

Geneticists aren't the only ones brawling. In 2009, paleontologist Mietje Germonpré reported finding an unusual skull in the archives of her museum, the Royal Belgian Institute of Natural Sciences in Brussels. Though the scientist who had originally unearthed the skull from Goyet Cave in southern Belgium pegged it as a wolf cranium, Germonpré's measurements indicated that it belonged to a dog. Radiocarbon dating revealed that the skull was 32,000 years old—so much older than other ancient dog remains known at the time that it could have finally stamped a time and place on canine beginnings.

Critics chomped, calling Germonpré's analysis "premature" and "misleading." They said the specimen, like some other ancient putative dog skulls, could merely be a strange-looking wolf. Germonpré responded that the creature may have been an early dog that didn't give rise to today's canines—a primitive attempt at domestication that hit a dead end. "It's a very combative field," she sighs. "More than any other subject in prehistory."

ENTER GREGER LARSON and Keith Dobney. The two had met in the early 1990s in Turkmenistan, where Dobney and a large group of other British archaeologists were excavating an early farming village. Larson—fresh out of college in California—showed up unannounced, wearing a baseball cap and loafers. The archaeologists, in their floppy hats and scruffy trousers, "thought he was just another preppy American," Dobney says. Yet Larson quickly impressed the scientists, asking a volley of incisive questions about their work. "It was a bit irritating, but his enthusiasm was infectious," Dobney says. Within a few days, Larson was shotgunning beers with his new pals.

The two began working together a few years later when Larson was a Ph.D. student at the University of Oxford and Dobney was back at the University of Aberdeen, both in the United Kingdom. Both were interested in the domestication of the pig—an animal that, like the dog, had played a crucial role in early human history but whose origins were murky. Their initial work, based on modern DNA, suggested that humans had independently domesticated wild boar in several locations. But when they combined ancient DNA with a relatively new technique known as geometric morphometrics—which involves taking thousands of measurements of bones to see how their shapes differ between individuals—they discovered that a long history of trading and interbreeding had created the impression of numerous domestication events when there were likely only one or two.



A gray wolf.

How the wolf became the dog By David Grimm

Scientists who study canine origins seem to fight about everything: where dogs arose, when this happened, and even the best way to find these answers. But there's one thing most of them agree on: *how* dogs became domesticated. Still, it's taken almost a century to get here, and the details are still emerging.

In 1907, the English scientist Francis Galton suggested that dogs first entered our lives when our ancestors nabbed some wolf pups, brought them back to camp, and raised them as pets. If you've ever seen a baby wolf, with its big eyes and oversized ears, the idea doesn't seem so far-fetched—and, indeed, Galton's hypothesis reigned for decades. But scientists eventually realized that domestication is a long, messy process that can take hundreds or even thousands of years. These early humans may have started with a cute pup, but they would have ended up with a wild animal.

So what did happen? Most experts now think dogs domesticated themselves. Early humans left piles of discarded carcasses at the edges of their campsites—a veritable feast, the thinking goes, for wolves that dared get close to people. Those wolves survived longer and produced more pups—a process that, generation by generation, yielded ever-bolder animals, until finally a wolf was eating out of a person's hand. Once our ancestors realized the utility of these animals, they initiated a second, more active phase of domestication, breeding early canines to be better hunters, herders, and guardians.

A massive collaboration that's trying to figure out where and when dogs emerged (see main story, p. 274) has found some intriguing insights into the second phase of dog domestication. A comparison of thousands of ancient dog and wolf skeletons, for example, has revealed flattening of the dorsal tips of ancient dog vertebrae, suggesting that the animals hauled heavy packs on their backs. The team has also spotted missing pairs of molars near the rear of the jaw in ancient dogs, which may indicate that the animals wore some sort of bridle to pull carts. These services, in addition to dogs' hunting prowess, may have proved critical for human survival, potentially allowing modern humans to outcompete our Neandertal rivals and even eventually settle down and become farmers.

Now, a study on page 333 helps explain how man and dog took the next step to become best friends. Takefumi Kikusui, an animal behaviorist at Azabu University in Sagamihara, Japan, and his colleagues have found that when dogs and humans gaze into each other's eyes, both experience a rise in oxytocin—a hormone that has been linked to trust and maternal bonding. The same rise in oxytocin occurs when human mothers and infants stare at each other, suggesting that early dogs may have hijacked this response to better bond with their new human family.

The oxytocin study and the skeletal data from the new collaboration go beyond clarifying the origin of the family pet, says collaboration leader Greger Larson, an evolutionary biologist at the University of Oxford in the United Kingdom. "The more that we know about the process of how dogs became associated with people, the more we learn about the origins of civilization." ■