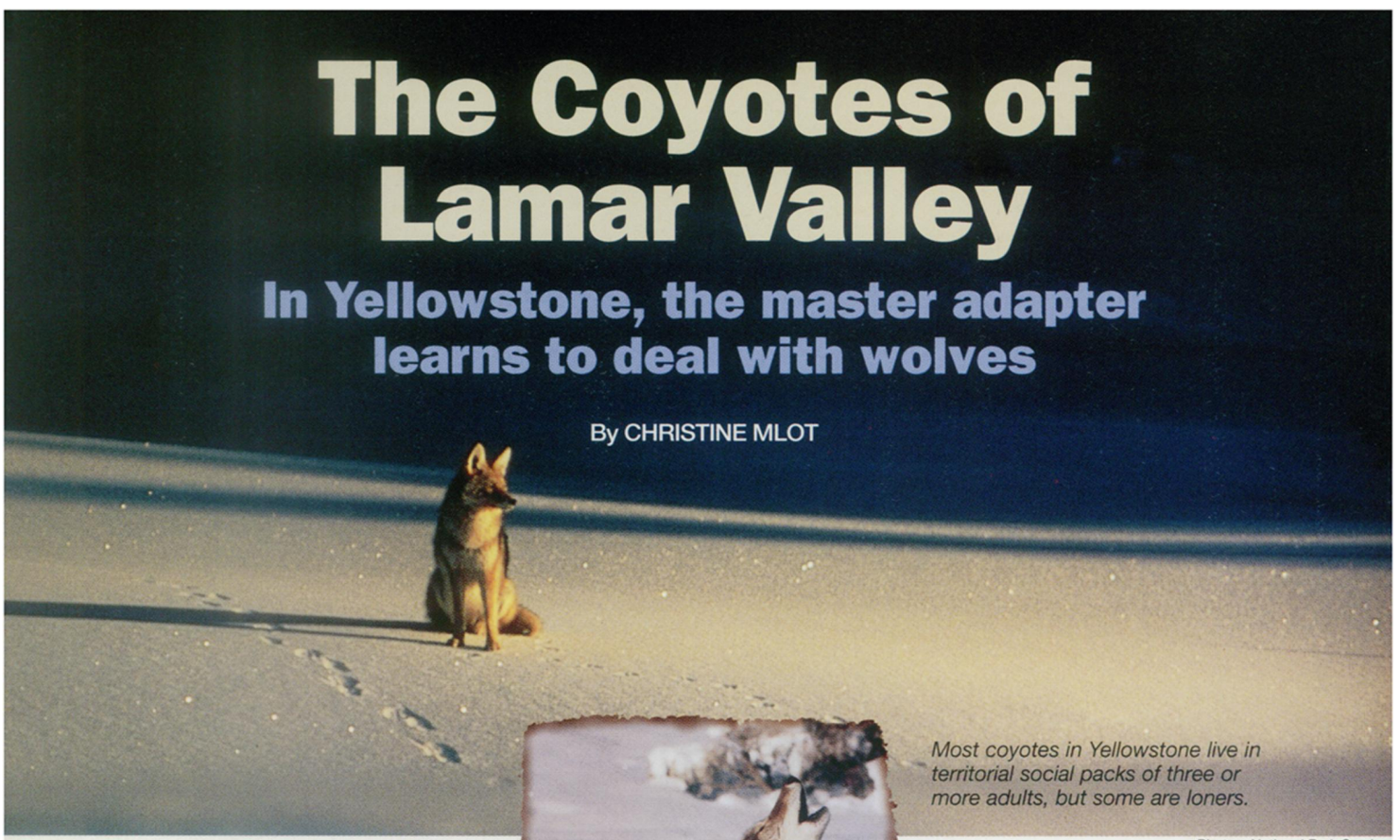
The Coyotes of Lamar Valley

In Yellowstone, the master adapter learns to deal with wolves

By CHRISTINE MLOT



Most coyotes in Yellowstone live in territorial social packs of three or more adults, but some are loners.

Photos: National Park Service

Described by a trapper in the 1830s as a "beautiful Vale" with "wild romantic scenery," the Lamar Valley stretches 1 to 2 miles wide and 7 miles long. High, rounded hills snuggle around the sagebrush and meadow of the valley floor. With its abundance of elk, bison, and other big game, this corner of Wyoming is sometimes called North America's little Serengeti. A river even runs through it.

Animal ecologists are drawn to this piece of Yellowstone National Park to study the hidden ways of coyotes. Coyotes are common and extremely successful throughout North America, even in urban areas (see sidebar), but they are wary of people and stay largely out of sight. Most of what scientists know about their behavior has come indirectly—not from observation, but from radio signals transmitted by animals that have been caught, fitted with a collar, and released.

