frazier Well area and Yavapai County in the Horseshoe Dam area.



38. *Eriogonum thompsonae* Wats. var. *atwoodii* Reveal; Mohave County southwest of Fredonia.
39. *Euphorbia platysperma* Engelm.; Yuma County, near Yuma.
40. *Ferocactus acanthodes* (Lemaire) B. & R. var. *acanthodes*; lower Gila River area into California and Baja California, Mexico.
41. *Graptopetalum bartramii* Rose; Santa Cruz County in the Pajarito, Patagonia, Santa Rita and Tumacacori mountains, Pima County in the Baboquivari and Rincon mountains, Cochise County in the Chiricahua Mountains.
42. *Hymenoxys helenioides* (Rydb.) Ckll.; Apache County in the Lukachukai Mountains, Coconino County at Hart Prairie near Flagstaff.
43. *Ipomoea lemmoni* Gray; Cochise County in the Huachuca Mountains, Santa Cruz County in the Santa Rita Mountains and in Sycamore Canyon.
44. *Lilaeopsis recurva* A. W. Hill; Cochise County in the Huachuca Mountains, near St. David and on the San Bernardino Ranch and Santa Cruz County near Patagonia.
45. *Lilium parryi* Wats; Cochise County in the Huachuca Mountains, Santa Cruz County in the Santa Rita Mountains.
46. *Margaranthus lemmoni* D. C. Eaton; Cochise County in the Huachuca Mountains.
47. *Neolloydia erectocentra* (Coult.) L. Benson var. *erectocentra*; southeastern Pima to western Cochise County.
48. *Notholaena lemmoni* D. C. Eaton; Pima County in the Coyote, Rincon, Santa Catalina, and Santa Rita mountains, Santa Cruz County in the Santa Rita, Atascosa and Tumacacori mountains.
49. *Opuntia wigginsii* L. Benson; a few isolated localities in Yuma, La Paz and Maricopa counties with additional populations in southeastern California.
50. *Palafoxia arida* Turner & Morris var. *gigantea*; Southeastern California with possible localities in the Yuma area.
51. *Pectis imberbis* Gray; rare in Cochise, Pima and Santa Cruz counties with additional localities in Sonora and Chihuahua, Mexico.
52. *Pediocactus papyracanthus* (Engelm.) L. Benson; Navajo County in the Holbrook-Showlow area.
53. *Penstemon bicolor* (T.S. Brand.) Clokey & Keck ssp. *roseus* Clokey & Keck; Mohave County on the west side of the Cerbat Mountains.
54. *Penstemon distans* N. Holmgren; Mohave County, southeast edge of Shivwits Plateau, Whitmore and Andres Canyons

55. *Perityle ajoensis* Todson; Pima County in the Ajo Mountains.

56. *Polemonium pauciflorum* Wats. ssp. *hinckleyi* (Standl.) wherry; Cochise County in the Chiricahua Mountains with additional localities in Texas and Nuevo Leon, Mexico.

57. *Polygonum fusiforme* Greene; isolated localities in Maricopa, Mohave, Pima, Santa Cruz and Yuma counties.

58. *Primula hunnewellii* Fern.; Coconino County on the North Rim of the Grand Canyon.

59. *Psoralea epipsila* Barneby; Coconino and Mohave counties, on the Kaibab Plateau with additional localities in southern Utah.

60. *Puccinellia parishii* Hitchc.; Coconino County near Tuba City, Navajo County at Shato and Pinal County along Aravaipa Creek.

61. *Rosa stellata* Woot.; Coconino County along rims of the Grand Canyon.

The Arizona Natural Heritage Program developed a more comprehensive list that includes not only the species of interest to FWS but also endemic or peripheral species that are rare in Arizona. Information on these species was entered into a data base that is now being managed by the nongame branch of the Arizona Game and Fish Commission.

There are a number of ways in which Society members may become involved in the endangered species program. Additional inventory is needed to improve our understanding of the distribution and habitat requirements of the majority of these species. Monitoring known populations of rare plants is needed to adequately document threats and to assess the status of the species. Members interested in learning more about Arizona's endangered species please contact Mary Butterwick, 508 E. Westchester, Tempe, AZ 85283. Phone: (work 602/863-4464, (home) 602/897-8053.



Chapter Events

Tucson

APRIL 10. David Hardy M.D. will talk on the very practical problem of rattlesnake bite.

MAY 8. Tim Clark, former state president, speaks on plant-related subject. Potluck and elections to follow.

Chapter meets on the second Wednesday of the month at 7:30 p.m. at the Tucson Botanical Garden.

Flagstaff

APRIL 17. Spring wildflower walk! Location and time to be announced.

Chapter meets on third Thursday of the month at Flagstaff Adult Center, 7:30 p.m. For information call Susan Husband 774-7924.

Prescott

The Prescott Chapter is a new edition to our organization. Lets give them our full support by offering our ideas and programs. For information call Robert Mason (w) 778-7202, (h) 778-7592.

South Central

MARCH 30. State Board Meeting of ANPS, 9 A.M. at Central Arizona College.

APRIL 6. General meeting at Arboretum.

APRIL 20. Field trip to Patagonia Bird Sanctuary.

MAY 4. General meeting with election of officers and slide presentation of field trips.

MAY 18. Home landscape tour and picnic.

Chapter meets the first Saturday of the month at 10:00 a.m. at the Central Arizona College. For more information contact Bill Kinnison 836-8562 or 836-8243. Call Lewis Ehrlich for field trip information at 466-5107.

Yuma

Chapter meets on the first Monday, 7:30 p.m. at the Yuma Extension Service Office. For information call Pat Callahan at 627-2773.

