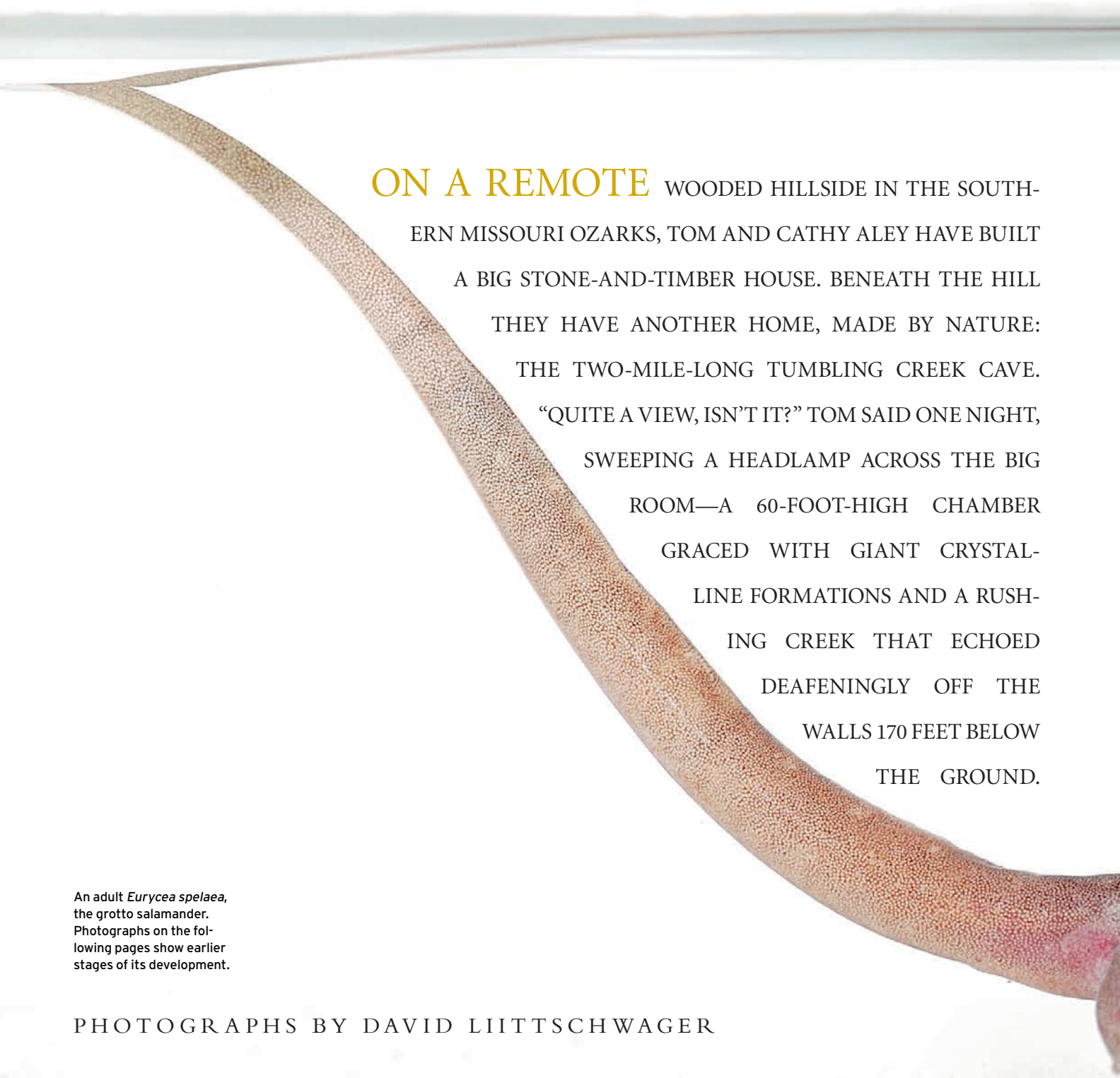


SMALL MIRACLES O

A tale of blind salamanders, endangered snails, and



ON A REMOTE WOODED HILLSIDE IN THE SOUTHERN MISSOURI OZARKS, TOM AND CATHY ALEY HAVE BUILT A BIG STONE-AND-TIMBER HOUSE. BENEATH THE HILL THEY HAVE ANOTHER HOME, MADE BY NATURE: THE TWO-MILE-LONG TUMBLING CREEK CAVE. “QUITE A VIEW, ISN’T IT?” TOM SAID ONE NIGHT, SWEEPING A HEADLAMP ACROSS THE BIG ROOM—A 60-FOOT-HIGH CHAMBER GRACED WITH GIANT CRYSTAL-LINE FORMATIONS AND A RUSHING CREEK THAT ECHOED DEAFENINGLY OFF THE WALLS 170 FEET BELOW THE GROUND.

