

## Tekst 4

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### Is climate shaping human evolution?

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- 1 AS THE climate changes and the world warms, will humans evolve to handle the effects? Maybe, if the Yoruba people of West Africa's response to living in arid conditions is anything to go by. Whether there is enough time to adapt is another matter.
- 2 The Yoruba have been exposed, historically, to the dry conditions of the Sahel on the edge of the Sahara desert. To find out whether they had evolved to cope, Andres Moreno at Stanford University in California and colleagues looked at the variation of a gene known to be involved in water retention in the kidney, called *FOX11*, in DNA samples from 20 Europeans, 20 East Asians and 20 Yoruba. The team found that 85 per cent of the Yoruba had an identical sequence of genetic information that was longer than it would have been if it was produced by random recombination and genetic shuffling. Instead, they suggest that it had been naturally selected.
- 3 The length of the genetic signature suggests that the change occurred in the last 10,000 to 20,000 years, which could have coincided with the initial stages of the desertification of the Sahara. They also analysed a region of the gene in 971 samples from 39 human populations around the world, including the Yoruba, and found that the same genetic sequence was found at higher frequencies in lower latitudes. Since lower latitudes are more likely to be regions of water-stress, this suggests that the selection pressure was climate-related, says Moreno. However, Steve Jones, a geneticist at University College London, points out that the evidence is only indirect, since we don't know whether the genetic variance in the Yoruba people actually boosts their survival.
- 4 Nonetheless, if Moreno's explanation is correct, the study opens up a new question: can humans evolve to adapt to climate change? "Over the long term, if the Earth keeps warming, I would not be surprised to see genetic shifts," says anthropological geneticist Anne Stone at Arizona State University in Tempe.
- 5 Predicting what a human of the future will look like is difficult, however, as there will be competing selection pressures. Take body shape. Stephen Stearns, an evolutionary biologist at Yale University, has suggested that because shorter, heavier women tend to have more children, who inherit these traits, we can expect the average woman to be shorter and heavier by 2049. But Stone predicts that because species in hot environments evolve body shapes that radiate heat better, climate change will cause humans to grow taller and slimmer. "It's likely we'll find a sweet spot where we're able to cope with higher temperatures, but still carry enough fat to be reproductively successful," she says.
- 6 Evolution is a slow process, however, so any adaptation would not save us from the imminent problems associated with global warming. "We're not going to evolve our way out of trouble," says Jones. "The answer lies in our skulls, not our testicles."

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- 1p 10 Which of the following becomes clear from paragraphs 1-3?
- A The correlation between Yoruba gene variation and their survival in dry areas ultimately lacks sufficient proof.
  - B The *FOX11* gene variation is found solely in Yoruba people and therefore crucial to research.
  - C The Yoruba example conclusively demonstrates that man is able to adapt to rising global temperatures.

“Evolution is a slow process, however, so any adaptation would not save us from the imminent problems associated with global warming.”  
(paragraph 6)

- 1p 11 In which paragraph has this notion been mentioned before?
- A paragraph 1
  - B paragraph 2
  - C paragraph 3
  - D paragraph 4
  - E paragraph 5

“The answer lies in our skulls” (alinea 6)

- 1p 12 Leg in je eigen woorden uit hoe wij volgens Steve Jones de oplossing uiteindelijk moeten bereiken.