In their Lamar Valley sanctuary, coyotes are usually indifferent to people—or even curious about them—giving researchers a rare opportunity to observe the animals directly. "As long as you sit and watch, they don't mind you being there," says Eric M. Gese of Utah State University in Logan. His recently published studies, based on 2,500 hours of observation over 3 years, detail coyote life in the valley.

Until a few years ago, however, something had been missing from the ecosystem. Wolves were eradicated from Yellowstone and most of the United States by the 1930s, leaving the coyote as top dog in the game-rich preserve.

The snows that blanket Yellowstone National Park in winter give wildlife researchers the rare chance to observe the usually hidden coyote. They are now watching as the once top predator is making way for wolves.

Then, in 1995, amid much fanfare, the National Park Service released a group of Canadian wolves into the valley (SN: 11/30/96, p. 344). From their hillside perches, researchers are now watching the two canines get reacquainted.

There have been more than a few dogfights and a significant number of coyote deaths. Robert L. Crabtree of Yellowstone Ecosystem Studies in Bozeman, Mont., is studying the dynamics of the wolf-coyote interaction for the park service. He estimates that the coyote population was down by about 50 percent at the start of this, the third winter with wolves. Yet researchers have little doubt that the adaptable coyote is learning to cope with the newcomer and will remain an important, if chastened, predator in the system.

Animal ecologists have been studying the Lamar Valley coyotes off and on since the 1930s. In addition to the animals' amenability, the lay of the land lends itself to research into animal behavior. The hillsides form natural observation posts with a good view of the relatively narrow valley and the resident coyote packs.

"Once you get some snow, they're highly visible," Gese says of the animals. He spent 3 years in Lamar, beginning in 1991, before the wolves arrived, gathering baseline data on 50 coyotes in five packs.

Each winter morning before sunrise, he and his coworkers got up, layered on underwear, fleece, and outerwear, then left their uninsulated wood cabin to hike slowly up the snow-packed hillsides. They would spend the 12-hour day with spotting scopes trained on particular packs and individuals and record the frequency of their behaviors—traveling, howling, hunting, feeding, resting, socializing, marking, sitting, or other activities, such as digging. Around a full moon, the scientists would take turns keeping an

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eye on the animals at night, too.

With abundant prey and no other competition in the valley, the coyotes carried on like wolves, the researchers found. Instead of socializing in twos or threes, as coyotes do elsewhere, they maintained packs of up to 10 animals. The social structure within the pack mimicked that of wolves, with a ruling, or alpha, male and female usually as sole breeders.

"The alpha male is cop of the territory," says Gese. This male spends a lot of his active time scent marking—urinating, defecating, or scratching the ground—Gese reports in the November 1997 ANIMAL BEHAVIOUR. The alpha male makes five marks per hour, more than twice the rate of beta coyotes. Scent marking warns neighboring coyote packs not to stray across territorial boundaries.

When an intruder did venture over the line, the alpha male would give chase and the intruder would typically exit—"very fast," says Gese. If the alpha male caught the intruder, the animals would roll and spar, but the intruder was never killed—a difference from wolf behavior.

Once the intruder managed to get out, "the resident would break off the chase literally right at the border," says Gese. "There it would bark and scent mark and scratch the ground, make quite a commotion for 10 or 15 minutes, then head back to the pack or whatever it was doing."

Most of what it was doing was resting, especially during the deep snows of the winter months, according to a May 1996 report by Gese, Robert L. Ruff of the University of Wisconsin-Madison, and Crabtree in the CANADIAN JOURNAL OF ZOOLOGY.

The well-insulated coyotes coped with extreme cold by bedding down individually. "I've watched them lie down in a snowstorm and basically become a white lump in the sagebrush," says Gese.

The snow and brutal temperatures helped the coyotes hunt elk and other ungulates. Although they do not depend on these prey, as wolves do, the coyotes took advantage of them in winter, when it didn't take much to bring down the nutritionally stressed ones. "Statistical carrion," Gese calls them.

The coyotes caught elk or deer in five of nine attempts that the researchers observed during winter. For the rest of the year, voles and other small mammals were the coyotes' dietary staple, although coyotes will consume almost anything, a key factor in their adaptability.

With wolves now installed in the valley, coyotes are adopting new feeding habits. They have taken to scavenging the carcasses left by their more efficient cousins—when the wolves will let them.

After wolves have killed an elk and eaten a meal, they get "meat drunk," says Crabtree. "They go waddling off for 4 or 5 hours with 15 pounds of meat in their stomach." That's when coyotes move in and scavenge.

Upon their return, wolves will often chase off or attack a scavenging coyote, lunging at and biting the animal for up to 15 minutes. In the course of nearly 1,000 hours of observation, Crabtree and his coworkers witnessed coyotes clashing with wolves 33 times. In 10 instances, the coyote was killed.