An adult *Eurycea spelaea*, the grotto salamander. Photographs on the following pages show earlier stages of its development.

PHOTOGRAPHS BY DAVID LIITTSCHWAGER

F THE CAVE WORLD

one man's underground crusade

BY KEVIN KRAJICK

BESIDES THE NICE INTERIOR SCENERY, TUMBLING CREEK HAS BIOLOGICAL WONDERS. IT IS HOST TO 115 SPECIES OF ANIMALS, THE RICHEST ASSEMBLAGE OF FAUNA IN A SINGLE CAVE WEST OF THE MISSISSIPPI—DOZENS OF RARE SUBTERRANEAN CREATURES SUCH AS BLIND SALAMANDERS, BATS INCLUDING ENDANGERED GRAYS AND INDIANAS, THE ENDANGERED TUMBLING CREEK CAVESNAIL (POP. 50–150; KNOWN TO EXIST ONLY HERE), AND THE UNIQUE BLIND CAVE MILLIPEDE *CHAETASPIS ALEYORUM*, A FINGERNAIL-LENGTH STRING OF PEARLS THAT LOVES BAT GUANO.



Suspicious locals have accused the Aleys of hiding a methamphetamine lab in Tumbling Creek Cave.



“It’s a myth that rock is solid,” said the 68-year-old Aley, who is always quick with a corny joke. Aley, a pioneering hydrologist and expert on all things subterranean, and his wife, Cathy, an aquatic biologist, have spent decades defending this cave and others from danger. “Caves are not worlds unto themselves,” he said. “If you do something on the surface, it affects the underground.” His studies of how water travels underground have shown how caves from Alaska to Arkansas suffer from surface pollution. While landowners typically run the other way from endangered species, Aley has found his own and spent a fortune—made from his consulting work—protecting them.

“If there is any one person who is the overarching protector of caves and karst in the United States, it is Tom Aley,” says Ron Kerbo, a geologist who oversaw the National Park Service’s caves until his retirement earlier this year. “Too many conservationists get overwhelmed by emotion. Tom operates on science. Because of him, a lot of people now see caves as part of the larger world.”

More and more, roads, quarries, and building excavations are wiping out caves directly

Karst, a cave-rich terrain that develops in water-soluble rocks such as marble or dolomite, underlies 15 percent of the earth’s surface; to a lesser extent, caves can also form inside volcanic or sedimentary rocks. Aside from their beauty and the priceless resources they offer geologists, archeologists, paleontologists, and other scientists, caves form a vast, little-known biological world. They are habitat for many part-time residents such as bats, which in turn play a large role in the ecology of the surface. In the United States, caves are also home to about 1,800 known species of

troglobite—creatures that dwell strictly in caves. These are primarily small invertebrates, plus some salamanders and fish. Most troglobites are elusive, even in well-explored caves, and 90 percent of the world’s caves probably have yet to be found. So it’s likely that the great majority of troglobites remain undiscovered.

They are also very vulnerable. More and more, roads, quarries, and building excavations are wiping out caves directly. For instance, nearly all the extensive karst that once underlay what is now St. Louis is badly damaged. Sewage, pesticides, toxic wastes, and fertilizers wash into sinkholes or other portals to the underground, unfiltered by soil. This turns underground streams into sewer conduits. It is not just the troglobites that suffer; in karst areas, these streams routinely feed back into human drinking water. Troglobites favor limited ranges of temperature, water chemistry, and humidity. Many are endemic to one cave, or one room of one cave, and are ill-equipped to survive elsewhere. A single disturbance—say, a chemical spill on a nearby highway—can kill a

whole species. Only about 2 percent of the species in the United States are actually listed by the government as endangered or threatened, but according to The Nature Conservancy, 95 percent are in fact imperiled. These include Hawaii’s six-inch-wide Kauai cave wolf spider, which dwells in volcanic caves over which new golf courses are booming, and dozens of aquatic species in Texas’s vast Edwards Aquifer, which is being quickly pumped dry to feed cities

and farms. Bill Elliott, a cave conservation expert with the Missouri Department of Conservation, says at least six U.S. species are already presumed extinct, but he suspects there are many more.

