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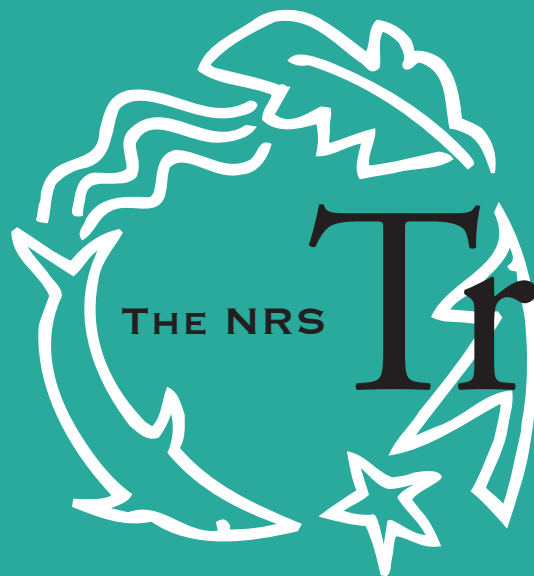
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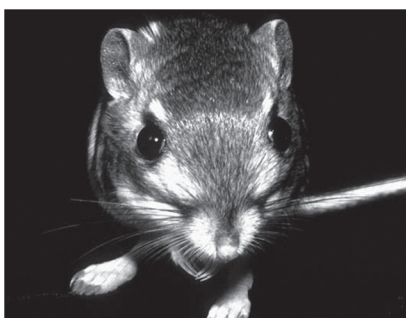
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A FEW WORDS FROM THE DIRECTOR OF THE NRS

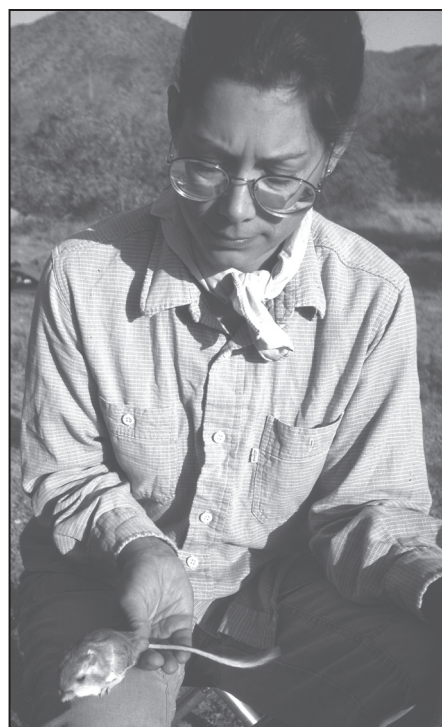
Three divergent subjects — rodents, art, and NRS retirements — converge in this issue of *Transect*. Here you will learn about hard-working kangaroo rats and unexpectedly entrepreneurial pocket mice, as well as the newly discovered songlike calls of deermice, which communicate through high notes beyond the hearing of most humans.

You will also learn of the amazing sensitivity to the natural world demonstrated by children, whose artistic abilities are showcased in the *Los Angeles Times* through “Drawing from Nature,” a monthly feature written by Carol Felixson, Director of Education and Community Outreach for the

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THE LAST TIME THIS ENDANGERED STEPHENS’ KANGAROO RAT (ABOVE) APPEARED ON THE COVER OF **TRANSECT** (11:2, FALL 1993), THE NRS’S MOTTE RIMROCK RESERVE HAD JUST BEEN DESIGNATED AN OFFICIAL K-RAT STUDY AREA, LARGELY ON THE STRENGTH OF FIELD RESEARCH BY UC RIVERSIDE PROFESSOR MARY PRICE (RIGHT, WITH MERRIAM’S K-RAT). PRICE RECENTLY RETIRED FROM UC’S FACULTY, BUT HER FIELD RESEARCH CONTINUES. PHOTO OF STEPHENS’ K-RAT BY MARK CHAPPELL



OF MICE AND (WO)MEN — RETIREMENT JUST MEANS MORE TIME FOR RESEARCH

As an up-and-coming UC Riverside professor in the early 1980s, Mary Price often served as “poster girl” for the Natural Reserve System. Her colleague, NRS founder Bill Mayhew, regularly took her out to meet landowners who were considering donating property to the reserve system. “When Charlie Motte was thinking of donating the land for the Motte Reserve,” Price modestly recalls, “Bill hauled me over there to convince him that there were energetic young faculty who would do wonderful things, and find out all sorts of terrific information, with his property. In reality, it was Bill’s passion and total dedication that were most convincing, but I was happy to help.”

Today Price is winding up her career at UC Riverside (UCR), having fulfilled Mayhew’s promise by working regularly at both the Motte Rimrock Reserve

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in Riverside County and the Sweeney Granite Mountains Desert Research Center in San Bernardino County. Her fieldwork at these sites, as well as others, has produced significant contributions to our understanding of community ecology and the coexistence of species.

