

UNIT 10

TEACHING THIS
INVESTIGATION

Framing problem/ question	Are humans still evolving?	
Why do historians, scientists, and others care about this question?	Some people argue that our technological advances have put humans beyond the reach of natural selection and, as a consequence, we have stopped evolving. Indeed, human innovations have allowed us to radically modify our environments, while medical treatments, advanced agricultural practices, and economic structures have significantly reduced natural challenges to human reproduction and survival. Geneticist Steve Jones is the leading and most outspoken proponent of the claim that humans have reached the end of evolution. However, most other scientists disagree. They argue that humans still face challenges to survival and reproduction, just not the same ones that we did 20,000 years ago. They say there is evidence that humans are continually evolving, such as disease-causing genetic mutations increasing in our genetic pool.	
Why should teachers and students of big history care about this question?	As students think about the future of humans and the planet, humans' biological evolution is an interesting factor to consider. Continuing human evolution could have implications for our ability to fight disease, for our brain function, and for our appearance and behavior. This investigation allows students to explore their curiosities about the future of the human species, and might help teachers identify misconceptions students continue to harbor about evolution. It also allows students to see how debates over scientific questions like this play out in the media.	
What texts are in the Investigation Library?	Secondary Sources	<ul style="list-style-type: none"> • Human evolution over the last 200,000 years • Geneticist Steve Jones argues humans are no longer evolving • Paleoanthropologist Chris Stringer argues human evolution continues • Evidence of natural selection in Framingham, Massachusetts
What is the students' project or prewriting task?	Students should use the provided chart to summarize opposing claims and the claim testers used to support each claim. Outside research is encouraged. They will use this chart to write their own persuasive speech or debate script.	
What is the students' writing task?	Students should write a one-page persuasive speech to argue a position for or against the claim that humans are still evolving. We recommend assigning one position to half the class, and the other position to the other half. Their persuasive speech should include an engaging introduction, a brief background on the issue, a position statement with supporting evidence, and a closing statement summarizing the main points. They should assume their audience knows very little about the topic. Students can then deliver their speeches individually or you can select one student from each side to role-play in a mock <i>Nightline</i> -style "Face-Off" debate. If you choose the latter option, students in the audience can role-play as news analysts who have to write a brief commentary on the debate afterward.	

Analysis of texts in this investigation

Text Name	Lexile Measure ¹	Common Core Stretch Grade Band ²	Mean Sentence Length	Flesch Ease ³
Introduction	1180	6–8	18.06	54.1
Steps in the Investigation	970	4–5	14.53	59.2
TEXT 01 Human evolution over the last 200,000 years	1100	6–8	15	33.6
TEXT 02 Jones argues humans are no longer evolving	1120	6–8	17.29	51.6
TEXT 03 Stringer argues human evolution continues	950	4–5	13.04	53.9
TEXT 04 Evidence of natural selection in Framingham, Massachusetts	1330	9–10	20.9	37.1

¹ Lexile measure indicates the reading demand of the text in terms of its semantic difficulty and syntactic complexity. The Lexile scale generally ranges from 200L to 1700L. The Common Core emphasizes the role of text complexity in evaluating student readiness for college and careers.

² We are using the Common Core “stretch” grade bands. The Common Core Standards advocate a “staircase” of increasing text complexity so that students “stretch” to read a certain proportion of texts from the next higher text complexity band.

³ In the Flesch Reading Ease test, higher scores indicate that the material is relatively easy to read while lower scores indicate greater difficulty. Scores in the 50–70 range should be easily understood by 13- to 15-year-olds, while those in the 0–30 range are appropriate for university graduates.

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INVESTIGATION

Are humans still evolving?

What do you think humans will look like and act like 100,000 years from now? Do you think we'll be significantly different? Or do you think we'll be exactly the same? Are humans still evolving?

Some people argue that humans have stopped evolving. They argue that human beings are beyond the reach of natural selection because of technological advances that have allowed us to modify our environments, to protect ourselves from fatal diseases, and to grow enough food to support a huge and growing population. Geneticist Steve Jones is the leading and most outspoken proponent of the claim that humans have reached the end of evolution.