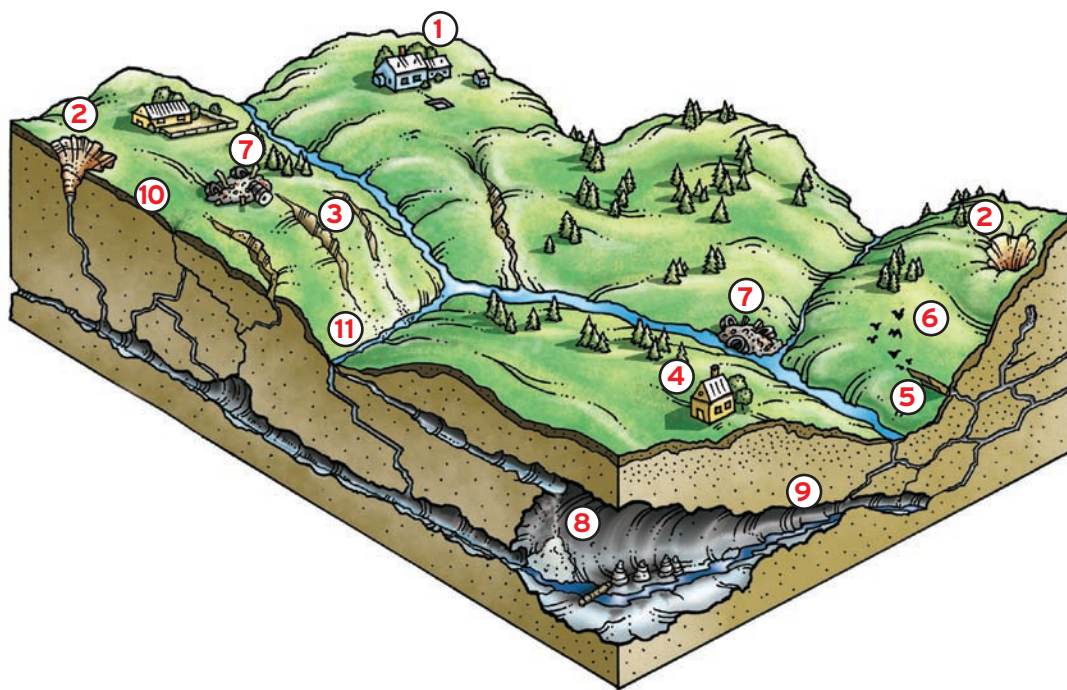
TOM ALEY WAS BORN IN 1938 AND SPENT HIS CHILDHOOD in rural Wintersville, Ohio, building forts in the woods and reading biology books in the library. Long before studies of underground toxic waste became a big business, a shrewd practical streak told him that hydrology—the then-fledgling study of water

and where it goes—would soon be important. At the University of California, Berkeley, he studied forestry, which involves hydrology—and hydrology often involves karst. It was during his time at Berkeley that he visited his first cave, on a campus hiking-club trip. The dreadfully skinny six-foot-three Aley soon discovered that he loved descending into black pits and squeezing his head through any space that did not rip off his ears. Some weekends, he practiced in the Berkeley storm-sewer system. (“Best to wait for low tide and watch for cops,” he remembers.) He went on to help discover about 40 new caves, from California to Arizona. One morning near the Grand Canyon, an earthquake shook him and some friends while they were deep inside a cavern. Everyone except Aley wanted to rush back to see if the entrance had collapsed. He argued that if it had, they were doomed; why not enjoy exploring the cave for the rest of the day, then find out at the end? They reached the intact entry just in time for sunset.

Around the time of the 1962 Cuban missile crisis, the U.S. Office of Naval Research wanted to know if Fidel Castro might have any caves good for hiding nuclear bombs; Aley wangled a grant from the agency to spend three carefree months exploring caves in Ja-

tory—a place where scientists would pay to study water flow, geology, and other phenomena. At 28, he set off cross-country with his first wife in a white 1961 Chevrolet Apache pickup to look for the cave. After nine months and scores of real estate brokers, they settled on the rolling, karst-rich Ozarks and found 126 acres covering most of Tumbling Creek Cave, with underground title. A mile and a half from a road and 30 miles east of Branson, the next big town, the property was in what some folks might call hillbilly country.

