

## Background[[edit](#)]

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[Charles Darwin](#) described how the process of domestication can involve both unconscious and methodical elements. Routine human interactions with animals and plants create [selection](#) pressures that cause [adaptation](#) as species adjust to human presence, use or cultivation. Deliberate [selective breeding](#) has also been used to create desired changes, often after initial domestication. These two forces, unconscious [natural selection](#) and methodical selective breeding, may have both played roles in the processes of domestication throughout history.<sup>[3]</sup> Both have been described from man's perspective as processes of [artificial selection](#).<sup>[citation needed]</sup>

The domestication of [wheat](#) provides an example. Wild wheat falls to the ground to reseed itself when ripe, but domesticated wheat stays on the stem for easier harvesting. There is evidence that this critical change came about as a result of a random mutation near the beginning of wheat's [cultivation](#). Wheat with this mutation was harvested and became the seed for the next crop. Therefore, without realizing, early farmers selected for this mutation, which would otherwise have died out. The result is domesticated wheat, which relies on farmers for its own reproduction and dissemination.<sup>[4]</sup>

Mutation is not the only way in which natural and artificial selection operate. Darwin describes how natural variations in individual plants and animals also support the selection of new traits. It is speculated that tamer than average [wolves](#), less wary of humans, selected themselves as [domestic dogs](#) over many generations. These wolves were able to thrive by following humans to scavenge for food near camp fires and garbage dumps. Eventually a [symbiotic](#) relationship developed between people and these [proto-dogs](#). The dogs fed on human food scraps, and humans found that dogs could warn them of approaching dangers, help with hunting, act as pets, provide warmth, or supplement their food supply. As this relationship progressed, humans eventually began to keep these [self-tamed wolves](#) and breed from them the types of dogs that we have today.

In recent times, selective breeding may best explain how continuing processes of domestication often work. Some of the best-known evidence of the power of selective breeding comes from an experiment by Russian scientist, [Dmitri K. Belyaev](#), in the 1950s. His team spent many years breeding the [Silver Fox](#) (*Vulpes vulpes*) and selecting only those individuals that showed the least fear of humans. Eventually, Belyaev's team selected only those that showed the most positive response to humans. He ended up with a population of grey-coloured foxes whose behavior and appearance was significantly changed. They no longer showed any fear of humans and often wagged their tails and licked their human caretakers to show affection. These foxes had floppy ears, smaller skulls, rolled tails and other traits commonly found in dogs.<sup>[5]</sup>

Despite the success of this experiment, it appears that selective breeding cannot always achieve domestication. Attempts to domesticate many kinds of wild animals have been unsuccessful. The [zebra](#) is one example. Despite the fact that four species of zebra can interbreed with and are part of the same [genus](#) as the horse and the donkey, attempts at domestication have failed.<sup>[6]</sup> Factors such as temperament, social structure and ability to breed in captivity play a role in determining whether a species can be successfully domesticated.<sup>[3]</sup> In human history to date, only a few species of large animal have been domesticated. In approximate order of their earliest domestication these are: dog, sheep, goat, pig, ox, yak,<sup>[7]</sup> reindeer,<sup>[8]</sup> water buffalo, horse, donkey, llama, alpaca, Bactrian camel and Arabian camel.<sup>[9]</sup>

## Plants[[edit](#)]

See also: [Cultigen](#) and [Horticulture](#)

The earliest human attempts at plant domestication occurred in South-Western Asia. There is early evidence for conscious cultivation and trait selection of plants by pre-Neolithic groups in Syria: grains of [rye](#) with domestic traits have been recovered from [Epi-Palaeolithic](#) (c. 11,050 BC) contexts at [Abu Hureyra](#) in [Syria](#),<sup>[12]</sup> but this appears to be a localised phenomenon resulting from cultivation of stands of wild rye, rather than a definitive step towards domestication.<sup>[citation needed]</sup>

By 10,000 BC the [bottle gourd](#) (*Lagenaria siceraria*) plant, used as a container before the advent of [ceramic](#) technology, appears to have been domesticated. The domesticated bottle gourd reached the Americas from Asia by 8000 BC, most likely due to the migration of peoples from Asia to America.<sup>[13]</sup>

Cereal crops were first domesticated around 9000 BC in the [Fertile Crescent](#) in the [Middle East](#). The first domesticated crops were generally annuals with large seeds or fruits. These included [pulses](#) such as [peas](#) and grains such as [wheat](#).<sup>[citation needed]</sup>

The Middle East was especially suited to these species; the dry-summer climate was conducive to the evolution of large-seeded annual plants, and the variety of elevations led to a great variety of species. As domestication took place humans began to move from a [hunter-gatherer](#) society to a settled agricultural society. This change would eventually lead, some 4000 to 5000 years later, to the first city states and eventually the rise of [civilization](#) itself.<sup>[citation needed]</sup>

Continued domestication was gradual, a process of trial and error that occurred intermittently. Over time perennials and small trees began to be domesticated including [apples](#) and [olives](#). Some plants were not domesticated until recently such as the [macadamia nut](#) and the [pecan](#).<sup>[citation needed]</sup>

In other parts of the world very different species were domesticated. In the [Americas](#) [squash](#), [maize](#), [beans](#), and perhaps [manioc](#) (also known as [cassava](#)) formed the core of the diet. In East Asia [millet](#), [rice](#), and [soy](#) were the most important crops. Some areas of the world such as [Southern Africa](#), [Australia](#), [California](#) and [southern South America](#) never saw local species domesticated.<sup>[citation needed]</sup>

Over the millennia many domesticated species have become utterly unlike their natural ancestors. [Maize ears](#) are now dozens of times the size of those of wild [teosinte](#). A similar change occurred between [wild strawberries](#) and [domesticated strawberries](#).<sup>[citation needed]</sup>

Domesticated plant species often differ from their wild relatives in predictable ways. These differences are called the domestication syndrome, and include.<sup>[14]</sup>

- Higher germination rates
- More predictable & synchronous germination
- Increased size of reproductive organs
- A tendency for ripe seeds to stay on the plant, rather than breaking off and falling to the ground
- Reduced physical and chemical defences
- Change in biomass allocation (more in fruits, roots, or stems, depending on human needs).