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Whole-genome analyses show that pigs have a long history of hooking up with wild boar.

## The taming of the pig took some wild turns

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By [Elizabeth Pennisi \(/author/elizabeth-pennisi\)](#) | 31 August 2015 11:00 am | [1 Comment \(/archaeology/2015/08/taming-pig-took-some-wild-turns#disqus\\_thread\)](#)

The next time you slice into a juicy pork chop or chow down on some sausage, see whether you can pick up the taste of wild boar. Farmers may have domesticated pigs 9000 years ago, but genome studies now show that in those early centuries, trysts with wild animals were quite common, particularly in Europe. In fact, they were so common that genes from the founding stock have all but disappeared. The new work not only sheds light on where pigs come from, but it also speaks to how complex the process of domestication is compared with what we thought it was.

The results “challenge the assumptions of 100 years of research,” says Fiona Marshall, an anthropologist at Washington University in St. Louis in Missouri, who was not involved with the work.

In the 19th century, evolutionary biologist Charles Darwin pointed out that breeding led to striking differences between farm animals and plants and their wild counterparts, an observation that helped lay the foundation for his theory of evolution. Based on that thinking, researchers imagined that about 9000 years ago, humans corralled a few wild boars and —by separating them from their fellows and breeding them for favorable traits like tameness, size, and meatiness —they developed the domesticated oinkers that we see all over the world today.

But the story is not quite that simple. For one, archaeological evidence now indicates that pigs were domesticated at least twice, once in China’s Mekong valley and once in Anatolia, the region in modern-day Turkey between the Black, Mediterranean, and Aegean seas. For another, a 2007 study of genetic material from 323 modern and 221 ancient pigs from western Eurasia suggests that [pigs first came to Europe from the Near East](http://news.sciencemag.org/2007/09/swine-envy-neolithic) (<http://news.sciencemag.org/2007/09/swine-envy-neolithic>), but that Europeans subsequently domesticated local wild boar, which seemed to replace those original pigs.

Eager to get the record straight, Laurent Frantz, now a bioinformaticist at the University of Oxford in the United Kingdom, carried out sophisticated computer analyses of 103 whole genomes sequenced from wild boars and domesticated pig breeds from all over Europe and Asia. His adviser at the time, animal genomicist Martien Groenen of Wageningen University and Research Centre in the Netherlands, had sequenced these genomes and had gathered additional, albeit less complete, genetic data from 600 other wild and domesticated pigs as part of another study.

[Domesticated animals have a large number of wild ancestors](http://nature.com/articles/doi:10.1038/ng.3394) (<http://nature.com/articles/doi:10.1038/ng.3394>), Frantz, Groenen, and their colleagues report online today in *Nature Genetics*. Their data support the idea that pigs originated in two places. But Europe’s modern pigs are mongrel mixes derived from multiple wild boar populations. Some of their genetic material does not match any wild boar DNA collected by the researchers, so they think that at

least some ancestors came from either an extinct group or from another group in central Eurasia. This anomaly suggests that pigs were herded from place to place, where they mated with this “ghost” population. Moreover, at one point—most likely in the 1800s, when Europeans imported Chinese pigs to improve their commercial breeds—a little Asian pig blood entered the mix.

The effort is quite impressive, says Carles Vila, an evolutionary biologist at the Spanish National Research Council’s Doñana Biological Station in Seville, Spain. “[It] uses this large amount of data to evaluate competing hypotheses and obtains very clear results.”

Those results are “part of the emerging story about long-term gene flow between domesticated and wild animals,” explains Greger Larson, a co-author and evolutionary biologist at Oxford. “We see this massive mosaic, with gene flow between east and west and between wild and domesticated.”

There have been hints before at this kind of interbreeding in dogs and [in horses](http://news.sciencemag.org/plants-animals/2012/05/whence-domestic-horse) (<http://news.sciencemag.org/plants-animals/2012/05/whence-domestic-horse>). But this work really drives home that, contrary to what researchers had long assumed, domesticated animals often mated with wild counterparts. And what happened in pigs—and possibly dogs and horses—may have happened in other animals, Vila says. Recent [work in barley](http://www.genomebiology.com/2015/16/1/176) (<http://www.genomebiology.com/2015/16/1/176>) indicates that some crops have a similar history. “The separation between domestic and wild lineages is not always clear,” Vila notes.

Researchers have assumed that so much interbreeding should have caused boars and pigs to look more alike than they do. But apparently by always selecting animals that looked like pigs and not boars, these early farmers were able to enhance and maintain piglike behavior and traits. This selection likely created “islands of domestication,” sets of genes that were passed on in the pigs despite interbreeding, the researchers suggest. There are even a few islands—those that contain genes involved in behavior and size, key traits for domesticated animals—that are in the genomes of both European and Asian pigs, Larson reports. The idea of “islands” provides a “basal genetic model for understanding domestication that could be tested in other species,” says Ludovic Antoine Alexandre Orlando, an evolutionary geneticist at the University of

Copenhagen, who was not involved with the work.

[Similar islands are thought to enable new species to form](#)

(<http://www.sciencemag.org/content/345/6197/611.summary?sid=284a5ff4-da0a-4b0c-8b4f-bacc5b8c2995>).

"We need to be looking at these special islands and how they are established and maintained," says Alan Cooper, a molecular evolutionist at the University of Adelaide in Australia who was not part of the study. And Larson and his colleagues are doing just that by sequencing genomes of ancient pigs and boars to better pick out the islands and figure out when they first appeared.

Marshall looks forward to these and other efforts. "We have to completely rethink domestication processes," she points out. "Genomics provides very exciting tools with which to do this."

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Have you ever tried meat from a cross between wild boar and pig? The meat is tender like pig but has that special taste from the wild boar. It's delicious. There's even a farm in Belgium that specialises in that meat (lookup "Sanglochon")

It used to happen often in the past, when pigs were taken to the wood to feast on acorns. If a wild boar saw a sow that it liked... I guess this study confirms it.

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