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NATURETECH

Wolf? Coyote? Coywolf? Understanding Wolf Hybrids Just Got a Bit Easier

BY MATT MILLER

AUGUST 3, 2015 | Follow Matt

Eastern wolf in Algonquin Park. Photo: © Michael Runtz

***In a Nutshell**: Eastern wolves, often considered to be a hybrid of gray wolves and coyotes, actually represent a separate species, revealed by the latest genomic research published in Biology Letters. The paper also helps clarify the hybrid origins of other wild canines, including Eastern coyotes and Great Lakes wolves.*

Unlike Little Red Riding Hood, most of us can tell the difference between a wolf and Grandmother. But beyond that: our wolf identification skills are probably not as good as we think.

Consider the names bandied about the popular media today: gray wolf, red wolf, coyote, coywolf, coydog. Which of these are species? What is the real deal with hybrids? What does it mean for conservation?

The answers are not simple, in large part because the topic of wolves and wolf hybrids often resides more in the realm of folklore than biology. A good way to pick a fight in any bar in rural America is to start offering opinions on "Canadian gray wolves" or "coywolves" or "eastern coyotes."

What does the science say?

A new paper in the journal *Biology Letters* uses the latest genomic techniques to give a clearer picture of canid taxonomy and hybrid origins. The researchers used a technique called restriction site association DNA marker sequencing (RADSeq) and genomic simulations to resolve the hybrid status of wild canines in North America.

It's only in the last ten years that these techniques have been developed to be able to understand complicated biological systems — not just in humans and fruit flies, but in wolves and all kinds of other creatures.

A whole new set of questions can now be answered with these genomic techniques – including questions about wolf hybrids.

Even the paper's authors acknowledge that canine taxonomy can be, well…complicated.

"The genetics has gotten very complicated," says the paper's lead author, Linda Rutledge, post-doctoral researcher and instructor at Trent University, Ontario. "It's very difficult for

people to read genomic papers and understand them."

So what should wildlife conservationists know about this research? Here are some key points.

Despite being often overlooked, Eastern wolves are a separate species.

The paper notes two prevailing evolutionary models for animals in the Canis genus in North America. One model maintains that there are two species of wild canids: the gray wolf (*Canis lupus*) and coyote (*Canis latrans*). Their comingling has also resulted in various hybrids.

The second adds a third species to the mix: the Eastern wolf (*Canis lycaon*).

For years, many have considered the Eastern wolf to be one of the hybrids of gray wolves and coyotes. This has led to confusion among policy makers and the general public.

The genomic research in this paper found no evidence that the Eastern wolf is a hybrid.

It's a separate species.

Disagreement over the eastern wolf's evolutionary history may be its biggest threat.

As geneticists debate, policy makers and wildlife managers base their decisions on confusing information. Or, more often: they feel paralyzed to make decisions.

Eastern wolves, though, need action. Their core population is centralized in Algonquin Provincial Park in Ontario. For many years, the animals could be legally shot as soon as they left the park.

That's changed: there is now a buffer zone around the park that prohibits all hunting and trapping of wild canids.

But beyond that, protection of eastern wolves in Ontario is largely on paper only. Why? The eastern wolf is difficult to tell apart from the coyote. And coyotes can be hunted or trapped year round, without bag limits.

So it's essentially open season on eastern wolves in potential expansion areas.

The paper's authors hope that establishing the evolutionary history of the eastern wolf, demonstrating it is a species and not a hybrid, will lead to better protection.

"The eastern wolf needs a recovery plan that extends into dispersal areas, including Quebec," says Rutledge. "There is wonderful habitat for them to disperse into; there just needs to be protection so they are not killed as soon as they disperse out of the buffer zone."

A Wisconsin coyote. Photo: Matt Miller/TNC

Eastern coyotes and Great Lakes wolves are hybrids.

The genomic testing revealed three species of canids, but there are also hybrids arising from these species encountering each other.

Here is what the paper argues about hybrids.

Eastern coyotes are hybrids of western coyotes and eastern wolves. This is the animal often referred to as the coywolf.

Following extermination of wild canids in the eastern United States following European colonization, western coyotes began colonizing the habitat – and bred with eastern wolves when they encountered them on their expansion.