Price's relationship with the Granite Mountains is particularly strong and began in the days when various sections of the reserve were still being assembled. It was January 1983 when Price and some colleagues took a memorable research trip to the area. Kevin Heinz, one of her graduate students, was studying the elevation distribution of two species of kangaroo rats, the Merriam's k-rat (*Dipodomys merriami*) and the Panamint k-rat (*Dipodomys panamintinus*). Heinz had set up transects throughout the Mojave, where both species occur. One of his study sites was in the Granites, so Mary and her husband, fellow UCR biology professor Nickolas Waser, offered to tag along to help him collect data. "The Granite Mountains site is a beautiful transect," Price explains. "You have a steady 3,000- to 4,000-foot gradient, along an uplifted piedmont with only minor changes in the soil substrate, so the vegetation changes gradually with the elevation."

Because the days were short and cold, the fieldwork was extremely hectic. The trio had to set and clear their traps, take soil samples, and conduct vegetation transects at five different elevations in as short a time as possible. The wind was howling. "We were running like

crazy the whole day just to get everything processed before dark," Price recalls.

When they were finally done, the exhausted researchers began looking for a campsite. At their first site, the wind was blowing so hard they couldn't keep the stove lit. Noticing some large rocks in the distance, they decided to seek a more sheltered spot. They repacked their gear and headed out along a dirt road in the general direction of the rocks. The road led them to the hoped-for sheltered spot, but with an additional surprise: an abandoned house.

"We were entranced," says Price. "Not only did we have shelter from the wind, but also it was a beautiful site. Our first thought was, 'Can we buy this place?'" Out of the reach of wind and weather,

at last, the three chatted over a hot dinner about how great it would be to have a field station in the East Mojave.

When Price returned to campus the next week, she mentioned their discovery to Mayhew and was surprised to learn that he knew about the place. He'd taken classes there many times, and in fact the Natural Reserve System was negotiating to buy the property as part of a much larger reserve they were putting together. Purchase of the land was completed in 1985; today the now-restored house is part of the reserve's Norris Camp. Price's dream of having a base of operations with electricity, running water, data connections, and all the other amenities required for long-term fieldwork is a reality.

The Company One Keeps

For Price, field stations are important not only for the facilities they provide, but also for the people they attract. When researchers spend extended time in a single area, they begin to notice the subtle factors that are crucial in understanding how a natural system functions. Price calls this developing one's "natural history intuition." This process is accelerated at a field station because one is surrounded by other trained researchers who are also observing the system closely, though perhaps from different perspectives. Price has found that a colleague's casual observation can sometimes cast her own research focus in a new light.

"Field stations allow information about a place to accumulate," Price adds, "so researchers can build on a base of knowledge and don't have to start from square one. In a sense, knowledge begets knowledge."



BACK IN 1975, MARY PRICE WAS ALREADY A SCIENTIST SERIOUSLY INTERESTED IN KANGAROO RATS. PHOTO COURTESY OF MARY PRICE

Soon after the University had established the Granite Mountains Reserve — now designated the Sweeney Granite Mountains Desert Research Center — Price and Waser began spending as much time as possible there. “Nick and I were trying to do behavioral observations,” Price explains. “So during vacations or sabbaticals, we’d head out there to do the fieldwork. We colonized the little rock house that Philippe and Cindy [Philippe Cohen and Cindy Stead, who managed the reserve from 1986 to 1993] had used as a storage shed. We more or less mouse-proofed the place so people could stay.”

Over the years, Price’s long stays at the research station have given her deeper understanding of the natural systems of that reserve, as well as some surprising, new insights into the lifestyles of the animals that make this desert their home.

Competition versus Coexistence

Much of Price’s research focuses on the heteromyidae, a family of small to medium-sized rodents that includes such diverse species as kangaroo rats and pocket mice. Price had become interested in the coexistence of multiple species of heteromyids while doing her graduate work at the University of Arizona. Because all such species share the same food source — seeds — logic would seem to dictate that one species, or perhaps one body type, should prove superior and out-compete the other species. Instead, diverse heteromyids coexist. When researchers put traps out in the desert, they often capture four or five different heteromyids, as well as an assortment of other small rodents and ground squirrels.



THIS GAWKY, 28-DAY-OLD JUVENILE KANGAROO RAT IS JUST LEARNING HOW TO HARVEST SEEDS. (THE HIND FEET GROW FIRST!) IT BELONGS TO ONE OF THE LARGEST-BODIED K-RAT SPECIES, **DIPODOMYS DESERTI**, WHICH HAS A MUCH WIDER RANGE THAN THAT OF THE ENDANGERED STEPHENS’ K-RAT (**D. STEPHENSI**). PHOTO COURTESY OF MARY PRICE

To uncover the secrets of this coexistence, Price decided to study two very different heteromyids: the medium-sized, bipedal kangaroo rats and the tiny, quadrupedal pocket mice. Her hypothesis was that coexistence between the two species was based on “resource partitioning,” a strategy employed by many other animals. Resource partitioning is the behavior of coexisting species using different parts of a single, shared resource. It leads to coexistence



HOW TO HOLD YOUR K-RAT. THIS SPECIMEN HAD STUFFED ITS CHEEK POUCHES WITH SEEDBAIT FROM THE TRAP IN WHICH IT WAS CAUGHT. UPON RELEASE, IT RUSHED TO CACHE THE HARVEST. PHOTO (AND HAND) COURTESY OF MARY PRICE

if each participating species is specially adapted to use a specific microhabitat for locating food and avoiding predators. In this case, Price reasoned, the larger, quicker kangaroo rats might be better at avoiding predators in the open space, while the pocket mice might be more efficient at finding seeds in the richer, coarser soils found underneath shrubs.