“Karst and poverty go together,” Aley said as we tromped through his rock-strewn woods. He pointed out sinkholes—dry depressions where the surface has collapsed—and cobbly “losing streams,” whose beds are dry, though the weather is wet. Most water here drops into the hollow underground, taking nutrients and soil with it. Drilling a reliable well is tough. Oaks, dogwoods, and other trees tend to be bone-thin; land good enough for growing crops is rare. About the only businesses in the area are cattle raising and seasonal employment for folks whose ancestors arrived around 1830. When Aley closed on Tumbling Creek in 1966, it cost \$7,700. As we reached the top of a hill, we could see the Apache, still parked near the garden, barely rusted. “Still runnable!” he claimed.



TOM ALEY'S WORLD

- [1] Mark Twain School
- [2] Sinkholes
- [3] Eroding Pasturelands
- [4] Field House for Visitors
- [5] Bat Gate
- [6] Bats Leaving the Cave
- [7] Trash Dumps
- [8] Tumbling Creek “Big Room”
- [9] Cave Stream (Snail Habitat)
- [10] Soil Layer
- [11] Losing Stream Segment

maica, Haiti, and the Dominican Republic, the closest ones to Cuba he could think of. After this, more consulting work came in, such as a plum job to explore and map a northern California cave that the owners wanted to turn into a tourist attraction. He was having so much fun, he never bothered finishing his Ph.D.

By 1965 he had a high-paying gig at a Los Angeles-area engineering firm. During this time he refined techniques for tracing underground water using fluorescent dyes, still the basic method. He testified in what was possibly the first U.S. legal case settled with dye tracing—a successful suit by a Berkeley homeowner whose foundation had been undermined by a leaky storm sewer. When Aley announced one day that he was quitting to buy his own cave, his boss offered to pay for a psychotherapist.

Aley's idea, which he never realized, was an underground labora-

TUMBLING CREEK CAVE'S NATURAL ENTRANCE—

a daunting crawlway from which the creek issues—was on a neighbor's land. So to make the place accessible from his own property, Aley hand-dug an 8-by-8-by-23-foot shaft to a side passage; he also installed air-lock doors to maintain the cave's natural humidity and temperature. Then he dug through massive amounts of clay and rock that constricted many passages and lugged in 200,000 pounds of cement to construct 2,100 feet of narrow path, being careful to minimize disturbance to cave dwellers and formations. It took five years.

To get into Tumbling Creek Cave, you enter a hand-built stone hut, shut the door behind you, and breathe in the humid, fresh air of the cave below, where the temperature is always 58 degrees. Descend several flights of stairs into a small natural room with a second door; beyond is a narrow passage where you must stoop a

bit, but this soon opens to a series of grand rooms, some with Tumbling Creek itself rushing through. There are tributaries, waterfalls, deep pools, and crystalline formations all around: gigantic draperies, sloping masses of flowstone, stalactites, stalagmites, and soda straws, which are skinny stalactites with water dripping through their hollow middles. Aley has found arrowheads and bones of extinct species of peccaries and jaguars. Climbing a high wall a few years after he bought the cave, he discovered a spectacular quarter-mile corridor that no one had ever entered.

Aley was at first more interested in the physical wonders of his cave, but gradually he came to realize he had a biological treasure too. Much of this had to do with his second wife, Cathy, whom he met in 1974. She has an eye for small creatures, no fear of

guano, or other tiny organisms. Little more is known about it. On the slope, many of the millipedes cling to each other belly to belly, their uncountable legs intertwined intimately. “Looks like their favorite activity is mating,” said Cathy one day. “At least I think that’s what they’re doing. What else is there to do in a cave?”

Nearby we saw assorted spiders, harvestmen, and squirmy, inch-long webworms that hang from threads inside rock crevices. Under some guano pellets were near-microscopic predatory pseudoscorpions, which sport ridiculously oversized claws but no stingers. These creatures are eyeless. “The pseudoscorpions have little hairs on their claws that sense air movements,” said Cathy. “A fungus gnat gets stuck in the clay. The pseudoscorpion senses the struggle. Then it moves in and grabs it—*like that*.” She darted out her strong hand



CAUSEYELLA DENDROPUS One of Tumbling Creek’s millipedes.