However, many scientists disagree. They argue that humans still face challenges to survival and reproduction, just not the same ones that we did 20,000 years ago. They say there is evidence that humans are continually evolving, such as disease-causing genetic mutations increasing in our genetic pool.

What do you think?

This investigation presents two different sides to this debate, which has been played out in the science sections of newspapers and in magazine articles over the last several years. You will look at a sampling of these articles so that you can familiarize yourself with the opposing claims and the specific claim testers that are being used to convince people that a particular claim is the right one. We have provided a chart to help you track and compare the opposing claims. At the end of the investigation you will try to persuade an audience to agree with one claim or the other, using as many claim testers as you can to convince your audience.

THE STEPS IN THIS INVESTIGATION

Are humans still evolving?

EXPLORE	<p>Begin by gathering your initial <i>conjectures</i> — your best guesses — about whether or not humans are still evolving.</p> <ul style="list-style-type: none">• What do you think humans will look like and act like 100,000 years from now? Do you think we'll be significantly different? Or do you think we'll be exactly the same?• Are humans still evolving? Why or why not?
RESEARCH	<p>Read the materials in the Investigation Library to learn about two sides of the debate over this question. Keep in mind that there are lots of scientists who have addressed this question but these texts represent a debate between scientists who have recently been featured in newspapers and magazines. Depending on the time allotted for this activity, you may want to do some independent research to learn more about scientists' viewpoints on the topic.</p>
SHOW YOUR THINKING	<p>Use the chart provided to record as many details as you can about the opposing claims. What claim testers are people using to support each opposing claim? How are intuition, logic, and authority being used? What specific evidence are people providing?</p> <p>Be prepared to take a stand on the issue, using relevant points and claim testers to support the position you're arguing. Your teacher may have you present your position in either a persuasive speech or in a mock news program debate. In either case, use as many claim testers as you can to try to convince your audience. Be sure to appeal to people's intuition, and to use logic, authority, and evidence.</p>

Are humans still evolving?

OPPOSING CLAIMS:

Viewpoint 1: Humans have stopped evolving.		Viewpoint 2: Humans are still evolving.	
Provide specific examples (cite the reason and/or source)	Which claim testers apply? (check all that apply)	Provide specific examples (cite the reason and/or source)	Which claim testers apply? (check all that apply)
	Intuition <input type="radio"/> Logic <input type="radio"/> Authority <input type="radio"/> Evidence <input type="radio"/>		Intuition <input type="radio"/> Logic <input type="radio"/> Authority <input type="radio"/> Evidence <input type="radio"/>
	Intuition <input type="radio"/> Logic <input type="radio"/> Authority <input type="radio"/> Evidence <input type="radio"/>		Intuition <input type="radio"/> Logic <input type="radio"/> Authority <input type="radio"/> Evidence <input type="radio"/>
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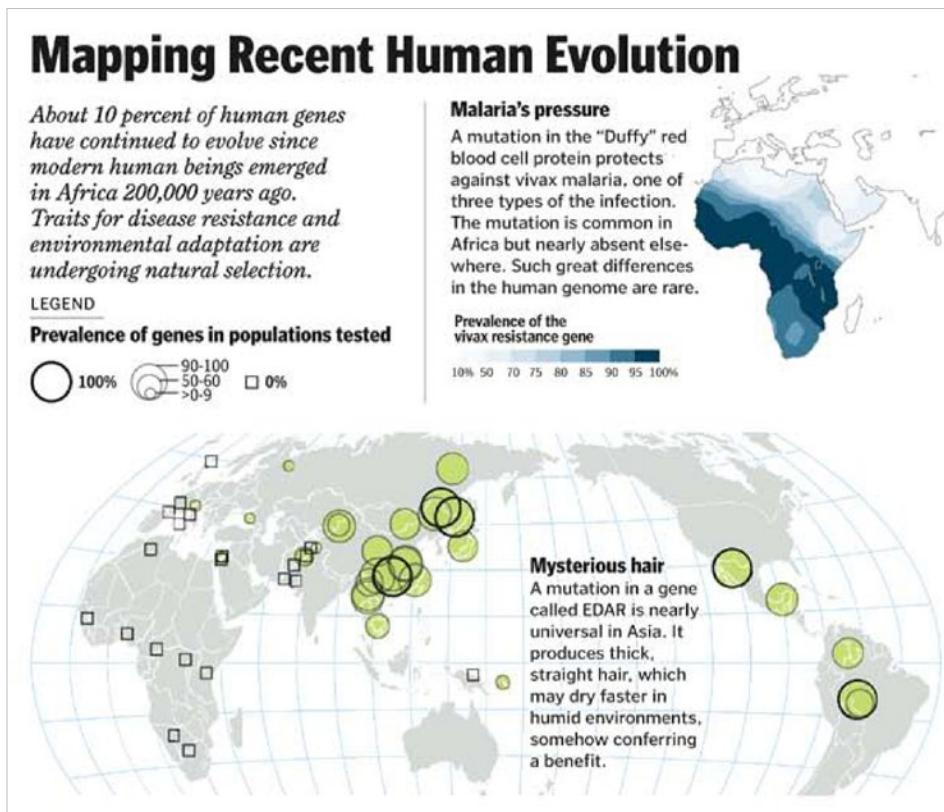
INVESTIGATION LIBRARY

