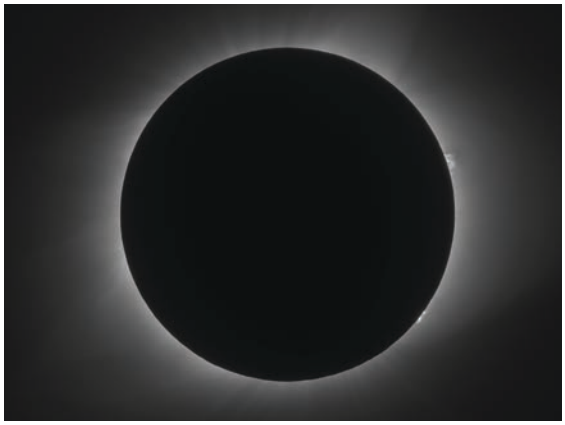
Nature Notes

VOLUME 17, NUMBER 4, FALL 2017 PAJARITO ENVIRONMENTAL EDUCATION CENTER, LOS ALAMOS, NM

Totality: The Los Alamos Expeditions

By Galen Gisler

The total eclipse on August 21 was an unprecedented opportunity for astronomers and the public to employ modern methods of photography and data collection to study our planet's closest star. From Oregon in the northwest to South Carolina in the southeast, millions living in the narrow zone of totality were joined by many millions more who travelled considerable distances to enjoy nature's most spectacular event.



This image of the Sun's elusive inner corona was captured by Galen Gisler during the total eclipse.

For us in Los Alamos, Nebraska and Wyoming are the closest states that experienced the path of totality, so that's where most of us went. A few went farther afield, to Idaho and Oregon and Missouri. On September 8th and 9th in the PEEC planetarium, and possibly to be repeated at some later date, Galen Gisler summarized reports from some of our expeditions.

A team led by Gisler participated in the Citizen CATE (Continental American Telescopic Eclipse) Experiment, which consisted of setting up teams with identical equipment (telescope, mount, camera, robotic controller, and computer) at 68 sites throughout the entire path of totality, with each team conducting a prescribed sequence of observations. The scientific goal of the CATE experiment was to assemble a record of the dynamics of the inner solar corona during the 90 minutes that it took the lunar shadow to pass from Oregon to South Carolina.

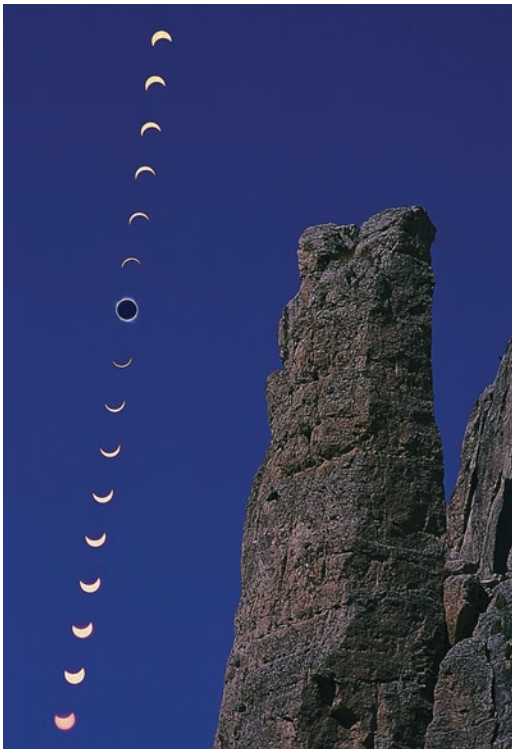
Gisler's team included eight Los Alamos High School (LAHS) students and two PEEC staff, Jonathan Creel and Siobhan Niklasson. They were assigned a site at Pilot Butte Reservoir in central Wyoming between Riverton and Dubois.

Gisler attended an initial training session at the end of April with Eric Mas (father of one of the students). Afterwards, they trained the students on the equipment in several sessions held at the nature center from May through the beginning of August.