underground places, and a forge-ahead character much like Aley’s. Over the decades, they have invited leading cave biologists to come look around, and thus gradually assembled a catalog of fauna. This includes a dozen named troglobites, plus six or so not yet named. There are dozens of troglaphiles—creatures that inhabit caves but may go back and forth to the surface (such as bats) or may be equally at home in other dark, humid environments such as leaf litter or underneath big rocks. (Many species of strictly troglobitic millipedes, spiders, and mites are thought to have evolved from such creatures.) There are also surface “accidentals” that wander in sometimes, including beavers, copperheads, feral hogs trying to escape winter cold, and raccoons dining on blind salamanders. Bears used to come to the cave too, until they were wiped out in this area. The cave’s unusual dome-shaped rooms help to attract eight species of bats in uncommonly large numbers, and these in turn help account for the troglobite diversity. Most caves lack food, cut off as they are from the fruits of photosynthesis. In Tumbling Creek, though, tons of guano stoke the food chain. Near the Big Room we passed one four-and-a-half-foot-high pile, reeking of ammonia, that a geologist has dated at 2,900 years.

At the far end of the Big Room is the Millipede Slope, a bank of clay where fresh guano is sprinkled like black manna. It literally crawls with bugs. It was here, during the early years, that the Aleys found *Chaetaspis aleyorum*, or “Aley’s millipede.” Formally described and named by a taxonomist in 2002, it dines on fungus that grows on



HESPEROCHERNES OCCIDENTALIS The tiny guano pseudoscorpion.

and seized my Adam’s apple. “Oh, sorry. Did I scare you?”

The top predators are four-inch-long grotto salamanders, blind creatures that cruise the bottoms of still pools. Among the many near-invisible denizens is the once-abundant Tumbling Creek cavesnail, a detritus-eating iridescent thing the size of a grain of sand, found on water-washed rocks in the creek. About once a decade the Aleys glimpse a fast-moving white crayfish that is probably an undiscovered species, but they have never caught one.

WHILE SLAVING IN THE CAVERN, ALEY TOOK A JOB

with the U.S. Forest Service, which owns much of the cave-rich land nearby. His job was to figure out how water gets around in karst over large areas. He pored over detailed maps showing layers of different rocks, fault lines, and other features that might help him predict where water would go. He dumped dyes into losing streams and sinkholes and positioned devices to monitor where the dyes emerged. This seminal work showed how intricately surface and subsurface interact.

Among other things, Aley traced the sources of Missouri’s famous Big Spring, a gigantic natural fountain that bubbles from the ground about 150 miles east of Tumbling Creek. His eventual map showed Big Spring’s 500-square-mile underground drainage, which karst hydrologists call a recharge area. In one case the dye sank into a creek bed and emerged two weeks later in Big Spring, almost 40 miles off—still the longest dye trace ever in the United States. Aley showed that such journeys often disregard visible topography and

instead follow hidden geologic pathways below surface rivers and underneath ridges to emerge in unpredictable places. Such work has helped Aley and others plot the underground movements of sewage and toxic waste as well as plain old water, in environments across the country. “Water tracing takes you to places you can’t visit personally. It gives you that third dimension on the earth,” Aley said.

Aley claims that he never set out to be a conservationist. In 1971 the Forest Service sent him to Indiana’s Lost River to assess a controversial dam project proposed by the U.S. Department of Agriculture (USDA). He dye-traced a previously unrecognized cave system in the impoundment area; the dam wouldn’t work, he pointed out, because the water would simply drain away. The project was killed. Local environmental groups loved him. The Forest Service sent

demand as government and private interests sought to assess the effects of landfills, sewers, and other developments on the underground. The Aleys were in the right place at the right time, and the Underground Lab prospered.

The Nature Conservancy has hired Aley several times to delineate cave recharge areas. Tim Snell, director of its Ozarks programs, says the group has bought or otherwise protected many tracts as a result of Aley’s work. This has headed off planned quarries, roads, and other projects threatening caves. In the 1970s, Interstate 540 near Cave Springs, Arkansas, was rerouted at a cost of \$100 million after Aley showed that the highway’s original route would have overrun habitat of the endangered blind Ozark cavefish.

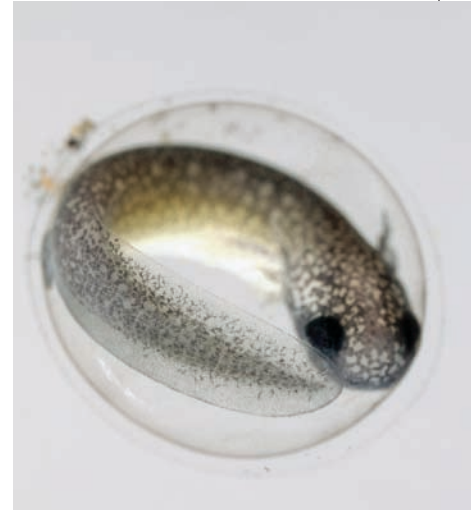
In the early 1990s Aley became embroiled in the vicious battle



ANTROBIA CULVERI The Tumbling Creek cavesnail.