Great Lakes wolves are hybrids of gray wolves and eastern wolves.

Red wolves are likely the same species as eastern wolves.

The researchers did not test for red wolves for this paper, but relied on a body of work conducted previously.

These animals, once found in the southeastern United States, became critically endangered in the 1900s, and the last wild animals were gathered and placed in captive breeding facilities.

The captive breeding of a small population may have caused their genetics to diverge from eastern wolves. They have been since been reintroduced in sites of the Southeast – where they breed readily with coyotes, perhaps further confusing the genetic situation.

“The attention and controversy around wolves is all cultural, not biological,” says coauthor Paul Hohenlohe, assistant professor of biology at the University of Idaho. “But the reality is the biological situation is also complicated. It’s not static.”

The role of canids in ecosystems is as important as their evolutionary history.

Arguments about wolf management and conservation can quickly descend into trying to reconstruct the past. What wolf really belongs in the East? Were gray wolves there? Are Canadian gray wolves the same as Rocky Mountain wolves?

Historical records don't help. European explorers were not taxonomists, let alone geneticists. They called things by confusing and inconsistent names: brush wolf and gray wolf and black wolf could all mean the same thing, or be perceived as different species.

And so obsessing over what canine belongs where can seem a futile quest.

Lead author Rutledge proposes another way for conservationists to approach this: focus on the ecosystem not the species.

"Conservation focuses on a very species-specific model," she says. "Agencies often want to know first whether a species is taxonomically valid, but that may not be an efficient way to approach conservation in general. Our research shows that what species are can be very difficult to pin down."

"But we know that ecosystems need top predators," she continues. "That is so clear in the case of over-abundant white-tailed deer in eastern forests. The eastern wolf could play that role, if it could disperse."

In other words: Let's quit trying to make wolves fit into our neat little taxonomic boxes. Let's focus instead on how to protect and restore their critical role as top predators.

REFERENCES

The paper: Rutledge LY, Devillard S, Boone JQ, Hohenlohe PA, White BN. 2015 RAD sequencing and genomic simulations resolve hybrid origins within North American Canis. Biol. Lett.11: 20150303. http://dx.doi.org/10.1098/rsbl.2015.0303

TAGS: Anthropocene, Genetics, Mammals, Wolves

Matt Miller is director of science communications for The Nature Conservancy and editor of the Cool Green Science blog. A lifelong naturalist and outdoor enthusiast, he has covered stories on science and nature around the globe. Matt has worked for the Conservancy for the past 14 years, previously serving as director of communications for the Idaho program. More from Matt

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35 COMMENTS

BY DAVID | REPLY

AUGUST 3, 2015

Thanks for this interesting story, Matt. One key question arises from the last two sentences of this piece: how well do coyotes fill the role of top predator in the east, and what differences are there between coyotes and Eastern wolves in affecting ecosystems? Seems like that is very important information in trying to advance the strategy of enabling dispersal of wolves in the east, since coyote extermination is a barrier to returning wolves to a wider range. If the role of coyotes is similar, that takes away at least one argument for unrestrained shooting of coyote. This also seems to be a situation where the Conservancy's increasing emphasis on social science could play a significant role.

BY MATT MILLER | REPLY

AUGUST 17, 2015

I think more studies are needed, but it is pretty clear the eastern coyote is not behaving like a wolf. That is again contrary to lore — the "hook and bullet" magazines are full of stories claiming that eastern coyotes are heavily preying on white-tailed deer. Studies suggest otherwise.

The eastern wolf — that looks an awful lot like a coyote — does prey on deer.

BY GARY P.BELL | REPLY

AUGUST 4, 2015

Interesting article Matt. Thanks for the link to the Rutledge paper. One correction: Algonquin is a Provincial Park, operated by the Province of Ontario, not a National Park.

BY MATT MILLER | REPLY

AUGUST 17, 2015

Thanks Gary. I made that correction. — Matt

BY JOHN PRUSINSKI | REPLY

AUGUST 5, 2015

It's my understanding that the hybrid Eastern coyote picked up some predatory advantages from crossbreeding with wolves: greater size, and a tendency to hunt in packs, for example. I would think that would bolster the case for classifying them as top predators in the Eastern ecosystem.

