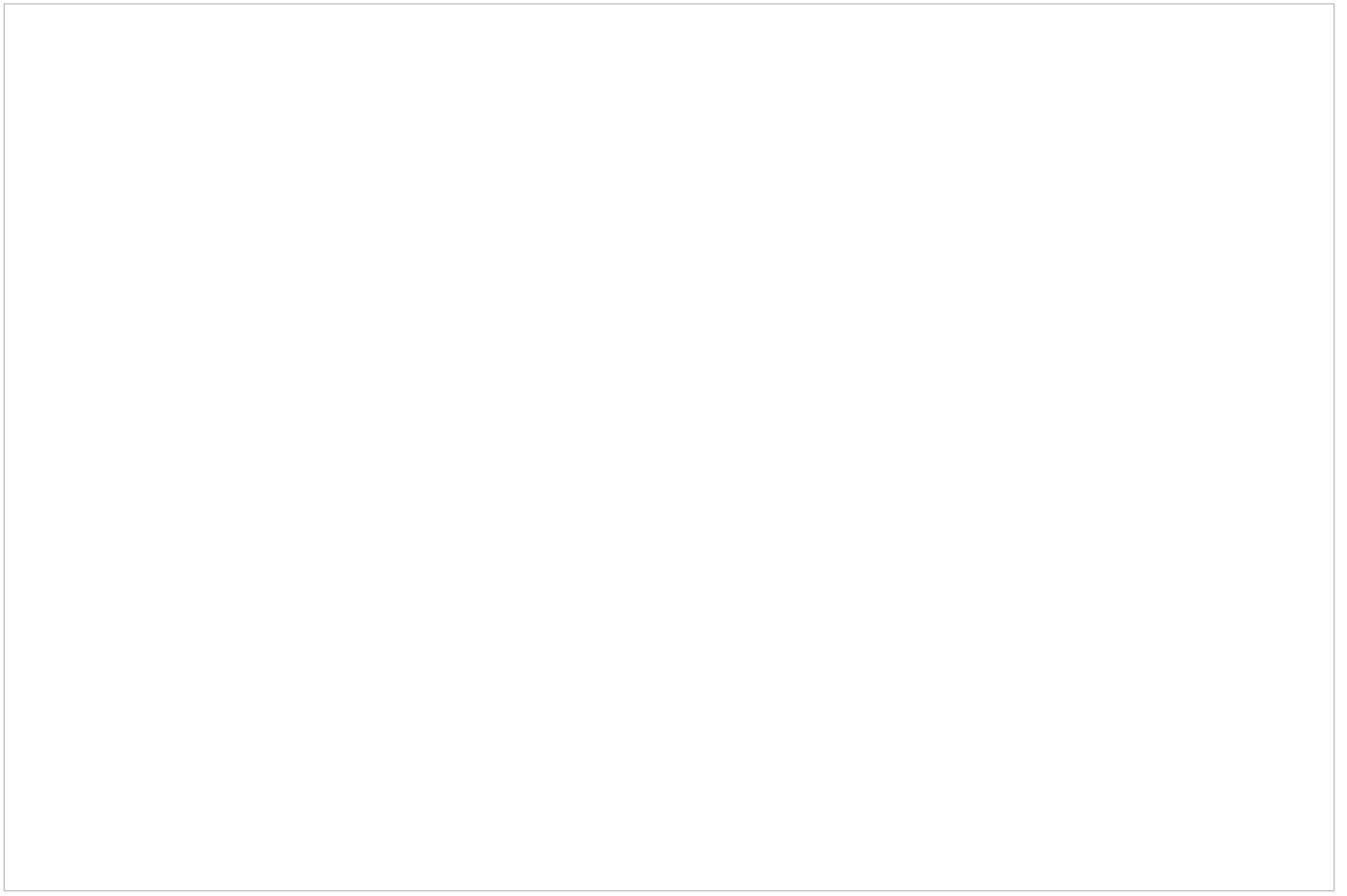
Curly hair may have evolved to protect early humans from the sun

In the first study to look at the evolution of hair types, researchers found tightly coiled hair provides a trade-off of shielding the head from the sun while minimising unwanted insulating



Hair type has previously been studied by researchers in fields such as cosmetics and forensics, but not from an evolutionary perspective

Mireya Acierto/Getty Images

Hair that is tightly coiled offers the best protection against the sun's potentially damaging rays, which could explain why this trait evolved in early humans in Africa and straighter hair emerged as some humans moved into cooler areas.