Starting two weeks before the eclipse, the team began to gather at the campsite, gradually populating it until the students arrived the weekend before the eclipse. The LAHS students participating were Jack Benner, Isabel Crooker, Steven Gulley, Maddie Mas, Prescott Moore, Elijah Pelofske, Maya Rogers, and Beth Short. LAHS science teacher Stephanie Mitchell, her husband Mark, Steven Boerigter, Patrick Moore, and Eric Mas supported the team before and during data collection. Others who camped with the team brought the total

number of Los Alamos folk to 25 at the Pilot Butte site. In addition to the CATE-specific observations that were carried out, some of the students performed observations of shadow bands, weather, wildlife, and daytime astronomy.

Although final data from the CATE experiment will not be available for a while, due to calibration and remaining processing tasks, the experiment appears to have been successful. Of the 68 sites, 56 have already returned data of sufficient quality for the inner coronal studies that will be carried out by Matt Penn and his colleagues at the National Solar Observatory in Tucson, AZ.



Timelapse collage of the Great American Eclipse that passed over North America on August 21, 2017. Photo by Fraser Goff.

Another large group from Los Alamos rented an RV and camped at the Wind River RV Park in Riverton, WY. From their vantage point, they performed observations of Bailey's Beads and the Diamond Ring, transient phenomena associated with the beginning and end of the total phase of the eclipse. They also made photographic records of the outer corona of the sun, which extended in this case up to ten solar diameters away from the sun itself. Rick used his 8' Celestron telescope to host a star party at the RV park. This group consisted of Rick Wallace, Bob & Claudia Hilko, and their families.

Sun's outer corona during totality. Photo by Rick Wallace.

Using binoculars, Jonathan Creel and Paul Arendt spent the majority of the total eclipse observing solar prominences flaring out past the moon's edge or limb, each one greater than five Earth's in size. A particularly striking prominence seemed to grow considerably during the two minutes they spent observing totality.

Fraser and Cathy Goff, with his daughter and son-in-law (Heather and Paul Connor), camped at the southern end of Boysen State Park, west of Shoshoni, WY. Goff returned with a variety of close-ups and beautiful composite shots of the entire eclipse – both partial phases bracketing totality.

Grief in the Garden

By Marilyn Lisowski

On the Pajarito Plateau, our beautiful area, we love the mountains, our invigorating weather, and the flora and fauna that abound here. We watch out for coyotes and deer on the roads, we decorate with penstemon and columbine, and we adore and feed wild birds. But, however much we enjoy and protect our surroundings, we love vegetable gardens, and in gardens, only the strong survive.

We carefully covered our 20' by 20' plot in the Los Alamos Community Garden with black plastic to eliminate weeds, especially bindweed. Little did we know we would have worse problems. As we learned, almost everything that can ravage your vegetable garden will do it, and do it well.

Deer have roamed our mesas and mountains for millennia. They munch on spring grass, leaves, and juniper. And they dine on our tomato plants. Thinking my tomatoes were safe inside a cage and water wall, my confidence was shattered to find only a stump left deep inside each protective shield.

We love all birds. In turn, the birds love our gardens, especially new shoots of beans, peas, and okra. They snip them off until a row of legumes looks like little

guillotined men. And they devour our carefully sown seeds even before they sprout.

Gophers peer out from their holes, impatient for us to leave so they can begin a munching massacre. They've already chomped at the roots, but the tops present a special delicacy. They can vanquish a tomatillo in a puff of mulch, gobble a newly sprouted pumpkin vine in seconds.

Rabbits abound, and our gardens are the tastiest thing around. Rabbits' rampage of gluttony is equal only to a cloud of locusts. Plants never know what hit them. Plan to harvest carrots? Think again.

Looking around for a friend, I spy the garden cat, midnight black and sleek, slinking between cornstalks, along rows of zucchini, leaping over bush beans.

"Ah!" I murmur, rubbing the cat. "Move into our garden! Bite all intruders!" The cat says nothing.

Regardless, the cat will not bother insects, like the enormous tomato worm I pried off the skeletal remains of one hapless tomato plant. Just a giant green stomach, a tomato worm attacks like a Sherman tank, steam-rolling over succulent leaves, tiny buds.

"Catch!" I toss it to my husband, who thinks it's a vegetable, and grabs it.

"Aaugh!" he says, flicking off the goo.

Grasshoppers dance on the remains of our lettuce, nearly bursting to lay eggs for a bumper crop of baby hoppers. Squash bugs run riot through the zucchini.