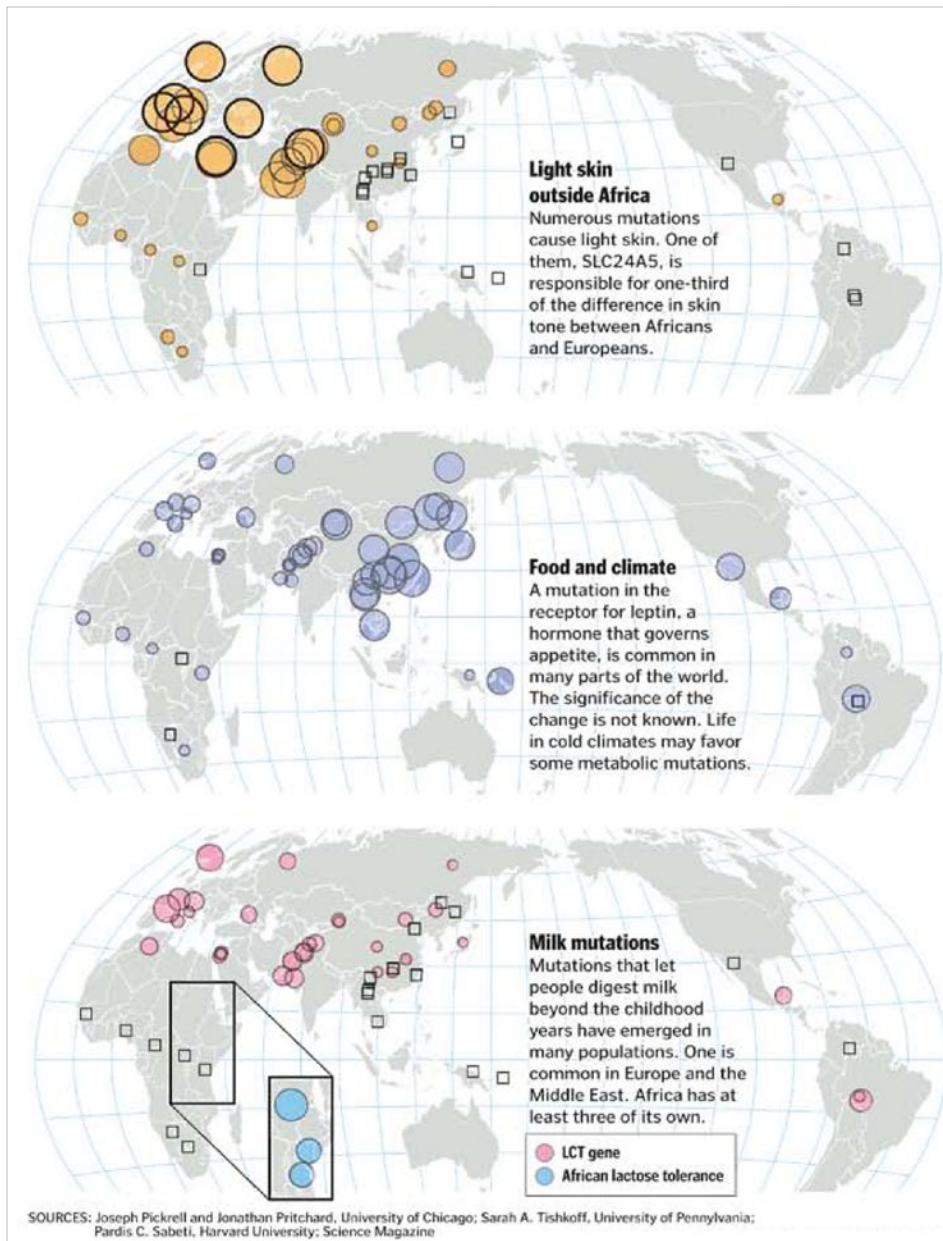
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TEXT 01