It has long been suggested that the reason our body hair became so fine that it is sometimes barely visible, while our scalp hair remained thick, is to prevent our heads from overheating in the sun. In our bipedal ancestors, the beneficial shading effect of head hair may have outweighed its insulating effect.

Tina Lasisi at Penn State University wondered if the type of hair on a person's head also makes a difference.

To learn more, Lasisi and her colleagues put three different wigs on a thermal manikin – a model of the human body with heaters and sensors that is used to measure the thermal effects of clothes.

All the wigs were made of human hair from people of Chinese descent. One wig was straight, one had moderate curls and one had tight curls. Lasisi says the tightly coiled wig was within the range of curl found in people of recent African ancestry.

In tests in a climate-controlled wind tunnel, the team found

that the hair's type made a big difference to how much heat the head of the manikin gained from simulated sunshine at 30°C (86°F).

The head with a straight wig gained less than half as much heat as a control head with no wig. The head wearing the moderately curled wig gained around a quarter as much heat and the head with the tightly curled wig gained less than a tenth as much as the no-wig control.

The researchers think that curls reduce how much heat reaches the skin by increasing the gap between it and the hair surface. Making straight hair longer doesn't achieve this because it flops over and lies flat, says Lasisi.

What's more, curlier hair appears to maximise the shielding effect from the sun while minimising an unwanted insulating effect. "It has this incredible way of bypassing this trade-off," says Lasisi.

Read more:

Who is Ancestor X? The biggest mystery in human evolution

The results also show that all the tested hair types reduce the cooling effect of sweating. When wetting the manikins to simulate sweat, the head with no wig lost twice as much heat via evaporation as those with the wigs.

However, having any head hair more than halves the amount of sweat that is required to prevent the head from gaining heat, with tightly coiled hair reducing this more than moderately curled or straight hair, the results show. Hair, particularly if tightly coiled, therefore lowers the amount of sweat that is required on the scalp to balance the sun's heat.

"Any mechanism that could help cool the body, and at the same time save precious water, would definitely have been acted on strongly by natural selection," says Joseph Graves at North Carolina Agricultural & Technical State University.

When some humans left Africa and moved into cooler climes, the selective pressure for tightly coiled hair would have been lost, says Lasisi, allowing variations to emerge from generation to generation by random chance, but the trait may have re-evolved in some peoples.

The study's findings are important because they could help change some people's prejudiced views, says Graves, who is the co-author of *Racism, Not Race*. Research into the physical traits of the first humans can help to erode racist ideas, he says.

The first humans would have had black skin and tightly curled hair, says Graves. It was only relatively recently that other skin colours and hair types appeared, he says. Biologists have begun to study the evolution of skin colour,

but this is the first study to look at hair type in an evolutionary context.

"This is indeed a first-of-its-kind study," says Gill Westgate at the University of Bradford, UK. "It is fascinating that curly hair protected against incident solar thermal effects, which would have been important in the development of bipedal hominins."

According to Lasisi, many aspects of the manikins used in the study don't match human physiology. Much more work needs to be done to understand the effects of hair type and how significant a factor it was during our evolution, she says.

Hair type has previously been studied by researchers in fields such as cosmetics and forensics, but not from an evolutionary perspective, which is probably a reflection of that field's history, says Lasisi.

"When it comes to anthropology, it has this history that's tightly woven with colonialism and racism," she says. "What kind of Victorian gentleman would have thought that a trait he did not possess could be critical to human evolution?"

Reference: bioRxiv