For resource partitioning to lead to coexistence, however, each species must be better than the others at using some *part* of the partitioned resource. This difference in performance, called a “trade-off,” is what prevents one species from usurping all of the available resources.

To determine the trade-offs between kangaroo rats and pocket mice, Price brought her subjects into her lab and exposed them to different feeding and predator-avoidance conditions. But she couldn’t find any trade-offs. When she tested their abilities to avoid predators in open spaces versus under shrubs, all species were found to be much safer under shrubs. When she tested their abilities to harvest seeds in different types of soils, the kangaroo rats were always faster at harvesting seeds. So why didn’t the larger, behaviorally dominant kangaroo rats simply drive out the pocket mice? Why did they live mostly in the riskiest open spaces?

Price agonized over this problem, racking her brain to consider every factor. She studied soil samples with the idea that each species might prefer certain soil textures with different amounts of organic materials. She took soil seed samples, thinking that maybe the secret was in the clumping of seeds,

Price agonized over this problem, racking her brain to consider every factor. She studied soil samples with the idea that each species might prefer certain soil textures with different amounts of organic materials. She took soil seed samples, thinking that maybe the secret was in the clumping of seeds,

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or their numbers, or their size, or their spatial distribution. But nothing seemed to reveal the required trade-offs.

Price's aha! moment came while she was reviewing her data. As part of her field experiments, she had decided, for the first time, to calibrate her measurement of the "seed bank" (seeds in the soil) by recording "seed rain" (seeds falling on the surface). What she found amazed her. Even during "seed pulses," when the plants were producing and dropping many more seeds than the animals could eat, very few of the falling seeds were finding their way into the seed bank.

Price began taking a closer look at seed rain. In an article co-written by Price and UCR undergraduate Jamie Joyner and published in *Ecology* in 1987, the investigators summarized the results of a 19-month study conducted in the Granite Cove section of the Sweeney Granite Mountains Reserve. In that paper, they conclusively established that input from the seed rain did *not* accumulate in the soil. Even though the seed rain averaged 262 seeds per square meter each day during the study period, the seed bank actually declined by a daily average of 114 seeds per square meter.

So what was happening to all those seeds? As Price recalls: "I suddenly realized that all of that seed was being sequestered, snatched up by granivores and stored. We were all wrong about the resources these animals were using. They were not using the seed bank; they were using the seed rain. Changing that perspective opened up a lot of possibilities we hadn't thought about before. It was an accidental ob-

servation, but now that we understood that seed production in a given year limits the population, we knew this explained the major population fluxes we'd seen between wet, seed-intensive years and dry, seed-scarce years."

Following this breakthrough, Price looked at the desert ecology differently. She now began to observe who was gathering the newly fallen seeds and tried to determine what they were doing with them. Even when she put out trays filled with seeds, no matter how rich, all of the seeds disappeared overnight. The animals were removing many more seeds than they could eat.

This discovery led her to uncover a time-honored, universal mechanism for coexistence — theft. As she noted in a recent presentation: "Suddenly we realized there are two phases to the competition: a scramble to harvest newly produced seeds, followed by a much longer period during which the animals use previously cached seeds. While the kangaroo rats are more efficient in the first phase, collecting and caching seeds, the pocket mice are experts at locating and stealing the seeds once they're cached by the larger animals."

The Future

Price retired from the University in order to spend more time publishing papers based on the mountains of data she has accumulated over the years. "It's a much better use of time," she says with a laugh, "than sitting in meetings." Though she will no longer be at the University, she won't stop conducting field research. In fact, she seems to be widening her horizons for future work. A recent trip to Australia's "Red Center" amazed her because the deserts were so

different than what she had become accustomed to in the United States. And not long ago, she completed an intensive Spanish-language course in preparation for doing more fieldwork in Mexico.

She's also working on a book proposal that focuses on the role of "place-based" research in developing a general understanding of larger ecological processes. "It's interesting that ecologists haven't really started to talk about how they gain understanding and how they know it's useful or accurate," she explains. "Ecologists tend to do focused work on one system for many years. So, how can you make much progress, given that there are billions of places out there and relatively few ecologists? How do you gain a general understanding that's useful beyond that one tiny place on earth where you happened to study? There's a paradox there, so we're asking ecologists to talk about it."

Despite these larger philosophical thoughts, Price has no regrets about spending much of her career conducting place-based research. "I do this because I like it," she muses. "There's something I find very personally satisfying about thinking about how nature is put together, and trying to figure out a strategy that will force nature to tell me something. That I find fascinating. My career choice has given me the freedom to do things I like to do." — JB

Editor's note: Mary V. Price is Professor Emerita of Biology at University of California, Riverside, an adjunct professor in the School of Natural Resources at the University of Arizona, Tucson, and affiliated with the Rocky Mountain Biological Laboratory, Crested Butte, CO. She can be contacted by email at: <mary.price@ucr.edu>.

