

Why jackals thrive where humans dominate

April 30 2019, by Alvin Powell



Nathan Ranc, a graduate student from the Moorcroft lab, studies the spread of golden jackals in Europe. Credit: María F. Sánchez

As humans put nature under the plow, asphalt, and concrete, some creatures thrive through an "enemy of my enemy is my friend" approach, embracing our disruption of the natural order, and rushing to fill the void created by hunting and habitat change.

Nathan Ranc, a doctoral student studying jointly in Harvard's Department of Organismic and Evolutionary Biology (OEB) and the Fondazione Edmund Mach in Italy, has been working with European biologists to document the surprising spread of the golden jackal through Eastern Europe.

Originally a creature of the warmer, drier environments of Turkey, the Middle East, and India, the jackal has spread north as far as the Baltic Sea nation of Estonia, walking for the first time in [human memory](#)—and perhaps ever—under northern forests' pines.

Ranc, working in the labs of OEB Professor Paul Moorcroft and Francesca Cagnacci, the 2015–2016 Hrdy Fellow at OEB and now at the Fondazione Edmund Mach, has helped track the jackals' European spread and is analyzing data to better understand what environments *Canis aureus* prefers and how its interactions with native creatures—particularly the recovering wolf—affect its spread.

Ranc sat down with the Gazette to talk about the golden jackal and how it models an often-underappreciated part of nature—the part that doesn't shun [human activity](#) but remains wild and prospers in our city edges, farm fields, and fragmented forests.

Q&A

GAZETTE: Tell me about your work with the golden jackal in Europe. What are you doing there and what are you hoping to find?

RANC: The work on golden jackals started in 2014. I'm a naturalist and I was interested in actually seeing this animal that I heard was dramatically expanding its distribution in Europe.

I was in Croatia and I contacted one of my friends working on [large carnivores](#) in Slovenia and he sent me the latest published literature on the animal. This article was an analysis of golden jackal patterns in Europe and I thought it was really interesting.

I sent him an email and said, "Look, I'm developing techniques that could actually be used to answer some of the questions you've been raising with this paper, but that were left unanswered."

So we set up a meeting, pretty much on the side of a highway. This is what we're still working on.

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GAZETTE: And who's the researcher?

RANC: Miha Krofel [at the University of Ljubljana]. At that point, our main question was what type of habitat do these jackals occupy?

Everybody had some idea about where they're found in their local areas, but nobody had the big picture. Hungarians had a good idea of where they were in Hungary. Croatians had a good idea of where they were in Croatia, and Greeks in Greece.

The second thing that we were interested in was their spatial association with wolves. Were they found in places where there were established wolf packs, where wolves were scarcely present, or where wolves were absent?

We based the study on a theoretical body of literature called "mesopredator release," where a large carnivore goes extinct and a

mesocarnivore [of intermediate size] can take much more space than it used to. The reverse is also true—when the carnivore returns, usually it shrinks either the abundance or distribution of the mesocarnivore.

The third thing we were interested in is knowing where suitable habitats could exist beyond the places that are currently occupied, because the main question we always get is, "How far and when?" When people hear about the expansion and are ahead of the wave, they wonder if and when they are going to catch it.

A lot of data existed already. It was patchy, but it existed. We needed to create a network of people who could share their data and, also complement it with additional surveys.

GAZETTE: The golden jackal is expanding its range. Would it be considered invasive?

RANC: It's definitely expanding its range. They arrived in Europe about 8,000 years ago. They were restricted to a very small place for most of the time.

Nowadays they're found in Estonia, and I can tell you they have never been in Estonia before. They've been recorded in Switzerland, in France, in Netherlands, in Germany. They've never been there before either.

That's just for dispersers, but even in the core range of the species today, we have no historical records of them being there before the '70s, the '80s, or the '90s.

Now, "invasive" means that the species causes harm to biodiversity, economy, or public health. But to be an invasive species, you need to be an "alien species" first. That's the European Union definition, which

needs to be applied here. And an alien species has a very clear definition: It has been moved physically, either intentionally or unintentionally, by humans. Jackals have not been moved physically by humans. Therefore they're neither an alien nor an invasive species. Like other species, they're taking advantage of human modifications of the environment.

With global change, there are winners and losers. The jackal is a winner, in the same way coyote was a winner [in North America].