Nasturtiums, also edible, distract insects from neighboring crops like these tomatoes. Photo by Marilyn Lisowski.

I pick an orange and black beetle off our biggest Brussels sprout plant. Its teeth are still clamped onto the edge of the gaping hole it created in a leaf, one of many, leaving the plant looking like Swiss cheese. The emerging Brussels sprouts are covered in aphids, happily sucking them dry.

"We'll never try those again," says a garden neighbor, tugging out his ripe, healthy garlic.

Weather features in each growing season. What might be left in the garden after animals and insects have had their way can be pummeled and perforated by hail, ripped by winds.

Marigolds add beauty and protect neighboring vegetables. Photo by Marilyn Lisowski.

Utterly discouraged, I notice that some gardens grow high and full, covered in plump eggplant, peppers, and watermelon. Tomato plants, some as tall and bushy as small trees, push against beet greens and chard. Zucchini balloons over leafy lettuce frames. (But no one grows Brussels sprouts).

"What do those gardeners know, that I don't?" I ask myself. And then, I see. Marigolds and California poppies border some gardens. Nasturtiums flower between rows. Sunflowers reach high, their stalks protecting tomatoes and corn. Onions, garlic, and chives mix with carrots and beans. Dill, basil, and rosemary grow along edges. I notice lettuce inside frames, screen across the top, and white netting on arches protecting tender plants from the worst of wild weather. In one garden, I spy a spray bottle of Deer Out. I pick it up and a powerful aroma of peppermint escapes. Deer hate it, says the label. Another gardener is changing batteries in a cylinder which he the inserts into the ground.

"Gophers can't stand the sound this makes," he says. "Sends them scurrying over to you." He laughs.

Chastened and determined, we lay plans for next year's garden. Our new garden map sports as many insect and rodent deterrents as it does vegetables. Frames and netting will protect my most precious seedlings and lettuce. We eliminate the Brussels sprouts. And best of all, I will hire that cat to live and work as a bouncer for our little plot!

Local tiger salamanders are abundant, but rarely seen. Titus, one of PEEC's exhibit animals, was originally found in a water meter well in Western Area of Los Alamos. Photo by Beth Cortright.

Tiger Salamanders and Mammals: Underground Companions?

By Dr. Ellen A.G. Chernoff and Jennifer Macke

Tiger salamanders are common on the Pajarito Plateau and throughout northern New Mexico. Because they live underground, we rarely see them. The underground parts of our world are one of our "final frontiers"; we know very little about what goes on down there!

Tiger salamanders in captivity are very bold and interactive with humans. This interaction may be based on a learned association of humans with food, but it might also be more instinctive: in nature, tiger salamanders interact with other mammals.

It's well documented that tiger salamanders utilize rodent burrows. One of the best-documented examples is the presence of tiger salamanders in prairie dog towns (Shipley et al., 2006; Kretzer and Cully, 2001). In this setting, tiger salamanders are often among a variety of small vertebrates sharing the prairie dog burrows. The types of mammalian burrows used by tiger salamanders also include those of pocket gophers, ground squirrels, pocket mice, and deer mice (Shipley et al., 2006; Hickman, 1977; Semonsen, 1998; Loredo et al., 1996; Richardson et al., 2000). Tiger salamanders need to den deep in the earth to avoid dry, hot summers and cold winters, so it is not surprising that they occupy burrows.

More interesting are cases in which tiger salamanders have been shown to actually interact with resident mammals. The paper that first brought this phenomenon to our attention was Semonsen, 1998, in which multiple California tiger salamanders were found hibernating with a ground squirrel. They were not only in the same burrow chamber, but some salamanders were found underneath the ground squirrel when a fiber-optic light was used to examine the burrow and the squirrel awoke.

Another type of interaction between a tiger salamander and a small mammal, a pocket gopher, was described by Hickman 1977: "[the pocket gopher was] at the end of a tunnel, apparently to begin excavating, only to find a tiger salamander at rest. The pocket gopher picked the salamander up by the mid-dorsal skin with the incisors, turned, and deposited the animate obstruction 0.6m away from the plug. The pocket gopher then returned to the plug to begin excavating. The salamander did not appear agitated or physically harmed" (Hickman, 1977).