More about mice

In late December 2004, Mark Stromberg, director of the Hastings Natural History Reservation in Monterey County, contacted the NRS Systemwide Office with exciting news. It had just been discovered at the reserve that adult deermice communicate with ultrasonic sounds.



PROMISCUOUS SONGSTER,
PEROMYSCUS BOYLII. PHOTO BY
MATINA KALCOUNIS-RÜPPELL

Stromberg and the entire reserve staff were riding the euphoria that accompanies a new discovery. The researchers responsible — Matina Kalcounis-Rüppell from the University of North Carolina at Greensboro, and Maarten Vonnhof of Western Michigan University — had placed bat detectors on the ground in an established reserve plot, then astounded everyone by playing back the initial recordings from their first two nights of work. Stromberg described the event: “We heard the most amazing, strong, loud songs in ultrasound. Nothing like this has ever been heard before in our forests. As [resident researcher] Walt Koenig joked, it was as if we had groups of howler monkeys around and never knew.”

Kalcounis-Rüppell discovered early in her career that she is able to hear the lower frequencies of ultrasound. “Probably many people can,” she observes, “they just don’t know it.” She goes on to describe the ability: “Hoary bats echolocate at about 25 kilohertz. Humans, on average, can hear up to 16 kilohertz, but some people can hear up to 20. I could be listening to the lower frequency bats on the bat detector [which renders high-frequency sound audible to humans], then turn it off and still hear the echolocation signals.”

Kalcounis-Rüppell had conducted much of her graduate and postdoctoral work at Hastings, studying differences between populations of monogamous mice (*Peromyscus californicus*) and promiscuous mice (*Peromyscus boylii*) that share the same habitat of narrow riparian oak woodlands along the reserve’s creeks. While working with the mice, she often suspected she was hearing ultrasonic sounds. But she was never sure.

She tried to test her suspicion in the North Carolina woods. She and Vonnhof set out a small array of bat detectors, but couldn’t hear mouse vocalizations because the insects were making so much ultrasonic noise.

So they decided to return to Hastings. Kalcounis-Rüppell knew the mouse populations there intimately, and the woodlands are much quieter than those on the East Coast because there are fewer insects. The reserve’s riparian areas are also mostly located at the bottom

of steep canyons, so there is much less wind, another source of interference at ultrasonic frequencies.

For the trip, the two researchers begged and borrowed more than 20 bat detectors from colleagues across the country — no small contribution, as each detector costs about \$1,500. They spent their first few evenings capturing and tagging local mice in the same 10 x 10-meter grids Kalcounis-Rüppell had used for her graduate work. Together, Kalcounis-Rüppell, her graduate student Jackie Metheny, and Vonnhof set up 300 traps, updated data on last year’s mice, and ear-tagged this year’s resident mice.

After confirming the location of the mice, the researchers acoustically wired a 30 x 40-meter portion of the grids with 22 bat detectors. As Kalcounis-Rüppell recounts: “Right away, we started recording all of these interesting sounds that the mice were producing. They’re all in the ultrasonic range, but we’re not sure what the function of the calls is. So we’ve shown that they’re producing ultrasonic calls, that there are several different call-types, and that both species (*P. californicus* and *P. boylii*) are making the calls. That’s important because there are four main hypotheses for why they’re making these sounds: mating, defending territories, communicating within families, and as an alarm.”

Kalcounis-Rüppell’s long history of work at Hastings and familiarity with its mouse populations will be important in the next phase of their work. She says: “It’s good to have these two species, because one is territorial and the other isn’t. So if there’s a territorial function, we can use those differences to test our hypotheses. If the sounds are for maintaining a bond with a mate, you would expect to hear more from the monogamous species than the promiscuous one. It’s a really good model for asking those questions.”

—JB

YOUNG READERS EXPLORE THE ART OF NATURE

Carol Felixson, who directs Education and Community Outreach for the NRS's Stunt Ranch Santa Monica Mountains Reserve and UCLA's Mildred E. Mathias Botanical Garden, is always seeking ways to promote the extensive K-12 education programs at both sites. So she decided to write a children's art and science column for her local paper.

Nothing too unusual about that strategy — until you consider that Felixson's "local paper" is the *Los Angeles Times*, which reaches three million people every day of the week.

Felixson's column, "Drawing from Nature," runs the first Sunday of each month as lead article on the "Kids' Reading Room" page. In each issue, Felixson tells a natural history story related to an animal or a plant found at the Stunt Ranch Reserve or in the Mathias Botanical Garden, while also providing instructions for an art project. The articles are illustrated with art created by children and accompanied by photos of the young artists.

The range of natural history subjects and art projects is broad: a great horned owl collaged in feathers, sugar

cookies shaped like desert cottontails, origami hummingbirds, pointillist raccoons, and face masks designed to transform the wearer into a coyote. Each project is accompanied by instructions geared to young readers, so they can try it themselves.