HUMAN EVOLUTION OVER THE LAST 200,000 YEARS

This image shows recorded gene mutations that have occurred in the last 200,000 years. It indicates the percentage of people within tested populations throughout the world who carry the mutation.





Source

Originally published in David Brown, "Going Where Darwin Feared to Tread: Scientists Begin to Decode the History of Human Evolution," *Washington Post*, February 12, 2009. Retrieved from <http://nie.washingtonpost.com/sites/default/files/OntheBrink.pdf>.

TEXT 02

GENETICIST STEVE JONES ARGUES HUMANS ARE NO LONGER EVOLVING

Steve Jones is a geneticist who agrees that humans have evolved over the last 200,000 years but thinks we are no longer evolving in the modern era. Jones is a geneticist at Galton Laboratory of the University College London. He has also written popular books on scientific issues, including *Genetics for Beginners* and *The Language of Genes*. Jones believes that cultural and technological changes in the modern world have led to the end of human evolution. In the following excerpts from a 2008 lecture, Jones gives his three main arguments for why he thinks human evolution is over.

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In ancient times half our children would have died by the age of 20. Now, in the Western world, 98 percent of them are surviving to the age of 21. Our life expectancy is now so good that eliminating all accidents and infectious diseases would only raise it by a further two years. Natural selection no longer has death as a handy tool.

Mutation, too, is slowing down. Yes, there are chemicals and radioactive pollution — but one of the most important mutagens, or agents of genetic mutation, is old men. For a 29-year-old father (the mean age of reproduction in the West) there are around 300 divisions between the sperm that made him and the one he passes on — each one with an opportunity to make mistakes. For a 50-year-old father, the figure is well over a thousand. A drop in the number of older fathers will thus have a major effect on the rate of mutation. Perhaps surprisingly, the age of reproduction has gone down — the mean age of male reproduction means that most conceive no children after the age of 35. Fewer older fathers means that if anything, mutation is going down.

Randomness is the third important ingredient in evolution. Humans are 10,000 times more common than we should be, according to the rules of the animal kingdom, and we have agriculture to thank for that. Without farming, the world population would probably have reached half a million by now. Small populations which are isolated can change — evolve — at random as genes are accidentally lost. Worldwide, all populations are becoming connected and the opportunity for random change is dwindling.

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Source

Modified from University College London, “Human Evolution Is Over, Says UCL Academic,” UCL Media Relations, October 7, 2008. Retrieved from <http://www.ucl.ac.uk/media/library/humanevolution>.