BY PETE KLEIN | REPLY

AUGUST 5, 2015

This is a perfect example of one of the many things that are wrong with humans.
We insist on defining everything. Wolves – coyotes. White – Black people. Straight – gay.
And by defining things, we think we know something.

BY ME | REPLY

AUGUST 14, 2015

Speak for yourself!

BY JIM KESEL | REPLY

AUGUST 17, 2015

We cannot live with ignorance.

BY JACK REYNOLDS | REPLY

AUGUST 17, 2015

Defining a thing is only the first step to understanding. It is a necessary one however and should be recognized as such.

BY HENRIETTA JORDAN | REPLY

AUGUST 5, 2015

You can view these magnificent creatures locally at the Adirondack Wildlife Refuge (977 Springfield Rd., Wilmington) in a new large, natural enclosure.

BY NATSCA DIGITAL DIGEST | NATSCA | REPLY

AUGUST 7, 2015

[…] from the European golden jackal, and is actually much more closely related to wolves! And new genomic research has clarified the status of Eastern wolves and other North American […]

BY AND | REPLY

AUGUST 8, 2015

Eastern Coyotes are not as much of an apex predator as Eastern Wolves – even though they share genetics.

BY ROBERT | REPLY

AUGUST 17, 2015

I saw a creature in my headlights one night when I took a friend home in Pinecrest, FL. It certainly wasn't a dog, it was too big for a fox (wrong color, also), so I guessed it had to be a coyote, but I hadn't seen such a creature for many years since I lived in Wyoming. I don't

think it was a wolf, because I'd seen wolves in Yellowstone NP, and this creature wasn't as big as those. This article seems to imply that coyotes and Eastern wolves interbred, but that seems unlikely. Out West, wolves usually chase coyotes away from wherever they frequent, so why wouldn't Eastern wolves do the same? I've seen foxes in the distant Miami suburbs before, so I think coyotes could live there also.

BY MATT MILLER | REPLY

AUGUST 17, 2015

Eastern wolves and coyotes have interbred — the genetic studies are clear on that. Eastern wolves are a different species than gray wolves.

Similarly, gray wolves and eastern wolves have bred — these hybrids live in the Great Lakes area.

When people refer to wolf/coyote hybrids, the assumption is this means gray wolf & coyote. That's not the case: it's eastern wolf/coytoe or gray wolf/eastern wolf.

BY CATHY MEYER | REPLY

AUGUST 17, 2015

They can't interbreed if they don't encounter each other. If there are no wolves around, they are just plain coyotes, aren't they? Could expanding coyote populations have crossed with southeastern red wolves before they were nearly exterminated?

BY OAKES PLIMPTON | REPLY

AUGUST 17, 2015

Matt Miller: How about their behavior?? I understand the Eastern hybrid (thought so up to now) behaves like a Coyote, "yips" instead of "howls" and hunts singly rather than in packs. I just read this amazing book Wolf Called Romeo!

Oakes Plimpton

BY MATT MILLER | REPLY

AUGUST 17, 2015

Hi Oakes, thanks for your comment, and I'll check out that book. Eastern coyotes, contrary to a lot of stories and anecdotes, are not a significant predator of white-tailed deer. And everything I have read has suggested your observation is correct: they behave like coyotes, not wolves.

However, eastern wolves do prey on deer. It would be interesting to see what happens if/when eastern wolves expand their range.

BY SUZANNE GRIFFITHS | REPLY

AUGUST 18, 2015

So here's a question. Eastern coyotes do not prey on deer. Eastern wolves do, but did I correctly read that they're not currently found outside of Canada? What was it, then, that clearly preyed on/ate part of a deer on Big Hosmer Lake in Vermont's Northeast Kingdom a few winters ago?

BY GEORGIA NEAL | REPLY

AUGUST 17, 2015

This is what I think,I think the coyote and wolf are separate creatures , if they the hunters the trappers and the haters if these animals ..will use any reason they can dream up to exterminate the majestic wolves and coyotes …We must stand up for our wildlife they are not a threat to Mankind we the threat …God created his wildlife for a reason ….we can all co exist and help our Eco system We need to stop these self serving bloodthirsty soulless hunters who don,t give a dam about anything accept there own cheap thrills!!God please give your power to stop this now!!