When Felixson began studying "Kids' Reading Room" to see what sort of articles they printed, the first thing she noticed was a weekday feature called "The California Classroom, A Learning Link to..." The pieces were usually written by staff from local museums, science centers, and botanical gardens,

How art and nature are brought together

Though Carol Felixson's "Drawing from Nature" articles appear simple and straightforward, each involves a tremendous amount of work.

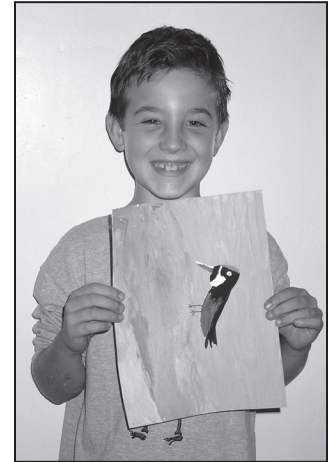
Once she selects a topic and an art technique, Felixson builds a research folder for both herself and the artist. Her research includes interesting facts and images about the subject, as well as concepts she thinks will capture the attention of young readers. "I usually accumulate about ten pages of research on a subject," she explains, "but I only have 150 words for the natural history story, so I have to pull the readers in quickly. Sometimes it's something really weird, like the stink-bug putting its head down, sticking its butt in the air, and putting out a foul odor. Kids really liked that."

With the story underway, Felixson sends her research to the artist, usually via the parents, in an email, along with suggestions of different Web sites where they can see additional images and learn more about the subject. She provides directions that take them step-by-step through the art technique, explaining what materials they'll need, what they have to do, and what she's looking for. She is also careful to let the parents know that, while they should supervise their children's efforts in a project, this isn't something for *them* to take over and do themselves.

Felixson is constantly searching for new artists. "Initially, I simply went to people I knew who had children," she recalls. "Now, people often contact me, and I've also gotten to know a number of art teachers who work with kids who are really fine artists." Her efforts go beyond trying to find kids who can do art. She also strives to balance the artists' genders, ethnicities, and neighborhoods. She has especially enjoyed the times when two siblings work cooperatively on a project.

For Felixson, the most gratifying moment comes when she finally meets the child and sees the project for the first time. "It's amazing," she says. "No matter what I might imagine when I come up with the idea, the children always, without exception, surpass my wildest imagination. Sometimes they add things I hadn't thought of, or they do the work with a creative flair in their choice of colors or how they use the materials. They've been particularly good at giving the animals personalities."

At that first face-to-face meeting, Felixson takes photographs of the artist with his or her finished project and at work on a similar project. She also borrows the art in order to create a digital scan that meets the paper's production requirements. — JB



CAROL FELIXSON REGARDS
AS CO-CREATORS THE
CHILDREN WHO PRODUCE

THE ART THAT ACCOMPANIES HER REGULAR COLUMN, "DRAWING FROM NATURE": "THE COLUMN WOULDN'T BE WHAT IT IS WITHOUT THEM." SHE ALSO HOPES HER WORK ENCOURAGES TEACHERS TO LOOK AT SCIENCE IN NEW WAYS: "FOR SCIENCE TEACHERS, GETTING AT A SCIENCE SUBJECT THROUGH AN ART PROJECT IS A WAY TO REACH KIDS WHO ARE JUST NOT INTERESTED IN THE ACADEMIC APPROACH, BUT WHO LOVE THE ART. SO, AS THEY DO THE ART PROJECT, THEY'RE LEARNING ABOUT THE ANIMAL AND ITS NATURAL HISTORY." SOME OF FELIXSON'S YOUNG CONTRIBUTORS AND THEIR ART ARE SHOWN ABOVE (LEFT TO RIGHT): JULIA SCHWARTZ, AGE 12, WITH HER PASTEL RENDERING OF POISON OAK; DANIELLE SORK, AGE 8, AND HER COYOTE MASK; ROMIE DRORI, AGE 5, AND HER COLLAGE DEPICTING AN ALLIGATOR LIZARD ON FOREST LITTER; JACKSON CRITES, AGE 6, AND HIS PAINTING OF AN ACORN WOODPECKER. PHOTOS BY CAROL FELIXSON

and focused on a current exhibit or topic of special interest. Each usually included a photograph from the institution or a professional illustration.

Felixson decided she, too, would write a "learning link." Rather than submit the usual institutional photo or professional illustration, however, she would have a child illustrate her story. The first article she submitted focused on the banana plants in the Mathias Botanical Garden and was illustrated by a friend's daughter, Davita Paul, who was then 10 years old.

"I called the piece 'Hands with Yellow Fingers,'" Felixson says. "And Davita's art added so much. I'd asked her to do any kind of illustration of a banana tree, but she went way beyond what I had imagined — she put herself in there and a little monkey, too."

Mary Ellen Walker, editor of "Kids' Reading Room" at the *L.A. Times*, works with dozens of freelance children's

authors and educators for her column, and she was impressed by the unusual submission. She ran that first article in April 2001 and encouraged Felixson to write more. In the months that followed, Felixson became an intermittent columnist for the section, writing pieces as she found time and asking friends if their children would like to provide illustrations. "I didn't give the kids any direction about what art technique they should use," Felixson recalls. "I just said, 'Here's a subject — go for it.'"