STYGOBROMUS OZARKENSIS An aquatic amphipod.



EURYCEA SPELAEA Larva about to hatch.

him a letter of commendation for saving government money; the USDA sent him a letter of reprimand for criticizing a sister agency. He framed them side by side. “I never said I was for or against that dam,” he said. “If you assemble good data that show how a system works, you have a much better chance of making a good decision.”

In 1973 Aley quit the Forest Service and started a hydrology and cave consultancy. It was somewhat misnamed the Ozark Underground Laboratory, since the actual lab was in an aboveground building near his house. It was at this point his first wife divorced him; he says one reason was that she couldn’t take the “cave lifestyle” anymore. Cathy, 10 years his junior, showed up one day as a student on a Wichita State University field trip and more or less never left. She became his first employee, then his wife and business partner.

“We hit it off like two peas in a pod,” Cathy said. “I like taking care of stuff. It doesn’t matter to me if it’s a stream or a mountain or an ocean. I just happen to have gotten a cave.” In addition to having scientific training as a biologist, she came with excellent skills as an auto mechanic and carpenter, learned from her father; she has built many of the structures on their land and helps keep a lot of the machinery running.

With the passage of laws in the 1970s cracking down on groundwater pollution, hydrologists suddenly came into high

between timber interests and environmental groups over the cutting of old-growth trees in Alaska’s Tongass National Forest. Some of the world’s largest cave systems, which are important to its regional ecology, archeology, and paleontology, were then coming to light. In 1993, as both forester and hydrologist, Aley headed a Forest Service–funded study showing that logging roads had collapsed Tongass caves and that debris was clogging subterranean water systems. This hurt not only troglobite habitat, but salmon

The millipedes cling to each other belly to belly, their uncountable legs intertwined intimately

and birds that use cave-fed surface streams. Plenty of damage had already been done—the nonprofit Karst Waters Institute still lists the Tongass as one of the world’s 10 most endangered karst systems—but the Forest Service has since severely limited or banned logging in 550 square miles of the most karst-intensive terrain.

In another battle, in 2001, a developer proposed to build a 180-acre resort near Arizona’s heavily visited Kartchner

Caverns State Park, which is famous worldwide for its pristine formations. The state hired Aley to assess the underground impact. He convinced lawmakers that wastewater could reach the caves through a series of hidden faults. The state condemned the developer's land and in 2003 added it to the park.

In the 1980s Aley was one of the first scientists to recognize that lighting systems in tourist caves encourage the growth of photosynthetic algae and other organisms that compete with native fauna. Many private operators and the National Park Service have since toned down lights in "show" caves. (Tumbling Creek still has none.)

In the 1990s, at Oregon Caves National Monument, ice coated delicate formations so heavily that they fell off. Aley's airflow tests confirmed that an extra exit and other modifications blasted into the

showing the recharge area—nine square miles that, like some of the other recharge areas he had delineated, unpredictably crossed surface drainages. To his dismay, he saw that some folks on his map were dumping household garbage into sinkholes and clearing delicate woodland for pasture. Rural cattle-grazing and garbage-dumping were venerable traditions, but some threshold had been crossed. Eroding silt and possibly some unseen toxic substance were reaching the cave. One family had stripped nearly every tree off 1,200 acres and overpopulated the land with steers, leaving a maze of overgrazed hillocks, erosion gullies, and junk. The Aleys were careful not to criticize their neighbors publicly, but Tom went to Paul McKenzie, a biologist with the U.S. Fish and Wildlife Service (USFWS). McKenzie agreed that the snails should be considered for endangered status; he privately nicknamed the 1,200 barren acres Afghanistan.

In 1996, when formal USFWS studies began, the snails were down to around 1,000. They continued their decline until 2001, when they almost disappeared. After intensive searching, a biologist turned up 40 in a previously unexplored side passage—the last apparent survivors. The agency listed the snail as endangered in August 2002. In a way, it was the best thing that ever happened to the Aleys.