BY MARK GALL | REPLY

AUGUST 17, 2015

White tailed deer in the eastern U.S. desperately need to have their numbers consistently reduced for the sake of plant species, other wildlife, and drivers (deer accidents)/farmers. So long as coyote hunting is allowed, I doubt that wolves, or wolf hybrids, can be maintained as they will simply be shot. Biologically, there is no reason for having coyote hunting to keep their numbers down, as their reproductive physiology simply produces larger litters, ie rapidly fills in the eliminated animals. We need large predators, and wolves or hybrids are not a danger to humans, except in some people's minds.
I say this as an ex hunter (I'm not against legal hunting), biologist, and retired National Park & BLM ranger.

BY BRAD | REPLY

AUGUST 17, 2015

This will be the last word. Until the next study comes out, using the next in an endless series of definitive new molecular techniques. The conclusions are always stated with certainty, but these are based on simulations and PCA. Please!

Rutledge is the same lead author of a previous study that the USFWS relied on exclusively to declare "Eastern Wolves" extinct and thereby to foreclose any possibility of federal wolf conservation in the East. And that study was roundly criticized by other geneticists and wolf experts. Do not be so quick to latch onto this one. It's just one study.

BY JIM KESEL | REPLY

AUGUST 17, 2015

Excellent article. As a retired wildlife biologist that has worked with Great Lakes wolves recent research cited in this article answers a lot of the questions we had when these animals were recolonizing Michigan, Minnesota and Wisconsin. Occasionally a trapper would show up at our office with a extra large coyote weighing more than 50lbs. Facial and body structure were all coyote but bone structure especially the jaw said wolf. In my opinion mixing a coyote

genome with the wolf genome will make a very effective large predator that will have an interesting interface with humans in urban areas.

Again interesting article.

BY TONY CHIAVIELLO | REPLY

AUGUST 17, 2015

If these variations are truly separate species, then would not their offspring be sterile, which I believe is the practical definition of separate species (see horse + donkey = mule = sterile offspring; the same should go for grizzly bear + polar bear = ? = sterile?).
This would give no long-term benefit to protecting the continuation of these variations in nature: their offspring would not reproduce and would then soon disappear.
so, are we setting different standards for existence of distinct species that supersede reproduction capability? I'd like that made clear if it is indeed the case.

BY DEBRA | REPLY

AUGUST 17, 2015

In my neck of the Great Lakes (CLE and maybe a bit beyond Cuyahoga Co), it is recognized that coyotes take small fawns (<|= 1week). Much anecdotal evidence suggests that there are varying degrees of pack hunting, presumably among family members.

Wild canids could indeed benefit, in my belief, our local ecosystems if allowed to saturate suitable habitats unmolested. In these highly urbanized areas, humans are a constant player. However, I fear more that in the future humans will interfere by actively feeding wild canids table scraps, just as some currently feed white tails on their properties, as opposed to killing them wholesale or piecemeal.

There are lots of variables at play in these environmentally volatile times, and genetics is just one. Which species will benefit from climate change?

Perhaps the better question is which set of adaptations will win in a particular scenario, and which species will provide the proper ecosystem service(s) needed in particular habitats?

BY GREG M HALL | REPLY

AUGUST 17, 2015

Matt,I have property in a remote, rural part of the western North Carolina mountains where as recently as 15-20 yrs ago squirrel, rabbits,quail,grouse and pheasants were fairly plentiful and often seen,heard,and hunted. More recently over the past 10-15 yrs there has been a significant uptick in the coyote population(not seen previously) and some have attributed the major decline in the above mentioned species to this influx of coyotes. Is this in fact likely due to the coyotes, or is it not that simple? And, if so, could the reintroduction of wolves to the area rebalance the ecosystem in a way similar to what happened in Yellowstone?

BY MATT MILLER | REPLY

AUGUST 21, 2015

Greg, thanks for your comment. It is really difficult to say. I have seen some studies that have indicated that what biologists call “meso-predators” (the mid-sized predators that thrive near humans) can have a significant impact on a variety of small wildlife. It may be coyotes but it could be other smaller predators you don’t see regularly, like raccoons.