Walker saw major potential in Felixson's early submissions. She said, "This [approach] was so unique and the illustrations were so endearing, I invited her to come down to the *Times* for lunch, and I asked her if she'd ever thought about writing stories that *teach* kids how to do scientific drawing."

Though the idea was new to Felixson, she'd always liked having children go out into nature to draw what they observed. Talking together, Walker and

Felixson came up with the concept of a monthly column that would include both a nature lesson and an art lesson — all conveyed in less than 300 words! Thus was born "Drawing from Nature."

Beginning in July 2003, the column became a regular in the Sunday "Kids' Reading Room." Walker chose the Sunday edition so that the feature could run in color and present the children's beautiful illustrations to best advantage. "We usually feature fiction on Sunday," she adds, "so Carol's nature lesson is a great once-a-month change." — *JB*

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MUSEUM SCIENTIST FINDS ARTISTIC MEDIUM IN MARINE ALGAE

Every year in late summer and early fall, ocean currents and waves dislodge marine algae from undersea rocks and sweep them ashore. Peter Connors, long-time manager of the Bodega Marine Reserve in Sonoma County, observed this phenomenon for years and became intrigued by the different types of drift algae he found on the beach.

A self-described “museum sort of person,” Connors set out to collect and identify as many algal species as possible. He discovered this was a daunting task — the Bodega coast alone is home to over 220 different types. To help himself learn all the names, he created flash cards, each with a dried alga sample on the front and its species name on the back.

Connors soon built up a binder full of flash cards. And as his understanding of algae increased, he became intrigued by their beauty. “They’re spectacular in the water,” he observes, “moving back and forth with the currents and reflecting light. But after they wash up on the beach, within days they turn into dry, crusty little pieces of nothing. So the challenge is to get them on a piece of paper so people will appreciate their beauty.”

Over the last three or four years, Connors has become very adept at capturing the algae’s natural grace. He has compiled an impressive collection of prints; he donates or sells his work to raise money for the Organization of Biological Field Stations, local community groups, and the Bodega Marine Laboratory’s Eva Mulder Memorial Student Support Fund.

Connors keeps framed examples of some of his favorite specimens. “I enjoy showing people groups of images,” he notes, “because it really gives them a sense of the huge variety of species in this area.” — *JB*

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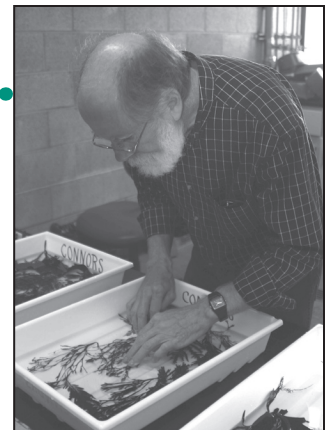
Editor’s Note: Peter Connors will retire from his position as manager of the Bodega Marine Reserve in June 2005.

HERE’S A LOOK AT THE CONNORS PROCESS:

STAGE 1: PETER CONNORS HAS LEARNED THAT THE BEST SPECIMENS OF ALGAE MUST BE COLLECTED AS SOON AS POSSIBLE AFTER THEY WASH ASHORE — OTHERWISE, THEY DETERIORATE. THE BEST COLLECTING SEASONS ARE LATE SUMMER AND EARLY FALL. PHOTO BY RICO TINSMAN



STAGE 2: IN THE LABORATORY, THE SPECIMENS ARE FLOATED IN A TRAY OF SEAWATER TO RINSE OFF SAND PARTICLES AND SMALL ANIMALS.



STAGE 3: ONLY THE BEST SPECIMENS ARE SELECTED FOR PRESSING. LACY SPECIES, SUCH AS THOSE SHOWN AT RIGHT, ARE ARRANGED WHILE FLOATING IN WATER. SPECIES WITH BROAD BLADES, SUCH AS THE ONE SHOWN BELOW, ARE LAID OUT DIRECTLY ON PAPER.



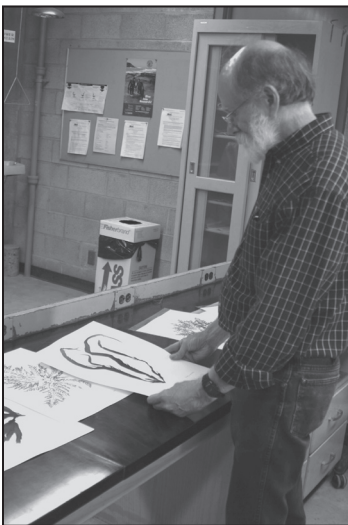


CONNORS REMOVES A DAMAGED PORTION OF AN ALGA. BECAUSE THE PIECE WILL NOT BE USED FOR SCIENTIFIC IDENTIFICATION, HE FEELS FREE TO TRIM OFF DAMAGED AREAS AND DUPLICATE BRANCHES.