Coyotes feed off a carcass. They recently have begun to scavenge meals from animals killed by wolves.

It's not literally a dog-eat-dog world, however. "They're killed and left unconsumed, which is evidence that it's competition, not predation," Crabtree says.

Sometimes the wolves tolerate the coyotes. Crabtree says he's seen them feeding side by side on a carcass. In this and other interactions, "it's a numbers game," he says. "Crudely, five coyotes are equivalent to about two wolves." The social status and appetites of the animals also play a role.

As the coyotes have begun to learn about safety in numbers, their packs have become more cohesive though smaller, says Crabtree. They are also rearranging their territories and avoiding the wolves' high-use areas. "They're living on the edge of wolf packs, and they're trying to stay out of an encounter."

Of the 80 well-studied coyotes that maintained a stable population in the early 1990s, Crabtree says, 36 were still alive as of November 1997. He describes the unfolding dynamic in a chapter of *Carnivores in Ecosystems*, due out next year from Yale University Press.

There are models from other areas that may predict what will happen in Lamar Valley. In Minnesota, as wolves expanded their range in one northern area, they completely eliminated a dozen radio-collared coyotes, says Bill Berg, a wildlife biologist with the Department of Natural Resources in Grand Rapids. To avoid the wolves, the coyote population has shifted south.

Gese says he thinks the situation in Yellowstone will probably mimic that in Montana's Glacier National Park, where wolves arrived on their own from Canada in about 1986 and began reestablishing themselves.

Wendy Arjo of the University of Montana in Missoula has been studying 18 radio-collared coyotes in the park over

The Urban Coyote

With its attackers in hot pursuit, the coyote ran for cover, where it hid for 2 1/2 hours.

The setting was downtown Seattle, the attackers a flock of crows, and the refuge an open doorway to an elevator in the Henry M. Jackson Federal Building.

That unusual chase scene took place late last year, according to the Associated Press. The report comes as no surprise to the small group of researchers studying the habits of the urban coyote.

In the last several decades, coyotes have expanded their traditional range in the United States by two-thirds. With the elimination of wolves as competitors and changes in land use, coyotes have fanned out or been transported from their traditional home in the West. They now occupy every state in the continental United States, including hospitable territory in or around many major cities, where their only predator is the car.

"They do well in cities," says Eric York, a National Park Service researcher. He is studying radio-collared coyotes that live half an hour from downtown Los Angeles in the Santa Monica National Recreation Area.

The animals enter urban areas at night, where they hunt rabbits and squirrels that live around the well-watered lawns. Ever the opportunist, coyotes will take the occasional dog as well. York says they also eat apricots and plums from backyard trees.

In Chicago, coyotes live in and around the city in the county's network of nature preserves. Roughly 40 percent of their diet consists of rabbit and 20 percent is deer, according to Wiley Buck of the University of Minnesota in St. Paul. The remainder is a mix of raccoons, other small mammals, fruit, and "traces of domestic cat and garbage."

There is one major urban frontier coyotes haven't seemed to cross. Contrary to Internet postings, there are no coyotes living off cats and leftover lo mein in New York's Central Park, according to Gordon Batcheller of the New York Department of Environmental Conservation in Albany. However, they have been sighted, he says, passing through the Bronx to greener, outlying spaces. —*C.M.*

the past 3 years. She compares her observations with those from a 1980 study, before the wolves returned.

The Glacier coyote population is persisting, although it "does appear to be smaller," says Arjo. "Predators do take a heavy toll." Of her original 18 subjects, 6 have been killed by cougars and 2 by wolves. Three others are unaccounted for.

She has noted other changes in the population. The coyotes have moved away from wolf territories and changed their diet, eating fewer hares and more ungulates, probably from scavenging wolf kills.

Perhaps the most interesting change is morphological. "Coyotes are bigger now," significantly so, Arjo says. The average male coyote has grown from 11.8 kilograms in 1980 to 13.9 kg. Females have grown from an average of 9.9 kg to almost 12 kg. They are longer, too—by more than 12 centimeters, on average. They may be thriving from the scavenged carcasses, or the smaller coyotes may simply have been killed.

A similar pattern will probably develop in Yellowstone, Arjo says. "I don't think the wolves will wipe out the coyotes. . . . [The coyotes will] definitely figure out who to stay away from. They're pretty flexible."

When the snow melts, coyotes fade into the grass.

It's the coyotes' flexibility that accounts for their success, the researchers say. "'Wily coyote' is a pretty good label," says Gese.

He has seen their guile up close.

While studying one of the packs in the valley, "I had this sensation that something was right behind me," Gese recalls. When he eased around, he came face-to-face with one of the beta coyotes, about 5 feet away. A piece of telemetry antenna lay on the ground between them.