However, I have also seen coyotes take the blame for changes in small wildlife populations when it’s clearly not the case. One example that springs to mind is Iowa, where the population crash in pheasants and northern bobwhite is often blamed on increased predators. However, the research clearly shows these populations crashes are tied to a loss of CRP lands, a loss of edge habitat, weather, disease and pesticides.

In areas that have good habitat, there are pheasants. Northern bobwhites, there is a lot more going on. But in both cases, predators play a minimal role.

There may be subtle changes on your land. Or it could be predators.

Finally, large predators are a huge and beneficial force on the landscape. The science is clear on that. And they do help control the smaller predators like coyotes.

BY JOANNE KLEIN | REPLY

AUGUST 18, 2015

Whatever their origins, regardless of mix, wolves are among the most beautiful and highly intelligent of animal species. I hope they will defeat the current drive to eliminate them – this would be a huge detriment to the balance of nature.

BY FLORENCE RENEE TWEED | REPLY

AUGUST 18, 2015

Having had the honor of having both a wolf/dog and a 100% wolf in my life as companions, I feel I am somewhat qualified to speak to something on the wolf issue. The half wolf I had was mixed with a huge dog breed; a Great Dane. We got him when he was seven weeks old. He was jet black with bright blue eyes. We named him Alpha. He was cute, goofy and loved to play silly games with us humans. He would make sounds that sounded like he was talking, as the sounds made words. There was nothing he couldn't figure out how to get into if he wanted to. That canine was exceptionally smart! I loved him.

We also had a wolf who had no doggie DNA in him whatsoever. He was very different from the hybrid we had before. He was very, very clever. He was quite determined early on that he was in charge. We called this one Lobo. He was cream colored with the typical wolf markings on his face. His eyes changed color often for a while. They finally settled on a golden brown. He was quite intimidating when he came at you with his head held sort of down and his neck out. After a while, it got to be impossible to keep him in the fenced in yard anymore. He would escape from any kind of enclosure we put him in. One day we heard the call of wild wolves over in the mountains which surrounded the house. Lobo heard them too; and a look came over him that we knew meant he wanted to go be with his kindred. So we let him out of

the pen and he took off like a shot. We never saw him again after that. The house burned down shortly after that and we had to move away.

Anyway, what I wanted to say is this… For all the people out there who think they want a pure wolf, you'd better think again. Wolves are NOT dogs. You can neither keep, raise, train, discipline or feed them like dogs. Wolves just aren't meant to be kept like dogs. They don't really need you to survive and they can dig out from under most any fence you erect, they're expert climbers too. While when young they will accept your position over them, but a male especially as it matures will start to see you as something that needs to be put into subjection under him. If you're a woman, he will never knuckle under to your dominance over him once he grows up. If you're man, he will seek to challenge you for the position of pack leader until he is dead.

Wolves are gorgeous, highly intelligent creatures who have a purpose in this world and deserve to be left as what they are… W-I-L-D. While I feel honored to have had one in my life, as Lobo taught me many things; much more than I ever taught him… He needed to be wild and so I let him go be with his kind for the rest of his life. It was simply the right thing to do, though it was a difficult thing for me to do. I will always continue to admire and love wolves, just from afar; which is as it should be.

BY GABRIELLE DES ROCHES | REPLY

AUGUST 19, 2015

I am particularly interested in this topic, not only from a anthropological and taxonomic perspective, but as an ANIMAL LOVER AND ADVOCATE!!
It dismays and angers me immensely, every time I hear or see about a wolf, coyote or any number of other animals "invading" OUR neighbourhoods and causing unnecessary fear and panic …. even among police officers and animal control.
This always seems to lead to tragedy for the innocent, defenceless and sentient creatures WE HAVE DISPLACED with our ever expanding "Urban Sprawl". Tell me, where are they supposed to live and feed themselves ??
Those animals who are killed "in self-defence" hardly ever pose a real danger, but a perceived

one.
Both the general public and law enforcement officials MUST BE RE-EDUCATED to take into account, both the SAFETY OF BOTH THE PUBLIC AND THE ANIMALS.