"If you are a doctor and you arrive at a car wreck, you have a special duty to act," said Aley. "We were on the scene at a snail wreck, and we had a duty." Well before the listing, they decided that the only way to protect the cave was to protect the recharge area. Of the 5,770 acres, a quarter was owned by the Forest Service. Managers heeded Aley's pleas to minimize the digging of fire lanes and other activities that could produce sediment, and a local congresswoman was enlisted to beat off a Bush administration proposal to sell part of the recharge zone. Sympathetic neighbors owned 20 percent of the remainder. That left about 3,500 acres.

Property in the area was still going for around \$500 an acre; the Aleys assessed their savings and started buying. From the next-door neighbor they bought 263 acres, including the cave's natural entrance. A nearby farmer had considered starting a trailer park on his 120 acres but sold to the Aleys after several years of sweet-talking and cash-dangling. They got another 120 acres with a falling-down house and barn in a sheriff's sale. Other old-timers eventually sold out. The Aleys paid by taking on more business and working as many hours as they could stay awake. In 2001, Afghanistan came up for sale, and they swallowed hard. Aley, then 63, was looking forward to retiring. Instead they borrowed most of the \$775,000 purchase price and went back to work. Today they own a 2,650-acre checkerboard. Luckily, due to the vast sales-tax revenues produced by Branson, land taxes are low to nonexistent here.

Once the snail was listed, the Aleys showed that an endangered species does not have to hurt a landowner. In their hands, it became a bonanza. Tom persuaded government agencies to hire him at his usual rate of \$110 an hour to refine the watershed delineation, study neighbors' septic systems, and assess snail threats from activities like the repaving of nearby roads. The Nature Conservancy gave the Aleys \$15,000 to build a new septic system for their lab and house. The Missouri Department of Conservation funded a \$25,000 gate at the cave's natural entrance that lets in bats but keeps out humans,

"Tom's our poster child for educating people who think endangered species will take over their properties"

caves in the 1930s had brought in cold winter air. The caves now have airlocks like those at Tumbling Creek. When one privately owned Midwest show cave experienced embarrassing cascades of earthworms and wet dirt from ceilings, Aley tracked the problem: Leaking septic systems above were turning the earth a little too fertile.

THE ALEYS LONG THOUGHT TUMBLING CREEK CAVE

was safe. The only visits allowed were low-key tours for college and high-school students. Local teenagers sometimes broke in and harassed bats, but Aley let people know he had a shotgun. The town of Branson had mushroomed and become famous (or infamous, depending on how you looked at it) as a brightly lit country-music mecca, a sort of combination of Disneyland and Nashville lined with malls where the big boxes happen to be theaters instead of Wal-Marts. However, from Tumbling Creek it was still just a distant glow in the night sky. As Aley likes to say, "We're centrally located. We're not near anything." He and Cathy thought their little kingdom would never change. They were wrong.

The trouble signs began with snails. In the 1970s there had been maybe 15,000 of them, living along 750 feet of creek bed. It was one of the smallest ranges of any creature on earth, but snails peppered practically every rock. Starting in the late 1980s, Cathy noticed that the normally clear creek water was sometimes turning turbid, and that sediment was gumming up stream cobbles that the snails preferred. Soon she noticed fewer and fewer of them. By 1995 snails were hard to find.

Bats also seemed to be declining, leading the Aleys to wonder about other creatures that were less easy to count. One mite species in the cave lives strictly on the anuses of gray bats, and it prefers female anuses. "That mite was in danger of losing its ass," said Aley. "It wasn't just the snail. It was the whole system."

Aley had done some dye tracing to see where Tumbling Creek came from, and now he stepped it up. He asked neighbors if he could work on their land, though in some cases, he admits, he just waited for dark. After several years of work, he drew up a map

which is reputed to be the largest of its kind in the world. So the Aleys could lease one old farm to a neighbor for cattle grazing but exclude livestock from sensitive drainages, the Missouri Conservation Heritage Foundation gave \$25,000 to buy a conservation easement, relocate a well, and put up fencing. To inventory and clean out the dozens of garbage dumps on the Aleys' newly acquired lands, the National Park Service and USFWS gave \$40,000. Members of regional caving clubs volunteered hundreds of hours of labor. They helped haul out 100 tons of scrap steel along with containers of pesticides, drums of paint and waste oil, roofing material, washing machines, plastic toys, and enough Pampers to diaper a small nation. For Afghanistan, the USDA paid \$175,000 to install fencing that would keep out livestock, regrade and replant eroded gullies, and



EURYLEA SPELAEA In its larval stage, with feathery red gills, this salamander still has functional eyes; as an adult its eyelids will fuse, leaving it blind.

plant 70,000 native trees. Under its soil-conservation program, the department also in effect rented the land, paying the Aleys \$112,500 over 15 years in return for protecting the watershed. In all, Aley estimates the snail has brought in more than \$500,000 so far. “Tom’s our poster child for educating people who think endangered species will take over their properties,” says McKenzie.