Larger scale experimental studies reported juvenile and adult California tiger salamanders in occupied ground squirrel burrows (Loredo et al., 1996). Of 57 burrows included in the study, 68% were "unambiguously occupied" by both ground squirrels and salamanders.

Tolerant housemates? This photo was taken from a video clip in which a tiger salamander is a bystander to the activities of a very active mouse. The full video can be viewed in the online version of this article at http://peecnature.org/salamanders. Copy permission from Ellen Chernoff.

A great video clip available online shows a tiger salamander in a burrow with a deer mouse in South Dakota. The mouse runs back and forth over and around the salamander, and the salamander does not seem to mind being stepped on! (The video can be viewed on the PEEC website http://peecnature.org/salamanders.)

"...the salamander does not seem to mind being stepped on!"

Tiger salamanders also dig their own burrows in nature, at least for short-term

A California tiger salamander entering a small mammal burrow. The photo was taken as part of a UC Davis research project at Jepson Prairie, California; used with permission, Melissa Newman.

use. The excavation prowess of tiger salamanders has been studied in the lab and can be confirmed by any keeper who has watched these pocket rototillers destroy terrarium landscaping. Even when digging on their own, they are said to dig mainly in disturbed soil (as they have no claws). They most often dig in ground loosened by burrowing mammals, so mammal burrows are very important to tiger salamander habitat. (The video of a tiger salamander digging its own burrow in a mole hill is available on the PEEC website at http://peecnature.org/salamanders.)

Denning with mammals may be an ancient practice for amphibians. In 2013, imaging was performed on an unusual fossil from the early Triassic, about 250 million years ago (Fernandezet al., 2013). It was found in South Africa, which was part of Gondwanaland at that time. A preserved burrow was found to contain a fossilized Temnospondyl amphibian curled up alongside an apparently estivating therapsid mammal forbear. This does make us wonder whether the salamander-mammalian association has ancestral roots.

Early roots of an underground association? An early Triassic fossil of a rodent burrow containing an early amphibian (Broomistega, upper right) and a mammalian ancestor (Thrinaxodon, lower left). Creative commons license, Wikimedia Commons.

Do the tiger salamanders here on the Pajarito Plateau live together in harmony with our local gophers, ground squirrels, and mice? Based on other examples, it seems very likely. Our dry terrain forces many animals to seek moist habitats underground, and rodent tunnels afford shelter to a wide variety of other species, including our common-but-rarely-seen tiger salamanders. We can only speculate on how the salamanders might interact with other burrow residents.

References

•Fernandez V, Abdala F, Carlson KJ, Cook DC, Rubidge BS, Yates A, et al. (2013) Synchrotron reveals early Triassic odd couple: injured amphibian and aestivating Therapsid share burrow. PLoS ONE 8(6): e64978

•Hickman GC (1977) Burrow system structure of Pappogeomys castanops (Geomyidae) in Lubbock County, Texas. Amer Midland Naturalist 97:50-58

•Kretzer JE, Cully Jr JF (2001) Effects of black-tailed prairie dogs on reptiles and amphibians in Kansas shortgrass prairie. Southwestern Naturalist 46:171-177

•Loredo I, Van Vuren D, Morrison ML (1996) Habitat use and migration behavior of the California tiger salamander. J Herpetology 30:282-285

•Richardson JS, Klenner W, Shatford J (2000) The tiger salamander in British Columbia: an amphibian in an endangered desert environment. In “Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk”, Kamloops, British Columbia, edited by LM Darling

•Semonsen, VJ (1998) Ambystoma californiense (California tiger salamander) survey technique. Herpetol. Rev 29:96

•Shipley BK, Reading RP (2006) A comparison of herpetofauna and small mammal diversity on black-tailed prairie dog (Cynomys ludovicianus) colonies and non-colonized grasslands in Colorado. J Arid Environ 66:27– 41

Look What You Did!

By Katherine Bruell

As always, October is the time we set aside to say thanks to you, our members, for all you do to help our community enjoy the outdoors. So much is possible with your support! Here are some stories that reflect all that you have helped us to accomplish this year:

You got retired people active. A Passport to the Pajarito Plateau hiker told us, "Ever since I've retired, I've just stayed put. This is just the BEST program, because it got me outside walking again. I'm so proud of myself for finishing! This is going to keep me healthy." Our Gentle Walkers love hiking with others who walk at their speed and focus on discovery, so they can safely explore our beautiful trails.