BY RUTH WUSTNER | REPLY
SEPTEMBER 16, 2015

Thanks Matt for helping me to understand the difference between Coyotes, Gray wolves, Eastern wolves, Coywolves and Eastern/Gray wolf hybrids. I saw something about 3 week ago, and I am not sure what it was. It ran in front of my car and it was so close I was surprised I did not hit it. To me, it looked like a cross between a wolf and a coyote. It was huge; long legs, thick fur, bushy full tail. It had a longer snout, and the body was full. It appeared to be in good health, the fur was thick and shiny. It was white and tan with black markings. I was certain it was a wolf by its size, but the head was not quite right, longer nose, head not as full. Then someone who works for my Vet told me about Coywolves. Is this really possible? I live in Wisconsin, and there has been a lot in the news lately about coyote attacks. The animal I saw was beautiful, I feel lucky that I saw it, I did not think to take a picture, but I wish I had. I would love to hear your thoughts. Thank you.

BY HEATHER JOHNSON | REPLY
OCTOBER 12, 2015

Thank you Matt for such a wonderful article.

I have a small livestock farm with sheep and goats in Muskoka, which I believe is an expansion area for the Algonquin Park Eastern Wolves. We are very keen on using predator friendly livestock protection and are currently using livestock guardian dogs to chase off and keep predators at bay.

We see widely spaced (>= 1m) canid tracks in the snow in winter, and have always thought that these were wolves, but are uncertain. For the past year we have had a big influx in what everyone is calling Coywolves, and they are absolutely crazy, and don't seem to match descriptions of either wolves or coyotes. Many of them are black or very dark coloured and

I've heard reports of two white ones. They hunt in packs and will scale fences at least 6 ft high with 2 strands of barbed wire atop; they did this to kill one of my neighbor's ewes right in her barnyard, right in front of her LGD who was holding the rest of the flock back in the barn. My own very large Maremma took a big puncture wound to his neck defending our sheep last winter.

Are these the canids that are "supposed" to be here or not? Should we continue to add more dogs to our 'pack' and keep trying to hold them back? Or should farmers be trying to shoot these Coywolf or Coydogs so that the actual wolves (which are rumored to be easier to deal with using dogs) can move in?

Alot of people in the community are really worked up over these canids as a lot of small dogs and other pets have been going missing. I've tried contacting both OMAFRA and the MNR in the past and all anybody has ever told me is that we are entitled to shoot anything that is attacking our sheep. As a farmer, I already realize that.....but given the opportunity, I'd rather have a predator management plan that is in tune with wildlife, and helps nature but does not hinder it- but currently, I'm not really sure what these canids are, and what the appropriate way to deal with them is.

Any direction appreciated. Thank you 🙂

BY MATT MILLER | REPLY

OCTOBER 13, 2015

Heather,
Thank you for your thoughtful comment, and for your attitudes towards raising livestock in a predator-friendly manner. It is difficult to know what the canids are in your area. Are there biologists you could consult? I will try to find a better answer for you! Thanks again for writing.

BY MEGHAN RUGGIERI | REPLY

OCTOBER 12, 2015

Here's a question. Are the Buffalo Wolf and the Great Plains Wolf the same one and the same?

BY MATT MILLER | REPLY

OCTOBER 13, 2015

Hi Meghan,

The many names used for wolves through history can make this really difficult to determine. If you read some old hunting stories, black wolves are treated as a separate species (they're not). Terms like "buffalo wolf" and "Great Plains wolf" were used commonly, but inconsistently. Since this was before scientists could use genetic markers, and even many field observations were inconsistent, we may never know what subspecies were here or not. I'm afraid it's a confusing picture. A lot of early naturalists, hunters and explorers used a "folk taxonomy" to name things. This can make determining the historic range of wolves, coyotes, etc really problematic. I am glad that these researchers are helping to untangle the picture.

BY SOM SAI | REPLY

NOVEMBER 13, 2015

Obviously some restoration is needed. I recommend the Rock Creek National Park, it worked in Yellowstone and Jamie Rapaport Clark who was so instrumental in that restoration also has an office nearby, she can help again.