TEXT 03

PALEOANTHROPOLOGIST CHRIS STRINGER ARGUES EVOLUTION CONTINUES

Chris Stringer is a paleoanthropologist at the Natural History Museum in London. He is one of the leading proponents of the recent theories that humans originated in Africa 200,000 years ago. Stringer has authored several publications on human evolution, including the 2012 book *Lone Survivors: How We Came to Be the Only Humans on Earth*. These excerpts are from a 2012 interview with the *New York Times*.

There's a lot of data, mainly by geneticists, that have showed just how many genetic changes there have been in the last few thousand years in the human genome. And this is because we've undergone great changes with urbanization, with agriculture, very big changes in lifestyles. And this has influenced our genetic makeup as much as living in the Paleolithic had done. We've seen, if anything, an acceleration of genetic changes in humans due to these lifestyle changes. So, I think human evolution has been going on quite rapidly recently, and it's going to carry on.

Not everyone agrees. My colleague in London, Steve Jones, has argued essentially that evolution has stopped in humans because we are in control of it. We have medical care. Nearly everyone reaches reproductive age. Everyone has enough food and water. So natural selection has been nullified in humans. I disagree with him because, of course, there are still a lot of people in the world who don't have the best medical care, who don't have enough food and water. Think of the impact of AIDS in Africa.

So selection is still operating on many human populations just as much as it ever has done, really. Also, all of us probably have 50 mutations in our DNA compared with our parents. So that's going on every generation as well. We are still evolving. We will continue to evolve.

Source

Modified from John Noble Wilford, "A Bone Here, a Bead There: On the Trail of Human Origins," *New York Times*, July 16, 2012. Retrieved from <http://www.nytimes.com/2012/07/17/science/chris-stringer-on-the-origins-and-rise-of-modern-humans.html?pagewanted=all>.

TEXT 04

EVIDENCE OF NATURAL SELECTION IN FRAMINGHAM, MASSACHUSETTS

This excerpt is from a 2009 *Time* magazine article. It reports on a study of women and their offspring from the community of Framingham, Massachusetts. The scientists reporting on this study claim it provides evidence that women's fertility rates are driving evolution. Steve Jones responds at the end of the text.

A team of scientists led by Yale University evolutionary biologist Stephen Stearns suggests that if the natural selection of fitter traits is no longer driven by survival, perhaps it owes to differences in women's fertility. That is, women who have more children are more likely to pass on certain traits to their offspring.

Stearns's team examined the vital statistics of 2,238 women participating in the Framingham Heart Study. The study has tracked the medical histories of some 14,000 residents of Framingham, Mass., since 1948. Investigators searched for correlations between women's physical characteristics — including height, weight, blood pressure and cholesterol levels — and the number of offspring they produced. According to their findings, it was stout, slightly plump women who tended to have more children, as did women with lower blood pressure and cholesterol levels. Using a sophisticated statistical analysis, researchers determined that these characteristics were passed on genetically from mothers to daughters and granddaughters.

If these trends were to continue with no cultural changes in the town for the next 10 generations, by 2409, the average Framingham woman would be 2 cm (0.8 in.) shorter and 1 kg (2.2 lb.) heavier. She would have a healthier heart, have her first child five months earlier and enter menopause 10 months later than a woman today, the study found.

Steve Jones, an evolutionary biologist at University College London who has previously held that human evolution was nearing its end, says the Framingham study is an important example of how natural selection still operates through inherited differences in reproductive ability. But Jones argues that variation in female fertility — as measured in the Framingham study — is a much less important factor in human evolution than differences in male fertility. Sperm hold a much higher chance of carrying a mutation than an egg, especially among older men. "While it used to be that men had many children in older age to many different women, now men tend to have only a few children at a younger age with one wife. The drop in the number of older fathers has had a major effect on the rate of mutation and has at least reduced the amount of new diversity — the raw material of evolution. Darwin's machine has not stopped, but it surely has slowed greatly," Jones says.

Source

Modified from Eben Harrell, "Darwin Lives! Modern Humans Are Still Evolving," *Time*, October 23, 2009. Retrieved from <http://www.time.com/time/health/article/0,8599,1931757,00.html>.