

Are humans evolving?

Teacher resources contents page



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Hint:

If you print out pages 2 – 7 of this document double sided there will be one section per sheet of paper.



Are humans still evolving?

Aims and objectives



Introduction

Over the past 40,000 years humans have altered the way we live radically. With the development of agriculture, medicine and regulated societies we are no longer subject to the pressures of natural selection in the way we used to be, or are we?

In this activity students will consider: the difference between natural selection and evolution, whether natural selection is still an important evolutionary force and what is affecting our evolution now and what this might mean for our future.

Students will consider these questions using a mixture of structured group and class discussion.

All the resources required to run this activity are downloadable from the Question of Taste website, they include:

1. Teacher resources
 - Aims and objectives sheet (this sheet) – Includes an introduction to the resources, learning outcomes and curriculum links
 - Lesson plan – Instructions and advice on one way to use the resources
 - Background information – Includes some background information on the topic covered and links to further reading
2. Power point presentation – Can be used by teachers to introduce the topic and structure the lesson
3. Student resources
 - Statement cards – A selection of cards written to stimulate debate
 - Support and against cards

Learning Outcomes

Knowledge and understanding

- Students will be able to define evolution
- Students will be able to identify natural selection and explain its influence on human evolution
- Students will identify the key factors that are influencing human evolution now such as technology and medicine
- Students will identify how medicine, technology and genetic variation can influence natural selection and evolution
- Students will develop an understanding that the scientific community has varying views on the direction of future human evolution

Attitudes and values

- Students will develop empathy with their peers opinions through discussing the factors that influence human evolution

Enjoyment, inspiration and creativity

- Students will use their imagination to consider how we may appear in the future

Skills

- Students will develop speaking and listening skills through discussing issues
- Students will develop summarising skills when asked to feedback to the class
- Students will develop analytical skills in assessing evidence before them



National Curriculum links

AQA

Biology

3.2 The variety of living organisms

- 3.2.1 Living organisms vary and this variation is influenced by genetic and environmental factors

3.2 The variety of living organisms

- 3.2.3 Genetic diversity

General Studies

3.1 Thinking, analytical and communication skills

Critical Thinking

3.1 Critical thinking foundation unit

- 3.1.1d Dialogue

OCR

Biology

3.2 Molecules, biodiversity, food and health

- 2.3.3 Evolution

General Studies

3.4 Thinking and analytical skills

Edexcel

Biology

Unit 2 Development, Plants and the Environment

- 2.4 Biodiversity and natural resources

General Studies

Unit 1 Challenges for Society

- 1.3 How does science affect society?
- 1.5 Does science benefit society?

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Lesson plan



Introduction

In this activity students will consider: the difference between natural selection and evolution, whether natural selection is still an important evolutionary force and what is affecting our evolution now and what this might mean for our future.

Students will consider these questions using a mixture of structured group and class discussion.

Equipment list

- Presentation for teacher to introduce activity
- Blue statement cards with support and against cards (one set per group)
- Pens and post it notes to record ideas (one set per group)
- A3 paper to design annotated diagram on (one per group)
- Flip chart or white board

Instructions

Introduction (10 minutes)

- Introduce the topic via the presentation (notes are available on the presentation)
- The presentation can be used to introduce the topic, including a definition of evolution and natural selection
- The presentation also contains a quote from Geoffrey Miller and Steve Jones which introduces scientific controversy surrounding future human evolution
- Divide the class into groups of 5 or 6

Task One (15 minutes)

- Read out the question on slide 8 (Is natural selection still influencing human evolution?)
- Read out task one on slide 8
- Hand out the blue statement cards with one support and one against card (one set per group)
- Ask the students to place the support and against cards at either end of the table
- Ask the students to read the statement cards one at a time
- The students have to discuss and decide if each card suggests natural selection is still influencing human evolution or not
- Ask the students to decide and place the cards somewhere between support and against. The cards will represent a range and some statements will fall in between support and against
- To expand the activity provide the students with post it notes so they can include their own examples or ideas into the discussion
- Ask the students to decide whether they think natural selection is still influencing human evolution or not
- Ask each group to explain their decision to the class as a whole

Task Two (10 minutes)

- Read out the question on slide 9 (In your group identify the key factors that influence our present evolution)
- Ask the students in their groups to identify the key factors that influence human evolution at present
- Students can use the previous activity to develop their ideas of the key factors, for example, culture, medicine or genetic variation



- Each group will record their ideas down on post it notes
- One student from each group will stick their post it notes on a flip chart at the front of the class
- You can use the post it notes to discuss with the students and identify the key themes that influence human evolution
- The post it notes can be grouped into themes such as medicine and technology

Task three (10 minutes)

- Read out the question on slide 10 (decide in your groups the key future characteristics of humans)
- Ask the students to consider the future evolution of our species taking into consideration the present influencing factors
- Ask the students to work in pairs and imagine what future human beings will be like
- The students can list the future characteristics or they can design a diagram with annotated descriptions and explanations

