



Dermis S. Davenport

# MORTAL

For millennia, the coyote's behaviour was shaped by its archenemy – the wolf. Now, for



Who is America's top dog?  
Coyotes (*left*) and grey  
wolves (*right*) are locked  
in a complex relationship  
shaped by competition for  
food and territory, aggressive  
encounters and hybridisation.

Thomas D Mangelsen

# ENEMIES

the first time in a century, the two carnivores are meeting again, says **ALEX BADYAEV**.

Though coyotes (this is a juvenile) may resemble wolves, their rivals are often five or six times heavier – and far more powerful. Their prey is typically much smaller, too – often hares, mice, squirrels and insects.



It's a sound familiar to everyone living in suburbia in the American south-west. A fire engine trying to negotiate gridlocked afternoon traffic sounds its siren and suddenly, in response, the hills around the city explode with coyote howls. The ululations seem to come from everywhere – from parking lots, playgrounds and back yards. People get up from their dinner tables, conversations pause, children stop their games to look around – every hedge seems to harbour a howling coyote.

For a few minutes the wave of sound rolls through the foothills. Then it stops as quickly as it erupted. Rival packs of urban coyotes, having re-established territorial claims for the coming night, continue their unseen descent into the town below. The city is meticulously subdivided among the packs, with every roadkill-rich street, restaurant dumpster and barbecue grill mapped and marked.

Such a wealth of resources is constantly at risk of being taken over. So much so that the offspring of local coyotes delay dispersing for years, joining their parents and even their grandparents to form the largest possible packs – up to 12–15 animals in some parts of town – to defend the most prized territories.

Two thousand kilometres to the north, as the sun sets over a vast Idaho prairie, a decidedly non-urban coyote

### THE EXPERT

ALEX BADYAEV



is a biologist for whom photography goes hand in hand with ecological research. He is professor of evolutionary biology at the University of Arizona. See more of his wildlife photos at [www.tenbestphotos.com](http://www.tenbestphotos.com)

is studying the trajectory of a grazing pronghorn antelope to deduce the position of its hidden newborn. It's the only carnivore with the intelligence to accomplish such a feat – the geometry of a mother's movements in this huge open space in relation to her concealed calf is complex (easily eluding biology students). After hours of triangulating, the coyote trots to the sage clump hiding the calf.

Three thousand kilometres to the east, as night falls on Chicago, the city's large coyote population fans silently through the neighbourhoods. Here, the keepers of territories around numerous eating establishments are resident mated pairs. Nobody remembers the garbage pick-up days, ethnic-festival schedules and sanitation-service routes better than they do. (Pets are another local delicacy – up to 20 per cent of prey items here are cats.)

Two thousand kilometres further to the east, a lone coyote unhurriedly crosses a runway in the headlights of a taxiing transatlantic jet at New York's LaGuardia Airport. In 2010, a rare coyote triggered a slow-speed police chase in Lower Manhattan. But nowadays, the coyotes seen by joggers in Central Park are old news.

North America's most adaptable carnivore – formerly the icon of the USA's rugged Wild West – is now pretty much everywhere. More than eight million coyotes live in all habitats, from the western deserts to the swamps of the Deep South and the coniferous forests of the north-east, and in all metropolitan areas in between. And the coyote has one species in particular to thank for its stunning success – its mortal enemy for millennia, the wolf.

## HARASSING LONE WOLVES EVEN BECAME A FAVOURITE PASTIME FOR SOME COYOTE PACKS IN YELLOWSTONE.



Coyotes thrive cheek by jowl with humans, and have expanded their diet to include roadkill, refuse, pets and even garden fruit and vegetables.

Left: Konrad Wothel/Minden/FLPA, right: Martin Cooper



Coyotes occur everywhere from semi-desert and prairie to forests and mountains. Packs tend to be larger in winter, splitting into smaller groups in spring.

### CYCLES OF CO-EXISTENCE

Like all canids, the coyote originated in North America 10–12 million years ago, but it is the sole member of the family never to have left the continent. It stayed behind when ancestral wolves left en masse for Eurasia via the Bering Strait, and then, thousands of years later, returned in the shape of new species, before the last glaciation.

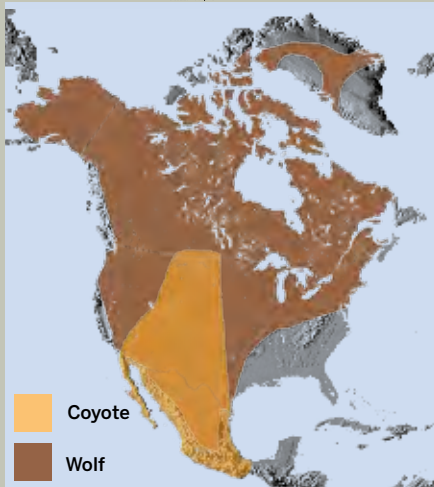
This is when the coyote learned to live side by side with the largest, most fearsome and most numerous canid of all time – the dire wolf. But eventually it saw the dire wolf

go extinct too, about 10,000 years ago, after its main prey of mammoths and large ungulates began to die out in North America's grasslands.