GAZETTE: Where does the jackal fit in ecologically? Between the wolf and the fox? Was there once another predator in that space or is it moving into the space occupied by the wolf before it was hunted out?

RANC: It definitely fits between those two canids. But you ask whether there ever was something there and it depends on our temporal reference. Because Europe having lions, leopards, and other animals—on a geological time scale—is not that far in the past. And at that point, there were probably a lot of other trophic levels.

If we're talking about historic time, indeed they've taken space that was certainly vacant and which may have been once held by other species. That's the space that here [in the U.S.] is occupied by coyotes, especially in the West.

What we see so far is that the wolf seems to have supremacy on jackals. We found jackals killed by wolves. We found that local jackal groups disappeared after wolves came back. And we found a negative association between wolves and jackal presence that is not easily explained by anything—habitat or proximity of people—other than wolf presence.

That is for the upper part [of the jackal's niche]. For the lower part, we have seen a high diet overlap between the fox and the jackal. And we know jackal densities can reach those of red fox. Instead, when you compare wolf and jackal densities, there are about 100 more jackals than wolves for a given area.

GAZETTE: And the consequences might be fox populations declining?

RANC: We still need to conduct research, but my ecological intuition is that so many potentially competing carnivores cannot step in on red fox territories without consequences.

GAZETTE: Do foxes have any chance against jackals?

RANC: In a direct challenge, it's probably going to be to the advantage of jackals.

GAZETTE: The foxes are just smaller?

RANC: They're indeed smaller, about half the size.

The impact of jackals may not only happen through direct predation, or direct killing of individual foxes; it may be that they compete either actively, through territorial or resource defense, or just by reducing resource availability for red foxes. They might also interfere through disease dynamics. This is a little bit of the unknown here.

GAZETTE: When we talk about ecological niches, clearly another factor is the presence of humans. Are

jackals better able to live in close proximity to humans than wolves and take advantage of a niche that, while not entirely natural, nonetheless exists?

RANC: That's an interesting question. Jackal behavior and needs collide less with humans. People don't feel threatened by jackals. I don't think there is a strong rationale for feeling threatened by wolves, but many people do. Wolves tend to predate on livestock. There are solutions to reduce this, but they generally do. Livestock predation by jackals tends to be less of a complaint.

Jackal population dynamics are strong; that means they are better able to buffer human impacts than larger carnivores. In general, smaller carnivores have more resilient populations and are less vulnerable to killing by humans. And most important, jackals largely benefit from scavenging on anthropogenic resources in garbage dumps, for example.

What's complicated in the current situation is that we have two simultaneous dynamics to disentangle. We have the jackal expansion and we also have the wolf expansion. And we are seeing that wolves are actually quite good at dealing with people, especially in places where they are protected. They are able to use habitat close to settlements in ways we probably did not imagine before.

So there's going to be a three-way interaction here and what's probably going to delineate the jackal's niche is the long-term relationship between wolves and people. Will wolves remain protected, or be persecuted again? That might buffer how close to humans they are able to establish stable packs and, in turn, the space available for jackals.

The interaction with humans might also be important for the red fox. If it turns out that foxes are indeed negatively impacted by jackals, though

foxes might find more resources near settlements, these might be population sinks for them.

In this context, the red fox might be better off away from people, which is the reverse pattern you would expect from the distribution of resources.

GAZETTE: To avoid the jackals?

RANC: That is correct. They may be better able to survive in areas with lower resource availability and stable [wolf packs](#) that are able to deter jackals. In this case the enemy of an enemy is really a friend. So we might have these different spatial spheres of influence of the different carnivores that are largely mediated by humans.

My guess is that if European landscapes were still covered by the historical large, unfragmented European forest, there'd be no jackals whatsoever. You'd have wolves all over the place and low resource availability for jackals.

GAZETTE: What does all this tell us about nature in what's being called the Anthropocene? We think of species doing better or worse according to how humans impact their natural environment and how much of it is preserved. But skunks and raccoons are all over the place —

RANC: Opossums.

GAZETTE: —and now their predators. What does this say about natural resilience?

RANC: One of the reasons why the jackal is a very interesting case study is that it's another example of the large-scale, indirect impact of humans that is characteristic of the Anthropocene.