STAGE 4: ONCE CONNORS HAS AN ARRANGEMENT HE LIKES, HE CAREFULLY SLIDES A SHEET OF MOUNTING PAPER INTO THE TRAY AND UNDER THE SPECIMEN — THEN PULLS IT FROM THE WATER.

STAGE 5: CONNORS PRESSES EACH SPECIMEN UNTIL COMPLETELY DRY. DURING PRESSING, THE ALGA IS PROTECTED BY A CLOTH SHEET AND SANDWICHED BETWEEN LAYERS OF PAPER FELT AND CORRUGATED CARDBOARD, WHICH ALLOWS AIR TO CIRCULATE AROUND IT. SPECIMENS ARE STACKED ON EDGE IN A DRYING CHAMBER WARMED BY LIGHT BULBS.



STAGE 6: CONNORS EXAMINES THE FINISHED PRINTS. COMPLETED WORKS ARE LABELED AND SIGNED. ONLY ONE IN 12 SPECIMENS MAKES IT TO THIS FINAL STAGE.



FINISHED ARTWORKS: FRAMED SPECIMENS GRACE THE CONFERENCE ROOM AT THE BODEGA MARINE LABORATORY. PHOTOS BY JERRY BOOTH

Editor's Note: Peter Connors's first one-man show is being planned for public exhibition later this summer at the University of California's Lawrence Hall of Science in Berkeley, CA. For calendar info on his algae-as-art, visit: <<http://www.lhs.berkeley.edu/>>.

RETIRED LONG-TIME RESERVE DIRECTOR IS STILL FOR THE BIRDS

Back in 1986, when Barbara Carlson became director of the Motte Rimrock Reserve, she especially enjoyed the peaceful spring evenings at the Riverside County reserve. From a high point at Motte, she could look out over the sparsely populated Perris Valley and watch hawks migrating overhead. Nowadays the hawks still migrate over Perris in the spring, but the valley floor is inundated with houses and shopping malls, and the roar of traffic from the nearby freeway makes contemplation difficult.

Carlson, who also managed the NRS's Emerson Oaks and Box Springs reserves, retired in December 2004. During her career, she saw a lot of changes in the area, especially at Motte Reserve. Hired by NRS pioneer Bill Mayhew because he "liked her qualities," Carlson recalls her first job was to "drop by campus, pick up several rolls of barbed wire and fencing tools, and fix the fences." She adds, with her customary dry wit, "That's about all the facilities we had back then."

By the time she became the reserve's director, Carlson was already familiar with the landscape. As a student, she had worked with Mayhew to establish a research grid at the reserve, so people could always identify where they were working. She had also carried out a number of studies on the area during her undergraduate and graduate years. Her master's thesis focused on breeding birds in burned and unburned portions of the reserve.

Trespassing was a problem on the reserve in the early days, and Mayhew had encouraged his students to kick out any strangers they encountered. One day as Carlson was working on her research plot, she noticed a man with his dog strolling along one of the dirt roads. Carlson confronted him, but as she approached, the man beat her to the punch. "Who are you?" he demanded. "And what are you doing here?" Surprised, Carlson told him she was a UC Riverside student doing research. The man seemed satisfied, but Carlson wasn't. "And who are *you*?" she countered. His response settled the issue: "I'm Charlie Motte."

This inauspicious first encounter was the beginning of a long, productive relationship between the reserve's donor and its future director. "Charlie used to walk the reserve every morning," Carlson recalls, "and we'd stop and talk. He was very interested in what was happening on the reserve and helped us out a tremendous amount. Both Charlie and his wife, Oattie, have been incredibly generous. It's been great working with both of them."

Motte's help included providing the reserve's first facilities. When Carlson mentioned she needed a small building to store equipment and serve as an office, the Mottes donated a house on the reserve where their secretary had been living. Carlson scraped together \$1,650 to renovate and furnish the place. "I'm probably known around campus as a real scrounger," she admits, "because I'm always asking people to keep us in mind when they have equipment or furniture they're going to get rid of. When they were replacing lab desks on campus, I was able to get quite a few of them for our lab. And both the collections trailer [from the National Parks Service] and the researcher's trailer [from the Hazardous Waste group on campus] were given to us for the cost of hauling."

Carlson's diligent work to expand the facilities at Motte helped assure a steady flow of researchers and classes. The reserve also hosted a number of NRS systemwide events, including the 2002 Mathias Symposium, which featured graduate students from throughout the UC system, and the 2003 NRS Management Workshop, attended by over forty people.

As for the future, Carlson notes that the new director will have to focus a lot of attention on the Emerson Oaks Reserve. "The facilities at Emerson Oaks were really coming along," she explains. "Mrs. Emerson had done many things to help us, and we had restored the cabin so we could have a staff person living on-site. But then the Eagle fire last spring



BARBARA CARLSON (FAR RIGHT) AT THE MOTTE RIMROCK RESERVE, WITH (FROM FAR LEFT TO RIGHT) RESERVE STEWARD JOSEPH MESSIN, FACULTY MANAGER JOHN ROTENBERRY, AND SYSTEMWIDE ASSOCIATE DIRECTOR CHEN YIN NOAH. PHOTO BY ALEX GLAZER

destroyed the cabin, and the heavy rains this winter completely filled the pond and home site with silt. The roads are almost impassable. It's going to take some really hard work to restore it."