Next the coyote endured a recolonisation of the continent by grey wolves, which came in waves across the glacial sheets from Eurasia. And a short historic time later it saw the complete extirpation of these wolves by newly arriving human settlers, first in the eastern part of North America and then, over the past century, throughout the west. The coyote persisted long enough to see the cycle repeat itself,

## WHO IS TOP DOG? A 200-YEAR STRUGGLE

The distribution of the coyote and the grey wolf are inextricably linked.



**1800** | Coyote: confined to centre and south  
Wolf: widespread, except south-east



**1950** | Coyote: spreading in all directions  
Wolf: persecution is forcing it north



**2013** | Coyote: absent only from far north  
Wolf: advancing steadily south again

Clockwise from left: Alex Badyaev x2; Donald M. Jones/Minden/FLPA



Wolves will not tolerate their smaller cousins on their patch. A coyote that dares to scavenge a wolf kill risks ending up as dinner.

when humans, struggling to reinstate ecological balance, began reintroducing grey wolves to their former range.

It is these repeated cycles of co-existence with wolves that have shaped the coyote's legendary social flexibility, genetic variability and biological adaptability.

### STUCK IN THE MIDDLE

Ecologically, the coyote is a 'mesopredator', in the middle of a trio of American canids, with the smaller red fox at the bottom and the larger grey wolf at the top. If either of these ecological controls moves, the coyote can expand its hunting repertoire. Over evolutionary time, such mesopredators become versatile, and their opportunistic habits have earned them a reputation of being tricksters in fairy tales and legends. In European folklore, the red fox – a mesopredator in Europe – is the undisputed trickster, but in North America it is most definitely the coyote.

The species' response to waves of wolf migration, extinction, recolonisation and extirpation has been dramatic. After the dire wolf's extinction, coyotes grew bigger, developing larger skulls with a stronger bite force, and for a time they occupied part of the dire wolf's former niche. When grey wolves returned to the continent, they pushed coyotes back to their smaller prey niche and sizes.

Then came the grey wolf's extirpation during the 18th, 19th and early 20th centuries, when the coyote again took advantage of newly available opportunities – by starting to hunt ungulates, for instance, instead of the more typical fare of rodents and lagomorphs. The species nearly tripled its geographical range in less than a century.

In some newly established populations in the north-east, up to 90 per cent of coyote prey items are deer – a stark contrast to rodent-subsisting western coyotes. But, as grey wolves reclaim parts of their former range ('Return of the wolf', December 2011), this process is going into reverse. ►

## HYBRIDISATION WOLF OR COYOTE?

In 2010, biologists in Michigan came upon a fresh set of wolf-sized tracks. They set traps, capturing three juvenile siblings – two females and a male. Though these animals resembled wolves, DNA testing revealed them to be coyotes with evidence of past hybridisation. A wolf (their great-grandmother) had mated with a male coyote; a resulting female hybrid (their grandmother) then mated with their coyote grandfather.

This was an echo of widespread hybridisation between wolves and coyotes during the latter species' colonisation of eastern North America, following the extermination of wolves in the mid-1900s. In the north, where

advancing coyote populations met the retreating wolves, the colonisation rate was five times faster than in the south, where wolves had been eliminated well before the first coyote's arrival.

Northern coyotes were becoming larger and darker, with stronger jaws and the ability to hunt deer, and were moving into dense forests. These features – all unusual for coyotes – were the result of hybridisation with the retreating wolves. Females of the increasingly rare wolves, unable to find mates of their own species, bred with male coyotes; the resulting hybrids mated with the coyotes.

And the result? Coyotes with wolf genes, better adapted for hunting large prey in the northern forests.



A coyote pack devours a sizeable elk (red deer) kill in Montana.

00000-431885 © Donald M. Jones/Minden Pictures/ELPA



Since changes in the coyote's prey base and hunting style require major adjustments in social structure – rodent hunting is a solitary affair, while defending large carcasses or bringing down deer requires co-operation – these cycles of lupine coming and going have naturally had a substantial impact on coyote behaviour.

