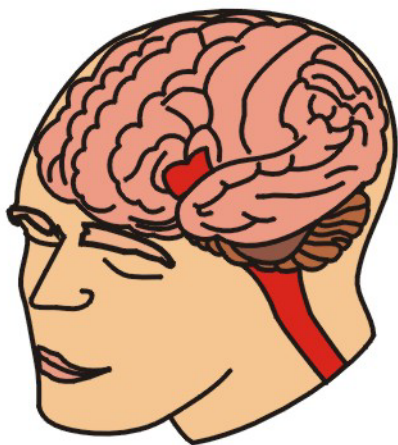


THE EVOLUTION OF THE BRAIN



#3460

OPEN-CAPTIONED
SCIENCE SCREEN REPORT
1996
Grade Levels: 9-12
14 minutes

DESCRIPTION

The complexity, capacity, and power of the human brain set us apart from other animals. Humans don't have the largest brains, but do have the greatest brain size relative to body size. Traces the evolution of the brain from Homo habilis to Homo sapiens. Discusses its composition and the function of the cerebral cortex.

ACADEMIC STANDARDS

Subject Area: Science

- Standard: Knows about the diversity and unity that characterize life
 - Benchmark: Knows how organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships (e.g., shared derived characteristics inherited from a common ancestor; degree of kinship estimated from the similarity of DNA sequences) (See Instructional Goals #1, #2, and #3)
 - Benchmark: Knows how variation of organisms within a species increases the chance of survival of the species, and how the great diversity of species on Earth increases the chance of survival of life in the event of major global changes (See Instructional Goal #2)

INSTRUCTIONAL GOALS

1. To describe how the neurons of early life cells evolved into a more complex network over millions of years.
2. To list examples of organisms that changed or evolved over time in order to survive.
3. To compare the size of the human brain to those of other mammals.
4. To explain what two factors influence brain development.

VOCABULARY

1. cerebral cortex
2. cerebrum
3. Homo habilis
4. Homo sapiens
5. neurons
6. stimulus
7. synapses

BEFORE SHOWING

1. Review the classification of animals from simple to complex.
2. Review the major parts of the brain, including the cerebellum, brain stem, cerebrum, and cerebral cortex; identify their chief functions.
3. Discuss the meaning of *organ*. Other organs have one major function but the brain is a multitask organ. List some of the brain's duties.
4. Draw a timeline depicting the beginning of life to the emergence of humans.

DURING SHOWING

Discussion Items and Questions

1. View the video more than once, with one showing uninterrupted.
2. Illustrate the evolution of the brain showing organisms as they appear in the video. Start with a group of neuron cells and progress to the next level of complexity.
3. Pause at the scene showing the amphibians.
 - a. Point out the appendages growing near the gills and discuss the reason for this.
 - b. Identify other change in body structure the amphibians underwent to adapt to life on land.
4. Pause at the sections showing Homo habilis, Homo erectus, and Homo sapiens. Compare the differences in their body structures.
5. Pause at the section showing the skyscraper and the ruler. Clarify the analogy.

AFTER SHOWING

Discussion Items and Questions

1. According to most scientists, where did animal life begin 550 million years ago?
2. What are *neurons*?
3. What was the primary function of the earliest forms of brains?
4. Which animals started migrating from the sea to land and adapted in order to survive?
5. Which animals evolved afterwards?
6. What development in the mammalian brain makes it different from that of other animals?
7. Compare the brain of Homo habilis with that of Homo sapiens. Determine what evidence shows what Homo habilis was capable of doing.
8. How much does the human brain weigh?
9. Does intelligence depend on the size of the brain?
10. Which part of the brain is the center for abstract ideas, language, and learning?
11. Upon what two factors does brain development depend?
12. How does the size of a baby's brain compare to the size of the rest of its body when it is born?
13. Why do children learn faster and easier than adults? What are examples of tasks at which children seem to be more skillful than adults?

Applications and Activities

1. Draw the human brain and label the parts that control emotions, speech, hearing, vision, balance, coordination, breathing, and heart rates.
2. Report on the largest and smallest brains of mammals.
3. Research brain sizes of other species and compare.
4. Visit a hospital to see how computerized axial tomography (CAT) and magnetic resonance imaging (MRI) work.
5. Report on famous people in history who grew up in poverty but later became highly educated individuals.
6. Research Homo habilis, Homo erectus, and early Homo sapiens. Draw a family tree from Homo habilis to present.
7. Divide the class into groups. Present each group with a picture of a skeleton from a different animal.
 - a. Use imagination to "flesh out" the bones in drawing, painting, or clay.
 - b. Reveal pictures of the animal belonging to each skeleton to see which group was the most accurate.
 - c. Discuss how paleontologists determine what a creature looked like from fossil remains.

8. Write an essay on what humans will look like in the future. Discuss the influence that science fiction has on this prediction.
9. Obtain a sheep brain from the local butcher. Study its structure and consistency. Compare to the human brain.
10. Measure a baby's height and the circumference of its head. Do the same with an adult. Compare the ratios.

RELATED RESOURCES

Captioned Media Program

- Human Brain, The (Second Edition) #2396
- Nervous System (Second Edition) #2575

World Wide Web

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid-safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- BRAIN POWER, IT'S ALL IN YOUR HEAD <http://www.pacsci.org/public/education/sow/bp/>

Contains lesson plans that give hands-on experience in learning about the brain.

- NEUROSCIENCE FOR KIDS <http://faculty.washington.edu/chudler/neurok.html>

Includes activities and experiments relating to the nervous system and the brain. Contains resource sheets such as brain facts and figures, brain metaphors, and brain quotes.

- MIND AND MACHINE MODULE <http://suhep.phy.syr.edu/courses/modules/MM/index.html>

Includes a section on the biology of the brain. Covers the history of the study of the brain, features of the brain, and illustrations of the anatomy of the brain.

- PROBE THE BRAIN <http://www.pbs.org/wgbh/aso/tryit/brain/>

Contains an interactive section in which the viewer moves a probe on the section of the brain that controls body movements to see which part of the body is affected. Requires downloading Macromedia Shockwave.