Carlson will be sorely missed at the Motte Rimrock, Emerson Oaks, and Box Springs reserves. John Rotenberry, faculty manager of these sites and campus NRS director at UCR, praised her, saying: "As the only director the Motte and Emerson reserves have ever known, she has had an indelible influence in shaping their configuration.... Everything about the Motte [Reserve] bears her stamp — and will into the foreseeable future. She has been a superb guide to its past development and is the principal architect of its current trajectory. All of this, I might add, under the increasing pressure of surrounding suburban development. Because of its location, the Motte has always been a bit under siege, and I don't think Bill Mayhew could have picked a better person to protect it.... She's looked out for the reserve's interests, sometimes fiercely so, but always with respect for our surrounding neighbors as well."

Though Carlson is retired, she will continue her long-term hummingbird research. One of a handful of master hummingbird banders in the country, she will continue to serve as California coordinator for the Hummingbird Monitoring Network, a group that tracks hummingbird populations throughout the western United States. Carlson and her friend, Ruth Yoder, also plan to do a lot of traveling in the Southwest. "We really enjoy the Ruby Lake National Wildlife Refuge in Nevada," Barbara notes. "It's a broad, flat valley at about 6,000 feet with a huge marsh, so it's filled with migrating ducks and other birds. Those are the kinds of places I want to see more of."

—JB

Current Mathias grant winners total 20

Recently announced were the recipients of the 2004-05 Mildred E. Mathias Graduate Student Research Grants. A total of 20 students from eight UC campuses were selected for research work that will be conducted on 13 different NRS reserves. Since its inception in 1988, the program has provided over 250 grants totaling nearly \$400,000. The following is a list of this year's awardees, by UC campus, and the NRS reserves they will be using:

From UC Berkeley:

- Rebecca Anderson
(Santa Cruz Island Reserve)
- Theresa Chuang
(Sagehen Creek Field Station)
- Maria Goodrich
(Angelo Coast Range Reserve)

- Susana Peluc
(Santa Cruz Island Reserve)

From UC San Diego:

- Serena Moseman
(Kendall-Frost Mission Bay Marsh Reserve)

From UC Davis:

- Erin Espeland
(McLaughlin Natural Reserve)
- Brooke Jacobs
(McLaughlin Natural Reserve)
- Adrianna Muir
(Bodega Marine Reserve)
- Louie Yang
(Sagehen Creek Field Station)

From UC Santa Barbara:

- Donald Burnette
(Coal Oil Point Natural Reserve)
- Jeff Howarth
(Santa Cruz Island Reserve)
- Robin Pelc
(Kenneth S. Norris Rancho Marino Reserve, Bodega Marine Reserve, Landels-Hill Big Creek Reserve)
- Grant Yip
(Santa Cruz Island Reserve)
- Mackenzie Zippay
(Kenneth S. Norris Rancho Marino, Coal Oil Point Natural Reserve, Santa Cruz Island Reserve)

From UC Irvine:

- Adrian Rocha
(San Joaquin Freshwater Marsh Reserve)

From UC Los Angeles:

- Rachel Kennison
(Carpinteria Salt Marsh Reserve)
- Benjamin Rossi
(McLaughlin Natural Reserve)

From UC Riverside:

- Lori Hargrove
(Boyd Deep Canyon Desert Research Center)

From UC Santa Cruz:

- Krikor Andonian
(Hastings Natural History Reservation)
- Elise Ferree
(Sagehen Creek Field Station)

For more information about the Mildred E. Mathias Graduate Student Research Grants (including the research topics that will be investigated by these Mathias winners), go to:

<http://nrs.ucop.edu/grants/grants.html>.

A FEW WORDS

Continued from page 1

NRS's Stunt Ranch Santa Monica Mountains Reserve and docent and communications coordinator for the Mildred E. Mathias Botanical Garden at UCLA. A second arts-oriented article introduces the algal art of Peter Connors, manager of the NRS's Bodega Marine Reserve (administered through UC Davis), who transforms transitory sea wrack collected on the beaches of Bodega Bay into lasting compositions of outstanding beauty.

Finally, we bid a grateful farewell to Barbara Carlson, who retired in December 2004 after 18 years of dedicated management of three NRS reserves administered through UC Riverside: Motte Rimrock Reserve, Emerson Oaks Reserve, and Box Springs Reserve. Peter Connors will also be retiring soon; he has been at Bodega for 34 years, of which he has spent 19 years managing the reserve.

NRS managers and stewards shoulder the greatest burdens of the reserve system. Consequently, the retirement

of a long-time manager—a Carlson or a Connors—means significant loss of institutional memory and organizational how-to. Fortunately, the NRS continues to attract staff who bring exceptional energy, dedication, and talents to the reserve system. Thus, though we mourn the departures of valued colleagues, we rest assured that the future of the NRS remains secure in capable hands.

— Alexander N. Glazer
Director, Natural Reserve System



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