Joyce Nickols and Christine Cloyd obtain another passport rubbing on a Gentle Walk. Photo by Terry Beery.

You helped our youngest community members become nature lovers. A mom told us, "I just want to say how much I appreciate PEEC for all the fun things they do for kiddos! Every Monday we go to Nature Playtimes and there are always multiple fun crafts, activities, and stories. They supply everything and the volunteers/ employees are wonderful. We are very lucky to have them in town!"

Millie Smalley excitedly poses for a photo before giving the photographer a tour of her fort during Nature Playtimes. Photo by Sandra West.

You gave bigger kids (5-8 year olds) a chance to explore and build on these connections. Here is a summary of one day's activities by our Forest Explorers. "Gianna created a Forest Explorer flag that kids passed around as we hiked and Alex stuck it into the ground to claim our base camp. There was lots of exploring and fairy house building, and there was even a campfire built for those who wanted to roast marshmallows (for pretend, of course). Deaglan found

Forest Explorers frolic among the roots and branches of our resilient trees. Photo by Jessie Dixon.

a really big borer beetle in the water that we decided to pose on top of our lichen so kids could illustrate either the beetle or the lichen or both in their journals."

You gave teens a chance to experience a once-in-a-lifetime event: a total solar eclipse. One teen who joined the group in Wyoming said, "My heart rate went up 12 beats per minute during totality because of how excited I was!"

You show young adults a fun time at our Suds & Shows movie events. Some have even come in costume.

Every day, you're helping people to get outside, to explore, to be active, and to experience the peace and calm that comes from being in nature. From one nature lover to another, thank you!

Beth Short, Isabel Crooker, and Maya Rogers (left to right) eagerly await totality. Maya's eye patch allows her right eye to acclimate to the dark, so she can see more stars during the brief time of totality. Photo by Siobhan Niklasson.

Our Mission: Enriching people's lives by strengthening their connections to our canyons, mesas, mountains, and skies.

PEEC Board of Directors

Bob Walker, President
Daniel Poretti, Vice President
Rick Wallace, Secretary
Nancy Arendt, Treasurer
Michele Altherr, Jeremy Campbell, Craig Martin, Rebecca Oertel, Karla Sartor, Ann Shafer, and Hari Viswanathan

PEEC Staff

Katherine Bruell, Executive Director
Jonathan Creel, Director of Interpretation
Siobhan Niklasson, Education Programs Director
Beth Cortright, Adventure Programs Manager
Sandra West, Marketing Manager
Christa Tyson, Visitor Services Manager
Denise Matthews, Educator
Kate Barrere, Gift Shop Manager

Inspiring the Next Generation:

"This is the coolest thing I've ever seen in my life! It's even better than the transit of Venus!"

—LAHS eclipse team student

Nature Center Hours:

Monday 10-4
Tuesday 10-8
Wednesday 10-4
Closed Thursday
Friday 10-4
Saturday 10-4
Sunday 1-4

Visit us online, too!

www.peecnature.org
facebook.com/peecnature
instagram.com/peecnature
flickr.com/photos/peec_nature
Download the free Los Alamos Trails App from the iTunes store or Google Play
Review us on Trip Advisor

PEEC
Pajarito Environmental Education Center

PEEC at the Los Alamos Nature Center
2600 Canyon Road
Los Alamos, New Mexico 87544
505.662.0460
www.peecnature.org

PRESORTED
STANDARD
U.S. POSTAGE PAID
LOS ALAMOS, NM
PERMIT NO. 152

This fox finds the Wildlife Observation Area a fun place to search for food, play in the pond, and hide behind the flowering bubble gum plant.
Photo by Beth Cortright.

INSIDE

FEATURED EVENTS

Valles Caldera Star Party **OCT. 14**
PEEC-nic **OCT. 15**
Fraser Goff Geology Tour **OCT. 21**
Leonora Curtin Wetland Tour **OCT. 22**
Acid Canyon Clean-up Day **OCT. 28**
Gilman Tunnels Bike Ride **OCT. 29**
Lesser Praire Chicken Talk **NOV. 7**