With golden eyes focused on the parka-clad figure, the coyote "slowly lowered his mouth, grabbed the antenna, and started backing up with it." As soon as the researcher raised his hand, the coyote dropped the antenna and walked off.

On another occasion, the scouting coyote didn't bother to sneak around. Gese watched a young beta male break away from its pack, cross the river, and climb the hillside to where he was perched. The coyote sat down about 10 feet from Gese and seemed to watch the pack as well, Gese recalls. "After about 15 minutes, he got kind of bored, curled up, and took a nap." An hour or so later, the coyote got up, stretched, yawned, and loped back down the hill.

Coyotes will respond to anything novel in their environment, Gese says, whether a shiny piece of metal or a man.

In the Yellowstone wolves, they have both something new and something old. "Coyotes coevolved with wolves," says Crabtree. "They know how to withstand mortality. They become wary." Indeed, coyotes managed to flourish under the same intense campaign of predator control that all but eliminated wolves.

The ultimate winner of the canine competition is the Yellowstone ecosystem, Crabtree says. As in Minnesota, red foxes have appeared in the wolves' new territory, which they avoided when coyotes were in charge. Without as many coyotes, there are more small mammals available for raptors and other predators to eat.

"Coyotes will decrease," says Crabtree, "but that will cause nothing but an increase in [species] richness." □

Biomedicine

Appendectomy? Scan me first, Doc

For emergency room doctors, appendicitis can be a tough call. A missed diagnosis can lead to a burst appendix and complications for the patient. On the other hand, rushing to surgery can mean taking out a perfectly good appendix.

Both occur frequently. Doctors initially fail to diagnose 20 percent of appendicitis cases. As a result, missed appendectomies are the most common successful malpractice claim made against emergency room physicians, studies in the United States and Europe show. What's more, in 15 to 40 percent of appendectomies, doctors end up removing a healthy organ.

In the United States, roughly 250,000 people are treated for appendicitis each year. To improve the odds of getting it right, doctors at Massachusetts General Hospital in Boston took computerized tomography (CT) scans of 100 consecutive patients hospitalized for suspected appendicitis. The doctors had made their preliminary diagnosis on the basis of the patients' medical histories, physical examinations, and laboratory tests.

The CT scans showed that only 53 of the 100 patients indeed had appendicitis. Among the 47 people who proved to have a different ailment, the scans prevented unneeded appendectomies in 13 who had been slated for emergency surgery, the researchers report in the Jan. 15 New England Journal of Medicine.

Overall, the CT scans were accurate in 98 of the 100 cases, says coauthor Patrick M. Rao, an emergency radiologist at the hospital. One CT scan missed a case of appendicitis; another identified a case falsely.

An appendix scan takes 15 minutes to perform. "Fifteen minutes is nothing in the big scheme of things," Rao says, noting that many potential appendectomy patients wait for hours in emergency rooms. Rao and his colleagues calculated the cost differential between removing a healthy appendix and having a CT scan at 16 to 1. The hospital thus saved roughly $44,700 overall for the 100 patients. —*N.S.*

Snoring impedes blood flow in brain

Surveys have linked snoring to strokes, but they have not revealed the basis for the connection. Now, researchers report that the obstruction of air passages that makes a person snore heavily or snort while sleeping can sharply reduce blood flow to the brain, possibly boosting the risk of stroke. Episodes in which air inflow is obstructed by more than 50 percent coincided with blood flow reductions of more than 50 percent in three-fourths of snoring episodes monitored, researchers report in the January Stroke.

To study the effects of snoring on blood flow, Kingman P. Strohl of Case Western Reserve University in Cleveland and his colleagues fitted 11 men and 1 woman with head gear that recorded their snoring patterns and the blood flow in their middle cerebral artery. The researchers found that obstructive apnea, in which a sleeper snores with abrupt snorts and pauses, and obstructive hypopnea, which causes heavy, long, loud snoring, decreased blood flow to the brain in 80 percent and 76 percent of incidents, respectively.

Both snoring conditions arise from upper airway obstructions that prevent the lungs from filling properly. This can create pressure inside the chest and on the heart, impeding blood outflow, says pulmonologist Strohl. The longer the snore, the greater the reduction of blood flow, his team found. Strohl likened the feeling to trying to breathe with a hand over one's mouth and nose. "It's this effort that causes lack of blood flow," he says.

While the reduced blood flow and later upsurge of blood to the brain after the obstruction clears seem to identify a risk pattern for strokes, no cause and effect has been proved, Strohl says. Surgery and other treatments can cure some snoring, but Strohl cautions that research with more snorers is needed to link snoring and stroke definitively. —*N.S.*