

HOW HAVE WE CHANGED SINCE OUR SPECIES FIRST APPEARED?

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Source: (<http://australianmuseum.net.au/how-have-we-changed-since-our-species-first-appeared>)

Human evolution did not stop when our own species appeared.

Physical and genetic changes have occurred within our species and will continue to occur at a basic level as new genes evolve. However, these changes may not be as dramatic as they were in the past as the situation today does not favour (sic) the evolution of a new human species.

Overview

We have undergone change since our species first evolved. Some changes were universal whereas others were more regional in effect. The changes apparent in worldwide populations include a decrease in both overall body size and brain size as well as a reduction in jaw and tooth proportions. Regional populations have also evolved different physical and genetic characteristics in response to varying climates and lifestyles.

Smaller bodies

We are now generally shorter, lighter and smaller boned than our ancestors were 100,000 years ago. The decrease has been gradual but has been most noticeable in the last 10,000 years. However, there has been some slight reversal to this trend in the last few centuries as the average height has started to increase.

The factors that affect body size are complex. They involve interactions between genetics, environment and lifestyle practices such as diet and technology.

Average height of Homo sapiens over the last 40,000 years

This information is based on the average heights of European males because better statistics exist for this population, but the general trend is worldwide.

- 40,000 years ago: European males – 183 cm (6 feet). Cro-Magnon people were the first modern humans (*Homo sapiens*) to inhabit Europe. These hunter-gatherers lived a physically demanding lifestyle that would have required greater body strength than the average human today. Their recent African ancestry may have also affected their height, as tall, long-limbed builds are useful adaptations to the warmer African climate.
- 10,000 years ago: European males – 162.5cm (5 ft 4 inches). A dramatic reduction in the size of humans occurred at this time. Many scientists think that this reduction was influenced by global climatic change and the adoption of agriculture. Agricultural communities suffered from malnutrition as a result of failed crops and a more restricted diet. Furthermore, a close association with domestic livestock introduced new diseases into human populations.
- 600 years ago: European males – 165 cm (5 ft 5 inches). Poor diet and health were the main causes for the shorter stature at this time.
- Today: European males – 175 cm (5ft 9 inches). There has been an increase in height over the last few hundred years. In part, this increase is due to improved diet and health care. There may also be a genetic link as industrial expansion and urbanisation has brought together genetically isolated people and reduced the impacts of inbreeding due to a greater mixing of populations and their genes.

Smaller brains

For the last two million years there has been a trend toward a bigger brain that has affected many species in our family tree. This trend has seen a reversal in our own species and our brains are now the smallest they have been at any time in the past 100,000 years. Most of this decrease occurred in the last 6,000 years. In part, this is related to a decrease in body size that also occurred during this period, however, other factors are probably also involved.

Our brains now average about 100-150 cubic centimetres less than when our species first appeared.

- 100,000 years ago: average brain size: 1500cc
- 12,000 years ago: average brain size: 1450cc
- Today: average brain size: 1350cc

Smaller teeth and jaws

The trend toward smaller jaws and teeth that was seen in our ancestors has continued in our own species. In fact, some people today do not have enough space in their jaws to fit their 3rd molars or wisdom teeth.

Overall, these changes have occurred in proportion with a decrease in body size. However, over the last 10,000 years dietary changes and technology have played a major role.

A decrease in size has occurred in the jaws and teeth of *Homo sapiens* over the last 30,000 years. However, there has been a very slight reversal in this trend in the last century as teeth have increased in size. This is partly related to the introduction of fluoride, which thickens dental enamel, so making teeth a little larger.

Developing physical diversity: All one species but looking different

Humans today show an enormous diversity in appearance, however this diversity was not apparent in early *Homo sapiens*. Early members of our species lived in Africa and had evolved physical characteristics that were similar to each other in order to survive in that climate. When humans started to spread to different parts of the world about 100,000 years ago, they encountered a variety of different climatic conditions and evolved new physical adaptations more suitable to those new climates.

Recent DNA studies (since 2007) confirm that genetic traits have changed or adapted to new environments during this time. In fact, the rate of change of DNA, and thus the rate of evolution, has accelerated in the last 40,000 years. Areas of the human genome still seem to be undergoing selection for things such as disease and skin colour.

Physical characteristics such as skin and eye colour, hair type and colour and body shape are determined by genetics, but can also be influenced by the environment. Over long periods of time, the environment will act on the genes to develop particular characteristics within a population.

All one species – how climate affects physical characteristics

- Body builds: Short, stocky builds are typical of humans living in cold climates. The reduced surface area compared to weight allows more body heat to be retained. A thin, long-limbed build is typical of humans in hot regions. The larger skin surface compared to weight allows for body heat to be lost more easily.
- Skin colour: Lighter skin allows the penetration of the sun's UV rays. These rays help the body to synthesise vitamin D. Darker skin protects the body from absorbing too many UV rays. This can cause cancer or destroy important vitamins and minerals.

- Noses: People living in hot, humid climates tend to have broad, flat noses that allow inhaled air to be moistened and the moisture in exhaled air to be retained. People living in hot, dry climates typically have narrowed, projecting noses. This type of nose reduces the amount of water that is lost from the lungs during breathing. People living in cold, dry climates generally have smaller, longer and narrower noses. This type of nose moistens and warms the incoming air.
- Hair: Tight, curly hair keeps the hair off the neck and exposes more areas of the scalp than straight hair. This helps with cooling and evaporation of sweat. Straight hair is common in people living in colder climates as it keeps the neck and head warm. Straight hair also allows cold moisture to run off the scalp more easily.
- Face shape: Eskimos have adapted to extreme cold by retaining layers of fat on their faces for additional warmth. Populations in northern Asia and the Arctic tend to have broad, flat faces as these reduce the effects of frostbite.
- Mouth shape: Thick lips have a larger surface area to help evaporate moisture and cool the body. The larger surface also allows cooling by moistening of the lips.
- Eyes: The epicanthic fold common among Northern and Eastern Asian populations is an adaptation for protecting the eye from the hard driving snow typical in these regions, and also to reduce snow glare. Blue eyes are better adapted for vision in regions where there is reduced light, as they let in more light than darker coloured eyes.
- Additional: Australian Aborigines of the Central Desert have an unusual physical adaptation to living in a climate where it can be freezing for short periods, such as during cold desert nights. They have evolved the ability to drop their bodies to low temperatures without triggering the usual reflex of shivering.