Some locals appeared jealous. Rumors swirled that the money for the land came from an illegal still, a marijuana plantation, or a methamphetamine lab, each supposedly hidden in Tumbling Creek Cave. Some said the Aleys were fronts for a government plot to take over Taney County for a nuclear-waste dump. Others questioned whether the snail really existed—or, if it did, how the Aleys got this government largesse while everyone else was poor. The Aleys are unapologetic. Sure, they’ve made money on government grants; so have their employees, who are paid to carry out some of the government-funded projects. The Aleys also own the government-funded improvements to their lands, such as fencing—and obviously the properties have grown in value now that they have been rehabilitated. Moreover, the price of land in the area is generally rising, thanks to the proximity of Branson and other resort developments.

Still, says Aley, “Some people don’t get it. This is not for profit. My kids will not be burdened by personal wealth.” The Aleys’ land and

retirement funds have been willed to their newly founded Tumbling Creek Cave Foundation. The core area around the cave has already been transferred. “We don’t go on vacations. I don’t go to the hairdresser or buy jewelry. All we do is work to protect the cave,” says Cathy. “I have no desire to own 2,650 acres. I look around and it frightens me how much work there is to do.”

One day I visited the area’s only public building: Mark Twain School, a shoestring operation with 60-some students from preschool to eighth grade. The principal is an ex-Marine named Dick Needham. In late 2003, said Needham, Aley told him that the school’s leaky open-sewage lagoon was polluting the cave. Around the same time, state health inspectors told Needham the lagoon had to be replaced, cave or no cave. The cost: \$90,000. Needham feared Mark Twain would be forced to close and vigilantes would come for the head of Tom Aley, whether Aley was to blame or not. “Dick, the snail can be a friend, not an enemy,” Aley told him. He was right: State conservation and USFWS officials facilitated a meeting at which federal, state, and local agencies cobbled together grants totaling \$89,000. This included \$2,000 from the Aleys themselves. A new septic system was completed in March 2006. “That snail was our salvation,” Needham told me. As we walked over the still dug-up ground, he said he tried to change the school’s mascot from the Pirates to the Cavesnails. “The school board wouldn’t go that far,” he said, “but attitudes here have definitely changed.”

One afternoon Tom Aley and I drove to the edge of Afghanistan. Rolling into the distance nearly to the horizon, its hills and valleys are now grassy, and new trees sprout. But unfortunately, the recovery of Tumbling Creek itself is still in question. Due perhaps to the new gate, bats have roared back. Tumbling Creek is clearer, but sediment in the streambed will take a long time to clear completely. There are still no more than 150 snails, all in a stoopway that requires crawling several dozen feet through an icy stream to reach. The Aleys are now testing an apparatus designed by a mollusk expert to raise snails for reintroduction into the cave. It may take 20 years for the snails to return, if they do.

“Probably a lot of things that live in the cave have been reduced, but we don’t have the studies to prove it,” said Cathy. “The snail gets all the attention.”

In the latest threat, feral hogs have been released by would-be hunters, and they are rooting up the woods, eroding soil all over again. Branson is still metastasizing. The Aleys have their eyes on 1,000 more acres to protect the cave, but for that they need \$1 million, and they are both getting arthritic and gray.

One day they sent a young assistant into the snails’ side passage to retrieve a few specimens for photographs. “I’d do it, but my knees are boogered up, and these days, those tight spaces seem tighter,” Aley said. “And funny thing—those little cave critters look littler all the time. At least to my eyes.”

We stood in the darkness. I did not want to ask the obvious, but I made myself do it. “So,” I said, “do you think you’ll live long enough to see Tumbling Creek recover?”

Aley let out something between a chuckle and a snort. “Damn right,” he growled. 🐾

Kevin Krajick is a journalist specializing in science and the environment. His work has been published in the New Yorker, National Geographic, and many other magazines. He has a morbid fear of small spaces.