Phoenix

APRIL 8, Tanna Baldwin with State Parks speaks on natural areas.

APRIL 27, Field trip to Boyce Thompson Arboretum.

MAY 11, Field trip to Camp Creek. Quickie trip to little known biological area, 30 miles north of Phoenix.

MAY 13, LeRoy Brady, is the principal landscape architect for Arizona Highways Dept. and state president of ANPS. He will present a program on water resources.

MAY 18, Field trip to West Fork, of Oak Creek wild flowers. By popular request.

Chapter meets the second Monday of the month at Desert Botanical Garden at 7:30 p.m. For more information about field trips contact Jack Norman 995-2017 or Marc Mittleman 265-0670.

General Membership Meeting

July 20, 1985 at the
Transition Zone
Horticultural Institute

Flagstaff, AZ

Details forthcoming.



Pristine desert meets the snow-capped Four Peaks in the Mazatzal Mountains, 2½ hours northeast of Phoenix.

Wildflower Legislation

Legislation setting aside funds for the use of native wildflower seeds and seedlings in highway landscaping passed both the House and Senate in the 98th Congress. Both the House and Senate versions of this legislation became part of other bills, which were sent to a conference committee of House and Senate members. Although there was no opposition to the wildflower legislation itself, the committee could not agree on a final form of the bills. Thus, the wildflower legislation died and was never returned to the House and Senate for a final vote.

Senator Lloyd Bentsen of Texas introduced the Senate bill, which was known as the National Wildflower Landscaping Act of 1984, S. 2585. In introducing the bill, Senator Bentsen mentioned the cost-cutting, water-saving, and labor-saving benefits of blending wildflowers into highway landscaping, and referred to "Mrs. Lady Bird Johnson's efforts to beautify America with the planting and cultivation of colorful and hardy native wildflowers."

The Senator also cited examples from the Texas Highway Department proving that less mowing and watering are required along highways where wildflowers grow, and that even travelers seem more reluctant to litter in these areas. He summed it up by saying, "I hope we may join together in following the lead of Lady Bird Johnson in beautifying our nation's highways and conserving a national resource, while contributing to significant financial savings."

Senator Bentsen is planning to introduce similar legislation again in the next Congress.

- Sharon Barnes

Reprinted from AMERICAN HORTICULTURIST

Editor's Note: To ensure the introduction of this legislation and to help get support for its passage, interested ANPS members may write Senators Barry Goldwater and Dennis DeConcini, and Representatives John McCain, Morris Udall, Bob Stump, Eldon Rudd and Jim Kolbe.

MEMBERSHIP RENEWALS ARE DUE!

Please send in
yours today. You
may use the form
in the previous
newsletter.

DON'T MISS ANOTHER ISSUE OF THE
PLANT PRESS!

Welcome New Members

PRESCOTT

Estella Godfrey
Archie Dickey
Watters Garden Center

PHOENIX

Roz Bentley
Larry Richards
Dona Shaver
Greg Presto

TUCSON

Marcille Lynn
Howard Bremand
Mae Criley
Bobi Lyon
Myron Rosby
Miles Thompson
Jim Honcoop
D. Peter Siminski
Jack Lynch
Helen Yankovic
Rey & Judy Gregory
David Hardy
Christine Galloway
Sallie Hale
Mrs. Robert Miller

FLAGSTAFF

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SOUTH CENTRAL

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Duncan Galusha

Plant's Color Shifts Tied to Attracting Pollinators

Experiments by biologists in Arizona have revealed that some flowering plants will change the color of their flowers to attract insects to pollinate their blooms.

The researchers said their findings, obtained over a three-year period, appeared to be the first documentation of this kind of complex evolutionary adaptation in the plant kingdom. The results of the research were reported recently in the journal *Science*.

The researchers report they found that plants of the phlox family shift the colors of their blooms from dark to light to encourage pollination by birds and insects that favor certain colors, depending on which birds or insects are present at different times of the year. Phlox is a type of flowering plant species common to gardens and fields in many parts of the United States.

The researchers, Kenneth N. Paige and Dr. Thomas G. Whitham of Northern Arizona University in Flagstaff, found that scarlet gilia, plants that grow about three feet high and have trumpet-shaped flowers, produce more muted shades of their deep red color in mid-August, about halfway through their blooming season, after hummingbirds, who like that color, leave the area.

SHIFT TO LIGHTER COLORS

Over the next four weeks the plants' secondary pollinators, hawkmoths, insects that favor lighter colors, appear on the scene and then, after the hummingbirds' departure, the same plants will produce much lighter-colored flowers that range from various shades of pink to white.

Mr. Paige, the principal researcher, said in an interview that the shift from a darker to a lighter color correlated with the shift from an emigrated pollinator, the hummingbird, to another, the hawkmoth. He cited the findings as evidence of a rapid and complex form of evolutionary adaptation.

Comparisons of plants that shifted to a lighter color were made with plants that did not shift hues. The tests showed that the shift enhanced the reproductive success of those plants because of the greater frequency of pollination by birds and insects and the higher seed production or reproductive success of the plants.

The scientists studied thousands of gilia plants at different altitudes on Fern mountain near Flagstaff. They found that plants growing at elevations where hummingbirds stayed all summer did not undergo the color variation. And they noted that at a different elevation where hummingbirds departed in late summer and hawkmoths remained prevalent, the plants catered to the hawkmoths by changing to light colors the insects preferred.

Other types of plants were found that also showed flower-color variation over time, the scientists reported, adding that they suspected that these other plants had also probably developed the same traits as an evolutionary advantage that helped reproductive success.

— Bayard Webster

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Saturday, January 12, 1985