### WOLF WARS

These changes are particularly evident in the Greater Yellowstone Ecosystem, where coyotes enjoyed the status of top canid for over 60 years. That reign ended abruptly in the winter of 1995, when the first Canadian grey wolves were released in this prime part of their former real estate. The priority for the newly arrived wolves was to clear out their former ecological niche – in the first few winters, they killed more than a third of the area's coyotes.

The coyotes proved to be quick learners, though, and these formerly solitary animals began uniting to form large packs that enabled them to defend themselves. So successful was this strategy that, occasionally, a particularly bold coyote pack would succeed in driving outnumbered wolves from their kills. Harassing lone wolves even became a favourite pastime for some coyote packs.

Coyote howls may develop into a noisy chorus as the rest of the pack joins in. These canids also utter a variety of barks and yips.



## TEAM PLAYERS CO-OPERATIVE HUNTING

Coyotes form hunting associations with other species with remarkable ease, reflecting their intelligence and behavioural flexibility.

### COYOTES AND CRANES

A frequent, if bizarre, spectacle in the western USA in late summer is hunting pairs of coyotes and sandhill cranes slowly circling freshly cut hay fields. The cranes feed on grasshoppers flushed by the trotting coyotes, while the canines keep close tabs on voles escaping under the birds' feet.

### COYOTES AND BADGERS

When an American badger digs out a ground squirrel colony, most of the inhabitants escape through the widely dispersed exits. That is, unless it has a coyote partner patrolling the exits, scaring the fleeing rodents back in the badger's direction – and taking a few for itself.

### COYOTES AND WOLVES

Perhaps the most stunning instance of opportunism and inter-species teamwork in coyotes was witnessed in Yellowstone National Park, where

in 1999 biologists watched in disbelief as an adventurous coyote tried to co-operate with a wolf to bring down a young bison.

The coyote sprinted alongside the bison, repeatedly biting its front legs and preventing it from changing direction, while the wolf attacked the animal's hindquarters. Neither canine had a chance of felling the beast alone, but together they succeeded. The coyote no doubt expected to take its fair share of the meat, but the wolf chased it away. It seems that old habits die hard.

Coyotes and sandhill cranes enjoy greater hunting success when working as a team.



Coyotes reproduce much more rapidly than wolves, reaching breeding age by their second year. In spring, females give birth to litters of three to seven pups; litters of a dozen or more young are known.

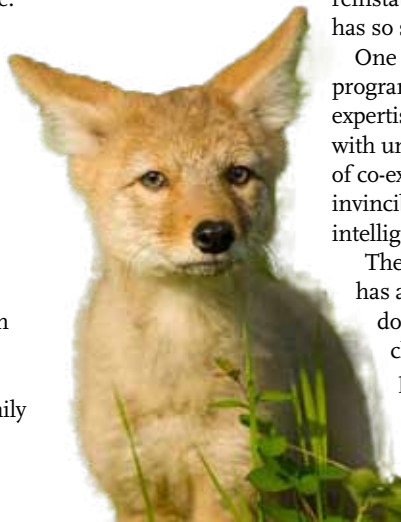
The coyotes drastically reduced their howling, too, because the incoming wolves – busy howling to establish their own territorial boundaries – were very intolerant of this intrusion. They also denned near Yellowstone National Park's buildings and road network to avoid trespassing on wolf-pack territories.

Yellowstone's coyotes rapidly learned to capitalise on the windfall of ungulate carcasses left by wolves – within just a few years, these became their main food source. Acquiring and defending such kills requires bigger packs, and here in the wilderness, as with urban populations in the south-west, larger coyote packs were formed by the recruitment of offspring that postponed dispersal and breeding to stay with the family group. Co-existence with wolves was, once again, having a major effect on virtually every aspect of coyote life and behaviour.

### EMERGENCE OF A SUPERSPECIES

The result of all these changes has been the evolution of an uncommonly versatile carnivore whose social system across its huge range in North America now encompasses every combination seen in the dog family

**A coyote pup is fully weaned after six to eight weeks. Come autumn, it will likely be driven away from its parents' range, though some juveniles stay with their families.**



Canidae. This training has prepared the coyote well for dealing with its greatest enemy – humans.

No other North American species has experienced such consistent and well-orchestrated persecution as the coyote. It has had to contend with daily helicopter hunts costing cash-strapped western states millions of dollars a year, open hunting seasons with no bag limits, sharpshooters and trappers being dispatched to cities, and state senates reinstating archaic bounty systems. Yet no other species has so spectacularly defied its persecutors.

One vital ingredient that these animal-control programmes do not have enough of is biological expertise. So this indiscriminate killing, in combination with unusual social flexibility honed over millennia of co-existence with wolves, is helping to create an invincible superspecies – an extraordinarily adaptive, intelligent predator that has learned to live off humans.