We focus a lot on our direct impact on the distribution and abundance of certain species, but we're also changing interactions between species. Jackals are interacting with animals that they never have before. Although they evolved in relatively warm climates, human-induced changes have allowed them to spread into the Estonian boreal forest. We've made jackals interact with moose. What were the odds that a species coming from the Middle East would interact with moose? We are changing their course of evolution.

GAZETTE: And its habits make it able to adapt to a human-influenced landscape.

RANC: That's right. We're going to drastically change the composition of the animal and plant communities because we are posing new evolutionary forces that are going to select a new set of winners and losers.

Not that things were ever stable before. It was dynamic. But now it's extremely dynamic and changing extremely fast. And it's pervasive.

Those niches that we might empty when we remove species will probably get filled by other things. If there is space, some species will likely take advantage of it. In the case of jackals, they are scavenging and probably filling the role of vultures, which were extirpated of many areas in Europe in the past few centuries. This could be an example of ecological resilience. But this resilience may hide large-scale simplification and homogenization of species assemblages.

GAZETTE: When you think about the broader concept of mesopredator release, are there other parts of the world where we've seen similar things? What about the decline of tigers?

RANC: I'm less familiar with this ecological system, but a study suggested that Asiatic wild dogs may be displaced by tigers and hence benefit from their decline. Mesopredator release has been documented in a wide range of terrestrial and marine systems. Classic examples include the release of coyotes with the absence of wolves in North America, of red fox after the persecution of dingoes in Australia, and the control of sea otters by killer whales in Alaska and bottlenose dolphins by tiger sharks, etc.

In the case of coyotes, their expansion may have been reinforced by the conversion of natural forests. At the moment, the species is expanding southward. Many coyote experts feel that they are going to take over the South American continent as well.

GAZETTE: So are we looking at a future where what we think of as "wild" nature exists mainly in preserves and remote places where humans aren't, then a second ecological system, dominated by humans, that looks like what we're talking about: human-altered landscape with a suite of animals, like jackals, that for one reason or another have accommodated human change?

RANC: I would argue that's already happening. An entire suite of species struggle to survive in human-dominated landscapes. Their last strongholds are often remote, protected areas. On the other hand, another set of species thrives at our contact. If you go to the suburban area around Boston, which species are there? Who are the winners? House sparrows, common grackles, brown-headed cowbirds, raccoons,

skunks, opossums. Some species may not have initially been able to take advantage of human settlements, but this may change as regulations and people's attitudes toward wildlife evolve.

For example, we're talking about the fisher coming into suburban landscapes. Fishers used to be associated with the remote Adirondacks but now downtown Albany, N.Y., has one of the highest densities ever reported.

Fundamentally, this is determined by the way humans interact with nature. Human density, how wastes are managed, how resources are used, the scale and intensity of agriculture and the regulations surrounding wildlife management will all influence the suite of species that can live in our immediate surroundings.

Because of human persecution, wolves were largely restricted to large, unfragmented forests in Europe during the past centuries. This has changed dramatically since the implementation of strict laws on hunting and management. We now know of a pack of wolves reproducing at the edge of Rome. There are wolves living in the agricultural plains of Spain, that reproduce in grain fields. We have wolves that have established a pack along the Po River in Italy, in places that are so agricultural that I would have doubted any large mammal could make it.

We can already see that wolves are showing a very high degree of plasticity.

GAZETTE: And is that one of the characteristics that humans—consciously or not—are selecting for?

RANC: Humans favor those species that can adapt to the rapid changes occurring in the Anthropocene—and unfortunately species like tigers do

not belong to that list. Leopards, on the other hand, manage to live in Mumbai, India. So in similar context, two closely related species may meet a very different fate.

In some cases, it really does come down to social acceptance. For example, grizzly bears thrive in very diverse landscapes, but I doubt people will ever tolerate them in their backyards. So there is not only the ecological and evolutionary constraints on [species](#), we set a strong filter on what we think is tolerable.

This story is published courtesy of the [Harvard Gazette](#), Harvard University's official newspaper. For additional university news, visit [Harvard.edu](#).

Provided by Harvard University

Citation: Why jackals thrive where humans dominate (2019, April 30) retrieved 6 May 2024 from <https://phys.org/news/2019-04-jackals-humans-dominate.html>

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