Feedback (10 minutes)

- Ask each group to feedback if they think natural selection is still influencing human evolution or not
- Ask the students to explain what is influencing natural selection and human evolution
- Ask the students to describe their future evolutionary projection of humans
- Ask the students to give examples and justification for their explanations

Suggested questions

Below are a number of questions that you might find useful for facilitating/stimulating group discussion

- Is human evolution over or has it just changed?
- Are humans still influenced by natural selection?
- Are humans weakening our genome by reducing the survival pressures on us?
- Are humans influencing evolution or is evolution influencing us?
- How has culture influenced our sexual selection? What does this mean for our evolution?
- How might we take control of our evolution now we have the ability to test our genes for certain characteristics?

Extension activity

For an extension activity you could ask students to research one of the following questions and bring their own researched questions to the next class to aid discussion

- What will the future hold for human evolution?
- How will technology and medicine affect humans in the future?
- Will we become half human and half machine?
- Will we grow organ replacements so we can live longer?

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Background reading



Evolution and natural selection

It will be important to clarify for the students the difference between evolution and natural selection so they can bring an informed viewpoint to the debate.

What is evolution?

- Evolution is the change of a species over time. This change through random variation and natural selection has led to the diversity of life on Earth

What is natural selection?

- Natural selection is the process where heritable characteristics make an individual more likely to survive and reproduce
- An individual with unfavourable characteristics may not reproduce as successfully
- The accumulated effect of natural selection will lead to specific adaptations of a species to its environment
- Natural selection has been the main mechanism by which evolution has happened

Human evolution in the last 40,000 years

- In the last 40,000 years humans have changed their environment significantly which has influenced natural selection pressures
- This change has become more evident in the last few centuries with the development of medicine and technology
- In many areas of the world mechanisation changed us from an agricultural to an industrial society
- Advances in medicine have enabled many to survive sickness or ill health and reproduce

Current human evolution

Below are a number of factors that influence human evolution today, they have been grouped into themes.

Technology and medicine

- Technological and medical development has acted to minimise the dangers to humans and further reduce or change natural selection
- Medical and sanitation improvements have resulted in the majority of individuals surviving to reproductive age and reproducing successfully

Genetic technology

- The development of genetics has given humans the potential to implement our own selection with the ability to eliminate unfavourable genetic characteristics
- Individuals with known genetic conditions can select embryos with preferable genetic characteristics

Culture

- Our culture influences what we understand as a successful and attractive partner
- We choose our partners not only because of reproductive potential but due to social and cultural norms



Migration

- Technology has enabled humans to reproduce with people across the world

Agriculture

- The development of agriculture increased food production, enabling diversification and development of technology
- Agriculture and cattle herding changed our diet and influenced our evolution
- Agriculture enabled humans to settle and build cities with large populations

Example of evolutionary pressure created by human culture

- 10,000 years ago adult humans in Europe could not drink milk after weaning
- This is because the lactase gene was switched off in adults
- The lactase enzyme breaks down the lactose sugar in milk
- 70% of the European population today can drink milk into adulthood. This is due to a variation in the lactase gene which enables lactase production
- This variation appeared around the same time humans began domesticating cattle for food and resources about 5,000 to 10,000 years ago
- The ability to drink milk would have represented a strong selective advantage and lactose intolerance would have been detrimental to survival and reproduction

Scientific controversy

- The future of human evolution is very difficult to predict with a complex array of variables which influence the outcome
- Scientific opinion is divided over the direction human evolution will take
- Steve Jones has suggested human evolution is over because natural selection has little relevance to humans at present
- Other points of view are more ethical in their direction. Steve Pinker would prefer to believe that human evolution stopped 50,000 to 100,000 years ago before human races diverged. Steve Pinker suggests this would ensure ethnic groups are biologically equivalent across the world

Further reading

- Are we still evolving? 2006, By Kate Douglas. New Scientist
www.newscientist.com/article/mg18925421.300-are-we-still-evolving.html
- Are human beings still evolving? Gresham College Lecture. Speaker Professor Christopher Dye.
<http://www.gresham.ac.uk/event.asp?PageId=45&EventId=853>
- Are humans still evolving? 2006, By Giles Newton and Penny Bailey. Wellcome Trust
http://genome.wellcome.ac.uk/doc_WTX034686.html
- Humans are still evolving - and it's happening faster than ever. 2007, By Ian Sample. The Guardian Newspaper
<http://www.guardian.co.uk/science/2007/dec/11/evolution>
- Humans are still evolving but technology will speed the process. 2009, By Professor Christopher Dye. The Independent Newspaper
<http://www.independent.co.uk/opinion/commentators/professor-christopher-dye-humans-are-still-evolving-but-technology-will-speed-the-process-1665259.html>
- Leading geneticist Steve Jones says human evolution is over
<http://www.timesonline.co.uk/tol/news/uk/science/article4894696.ece>