The Achilles heel of large and medium-sized canids has always been their social structure: only a single dominant pair breeds in each pack. So there are clearly defined social hierarchies, which are particularly important when co-ordinating hunts – initiating attacks, planning long-distance





Ever the opportunists, coyotes can swim and fish. This one caught a cutthroat trout in a mountain stream.

## HEAD TO HEAD WOLF vs COYOTE

	 <b>GREY WOLF</b> <i>Canis lupus</i>	 <b>COYOTE</b> <i>Canis latrans</i>
<b>HEIGHT</b>	Up to 90cm at shoulder.	Up to 61cm at shoulder.
<b>HEAD TO TAIL</b>	Male: 140–190cm; female: 125–170cm.	100–134cm in both sexes.
<b>WEIGHT</b>	Male: up to 70kg; female: up to 50kg.	Male: 7.8–15.8kg; female: 7.7–14.5kg.
<b>DIET</b>	Mostly large mammals, including moose, caribou, bison, elk (red deer) and white-tailed and mule deer; sometimes takes livestock, small animals and carrion.	Mostly small mammals such as rodents and hares, but also a wide range of other animals, fruit, carrion and refuse. In some areas (mainly in north), hunts deer and other large mammals in packs.
<b>SOCIAL STRUCTURE</b>	Lives in packs that are mostly family groups led by a dominant breeding pair. Most packs consist of 5–12 individuals, though larger groups up to 40 strong are known.	Social unit is a mated pair that lives alone or with relatives in a pack, usually small; packs of 15–20 form in cities and where large mammals are key prey.
<b>LEGAL STATUS</b>	Removed from USA's Endangered Species List in 2011; some US states now operate regular hunting and trapping seasons.	Considered a pest species and subject to concerted efforts to control its populations.
<b>POPULATION</b>	57,000–77,000 (USA & Canada).	Probably more than 8 million.

movements and territorial negotiations with neighbouring packs are the prerogatives of older, dominant individuals. Should one of these leaders be killed, an otherwise healthy coyote pack can easily die out.

On the contrary, animal-control departments say that a typical complaint about coyotes (for example, a killed pet, slaughtered lamb or barbecue brazenly stolen from a back yard) results in the destruction of several adult animals in the vicinity before the culprit, often the best at hiding from people and avoiding traps, is finally identified. Such untargeted culling inadvertently imposes a strong selection pressure on the coyote to be able to 'restart' its pack from different starting points.

As a result, juvenile coyotes whose attempts at mating were previously suppressed by older pack members begin to breed; the newly mated pairs split from packs and form their own bands of juveniles. Instead of large packs consisting of individuals of varying ages, which provide food and baby-sit for the dominant pair's single litter, now juvenile pairs are overwhelmed by the demand for food from many growing pups of their own. Sheep and pets – which are easy and abundant prey – pay the price. And all the while, coyotes learn to use human environments without being seen.

### NOW YOU SEE ME...

None of the USA's common mammals are easier to see in the country's protected areas and yet harder to observe outside them than the coyote. In Yellowstone National Park, it seems to be the only resident – aside from park rangers – that knows the exact location of park boundaries. Many moose, deer and wolves have lost their lives because they stepped over the unmarked boundaries where national park territory merges into wilderness lands where numerous hunters camp. Coyotes make no such mistake.

The same animals that trot beside queues of cars in broad daylight at park entrances, begging for handouts from open vehicle windows, all but disappear outside the park. Coyotes are no less numerous there, just invisible,

becoming nocturnal and suspicious. They know us too well.

Last year, a study in Los Angeles compared the patterns of neighbourhood use by its coyote packs with those of 29 street gangs. The scientists found that city use by the canines and the human gangs was identical in relation to prominent landscape features, such as interstate highways, overpasses and shopping malls, as well as interaction with their neighbours. Though gangs used graffiti to mark territorial boundaries and conflict areas, and the packs favoured urination posts and piles of faeces, these badges of ownership were frequently left in the same places.

The species that received its first lessons in social skills by sharing mammoth remains with some of North America's most fearsome prehistoric predators, and whose survival strategies were honed by many thousands of years of life-and-death co-existence with grey wolves, is here to stay. 🐾

## A STUDY IN LOS ANGELES FOUND THAT CITY USE BY COYOTE PACKS AND ITS GANGS WAS IDENTICAL.

### FIND OUT MORE

For more information, visit  
[www.projectcoyote.org](http://www.projectcoyote.org)  
[www.urbancoyotersearch.com](http://www.urbancoyotersearch.com)  
[www.rockies.ca/coyotes/index.php](http://www.rockies.ca/coyotes/index.php)

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